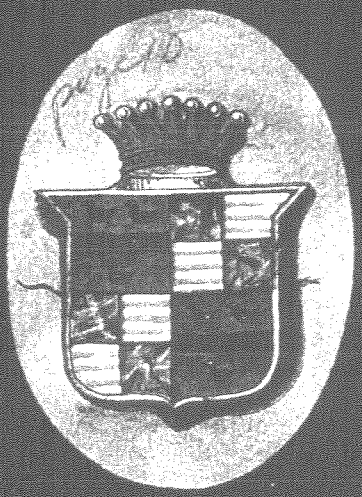
CADILLAC
Miscellaneous
General
1919- The Cadillac moto
car



LIBRARY REFERENCE COPY
NOT TO CIRCULATE

# The CADILLAC Motor Car

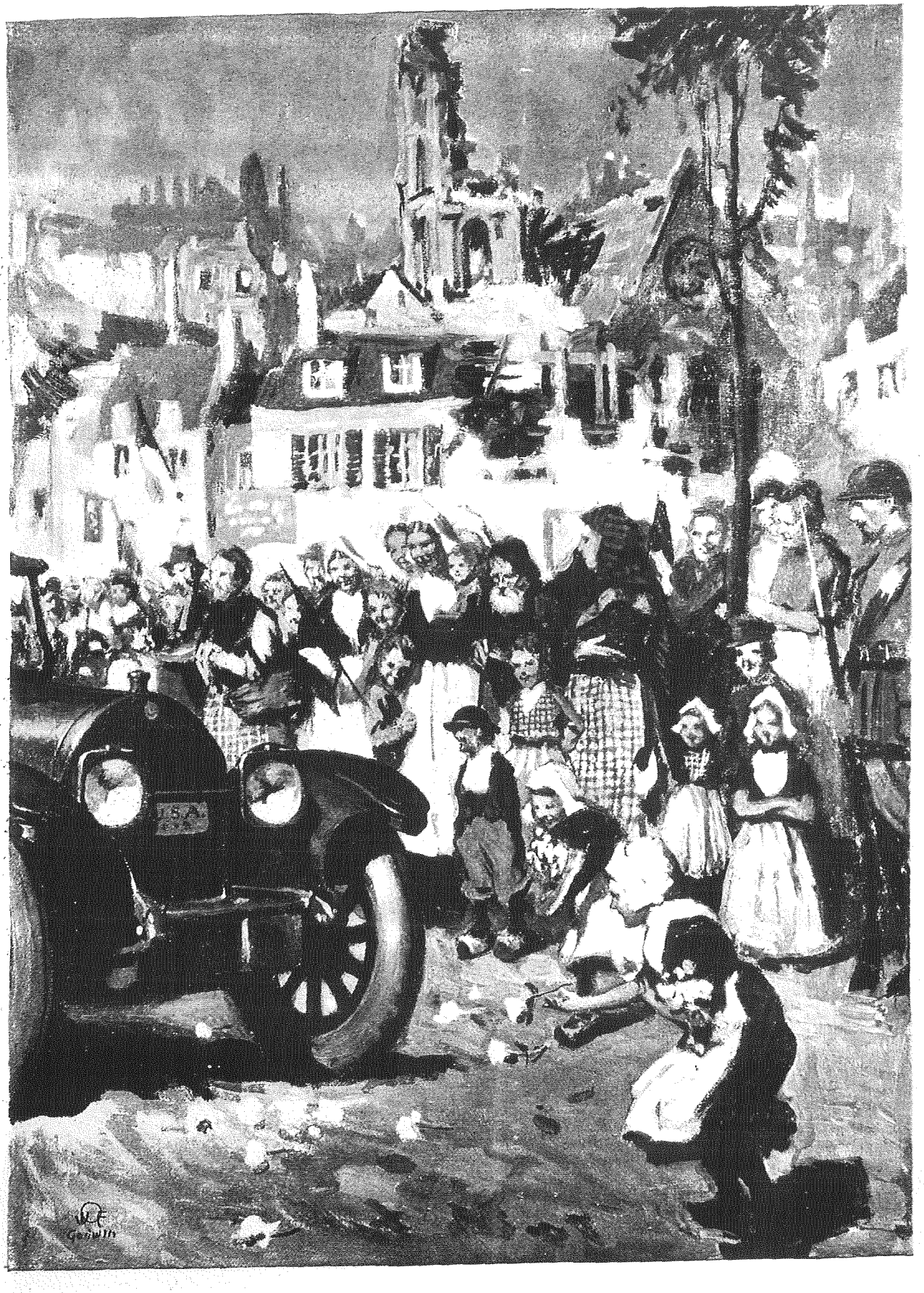
*An Illustrated Description of the Latest Open and Closed Models*



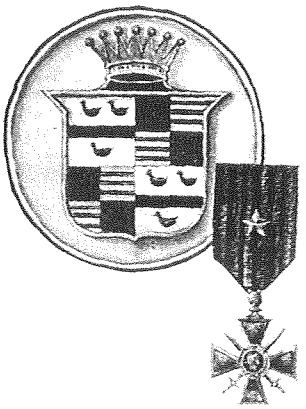
CADILLAC MOTOR CAR COMPANY

DETROIT, MICHIGAN

*Copyrighted 1919, Cadillac Motor Car Company*



*Peace brought the joy of playtime back to millions of children in France*



# *Cadillac's Eighteenth Year*

THE times invite a continuation of good things. They have weeded out the inefficient and uncertain. As it stands, the Cadillac car is a matured development of principles of automobile design and construction already proved sound. With this foundation the efforts of Cadillac designers have been in the direction of finishing touches and refinements.

For eighteen years Cadillac craftsmen have built an automobile which has been second only to an improved type of their own making. Each new year has brought a better understanding of what should be sought for in a good automobile. And each succeeding year has found Cadillac a more complete expression of motor car refinement, a more effective embodiment of motoring dependability and a more practical conception of motor car economy.

As the Standard Seven-Passenger Car of the United States Army, the present Cadillac has been subject to usage and put to tests which no automobile was ever meant to endure. The Army chose Cadillac on its reputation for dependable service with minimum care. Great things were expected of it. The manner in which the car lived up to these expectations has proved a great source of satisfaction to its makers and to Cadillac owners.

# DETAILS AND APPOINTMENTS

THE effort of Cadillac engineers to create a permanent, dependable mechanism in the Cadillac chassis is supplemented by the desire of Cadillac body builders to provide maximum motoring comfort and convenience. The earnest ambition of factory designers to incorporate every possible motoring convenience as a Cadillac feature has created rather than catered to the tastes of discriminating motorists.

It has been the thought of body engineers not only to include these comforts as standard Cadillac equipment, but so to incorporate them in the general design that, built-in rather than added on, they contribute character and dignity to the bearing of the whole car.

*Controls*

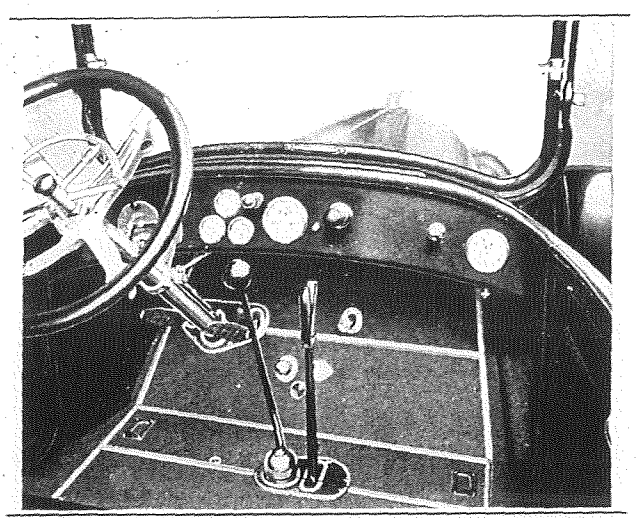
Convenience and comfort are amply prescribed in the arrangement of the driver's compartment. Everything is within easy reach. Steering wheel, gear shift lever, hand and foot brakes, clutch pedal and foot throttle are all designed and placed so that their manipulation easily becomes instinctive. There is thus an added certainty to every driving operation.

The large steering wheel fits conveniently into the driver's lap, though easily pushed out of the way for getting in or out. The ease with which the car is guided is one reason so many women are driving Cadillacs. Turning effort at the steering wheel, due very largely to anti-friction bearings and close workmanship in the steering system, requires little strength. Straightening up after a curve, the caster effect in the front spindles gives the front wheels a strong tendency to come back to center.

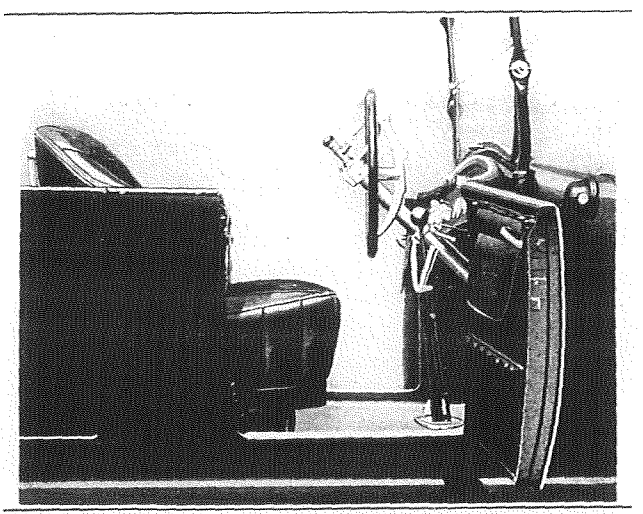
The electric horn button is at the top of the steering column in the center of the wheel. A touch from any angle brings instant response from the familiar Cadillac horn.

The gear change lever is long and close up, so that the hand falls naturally to grasp it. When occasionally it is necessary to shift gears, a minimum of effort is required and only a small movement of the lever. The smoothness of the clutch action is a surprise. It disengages with slight resistance. The braking effort is equalized between the wheels, reducing the chance of skidding, and the light pressure which brings the car to a stop is possible without the driver altering his position. The car decelerates smoothly, but with a satisfying firmness.

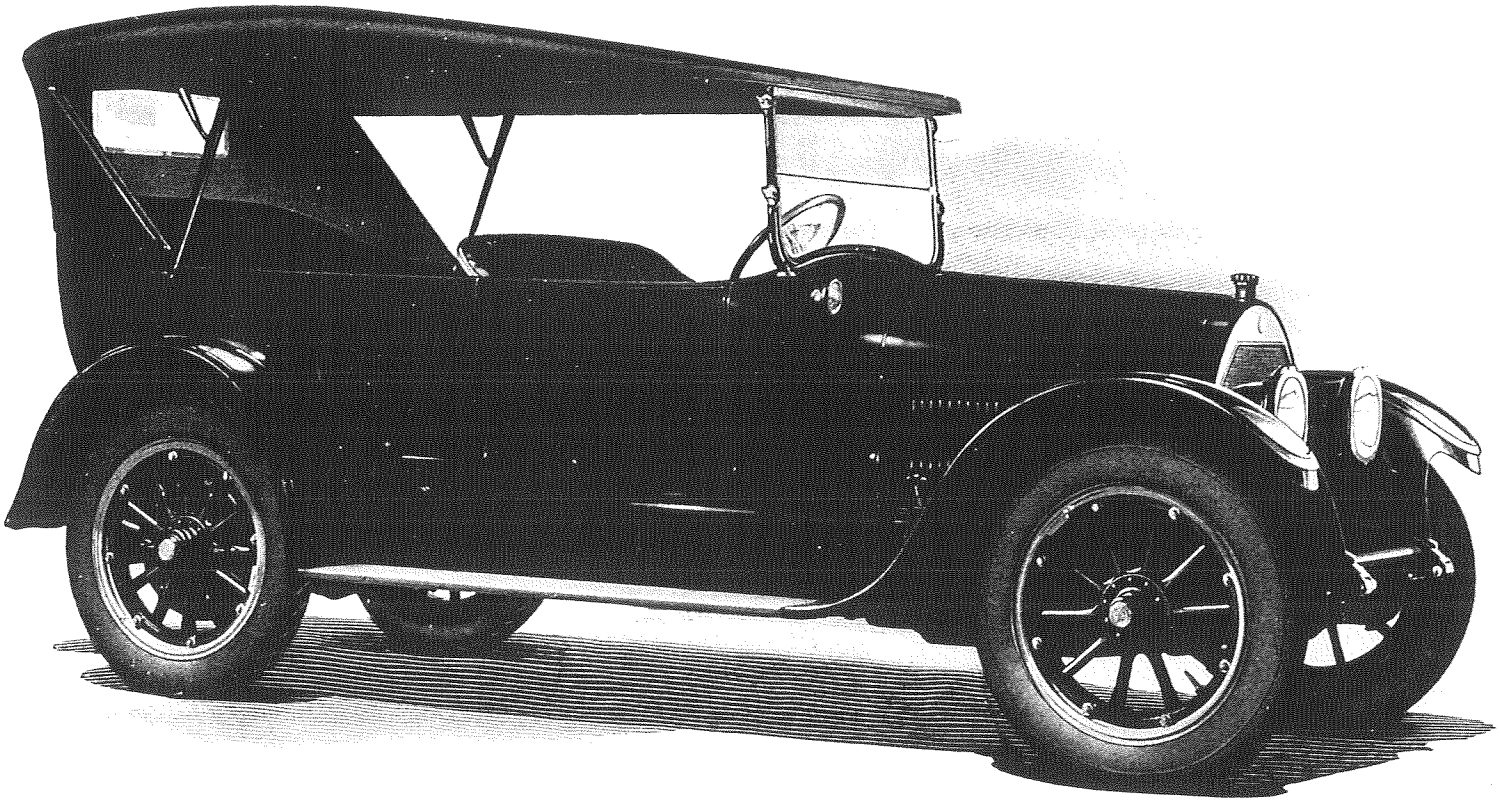
(Continued on page eight)



*Dash and driving controls are convenient to driver's hand and eye. Two dash lamps illuminate instruments on the cowl*



*Wide front doors and tilting steering wheel make even the driver's seat very accessible*



## THE CADILLAC SEVEN-PASSENGER TOURING CAR

THREE considerations are uppermost when the prosperous American family chooses an automobile. They must have a dependable car ready for any contingency. Both very young and very old must find it comfortable. Its appearance, withal, must completely satisfy the vanity of the most particular members of the household.

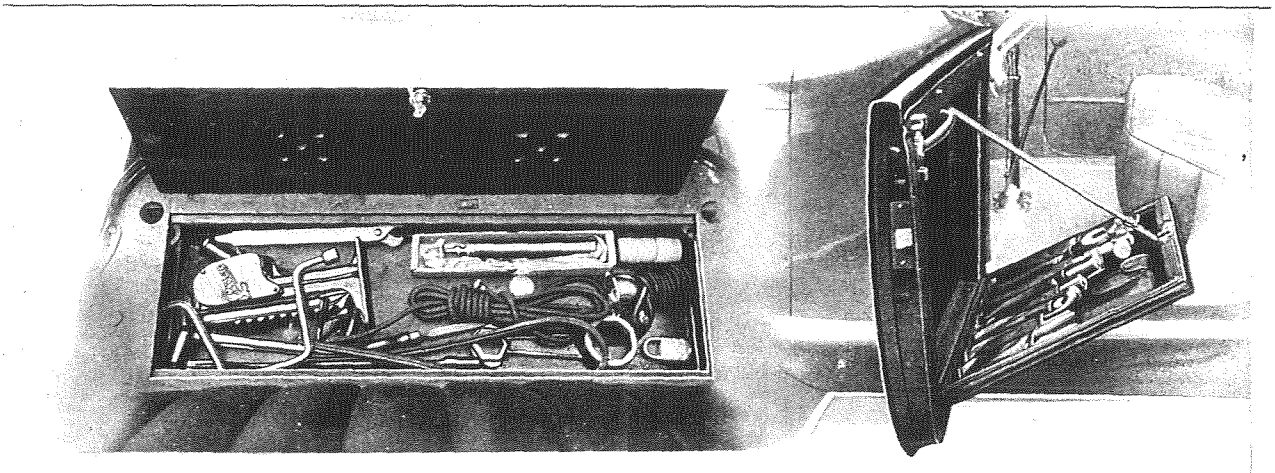
Infinite care in the close inspection of even minor operations is responsible for the reputation for reliability which the Cadillac chassis has earned everywhere.

Bodily comfort in the Seven-Passenger is wisely provided for in design and detail. The 125-inch wheelbase is long enough to include an amply roomy tonneau (knee room being sufficient for five in the rear, with extra seats in use.) Further, this length of wheelbase makes for added road comfort. Still, the turning radius is not so long as to be awkward in congested traffic or at crowded city corners.

The smooth and easy operation of gear shift, clutch and brake pedals, is another kind of comfort which especially appeals to women drivers.

The Seven-Passenger satisfies good taste in cleanness of lines and smooth lustre of finish. But Cadillac beauty lies deeper than this; it is everywhere—in the fineness of material in the full-lined top, the excellence of quality in the plaited leather upholstery, in fact in a fine discretion in the choice of materials throughout.

One feels that this Seven-Passenger is the physical embodiment of that old adage by which the quality ideal has long been expressed — "Whatever is worth doing is worth doing well."



*Full tool and tire change equipment is under lock and key*

[Continued from page six]

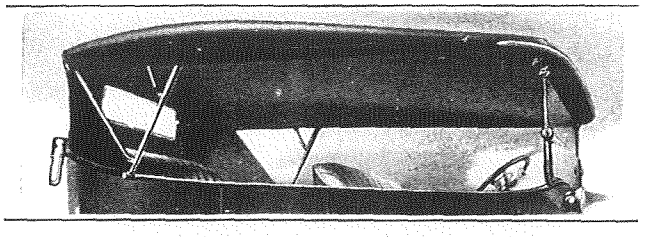
Travel is almost entirely in high gear under throttle control. The foot throttle is well under the right foot, and a rubber-topped foot rest beside it makes the control steady without muscular strain. Step on it, no matter how hard or quickly, and there is an immediate, unfaltering response, which the Cadillac owner has learned to expect.

The starting pedal is up and a little to the right of the accelerator on the sloping foot board. There is a readiness about the Cadillac engine which makes even starting in cold weather quick and quiet.

The instrument board is complete, though not confusing. To the left of the steering column is the switch, controlling all lights and ignition. Oil pressure, ammeter and gasoline pressure gauges are grouped with the speedometer under a lamp in the center of the dash. The eight-day Waltham clock with a red tell-tale spot for winding, is farther to the right, under a light of its own. The speedometer has a trip re-set. Both speedometer and clock are easily readable from the tonneau. The ignition switch key is universal, fitting tool compartments and tire padlock. An auxiliary air valve lever on the steering column below the wheel provides a rich mixture for difficult starting conditions.

A lever on the steering column controls the patent tilting headlamp reflectors which prevent glare, not by dimming the headlights, but by throwing their rays directly in front of the car, where they are most needed. This is a distinct advantage when rounding a curve or topping a hill.

Wide doors on all cars give unrestricted entrance to any seat. A tilting steering wheel makes even the driver's place very accessible from either side. A tonneau light in the rear curb doorway illuminates at night the threshold and running board of the touring car.

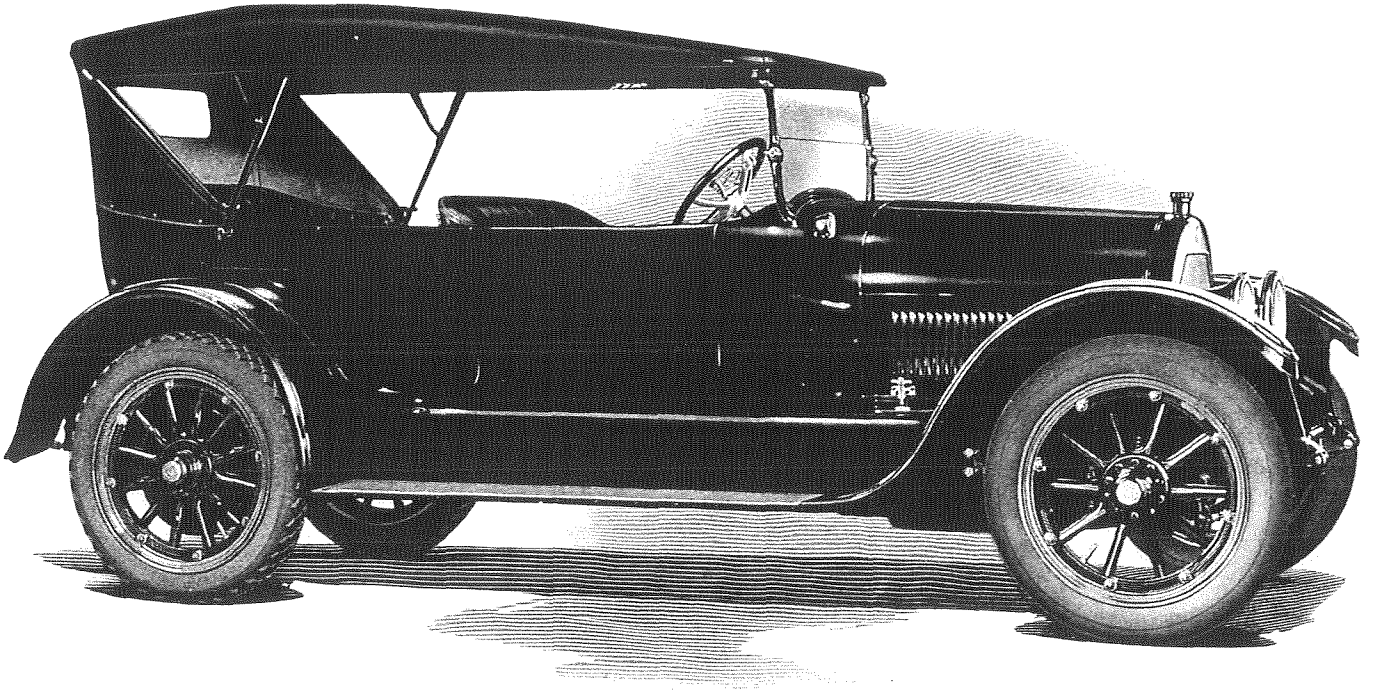


*Tan top lining conceals bows and head straps, finishing the top off smoothly*

*Upholstering*

There is solid comfort in Cadillac motoring, regardless of road conditions. Both chassis and seat springs contribute to this ease

[Continued on page ten]

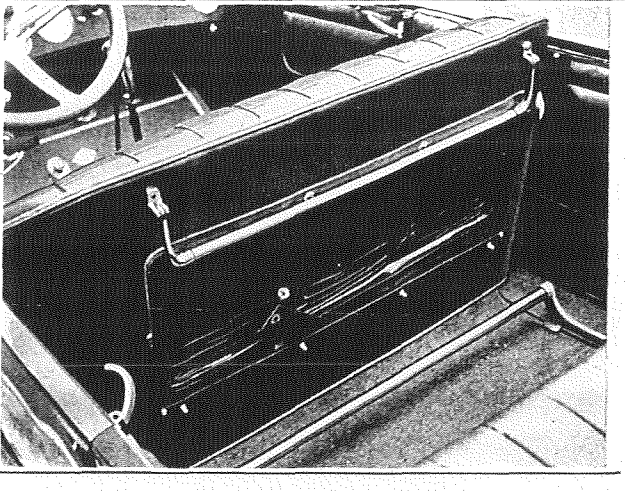


## THE CADILLAC PHAETON

THE Four-Passenger Phaeton is a smaller, lighter body on the same wheelbase as the Seven-Passenger model. With a capacity for four or five persons it is capable of very fast road work. It is an excellent car for the man who makes of his motoring a sport and a hobby.

The design is very smooth and trim, with a low, snug-fitting top and side curtains. The curtains when not in use stow away in a compartment in the back of the front seat. Seats for two are provided in front, with places for two more in the tonneau. A third may be accommodated in the rear when necessary.

Seating arrangements and the flexibility and ease of Cadillac chassis control suits the Phaeton to the use of the small family. There is nothing freakish about the Cadillac Four-Passenger, but it is a car which one finds exceptionally good-looking among those that pass. It adapts itself especially well to individual effects, with wire wheels and a special color.



*Curtain compartment open, showing curtains stowed neatly in back of front seat*

[Continued from page eight]

of mind and body. Three-quarter platform rear springs and long semi-elliptics in front cradle Cadillac bodies against road shocks. The seat cushions are made up of many small spiral springs, nested together in place of the usual stiff hour-glass construction. So formed, one sinks into rather than sits on the car cushions, the gentle action of the springs absorbing rather than reacting to the unevenness of the road.

All open cars are snugly protected against unfavorable weather by a set of close-fitting side curtains. Three quarters of the curtain area is transparent. Curtains swing with the doors on brackets which go on and come off easily without tools. They are fitted with double flaps at top and bottom, and fastened with special "lift the dot" fasteners.

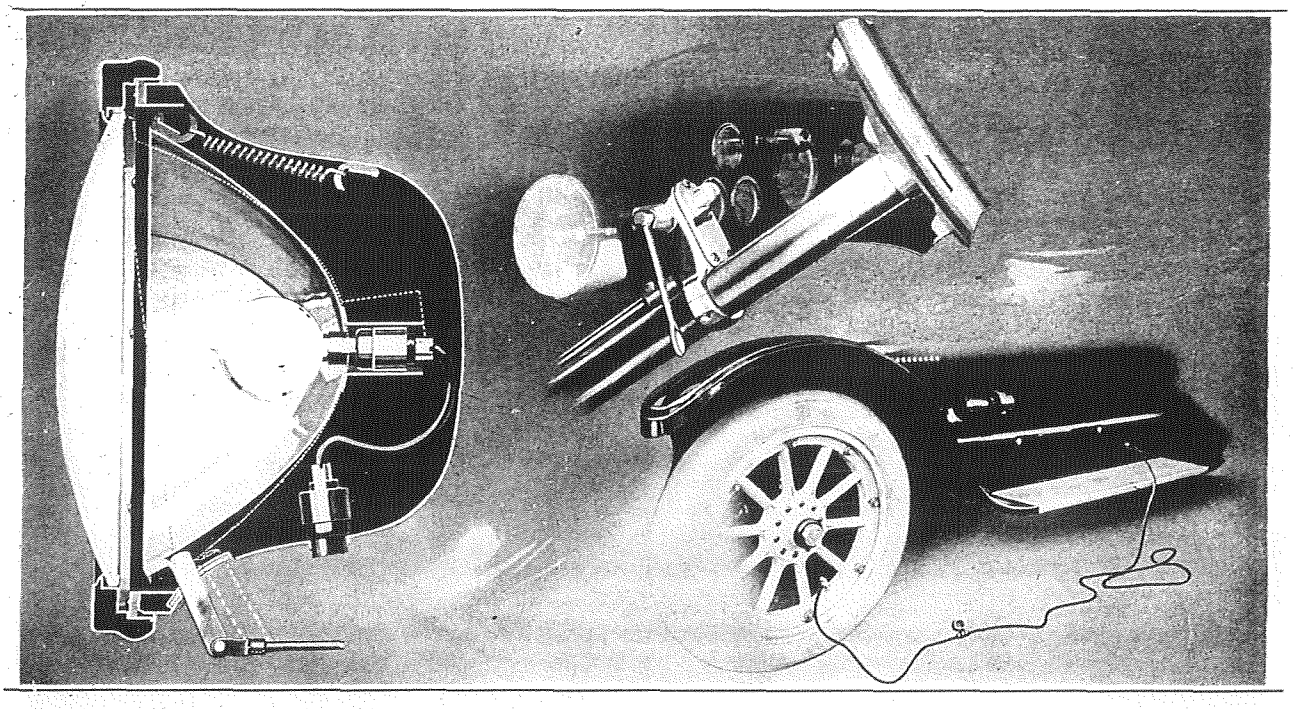
Top lines have been a consideration in the design of the open cars. Heavy black waterproof, leatherized material has a permanent smoothness. The rear curtain protects the sides and back of the tonneau seat. A beveled plate glass window is set in concealed mouldings in the center of the back curtain. A tan lining covers the bows, and conceals the framing on the underside of the top, presenting a well-tailored finish.

A very complete set of tools accompanies each Cadillac car. Tire jack and larger tools are under the front seat, in a locked compartment. The smaller tools—wrench, screw drivers, pliers and so forth—are in a case in the door next to the driver's seat. Both tool compartments are locked by the ignition switch key.

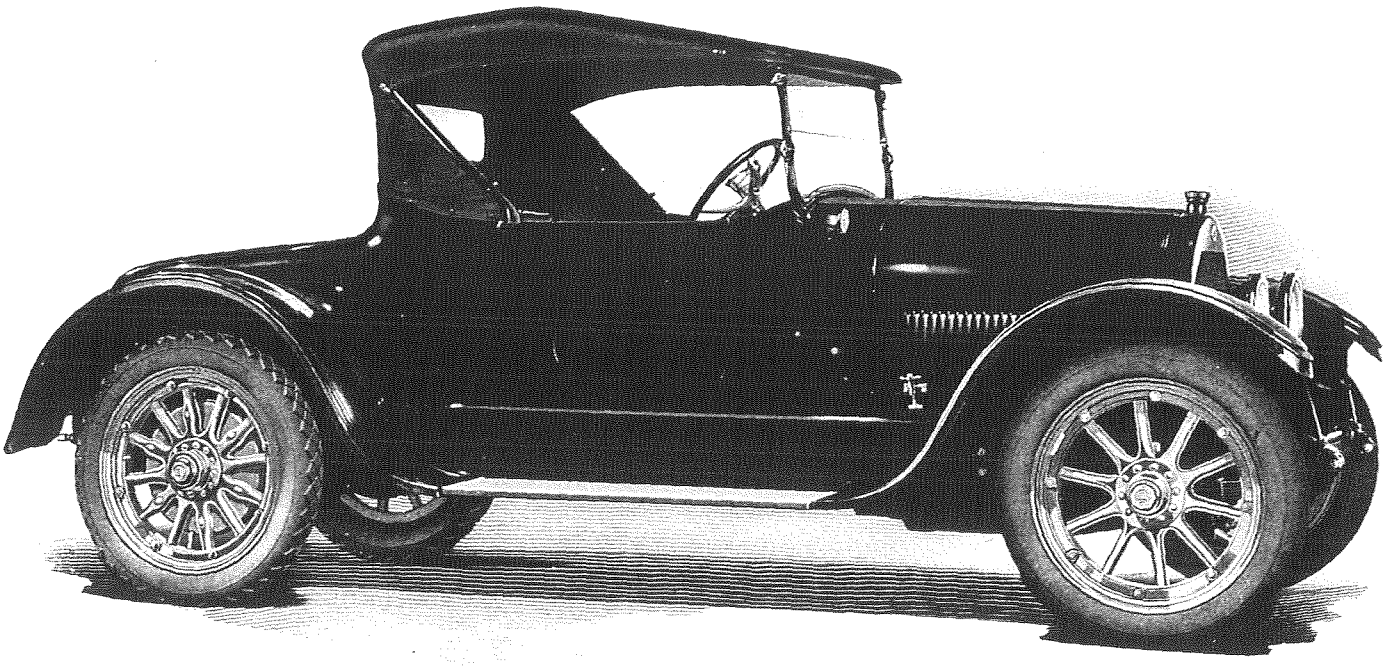
The windshield on the open cars is double ventilating, and waterproofed with a rubber dam between the sections, and at the bottom, next to the cowl.

A power tire pump is connected with the motor drive. Tubing to reach all wheels is furnished, with a gauge, so that tires may at any time be inflated to their proper pressure. The pump saves energy and tires by making it easy to have them properly inflated. The

[Continued on page twelve]



*A lever on the steering column throws rays from headlight close in front for passing. Connection for power tire pump is through left-hand dust shield*



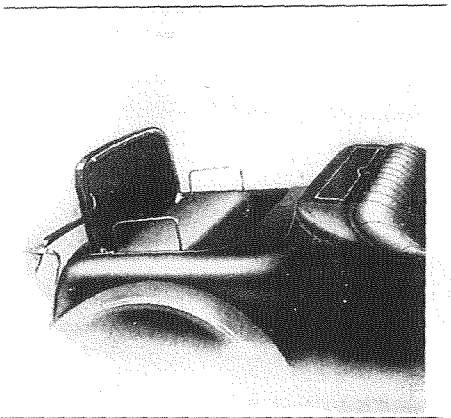
## THE CADILLAC ROADSTER

THE Two-Passenger Roadster, except for seating capacity, is a counterpart of the Four-Passenger Phaeton. It is modelled on the same low, clean lines and mounted on the 125-inch wheelbase. The Roadster top is very smooth, bows being invisible and a Grecian curve joining the top with the rear curtain. Curtains make a close, weather-tight fit.

The driver's seat is low, and particularly comfortable for long, rough rides. Immediately back of it is storage space for a bag or moderate sized suitcase.

The rumble, entered through a waterproof lid in the top, has concealed in it comfortable auxiliary accommodations for two, as well as an ample storage space for luggage.

Extra tires, as on other models, are mounted at the rear and secured with a universal key padlock.



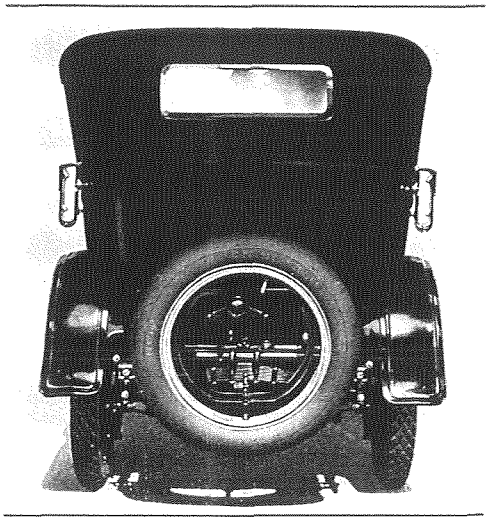
*Storage compartment and emergency seat in Roadster*

The Two-Passenger is capable of any amount of rough, hard work. Like the Phaeton, it is very fast, the kind of a car which a professional man most appreciates. For long daily journeys it is dependable and comfortable enough to make relaxation possible while on the road.

[Continued from page ten]

hose connection is through an opening in the left dust shield.

A sturdy tire carrier with a capacity for two extra rims with tires, special rim lock operated by the switch key, and one extra tire rim, as well as a license holder, are standard equipment on all Cadillac cars.

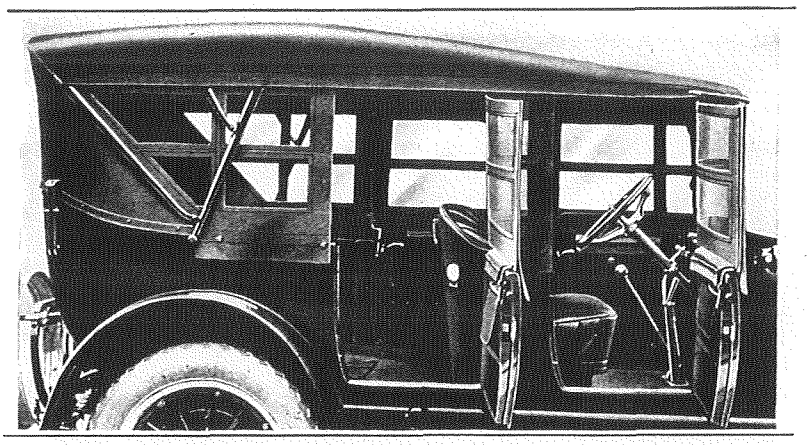


*Concealed moulding holds beveled glass in top curtain. Rim lock tire carrier accommodates two spares*

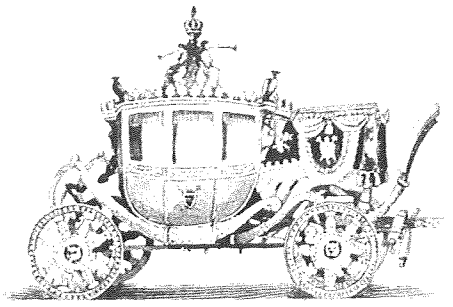
Many separate coats make up the finish of Cadillac open bodies. Before any paint is applied each body is subjected to a sand blast which removes every trace of grease or foreign matter from the surface of the metal. These bodies are not touched by any but gloved hands after sand blasting until the first coat of primer has been applied. Each of the many priming and filling coats is dried and rubbed before applying the next. On this surface several coats of color varnish are then laid and baked, the baking and rubbing greatly hardening the varnish surface. After sufficient drying a final coat of pure coach varnish is applied, and the body allowed to stand and season before being placed on its chassis.

The standard finish for the Touring Car and Phaeton is Cadillac blue, the radiator, lamps, dust shields, hub caps and the chassis being black. The standard finish for the Roadster, except for cream wheels, is the same as for the Touring Car and Phaeton.

No outlay in various motoring accessories is necessary with the delivery of a Cadillac car. The details and appointments, completed before each car leaves the factory, complete the comfort desired by the average motorist.



*Curtains swing with the doors; double flaps on door curtains make tight fit; curtain rods placed without tools*



# CADILLAC COACH WORK

SINCE 1903 Cadillac reputation has rested on the permanence and dependability of its chassis. In the design and construction of bodies the effort of Cadillac coach builders has been directed toward supplying a carriage conservative enough in appearance and so substantially framed as to parallel in utility the mechanical service of the chassis.

*Framing*

As in any sort of structure, the life of a Cadillac closed body depends on a solid foundation. Permanence in Cadillac body construction begins with the chassis frame. The side members are channel sections with a maximum depth of eight inches and of heavier gauge than usual practice. They are joined by five cross members. Two are pressed steel sections, with triangular corner braces. The other three are tubular, splined at the ends to resist twisting strains, and pressed into the side member brackets with ten to fifteen tons pressure.

The frame, thus substantially braced, forms a rigid bed for the body proper, protecting it from the strains of uneven roads, and greatly lengthening body life, as well as reducing to a minimum the possibility of developing body squeaks and rattles.

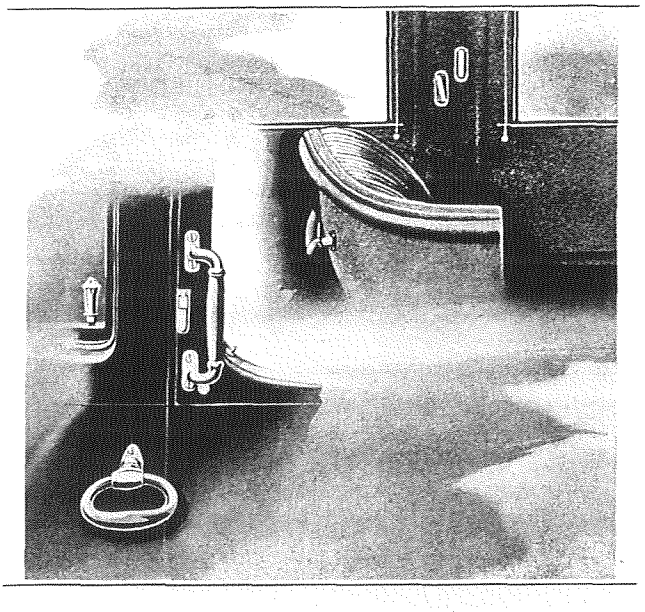
The body sills and side posts are very stout. The material used is first grade oak and ash.

Sills and posts have a substantial cross section. All joints are mortised, screw-fastened and glued, as well as reinforced by steel brackets. Diagonal steel bracing is used on doors and in other places where it is desirable.

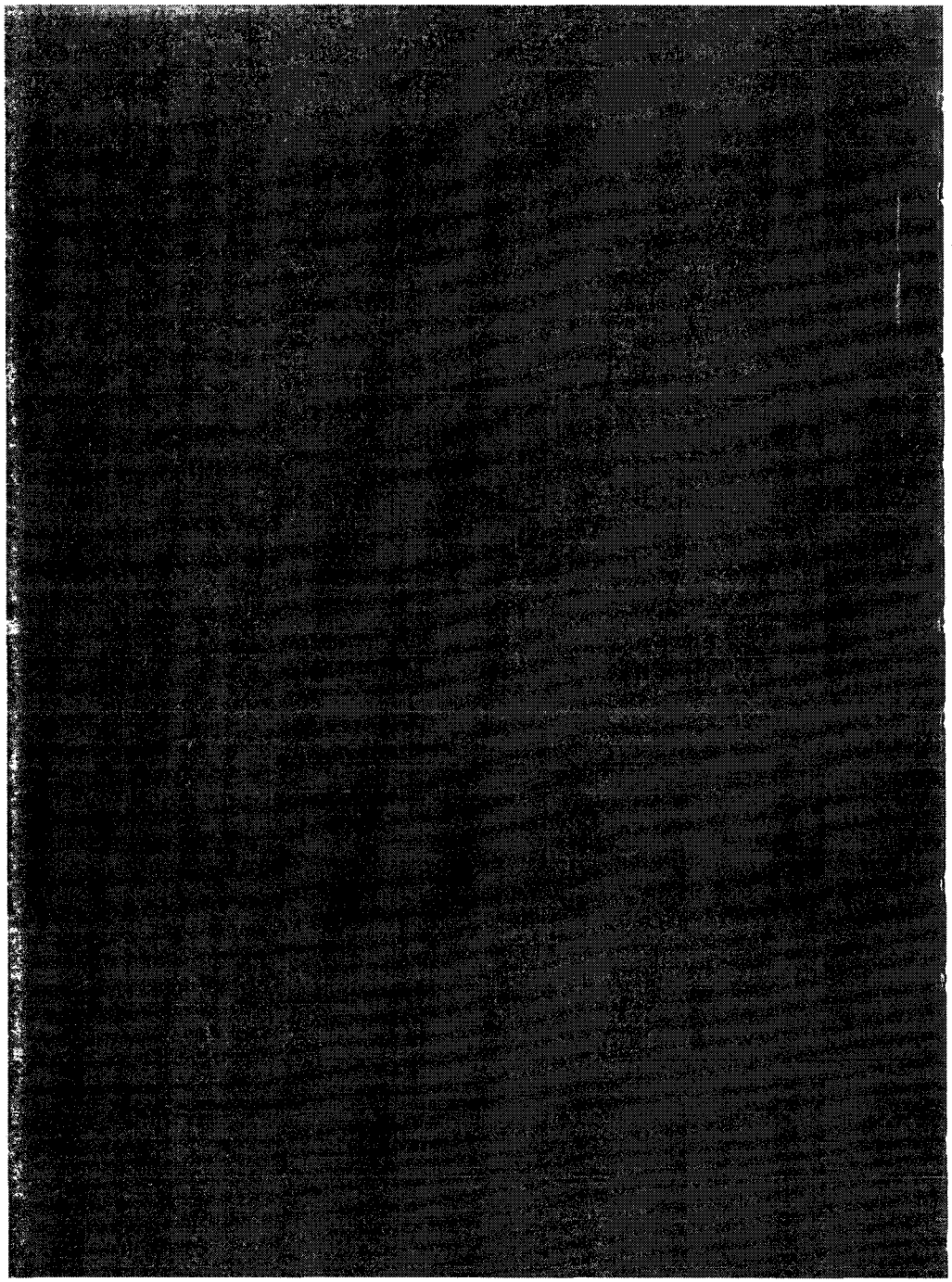
*Panelling*

Exterior body panelling is 14-gauge sheet aluminum throughout.

This is shaped and applied in a few large sheets, the seams afterward being welded so that the body covering when complete is practically one piece. Roofs are one-piece aluminum, provided with a drain channel at the front and sides. *[Continued on page fourteen]*



*Inside thumb locks and curb door key lock protect Cadillac coaches against intrusion*



# Price List of Parts

## Type 57

PRICE 75 CENTS NET

This Price List is effective on Sept. 1st, 1922, and supersedes all previous quotations. All prices are subject to change without notice.

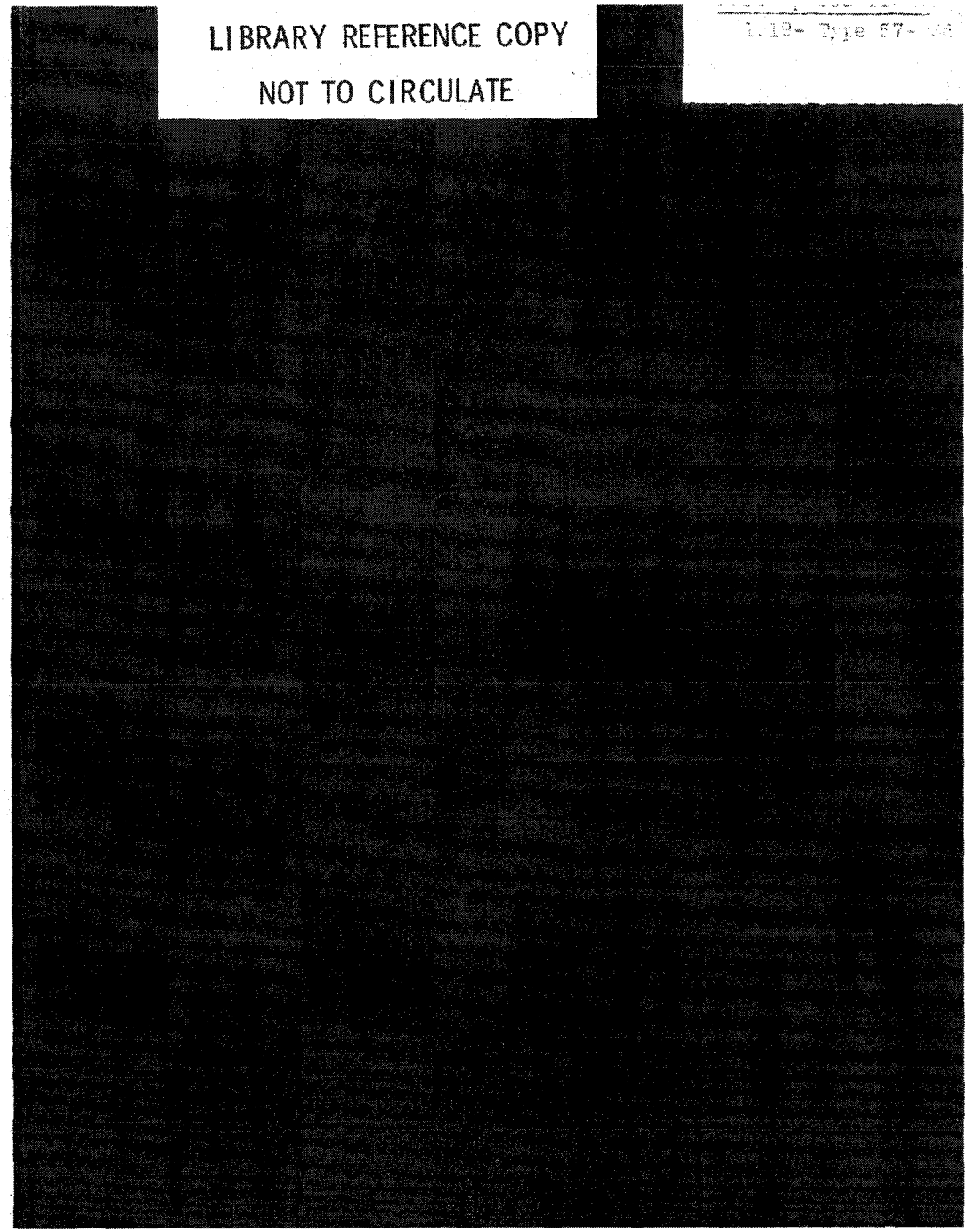
Copyright 1919 by

Cadillac Motor Car Company

Detroit, Michigan, U. S. A.

THIRD EDITION

LIBRARY REFERENCE COPY
NOT TO CIRCULATE



## TO THE USER

With more than a hundred and sixty thousand Cadillac automobiles in use, it is obviously impractical for us to deal directly with Cadillac users. We cannot open accounts with or sell at a discount to any except regular distributors with whom we make annual contracts.

To avoid unnecessary delay and correspondence, new parts should, where possible, be ordered from the distributor or dealer from whom the car was purchased, or from the nearest distributor or dealer, who is in a position to know what is desired and usually to supply it from his stock. If he cannot do so he can order it for you.

Where, however, conditions are such as in our judgment to warrant it, users' orders for parts will be filled, provided the order is accompanied by cash. The prices quoted herein are subject to change without notice. Make remittance for the amount listed and if it does not cover the current price, the shipment will be made with C. O. D. charge attached for the balance.

## ORDERING PARTS

Unless these instructions are followed carefully we cannot be responsible for errors or delay.

This Price List is arranged in groups to assist in locating readily the serial number and name of a part desired; for example, the Crankcase, Carburetor, Transmission Control, etc. Under these headings will be found listed all the parts that compose the respective groups.

Parts must be ordered by the serial number and by the name in full as given herein, except in telegraphed orders, when the code word may be used. (See under "Ordering by Telegraph.") The type and engine number must be given on the order. (See under "Engine Number.") If in doubt as to the correct name and serial number of the part desired, send us a sketch of it with dimensions, or return the used part. (See under "Returning Parts.")

Confusion in ordering "Right" and "Left" parts will be avoided if it is remembered that the "Right" side is that at the right of the driver.

Our responsibility in the shipment of parts ceases with delivery to the transportation company.

When parts for closed bodies are ordered the engine number of the car for which the part is intended should be furnished as well as the serial number and description of the part.

## ENGINE NUMBER

*On eight cylinder cars the engine number is stamped on the crankcase just back of* the right hand block of cylinders. On Type 57 it is stamped on the fan shaft housing also. The engine number of each Type 57 car begins with the figures "57."



## ORDERING BY TELEGRAPH

*The Cadillac Motor Car Company cannot be responsible for errors which may* occur as the result of incorrectly written or incorrectly transmitted telegrams.

Code words should be used only in direct messages and when the name and serial number cannot be transmitted in ten words. In ordering by mail, night letter, day letter or by direct message, when the order can be written in ten words, the serial number and name of the part should be given. Code words in night letters or day letters will subject the message to full toll charges by the telegraph company.

## USE OF CODE

The telegraph code used in this book has been formulated for convenience and economy in telegraphing orders for parts. While it is extremely simple to understand and use, it must be used with absolute exactness or it is worse than useless.

These same code words are used in all Cadillac price lists. It is therefore necessary in ordering from this book to precede the code words for the various items by the KEY WORD "STURDY."

For example, the following order is to be codified. Ship by express one sprocket on crank shaft for cam drive, one exhaust manifold, right, one piston with rings, one drive shaft for water pump.

*The first item is listed on* Page 10 under the heading Engine Chains and Sprockets. The code word for this item is ZELAB.

The second item is listed on Page 13 under the heading Valves and Manifolds. The code word for this item is RERAB.

The third item is listed on Page 13 under the heading Connecting Rods and Pistons. The code word for this item is FURAB.

The fourth item is listed on Page 15 under the heading Water Pumps and Drive Shaft. The code word for this item is TOTAB.

The codified telegram should therefore read:

Cadillac Motor Car Company,
Detroit, Michigan.

Express STURDY one each ZELAB, RERAB, FURAB, TOTAB.

Signed.....

## RETURNING PARTS

In the event parts are returned to the factory for any purpose, the transportation charges must be prepaid or the parts will not be accepted. The name and address of the shipper must be written plainly on the package. Each individual part must also be tagged with the name and address of the shipper, the name of the owner of the car and the type and engine number of the car. Be sure to write us at the time the package is shipped, stating what is being shipped, how it is being shipped (mail, express or freight) and what disposition is to be made of the parts. This is necessary regardless of any former correspondence. In addition reference should be made by date to previous correspondence.

## TIRES, SPEEDOMETERS, CLOCKS AND STORAGE BATTERIES

In cases of repairs to tires, speedometers, storage batteries or clocks correspondence should be opened directly with the manufacturers, or one of their branches. If necessary, the parts should be sent to them. Transportation charges should be prepaid.

## KEY TO ABBREVIATIONS OF BODY STYLES

In many cases different parts are used on chassis of different wheelbase length and with different body styles. To indicate on which chassis or with which bodies parts are used, the following abbreviations are used:

| | |
|---|---|
| Seven-Passenger Touring. | (7-P) |
| *Phaeton, first type. | (P-1) |
| *Phaeton, second type. | (P-2) |
| *Roadster, first type. | (R-1) |
| *Roadster, second type. | (R-2) |
| **Victoria, Type A. | (V-1) |
| **Victoria, Type B. | (V-2) |
| **Brougham, Type A. | (B-1) |
| **Brougham, Type B. | (B-2) |
| Limousine. | (L) |
| Town Limousine. | (TL) |
| Landaulet. | (LD) |
| Town Limousine. | (TLD) |
| Imperial. | (I) |
| Seven Passenger Brougham. | (7-B) |
| Suburban, Type A. | (SB-1) |
| Suburban, Type B. | (SB-2) |
| Open Cars. | (OC) |
| Closed Cars. | (CC) |
| 125" wheel base chassis. | (S) |
| 132" wheel base chassis. | (M) |
| 145" wheel base chassis. | (A) |
| 125" wheel base cars. | (F) |
| 132" wheel base cars. | (G) |
| 145" wheel base cars. | (H) |

*The Phaeton first type and Roadster first type can be distinguished from the Phaeton second type and Roadster second type by the bead on the doors and body of the first type.

**Shipments of Victoria Type A, were completed previous to May 15, 1919. Broughams, Type A, previous to June 10, 1919, and Suburbans, Type A, previous to June 27, 1919.

## WHEEL BASE

Open cars, Victorias and Broughams bodies are mounted on 125" wheel base chassis. Closed car bodies, except Victorias and Broughams, are mounted on 132" wheel base chassis. Chassis furnished without bodies have 125", 132" or 145" wheel base.



## CODIFIED SENTENCES

Forward by express C. O. D.....CABOU
Forward by Parcel Post C. O. D.....CABME
Forward by Freight, D. B. L.....CADRE
Include the following parts in our next carload shipment.....CAMEO
Ship our order number—via express instead of freight.....CASTE
Ship our order number—via freight instead of express.....CAMPO
Rush parts via freight. Do not hold for carload shipment.....CARPO
How and when did you ship our order number?.....CAUMA
Trace shipment of our order number.....CENTI
Reply by mail .....CESTA
Parts were shipped via————.....CERIO
Carriers have been instructed to trace shipment of your number.....CURIO
Advise engine number for parts, your order number.....CIRSO
State size of wheel and style of rim, your order number.....CITRA
State engine number of car for which parts are wanted in your order number .....COCOA
Cannot supply————shall we ship————?.....COLPO
Expect to ship parts called for in your————(letter, wire, or order) number————(date) .....COMPO
————word in your wire not clear; advise part wanted.....CONGO
Advise key word of code your wire————.....CONTE
Include in first (freight or express) shipment coming to us———— (parts) ———— .....COOBA
We have a large number of parts holding for carload. There is no carload in sight. Shall we ship by straight freight or express? Weight of parts is———— pounds .....CONGE
Cancel our order number———— .....CREDO
Cancel————item on our order number————.....COPRO
Have received request from————asking us to ship parts to (him or them) and charge to your account. Shall we do so?.....CORMO
Ship to ————and charge to us parts ordered by.....COWLE
Do not charge to us parts ordered by————.....COSTA
Ship to————by————and charge to us the following parts ————..... COPRU
Confirmation does not agree with your wire————(date). Have shipped———— Shall we ship?———— .....CORNU
Cannot locate your order number————of (date).....CURIA
Duplicate parts on order number———— .....CYANO

## CODIFIED NUMBERS

A code word consisting of five letters or less is counted as one word by telegraph companies. There is a saving therefore in using the following table in wiring numbers:

| | | | | |
|---|---|---|---|---|
| 1-A. | 3-C. | 5-E. | 7-G. | 9-I. |
| 2-B. | 4-D. | 6-F. | 8-H. | 0-J. |

For example, it takes four words to write the number 1250. By the use of the above table but one word is required, namely ABEJ.

## SAVING BY USE OF CODE

The following 13-word message may be written in 2 words if the code is used. "When and how did you ship on order number 3750?" CAUMA CGEJ

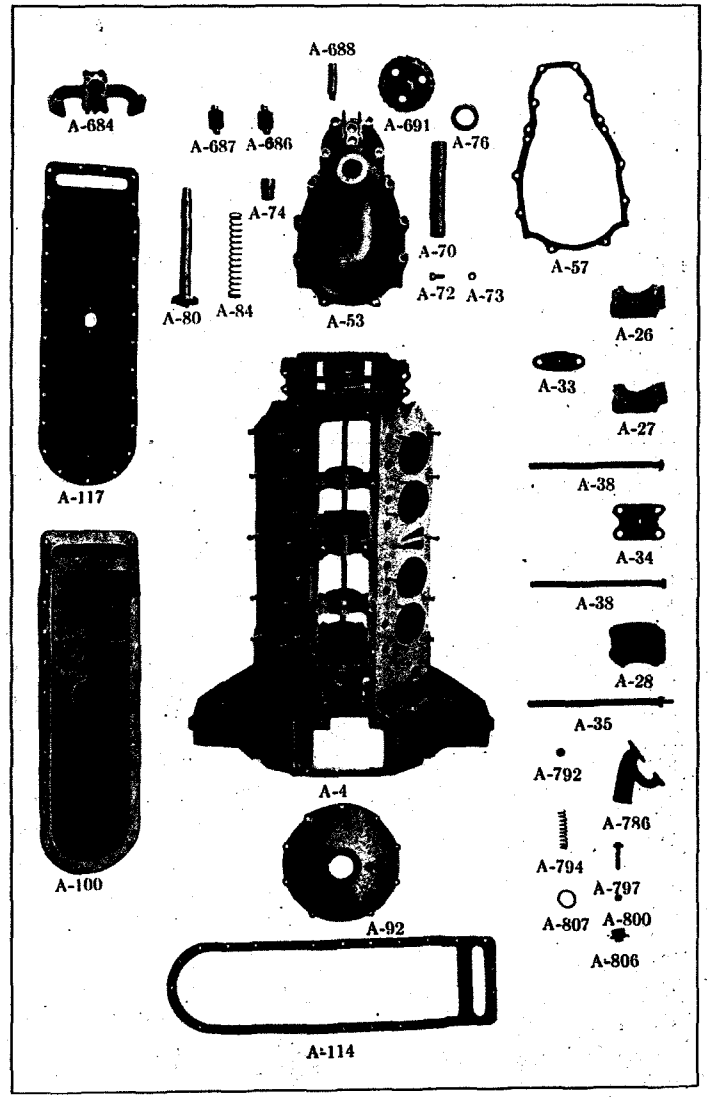
## CRANK CASE

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADAB | A-4 | Crank case with studs, bearings, bearing caps, plates, bolts and nuts (Specify engine number) | 22586 | 280.00 |
| DADAB | A-8 | Stud in crank case for water pump, per doz. .25 | 34750 | .05 |
| FADAB | A-9 | Stud in crank case for oil pump elbows, per doz. .25 | 37202 | .05 |
| KADAB | A-10 | Stud in crank case attaching cylinder block | 19705 | .05 |
| LADAB | A-11 | Stud in crank case for cam slide clamp | 19700 | .05 |
| MADAB | A-13 | Stud, short, attaching oil relief housing, per doz. .25 | 37202 | .05 |
| PADAB | A-14 | Stud, long, to attach pipe flange and oil relief housing | 30119 | .05 |
| RADAB | A-15 | Stud for valve rocker cover, per. doz. .25 | 19708 | .05 |
| SADAB | A-17 | Stud, short, 2 used on forward corners of crank case attaching oil pan, per doz. .25 | 34866 | .05 |
| ZADAB | A-18 | Stud attaching oil pan to crank case, 25 used, per doz. .25 | 34865 | .05 |
| BEDAB | A-21 | 1⅛" plug in crank case at rear of cam shaft | 30160 | .35 |
| CEDAB | A-22 | Gasket for plug, per doz. .25 | 30470 | .05 |
| DEDAB | A-23 | 2" pipe plug in bottom of crank case | 32587 | .35 |
| FEDAB | A-24 | Tube in crank case for oiling chains | 34029 | .10 |
| KEDAB | A-25 | Plug in oil holes to cam shaft, per doz. .25 | 19781 | .05 |
| LEDAB | A-26 | Cap for front main bearing (with oversize dowel holes) | 31198 | 2.30 |
| MEDAB | A-27 | Cap for center main bearing (with oversize dowel holes) | 19411 | 2.00 |
| PEDAB | A-28 | Cap for rear main bearing (with oversize dowel holes) | 19412 | 3.00 |
| REDAB | A-31 | Dowel, oversize, front and center main bearing cap | 34532 | .10 |
| SEDAB | A-32 | Dowel, oversize, rear main bearing cap | 34531 | .10 |
| TEDAB | A-33 | Plate for main bearing front and center | 19413 | 1.25 |
| ZEDAB | A-34 | Plate for main bearing, rear | 19414 | 1.75 |
| BIDAB | A-35 | Bolt for front and center main bearing caps | 19415 | 1.25 |
| CIDAB | A-38 | Bolt for rear main bearing (4 used) | 30953 | 1.25 |
| DIDAB | A-39 | Nut for main bearing bolt | 11665 | .20 |
| FIDAB | A-40 | Cotter pin, per doz. .25 | 15166 | .05 |
| KIDAB | A-41 | Dowel for main bearing bolts, per doz. .25 | 19664 | .05 |
| LIDAB | A-42 | Bushing in crank case for oil pump shaft, front | 19531 | .35 |
| MIDAB | A-44 | Bushing in crank case for oil pump shaft, rear | 31337 | .55 |
| PIDAB | A-45 | Nipple in main bearing plate for oil pipe connection | 19596 | .40 |
| RIDAB | A-49 | Thimble dowel, locating generator, per doz. .25 | 19595 | .05 |
| SIDAB | A-50 | Bolt to fasten engine to frame | 32541 | .45 |
| TIDAB | A-51 | Castle nut for engine bolt | 19019 | .35 |
| ZIDAB | A-52 | Cotter pin, per doz. .25 | 15212 | .05 |

## COVERS FOR FRONT AND REAR OF CRANK CASE STARTING CRANK AND SHAFT

| | | | | |
|---|---|---|---|---|
| RODAB | A-53 | Cover for front of crank case with studs and bushings | 20862 | 17.50 |
| SODAB | A-54 | Stud in front cover for oil pump casing | 19704 | .05 |
| TODAB | A-55 | Stud in front cover for air pump, per doz. .25 | 37202 | .05 |
| ZODAB | A-56 | Bushing in front cover for oil pump gear | 19535 | .30 |
| BUDAB | A-57 | Paper gasket for front cover | 19611 | .05 |
| CUDAB | A-58 | Screw (2⅜" long), front cover to crank case | 11621 | .10 |
| DUDAB | A-59 | Screw (1¼" long), front cover to crank case | 10026 | .10 |
| FUDAB | A-60 | Screw (3" long), front cover to crank case | 10036 | .20 |
| KUDAB | A-61 | Screw, front cover to fan housing | 10024 | .08 |
| LUDAB | A-62 | Lock washer for screws, per doz. .25 | 11325 | .05 |
| MUDAB | A-63 | Threaded dowel for front cover | 19545 | .10 |
| RUDAB | A-70 | Tube with bushing for front engine support | 22873 | 3.75 |
| SUDAB | A-71 | Bushing in engine support tube | 19551 | .50 |
| TUDAB | A-72 | Screw, engine support tube to cover | 11627 | .05 |
| ZUDAB | A-73 | Lock washer on screw, per doz. .25 | 11325 | .05 |






CRANK CASE AND END COVERS. OIL PAN AND BAFFLE PLATE

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAHAB | A-74 | Bushing for engine support tube, front | 19550 | .85 |
| CAHAB | A-75 | Taper pin for bushing, per doz. .25 | 15030 | .05 |
| DAHAB | A-76 | Ball for front engine support | 19555 | 2.50 |
| FAHAB | A-80 | Starting crank shaft | 27428 | 4.00 |
| KAHAB | A-84 | Spring for starting crank shaft | 34350 | .15 |
| LAHAB | A-89 | Starting crank complete | 22872 | 3.00 |
| MAHAB | A-92 | Cover for rear end of crankcase (2 halves) | 22222 | 5.50 |
| PAHAB | A-93 | Gasket for rear end cover | 19542 | .05 |
| RAHAB | A-94 | Screw for halves of cover, per doz. .25 | 11855 | .05 |
| SAHAB | A-95 | Nut, per doz. .25 | 10887 | .05 |
| TAHAB | A-96 | Lock washer, per doz. .25 | 11313 | .05 |
| ZAHAB | A-97 | Screw, rear cover to crank case | 10006 | .05 |
| BEHAB | A-98 | Lock washer, per doz. .25 | 11324 | .05 |

## ENGINE OIL PANS AND BAFFLE PLATES

| | | | | |
|---|---|---|---|---|
| CEHAB | A-100 | Oil pan | 22894 | 12.00 |
| DEHAB | A-103 | Nut on stud for oil pan | 11735 | .08 |
| FEHAB | A-104 | Lock washer, per doz. .25 | 11324 | .05 |
| KEHAB | A-105 | Drain plug for oil pan, ¾" | 30436 | .25 |
| LEHAB | A-106 | Gasket for drain plug, per doz. .25 | 30437 | .05 |
| MEHAB | A-111 | Plug for overflow pipe in oil pan | 34121 | .08 |
| PEHAB | A-114 | Gasket for oil pan and baffle plate | 18374 | .30 |
| REHAB | A-117 | Baffle plate for oil pan | 22123 | 3.50 |

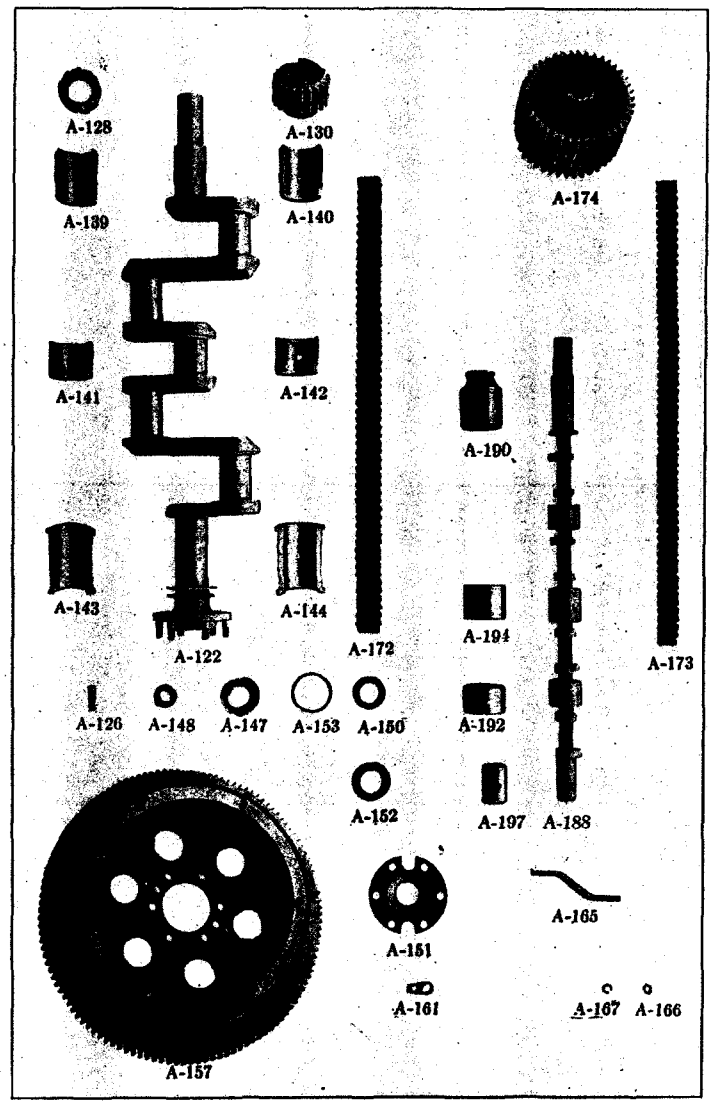
## CRANK SHAFT AND MAIN BEARINGS

| | | | | |
|---|---|---|---|---|
| FIHAB | A-122 | Crank shaft with studs and plugs | 22489 | 100.00 |
| KIHAB | A-123 | Stud in crank shaft for fly wheel | 19678 | .05 |
| LIHAB | A-124 | Nut for stud | 11675 | .05 |
| MIHAB | A-125 | Lock washer, per doz. .25 | 11324 | .05 |
| PIHAB | A-126 | Dowel, crank shaft to fly wheel | 19680 | .15 |
| SIHAB | A-128 | Spiral gear on crank shaft for pump drive (10 teeth) | 19521 | 2.50 |
| TIHAB | A-129 | Woodruff key for spiral gear | 11363 | .05 |
| ZIHAB | A-130 | Sprocket on crank shaft for cam drive | 32624 | 4.00 |
| BOHAB | A-131 | Woodruff key for sprocket | 11370 | .10 |
| COHAB | A-133 | Stud in end of crank shaft | 33165 | .10 |
| DOHAB | A-134 | Nut on stud | H-1700 | .05 |
| FOHAB | A-135 | Flat washer on stud or screw | 11465 | .05 |
| KOHAB | A-136 | Lock washer, per doz. .25 | 11327 | .05 |
| LOHAB | A-137 | Spacer for crank shaft sprocket | 30276 | .40 |
| MOHAB | A-138 | Pipe plug for oil holes in crank shaft | 30471 | .08 |
| POHAB | A-139 | Main bearing, front, upper half | 19960 | 3.00 |
| ROHAB | A-140 | Main bearing, front, lower half | 19407 | 3.00 |
| SOHAB | A-141 | Main bearing, center, upper half | 19962 | 2.85 |
| TOHAB | A-142 | Main bearing, center, lower half | 19408 | 2.85 |
| ZOHAB | A-143 | Main bearing, rear, upper half | 19961 | 4.75 |
| BUHAB | A-144 | Main bearing, rear, lower half | 19409 | 4.75 |
| CUHAB | A-145 | *Liner for main bearing, front and center | 19623 | .20 |
| DUHAB | A-146 | *Liner for main bearing, rear | 19622 | .25 |
| FUHAB | A-146B | Main bearing, front, upper half, **.020 undersize** | 50577 | 3.00 |
| KUHAB | A-146C | Main bearing, front, lower half, **.020 undersize** | 50578 | 3.00 |
| LUHAB | A-146D | Main bearing, center, upper half, **.020 undersize** | 50579 | 2.85 |
| MUHAB | A-146E | Main bearing, center, lower half, **.020 undersize** | 50580 | 2.85 |
| ZUHAB | A-146F | Main bearing, rear, upper half, **.020 undersize** | 50581 | 4.75 |
| XUHAB | A-146H | Main bearing, rear, lower half, **.020 undersize** | 50582 | 4.75 |

***NOTE—Liners for main bearings may be had in the following thicknesses: .170, .172, .174, .176, .178, .180, .185, .190.**

| | | | | |
|---|---|---|---|---|
| PUHAB | A-147 | Bearing on front end of clutch connection in crank shaft | 18803 | 7.60 |
| RUHAB | A-148 | Bushing on front clutch connection for bearing | 18802 | .35 |
| SUHAB | A-149 | Pin for bushing on clutch connection, per doz. .25 | 18898 | .05 |
| TUHAB | A-150 | Felt washer for bearing | 18808 | .05 |






CRANK SHAFT, CAM SHAFT, BEARINGS, CHAINS AND FLY WHEEL

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BALAB | A-151 | Cover for felt retainer and bearing in crank shaft | 18822 | .35 |
| CALAB | A-152 | Plate for felt retainer | 18805 | .05 |
| DALAB | A-153 | Paper washer for retainer cover, per doz. .25 | 19893 | .05 |

## FLY WHEEL

| | | | | |
|---|---|---|---|---|
| FALAB | A-157 | Fly wheel with studs | 22139 | 30.00 |
| KALAB | A-158 | Stud to fasten clutch drive to fly wheel | 19702 | .05 |
| LALAB | A-159 | Nut for stud for clutch driver | 11678 | .05 |
| MALAB | A-160 | Lock washer for nut, per doz. .25 | 11325 | .05 |
| PALAB | A-161 | Lock for fly wheel dowel | 19681 | .05 |
| RALAB | A-162 | Screw to fasten lock to fly wheel | 11647 | .05 |
| SALAB | A-163 | Lock washer on screw, per doz. .25 | 11324 | .05 |
| TALAB | A-165 | Indicator for fly wheel | 31001 | .75 |
| ZALAB | A-166 | Check nut for indicator (2 used) | 3798 | .05 |
| BELAB | A-167 | Lock washer for check nut, per doz. .25 | 11324 | .05 |

## ENGINE CHAINS AND SPROCKETS

| | | | | |
|---|---|---|---|---|
| PELAB | A-172 | Silent chain for cam shaft drive (closed) | 19480 | 6.00 |
| RELAB | A-173 | Silent chain for fan drive (open) | 19481 | 5.50 |
| SELAB | A-174 | Sprocket for cam shaft and fan drive | 32654 | 10.50 |
| TELAB | A-175 | Key for cam shaft sprocket | 17149 | .15 |
| ZELAB | A-176 | Sprocket on crank shaft for cam drive | 32624 | 4.00 |
| BILAB | A-177 | Woodruff key for sprocket | 11370 | .10 |
| CILAB | A-179 | Sprocket on fan shaft for fan drive | 31172 | 3.00 |
| DILAB | A-180 | Key, sprocket for fan shaft | 11363 | .05 |
| FILAB | A-181 | Seat pins, for fan chains, per doz. .25 | 38533 | .05 |
| KILAB | A-182 | Rocker pins for fan chain, per doz. .25 | 38535 | .05 |
| LILAB | A-183 | Washer for silent chain pin, per doz. .25 | 38537 | .05 |
| MILAB | A-184 | Seat pin for cam chain, per doz. .25 | 38534 | .05 |
| PILAB | A-185 | Rocker pin for cam chain, per doz. .25 | 38536 | .05 |

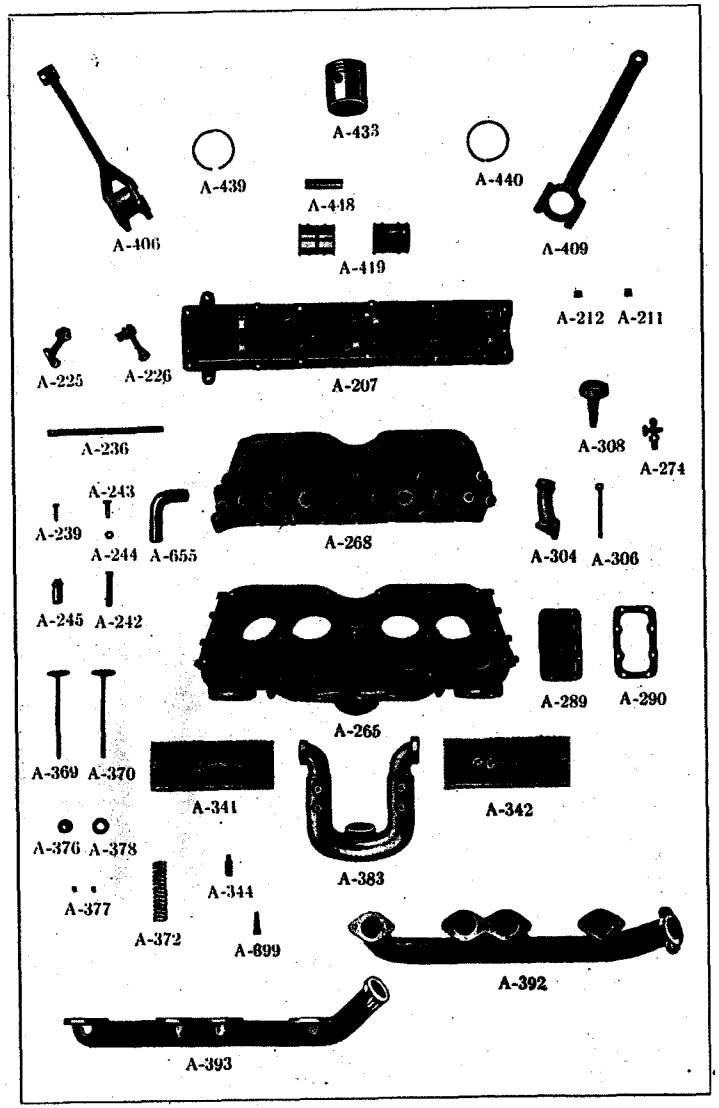
## CAM SHAFT AND BEARINGS

| | | | | |
|---|---|---|---|---|
| DOLAB | A-188 | Cam shaft | 32647 | 26.00 |
| FOLAB | A-190 | Bearing for cam shaft, front | 32594 | 4.50 |
| KOLAB | A-192 | Bearing for cam shaft, 2nd and 4th | 32595 | 1.75 |
| LOLAB | A-194 | Bearing for cam shaft, center | 32596 | 2.35 |
| MOLAB | A-197 | Bearing for cam shaft, rear | 38274 | 1.75 |
| POLAB | A-201 | Lock screw for front cam shaft bearing | 32593 | .10 |

## VALVE MECHANISM

| | | | | |
|---|---|---|---|---|
| FULAB | A-207 | Cover for valve rocker arms and cam shaft | 32658 | 16.00 |
| KULAB | A-210 | Gasket under valve rocker cover | 32611 | .05 |
| LULAB | A-211 | Bushing with shoulder for valve rocker shaft, front and center | 19450 | .20 |
| MULAB | A-212 | Bushing for valve rocker shaft, rear | 32590 | .15 |
| PULAB | A-217 | Spacer for valve rocker shaft, long | 32592 | .40 |
| RULAB | A-219 | Dowel for valve rocker arm cover to crank case | 19714 | .10 |
| TULAB | A-221 | Nut on valve rocker cover stud | 11678 | .05 |
| ZULAB | A-222 | Lock washer for nut, per doz. .25 | 11325 | .05 |






CYLINDER BLOCKS AND HEADS, PISTON, CONNECTING RODS AND VALVE MECHANISM

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAPAB | A-225 | Valve rocker arm, RIGHT, complete with roll, pin, tappet pin and bushing | 22879 | 3.00 |
| DAPAB | A-226 | Valve rocker arm, LEFT, complete with roll, pin, tappet pin and bushing | 22880 | 3.00 |
| KAPAB | A-229 | Valve rocker arm, RIGHT, with bushing and tappet pin | 41731 | 2.25 |
| LAPAB | A-230 | Valve rocker arm, LEFT, with bushing and tappet pin | 41732 | 2.25 |
| MAPAB | A-230A | Bushing for valve rocker arm | 34332 | .25 |
| PAPAB | A-231 | Roller for valve rocker arm | 19448 | .30 |
| RAPAB | A-233 | Pin for roller | 32571 | .15 |
| SAPAB | A-234 | Cotter pin for pin, per doz. .25 | 15161 | .05 |
| TAPAB | A-236 | Shaft for valve rocker arm | 32589 | 1.15 |
| ZAPAB | A-239 | Set screw with flat point, for valve rocker shaft | 11289 | .10 |
| BEPAB | A-241 | Lock washer, per doz. .25 | 11324 | .05 |
| CEPAB | A-242 | Cam slide | 19458 | .70 |
| DEPAB | A-243 | Screw to adjust cam slide | 19460 | .20 |
| FEPAB | A-244 | Check nut for adjusting screw | 11667 | .15 |
| KEPAB | A-245 | Guide for cam slide | 37985 | .50 |
| LEPAB | A-248 | Clamp for valve guide | 37986 | .15 |
| MEPAB | A-249 | Nut on stud for cam slide clamp | 11676 | .03 |
| PEPAB | A-250 | Lock washer, per doz. .25 | 11324 | .05 |

## CYLINDER BLOCK

| | | | | |
|---|---|---|---|---|
| TEPAB | A-265 | Cylinder block with end covers, studs and bushings, less head | 24268 | 55.00 |
| ZEPAB | A-266 | Cylinder block, **first oversize** with end covers, studs and bushings less head | 24474 | 55.00 |
| CIPAB | A-267 | Cylinder block, **second oversize** with end covers, studs and bushings, less head | 24475 | 55.00 |
| FIPAB | A-268 | Cylinder head, RIGHT | 23485 | 15.00 |
| KIPAB | A-269 | Cylinder head, LEFT | 23486 | 15.00 |
| LIPAB | A-270 | Gasket for cylinder heads | 37858 | .55 |
| MIPAB | A-271 | Stud, short, attaching head | 37865 | .10 |
| PIPAB | A-272 | Stud, long, attaching head | 37866 | .10 |
| RIPAB | A-273 | Nut on studs | 11737 | .05 |
| SIPAB | A-274 | Priming cock in cylinder head | 32047 | .60 |
| TIPAB | A-289 | Cover for cylinder end | 37855 | .55 |
| ZIPAB | A-290 | Gasket for cylinder end covers | 37856 | .10 |
| BOPAB | A-291 | Stud to attach cylinder end covers, per doz. .25 | 30572 | .05 |
| COPAB | A-292 | Nut for stud, per doz. .25 | 11696 | .05 |
| DOPAB | A-293 | Lock washer for nut, per doz. .25 | 11324 | .05 |
| FOPAB | A-294 | Bushing for valve stem | 19454 | .60 |
| KOPAB | A-295 | Support for valve tappet cover plate | 19465 | .60 |
| LOPAB | A-296 | Screw to fasten support to cylinder, per doz. .25 | 10237 | .05 |
| MOPAB | A-297 | Lock washer on screw, per doz. .25 | 11313 | .05 |
| POPAB | A-304 | Housing on outer side of cylinder for breather | 37877 | 1.50 |
| ROPAB | A-305 | Gasket for breather housing, per doz. .25 | 37874 | .05 |
| SOPAB | A-306 | Screw, breather housing to cylinder | 37875 | .10 |
| TOPAB | A-307 | Lock washer for screw, per doz. .25 | 11315 | .05 |
| ZOPAB | A-308 | Cap, with body and gauze complete for breather | 25345 | 1.25 |
| BUPAB | A-309 | Breather body with gauze | 41840 | 1.15 |
| CUPAB | A-310 | Cap for breather | 38663 | .20 |
| DUPAB | A-311 | Screw, cap to breather body, per doz. .25 | 38664 | .05 |
| FUPAB | A-312 | 1¼" pipe plug in cylinder for water inlet | 30511 | .25 |
| KUPAB | A-314 | ¼" pipe plug for cylinder | H-1-425 | .05 |
| LUPAB | A-315 | Plug in cylinder | 3467 | .05 |
| MUPAB | A-318 | Pet cock to drain cylinders | 14024 | .60 |
| PUPAB | A-319 | Gasket between cylinders and crank case | 37151 | .05 |
| RUPAB | A-321 | Nut for stud to attach cylinders to crank case | 11675 | .05 |
| SUPAB | A-322 | Lock washer for nut, per doz. .25 | 11326 | .05 |
| TUPAB | A-323 | Threaded dowel, cylinder to crank case | 19680 | .15 |



## VALVE TAPPET COVER PLATES

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BARAB | A-341 | Valve tappet cover plate, RIGHT front, LEFT rear | 38150 | 1.65 |
| CARAB | A-342 | Valve tappet cover plate, LEFT front, RIGHT, rear | 38151 | 1.65 |
| DARAB | A-344 | Stud to support valve tappet cover plate | 19466 | .20 |
| FARAB | A-345 | Screw to attach valve tappet cover plate | 11626 | .05 |
| KARAB | A-346 | Lock washer for screw, per doz. .25 | 11314 | .05 |

## INLET AND EXHAUST VALVES AND MANIFOLDS

| | | | | |
|---|---|---|---|---|
| ZARAB | A-369 | Inlet valve, marked "IN" | 32629 | 1.75 |
| BERAB | A-370 | Exhaust valve, marked "EX" | 39594 | 3.50 |
| CERAB | A-372 | Spring for inlet or exhaust valves | 32616 | .20 |
| DERAB | A-376 | Seat for valve spring | 37868 | .10 |
| FERAB | A-377 | Collar for valve spring seat (2 used, each valve) | 30604 | .10 |
| KERAB | A-378 | Valve spring retainer, upper | 31103 | .05 |
| LERAB | A-383 | Intake manifold | 33527 | 30.00 |
| MERAB | A-386 | Screw to attach intake manifold to cylinder | 11643 | .10 |
| PERAB | A-387 | Lock washer on screw, per doz. .25 | 11325 | .05 |
| RERAB | A-392 | Exhaust manifold, RIGHT | 32659 | 8.50 |
| SERAB | A-393 | Exhaust manifold, LEFT | 32660 | 8.50 |
| TERAB | A-395 | Gasket for exhaust manifold, front and rear | 32600 | .05 |
| ZERAB | A-396 | Gasket for exhaust manifold, center | 32646 | .10 |
| BIRAB | A-399 | Screw to attach exhaust manifold to cylinder | 32603 | .15 |

## CONNECTING RODS AND PISTONS

| | | | | |
|---|---|---|---|---|
| SIRAB | A-406 | Outside connecting rod with wrist pin bushing, caps and bolts, less crank end bearing and piston | 22143 | 16.00 |
| ZIRAB | A-409 | Inside connecting rod with wrist pin bushing, less crank end bearing and piston | 25434 | 12.00 |
| CORAB | A-411 | Bolt for outside connecting rod cap | 32605 | .30 |
| DORAB | A-412 | Nut for outside connecting rod cap bolt | 11669 | .10 |
| FORAB | A-413 | Cotter pin for nut, per doz. .25 | 15162 | .05 |
| KORAB | A-415 | Bolt for inside connecting rod cap | 32606 | .30 |
| LORAB | A-416 | Nut for inside connecting rod cap bolt | 11668 | .15 |
| MORAB | A-417 | Cotter pin for nut, per doz. .25 | 15163 | .05 |
| PORAB | A-419 | Bearing for connecting rod (halves not sold separately) | 22617 | 5.00 |
| SORAB | A-419D | Bearing for connecting rod **.005 undersize** | 22616 | 5.00 |
| TORAB | A-419E | Bearing for connecting rod **.020 undersize** | 41899 | 5.00 |
| RORAB | A-420* | Shim for connecting rod bearing | 30156 | .03 |

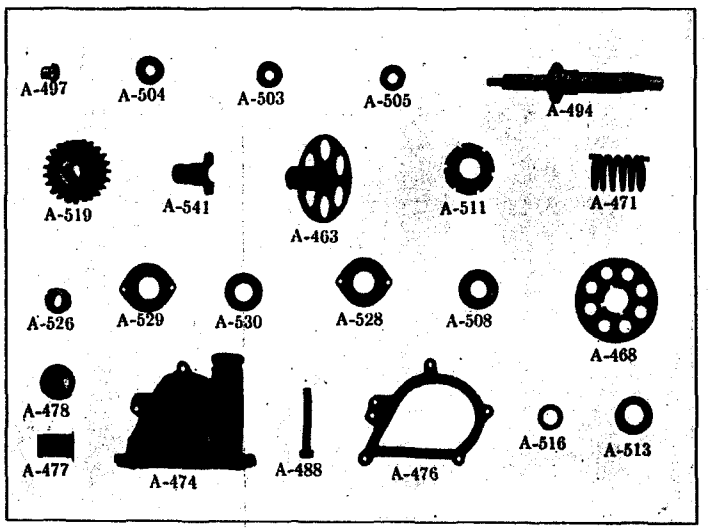
**NOTE:—Shims for connecting rod bearings may be had in the following thicknesses: .002, .003, .004, .005.**

| | | | | |
|---|---|---|---|---|
| CURAB | A-422 | Dowel for connecting rod bearing, per doz. .25 | 32608 | .05 |
| FURAB | A-433 | Piston with rings | 25245 | 4.00 |
| LURAB | A-436 | Piston with rings **(standard high limit)** | 25330 | 4.00 |
| MURAB | A-437 | Piston with rings, **first oversize** | 25980 | 4.00 |
| PURAB | A-438 | Piston with rings, **second oversize** | 25981 | 4.00 |
| RURAB | A-439 | Piston ring, 3 used | 30736 | .30 |
| TURAB | A-441 | Piston ring, **first oversize**, 3 used | 30776 | .30 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BASAB | A-443 | Piston ring, **second oversize**, 3 used | 30778 | .30 |
| DASAB | A-448 | Wrist pin | 37673 | 1.00 |
| FASAB | A-451 | Wrist pin **.003 oversize** | 37087 | 1.00 |
| KASAB | A-453 | Wrist pin bushing | 32607 | .50 |
| LASAB | A-456 | Lock screw for wrist pin to piston | 32540 | .10 |
| MASAB | A-458-A | Lock washer for screw, per doz. .25 | 11324 | .05 |

## FAN AND FAN HOUSING

| | | | | |
|---|---|---|---|---|
| CESAB | A-460 | Fan complete (blades, rim and disc) | 22246 | 6.50 |
| DESAB | A-463 | Driving disc for fan, front, with pins and bushings | 22528 | 4.50 |
| FESAB | A-465 | Pin for fan driving disc | 30842 | .05 |
| KESAB | A-466 | Bushing for fan driving disc | 31139 | .20 |
| LESAB | A-468 | Pressure disc for fan, rear | 30846 | 2.00 |
| MESAB | A-471 | Spring for fan drive | 30845 | .40 |
| PESAB | A-476 | Gasket between fan housing and distributor | 31107 | .05 |
| RESAB | A-477 | Strainer for oil filler in fan housing | 23325 | .50 |
| SESAB | A-478 | Cap, oil filler, on fan housing | 13118 | .50 |
| TESAB | A-479 | Washer for oil filler cap | 38077 | .05 |
| ZESAB | A-482 | Screw, fan housing to crank case | 10026 | .10 |
| BISAB | A-483 | Lock washer, per doz. .25 | 11325 | .05 |
| CISAB | A-484 | Threaded dowel, fan housing to crank case | 19714 | .10 |
| FISAB | A-487 | Screw, short, fan housing to distributor | 10028 | .10 |
| KISAB | A-488 | Screw, long, fan housing to distributor | 11859 | .20 |
| LISAB | A-489 | Stud in distributor for fan housing, per doz. .25 | 19777 | .05 |
| MISAB | A-490 | Nut | 11678 | .05 |
| PISAB | A-491 | Lock washer, per doz. .25 | 11325 | .05 |




FAN HOUSING



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BATAB | A-494 | Fan shaft | 31842 | 5.20 |
| CATAB | A-497 | Nut for front end of fan shaft | 30823 | .60 |
| DATAB | A-499 | Cotter pin for nut on front end, per doz. .25 | 15176 | .05 |
| FATAB | A-503 | Fibre thrust washer on front end of fan shaft | 11505 | .20 |
| KATAB | A-504 | Front washer for thrust bearing | 11503 | .30 |
| LATAB | A-505 | Rear washer for thrust bearing | 11504 | .30 |
| MATAB | A-506 | Pin locking thrust bearing washers, per doz. .25 | 32793 | .05 |
| PATAB | A-507 | Dust cover for fan shaft thrust bearing | 30902 | .10 |
| RATAB | A-508 | Ball bearing, front and rear on fan shaft (No. 205 single roll) | 19484 | 5.80 |
| SATAB | A-511 | Retainer, fan shaft bearing, front | 31968 | 1.75 |
| TATAB | A-513 | Felt washer for front retainer | 11808 | .05 |
| ZATAB | A-516 | Spacer for fan shaft front bearing | 31969 | .08 |
| BETAB | A-517 | Spacer between sprocket and front bearing | 30811 | .15 |
| CETAB | A-519 | Sprocket for fan drive | 31172 | 3.00 |
| DETAB | A-520 | Key for sprocket | 11363 | .05 |
| FETAB | A-526 | Lock nut for rear fan shaft bearing | 30813 | .55 |
| KETAB | A-527 | Cotter pin, per doz. .25 | 15169 | .05 |
| LETAB | A-528 | Retainer, inner, for rear fan shaft bearing felt | 31378 | .15 |
| METAB | A-529 | Retainer, outer, for rear fan shaft bearing felt | 31379 | .25 |
| PETAB | A-530 | Felt washer between retainers | 11506 | .10 |
| RETAB | A-531 | Screw, attaching retainers, per doz. .25 | 10272 | .05 |
| SETAB | A-532 | Lock washer, per doz. .25 | 11314 | .05 |
| TETAB | A-541 | Coupling on fan shaft for generator coupling | 32618 | 2.25 |
| ZETAB | A-542 | Woodruff key for coupling | 11359 | .05 |
| BITAB | A-543 | Screw in end of fan shaft for coupling | 10059 | .10 |
| CITAB | A-544 | Flat washer, per doz. .25 | 11512 | .05 |
| DITAB | A-545 | Lock washer, per doz. .25 | 11327 | .05 |

## WATER PUMP AND DRIVE SHAFT

| | | | | |
|---|---|---|---|---|
| FITAB | A-554 | Water pump complete, RIGHT | 23907 | 35.00 |
| KITAB | A-555 | Water pump complete, LEFT | 23908 | 35.00 |
| LITAB | A-557 | Stud water pump to crank case, per doz. .25 | 34750 | .05 |
| MITAB | A-558 | Nut | 11678 | .05 |
| PITAB | A-559 | Lock washer, per doz. .25 | 11325 | .05 |
| RITAB | A-563 | Body of water pump with bushing and studs, RIGHT | 23584 | 7 50 |
| SITAB | A-565 | Body of water pump with bushing and studs, LEFT | 23585 | 7.50 |
| TITAB | A-566 | Stud in body of water pump attaching cover | 19770 | .05 |
| ZITAB | A-567 | Nut, per doz. .25 | 11674 | .05 |
| BOTAB | A-568 | Lock washer, per doz. .25 | 11314 | .05 |
| COTAB | A-572 | Bushing for water pump body, RIGHT | 34789 | 1.30 |
| DOTAB | A-574 | Bushing for water pump body, LEFT | 34790 | 1.30 |
| FOTAB | A-575 | Dowel for bushing, per doz. .25 | 19716 | .05 |
| KOTAB | A-577 | Cover for water pump with bushing | 23645 | 6.00 |
| LOTAB | A-578 | Bushing in pump cover | 19517 | .50 |
| MOTAB | A-579 | Gasket for pump cover, per doz. .25 | 19512 | .05 |
| POTAB | A-580 | 1/8" plug for side of pump cover | 3467 | .05 |
| ROTAB | A-581 | Drain plug for pump cover | 11834 | .15 |
| SOTAB | A-582 | Gasket for drain plug, per doz. .25 | 30201 | .05 |
| TOTAB | A-583 | Drive shaft for pump (male) | 19513 | 1.75 |
| ZOTAB | A-584 | Spiral gear on water pump drive shaft | 19522 | 2.50 |
| BUTAB | A-585 | Woodruff key | 11361 | .05 |
| CUTAB | A-587 | Bearing for water pump shaft, RIGHT, with LEFT hand thread | 32626 | 3.50 |
| DUTAB | A-589 | Bearing for water pump shaft, LEFT, with RIGHT hand thread | 32627 | 3.75 |
| KUTAB | A-591 | Lock screw for pump shaft bearing | 32536 | .10 |
| LUTAB | A-592 | Lock washer, per doz. .25 | 11324 | .05 |
| MUTAB | A-593 | Packing nut for pump shaft, RIGHT, with LEFT hand thread | 32539 | .35 |
| RUTAB | A-594 | Packing nut for pump shaft, LEFT, with RIGHT hand thread | 32538 | .35 |
| SUTAB | A-595 | Packing for water pump drive shaft bearing (2 pieces) | 34636 | .25 |
| TUTAB | A-596 | Thrust washer for pump bearing | 11462 | .30 |
| ZUTAB | A-597 | Ball retainer and balls for thrust bearing | 20577 | .60 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAZAB | A-599 | Shaft for water pump, female (2 used) | 34784 | 3.50 |
| CAZAB | A-600 | Pump impeller, RIGHT | 19514 | 2.20 |
| DAZAB | A-601 | Pump impeller, LEFT | 19515 | 2.20 |
| FAZAB | A-602 | Taper pin, impeller to shaft, per doz. .25 | 15051 | .05 |
| KAZAB | A-603 | Thrust washer for pump impeller | 19518 | .25 |
| LAZAB | A-607 | Gland nut for shaft, RIGHT hand thread | 34661 | 1.00 |
| MAZAB | A-609 | Gland nut for shaft, LEFT hand thread | 34662 | 1.00 |
| PAZAB | A-610 | Lock for gland nut, RIGHT | 37053 | .10 |
| RAZAB | A-611 | Lock for gland nut, LEFT | 37054 | .10 |
| SAZAB | A-612 | Screw for lock, per doz. .25 | 11980 | .05 |
| TAZAB | A-615 | Gland for water pump shaft packing | 34663 | .35 |
| ZAZAB | A-616 | Packing for female pump shaft | 37065 | .25 |
| BEZAB | A-619 | Coupling for grease cup extension | 19754 | .08 |
| CEZAB | A-620 | Grease cup with ball check | 17055 | .50 |
| DEZAB | A-623 | Collar for water pump shaft | 32537 | .10 |
| FEZAB | A-624 | Clip for grease cup extension | 38037 | .05 |
| KEZAB | A-625 | Extension for grease cup | 38038 | .25 |
| LEZAB | A-626 | Elbow for grease cup extension | 38036 | .40 |
| MEZAB | A-631 | Body for thermostat valve, RIGHT | 37072 | 4.00 |
| PEZAB | A-632 | Body for thermostat valve, LEFT | 37073 | 4.00 |
| REZAB | A-633 | Screw, thermostat body to pump | 11839 | .15 |
| SEZAB | A-634 | Lock washer, per doz. .25 | 11325 | .05 |
| TEZAB | A-635 | Gasket, thermostat body and pump, per doz. .25 | 30132 | .05 |
| ZEZAB | A-638 | Cap for thermostat valve body | 38093 | .40 |
| BIZAB | A-641 | Gasket, thermostat body and cap, per doz. .25 | 30133 | .05 |
| CIZAB | A-642 | Screw, cap to thermostat body | 10273 | .05 |
| DIZAB | A-643 | Lock washer, per doz. .25 | 11314 | .05 |
| FIZAB | A-645 | Expanding member of thermostat with drain pin | 23581 | 4.00 |
| KIZAB | A-646 | Valve for thermostat | 30134 | 1.20 |
| LIZAB | A-647 | Nut adjusting thermostat valve | 30159 | .20 |
| MIZAB | A-648 | Cam for thermostat valve | 19886 | .85 |
| PIZAB | A-649 | Retainer nut for thermostat cam | 19888 | .80 |
| RIZAB | A-650 | Gasket for retaining nut, per doz. .25 | 30594 | .05 |
| SIZAB | A-651 | Packing nut for thermostat cam | 19885 | .20 |
| TIZAB | A-652 | Packing for thermostat cam | 32128 | .10 |

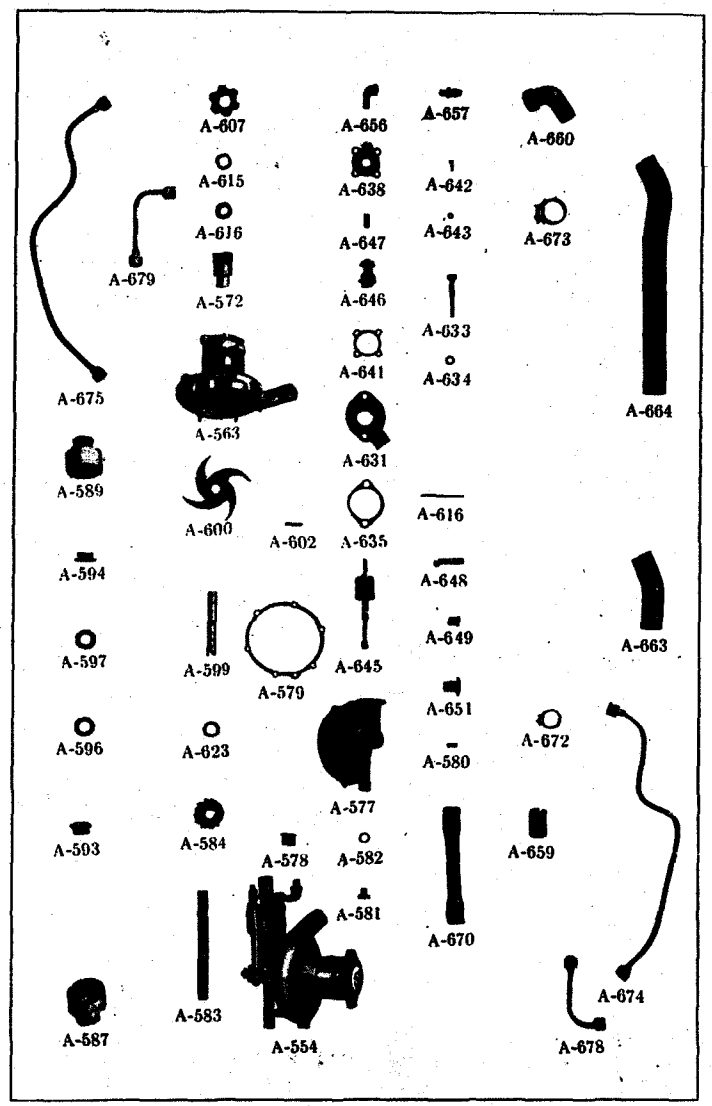
## WATER CONNECTIONS

| | | | | |
|---|---|---|---|---|
| ZIZAB | A-655 | Elbow on cylinder head for thermostat connection | 38072 | 1.00 |
| BOZAB | A-656 | Elbow on thermostat cover for water connection | 30375 | .05 |
| COZAB | A-657 | Nipple on thermostat and cylinder for water pipe connection | 16498 | .40 |
| DOZAB | A-659 | Nipple on cylinder for water outlet | 19733 | .35 |
| FOZAB | A-660 | Elbow on cylinder for water inlet | 19732 | 1.00 |
| KOZAB | A-663 | Hose connection from radiator to pump | 37079 | .45 |
| LOZAB | A-664 | Hose connection from water pump to cylinder | 19730 | .75 |
| MOZAB | A-669 | Hose connection from cylinder to radiator | 38098 | .45 |
| POZAB | A-670 | Hose connection from cylinder to thermostat | 51292 | .30 |
| ROZAB | A-672 | Clamp for hose, small (4 used) | 34020 | .20 |
| SOZAB | A-673 | Clamp for hose, large | 30721 | .25 |
| TOZAB | A-674 | Copper water pipe from water pump to intake manifold, RIGHT | 20666 | 1.00 |
| ZOZAB | A-675 | Copper water pipe from water pump to intake manifold, LEFT | 20667 | 1.00 |
| BUZAB | A-678 | Copper water pipe from cylinder to intake manifold, RIGHT | 23967 | 1.00 |
| CUZAB | A-679 | Copper water pipe from cylinder to intake manifold, LEFT | 23968 | 1.00 |
| DUZAB | A-680 | Nut for water pipe connection | 11688 | .20 |

## OIL PUMP AND DRIVE SHAFT

| | | | | |
|---|---|---|---|---|
| MUZAB | A-684 | Casing with bushing for oil pump | 24251 | 7.50 |
| PUZAB | A-685 | Bushing for oil pump gear | 19535 | .30 |
| RUZAB | A-686 | Drive gear for oil pump | 19533 | 2.00 |
| SUZAB | A-687 | Driven gear for oil pump | 19534 | 1.75 |
| TUZAB | A-688 | Shaft for oil pump drive | 19529 | .75 |
| ZUZAB | A-689 | Spacer for oil pump shaft | 19530 | .25 |






WATER PUMPS, DRIVE SHAFTS AND WATER CONNECTIONS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAFED | A-690 | Dowel for spacer on shaft, per doz. .25 | 19776 | .05 |
| CAFED | A-691 | Spiral gear for oil pump drive, 20 teeth | 19528 | 5.75 |
| DAFED | A-692 | Taper pin | 15032 | .05 |
| FAFED | A-693 | Gasket between oil pump and front end cover, per doz. .25 | 19610 | .05 |
| KAFED | A-694 | Nut on stud attaching pump, per doz. .25 | 11674 | .05 |
| LAFED | A-695 | Lock washer, per doz. .25 | 11314 | .05 |
| MAFED | A-696 | Dowel for oil pump casing, per doz. .25 | 19660 | .05 |
| PAFED | A-701 | Gasket, large, for ⅝" elbow and between crank case and ½" elbow, 3 used, per doz. .25 | 19662 | .05 |
| SAFED | A-704 | Nut on studs and screw attaching elbows, per doz. .25 | 11674 | .05 |
| TAFED | A-705 | Lock washer, per doz. .25 | 11314 | .05 |

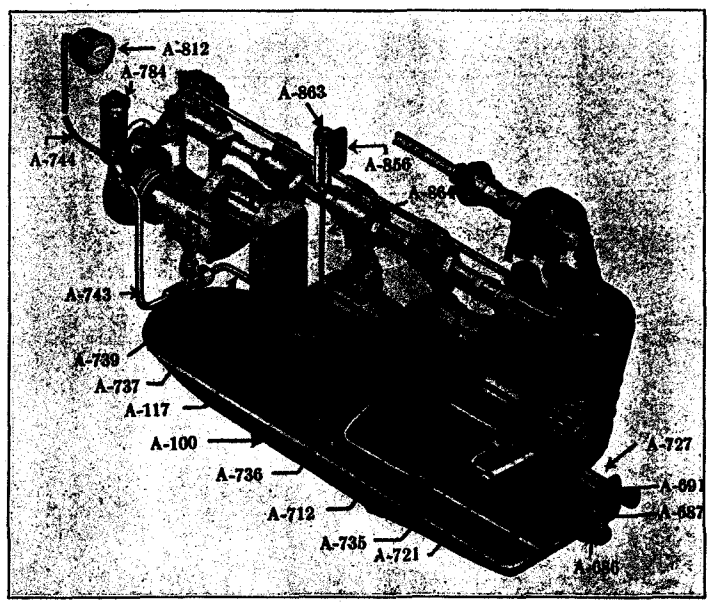
## OIL PIPING

| | | | | |
|---|---|---|---|---|
| LEFED | A-712 | Suction pipe with flange and union nut | 22283 | 2.25 |
| MEFED | A-713 | Stud attaching flange to baffle plate, per doz. .25 | 30372 | .05 |
| PEFED | A-714 | Nut, per doz. .25 | 11674 | .05 |
| REFED | A-715 | Lock washer, per doz. .25 | 11314 | .05 |
| SEFED | A-717 | Gasket for suction pipe flange | 32602 | .05 |
| TEFED | A-718 | Union nut, RIGHT hand connection for suction pipe | 32550 | .15 |
| ZEFED | A-719 | Clip, upper, for oil suction pipe, per doz. .25 | 19666 | .05 |
| BIFED | A-720 | Clip, lower, for oil suction pipe, per doz. .25 | 19667 | .05 |
| CIFED | A-721 | Pipe connecting suction pipe with elbow on crank case, RIGHT side | 32548 | 1.25 |
| DIFED | A-723 | Header pipe for oil pump (2nd type on 51) | 30161 | 4.00 |
| FIFED | A-724 | Sleeve nipple for header pipe connection | 19638 | .30 |
| KIFED | A-726 | Union nut for header pipe connection | 32551 | .15 |
| LIFED | A-727 | Pipe connecting header pipe to elbow on crank case, LEFT side | 19794 | 1.00 |
| MIFED | A-728 | Clip, upper, for oil header pipe, per doz. .25 | 19668 | .05 |
| PIFED | A-729 | Clip, lower, for oil header pipe, per doz. .25 | 19665 | .05 |
| RIFED | A-730 | Screw for clips for header and suction pipe, per doz. .25 | 11616 | .05 |
| SIFED | A-731 | Nut | 11676 | .03 |
| TIFED | A-732 | Lead washer, per doz. .25 | 11459 | .05 |
| ZIFED | A-733 | Flat washer, per doz. .25 | 11464 | .05 |
| BOFED | A-734 | Lock washer, per doz. .25 | 11315 | .05 |
| COFED | A-735 | Oil pipe from header to front main bearing | 20661 | .85 |
| DOFED | A-736 | Oil pipe from header to center main bearing | 20668 | .85 |
| FOFED | A-737 | Oil pipe from header to rear main bearing tee | 20679 | .85 |
| KOFED | A-739 | Pipe and tee complete on rear main bearing for oil pipe connection (2nd type on 51) | 20470 | 1.25 |
| LOFED | A-743 | Pipe with flange from tee to relief valve on crank case | 20779 | 1.50 |
| MOFED | A-744 | Pipe from oil relief valve to dash | 23388 | 2.00 |
| POFED | A-745 | Flange for ⅜" pipe on oil relief valve | 30120 | .45 |
| ROFED | A-746 | Gasket for ⅜" pipe flange on oil relief valve, per doz. .25 | 30122 | .05 |
| SOFED | A-755 | Oil pipe from elbow on dash to gauge except (SB-1) (SB-2) | 22413 | .75 |
| TOFED | A-758 | Oil pipe from elbow on dash to gauge (SB-1) (SB-2) (V-2) (B-2) | 25249 | .75 |
| ZOFED | A-760 | Thick fibre block for oil pipe on dash | 19871 | .05 |
| BUFED | A-761 | Fibre block for single clip (countersunk hole) | 38114 | .10 |
| CUFED | A-762 | Thin fibre clip for oil pipes on dash | 19329 | .05 |
| DUFED | A-763 | Clip, single (sheet steel) for oil pipe on dash | 19330 | .05 |
| FUFED | A-765 | Screw to attach clips to dash, per doz. .25 | 10598 | .05 |
| KUFED | A-766 | Screw to attach clips to dash (CC), per doz. .25 | 36359 | .05 |
| LUFED | A-767 | Nut, per doz. .25 | 10889 | .05 |
| MUFED | A-768 | Lock washer, per doz. .25 | 11314 | .05 |
| PUFED | A-773 | Nut for elbow | 11656 | .15 |
| RUFED | A-774 | Nut for ⅜" copper pipe union | 11688 | .20 |
| SUFED | A-775 | Nut for ½" copper pipe union | 11687 | .20 |
| TUFED | A-776 | Nut for ¼" copper pipe union | 18286 | .15 |
| ZUFED | A-777 | Nipple on main bearing plate for oil pipe connection | 19596 | .40 |



## OIL RELIEF VALVE

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAHED | A-784 | Oil relief housing complete | 22294 | 6.00 |
| CAHED | A-786 | Oil relief housing only, with nipple and valve seat | 22560 | 4.25 |
| DAHED | A-787 | Nut on stud attaching oil relief housing, per doz. .25 | 11674 | .05 |
| FAHED | A-788 | Lock washer, per doz. .25 | 11314 | .05 |
| KAHED | A-789 | Seat for oil relief housing | 19591 | .45 |
| LAHED | A-790 | Gasket for outlet branch of relief housing, per doz. .25 | 30124 | .05 |
| MAHED | A-791 | Gasket for inlet branch of oil relief housing, per doz. .25 | 30122 | .05 |
| PAHED | A-792 | ¾" ball for oil relief valve | 19955 | .25 |
| RAHED | A-794 | Spring for oil relief valve | 30475 | .10 |
| SAHED | A-795 | Seat, lower for oil relief valve spring | 30757 | .10 |
| TAHED | A-797 | Stud adjusting oil relief valve | 32543 | .05 |
| ZAHED | A-799 | Seat, upper, on stud for oil relief valve spring | 32544 | .10 |
| BEHED | A-800 | Nut, locking upper seat | 11720 | .05 |
| CEHED | A-806 | Cap for oil relief valve | 32542 | .45 |
| DEHED | A-807 | Gasket for cap, per doz. .25 | 19674 | .05 |
| FEHED | A-810 | Nipple in oil relief housing for pipe connection | 32553 | .20 |




ENGINE OILING SYSTEM

## OIL PRESSURE GAUGE

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAKED | A-812 | Oil pressure gauge complete on instrument board | 32970 | 2.00 |
| CAKED | A-813 | Strap for oil pressure gauge (OC) (S) (M) (A) | 18874 | .10 |
| DAKED | A-814 | Strap for oil pressure gauge (CC) | 18875 | .10 |
| FAKED | A-815 | Alignment strap for pressure gauge | 37090 | .05 |
| KAKED | A-816 | Flat washer for oil pressure gauge (CC) | 31463 | .05 |
| LAKED | A-817 | Nut, strap on gauge, per doz. .25 | 10888 | .05 |
| MAKED | A-818 | Lock washer, per doz. .25 | 11314 | .05 |
| PAKED | A-819 | Glass for oil pressure gauge | 754 | .20 |
| RAKED | A-820 | Spacing ring for glass | 821 | .10 |
| SAKED | A-821 | Ring retainer for glass | 1425 | .20 |

## OIL LEVEL INDICATOR

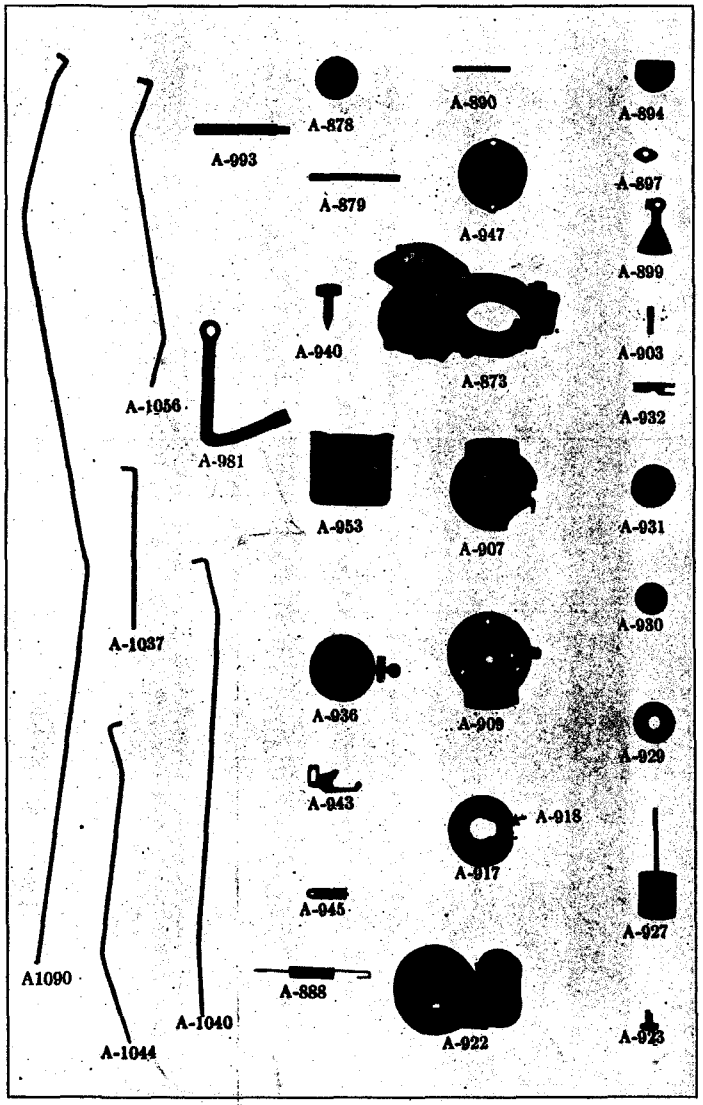
| | | | | |
|---|---|---|---|---|
| KEKED | A-856 | Body with dial and glass for oil indicator | 22103 | 1.80 |
| LEKED | A-858 | Body and dial for oil indicator | 22539 | 1.40 |
| MEKED | A-859 | Rivet for dial to body, per doz. .25 | 17649 | .05 |
| PEKED | A-860 | Screw, indicator to top cover | 10273 | .05 |
| REKED | A-861 | Glass for oil indicator | 31771 | .20 |
| SEKED | A-862 | Gasket for glass in oil indicator body, per doz. .25 | 31772 | .05 |
| TEKED | A-863 | Plug in top oil indicator body | 31777 | .15 |
| ZEKED | A-864 | Rod and float for oil indicator | 21772 | .65 |
| BIKED | A-865 | Ball for oil indicator rod | 31781 | .10 |
| CIKED | A-866 | Guide in baffle plate | 31773 | .05 |

## CARBURETOR

| | | | | |
|---|---|---|---|---|
| RIKED | A-871 | Carburetor complete, LEFT steering | 22344 | 30.00 |
| SIKED | A-872 | Carburetor complete, RIGHT steering | 22840 | 30.00 |
| TIKED | A-873 | Carburetor body with bushings, throttle and automatic valves, LEFT steering | 21741 | 10.00 |
| BOKED | A-874 | Carburetor body with bushings, throttle and automatic valves, RIGHT steering | 21744 | 10.00 |
| DOKED | A-875 | Gasket for carburetor at intake manifold | 19963 | .05 |
| FOKED | A-876 | Retainer for auxiliary air valve seat | 19393 | .10 |
| KOKED | A-877 | Leather for auxiliary air valve seat | 19395 | .08 |
| LOKED | A-878 | Throttle valve only | 19392 | .10 |
| MOKED | A-879 | Shaft for throttle valve, LEFT steering | 31473 | .35 |
| POKED | A-880 | Shaft for throttle valve, RIGHT steering | 31626 | .35 |
| ROKED | A-881 | Screw, throttle valve on shaft, per doz. .25 | 9580 | .05 |
| SOKED | A-882 | Throttle control lever, LEFT steering | 31217 | .60 |
| TOKED | A-883 | Throttle control lever, RIGHT steering | 31625 | .50 |
| ZOKED | A-884 | Adjusting screw for throttle lever, per doz. .25 | 11872 | .05 |
| BUKED | A-885 | Clamp screw for lever and adjusting clamp, per doz. .25 | 11828 | .05 |
| CUKED | A-886 | Bushing for throttle shaft in body | 19855 | .10 |
| DUKED | A-887 | Taper pin for throttle lever, per doz. .25 | 15000 | .05 |
| FUKED | A-888 | Spring operating throttle valve | 19913 | .10 |
| KUKED | A-889 | Shaft with spring and cap for automatic throttle valve, LEFT steering | 21406 | .30 |
| MUKED | A-890 | Shaft for automatic throttle valve | 31634 | .15 |
| PUKED | A-891 | Spring for automatic throttle valve | 31636 | .05 |
| RUKED | A-892 | Cap for spring on automatic throttle valve | 31635 | .05 |
| SUKED | A-893 | Spacer for automatic throttle shaft | 31603 | .05 |
| TUKED | A-894 | Disc for automatic throttle valve | 31633 | .10 |
| ZUKED | A-895 | Stop pin for automatic throttle disc, per doz. .25 | 31621 | .05 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BALED | A-896 | Screw, disc to shaft, per doz. .25 | 11866 | .05 |
| CALED | A-897 | Clamp plate for automatic throttle valve cap | 31637 | .05 |
| DALED | A-898 | Screw for clamp plate, per doz. .25 | 11873 | .05 |
| FALED | A-899 | Shutter for vacuum regulator | 31398 | .40 |
| LALED | A-901 | Clamp screw for shutter and vacuum regulating screw, per doz. .25 | 11828 | .05 |
| PALED | A-902 | Taper pin on shutter, per doz. .25 | 15142 | .05 |
| RALED | A-903 | Vacuum regulating screw | 31457 | .10 |
| SALED | A-907 | Strangle tube complete | 21355 | .75 |
| TALED | A-909 | Diaphragm with drain tube | 22680 | 3.50 |
| ZALED | A-910 | Cork gasket for bowl | 31223 | .05 |
| BELED | A-911 | Strainer with ring in connection at diaphragm | 22339 | .25 |
| CELED | A-912 | Strainer housing on diaphragm | 33271 | .50 |
| DELED | A-913 | Washer for strainer, per doz. .25 | 33280 | .05 |
| FELED | A-914 | Spray nozzle No. 17 with stop | 22059 | .50 |
| KELED | A-915 | Needle valve | 13392 | .25 |
| LELED | A-916 | Screw, diaphragm to body (3 used), per doz. .25 | 10239 | .05 |
| MELED | A-917 | Cork float | 18002 | .50 |
| PELED | A-918 | Lever for carburetor float | 18003 | .10 |
| RELED | A-919 | Pin for float lever, per doz. .25 | 18000 | .05 |
| SELED | A-920 | Screw for float lever, per doz. .25 | 11858 | .05 |
| TELED | A-922 | Bowl and accelerator chamber with disc and nipple for packing nut | 22341 | 5.25 |
| BILED | A-923 | Screw in bottom of bowl | 31591 | .15 |
| CILED | A-924 | Leather washer for screw, per doz. .25 | 14882 | .05 |
| DILED | A-925 | Packing nut for drain tube in bottom of bowl | 34136 | .10 |
| FILED | A-926 | Packing for nut on drain tube in bottom of bowl | 34137 | .05 |
| KILED | A-927 | Plunger with rod for accelerator chamber | 22255 | 1.00 |
| LILED | A-928 | Cork stopper for plunger well | 32213 | .10 |
| MILED | A-929 | Cover plate for plunger on accelerator chamber | 19876 | .05 |
| PILED | A-930 | Packing washer between cover plate and chamber | 11467 | .15 |
| RILED | A-931 | Cap for plunger on accelerator chamber | 19875 | .15 |
| SILED | A-932 | Adjusting clamp for plunger | 31222 | .35 |
| TILED | A-933 | Screw for plunger adjusting clamp, per doz. .25 | 11828 | .05 |
| ZILED | A-934 | Pin for plunger clamp and accelerator lever | 16221 | .05 |
| BOLED | A-935 | Cotter pin | 15251 | .03 |
| COLED | A-936 | Auxiliary air valve | 19391 | 1.00 |
| DOLED | A-937 | Spring for auxiliary air valve | 19828 | .10 |
| FOLED | A-938 | Pin for auxiliary air valve | 16220 | .05 |
| KOLED | A-939 | Cotter pin | 15251 | .03 |
| LOLED | A-940 | Adjusting screw for auxiliary air valve | 20412 | .45 |
| MOLED | A-941 | Plunger for adjusting screw | 12265 | .05 |
| POLED | A-942 | Spring for plunger | 12266 | .03 |
| ROLED | A-943 | Lever arm for auxiliary air valve | 16404 | .30 |
| SOLED | A-944 | Spring for lever arm | 16410 | .05 |
| TOLED | A-945 | Cover for lever arm slot | 16405 | .05 |
| ZOLED | A-946 | Screw attaching cover, per doz. .25 | 11829 | .05 |
| BULED | A-947 | Cover plate complete for air valve | 20475 | .30 |
| CULED | A-948 | Cover plate only for auxiliary air valve | 19854 | .15 |
| DULED | A-949 | Cork stop for auxiliary air valve | 19933 | .10 |
| FULED | A-950 | Rivet for stop, per doz. .25 | 17688 | .05 |
| KULED | A-951 | Washer for rivet, per doz. .25 | 11472 | .05 |
| LULED | A-952 | Screw, attaching cover, per doz. .25 | 11829 | .05 |
| MULED | A-953 | Shield for auxiliary air inlet | 31288 | .30 |
| PULED | A-954 | Screw attaching shield, per doz. .25 | 11829 | .05 |
| RULED | A-955 | Screw, carburetor to intake manifold | 11643 | .10 |




CARBURETOR SPARK AND THROTTLE CONTROL



## CARBURETOR DRAIN

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAPED | A-960 | Drain pocket for carburetor | 34176 | 1.75 |
| CAPED | A-963 | Support for drain pocket | 34175 | .30 |
| DAPED | A-965 | Clamp screw, drain pocket on support stud | 11644 | .05 |
| FAPED | A-966 | Lock washer, per doz. .25 | 11314 | .05 |
| KAPED | A-967 | Lock washer under support stud, per doz. .25 | 11325 | .05 |
| LAPED | A-971 | Front drain pipe with nut and clip | 22765 | 1.15 |
| MAPED | A-973 | Rear drain pipe with nut and clip | 22766 | 1.15 |
| PAPED | A-974 | Nut for drain pipe connection | 11687 | .20 |
| RAPED | A-975 | Clip for front drain pipe | 34182 | .05 |

## SPARK AND THROTTLE CONTROL

| | | | | |
|---|---|---|---|---|
| TAPED | A-981 | Accelerator foot pedal, LEFT steering | 31953 | 2.65 |
| ZAPED | A-983 | Accelerator foot pedal, RIGHT steering | 34324 | 1.25 |
| BEPED | A-984 | Button for accelerator pedal | 19766 | .60 |
| CEPED | A-986 | Lock washer for button, per doz. .25 | 11335 | .05 |
| DEPED | A-987 | Clamp screw for accelerator pedal, LEFT steering | 10275 | .05 |
| FEPED | A-988 | Lock washer, per doz. .25 | 11314 | .05 |
| KEPED | A-992 | Shaft for accelerator pedal, RIGHT steering | 30835 | .15 |
| LEPED | A-993 | Shaft for accelerator pedal, LEFT steering | 31951 | .15 |
| MEPED | A-994 | Bushing for accelerator shaft, RIGHT steering | 30836 | .40 |
| PEPED | A-995 | Taper pin for accelerator pedal to shaft, per doz. .25 | 15016 | .05 |
| REPED | A-996 | Bushing for accelerator shaft, LEFT steering | 31948 | .35 |
| SEPED | A-997 | Bowen oiler in bracket for accelerator pedal | 30772 | .20 |
| TEPED | A-998 | Bowen oiler on bracket for pedal shaft, RIGHT steering | 32303 | .20 |
| ZEPED | A-1003 | Screw to attach bracket | 10008 | .10 |
| BIPED | A-1008 | Rocker shaft for spark control, RIGHT steering | 30965 | .25 |
| CIPED | A-1009 | Bushing for spark control rocker shaft, RIGHT steering | 30959 | .60 |
| DIPED | A-1011 | Bracket on transmission case with bushing for spark control shaft, RIGHT steering | 24291 | 1.60 |
| KIPED | A-1012 | Screw to attach bracket | 10008 | .10 |
| LIPED | A-1013 | Lock washer for screw, per doz. .25 | 11324 | .05 |
| MIPED | A-1015 | Lever for accelerator pedal shaft, LEFT steering | 31950 | .35 |
| PIPED | A-1016 | Taper pin, per doz. .25 | 15016 | .05 |
| RIPED | A-1020 | Bell crank for throttle control, LEFT steering | 31949 | .70 |
| SIPED | A-1023 | Bell crank for throttle control, RIGHT steering | 30997 | .75 |
| TIPED | A-1026 | Arm on rocker shaft for spark rods to distributor, RIGHT steering | 19066 | .40 |
| BOPED | A-1027 | Clamp screw for arm | 10273 | .05 |
| COPED | A-1028 | Lock washer, per doz. .25 | 11314 | .05 |
| DOPED | A-1029 | Arm on rocker shaft for spark control, LEFT steering | 30837 | .50 |
| FOPED | A-1030 | Rocker arm for spark rod to steering gear, RIGHT steering | 31940 | .45 |
| KOPED | A-1031 | Clamp screw for rocker arm | 10273 | .05 |
| LOPED | A-1032 | Lock washer, per doz. .25 | 11324 | .05 |
| MOPED | A-1037 | Rod, 2nd type accelerator pedal to bell crank, LEFT steering | 31952 | .35 |
| POPED | A-1040 | Accelerator rod, bell crank to carburetor, LEFT steering | 31306 | .30 |
| ROPED | A-1041 | Accelerator rod, bell crank to carburetor, RIGHT steering | 31606 | .30 |
| SOPED | A-1044 | Throttle rod, bell crank to steering gear, LEFT steering | 31588 | .30 |
| TOPED | A-1048 | Throttle rod, bell crank to steering gear, RIGHT steering | 31604 | .40 |
| ZOPED | A-1049 | Trunion for throttle rod at bell crank, LEFT steering | 19786 | .15 |
| BUPED | A-1050 | Collar for throttle rod | 51734 | .15 |
| CUPED | A-1051 | Set screw in collar, per doz. .25 | 5277 | .05 |
| DUPED | A-1052 | Trunion for throttle rod at bell crank, RIGHT steering | 31962 | .15 |
| FUPED | A-1053 | Cotter pin in ends of rods, per doz. .25 | 15251 | .05 |
| KUPED | A-1056 | Spark rod, bell crank to steering gear, LEFT steering | 31305 | .15 |
| LUPED | A-1057 | Spark rod, rocker shaft to steering column, RIGHT steering | 31605 | .20 |
| MUPED | A-1059 | Spark rod, rocker arm to distributor, LEFT steering | 31304 | .30 |
| PUPED | A-1060 | Spark rod, rocker shaft to distributor, RIGHT steering | 31602 | .35 |
| RUPED | A-1061 | Adjustable trunion for spark and accelerator rods | 19082 | .20 |
| SUPED | A-1063 | Support for spark rod to distributor, RIGHT steering | 31601 | .10 |

## AIR CONTROL RODS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BARED | A-1090 | Rod for auxiliary air control (7-P),(V-1), (S), (P-1) (R-1), LEFT steering | 37651 | .40 |
| DARED | A-1091 | Rod for auxiliary air control (R-2), (P-2), LEFT steering | 38133 | .40 |
| FARED | A-1092 | Rod for auxiliary air control (L), (I), (LD), (B-1), (TL), (TLD), (M), and (A), LEFT steering | 37652 | .40 |
| LARED | A-1092-A | Rod for auxiliary air control (V-2), (SB-2) | 38733 | .40 |
| MARED | A-1093 | Rod for auxiliary air control (7-P), (V-1), (S), (R-1) and (P-1), RIGHT steering | 37670 | .40 |
| RARED | A-1094 | Rod for auxiliary air control (R-2) and (P-2), RIGHT steering | 38134 | .40 |
| SARED | A-1095 | Rod for auxiliary air control (B-1), (I), (LD), (TL), (TLD), (M), and (A), RIGHT steering | 37671 | .40 |
| ZARED | A-1096 | Rod for auxiliary air control (SB-1) (SB-2), LEFT steering | 38228 | .40 |
| BERED | A-1097 | Rod for auxiliary air control (SB-1) (SB-2), RIGHT steering | 38229 | .40 |
| CERED | A-1100 | Flat washer on auxiliary air control rod, per doz. .25 | 11429 | .05 |
| DERED | A-1102 | Lock swivel for air control rod | 17021 | .15 |
| FERED | A-1103 | Set screw for lock swivel | 11253 | .05 |
| KERED | A-1107 | Air control lever | 33603 | .75 |
| LERED | A-1109 | Spring for air control lever | 33600 | .05 |
| MERED | A-1111 | Flat washer for air control lever spring, per doz. .25 | 11521 | .05 |
| PERED | A-1113 | Nut for air control lever stud | 33596 | .15 |
| RERED | A-1115 | Pin for nut on air control lever stud | 33597 | .05 |

## STARTER CONTROL

| | | | | |
|---|---|---|---|---|
| FIRED | A-1244 | Housing for starter gear | 32650 | 8.50 |
| KIRED | A-1246 | Top cover for starter housing | 31035 | .15 |
| LIRED | A-1247 | Screw for top cover, per doz. .25 | 10272 | .05 |
| MIRED | A-1248 | Lock washer, per doz. .25 | 11314 | .05 |
| PIRED | A-1249 | Screw, housing to generator | 10328 | .05 |
| RIRED | A-1250 | Lock washer, per doz. .25 | 11324 | .05 |
| SIRED | A-1251 | Screw, long, housing to crankcase | 10356 | .10 |
| TIRED | A-1252 | Screw, short, housing to crankcase | 10024 | .08 |
| ZIRED | A-1253 | Lock washer, per doz. .25 | 11325 | .05 |
| BORED | A-1254 | Shaft, LEFT, for starter shifter, LEFT steering | 30918 | .15 |
| CORED | A-1255 | Shaft, LEFT, for starter shifter, RIGHT steering | 31051 | .15 |
| DORED | A-1256 | Collar for LEFT shifter shaft | 30919 | .10 |
| FORED | A-1257 | Cotter pin in collar, per doz. .25 | 15165 | .05 |
| KORED | A-1258 | Shaft, RIGHT, for starter shifter | 30914 | .30 |
| LORED | A-1259 | Bowen oiler (2D-Vertical) in housing | 32303 | .20 |
| MORED | A-1260 | Lever on RIGHT shaft for starter pedal, all except (C) | 30915 | 1.00 |
| PORED | A-1263 | Spring for starter pedal | 30822 | .10 |
| RORED | A-1264 | Stud in housing for starter lever spring | 30838 | .05 |
| SORED | A-1266 | Stop screw for starter pedal lever, all except (C) on 53 | 30971 | .05 |
| TORED | A-1268 | Nut for stop screw, per doz. .25 | 11674 | .05 |
| ZORED | A-1269 | Shifter with pins for starter gear | 21782 | 3.75 |
| BURED | A-1270 | Pin for generator shifter fork | 19729 | .08 |
| CURED | A-1271 | Taper pin for shifter, per doz. .25 | 15028 | .05 |
| DURED | A-1272 | Pin in shifter operating lifting rod in generator | 30824 | .05 |
| FURED | A-1273 | Nut on pin | 11676 | .03 |
| KURED | A-1274 | Lock washer, per doz. .25 | 11324 | .05 |
| LURED | A-1277 | Shaft for starter clutch | 24516 | 1.25 |
| MURED | A-1278 | Set screw for shaft in housing | 11268 | .05 |
| PURED | A-1279 | Lock nut, per doz. .25 | 11674 | .05 |
| RURED | A-1282 | Elbow for starter clutch shaft | 24175 | .75 |
| SURED | A-1283 | Plug for elbow | 37094 | .10 |
| TURED | A-1290 | Starter pedal with pin, all except (C) | 21510 | 3.00 |
| ZURED | A-1291 | Pin in pedal operating starting lever, all except (C) | 30916 | .10 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BASED | A-1294 | Button for starter pedal, all (CC) except (V-1) (V-2) (SB-1) (SB-2) | 37645 | .60 |
| DASED | A-1295 | Button for starter pedal (OC) (V-1) (V-2) (SB-1) (SB-2) (S) (M) (A) | 37845 | .70 |
| KASED | A-1296 | Lock washer for button, per doz. .25 | 11335 | .05 |
| LASED | A-1299 | Fulcrum pin for pedal | 32790 | .30 |
| MASED | A-1303 | Nut for fulcrum pin | 11721 | .05 |
| PASED | A-1307 | Bracket on transmission for starter pedal | 37413 | 1.00 |
| RASED | A-1309 | Screw for bracket | 10007 | .05 |
| SASED | A-1311 | Lock washer, per doz. .25 | 11315 | .05 |
| TASED | A-1312 | Bowen oiler (2D-Vertical) in starter pedal | 32303 | .20 |

## STARTER CLUTCH

| | | | | |
|---|---|---|---|---|
| LESED | A-1317 | Starter clutch complete | 12677-D | 12.50 |
| MESED | A-1332 | Pinion complete for starter clutch | 12684-D | 4.00 |
| PESED | A-1333 | Inner retainer on back of clutch for hub and cam | 27828-D | .05 |
| RESED | A-1334 | Outer locking retainer on back of clutch for large gear on hub | 27827-D | .05 |
| SESED | A-1335 | Retaining ring between pinion and large gear | 27891-D | .10 |
| TESED | A-1336 | Large gear for starter clutch | 12679-D | 4.25 |
| ZESED | A-1338 | Cam for starter clutch | 27883-D | 2.00 |
| BISED | A-1340 | Roll for starter clutch cam | 25506-D | .10 |
| CISED | A-1341 | Plunger for starter clutch cam | 20017-D | .05 |
| DISED | A-1342 | Spring for starter clutch cam | 21538-D | .05 |

## GENERATOR AND GENERATOR DRIVE SHAFT. STARTING CABLE AND GROUND LEAD

| | | | | |
|---|---|---|---|---|
| LISED | A-1644 | Motor generator complete | 98-D | 140.75 |
| MISED | A-1645 | Screw, front, generator to rocker plate | 31844 | .15 |
| PISED | A-1646 | Screw, rear end of generator to cover plate | 11648 | .10 |
| RISED | A-1647 | Lock washer, per doz. .25 | 11327 | .05 |
| SISED | A-1651 | Generator drive shaft | 31834 | 1.70 |
| TISED | A-1652 | Coupling on rear end of generator drive shaft | 31833 | 1.70 |
| ZISED | A-1653 | Taper pin, per doz. .25 | 15030 | .05 |
| BOSED | A-1654 | Key for front and rear coupling | 11359 | .05 |
| COSED | A-1655 | Headless set screw for couplings | 11256 | .15 |
| DOSED | A-1656 | Ring for front and rear coupling on generator shaft | 31835 | .10 |
| FOSED | A-1657 | Screw, ring to front or rear coupling | 11878 | .05 |
| KOSED | A-1658 | Nut, per doz. .25 | 11674 | .05 |
| LOSED | A-1659 | Screw, ring to driving clutch, per doz. .25 | 10272 | .05 |
| MOSED | A-1660 | Lock washer, per doz. .25 | 11314 | .05 |
| POSED | A-1661 | Coupling, front end of generator drive shaft | 31832 | 1.50 |
| ROSED | A-1662 | Coupling on rear end of fan shaft | 32618 | 2.25 |
| SOSED | A-1663 | Screw in end of fan shaft for coupling | 10058 | .10 |
| TOSED | A-1664 | Special flat washer on screw, per doz. .25 | 11512 | .05 |
| ZOSED | A-1665 | Lock washer, per doz. .25 | 11327 | .05 |
| BUSED | A-1667 | Cable complete : enerator to storage battery | 22326 | 4.50 |
| CUSED | A-1668 | Conduit with flange for generator cable | 20984 | 1.50 |
| DUSED | A-1669 | Connector on cable at generator | 26192-D | .25 |
| FUSED | A-1670 | Screw, connector on generator | 26203-D | .05 |
| KUSED | A-1671 | Lock washer | 21163-D | .05 |
| LUSED | A-1674 | Battery lug (clamp), negative | 32996 | .40 |
| MUSED | A-1675 | Battery lug (clamp), positive | 39345 | .40 |
| PUSED | A-1677 | Ground lead, complete with connectors | 22327 | 1.25 |
| RUSED | A-1678 | Ground connection for storage battery on side bar | 19079 | .40 |
| SUSED | A-1679 | Screw, ground connection to frame | 10025 | .05 |
| TUSED | A-1680 | Nut | 10893 | .05 |
| ZUSED | A-1681 | Lock washer, per doz. .25 | 11316 | .05 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| CATED | A-1683 | Reinforcement for ground connection on frame | 16467 | .15 |
| DATED | A-1684 | Fibre bushing for generator cable | 18633 | .05 |
| FATED | A-1685 | Lead contact plate for ground connection next to frame | 16515 | .05 |
| KATED | A-1686 | Conduit for generator cover | 31278 | .75 |
| LATED | A-1687 | Screw, condulet to generator | 10273 | .05 |
| MATED | A-1688 | Lock washer, per doz. .25 | 11314 | .05 |

## GENERATOR FRAME, END FRAMES, TOP AND END COVERS

| | | | | |
|---|---|---|---|---|
| RATED | A-1691 | Generator frame, core, bottom and side frame | 12840-D | 14.70 |
| SATED | A-1692 | Binding screw through core holding upper ends of frame | 24228-D | .60 |
| TATED | A-1693 | Binding screw through core holding lower ends of frame | 24126-D | .05 |
| ZATED | A-1694 | Lock washer | 24494-D | .05 |
| BETED | A-1695 | Terminal guard on top of side frame | 26542-D | .05 |
| CETED | A-1696 | Screw for terminal guard to top of side frame | 22229-D | .05 |
| DETED | A-1697 | Lock washer | 20791-D | .05 |
| FETED | A-1698 | Stud dowel through RIGHT frame supporting horn wire | 26184-D | .15 |
| KESED | A-1699 | Nut | 26265-D | .05 |
| LETED | A-1700 | Lock washer | 21717-D | .05 |
| METED | A-1701 | Top cover with name plate | 12042-D | 2.95 |
| PETED | A-1702 | Knurled head screw for top cover | 26182-D | .10 |
| RETED | A-1703 | Stud in side frame for top cover | 26181-D | .30 |
| SETED | A-1704 | Name plate on top cover | 26180-D | .15 |
| TETED | A-1705 | Rivet | 23627-D | .05 |
| ZETED | A-1707 | Motor end frame with stud | 13349-D | 7.60 |
| BITED | A-1708 | Cover for motor end frame (on side and bottom) | 33530-D | .15 |
| CITED | A-1709 | Gasket for cover | 27864-D | .05 |
| DITED | A-1710 | Screw, attaching cover | 32815-D | .05 |
| FITED | A-1711 | Lock washer, per doz. .25 | 19092 | .05 |
| KITED | A-1712 | Screw for motor end frame, lower, RIGHT | 33529-D | .10 |
| LITED | A-1713 | Screw for motor end frame, lower, LEFT | 21663-D | .05 |
| MITED | A-1714 | Screw through upper LEFT corner of motor end frame | 26198-D | .10 |
| PITED | A-1715 | Screw through upper RIGHT corner of motor end frame | 26199-D | .05 |
| RITED | A-1716 | Motor end cover, complete | 12045-D | 1.70 |
| SITED | A-1717 | Bearing oiler in motor end top cover | 14043-D | .30 |
| TITED | A-1718 | Wick for oiler | 30639-D | .05 |
| ZITED | A-1719 | Screw, motor end cover to frame | 26567-D | .10 |
| BOTED | A-1720 | Spring washer | 20484-D | .05 |
| COTED | A-1722 | Generator end frame | 27861-D | 4.70 |
| DOTED | A-1723 | Cover for generator end frame (bottom) | 27863-D | .10 |
| FOTED | A-1724 | Gasket for cover | 27864-D | .05 |
| KOTED | A-1725 | Screw | 32815-D | .05 |
| LOTED | A-1726 | Lock washer, per doz. .25 | 19092 | .05 |
| MOTED | A-1727 | Bearing oiler in generator end frame | 14043-D | .30 |
| POTED | A-1728 | Wick for oiler | 30639-D | .05 |
| ROTED | A-1729 | Screw, generator end frame, upper RIGHT and lower LEFT | 33529-D | .10 |
| SOTED | A-1730 | Screw, generator end frame, upper LEFT and lower RIGHT | 21663-D | .05 |
| TOTED | A-1731 | Generator end top cover, less screws | 12046-D | 1.15 |
| ZOTED | A-1732 | Screw, for generator end cover | 21531-D | .05 |

## GENERATOR ARMATURE AND BEARINGS FOR ARMATURE SHAFT. PINION AND DRIVING CLUTCH

| | | | | |
|---|---|---|---|---|
| PUTED | A-1739 | Armature complete | 11989-D | 46.00 |
| RUTED | A-1740 | Retainer for felt washer for rear roller bearing | 20808-D | .05 |
| SUTED | A-1741 | Screw, retainer to motor end frame | 20178-D | .05 |
| TUTED | A-1742 | Lock washer | 20241-D | .05 |
| ZUTED | A-1743 | Felt oil retainer for rear bearing | 21703-D | .05 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAZED | A-1744 | Roller bearing and inner race on rear end of armature shaft | 11823-D | 3.25 |
| CAZED | A-1745 | Outer bearing race in motor end frame | 25812-D | 1.50 |
| DAZED | A-1747 | Washer (first type) (4 used) for bearing race in motor end frame | 27147-D | .05 |
| KAZED | A-1748 | Retainer (second type) (1 used) for bearing race in motor end frame | 30514-D | .05 |
| MAZED | A-1749 | Flat washer on armature shaft in motor end housing | 25926-D | .05 |
| PAZED | A-1750 | Spacing sleeve back of pinion on armature shaft | 26217-D | .15 |
| RAZED | A-1751 | Pinion on rear end of armature shaft | 26201-D | 1.50 |
| SAZED | A-1752 | Clamp washer for pinion on armature shaft | 21536-D | .25 |
| TAZED | A-1753 | Lock washer | 24622-D | .05 |
| ZAZED | A-1754 | Clamp screw in motor end of armature shaft | 24496-D | .05 |
| BEZED | A-1755 | Ball bearing on front end of armature shaft | 12988-D | 4.85 |
| CEZED | A-1756 | Retainer for bearing in generator end frame | 25406-D | .10 |
| DEZED | A-1758 | Screw, bearing retainer in generator end frame | 22751-D | .05 |
| FEZED | A-1759 | Lock washer | 23277-D | .05 |
| KEZED | A-1760 | Felt oil retainer for front end bearing (2 used) | 21383-D | .05 |
| LEZED | A-1761 | Spacing collar back of driving clutch on armature shaft | 23192-D | .15 |
| MEZED | A-1764 | Generator driving clutch complete | 12257-D | 7.50 |
| PEZED | A-1765 | Generator clutch outer shell and cam | 12256-D | 4.50 |
| REZED | A-1766 | Inner shell for driving clutch | 26109-D | 2.50 |
| SEZED | A-1767 | Roll for driving clutch cam | 23952-D | .25 |
| TEZED | A-1768 | Plunger for driving clutch cam | 20017-D | .05 |
| ZEZED | A-1769 | Spring for plunger in driving clutch cam | 20024-D | .05 |
| BIZED | A-1770 | Binding spring which holds outer shell and cam on inner shell | 23983-D | .10 |
| CIZED | A-1771 | Clamp washer holding generator clutch on end of armature shaft. | 24770-D | .40 |
| DIZED | A-1772 | Clamp screw for generator clutch on armature shaft | 24828-D | .10 |
| FIZED | A-1773 | Lock washer | 24829-D | .05 |

## GENERATOR FIELD COIL, LIFTING ROD, SERIES ARMS AND MOTOR GROUND ARM

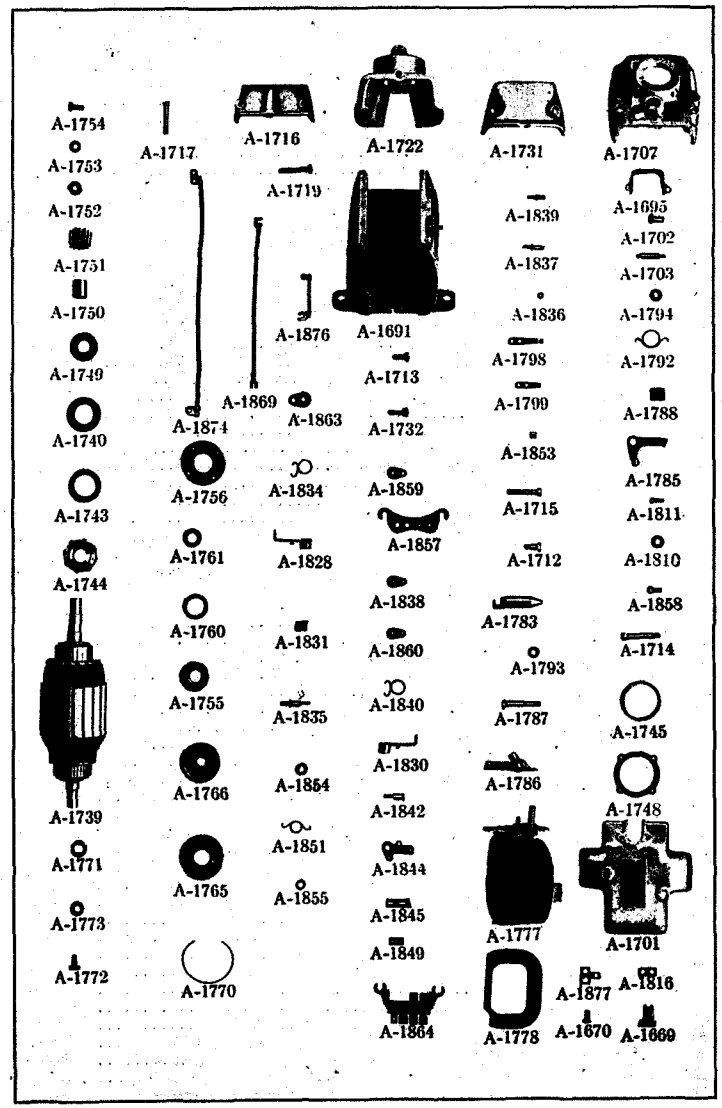
| | | | | |
|---|---|---|---|---|
| MIZED | A-1777 | Field coil complete, less lead attachments for motor and generator brushes | 13076-D | 14.50 |
| RIZED | A-1778 | Insulator on either side of field coil | 25929-D | .05 |
| SIZED | A-1779 | Terminal clip on side of coil | 26786-D | .05 |
| TIZED | A-1781 | Clip on coil for connection to terminal plate | 28021-D | .10 |
| ZIZED | A-1782 | Insulator for terminal on side of coil | 26826-D | .05 |
| BOZED | A-1783 | Lifting rod for motor brushes | 26202-D | 1.15 |
| DOZED | A-1785 | Series brush arm complete, less brush | 12010-D | 1.00 |
| FOZED | A-1786 | Ground arm complete, less brush | 12009-D | 1.50 |
| KOZED | A-1787 | Stud for ground motor brush | 23147-D | .25 |
| LOZED | A-1788 | Motor brush only (2 used) | 30530-D | .70 |
| MOZED | A-1789 | Screw, brush to arm | 22751-D | .05 |
| POZED | A-1790 | Lock plate, per doz. .25 | 19092 | .05 |
| ROZED | A-1791 | Spring in hub of series motor and ground brush arms | 26276-D | .05 |
| SOZED | A-1792 | Spring holding ground and series motor brushes against commutator | 27675-D | .05 |
| ZOZED | A-1793 | Brass washer on studs for motor brushes | 26274-D | .05 |
| BUZED | A-1794 | Flat washer on outer end motor brush stud | 21168-D | .05 |
| CUZED | A-1795 | Lock washer for motor brush arm stud | 20725-D | .00 |
| DUZED | A-1796 | Nut for brush arm stud in end frame | 20217-D | .05 |
| FUZED | A-1797 | Cotter pin for series motor brush arm stud, per doz. .25 | 20163-D | .05 |
| KUZED | A-1798 | Contact spring for generator on upper end of ground motor brush arm | 25960-D | .05 |
| MUZED | A-1799 | Plate supporting contact spring | 25961-D | .05 |
| PUZED | A-1800 | Insulating plate each side of contact spring | 25762-D | .05 |
| RUZED | A-1803 | Screw for contact spring | 21899-D | .05 |
| SUZED | A-1804 | Plain washer for screw | 20790-D | .05 |
| TUZED | A-1805 | Bushing on screw for spring | 27160-D | .10 |
| ZUZED | A-1806 | Lock washer on screw, per doz. .25 | 19092 | .05 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| CABIG | A-1808 | Motor brush plate, supporting brush arm | 10660-D | .75 |
| DABIG | A-1810 | Insulating washer on each side of motor brush | 20125-D | .05 |
| FABIG | A-1811 | Screw holding motor brush plate to frame | 21147-D | .05 |
| KABIG | A-1812 | Insulating bushing on motor brush plate screw | 23282-D | .05 |
| LABIG | A-1813 | Flat washer | 20114-D | .05 |
| MABIG | A-1814 | Lock washer | 21717-D | .05 |
| PABIG | A-1815 | Rivet, brush plate to field coil | 22520-D | .05 |
| RABIG | A-1816 | Insulator on each side of clip on motor brush plate | 20219-D | .05 |
| SABIG | A-1817 | Screw clip to plate | 20035-D | .05 |
| TABIG | A-1818 | Lock plate | 23197-D | .05 |
| ZABIG | A-1819 | Insulating bushing on clip screw | 23226-D | .05 |
| BEBIG | A-1820 | Screw to fasten clip to lead | 23451-D | .05 |
| CEBIG | A-1821 | Nut, per doz. .25 | 19093 | .05 |
| DEBIG | A-1822 | Lock washer, per doz. .25 | 19092 | .05 |

## GENERATOR BRUSH ARMS

| | | | | |
|---|---|---|---|---|
| KEBIG | A-1828 | RIGHT generator brush arm only | 11729-D | .15 |
| MEBIG | A-1830 | LEFT generator brush arm only | 11728-D | .15 |
| PEBIG | A-1831 | Brush for RIGHT or LEFT generator brush arm | 23079-D | .25 |
| REBIG | A-1832 | Screw, brush to arm | 22751-D | .05 |
| SEBIG | A-1833 | Lock plate | 22817-D | .05 |
| TEBIG | A-1834 | Spring holding RIGHT brush to commutator | 25356-D | .05 |
| ZEBIG | A-1835 | Stud for RIGHT and third generator brush arms | 25777-D | .25 |
| BIBIG | A-1836 | Insulating sleeve on spring stud for third generator brush arms | 25784-D | .05 |
| CIBIG | A-1837 | Stud holding spring for third and RIGHT generator brush arms | 14547-D | .30 |
| DIBIG | A-1838 | Plate either side of LEFT generator brush arm bracket | 25955-D | .05 |
| KIBIG | A-1839 | Stud for LEFT generator brush arm spring | 25355-D | .05 |
| LIBIG | A-1840 | Spring holding LEFT generator brush to commutator | 25357-D | .05 |
| MIBIG | A-1841 | Nut on generator brush arm studs, | 20068-D | .05 |
| PIBIG | A-1842 | Stud for LEFT brush arm on bracket | 25387-D | .15 |
| SIBIG | A-1844 | Third arm only, less extension | 12169-D | .15 |
| TIBIG | A-1845 | Extension for third brush arm | 27935-D | .10 |
| ZIBIG | A-1846 | Screw, extension to third brush arm | 25931-D | .05 |
| BOBIG | A-1847 | Flat washer | 20810-D | .05 |
| COBIG | A-1848 | Lock washer, per doz. .25 | 19092 | .05 |
| DOBIG | A-1849 | Brush for generator third brush arm | 29361-D | .25 |
| FOBIG | A-1850 | Screw, brush to third arm | 26766-D | .05 |
| KOBIG | A-1851 | Spring, third generator brush to commutator | 25783-D | .05 |
| LOBIG | A-1852 | Flat washer on third brush arm stud | 24201-D | .05 |
| MOBIG | A-1853 | Insulating bushing on third brush arm stud | 25779-D | .05 |
| POBIG | A-1854 | Large insulating washer on third brush arm | 21036-D | .05 |
| ROBIG | A-1855 | Small insulating washer on third brush arm stud | 21298-D | .05 |
| SOBIG | A-1856 | Cotter pin in stud for third brush arm | 25723-D | .05 |
| TOBIG | A-1857 | Brush holder bracket for generator brush arms | 23093-D | .25 |
| ZOBIG | A-1858 | Screw, generator brush bracket to terminal bracket, per doz. .25 | 20188-D | .05 |
| BUBIG | A-1859 | Thin plate on back of studs for generator brush support | 20494-D | .05 |
| DUBIG | A-1860 | Thick plate on RIGHT generator stud | 22145-D | .05 |
| FUBIG | A-1861 | Lock washer, | 20495-D | .05 |
| KUBIG | A-1862 | Insulating bushing in bracket on RIGHT generator stud | 23249-D | .05 |
| MUBIG | A-1863 | Insulator on each side of brush holder bracket for RIGHT arm | 23623-D | .05 |
| PUBIG | A-1864 | Terminal bracket complete | 12008-D | .75 |
| RUBIG | A-1865 | Clip for terminal bracket | 23450-D | .05 |
| SUBIG | A-1866 | Screw for clip | 19091 | .05 |
| TUBIG | A-1867 | Nut, per doz. .25 | 19093 | .05 |
| ZUBIG | A-1868 | Lock washer, per doz. .25 | 19092 | .05 |






GENERATOR

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAFIG | A-1869 | Lead from motor brush plate to terminal bracket | 11999-D | .25 |
| CAFIG | A-1870 | Clip on motor brush end of lead to terminal bracket | 23666-D | .05 |
| DAFIG | A-1871 | Spade clip on lead from terminal bracket to motor brush plate | 23374-D | .05 |
| KAFIG | A-1872 | Clip on end of lead from generator brush to switch | 27929-D | .05 |
| LAFIG | A-1874 | Lead from switch arm to generator brush bracket | 12748-D | .30 |
| MAFIG | A-1875 | Clip on switch end of lead to generator brush bracket | 26225-D | .05 |
| PAFIG | A-1876 | Lead from field coil to third generator brush | 11998-D | .15 |
| RAFIG | A-1877 | Clip for generator lead to motor brush plate | 23051-D | .15 |
| SAFIG | A-1878 | Screw | 20300-D | .05 |
| TAFIG | A-1879 | Lock washer, per doz. .25 | 19092 | .05 |

## DISTRIBUTOR, DISTRIBUTOR HOUSING AND DISTRIBUTOR HEAD. ROTOR, TIMER CONTACT ARM AND CONTACT SCREW

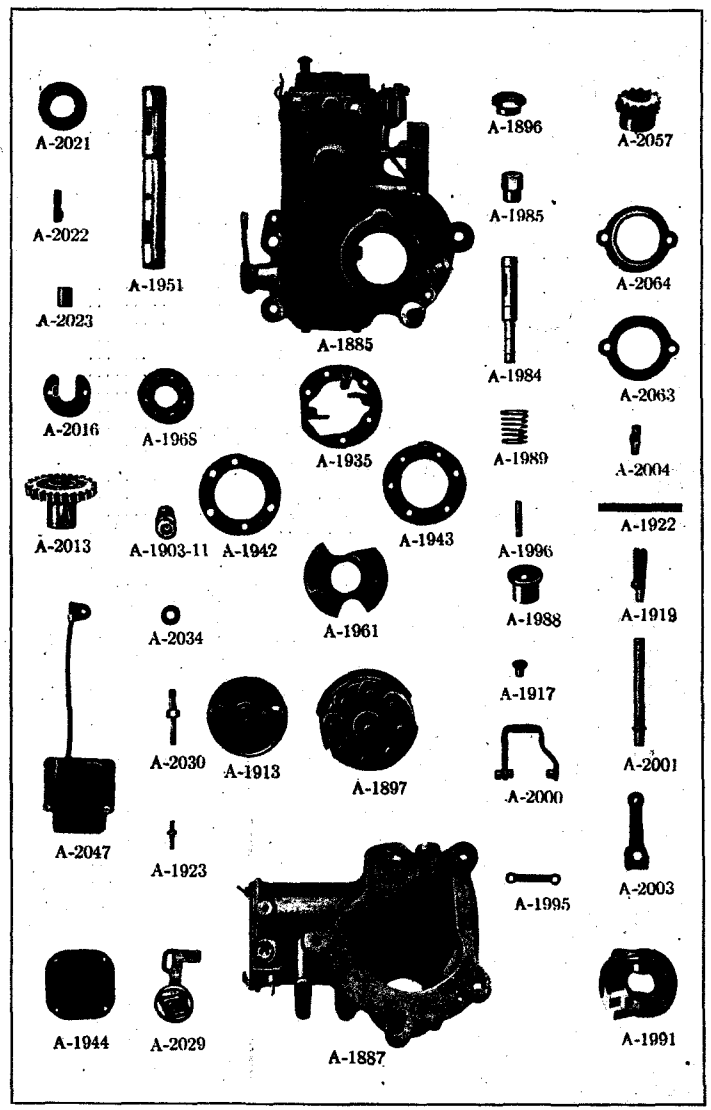
| | | | | |
|---|---|---|---|---|
| DEFIG | A-1885 | Distributor, complete | 5166-D | 46.75 |
| FEFIG | A-1887 | Housing for distributor with clips, and lower bearing | 14219-D | 10.65 |
| BEFIG | A-1887B | Bearing in housing for shaft | 32957-D | 1.00 |
| KEFIG | A-1888 | Oiler in distributor housing for lower bearing | 11323-D | .35 |
| LEFIG | A-1889 | Wick for oiler | 29074-D | .05 |
| MEFIG | A-1890 | Spring for wick | 29246-D | .05 |
| PEFIG | A-1891 | Plain clip for distributor head | 21783-D | .05 |
| REFIG | A-1892 | Slotted clip for distributor head | 23432-D | .05 |
| SEFIG | A-1893 | Lock clip for distributor head | 23433-D | .05 |
| TEFIG | A-1894 | Rivet, clips to distributor housing | 25048-D | .05 |
| ZEFIG | A-1895 | Rivet, plain clip to housing | 25049-D | .05 |
| BIFIG | A-1896 | Breather with gauze for distributor housing | 12075-D | .30 |
| CIFIG | A-1897 | Distributor head complete, less terminals | 12568-D | 3.00 |
| DIFIG | A-1899 | Plunger, flat end and drilled in distributor head | 27608-D | .05 |
| FIFIG | A-1901 | Spring for distributor head plunger, tapering toward center | 27607-D | .05 |
| KIFIG | A-1902 | Bowen oiler for distributor under rotor | 13090-D | .30 |
| LIFIG | A-1903 | High tension terminal, center, plain | 10877-D | .40 |
| MIFIG | A-1904 | No. 1 high tension terminal | 10878-D | .40 |
| PIFIG | A-1905 | No. 2 high tension terminal | 10879-D | .40 |
| RIFIG | A-1906 | No. 3 high tension terminal | 10880-D | .40 |
| SIFIG | A-1907 | No. 4 high tension terminal | 10881-D | .40 |
| TIFIG | A-1908 | No. 5 high tension terminal | 10882-D | .40 |
| ZIFIG | A-1909 | No. 6 high tension terminal | 10883-D | .40 |
| BOFIG | A-1910 | No. 7 high tension terminal | 10884-D | .40 |
| COFIG | A-1911 | No. 8 high tension terminal | 10885-D | .40 |
| DOFIG | A-1912 | Washer for distributor head terminals | 23865-D | .05 |
| FOFIG | A-1913 | Rotor complete for distributor | 12071-D | 1.35 |
| KOFIG | A-1914 | Connector on top of distributor from center to brush | 23074-D | .05 |
| LOFIG | A-1916 | Screw, No. 5—40, connector to rotor | 26803-D | .05 |
| MOFIG | A-1917 | Brush for distributor rotor | 23895-D | .10 |
| POFIG | A-1918 | Spring for distributor rotor brush | 24414-D | .05 |
| ROFIG | A-1919 | Timer contact arm complete | 12413-D | 1.30 |
| SOFIG | A-1922 | Spring, contact arms against cam | 25634-D | .05 |
| TOFIG | A-1923 | Stud for contact arm | 26284-D | .10 |
| ZOFIG | A-1925 | Insulating bushing for contact arm stud | 29438-D | .10 |
| BUFIG | A-1926 | Insulating washer for contact arm stud | 29440-D | .05 |
| CUFIG | A-1927 | Nut, contact arm studs in top of distributor | 28834-D | .05 |
| DUFIG | A-1928 | Flat washer | 24336-D | .05 |
| FUFIG | A-1929 | Lock washer | 24337-D | .05 |
| KUFIG | A-1930 | Cotter pin | 25723-D | .05 |
| LUFIG | A-1931 | Timer contact screw | 12411-D | .80 |
| MUFIG | A-1932 | Brass nut, contact screw in bracket | 26836-D | .05 |
| PUFIG | A-1933 | Lock nut for contact screw | 26828-D | .05 |
| RUFIG | A-1934 | Lock washer | 20345-D | .05 |
| SUFIG | A-1935 | Contact plate in top of distributor | 13514-D | .45 |
| TUFIG | A-1938 | Screw, contact plate in distributor | 23879-D | .05 |
| ZUFIG | A-1939 | Lock washer, per doz. .25 | 19092 | .05 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAHIG | A-1940 | Bushing on screws for contact plate and mounting plate | 26293-D | .05 |
| CAHIG | A-1941 | Flat washer | 23876-D | .05 |
| DAHIG | A-1942 | Washer insulating contact plate from housing | 26289-D | .25 |
| FAHIG | A-1943 | Connector between contact plate and insulator | 26286-D | .10 |
| KAHIG | A-1944 | Cover plate for bottom of housing | 25405-D | .10 |
| LAHIG | A-1945 | Gasket for bottom cover plate | 25433-D | .05 |
| MAHIG | A-1946 | Screw for bottom cover plate | 26310-D | .05 |
| PAHIG | A-1947 | Lock washer on screws, per doz. .25 | 19092 | .05 |

## DISTRIBUTOR SHAFT AND CAM, GOVERNOR AND SPIRAL GEAR ON DISTRIBUTOR SHAFT

| | | | | |
|---|---|---|---|---|
| TAHIG | A-1951 | Distributor shaft only | 29062-D | 4.00 |
| ZAHIG | A-1954 | Clip for upper cone on distributor shaft | 23720-D | .05 |
| BEHIG | A-1961 | Plate under retainer for ball bearing | 29068-D | 1.25 |
| CEHIG | A-1963 | Screw, short, mounting plate in upper end of distributor | 20809-D | .05 |
| DEHIG | A-1964 | Screw, long, mounting plate in upper end of distributor | 20205-D | .05 |
| FEHIG | A-1965 | Washer on screw | 26441-D | .05 |
| KEHIG | A-1966 | Lock washer, per doz. .25 | 19092 | .05 |
| LEHIG | A-1968 | Ball bearing for upper end of distributor shaft | 13342-D | 2.95 |
| MEHIG | A-1969 | Retainer for ball bearing | 29069-D | .05 |
| PEHIG | A-1970 | Plain washer (thin) for ball bearing | 29066-D | .05 |
| REHIG | A-1971 | Plain washer (thick) for ball bearing | 20398-D | .05 |
| SEHIG | A-1972 | Clip, retaining washer | 29072-D | .05 |
| TEHIG | A-1973 | Plain washer above clip | 26033-D | .05 |
| ZEHIG | A-1974 | Collar retaining washer | 28951-D | .05 |
| BIHIG | A-1975 | Clip retaining collar | 28949-D | .05 |
| CIHIG | A-1976 | Felt washer for ball bearing | 28929-D | .05 |
| DIHIG | A-1978 | Clip retaining lower bearing | 29072-D | .05 |
| FIHIG | A-1979 | Plain washer above bearing | 29071-D | .10 |
| KIHIG | A-1984 | Cam shaft, inner, for cam adjustment | 29057-D | 2.00 |
| LIHIG | A-1985 | Cam on upper end of inner distributor shaft | 28837-D | 1.50 |
| MIHIG | A-1986 | Spacing washer under cam | 29528-D | .05 |
| PIHIG | A-1987 | Screw, cam to inner distributor shaft | 13474-D | .10 |
| RIHIG | A-1988 | Collar for automatic advance on distributor shaft | 24362-D | .70 |
| SIHIG | A-1989 | Spring on distributor shaft for automatic advance collar | 23129-D | .25 |
| TIHIG | A-1990 | Washer on top of spring | 26033-D | .05 |
| ZIHIG | A-1991 | Governor ring, complete for distributor | 10889-D | 1.50 |
| BOHIG | A-1995 | Advance arms between governor ring and advance collar pin | 23104-D | .05 |
| COHIG | A-1996 | Pin for either end of advance arms | 25922-D | .10 |
| DOHIG | A-1997 | Clip on end of advance collar pin | 25921-D | .05 |
| FOHIG | A-1998 | Screw, governor ring to distributor shaft | 23496-D | .05 |
| KOHIG | A-1999 | Lock washer | 24493-D | .05 |
| LOHIG | A-2000 | Advance yoke for distributor | 12084-D | .70 |
| MOHIG | A-2001 | Shaft for advance yoke | 26148-D | .25 |
| POHIG | A-2002 | Screw, advance yoke to shaft | 21797-D | .05 |
| ROHIG | A-2003 | Lever for advance yoke shaft | 23143-D | .75 |
| SOHIG | A-2004 | Screw, lever to shaft | 23144-D | .15 |
| TOHIG | A-2005 | Nut | 26922-D | .05 |
| ZOHIG | A-2006 | Lock washer | 20137-D | .05 |
| BUHIG | A-2007 | Spring on advance shaft | 26276-D | .05 |
| CUHIG | A-2008 | Washer on advance shaft for spring | 26443-D | .05 |
| DUHIG | A-2009 | Felt washer between housing and advance yoke | 25430-D | .05 |
| FUHIG | A-2010 | Stop for advance yoke | 26732-D | .05 |
| KUHIG | A-2011 | Screw, stop for advance arm to inside of housing | 20173-D | .05 |
| LUHIG | A-2012 | Lock plate | 22827-D | .05 |
| MUHIG | A-2013 | Spiral gear and hub | 14030-D | 2.10 |
| RUHIG | A-2016 | Guide plate for spiral gear | 23217-D | .15 |
| SUHIG | A-2018 | Screw, spiral gear to hub | 27548-D | .05 |
| TUHIG | A-2019 | Lock washer, per doz. .25 | 19092 | .05 |
| ZUHIG | A-2020 | Dowel pin, spiral gear to hub | 24029-D | .05 |




DISTRIBUTOR



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BALIG | A-2021 | Advance ring on lower end of distributor shaft | 23100-D | 1.15 |
| CALIG | A-2022 | Pin for advance ring | 23134-D | .25 |
| DALIG | A-2023 | Clamp for pin in lower end of distributor shaft | 23218-D | .25 |
| FALIG | A-2024 | Screw locating pin in advance ring | 23378-D | .05 |
| KALIG | A-2025 | Lock washer on screw, per doz. .25 | 19092 | .05 |

## RESISTANCE UNIT AND CONDENSER FOR DISTRIBUTOR

| | | | | |
|---|---|---|---|---|
| LALIG | A-2029 | Resistance unit | 12013-D | .60 |
| MALIG | A-2030 | Stud for resistance unit | 26132-D | .10 |
| PALIG | A-2031 | Nut on inner end of resistance unit stud | 20704-D | .05 |
| RALIG | A-2032 | Flat washer | 20310-D | .05 |
| SALIG | A-2033 | Lock washer | 20791-D | .05 |
| TALIG | A-2034 | Insulating washer | 20076-D | .05 |
| ZALIG | A-2035 | Bushing through housing on resistance unit stud | 22738-D | .10 |
| BELIG | A-2036 | Flat washer between resistance unit and housing on resistance unit stud | 22616-D | .05 |
| DELIG | A-2037 | Insulator washer next to outside of housing on resistance unit stud | 20076-D | .05 |
| KELIG | A-2038 | Nut, resistance unit on stud | 20068-D | .05 |
| LELIG | A-2039 | Flat washer | 28548-D | .05 |
| MELIG | A-2040 | Lock washer | 20495-D | .05 |
| PELIG | A-2041 | Stud for RIGHT side of plain clip and resistance unit stud | 26137-D | .05 |
| RELIG | A-2042 | Bushing on stud in slot of resistance terminal | 26829-D | .10 |
| SELIG | A-2043 | Terminal clip on resistance unit connection | 23450-D | .05 |
| TELIG | A-2044 | Screw | 26209-D | .05 |
| ZELIG | A-2045 | Nut | 26207-D | .05 |
| BILIG | A-2046 | Lock washer, per doz. .25 | 19092 | .05 |
| CILIG | A-2047 | Condenser complete with screws | 12458-D | 3.00 |
| DILIG | A-2048 | Clip on end of condenser lead | 23314-D | .05 |
| FILIG | A-2049 | Screw attaching condenser | 23601-D | .05 |
| KILIG | A-2050 | Bushing for screw | 27798-D | .05 |
| LILIG | A-2052 | Distributor wrench, plain | 31886-D | .10 |
| MILIG | A-2053 | Distributor wrench with gauges | 12741-D | .15 |

## DISTRIBUTOR DRIVE GEAR ON FAN SHAFT. COVER FOR DISTRIBUTOR HEAD

| | | | | |
|---|---|---|---|---|
| COLIG | A-2057 | Gear on fan shaft driving distributor | 26795-D | 3.00 |
| DOLIG | A-2059 | Key for gear on shaft | 11359 | .05 |
| FOLIG | A-2063 | Plate, inner, on fan shaft for distributor housing | 31836 | .10 |
| KOLIG | A-2064 | Plate, outer, on fan shaft for distributor housing | 31837 | .10 |
| LOLIG | A-2065 | Felt washer on fan shaft for distributor housing | 31840 | .05 |
| MOLIG | A-2066 | Screw, plate to distributor, per doz. .25 | 10272 | .05 |
| POLIG | A-2067 | Lock washer, per doz. .25 | 11314 | .05 |
| ROLIG | A-2068 | Protection cover for distributor head | 30978 | 3.00 |
| SOLIG | A-2069 | Bale, locking protection cover | 31095 | .45 |
| TOLIG | A-2070 | Side plate for distributor head cover | 31096 | 1.25 |
| ZOLIG | A-2071 | Screw, side plate to housing, per doz. .25 | 11879 | .05 |

## CIRCUIT BREAKER RELAY

| | | | | |
|---|---|---|---|---|
| MULIG | A-2077 | Circuit breaker relay, complete | 5749-D | 9.00 |
| PULIG | A-2078 | Shell for circuit breaker relay | 11085-D | .75 |
| RULIG | A-2079 | Thumb nut in top of shell | 26678-D | .15 |
| TULIG | A-2107 | Metal plate between contact spring and bracket | 29392-D | .05 |
| ZULIG | A-2123 | Mounting bracket complete with rod | 26558-D | .55 |

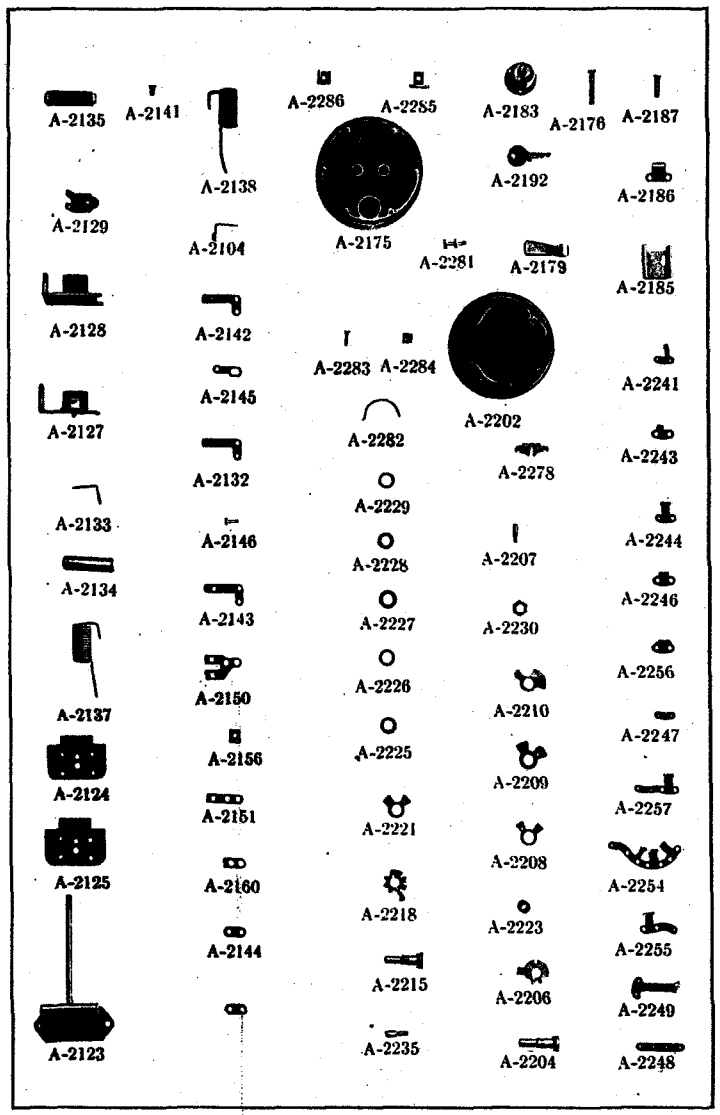
| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAMIG | A-2124 | Mounting plate base for shell | 26577-D | .05 |
| CAMIG | A-2125 | Mounting plate | 26573-D | .30 |
| DAMIG | A-2126 | Screw, brackets and mounting plate to base | 26553-D | .05 |
| FAMIG | A-2127 | Bracket for armature on RIGHT side of relay | 12228-D | .75 |
| KAMIG | A-2128 | Bracket for armature on LEFT side of relay | 12180-D | .75 |
| LAMIG | A-2129 | Armature with clamp for lock out relay | 12005-D | .25 |
| MAMIG | A-2130 | Armature with clamp for vibrating relay | 12591-D | .25 |
| PAMIG | A-2131 | Hinge pin for armature | 24082-D | .05 |
| RAMIG | A-2132 | Spring for RIGHT armature | 26534-D | .05 |
| SAMIG | A-2133 | Spring for LEFT armature | 26297-D | .05 |
| TAMIG | A-2134 | Core only for RIGHT coil | 12006-D | .25 |
| ZAMIG | A-2135 | Core complete, LEFT, less coil | 12150-D | .75 |
| BEMIG | A-2136 | Sleeve for RIGHT core | 24733-D | .05 |
| CEMIG | A-2137 | Coil for RIGHT core | 26536-D | .40 |
| DEMIG | A-2138 | Coil for LEFT core | 26561-D | .40 |
| FEMIG | A-2140 | Clip on end of coil for center terminal post | 24724-D | .05 |
| KEMIG | A-2141 | Screw, core to bracket | 24049-D | .05 |
| LEMIG | A-2142 | "L" shaped contact spring on RIGHT bracket | 12148-D | .25 |
| MEMIG | A-2143 | "L" shaped contact spring with small hole on LEFT bracket | 12149-D | .15 |
| PEMIG | A-2144 | Insulator plate between armature spring and contact spring | 26337-D | .05 |
| SEMIG | A-2145 | Brass connector from contact spring to terminal post (2 used) | 24725-D | .05 |
| ZEMIG | A-2146 | Screw, contact spring to bracket | 25362-D | .05 |
| BIMIG | A-2147 | Bushing on screw attaching contact spring | 24081-D | .10 |
| CIMIG | A-2148 | Lock washer | 25206-D | .05 |
| DIMIG | A-2149 | Brass washer on screw for contact and armature springs | 24046-D | .05 |
| KIMIG | A-2150 | Base plate for double terminal post | 29526-D | .10 |
| LIMIG | A-2151 | Base plate for single terminal post | 29525-D | .05 |
| MIMIG | A-2152 | Screw, terminal post to mounting | 24375-D | .05 |
| PIMIG | A-2153 | Bushing on screw attaching terminals to mounting | 24485-D | .10 |
| RIMIG | A-2154 | Lock washer on screw holding terminals to mounting | 19092 | .05 |
| TIMIG | A-2155 | Plain washer on screw for attaching terminal post to mounting | 23876-D | .05 |
| BOMIG | A-2156 | Clip on end of terminal post | 23450-D | .05 |
| COMIG | A-2157 | Screw for clip on terminal post (4 used) | 19091 | .05 |
| DOMIG | A-2158 | Nut for screw, per doz. .25 | 19093 | .05 |
| FOMIG | A-2159 | Lock washer for terminal screw, per doz. .25 | 19092 | .05 |
| KOMIG | A-2160 | Insulator for terminal post | 24282-D | .05 |
| LOMIG | A-2161 | Terminal (double spade) | 23375-D | .05 |
| MOMIG | A-2162 | Terminal (single spade) | 23374-D | .05 |
| POMIG | A-2163 | Screw to attach relay to dash (OC), per doz. .25 | 10559 | .05 |
| ROMIG | A-2164 | Screw to attach relay to dash (CC), per doz. .25 | 10560 | .05 |
| SOMIG | A-2165 | Nut on screw attaching relay, per doz. .25 | 10887 | .05 |
| TOMIG | A-2166 | Lock washer for nut, per doz. .25 | 11313 | .05 |

## COMBINATION SWITCH AND CLAMP FOR COMBINATION SWITCH

| | | | | |
|---|---|---|---|---|
| CUMIG | A-2172 | Combination switch complete | 1150-D | 16.75 |
| DUMIG | A-2175 | Housing only for switch with push button for clock light | 13112-D | 3.15 |
| FUMIG | A-2176 | Screw, housing to switch | 23735-D | .05 |
| KUMIG | A-2177 | Lock washer, per doz. .25 | 19092 | .05 |
| LUMIG | A-2179 | Lever for combination switch | 33631-D | .75 |
| MUMIG | A-2180 | Screw, lever to studs | 23745-D | .05 |
| PUMIG | A-2183 | Sargent lock for combination switch ("S" series) (specify lock No.) | 39360 | 2.80 |
| SUMIG | A-2184 | Sargent lock for combination switch ("R" series) (specify lock No.) | 39360 | 2.80 |
| ZUMIG | A-2185 | Tumbler for lock on combination switch | 10930-D | .45 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAPIG | A-2186 | Spring for tumbler | 23776-D | .05 |
| CAPIG | A-2187 | Screw, tumbler and spring on mounting plate | 23740-D | .10 |
| DAPIG | A-2188 | Nut | 23713-D | .05 |
| FAPIG | A-2192 | Key for switch lock (Sargent) (specify lock No.) | | .35 |
| KAPIG | A-2193 | Screw, lock in housing | 24626-D | .05 |
| LAPIG | A-2194 | Push button and stud complete for clock light | 13110-D | .70 |
| MAPIG | A-2195 | Push button for clock light | 23564-D | .15 |
| PAPIG | A-2196 | Insulating washer between insulating roll and housing on push button stud | 28308-D | .05 |
| RAPIG | A-2202 | Bakalite mounting base for switch | 28295-D | 1.55 |
| SAPIG | A-2203 | Switch blade assembly complete | 13290-D | 1.15 |
| TAPIG | A-2204 | Stud on ignition side of switch | 13323-D | .40 |
| ZAPIG | A-2206 | Stop disc, lower, on ignition stud | 12143-D | .30 |
| BEPIG | A-2207 | Stop screw for disc on ignition stud | 24632-D | .05 |
| CEPIG | A-2208 | Lower contact blade on ignition stud | 26497-D | .05 |
| DEPIG | A-2209 | Insulator between contact blades on insulator stud, | 26496-D | .05 |
| FEPIG | A-2210 | Upper contact blade on ignition stud | 26524-D | .05 |
| KEPIG | A-2215 | Stud complete on lighting side of switch | 13324-D | .40 |
| LEPIG | A-2216 | Stud complete supporting lighting lever | 13291-D | 1.15 |
| MEPIG | A-2218 | Stop disc, lower, on lighting stud | 12142-D | .30 |
| PEPIG | A-2219 | Bushing on small stud on stop disc (2 used) | 26527-D | .10 |
| REPIG | A-2221 | Contact plate on lighting stud | 26544-D | .15 |
| SEPIG | A-2223 | Bushing on lighting and ignition studs | 30635-D | .05 |
| TEPIG | A-2225 | Thick washer between stop disc and lower insulator on switch studs (4 used) | 23717-D | .05 |
| ZEPIG | A-2226 | Thin brass washer above top insulator and between thick washer on switch studs (4 used) | 25473-D | .05 |
| BIPIG | A-2227 | Insulating washer for contact plates on lighting and ignition studs (4 used) | 23710-D | .05 |
| CIPIG | A-2228 | Thin brass washer on switch studs below lock washer | 23909-D | .05 |
| DIPIG | A-2229 | Thick brass washer above top insulator on switch studs (2 used) | 23908-D | .05 |
| FIPIG | A-2230 | Large nut on lighting and ignition switch studs | 23711-D | .05 |
| KIPIG | A-2232 | Lock washer for nut on upper end of switch studs | 26526-D | .05 |
| LIPIG | A-2234 | Flat washer on switch studs above nuts | 31009-D | .05 |
| MIPIG | A-2235 | Small stud supporting lighting and ignition studs | 28896-D | .25 |
| PIPIG | A-2236 | Nut on stud for supporting lighting and ignition levers | 23712-D | .05 |
| SIPIG | A-2238 | Lock washer on stud supporting lighting studs | 26495-D | .05 |
| TIPIG | A-2239 | Nut on small studs on back of switch (5 used) | 23713-D | .05 |
| ZIPIG | A-2240 | Lock washer on small studs on switch back (5 used) | 25206-D | .05 |
| BOPIG | A-2241 | Blade contact for No. 1 terminal | 23688-D | .05 |
| COPIG | A-2243 | Insulator for blade contact on No. 1 terminal | 26525-D | .05 |
| DOPIG | A-2244 | Blade contact for terminals Nos. 2, 3, 5, 6 | 23687-D | .05 |
| FOPIG | A-2246 | Insulating plate between contact blades on terminals Nos. 2, 3, 5, 6 (12 used) | 26530-D | .05 |
| LOPIG | A-2247 | Plate under tumbler for No. 4 terminal | 23683-D | .05 |
| MOPIG | A-2248 | Brass plate connector under No. 4 terminal | 23691-D | .05 |
| POPIG | A-2249 | Blade contact for No. 8 terminal | 28557-D | .05 |
| ROPIG | A-2250 | Brass spacers under blade contact for No. 8 terminal (2 used) | 28486-D | .05 |
| TOPIG | A-2251 | Brass connector for terminals Nos. 8 and 3, | 28485-D | .05 |
| ZOPIG | A-2252 | Spring contact on No. 8 terminal for clock lamp push button | 28537-D | .05 |
| BUPIG | A-2253 | Spring contact for clock lamp terminal | 27707-D | .10 |
| CUPIG | A-2254 | Brush for switch lower contact; for Nos. 3, 2, 1, and connector to No. 4 | 24624-D | .15 |
| FUPIG | A-2255 | Blade contact, lower, No. 5 and connector to No. 4 | 23674-D | .05 |
| KUPIG | A-2256 | Insulating plate, lower, for No. 6 contact | 23697-D | .05 |
| LUPIG | A-2257 | Blade contact, lower, No. 6 and connector to No. 7 | 26498-D | .05 |
| MUPIG | A-2262 | Screw, terminal and blade contact Nos. 5, 6, 1, 2, 3 to mounting | 25903-D | .05 |
| RUPIG | A-2264 | Bushing on screw for attaching terminals, Nos. 1, 2, 3 | 26500-D | .05 |
| SUPIG | A-2265 | Screw for attaching No. 4 terminal | 23741-D | .05 |
| TUPIG | A-2266 | Screw through ends of brass plate under No. 4 terminal, | 23742-D | .05 |




CIRCUIT BREAKER RELAY COMBINATION SWITCH



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BASIG | A-2267 | Nut on screw in ends of plate connector under No. 4 terminal. | 23668-D | .05 |
| DASIG | A-2269 | Screws for terminal No. 7 | 26523-D | .05 |
| FASIG | A-2271 | Screw for long brush and No. 8 terminal | 25903-D | .05 |
| KASIG | A-2278 | Retainer block to hold rolls against blade | 27014-D | .05 |
| LASIG | A-2280 | Roll for retainer | 27013-D | .05 |
| MASIG | A-2281 | Stud, yoke to mounting | 26654-D | .10 |
| PASIG | A-2282 | Spring on mounting for roller stop | 23774-D | .05 |
| RASIG | A-2283 | Screw, spring to mounting | 24616-D | .05 |
| SASIG | A-2284 | Nut | 23707-D | .05 |
| TASIG | A-2285 | Terminal post on back of switch (8 used) | 23898-D | .05 |
| ZASIG | A-2286 | Clip for terminals on back of switch | 23450-D | .05 |
| BESIG | A-2287 | Screw | 19091 | .05 |
| CESIG | A-2288 | Nut, per doz. .25 | 19093 | .05 |
| DESIG | A-2289 | Lock washer, per doz. .25 | 19092 | .05 |
| KESIG | A-2294 | Screw for combination switch clamp (OC) | 11900 | .05 |
| LESIG | A-2295 | Nut, per doz. .25 | 10889 | .05 |
| MESIG | A-2296 | Lock washer, per doz. .25 | 11314 | .05 |
| PESIG | A-2298 | Clamp complete for combination switch (CC) | 25733 | 2.75 |
| RESIG | A-2301 | Screw for switch clamp (CC) (1½" long) | 11876 | .08 |
| SESIG | A-2302 | Lock washer, per doz. .25 | 11315 | .05 |

## AUTO ELECTRIC HORN AND SUPPORT

| | | | | |
|---|---|---|---|---|
| TESIG | A-2305 | Auto electric horn with support | 5312-D | 20.00 |
| ZESIG | A-2306 | Bell or projector on horn front | 12090-D | 4.55 |
| CISIG | A-2309 | Shell only for auto horn | 13690-D | 2.10 |
| DISIG | A-2310 | Name plate for horn shell | 24719-D | .05 |
| FISIG | A-2311 | Rivet for name plate | 26838-D | .05 |
| KISIG | A-2312 | Thumb nut in shell for horn | 26678-D | .15 |
| LISIG | A-2313 | Lock washer | 20131-D | .05 |
| MISIG | A-2314 | Support for horn | 32917 | 1.75 |
| PISIG | A-2316 | Nut on horn support | 6773 | .10 |
| RISIG | A-2317 | Lock washer on horn support nut, per doz. .25 | 11320 | .05 |
| SISIG | A-2320 | Rubber bushing for horn support | 37568 | .08 |
| TISIG | A-2322 | Housing, with stud, for auto horn | 13689-D | 2.10 |
| XISIG | A-2323B | Stud in housing for shell | 27036-D | .05 |
| ZISIG | A-2324 | Bushing through housing for lower end of tapper | 24690-D | .05 |
| BOSIG | A-2325 | Screw, long, through shell for bracket | 24696-D | .05 |
| COSIG | A-2326 | Screw, short, through shell for bracket | 24695-D | .05 |
| DOSIG | A-2327 | Nut | 24674-D | .05 |
| FOSIG | A-2328 | Lock washer | 28580-D | .05 |
| KOSIG | A-2329 | Core assembled in center of housing holding coil | 12140-D | 2.10 |
| LOSIG | A-2330 | Coil assembled on RIGHT prong of horn | 11367-D | .85 |
| MOSIG | A-2331 | Screw, to housing | 24694-D | .05 |
| POSIG | A-2333 | Resistance coil assembled on LEFT prong of housing | 13659-D | .75 |
| ROSIG | A-2334 | Screw for resistance coil | 20002-D | .05 |
| SOSIG | A-2335 | Lock washer per doz. .25 | 19092-D | .05 |
| TOSIG | A-2336 | Washer for screw | 29777-D | .05 |
| ZOSIG | A-2337 | Retainer for coil on core | 24668-D | .05 |
| BUSIG | A-2339 | Nut | 24674-D | .05 |
| CUSIG | A-2341 | Lock washer | 28580-D | .05 |
| DUSIG | A-2342 | Clip on end of field coil lead, small | 24666-D | .05 |
| FUSIG | A-2343 | Clip on screw, field coil terminal to housing | 23450-D | .05 |
| KUSIG | A-2344 | Terminal on end of lead from resistance coil | 24685-D | .05 |
| LUSIG | A-2345 | Screw, field coil terminal to housing | 25705-D | .10 |
| MUSIG | A-2346 | Nut for field coil screw | 29485-D | .05 |
| PUSIG | A-2347 | Lock washer for field coil, per doz. .25 | 19092-D | .05 |
| RUSIG | A-2348 | Washer between lock washer and terminal clip | 23876-D | .05 |
| SUSIG | A-2349 | Bushing on screw for field coil terminal clip | 24672-D | .05 |
| TUSIG | A-2350 | Pin in terminal base through housing | 24671-D | .05 |
| ZUSIG | A-2351 | Bushing for pin in terminal through housing | 24692-D | .05 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BATIG | A-2352 | Insulator on each side of housing for field coil terminal screws. | 24669-D | .05 |
| DATIG | A-2353 | Base of terminal under clip on side of housing | 29484-D | .10 |
| FATIG | A-2354 | Plate, diaphragm, between housing and shell | 20747-D | .60 |
| KATIG | A-2355 | Ring, cork, between diaphragm and housing | 25204-K | .08 |
| LATIG | A-2356 | Protector for diaphragm | 26427-D | .25 |
| MATIG | A-2357 | Ring between diaphragm and protector | 24204-D | .15 |
| PATIG | A-2358 | Tapper for horn | 24691-D | .25 |
| RATIG | A-2359 | Armature assembled on tapper below springs | 11178-D | .85 |
| SATIG | A-2360 | Insulator between stop plate and armature | 25507-D | .05 |
| TATIG | A-2361 | Stop plate between insulators on tapper | 24608-D | .05 |
| ZATIG | A-2362 | Insulator between stop plate and armature | 28334-D | .05 |
| BETIG | A-2363 | Plate spring operating tapper | 24681-D | .05 |
| CETIG | A-2364 | Nut on upper end of tapper | 24686-D | .05 |
| DETIG | A-2365 | Lock washer under nut on tapper | 26586-D | .05 |
| FETIG | A-2366 | Clamp over each end of armature spring | 24689-D | .05 |
| KETIG | A-2367 | Screw, spring clamp to housing | 24698-D | .05 |
| LETIG | A-2368 | Lock washer for spring clamp screw per doz. .25 | 19092 | .05 |
| METIG | A-2369 | Screw, contact plate and spring to housing | 24697-D | .05 |
| PETIG | A-2370 | Bushing for screw for contact plate | 24684-D | .05 |
| RETIG | A-2371 | Lock washer for contact plate screw (2 used) | 26586-D | .05 |
| SETIG | A-2372 | Plate for contact screw, "T" shaped | 24680-D | .15 |
| TETIG | A-2373 | Contact screw assembled through contact plate | 11372-D | 1.15 |
| ZETIG | A-2374 | Nut which holds contact screw in plate | 24705-D | .05 |
| BITIG | A-2375 | Lock washer for contact screw | 24953-D | .05 |
| CITIG | A-2376 | Washer, thick, on screw under contact screw plate | 24687-D | .05 |
| DITIG | A-2377 | Washer above contact spring on RIGHT screw | 24675-D | .05 |
| FITIG | A-2378 | Insulating washer above contact spring | 24677-D | .05 |
| KITIG | A-2379 | Contact spring assembled with point, "T" shaped | 11366-D | 1.20 |
| LITIG | A-2380 | Washer, thin, between housing and contact spring | 24678-D | .05 |
| MITIG | A-2381 | Block on screw for contact plate and spring | 24688-D | .05 |
| PITIG | A-2382 | Insulator between block and housing | 24676-D | .05 |

## HORN WIRES

| | | | | |
|---|---|---|---|---|
| RITIG | A-2403 | Conduit, less wire, horn switch to horn, LEFT steering | 23932 | 1.50 |
| SITIG | A-2404 | Wire assembly, less conduit, horn switch to horn, LEFT steering | 27311 | 1.25 |
| ZITIG | A-2405 | Wire, only, horn switch to horn | 33885 | .50 |
| BOTIG | A-2406 | Conduit, less wire, horn switch to horn, RIGHT steering | 24256 | 1.75 |
| COTIG | A-2407 | Wire assembly, less conduit, horn switch to horn RIGHT, steering | 24254 | 2.00 |
| FOTIG | A-2408 | Wire only, horn switch to horn, RIGHT steering | 33867 | .75 |
| KOTIG | A-2409 | Conduit with wire, generator to horn | 23930 | 1.50 |
| LOTIG | A-2410 | Wire only, generator to horn | 33886 | .40 |
| MOTIG | A-2411 | Single spade terminal on wires | 23374-D | .05 |
| POTIG | A-2412 | Rubber bushing for horn wire in dust shield | 31350 | .10 |
| ROTIG | A-2413 | Clip for horn conduit on generator | 31338 | .10 |
| SOTIG | A-2414 | Support for horn conduit | 38092 | .10 |
| TOTIG | A-2415 | Clamp screw for support on conduit, per doz. .25 | 10559 | .05 |
| ZOTIG | A-2416 | Nut on screw, per doz. .25 | 10887 | .05 |
| BUTIG | A-2417 | Lock washer, per doz. .25 | 11313 | .05 |
| CUTIG | A-2418 | Screw, conduit to steering gear, per doz. .25 | 11617 | .05 |
| DUTIG | A-2419 | Lock washer, per doz. .25 | 11314 | .05 |

## IGNITION TUBES AND WIRES

| | | | | |
|---|---|---|---|---|
| MUTIG | A-2481 | Ignition tube, RIGHT, complete with wires and connectors | 23708 | 11.00 |
| PUTIG | A-2484 | Ignition tube, LEFT, complete with wires and connectors | 23901 | 10.00 |
| RUTIG | A-2487 | Flexible conduit with condulet and wires from RIGHT ignition tube to dash | 25479 | 3.00 |
| TUTIG | A-2488 | Screw, condulet to dash, per doz. .25 | 10595 | .05 |
| ZUTIG | A-2490 | Lock washer, per doz. .25 | 11314 | .05 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAZIG | A-2493 | Bracket on cylinder supporting ignition tube | 37859 | .60 |
| CAZIG | A-2494 | Nut on stud attaching bracket, per doz. .25 | 11696 | .05 |
| DAZIG | A-2495 | Lock washer, per doz. .25 | 11324 | .05 |
| FAZIG | A-2496 | Clip on ignition tube for bracket | 31026 | .50 |
| KAZIG | A-2497 | Screw, clip to bracket | 11870 | .05 |
| LAZIG | A-2498 | Nut, per doz. .25 | 11715 | .05 |
| MAZIG | A-2499 | Lock washer, per doz. .25 | 11511 | .05 |
| PAZIG | A-2502 | Secondary wire to No. 1 cylinder | 33853 | .20 |
| RAZIG | A-2505 | Secondary wire to No. 2 cylinder | 33854 | .30 |
| SAZIG | A-2507 | Secondary wire to No. 3 cylinder | 33855 | .35 |
| TAZIG | A-2510 | Secondary wire to No. 4 cylinder | 33856 | .25 |
| ZAZIG | A-2513 | Secondary wire to No. 5 cylinder | 7428 | .35 |
| BEZIG | A-2516 | Secondary wire to No. 6 cylinder | 18736 | .35 |
| CEZIG | A-2519 | Secondary wire to No. 7 cylinder | 33857 | .25 |
| DEZIG | A-2522 | Secondary wire to No. 8 cylinder | 33858 | .35 |
| FEZIG | A-2524 | Terminal for spark plug on secondary wire | 31297 | .10 |
| KEZIG | A-2525 | Bushing on secondary wires to cylinders 1, 3, 4, 5 | 34274 | .10 |
| LEZIG | A-2528 | Secondary wire, distributor to ignition coil | 33849 | .60 |
| MEZIG | A-2531 | Primary wire, distributor to ignition coil | 33850 | .45 |

## IGNITION COIL

| | | | | |
|---|---|---|---|---|
| PEZIG | A-2537 | Ignition coil | 2115-D | 12.00 |
| REZIG | A-2538 | Bracket for ignition coil | 10663-D | .55 |
| SEZIG | A-2539 | Rivet, ignition coil bracket to dash (OC), per doz. .25 | 17728 | .05 |
| TEZIG | A-2541 | Screw, ignition coil bracket to dash (CC) | 10273 | .05 |
| ZEZIG | A-2542 | Nut on screws, per doz. .25 | 10889 | .05 |
| BIZIG | A-2543 | Lock washer, per doz. .25 | 11314 | .05 |
| CIZIG | A-2544 | Nut on stud at each end of coil | 29254-D | .05 |
| DIZIG | A-2545 | Lock washer | 26511-D | .05 |
| FIZIG | A-2546 | Special nut for terminal on side of coil | 23771-D | .05 |
| KIZIG | A-2547 | Lock washer | 26362-D | .05 |

## COWL WIRES—ALL CARS. WIRES FOR TAIL AND TONNEAU LAMPS—OPEN CARS

| | | | | |
|---|---|---|---|---|
| COZIG | A-2781 | Wires complete on cowl with conduit terminals and connectors less switch (7-P) (S) (M) (A) (P-1) | 23405 | 18.00 |
| FOZIG | A-2782 | Wires complete on cowl with conduit, terminals and connectors less switch (P-2) | 24367 | 18.00 |
| LOZIG | A-2783 | Wires complete on cowl with conduit, terminals and connectors less combination switch (R-1) | 23927 | 18.00 |
| POZIG | A-2784 | Wires complete on cowl with conduit, terminals and connectors less switch (R-2) | 24365 | 18.00 |
| SOZIG | A-2785 | Wires complete on cowl with conduit, terminals and connectors less switch (B-1) (B-2) (V-1) (V-2) | 23410 | 18.00 |
| ZOZIG | A-2786 | Wires complete on cowl with terminals and connectors less switch (L) (I) (LD) (TL) (TLD) (7-B) | 23460 | 18.00 |
| CUZIG | A-2787 | Wires complete on cowl with terminals and connectors less switch (SB-1) (SB-2) | 24509 | 18.00 |
| FUZIG | A-2788 | Fibre spacer for wires at dash | 32961 | .10 |
| KUZIG | A-2789 | Clamp screw in bracket holding upper section of conduit to lower | 10278 | .05 |
| LUZIG | A-2790 | Nut, per doz. .25 | 10889 | .05 |
| MUZIG | A-2791 | Lock washer, per doz. .25 | 11314 | .05 |
| PUZIG | A-2792 | Bracket, conduit to instrument board (OC) | 33391 | .15 |
| RUZIG | A-2793 | Bracket, conduit to instrument board (CC) | 33009 | .15 |
| SUZIG | A-2794 | Screw, conduit bracket to instrument board (OC) | 10271 | .05 |
| TUZIG | A-2795 | Clamp screw for bracket on conduit (OC) | 10273 | .05 |
| ZUZIG | A-2796 | Nut, per doz. .25 | 10889 | .05 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BABOM | A-2797 | Lock washer, per doz. .25 | 11314 | .05 |
| CABOM | A-2798 | Wires, No. 1 on switch to side lamps | 24497 | 1.60 |
| DABOM | A-2799 | Wire only, No. 1 on switch to RIGHT side lamp on LEFT steering and to LEFT side lamp on RIGHT steering | 33897 | .75 |
| KABOM | A-2800 | Wire only, No. 1 on switch to LEFT side lamp LEFT steering and RIGHT side lamp RIGHT steering | 18713 | .15 |
| MABOM | A-2801 | Wire with connectors, No. 2 on switch to speedometer lamp | 24502 | .75 |
| PABOM | A-2802 | Wire only, No. 2 on switch to speedometer lamp | 38313 | .35 |
| RABOM | A-2803 | Plug connector for side, clock and speedometer lamp | 33011 | .40 |
| SABOM | A-2804 | Single spade terminal on switch end of wire for clock and speedometer lamp | 23374-D | .05 |
| ZABOM | A-2805 | Double spade terminal on switch end of side lamp wire | 23375-D | .05 |
| CEBOM | A-2806 | Wire complete, No. 3 on switch to hood shelf for head lamps | 24501 | 2.40 |
| DEBOM | A-2807 | Wire only, No. 3 on switch to hood shelf for head lamp, RIGHT or LEFT | 38312 | .60 |
| KEBOM | A-2808 | Double spade terminal on switch end of head lamp wire | 23375-D | .05 |
| MEBOM | A-2809 | Connector on hood shelf end of wire | 16658 | .55 |
| PEBOM | A-2810 | Wire with terminals, No. 4 on switch to circuit breaker | 24513 | .50 |
| REBOM | A-2811 | Wire complete, No. 5 on switch to circuit breaker and large terminal on ammeter, all except (SB-1) (SB-2) | 22701 | .80 |
| TEBOM | A-2812 | Wire complete, No. 5 on switch to circuit breaker and large terminal on ammeter (SB-1) (SB-2) | 24499 | .80 |
| BIBOM | A-2813 | Wire only, No. 5 on switch to circuit breaker | 18764 | .35 |
| CIBOM | A-2814 | Wire only, circuit breaker to large stud on ammeter | 33809 | .35 |
| DIBOM | A-2815 | Insulator on wire to ammeter, per doz. .25 | 16985 | .05 |
| FIBOM | A-2816 | Large terminal on ammeter end of wire from No. 5 on switch | 19101 | .05 |
| KIBOM | A-2817 | Wire with terminals, No. 6 on switch to generator | 24512 | .75 |
| LIBOM | A-2818 | Wire only, No. 6 on switch to generator | 7288 | .50 |
| MIBOM | A-2819 | Wire with terminals, No. 7 on switch to ignition coil | 24500 | .50 |
| PIBOM | A-2820 | Terminal clip for coil end of wire from switch | 23360-D | .05 |
| RIBOM | A-2821 | Ferrule for terminal clip | 19916 | .05 |
| SIBOM | A-2822 | Wire with terminals, No. 8 on switch to generator | 24511 | .60 |
| TIBOM | A-2823 | Wire only, generator to No. 8 on switch | 7249 | .50 |
| ZIBOM | A-2824 | Tail lamp wire with terminals, speedometer lamp to tail lamp jumper (OC) (S) (M) (A) | 23403 | 1.50 |
| COBOM | A-2825 | Tail lamp wire with terminals, speedometer lamp to tail lamp jumper (R-1) (R-2) | 22912 | 1.00 |
| FOBOM | A-2826 | Wire with connectors, switch to clock lamp | 24503 | 1.00 |
| KOBOM | A-2827 | Wire only, switch to clock lamp | 38314 | .45 |
| LOBOM | A-2828 | Wires, circuit breaker to handy lamp and tonneau lamp (7-P) (P-1) (P-2) | 23402 | 2.00 |
| POBOM | A-2829 | Wire only, circuit breaker to tonneau lamp (7-P) (P-1) (P-2) | 18786 | 1.00 |
| ROBOM | A-2830 | Wire complete, circuit breaker to handy lamp, all except (SB-1) (SB-2) | 22703 | 1.00 |
| SOBOM | A-2831 | Wire complete, circuit breaker to handy lamp (SB-1) (SB-2) | 24505 | .35 |
| TOBOM | A-2832 | Wire only, circuit breaker to handy lamp | 33877 | .50 |
| ZOBOM | A-2833 | Wire with terminals, generator to circuit breaker | 24498 | .40 |
| BUBOM | A-2834 | Wire complete, generator to small stud on ammeter | 24496 | .50 |
| CUBOM | A-2835 | Wire only, generator to small stud on ammeter | 33896 | .40 |
| DUBOM | A-2836 | Terminal for small stud on ammeter | 19100 | .05 |
| FUBOM | A-2837 | Double spade terminal clips for wire | 23375-D | .05 |

## AMMETER

| | | | | |
|---|---|---|---|---|
| LUBOM | A-2841 | Ammeter complete | 19280 | 5.25 |
| MUBOM | A-2844 | Clamp for ammeter (OC) | 19259 | .20 |
| PUBOM | A-2845 | Clamp for ammeter (CC) | 19260 | .25 |
| RUBOM | A-2846 | Nut on large stud of ammeter, per doz. .25 | 11671 | .05 |
| SUBOM | A-2847 | Nut on small stud of ammeter, per doz. .25 | 11672 | .05 |
| TUBOM | A-2848 | Lock washer for large nut, per doz. .25 | 11500 | .05 |
| ZUBOM | A-2849 | Lock washer for small nut, per doz. .25 | 11501 | .05 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADOM | A-2850 | Terminal for large stud | 19101 | .05 |
| CADOM | A-2851 | Terminal for small stud | 19100 | .05 |
| DADOM | A-2852 | Insulator for terminal, per doz. .25 | 16985 | .05 |

## HEAD LAMPS

| | | | | |
|---|---|---|---|---|
| FADOM | A-2859 | Head lamp complete with bulb (black and nickel) (door hinged at top) | 25255 | 17.00 |
| LADOM | A-2860 | Head lamp complete with bulb (special all nickel) (door hinged at top) | 25256 | 19.00 |
| PADOM | A-2864 | Door less glass for head lamp (black and nickel) (hinged at either side) | B44-GD | 8.00 |
| SADOM | A-2865 | Door less glass for head lamp, (black and nickel) (hinge at top) | P475-GD | 8.00 |
| TADOM | A-2866 | Door less glass for head lamp, (special all nickel) (hinged at either side) | B-44-AN | 8.50 |
| BEDOM | A-2867 | Door less glass for head lamp, (special all nickel) (hinge at top) | P-475-AN | 8.50 |
| CEDOM | A-2868 | Glass for head lamp | 31233 | 1.25 |
| DEDOM | A-2869 | Packing ring for head lamp glass | B47-GD | .20 |
| FEDOM | A-2870 | Clip for head lamp glass | B48-GD | .10 |
| KEDOM | A-2871 | Screw for head lamp glass | 11948 | .05 |
| LEDOM | A-2872 | Cotton packing for head lamp glass | 33996 | .08 |
| MEDOM | A-2874 | Parabolic (tilting) reflector complete for head lamp | B-53-GD | 8.00 |
| XEDOM | A-2876 | Ediswan receptacle complete with wire for bulb | 52872 | 2.40 |
| TEDOM | A-2882 | Bulb for head lamp, (7-V) 18 C. P. | 38188 | .52 |
| ZEDOM | A-2883 | Screw for side hinges for head lamp door | P653-GD | .10 |
| BIDOM | A-2884 | Screw for top hinge for head lamp door | P654-GD | .10 |
| CIDOM | A-2885 | Eye bolt and clamp nut B11-GD for head lamp door | 52870 | .25 |
| DIDOM | A-2886 | Fork for head lamp | 18481 | 2.40 |
| FIDOM | A-2888 | Screw, head lamp fork to fender iron | 11882 | .15 |
| KIDOM | A-2889 | Lock washer, per doz. .25 | 11317 | .05 |
| LIDOM | A-2890 | Acorn nut on head lamp forks | 9479 | .30 |
| MIDOM | A-2890A | Lock washer | 11486 | .05 |
| PIDOM | A-2891 | Tie rod for head lamp fork 16" long | 22910 | 1.00 |
| RIDOM | A-2892 | Tie rod for head lamp fork 16½" long | 22911 | 1.00 |
| SIDOM | A-2893 | Clamp complete for license tag on tie rod | 20254 | .75 |
| TIDOM | A-2895 | Wire, No. 12 black, in hood shelf for head lamp (2 used) | 18716 | .45 |
| ZIDOM | A-2897 | Plug connector at either end of hood shelf wire | 33012 | .40 |

## HEAD LAMP REFLECTOR CONTROL

| | | | | |
|---|---|---|---|---|
| MODOM | A-2900 | Support for housing tube and head lamp control with bushings, cap, cover and plunger (7-P) (PI) (RI) (S) | 24287 | 7.50 |
| RODOM | A-2901 | Support for housing tube and head lamp control with bushings, cap, cover and plunger (P-2) (R-2) | 41730 | 7.50 |
| TODOM | A-2902 | Support for housing tube and head lamp control with bushings, cap, cover and plunger (V-1) (V-2) (B-2) | 24370 | 7.50 |
| BUDOM | A-2903 | Housing for head lamp control on steering tube with bushings, cap, cover and plunger (M) (A) (CC) except (V-1) (V-2) (B-2) | 24369 | 7.50 |
| DUDOM | A-2904 | Cover with bushing for support or housing | 24288 | 1.65 |
| FUDOM | A-2905 | Screw, cover to housing or support | 11610 | .05 |
| KUDOM | A-2906 | Bushing in cover for lock plunger | 37955 | .25 |
| LUDOM | A-2907 | Plunger in cover for lock | 37947 | .35 |
| MUDOM | A-2908 | Spring in plunger for lock | 37937 | .05 |
| PUDOM | A-2909 | Screw for plunger guide | 37978 | .03 |
| RUDOM | A-2910 | Pipe plug in support or housing (M) (A) and (CC) except (V-1) (V-2) (B-2) | 30471 | .08 |
| TUDOM | A-2911 | Bushing in housing for support for control shaft and rod end (2 used) | 37957 | .25 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAFOM | A-2912 | Anchor pin for bushing in housing or support, per doz. .25 | 37958 | .05 |
| CAFOM | A-2913 | Hand lever with shaft for head lamp control | 23434 | 1.50 |
| DAFOM | A-2914 | Lever in housing with slot for lock plunger | 37969 | 1.60 |
| FAFOM | A-2915 | Shaft in housing or support for levers | 37941 | .10 |
| KAFOM | A-2916 | Taper pin for levers on shaft, per doz. .25 | 15002 | .05 |
| LAFOM | A-2917 | End for control shifter rod in housing or support | 37953 | .35 |
| MAFOM | A-2918 | Control shifter rod with washer, housing to lower support on steering column (7-P) (P-1) (R-1) (V-1) (V-2) (S) | 23359 | .40 |
| RAFOM | A-2919 | Control shifter rod with washer, housing to lower support on steering column (P-2) (R-2) | 24280 | .40 |
| TAFOM | A-2920 | Control shifter rod with washer, housing to lower support on steering column (M) (A) and (CC) except (V-1) (V-2) (SB-1) (SB-2) | 23360 | .40 |
| CEFOM | A-2921 | Control shifter rod with washer, housing to lower support on steering column (SB-1) (SB-2) | 24428 | .40 |
| FEFOM | A-2922 | Nut on upper end of shifter rod | 37936 | .05 |
| KEFOM | A-2923 | Protection tube for control shifter rod (7-P) (P-1) (R-1) (V-1) (S) | 37946 | .60 |
| MEFOM | A-2924 | Protection tube for control shifter rod (P-2) (R-2) | 38270 | .60 |
| PEFOM | A-2925 | Protection tube for control shifter rod (M) (A) and (CC) except (V-1) (V-2) (B-2) | 37945 | .60 |
| SEFOM | A-2925B | Protection tube for control shifter rod (V-2) (B-2) | 38681 | .60 |
| TEFOM | A-2926 | Taper pin, tube to housing or support, per doz. .25 | 15002 | .05 |
| ZEFOM | A-2927 | Clamp supporting protection on tube (2 used) | 37954 | .15 |
| BIFOM | A-2928 | Screw through clamp, per doz. .25 | 11985 | .05 |
| CIFOM | A-2929 | Nut | 38018 | .05 |
| DIFOM | A-2930 | Sleeve for tension spring on lower end of shifter rod | 37973 | .45 |
| FIFOM | A-2931 | Tension spring on lower end of shifter rod | 37938 | .05 |
| RIFOM | A-2931B | Special flat washer for spring | 11533 | .05 |
| KIFOM | A-2932 | Nut on sleeve for tension spring | 37952 | .25 |
| LIFOM | A-2933 | Bracket, lower, with shaft and levers on steering column, LEFT steering | 23943 | 4.00 |
| PIFOM | A-2934 | Bracket, lower, with shaft and levers on steering column, RIGHT steering | 23944 | 5.00 |
| SIFOM | A-2935 | Bushing in lower bracket for shaft | 37956 | .10 |
| TIFOM | A-2936 | Shaft in lower bracket for control rod levers | 37939 | .10 |
| ZIFOM | A-2937 | Lever on lower bracket for shifter rod | 37949 | .50 |
| BOFOM | A-2938 | Lever on shaft in lower bracket for head lamp control rod, LEFT steering | 38149 | .60 |
| DOFOM | A-2939 | Lever on shaft in lower bracket for head lamp control rod, RIGHT steering | 37951 | .60 |
| KOFOM | A-2940 | Rod, bracket on steering column to rocker shaft lever on radiator | 23358 | .75 |
| LOFOM | A-2942 | Clevis on control rods (3 used) | 16843 | .60 |
| MOFOM | A-2943 | Lock nut for clevis on rod | 11734 | .05 |
| POFOM | A-2944 | Pin for clevis on levers | 13726 | .05 |
| ROFOM | A-2945 | Cotter pin for pin | 15251 | .03 |
| SOFOM | A-2946 | Casing and bushing for rocker shaft on radiator | 23355 | 1.25 |
| TOFOM | A-2947 | Bushing in casing (2 used) | 7580 | .05 |
| ZOFOM | A-2948 | Rocker shaft on radiator for head lamp control | 37940 | .25 |
| BUFOM | A-2949 | Lever, long, for rocker shaft on radiator | 37968 | .75 |
| CUFOM | A-2950 | Lever, short, for rocker shaft on radiator | 37950 | .50 |
| DUFOM | A-2951 | Bracket for rocker shaft on radiator, RIGHT | 25343 | .75 |
| FUFOM | A-2952 | Bracket for rocker shaft on radiator, LEFT | 25344 | .75 |
| KUFOM | A-2953 | Clamp for bracket | 38660 | .10 |
| LUFOM | A-2954 | Screw for clamp, per doz. .25 | 11617 | .05 |
| MUFOM | A-2955 | Nut, per doz. .25 | 10889 | .05 |
| PUFOM | A-2956 | Lock washer, per doz. .25 | 11304 | .05 |
| RUFOM | A-2957 | Rod, rocker shaft lever to head lamp, RIGHT or LEFT | 23356 | .40 |

## SIDE LAMPS

| | | | | |
|---|---|---|---|---|
| SUFOM | A-2963 | Side lamp with bulb, RIGHT (special, all nickel), (CC) except (V-2) (B-2) (SB-2) | 22354 | 4.25 |
| ZUFOM | A-2967 | Side lamp with bulb, LEFT (special all nickel), (CC) except (V-2) (B-2) (SB-2) | 22355 | 4.25 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAGOM | A-2969 | Side lamp with bulb, RIGHT (black and nickel), (P-1) (R-1) (S) (M) (A) (7-P) | 23820 | 3.75 |
| DAGOM | A-2970 | Side lamp with bulb, RIGHT (black and nickel), (P-2) (R-2) (V-2) (B-2) (SB-2) | 24397 | 3.75 |
| KAGOM | A-2971 | Side lamp with bulb, RIGHT (black and nickel), (CC) except (V-2) (B-2) (SB-2) | 23986 | 3.75 |
| MAGOM | A-2972 | Side lamp with bulb, RIGHT (special all nickel), (7-P) (P-1) (R-1) (S) (M) (A) | 24395 | 4.25 |
| RAGOM | A-2973 | Side lamp with bulb, RIGHT (special all nickel), (P-2) (R-2) (V-2) (B-2) (SB-2) | 25321 | 4.25 |
| TAGOM | A-2974 | Side lamp with bulb, LEFT (black and nickel), (7-P) (P-1) (R-1) (S) (M) (A) | 23821 | 3.75 |
| BEGOM | A-2975 | Side lamp with bulb, LEFT (black and nickel), (P-2) (R-2) (V-2) (B-2) (SB-2) | 24398 | 3.75 |
| DEGOM | A-2976 | Side lamp with bulb, LEFT (black and nickel), (CC) except (V-2) (B-2) (SB-2) | 23987 | 3.75 |
| KEGOM | A-2977 | Side lamp with bulb, LEFT (special all nickel), (7-P) (P-1) (R-1) (S) (M) (A) | 24396 | 4.25 |
| MEGOM | A-2978 | Side lamps with bulb, LEFT (special all nickel), (P-2) (R-2) (V-2) (B-2) (SB-2) | 25322 | 4.25 |
| BOGOM | A-2994 | Screw to attach side lamp door, per doz. .25 | P590-GD | .05 |
| COGOM | A-2995 | Glass for side lamp door, all except (P-2) (R-2) | 31230 | .15 |
| DOGOM | A-2996 | Glass for side lamp door (P-2) (R-2) | 31229 | .15 |
| FOGOM | A-2998 | Glass in side of side lamp (Jewel) | 52868 | .30 |
| KOGOM | A-3000 | Bulb for side lamp, 8 V, 6 C. P | 31185 | .50 |
| POGOM | A-3004 | Reflector complete for LEFT side lamp (CC) | B82-GD | 2.40 |
| CUGOM | A-3008 | Receptacle for side lamp | P151-GD | .75 |
| DUGOM | A-3009 | Bolt, side lamp to body (OC) (S) (M) (A) | 33967 | .50 |
| FUGOM | A-3012 | Bolt, side lamp to body (CC) | 33966 | .50 |
| KUGOM | A-3015 | Lock washer | 11342 | .03 |
| LUGOM | A-3016 | Special lock washer | 31175 | .08 |

## SPEEDOMETER AND CLOCK LAMPS

| | | | | |
|---|---|---|---|---|
| MUGOM | A-3018 | Flange for speedometer and clock lamps (OC) | 18893 | 1.00 |
| PUGOM | A-3019 | Flange for speedometer and clock lamps (CC) | 18894 | 1.50 |
| RUGOM | A-3020 | Flat washer for clock lamp flange | 11513 | .08 |
| SUGOM | A-3021 | Housing for speedometer lamp | 18892 | .35 |
| TUGOM | A-3022 | Housing for clock lamp | 31848 | .35 |
| ZUGOM | A-3023 | Shut off for speedometer and clock lamps | 18891 | .20 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAHOM | A-3024 | Shell connector for speedometer and clock lamps | 16756 | .60 |
| CAHOM | A-3025 | Special nut for flange on speedometer and clock lamps | 11658 | .10 |
| DAHOM | A-3027 | Flat insulator for speedometer lamp (OC) | 18890 | .03 |
| FAHOM | A-3028 | Insulator with shoulder for speedometer lamp | 18889 | .05 |
| KAHOM | A-3029 | Terminal bracket assembly (CC) | 22649 | .25 |
| LAHOM | A-3030 | Terminal bracket for speedometer lamp all cars, and for clock lamp on (CC) | 18888 | .10 |
| PAHOM | A-3031 | Clamp for wire terminal on speedometer and clock lamps | 23450-D | .05 |
| RAHOM | A-3032 | Screw for terminal on speedometer and clock lamps | 19091 | .05 |
| SAHOM | A-3033 | Lock washer, per doz. .25 | 19092 | .05 |
| TAHOM | A-3034 | Nut, per doz. .25 | 19093 | .05 |
| ZAHOM | A-3035 | Bulb for speedometer lamp | 31133 | .28 |
| BEHOM | A-3036 | Bulb for clock lamp | 31827 | .28 |
| CEHOM | A-3038 | Plug connector for speedometer and clock lamp | 33011 | .40 |
| DEHOM | A-3039 | Single spade terminal for speedometer and clock lamp connections | 23374-D | .05 |

## TONNEAU LAMPS

| | | | | |
|---|---|---|---|---|
| KEHOM | A-3042 | Tonneau lamp with bulb and jumper wire (7-P) (P-1) (P-2) LEFT steering | 22359 | 3.00 |
| MEHOM | A-3043 | Tonneau lamp with bulb and jumper wire (7-P) (P-1) (P-2) RIGHT steering | 22358 | 3.00 |
| REHOM | A-3044 | Tonneau lamp less bulb and jumper wire (7-P) (P-1) (P-2) LEFT steering | 31244 | 1.75 |
| TEHOM | A-3045 | Tonneau lamp less bulb and jumper wire (7-P) (P-1) (P-2) RIGHT steering | 31942 | 1.75 |
| BIHOM | A-3046 | Bulb for Tonneau lamp 8 V, 2 C. P. | 31827 | .28 |
| CIHOM | A-3047 | Jumper wire with connectors for Tonneau lamp | 20970 | 1.00 |
| DIHOM | A-3048 | Jumper wire for Tonneau lamp | 18717 | .15 |
| FIHOM | A-3049 | Connector for Tonneau lamp jumper wire | 31137 | .55 |
| KIHOM | A-3050 | Glass for Tonneau lamp | 52763 | .35 |
| LIHOM | A-3051 | Retainer for glass | 52823 | .10 |
| MIHOM | A-3052 | Tension spring under glass | 52822 | .10 |

## HANDY LAMP AND CONNECTION

| | | | | |
|---|---|---|---|---|
| COHOM | A-3055 | Handy lamp complete | 21814 | 3.00 |
| DOHOM | A-3056 | Bulb for handy lamp 8 V, 6 C. P. | 38231 | .50 |
| FOHOM | A-3057 | Bracket on dash for handy lamp connector (with two screw holes) | 18885 | .05 |
| LOHOM | A-3058 | Bracket for ground terminal on handy lamp | 18886 | .10 |
| MOHOM | A-3059 | Connector for handy lamp | 17272 | .70 |
| POHOM | A-3060 | Special flat washer for handy lamp connector (OC) (S) (M) (A), per doz. .25 | 11480 | .05 |
| SOHOM | A-3061 | Lock washer on handy lamp connector, per doz. .25 | 12136 | .05 |
| TOHOM | A-3066 | Clamp for terminal on handy lamp connector (CC) | 23450-D | .05 |
| ZOHOM | A-3067 | Screw for terminal handy lamp connector (CC) | 19091 | .04 |
| BUHOM | A-3068 | Lock washer, per doz. .25 | 19092 | .05 |
| CUHOM | A-3069 | Nut, per doz. .25 | 19093 | .05 |
| DUHOM | A-3070 | Ground wire with terminals for handy lamp connection (CC) | 24504 | .25 |

## TAIL LAMP

| | | | | |
|---|---|---|---|---|
| RUHOM | A-3073 | Tail lamp complete with license tag holder, all with wood wheels except (R-1) (R-2) (V-1) | 22363 | 7.50 |
| TUHOM | A-3074 | Tail lamp complete with license tag holder (R-1) (R-2) (V-1) and all with wire wheels | 21799 | 7.00 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAKOM | A-3075 | Tail lamp shell only with bracket and riveted parts, all with wood wheels except (R-1) (R-2) (V-1) | 22362 | 4.00 |
| DAKOM | A-3076 | Tail lamp shell only with bracket and riveted parts (R-1) (R-2) (V-1) and all with wire wheels | 20415 | 3.50 |
| KAKOM | A-3077 | Clamp screw for lamp on tube | 10008 | .10 |
| LAKOM | A-3078 | Lock washer, per doz. .25 | 11315 | .05 |
| MAKOM | A-3079 | Bulb for tail lamp 4 V, 2 C. P. | 31133 | .28 |
| PAKOM | A-3080 | Red glass for tail lamp | 18457 | .15 |
| RAKOM | A-3081 | Plain glass for tail lamp | 18454 | .20 |
| SAKOM | A-3082 | Small plain glass in rear of tail lamp, all with wood wheels except (R-1) (R-2) (V-1) | 32936 | .15 |
| ZAKOM | A-3083 | Clamp with ear and nut for red glass | 20416 | .50 |
| BEKOM | A-3084 | Screw for clamp, per doz. .25 | 11604 | .05 |
| CEKOM | A-3085 | Cover retaining large plain glass in shell | 18458 | .05 |
| DEKOM | A-3086 | Retainer for small plain glass in shell, all with wood wheels except (R-1) (R-2) (V-1) | 32937 | .08 |
| KEKOM | A-3087 | Screw for cover and retainer for plain glasses, per doz. .25 | 18453 | .05 |
| LEKOM | A-3088 | Step bolt for license tag | 6728 | .05 |
| MEKOM | A-3089 | Leather washer, per doz. .25 | 11441 | .05 |
| PEKOM | A-3090 | Flat washer, per doz. .25 | 11442 | .05 |
| REKOM | A-3091 | Lock washer, per doz. .25 | 11314 | .05 |
| SEKOM | A-3092 | Wing nut on bolt for license tag holder | 6978 | .10 |

## TUBE AND JUMPER WIRE FOR TAIL LAMP

| | | | | |
|---|---|---|---|---|
| LIKOM | A-3098 | Tube only for tail lamp jumper wire all with standard wheels except (R-1) (R-2) (V-1) (V-2) | 32941 | 2.00 |
| PIKOM | A-3099 | Tube only for tail lamp jumper wire all with wire wheels except (R-2) (R-1) (V-1) (V-2) | 33577 | 2.25 |
| SIKOM | A-3099A | Tube only for tail lamp jumper wire (V-2) | 38325 | 2.50 |
| TIKOM | A-3100 | Tube only for tail lamp jumper wire, all with MM. wheels except (V-1) (R-1) (R-2) | 38105 | 3.00 |
| BOKOM | A-3103 | Jumper wire only for tail lamp, used with wire wheels (R-1) (R-2) (V-1) (V-2) | 18627 | .25 |
| DOKOM | A-3105 | Jumper wire only for tail lamp (7-P) (V-1) (R-1) (R-2) (S) (M) (A) | 18742 | .25 |
| KOKOM | A-3107 | Jumper wire only for tail lamp (P-2) (B-1) (B-2) (L) (I) (LD) (TL) (TLD) (SB-1) (SB-2) (7-B) (V-2) | 33810 | .25 |
| MOKOM | A-3108 | Rubber bushing for jumper wire in fender (R-1) (R-2) (V-1) | 31350 | .10 |
| POKOM | A-3109 | Connector on tail lamp jumper wire at lamp | 16974 | .40 |
| ROKOM | A-3110 | Connector in tail lamp for jumper wire | 19856 | .50 |
| SOKOM | A-3111 | Set screw for connector in tail lamp | 11254 | .05 |
| TOKOM | A-3113 | Plug connector for tail lamp jumper wire at body | 33011 | .40 |
| ZOKOM | A-3114 | Connector No. 6 in body for tail lamp jumper wire | 16660 | .85 |
| BUKOM | A-3115 | Lock washer on tail lamp connector in body, per doz. .25 | 12136 | .05 |
| CUKOM | A-3116 | Box for tail lamp connectors (R-1) (R-2) and all with wire wheels. | 33064 | .50 |

## TAIL LAMP ATTACHMENTS ON CROSS TUBE AND FENDER

| | | | | |
|---|---|---|---|---|
| FUKOM | A-3133 | Shoe for tail lamp tube on rear cross tube | 21813 | .35 |
| KUKOM | A-3134 | Ball in shoe for tail lamp tube, per doz. .25 | 3821 | .05 |
| LUKOM | A-3135 | Clamp, lower, for tail lamp tube on rear cross tube | 18466 | .30 |
| MUKOM | A-3136 | Eye for tail lamp tube | 18464 | .45 |
| PUKOM | A-3137 | Screw, lower clamp to eye bolt | 10352 | .08 |
| RUKOM | A-3138 | Lock washer, per doz. .25 | 11316 | .05 |
| SUKOM | A-3140 | Bracket for tail lamp and license tag holder (R-1) (R-2) (R) (V) (V-1) | 33576 | 3.00 |
| TUKOM | A-3142 | Support on fender for tail lamp tube, all with wire wheels except (R-1) (R-2) (V-1) | 33574 | .65 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BALOM | A-3143 | Reinforcement for tail lamp support, all with wire wheels except (R-1) (R-2) (V-1) | 31686 | .08 |
| DALOM | A-3144 | Screw, reinforcement to support | 10023 | .05 |
| FALOM | A-3145 | Lock washer, per doz. .25 | 11306 | .05 |
| KALOM | A-3146 | Screw, tail lamp bracket to fender | 10273 | .05 |
| LALOM | A-3147 | Lock washer, per doz. .25 | 11314 | .05 |

## QUARTER AND DOME LAMPS

| | | | | |
|---|---|---|---|---|
| MALOM | A-3153 | Quarter lamp complete (B-1) (B-2) (L) (I) (TL) (SB-1) (SB-2) (7-B) | 24110-F | 2.75 |
| CALOM | A-3153B | Quarter lamp complete (second type) on (L-2) (SB-2) (B-2) | 27885-F | 5.25 |
| RALOM | A-3158 | Dome lamp complete (V-1) (V-2) (L) (I) (LD) (TL) (TLD) (7-B) | 24141-F | 3.60 |
| PALOM | A-3158B | Dome lamp complete (second type) on (L-2) (SD-2) (V-2) | 27874-F | 10.00 |
| SALOM | A-3159 | Bulb for quarter lamp 8 V, 2 C. P. | 31827 | .28 |
| TALOM | A-3160 | Bulb for dome lamp 8V, 6 C. P. | 38231 | .50 |
| ZALOM | A-3162 | Clamp for terminal on quarter and dome lamps | 23450-D | .05 |
| BELOM | A-3163 | Screw | 19091 | .05 |
| CELOM | A-3164 | Nut, per doz. .25 | 19093 | .05 |
| DELOM | A-3165 | Lock washer, per doz. .25 | 19092 | .05 |
| FELOM | A-3166 | Washer for ground connections (L) (I) (LD) (TL) (TLD), per doz. .25 | 2801 | .05 |

## SWITCH FOR DOME LAMP—VICTORIA

| | | | | |
|---|---|---|---|---|
| ZELOM | A-3179 | Switch on door column for quarter lamp (B-1) (B-2) (SB-1) (SB-2) and dome lamp (V-1) (V-2) | 22826-F | 1.25 |
| CILOM | A-3180 | Switch on door column and heel board for inside lamps (nickel) (L) (I) (LD) (TL) (TLD) (7-B) | 22825-F | 1.25 |
| BILOM | A-3180B | Escutcheon plate for switch on door column (V-2)(B-2)(SB-2) (L-2) | 27887-V | 1.25 |
| FILOM | A-3183 | Push button switch on instrument board for dome lamp (V-1) (V-2) | 44-K | 3.75 |

## TRANSMISSION CASE

| | | | | |
|---|---|---|---|---|
| ZOLOM | A-3201 | Transmission case with studs and bushings, LEFT steering | 23806 | 68.50 |
| BULOM | A-3205 | Transmission case with studs and bushings, RIGHT steering | 24237 | 70.00 |
| CULOM | A-3206 | Screw, transmission to crank case | 10048 | .10 |
| DULOM | A-3207 | Nut | 11675 | .05 |
| FULOM | A-3208 | Lock washer, per doz. .25 | 11326 | .05 |
| KULOM | A-3210 | Stud in transmission case for hand brake ratchet | 31793 | .05 |
| LULOM | A-3215 | Stud in side of transmission case for pedal bracket and tire pump, per doz. .25 | 37273 | .05 |
| PULOM | A-3216 | Bushing for clutch release shaft (2 used) | 18966 | .90 |
| RULOM | A-3219 | Overflow plug in side of transmission case | 6117 | .10 |
| SULOM | A-3220 | Drain plug in bottom of transmission case | 2896 | .20 |
| TULOM | A-3223 | Cover for bottom of transmission case | 37243 | 3.00 |
| ZULOM | A-3224 | Gasket for bottom cover | 37244 | .05 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAPOM | A-3227 | Stud for transmission bottom cover | 37270 | .08 |
| CAPOM | A-3228 | Nut | 11676 | .03 |
| DAPOM | A-3230 | Lock washer on stud, per doz. .25 | 11315 | .05 |
| FAPOM | A-3235 | Hand hole cover for top of transmission case | 37240 | .10 |
| KAPOM | A-3236 | Screw | 37271 | .08 |
| LAPOM | A-3430 | Clutch connection for transmission | 37232 | 23.00 |
| MAPOM | A-3431 | Rear bearing for clutch connection (No. 1309 N. D.) | 37236 | 16.00 |
| PAPOM | A-3432 | Retainer for clutch connection rear bearing | 37220 | 2.00 |
| RAPOM | A-3433 | Steel ring either side of rear clutch connection bearing | 37235 | .10 |
| SAPOM | A-3434 | Check nut for rear clutch connection bearing | 37238 | .75 |
| TAPOM | A-3435 | Locking wire for check nut, per doz. .25 | 37239 | .05 |
| ZAPOM | A-3436 | Cap for clutch connection main bearing | 37237 | 1.75 |

## TRANSMISSION SHAFTS, GEARS, BEARINGS AND RETAINERS

| | | | | |
|---|---|---|---|---|
| DEPOM | A-3437 | Gasket between cap and retainer, per doz. .25 | 37219 | .05 |
| FEPOM | A-3438 | Screw, cap and retainer to transmission case | 37264 | .10 |
| KEPOM | A-3439 | Lock washer, per doz. .25 | 11315 | .05 |
| LEPOM | A-3440 | Nut on clutch end of clutch connection | 18804 | .45 |
| MEPOM | A-3441 | Lock washer | 11323 | .05 |
| PEPOM | A-3442 | Transmission drive shaft with collar | 24181 | 12.00 |
| REPOM | A-3443 | Collar for front end of transmission drive shaft | 37233 | .15 |
| SEPOM | A-3444 | Hyatt bearing in end of clutch connection for transmission drive shaft | 37234 | 2.00 |
| ZEPOM | A-3445 | Spacer in clutch connection end for drive shaft bearing | 37268 | .30 |
| BIPOM | A-3446 | Bearing for rear end of transmission drive shaft | 18901 | 16.80 |
| CIPOM | A-3447 | Retainer for rear drive shaft bearing | 37220 | 2.00 |
| DIPOM | A-3448 | Throw off ring front and rear of drive shaft rear bearing | 38513 | .08 |
| FIPOM | A-3449 | Spacing ring for drive shaft rear bearing | 37214 | .25 |
| KIPOM | A-3450 | Retainer for spacing ring | 37218 | .10 |
| LIPOM | A-3451 | Gasket between retainers, per doz. .25 | 37219 | .05 |
| MIPOM | A-3452 | Cap for rear drive shaft bearing | 37217 | .25 |
| PIPOM | A-3453 | Felt washer under rear drive shaft bearing cap | 37272 | .20 |
| RIPOM | A-3454 | Screw, cap and retainer to transmission case | 10007 | .05 |
| SIPOM | A-3455 | Lock washer, per doz. .25 | 11315 | .05 |
| TIPOM | A-3456 | Flange on transmission drive shaft for universal joint | 37266 | 5.00 |
| ZIPOM | A-3457 | Screw, flange to drive shaft | 37216 | .15 |
| BOPOM | A-3458 | Flat washer | 37215 | .05 |
| COPOM | A-3459 | Lock washer, per doz. .25 | 11340 | .05 |
| DOPOM | A-3460 | Shipper gear on drive shaft for high and intermediate speeds, 22 teeth, 16 grooves | 37231 | 12.00 |
| KOPOM | A-3461 | Shipper gear on drive shaft for low and reverse speeds (29 teeth) | 37227 | 13.50 |
| LOPOM | A-3462 | Jack shaft gears assembled (high, intermediate, low and reverse gear with oil scoop and spacer) | 23635 | 40.00 |
| POPOM | A-3463 | Jack shaft gears only (intermediate, low and reverse with oil scoop and spacer) | 41735 | 30.00 |
| SOPOM | A-3464 | Driven or high gear only for jack shaft gear assembly (31 teeth) | 37241 | 12.50 |
| TOPOM | A-3465 | Rivet, driven gear to jack shaft gears | 17614 | .03 |
| ZOPOM | A-3466 | Scoop in gears, oiling jack shaft bearings | 37630 | .10 |
| BUPOM | A-3467 | Pinion with bushing for reverse speed (16 teeth) | 23804 | 10.00 |
| CUPOM | A-3468 | Bushing for reverse pinion | 37261 | .80 |
| DUPOM | A-3469 | Shaft for reverse pinion | 38905 | 1.50 |
| FUPOM | A-3470 | Set screw for reverse pinion shaft | 37263 | .15 |
| KUPOM | A-3471 | Spacing collar on reverse pinion shaft | 37259 | .45 |
| LUPOM | A-3472 | Dowel in case anchoring collar, per doz. .25 | 37223 | .05 |
| MUPOM | A-3473 | Jack shaft only | 37749 | 2.50 |
| PUPOM | A-3474 | Hyatt bearing on jack shaft for gear (2 used) | 37747 | 2.10 |
| RUPOM | A-3475 | Spacer between jack shaft bearings | 37748 | 1.00 |
| SUPOM | A-3476 | Set screw in transmission case for jack shaft | 37257 | .10 |
| TUPOM | A-3477 | Lock nut on set screw | H-1700 | .05 |
| ZUPOM | A-3478 | Spacing collar on jack shaft (front and rear) | 37224 | .60 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAROM | A-3479 | Dowel in case anchoring jack shaft collar (front and rear), per doz. .25 | 37223 | .05 |
| DAROM | A-3480 | Cover for end of jack shaft front and rear | 37221 | .50 |
| FAROM | A-3481 | Gasket for jack shaft end cover, per doz. .25 | 37269 | .05 |
| KAROM | A-3482 | Stud for attaching jack shaft end cover, per doz. .25 | 30495 | .05 |
| LAROM | A-3483 | Nut, per doz. .25 | 11674 | .05 |
| MAROM | A-3484 | Lock washer, per doz. .25 | 11315 | .05 |

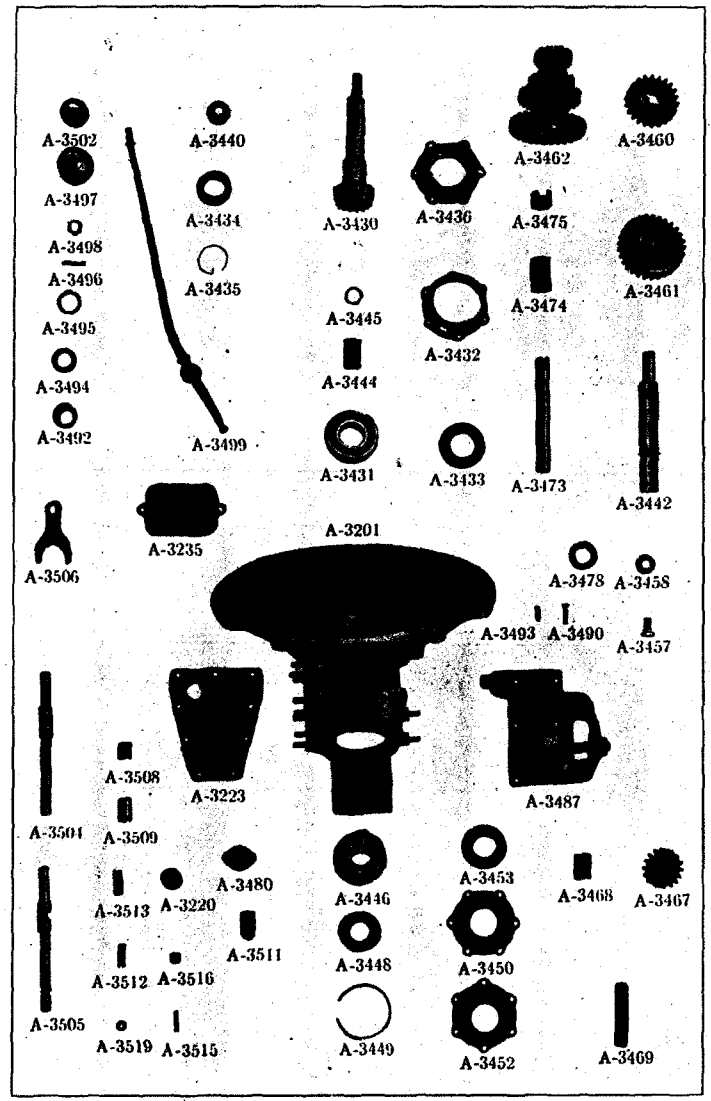
## TRANSMISSION CONTROL

| | | | | |
|---|---|---|---|---|
| PAROM | A-3487 | Top cover for transmission with ball seat and shaft for hand brake lever, LEFT steering | 23735 | 11.00 |
| SAROM | A-3488 | Top cover for transmission with ball seat and shaft for hand brake lever, RIGHT steering | 24240 | 11.00 |
| ZAROM | A-3489 | Gasket for top cover | 38104 | .05 |
| BEROM | A-3490 | Screw to attach top cover | 11848 | .10 |
| CEROM | A-3491 | Breather in top cover for transmission | 37750 | .20 |
| DEROM | A-3492 | Seat for control lever | 30906 | .65 |
| FEROM | A-3493 | Dowel pin for seat in top cover, per doz. .25 | 30908 | .05 |
| KEROM | A-3494 | Felt washer on control lever seat | 11506 | .10 |
| LEROM | A-3495 | Lock nut for control lever in seat | 30905 | .35 |
| MEROM | A-3496 | Pin for control lever in seat | 30904 | .15 |
| PEROM | A-3497 | Cap for ball seat of control lever | 30903 | .50 |
| REROM | A-3498 | Nut retaining cap on control lever | 30907 | .35 |
| SEROM | A-3499 | Control lever less hand ball (OC) (S) (V-1) (V-2) (SB-1) (SB-2) (B-2) | 37486 | 4.50 |
| ZEROM | A-3500 | Control lever less hand ball (I) (LD) (TL) (TLD) | 37849 | 4.50 |
| BIROM | A-3501 | Control lever less hand ball (B-1) (M) (A) | 37488 | 4.50 |
| CIROM | A-3502 | Hand ball for control lever | 18937 | .75 |
| DIROM | A-3503 | Oiler on top cover for accelerator pedal shaft, LEFT steering | 30772 | .20 |
| FIROM | A-3504 | Shaft only for shifter fork, high and intermediate speed | 37249 | 2.85 |
| KIROM | A-3505 | Shaft only for shifter fork, low and reverse speed | 37248 | 2.60 |
| LIROM | A-3506 | Shifter fork only for all speeds | 37229 | 2.25 |
| MIROM | A-3507 | Taper pin in shifter fork | 37831 | .05 |
| PIROM | A-3508 | Bushing for either shifter shaft, front | 37251 | .50 |
| RIROM | A-3509 | Bushing for either shifter shaft, rear | 37213 | .75 |
| SIROM | A-3510 | Screw anchoring shifter shaft rear bushing, per doz. .25 | 37212 | .05 |
| TIROM | A-3511 | Cap for rear end of shifter shafts | 38099 | .20 |
| ZIROM | A-3512 | Plunger for locking shifter shaft, either side | 37255 | .60 |
| BOROM | A-3513 | Bushing for plunger, either side | 37254 | .70 |
| COROM | A-3514 | Anchor pin for bushing, per doz. .25 | 18162 | .05 |
| DOROM | A-3515 | Spring in plunger, either side | 37256 | .05 |
| FOROM | A-3516 | Cap covering plunger and spring, either side | 37253 | .10 |
| KOROM | A-3517 | Cotter pin through cap and plunger, per doz. .25 | 15165 | .05 |
| LOROM | A-3518 | Ball between shifter shafts | 37252 | .05 |
| MOROM | A-3519 | Bushing for ball between shifter shafts | 37250 | .10 |

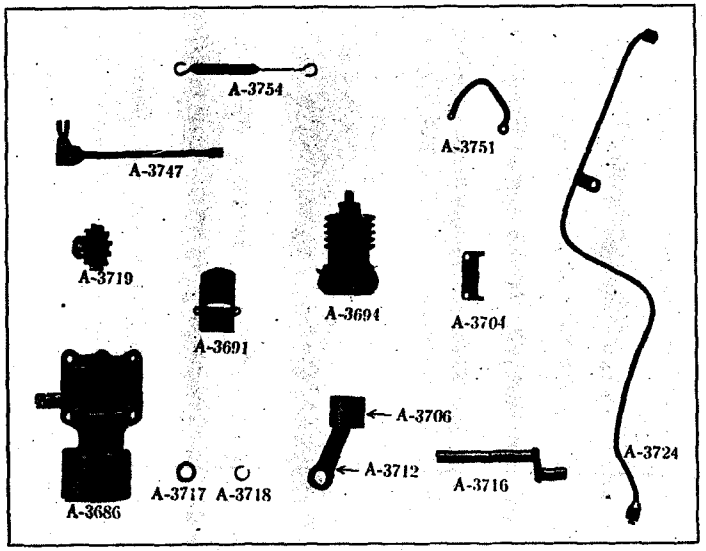
## TIRE PUMP AND CONTROL

| | | | | |
|---|---|---|---|---|
| CUROM | A-3683 | Kellogg tire pump complete (Model 201) | 37300 | 15.00 |
| DUROM | A-3684 | Nut on stud attaching tire pump | 11678 | .05 |
| FUROM | A-3685 | Lock washer, per doz. .25 | 11316 | .05 |
| KUROM | A-3686 | Base for tire pump with bushings, shifter fork and shaft | 23918 | 9.00 |
| LUROM | A-3687 | Bushing in center of base for crank shaft (2 used) | 2948-KP | .20 |
| MUROM | A-3688 | Bushing in base for end of crankshaft | 3392-KP | .20 |
| PUROM | A-3689 | Button head screw in hole from which taper pin is removed from shifter fork, per doz. .25 | 10595 | .05 |
| SUROM | A-3690 | Lock washer, per doz. .25 | 11324 | .05 |
| TUROM | A-3691 | End cover and name plate for base | 52689 | .05 |
| ZUROM | A-3692 | Button head screw, attaching end cover, per doz. .25 | 10505 | .05 |






TRANSMISSION AND CONTROL




TIRE PUMP AND CONTROL

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| LITOM | A-3693 | Gasket between tire pump base and transmission case | 37709 | .05 |
| MITOM | A-3694 | Cylinder for tire pump with outlet valve and nipple | 24374 | 2.80 |
| PITOM | A-3695 | Felt in cylinder wall (2 used) | 3121-KP | .05 |
| RITOM | A-3696 | Oil hole cover on cylinder (2 used) | 3561-KP | .05 |
| SITOM | A-3697 | Pin, attaching oil hole cover | 9236-KP | .05 |
| TITOM | A-3698 | Nipple in top of cylinder | 52685 | .40 |
| ZITOM | A-3699 | Outlet valve in cylinder | 3627-KP | .10 |
| BOTOM | A-3700 | Guide for outlet valve in cylinder | 3880-KP | .08 |
| COTOM | A-3701 | Spring on outlet valve stem | 3678-KP | .10 |
| DOTOM | A-3702 | Screw, attaching cylinder head | 52679 | .03 |
| FOTOM | A-3703 | Lock washer | 52704 | .03 |
| KOTOM | A-3704 | Baffle plate with felt (3120-KP) | 3115-KP | .20 |
| LOTOM | A-3705 | Baffle plate felt | 3120-KP | .10 |
| MOTOM | A-3706 | Piston with rings and intake valve | 24381 | 2.10 |
| POTOM | A-3707 | Piston ring | 52694 | .05 |
| ROTOM | A-3708 | Intake valve in piston | 3093-KP | .10 |
| SOTOM | A-3709 | Guide for intake valve | 3583-KP | .20 |
| TOTOM | A-3710 | Valve spring for inlet valve | 3678-KP | .10 |
| ZOTOM | A-3711 | Intake valve washer, retaining spring | 3128-KP | .05 |
| BUTOM | A-3712 | Connecting rod with bushing (52674) for tire pump | 52695 | .85 |
| CUTOM | A-3713 | Connecting rod bushing | 52674 | .45 |
| DUTOM | A-3714 | Wrist pin | 52688 | .10 |
| FUTOM | A-3715 | Cotter pin, through wrist pin, per doz. .25 | 15175 | .05 |
| KUTOM | A-3716 | Crank shaft only for tire pump | 3391-KP | 1.50 |
| LUTOM | A-3717 | Thrust collar on crank shaft | 2276-KP | .05 |
| MUTOM | A-3718 | Thrust ring on crank shaft | 2277-KP | .05 |
| PUTOM | A-3719 | Shifter gear in tire pump | 38052 | 2.20 |
| RUTOM | A-3720 | Key for shifter gear | 52684 | .05 |
| SUTOM | A-3721 | Shifter fork | 52706 | .45 |
| TUTOM | A-3722 | Taper pin in shifter fork | 15008 | .05 |
| ZUTOM | A-3723 | Shifter shaft only | 3460-KP | .50 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAZOM | A-3724 | Air pipe, tire pump to tool box in RIGHT dust shield | 23386 | 1.25 |
| CAZOM | A-3725 | Air pipe, tire pump to dust shield, used on cars without tool box in dust shield | 24403 | 1.50 |
| FAZOM | A-3726 | Union nut for air pipe connection | 18286 | .15 |
| KAZOM | A-3727 | Screw attaching air pipe clip, used on cars without tool box in dust shield | 10273 | .05 |
| MAZOM | A-3728 | Nut, per doz. .25 | 10889 | .05 |
| PAZOM | A-3729 | Lock washer, per doz. .25 | 11314 | .05 |
| RAZOM | A-3730 | Nipple for air hose connection, in tool box | 31201 | .60 |
| SAZOM | A-3731 | Felt washer on nipple in tool box, per doz. .25 | 31204 | .05 |
| TAZOM | A-3732 | Steel washer, per doz. .25 | 31206 | .05 |
| ZAZOM | A-3733 | Leather washer, per doz. .25 | 31207 | .05 |
| BEZOM | A-3734 | Nipple for tire pump connection through dust shield, used on cars without tool box in dust shield | 38218 | .35 |
| DEZOM | A-3735 | Flat washer, inner, between nipple shoulder and shield, used on cars without tool box in dust shield, per doz. .25 | 11502 | .05 |
| KEZOM | A-3736 | Flat washer, outer, between nut and shield, used on cars without tool box in dust shield, per doz. .25 | 11537 | .05 |
| MEZOM | A-3737 | Nut holding nipple in tool box and dust shield | 12744 | .05 |
| PEZOM | A-3738 | Cap for nipple | 12802 | .05 |
| REZOM | A-3739 | Gasket in cap, per doz. .25 | 12804 | .05 |
| SEZOM | A-3740 | Air hose and gauge complete | 37669 | 4.00 |
| TEZOM | A-3741 | Air pressure gauge for tire pump with connection 552-KP (200 lb. gauge) | 50648 | 2.00 |
| BIZOM | A-3742 | Hose for tire pump, short | 50649 | .40 |
| CIZOM | A-3743 | Hose for tire pump, long | 50247 | 1.50 |
| DIZOM | A-3744 | Plain hose connection on tire pump end of hose | 50774 | .20 |
| FIZOM | A-3745 | Valve lifting thumb lock complete for air hose | 50653 | .50 |
| KIZOM | A-3746 | Ferrule, fastening hose on connections | 50773 | .10 |
| LIZOM | A-3747 | Rod with button in floor board to start pump | 23794 | 1.50 |
| MIZOM | A-3748 | Lock screw for tire starter rod to shifter shaft | 11272 | .05 |
| PIZOM | A-3749 | Nut | R-4-701 | .05 |
| RIZOM | A-3750 | Lock washer, per doz. .25 | 11316 | .05 |
| SIZOM | A-3751 | Link connecting lever and spring | 30871 | .50 |
| TIZOM | A-3752 | Pin for operating lever and link | 30872 | .05 |
| ZIZOM | A-3753 | Cotter pin, per doz. .25 | 15153 | .05 |
| BOZOM | A-3754 | Spring operating tire pump shifter lever | 31314 | .10 |
| COZOM | A-3755 | Bracket on transmission case for spring | 31293 | .10 |
| DOZOM | A-3756 | Screw to attach bracket | 11647 | .05 |
| FOZOM | A-3757 | Lock washer, per doz. .25 | 11315 | .05 |

## MULTIPLE DISC CLUTCH

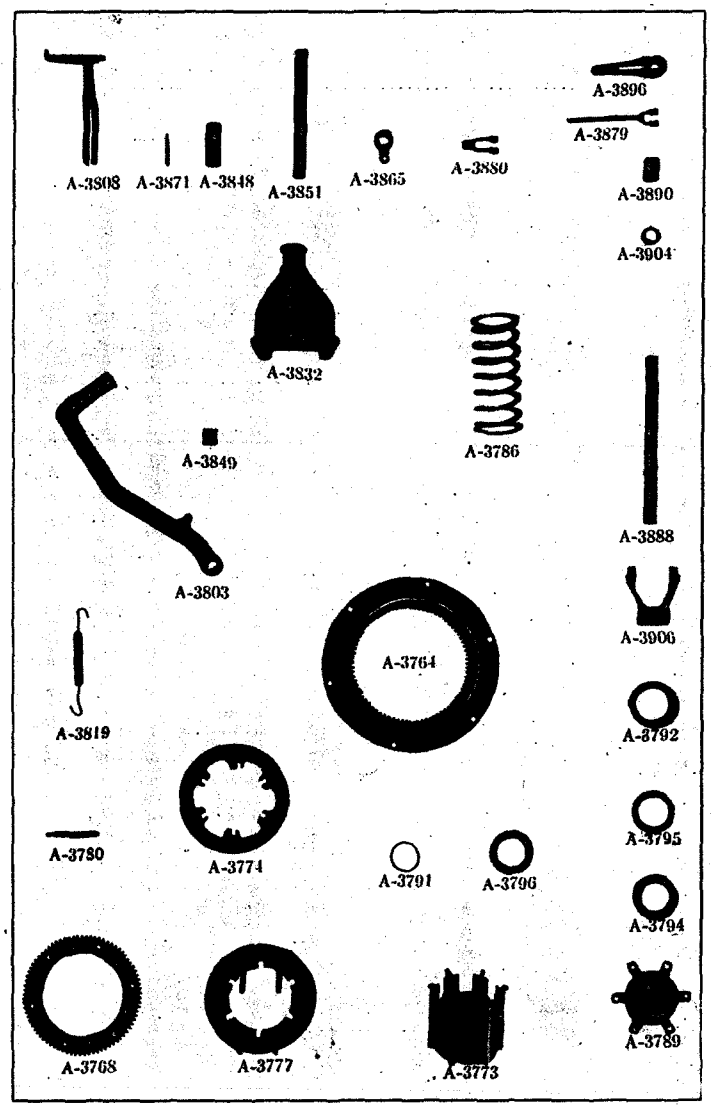
| | | | | |
|---|---|---|---|---|
| ROZOM | A-3762 | Multiple disc clutch complete | 23726 | 75.00 |
| SOZOM | A-3764 | Clutch driver for drive discs | 32883 | 12.50 |
| TOZOM | A-3768 | Drive disc with facings, lugs and rivets | 22242 | 3.00 |
| ZOZOM | A-3769 | Woven facing for drive disc (16 used) | 18821 | .50 |
| BUZOM | A-3771 | Rivet to attach facings | 33206 | .10 |
| CUZOM | A-3773 | Driver for clutch driven discs | 37247 | 30.00 |
| DUZOM | A-3774 | Driven discs with lugs | 20713 | 1.50 |
| FUZOM | A-3777 | Front retainer plate with studs for discs | 23690 | 3.00 |
| KUZOM | A-3780 | Stud, front retainer plate to spider | 38973 | .30 |
| LUZOM | A-3782 | Nut | 11676 | .03 |
| MUZOM | A-3783 | Lock washer, per doz. .25 | 11315 | .05 |
| PUZOM | A-3784 | Rear retainer plate for discs | 18811 | .95 |
| RUZOM | A-3786 | Spring for clutch | 37267 | 3.50 |
| SUZOM | A-3789 | Spider with bushing for clutch | 23723 | 5.00 |
| TUZOM | A-3790 | Ball race complete for spider | 20594 | 5.50 |
| ZUZOM | A-3791 | Ring, retainer for clutch spider bearing | 18807 | .10 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BABUP | A-3792 | Brass retainer for ball bearing | 20410 | .55 |
| CABUP | A-3793 | ⅛" pipe plug in brass retainer | 30471 | .08 |
| DABUP | A-3794 | Inner ball race for clutch spider, front (beveled edge) | 18815 | 2.00 |
| FABUP | A-3795 | Retainer with balls for clutch spider bearing | 18813 | .75 |
| KABUP | A-3796 | Outer ball race for clutch spider | 18816 | 2.25 |
| LABUP | A-3797 | Nut retaining clutch on clutch connection | 18804 | .45 |
| MABUP | A-3798 | Lock washer | 11323 | .05 |

## CLUTCH CONTROL

| | | | | |
|---|---|---|---|---|
| PABUP | A-3802 | Pedal only for clutch, all (CC) except (V-1) (V-2) (B-2) (SB-1) (SB-2), LEFT steering | 18974 | 4.75 |
| SABUP | A-3803 | Pedal only for clutch, all (OC) (B-2) (V-1) (V-2) (SB-1) (SB-2) (S) (M) (A), LEFT steering | 37282 | 4.75 |
| ZABUP | A-3804 | Pad for clutch pedal, all (CC) except (V-1) (V-2) (SB-1) (SB-2) (B-2), LEFT steering | 18971 | 2.25 |
| CEBUP | A-3808 | Pad for clutch pedal (V-1) (V-2) (SB-1) (SB-2) (B-2) (S) (M) (A), LEFT steering | 37288 | 2.25 |
| FEBUP | A-3810 | Pedal only for clutch (CC) except (V-1) (V-2) (SB-1) (SB-2) (B-2), RIGHT steering | 31017 | 4.75 |
| LEBUP | A-3811 | Pedal only for clutch (OC) (V-1) (V-2) (B-2) (SB-1) (SB-2) (S) (M) (A), RIGHT steering | 37286 | 4.75 |
| PEBUP | A-3812 | Pad for clutch pedal (CC) except (V-1) (V-2) (SB-1) (SB-2) (B-2) RIGHT steering | 31016 | 2.25 |
| REBUP | A-3814 | Pad for clutch pedal (OC) (V-1) (V-2) (SB-1) (SB-2) (B-2) (S) (M) (A), RIGHT steering | 37290 | 2.25 |
| TEBUP | A-3815 | Clamp screw for clutch pedal | 12602 | .10 |
| ZEBUP | A-3816 | Sleeve nut for clamp screw | 17426 | .10 |
| BIBUP | A-3819 | Retracting spring for clutch pedal, LEFT steering | 32513 | .15 |
| CIBUP | A-3823 | Retracting spring for clutch pedal (F) RIGHT steering | 34579 | .40 |
| DIBUP | A-3824 | Retracting spring for clutch pedal (G), RIGHT steering | 37545 | .25 |
| FIBUP | A-3828 | Bracket for retracting spring, LEFT steering | 32423 | .10 |
| KIBUP | A-3832 | Bracket for pedal shaft on transmission, LEFT steering | 50080 | 5.50 |
| LIBUP | A-3837 | Bracket for pedal shaft, inner, RIGHT steering | 37695 | 2.50 |
| MIBUP | A-3838 | Bracket for pedal shaft, outer, RIGHT steering | 37696 | 7.50 |
| PIBUP | A-3839 | Nut on stud attaching bracket to transmission case | 11678 | .05 |
| RIBUP | A-3840 | Lock washer, per doz. .25 | 11316 | .05 |
| SIBUP | A-3842 | Screw attaching outer pedal bracket, RIGHT steering | 10046 | .05 |
| TIBUP | A-3843 | Lock washer, per doz. .25 | 11326 | .05 |
| ZIBUP | A-3844 | Screw attaching inner pedal bracket, RIGHT steering | 10007 | .05 |
| BOBUP | A-3845 | Lock washer, per doz. .25 | 11315 | .05 |
| COBUP | A-3846 | Clamp screw on inner bracket, RIGHT steering | 11979 | .10 |
| DOBUP | A-3847 | Nut | 10892 | .05 |
| FOBUP | A-3848 | Bushing, long, in pedal shaft bracket, LEFT steering | 19233 | 1.50 |
| KOBUP | A-3849 | Bushing, short, in pedal shaft bracket, LEFT steering | 18967 | 1.00 |
| LOBUP | A-3851 | Shaft for clutch and brake pedal, LEFT steering | 37281 | .70 |
| MOBUP | A-3853 | Shaft for clutch and brake pedal, RIGHT steering | 37685 | .70 |
| POBUP | A-3857 | Spacer for pedal shaft, RIGHT steering | 33734 | .15 |
| ROBUP | A-3860 | Screw in end of pedal shaft for brace on outer bracket, RIGHT steering | 18960 | .05 |
| TOBUP | A-3861 | Lock washer, per doz. .25 | 11316 | .05 |
| ZOBUP | A-3862 | Flat washer, per doz. .25 | 9793 | .05 |
| BUBUP | A-3865 | Arm on pedal shaft operating clutch release rod, LEFT steering. | 30816 | 1.00 |
| CUBUP | A-3866 | Taper pin, arm and pedal on shaft, LEFT steering | 15071 | .03 |
| DUBUP | A-3871 | Stop screw for clutch release arm | 37279 | .10 |
| FUBUP | A-3872 | Lock nut | 6505 | .05 |
| KUBUP | A-3873 | Pin in arm for yoke end | 30852 | .15 |
| LUBUP | A-3874 | Cotter pin, per doz. .25 | 15171 | .05 |
| MUBUP | A-3879 | Rod, arm on pedal shaft to clutch release lever | 23682 | .80 |
| PUBUP | A-3880 | Yoke on clutch pedal rod | H-952 | .55 |
| RUBUP | A-3881 | Lock nut, per doz. .25 | H-1702 | .05 |
| SUBUP | A-3882 | Pin in yoke | 19165 | .05 |
| TUBUP | A-3883 | Cotter pin, per doz. .25 | 15171 | .05 |
| ZUBUP | A-3888 | Shaft for clutch release, LEFT steering | 37280 | .50 |






CLUTCH AND CONTROL

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAFUP | A-3889 | Shaft for clutch release, RIGHT steering | 37684 | .50 |
| CAFUP | A-3890 | Bushing in transmission case for clutch release shaft (2 used) | 18966 | .90 |
| DAFUP | A-3894 | Bowen oiler (2D-Vertical) for pedal bracket | 32303 | .20 |
| FAFUP | A-3896 | Lever for clutch release shaft | 37277 | 2.35 |
| KAFUP | A-3899 | Clamp screw for clutch release lever | 6356 | .05 |
| LAFUP | A-3900 | Nut | 11678 | .05 |
| MAFUP | A-3901 | Lock washer, per doz. .25 | 11316 | .05 |
| PAFUP | A-3903 | Woodruff key, lever on shaft | 11363 | .05 |
| RAFUP | A-3904 | Collar for clutch release shaft | 18918 | .10 |
| SAFUP | A-3906 | Fork on shaft for clutch release | 37276 | 1.50 |
| TAFUP | A-3907 | Taper pin, collar and fork on clutch release shaft | 15041 | .03 |

## PEDALS AND PADS FOR BRAKE CONTROL

| | | | | |
|---|---|---|---|---|
| ZAFUP | A-3912 | Pedal for brake, (CC) except (V-1) (V-2) (SB-1) (SB-2) (B-2), LEFT steering | 30913 | 5.25 |
| CEFUP | A-3913 | Pedal for brake, (CC) except (V-1) (V-2) (B-2) (SB-1) (SB-2), RIGHT steering | 31018 | 5.00 |
| FEFUP | A-3914 | Pedal for brake, (OC) (V-1) (V-2) (SB-1) (SB-2) (B-2) (S) (M) (A), LEFT steering | 50072 | 5.75 |
| LEFUP | A-3915 | Pedal for brake, (OC) (V-1) (V-2) (SB-1) (SB-2) (B-2) (S) (M) (A), RIGHT steering | 37287 | 5.25 |
| PEFUP | A-3916 | Pad for brake pedal, (CC) except (V-1) (SB-1) (SB-2) (B-2), RIGHT steering | 18983 | 2.25 |
| SEFUP | A-3918 | Pad for brake pedal (CC) except (V-1) (V-2) (SB-1) (SB-2) (B-2), LEFT steering | 30917 | 2.25 |
| ZEFUP | A-3922 | Pad for brake pedal (OC) (V-1) (V-2) (SB-1) (SB-2) (B-2) (S) (M) (A), LEFT steering | 37289 | 2.25 |
| CIFUP | A-3923 | Pad for brake pedal all (OC) (V-1) (V-2) (SB-1) (SB-2) (B-2) (S) (M) (A), RIGHT steering | 37291 | 2.25 |
| FIFUP | A-3927 | Retracting spring for brake pedal | 37545 | .25 |
| KIFUP | A-3928 | Clamp screw for pad on pedal | 12602 | .10 |
| LIFUP | A-3929 | Sleeve nut for clamp screw | 17426 | .10 |
| MIFUP | A-3931 | Bowen oiler (No. 2D Vertical) in brake pedal | 32303 | .20 |

## HAND BRAKE LEVER

| | | | | |
|---|---|---|---|---|
| COFUP | A-3953 | Hand brake lever (7-P) (V-1) (V-2) (SB-1) (SB-2) (B-2) (P-2) (P-1) (R-1) (R-2) (S), LEFT steering | 51274 | 6.00 |
| FOFUP | A-3954 | Hand brake lever (I) (L) (LD) (TL) (TLD) (7-B) (B-1) (M) (A), LEFT steering | 37483 | 6.50 |
| LOFUP | A-3955 | Hand brake lever (7-P) (V-1) (V-2) (P-1) (SB-1) (SB-2) (R-1) (S), RIGHT steering | 37484 | 9.50 |
| POFUP | A-3956 | Hand brake lever (R-2) (P-2) (B-2), RIGHT steering | 38132 | 8.00 |
| ROFUP | A-3957 | Hand brake lever (I) (L) (LD) (TL) (TLD) (7-B) (B-1) (M) (A), RIGHT steering | 37485 | 9.50 |
| TOFUP | A-3960 | Grip with stop for hand brake lever | 21458 | 1.50 |
| ZOFUP | A-3961 | Stop pin for grip, per doz. .25 | 31159 | .05 |
| BUFUP | A-3962 | Fulcrum pin for grip | 31790 | .05 |
| CUFUP | A-3968 | Rod for hand brake lever (OC) (S) (SB-1) (SB-2) (V-1) (V-2) (B-2) | 37489 | .25 |
| FUFUP | A-3969 | Rod for hand brake lever (M) (A) and (CC) except (V-1) (V-2) (SB-2) (B-2) | 37491 | .25 |
| LUFUP | A-3970 | End for rod at grip | 31789 | .30 |
| MUFUP | A-3971 | Pin holding rod end in grip | 31791 | .05 |
| PUFUP | A-3972 | Spring for hand brake lever rod | 3022 | .05 |
| RUFUP | A-3973 | Flat washer for spring, per doz. .25 | 11499 | .05 |
| SUFUP | A-3974 | Yoke on lower end of hand brake lever rod | 18981 | .50 |
| TUFUP | A-3975 | Lock nut for rod at yoke, per doz. .25 | 10887 | .05 |
| ZUFUP | A-3976 | Pawl for hand brake lever rod | 18976 | .65 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAGUP | A-3977 | Pin through yoke end and pawl | 18978 | .10 |
| CAGUP | A-3978 | Cotter pin, per doz. .25 | 15150 | .05 |
| DAGUP | A-3979 | Pin through lever and pawl | 12076 | .08 |
| FAGUP | A-3980 | Cotter pin, per doz. .25 | 15171 | .05 |
| KAGUP | A-3984 | Ratchet for hand brake lever | 37284 | .40 |
| LAGUP | A-3985 | Nut on stud attaching ratchet | 11678 | .05 |
| MAGUP | A-3986 | Lock washer, per doz. 25 | 11316 | .05 |
| PAGUP | A-3989 | Shaft for hand brake lever | 37283 | 1.00 |
| RAGUP | A-3990 | Taper pin for shaft in top cover | 15032 | .05 |
| SAGUP | A-3993 | ⅜" pipe plug in end of shaft | 30121 | .05 |

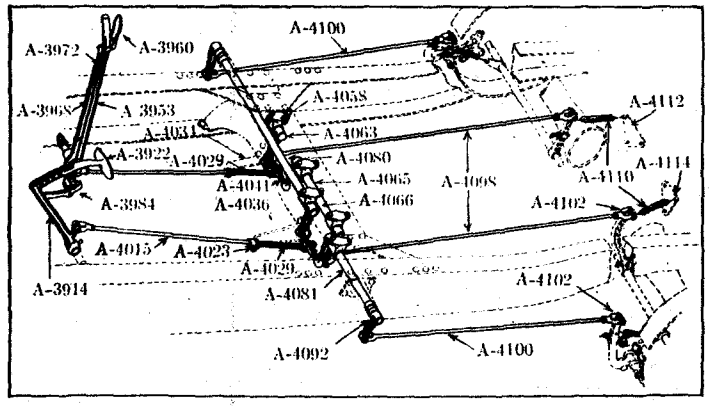
## BRAKE CONTROL

| | | | | |
|---|---|---|---|---|
| TAGUP | A-4006 | Rod, hand brake to equalizing bar (F) | 23711 | 1.25 |
| ZAGUP | A-4007 | Rod, hand brake to equalizing bar (G) | 23712 | 1.25 |
| BEGUP | A-4008 | Rod, hand brake to equalizing bar (H) | 23713 | 1.25 |
| CEGUP | A-4015 | Rod, foot brake pedal to equalizing bar (F) | 22338 | 1.25 |
| DEGUP | A-4016 | Rod, foot brake pedal to equalizing bar (G) | 22337 | 1.50 |
| FEGUP | A-4017 | Rod, foot brake pedal to equalizing bar (H) | 22336 | 1.75 |
| KEGUP | A-4018 | Buffer for foot brake rod (H) | 5353 | .15 |
| LEGUP | A-4019 | Yoke on end of hand and foot brake rods to equalizing bar | H-952 | .55 |
| MEGUP | A-4020 | Lock nut for yoke, per doz. .25 | H-1702 | .05 |
| PEGUP | A-4021 | Pin in yokes on brake rods | 19165 | .05 |
| REGUP | A-4022 | Cotter pin, per doz. .25 | 15171 | .05 |
| SEGUP | A-4023 | Stop collar for foot brake rod | 19340 | .40 |
| TEGUP | A-4024 | Clamp screw in collar | 10007 | .05 |
| ZEGUP | A-4025 | Nut | 10892 | .05 |
| BIGUP | A-4026 | Lock washer, per doz. .25 | 11315 | .05 |
| CIGUP | A-4027 | Rubber washer between stop collar and bracket on foot brake rod | 31165 | .05 |
| DIGUP | A-4029 | Retracting spring for hand and foot brake rod | 34184 | .10 |
| FIGUP | A-4030 | Washer, flat for retracting spring on all brake rods except hand brake rod, per doz. .25 | H-1675 | .05 |
| LIGUP | A-4031 | Washer, flat, for retracting spring on hand brake rod, per doz. .25 | 11508 | .05 |
| MIGUP | A-4034 | Bracket for retracting spring on hand brake pull rod, LEFT steering | 37512 | .25 |
| RIGUP | A-4035 | Bracket for retracting spring on hand brake pull rod, RIGHT steering | 37513 | .50 |
| TIGUP | A-4036 | Bracket for retracting spring on foot brake pull rod | 33592 | .30 |
| ZIGUP | A-4041 | Equalizing bar for brakes | 32527 | 1.00 |
| BOGUP | A-4053 | Pin for brake rod yoke on equalizing bar | 9576 | .05 |
| COGUP | A-4054 | Washer on yoke pin, per doz. .25 | H-1675 | .05 |
| DOGUP | A-4056 | Stud or pin for hand brake equalizing lever | 37699 | .25 |
| FOGUP | A-4058 | Bracket on cross member for lever stud | 37702 | 1.00 |
| KOGUP | A-4059 | Taper pin for stud in bracket | 15031 | .03 |
| LOGUP | A-4060 | Screw, stud bracket to cross member | 10024 | .08 |
| MOGUP | A-4061 | Nut | 11678 | .05 |
| POGUP | A-4062 | Lock washer, per doz. .25 | 11316 | .05 |
| ROGUP | A-4063 | Lever on stud with bushing for hand brake equalizing bar | 42000 | 2.20 |
| SOGUP | A-4064 | Bushing in lever | 33587 | .50 |
| TOGUP | A-4065 | Rocker shaft for hand brake equalizing lever | 33591 | 1.00 |
| ZOGUP | A-4066 | Lever on brake rocker shaft for equalizing bar, (3 used) | 32530 | 1.25 |
| BUGUP | A-4067 | Taper pin for lever on shaft | 15031 | .03 |
| CUGUP | A-4068 | Lever on hand brake rocker shaft, rod to brakes | 33588 | 1.50 |
| DUGUP | A-4080 | Rocker shaft, RIGHT, on cross member for foot brake equalizer and lever, LEFT steering | 37722 | 1.50 |
| KUGUP | A-4081 | Rocker shaft, LEFT, on cross member for foot brake equalizer, LEFT steering | 37721 | 1.00 |
| MUGUP | A-4082 | Rocker shaft, RIGHT, on cross member for foot brake equalizer and lever, RIGHT steering | 37719 | .75 |
| RUGUP | A-4083 | Rocker shaft, LEFT, on cross member for foot brake equalizer and lever, RIGHT steering | 37720 | 1.50 |
| TUGUP | A-4086 | Shim for brake rocker shaft, per doz. .25 | 38161 | .05 |
| ZUGUP | A-4087 | Spacing collar between brackets and lever on brake rocker shaft | 37796 | .10 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAHUP | A-4088 | Grease cup for rocker shaft | 17054 | .50 |
| CAHUP | A-4089 | Extension for grease cup on rocker shaft bracket | 37987 | .20 |
| DAHUP | A-4090 | Coupling for grease cup and extension | 19754 | .08 |
| FAHUP | A-4092 | Lever on outer end of foot brake rocker shaft | 32531 | 1.25 |
| KAHUP | A-4093 | Taper pin for levers on shaft | 15031 | .03 |
| LAHUP | A-4098 | Rod for hand brake, rocker shaft to internal brake (2 used) | 22635 | 1.50 |
| MAHUP | A-4100 | Rod, foot brake rocker shaft lever to external brake, (2 used) | 41997 | .75 |
| PAHUP | A-4102 | Yoke for internal and external brake rod ends | H-952 | .55 |
| RAHUP | A-4103 | Lock nut for yoke, per doz. .25 | H-1702 | .05 |
| SAHUP | A-4106 | Pin for rod end and yoke | 19165 | .05 |
| TAHUP | A-4108 | Cotter pin, 1/8" in pin, per doz. .25 | 15171 | .05 |
| ZAHUP | A-4110 | Retracting spring for internal or hand brake rods at rear axle | 30233 | .10 |
| BEHUP | A-4112 | Bracket, RIGHT, on rear axle for internal brake rod retracting spring | 33669 | .10 |
| DEHUP | A-4114 | Bracket, LEFT, on rear axle for internal brake rod retracting spring | 33670 | .10 |

## RADIATOR

| | | | | |
|---|---|---|---|---|
| TEHUP | A-4120 | Radiator complete | 24233 | 97.00 |
| ZEHUP | A-4124 | Outside casing with clips and emblem | 23983 | 15.00 |
| BIHUP | A-4125 | Screw to attach radiator casing | 10758 | .05 |
| CIHUP | A-4126 | Nut, per doz. .25 | B-1350 | .05 |
| DIHUP | A-4127 | Lock washer, per doz. .25 | 11313 | .05 |
| FIHUP | A-4130 | Radiator complete, less casing | 23461 | 83.00 |
| KIHUP | A-4131 | Filler cap for radiator | 37531 | 1.00 |
| LIHUP | A-4132 | Gasket for filler cap | 7679 | .10 |
| MIHUP | A-4133 | Discs for radiator filler cap | 23428 | .30 |
| PIHUP | A-4137 | Stud in bottom plate of radiator | 37521 | .20 |
| RIHUP | A-4138 | Spring for radiator stud | 14057 | .10 |
| SIHUP | A-4140 | Leather washer for stud in bottom plate, per doz. .25 | 37523 | .05 |
| TIHUP | A-4141 | Steel washer (1/16" thick) on radiator stud | 37524 | .05 |
| ZIHUP | A-4142 | Steel washer (1/8" thick) on radiator stud | 37525 | .05 |
| BOHUP | A-4143 | Retainer for washer on radiator stud | 37522 | .05 |
| COHUP | A-4144 | Nut on stud | 14054 | .10 |
| DOHUP | A-4145 | Cotter pin in end of stud, per doz. .25 | 15117 | .05 |
| FOHUP | A-4146 | Spacer on radiator stud (used as required) | 07369 | .05 |




BRAKE CONTROL



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAKUP | A-4148 | Tie rod between radiator and dash | 41996 | .60 |
| CAKUP | A-4149 | Screw, tie rod to radiator | 10003 | .05 |
| DAKUP | A-4150 | Nut on dash end of tie rod (2 used) | 10892 | .05 |
| FAKUP | A-4151 | Lock washer for nut and screw, per doz. .25 | 11315 | .05 |
| KAKUP | A-4152 | Bracket on dash for tie rod | 18412 | .10 |
| LAKUP | A-4158 | Bracket on cowl for hood hinge rod | 37207 | .50 |
| MAKUP | A-4159 | Rivet, bracket to dash, per doz. .25 | 17605 | .05 |
| PAKUP | A-4162 | Bracket on radiator for hood hinge rod | 18214 | .25 |
| RAKUP | A-4164 | Rivet to attach bracket, per doz. .25 | 17611 | .05 |
| SAKUP | A-4165 | Guard on radiator for fan | 8288 | .30 |
| TAKUP | A-4168 | Lace on radiator for hood | 30702 | .20 |
| ZAKUP | A-4169 | Clip for end of lace, per doz. .25 | 32272 | .05 |
| BEKUP | A-4171 | Strainer for radiator outlet | 23725 | .40 |
| CEKUP | A-4173 | Plug for radiator outlet | 37518 | .65 |
| DEKUP | A-4174 | Gasket for plug | 37520 | .05 |

## RADIATOR CONDENSER TANK AND PIPING

| | | | | |
|---|---|---|---|---|
| FEKUP | A-4177 | Condenser tank complete, all except (V-1) (V-2) | 23537 | 7.75 |
| KEKUP | A-4178 | Condenser tank complete (V-1) (V-2) | 23580 | 7.75 |
| LEKUP | A-4179 | Support bracket for tank, front | 34486 | .25 |
| MEKUP | A-4180 | Support bracket for tank, rear | 34487 | .25 |
| PEKUP | A-4181 | Screw, support to tank | 11955 | .05 |
| REKUP | A-4182 | Lock washer, per doz. .25 | 11316 | .05 |
| SEKUP | A-4183 | Screw, condenser tank brackets to side bar | 11967 | .05 |
| TEKUP | A-4184 | Lock washer, per doz. .25 | 11316 | .05 |
| ZEKUP | A-4185 | Nut | 10893 | .05 |
| BIKUP | A-4186 | Plug for condenser tank filler | 34490 | .35 |
| CIKUP | A-4187 | Elbow for condenser pipes | 23683 | 1.25 |
| DIKUP | A-4188 | Plug in elbow to drain tank | 3467 | .05 |
| FIKUP | A-4189 | Pipe, long, from elbow to radiator overflow tube | 37788 | 2.25 |
| KIKUP | A-4190 | Reinforcement for long pipe | 34915 | .15 |
| LIKUP | A-4192 | Support for condenser tank pipe | 37789 | .10 |
| MIKUP | A-4193 | Clamp screw for support on pipe | 10274 | .05 |
| PIKUP | A-4194 | Nut, per doz. .25 | 10889 | .05 |
| RIKUP | A-4195 | Lock washer, per doz. .25 | 11304 | .05 |
| SIKUP | A-4196 | Screw to attach upper end of support | 11962 | .05 |
| TIKUP | A-4197 | Hose connection for pipes (2 used) | 34656 | .25 |
| ZIKUP | A-4198 | Clamp for hose connections | 34817 | .10 |
| BOKUP | A-4199 | Cover for condenser tank filler in auxiliary seat well (V-1) (V-2) | 34648 | .05 |

## GASOLINE TANK

| | | | | |
|---|---|---|---|---|
| POKUP | A-4207 | Gasoline tank complete (U. S. gallons) | 23746 | 40.00 |
| ROKUP | A-4208 | Gasoline tank complete, (Liters) | 23912 | 40.00 |
| SOKUP | A-4209 | Gasoline tank complete (Imperial gallons) | 23910 | 40.00 |
| TOKUP | A-4211 | Filler cap with thumb screw, plate and leather gasket, for gasoline tank | 22125 | 2.60 |
| BUKUP | A-4212 | Gasket for filler cap | 16373 | .10 |
| CUKUP | A-4213 | Thumb screw for filler cap | 32795 | .70 |
| DUKUP | A-4214 | Clamp plate in filler cap | 32803 | .10 |
| FUKUP | A-4216 | Clamp on cross member for gasoline tank hanger | 32410 | .25 |
| KUKUP | A-4217 | Screw through clamp and hanger | 52344 | .05 |
| LUKUP | A-4218 | Nut | 10893 | .05 |
| MUKUP | A-4219 | Lock washer, per doz. .25 | 11306 | .05 |
| PUKUP | A-4220 | Hanger for gasoline tank front (2 used) | 32806 | 1.00 |
| RUKUP | A-4221 | Support bolt for gasoline tank, rear | 18433 | .20 |
| SUKUP | A-4222 | Lock washer on rear support only, per doz. .25 | 11308 | .05 |
| TUKUP | A-4224 | Castle nut for gasoline tank support stud | 11681 | .10 |
| ZUKUP | A-4225 | Cotter pin for castle nut, per doz. .25 | 15164 | .05 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BALUP | A-4226 | Concave washer for gasoline tank supports and hangers | 11456 | .05 |
| CALUP | A-4227 | Convex washer, thin, for gasoline tank supports and hangers | 11455 | .05 |
| DALUP | A-4229 | Gasoline gauge frame complete, with dial pointer and float, in gasoline tank (U. S. gallons) | 38527 | 1.75 |
| KALUP | A-4230 | Frame, dial and pinion for gasoline gauge | 1204-US | .90 |
| LALUP | A-4231 | Float with rod and gear for gasoline gauge | 321 | .50 |
| MALUP | A-4232 | Bolt to fasten gear to frame | 631 | .20 |
| PALUP | A-4233 | Nut for bolt (2 used) | 290 | .05 |
| RALUP | A-4234 | Gasket for gasoline gauge, per doz. .25 | 30646 | .05 |
| SALUP | A-4235 | Octagonal cap for gasoline gauge | 19166 | 1.00 |
| TALUP | A-4236 | Cork gasket for glass | 19169 | .05 |
| ZALUP | A-4237 | Glass for gasoline gauge | 19167 | .20 |
| BELUP | A-4238 | ¼" plug for settling chamber drain | 17422 | .10 |
| CELUP | A-4244 | Stem for gasoline tank valve | 37475 | .35 |
| DELUP | A-4245 | Cotter pin in valve stem for stop, per doz. .25 | 15173 | .05 |
| FELUP | A-4247 | Wing nut on valve stem | 37472 | .20 |
| KELUP | A-4249 | Taper pin for wing nut, per doz. .25 | 15023 | .05 |
| LELUP | A-4251 | Packing nut on valve stem | 37473 | .35 |
| MELUP | A-4253 | Packing for valve stem nut | 37471 | .03 |
| PELUP | A-4259 | Connection on tank with pipe and strainer for gasoline line | 23744 | 4.50 |
| RELUP | A-4260 | Lead gasket for gasoline connection on tank | 16383 | .15 |
| SELUP | A-4262 | Screw, connection for gasoline line to tank | 11884 | .05 |
| TELUP | A-4263 | Lock washer, per doz. .25 | 11315 | .05 |

## GASOLINE AND AIR PIPES. CLIPS AND SUPPORTS FOR PIPES

| | | | | |
|---|---|---|---|---|
| CILUP | A-4269 | Gasoline pipe complete, gasoline tank to strainer on side bar (F) | 25671 | 2.00 |
| DILUP | A-4271 | Gasoline pipe complete, tank to strainer on side bar (G) | 21709 | 2.25 |
| FILUP | A-4273 | Gasoline pipe complete, tank to strainer on side bar (H) | 22416 | 2.50 |
| KILUP | A-4276 | Gasoline pipe complete, strainer to carburetor | 25676 | 1.25 |
| LILUP | A-4280 | Gasoline pipe complete, strainer to elbow on dash | 23389 | 1.35 |
| MILUP | A-4282 | Gasoline pipe complete, elbow on dash to gauge, all except (SB-1) (SB-2) (V-2) (B-2) | 22413 | .75 |
| RILUP | A-4285 | Gasoline pipe complete, elbow on dash to gauge (SB-1) (SB-2) (V-2) (B-2) | 25249 | .75 |
| TILUP | A-4288 | Air pipe complete, tank to tee on side bar (F) | 25672 | 2.00 |
| ZILUP | A-4290 | Air pipe complete, tank to tee on side bar (G) | 22409 | 2.25 |
| BOLUP | A-4292 | Air pipe complete, tank to tee on side bar (H) | 22410 | 2.50 |
| COLUP | A-4295 | Air pipe complete, tee on side bar to pump on cam shaft | 22407 | 1.25 |
| DOLUP | A-4300 | Air pipe complete, relief valve on side bar to elbow on dash | 23390 | 1.35 |
| FOLUP | A-4301 | Air pipe complete, elbow on dash to hand pump, all except (SB-1) (SB-2) (V-2) (B-2) | 22412 | .75 |
| LOLUP | A-4304 | Air pipe complete, elbow on dash to hand pump (SB-1) (SB-2) (V-2) (B-2) | 25250 | .75 |
| POLUP | A-4305 | Nut for copper pipe union on gasoline and air lines | 18286 | .15 |
| ROLUP | A-4306 | Elbow on dash for gasoline and air pipe connection | 19134 | .50 |
| SOLUP | A-4308 | Nut, elbow on dash | 11656 | .15 |
| TOLUP | A-4309 | Lock washer | 11338 | .05 |
| ZOLUP | A-4311 | Fibre blocks for pipe clip at gasoline tank | 19995 | .15 |
| BULUP | A-4313 | Bolt for pipe clip at gasoline tank | 33424 | .10 |
| CULUP | A-4315 | Spring on bolt for pipe clips at gasoline tank (2 used) | 33423 | .05 |
| DULUP | A-4316 | Nut on bolt for pipe clips | 10892 | .05 |
| FULUP | A-4317 | Lock washer, per doz. .25 | 11315 | .05 |
| KULUP | A-4318 | Double clip for gasoline and air pipes | 19333 | .05 |
| LULUP | A-4319 | Square thin fibre washer for double clip on gasoline and air pipe lines | 19332 | .05 |
| PULUP | A-4320 | Double fibre block for pipe lines | 648-20 | .05 |
| RULUP | A-4321 | Double fibre block for gasoline air pipes, 1 1/32" thick | 30606 | .20 |
| SULUP | A-4324 | Double fibre block for pipe clip at dash and on transmission | 19870 | .10 |
| TULUP | A-4325 | Double fibre block for pipe clip on dash, countersunk (1 used), (OC) (V-1) (V-2) (S) (M) (A) (SB-1) (SB-2) | 38115 | .15 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAMUP | A-4331 | Clip on air pipe from tee on side bar to pump on cam shaft | 37057 | .05 |
| CAMUP | A-4333 | Screw, 1 5/8" long, for pipe clips | 10279 | .05 |
| DAMUP | A-4336 | Screw for floating clip, pipe clip on transmission case | 10275 | .05 |
| FAMUP | A-4337 | Screw, upper clip to dash (OC)(V-1)(V-1)(S)(M)(A)(SB-1)(SB-2) | 10797 | .05 |
| KAMUP | A-4338 | Screw, upper clip to dash, (CC) except (V-1) (V-2) (SB-1) (SB-2) and lower clip (OC) (S) (M) (A) (SB-1) (SB-2) | 10600 | .03 |
| MAMUP | A-4339 | Screw, lower clip to dash (CC) except (SB-1) (SB-2), per doz. .25 | 36359 | .05 |
| PAMUP | A-4340 | Nut, per doz. .25 | 10889 | .05 |
| RAMUP | A-4341 | Special nut on screw attaching clip, per doz. .25 | 11739 | .05 |
| SAMUP | A-4342 | Lock washer, per doz. .25 | 11314 | .05 |

## GASOLINE STRAINER. AIR PRESSURE RELIEF VALVE

| | | | | |
|---|---|---|---|---|
| ZAMUP | A-4348 | Body of gasoline strainer | 33721 | 1.75 |
| BEMUP | A-4350 | Plug with gauze for strainer | 22641 | .80 |
| CEMUP | A-4351 | Lead washer for strainer plug, per doz. .25 | 3145 | .05 |
| DEMUP | A-4356 | Air pressure relief valve complete | 23455 | 5.50 |
| FEMUP | A-4357 | Cover for air pressure relief valve | 37453 | .15 |
| KEMUP | A-4358 | Needle for air pressure relief valve | 37457 | .30 |
| LEMUP | A-4359 | Spring on needle in air pressure relief valve, per doz. .25 | 37458 | .05 |
| MEMUP | A-4360 | Seat for relief valve needle | 37459 | .20 |
| PEMUP | A-4361 | Gland nut for relief valve | 37798 | .15 |
| REMUP | A-4362 | Packing for relief valve, per doz. .25 | 38116 | .05 |
| SEMUP | A-4363 | Screw, strainer and regulator to side bar | 10006 | .05 |
| TEMUP | A-4364 | Lock washer, per doz. .25 | 11315 | .05 |

## GASOLINE AIR PRESSURE GAUGE

| | | | | |
|---|---|---|---|---|
| LIMUP | A-4367 | Gasoline air pressure gauge on instrument board | 32811 | 2.00 |
| MIMUP | A-4368 | Glass for air pressure gauge | 754 | .20 |
| PIMUP | A-4369 | Spacing ring for glass on air gauge | 821 | .10 |
| RIMUP | A-4370 | Ring retainer for glass on gauge | 1425 | .20 |
| SIMUP | A-4371 | Strap for air gauge (OC) (S) (M) (A) | 18874 | .10 |
| TIMUP | A-4372 | Strap for air gauge (CC) | 18875 | .10 |
| ZIMUP | A-4373 | Alignment strap for pressure gauges | 37090 | .05 |
| BOMUP | A-4374 | Nut for air gauge, per doz. .25 | 10888 | .05 |
| COMUP | A-4375 | Lock washer, per doz. .25 | 11314 | .05 |

## GASOLINE AIR PRESSURE PUMP

| | | | | |
|---|---|---|---|---|
| ROMUP | A-4379 | Gasoline air pressure pump complete on cam shaft less check valve | 21205 | 6.00 |
| TOMUP | A-4380 | Nut on stud, pump to front end cover, per doz. .25 | 11674 | .05 |
| ZOMUP | A-4381 | Lock washer, per doz. .25 | 11314 | .05 |
| BUMUP | A-4382 | Plug for top of gasoline air pump body | 30563 | .75 |
| CUMUP | A-4383 | Gasket for plug, per doz. .25 | 30562 | .05 |
| DUMUP | A-4384 | Connecting rod for air pressure pump | 19469 | .75 |
| FUMUP | A-4385 | Wrist pin for pump | 19470 | .15 |
| KUMUP | A-4386 | Check valve complete for gasoline air line | 21327 | 1.25 |
| MUMUP | A-4390 | Cap for check valve | 30955 | .10 |
| PUMUP | A-4391 | Needle for check valve on air line | 13392 | .25 |
| RUMUP | A-4392 | Eccentric nut with plug and oil tube for air pump | 20753 | 1.50 |
| SUMUP | A-4393 | Oil tube for eccentric nut | 30412 | .05 |

## HAND AIR PRESSURE PUMP

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BARUP | A-4397 | Hand air pump complete (OC) | 31267 | 3.50 |
| CARUP | A-4400 | Hand air pump complete (CC) | 31267½ | 3.50 |
| DARUP | A-4406 | Nut on hand pump bearing flange | 11659 | .25 |
| FARUP | A-4407 | Flat washer for hand pump bearing flange (CC) | 30946 | .05 |
| KARUP | A-4409 | Barrel for hand pump with end and flange (OC) | 21783 | 1.85 |
| LARUP | A-4410 | Barrel for hand pump with end and flange (CC) | 21784 | 2.25 |
| MARUP | A-4412 | Knob for hand pump | 31264 | .30 |
| PARUP | A-4413 | Collar for knob | 31260 | .30 |
| RARUP | A-4414 | Pin for knob | 31261 | .10 |
| SARUP | A-4416 | Cap with bushing for hand pump | 21785 | .55 |
| TARUP | A-4417 | Spring for plunger rod | 19116 | .10 |
| ZARUP | A-4418 | Plunger rod for hand pump | 31265 | .35 |
| BERUP | A-4419 | Steel washer for hand pump plunger (above fibre washer) | 11451 | .05 |
| CERUP | A-4420 | Fibre washer for hand pump plunger | 11452 | .05 |
| DERUP | A-4421 | Leather washer for hand pump expanding spring | 19117 | .10 |
| FERUP | A-4422 | Steel washer, retaining leather washer on plunger | 11450 | .05 |
| KERUP | A-4423 | Expanding spring for hand pump plunger | 19124 | .05 |
| LERUP | A-4424 | Seat for expanding spring on plunger | 19118 | .05 |
| MERUP | A-4425 | Nut on lower end of plunger rod, per doz. .25 | 11680 | .05 |
| PERUP | A-4426 | Packing for valve on hand pump | 19120 | .05 |
| RERUP | A-4427 | Valve for hand pump nipple | 19121 | .10 |
| SERUP | A-4428 | Spring for hand pump nipple valve | 32153 | .03 |
| TERUP | A-4429 | Elbow for hand pump | 31454 | .30 |

## FRAME SIDE BARS AND OUTRIGGERS

| | | | | |
|---|---|---|---|---|
| KIRUP | A-4452 | Side bar, RIGHT, with outriggers, brackets and bushing for spring shackles (F), LEFT steering | 22109 | 36.50 |
| MIRUP | A-4453 | Side bar, LEFT, with outriggers, brackets and bushing for spring shackles (F), LEFT steering | 22110 | 35.50 |
| RIRUP | A-4454 | Side bar, RIGHT, with outriggers, brackets and bushing for spring shackles (G), LEFT steering | 22455 | 40.50 |
| TIRUP | A-4455 | Side bar, LEFT, with outriggers, brackets and bushing for spring shackles (G), LEFT steering | 22456 | 40.50 |
| BORUP | A-4456 | Side bar, RIGHT, with outriggers, brackets and bushing for spring shackles (H), LEFT steering | 22556 | 46.50 |
| DORUP | A-4457 | Side bar, LEFT, with outriggers, brackets and bushing for spring shackles (H), LEFT steering | 22557 | 46.50 |
| KORUP | A-4458 | Side bar, RIGHT, with outriggers, brackets and bushing for spring shackles (F), RIGHT steering | 22111 | 36.50 |
| MORUP | A-4459 | Side bar, LEFT, with outriggers, brackets and bushing for spring shackles (F), RIGHT steering | 22112 | 36.50 |
| RORUP | A-4460 | Side bar, RIGHT, with outriggers, brackets and bushing for spring shackles (G), RIGHT steering | 22453 | 40.50 |
| TORUP | A-4461 | Side bar, LEFT, with outriggers, brackets and bushing for spring shackles (G), RIGHT steering | 22454 | 40.50 |
| BURUP | A-4462 | Side bar, RIGHT, with outriggers, brackets and bushing for spring shackles (H), RIGHT steering | 22558 | 46.50 |
| DURUP | A-4463 | Side bar, LEFT, with outriggers, brackets and bushing for spring shackles (H), RIGHT steering | 22559 | 46.50 |
| KURUP | A-4466 | Outrigger, front, RIGHT | 32404 | 6.50 |
| LURUP | A-4467 | Outrigger, front, LEFT | 51248 | 6.50 |
| MURUP | A-4470 | Outrigger, rear, RIGHT | 32406 | 5.50 |
| PURUP | A-4471 | Outrigger, rear, LEFT | 32407 | 5.50 |
| RURUP | A-4473 | Plug for taper hole in rear outrigger (V-1) (V-2) | 32431 | .75 |
| SURUP | A-4474 | Screw for plug, per doz. .25 | 10598 | .05 |
| TURUP | A-4475 | Flat washer, per doz. .25 | 11478 | .05 |
| ZURUP | A-4476 | Lock washer, per doz. .25 | 11314 | .05 |



## BRACKETS AND HANGERS ON SIDE BARS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BASUP | A-4482 | Bracket on side bar for fender iron, front all cars, rear (V-1) (R-1) (R-2) | 31000 | 1.25 |
| DASUP | A-4483 | Flange on side bar for hood pull, front | 30979 | .35 |
| FASUP | A-4485 | Flange on side bar for hood pull, rear | 32429 | .35 |
| KASUP | A-4487 | Bracket only for front spring shackle | 32430 | 1.75 |
| LASUP | A-4489 | Bushing in bracket for front spring shackle | 32403 | .80 |
| MASUP | A-4491 | Bracket for front end of rear side spring | 32425 | 6.50 |
| PASUP | A-4495 | Bracket on side bar for horn support | 32422 | 1.50 |
| RASUP | A-4496 | Plug in side bar for adjusting wrench on eccentric bushing | 30512 | .20 |
| SASUP | A-4498 | Bracket with plate for rear engine support, RIGHT | 22105 | 3.50 |
| TASUP | A-4500 | Bracket with plate for rear engine support, LEFT | 22106 | 3.50 |
| ZASUP | A-4502 | Wick for rear engine support brackets, per doz. .25 | 32416 | .05 |
| BESUP | A-4504 | Hanger for running board and attaching body to frame | 32432 | 1.75 |
| CESUP | A-4510 | Bracket, body to frame, four on (R-1) (R-2) (V-1), two all others | 32434 | .30 |
| DESUP | A-4512 | Hanger for rear end of muffler, RIGHT except (H) | 32427 | .60 |
| FESUP | A-4513 | Hanger for rear end of muffler, RIGHT, (H) LEFT steering | 37757 | 1.00 |
| KESUP | A-4515 | Hanger for rear end of muffler, except (H) | 32428 | .60 |
| LESUP | A-4516 | Hanger for rear end of muffler, LEFT, (H) | 37758 | 1.00 |
| MESUP | A-4517 | Hanger for rear end of muffler, RIGHT (H), RIGHT steering | 38067 | .65 |
| PESUP | A-4518 | Washer, for rear muffler hanger (H) | 11530 | .10 |
| RESUP | A-4521 | Bracket for muffler outlet pipes (2 used) | 37640 | .40 |
| SESUP | A-4522 | Bracket on side bar for clutch pedal retracting spring | 32423 | .10 |

## FRAME CROSS MEMBERS AND BRACKETS

| | | | | |
|---|---|---|---|---|
| KISUP | A-4525 | Tubular cross member between front outriggers | 32408 | 5.50 |
| LISUP | A-4529 | Cross member under radiator with bracket and cap for front engine support | 22107 | 14.00 |
| PISUP | A-4530 | Bracket with cap and screws on cross member for front engine support | 20285 | 4.50 |
| SISUP | A-4531 | Screw, cap to bracket for engine support | 10066 | .10 |
| TISUP | A-4532 | Lock washer, per doz. .25 | 11318 | .05 |
| ZISUP | A-4533 | Grease cup for front engine support bracket | 17054 | .50 |
| BOSUP | A-4534 | Extension for grease cup | 19754 | .08 |
| COSUP | A-4535 | Nipple for grease cup extension | 30383 | .15 |
| DOSUP | A-4536 | Gusset, RIGHT, for front cross member | 19003 | 1.00 |
| FOSUP | A-4537 | Gusset, LEFT, for front cross member | 19004 | 1.00 |
| KOSUP | A-4540 | Cross member with gusset plates and brackets for rocker shafts and equalizer, LEFT steering | 23705 | 18.00 |
| MOSUP | A-4543 | Cross member with gusset plates and brackets for rocker shaft and equalizer, RIGHT steering | 23860 | 18.00 |
| ROSUP | A-4545 | Gusset plate for equalizer cross member (2 used) | 32418 | .90 |
| SOSUP | A-4555 | Bracket with bushings on cross member for hand and foot brake rocker shaft | 26927 | 1.30 |
| ZOSUP | A-4556 | Bushing for brake rocker shaft brackets | 52084 | .30 |
| BUSUP | A-4557 | Bracket on cross member for hand brake rocker shaft (1 used) | 37702 | 1.00 |
| CUSUP | A-4559 | Bracket with bushing for foot brake rocker shaft, RIGHT steering | 26930 | 2.60 |
| FUSUP | A-4560 | Taper pin in rocker shaft brackets and levers | 15031 | .03 |
| KUSUP | A-4562 | Outer support bracket on side bar for foot brake rocker shaft | 37700 | 1.50 |
| LUSUP | A-4566 | Bracket on equalizing cross member for torsion arm | 32421 | 3.50 |
| MUSUP | A-4569 | Bracket on cross member for hand brake retracting spring, LEFT steering | 37512 | .25 |
| RUSUP | A-4570 | Bracket on cross member for hand brake retracting spring RIGHT steering | 37513 | .50 |
| TUSUP | A-4572 | Bracket on cross member for foot brake retracting spring | 33592 | .20 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BATUP | A-4574 | Tubular cross member in front of gasoline tank and between rear outriggers | 32409 | 6.50 |
| DATUP | A-4575 | Bracket on side bar for tubular cross member in front of gasoline tank | 38324 | 3.25 |
| KATUP | A-4578 | Plug for rear outrigger, thin | 31799 | .05 |
| LATUP | A-4579 | Plug for rear outrigger, thick | 16250 | .10 |

## REAR AXLE BUMPER AND REBOUND STRAP

| | | | | |
|---|---|---|---|---|
| MATUP | A-4584 | Rubber bumper for rear axle | 37642 | .60 |
| PATUP | A-4586 | Support bracket on frame for rear axle bumper | 37643 | .35 |
| RATUP | A-4587 | Screw, rubber bumper to side bar | 33469 | .15 |
| SATUP | A-4588 | Flat washer, per doz. .25 | 11453 | .05 |
| TATUP | A-4589 | Lock washer, per doz. .25 | 11316 | .05 |
| ZATUP | A-4590 | Nut, per doz. .25 | 11678 | .05 |
| BETUP | A-4592 | Rebound strap for rear axle | 38323 | 1.60 |
| CETUP | A-4593 | Hanger for rebound strap | 18409 | 1.25 |
| DETUP | A-4594 | Pin in hanger for rebound strap | 16243 | .10 |
| FETUP | A-4595 | Cotter pin for pin, per doz. .25 | 15161 | .05 |
| KETUP | A-4596 | Nut on hanger | 11660 | .15 |
| LETUP | A-4597 | Cotter pin for nut, per doz. .25 | 15165 | .05 |
| METUP | A-4598 | Cup for spring on rebound strap hanger | 18407 | .05 |
| PETUP | A-4599 | Seat for spring | 38322 | .10 |
| RETUP | A-4600 | Spring on hanger for rebound strap | 18406 | .15 |
| SETUP | A-4601 | Leather washer in cup for rebound strap, per doz. .25 | 18408 | .05 |
| TETUP | A-4602 | Spacer for rebound strap hanger | 16848 | .10 |

## ATTACHMENTS FOR SNUBBERS

| | | | | |
|---|---|---|---|---|
| LITUP | A-4613 | Reinforcement plate for snubber bracket on frame | 33468 | .10 |
| MITUP | A-4614 | Screw ¾" long, snubber to side bar (1 used each snubber) | 11903 | .05 |
| PITUP | A-4615 | Screw 1" long, snubber to side bar (2 used each snubber) | 11904 | .05 |
| RITUP | A-4616 | Lock washer, per doz. .25 | 11316 | .05 |
| SITUP | A-4622 | Clamp plate for end of snubber belt | 33572 | .20 |
| TITUP | A-4623 | Staple bolt for clamping end of snubber strap | 33573 | .20 |
| ZITUP | A-4624 | Nut holding staple bolt in clamp, per doz. .25 | 10889 | .05 |
| BOTUP | A-4625 | Lock washer, per doz. .25 | 11336 | .05 |
| COTUP | A-4626 | Clip or guide for snubber belt on rear axle | 33470 | .10 |
| DOTUP | A-4627 | Screw to attach clip, per doz. .25 | 11902 | .05 |
| FOTUP | A-4628 | Lock washer, per doz. .25 | 11304 | .05 |

## TIRE CARRIERS

| | | | | |
|---|---|---|---|---|
| TOTUP | A-4645 | Nut on upper supports in outriggers | 6773 | .10 |
| ZOTUP | A-4646 | Lock washer, per doz. .25 | 11320 | .05 |
| BUTUP | A-4649 | Support, lower, complete for tire carrier (R-1) (R-2) (P-1) (P-2) (CC) except (V-1) | 20572 | 8.00 |
| DUTUP | A-4650 | Support, lower, complete with clamp screws for tire carrier (7-P) (S) (M) (A) | 22193 | 8.00 |
| KUTUP | A-4653 | Support only, lower, for tire carrier (R-1) (R-2) (P-1) (P-2) (CC) except (V-1) | 19272 | 3.50 |
| MUTUP | A-4654 | Support only, lower, for tire carrier (7-P) (S) (M) (A) | 32943 | 3.50 |
| PUTUP | A-4655 | Rivet, supports to ring, per doz. .25 | 17638 | .05 |
| RUTUP | A-4656 | Clamp screw in lower support for tire carrier lock | 23551 | 2.00 |
| SUTUP | A-4657 | Foot on clamp sctew in lower support | 19271 | .15 |
| TUTUP | A-4658 | Taper pin, foot on screw, per doz. .25 | 15030 | .05 |
| ZUTUP | A-4659 | Anti-rattler on clamp screw | 30117 | .05 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAZUP | A-4662 | Plate on rear cross spring for lower support, all except (V-1) | 19269 | 3.00 |
| CAZUP | A-4663 | Screw, lower support to spring plate | 11611 | .35 |
| DAZUP | A-4664 | Flat washer | 11457 | .10 |
| FAZUP | A-4665 | Lock washer | 11323 | .05 |
| KAZUP | A-4670 | Tire carrier complete with supports (7-P) (S) (M) (A) | 22838 | 22.50 |
| LAZUP | A-4671 | Tire carrier complete with supports (R-1) (R-2) (P-1) (P-2) (CC) except (V-1) | 22856 | 22.50 |
| PAZUP | A-4672 | Tire carrier complete with supports (V-1) (Special) | 22838 | 22.50 |
| RAZUP | A-4673 | Ring for tire carrier | 33220 | 3.15 |
| SAZUP | A-4676 | Support for tire carrier, RIGHT, (7-P) (S) (M) (A) | 33221 | 3.20 |
| TAZUP | A-4677 | Support for tire carrier, LEFT, (7-P) (S) (M) (A) | 33222 | 3.20 |
| ZAZUP | A-4678 | Support for tire carrier, RIGHT, (R-1) (R-2) (P-1) (P-2) (V-2) (G) (H) | 33223 | 3.45 |
| CEZUP | A-4679 | Support for tire carrier, LEFT, (R-1) (R-2) (P-1) (P-2) (V-2) (G) (H) | 33224 | 3.45 |
| FEZUP | A-4680 | Support for tire carrier, RIGHT, (V-1) (Special) | 33221 | 3.20 |
| KEZUP | A-4681 | Support for tire carrier, LEFT, (V-1) (Special) | 33222 | 3.20 |
| LEZUP | A-4682 | Support for tire carrier, lower, (V-1) (Special) | 32943 | 3.50 |
| MEZUP | A-4683 | Sargent lock (less keys) on clamp screws for tire carrier (specify lock number) | 37581 | 3.75 |

## TIRE CARRIER FOR 895 x 135 MILLIMETER TIRES

| | | | | |
|---|---|---|---|---|
| REZUP | A-4687 | Tire carrier complete with supports (7-P) (S) (M) (A) | 21765 | 22.50 |
| SEZUP | A-4688 | Tire carrier complete with supports (R-1) (R-2) (P-1) (P-2) (CC) except (V-1) | 21764 | 22.50 |
| ZEZUP | A-4689 | Ring for tire carrier (7-P) (S) (M) (A) | 19978 | 3.15 |
| BIZUP | A-4690 | Ring for tire carrier (R-1) (R-2) (P-1) (P-2) (CC) except (V-1) | 19979 | 3.15 |
| CIZUP | A-4693 | Support for tire carrier, RIGHT (7-P) (S) (M) (A) | 19974 | 3.50 |
| DIZUP | A-4694 | Support for tire carrier, LEFT (7-P) (S) (M) (A) | 19975 | 3.50 |
| FIZUP | A-4695 | Support for tire carrier, RIGHT (R-1)(R-2) (P-1) (P-2) (CC) except (V-1) | 19976 | 3.50 |
| LIZUP | A-4696 | Support for tire carrier, LEFT (R-1) (R-2) (P-1) (P-2) (CC) except (V-1) | 19977 | 3.50 |

**NOTE:—Parts not listed for millimeter carrier are the same as those used on standard size tire carrier.**

## RUDGE-WHITWORTH WIRE WHEEL CARRIERS

| | | | | |
|---|---|---|---|---|
| KOZUP | A-4733 | Wheel carrier complete for one wire wheel (7-P) (S) (M) (A) | 22220 | 45.00 |
| LOZUP | A-4734 | Wheel carrier complete for one wire wheel (R-1) (R-2) (P-1) (P-2) (CC) except (V-1) | 22219 | 45.00 |
| POZUP | A-4737 | Wheel carrier complete for two wire wheels (7-P) (S) (M) (A) | 22221 | 60.00 |
| ROZUP | A-4738 | Wheel carrier complete for two wire wheels (P-1) (P-2) (R-1) (R-2) (CC) except (V-1) | 22218 | 60.00 |
| TOZUP | A-4741 | Upper support for wheel carrier (attaching to outriggers) (7-P) (S) (M) (A) | 33018 | 12.00 |
| BUZUP | A-4742 | Upper support for wheel carrier (attaching to outriggers) (P-1) (P-2) (R-1) (R-2) (CC) except (V-1) | 33017 | 12.00 |
| DUZUP | A-4744 | Lower support for wheel carrier (attaching to spring plate) (7-P) (S) (M) (A) | 33016 | 7.00 |
| KUZUP | A-4745 | Lower support for wheel carrier (attaching to spring plate) (P-1) (P-2) (R-1) (R-2) (CC) except (V-1) | 32112 | 7.00 |
| MUZUP | A-4747 | Hub only for single wire wheel carrier | 32105 | 14.00 |
| PUZUP | A-4749 | Hub only for double wire wheel carrier | 32108 | 18.00 |
| RUZUP | A-4751 | Plate with clip in hub for wire wheel carrier | 22209 | 1.75 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BABAR | A-4752 | Nut holding wire wheel on hub (1 used on single, 2 on double carrier) | 32106 | 8.50 |
| DABAR | A-4753 | Rivet, hub to supports (5 used), per doz. .25 | 17752 | .05 |
| FABAR | A-4754 | Rivet, hub to supports (1 used), per doz. .25 | 17753 | .05 |

**NOTE: Tire lock and attachments for lower support are the same as used on standard tire carriers.**

## HOLDERS FOR TIRES UNDER DECK

| | | | | |
|---|---|---|---|---|
| PABAR | A-4770 | Footman's loop for short tire strap (V-1) | 30234 | .10 |
| RABAR | A-4771 | Tug loop for short tire strap (V-1) | 30236 | .05 |
| SABAR | A-4772 | Reinforcement on floor for footman loop (V-1) | 30239 | .05 |
| TABAR | A-4773 | Screw, loop to floor boards (V-1), per doz. .25 | 10799 | .05 |
| ZABAR | A-4775 | Nut, per doz. .25 | 10889 | .05 |
| BEBAR | A-4776 | Lock washer, per doz. .25 | 11314 | .05 |
| CEBAR | A-4777 | Flat washer, per doz. .25 | 11478 | .05 |
| DEBAR | A-4778 | Bracket for extra tire (V-1) | 17146 | 2.50 |
| FEBAR | A-4779 | Reinforcement for bracket | 17148 | .10 |
| KEBAR | A-4781 | Screw, bracket to reinforcement (V-1) | 10012 | .08 |
| LEBAR | A-4783 | Nut | 10892 | .05 |
| MEBAR | A-4784 | Lock washer, per doz. .25 | 11315 | .05 |

## FRONT SPRINGS AND LEAVES

| | | | | |
|---|---|---|---|---|
| CIBAR | A-4808 | Front spring, (F) (G) | 32700 | 9.00 |
| DIBAR | A-4809 | Eye leaf (No. 1) with bushings | 35730 | 2.70 |
| FIBAR | A-4810 | No. 2 leaf | 35731 | 1.80 |
| KIBAR | A-4811 | No. 3 leaf with clips | 35732 | 1.60 |
| LIBAR | A-4812 | No. 4 leaf | 35733 | 1.25 |
| MIBAR | A-4813 | No. 5 leaf | 35734 | 1.10 |
| PIBAR | A-4814 | No. 6 leaf | 35735 | 1.00 |
| RIBAR | A-4815 | No. 7 leaf | 35736 | .75 |
| SIBAR | A-4816 | No. 8 leaf with clips | 35737 | 1.00 |
| TIBAR | A-4817 | No. 9 leaf | 35738 | .40 |
| ZIBAR | A-4818 | Front spring, (H) | 32710 | 9.00 |
| BOBAR | A-4819 | Eye leaf (No. 1) with bushings | 35730 | 2.70 |
| COBAR | A-4820 | No. 2 leaf | 35820 | 1.80 |
| DOBAR | A-4821 | No. 3 leaf with clips | 35593 | 1.60 |
| KOBAR | A-4823 | No. 5 leaf | 35823 | 1.10 |
| LOBAR | A-4824 | No. 6 leaf | 35824 | 1.00 |
| MOBAR | A-4825 | No. 7 leaf | 35825 | .75 |
| POBAR | A-4826 | No. 8 leaf with clips | 35826 | 1.00 |
| ROBAR | A-4827 | No. 9 leaf | 35838 | .40 |

## REAR SIDE SPRINGS AND LEAVES

| | | | | |
|---|---|---|---|---|
| FUBAR | A-4919 | Rear side spring, RIGHT, (S) (M) | 32701 | 14.50 |
| KUBAR | A-4920 | Eye leaf (No. 1) with bushings | 35750 | 3.40 |
| LUBAR | A-4921 | No. 2 leaf | 35740 | 2.20 |
| MUBAR | A-4922 | No. 3 leaf with clip | 35741 | 2.25 |
| PUBAR | A-4923 | No. 4 leaf with clip | 35742 | 1.95 |
| RUBAR | A-4924 | No. 5 leaf with clip | 35743 | 1.60 |
| SUBAR | A-4925 | No. 6 leaf | 35744 | 1.30 |
| TUBAR | A-4926 | No. 7 leaf | 35745 | 1.15 |
| ZUBAR | A-4927 | No. 8 leaf | 35746 | 1.00 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADAR | A-4928 | No. 9 leaf | 35747 | .80 |
| CADAR | A-4929 | No. 10 leaf with clips | 35748 | 1.00 |
| DADAR | A-4930 | No. 11 leaf | 35738 | .40 |
| FADAR | A-4931 | Rear side spring, LEFT, (S) (M) | 32702 | 14.50 |
| KADAR | A-4932 | Eye leaf (No. 1) with bushings | 35750 | 3.40 |
| LADAR | A-4933 | No. 2 leaf | 35751 | 2.20 |
| MADAR | A-4934 | No. 3 leaf with clip | 35741 | 2.25 |
| PADAR | A-4935 | No. 4 leaf with clip | 35753 | 1.95 |
| RADAR | A-4936 | No. 5 leaf with clip | 35754 | 1.60 |
| SADAR | A-4937 | No. 6 leaf | 35755 | 1.30 |
| TADAR | A-4938 | No. 7 leaf | 35756 | 1.15 |
| ZADAR | A-4939 | No. 8 leaf | 35757 | 1.00 |
| BEDAR | A-4940 | No. 9 leaf | 35747 | .80 |
| CEDAR | A-4941 | No. 10 leaf with clips | 35759 | 1.00 |
| DEDAR | A-4942 | No. 11 leaf | 35738 | .40 |
| FEDAR | A-4943 | Rear side spring, RIGHT, (7-P) (B-1) (B-2) (L) (I) (LD) (TL) (TLD) (SB-1) (SB-2) (7-B) | 32714 | 12.00 |
| KEDAR | A-4944 | Eye leaf (No. 1) with bushings | 35859 | 3.40 |
| LEDAR | A-4945 | No. 2 leaf | 35860 | 2.20 |
| MEDAR | A-4946 | No. 3 leaf with clip | 35873 | 2.10 |
| PEDAR | A-4947 | No. 4 leaf | 35862 | 1.30 |
| REDAR | A-4948 | No. 5 leaf | 35863 | 1.25 |
| SEDAR | A-4949 | No. 6 leaf with clip | 35864 | 1.30 |
| TEDAR | A-4950 | No. 7 leaf | 35865 | 1.05 |
| ZEDAR | A-4951 | No. 8 leaf | 35866 | .90 |
| BIDAR | A-4952 | No. 9 leaf | 35867 | .75 |
| CIDAR | A-4953 | No. 10 leaf | 35880 | .70 |
| DIDAR | A-4954 | No. 11 leaf with clips | 35869 | .85 |
| FIDAR | A-4955 | No. 12 leaf | 35870 | .40 |
| KIDAR | A-4956 | Rear side spring, LEFT, (7-P) (B-1) (B-2) (L) (I) (LD) (TL) (TLD)(SB-1) (SB-2) (7-B) | 32715 | 12.00 |
| LIDAR | A-4957 | Eye leaf (No. 1) with bushings | 35871 | 3.40 |
| MIDAR | A-4958 | No. 2 leaf | 35872 | 2.20 |
| PIDAR | A-4959 | No. 3 leaf with clip | 35873 | 2.10 |
| RIDAR | A-4960 | No. 4 leaf | 35874 | 1.30 |
| SIDAR | A-4961 | No. 5 leaf | 35875 | 1.25 |
| TIDAR | A-4962 | No. 6 leaf with clip | 35876 | 1.30 |
| ZIDAR | A-4963 | No. 7 leaf | 35877 | 1.05 |
| BODAR | A-4964 | No. 8 leaf | 35878 | .90 |
| CODAR | A-4965 | No. 9 leaf | 35879 | .75 |
| DODAR | A-4966 | No. 10 leaf | 35880 | .70 |
| FODAR | A-4967 | No. 11 leaf with clips | 35881 | .85 |
| KODAR | A-4968 | No. 12 leaf | 35882 | .40 |
| LODAR | A-4969 | Rear side spring, RIGHT, (P-1) (P-2) and after engine 57-T-323 on (V-1) (V-2) (R-2) | 32704 | 10.50 |
| MODAR | A-4970 | Eye leaf (No. 1) with bushings | 35770 | 3.40 |
| PODAR | A-4971 | No. 2 leaf | 35771 | 2.20 |
| RODAR | A-4972 | No. 3 leaf with clip | 35772 | 2.25 |
| SODAR | A-4973 | No. 4 leaf with clip | 35773 | 1.80 |
| TODAR | A-4974 | No. 5 leaf with clip | 35774 | 1.50 |
| ZODAR | A-4975 | No. 6 leaf | 35775 | 1.10 |
| BUDAR | A-4976 | No. 7 leaf with clips | 35776 | 1.20 |
| CUDAR | A-4977 | No. 8 leaf | 35777 | .70 |
| DUDAR | A-4978 | No. 9 leaf | 35738 | .45 |
| FUDAR | A-4979 | Rear side spring, LEFT, (P-1) (P-2) and after engine 57-T-323 on (V-1) (V-2) (R-2) | 32705 | 10.50 |
| KUDAR | A-4980 | Eye leaf (No. 1) with bushings | 35779 | 3.40 |
| LUDAR | A-4981 | No. 2 leaf | 35780 | 2.20 |
| MUDAR | A-4982 | No. 3 leaf with clip | 35781 | 2.25 |
| PUDAR | A-4983 | No. 4 leaf with clip | 35782 | 1.80 |
| RUDAR | A-4984 | No. 5 leaf with clip | 35783 | 1.50 |
| SUDAR | A-4985 | No. 6 leaf | 35784 | 1.10 |
| TUDAR | A-4986 | No. 7 leaf | 35785 | .90 |
| ZUDAR | A-4987 | No. 8 leaf with clips | 35786 | 1.10 |
| BYDAR | A-4988 | No. 9 leaf | 35738 | .40 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAFAR | A-4989 | Rear side spring, RIGHT, before engine 57-T-323 on (R-1) (R-2) (V-1) | 32707 | 10.00 |
| DAFAR | A-4990 | Eye leaf (No. 1) with bushings | 35795 | 3.40 |
| FAFAR | A-4991 | No. 2 leaf | 35796 | 2.20 |
| KAFAR | A-4992 | No. 3 leaf with clips | 35797 | 1.80 |
| LAFAR | A-4993 | No. 4 leaf | 35798 | 1.30 |
| MAFAR | A-4994 | No. 5 leaf | 35799 | 1.20 |
| PAFAR | A-4995 | No. 6 leaf | 35800 | 1.05 |
| RAFAR | A-4996 | No. 7 leaf | 35801 | .80 |
| SAFAR | A-4997 | No. 8 leaf with clips | 35811 | 1.00 |
| TAFAR | A-4998 | No. 9 leaf | 35812 | .40 |
| ZAFAR | A-4999 | Rear side spring, LEFT, before engine 57-T-323 on (R-1) (R-2) (V-1) | 32708 | 10.00 |
| CEFAR | A-5000 | Eye leaf (No. 1) with bushings | 35804 | 3.40 |
| DEFAR | A-5001 | No. 2 leaf | 35805 | 2.20 |
| FEFAR | A-5002 | No. 3 leaf with clips | 35806 | 1.80 |
| KEFAR | A-5003 | No. 4 leaf | 35807 | 1.30 |
| LEFAR | A-5004 | No. 5 leaf | 35808 | 1.20 |
| MEFAR | A-5005 | No. 6 leaf | 35809 | 1.05 |
| PEFAR | A-5006 | No. 7 leaf | 35810 | .80 |
| REFAR | A-5007 | No. 8 leaf with clips | 35811 | 1.00 |
| SEFAR | A-5008 | No. 9 leaf | 35812 | .40 |
| TEFAR | A-5009 | Rear side spring, RIGHT (H) | 32711 | 14.50 |
| ZEFAR | A-5010 | Eye leaf (No. 1) with bushings | 35828 | 3.40 |
| BIFAR | A-5011 | No. 2 leaf | 35829 | 2.20 |
| CIFAR | A-5012 | No. 3 leaf with clip | 35830 | 2.25 |
| DIFAR | A-5013 | No. 4 leaf with clip | 35831 | 1.95 |
| FIFAR | A-5014 | No. 5 leaf with clip | 35832 | 1.60 |
| KIFAR | A-5015 | No. 6 leaf | 35833 | 1.30 |
| LIFAR | A-5016 | No. 7 leaf | 35834 | 1.15 |
| MIFAR | A-5017 | No. 8 leaf | 35835 | 1.00 |
| PIFAR | A-5018 | No. 9 leaf | 35836 | .80 |
| RIFAR | A-5019 | No. 10 leaf with clips | 35837 | 1.00 |
| SIFAR | A-5020 | No. 11 leaf | 35838 | .40 |
| TIFAR | A-5021 | Rear side spring, LEFT (H) | 32712 | 14.50 |
| ZIFAR | A-5022 | Eye leaf (No. 1) with bushings | 35839 | 3.40 |
| BOFAR | A-5023 | No. 2 leaf | 35840 | 2.20 |
| COFAR | A-5024 | No. 3 leaf with clip | 35841 | 2.25 |
| DOFAR | A-5025 | No. 4 leaf with clip | 35842 | 1.95 |
| FOFAR | A-5026 | No. 5 leaf with clip | 35843 | 1.60 |
| KOFAR | A-5027 | No. 6 leaf | 35844 | 1.30 |
| LOFAR | A-5028 | No. 7 leaf | 35845 | 1.15 |
| MOFAR | A-5029 | No. 8 leaf | 35846 | 1.05 |
| POFAR | A-5030 | No. 9 leaf | 35847 | .80 |
| ROFAR | A-5031 | No. 10 leaf with clips | 35848 | 1.00 |
| SOFAR | A-5032 | No. 11 leaf | 35838 | .40 |

## REAR CROSS SPRINGS AND LEAVES

| | | | | |
|---|---|---|---|---|
| TOFAR | A-5072 | Rear cross spring (S) (M) | 32703 | 7.50 |
| ZOFAR | A-5073 | Eye leaf (No. 1) with bushings | 35761 | 2.50 |
| BUFAR | A-5074 | No. 2 leaf | 35884 | 1.60 |
| CUFAR | A-5075 | No. 3 leaf | 35763 | 1.30 |
| FUFAR | A-5077 | No. 5 leaf | 35765 | 1.05 |
| KUFAR | A-5078 | No. 6 leaf | 35766 | .90 |
| LUFAR | A-5079 | No. 7 leaf | 35767 | .75 |
| MUFAR | A-5080 | No. 8 leaf with clips | 35768 | .85 |
| PUFAR | A-5081 | No. 9 leaf | 35794 | .40 |
| RUFAR | A-5082 | Rear cross spring (7-P) (L) (I) (LD) (TL) (TLD) (B-1) (B-2) (SB-1) (SB-2) (7-B) | 32716 | 8.00 |
| TUFAR | A-5083 | Eye leaf (No. 1) with bushings | 35883 | 2.50 |
| ZUFAR | A-5084 | No. 2 leaf | 35884 | 1.60 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAGAR | A-5085 | No. 3 leaf | 35885 | 1.25 |
| CAGAR | A-5086 | No. 4 leaf with clips | 35886 | 1.40 |
| DAGAR | A-5087 | No. 5 leaf | 35887 | 1.05 |
| FAGAR | A-5088 | No. 6 leaf | 35888 | 1.00 |
| KAGAR | A-5089 | No. 7 leaf | 35889 | .80 |
| LAGAR | A-5090 | No. 8 leaf | 35890 | .70 |
| MAGAR | A-5091 | No. 9 leaf with clips | 35891 | .85 |
| PAGAR | A-5092 | No. 10 leaf | 35892 | .40 |
| RAGAR | A-5093 | Rear cross spring (P-1) (P-2) and after engine 57-T-323 on (V-1) (V-2) (R-2) | 32706 | 6.75 |
| TAGAR | A-5094 | Eye leaf (No. 1) with bushings | 35788 | 2.50 |
| ZAGAR | A-5095 | No. 2 leaf | 35789 | 1.60 |
| BEGAR | A-5096 | No. 3 leaf with clips | 35790 | 1.45 |
| CEGAR | A-5097 | No. 4 leaf | 35791 | 1.10 |
| DEGAR | A-5098 | No. 5 leaf | 35792 | .90 |
| FEGAR | A-5099 | No. 6 leaf with clips | 35793 | 1.10 |
| KEGAR | A-5100 | No. 7 leaf | 35794 | .40 |
| LEGAR | A-5101 | Rear cross spring before engine 57-T-323 on (R-1) (R-2) (V-1) | 32709 | 7.50 |
| MEGAR | A-5102 | Eye leaf (No. 1) with bushings | 35813 | 2.50 |
| PEGAR | A-5103 | No. 2 leaf | 35814 | 1.60 |
| REGAR | A-5104 | No. 3 leaf with clips | 35815 | 1.40 |
| SEGAR | A-5105 | No. 4 leaf | 35816 | 1.00 |
| TEGAR | A-5106 | No. 5 leaf with clips | 35817 | 1.15 |
| ZEGAR | A-5107 | No. 6 leaf | 35818 | .50 |
| BIGAR | A-5108 | Rear cross spring (H) | 32713 | 8.00 |
| CIGAR | A-5109 | Eye leaf (No. 1) with bushings | 35850 | 2.50 |
| DIGAR | A-5110 | No. 2 leaf | 35851 | 1.60 |
| FIGAR | A-5111 | No. 3 leaf | 35852 | 1.30 |
| KIGAR | A-5112 | No. 4 leaf with clips | 35853 | 1.40 |
| LIGAR | A-5113 | No. 5 leaf | 35854 | 1.05 |
| MIGAR | A-5114 | No. 6 leaf | 35855 | .90 |
| PIGAR | A-5115 | No. 7 leaf | 35856 | .75 |
| RIGAR | A-5116 | No. 8 leaf with clips | 35857 | .85 |
| SIGAR | A-5117 | No. 9 leaf | 35858 | .40 |

## BUSHINGS FOR EYE LEAVES CENTER BOLT AND BOLTED CLAMP FOR LEAVES

| | | | | |
|---|---|---|---|---|
| BOGAR | A-5123 | Bushing for eye leaf (2 used each spring) | 32677 | .60 |
| COGAR | A-5125 | Center bolt, 3¾" long, under head | 35441 | .15 |
| DOGAR | A-5126 | Center bolt, 3½" long, under head | 35440 | .12 |
| FOGAR | A-5127 | Center bolt, 3¼" long, under head | 35439 | .10 |
| KOGAR | A-5128 | Center bolt, 3" long, under head | 35438 | .10 |
| LOGAR | A-5129 | Center bolt, 2¾" long, under head | 35437 | .10 |
| MOGAR | A-5130 | Center bolt, 2½" long, under head | 35436 | .10 |
| POGAR | A-5131 | Center bolt, 2" long, under head | 35434 | .10 |
| ROGAR | A-5132 | Nut for center bolt | B-1363 | .05 |
| SOGAR | A-5133 | Bolted clamp for spring leaves 1⅛" deep | 35453 | .15 |
| TOGAR | A-5134 | Bolted clamp for spring leaves 1 1/16" deep | 35454 | .15 |
| ZOGAR | A-5135 | Bolted clamp for spring leaves 1¼" deep | 35455 | .15 |
| BUGAR | A-5136 | Bolted clamp for spring leaves 1 1/16" deep | 35456 | .15 |
| CUGAR | A-5137 | Bolted clamp for spring leaves 1⅜" deep | 35457 | .15 |
| DUGAR | A-5138 | Bolted clamp for spring leaves 1 1/16" deep | 35458 | .15 |
| FUGAR | A-5139 | Bolted clamp for spring leaves 1½" deep | 35459 | .15 |
| KUGAR | A-5141 | Bolted clamp for spring leaves 1⅝" deep | 35461 | .15 |
| LUGAR | A-5142 | Bolted clamp for spring leaves 1 11/16" deep | 35462 | .15 |
| MUGAR | A-5143 | Bolted clamp for spring leaves 1¾" deep | 35463 | .15 |
| PUGAR | A-5145 | Bolted clamp for spring leaves 1⅞" deep | 35465 | .15 |
| RUGAR | A-5148 | Bolted clamp for spring leaves 2¼" deep | 35471 | .20 |
| SUGAR | A-5150 | Bolted clamp for spring leaves 2 1/16" deep | 35474 | .20 |
| TUGAR | A-5151 | Bolted clamp for spring leaves 2½" deep | 35475 | .20 |
| ZUGAR | A-5152 | Bolted clamp for spring leaves 2 1/16" deep | 35476 | .20 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAHAR | A-5153 | Bolted clamp for spring leaves 2 5/8" deep | 35477 | .20 |
| CAHAR | A-5155 | Bolted clamp for spring leaves 3" deep | 35483 | .25 |
| DAHAR | A-5157 | Bolted clamp for spring leaves 3 7/16" deep | 35486 | .25 |
| FAHAR | A-5158 | Bolt for clamp | 11880 | .05 |
| KAHAR | A-5159 | Nut for bolt | 11719 | .05 |
| LAHAR | A-5160 | Spacer for bolted clamps | 35500 | .05 |
| MAHAR | A-5161 | Rivet for clamp, per doz. .25 | 17651 | .05 |

## SPRING CLIPS
## BUMPER ON SPRING CLIP FOR FRONT AXLE

| | | | | |
|---|---|---|---|---|
| SAHAR | A-5166 | Double clip for front spring | 32688 | 6.00 |
| TAHAR | A-5167 | Single clip for rear cross spring, all except (V-1) (H) | 19810 | 1.25 |
| ZAHAR | A-5169 | Single clip for rear cross spring (V-1) | 30199 | 1.00 |
| BEHAR | A-5170 | Single clip for rear cross spring (H) | 19548 | 1.00 |
| CEHAR | A-5171 | Double clip for rear side spring, all except (P-1)(P-2) (R-1) (R-2) (V-1) (V-2) | 32687 | 7.00 |
| FEHAR | A-5172 | Double clip for rear side spring (P-1) (P-2) (R-1) (R-2) (V-1) (V-2) | 32717 | 7.00 |
| LEHAR | A-5174 | Bumper on spring clip for front axle | 32679 | .30 |
| MEHAR | A-5176 | Screw, bumper to clip | 37003 | .05 |
| PEHAR | A-5177 | Lock washer, per doz. .25 | 11335 | .05 |
| REHAR | A-5178 | Retainer for screw, per doz. .25 | 37004 | .05 |
| SEHAR | A-5179 | Nut for spring clip | 5009 | .10 |
| TEHAR | A-5180 | Lock washer, per doz. .25 | 11310 | .05 |
| ZEHAR | A-5185 | Plate for rear cross spring (V-1) | 19141 | 1.25 |
| BIHAR | A-5186 | Plate for rear cross spring (all with outside tire carriers) | 19269 | 3.00 |
| CIHAR | A-5187 | Shim for rear cross spring plate (P-1) (P-2) (R-1) (R-2) (V-1) (V-2) | 32039 | 1.00 |
| FIHAR | A-5188 | Perch for rear cross spring on tube | 19112 | 1.75 |
| KIHAR | A-5189 | Screw, spring perch to tube | 10326 | .05 |
| LIHAR | A-5190 | Dowel, spring perch to tube, per doz. .25 | 16428 | .05 |

## SPRING SHACKLES AND BOLTS

| | | | | |
|---|---|---|---|---|
| BOHAR | A-5196 | Link, inner, plain, for front spring | 32682 | .65 |
| COHAR | A-5197 | Link, outer, with boss, for front shackle | 32683 | .75 |
| DOHAR | A-5199 | Bushing in bracket for front spring shackle bolt | 32403 | .80 |
| FOHAR | A-5206 | Pocket for front spring shackle | 39908 | .35 |
| KOHAR | A-5210 | Screw, pocket to side bar, per doz. .25 | R-4-411 | .05 |
| LOHAR | A-5211 | Nut | 11653 | .05 |
| MOHAR | A-5212 | Lock washer, per doz. .25 | 11304 | .05 |
| POHAR | A-5215 | Spring shackle, RIGHT, for rear cross spring, (used with grease cup) all except (R-1) (R-2) | 22952 | 6.25 |
| SOHAR | A-5217 | Spring shackle, RIGHT, with step for rear cross spring (R-1) (R-2) | 22852 | 7.00 |
| ZOHAR | A-5220 | Spring shackle, LEFT, for rear cross spring, (used with grease cup), all except (R-1) (R-2) | 22953 | 6.25 |
| CUHAR | A-5222 | Spring shackle, LEFT, with step for rear cross spring (R-1) (R-2) | 22853 | 7.00 |
| DUHAR | A-5225 | Link, inner, plain for rear spring shackle; (not used on upper shackle for (R-1) (R-2) | 32672 | 1.00 |
| KUHAR | A-5226 | Link, outer, with boss for rear spring shackle; (not used on upper shackle for (R-1) (R-2) | 32684 | 1.00 |
| MUHAR | A-5227 | Link, inner, plain with step for upper rear spring shackle (R-1) (R-2) | 33950 | 1.40 |
| RUHAR | A-5228 | Link, outer, with boss and step for upper rear spring shackle (R-1) (R-2) | 33949 | 1.40 |
| TUHAR | A-5233 | Knuckle for rear spring shackle (used with grease cup) | 32721 | 2.50 |
| ZUHAR | A-5235 | Pin through knuckle for shackle links | 32693 | .45 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAKAR | A-5240 | Bolt, front end of front, rear end of rear side and either end of rear cross springs | 32722 | .75 |
| DAKAR | A-5241 | Bolt, front end of rear side spring | 32723 | .85 |
| FAKAR | A-5242 | Bolt, rear end of front spring and front spring shackle | 32720 | .85 |
| KAKAR | A-5247 | Nut for spring and shackle bolts, except front end of rear side spring | 32678 | .15 |
| MAKAR | A-5248 | Cotter pin for nut, per doz. .25 | 32695 | .05 |
| PAKAR | A-5249 | Nut on bolt for front end of rear side spring | 6168 | .10 |
| RAKAR | A-5250 | Lock washer, per doz. .25 | 11322 | .05 |
| SAKAR | A-5256 | Grease cup on front end of rear side spring | 17054 | .50 |
| TAKAR | A-5257 | Grease cup (wingless, not used with extension) | 32724 | .40 |
| ZAKAR | A-5258 | Elbow for grease cup in bolt for rear cross spring shackle | 32719 | .65 |
| BEKAR | A-5261 | Spacing washer (.095 thick) for spring bolt | 32697-A | .05 |
| CEKAR | A-5262 | Spacing washer (.100 thick) for spring bolt | 32697-B | .05 |
| DEKAR | A-5263 | Spacing washer (.105 thick) for spring bolt | 32697-C | .05 |
| FEKAR | A-5264 | Spacing washer (.115 thick) for spring bolt | 32697-E | .05 |
| KEKAR | A-5265 | Spacing washer (.125 thick) for spring bolt | 32697-G | .05 |

## MUFFLER

**NOTE:—The first type muffler had saucer shaped plates while the second type had both saucer and conical shaped plates.**
**When a complete muffler is required, the second type will be supplied.**

| | | | | |
|---|---|---|---|---|
| LIKAR | A-5297 | Muffler complete | 24411 | 9.00 |
| MIKAR | A-5298 | Center casings for muffler | 22254 | 1.65 |
| PIKAR | A-5299 | Casing with baffle nozzle for front end of muffler | 23482 | 1.75 |
| RIKAR | A-5300 | Casing with clamp for rear end of muffler | 34228 | 1.25 |
| SIKAR | A-5301 | Baffle plate for muffler, Nos. 3 and 6 on 1st and No. 5 on 2nd type 57 | 34152 | .20 |
| ZIKAR | A-5302 | Baffle plate for muffler (saucer shape) No. 2 on 1st type 57 | 37085 | .30 |
| BOKAR | A-5303 | Baffle plate for muffler (saucer shape) Nos. 4 and 7 on 1st and No. 6 on 2nd type 57 | 34153 | .25 |
| DOKAR | A-5304 | Baffle plate for muffler (saucer shape) Nos. 5 and 8 on 1st and No. 7 on 2nd type | 34151 | .35 |
| KOKAR | A-5305 | Baffle plate for muffler No. 2 (conical), 2nd type | 22320 | .30 |
| LOKAR | A-5306 | Baffle plate for muffler No. 3 (conical), 2nd type | 22319 | .40 |
| MOKAR | A-5307 | Baffle plate for muffler (conical) No. 4, 2nd type | 22318 | .60 |
| POKAR | A-5308 | Screw, muffler ends and baffle plates to center casing | 11878 | .05 |
| ROKAR | A-5309 | Nut, per doz. .25 | 11726 | .05 |
| SOKAR | A-5310 | Lock washer, per doz. .25 | 11314 | .05 |
| TOKAR | A-5311 | Clamp for front end of muffler | 34264 | .15 |
| ZOKAR | A-5312 | Hanger for front end of muffler | 37059 | .20 |
| BUKAR | A-5313 | Reinforcement for front muffler hanger (H) | 37060 | .00 |
| CUKAR | A-5314 | Screw for hanger and clamp on front end casing | 10026 | .15 |
| DUKAR | A-5315 | Screw, front muffler hanger to frame | 10023 | .05 |
| FUKAR | A-5316 | Screw in rear clamp for exhaust pipe in muffler | 10025 | .05 |
| KUKAR | A-5317 | Nut | 10893 | .05 |
| LUKAR | A-5318 | Lock washer, per doz. .25 | 11316 | .05 |
| MUKAR | A-5319 | Bracket for muffler support, rear | 33398 | .35 |
| PUKAR | A-5321 | Clamp screw for rear hanger on muffler pipe | 10012 | .08 |
| RUKAR | A-5322 | Flat washer at rear muffler support on side bar (H) | 11530 | .10 |
| SUKAR | A-5323 | Screw, rear bracket to hanger, per doz. .25 | 10003 | .05 |
| TUKAR | A-5324 | Nut, per doz. .25 | 10892 | .05 |
| ZUKAR | A-5325 | Lock washer, per doz. .25 | 11315 | .05 |

## MUFFLER PIPES

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BALAR | A-5346 | Pipe, manifold to muffler, RIGHT, (F) (H) | 23701 | 5.25 |
| CALAR | A-5347 | Pipe, manifold to muffler, LEFT (F) (H) | 23702 | 5.25 |
| DALAR | A-5348 | Pipe, manifold to muffler, RIGHT (G) | 23703 | 5.25 |
| FALAR | A-5349 | Pipe, manifold to muffler, LEFT (G) | 23704 | 5.25 |
| KALAR | A-5350 | Flange for exhaust pipe | 19803 | .40 |
| LALAR | A-5351 | Gasket for exhaust pipe flange | 19802 | .05 |
| MALAR | A-5352 | Special bolt, exhaust pipe flange to manifold | 30226 | .10 |
| PALAR | A-5353 | Bolt, exhaust pipe flange to manifold | 10033 | .10 |
| RALAR | A-5354 | Nut | 12926 | .10 |
| SALAR | A-5355 | Check nut for nut | 12927 | .10 |
| TALAR | A-5356 | Reinforcement for exhaust pipe | 19805 | .10 |
| ZALAR | A-5357 | Asbestos covering for exhaust pipe | 19773 | .50 |
| CELAR | A-5363 | Exhaust pipe for muffler outlet, RIGHT (F) (G) | 37500 | 3.00 |
| DELAR | A-5364 | Exhaust pipe for muffler outlet, LEFT (F) (G) | 37501 | 3.00 |
| FELAR | A-5365 | Exhaust pipe for muffler outlet, RIGHT (H) | 37754 | 3.75 |
| KELAR | A-5366 | Exhaust pipe for muffler outlet, LEFT (H) | 37755 | 3.75 |
| LELAR | A-5367 | Clip for muffler outlet pipe | 19984 | .10 |
| MELAR | A-5368 | Nut on clip | 10892 | .05 |
| PELAR | A-5369 | Lock washer, per doz. .25 | 11315 | .05 |
| RELAR | A-5370 | Asbestos covering for RIGHT exhaust pipe, under condenser tank | 37093 | .35 |

## STEERING WHEEL AND SPIDER

| | | | | |
|---|---|---|---|---|
| KILAR | A-5374 | Steering wheel complete with rim, spider, hub and latches | 21533 | 19.50 |
| LILAR | A-5375 | Steering wheel only | 41745 | 12.00 |
| MILAR | A-5376 | Hub only, with dowels for steering wheel | 20781 | 5.40 |
| PILAR | A-5377 | Dowel pin for latch | 16306 | .03 |
| RILAR | A-5378 | Key, hub to steering wheel | 17149 | .15 |
| SILAR | A-5379 | Cover plate with guides for latches | 20043 | .70 |
| TILAR | A-5380 | Latch RIGHT for steering wheel | 16303 | 1.00 |
| ZILAR | A-5381 | Latch LEFT for steering wheel | 16550 | 1.00 |
| BOLAR | A-5382 | Spring for latch | 16308 | .05 |
| COLAR | A-5383 | Screw for latch cover (2 used) | 11551 | .05 |
| DOLAR | A-5384 | Lock washer, per doz. .25 | 11313 | .05 |
| FOLAR | A-5385 | Screw for hinge of steering wheel | 11550 | .20 |
| KOLAR | A-5386 | Flat washer on hinge screw, per doz. .25 | 11430 | .05 |
| LOLAR | A-5387 | Spherical washer for hinge screw | 11426 | .05 |
| MOLAR | A-5388 | Special nut for hinge screw | 11650 | .15 |

## HOUSING TUBE AND SUPPORT FOR STEERING GEAR

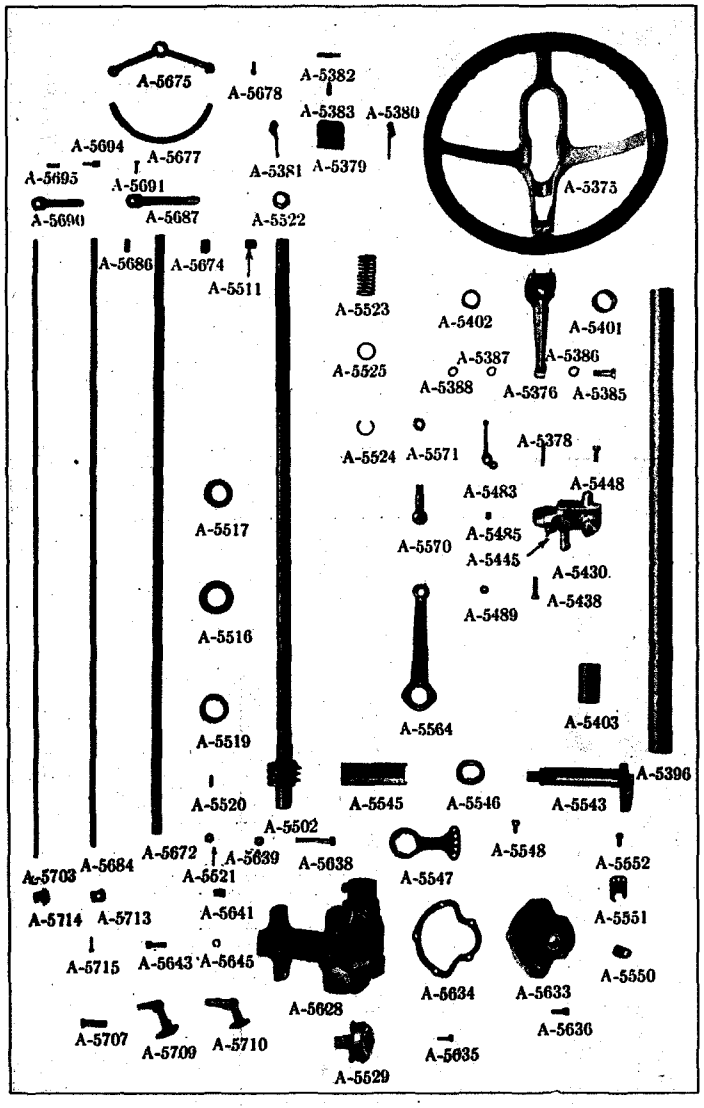
| | | | | |
|---|---|---|---|---|
| CULAR | A-5396 | Housing tube with bushings all (OC) (SB-1) (SB-2) (V-1) (V-2) (S) | 21320 | 5.40 |
| FULAR | A-5400 | Housing tube with bushings (M) (A) and all (CC) except (V-1) (V-2) (SB-1) (SB-2) | 22253 | 5.10 |
| LULAR | A-5401 | Bushing with internal taper for housing tube | 9907 | .80 |
| MULAR | A-5402 | Bushing with external taper for housing tube | 9906 | .85 |
| PULAR | A-5403 | Bushing for lower end of housing tube | 9081 | .80 |
| RULAR | A-5404 | Felt washer at top of housing tube, per doz. .25 | 11529 | .05 |
| SULAR | A-5430 | Support for housing tube and headlight control with bushings, cap, cover and plunger (7-P) (P-1) (R-1) (S) | 24287 | 7.50 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAMAR | A-5431 | Support for housing tube and headlight control with bushings, cap, cover and plunger (P-2) (R-2) | 41730 | 7.50 |
| DAMAR | A-5432 | Support for housing tube and headlight control with bushings, cap, cover and plunger (V-1) (V-2) (B-2) | 24370 | 7.50 |
| KAMAR | A-5433 | Support with cap for housing tube (B-1) | 23765 | 3.45 |
| MAMAR | A-5434 | Support with cap for housing tube (I) (L) (LD) (7-B) | 23766 | 3.45 |
| PAMAR | A-5435 | Support with cap for housing tube (TL) (TLD) | 23483 | 3.80 |
| RAMAR | A-5436 | Support with cap for housing tube (SB-1) (SB-2) | 24427 | 3.80 |
| SAMAR | A-5437 | Support with cap for housing tube (M) (A) | 23764 | 3.50 |
| TAMAR | A-5438 | Screw, cap to support | 11968 | .10 |
| ZAMAR | A-5439 | Lock washer, per doz. .25 | 11335 | .05 |
| BEMAR | A-5445 | Pivot stud in support for air control lever | 33599 | .30 |
| CEMAR | A-5446 | Stop pin for air control lever, per doz. .25 | 33598 | .05 |
| DEMAR | A-5447 | Taper pin anchoring pivot stud, per doz. .25 | 34603 | .05 |
| FEMAR | A-5448 | Screw, support to instrument board (OC) (S) (M) (A) (SB-1) (SB-2) | 10024 | .08 |
| LEMAR | A-5449 | Lock washer, per doz. .25 | 11316 | .05 |
| MEMAR | A-5450 | Screw, support to instrument board (CC) except (SB-1) (SB-2) | 10005 | .05 |
| PEMAR | A-5451 | Lock washerper doz. .25 | 11315 | .05 |
| REMAR | A-5464 | *Reinforcement with bushing for housing tube support (OC) (S) (M) (A)* | 21716 | .25 |
| TEMAR | A-5466 | Reinforcement for housing tube support (B-1) | 33771 | .10 |
| ZEMAR | A-5468 | Reinforcement for housing tube support (L) (LD) (V-1) (V-2) (I) (SB-1) (SB-2) (B-2) (7-B) | 33770 | .20 |
| CIMAR | A-5469 | Reinforcement for housing tube support (TL) (TLD) | 37786 | .15 |
| DIMAR | A-5483 | Air control lever | 33603 | .75 |
| FIMAR | A-5485 | Spring for air control lever | 33600 | .05 |
| KIMAR | A-5487 | Flat washer for air control lever spring, per doz. .25 | 11521 | .05 |
| LIMAR | A-5489 | Nut for air control lever stud | 33596 | .15 |
| MIMAR | A-5491 | Pin for nut | 33597 | .05 |

## STEERING TUBE WITH WORM, SUPPORT FOR STEERING TUBE AND WORM

| | | | | |
|---|---|---|---|---|
| SIMAR | A-5501 | Steering tube with worm and bushing (M) (A) and (CC) except (V-1) (V-2) (SB-1) (SB-2) LEFT steering | 22688 | 10.00 |
| ZIMAR | A-5502 | Steering tube with worm and bushing (OC) (V-1) (V-2) (SB-1) (SB-2) (S), LEFT steering | 23769 | 10.00 |
| COMAR | A-5509 | Steering tube with worm and bushing (M) (A) and (CC) except (V-1) (V-2) (SB-1) (SB-2), RIGHT steering | 23555 | 10.00 |
| FOMAR | A-5510 | Steering tube with worm and bushing (OC) (V-1) (V-2) (SB-1) (SB-2) (S), RIGHT steering | 23770 | 10.00 |
| LOMAR | A-5511 | Bushing in upper end of steering tube | 3181 | .15 |
| MOMAR | A-5512 | Pin for bushing in tube, per doz. .25 | 32376 | .05 |
| POMAR | A-5516 | Race for bearing, above or below worm | 6012 | .65 |
| ROMAR | A-5517 | Ball retainer with balls, above or below worm on tube | 6026 | .50 |
| SOMAR | A-5519 | Adjusting nut for steering tube | 31982 | 1.50 |
| TOMAR | A-5520 | Set screw for adjusting nut, (2 used) | 3167 | .05 |
| ZOMAR | A-5521 | Lock nut on set screw (2 used) | R-4-701 | .05 |
| BUMAR | A-5522 | *Nut on end of steering tube* | 3213 | .45 |
| CUMAR | A-5523 | Spring on tube for housing bushing | 9909 | .10 |
| DUMAR | A-5524 | Ring on steering tube for spring | 9908 | .05 |
| FUMAR | A-5525 | Flat washer for spring on steering tube, per doz. .25 | 9910 | .05 |
| KUMAR | A-5529 | Support on bottom of housing for steering tube | 37470 | 3.50 |
| LUMAR | A-5530 | Clamp screw in support | 10006 | .05 |
| MUMAR | A-5531 | Lock washer, per doz. .25 | 11315 | .05 |
| PUMAR | A-5532 | Screw, support to housing | 10024 | .05 |
| RUMAR | A-5533 | Lock washer, per doz. .25 | 11316 | .05 |




STEERING GEAR



## STEERING GEAR SECTOR

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BASAR | A-5543 | Sector for worm on steering tube, LEFT steering | 37415 | 17.50 |
| CASAR | A-5544 | Sector for worm on steering tube, RIGHT steering | 37416 | 17.50 |
| DASAR | A-5545 | Eccentric bushing to adjust sector | 18026 | 2.00 |
| FASAR | A-5546 | Thrust ring for eccentric bushing on sector | 18099 | .35 |
| KASAR | A-5547 | Adjusting wrench on side bar for eccentric bushing | 18101 | .25 |
| LASAR | A-5548 | Screw, wrench to side bar | 11848 | .10 |
| MASAR | A-5549 | Lock washer, per doz. .25 | 11315 | .05 |
| PASAR | A-5550 | Adjusting screw for sector, in housing cover | 18098 | .55 |
| RASAR | A-5551 | Wrench for sector adjusting screw | 18097 | .05 |
| SASAR | A-5552 | Screw, wrench to housing cover | 10004 | .05 |
| TASAR | A-5553 | Lock washer, per doz. .25 | 11315 | .05 |
| ZASAR | A-5554 | Grease cup in sector | 17054 | .50 |

## STEERING GEAR ARM AND CONNECTING ROD

| | | | | |
|---|---|---|---|---|
| MESAR | A-5564 | Arm for steering gear | 37419 | 4.00 |
| KISAR | A-5570 | Pivot for steering arm | 9198 | 1.50 |
| LISAR | A-5571 | Castle nut on pivot | 9197 | .10 |
| MISAR | A-5572 | Cotter pin through pivot and nut, per doz. .25 | 15175 | .05 |
| PISAR | A-5576 | Nut retaining steering arm on sector | 37468 | .25 |
| RISAR | A-5577 | Lock washer, per doz. .25 | 37469 | .05 |
| SISAR | A-5585 | Steering connecting rod complete, (STANDARD TREAD) LEFT steering | 22510 | 14.00 |
| ZISAR | A-5586 | Steering connecting rod complete, (STANDARD TREAD) RIGHT steering | 22511 | 14.00 |
| COSAR | A-5587 | Steering connecting rod complete, (WIDE TREAD) LEFT steering | 20799 | 12.20 |
| FOSAR | A-5588 | Steering connecting rod complete, (WIDE TREAD) RIGHT steering | 22678 | 14.00 |
| SOSAR | A-5593 | Bearing for pivot, front, for steering connecting rod (2 used) | 9202 | .65 |
| TOSAR | A-5594 | Bearing for pivot, rear, for steering connecting rod (2 used) | 9200 | .70 |
| ZOSAR | A-5595 | Plug in either end of connecting rod | 9203 | .40 |
| BUSAR | A-5596 | Cotter pin for plug in tube, per doz. .25 | 15183 | .05 |
| CUSAR | A-5597 | Spring for either end of connecting rod | 9199 | .10 |
| DUSAR | A-5598 | Disc for spring seat in connecting rod | 9201 | .05 |
| FUSAR | A-5599 | Grease cup for rod | 17054 | .50 |
| KUSAR | A-5600 | Elbow for grease cup | B-600 | .15 |
| LUSAR | A-5601 | Leather boot on front end of connecting rod joint, LEFT steering | 30464 | .50 |
| MUSAR | A-5602 | Leather boot on rear end of connecting rod joint, LEFT steering | 30465 | .50 |
| PUSAR | A-5603 | Leather boot on front end of connecting rod joint, RIGHT steering | 30466 | .50 |
| SUSAR | A-5604 | Leather boot for rear end of connecting rod joint, RIGHT steering | 30467 | .50 |
| ZUSAR | A-5605 | Lace for leather boots | 19185 | .05 |

## HOUSING FOR STEERING WORM AND SECTOR

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BATAR | A-5626 | Housing for steering worm and sector (P-2) (R-2) LEFT steering | 41946 | 12.50 |
| CATAR | A-5627 | Housing for steering worm and sector (M) (A) and (CC) except (V-1) (V-2) (SB-1) (SB-2), LEFT steering | 41947 | 12.50 |
| FATAR | A-5628 | Housing for steering worm and sector (S) (7-P) (P-1) (R-1) (V-1) (V-2) (SB-1) (SB-2) LEFT steering | 41948 | 12.50 |
| LATAR | A-5630 | Housing for steering worm and sector (P-2) (R-2), RIGHT steering | 41950 | 12.50 |
| PATAR | A-5631 | Housing for steering worm and sector (M) (A) and (CC) except (V-1) (V-2) (SB-1) (SB-2), RIGHT steering | 41951 | 12.50 |
| SATAR | A-5632 | Housing for steering worm and sector (7-P) (P-1) (R-1) (V-1) (V-2) (SB-1) (SB-2) (S), RIGHT steering | 37426 | 12.50 |
| ZATAR | A-5633 | Cover for housing | 18100 | 1.75 |
| BETAR | A-5634 | Gasket for housing cover | 19959 | .10 |
| CETAR | A-5635 | Screw, 1" long, cover to housing, per doz. .25 | 10006 | .05 |
| DETAR | A-5636 | Screw, ¾" long, cover to housing (4 used) | 10004 | .05 |
| FETAR | A-5637 | Lock washer, per doz. .25 | 11315 | .05 |
| KETAR | A-5638 | Clamp screw in housing for tube | 10035 | .15 |
| LETAR | A-5639 | Nut | 10893 | .05 |
| METAR | A-5640 | Lock washer, per doz. .25 | 11316 | .05 |
| PETAR | A-5641 | ⅜" pipe plug in housing | 3466 | .08 |
| RETAR | A-5642 | ⅛" pipe plug in housing | 3467 | .05 |
| SETAR | A-5643 | Screw, housing to side bar | 37035 | .05 |
| TETAR | A-5644 | Nut | 10893 | .05 |
| ZETAR | A-5645 | Lock washer, per doz. .25 | 11316 | .05 |

## HORN SWITCH ON STEERING GEAR

| | | | | |
|---|---|---|---|---|
| MITAR | A-5655 | Button with stud, spring and bushing for horn switch | 33900-K | .70 |
| PITAR | A-5656 | Button only for horn switch | 33890-K | .25 |
| RITAR | A-5657 | Set screw in spark lever, retaining horn switch button, per doz. .25 | 37436 | .05 |
| SITAR | A-5658 | Spring for horn switch button | 33895-K | .15 |
| TITAR | A-5659 | Stud with contact point for horn button | 33899-K | .10 |
| ZITAR | A-5660 | Lock washer, per doz. .25 | 23021-K | .05 |
| BOTAR | A-5661 | Brass bushing on stud for horn button | 33898-K | .20 |
| COTAR | A-5662 | Brass contact for wire to horn button | 38497 | .10 |
| DOTAR | A-5663 | Bakelite bushing for wire to horn button | 38498 | .30 |
| FOTAR | A-5664 | Bakelite bushing between brass bushing and contact for horn wire | 51146 | .25 |

## SPARK AND THROTTLE CONTROL ON STEERING GEAR

| | | | | |
|---|---|---|---|---|
| CUTAR | A-5672 | Staff with bushings for spark and throttle control segment (OC) (V-1) (V-2) (SB-1) (SB-2) (S) | 21743 | 1.50 |
| FUTAR | A-5673 | Staff with bushings for spark and throttle control segment (M) (A) (CC) except (V-1) (V-2) (SB-1) (SB-2) | 23553 | 1.50 |
| LUTAR | A-5674 | Bushing in staff for spark and throttle control segment | H-827 | .15 |
| MUTAR | A-5675 | Segment arm on staff for spark and throttle control | 16422 | 2.00 |
| PUTAR | A-5676 | Taper pin, segment arm on staff, per doz. .25 | 11274 | .05 |
| RUTAR | A-5677 | Controller segment for spark and throttle levers | 39084 | 1.75 |
| SUTAR | A-5678 | Screw, controller segment to arm | H-870 | .08 |
| TUTAR | A-5684 | Throttle tube with bushings (OC) (V-1) (V-2) (SB-1) (SB-2) (S) | 21742 | 1.70 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAZAR | A-5685 | Throttle tube with bushings (M) (A) (CC) except (V-1) (V-2) (SB-1) (SB-2) | 23552 | 1.70 |
| DAZAR | A-5686 | Bushing for throttle tube | 7580 | .05 |
| FAZAR | A-5687 | Lever on steering gear for throttle control | 16423 | 1.00 |
| KAZAR | A-5690 | Lever on steering gear for spark control tube | 37467 | 1.00 |
| LAZAR | A-5691 | Clamp screw for throttle lever | 12816 | .05 |
| MAZAR | A-5693 | Pin, anchoring spark lever, per doz. .25 | 34603 | .05 |
| PAZAR | A-5694 | Plunger for spark and throttle lever | 7570 | .15 |
| RAZAR | A-5695 | Spring for plunger | 6161 | .05 |
| SAZAR | A-5703 | Spark control tube (OC) (V-1) (V-2) (SB-1) (SB-2) (S) (one end notched) | 37442 | 1.15 |
| TAZAR | A-5704 | Spark control tube (M) (A) (CC) except (SB-1) (SB-2) (V-1) (V-2) (one end notched) | 37443 | 1.15 |
| CAZAR | A-5704B | Spark control tube (both ends notched) (CC) (SB-1) (SB-2) (B-2) (V-1) (V-2) | 38511 | 1.25 |
| ZAZAR | A-5704C | Spark control tube (both ends notched) (M) (A) and all (CC) except (SB-1) (SB-2) (B-2) (V-1) (V-2) | 38512 | 1.25 |
| BEZAR | A-5705 | Collar on upper end of spark control tube with plain hole | 37447 | .10 |
| XAZAR | A-5705B | Collar on upper end of spark control tube (notched hole) | 38510 | .15 |
| CEZAR | A-5706 | Pin, anchoring collar on tube, per doz. .25 | 32793 | .05 |
| DEZAR | A-5707 | Stud for spark and throttle control gears | 19071 | .20 |
| FEZAR | A-5708 | Taper pin for stud, per doz. .25 | 15014 | .05 |
| KEZAR | A-5709 | Gear for spark control, LEFT steering | 37310 | 1.15 |
| LEZAR | A-5710 | Gear for throttle control, LEFT steering | 37308 | .95 |
| MEZAR | A-5711 | Gear for spark control, RIGHT steering | 37302 | 1.15 |
| PEZAR | A-5712 | Gear for throttle control, RIGHT steering | 37309 | .95 |
| REZAR | A-5713 | Pinion on lower end of throttle control tube | 37306 | .70 |
| SEZAR | A-5714 | Pinion on lower end of spark control tube | 37307 | .80 |
| TEZAR | A-5715 | Clamp screw for spark and throttle pinions | 13584 | .05 |
| ZEZAR | A-5716 | Lock washer, per doz. .25 | 11314 | .05 |
| BIZAR | A-5717 | Thrust washer for throttle control pinion | 38201 | .05 |

## HOODS AND HOOD PANELS

**NOTE: Specify engine number when ordering hoods or hood parts that we may supply parts painted the proper color.**

| | | | | |
|---|---|---|---|---|
| LIZAR | A-5727 | Hood complete (OC) | 24421 | 42.50 |
| MIZAR | A-5728 | Hood complete (CC) | 24421 | 42.50 |

**NOTE: The following panels are for hoods having a bead around outer edge and nine louvres in each side panel.**

| | | | | |
|---|---|---|---|---|
| BOZAR | A-5744 | Top panel, RIGHT, with one half of each hinge | 41740 | 10.50 |
| COZAR | A-5745 | Top panel, LEFT, with one-half of each hinge | 41741 | 10.50 |
| DOZAR | A-5746 | Side panel, RIGHT, with hood handle, hooks and one-half of side hinge | 24272 | 12.00 |
| KOZAR | A-5747 | Side panel, LEFT, with hood handle, hooks and one-half of side hinge | 24273 | 12.00 |

**NOTE: The following panels are for hoods having nine or twenty-five louvres in each side panel but without bead.**

| | | | | |
|---|---|---|---|---|
| ZOZAR | A-5748 | Top panel, RIGHT, with one-half of each hinge | 41742 | 14.00 |
| BUZAR | A-5749 | Top panel, LEFT, with one half of each hinge | 41743 | 14.00 |
| CUZAR | A-5750 | Side panel, RIGHT, with hood handle, hooks and one-half of side hinge (9 louvres) | 41738 | .1200 |
| FUZAR | A-5751 | Side panel, LEFT, with hood handle, hooks and one-half of side hinge (9 louvres) | 41739 | 12.00 |
| LUZAR | A-5752 | Side panel, RIGHT, with hood handle, hooks and one-half of side hinge (25 louvres) | 41736 | 12.00 |
| PUZAR | A-5753 | Side panel, LEFT, with hood handle, hooks and one-half of side hinge (25 louvres) | 41737 | 12.00 |
| SUZAR | A-5760 | Top hinge for hood (2 used) | 37635 | 1.60 |
| TUZAR | A-5764 | Side hinge for hood (4 used) on hood with 9 louvres | 37637 | 1.20 |
| ZUZAR | A-5765 | Side hinge for hood (4 used) on hood with 25 louvres | 38215 | 1.20 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BABAS | A-5768 | Rod for top hinge | 37636 | .25 |
| CABAS | A-5771 | Rod for either side hinge | 37638 | .15 |
| DABAS | A-5772 | Rivet ¼ in. (countersunk head), side hinge to top panel, per doz. | 17710 | .10 |
| FABAS | A-5773 | Rivet $\frac{4}{16}$ in. (countersunk head), hinge to side panel, per doz. | 17712 | .10 |
| KABAS | A-5774 | Rivet $\frac{4}{16}$ in. (round head), side hinge to top panel (8 used), late type hood, per doz | 17717 | .10 |
| MABAS | A-5775 | Rivet $\frac{4}{16}$ in. (flat head), top hinge to panel (8 used), per doz | 17715 | .10 |
| PABAS | A-5776 | Rivet ¼ in. (flat head), top hinge to panel (26 used), per doz | 17713 | .10 |
| RABAS | A-5777 | Handle for hood | 18420 | .50 |
| SABAS | A-5778 | Reinforcement for hood handle | 18419 | .05 |
| TABAS | A-5780 | Hook on hood for hood pull | 30981 | .65 |
| ZABAS | A-5781 | Rivet, hook and handle to hood, per doz. .25 | 8891 | .05 |

## HOOD PULL

| | | | | |
|---|---|---|---|---|
| BEBAS | A-5788 | Hood pull handle, complete | 21330 | 2.30 |
| CEBAS | A-5793 | Flange for hood pull, front | 30979 | .35 |
| DEBAS | A-5796 | Flange for hood pull, rear | 32429 | .35 |
| FEBAS | A-5798 | Screw, hood pull to flange | 11549 | .05 |
| KEBAS | A-5800 | Lock washer, per doz. .25 | 11314 | .05 |

## HOOD SHELVES

| | | | | |
|---|---|---|---|---|
| ZEBAS | A-5814 | Hood shelf, RIGHT, less head lamp wire | 22181 | 2.25 |
| BIBAS | A-5817 | Hood shelf, LEFT, less head lamp wire | 22182 | 2.25 |
| CIBAS | A-5819 | Screw, hood shelf to frame | 32451 | .10 |
| DIBAS | A-5821 | Lock washer, per doz. .25 | 11315 | .05 |
| FIBAS | A-5825 | Spacer for hood shelf | 32450 | .08 |
| KIBAS | A-5828 | Anti-squeak between splash shield and hood shelf | 34476 | .10 |
| LIBAS | A-5829 | Anti-squeak between side bar, dust shield and hood shelf | 34418 | .15 |
| MIBAS | A-5830 | Anti-squeak between hood shelf and front fender apron | 34395 | .15 |
| PIBAS | A-5833 | Anti-squeak or webbing on cowl for hood, all except (P-2) (R-2) | 37441 | .25 |
| RIBAS | A-5834 | Anti-squeak or webbing on cowl for hood (P-2) (R-2) | 37785 | .40 |
| SIBAS | A-5835 | Rivet, lace or anti-squeak to cowl (CC), per doz | 17706 | .10 |
| TIBAS | A-5836 | Rivet, anti-squeak to splash shield, per doz | 39974 | .10 |
| ZIBAS | A-5837 | Rivet, anti-squeak to dust shield, per doz. .25 | 17755 | .05 |
| BOBAS | A-5838 | Cap for rivet, per doz. .25 | 17756 | .05 |
| COBAS | A-5840 | Clip for anti-squeak on cowl, per doz. .25 | 38112 | .05 |
| DOBAS | A-5841 | Screw, clip and anti-squeak to cowl (OC), per doz. .25 | 11987 | .05 |
| FOBAS | A-5847 | Bracket on cowl for hood hinge rod | 37207 | .50 |
| KOBAS | A-5848 | Rivet (⅜" round head) to attach bracket, per doz. .25 | 17605 | .05 |

## FENDERS

| | | | | |
|---|---|---|---|---|
| ZOBAS | A-5865 | Front fender, RIGHT | 23871 | 36.00 |
| BUBAS | A-5866 | Front fender, LEFT | 23872 | 36.00 |
| CUBAS | A-5944 | Rear fender, RIGHT (7-P) (S) (M) (A) | 23863 | 18.00 |
| DUBAS | A-5945 | Rear fender, LEFT (7-P) (S) (M) (A) | 23864 | 18.00 |
| FUBAS | A-5946 | Rear fender, RIGHT (P-1) | 23875 | 18.00 |
| KUBAS | A-5947 | Rear fender, LEFT (P-1) | 23876 | 18.00 |
| LUBAS | A-5948 | Rear fender, RIGHT (P-2) | 24425 | 20.00 |
| MUBAS | A-5949 | Rear fender, LEFT (P-2) | 24426 | 20.00 |
| PUBAS | A-5950 | Rear fender, RIGHT (R-1) (R-2) (V-1), LEFT steering | 23996 | 31.75 |
| RUBAS | A-5951 | Rear fender, LEFT (R-1) (R-2) (V-1), LEFT steering | 23997 | 31.75 |
| SUBAS | A-5952 | Rear fender, RIGHT (R-1) (R-2) (V-1), RIGHT steering | 24414 | 31.75 |
| TUBAS | A-5953 | Rear fender, LEFT (R-1) (R-2) (V-1), RIGHT steering | 25971 | 31.75 |
| ZUBAS | A-5954 | Rear fender, RIGHT (V-2) | 25354 | 22.50 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADAS | A-5955 | Rear fender, LEFT (V-2) | 25355 | 22.50 |
| CADAS | A-5956 | Rear fender, RIGHT (B-1) | 23879 | 20.00 |
| DADAS | A-5957 | Rear fender, LEFT (B-1) | 23880 | 20.00 |
| FADAS | A-5958 | Rear fender, RIGHT (B-2) | 25362 | 20.00 |
| KADAS | A-5959 | Rear fender, LEFT (B-2) | 25363 | 20.00 |
| LADAS | A-5960 | Rear fender, RIGHT (L) (I) (LD) (7-B) | 23883 | 18.00 |
| MADAS | A-5961 | Rear fender, LEFT (L) (I) (LD) (7-B) | 23884 | 18.00 |
| PADAS | A-5962 | Rear fender, RIGHT (TL) (TLD) | 24137 | 18.00 |
| RADAS | A-5963 | Rear fender, LEFT (TL) (TLD) | 24138 | 18.00 |
| SADAS | A-5964 | Rear fender, RIGHT (SB-1) | 24471 | 18.00 |
| TADAS | A-5965 | Rear fender, LEFT (SB-1) | 24472 | 18.00 |
| ZADAS | A-5966 | Rear fender, RIGHT (SB-2) | 25360 | 20.00 |
| BEDAS | A-5967 | Rear fender, LEFT (SB-2) | 25361 | 20.00 |
| CEDAS | A-5968 | Rear fender, RIGHT (hearse, ambulance and patrol) | 24259 | 20.00 |
| DEDAS | A-5969 | Rear fender, LEFT (hearse, ambulance and patrol) | 24260 | 20.00 |

## CORNER SHIELDS FOR REAR FENDERS

| | | | | |
|---|---|---|---|---|
| FEDAS | A-5997 | Shield, RIGHT, between rear fender and body (7-P) (S) (M) (A) | 24077 | 1.50 |
| KEDAS | A-5998 | Shield, LEFT, between rear fender and body (7-P) (S) (M) (A) | 24078 | 1.50 |
| LEDAS | A-5999 | Shield, RIGHT, between rear fender and body (P-1) | 24079 | 3.00 |
| MEDAS | A-6000 | Shield, LEFT, between rear fender and body (P-1) | 24080 | 3.00 |
| PEDAS | A-6001 | Shield, RIGHT, between rear fender and body (P-2) | 24391 | 3.50 |
| REDAS | A-6002 | Shield, LEFT, between rear fender and body (P-2) | 24392 | 3.50 |
| SEDAS | A-6003 | Shield, RIGHT, between rear fender and body (B-1) | 24083 | 3.40 |
| TEDAS | A-6004 | Shield, LEFT, between rear fender and body (B-1) | 24084 | 3.40 |
| ZEDAS | A-6005 | Shield, RIGHT, between rear fender and body (B-2) | 25366 | 2.50 |
| BIDAS | A-6006 | Shield, LEFT, between rear fender and body (B-2) | 25367 | 2.50 |
| CIDAS | A-6007 | Shield, RIGHT, between rear fender and body (L) (I) (LD) (7-B) | 24081 | 3.40 |
| FIDAS | A-6008 | Shield, LEFT, between rear fender and body (L) (I) (LD) (7-B) | 24082 | 3.40 |
| KIDAS | A-6009 | Shield, RIGHT, between rear fender and body (TL) (TLD) | 24252 | 2.80 |
| LIDAS | A-6010 | Shield, LEFT, between rear fender and body (TL) (TLD) | 24253 | 2.80 |
| MIDAS | A-6011 | Shield, RIGHT, between rear fender and body (SB-1) | 24479 | 2.50 |
| PIDAS | A-6012 | Shield, LEFT, between rear fender and body (SB-1) | 24480 | 2.50 |
| RIDAS | A-6013 | Shield, RIGHT, between rear fender and body (SB-2) | 25356 | 2.50 |
| SIDAS | A-6014 | Shield, LEFT, between rear fender and body (SB-2) | 25357 | 2.50 |
| TIDAS | A-6015 | Shield, RIGHT, between rear fender and body (V-2) | 25351 | 2.50 |
| ZIDAS | A-6016 | Shield, LEFT, between rear fender and body (V-2) | 25349 | 2.50 |

## ATTACHMENTS FOR FENDERS AND FENDER SHIELDS

| | | | | |
|---|---|---|---|---|
| PODAS | A-6020 | Nut for fender iron | 6773 | .10 |
| RODAS | A-6021 | Lock washer, per doz. .25 | 11316 | .05 |
| SODAS | A-6044 | Screw (¾" long), front fender to running board | 10022 | .05 |
| TODAS | A-6045 | Screw (¾" long), rear fender to running board | 8733 | .10 |
| ZODAS | A-6046 | Lock washer, per doz. .25 | 11316 | .05 |
| BUDAS | A-6047 | Screw (¾" long), corner shield to fender, all except (R-1) (R-2) (V-1) | 11615 | .05 |
| DUDAS | A-6048 | Nut | 11653 | .05 |
| FUDAS | A-6049 | Flat washer, per doz. .25 | 11478 | .05 |
| KUDAS | A-6050 | Lock washer, per doz. .25 | 11314 | .05 |
| LUDAS | A-6051 | Screw (¾" long), corner shield to body (CC) except (V-1) | 8733 | .10 |
| MUDAS | A-6052 | Flat washer large, per doz. .25 | R-4-347 | .05 |
| PUDAS | A-6053 | Screw (¾" long), corner shield to body (7-P) (P-1) (P-2) | 11981 | .10 |
| RUDAS | A-6054 | Flat washer, per doz. .25 | H-1675 | .05 |
| SUDAS | A-6055 | Lock washer, per doz. .25 | 11315 | .05 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAFAS | A-6056 | Screw (1" long), rear fender to body (R-1) (R-2) (V-1) (V-2) (B-1) (B-2) (TL) (TLD) (SB-1) (SB-2) | 11602 | .10 |
| DAFAS | A-6057 | Screw (¾" long), rear fender to body (I) (L) (LD) (7-B) | 8733 | .10 |
| FAFAS | A-6058 | Lock washer on screws, per doz. .25 | 11316 | .05 |
| KAFAS | A-6059 | Screw (1" long), rear fender to body (7-P) (P-1) (P-2) | 11982 | .10 |
| LAFAS | A-6060 | Lock washer, per doz. .25 | 11315 | .05 |
| MAFAS | A-6062 | Special lock washer on screws, rear fender to body, per doz. .25 | 11531 | .05 |
| PAFAS | A-6063 | Screw (¾" long, flat head), fender to dust shield, per doz. .25 | 10796 | .05 |
| RAFAS | A-6064 | Screw (¾" long, fillister head), fender to dust shield | 11615 | .05 |
| SAFAS | A-6065 | Screw (1" long, fillister head), fender to dust shield | 11874 | .05 |
| TAFAS | A-6066 | Nut | 11653 | .05 |
| ZAFAS | A-6067 | Lock washer, per doz. .25 | 11314 | .05 |
| BEFAS | A-6068 | Flat washer, per doz. .25 | 11442 | .05 |

## ANTI-SQUEAK FOR FENDERS, CORNER SHIELDS, DUST SHIELDS AND RUNNING BOARDS

| | | | | |
|---|---|---|---|---|
| FEFAS | A-6084 | Anti-squeak, front fender to hood shelf | 34395 | .15 |
| KEFAS | A-6085 | Anti-squeak, front fender to frame | 32855 | .35 |
| LEFAS | A-6086 | Anti-squeak, front fender to dust shield | 39586 | .10 |
| MEFAS | A-6089 | Anti-squeak, rear fender to body (R-1) (R-2) (V-1) | 33555 | .25 |
| PEFAS | A-6100 | Anti-squeak, rear fender to dust shield all except (R-1) (R-2) (V-1) (SB-2) | 33552 | .05 |
| SEFAS | A-6101 | Anti-squeak, rear fender to dust shield (R-1) (R-2) (V-1) | 32839 | .10 |
| TEFAS | A-6102 | Anti-squeak, rear fender to body (7-P) | 37713 | .25 |
| ZEFAS | A-6103 | Anti-squeak, rear fender to body (P-1) | 37725 | .20 |
| BIFAS | A-6104 | Anti-squeak, rear fender to body (P-2) | 38179 | .20 |
| CIFAS | A-6105 | Anti-squeak, rear fender to body (B-1) | 37899 | .25 |
| DIFAS | A-6106 | Anti-squeak, rear fender to body (B-2) | 38710 | .30 |
| FIFAS | A-6107 | Anti-squeak, rear fender to body (L) (LD) (I) (7-B) | 37901 | .35 |
| KIFAS | A-6108 | Anti-squeak, rear fender to body (V-2) | 38718 | .40 |
| LIFAS | A-6109 | Anti-squeak, rear fender to body (SB-1) | 38289 | .30 |
| MIFAS | A-6110 | Anti-squeak, rear fender to body (SB-2) | 38724 | .30 |
| PIFAS | A-6111 | Anti-squeak, rear fender to body (TL) (TLD) | 38068 | .20 |
| RIFAS | A-6112 | Anti-squeak, corner shield to body (7-P) | 37714 | .05 |
| SIFAS | A-6113 | Anti-squeak, corner shield to body (P-1) | 37726 | .05 |
| TIFAS | A-6114 | Anti-squeak, corner shield to body (P-2) | 38180 | .10 |
| ZIFAS | A-6115 | Anti-squeak, corner shield to body, RIGHT, (B-1) | 38009 | .10 |
| BOFAS | A-6116 | Anti-squeak, corner shield to body, LEFT, (B-1) | 38010 | .10 |
| COFAS | A-6117 | Anti-squeak, corner shield to body (B-2) | 38728 | .10 |
| DOFAS | A-6118 | Anti-squeak, corner shield to body (L) (I) (LD) (7-B) | 38011 | .05 |
| FOFAS | A-6119 | Anti-squeak, corner shield to body (TL) (TLD) | 68428 | .05 |
| KOFAS | A-6120 | Anti-squeak, corner shield to body (SB-1) | 38297 | .10 |
| LOFAS | A-6121 | Anti-squeak, corner shield to body (SB-2) | 38719 | .05 |
| MOFAS | A-6122 | Anti-squeak, corner shield to body (V-2) | 38720 | .05 |
| POFAS | A-6123 | Anti-squeak, rear fender to corner shield (7-P) | 37715 | .05 |
| ROFAS | A-6124 | Anti-squeak, rear fender to corner shield (P-1) | 37724 | .05 |
| SOFAS | A-6125 | Anti-squeak, rear fender to corner shield (P-2) | 38178 | .05 |
| TOFAS | A-6126 | Anti-squeak, rear fender to corner shield (B-1) (V-2) | 38012 | .10 |
| ZOFAS | A-6127 | Anti-squeak, rear fender to corner shield (B-2) | 38711 | .05 |
| BUFAS | A-6128 | Anti-squeak, rear fender to corner shield (L) (I) (LD) (7-B) | 38013 | .05 |
| CUFAS | A-6129 | Anti-squeak, rear fender to corner shield (SB-1) | 38298 | .05 |
| DUFAS | A-6130 | Anti-squeak, rear fender to corner shield (SB-2) | 38725 | .05 |
| FUFAS | A-6131 | Anti-squeak, rear fender to corner shield (TL) (TLD) | 38069 | .05 |
| KUFAS | A-6135 | Anti-squeak, dust shield to running board (7-P) (P-1) (P-2) (B-1) (B-2) (V-2) (S) | 32789 | .35 |
| MUFAS | A-6136 | Anti-squeak, dust shield to running board (R-1) (R-2) (V-1) | 33078 | .10 |
| PUFAS | A-6137 | Anti-squeak, dust shield to running board (G) | 33084 | .30 |
| RUFAS | A-6138 | Anti-squeak, dust shield to running board (H) | 33090 | .35 |
| SUFAS | A-6140 | Anti-squeak, hood shelf to dust shield to frame | 34418 | .15 |



## DUST SHIELDS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| | | **NOTE: Dust shields as listed do not include Tool Box, Battery Box or Covers.** | | |
| FAGAS | A-6170 | Dust shield only, RIGHT (7-P) (B-1) (P-1) (S) (used with tool box in dust shield) | 23777 | 17.50 |
| LAGAS | A-6171 | Dust shield with reinforcement, RIGHT (7-P) (B-1) (B-2) (V-2) (P-2) (S) (used when tool box is under front cushion) | 24441 | 16.75 |
| PAGAS | A-6172 | Dust shield only, LEFT (7-P) (P-1) (P-2) (B-1) (B-2) (V-2) (S) | 23778 | 17.50 |
| RAGAS | A-6173 | Dust shield only, RIGHT (R-1) (V-1) (used with tool box in dust shield) | 23779 | 16.00 |
| TAGAS | A-6174 | Dust shield with reinforcements, RIGHT (R-2) (V-1) (used when tool box is under front cushion) | 24442 | 15.00 |
| BEGAS | A-6175 | Dust shield only, LEFT (R-1) (R-2) (V-1) | 23780 | 16.00 |
| CEGAS | A-6176 | Dust shield only, RIGHT (G) (used with tool box in dust shield). | 23781 | 18.50 |
| DEGAS | A-6177 | Dust shield with reinforcements, RIGHT (G) (used when tool box is under front cushion) | 24443 | 17.25 |
| KEGAS | A-6178 | Dust shield only, LEFT (G) | 23782 | 17.50 |
| LEGAS | A-6179 | Dust shield only, RIGHT (H) (used with tool box in dust shield). | 23783 | 19.50 |
| MEGAS | A-6180 | Dust shield with reinforcements, RIGHT (H) (used when tool box is under front cushion) | 24444 | 18.10 |
| REGAS | A-6181 | Dust shield only, LEFT (H) | 23784 | 19.50 |
| SEGAS | A-6185 | Cover with hinge for hand hole in dust shield, RIGHT | 22296 | .55 |
| TEGAS | A-6186 | Cover with hinge for hand hole in dust shield, LEFT | 22757 | .55 |
| ZEGAS | A-6189 | Hinge pin for hand hole cover | 32845 | .05 |
| BIGAS | A-6190 | Locking clip for hand hole cover to dust shield | 34806 | .05 |
| CIGAS | A-6191 | Bolt for locking clip on hand hole cover | 34805 | .08 |
| DIGAS | A-6192 | Flat washer, per doz. .25 | 13685 | .05 |
| FIGAS | A-6193 | Lock washer, per doz. .25 | 11304 | .05 |
| KIGAS | A-6194 | Nut, per doz. .25 | 10887 | .05 |
| LIGAS | A-6195 | Screw, dust shield to frame (not used with tool box in dust shield). | 10795 | .05 |
| MIGAS | A-6196 | Nut | 11653 | .05 |
| PIGAS | A-6197 | Flat washer, per doz. .25 | 11454 | .05 |
| RIGAS | A-6198 | Lock washer, per doz. .25 | 11314 | .05 |

## TOOL BOX IN DUST SHIELD

| | | | | |
|---|---|---|---|---|
| FOGAS | A-6203 | Tool box complete less cover in RIGHT dust shield | 22155 | 5.25 |
| KOGAS | A-6206 | Cover complete less locks for tool box in dust shield | 22154 | 5.00 |
| LOGAS | A-6209 | Sargent lock for tool box less keys (specify lock number when ordering lock or key) | 37579 | 2.50 |
| POGAS | A-6213 | Hinge pin for tool box cover, per doz. .25 | 19211 | .05 |
| ROGAS | A-6214 | Screw, tool box to support, per doz. .25 | 11614 | .05 |
| SOGAS | A-6216 | Gasket for tool box support, rear end on 51-3, front and rear on 55-7 | 19201 | .05 |
| ZOGAS | A-6217 | Nut on screw attaching tool box ends | 11653 | .05 |
| BUGAS | A-6218 | Lock washer, per doz. .25 | 11314 | .05 |
| CUGAS | A-6219 | Packing for top of tool box | 19296 | .10 |
| DUGAS | A-6220 | Screw, tool box ends to water shield, per doz. .25 | 11599 | .05 |
| FUGAS | A-6221 | Lock washer, per doz. .25 | 11314 | .05 |
| KUGAS | A-6222 | Screw, tool box and condenser to frame (STANDARD TREAD). | 11967 | .05 |
| LUGAS | A-6225 | Felt washer on screw | 31205 | .05 |
| MUGAS | A-6227 | Flat washer, per doz. .25 | 31206 | .05 |
| PUGAS | A-6228 | Nut on screw | 10893 | .05 |
| RUGAS | A-6229 | Lock washer, per doz. .25 | 11316 | .05 |
| SUGAS | A-6230 | Screw, tool box to dust shield | 10795 | .05 |
| TUGAS | A-6231 | Flat washer, per doz. .25 | 11454 | .05 |
| ZUGAS | A-6232 | Nut | 11653 | .05 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAHAS | A-6233 | Lock washer, per doz. .25 | 11314 | .05 |
| CAHAS | A-6234 | Bracket, tool box to running board | 19204 | .10 |

## TOOL COMPARTMENT UNDER FRONT SEAT

| | | | | |
|---|---|---|---|---|
| DAHAS | A-6238 | Lid and retainer for tool compartment under front cushion (7-P). | 25026 | 1.45 |
| FAHAS | A-6239 | Lid and retainer for tool compartment under front cushion (P-2) (R-2) | 25027 | 2.25 |
| KAHAS | A-6240 | Retainer for tool compartment lid (7-P) (P-2) (R-2) | 68386 | .30 |
| LAHAS | A-6241 | Lid for tool compartment under front cushions (B-1) (B-2) | 24104-F | 1.50 |
| MAHAS | A-6242 | Lid for tool compartment under driver's cushion (V-1) (V-2) | 25407-F | 1.25 |
| PAHAS | A-6243 | Lid for tool compartment under front cushion (I) (L) (LD) (7-B) | 24171-F | 2.00 |
| RAHAS | A-6244 | Lid for tool compartment under front cushion (TL) (TLD) | 25004-F | 2.00 |
| SAHAS | A-6245 | Lid for tool compartment under front cushion (SB-1) (SB-2) | 24162-F | 2.00 |
| TAHAS | A-6246 | Sargent lock for tool compartment lid under cushion (specify lock number when ordering lock or key) | 38339 | 2.50 |

## BATTERY BOX

| | | | | |
|---|---|---|---|---|
| MEHAS | A-6251 | Battery box complete less cover | 22251 | 5.35 |
| PEHAS | A-6254 | Cover for battery box, less slotted nuts | 22282 | 4.25 |
| REHAS | A-6256 | Special bolt for battery box cover | 32818 | .40 |
| SEHAS | A-6258 | Nut or bracket on battery box for slotted nuts | 32817 | .35 |
| TEHAS | A-6260 | Screw, battery box to support on dust shield | 11613 | .03 |
| ZEHAS | A-6261 | Flat head screw, battery box to dust shield, per doz. .25 | 10794 | .05 |
| BIHAS | A-6262 | Nut | 11653 | .05 |
| CIHAS | A-6263 | Lock washer, per doz. .25 | 11314 | .05 |
| DIHAS | A-6264 | Screw, 3/8" long, battery box to frame | 10023 | .05 |
| FIHAS | A-6265 | Screw, 1 1/4" long, battery box to frame | 10026 | .10 |
| KIHAS | A-6267 | Nut for screws | 10893 | .05 |
| LIHAS | A-6268 | Lock washer, per doz. .25 | 11316 | .05 |
| MIHAS | A-6269 | Flat washer, per doz. .25 | R-4-347 | .05 |
| PIHAS | A-6270 | Stay or hold down bolt for battery | 19183 | .15 |
| RIHAS | A-6271 | Nut for battery hold down bolt | 19181 | .15 |
| SIHAS | A-6272 | Hold down clamp for battery | 19184 | .20 |
| TIHAS | A-6273 | Lock washer for hold down clamp and nut, per doz. .25 | 11315 | .05 |
| ZIHAS | A-6274 | Stop, locating battery box | 18905 | .10 |
| BOHAS | A-6275 | Locating angles for battery box | 16698 | .05 |

## SPLASH SHIELDS

| | | | | |
|---|---|---|---|---|
| POHAS | A-6280 | Splash shield between front fenders | 23484 | 11.75 |
| ROHAS | A-6283 | Cap for starting crank hole in splash shield | 38070 | 1.10 |
| SOHAS | A-6296 | Splash shield complete under radiator and engine | 23971 | 14.75 |
| TOHAS | A-6309 | Screw, splash shield to hood shelf | 32451 | .10 |
| ZOHAS | A-6310 | Lock washer, per doz. .25 | 11315 | .05 |
| BUHAS | A-6311 | Clamp, splash shield to cross member | 37095 | .20 |
| CUHAS | A-6312 | Rivet, clamp to splash shield, per doz. .25 | 17675 | .05 |
| DUHAS | A-6313 | Screw for clamp, mud pan to cross member | 11612 | .05 |
| FUHAS | A-6314 | Lock washer, per doz. .25 | 11315 | .05 |
| KUHAS | A-6315 | Plate supporting splash shield, front, RIGHT | 37890 | .30 |
| LUHAS | A-6316 | Plate supporting splash shield, front, LEFT | 37891 | .30 |
| MUHAS | A-6317 | Plate supporting splash shield, rear, RIGHT | 37892 | .30 |
| PUHAS | A-6318 | Plate supporting splash shield, rear, LEFT | 37893 | .30 |
| RUHAS | A-6319 | Screw, support plates to side bar | 11641 | .05 |
| SUHAS | A-6320 | Nut | 11673 | .10 |
| TUHAS | A-6421 | Lock washer, per doz. .25 | 11315 | .05 |
| ZUHAS | A-6322 | Pull handle for mud pan | 37888 | .20 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAKAS | A-6323 | Spring on pull handle | 37887 | .05 |
| CAKAS | A-6324 | Nut on pull handle | 38027 | .10 |
| DAKAS | A-6325 | Cotter pin retaining nut, per doz. .25 | 15154 | .05 |
| FAKAS | A-6326 | Anti-squeak, front support plate to side bar | 38014 | .10 |
| KAKAS | A-6327 | Anti-squeak, rear support plate to side bar | 38022 | .08 |
| LAKAS | A-6328 | Anti-squeak, front side of mud pan | 38020 | .05 |
| MAKAS | A-6329 | Anti-squeak, center side of mud pan | 38021 | .05 |
| PAKAS | A-6330 | Anti-squeak, rear side of mud pan | 38023 | .08 |
| RAKAS | A-6331 | Rivet, to fasten anti-squeaks, per doz. .25 | 17755 | .05 |
| SAKAS | A-6332 | Cap for rivet, per doz. .25 | 17756 | .05 |

## RUNNING BOARDS

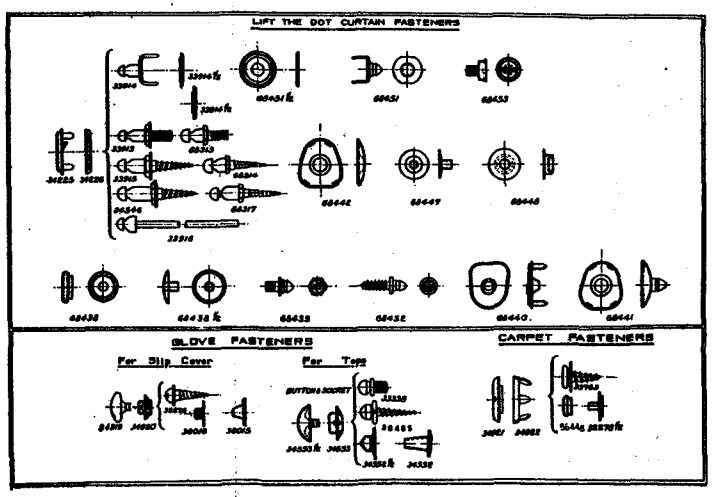
| | | | | |
|---|---|---|---|---|
| CEKAS | A-6356 | Running board complete, RIGHT (R-1) (R-2) (V-1) | 24115 | 11.00 |
| DEKAS | A-6357 | Running board complete, LEFT (R-1) (R-2) (V-1) | 24116 | 11.00 |
| FEKAS | A-6358 | Running board complete, RIGHT (7-P) (P-1) (P-2) (V-2) (B-1) (B-2) (S) | 24113 | 13.00 |
| LEKAS | A-6359 | Running board complete, LEFT (7-P) (P-1) (P-2) (V-2) (B-1) (B-2) (S) | 24114 | 13.00 |
| PEKAS | A-6360 | Running board complete, RIGHT (G) | 24117 | 14.50 |
| REKAS | A-6361 | Running board complete, LEFT (G) | 24118 | 14.50 |
| SEKAS | A-6362 | Running board complete, RIGHT (H) | 24119 | 16.50 |
| TEKAS | A-6363 | Running board complete, LEFT (H) | 24120 | 16.50 |

## MATS, BINDINGS AND ATTACHMENTS FOR RUNNING BOARDS

| | | | | |
|---|---|---|---|---|
| LOKAS | A-6397 | Mat for running board (G) | 51040 | 1.60 |
| MOKAS | A-6398 | Mat for running board (H) | 30397 | 1.75 |
| POKAS | A-6403 | Mat for running board (R) (R-1) (R-2) (V) (V1-) | 33079 | 1.25 |
| ROKAS | A-6406 | Mat for running board (7-P) (P-1) (P-2) (B-1) (B-2) (V-2) (S) | 37448 | 1.50 |
| DUKAS | A-6416 | Screw, binding to running board, per doz. .25 | 36779 | .05 |
| FUKAS | A-6418 | Bracket, fender to running board | 32777 | .75 |
| KUKAS | A-6421 | Bolt, fender bracket to running board, per doz. .25 | 19358 | .05 |
| LUKAS | A-6422 | Nut on bolt | 11653 | .05 |
| MUKAS | A-6423 | Lock washer, per doz. .25 | 11314 | .05 |
| PUKAS | A-6424 | Step bolt, running board to dust shield, tool box, battery box and hangers | 19297 | .05 |
| SUKAS | A-6425 | Nut on step bolt | 11733 | .05 |
| TUKAS | A-6426 | Square washer, per doz. .25 | 13184 | .05 |
| ZUKAS | A-6428 | Lock washer, per doz. .25 | 11315 | .05 |

# TOPS, TOP COVERING AND DUST HOODS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| | | **NOTE: First Type Tops for Seven Passengers or (7P) have a spring in No. 3 or Main Bow Socket. Second Type Tops do not have springs in the bow sockets.** | | |
| | | **Three Types of Tops were used on the Phaetons. The First Type Top which had a spring in No. 3 or Main Bow Socket was used exclusively on the First Type Phaetons or (P-1).** | | |
| | | **Two Types of Tops were used on the Second Type Phaetons or (P-2). Neither of these have a spring in No. 3 or Main Bow Socket. Shipment of (P-2) cars with first type tops was concluded March 31, 1919.** | | |
| | | **Three Types of Tops were used on the Roadsters.** | | |
| | | **The First Type Top was used on all First Type Roadsters or (R-1).** | | |
| | | **Two Types of Tops were used on the Second Type Roadsters or (R-2). Shipment of (R-2) cars with First Type Tops was concluded April 9, 1922.** | | |
| RALAS | A-7086 | Top complete with curtains and dust hood (7-P) 2nd type | 25116 | 185.00 |
| SALAS | A-7087 | Top complete with curtains and dust hood (P-1) | 24099 | 170.00 |
| TALAS | A-7088 | Top complete with curtains and dust hood (P-2) 1st type | 25071 | 185.00 |
| ZALAS | A-7088B | Top complete with curtains and dust hood (P-2) 2nd type | 24582 | 185.00 |
| BELAS | A-7089 | Top complete with curtains and dust hood (R-1) | 24100 | 135.00 |
| CELAS | A-7090 | Top complete with curtains and dust hood (R-2) 1st type | 24095 | 138.00 |
| DELAS | A-7090B | Top complete with curtains and dust hood (R-2) 2nd type | 24602 | 138.00 |
| FELAS | A-7091 | Wing nut, sockets to body | 11682 | .05 |
| KELAS | A-7092 | Pike lock nut for wing nut | 8667 | .10 |
| LELAS | A-7093 | Dust hood complete for top (7-P) | 24101 | 24.75 |
| MELAS | A-7094 | Dust hood complete for top (P-1) | 24102 | 24.75 |
| PELAS | A-7095 | Dust hood complete for top (P-2) | 25079 | 24.75 |
| RELAS | A-7096 | Dust hood complete for top (R-1) | 24103 | 17.50 |
| SELAS | A-7097 | Dust hood complete for top (R-2) | 25123 | 17.50 |
| TELAS | A-7098 | Grommet in dust hood for strap, per doz. .25 | 19898 | .05 |
| ZELAS | A-7099 | Washer for dust hood grommet, per doz. .25 | 11468 | .05 |
| BILAS | A-7100 | Windshield flap on top (7-P) 1st type | 24134 | 2.80 |
| CILAS | A-7101 | Windshield flap on top (7-P) 2nd type | 25114 | 2.80 |
| DILAS | A-7102 | Windshield flap on top (P-1) | 24211 | 2.80 |
| FILAS | A-7103 | Windshield flap on top (P-2) (R-2) | 25060 | 2.80 |
| KILAS | A-7104 | Windshield flap on top (R-1) | 24309 | 2.80 |
| LILAS | A-7105 | Back cone for top (7-P) 1st type | 24157 | 4.80 |




NOTE—These fasteners are not listed. Order parts by name and symbol.



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAMAS | A-7106 | Back cone for top (7-P) 2nd type | 25112 | 4.80 |
| CAMAS | A-7107 | Back cone for top (P-1) | 24214 | 4.80 |
| DAMAS | A-7108 | Back cone for top (P-2) | 25062 | 4.80 |
| FAMAS | A-7109 | Back cone for top (R-1) (R-2) | 24311 | 4.80 |
| KAMAS | A-7110 | Back stay strainer (7-P) and (P-2) 2nd type | 24136 | 1.00 |
| LAMAS | A-7111 | Back stay strainer (P-1) | 24212 | 1.00 |
| MAMAS | A-7112 | Back stay strainer (P-2) 1st type | 25056 | 1.00 |
| PAMAS | A-7113 | Back stay strainer (R-1) | 24302 | 1.00 |
| RAMAS | A-7114 | Back stay strainer (R-2) | 25091 | 1.00 |
| SAMAS | A-7115 | Anchor on body for back stay strainer | 33388 | .35 |
| TAMAS | A-7116 | Screw to attach back stay anchor | 11942 | .10 |
| ZAMAS | A-7117 | Nut, per doz. .25 | 10889 | .05 |
| BEMAS | A-7118 | Lock washer, per doz. .25 | 11314 | .05 |
| CEMAS | A-7119 | Loop for back stay strainer | 19361 | .10 |
| DEMAS | A-7120 | Reinforcement for back stay strainer loop | 33422 | .10 |
| FEMAS | A-7121 | Screw for loop on anchor | 11989 | .15 |
| KEMAS | A-7122 | Lock washer, per doz. .25 | 11348 | .05 |
| LEMAS | A-7123 | Top deck with side quarters (7-P) 1st type | 24133 | 32.75 |
| MEMAS | A-7124 | Top deck with side quarters (7-P) 2nd type | 25113 | 32.75 |
| PEMAS | A-7125 | Top deck with side quarters (P-1) | 24210 | 31.75 |
| REMAS | A-7126 | Top deck with side quarters (P-2) | 25059 | 31.75 |
| SEMAS | A-7127 | Top deck with side quarters (R-1) | 24313 | 19.00 |
| TEMAS | A-7128 | Top deck with side quarters (R-2) | 25089 | 19.00 |
| ZEMAS | A-7129 | Side quarter for top, RIGHT (7-P) 1st type | 24131 | 9.60 |
| BIMAS | A-7130 | Side quarter for top, LEFT (7-P) 1st type | 24132 | 9.60 |
| CIMAS | A-7131 | Side quarter for top, RIGHT (7-P) 2nd type | 25108 | 9.60 |
| DIMAS | A-7132 | Side quarter for top, LEFT (7-P) 2nd type | 25109 | 9.60 |
| FIMAS | A-7133 | Side quarter for top, RIGHT (P-1) | 24208 | 8.00 |
| KIMAS | A-7134 | Side quarter for top, LEFT (P-1) | 24209 | 8.00 |
| LIMAS | A-7135 | Side quarter for top, RIGHT (P-2) | 25054 | 9.60 |
| MIMAS | A-7136 | Side quarter for top, LEFT (P-2) | 25055 | 9.60 |
| PIMAS | A-7137 | Side quarter for top, RIGHT (R-1) | 24303 | 6.00 |
| RIMAS | A-7138 | Side quarter for top, LEFT (R-1) | 24304 | 6.00 |
| SIMAS | A-7139 | Side quarter for top, RIGHT (R-2) | 25087 | 6.00 |
| TIMAS | A-7140 | Side quarter for top, LEFT (R-2) | 25088 | 6.00 |
| ZIMAS | A-7141 | Pad for top, RIGHT (7-P) | 41771 | 2.00 |
| BOMAS | A-7142 | Pad for top, LEFT (7-P) | 41772 | 2.00 |
| COMAS | A-7143 | Pad for top, RIGHT (P-1) | 41773 | 2.00 |
| DOMAS | A-7144 | Pad for top, LEFT (P-1) | 41774 | 2.00 |
| FOMAS | A-7145 | Pad for top, RIGHT (P-2) | 25057 | 2.00 |
| KOMAS | A-7146 | Pad for top, LEFT (P-2) | 25058 | 2.00 |
| LOMAS | A-7147 | Pad for top, RIGHT (R-1) (R-2) | 24316 | 1.00 |
| MOMAS | A-7148 | Pad for top, LEFT (R-1) (R-2) | 24317 | 1.00 |
| | | **NOTE: Headlining covers the side quarters only on the (P-1) (R-1) and 1st type(7-P) tops. Headlining covers both top deck and side quarters on the (P-2) (R-2) and 2nd type (7-P) tops.** | | |
| POMAS | A-7149 | Headlining for RIGHT side quarter (7-P) 1st type | 24155 | 4.00 |
| ROMAS | A-7150 | Headlining for LEFT side quarter (7-P) 1st type | 24156 | 4.00 |
| SOMAS | A-7151 | Headlining for RIGHT side quarter (P-1) | 24221 | 3.40 |
| TOMAS | A-7152 | Headlining for LEFT side quarter (P-1) | 24222 | 3.40 |
| ZOMAS | A-7153 | Headlining for RIGHT side quarter (R-1) | 24318 | 2.20 |
| BUMAS | A-7154 | Headlining for LEFT side quarter (R-1) | 24319 | 2.20 |
| CUMAS | A-7155 | Headlining for top deck and side quarters (7-P) 2nd type | 25133 | 9.00 |
| DUMAS | A-7156 | Headlining for either side of top deck (7-P) 2nd type | 61616 | 4.50 |
| FUMAS | A-7157 | Headlining for top deck and side quarters (P-2) | 25134 | 8.50 |
| KUMAS | A-7158 | Headlining for either side of top deck (P-2) | 61508 | 4.25 |
| LUMAS | A-7159 | Headlining for top deck and side quarters (R-2) | 25136 | 7.00 |
| MUMAS | A-7160 | Headlining for top deck only (R-2) | 61581 | 3.00 |
| PUMAS | A-7161 | Headlining for RIGHT side quarter (R-2) | 61579 | 1.25 |
| RUMAS | A-7162 | Headlining for LEFT side quarter (R-2) | 61580 | 1.25 |

## CURTAINS, CURTAIN RODS AND ENVELOPES

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAPAS | A-7166 | Front side curtain, RIGHT (7-P) 1st type | 24122 | 8.15 |
| CAPAS | A-7167 | Front side curtain, LEFT (7-P) 1st type | 24123 | 8.15 |
| DAPAS | A-7168 | Front side curtain, RIGHT (7-P) 2nd type | 25103 | 8.15 |
| FAPAS | A-7169 | Front side curtain, LEFT (7-P) 2nd type | 25104 | 8.15 |
| KAPAS | A-7170 | Front side curtain, RIGHT (P-1) | 24206 | 8.15 |
| LAPAS | A-7171 | Front side curtain, LEFT (P-1) | 24207 | 8.15 |
| MAPAS | A-7172 | Front side curtain, RIGHT (P-2) | 25048 | 8.15 |
| PAPAS | A-7173 | Front side curtain, LEFT (P-2) | 25049 | 8.15 |
| RAPAS | A-7174 | Front side curtain, RIGHT (R-1) | 24305 | 6.50 |
| SAPAS | A-7175 | Front side curtain, LEFT (R-1) | 24306 | 6.50 |
| TAPAS | A-7176 | Front side curtain, RIGHT (R-2) | 25083 | 6.50 |
| ZAPAS | A-7177 | Front side curtain, LEFT (R-2) | 25084 | 6.50 |
| BEPAS | A-7178 | Center side curtain, RIGHT (7-P) 1st type | 24124 | 8.00 |
| CEPAS | A-7179 | Center side curtain, LEFT (7-P) 1st type | 24125 | 8.00 |
| DEPAS | A-7180 | Center side curtain, RIGHT (7-P) 2nd type | 25105 | 8.00 |
| FEPAS | A-7181 | Center side curtain, LEFT (7-P) 2nd type | 25106 | 8.00 |
| KEPAS | A-7182 | Center side curtain, RIGHT (P-1) | 24198 | 8.00 |
| LEPAS | A-7183 | Center side curtain, LEFT (P-1) | 24199 | 8.00 |
| MEPAS | A-7184 | Center side curtain, RIGHT (P-2) | 25050 | 8.00 |
| PEPAS | A-7185 | Center side curtain, LEFT (P-2) | 25051 | 8.00 |
| REPAS | A-7186 | Rear side curtain, RIGHT (7-P) | 24126 | 7.65 |
| SEPAS | A-7187 | Rear side curtain, LEFT (7-P) | 24127 | 7.65 |
| TEPAS | A-7188 | Rear side curtain, RIGHT (P-1) | 24200 | 7.00 |
| ZEPAS | A-7189 | Rear side curtain, LEFT (P-1) | 24201 | 7.00 |
| BIPAS | A-7190 | Rear side curtain, RIGHT (P-2) | 25052 | 7.65 |
| CIPAS | A-7191 | Rear side curtain, LEFT (P-2) | 25053 | 7.65 |
| DIPAS | A-7192 | Rear side curtain, RIGHT (R-1) | 24307 | 5.00 |
| FIPAS | A-7193 | Rear side curtain, LEFT (R-1) | 24308 | 5.00 |
| KIPAS | A-7194 | Rear side curtain, RIGHT (R-2) | 25085 | 5.00 |
| LIPAS | A-7195 | Rear side curtain, LEFT (R-2) | 25086 | 5.00 |
| MIPAS | A-7196 | Back curtain complete with Pyraline window (7-P) 1st type | 24128 | 13.25 |
| PIPAS | A-7197 | Back curtain complete with plate glass window (7-P) 2nd type | 25107 | 28.50 |
| XEPAS | A-7197B | Back curtain, less plate glass window (7-P) 2nd type | 41823 | 20.00 |
| RIPAS | A-7198 | Back curtain complete with Pyraline window (P-1) | 24202 | 12.25 |
| SIPAS | A-7199 | Back curtain complete with plate glass (Special) (P-1) | 41809 | 25.00 |
| TIPAS | A-7200 | Back curtain complete with plate glass window (P-2) | 25064 | 25.00 |
| XIPAS | A-7200B | Back curtain, less plate glass window (P-2) | 41824 | 17.50 |
| ZIPAS | A-7201 | Back curtain complete with Pyraline window (R-1) | 24312 | 10.25 |
| BOPAS | A-7202 | Back curtain complete with plate glass (Special) (R-1) | 41810 | 23.50 |
| COPAS | A-7203 | Back curtain complete with plate glass window (R-2) | 25096 | 23.50 |
| XOPAS | A-7203B | Back curtain, less plate glass window (R-2) | 41825 | 16.00 |
| DOPAS | A-7204 | Screw, back curtain to body | 36819 | .03 |
| FOPAS | A-7205 | Special washer on screw | 34307 | .05 |
| KOPAS | A-7206 | Pyraline for window in back curtain 10x36" (7-P) (P-1) | 60885 | .65 |
| LOPAS | A-7207 | Pyraline for window in back curtain 10x30" (R-1) | 61356 | .50 |
| MOPAS | A-7208 | Plate glass only for window in back curtain (7-P) | 39694 | 4.75 |
| POPAS | A-7209 | Plate glass only for window in back curtain (P-2) (R-2) | 39770 | 4.00 |
| ROPAS | A-7210 | Frame for plate glass in back curtain (7-P) | 26200 | 3.00 |
| SOPAS | A-7211 | Frame for plate glass in back curtain (P-2) (R-2) | 26115 | 2.40 |
| TOPAS | A-7212 | Retainer with covering for glass in frame (7-P) | 26297 | 1.35 |
| ZOPAS | A-7213 | Retainer with covering for glass in frame (P-2) (R-2) | 26189 | 1.25 |
| BUPAS | A-7214 | Curtain rod on doors, RIGHT (7-P) (P-1) and 1st type top on (P-2) | 39544 | 1.25 |
| DUPAS | A-7215 | Curtain rod on doors, LEFT (7-P) (P-1) and 1st type top on (P-2) | 39545 | 1.25 |
| CUPAS | A-7215B | Curtain rod on RIGHT rear door (7-P) | 39546 | 1.25 |
| KUPAS | A-7215C | Curtain rod on LEFT rear door (7-P) | 39547 | 1.25 |
| FUPAS | A-7216 | Curtain rod on doors, RIGHT (R-1) (R-2) and 2nd type top on (P-2) | 39540 | 1.25 |
| LUPAS | A-7217 | Curtain rod on doors, LEFT (R-1) (R-2) and 2nd type top on (P-2) | 39541 | 1.25 |
| MUPAS | A-7217B | Curtain rod on RIGHT rear door (P-1) (P-2) | 39542 | 1.25 |
| XUPAS | A-7217C | Curtain rod on LEFT rear door (P-1) (P-2) | 39543 | 1.25 |
| PUPAS | A-7218 | Socket for curtain rod on door | 33212 | 1.00 |
| RUPAS | A-7219 | Clamp or plate on door for socket | 33210 | .10 |
| SUPAS | A-7220 | Screw, socket to plate | 10781 | .05 |
| TUPAS | A-7221 | Envelope, front, for curtains (7-P) 1st type | 24129 | 2.00 |
| ZUPAS | A-7222 | Envelope, rear, for curtains (7-P) 1st type | 24130 | 4.00 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BARAS | A-7223 | Envelope, front, for curtains (P-1) | 24204 | 2.00 |
| CARAS | A-7224 | Envelope, rear, for curtains (P-1) | 24205 | 3.50 |
| DARAS | A-7225 | Envelope, front, for curtains (R-1) | 24314 | 2.50 |
| FARAS | A-7226 | Envelope, rear, for curtains (R-1) | 24315 | 2.00 |
| KARAS | A-7227 | Bag for side curtains (1 used under front seat) 2nd type (7-P) | 25124 | 3.50 |
| LARAS | A-7228 | Bag for side curtains (1 used under front seat) (P-2) | 25070 | 3.50 |
| MARAS | A-7229 | Bag for side curtains (1 used under front seat) (R-2) | 25135 | 3.00 |

## WOOD BOWS

| | | | | |
|---|---|---|---|---|
| PARAS | A-7233 | Wood bow, No. 1 front, with reinforcement for top (7-P) | 21246 | 2.25 |
| RARAS | A-7234 | Wood bow, No. 2 for top (7-P) | 19177 | 1.50 |
| SARAS | A-7235 | Wood bow, No. 3 or No. 4 for top (7-P) | 19176 | 1.50 |
| TARAS | A-7236 | Wood bow, No. 5 rear, with reinforcement for top (7-P) | 21196 | 2.25 |
| ZARAS | A-7237 | Wood bow, No. 1 with reinforcement for top (P-1) | 23444 | 1.75 |
| BERAS | A-7238 | Wood bow, No. 2 for top (P-1) | 68270 | 1.50 |
| CERAS | A-7239 | Wood bow, No. 3 for top (P-1) | 68272 | 1.50 |
| DERAS | A-7240 | Wood bow, No. 4 with reinforcement for top (P-1) | 23445 | 1.50 |
| FERAS | A-7241 | Wood bow, No. 1 with reinforcement for top (P-2) | 22898 | 2.25 |
| KERAS | A-7242 | Wood bow, No. 2 for top (P-2) | 33635 | 1.50 |
| LERAS | A-7243 | Wood bow, No. 3 or No. 4 for top (P-2) | 33636 | 1.50 |
| MERAS | A-7244 | Wood bow, No. 5 with reinforcement for top (P-2) | 24561 | 2.00 |
| PERAS | A-7245 | Wood bow, No. 1 with reinforcement for top (R-1) | 24267 | 1.75 |
| RERAS | A-7246 | Wood bow, No. 2 for top (R-1) | 68348 | 1.00 |
| SERAS | A-7247 | Wood bow, No. 3 for top (R-1) | 68349 | 3.50 |
| TERAS | A-7248 | Wood bow, No. 1 with reinforcement for top (R-2) | 22898 | 2.25 |
| ZERAS | A-7249 | Wood bow, No. 2 for top (R-2) | 25138 | 1.75 |
| BIRAS | A-7250 | Wood bow, No. 3 for top (R-2) | 38252 | 4.00 |
| CIRAS | A-7251 | Finish binding for top on front bow (7-P) | 61672 | .80 |
| DIRAS | A-7252 | Finish binding for top on rear bow (7-P) | 61673 | .85 |
| FIRAS | A-7253 | Finish binding for top, front and rear bows (P-1) (P-2) | 61674 | .65 |
| KIRAS | A-7254 | Finish binding for top, front bow (R-1) (R-2) | 61675 | .65 |
| LIRAS | A-7255 | Finish binding for top, rear bow (R-1) (R-2) | 61676 | .70 |
| MIRAS | A-7256 | Cap on end of binding for top | 34168 | .15 |
| PIRAS | A-7257 | Screw to attach cap, per doz. .25 | 36815 | .05 |

## METAL BOW SOCKETS, SEVEN PASSENGER, FIRST TYPE

| | | | | |
|---|---|---|---|---|
| KORAS | A-7261 | Metal bow sockets complete, RIGHT side (7-P) | 68236 | 12.00 |
| LORAS | A-7262 | Metal bow sockets complete, LEFT side (7-P) | 68237 | 12.00 |
| MORAS | A-7263 | No. 1 RIGHT front bow socket with bracket (7-P) | 45858 | 1.75 |
| PORAS | A-7264 | No. 1 LEFT front bow socket with bracket (7-P) | 45859 | 1.75 |
| RORAS | A-7265 | No. 2 RIGHT short bow socket with sliding bracket (7-P) | 45860 | 1.45 |
| SORAS | A-7266 | No. 2 LEFT short bow socket with sliding bracket (7-P) | 45861 | 1.45 |
| TORAS | A-7267 | No. 3 RIGHT main socket bow with bracket and bow separator (7-P) | 45862 | 5.00 |
| BURAS | A-7268 | No. 3 LEFT main socket bow with bracket and bow separator (7-P) | 45863 | 5.00 |
| DURAS | A-7269 | No. 4 RIGHT short bow socket (7-P) | 45864 | 1.45 |
| FURAS | A-7270 | No. 4 LEFT short bow socket (7-P) | 45865 | 1.45 |
| KURAS | A-7271 | No. 5 RIGHT rear upright bow socket with bracket (7-P) | 45866 | 2.00 |
| LURAS | A-7272 | No. 5 LEFT rear upright bow socket with bracket (7-P) | 45867 | 2.00 |
| MURAS | A-7273 | Brace connecting No. 1 socket with bracket on main socket (7-P) | 45870 | 1.00 |
| PURAS | A-7274 | Link, RIGHT, with bracket connecting No. 1 and No. 3 sockets (7-P) | 45876 | 1.20 |
| SURAS | A-7275 | Link, LEFT, with bracket connecting No. 1 and No. 3 sockets (7-P) | 45877 | 1.20 |
| ZURAS | A-7276 | Bracket on link No. 2 socket (7-P) | 45869 | .30 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BATAS | A-7277 | Short link connecting brace and bracket at main socket (7-P) | 45871 | 1.00 |
| CATAS | A-7278 | Bow separator on No. 3 socket (7-P) | 45868 | .30 |
| DATAS | A-7279 | Bracket on No. 5 socket supporting No. 4 socket (7-P) | 45873 | .30 |
| FATAS | A-7280 | Bracket attaching main socket to No. 3 bow, RIGHT (7-P) | 45900 | 1.00 |
| KATAS | A-7281 | Bracket attaching main socket to No. 3 bow, LEFT (7-P) | 45901 | 1.00 |
| LATAS | A-7282 | Sliding clamp on No. 2 socket for brace (7-P) | 45872 | .30 |
| MATAS | A-7283 | Spring inside of main socket (7-P) | 45878 | 1.75 |
| PATAS | A-7284 | Screw attaching No. 3 and No. 5 sockets | 45789 | .25 |
| RATAS | A-7285 | Screw attaching upper end of spring in No. 3 socket (7-P) | 45790 | .25 |

## METAL BOW SOCKETS, SEVEN PASSENGER, SECOND TYPE

| | | | | |
|---|---|---|---|---|
| ZATAS | A-7288 | Metal bow sockets complete, RIGHT side (7-P) | 68395 | 7.00 |
| BETAS | A-7289 | Metal bow sockets complete, LEFT side (7-P) | 68396 | 7.00 |
| CETAS | A-7290 | No. 1 RIGHT front bow socket (7-P) | 45902 | 2.50 |
| DETAS | A-7291 | No. 1 LEFT front bow socket (7-P) | 45903 | 2.50 |
| FETAS | A-7292 | No. 2 RIGHT short bow socket with sliding bracket (7-P) | 45904 | 1.45 |
| KETAS | A-7293 | No. 2 LEFT short bow socket with sliding bracket (7-P) | 45905 | 1.45 |
| LETAS | A-7294 | No. 3 RIGHT main socket bow with brackets (7-P) | 45906 | 4.25 |
| METAS | A-7295 | No. 3 LEFT main socket bow with brackets (7-P) | 45907 | 4.25 |
| PETAS | A-7296 | No. 4 RIGHT short bow socket (7-P) | 45908 | 1.45 |
| RETAS | A-7297 | No. 4 LEFT short bow socket (7-P) | 45910 | 1.45 |
| SETAS | A-7298 | No. 5 RIGHT rear upright bow socket (7-P) | 45911 | 2.50 |
| TETAS | A-7299 | No. 5 LEFT rear upright bow socket (7-P) | 45912 | 2.50 |
| ZETAS | A-7300 | Brace connecting socket No. 1 with clamp on main socket, RIGHT (7-P) | 45913 | 1.00 |
| CITAS | A-7301 | Brace connecting socket No. 1 with clamp on main socket, LEFT (7-P) | 45914 | 1.00 |
| FITAS | A-7302 | Link, RIGHT, with bracket (7-P) | 45915 | 1.24 |
| KITAS | A-7303 | Link, LEFT, with bracket (7-P) | 45916 | 1.25 |
| LITAS | A-7304 | Clamp holding link on main socket, RIGHT (7-P) | 45917 | 1.00 |
| MITAS | A-7305 | Clamp holding link on main socket, LEFT (7-P) | 45918 | 1.00 |
| PITAS | A-7306 | Bracket on link for No. 2 socket (7-P) | 45869 | .30 |
| RITAS | A-7307 | Bracket on No. 3 socket supporting No. 4 socket (7-P) | 45873 | .30 |
| SITAS | A-7308 | Sliding clamp on No. 2 socket for brace (7-P) | 45872 | .30 |

## METAL BOW SOCKETS, PHAETON, FIRST TYPE

| | | | | |
|---|---|---|---|---|
| KOTAS | A-7311 | Metal bow sockets complete, RIGHT side (P-1) | 68267 | 10.00 |
| LOTAS | A-7312 | Metal bow sockets complete, LEFT side (P-1) | 68268 | 10.00 |
| MOTAS | A-7313 | No. 1 RIGHT front bow socket (P-1) | 45879 | 1.75 |
| POTAS | A-7314 | No. 1 LEFT front bow socket (P-1) | 45880 | 1.75 |
| ROTAS | A-7315 | No. 2 RIGHT short bow socket with sliding bracket (P-1) | 45881 | 1.45 |
| SOTAS | A-7316 | No. 2 LEFT short bow socket with sliding bracket (P-1) | 45882 | 1.45 |
| TOTAS | A-7317 | No. 3 RIGHT main bow socket with bracket and bow separator (P-1) | 45883 | 5.50 |
| BUTAS | A-7318 | No. 3 LEFT main bow socket with bracket and bow separator (P-1) | 45884 | 5.50 |
| DUTAS | A-7319 | No. 4 RIGHT rear bow socket (P-1) | 45885 | 1.75 |
| FUTAS | A-7320 | No. 4 LEFT rear bow socket (P-1) | 45886 | 1.75 |
| KUTAS | A-7321 | Brace connecting No. 1 socket with bracket on main socket, RIGHT (P-1) | 45887 | 1.00 |
| MUTAS | A-7322 | Brace connecting No. 1 socket with bracket on main socket, LEFT (P-1) | 45888 | 1.00 |
| RUTAS | A-7323 | Link, RIGHT, connecting No. 1 and No. 3 sockets with bracket (P-1) | 45889 | 1.20 |
| TUTAS | A-7324 | Link, LEFT, connecting No. 1 and No. 3 sockets with bracket (P-1) | 45890 | 1.20 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BABAT | A-7325 | Bracket on link for No. 2 socket (P-1) | 45783 | .30 |
| CABAT | A-7326 | Bow separator on No. 3 socket (P-1) | 45868 | .30 |
| DABAT | A-7327 | Short link connecting brace and bracket at main socket (P-1) | 45791 | .30 |
| FABAT | A-7328 | Bracket attaching main socket to No. 3 bow, RIGHT (P-1) | 45919 | 1.00 |
| KABAT | A-7329 | Bracket attaching main socket to No. 3 bow, LEFT (P-1) | 45920 | 1.00 |
| LABAT | A-7330 | Sliding clamp on No. 2 socket for brace (P-1) | 45956 | .30 |
| MABAT | A-7331 | Spring in No. 3 socket (P-1) | 45787 | 1.75 |
| PABAT | A-7332 | Screw attaching No. 3 and No. 4 sockets (P-1) | 45789 | .25 |
| RABAT | A-7333 | Hex. head screw, upper end of spring in No. 3 socket (P-1) | 45790 | .25 |

## METAL BOW SOCKETS, PHAETON, SECOND TYPE

### (1st or 2nd Type Tops)

| | | | | |
|---|---|---|---|---|
| KEBAT | A-7334 | Metal bow sockets complete, RIGHT side (P-2) 1st type | 68382 | 7.00 |
| LEBAT | A-7335 | Metal bow socket complete, LEFT side (P-2) 1st type | 68383 | 7.00 |
| MEBAT | A-7336 | Metal bow sockets complete, RIGHT side (P-2) 2nd type | 38637 | 7.00 |
| PEBAT | A-7337 | Metal bow sockets complete, LEFT side (P-2) 2nd type | 38638 | 7.00 |
| REBAT | A-7338 | No. 1 RIGHT front bow socket (P-2) | 45921 | 1.75 |
| SEBAT | A-7339 | No. 1 LEFT front bow socket (P-2) | 45922 | 1.75 |
| TEBAT | A-7340 | No. 2 RIGHT short bow socket with sliding bracket (P-2) | 45923 | 1.45 |
| ZEBAT | A-7341 | No. 2 LEFT short bow socket with sliding bracket (P-2) | 45924 | 1.45 |
| BIBAT | A-7342 | No. 3 RIGHT main socket with brackets (P-2) 1st type | 45925 | 4.50 |
| CIBAT | A-7343 | No. 3 LEFT main socket with brackets (P-2) 1st type | 45926 | 4.50 |
| DIBAT | A-7344 | No. 4 RIGHT short bow socket (P-2) 1st type | 45927 | 1.00 |
| FIBAT | A-7345 | No. 4 LEFT short bow socket (P-2) 1st type | 45928 | 1.00 |
| KIBAT | A-7346 | No. 5 RIGHT rear upright bow socket (P-2) 1st type | 45929 | 2.00 |
| LIBAT | A-7347 | No. 5 LEFT rear upright bow socket (P-2) 1st type | 45930 | 2.00 |
| MIBAT | A-7348 | Brace connecting socket No. 1 with bracket on main socket, RIGHT (P-2) | 45931 | 1.00 |
| RIBAT | A-7349 | Brace connecting socket No. 1 with bracket on main socket, LEFT (P-2) | 45932 | 1.00 |
| TIBAT | A-7350 | Link, RIGHT, connecting No. 1 and No. 3 sockets with bracket for No. 2 socket (P-2) 1st type | 45933 | 1.25 |
| BOBAT | A-7351 | Link, LEFT, connecting No. 1 and No. 3 sockets with bracket for No. 2 socket (P-2) 1st type | 45934 | 1.25 |
| DOBAT | A-7352 | Bracket on link for No. 2 socket (P-2) | 45869 | .30 |
| FOBAT | A-7353 | Bracket on No. 3 socket for No. 4 socket (P-2) | 45873 | .30 |
| KOBAT | A-7354 | Sliding clamp on No. 2 socket for brace (P-2) | 45872 | .30 |
| LOBAT | A-7355 | Bracket on upper end of No. 3 main socket, RIGHT (P-2) | 45952 | 1.65 |
| MOBAT | A-7356 | Bracket on upper end of No. 3 main socket, LEFT (P-2) | 45953 | 1.65 |
| POBAT | A-7357 | No. 3 RIGHT main bow socket with brackets (P-2) 2nd type | 45988 | 4.25 |
| ROBAT | A-7358 | No. 3 LEFT main bow socket with brackets (P-2) 2nd type | 45989 | 4.25 |
| SOBAT | A-7359 | No. 4 RIGHT short bow socket (P-2) 2nd type | 45990 | 1.00 |
| TOBAT | A-7360 | No. 4 LEFT short bow socket (P-2) 2nd type | 45991 | 1.00 |
| ZOBAT | A-7361 | No. 5 RIGHT rear upright bow socket (P-2) 2nd type | 45992 | 2.35 |
| BUBAT | A-7362 | No. 5 LEFT rear upright bow socket (P-2) 2nd type | 45993 | 2.35 |
| CUBAT | A-7363 | Link RIGHT connecting No. 1 and No. 3 sockets with bracket for No. 2 (P-2) 2nd type | 45996 | 1.25 |
| FUBAT | A-7364 | Link LEFT connecting No. 1 and No. 3 sockets with bracket for No. 2 (P-2) 2nd type | 45997 | 1.25 |

## METAL BOW SOCKETS, ROADSTER, FIRST TYPE

| | | | | |
|---|---|---|---|---|
| MUBAT | A-7389 | Metal bow sockets complete RIGHT (R-1) | 68338 | 5.00 |
| PUBAT | A-7390 | Metal bow sockets complete LEFT (R-1) | 68339 | 5.00 |
| RUBAT | A-7391 | No. 1 RIGHT front bow socket with bracket (R-1) | 45935 | 1.75 |
| SUBAT | A-7392 | No. 1 LEFT front bow socket with bracket (R-1) | 45936 | 1.75 |
| TUBAT | A-7393 | No. 2 RIGHT short bow socket with bracket (R-1) | 45937 | 1.45 |
| ZUBAT | A-7394 | No. 2 LEFT short bow socket with bracket (R-1) | 45938 | 1.45 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADAT | A-7395 | No. 3 RIGHT rear bow socket with bracket and bow separator (R-1) | 45939 | 3.25 |
| DADAT | A-7396 | No. 3 LEFT rear bow socket with bracket and bow separator (R-1) | 45940 | 3.25 |
| KADAT | A-7397 | Bracket on link for No. 2 socket (R-1) | 45873 | .30 |
| LADAT | A-7398 | Bracket RIGHT on No. 2 socket for brace and link (R-1) | 45941 | 1.00 |
| MADAT | A-7399 | Bracket LEFT on No. 2 socket for brace and link (R-1) | 45942 | 1.00 |
| PADAT | A-7400 | Bow separator on No. 3 socket (R-1) | 45943 | .30 |
| RADAT | A-7401 | Brace from No. 1 socket to No. 2 | 45944 | .75 |
| SADAT | A-7402 | Link RIGHT with bracket for No. 2 socket connecting No. 1, No. 2 and No. 3 sockets (R-1) | 45959 | 1.25 |
| ZADAT | A-7403 | Link LEFT with bracket for No. 2 socket connecting No. 1, No. 2 and No. 3 sockets (R-1) | 45960 | 1.25 |
| CEDAT | A-7404 | Brace from No. 2 socket to bracket on No. 3 socket, RIGHT (R-1) | 46008 | .75 |
| FEDAT | A-7405 | Brace from No. 2 socket to bracket on No. 3 socket LEFT (R-1) | 46009 | .75 |

## METAL BOW SOCKETS, ROADSTER, SECOND TYPE

| | | | | |
|---|---|---|---|---|
| TEDAT | A-7408 | Metal bow sockets RIGHT complete (R-2) | 68392 | 6.00 |
| ZEDAT | A-7409 | Metal bow sockets LEFT complete (R-2) | 68393 | 6.00 |
| BIDAT | A-7410 | No. 1 RIGHT front bow socket (R-2) | 45946 | 1.75 |
| CIDAT | A-7411 | No. 1 LEFT front bow socket (R-2) | 45947 | 1.75 |
| DIDAT | A-7412 | No. 2 RIGHT short bow socket (R-2) | 45948 | 1.45 |
| FIDAT | A-7413 | No. 2 LEFT short bow socket (R-2) | 45949 | 1.45 |
| KIDAT | A-7414 | No. 3 RIGHT rear bow socket with bracket and bow separator (R-2) | 45950 | 2.25 |
| MIDAT | A-7415 | No. 3 LEFT rear bow socket with bracket and bow separator (R-2) | 45951 | 2.25 |
| RIDAT | A-7416 | Bow separator on No. 3 socket (R-2) | 45868 | .30 |
| SIDAT | A-7417 | Bracket on link for No. 2 socket (R-2) | 45869 | .30 |
| BODAT | A-7420 | Link RIGHT connecting No. 1 and No. 3 sockets with bracket for No. 2 socket (R-2) | 45965 | 1.25 |
| DODAT | A-7421 | Link LEFT connecting No. 1 and No. 3 sockets with bracket for No. 2 socket (R-2) | 45966 | 1.25 |
| KODAT | A-7422 | Brace from No. 1 socket to No. 2 socket RIGHT (R-2) | 45961 | .75 |
| LODAT | A-7423 | Brace from No. 1 socket to No. 2 socket LEFT (R-2) | 45962 | .75 |
| MODAT | A-7424 | Brace from No. 2 socket to bracket on No. 3 socket RIGHT (R-2) | 45963 | .75 |
| PODAT | A-7425 | Brace from No. 2 socket to bracket on No. 3 socket LEFT (R-2) | 45964 | .75 |

## PROP SUPPORTS FOR TOP

| | | | | |
|---|---|---|---|---|
| RODAT | A-7428 | Prop support complete, RIGHT (used with 1st type top) (7-P) | 68183 | 4.00 |
| SODAT | A-7429 | Prop support complete, LEFT (used with 1st type top) (7-P) | 68184 | 4.00 |
| TODAT | A-7430 | Prop support complete, RIGHT (used with 2nd type top) (7-P) | 68390 | 4.00 |
| ZODAT | A-7431 | Prop support complete, LEFT (used with 2nd type top) (7-P) | 68391 | 4.00 |
| BUDAT | A-7432 | Prop support complete, RIGHT (P-1) | 68204 | 3.00 |
| CUDAT | A-7433 | Prop support complete, LEFT (P-1) | 68205 | 3.00 |
| DUDAT | A-7434 | Prop support complete, RIGHT (P-2) | 68369 | 5.00 |
| FUDAT | A-7435 | Prop support complete, LEFT (P-2) | 68370 | 5.00 |
| KUDAT | A-7436 | Prop support complete, RIGHT (R-1) and 1st type top on (R-2) | 68264 | 4.00 |
| LUDAT | A-7437 | Prop support complete, LEFT (R-1) and 1st type top on (R-2) | 68265 | 4.00 |
| MUDAT | A-7437-B | Prop support complete, RIGHT 2nd type top on (R-2) | 68449 | 3.00 |
| PUDAT | A-7437-C | Prop support complete, LEFT 2nd type top on (R-2) | 68450 | 3.00 |
| RUDAT | A-7438 | Screw, prop support to body iron | 34850 | .10 |
| SUDAT | A-7439 | Lock washer, per doz. .25 | 11316 | .50 |
| TUDAT | A-7440 | Expanding plug for prop support screw ($\frac{5}{8}$") | 25533 | .20 |
| ZUDAT | A-7441 | Expanding plug for prop support screw ($\frac{11}{16}$") | 39495 | .20 |
| XUDAT | A-7441B | Expanding sleeve for prop support | 46010 | .50 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAFAT | A-7442 | Rubber pad for prop support (P-2) and (7-P) 1st type top | 38247 | .95 |
| CAFAT | A-7443 | Rubber pad for prop support (7-P) 2nd type top | 68429 | .95 |
| DAFAT | A-7444 | Rubber pad for prop support (P-1) | 38248 | .95 |
| FAFAT | A-7445 | Rubber pad for prop support (R-1) (R-2) | 38249 | 1.00 |
| KAFAT | A-7446 | Clamping lever for prop support (7-P) (P-1) (P-2) | 45969 | .40 |
| LAFAT | A-7447 | Link for clamping lever (7-P) (P-1) (P-2) | 45970 | .30 |
| MAFAT | A-7448 | Tension spring for link (7-P) (P-1) (P-2) and 2nd type on (R-2) | 45971 | .10 |
| PAFAT | A-7449 | Clamping lever for prop support (R-1) and 1st type on (R-2) | 45967 | .40 |
| RAFAT | A-7450 | Link or spring for clamping lever (R-1) and 1st type on (R-2) | 45968 | .25 |
| SAFAT | A-7451 | Clamping lever for prop support (R-2) 2nd type | 45969 | .40 |
| TAFAT | A-7452 | Link for clamping lever (R-2) 2nd type | 46004 | .40 |
| ZAFAT | A-7452-B | Plug in head of body iron when prop support is not used | 39033 | .75 |
| BEFAT | A-7452-C | Screw for plug | 39032 | .15 |
| CEFAT | A-7452-D | Core with pin | 25533 | .20 |

## TOP IRONS ON BODY

| | | | | |
|---|---|---|---|---|
| REFAT | A-7453 | Body iron, front RIGHT, to attach top to body (7-P) | 68321 | 1.60 |
| SEFAT | A-7454 | Body iron, front LEFT, to attach top to body (7-P) | 68322 | 1.60 |
| TEFAT | A-7455 | Body iron, front RIGHT, to attach top to body (P-1) | 68331 | 1.60 |
| ZEFAT | A-7456 | Body iron, front LEFT, to attach top to body (P-1) | 68332 | 1.60 |
| BIFAT | A-7457 | Body iron, front RIGHT, to attach top to body (P-2) | 68371 | 1.60 |
| CIFAT | A-7458 | Body iron, front LEFT, to attach top to body (P-2) | 68372 | 1.60 |
| DIFAT | A-7459 | Body iron, front RIGHT, to attach top to body (R-1) | 68214 | 1.60 |
| FIFAT | A-7460 | Body iron, front LEFT, to attach top to body (R-1) | 68215 | 1.60 |
| KIFAT | A-7461 | Body iron, front RIGHT, to attach top to body (R-2) | 33579 | 2.10 |
| LIFAT | A-7462 | Body iron, front LEFT, to attach top to body (R-2) | 33580 | 2.10 |
| MIFAT | A-7463 | Body iron, rear RIGHT, for prop support (7-P) | 23814 | 2.10 |
| PIFAT | A-7464 | Body iron, rear LEFT, for prop support (7-P) | 23815 | 2.10 |
| RIFAT | A-7465 | Body iron, rear RIGHT, for prop support (P-1) | 23301 | 2.10 |
| SIFAT | A-7466 | Body iron, rear LEFT, for prop support (P-1) | 23302 | 2.10 |
| TIFAT | A-7467 | Body iron, rear RIGHT, for prop support (P-2) | 25011 | 2.10 |
| ZIFAT | A-7468 | Body iron, rear LEFT, for prop support (P-2) | 25012 | 2.10 |
| BOFAT | A-7469 | Body iron, rear RIGHT, for prop support (R-1) (R-2) | 23463 | 2.10 |
| COFAT | A-7470 | Body iron, LEFT, for prop support (R-1) (R-2) | 23464 | 2.10 |
| DOFAT | A-7471 | Stud in front body irons attaching top to body (7-P) | 32317 | .25 |
| FOFAT | A-7472 | Stud in front body irons attaching top to body (P-1) (P-2) (R-1) (R-2) | 34244 | .25 |
| LOFAT | A-7473 | Rubber bushing on stud in body iron (OC) | 32268 | .05 |

## BRACKETS TO ATTACH TOP TO WINDSHIELD, OPEN CARS

| | | | | |
|---|---|---|---|---|
| CUFAT | A-7476 | Bracket complete attaching top to windshield | 25776 | 4.00 |
| DUFAT | A-7477 | Bracket only attaching top to windshield | 19314 | 1.00 |
| FUFAT | A-7478 | Adjusting nut on eye bolt for top bracket | 19315 | .35 |
| KUFAT | A-7479 | Eye bolt for windshield top bracket | 19907 | .90 |
| LUFAT | A-7480 | Wing nut on eye bolt for top bracket | 39512 | .35 |
| MUFAT | A-7481 | Flat washer on eye bolt for wing nut, per doz. .25 | 11497 | .05 |
| PUFAT | A-7482 | Plate attaching top bracket to bow | 39329 | .95 |
| RUFAT | A-7483 | Screw, short, windshield top bracket to bow | 11965 | .05 |
| SUFAT | A-7484 | Screw, long, windshield top bracket to bow | 11966 | .08 |
| TUFAT | A-7485 | Flat washer on screw, per doz. .25 | 11502 | .05 |
| ZUFAT | A-7486 | Lock washer on screw, and eye bolt, per doz. .25 | 11315 | .05 |

## FRONT AXLE, SPINDLES AND BEARINGS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAGAT | A-7494 | Front axle with yokes and upper bearing mountings 50290 (STANDARD TREAD) | L-5666 | 37.00 |
| DAGAT | A-7498 | Steel bushing for lower front axle yoke | 50289 | .40 |
| FAGAT | A-7505 | Roller bearing, upper, for front axle yoke | 50318 | 3.90 |
| KAGAT | A-7506 | Mounting in upper axle yoke for bearing | 50290 | 1.80 |
| LAGAT | A-7507 | Cap for upper bearing in front axle yoke | 50317 | .25 |
| MAGAT | A-7508 | Dust cap, lower | 50320 | .05 |
| PAGAT | A-7510 | Key for dust cap | 50319 | .10 |
| RAGAT | A-7515 | Spindle RIGHT | L-5684 | 13.50 |
| SAGAT | A-7516 | Spindle LEFT | L-5683 | 9.75 |
| TAGAT | A-7519 | Spindle bolt | 50316 | 1.80 |
| ZAGAT | A-7520 | Washer on lower end of spindle bolt | 50325 | .03 |
| BEGAT | A-7522 | Nut for lower end of spindle bolt | 50326 | .08 |
| CEGAT | A-7523 | Cotter pin, per doz. .25 | 15177 | .05 |
| DEGAT | A-7524 | Grease cup for spindle bolt | 17054 | .50 |
| FEGAT | A-7526 | Draw key for spindle bolt | 50321 | .05 |
| KEGAT | A-7527 | Draw key for spindle bolt (when required) | 50322 | .05 |
| LEGAT | A-7528 | Draw key for spindle bolt (when required) | 50328 | .05 |
| MEGAT | A-7529 | Draw key for spindle bolt (when required) | 50329 | .05 |
| PEGAT | A-7535 | Roller bearing, inside for front axle spindle | 50310 | 4.90 |
| REGAT | A-7536 | Roller bearing, outside for front axle spindle | 50309 | 3.25 |
| SEGAT | A-7538 | Dust washer complete with retainers for spindle inner bearing | 50303 | 1.00 |
| TEGAT | A-7539 | Felt washer between dust washer and inner bearing | 50304 | .10 |
| ZEGAT | A-7540 | Dust shield for spindle inner bearing | 50308 | .05 |
| BIGAT | A-7541 | Locking wire for dust washer | 50305 | .03 |
| CIGAT | A-7542 | Screw for locking wire | 50306 | .05 |
| DIGAT | A-7550 | Adjusting nut with pin 50313, for RIGHT spindle bearing | 50311 | .75 |
| FIGAT | A-7551 | Adjusting nut with pin 50313, for LEFT spindle bearing | L-5685 | .75 |
| KIGAT | A-7553 | Locking ring with 12 slots for spindle adjusting nut | 50312 | .10 |
| LIGAT | A-7554 | Jam nut, RIGHT, for spindle outer bearing | 50314 | .20 |
| MIGAT | A-7555 | Jam nut, LEFT, for spindle outer bearing | X-1225 | .30 |
| PIGAT | A-7556 | Wrench for jam nut on spindle and hub cap | 30411 | .75 |

## FRONT AXLE STEERING ARMS AND PARALLEL ROD

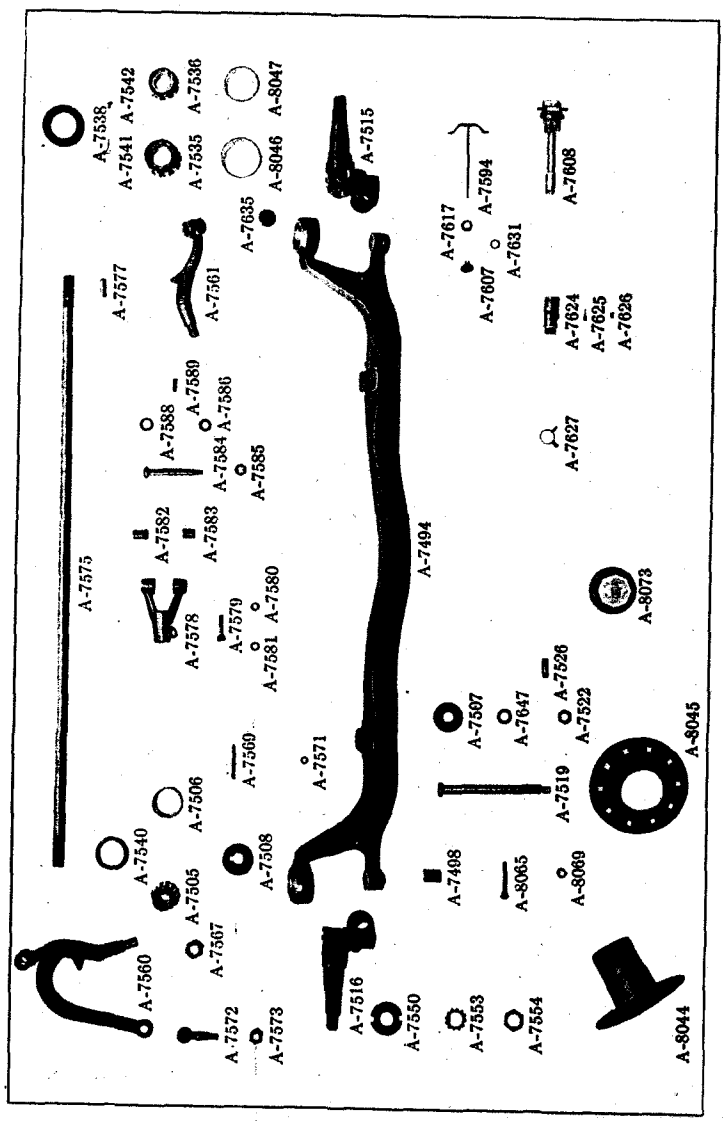
| | | | | |
|---|---|---|---|---|
| KOGAT | A-7560 | Steering arm for LEFT spindle, double LEFT steering | L-5169 | 8.00 |
| LOGAT | A-7561 | Steering arm for RIGHT spindle, single LEFT steering | L-5170 | 4.00 |
| MOGAT | A-7562 | Steering arm for RIGHT spindle, double, RIGHT steering | L-2312 | 8.00 |
| POGAT | A-7564 | Steering arm for LEFT spindle, single, RIGHT steering | L-2309 | 4.00 |
| ROGAT | A-7566 | Key for steering arm | 50283 | .05 |
| SOGAT | A-7567 | Castle nut for steering arm | 50284 | .15 |
| TOGAT | A-7568 | Cotter pin for castle nut | 15207 | .05 |
| ZOGAT | A-7569 | Stop screw to limit travel of steering arm | 50291 | .20 |
| CUGAT | A-7571 | Nut on stop screw | 50292 | .05 |
| DUGAT | A-7572 | Pivot for double steering arm | 9198 | 1.50 |
| FUGAT | A-7573 | Castle nut for pivot | 9197 | .10 |
| KUGAT | A-7574 | Cotter pin for castle nut, per doz. .25 | 15177 | .05 |
| LUGAT | A-7575 | Parallel rod | 50332 | 3.00 |
| MUGAT | A-7577 | Taper plug for end of parallel rod | 50335 | .15 |
| PUGAT | A-7578 | Yoke with bushings for parallel rod | 50293 | 2.60 |
| RUGAT | A-7579 | Clamp screw for yoke | 50296 | .05 |
| SUGAT | A-7580 | Nut for clamp screw | 50061 | .05 |
| TUGAT | A-7581 | Lock washer, per doz. .25 | 11337 | .05 |
| ZUGAT | A-7582 | Upper bushing for parallel rod yoke | 50294 | .30 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAHAT | A-7583 | Lower bushing for parallel rod yoke | 50295 | .30 |
| CAHAT | A-7584 | Bolt for parallel rod yoke | 50327 | .70 |
| DAHAT | A-7585 | Slotted hex. nut for bolt | 50331 | .05 |
| FAHAT | A-7586 | Washer | 50330 | .03 |
| KAHAT | A-7587 | Cotter pin, per doz. .25 | 15174 | .05 |
| LAHAT | A-7588 | Dust cap for bolt | 50328 | .05 |
| MAHAT | A-7589 | Draw key for bolt | 50329 | .05 |
| PAHAT | A-7590 | Grease cup for parallel rod | 17054 | .50 |

## SPEEDOMETER DRIVING PARTS IN SPINDLE

| | | | | |
|---|---|---|---|---|
| DEHAT | A-7594 | Speedometer driving shaft and plate in RIGHT spindle | L-5989 | .50 |
| FEHAT | A-7607 | Speedometer driving gear (20 teeth) used with 34x4½" Fabric or 895x135 Millimeter tires | L-5984 | 1.30 |
| LEHAT | A-7608 | Speedometer driven shaft with gear and bearing assembled, used with 34x4½" Fabric or 895x135 Millimeter tires | 41862 | 2.75 |
| PEHAT | A-7609 | Speedometer driven gear (12 teeth) used with 34x4½" Fabric or 895x135 Millimeter tires | L-5717 | .70 |
| SEHAT | A-7610 | Speedometer driving gear (18 teeth) used with 36x4½" Fabric or 35x5" Cord tires | L-5987 | 1.30 |
| ZEHAT | A-7611 | Speedometer driven shaft with gear and bearing assembled, used with 36x4½" Fabric or 35x5" Cord tires | 41861 | 2.75 |
| CIHAT | A-7612 | Speedometer driven gear (10 teeth) used with 36x4½" Fabric or 35x5" Cord tires | L-5711 | .70 |
| FIHAT | A-7613 | Speedometer driving gear (19 teeth) used with 35x5" Fabric or 34x4½" Cord tires | L-5985 | 1.30 |
| LIHAT | A-7614 | Speedometer driven shaft with gear and bearing assembled, used with 35x5" Fabric or 34x4½" Cord tires | 41864 | 2.75 |
| PIHAT | A-7615 | Speedometer driven gear (11 teeth) used with 35x5" Fabric or 34x4½" Cord tires | L-5721 | .70 |
| SIHAT | A-7616 | Shaft only for speedometer driven gear in RIGHT spindle | L-5323 | .30 |
| TIHAT | A-7617 | Bushing for speedometer driven gear in RIGHT spindle | L-2704 | .15 |
| ZIHAT | A-7618 | Pin, speedometer driven gear to shaft | X-900 | .05 |
| BOHAT | A-7619 | Collar for speedometer driven gear shaft | L-5325 | .05 |
| COHAT | A-7620 | Pin anchoring collar, per doz. .25 | X-1073 | .05 |
| DOHAT | A-7622 | Front bearing in spindle for speedometer driven gear shaft | L-5712 | .85 |
| FOHAT | A-7623 | Front cover for speedometer driven gear shaft | L-5327 | .10 |
| KOHAT | A-7624 | Rear bearing which screws into spindle for speedometer driven gear shaft | L-2906 | 2.50 |
| MOHAT | A-7625 | Clamp bolt for rear bearing | L-2718 | .05 |
| POHAT | A-7626 | Nut | L-2880 | .10 |
| ROHAT | A-7627 | Wing washer for driven gear shaft bearing, front or rear | X-836 | .05 |
| SOHAT | A-7628 | Spacer, thin, for driven gear shaft bearing, front or rear | L-2859 | .05 |
| TOHAT | A-7629 | Spacer, thick, for driven gear shaft bearing, front or rear | L-3081 | .05 |
| ZOHAT | A-7630 | Spacer, medium, for driven gear shaft bearing, front or rear | L-3080 | .05 |
| BUHAT | A-7631 | Spacer, thin, for driving gear bearing | L-3082 | .05 |
| CUHAT | A-7632 | Spacer, medium, for driving gear bearing | L-3083 | .05 |
| DUHAT | A-7633 | Spacer, thick, for driving gear bearing | L-3084 | .05 |
| FUHAT | A-7634 | Plug for speedometer gear chamber in RIGHT spindle | 3467 | .05 |
| KUHAT | A-7635 | Cover for speedometer gear chamber | L-5234 | .20 |
| LUHAT | A-7636 | Cotter pin chamber through cover and spindle, per doz. .25 | 15183 | .05 |
| MUHAT | A-7637 | Pressure spring in hub cap for speedometer shaft | 30166 | .20 |
| PUHAT | A-7638 | Pressure spring in front RIGHT wire wheel hub cap for speedometer shaft | 17900 | .25 |




FRONT AXLE

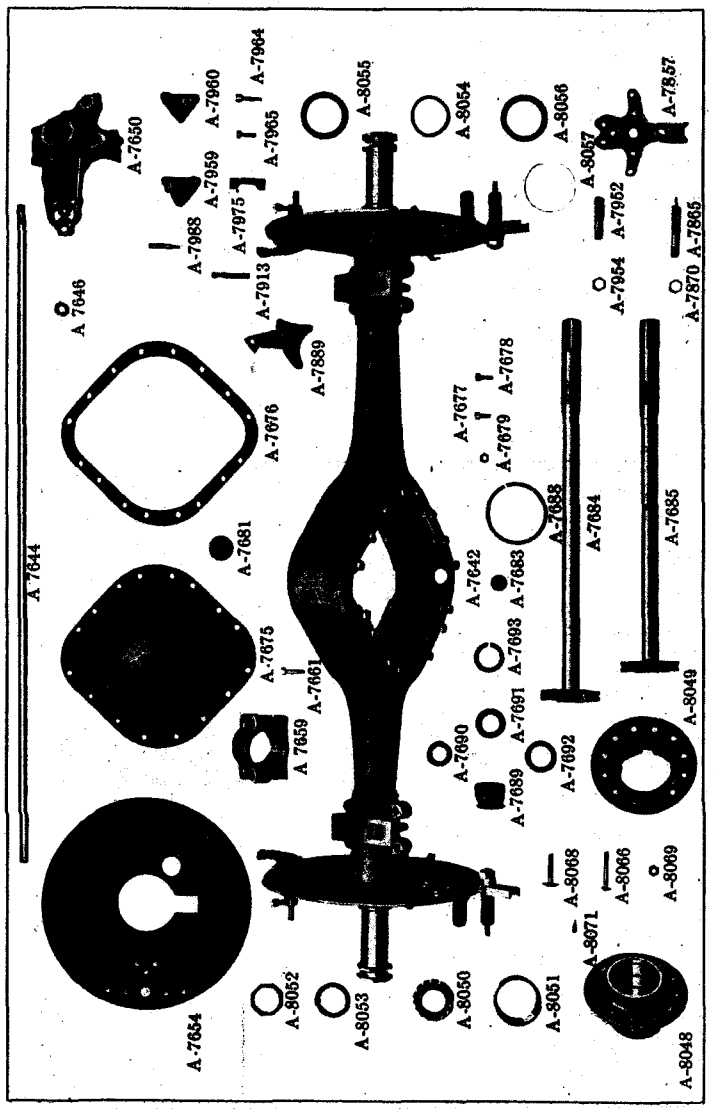


## REAR AXLE HOUSING AND COVER. REAR AXLE SHAFTS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BALAT | A-7642 | Rear axle housing with fixed parts and truss rod, less differential covers, brakes and anchor pins | 53305 | 95.00 |
| DALAT | A-7644 | Truss rod for rear axle housing | T-4205 | 1.00 |
| FALAT | A-7646 | Slotted hex. nut for truss rod | X-1098 | .10 |
| KALAT | A-7647 | Washer for truss rod | 50225 | .03 |
| LALAT | A-7648 | Cotter pin, per doz. .25 | 15177 | .05 |
| MALAT | A-7649 | Brake support, RIGHT | R-5252 | 7.00 |
| PALAT | A-7650 | Brake support, LEFT | R-5251 | 7.00 |
| RALAT | A-7651 | Rivet for brake support, per doz. .25 | 17637 | .05 |
| SALAT | A-7654 | Dust shield for brake support, RIGHT | 50165 | 3.00 |
| TALAT | A-7655 | Dust shield for brake support, LEFT | 50164 | 3.00 |
| ZALAT | A-7656 | Rivet, dust shield to brake support, per doz. .25 | 17607 | .05 |
| BELAT | A-7659 | Spring seat with bolts, nuts and washers (2 used) | 32691 | 6.20 |
| CELAT | A-7661 | Bolt for rear axle spring seat | 50173 | .05 |
| DELAT | A-7663 | Lock washer, per doz. .25 | 11306 | .05 |
| FELAT | A-7668 | Grease cup for spring seat | 17054 | .50 |
| KELAT | A-7675 | Rear cover on housing for differential | 50154 | 5.00 |
| LELAT | A-7676 | Gasket for rear cover | 30793 | .15 |
| MELAT | A-7677 | Cap screw, short, for rear cover | X-910 | .05 |
| PELAT | A-7678 | Cap screw, long, for rear cover | X-542 | .10 |
| RELAT | A-7679 | Nut for cap screw | X-189 | .05 |
| SELAT | A-7680 | Lock washer, per doz. .25 | 11306 | .05 |
| TELAT | A-7681 | Filler plug in rear cover | 50160 | .20 |
| ZELAT | A-7683 | Drain plug in bottom of rear axle housing | X-433 | .10 |
| BILAT | A-7684 | Axle shaft, RIGHT | 50225 | 12.00 |
| CILAT | A-7685 | Axle shaft, LEFT | 50224 | 12.00 |
| DILAT | A-7688 | Lock wire for rear axle shaft and flange | 50226 | .08 |
| FILAT | A-7689 | Oil retainer cup, inner, in rear axle housing sleeve | 50169 | .20 |
| KILAT | A-7690 | Felt oil retainer in rear axle housing sleeve (SMALL) | 38336 | .10 |
| LILAT | A-7691 | Felt oil retainer in rear axle housing sleeve (LARGE) | 38337 | .10 |
| MILAT | A-7692 | Flat washer between felts | 50168 | .03 |
| PILAT | A-7693 | Flat retainer, outer, in rear axle housing sleeve | 50170 | .05 |
| RILAT | A-7694 | Cotter pin holding retainer in housing sleeve, per doz. .25 | 15161 | .05 |

## REAR AXLE DIFFERENTIAL AND DRIVEN GEAR

| | | | | |
|---|---|---|---|---|
| BOLAT | A-7698 | Differential complete with driven gear for rear axle (Ratio 4 to 1) | 42105 | 65.00 |
| FOLAT | A-7699 | Differential complete with driven gear for rear axle (Ratio $4\frac{7}{16}$ to 1) | 42107 | 65.00 |
| COLAT | A-7699B | Differential complete with driven gear for rear axle (Ratio $5\frac{1}{14}$ to 1) | 42106 | 65.00 |
| LOLAT | A-7700 | Gear mount (halves not sold separately) with cap screws and locking wire No. 1 and 2 D | 50117-8 | 18.00 |
| POLAT | A-7701 | Cap screw for gear mount (6D) | 52378 | .10 |
| ROLAT | A-7703 | Driven gear for rear axle (Ratio $4\frac{7}{16}$ to 1) 71 teeth | 19277 | 27.50 |
| SOLAT | A-7704 | Driven gear for rear axle (Ratio $5\frac{1}{14}$ to 1) 71 teeth | 19056 | 27.50 |
| TOLAT | A-7705 | Rivet, driven gear to gear mount | 50149 | .03 |
| ZOLAT | A-7708 | Spider for rear axle differential (5-D) | 50119 | 4.00 |
| BULAT | A-7709 | Pinion for rear axle differential (4-D) | 52997 | 1.00 |
| CULAT | A-7710 | Equalizing gear for rear axle differential (3-D) | 50121 | 5.00 |
| DULAT | A-7711 | Roller bearing for RIGHT side of gear mount | 50132 | 5.85 |
| FULAT | A-7712 | Mounting for bearing on RIGHT side of gear mount | 50133 | 4.25 |
| KULAT | A-7713 | Roller bearing for LEFT side of gear mount | 50130 | 8.30 |
| LULAT | A-7714 | Mounting for bearing on LEFT side of gear mount | 50131 | 6.20 |
| MULAT | A-7716 | Adjusting nut, RIGHT, for gear mount bearing | 50142 | 2.50 |
| PULAT | A-7718 | Adjusting nut, LEFT, for gear mount bearing | 50141 | 2.75 |
| RULAT | A-7720 | Lock lever for adjusting nut | 50143 | .15 |
| SULAT | A-7721 | Rivet for lock lever, per doz. .25 | 50144 | .05 |
| TULAT | A-7722 | Collar for differential bearing, RIGHT | 50140 | .40 |
| ZULAT | A-7723 | Collar for differential bearing, LEFT | 50139 | .40 |




REAR AXLE



## DRIVING PINION AND SHAFT. FLANGE FOR UNIVERSAL JOINT

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| XAPAT | A-7731B | Driving pinion for rear axle (Ratio 4 to 1) special 18 teeth | 37740 | 14.00 |
| BAPAT | A-7732 | Driving pinion for rear axle (Ratio 4 1/16 to 1) 16 teeth | 37741 | 14.00 |
| CAPAT | A-7733 | Driving pinion for rear axle (Ratio 5 1/14 to 1) 14 teeth | 37742 | 14.00 |
| DAPAT | A-7735 | Shaft for driving pinion | T-6744 | 6.00 |
| FAPAT | A-7736 | Nut, pinion on shaft | L-224 | .15 |
| KAPAT | A-7737 | Washer for nut | T-983 | .10 |
| LAPAT | A-7738 | Cotter pin through nut and shaft | 15207 | .05 |
| MAPAT | A-7739 | Key for pinion on shaft | X-719 | .15 |
| PAPAT | A-7740 | Flange on rear axle driving pinion shaft for universal joint | 19382 | 4.50 |
| RAPAT | A-7742 | Castle nut, flange on front end of pinion shaft | X-1274 | .20 |
| SAPAT | A-7744 | Washer for castle nut | X-951 | .05 |
| TAPAT | A-7745 | Cotter pin for castle nut, per doz. .25 | 15181 | .05 |
| ZAPAT | A-7746 | Key for universal joint flange on rear axle pinion shaft | 19894 | .20 |
| BEPAT | A-7747 | Special washer on pinion shaft for universal joint flange key | T-6357 | .10 |

## DIFFERENTIAL CARRIER. BEARINGS, MOUNTINGS AND ADJUSTING NUTS IN CARRIER. SHAFT FOR TORSION ARM

**NOTE: On the Type 57 Cars, 3 Types of Differential Carriers were used. The first type carrier has adjusting port at top while the second and third types has adjusting port at side of carrier. The third type has two short slots under clamping bolts for adjusting nut. The mountings for pinion are carried in the adjusting nut and collar instead of in the carrier.**

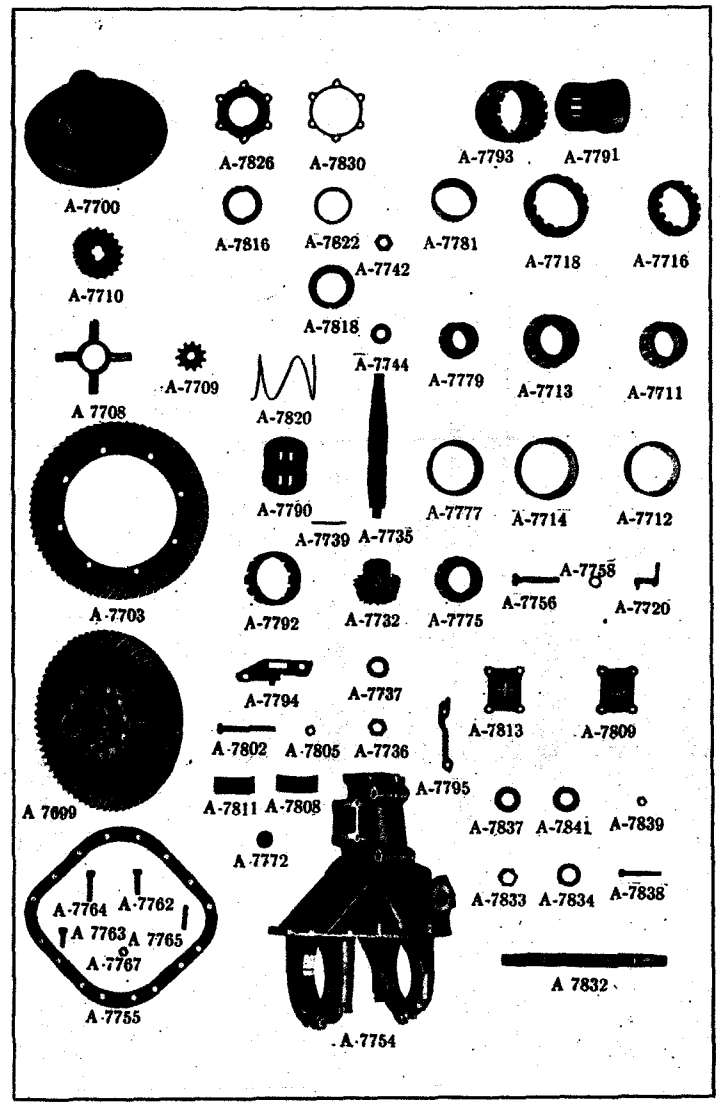
| | | | | |
|---|---|---|---|---|
| MIPAT | A-7753 | Differential carrier with adjusting collar, adjusting nut and mountings, front end cover and gasket (used instead of first and Second Type Carrier) | 41865 | 75.00 |
| SIPAT | A-7754 | Differential carrier only (3rd type) after engine 57-DD-314 | AT-4912-2 | 48.00 |
| TIPAT | A-7755 | Paper gasket for differential carrier | 30794 | .10 |
| ZIPAT | A-7756 | Cap screw for differential bearing cap | 50136 | .40 |
| BOPAT | A-7757 | Locking wire through bearing cap screw | 50138 | .05 |
| COPAT | A-7758 | Lock washer, per doz. .25 | 11319 | .05 |
| DOPAT | A-7761 | Bolt (2" long) for differential carrier | X-1024 | .10 |
| FOPAT | A-7762 | Bolt (1 5/8" long) for differential carrier | 50296 | .05 |
| KOPAT | A-7763 | Bolt (1 7/8" long) for differential carrier | X-1235 | .10 |
| LOPAT | A-7764 | Bolt (1 1/4" long) for differential carrier | X-788 | .05 |
| MOPAT | A-7765 | Stud, differential carrier to housing (2 used) | 50125 | .10 |
| POPAT | A-7766 | Anchor pin for stud | 50127 | .03 |
| ROPAT | A-7767 | Nut for differential carrier bolt | 50206 | .05 |
| SOPAT | A-7768 | Flat washer (copper) | X-914 | .05 |
| TOPAT | A-7769 | Lock washer, per doz. .25 | 11337 | .05 |
| ZOPAT | A-7770 | Cup washer for lock washer | T-7053 | .05 |
| BUPAT | A-7772 | Peep hole plug in differential carrier | 50145 | .20 |
| CUPAT | A-7775 | Roller bearing for driving pinion, rear | 456 | 5.80 |
| DUPAT | A-7777 | Mounting for pinion bearing, rear | 50133 | 4.25 |
| FUPAT | A-7779 | Roller bearing for driving pinion shaft, front | 415 | 4.90 |
| KUPAT | A-7781 | Mounting for pinion shaft bearing, front | 414 | 2.60 |
| LUPAT | A-7782 | Grease cup for pinion shaft bearing | 38476 | .55 |
| MUPAT | A-7790 | Adjusting collar for pinion shaft bearing, front (with 1st or 2nd type carriers) | T-6441 | 3.25 |
| RUPAT | A-7791 | Adjusting collar with mounting 414-C for pinion shaft bearing (with 3rd type carrier) | T-7136 | 12.00 |
| TUPAT | A-7792 | Adjusting nut for pinion shaft bearing, rear (with 1st or 2nd type carriers) | T-6442 | 4.00 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BARAT | A-7793 | Adjusting nut with mounting 454-C for pinion shaft bearing, rear (with 3rd type carrier) | T-7137 | 17.00 |
| DARAT | A-7794 | Lock for adjusting collar (used with 1st type differential carrier) | T-6443 | .30 |
| FARAT | A-7795 | Lock for adjusting collar (used with 2nd or 3rd type differential carriers) | T-6802 | .30 |
| LARAT | A-7801 | Clamp bolt in carrier for adjusting collar (used with 1st type carrier) | X-1197 | .25 |
| PARAT | A-7802 | Clamp bolt in carrier for adjusting collar (used with 2nd or 3rd type carrier) | X-997 | .30 |
| SARAT | A-7804 | Nut for clamp bolt (used with 1st type carrier) | X-429 | .10 |
| TARAT | A-7805 | Nut for clamp bolt (used with 2nd or 3rd type carrier) | X-726 | .05 |
| ZARAT | A-7806 | Lock washer, per doz: .25 | 11310 | .05 |
| BERAT | A-7807 | Cotter pin through nut and clamp bolt (used on 1st type carrier) per doz. .25 | 15165 | .05 |
| DERAT | A-7808 | Cover for adjusting port on carrier (used on top of 1st type carrier on 57) | T-6444 | .15 |
| KERAT | A-7809 | Cover for adjusting port on carrier marked, "Ratio 4½ to 1," (used on side of 2nd or 3rd type carrier) | T-6823 | .60 |
| MERAT | A-7810 | Cover for adjusting port on carrier marked, "Ratio 5 to 1", (used on side of 2nd or 3rd type carrier) | T-6822 | .60 |
| RERAT | A-7811 | Felt for adjusting port, (used with 1st type carrier) | T-6445 | .05 |
| SERAT | A-7812 | Rivet, felt to cover (used with 1st type carrier) | 50922 | .03 |
| TERAT | A-7813 | Gasket for adjusting port cover (used with 2nd or 3rd type carrier) | T-6801 | .10 |
| ZERAT | A-7814 | Screw, adjusting port cover (used with 2nd or 3rd type carrier) | 50078 | .10 |
| BIRAT | A-7816 | Packing for pinion front bearing (2 pieces) | 50607 | .40 |
| CIRAT | A-7818 | Cup for pinion bearing packing | T-6436 | .90 |
| DIRAT | A-7820 | Spring for packing cup | T-6437 | .15 |
| FIRAT | A-7822 | Washer for packing for pinion front bearing | 50608 | .10 |
| KIRAT | A-7825 | Lock pin in front cover for packing cup | T-6961 | .15 |
| LIRAT | A-7826 | Cover on front end of carrier (with 1st or 2nd type carrier) | T-6438 | .40 |
| MIRAT | A-7827 | Cover on front end of carrier (with 3rd type carrier) | T-7138 | .60 |
| PIRAT | A-7828 | Screw for end cover of carrier | T-6439 | .05 |
| RIRAT | A-7829 | Locking wire for screws in end cover of carrier | T-4876 | .05 |
| SIRAT | A-7830 | Paper gasket for front end cover of carrier (with 1st or 2nd type carrier) | T-6450 | .05 |
| ZIRAT | A-7831 | Paper gasket for front end cover of carrier (with 3rd type carrier) | T-7139 | .05 |
| BORAT | A-7832 | Shaft for torsion arm in carrier | 51725 | 2.60 |
| TIRAT | A-7832B | Shaft for torsion arm in carrier (.015 oversize) | 39957 | 2.75 |
| CORAT | A-7833 | Castle nut on shaft | 50203 | .20 |
| DORAT | A-7834 | Washer on shaft | 50204 | .10 |
| FORAT | A-7835 | Cotter pin through nut and shaft | 15207 | .05 |
| KORAT | A-7837 | Dust cap for upper end of shaft for torsion arm | 50207 | .05 |
| LORAT | A-7838 | Clamp bolt for torsion shaft | 50205 | .10 |
| MORAT | A-7839 | Nut for clamp bolt | 50206 | .05 |
| PORAT | A-7840 | Lock washer, per doz. .25 | 11337 | .05 |
| RORAT | A-7841 | Spacing washer (.132) for torsion shaft | 50208 | .10 |
| SORAT | A-7842 | Spacing washer (.128) for torsion shaft | 50209 | .10 |
| TORAT | A-7843 | Spacing washer (.124) for torsion shaft | 50210 | .15 |
| ZORAT | A-7844 | Pin for spacing washer | 50211 | .05 |

## EXTERNAL BRAKE BAND

| | | | | |
|---|---|---|---|---|
| BURAT | A-7850 | External brake band, RIGHT, with lining and end clips | 22939 | 8.00 |
| CURAT | A-7851 | External brake band, LEFT, with lining and end clips | 22940 | 8.00 |
| DURAT | A-7852 | Lining with 28 rivets, 50922, for external brake band, 2½" x 54" long | 33528 | 3.00 |
| KURAT | A-7853 | Rivet, lining to external brake band | 50922 | .03 |
| LURAT | A-7854 | End clip, upper, for external brake band | 50021 | .40 |
| MURAT | A-7855 | End clip, lower, for external brake band | 50022 | .50 |
| PURAT | A-7856 | Rivet, end clip to external brake band, per doz. .25 | 17610 | .05 |
| RURAT | A-7857 | Anchor for external brake band | 50019 | 1.50 |
| SURAT | A-7858 | Rivet, anchor to external brake band, per doz. .25 | 17637 | .05 |
| TURAT | A-7860 | Anchor bracket for external brake band | 50028 | .80 |
| ZURAT | A-7861 | Rivet, anchor bracket to external brake band, per doz. .25 | 17610 | .05 |






DIFFERENTIAL AND CARRIER

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BABAX | A-7862 | Washer for anchor bracket (special) | 50029 | .05 |
| CABAX | A-7865 | Pin for anchor bracket | 50047 | .50 |
| DABAX | A-7866 | Washer ($\frac{1}{16}$") for pin (as required) | 50051 | .05 |
| FABAX | A-7867 | Washer ($\frac{3}{32}$") for pin (as required) | 50049 | .05 |
| KABAX | A-7868 | Washer ($\frac{1}{8}$") for pin (as required) | 50050 | .05 |
| LABAX | A-7870 | Nut on pin for anchor bracket | 50048 | .08 |
| MABAX | A-7871 | Spring on pin for anchor bracket | 50057 | .05 |
| PABAX | A-7872 | Washer for spring, per doz. .25 | 51754 | .05 |
| RABAX | A-7873 | Retainer for spring | 50058 | .03 |
| SABAX | A-7874 | Cotter pin for spring, per doz. .25 | 15162 | .05 |
| TABAX | A-7878 | Adjusting stop screw in anchor bracket | 50052 | .20 |
| ZABAX | A-7882 | Spring for adjusting stop screw | 50053 | .05 |
| BEBAX | A-7884 | Washer for spring, per doz. .25 | 50054 | .05 |
| CEBAX | A-7885 | Retainer for spring | 50055 | .05 |
| DEBAX | A-7886 | Felt washer for adjusting stop screw | 50056 | .03 |
| FEBAX | A-7887 | Cotter pin for adjusting stop screw, per doz. .25 | 15179 | .05 |
| KEBAX | A-7888 | Supporting bracket, RIGHT, for external brake band | 50023 | .50 |
| LEBAX | A-7889 | Supporting bracket, LEFT, for external brake band | 50025 | .50 |
| MEBAX | A-7890 | Eye bolt for supporting bracket | 50060 | .50 |
| PEBAX | A-7891 | Nut for eye bolt | 50061 | .05 |
| REBAX | A-7892 | Lock washer, per doz. .25 | 11337 | .05 |
| SEBAX | A-7893 | Rivet, supporting bracket to external brake band, ($\frac{5}{16}$" long), per doz. .25 | 17607 | .05 |
| ZEBAX | A-7894 | Rivet, supporting bracket to external brake band, ($\frac{1}{2}$" long), per doz. .25 | 17605 | .05 |
| CIBAX | A-7895 | Yoke bolt for external brake band | 50030 | .80 |
| DIBAX | A-7896 | Pin through yoke bolt and lever | 50045 | .15 |
| FIBAX | A-7897 | Expanding spring for external brake band | 50059 | .05 |
| KIBAX | A-7898 | Washer for expanding spring, upper, per doz. .25 | 4526 | .05 |
| LIBAX | A-7899 | Washer for expanding spring, lower, per doz. .25 | 50035 | .05 |
| MIBAX | A-7900 | Jamb nut for yoke bolt | 50033 | .05 |
| PIBAX | A-7901 | Stop nut for yoke bolt | 50032 | .10 |
| RIBAX | A-7902 | Adjusting nut for yoke bolt | 50031 | .50 |
| SIBAX | A-7904 | Lever, RIGHT, on band to operate external brake | 50039 | 1.60 |
| TIBAX | A-7906 | Lever, LEFT, on band to operate external brake | 50042 | 1.60 |
| ZIBAX | A-7907 | *Pin for lever and end clip* | 50045 | .15 |
| BOBAX | A-7908 | Cotter pin, per doz. .25 | 15165 | .05 |
| COBAX | A-7909 | Stop screw for lever operating external brake | 50040 | .05 |
| DOBAX | A-7910 | Check nut for stop screw | 11719 | .05 |
| FOBAX | A-7911 | Pull back spring for lever operating external brake | 38655 | .10 |
| KOBAX | A-7912 | Steady bracket for external brake band (on dust shield) | 50027 | .05 |
| LOBAX | A-7913 | Guide plate for steady bracket | 50036 | .05 |
| MOBAX | A-7914 | Rivet, guide plate to steady bracket, per doz, .25 | 17605 | .05 |

## INTERNAL BRAKE BAND

| | | | | |
|---|---|---|---|---|
| POBAX | A-7945 | Internal brake band with lining, end clips and anchor bracket | 40418 | 8.00 |
| ROBAX | A-7946 | Lining with 22 rivets, (50922) for internal brake band, 2½" x 51" long | 33529 | 2.80 |
| TOBAX | A-7947 | Rivet, lining to internal brake band | 50922 | .03 |
| ZOBAX | A-7948 | End clip for internal brake band | 50079 | .75 |
| BUBAX | A-7949 | Anchor bracket for internal brake band | 50063 | .75 |
| CUBAX | A-7950 | Rivet, end clip to anchor bracket, per doz. .25 | 50064 | .05 |
| DUBAX | A-7952 | Pin for anchor bracket | 50095 | .40 |
| FUBAX | A-7954 | Nut for anchor bracket pin | 50096 | .08 |
| KUBAX | A-7956 | Adjusting screw in anchor bracket | 50104 | .10 |
| LUBAX | A-7957 | Cotter pin through adjusting screw, per doz. .25 | 15179 | .05 |
| MUBAX | A-7959 | Steady bracket for internal brake band, upper RIGHT, lower LEFT | 50071 | .60 |
| RUBAX | A-7960 | Steady bracket for internal brake band, upper LEFT, lower RIGHT | 50069 | .60 |
| TUBAX | A-7961 | Steady bracket for internal brake band upper rear (2 used) | 50067 | .60 |
| ZUBAX | A-7962 | Rivet to attach steady bracket, per doz. .25 | 17607 | .05 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADAX | A-7963 | Releasing spring for internal brake | 50111 | .05 |
| CADAX | A-7964 | Adjusting stop screw for internal brake band | 50105 | .10 |
| DADAX | A-7965 | Locking screw for adjusting stop screw | 50078 | .10 |
| FADAX | A-7966 | Washer on locking screw, per doz. .25 | 11337 | .05 |
| KADAX | A-7967 | Toggle bracket, outer, upper RIGHT, lower LEFT for toggle adjusting screw | 50075 | .80 |
| MADAX | A-7968 | Toggle bracket, outer, upper LEFT, lower RIGHT for toggle adjusting screw | 50074 | .80 |
| RADAX | A-7969 | Toggle bracket, inner, narrow fork, for adjusting screw | 50077 | .80 |
| SADAX | A-7970 | Toggle bracket, inner, wide fork, for adjusting screw | 50076 | .80 |
| TADAX | A-7971 | Clamp screw for toggle bracket | 50078 | .10 |
| ZADAX | A-7972 | Lock washer for clamp screw, per doz. .25 | 11316 | .05 |
| BEDAX | A-7973 | Pin for outer toggle bracket | 50100 | .15 |
| CEDAX | A-7974 | Cotter pin for outer toggle pin, per doz. .25 | 15176 | .05 |
| DEDAX | A-7975 | Stop lock to limit travel of toggles | 50113 | .05 |
| FEDAX | A-7976 | Rivet for stop lock, per doz. .25 | 17605 | .05 |
| KEDAX | A-7977 | Adjusting screw for toggle | 50103 | .15 |
| LEDAX | A-7979 | Link for toggle for internal brake | 50094 | .60 |
| MEDAX | A-7980 | Pin, upper, for link and toggle | 50102 | .15 |
| PEDAX | A-7981 | Pin, lower, for link and toggle | 50101 | .15 |
| REDAX | A-7982 | Cotter pin for toggle link pins, per doz. .25 | 15163 | .05 |
| SEDAX | A-7983 | Expansion lever for internal brake | 50081 | .60 |
| TEDAX | A-7984 | Taper pin for expansion lever, per doz. .25 | 15030 | .05 |
| ZEDAX | A-7985 | Contracting spring for internal brake | 50110 | .08 |
| BIDAX | A-7986 | Stud for contracting spring | 50115 | .05 |
| CIDAX | A-7987 | Anti-rattling spring for internal brake | 50109 | .05 |
| DIDAX | A-7988 | Pin for anti-rattling spring | 50097 | .08 |
| FIDAX | A-7989 | *Cotter pin, per doz. .25* | 15173 | .05 |
| KIDAX | A-7990 | Inner washer for anti-rattling spring | 50098 | .05 |
| LIDAX | A-7991 | Outer washer for anti-rattling spring, per doz. .25 | 4526 | .05 |

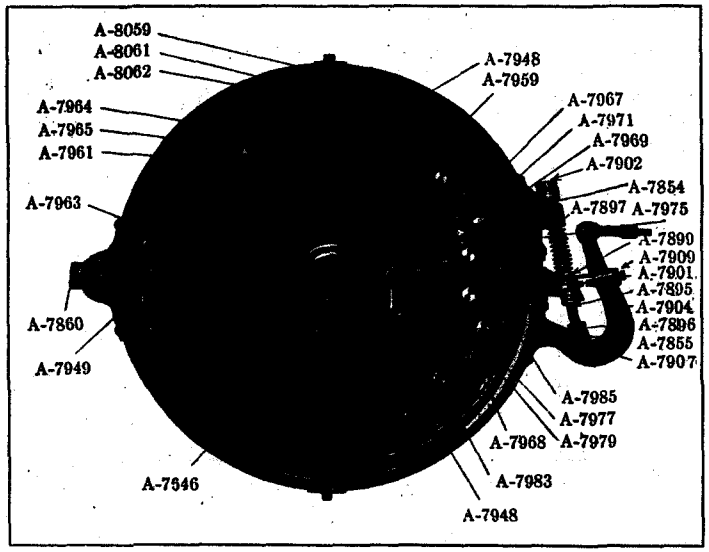
## SHAFTS AND LEVERS ON REAR AXLE FOR INTERNAL BRAKE

| | | | | |
|---|---|---|---|---|
| MIDAX | A-8003 | Shaft for internal brake, RIGHT | 50108 | 1.50 |
| PIDAX | A-8004 | Shaft for internal brake, LEFT | 50107 | 1.50 |
| RIDAX | A-8005 | *Spacing spring on brake shaft* | 50112 | .05 |
| SIDAX | A-8006 | Washer on brake shaft for internal pull back spring | 50116 | .08 |
| TIDAX | A-8007 | Cotter pin in shaft for washer, per doz. .25 | 15176 | .05 |
| ZIDAX | A-8009 | Bracket for internal brake shaft on carrier, RIGHT | 50066 | 1.00 |
| BODAX | A-8010 | Bracket for internal brake shaft on carrier, LEFT | 50065 | 1.00 |
| CODAX | A-8011 | Self-lubricating bushing in bracket for internal brake shaft (2 used) | 50073 | .60 |
| FODAX | A-8012 | Self-lubricating bushing in brake spider (2 used) | 50163 | .45 |
| KODAX | A-8014 | Lever on outer end of brake shaft, RIGHT | 50088 | 1.60 |
| LODAX | A-8017 | Lever on outer end of brake shaft, LEFT | 50083 | 2.20 |
| MODAX | A-8019 | Clamp bolt for brake shaft lever | 50084 | .08 |
| PODAX | A-8020 | Nut on clamp bolt | 50085 | .05 |
| RODAX | A-8021 | Lock washer | 11306 | .05 |
| SODAX | A-8022 | Stop screw, short, for operating lever | 50091 | .05 |
| TODAX | A-8023 | Stop screw, long, for operating lever | 50291 | .20 |
| ZODAX | A-8024 | Nut for stop screw | 50087 | .05 |

## WHEELS

**Specify engine number or color when ordering wheels, that we may supply parts painted the proper color.**

| | | | | |
|---|---|---|---|---|
| RUDAX | A-8032 | Front wheel with hub, less rim and lugs (34 x 4½) | 22753 | 29.00 |
| BUDAX | A-8032B | Front wheel with hub less rim lugs (34x4½ special size on 55) (Natural wood finish) | 22995 | 32.57 |
| SUDAX | A-8033 | Rear wheel with hub and brake drum, less rim and lugs (34 x 4½) | 22754 | 49.00 |
| CUDAX | A-8033B | Rear wheel with hub and brake drum less rim and lugs (34x4½ special size on 55) (Natural wood finish) | 22996 | 52.75 |
| TUDAX | A-8036 | *Front wheel, wood parts and felloe band (34 x 4½)* | 33410 | 13.00 |
| ZUDAX | A-8037 | Rear wheel, wood parts and felloe band, (34 x 4½) | 33409 | 14.00 |
| DUDAX | A-8037B | Front wheel wood parts and felloe band (34x4½ special size on 55) (Natural wood finish) | 34857 | 16.75 |
| FUDAX | A-8037C | Rear wheel wood parts and felloe band (34x4½ special size on 55) (Natural wood finish) | 34858 | 17.75 |




INTERNAL AND EXTERNAL BRAKE BANDS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| MIFAX | A-8038 | Front wheel, wood parts and felloe band, used with millimeter tires | 19229 | 14.00 |
| RIFAX | A-8039 | Rear wheel, wood parts and felloe band used with millimeter tires | 19228 | 15.00 |
| SIFAX | A-8041 | Felloe band only (34 x 4½) | 3467-KW | 2.00 |
| TIFAX | A-8044 | Hub (inside, having round bolt holes) with bearing mountings for front wheel | 52156 | 12.00 |
| BOFAX | A-8045 | Flange (outside, having square bolt holes) for front wheel hub | 52168 | 2.00 |
| COFAX | A-8046 | Mounting for inside bearing for front wheel | 37915 | 2.95 |
| DOFAX | A-8047 | Mounting for outside bearing for front wheel | 37914 | 2.10 |
| FOFAX | A-8048 | Inside flange with bearing mountings for rear wheel hub | 52157 | 12.50 |
| KOFAX | A-8049 | Outside flange for rear wheel | 52159 | 7.00 |
| ZIFAX | A-8049B | Outside flange for rear wheel, slots **.025 undersize** | 51947 | 10.00 |
| LOFAX | A-8050 | Bearing for rear wheel | 50212 | 4.25 |
| MOFAX | A-8051 | Mounting for bearing for rear wheel | 37916 | 2.90 |
| POFAX | A-8052 | Adjusting nut for rear wheel bearing | 50222 | .50 |
| ROFAX | A-8053 | Adjusting washer for rear wheel bearing | 50223 | .30 |
| SOFAX | A-8054 | Dust felt for rear wheel inner bearing | 11818 | .10 |
| TOFAX | A-8055 | Inner retainer for dust felt | 50218 | .10 |
| ZOFAX | A-8056 | Outer retainer for dust felt | 50219 | .10 |
| BUFAX | A-8057 | Wire retainer for dust felt | 50220 | .05 |
| CUFAX | A-8058 | Brake drum for rear wheel | 52160 | 7.50 |
| DUFAX | A-8059 | Cover complete for peep hole in brake drum | 26488 | 1.00 |
| LUFAX | A-8062 | Lock nut, large, for bolt | 50206 | .05 |
| MUFAX | A-8063 | Handle nut, small, for bolt | 10892 | .05 |
| PUFAX | A-8065 | Bolt for front wheel hub | 33160 | .05 |
| RUFAX | A-8066 | Bolt for rear wheel hub | 32380 | .05 |
| SUFAX | A-8068 | Brake drum bolt for rear wheel | 32382 | .10 |
| TUFAX | A-8069 | Nut for brake drum and hub bolts | 52161 | .05 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAGAX | A-8071 | Oiler in rear wheel hub | 52160 | .15 |
| CAGAX | A-8073 | Hub cap for front wheel | 50411 | 1.75 |
| DAGAX | A-8074 | Hub cap for rear wheel | 50412 | 2.50 |
| FAGAX | A-8075 | Wrench for hub cap and jamb nut on spindle | 34011 | .75 |

## RIMS FOR WHEELS

| | | | | |
|---|---|---|---|---|
| KAGAX | A-8081 | Kelsey straight side demountable rim with ring | 34044 | 6.00 |
| LAGAX | A-8082 | Kelsey universal demountable rim with rings | 34045 | 7.10 |
| MAGAX | A-8083 | Kelsey universal demountable rim with rings for (895 x 135) millimeter tires | 51805 | 8.00 |
| RAGAX | A-8086 | Outside locking ring for straight side demountable rim (34 x 4½) | 50625 | 2.00 |
| SAGAX | A-8087 | Outside locking ring for universal demountable rim (34 x 4½) | 3468-KW | 2.30 |
| TAGAX | A-8088 | Outside locking ring for universal demountable rim (895 x 135) millimeter tires | 51806 | 2.45 |
| BEGAX | A-8090 | Inside ring for universal demountable rim (34 x 4½) | 3469-KW | 1.70 |
| CEGAX | A-8091 | Inside ring for universal demountable rim (895 x 135) millimeter tires | 51807 | 1.70 |
| FEGAX | A-8093 | Clamping ring, straight side or universal demountable rim on wheel (34 x 4½) | 50626 | .45 |
| ZEGAX | A-8093B | Clamping ring for universal demountable rim (895x135 M. M. tires) | 38519 | .45 |
| LEGAX | A-8094 | Lock for outside locking ring | 50623 | .25 |
| MEGAX | A-8095 | Rivet to attach lock, per doz. .25 | 50624 | .05 |
| PEGAX | A-8096 | Bolt for rims | 38515 | .10 |
| REGAX | A-8097 | Nut and wedge assembled for rims | 52938 | .20 |
| SEGAX | A-8098 | Stop pin for nut and wedge | 3477-KW | .03 |
| TEGAX | A-8099 | Driving stud for rim | $5062_2$ | .10 |

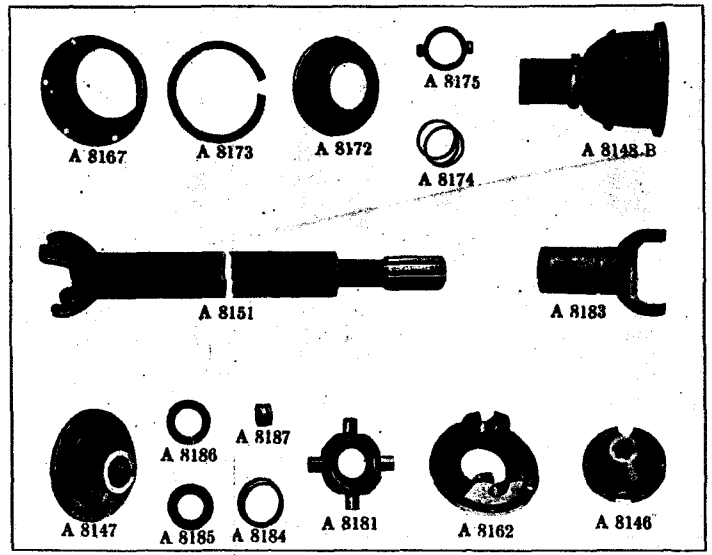
## TORSION ARM

| | | | | |
|---|---|---|---|---|
| LIGAX | A-8105 | Torsion arm with riveted parts and bushings | 23331 | 18.50 |
| MIGAX | A-8107 | End, front, for torsion arm | 31805 | 3.50 |
| PIGAX | A-8109 | Support with bushing for front end of torsion arm | 21508 | 3.50 |
| RIGAX | A-8110 | Bushing for torsion arm support | 30829 | .30 |
| SIGAX | A-8112 | Spring on torsion arm support (2 used) | 30833 | .40 |
| TIGAX | A-8114 | Washer on lower end of support for spring | 30828 | .10 |
| ZIGAX | A-8115 | Castle nut on support | 9197 | .10 |
| BOGAX | A-8116 | Cotter pin, per doz. .25 | 15175 | .05 |
| COGAX | A-8117 | Seat above and below end on support for spring | 30830 | .55 |
| DOGAX | A-8118 | Bolt, torsion arm support to cross member | 18309 | .75 |
| FOGAX | A-8119 | Nut on bolt | 6411 | .10 |
| KOGAX | A-8120 | Lock washer, per doz. .25 | 11310 | .05 |
| LOGAX | A-8121 | Grease cup for bolt in front support and shaft at rear end of torsion arm | 17054 | .50 |
| DUGAX | A-8121C | Bracket with bushing lower rear end of torsion arm | 42002 | 3.50 |
| FUGAX | A-8121D | Bracket with bushing upper rear end of torsion arm | 42001 | 3.50 |
| POGAX | A-8122 | Bushings in rear end of torsion arm (2 used) | 19145 | .85 |
| ROGAX | A-8127 | Pipe extension for grease cup, at rear end of torsion arm | 37751 | .20 |
| SOGAX | A-8128 | Elbow for grease cup extension | 30382 | .15 |
| TOGAX | A-8129 | Coupling for grease cup extension | 19754 | .08 |
| ZOGAX | A-8130 | Support for extension | 37752 | .05 |
| BUGAX | A-8131 | Screw to attach support | 11613 | .03 |
| CUGAX | A-8132 | Lock washer, per doz. .25 | 11314 | .05 |

## UNIVERSAL JOINTS AND CASINGS

| | | | | |
|---|---|---|---|---|
| PUGAX | A-8142 | Spicer universal joints complete with shaft (F) | 37539 | 41.00 |
| RUGAX | A-8143 | Spicer universal joints complete with shaft (G) | 37540 | 55.00 |
| SUGAX | A-8144 | Spicer universal joints complete with shaft (H) | 37541 | 65.00 |
| TUGAX | A-8146 | Flange on transmission drive shaft for universal joint | 37266 | 5.00 |
| ZUGAX | A-8147 | Flange on rear axle pinion shaft for universal joint | 19382 | 4.50 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAHAX | A-8148-B | Joint complete for front end of shaft | 431-A | 14.00 |
| CAHAX | A-8151 | Shaft for joints with rear end ball joint 2608-SF, and stub shaft 2607-SF (F) | 2609-SF | 17.50 |
| FAHAX | A-8154 | Shaft for joints with stub shafts (G) | 41817 | 26.50 |
| KAHAX | A-8157 | Shaft for joints with stub shafts (H) | 41818 | 35.00 |
| LAHAX | A-8159 | Ball yoke on shaft for rear joint (G) (H) | 4-4-8 | 3.85 |
| MAHAX | A-8160 | Nut retaining ball yoke on shaft (G) (H) | 54-16 | .65 |
| PAHAX | A-8161 | Cotter pin for nut on shaft (G) (H), per doz. .25 | 15169 | .05 |
| RAHAX | A-8162 | Yoke flange, either end | 3176-SF | 4.50 |
| SAHAX | A-8163 | Bolt, attaching yoke flange | 34030 | .08 |
| TAHAX | A-8164 | Nut | 33426 | .05 |
| ZAHAX | A-8165 | Lock washer, per doz. .25 | 11315 | .05 |
| BEHAX | A-8167 | Inside casing for joint, either end | 2635-SF | .85 |
| CEHAX | A-8169 | Oil hole plug for inside casing | 50516 | .05 |
| DEHAX | A-8171 | Cotter pin for oil hole plug, per doz. .25 | 15175 | .05 |
| FEHAX | A-8172 | Outside casing for joint, either end | 4-9-1 | .90 |
| KEHAX | A-8173 | Packing in outside casing | 4-10-1 | .15 |
| LEHAX | A-8174 | Spring for outside casing | 4-12-1 | .20 |
| MEHAX | A-8175 | Lock nut for spring against outside casing | 5-13-12 | .80 |
| PEHAX | A-8176 | Screw for lock nut | 4-73-1117 | .05 |
| MIHAX | A-8176B | Nut for screw | 4-74-11 | .05 |
| REHAX | A-8177 | Lock washer, per doz. .25 | 11314 | .05 |
| SEHAX | A-8181 | Cross for yoke, either end | 50513 | 2.50 |
| TEHAX | A-8183 | Sleeve yoke on shaft for front joint | 3170-SF | 4.00 |
| ZEHAX | A-8184 | Knurled dust cap for sleeve yoke | 4-14-1 | .85 |
| BIHAX | A-8185 | Felt washer in dust cap for sleeve yoke | 8776 | .10 |
| CIHAX | A-8186 | Flat split washer for retaining felt washer in dust cap | 4-15-1 | .10 |
| DIHAX | A-8187 | Steel bushing in yoke for cross (4 used), either end | 50509 | .20 |
| FIHAX | A-8188 | Wire retainer for bushing | 50520 | .05 |
| KIHAX | A-8191 | Casing for front end of universal joint | 37297 | .80 |
| LIHAX | A-8193 | Clip for casing with button (plain) | 23773 | .15 |




UNIVERSAL JOINTS



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAKAX | A-8194 | Clip for casing with button (tapped) | 41770 | .15 |
| CAKAX | A-8196 | Screw, casing to clip, per doz. .25 | 37496 | .05 |
| DAKAX | A-8198 | Screw, clip to transmission | 10007 | .05 |
| FAKAX | A-8200 | Lock washer, per doz. .25 | 11315 | .05 |

## WINDSHIELDS, FRAMES AND GLASSES FOR WINDSHIELDS—OPEN CARS

**NOTE: Two types of windshields were used on Type 57 (P-2)and(R-2). The upper glass is 9 13/32" wide on the first type and 7 11/32" wide on the second type. The latter was used on all (P-2) and (R-2), shipped after April 10, 1919. Specify engine number when ordering.**

| | | | | |
|---|---|---|---|---|
| TAKAX | A-8213 | Windshield complete (7P) (P-1) | 37400 | 50.00 |
| ZAKAX | A-8214 | Windshield complete (R-1) | 38085 | 50.00 |
| BEKAX | A-8215 | Windshield complete (P-2) (R-2) 1st Type | 38144 | 55.00 |
| CEKAX | A-8216 | Windshield complete (P-2) (R-2) 2nd type | 38633 | 50.00 |
| DEKAX | A-8229 | Frame with glass, upper (7P) (P-1) | 41779 | 22.50 |
| FEKAX | A-8230 | Frame with glass, upper (R-1) | 41780 | 22.50 |
| KEKAX | A-8231 | Frame with glass, lower (7P) (P-1) (R-1) | 41782 | 22.50 |
| LEKAX | A-8232 | Frame with glass, upper (P-2) (R-2) 1st Type | 41781 | 22.50 |
| MEKAX | A-8233 | Frame with glass, upper (P-2) (R-2) 2nd Type | 41877 | 22.50 |
| PEKAX | A-8234 | Frame with glass, lower (P-2) (R-2) | 41783 | 16.00 |
| REKAX | A-8244 | Glass for upper frame (7P) (P-1) | 37401 | 9.50 |
| SEKAX | A-8245 | Glass for upper frame (R-1) | 38082 | 9.50 |
| TEKAX | A-8246 | Glass for lower frame (7P) (P-1) (R-1) | 37402 | 9.50 |
| ZEKAX | A-8247 | Glass for upper frame (P-2) (R-2) 1st Type (9 13/32" wide) | 38148 | 12.00 |
| BIKAX | A-8248 | Glass for upper frame (P-2) (R-2) 2nd Type (7 11/32" wide) | 38629 | 10.00 |
| CIKAX | A-8249 | Glass for lower frame (P-2) (R-2) | 33458 | 11.00 |
| DIKAX | A-8250 | Cap for corner of frame and glass (OC) | 16569 | .25 |
| FIKAX | A-8251 | Screw, flat head, to attach corner caps | 11553 | .05 |
| KIKAX | A-8252 | Felt packing for glass in frame | 45356 | .15 |
| LIKAX | A-8253 | Handle for lower frame of windshield (OC) except (P-2) (R-2) | 19244 | .25 |
| MIKAX | A-8254 | Handle for lower frame of windshield (P-2) (R-2) | 38277 | .25 |
| PIKAX | A-8255 | Screw for windshield handle, per doz. .25 | 11867 | .05 |
| RIKAX | A-8256 | Nut for windshield handle screw | 19242 | .05 |

## SUPPORTS, LINKS AND CONES FOR WINDSHIELDS OPEN CARS

| | | | | |
|---|---|---|---|---|
| KOKAX | A-8272 | Support for windshield, RIGHT (7P) (P-1) | 38044 | 6.00 |
| LOKAX | A-8273 | Support for windshield, LEFT (7P) (P-1) | 38045 | 6.00 |
| MOKAX | A-8274 | Support for windshield, RIGHT (R-1) | 38083 | 10.00 |
| POKAX | A-8275 | Support for windshield, LEFT (R) | 38084 | 10.00 |
| ROKAX | A-8276 | Support for windshield, RIGHT (P-2) (R-2) 1st Type | 38145 | 10.00 |
| SOKAX | A-8277 | Support for windshield, LEFT (P-2) (R-2) 1st Type | 38146 | 10.00 |
| TOKAX | A-8278 | Support for windshield, RIGHT (P-2) (R-2) 2nd Type | 38631 | 9.50 |
| ZOKAX | A-8279 | Support for windshield, LEFT (P-2) (R-2) 2nd Type | 38632 | 9.50 |
| BUKAX | A-8281 | Nut, support to body (OC) | 11686 | .25 |
| CUKAX | A-8282 | Lock washer, per doz. .25 | 11320 | .05 |
| DUKAX | A-8283 | Bushing in cowl for windshield support | 16362 | .80 |
| FUKAX | A-8290 | Cone, loose, for upper or lower joints | 16558 | .60 |
| KUKAX | A-8291 | Cone for upper joints, fixed | 16559 | .80 |
| LUKAX | A-8292 | Cone for lower joints, fixed | 16560 | .75 |
| MUKAX | A-8294 | Wing nut for upper and lower joints | 16564 | .80 |
| PUKAX | A-8296 | Cap screw for studs in center of wing nuts (left hand thread) | 11552 | .15 |
| RUKAX | A-8297 | Lock washer on cap screw | 11349 | .08 |
| SUKAX | A-8298 | Plain washer for wing nuts at joints | 11428 | .10 |
| TUKAX | A-8299 | Lock washer on studs for wing nuts | 11338 | .05 |
| ZUKAX | A-8300 | Stud for upper and lower joints | 16562 | .20 |

## RAIN STRIP AND RUBBER MOULDING FOR WINDSHIELDS—OPEN CARS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BALAX | A-8304 | Rain strip between upper and lower glasses (OC) except (P-2) (R-2) | 32040 | .60 |
| DALAX | A-8305 | Rain strip between upper and lower glasses (P-2) (R-2) | 32040 | .60 |
| FALAX | A-8309 | Rubber moulding under windshield (P-2) (R-2) | 33464 | 1.10 |
| KALAX | A-8310 | Rubber moulding under windshield (7-P) (P-1) (R-1) | 37393 | 1.10 |
| LALAX | A-8314 | Reinforcement for moulding under windshield (P-2) (R-2) | 33466 | 2.00 |
| MALAX | A-8315 | Reinforcement for moulding under windshield (7P) (P-1) (R-1) | 37397 | 1.50 |
| PALAX | A-8317 | Reinforcement for moulding on sides of windshield (2 used) (P-2) (R-2) | 33465 | .50 |
| SALAX | A-8318 | Reinforcement for moulding on sides of windshields (2 used)(7-P) (P-1) (R-1) | 37396 | .75 |
| ZALAX | A-8319 | Screw ½" long, reinforcement to body | 11835 | .05 |
| BELAX | A-8320 | Screw ⅝" long, reinforcement to body | 11899 | .05 |
| CELAX | A-8321 | Screw ⅞" long, reinforcement to body | 11988 | .05 |
| DELAX | A-8323 | Stud fasteners on windshield support for side curtains | 33338 | .05 |

## RAIN VISION SHIELD—CLOSED CARS

| | | | | |
|---|---|---|---|---|
| KELAX | A-8337 | Rain vision frame with glass (I) (7-B) | 23558-F | 22.75 |
| LELAX | A-8338 | Rain vision frame with glass (V-1) | 22860-F | 24.00 |
| MELAX | A-8339 | Rain vision frame with glass (V-2) | 27337-F | 27.50 |
| PELAX | A-8340 | Rain vision frame with glass (B-1) | 24095-F | 25.50 |
| RELAX | A-8341 | Rain vision frame with glass (B-2) | 27855-F | 27.50 |
| SELAX | A-8342 | Rain vision frame with glass (L) (LD) | 24142-F | 22.75 |
| TELAX | A-8343 | Rain vision frame with glass (SB-1) | 25390-F | 27.50 |
| ZELAX | A-8344 | Rain vision frame with glass (SB-2) | 28538-F | 27.50 |
| BILAX | A-8354 | Glass for rain vision shield (L) (LD) | 23116-F | 11.25 |
| CILAX | A-8355 | Glass for rain vision shield (I) (7B) | 23554-F | 12.50 |
| DILAX | A-8356 | Glass for rain vision shield (V-1) | 22946-F | 11.75 |
| FILAX | A-8357 | Glass for rain vision shield (V-2) | 27339-F | 14.00 |
| KILAX | A-8358 | Glass for rain vision shield (B-1) | 24096-F | 14.00 |
| LILAX | A-8359 | Glass for rain vision shield (B-2) | 27857-F | 13.50 |
| MILAX | A-8360 | Glass for rain vision shield (SB-1) | 25392-F | 14.00 |
| PILAX | A-8361 | Glass for rain vision shield (SB-2) | 28540-F | 14.00 |
| RILAX | A-8365 | Clip on corner of rain vision frame for glass (CC) | 22706-F | .45 |
| SILAX | A-8370 | Screw for clip (CC) except (B-1) (B-2) (I) (LD) (7B) | 15-X-853 | .10 |
| TILAX | A-8371 | Screw for clip (B-1) (B-2) (I) (LD) (7B) | 14-X-854 | .06 |
| ZILAX | A-8378 | Piano hinge for rain vision shield (B-1) (B-2) | 184X-4437 | 1.65 |
| BOLAX | A-8378-B | Piano hinge for rain vision shield (B-2) | 239X-4162 | 1.65 |
| COLAX | A-8379 | Piano hinge for rain vision shield (I) (7B) | 184X-4137 | 1.65 |
| DOLAX | A-8380 | Piano hinge for rain vision shield (V-1) (V-2) | 184X-4537 | 1.65 |
| FOLAX | A-8380-B | Piano hinge for rain vision shield (V-2) | 239X-4312 | 1.65 |
| KOLAX | A-8381 | Piano hinge for rain vision shield (SB-1) (SB-2) | 363X-4412 | 1.65 |
| LOLAX | A-8381-B | Piano hinge for rain vision shield (SB-2 | 239X-4337 | 1.65 |
| POLAX | A-8387 | Quadrant arm for rain vision shield (CC) except (L) (LD) (TL) (TLD) | 22962-F | 2.25 |
| SOLAX | A-8387-B | Quadrant arm only for rain vision shield (V-2) (SB-2) (B-2) | 27363-F | 2.00 |
| TOLAX | A-8387-C | Knob for end of quadrant arm (B-2) (V-2) (SB-2) | 27438-F | .45 |
| ZOLAX | A-8387-D | Screw for knob (V-2) (B-2) (SB-2) | 27434-F | .12 |
| BULAX | A-8387-E | Bracket on sash for rain vision shield quadrant arm (V-2) (B-2) (SB-2) | 27365-F | 1.00 |
| DULAX | A-8387-F | Lock plug for bracket (V-2) (B-2) (SB-2) | 78-X-413 | .06 |
| FULAX | A-8398 | Knurled head adjusting screw for quadrant arm (CC) except (L) (LD) (TL) (TLD) | 21381-F | .55 |
| LULAX | A-8398-B | Knurled head screw in bracket (V-2) (B-2) (SB-2) | 27366-F | .45 |
| MULAX | A-8399 | Acorn nut for quadrant arm on rain vision shield (CC) except (L) (LD) (TL) (TLD) | 39-X-441A | .12 |
| RULAX | A-8400 | Washer under nut | 41-X-440A | .06 |
| ZULAX | A-8405 | Wing nut for friction hinge | 20733-A | .80 |



## UPPER WINDSHIELD FRAMES AND ATTACHMENTS CLOSED CARS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAMAX | A-8423 | Upper windshield frame with glass (V-1) | 24310-F | 23.25 |
| CAMAX | A-8424 | Upper windshield frame with glass (V-2) | 26406-F | 20.75 |
| DAMAX | A-8425 | Upper windshield frame with glass (B-1) | 24090-F | 22.00 |
| FAMAX | A-8426 | Upper windshield frame with glass (B-2) | 27847-F | 20.50 |
| KAMAX | A-8427 | Upper windshield frame with glass (L) (LD) | 24140-F | 22.50 |
| LAMAX | A-8428 | Upper windshield frame with glass (TL) (TLD) | 24880-F | 25.00 |
| MAMAX | A-8429 | Upper windshield frame with glass (SB-1) | 25388-F | 23.00 |
| PAMAX | A-8430 | Upper windshield frame with glass (SB-2) | 28532-F | 23.00 |
| RAMAX | A-8431 | Upper windshield frame with glass (I) (7-B) | 24587-F | 22.00 |
| SAMAX | A-8443 | Glass for upper windshield frame (L) (LD) | 23116-F | 11.25 |
| TAMAX | A-8444 | Glass for upper windshield frame (I) (7B) | 23554-F | 12.50 |
| ZAMAX | A-8445 | Glass for upper windshield frame (V-1) | 22946-F | 11.75 |
| BEMAX | A-8446 | Glass for upper windshield frame (V-2) | 27330-F | 8.75 |
| CEMAX | A-8447 | Glass for upper windshield frame (B-1) | 24096-F | 8.75 |
| DEMAX | A-8448 | Glass for upper windshield frame (B-2) | 27849-F | 8.75 |
| FEMAX | A-8449 | Glass for upper windshield frame (TL) (TLD) | 24877-F | 9.00 |
| KEMAX | A-8450 | Glass for upper windshield frame (SB-1) | 25392-F | 14.00 |
| LEMAX | A-8451 | Glass for upper windshield frame (SB-2) | 28534-F | 11.75 |
| MEMAX | A-8452 | Lifter handle or clip on upper windshield frame (CC) | 22349-F | .06 |
| PEMAX | A-8457 | Clip on corner of frame for glass (CC) except (TLD) (TL) | 22706-F | .45 |
| REMAX | A-8458 | Clip on corner of frame for glass (TL) (TLD) | 24887-F | .55 |
| SEMAX | A-8463 | Screw for clip (V-1) (V-2) (L) (SB-1) (SB-2) | 15-X-853 | .06 |
| TEMAX | A-8464 | Screw for clip (B-1) (B-2) (I) (LD) (7B) | 14-X-854 | .06 |
| ZEMAX | A-8465 | Screw for clip (TL) (TLD) | 24844-F | .10 |
| BIMAX | A-8466 | Rod connecting supports at top of windshield (TL) (TLD) | 24840-F | 4.40 |
| CIMAX | A-8467 | Screw, rod to supports (TL) (TLD) | 24827-F | .10 |
| DIMAX | A-8501 | Thumb screw for friction fixture (L) (LD) | 20733-F | .80 |
| FIMAX | A-8502 | Friction fixture, RIGHT (CC) except (L) (LD) (TL) (TLD) | 24064-F | 5.00 |
| KIMAX | A-8503 | Friction fixture, LEFT (CC) except (L) (LD) (TL) (TLD) | 24065-F | 5.00 |
| LIMAX | A-8503-B | Hinge body bracket, RIGHT for upper windshield (V-2) (B-2) (SB-2) | 26372-F | 2.00 |
| PIMAX | A-8503-C | Hinge body bracket, LEFT for upper windshield (V-2) (B-2) (SB-2) | 26373-F | 2.00 |
| SIMAX | A-8503-D | Hinge sash bracket, RIGHT on upper windshield (V-2) (B-2) (SB-2) | 27345-F | 1.50 |
| ZIMAX | A-8503-E | Hinge sash bracket, LEFT on upper windshield frame (V-2) (B-2) (SB-2) | 27346-F | 1.50 |
| COMAX | A-8503-F | Inner plate, RIGHT, for upper windshield hinge (V-2) (B-2) (SB-2) | 26378F | .20 |
| FOMAX | A-8503-G | Inner plate, LEFT, for upper windshield hinge (V-2) (B-2) (SB-2) | 26379-F | .20 |
| LOMAX | A-8504 | Friction fixture, RIGHT (L) (LD) | 24148-F | 15.50 |
| MOMAX | A-8505 | Friction fixture, LEFT (L) (LD) | 24149-F | 15.50 |
| POMAX | A-8506 | Thumb screw for friction fixture (CC) except (L) (LD) (TL) (TLD) | 22800-M | .55 |
| SOMAX | A-8506-B | Thumb screw assembly for upper windshield hinge (V-2) (B-2) (SB-2) | 27384-F | .80 |
| ZOMAX | A-8507 | Thumb screw for friction fixture (L) (LD) | 20733-F | .80 |
| BUMAX | A-8508 | Thumb nut for friction fixture (TL) (TLD) | 24807-A | .55 |

## LOWER WINDSHIELD FRAMES AND ATTACHMENTS CLOSED CARS

| | | | | |
|---|---|---|---|---|
| DUMAX | A-8523 | Lower windshield frame with glass (L) (LD) | 23111-F | 18.50 |
| BUMAX | A-8523B | Lower windshield frame with glass (L-2) | 26508-F | 18.50 |
| FUMAX | A-8524 | Lower windshield frame with glass (I) (7B) | 23557-F | 19.00 |
| KUMAX | A-8525 | Lower windshield frame with glass (V-1) | 22859-F | 18.00 |
| LUMAX | A-8526 | Lower windshield frame with glass (V-2) | 27331-F | 17.75 |
| MUMAX | A-8527 | Lower windshield frame with glass (B-1) | 24091-F | 18.00 |
| PUMAX | A-8528 | Lower windshield frame with glass (B-2) | 27850-F | 17.25 |
| RUMAX | A-8529 | Lower windshield frame with glass (SB-1) | 25456-F | 18.00 |
| SUMAX | A-8530 | Lower windshield frame with glass (SB-2) | 28535-F | 18.00 |
| TUMAX | A-8531 | Lower windshield frame with glass and weather strip (TL) (TLD) | 24881-F | 26.00 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADEF | A-8542 | Glass for lower windshield frame (L) (LD) | 23117-F | 9.00 |
| XADEF | A-8542B | Glass for lower windshield frame (L-2) | 26510-F | 9.00 |
| CADEF | A-8543 | Glass for lower windshield frame (I) (7B) | 23555-F | 9.00 |
| DADEF | A-8544 | Glass for lower windshield frame (V-1) | 22947-F | 8.00 |
| FADEF | A-8545 | Glass for lower windshield frame (V-2) | 27343-F | 7.80 |
| KADEF | A-8546 | Glass for lower windshield frame (B-1) | 24097-F | 9.00 |
| LADEF | A-8547 | Glass for lower windshield frame (B-2) | 27853-F | 7.50 |
| MADEF | A-8548 | Glass for lower windshield frame (SB-1) | 25458-F | 8.00 |
| PADEF | A-8549 | Glass for lower windshield frame (SB-2) | 28537-F | 8.00 |
| RADEF | A-8549-B | Glass for lower windshield frame (TL) (TLD) | 24888-F | 8.00 |
| SADEF | A-8554 | Clip for lower windshield glass (V-1) (V-2) | 22944-F | .55 |
| TADEF | A-8555 | Clip for lower windshield glass (B-1) (B-2) (SB-1) (SB-2) (L) (I) (LD) (7B) | 22706-F | .55 |
| BEDEF | A-8556 | Clip for glass in lower frame (TL) (TLD) | 24887-F | .55 |
| CEDEF | A-8561 | Screw for clip (V-1) (V-2) (L) (SB-1) (SB-2) | 15-X-853 | .06 |
| DEDEF | A-8562 | Screw for clip (B-1) (B-2) (I) (LD) (7B) | 14-X-854 | .06 |
| FEDEF | A-8563 | Screw for clip (TL) (TLD) | 24844-F | .10 |
| LEDEF | A-8563B | Lifter handle for lower windshield (CC) except (LD) (TLD) | 22215-F | .20 |
| KEDEF | A-8574 | Lower windshield ventilating hinge complete, RIGHT (V-1) (V-2) (B-1) (B-2) (SB-1) (SB-2) (I) (7B) | 22771-F | 1.20 |
| MEDEF | A-8575 | Lower windshield ventilating hinge complete, LEFT (V-1) (V-2) (B-1) (B-2) (SB-1) (SB-2) (I) (7B) | 22772-F | 1.20 |
| REDEF | A-8576 | Lower windshield ventilating hinge complete, RIGHT (L) (LD) | 23108-F | 1.00 |
| SEDEF | A-8577 | Lower windshield ventilating hinge complete, LEFT (L) (LD) | 23109-F | 1.00 |
| TEDEF | A-8586 | Bracket, RIGHT, on body for lower windshield hinge (L) (LD) | 20645-F | .45 |
| ZEDEF | A-8587 | Bracket, LEFT, on body for lower windshield hinge (L) (LD) | 20646-F | .45 |
| BIDEF | A-8588 | Bracket, RIGHT, on body for lower windshield hinge (V-1) (V-2) (B-1) (B-2) (SB-1) (SB-2) (I) (7B) | 22708-F | .45 |
| DIDEF | A-8589 | Bracket, LEFT, on body for lower windshield hinge (V-1) (V-2) (B-1) (B-2) (SB-1) (SB-2) (I) (7B) | 22709-F | .45 |
| KIDEF | A-8592 | Bracket, RIGHT, on frame for ventilating hinge (CC) | 21742-F | .20 |
| LIDEF | A-8593 | Bracket, LEFT, on frame for ventilating hinge (CC) | 21743 | .20 |
| MIDEF | A-8600 | Adjusting screw for ventilating fixture (V-1) (V-2) (B-1) (B-2) (SB-1) (SB-2) (I) (7B) | 20642-M | .45 |
| RIDEF | A-8601 | Adjusting screw for ventilating fixture (L) (LD) | 20642-A | .45 |
| SIDEF | A-8602 | Wing nut for hinge on lower frame (TL) (TLD) | 22800-F | .55 |

## WINDSHIELD STANDARDS AND WEATHER STRIPS—CLOSED CARS

| | | | | |
|---|---|---|---|---|
| BODEF | A-8618 | Windshield standard, RIGHT (L) (LD) | 24150-F | 24.75 |
| CODEF | A-8619 | Windshield standard, LEFT (L) (LD) | 24151-F | 24.75 |
| DODEF | A-8620 | Windshield standard, RIGHT (TL) (TLD) | 24837-F | 24.75 |
| FODEF | A-8621 | Windshield standard, LEFT (TL) (TLD) | 24838-F | 24.75 |
| KODEF | A-8663 | Weather strip at top of windshield (V-1) (V-2) | 163-X-4537 | .35 |
| LODEF | A-8664 | Weather strip at top of windshield (B-1) (B-2) | 163-X-4437 | .35 |
| MODEF | A-8665 | Weather strip at top of windshield (L) (LD) | 163-X-4337 | .35 |
| PODEF | A-8666 | Weather strip at top of windshield (I) (7B) | 163-X-4137 | .35 |
| RODEF | A-8667 | Weather strip at top of windshield (SB-1) (SB-2) | 163-X-4412 | .35 |
| SODEF | A-8668 | Weather strip at top of windshield (TL) (TLD) | 349-X-4075 | .40 |
| TODEF | A-8669 | Weather strip at side of windshield (V-1) (V-2) | 163-X-2106 | .20 |
| ZODEF | A-8670 | Weather strip at side of windshield (B-1) (B-2) | 163-X-2156 | .20 |
| BUDEF | A-8671 | Weather strip at side of windshield (L) (LD) | 195-X-2025 | .25 |
| CUDEF | A-8672 | Weather strip at side of windshield (I) (7B) | 163-X-2268 | .25 |
| DUDEF | A-8673 | Weather strip at side of windshield (SB-1) (SB-2) | 163-X-2162 | .20 |
| FUDEF | A-8674 | Weather strip in top edge of upper frame (TL) (TLD) | 349-X-4075 | .40 |
| KUDEF | A-8675 | Weather strip at sides of upper frame (TL) (TLD) | 348-X-950 | .20 |
| LUDEF | A-8676 | Weather strip in bottom of lower frame (TL) (TLD) | 349-X-3300 | .35 |
| MUDEF | A-8677 | Weather strip at side of lower frame (TL) (TLD) | 348-X-850 | .20 |
| PUDEF | A-8678 | Rain strip between upper and lower glasses (V-1) (V-2) | 91-X-4262 | .70 |
| XODEF | A-8678B | Weather strip between upper and lower glasses (V-2) | 168X4312 | .80 |
| RUDEF | A-8679 | Rain strip between upper and lower glasses (B-1) (B-2) | 91-X-4162 | .85 |
| XUDEF | A-8679B | Weather strip between upper and lower glasses (B-2) (L-2) | 168X4137 | .80 |
| SUDEF | A-8680 | Rain strip between upper and lower glasses (L) (LD) (I) (7B) | 91-X-3862 | .70 |
| TUDEF | A-8681 | Rain strip between upper and lower glasses (TL) (TLD) | 91-X-3725 | .70 |
| ZUDEF | A-8682 | Rain strip between upper and lower glasses (SB-1) (SB-2) | 91-X-4137 | .90 |
| WUDEF | A-8682B | Weather strip between upper and lower glasses (SB-2) | 168-X-4337 | .80 |



## DOORS—OPEN CARS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADEK | A-8714 | Front door complete, RIGHT (used on cars not equipped with removable tool panel in LEFT front door) (7P) (P-1) (R-1) | 23952 | 32.00 |
| DADEK | A-8715 | Front door complete, LEFT (used on cars not equipped with removable tool panel in LEFT front door) (7P) (P-1) (R-1) | 23953 | 32.00 |
| KADEK | A-8716 | Front door complete, RIGHT (used on cars with removable tool panel in LEFT door) (7P) | 25170 | 32.00 |
| MADEK | A-8717 | Front door complete, LEFT (with removable tool panel in LEFT front door) (7P) | 25171 | 42.00 |
| RADEK | A-8718 | Front door complete, RIGHT (P-2) | 25028 | 32.00 |
| SADEK | A-8719 | Front door complete, LEFT (with removable tool panel (P-2) | 25029 | 42.00 |
| TADEK | A-8720 | Door complete, RIGHT (R-2) | 25032 | 32.00 |
| ZADEK | A-8721 | Door complete, LEFT (with removable tool panel) (R-2) | 25033 | 42.00 |
| BEDEK | A-8734 | Rear door complete, RIGHT (7P) )P-1) | 25172 | 32.00 |
| CEDEK | A-8735 | Rear door complete, LEFT (7P) (P-1) | 25173 | 32.00 |
| DEDEK | A-8736 | Rear door complete, RIGHT (P-2) | 25030 | 32.00 |
| FEDEK | A-8737 | Rear door complete, LEFT (P-2) | 25031 | 32.00 |
| KEDEK | A-8746 | Panel (removable) in LEFT front door for tools (7P) | 25025 | 15.00 |
| LEDEK | A-8747 | Panel (removable) in LEFT front door for tools (P-2) | 25075 | 15.00 |
| MEDEK | A-8748 | Panel (removable) in LEFT door for tools (R-2) | 25074 | 15.00 |
| PEDEK | A-8749 | Lock for panel, less key (specify lock number) | 38339 | 2.50 |
| REDEK | A-8750 | Key for lock (specify lock number) | | .35 |
| SEDEK | A-8751 | Collar for lock | 34141 | .20 |
| TEDEK | A-8752 | Grommet for lock, inner side of panel | 34140 | .05 |
| ZEDEK | A-8753 | Catch plate for lock | 38240 | .10 |
| BIDEK | A-8754 | Rubber bumper on door for panel | 68410 | .03 |
| CIDEK | A-8755 | Washer on bumper | 68399 | .03 |
| DIDEK | A-8756 | Hinge plate for tongue of panel | 38238 | .08 |

## DOOR LOCKS AND HANDLES—OPEN CARS

| | | | | |
|---|---|---|---|---|
| FIDEK | A-8764 | Door lock complete for RIGHT door (OC) | 33242 | 2.00 |
| KIDEK | A-8765 | Door lock complete for LEFT door (OC) | 50015 | 2.00 |
| LIDEK | A-8769 | Handle for RIGHT door lock (OC) | 33767 | 1.00 |
| MIDEK | A-8770 | Handle for LEFT door lock (OC) | 33768 | 1.00 |
| PIDEK | A-8772 | Nut for door lock handle (OC) | 11736 | .10 |
| RIDEK | A-8775 | Strike plate for door lock (P-1) (R-1) and 1st type (7P) | 13417 | .55 |
| SIDEK | A-8777 | Strike plate for door lock (P-2) and 2nd type (7P) | 68235 | .65 |
| TIDEK | A-8778 | Strike plate for door lock (R-2) | 68415 | .65 |

## DOOR HINGES—OPEN CARS

| | | | | |
|---|---|---|---|---|
| FODEK | A-8785 | Hinge for front door (housing flange $1\frac{13}{16}$" wide) (OC) | 37574 | 2.25 |
| KODEK | A-8786 | Hinge for front or rear door (housing flange 2" wide) (OC) | 25370-F | 2.20 |
| LODEK | A-8787 | Hinge for rear door (housing flange $1\frac{13}{16}$" wide) (7P) (P-1) (P-2) | 37569 | 2.50 |
| MODEK | A-8788 | Screw, support to housing flange, per doz. .25 | 10327 | .05 |
| PODEK | A-8789 | Lock washer, per doz. .25 | 11335 | .05 |
| RODEK | A-8790 | Hinge pin | 12916 | .05 |

## RUBBER BUMPERS FOR DOORS—OPEN CARS

| | | | | |
|---|---|---|---|---|
| CUDEK | A-8800 | Rubber bumper for door, upper (P-2) (R-2) | 34275 | .10 |
| DUDEK | A-8801 | Retainer for bumper, upper RIGHT (P-2) | 34284 | .65 |
| FUDEK | A-8802 | Retainer for bumper, upper LEFT (P-2) | 34285 | .50 |
| KUDEK | A-8803 | Retainer for bumper, upper RIGHT (R-2) | 34286 | .50 |
| LUDEK | A-8804 | Retainer for bumper, upper LEFT (R-2) | 34287 | .50 |
| MUDEK | A-8805 | Rubber bumper for door, upper RIGHT (7P) (P-1) (R-1) | 68212 | .10 |
| PUDEK | A-8806 | Rubber bumper for door, upper LEFT (7P) (P-1) (R-1) | 68213 | .10 |
| RUDEK | A-8807 | Retainer for rubber bumper, upper RIGHT (7P) (P-1) (R-1) | 68208 | .60 |
| SUDEK | A-8808 | Retainer for rubber bumper, upper LEFT (7P) (P-1) (R-1) | 68209 | .60 |
| TUDEK | A-8809 | Rubber bumper for door, lower (OC) (used with retainer having 2 screw holes) | 68206 | .10 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADEL | A-8810 | Retainer for rubber bumper, lower (OC) (with 2 screw holes) | 68207 | .15 |
| CADEL | A-8811 | Rubber bumper for door, lower (OC) (used with retainer having 1 screw hole) | 68417 | .05 |
| FADEL | A-8812 | Retainer for rubber bumper, lower (OC) (with 1 screw hole) | 68416 | .05 |
| KADEL | A-8813 | Dove tail striker on body for door (female half) (P-2) (R-2) and 2nd type (7P) | 68418 | .35 |
| MADEL | A-8814 | Dove tail striker on door (male half) (P-2) (R-2) and 2nd type (7P) | 68420 | .15 |

## GUARDS FOR DOOR SILLS—OPEN CARS

| | | | | |
|---|---|---|---|---|
| RADEL | A-8828 | Guard for RIGHT front door sill (P-2) (R-2) | 34341 | .75 |
| SADEL | A-8829 | Guard for RIGHT rear door sill (P-2) | 34343 | .75 |
| TADEL | A-8830 | Guard for LEFT front door sill (P-2) (R-2) | 34342 | .75 |
| ZADEL | A-8831 | Guard for LEFT rear door sill (P-2) | 34344 | .75 |
| BEDEL | A-8832 | Guard for RIGHT front door sill (7P) (P-1) (R-1) | 68164 | .75 |
| CEDEL | A-8833 | Guard for RIGHT rear door sill (7P) (P-1) | 68166 | .75 |
| DEDEL | A-8834 | Guard for LEFT front door sill (7P) (P-1) (R-1) | 68165 | .75 |
| FEDEL | A-8835 | Guard for LEFT rear door sill (7P) (P-1) | 68167 | .75 |

## LATCH LOCKS FOR DOORS—CLOSED CARS

| | | | | |
|---|---|---|---|---|
| PEDEL | A-8863 | Latch lock less handles for RIGHT doors (V-1) (V-2) (I) (7B) | 22781-F | 3.30 |
| REDEL | A-8864 | Latch lock less handles for LEFT doors (V-1) (V-2) (I) (7B) | 22782-F | 3.30 |
| SEDEL | A-8865 | Latch lock less handles for RIGHT front doors (B-1) (B-2) (SB-1) (SB-2) | 22782-F | 3.30 |
| ZEDEL | A-8866 | Latch lock less handles for LEFT front doors (B-1) (B-2) | 22781-F | 3.30 |
| BIDEL | A-8867 | Lock with handle for RIGHT front door (L) (LD) (TL) (TLD) | 21991-F | 3.00 |
| CIDEL | A-8868 | Lock with handle for LEFT front door (L) (LD) (TL) (TLD) | 21990-F | 3.00 |
| DIDEL | A-8869 | Latch lock less handles for RIGHT rear door (B-1) (B-2) (L) (LD) (TL) (TLD) | 22781-F | 3.30 |
| KIDEL | A-8870 | Latch lock less handles for LEFT rear door (B-1) (B-2) (L) (LD) (TL) (TLD) | 22782-F | 3.30 |
| MIDEL | A-8871 | Latch lock less handles for LEFT front and RIGHT rear door (SB-1) (SB-2) | 25397-F | 3.30 |
| RIDEL | A-8872 | Latch lock less handles for LEFT rear door (SB-1) (SB-2) | 25398-F | 3.30 |
| SIDEL | A-8923 | Handle, outside, for latch lock (V-1) | 21769-F | 2.50 |
| TIDEL | A-8924 | Handle, outside, for front door latch locks (B-1) (B-2) and all (CC) except (SB-1) (SB-2) for rear door latch locks | 21769-F | 2.50 |
| BODEL | A-8925 | Handle, outside, for front door latch lock (I) (7B) | 21897-F | 2.50 |
| CODEL | A-8926 | Handle, outside, for RIGHT front and LEFT rear door latch locks (SB-1) (SB-2) | 21769-F | 2.50 |
| FODEL | A-8927 | Handle, outside, for LEFT front and RIGHT rear door latch locks (SB-1) (SB-2) | 21769-F | 2.50 |
| LODEL | A-8928 | Top lever handle, inside, for latch locks (B-1) (B-2) (V-1) (V-2) (I) (7B) and rear on all (CC) | 24092-F | 1.00 |
| DODEL | A-8928B | Top lever handle, inside (2nd type) for door latch lock (V-2) (B-2) (SB-2) (L-2) | F-27877 | 1.10 |
| PODEL | A-8929 | Handle for RIGHT front door locks (L) (LD) (TL) (TLD) | 21992-M | 1.00 |
| RODEL | A-8930 | Handle for LEFT front door locks (L) (LD) (TL) (TLD) | 21993-M | 1.00 |
| SODEL | A-8931 | Nut for front door lock handle (L) (LD) (TL) (TLD) | 22045-M | .12 |
| TODEL | A-8932 | Escutcheon plate for top lever handle (CC) | 22807-M | .25 |
| KODEL | A-8932B | Escutcheon plate (2nd type) for top lever handle (CC) | F-27878 | 1.20 |
| MODEL | A-8932C | Escutcheon plate for lever handle, front door (L-2) | F-22044M | .25 |
| ZODEL | A-8933 | Strike plate for latch lock (CC) except front on (L) (LD) (TL) (TLD) | 22977-P | .70 |
| CUDEL | A-8934 | Strike plate for front door lock (L) (LD) (TL) (TLD) | 24136-P | .70 |

## PILLAR (SAFETY) LOCKS AND PILLAR HANDLES CLOSED CARS

| | | | | |
|---|---|---|---|---|
| LUDEL | A-8947 | Pillar lock, outside, for RIGHT doors (V-1) (V-2) | 20711-F | 3.30 |
| MUDEL | A-8948 | Turn bolt lock for LEFT door (V-1) (V-2) | 21527-F | 1.95 |
| PUDEL | A-8955 | Pillar lock, outside, for RIGHT front door (B-1) (B-2) (SB-1) (SB-2) | 20712-F | 3.30 |
| SUDEL | A-8956 | Pillar lock, outside, for RIGHT rear door (L) (LD) (TL) (TLD) (I) (7B) | 20711-F | 3.30 |
| ZUDEL | A-8957 | Pillar lock, outside, for LEFT rear door (L) (LD)(TL)(TLD)(I) (7B) | 20712-F | 3.30 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADEM | A-8958 | Turn bolt lock, inside, for RIGHT rear and LEFT front doors (B-1) (B-2) | 21526-F | 1.95 |
| DADEM | A-8959 | Turn bolt lock complete, inside, for LEFT rear door (B-1) (B-2) | 21527-F | 1.95 |
| FADEM | A-8960 | Key hole cover for pillar locks (CC) | 20710-F | .70 |
| KADEM | A-8961 | Strike plate for pillar lock (CC) | 20708-F | .25 |
| LADEM | A-8962 | Key for outside pillar lock (specify lock number) (CC) | 20709-F | .35 |
| MADEM | A-8966 | Key for inside turn bolt lock (CC) | 22702-F | 1.50 |
| RADEM | A-8966B | Escutcheon plate for key for inside turn bolt lock (V-2) (B-2) (SB-2) (L-2) | 27886-F | 1.20 |
| PADEM | A-8969 | Pillar handle with screws on rear door pillar (L) (LD) (TL) (TLD) (I) (7B) | 21882-F | 2.25 |

## PULL-TO HANDLES—CLOSED CARS

| | | | | |
|---|---|---|---|---|
| SADEM | A-8992 | Handle pull-to on RIGHT front doors (V-1) (V-2) (B-1) (B-2) | 24040-F | 2.00 |
| TADEM | A-8993 | Cord pull-to on doors (CC) except RIGHT front on (V-1) (V-2) (B-1) (B-2) | 334-X | 2.75 |
| CEDEM | A-8993B | Cord pull-to (2nd type) on doors (CC) | 456-X | 4.00 |
| DEDEM | A-8993C | Cord pull-to end assembly (1st type) (CC) | 24112-F | .60 |
| FEDEM | A-8993D | Cord pull-to end assembly (2nd type) (CC) | 27891-F | 1.20 |
| BEDEM | A-8994 | Check strap for door stop (CC) (specify type, model and upholstery) | 27879-F | 2.50 |

## DOOR HINGES—CLOSED CARS

| | | | | |
|---|---|---|---|---|
| REDEM | A-9031 | Hinge, upper, for doors (V-1) (V-2) | 22369-F | 3.00 |
| SEDEM | A-9033 | Hinge, lower, for doors (V-1) (V-2) | 27900-F | 1.95 |
| TEDEM | A-9036 | Hinge, upper and center, for doors (B-1) (B-2) (I) (7B), rear doors (L) (LD) (TL) (TLD) | 25370-F | 2.20 |
| BIDEM | A-9036-A | Hinge upper and center for doors (SB-1) | 25370-F | 2.20 |
| CIDEM | A-9037 | Hinge, lower, for front doors (I) (7B) | 23540-F | 2.20 |
| DIDEM | A-9038 | Hinge, lower, for front doors (B-1) (B-2) | 22775-F | 2.20 |
| FIDEM | A-9038-A | Hinge lower for right front door (SB-1) | 25430-F | 2.20 |
| LIDEM | A-9038B | Hinge, lower, for LEFT front door (SB-1) | 25429-F | 2.20 |
| MIDEM | A-9038C | Hinge, lower, for RIGHT front door (SB-2) | 28670-F | 1.95 |
| KIDEM | A-9039 | Hinge, lower, for rear doors (I) (L) (LD) (B-1) (B-2) (TL) (TLD) (SB-1) (SB-2) (7B) | 22776-F | 1.95 |
| PIDEM | A-9039B | Hinge, lower, for RIGHT front door (B-2) | 27871-F | 1.95 |
| RIDEM | A-9039C | Hinge, lower, for LFFT front door (B-2) | 27870-F | 1.95 |

## RUBBER BUMPERS AND RETAINERS FOR DOORS—CLOSED CARS

| | | | | |
|---|---|---|---|---|
| DODEM | A-9064 | Rubber bumper (dovetail) for door, center (CC) | 22348-F | .15 |
| KODEM | A-9066 | Retainer for dovetail rubber bumper, center (CC) except (V-1) (V-2) | 22346-F | .25 |
| MODEM | A-9067 | Retainer for dovetail rubber bumper, center (V-1) (V-2) | 20960-F | .25 |
| RODEM | A-9069 | Spring for dovetail rubber bumper (CC) | 22821-F | .06 |
| TODEM | A-9069B | Felt for dovetail bumper (V-1) and front doors (TLD) (LD) (L-1) (L-2) | 21126-F | .06 |
| SODEM | A-9070 | Plunger on front doors for dovetail bumper (CC) except (B-1) (B-2) | 20769-F | .20 |
| ZODEM | A-9071 | Plunger on rear doors for dovetail bumper all (CC) and front doors on (B-1) (B-2) | 21775-F | .25 |

## DOOR WINDOWS AND GLASSES—CLOSED CARS

| | | | | |
|---|---|---|---|---|
| RUDEM | A-9098 | Door window complete, RIGHT front (I) (7B) | 23546-F | 20.00 |
| SUDEM | A-9099 | Door window complete, LEFT front (I) (7B) | 23547-F | 20.00 |
| TUDEM | A-9100 | Door window complete, RIGHT rear (I) (L) (LD) (7B) | 23550-F | 20.00 |
| ZUDEM | A-9101 | Door window complete, LEFT rear (I) (L) (LD) (7B) | 23551-F | 20.00 |
| MUDEM | A-9101B | Door window complete, RIGHT rear (L-2) | 29100-F | 21.50 |
| PUDEM | A-9101C | Door window complete, LEFT rear (L-2) | 29101-F | 21.50 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADEP | A-9102 | Door window complete, RIGHT (V-1) | 24294-F | 21.50 |
| CADEP | A-9103 | Door window complete, LEFT (V-1) | 24295-F | 21.50 |
| DADEP | A-9104 | Door window complete, RIGHT (V-2) | 26388-F | 21.50 |
| FADEP | A-9105 | Door window complete, LEFT (V-2) | 26389-F | 21.50 |
| KADEP | A-9106 | Door window complete, RIGHT front (B-1) | 24074-F | 21.50 |
| LADEP | A-9107 | Door window complete, LEFT front (B-1) | 24075-F | 21.50 |
| MADEP | A-9108 | Door window complete, RIGHT rear (B-1) | 24081-F | 22.00 |
| PADEP | A-9109 | Door window complete, LEFT rear (B-1) | 24082-F | 22.00 |
| RADEP | A-9110 | Door window complete, RIGHT front (B-2) | 27772-F | 21.50 |
| SADEP | A-9111 | Door window complete, LEFT front (B-2) | 27773-F | 21.50 |
| TADEP | A-9112 | Door window complete, RIGHT rear (B-2) | 27795-F | 21.50 |
| ZADEP | A-9113 | Door window complete, LEFT rear (B-2) | 27796-F | 21.50 |
| BEDEP | A-9114 | Door window complete, RIGHT rear (TL) (TLD) | 24845-F | 21.50 |
| CEDEP | A-9115 | Door window complete, LEFT rear (TL) (TLD) | 24846-F | 21.50 |
| DEDEP | A-9116 | Door window complete, RIGHT front or LEFT rear (SB-1) | 25377-F | 21.50 |
| FEDEP | A-9117 | Door window complete, LEFT front or RIGHT rear (SB-1) | 25376-F | 21.50 |
| KEDEP | A-9118 | Door window complete, RIGHT front (SB-2) | 28503-F | 21.50 |
| LEDEP | A-9119 | Door window complete, LEFT front (SB-2) | 28504-F | 21.50 |
| MEDEP | A-9119-B | Door window complete, RIGHT rear (SB-2) | 28513-F | 21.50 |
| PEDEP | A-9119-C | Door window complete, LEFT rear (SB-2) | 28514-F | 21.50 |
| REDEP | A-9134 | Glass for front door window (I) (7B) | 23586-F | 11.00 |
| SEDEP | A-9135 | Glass for rear door window (L) (LD) (I) (7B) | 22742-F | 10.00 |
| XEDEP | A-9135B | Glass for rear door window (L-2) | 26484-F | 11.00 |
| TEDEP | A-9136 | Glass for door window (V-1) | 24298-F | 11.00 |
| ZEDEP | A-9137 | Glass for door window (V-2) | 26392-F | 11.00 |
| BIDEP | A-9138 | Glass for front door window (B-1) | 24078-F | 11.00 |
| CIDEP | A-9139 | Glass for rear door window (B-1) | 24085-F | 11.50 |
| DIDEP | A-9140 | Glass for front door window (B-2) | 27776-F | 11.00 |
| FIDEP | A-9141 | Glass for rear door window (B-2) | 27799-F | 11.00 |
| KIDEP | A-9142 | Glass for door window (SB-1) | 25380-F | 11.00 |
| LIDEP | A-9143 | Glass for door window (SB-2) | 28507-F | 11.00 |
| MIDEP | A-9143-B | Glass for rear door window (SB-2 | 28517-F | 11.00 |
| PIDEP | A-9144 | Glass for rear door window (TL) (TLD) | 24849-F | 11.50 |

## BODY WINDOWS AND GLASSES CLOSED CARS

| | | | | |
|---|---|---|---|---|
| RIDEP | A-9154 | Window assembly, RIGHT, between front and rear doors (I) (7B) | 23590-F | 15.50 |
| TIDEP | A-9155 | Window assembly, LEFT, between front and rear doors (I) (7B) | 23591-F | 15.50 |
| ZIDEP | A-9168 | Glass between front and rear koors (I) (7-B) | 23578-F | 6.75 |
| BODEP | A-9193 | Window assembly, RIGHT, for rear quarter (V-1) | 24300-F | 21.50 |
| CODEP | A-9194 | Window assembly, LEFT, for rear quarter (V-1) | 24300-F | 21.50 |
| DODEP | A-9195 | Window assembly, RIGHT, for rear quarter (V-2) | 26397-F | 22.00 |
| FODEP | A-9196 | Window assembly, LEFT, for rear quarter (V-2) | 26398-F | 22.00 |
| KODEP | A-9197 | Window assembly, RIGHT, for rear quarter (B-1) | 24086-F | 23.50 |
| LODEP | A-9198 | Window assembly, LEFT, for rear quarter (B-1) | 24087-F | 23.50 |
| MODEP | A-9199 | Window assembly, RIGHT, for rear quarter (B-2) | 27805-F | 22.00 |
| PODEP | A-9200 | Window assembly, LEFT, for rear quarter (B-2) | 27806-F | 22.00 |
| RODEP | A-9201 | Window assembly, RIGHT, for rear quarter (L) (LD) (I) (7B) | 22763-F | 25.00 |
| XODEP | A-9201B | Window assembly for rear quarter (L-2) | 29104-F | 24.00 |
| SODEP | A-9202 | Window assembly, LEFT, for rear quarter (L) (LD) (I) (7B) | 22764-F | 25.00 |
| XUDEP | A-9202B | Window assembly for rear quarter (L-2) | 29105-F | 24.00 |
| TODEP | A-9203 | Window assembly, RIGHT, for rear quarter (TL) (TLD) | 24850-F | 23.50 |
| ZODEP | A-9204 | Window assembly, LEFT, for rear quarter (TL) (TLD) | 24851-F | 23.50 |
| BUDEP | A-9205 | Window assembly, RIGHT or LEFT, for rear quarter (SB-1) | 25381-F | 23.50 |
| CUDEP | A-9206 | Window assembly, RIGHT or LEFT, for rear quarter (SB-2) | 28523-F | 24.50 |
| DUDEP | A-9223 | Glass for rear quarter window (V-1) | 24304-F | 11.00 |
| FUDEP | A-9224 | Glass for rear quarter window (V-2) | 26401-F | 11.50 |
| KUDEP | A-9225 | Glass for rear quarter window (B-1) | 24100-F | 13.25 |
| LUDEP | A-9226 | Glass for rear quarter window (B-2) | 27809-F | 11.50 |
| MUDEP | A-9227 | Glass for rear quarter window (L) (LD) (I) (7-B) | 22749-F | 14.50 |
| WUDEP | A-9227B | Glass for rear quarter window (L-2) | 26511-F | 14.50 |
| PUDEP | A-9228 | Glass for rear quarter window (TL) (TLD) | 24854-F | 13.25 |
| RUDEP | A-9229 | Glass for rear quarter window (SB-1) | 25383-F | 13.25 |
| SUDEP | A-9230 | Glass for rear quarter window (SB-2) | 28527-F | 13.75 |
| TUDEP | A-9244 | Glass for back window (V-1) (B-1) | 22780-F | 11.50 |
| ZUDEP | A-9245 | Glass for back window (V-2) (B-2) | 27370-F | 11.50 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADER | A-9246 | Glass for back window (L) (I) (TL) (7-B) (SB-1) | 23089-F | 11.50 |
| CADER | A-9248 | Glass for back window (LD) (TLD) | 24585-F | 3.50 |
| DADER | A-9252 | Window assembly, CENTER, for partition (L) (LD) (I) | 23090-F | 26.00 |
| WADER | A-9252B | Window assembly, CENTER, for partition (L-2) | 29108-F | 23.50 |
| FADER | A-9253 | Window assembly, CENTER, for partition (TL) (TLD) | 24855-F | 31.50 |
| KADER | A-9258 | Glass, straight, for partition (L) (LD) (I) | 23091-F | 15.50 |
| XADER | A-9258B | Glass, straight, for partition (L-2) | 26498-F | 12.75 |
| LADER | A-9259 | Glass, curved, for partition (L) (LD) (I) | 22758-F | 11.50 |
| YADER | A-9259B | Glass, curved, for partition (L-2) | 26491-F | 11.50 |

## SASH CHANNELS—CLOSED CARS

| | | | | |
|---|---|---|---|---|
| PADER | A-9264 | Folding sash channel on door, LEFT front, RIGHT rear (V-1) | 23567-F | 3.50 |
| RADER | A-9265 | Folding sash channel on door, RIGHT front, LEFT rear (V-1) | 23566-F | 3.50 |
| SADER | A-9270 | Sash channel, RIGHT door window (V-1) | 24683-F | 9.30 |
| TADER | A-9271 | Sash channel, LEFT door window (V-1) | 24683-F | 9.30 |
| ZADER | A-9272 | Sash channel, RIGHT door window (V-2) | 26390-F | 9.35 |
| BEDER | A-9273 | Sash channel, LEFT door window (V-2) | 26391-F | 9.35 |
| CEDER | A-9274 | Sash channel, RIGHT front door window (B-1) | 25322-F | 10.70 |
| DEDER | A-9275 | Sash channel, LEFT front door window (B-1) | 25323-F | 10.70 |
| FEDER | A-9276 | Sash channel, RIGHT rear door window (B-1) | 24690-F | 10.70 |
| KEDER | A-9277 | Sash channel, LEFT rear door window (B-1) | 24691-F | 10.70 |
| LEDER | A-9278 | Sash channel, RIGHT front door window (B-2) | 27774-F | 9.35 |
| MEDER | A-9279 | Sash channel, LEFT front door window (B-2) | 27775-F | 9.35 |
| PEDER | A-9280 | Sash channel, RIGHT rear door window (B-2) | 27797-F | 9.35 |
| REDER | A-9281 | Sash channel, LEFT rear door window (B-2) | 27798-F | 9.35 |
| SEDER | A-9282 | Sash channel, RIGHT front door window (I) (7B) | 23548-F | 9.35 |
| TEDER | A-9283 | Sash channel, LEFT front door window (I) (7B) | 23549-F | 9.35 |
| ZEDER | A-9284 | Sash channel, RIGHT rear door window (L) (LD) (I) (7B) | 24752-F | 9.35 |
| BIDER | A-9285 | Sash channel, LEFT rear door window (L) (LD) (I) (7B) | 24753-F | 9.35 |
| XEDER | A-9285B | Sash channel, RIGHT rear door window (L-2) | 29102-F | 9.35 |
| XIDER | A-9285C | Sash channel, LEFT rear door window (L-2) | 29103-F | 9.35 |
| CIDER | A-9286 | Sash channel, RIGHT, rear door window (TL) (TLD) | 24847-F | 9.35 |
| DIDER | A-9287 | Sash channel, LEFT rear door window (TL) (TLD) | 24848-F | 9.35 |
| FIDER | A-9288 | Sash channel, RIGHT front or LEFT rear door window (SB-1) | 25379-F | 9.35 |
| KIDER | A-9289 | Sash channel, LEFT front or RIGHT rear door window (SB-1) | 25378-F | 9.35 |
| LIDER | A-9290 | Sash channel, RIGHT front or LEFT rear door window (SB-2) | 28505-F | 9.35 |
| MIDER | A-9291 | Sash channel, LEFT front or RIGHT rear door window (SB-2) | 28506-F | 9.35 |
| PIDER | A-9291-B | Sash channel, RIGHT rear door window (SB-2) | 28515-F | 9.35 |
| RIDER | A-9291-C | Sash channel, LEFT rear door window (SB-2) | 28516-F | 9.35 |
| SIDER | A-9292 | Sash channel, RIGHT front quarter window (I) (7B) | 23592-F | 9.35 |
| TIDER | A-9293 | Sash channel, LEFT front quarter window (I) (7B) | 23593-F | 9.35 |
| ZIDER | A-9294 | Sash channel, RIGHT rear quarter window (V-1) | 24302-F | 9.35 |
| BODER | A-9295 | Sash channel, LEFT rear quarter window (V-1) | 24303-F | 9.35 |
| CODER | A-9296 | Sash channel, RIGHT rear window (V-2) | 26399-F | 9.35 |
| DODER | A-9297 | Sash channel, LEFT rear window (V-2) | 26400-F | 9.35 |
| FODER | A-9298 | Sash channel, RIGHT rear quarter window (B-1) | 24088-F | 9.65 |
| KODER | A-9299 | Sash channel, LEFT rear quarter window (B-1) | 24089-F | 9.65 |
| LODER | A-9300 | Sash channel, RIGHT rear quarter window (B-2) | 27807-F | 9.35 |
| MODER | A-9301 | Sash channel, LEFT rear quarter window (B-2) | 27808-F | 9.35 |
| PODER | A-9302 | Sash channel, RIGHT rear quarter window (L) (LD) (I) (7B) | 24200-F | 9.65 |
| RODER | A-9303 | Sash channel, LEFT rear quarter window (L) (LD) (I) (7B) | 24201-F | 9.65 |
| FUDER | A-9303B | Sash channel, RIGHT rear door window (L-2) | 29106-F | 9.65 |
| KUDER | A-9303C | Sash channel, LEFT rear quarter window (L-2) | 29107-F | 9.65 |
| SODER | A-9304 | Sash channel, RIGHT rear quarter window (TL) (TLD) | 24852-F | 9.65 |
| TODER | A-9305 | Sash channel, LEFT rear quarter window (TL) (TLD) | 24853-F | 9.65 |
| ZODER | A-9306 | Sash channel, RIGHT or LEFT rear quarter window (SB-1) | 25382-F | 9 35 |
| BUDER | A-9307 | Sash channel, RIGHT or LEFT rear quarter window (SB-2) | 28525-F | 9.35 |
| CUDER | A-9308 | Sash channel, CENTER partition window (L) (LD) (I) | 23096-F | 9.65 |
| DUDER | A-9309 | Sash channel, CENTER partition window (TL) (TLD) | 24856-F | 10.70 |

## WINDOW LIFTS

| | | | | |
|---|---|---|---|---|
| MUDER | A-9322 | Mechanical window lift on RIGHT door (V-1) (V-2), give engine number | 24512-F | 11.00 |
| PUDER | A-9323 | Mechanical window lift on LEFT door (V-1) (V-2), give engine number | 24513-F | 11.00 |
| RUDER | A-9324 | Mechanical window lift on RIGHT door (B-1) (B-2) (I) (L) (LD) (7B) (TL) (TLD) | 24792-F | 11.00 |
| TUDER | A-9325 | Mechanical window lift on LEFT door (B-1) (B-2) (I) (L) (LD) (7B) (TL) (TLD) | 24793-F | 11.00 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| CADES | A-9325B | Mechanical window lift on RIGHT rear door (L-2) | 27673-F | 11.00 |
| FADES | A-9325C | Mechanical window lift on LEFT rear door (L-2) | 27674-F | 11.00 |
| BADES | A-9326 | Mechanical window lift, RIGHT front or LEFT rear doors (SB-1) (SB-2) | 25041-F | 11.00 |
| DADES | A-9327 | Mechanical window lift, LEFT front or RIGHT rear doors (SB-1) (SB-2) | 25040-F | 11.00 |
| LADES | A-9327B | Mechanical window lift, RIGHT front or LEFT rear door (B-2) (SB-2) and LEFT door (V-2) | 27356-F | 11.00 |
| PADES | A-9327C | Mechanical window lift, LEFT front or RIGHT rear door (B-2) (SB-2) and RIGHT door (V-2) | 27355-F | 11.00 |
| KADES | A-9328 | Mechanical window lift for CENTER partition window (L) (LD) (I) | 24788-F | 11.00 |
| MADES | A-9329 | Mechanical window lift for CENTER partition window (TL) (TLD) | 24761-F | 12.50 |
| RADES | A-9335 | Handle for window lift (CC) | 24046-M | 2.50 |
| FODES | A-9335B | Handle (2nd type) for window lift (CC) | 27875-F | 2.75 |
| KODES | A-9335C | Escutcheon plate (1st type) for handle (CC) | 27750-F | .35 |
| LODES | A-9335D | Escutcheon plate (2nd type) for handle (CC) | 27876-F | 1.00 |
| SADES | A-9336 | Screw for handle (CC) | 24061-M | .08 |
| MODES | A-9336B | Split nut for mechanical window lift handle (both halves) (CC) | 27906-F | .35 |
| TADES | A-9352 | Lifter strap, rear quarter window (CC) | 27294-F | 2.60 |
| ZADES | A-9353 | Guide for lifter strap (CC) | 22807-F | .25 |
| PODES | A-9353B | Guide for lifter strap (2nd type) (CC) | 27878-F | 1.20 |

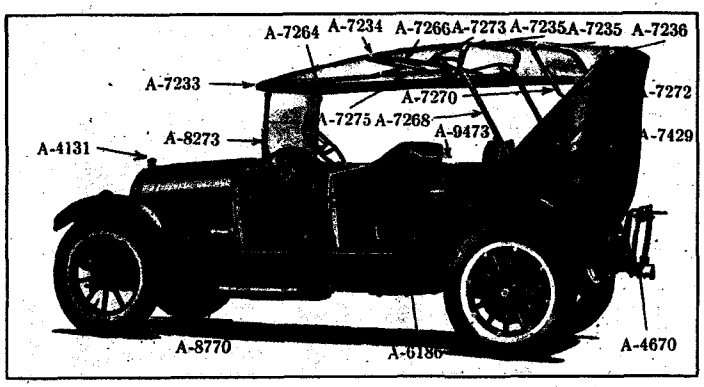
## SEAT CUSHIONS

| | | | | |
|---|---|---|---|---|
| CEDES | A-9429 | Cushion complete, front (7P) | 24045 | 43.50 |
| DEDES | A-9430 | Cushion complete, rear (7P) | 24046 | 43.50 |
| FEDES | A-9431 | Cushion complete, front (P-1) (P-2) (R-1) (R-2) | 24106 | 40.00 |
| KEDES | A-9432 | Cushion complete, rear (P-1) (P-2) | 24107 | 40.00 |
| LEDES | A-9434 | Cushion complete for driver's seat (V-1) | 22866-F | 38.50 |
| MEDES | A-8435 | Cushion complete for passenger's seat (V-1) | 22870-F | 55.00 |
| PEDES | A-9436 | Cushion complete for driver's seat (V-2) | 27287-F | 38.50 |
| REDES | A-9437 | Cushion complete for passenger's seat (V-2) | 27288-F | 55.00 |
| SEDES | A-9438 | Cushion complete, front RIGHT (B-1) | | 37.50 |
| TEDES | A-9439 | Cushion complete, front LEFT (B-1) | | 37.50 |
| ZEDES | A-9440 | Cushion complete, rear (B-1) | | 75.00 |
| BIDES | A-9441 | Cushion complete, front (B-2) | 31086-F | 71.50 |
| CIDES | A-9442 | Cushion complete, rear (B-2) | 31087-F | 77.00 |
| DIDES | A-9443 | Cushion complete, front (L) (LD) | 33794-F | 71.50 |
| FIDES | A-9444 | Cushion complete, front (I) (7B) | 23574-F | 71.50 |
| KIDES | A-9445 | Cushion complete, rear (L) (LD) (I) (7B) | 23143-F | 82.00 |
| LIDES | A-9446 | Cushion complete, front (TL) (TLD) | 24892-F | 65.00 |
| MIDES | A-9447 | Cushion complete, rear (TL) (TLD) | 24896-F | 82.00 |
| PIDES | A-9448 | Cushion complete, front (SB-1) | | 80.00 |
| RIDES | A-9449 | Cushion complete, rear (SB-1) | 25386-F | 80.00 |
| SIDES | A-9450 | Cushion complete, front (SB-2) | 31603-F | 82.00 |
| TIDES | A-9451 | Cushion complete, rear (SB-2) | 31604-F | 82.00 |
| ZIDES | A-9452 | Spring for front seat cushion (7P) | 68277 | 12.00 |
| BODES | A-9453 | Spring for rear seat cushion (7P) | 68279 | 15.50 |
| CODES | A-9454 | Spring for front seat cushion (P-1) (P-2) (R-1) (R-2) | 68281 | 9.00 |
| DODES | A-9455 | Spring for rear seat cushion (P-1) (P-2) | 68283 | 12.00 |

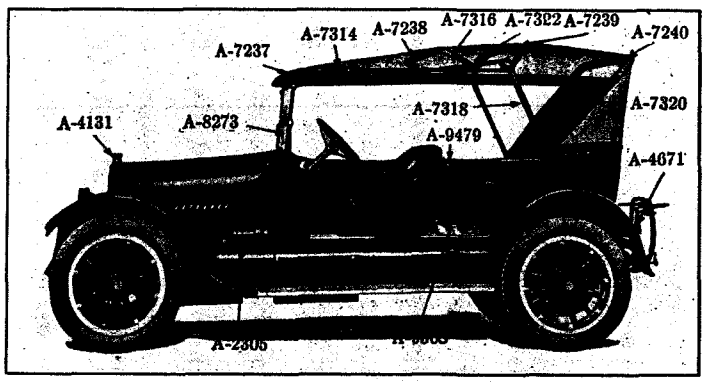
## ROBE RAIL AND ROBE CORD

**NOTE: When ordering upholstered parts specify engine and upholstery number.**

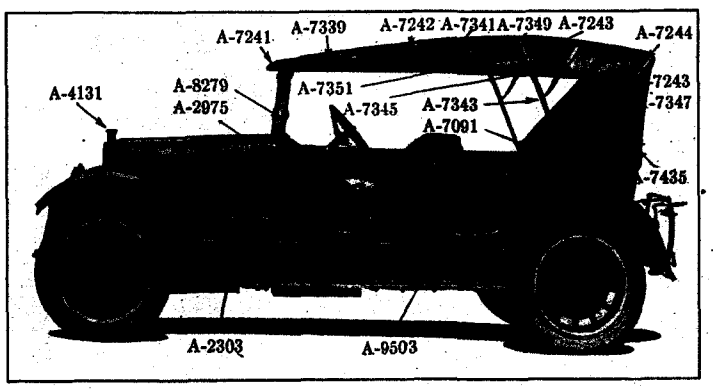
| | | | | |
|---|---|---|---|---|
| ZODES | A-9473 | Robe rail complete, back of front seat (7P) | 22183 | 4.75 |
| BUDES | A-9474 | Bracket for robe rail support (7P) | 32310 | 1.00 |
| CUDES | A-9475 | Screw, robe rail support to body (7P) | 11891 | .05 |
| DUDES | A-9476 | Lock washer, (7P) per doz. .25 | 11314 | .05 |
| FUDES | A-9479 | Robe rail complete (P-1) (P-2) | 22948 | 4.75 |
| LUDES | A-9481 | Rivet for bracket (7P) (P-1) (P-2), per doz. .25 | 34043 | .05 |
| MUDES | A-9482 | Screw, attaching robe rail (P-1) (P-2) | 11891 | .05 |
| PUDES | A-9483 | Lock washer (P-1) (P-2), per doz. .25 | 11314 | .05 |
| RUDES | A-9489 | Robe cord on back of RIGHT front seat (B-1) (B-2) | 356-X | 2.85 |
| SUDES | A-9490 | Robe cord on back of LEFT front seat (B-1) (B-2) | 357-X | 2.85 |
| ZUDES | A-9492 | Robe cord on center partition (I) (L) (TL) (TLD) (7B) | 331-X | 3.00 |




SEVEN PASSENGER TOURING



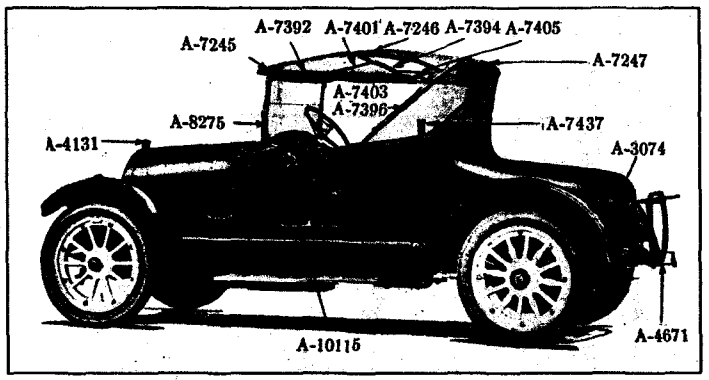

PHAETON, FIRST TYPE



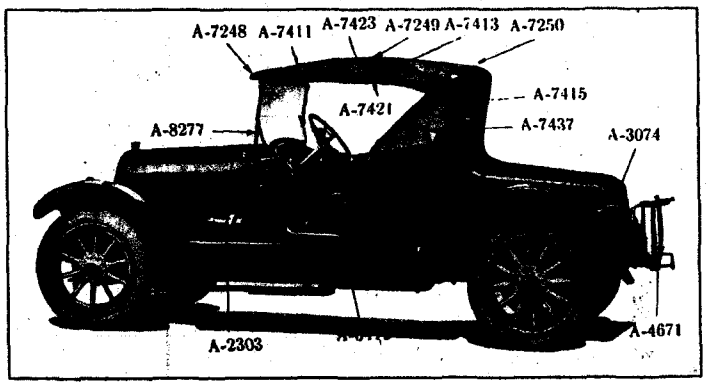

PHAETON, SECOND TYPE

## FOOT RAILS AND HASSOCKS

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| | | NOTE: When ordering hassocks or upholstered parts specify engine and upholstery number. | | |
| FADEX | A-9502 | Foot rail complete (7P) | 22184 | 7.00 |
| KADEX | A-9503 | Foot rail complete (P-1) (P-2) | 23567 | 5.75 |
| LADEX | A-9504 | Foot rail complete (V-1) | 24327-F | 6.00 |
| MADEX | A-9505 | Foot rail complete (V-2) | 24327-MH | 6.00 |
| PADEX | A-9506 | Hassock or foot rest (SB-1) (SB-2) | 28524-F | 14.85 |
| RADEX | A-9507 | Hassock or foot rest (CC) except (V-1) (V-2) (SB-1) (SB-2) | 28524-F | 14.85 |




ROADSTER, FIRST TYPE




ROADSTER, SECOND TYPE



## COWL PANELS AND KICK PADS—OPEN CARS

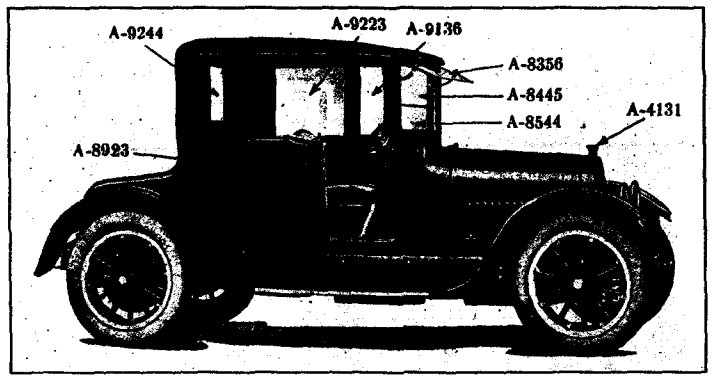
| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BADEZ | A-9530 | Leather cowl panel, RIGHT (7P) (R-1) | 24057 | 2.20 |
| CADEZ | A-9531 | Leather cowl panel, LEFT (7P) (R-1) | 24058 | 2.20 |
| DADEZ | A-9532 | Leather cowl panel, RIGHT (P-1) (P-2) | 25035 | 2.00 |
| FADEZ | A-9533 | Leather cowl panel, LEFT (P-1) (P-2) | 25036 | 2.00 |
| KADEZ | A-9534 | Leather cowl panel, RIGHT (R-2) | 25072 | 2.00 |
| LADEZ | A-9535 | Leather cowl panel, LEFT (R-2) | 25073 | 2.00 |
| MADEZ | A-9545 | Kick pad, back of front seat (7P) | 60741 | 6.00 |
| PADEZ | A-9546 | Kick pad, back of front seat (P-1) | 60900 | 2.50 |
| RADEZ | A-9547 | Kick pad, back of front seat (P-2) | 67041 | 5.00 |

## CARPETS

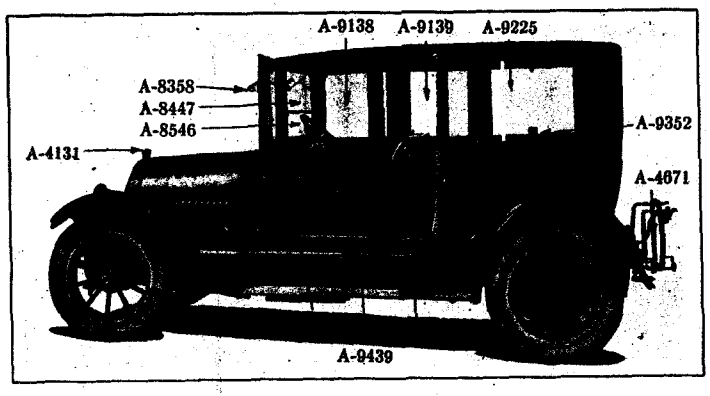
| | | NOTE: When ordering carpets or upholstered parts specify engine and upholstery number. | | |
|---|---|---|---|---|
| MEDEZ | A-9606 | Carpet, large, for floor of tonneau (7P) | 24063 | 9.00 |
| PEDEZ | A-9607 | Carpet for auxiliary chair well, RIGHT (7P) | 24060 | 2.25 |
| REDEZ | A-9608 | Carpet for auxiliary chair well, LEFT (7P) | 24061 | 2.25 |
| SEDEZ | A-9609 | Carpet for center sill between chair wells (7P) | 24062 | 1.00 |
| TEDEZ | A-9610 | Carpet for RIGHT side sill (7P) | 24064 | 1.50 |
| ZEDEZ | A-9611 | Carpet for LEFT side sill (7P) | 24065 | 1.50 |
| BIDEZ | A-9612 | Carpet for FRONT of auxiliary chair support (7P) | 24523 | 1.75 |
| CIDEZ | A-9613 | Carpet for REAR of auxiliary chair-support (7P) | 24524 | 2.00 |
| DIDEZ | A-9614 | Carpet, large, for floor of tonneau (P-1) | 24190 | 6.00 |
| FIDEZ | A-9615 | Carpet for RIGHT side sill (P-1) | 24191 | .75 |
| KIDEZ | A-9616 | Carpet for LEFT side sill (P-1) | 24197 | .75 |
| LIDEZ | A-9617 | Carpet, large, for floor of tonneau (P-2) | 23050 | 6.00 |
| MIDEZ | A-9618 | Carpet for RIGHT side sill (P-2) | 23051 | 1.50 |
| PIDEZ | A-9619 | Carpet for LEFT side sill (P-2) | 23052 | 1.50 |
| RIDEZ | A-9620 | Carpet, large, for foot rest housing (P-2) | 23031 | 3.20 |
| SIDEZ | A-9621 | Carpet for RIGHT corner of foot rest housing (P-2) | 23053 | .50 |
| TIDEZ | A-9622 | Carpet for LEFT corner of foot rest housing (P-2) | 23054 | .50 |
| ZIDEZ | A-9623 | Carpet rug, front, on floor (B-1) | 26837-F | 22.00 |
| BODEZ | A-9624 | Carpet rug, rear, on floor (B-1) | 26838-F | 19.25 |
| CODEZ | A-9625 | Carpet rug, front, on floor (B-2) | 27256-F | 22.00 |
| DODEZ | A-9626 | Carpet rug, rear, on floor (B-2) | 27257-F | 19.25 |
| FODEZ | A-9627 | Carpet rug for floor (V-1) | 24274-F | 22.00 |
| KODEZ | A-9628 | Carpet rug for floor (V-2) | 27280-F | 22.00 |
| XODEZ | A-9628B | Carpet ring for floor, front half (V-2) | | 12.00 |
| LODEZ | A-9629 | Carpet rug for floor (L) | 27244-F | 22.00 |
| MODEZ | A-9630 | Carpet rug for floor (1) (7B) | 26920-F | 22.00 |
| PODEZ | A-9631 | Carpet rug for floor (LD) | 23711-F | 24.75 |
| RODEZ | A-9632 | Carpet rug for floor (TL) | 24801-F | 22.00 |
| SODEZ | A-9633 | Carpet rug for floor (TLD) | | 24.75 |
| TODEZ | A-9634 | Carpet rug, front, on floor (SB-1) | 26839-F | 22.00 |
| ZODEZ | A-9635 | Carpet rug, rear, on floor (SB-1) | 26822-F | 19.25 |
| BUDEZ | A-9636 | Carpet rug, front, on floor (SB-2) | 27249-F | 22.00 |
| CUDEZ | A-9637 | Carpet rug, rear, on floor (SB-2) | 27250-F | 24.75 |
| DUDEZ | A-9638 | Carpet for auxiliary seat well (CC) except (V-1) (V-2) (B-1) (B-2) | 27245-F | 1.40 |
| FUDEZ | A-9639 | Carpet for auxiliary seat well (V-1) | 24275-F | 1.40 |
| KUDEZ | A-9640 | Carpet for auxiliary seat well (V-2) | 27307-F | 1.40 |

# TOE BOARDS, MATS AND BINDINGS

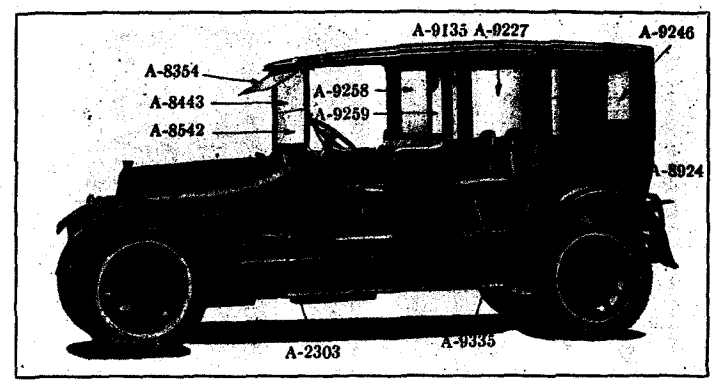
| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAFEF | A-9980 | Toe board, upper, with mat and binding, LEFT steering (OC) (S) | 23435 | 4.75 |
| CAFEF | A-9981 | Toe board, upper, with mat and binding, LEFT steering (M) (A). | 23478 | 4.75 |
| DAFEF | A-9982 | Toe board, lower, with mat and binding, LEFT steering (7P) (P-1) (R-1) (S) | 23436 | 5.50 |
| KAFEF | A-9983 | Toe board, lower, with mat and binding, LEFT steering (P-2) (R-2) | 24484 | 5.75 |
| MAFEF | A-9984 | Toe board, lower, with mat and binding, LEFT steering (M) (A).. | 23479 | 5.75 |
| PAFEF | A-9985 | Toe board, upper, with mat and binding, RIGHT steering (OC) (S) | 24486 | 5.25 |
| SAFEF | A-9986 | Toe board only, upper, with cleats, RIGHT steering (M) (A).... | 23379 | 1.75 |



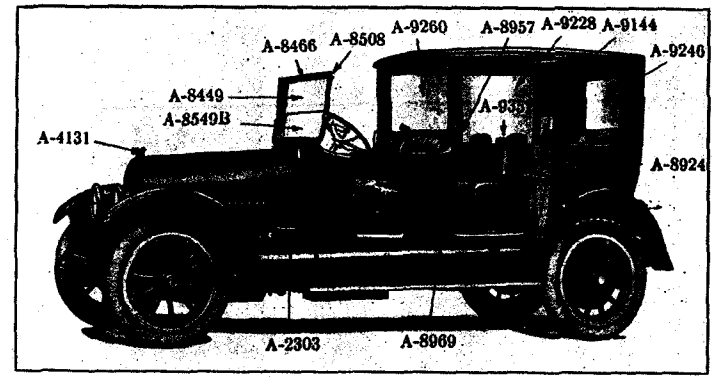

VICTORIA, TYPE A



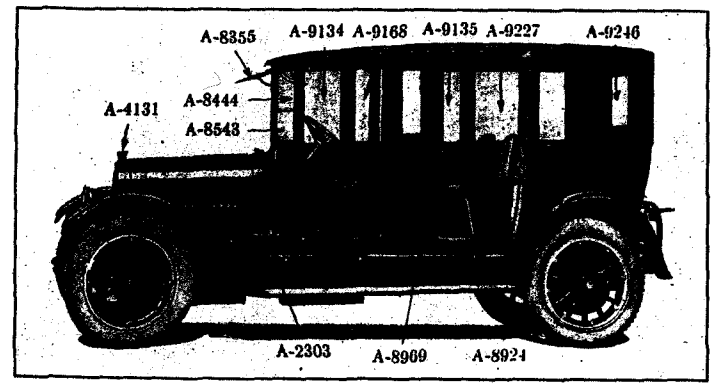

BROUGHAM, TYPE A




LIMOUSINE




TOWN LIMOUSINE




IMPERIAL

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAKEF | A-9987 | Toe board, lower, with mat and binding(7P)(P-1)(R-1)(S) RIGHT steering | 24487 | 5.50 |
| CAKEF | A-9988 | Toe board, lower, with mat and binding (P-2) (R-2) RIGHT steering | 24485 | 5.50 |
| DAKEF | A-9989 | Toe board only, lower, with cleats, RIGHT steering (M) (A) | 23381 | 1.65 |
| FAKEF | A-9990 | Mat for upper toe board, LEFT steering (OC) (S) | 37348 | .85 |
| KAKEF | A-9991 | Mat for upper toe board, LEFT steering (M) (A) | 37909 | .85 |
| LAKEF | A-9992 | Mat for lower toe board, LEFT steering (7P) (P-1) (R-1) (S) | 37347 | .85 |
| MAKEF | A-9993 | Mat for lower toe board, LEFT steering (P-2) (R-2) | 38153 | .85 |
| PAKEF | A-9994 | Mat for lower toe board, LEFT steering (M) (A) | 37908 | .85 |
| RAKEF | A-9995 | Mat for upper toe board, RIGHT steering (OC) (S) | 37923 | .85 |
| SAKEF | A-9996 | Mat for upper toe board, RIGHT steering (M) (A) | 37917 | .85 |
| TAKEF | A-9997 | Mat for lower toe board, RIGHT steering (7P) (P-1) (R-1) (S) | 37924 | .85 |
| ZAKEF | A-9998 | Mat for lower toe board, RIGHT steering (P-2) (R-2) | 38152 | .85 |
| BEKEF | A-9999 | Mat for lower toe board, RIGHT steering (M) (A) | 37919 | .85 |
| CEKEF | A-10000 | Binding, RIGHT half, for top edge of upper toe board (OC) (S) (M) (A) | 39481 | .30 |
| FEKEF | A-10001 | Binding, LEFT half, for top edge of upper toe board (OC) (S) (M) (A) | 39481 | .30 |
| LEKEF | A-10002 | Binding for RIGHT side of upper toe board (OC) (S) | 45586 | .15 |
| MEKEF | A-10003 | Binding for LEFT side of upper toe board (OC) (S) | 45586 | .15 |
| PEKEF | A-10004 | Binding for RIGHT side of upper toe board (M) (A) | 45586 | .15 |
| REKEF | A-10005 | Binding for LEFT side of upper toe board (M) (A) | 45586 | .15 |
| SEKEF | A-10006 | Binding, RIGHT half, for top edge of lower toe board, LEFT steering (OC) (S) | 45609 | .40 |
| ZEKEF | A-10007 | Binding, LEFT half, for top edge of lower toe board, LEFT steering (OC) (S) | 45593 | .10 |
| CIKEF | A-10008 | Binding, RIGHT half, for top edge of lower toe board, LEFT steering (M) (A) | 45609 | .40 |
| FIKEF | A-10009 | Binding, LEFT half, for top edge of lower toe board, LEFT steering (M) (A) | 45593 | .10 |
| LIKEF | A-10010 | Binding, RIGHT half, for top edge of lower toe board, RIGHT steering (OC) (S) | 45593 | .10 |
| PIKEF | A-10011 | Binding, LEFT half, for top edge of lower toe board, RIGHT steering (OC) (S) | 45609 | .40 |
| SIKEF | A-10012 | Binding, RIGHT half, for top edge of lower toe board, RIGHT steering (M) (A) | 45593 | .10 |
| ZIKEF | A-10013 | Binding, LEFT half, for top edge of lower toe board, RIGHT steering (M) (A) | 45609 | .40 |
| COKEF | A-10014 | Binding for RIGHT side of lower toe board (OC) (S) | 45586 | .15 |
| DOKEF | A-10015 | Binding for LEFT side of lower toe board (OC) (S) | 45586 | .15 |
| FOKEF | A-10016 | Binding for RIGHT side of lower toe board (M) (A) | 45586 | .15 |
| KOKEF | A-10017 | Binding for LEFT side of lower toe board (M) (A) | 45586 | .15 |
| LOKEF | A-10018 | Anti-squeak for toe and foot boards (OC) (S) (M) (A) | 34566 | .75 |
| MOKEF | A-10019 | Bolt, boards to bracket on body (OC) (S) (M) (A) | 19319 | .05 |
| POKEF | A-10020 | Flat washer on bolt (OC) (S) (M) (A), per doz. .25 | 11478 | .05 |
| ROKEF | A-10021 | Wing nut on bolt (OC) (S) (M) (A) | 6978 | .10 |
| SOKEF | A-10022 | Lock washer for wing nut (OC) (S) (M) (A), per doz. .25 | 11314 | .05 |

## FOOT BOARDS, MATS AND BINDINGS

| | | | | |
|---|---|---|---|---|
| TOKEF | A-10026 | Foot board, front, with mat and bindings, LEFT steering (OC) (S) (M) (A) | 23437 | 5.50 |
| BUKEF | A-10027 | Foot board, rear, with mat and bindings, LEFT steering (OC) (S) (M) (A) | 23438 | 4.50 |
| DUKEF | A-10028 | Foot board, front, with mat and bindings, RIGHT steering (OC) (S) (M) (A) | 24488 | 5.50 |
| KUKEF | A-10029 | Foot board, rear, with mat and bindings, RIGHT steering (OC) (S) (M) (A) | 24489 | 4.50 |
| MUKEF | A-10030 | Mat for front foot board, LEFT steering (OC) (S) (M) (A) | 37600 | .50 |
| PUKEF | A-10031 | Mat for rear foot board, LEFT steering (OC) (S) (M) (A) | 37599 | 1.00 |
| RUKEF | A-10032 | Mat for front foot board, RIGHT steering (OC) (S) (M) (A) | 37928 | .60 |
| SUKEF | A-10033 | Mat for rear foot board, RIGHT steering (OC) (S) (M) (A) | 37927 | 1.00 |
| TUKEF | A-10034 | Binding for either end of front foot board (OC) (S) (M) (A) | 45586 | .15 |
| ZUKEF | A-10035 | Binding on front of front foot board (OC) (S) (M) (A) | 37358 | .45 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BALEF | A-10036 | Binding, RIGHT half, for rear of front foot board, LEFT steering (OC) (S) (M) (A) | 39481 | .30 |
| DALEF | A-10037 | Binding, LEFT half, for rear of front foot board, LEFT steering (OC) (S) (M) (A) | 39481 | .30 |
| KALEF | A-10038 | Binding, RIGHT half, for rear of front foot board, RIGHT steering (OC) (S) (M) (A) | 39481 | .30 |
| MALEF | A-10039 | Binding, LEFT half, for rear of front foot board, RIGHT steering (OC) (S) (M) (A) | 39481 | .30 |
| RALEF | A-10040 | Binding for either end of rear foot board (OC) (S) (M) (A) | 39481 | .30 |
| SALEF | A-10041 | Mat for toe board bracket and sill, RIGHT side (7P) (P-1) (R-1) (S) (M) (A) | 68216 | .50 |
| ZALEF | A-10042 | Mat for toe board bracket and sill, RIGHT side (P-2) | 34560 | .50 |
| BELEF | A-10043 | Mat for toe board bracket and sill, RIGHT side (R-2) | 34322 | .50 |
| CELEF | A-10044 | Mat for toe board bracket and sill, LEFT side (7P) (P-1) (R-1) (S) (M) (A) | 68217 | .50 |
| FELEF | A-10045 | Mat for toe board bracket and sill, LEFT side (P-2) | 34561 | .50 |
| KELEF | A-10046 | Mat for toe board bracket and sill, LEFT side (R-2) | 34323 | .50 |
| LELEF | A-10047 | Anti-squeak for toe and floor boards (OC) (S) (M) (A) | 34566 | .75 |
| MELEF | A-10048 | Lifter for foot boards | 33387 | .50 |

## ALUMINUM PLATES ON TOE AND FOOT BOARDS

| | | | | |
|---|---|---|---|---|
| RELEF | A-10052 | Plate with pads for steering post, clutch and brake pedals, upper half, LEFT steering (7P) (P-1) (R-1) (V-1) (SB-1) (SB-2) | 23420 | 1.60 |
| TELEF | A-10053 | Plate with pads for steering post, clutch and brake pedals, upper half, LEFT steering (P-2) (R-2) (V-2) (B-2) | 24463 | 1.60 |
| BILEF | A-10054 | Plate with pads for steering post, clutch and brake pedals, upper half, LEFT steering (CC) except (V-1) (V-2)(SB-1)(SB-2)(B-2) | 23415 | 1.60 |
| DILEF | A-10055 | Plate with pads for steering post, clutch and brake pedals, upper half, LEFT steering (M) (A) | 23413 | 1.45 |
| KILEF | A-10056 | Plate with pads for steering post, clutch and brake pedals lower half, LEFT steering (7P) (S) (P-1) (R-1) (V-1) (SB-1) (SB-2) | 23421 | 1.65 |
| PILEF | A-10057 | Plate with pads for steering post, clutch and brake pedals, lower half, LEFT steering (P-2) (R-2) (B-2) (V-2) | 24465 | 1.50 |
| SILEF | A-10058 | Plate with pads for steering post, clutch and brake pedals, lower half, LEFT steering (CC) except (V-1) (V-2)(SB-1)(SB-2)(B-2) | 23417 | 2.00 |
| ZILEF | A-10059 | Plate with pads for steering post, clutch and brake pedals, lower half, LEFT steering (M) (A) | 23414 | 1.65 |
| COLEF | A-10060 | Plate with pads for steering post, clutch and brake pedals, upper half, RIGHT steering (7P) (P-1) (R-1) (V-1) (S) (SB-1) (SB-2) | 23425 | 1.50 |
| KOLEF | A-10061 | Plate with pads for steering post, clutch and brake pedals, upper half, RIGHT steering (P-2) (R-2) (V-2) (B-2) | 25643 | 2.00 |
| MOLEF | A-10062 | Plate with pads for steering post, clutch and brake pedals, upper half, RIGHT steering(CC)except(V-1)(V-2)(SB-1)(SB-2)(B-2) | 23415 | 1.60 |
| ROLEF | A-10063 | Plate with pads for steering post, clutch and brake pedals, upper half, RIGHT steering (M) (A) | 23423 | 1.50 |
| TOLEF | A-10064 | Plate with pads for steering post, clutch and brake pedals, lower half, RIGHT steering (7P) (P-1) (R-1) (S) | 23424 | 1.80 |
| BULEF | A-10065 | Plate with pads for steering post, clutch and brake pedals, lower half, RIGHT steering (P-2) (R-2) (V-2) (B-2) | 25642 | 2.00 |
| DULEF | A-10066 | Plate with pads for steering post, clutch and brake pedals, lower half RIGHT steering (CC) except (V-1) (V-2) (SB-1) (SB-2) (B-2) | 23416 | 2.00 |
| KULEF | A-10067 | Plate with pads for steering post, clutch and brake pedals, lower half, RIGHT steering (M) (A) | 23422 | 2.00 |
| MULEF | A-10068 | Felt pad on upper half of plate for steering post, per doz. .25 | 37959 | .05 |
| PULEF | A-10069 | Felt pad on lower half of plate for steering post, per doz. .25 | 37343 | .05 |
| RULEF | A-10070 | Felt pad on upper half of plate for clutch and brake pedals (OC) (V-1) (V-2) (S) (M) (A) (SB-1) (SB-2) (B-2), per doz. .25 | 37680 | .05 |
| TULEF | A-10071 | Felt pad on lower half of plate for clutch and brake pedals (OC) (V-1) (V-2) (S) (M) (A) (SB-1) (SB-2) (B-2), per doz. .25 | 37681 | .05 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAMEF | A-10072 | Felt pad on lower half of plate for clutch and brake pedals (CC) except (V-1) (V-2) (SB-1) (SB-2) (B-2) | 31731 | .05 |
| DAMEF | A-10073 | Retainer for pad on upper half of steering post plate | 37960 | .05 |
| FAMEF | A-10074 | Retainer for pad on lower half of steering post plate | 37344 | .05 |
| KAMEF | A-10075 | Retainer for pad on upper half of plate for clutch and brake pedals (OC) (V-1) (V-2) (SB-1) (SB-2) (B-2) (S) (M) (A) | 37678 | .05 |
| MAMEF | A-10076 | Retainer for pad on lower half of plate for clutch and brake pedals (OC) (V-1) (V-2) (SB-1) (SB-2) (B-2) (S) (M) (A) | 37679 | .05 |
| RAMEF | A-10077 | Retainer for pad on upper half of plate for clutch and brake pedals (CC) except (V-1) (V-2) (SB-1) (SB-2) (B-2) | 31732 | .05 |
| TAMEF | A-10078 | Rivet, retainer and pads to plate, per doz. .25 | 17680 | .05 |
| ZAMEF | A-10079 | Plate, front half, with felts and retainers on floor boards for control and hand brake levers, LEFT steering | 25640 | 1.50 |
| CEMEF | A-10080 | Plate, rear half, with felts and retainers on floor boards for control and hand brake levers, LEFT steering | 25649 | 1.50 |
| FEMEF | A-10081 | Plate, front half, with felts and retainers on floor boards for control and hand brake levers, RIGHT steering | 23426 | 1.25 |
| LEMEF | A-10082 | Plate, rear half, with felts and retainers on floor boards for control and hand brake levers, RIGHT steering | 23427 | 1.25 |
| PEMEF | A-10083 | Felt pad for plate for control lever (2 used) | 37586 | .05 |
| REMEF | A-10084 | Retainer for felt pad on plate for control lever (2 used) | 37587 | .05 |
| SEMEF | A-10085 | Felt pad on plate for brake lever (front half) | 37746 | .05 |
| TEMEF | A-10086 | Retainer for felt pad on plate for brake lever (front half), per doz. .25 | 37745 | .05 |
| BIMEF | A-10087 | Felt pad on plate for brake lever (rear half), per doz. .25 | 37584 | .05 |
| CIMEF | A-10088 | Retainer for felt pad on plate for brake lever (rear half), per doz. .25 | 37585 | .05 |
| FIMEF | A-10089 | Rivet, retainer and pad to plate, per doz. .25 | 17680 | .05 |
| KIMEF | A-10090 | Cover plate with pads and retainers for generator on toe boards, LEFT steering (CC) except (V-1) (V-2) (SB-1) (SB-2) | 22229 | 8.00 |
| MIMEF | A-10091 | Cover plate with pads and retainers for generator on toe boards, RIGHT steering (CC) except (V-1) (V-2) (SB-1) (SB-2) | 22692 | 8.00 |
| RIMEF | A-10092 | Plug in cover plate (CC) except (V-1) (V-2) (SB-1) (SB-2) | 37036 | .20 |
| SIMEF | A-10093 | Anchor bracket on toe board for screw attaching cover (CC) except (V-1) (V-2) (SB-1) (SB-2) | 31437 | .15 |
| ZIMEF | A-10094 | Felt strip on top edge of cover (CC) except (V-1) (V-2) (SB-1) (SB-2) | 37990 | .05 |
| COMEF | A-10095 | Felt strip between sides of generator cover and toe boards (CC) except (V-1) (V-2) (SB-1) (SB-2) | 31432 | .05 |
| FOMEF | A-10096 | Retainer for felt on top edge of cover (CC) except (V-1) (V-2) (SB-1) (SB-2) | 31431 | .05 |
| LOMEF | A-10097 | Retainer for felt on side of cover (CC) except (V-1) (V-2) (SB-1) (SB-2) | 31430 | .05 |
| POMEF | A-10098 | Screw, long, to attach cover plate to toe boards (CC) except (V-1) (V-2) (SB-1) (SB-2) | 31435 | .25 |
| SOMEF | A-10099 | Screw, short, to attach cover plate to toe board (CC) except (V-1) (V-2) (SB-1) (SB-2) | 31436 | .15 |
| ZOMEF | A-10100 | Felt pad for conduit hole in upper toe board (OC) (V-1) (V-2) (SB-1) (SB-2) (S) (M) (A), per doz. .25 | 38054 | .05 |
| CUMEF | A-10101 | Plate for conduit hole in upper toe board (OC) (V-1) (V-2) (SB-1) (SB-2) (S) (M) (A) | 38053 | .08 |
| FUMEF | A-10102 | Felt pad for starter and accelerator pedal (OC) (V-1) (V-2) (SB-1) (SB-2) (S) (M) (A) | 33992 | .05 |
| LUMEF | A-10103 | Felt pad for starter and accelerator pedal (CC) except (V-1) (V-2) (SB-1) (SB-2) | 31975 | .05 |
| PUMEF | A-10104 | Plate for felt on starter and accelerator pedal in toe boards (OC) (V-1) (V-2) (SB-1) (SB-2) (S) (M) (A) | 33991 | .15 |
| SUMEF | A-10105 | Plate for accelerator pedal hole in toe boards, RIGHT steering (OC) (SB-1) (SB-2) (S) (M) (A) | 37906 | .15 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAPEF | A-10106 | Felt pad for accelerator pedal hole in toe boards, RIGHT steering (OC) (SB-1) (SB-2) (S) (M) (A), per doz. .25 | 37907 | .05 |
| DAPEF | A-10107 | Plate on toe boards for oiling starter gear shaft (OC) (V-1) (V-2) (SB-1) (SB-2) (S) (M) (A) | 33215 | .25 |
| KAPEF | A-10108 | Screw, RIGHT, attaching oiler plate to cover (OC) (V-1) (V-2) (SB-1) (SB-2) (S) (M) (A) | 33216 | .05 |
| MAPEF | A-10109 | Screw, LEFT, attaching oiler plate to cover (OC) (V-1) (V-2) (SB-1) (SB-2) (S) (M) (A) | 33214 | .05 |
| RAPEF | A-10110 | Thimble for tire pump starting rod in floor boards | 37711 | .15 |
| SAPEF | A-10111 | Hand hole cover on rear floor, all except (R-1) (R-2) (V-1) (V-2) | 23706 | .60 |

## ACCELERATOR FOOT REST

| | | | | |
|---|---|---|---|---|
| TAPEF | A-10115 | Soft rubber cap for foot rest | 19685 | .10 |
| ZAPEF | A-10116 | Retainer with supporting stud for foot rest | 21018 | .30 |
| BEPEF | A-10117 | Special nut on stud for foot rest | 30590 | .20 |
| CEPEF | A-10118 | Nut on stud for foot rest, per doz. .25 | 10893 | .05 |
| DEPEF | A-10119 | Flat washer on stud for foot rest, per doz. .25 | R-4-347 | .05 |
| FEPEF | A-10120 | Lock washer for nut on foot rest screw, per doz. .25 | 11316 | .05 |

## BOLTS, BODY TO FRAME

| | | | | |
|---|---|---|---|---|
| TEPEF | A-10124 | Bolt (2½" long), body to frame | 11622 | .15 |
| ZEPEF | A-10127 | Bolt (3" long), body to frame | 11624 | .15 |
| BIPEF | A-10129 | Bolt (3¼" long), body to frame | 11830 | .20 |
| CIPEF | A-10131 | Bolt (1⅜" long), body to frame | 11861 | .10 |
| DIPEF | A-10134 | Nut for body bolts, per doz. .25 | 10894 | .05 |
| FIPEF | A-10135 | Lock washer, per doz. .25 | 11317 | .05 |
| KIPEF | A-10136 | Flat washer with square hole | 11463 | .03 |
| LIPEF | A-10138 | Special washer for body bolts | 37206 | .03 |
| MIPEF | A-10139 | Special washer for body bolts | 11527 | .05 |
| PIPEF | A-10146 | Anti-squeak between body and frame (60" long) | 68362 | .35 |
| RIPEF | A-10147 | Anti-squeak pad for body brackets (2" x 3½") | 68294 | .05 |
| SIPEF | A-10148 | Anti-squeak pad for body brackets (2½" x 4") | 32968 | .08 |
| TIPEF | A-10149 | Anti-squeak pad for front body brackets (1⅛" x 4") | 32967 | .05 |

## SEVEN PASSENGER AUXILIARY CHAIR

| | | | | |
|---|---|---|---|---|
| LOPEF | A-10208 | Auxiliary chair complete (upholstered) 2nd type (7P) | 24482 | 35.00 |
| MOPEF | A-10209 | Bracket on floor for auxiliary chair, RIGHT, outside (hinge hole open) 1st type (7P) | 68173 | 2.10 |
| ROPEF | A-10210 | Bracket on floor for auxiliary chair, RIGHT, outside (hinge hole closed) 2nd type (7P) | 38243 | 2.10 |
| TOPEF | A-10211 | Bracket on floor for auxiliary chair, LEFT, outside (hinge hole open) 1st type (7P) | 68174 | 2.10 |
| BUPEF | A-10212 | Bracket on floor for auxiliary chair, LEFT, outside (hinge hole closed) 2nd type (7P) | 38244 | 2.10 |
| DUPEF | A-10213 | Bracket on floor for auxiliary chair, RIGHT, inside (hinge hole open) 1st type (7P) | 68175 | 1.60 |
| KUPEF | A-10214 | Bracket on floor for auxiliary chair, RIGHT, inside (hinge hole closed) 2nd type (7P) | 38259 | 1.60 |
| MUPEF | A-10215 | Bracket on floor for auxiliary chair, LEFT, inside (hinge hole open) 1st type (7P) | 68176 | 1.60 |
| RUPEF | A-10216 | Bracket on floor for auxiliary chair, LEFT, inside (hinge hole closed) 2nd type (7P) | 38260 | 1.60 |

| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BAREF | A-10217 | Swivel rod for auxiliary chair (1st type) (7P) | 68179 | 1.40 |
| CAREF | A-10218 | Pin on swivel rod auxiliary chair (1st type) (7P), per doz. .25 | 68180 | .05 |
| DAREF | A-10219 | Hinge stud in bracket for auxiliary chair (2nd type) (7P) | 32975 | .15 |
| FAREF | A-10220 | Nut for hinge stud (2nd type) (7P) | 32976 | .15 |

## DECK LID FOR ROADSTER

| | | | | |
|---|---|---|---|---|
| KAREF | A-10269 | Lock for deck lid (R-1) (R-2) | 34212 | .40 |
| LAREF | A-10271 | Key for deck lid lock (R-1) (R-2) | 17203 | .85 |
| MAREF | A-10272 | Cover for keyhole in deck (R-1) (R-2) | 17334 | .50 |
| PAREF | A-10274 | Screw, keyhole cover to deck (R-1) (R-2), per doz. .25 | 11957 | .05 |
| RAREF | A-10275 | Striker plate for lock (R-1) (R-2) | 34211 | .05 |
| SAREF | A-10276 | Rubber bumper for deck lid (R-1) (R-2) | 5118 | .05 |
| TAREF | A-10277 | Retainer for rubber bumper (R-1) (R-2) | 30458 | .05 |
| ZAREF | A-10278 | Screw for retainer (R-1) (R-2) | 10808 | .10 |
| BEREF | A-10279 | Nut on screw (R-1) (R-2), per doz. .25 | 10889 | .05 |
| CEREF | A-10280 | Lock washer (R-1) (R-2), per doz. .25 | 11314 | .05 |
| DEREF | A-10281 | Plate for bumper on deck lid (R-1) (R-2) | 34304 | .20 |
| FEREF | A-10282 | Retracting spring for deck lid (R-1) (R-2) | 33557 | .25 |

## TAIL GATE

| | | | | |
|---|---|---|---|---|
| TEREF | A-10311 | Hinge for tail gate (V-1) | 20717-F | 1.75 |
| ZEREF | A-10317 | Support for tail gate (V-1) | 20970-F | 1.00 |
| BIREF | A-10319 | Catch, RIGHT, for tail gate lock (V-1) | 20946-F | .20 |
| CIREF | A-10320 | Catch, LEFT, for tail gate lock (V-1) | 20947-F | .20 |
| DIREF | A-10326 | Lock for tail gate (V-1) | 20704-F | .40 |
| FIREF | A-10327 | Key for tail gate lock (V-1) | 17203 | .85 |
| KIREF | A-10333 | Key hole cover (V-1) | 17334 | .50 |
| LIREF | A-10335 | Rubber bumper for tail gate (V-1) | 20863-F | .10 |

## PACKAGE COMPARTMENT LID—ROADSTER

| | | | | |
|---|---|---|---|---|
| BOREF | A-10341 | Lid or cover for package compartment less lock and hinge (R-1) | 24041 | 3.25 |
| COREF | A-10342 | Lid or cover for package compartment less lock and hinge (R-2) | 23142 | 3.25 |
| DOREF | A-10344 | Sargent lock for package compartment lid (specify lock number) (R-1) (R-2) | 68263 | 2.50 |
| KOREF | A-10345 | Plate holding lock in lid (R-1) (R-2) | 34140 | .05 |
| LOREF | A-10346 | Collar for lock in lid (R-1) (R-2) | 34141 | .20 |
| MOREF | A-10347 | Strike plate for compartment lid lock (R-1) (R-2) | 34440 | .30 |
| POREF | A-10348 | Hinge for package compartment lid (R-1) (R-2) | 32123 | 1.80 |

## ATTACHMENT FOR SPEEDOMETER

| | | | | |
|---|---|---|---|---|
| DUREF | A-10359 | Retaining ring for speedometer head (CC) | 34711 | .75 |
| FUREF | A-10364 | Clamp bolt for speedometer head (OC) | 34708 | .20 |
| KUREF | A-10365 | Clamp bolt for speedometer head (CC) | 34710 | .15 |
| LUREF | A-10368 | Nut for clamp bolt on Waltham speedometer head | 10886 | .05 |
| MUREF | A-10369 | Lock washer, per doz. .25 | 11313 | .05 |
| PUREF | A-10372 | "L" shaped attachment for shaft at speedometer head (Waltham) | 34867 | 5.00 |
| RUREF | A-10373 | Set screw for speedometer head and elbow | SW-6451 | .05 |
| SUREF | A-10374 | Grease cup for speedometer shaft | 17054 | .50 |



| Code Word | Serial | Part Name | Symbol | Price |
|---|---|---|---|---|
| BASEF | A-10376 | Bushing for Waltham speedometer shaft in dash and splash shield | 31856 | .08 |
| DASEF | A-10378 | Bushing for Van Sicklen speedometer shaft in dash and splash shield | 38079 | .08 |
| KASEF | A-10379 | Grommet in dash for bushing | 19357 | .05 |
| LASEF | A-10380 | Strap with sleeve supporting speedometer shaft | 30701 | .60 |

## OIL CAN AND HOLDER

| | | | | |
|---|---|---|---|---|
| BESEF | A-10384 | Oil can | 3944 | .35 |
| CESEF | A-10385 | Holder for oil can | 12273 | .25 |
| DESEF | A-10386 | Screw, oil can holder to dash, per doz. .25 | 10199 | .05 |
| FESEF | A-10387 | Nut, per doz. .25 | 10885 | .05 |
| KESEF | A-10388 | Lock washer, per doz. .25 | 11313 | .05 |

## TOOL EQUIPMENT

| | | | | |
|---|---|---|---|---|
| ZESEF | A-10393 | Large bag for tools | 37672 | 2.00 |
| BISEF | A-10394 | Cold chisel (6" long) | 3921 | .25 |
| CISEF | A-10395 | File and handle | 3922 | .25 |
| DISEF | A-10396 | Monkey wrench (11" long) | 3936 | 1.50 |
| FISEF | A-10397 | Punch (5" long) | 6754 | .20 |
| KISEF | A-10398 | Hammer | 13594 | 1.00 |
| LISEF | A-10399 | Wrench for hub caps, jam nuts on front axle spindle and adjusting nuts for rear wheel bearings | 34011 | .75 |
| PISEF | A-10402 | Timer wrench (plain) | 31885-D | .10 |
| RISEF | A-10403 | Timer wrench (with gauges) | 12741-D | .15 |
| SISEF | A-10404 | Spark plug | 19865 | 1.00 |
| TISEF | A-10405 | Box for spark plug | 17129 | .10 |
| ZISEF | A-10406 | Gasket for spark plug | 8819 | .05 |
| BOSEF | A-10407 | Wrench for set screw on generator coupling | 19982 | .15 |
| COSEF | A-10409 | Wrench for spark plug and air relief cock | 30222 | .70 |
| DOSEF | A-10410 | Wrench for adjusting internal and external brakes | 30223 | .40 |
| FOSEF | A-10411 | Wrench for removing drain plug in engine oil pan | 38670 | .80 |
| KOSEF | A-10413 | Small bag for tools | 32813 | .50 |
| LOSEF | A-10414 | Screw driver | 3923 | .30 |
| MOSEF | A-10415 | Bicycle wrench (4" long) | 3929 | .75 |
| POSEF | A-10416 | Screw driver (3" long, square blade) | 6753 | .40 |
| ROSEF | A-10417 | Pliers | 30520 | .85 |
| SOSEF | A-10418 | Socket wrench for water pump (thermostat cam) | 72819 | 1.00 |
| TOSEF | A-10419 | Brace and socket wrench for Kelsey demountable rims | 14903 | .75 |
| ZOSEF | A-10420 | Tongs for Kelsey rims | 16052 | .55 |
| BUSEF | A-10422 | Hose and gauge for tire pump | 37669 | 4.00 |
| CUSEF | A-10423 | Grease gun complete | 37646 | 1.80 |
| DUSEF | A-10425 | Auto jack (Buckeye) | 50180 | 6.00 |
| FUSEF | A-10426 | Handle for jack | 9979½ | .45 |
| KUSEF | A-10427 | Handy lamp complete | 21814 | 3.50 |
| LUSEF | A-10429 | Starting crank | 22872 | 3.00 |

# TABLE OF CONTENTS

**Alphabetically Arranged**


**A**

| | Page |
|---|---|
| Armature | 26 |
| Accelerator toe rest | 121 |
| Air control, auxiliary | 24 |
| Air piping | 58 |
| Aluminum plates on toe and foot board | 119 |
| Ammeter | 40 |
| Anti-squeak dust shield, Corner shield | 78 |
| Anti-squeak fender, Running Board | 78 |
| Arm, Contact | 30 |
| Arm, steering gear | 73 |
| Arm, generator brush | 28 |
| Arm, front axle steering | 90 |
| Arm, Torsion | 101 |
| Auxiliary air control | 24 |
| Auxiliary chair (7-P) | 121 |
| Axle, front | 90 |
| Axle housing, rear | 93 |
| Axle, rear | 93 |

**B**

| | Page |
|---|---|
| Battery box | 80 |
| Bearings, main engine | 8 |
| Bearings, differential | 95 |
| Bearings, transmission | 47 |
| Binding, toe board | 116 |
| Binding, running boards | 81 |
| Board, foot | 118 |
| Board, toe | 116 |
| Bolted clamp for leaves of spring | 67 |
| Bolts, spring shackles | 68 |
| Bow Socket, metal first type (P-1) | 86 |
| Bow Socket, metal second type (P-2) | 87 |
| Bow Socket, metal first type (R-1) | 87 |
| Bow Socket, metal second type (R-2) | 88 |
| Bow sockets, metal 1st type (7-P) | 85 |
| Bow sockets, metal 2nd type (7-P) | 86 |
| Bows, wood for tops | 85 |
| Brackets for cross members on frame | 61 |
| Brackets on side bar | 60 |
| Brackets to attach top to windshield | 89 |
| Brake band, external | 96 |
| Brake band, internal | 98 |
| Brake control | 55 |
| Bumper, rubber, for door (OC) | 107 |
| Bumper, rubber, for door (CC) | 109 |
| Bushing for eye leaves | 67 |

**C**

| | Page |
|---|---|
| Cables for horn | 38 |
| Cables for generator | 25 |
| Cam shaft | 10 |
| Carburetor | 20 |
| Carburetor drain | 23 |
| Carpets | 115 |
| Case, transmission | 46 |
| Chains, engine | 10 |
| Chair, auxiliary (7-P) | 121 |
| Channel (CC) | 111 |
| Circuit breaker relay attachments | 33 |
| Clamp bolted, spring leaves | 67 |
| Clips, spring | 68 |
| Clock lamp | 43 |
| Clutch control | 52 |
| Clutch, multiple disc | 51 |
| Clutch, starter | 25 |
| Clutch, driving | 26 |
| Coil, ignition | 39 |
| Collars, adjusting, driving pinion | 95 |
| Combination switch | 34 |
| Control, head lamp reflector | 41 |
| Condenser, distributor | 33 |
| Connection for handy lamp | 44 |
| Connecting rods, engine | 13 |
| Corner shields for rear fenders | 77 |
| Couplings for generator shaft | 25 |
| Cover, distributor | 33 |
| Cover, hand hole on dust shield | 79 |
| Cover, front crank case | 6 |
| Cover, rear crank case | 6 |
| Cover, rear differential | 96 |
| Crank case | 6 |
| Crank case cover, front | 6 |
| Crank case cover, rear | 6 |
| Crank shaft | 8 |
| Cross members for frame | 61 |
| Curtain envelopes | 84 |
| Curtains for tops | 84 |
| Curtain rods | 84 |
| Cushions | 112 |
| Cylinder blocks | 12 |

**D**

| | Page |
|---|---|
| Deck lid (R-1) (R-2) | 122 |
| Differential | 93 |
| Differential bearings | 95 |
| Differential carrier | 95 |
| Differential cover, rear | 96 |
| Differential driven gear | 93 |
| Differential mountings | 95 |
| Dome lamp | 46 |
| Door parts, closed cars | 109 |
| Doors, open cars | 107 |
| Distributor | 30 |
| Dust hood for top | 82 |
| Dust shields | 79 |




# TABLE OF CONTENTS—Continued


**E**

| | Page |
|---|---|
| Engine bearings, main | 8 |
| Engine chains | 10 |
| Engine oil pan | 8 |
| Engine sprockets | 10 |
| Envelopes for curtains | 84 |
| Exhaust manifolds | 13 |
| External brake bands | 96 |

**F**

| | Page |
|---|---|
| Fan | 14 |
| Fan housing | 14 |
| Fender attachments | 77 |
| Fenders | 76 |
| Fly wheel | 10 |
| Foot boards, open cars | 118 |
| Foot rail | 114 |
| Frame, windshield (OC) | 103 |
| Frame, upper windshield (CC) | 105 |
| Frame, lower windshield (CC) | 105 |
| Frame brackets | 61 |
| Frame cross members | 61 |
| Frame outriggers | 60 |
| Frame side bars | 60 |
| Front axle | 90 |

**G**

| | Page |
|---|---|
| Gasoline tank | 57 |
| Gauge, gasoline pressure | 59 |
| Gauge, gasoline on tank | 57 |
| Gauge, oil pressure | 20 |
| Gear, differential driven | 93 |
| Gear, distributor drive | 33 |
| Gears, transmission | 47 |
| Generator | 25 |
| Generator cables | 25 |
| Generator drive shaft | 25 |
| Glass, windshield (OC) | 103 |
| Guard, door sill, open cars | 108 |

**H**

| | Page |
|---|---|
| Handy lamp | 44 |
| Handy lamp connection | 44 |
| Hassocks | 114 |
| Hangers, running boards | 61 |
| Head, distributor | 30 |
| Head lamp | 41 |
| Head lamp reflector control | 41 |
| Hinge, door (CC) | 109 |
| Hinges, open car doors | 107 |
| Hood | 75 |
| Hood shelf | 76 |
| Horn | 37 |
| Horn attachments | 37 |
| Horn cables | 38 |
| Horn switch on steering gear | 74 |
| Housing, fan | 14 |
| Housing, steering worm and sector | 74 |
| Housing, rear axle | 93 |
| Housing tube | 70 |
| Hub for steering wheel | 70 |

**I**

| | Page |
|---|---|
| Ignition tubes and wires | 38 |
| Ignition coil | 39 |
| Indicator, oil level | 20 |
| Internal brake band | 98 |

**L**

| | Page |
|---|---|
| Lamp, clock | 43 |
| Lamp, dome | 46 |
| Lamp, handy | 44 |
| Lamp, head | 41 |
| Lamp, head, reflector control | 41 |
| Lamp, quarter | 46 |
| Lamp, side | 42 |
| Lamp, speedometer | 43 |
| Lamp, tail | 44 |
| Lamp, tonneau | 44 |
| Leaves, front springs | 64 |
| Leaves, rear cross springs | 66 |
| Leaves, rear side springs | 64 |
| Lever, hand brake | 54 |
| Lid, package compartment (R) (2-P) | 122 |
| Lift, window regulator | 111 |
| Lock, latch for door (CC) | 108 |
| Lock, pillar-handle (CC) | 108 |
| Locks, open cars | 107 |

**M**

| | Page |
|---|---|
| Manifolds, exhaust | 13 |
| Mats, running boards | 81 |
| Mats, toe board | 116 |
| Mountings, differential | 95 |
| Muffler | 69 |

**N**

| | Page |
|---|---|
| Nuts, adjusting steering tube | 71 |
| Nuts, differential adjusting | 95 |

**O**

| | Page |
|---|---|
| Oil can and holder | 123 |
| Oil level indicator | 20 |
| Oil pan for engine | 8 |
| Outrigger for frame | 60 |

# TABLE OF CONTENTS—Continued


P

| | Page |
|---|---|
| Pan, oil for engine | 8 |
| Pedals, brake control | 54 |
| Pipes, muffler | 70 |
| Piping, air | 58 |
| Piping, gasoline | 58 |
| Piping, oil | 18 |
| Pinion, driving, rear axle | 95 |
| Pistons, engine | 13 |
| Plates, valve tappet cover | 13 |
| Plates on toe and floor boards, aluminum | 119 |
| Prop support for top | 88 |
| Pump, gasoline air pressure | 59 |
| Pump, hand air pressure | 60 |
| Pump, oil | 16 |
| Pump, tire and control | 48 |
| Pumps, water | 15 |

Q

| | |
|---|---|
| Quarter lamps | 46 |

R

| | |
|---|---|
| Radiator | 56 |
| Radiator condenser tank and piping | 57 |
| Rear axle | 93 |
| Relay, circuit breaker | 33 |
| Rails, foot | 114 |
| Rear axle housing with fixed parts | 93 |
| Resistance units | 33 |
| Retainers for transmission bearings | 47 |
| Rims for wheels | 101 |
| Robe cord | 112 |
| Robe rail | 112 |
| Rods, air control | 24 |
| Rod, parallel | 90 |
| Rods, curtain | 84 |
| Rotor, distributor | 30 |
| Running boards | 81 |
| Running boards, bindings | 81 |
| Running boards, hangers | 61 |

S

| | |
|---|---|
| Sector for steering gear | 73 |
| Screw, contact | 30 |
| Shackles for springs | 68 |
| Shaft, cam | 10 |
| Shaft, crank | 8 |
| Shaft, drive, oil pump | 16 |
| Shaft, drive, water pump | 15 |
| Shaft, generator drive | 25 |

S

| | |
|---|---|
| Shaft, torsion arm | 95 |
| Shafts, rear axle | 93 |
| Shafts, transmission | 47 |
| Shield, universal joints | 101 |
| Shields, corner, rear fenders | 77 |
| Shield, rain vision (CC) | 104 |
| Shields, splash engine and radiator | 80 |
| Side bar, frame | 60 |
| Side lamps | 42 |
| Spark control | 23 |
| Spark control, steering gear | 74 |
| Speedometer heads, attachments | 122 |
| Speedometer lamp | 43 |
| Speedometer parts in spindle | 91 |
| Splash shield engine and radiator | 80 |
| Spring clips | 68 |
| Springs for cushions | 112 |
| Springs, front | 64 |
| Springs, rear cross | 66 |
| Springs, rear side | 64 |
| Spring shackles and bolts | 68 |
| Sprockets, engine | 10 |
| Starter control | 24 |
| Steering connecting rod | 73 |
| Steering gear arm | 73 |
| Steering gear housing for worm and sector | 74 |
| Steering gear sector | 73 |
| Steering gear support for housing tube | 70 |
| Steering gear support for tube and worm | 71 |
| Steering tube with worm | 71 |
| Steering wheel | 70 |
| Steering wheel hub | 70 |
| Strainer, gasoline line | 59 |
| Support, housing tube | 70 |
| Support for windshield (OC) | 103 |
| Support, tube and worm | 71 |
| Switch attachments, combination | 34 |
| Switches, dome | 46 |

T

| | |
|---|---|
| Tail gate (Victoria Type A) | 122 |
| Tail lamp | 44 |
| Throttle control, carburetor | 23 |
| Throttle control, steering gear | 74 |
| Timer and distributor | 33 |
| Tire carrier (Standard) | 62 |
| Tire carrier, Millimeter tires | 63 |
| Tire holder, Victoria Type A | 62 |
| Toe boards, open cars | 116 |
| Tonneau lamp | 44 |
| Top covering | 82 |
| Top irons on body | 89 |
| Tops | 82 |
| Tool box in dust shield | 79 |




# TABLE OF CONTENTS—Continued


T

| | Page |
|---|---|
| Tool compartment under front seat | 80 |
| Tool equipment | 123 |
| Torsion arm | 101 |
| Torsion arm shaft | 95 |
| Transmission bearings | 47 |
| Transmission case | 46 |
| Transmission control | 48 |
| Transmission gears | 47 |
| Transmission shafts | 47 |

U

| | |
|---|---|
| Universal joints | 101 |
| Universal joint shield | 102 |

V

| | |
|---|---|
| Valve mechanism | 10 |
| Valve, oil relief | 19 |
| Valve, pressure relief gasoline line | 59 |
| Valves, inlet and exhaust | 13 |

W

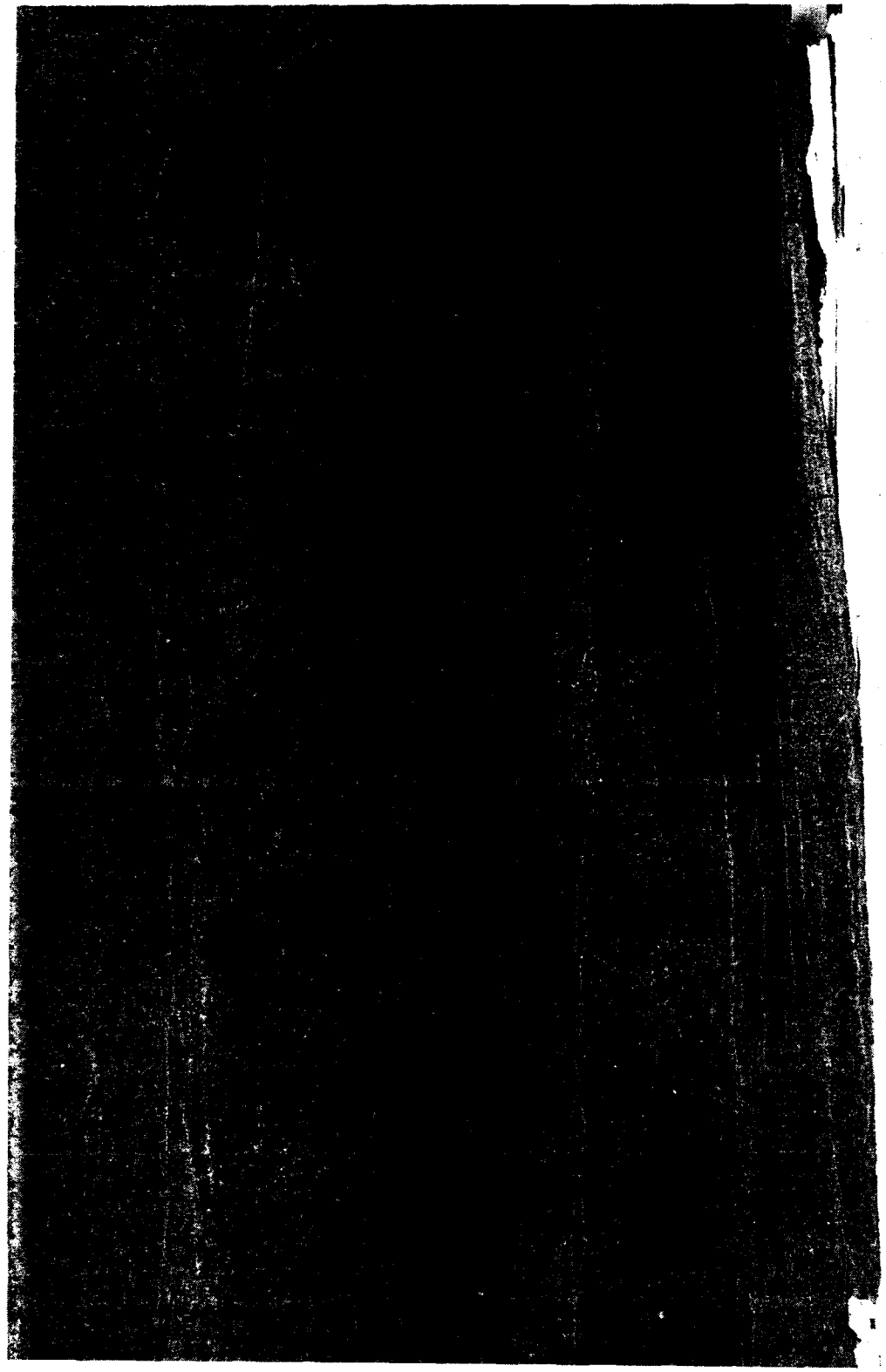
| | |
|---|---|
| Water connections | 16 |
| Wheels | 99 |
| Wheel carrier, wire | 63 |
| Wheel rims | 101 |
| Wheel, steering | 70 |
| Windows, closed cars | 110 |
| Window parts, closed cars | 110 |
| Windshields, open cars | 103 |
| Windshields, parts, closed cars | 104 |
| Wire, ignition | 38 |
| Wire, tail lamps, closed cars | 39 |
| Wire, tail lamps, open cars | 39 |
| Wire, tonneau lamp | 39 |
| Wire wheel carrier | 63 |
| Wires, horn | 38 |
| Wires, cowl conduit | 39 |
| Wires, jumper for tail lamp | 45 |

CADILLAC MOTOR CAR CO.
Shop manuals

1:1:- Shop manual- type 57.

LIBRARY REFERENCE COPY
NOT TO CIRCULATE

Evans-Winter-H



# SHOP MANUAL

For the Lubrication, Diagnosis, Adjustment and Repair of the Cadillac Automobile

Type 57

TABLE OF CONTENTS


Part I. Diagnosis . . . . . 5-27
Part II. Adjustment . . . . . 28-78
Part III. Removal, Inspection and Replacement . . 79-173
Part IV. Lubrication . . . . . 174-183



Cadillac Motor Car Company
Detroit, Michigan, U. S. A.

Second Edition Price $1.25 Net


Copyrighted 1921

# GENERAL DATA

ENGINE:

| | | | |
|---|---|---|---|
| Number of cylinders | 8 | Crankshaft diameter | 1⅞ inches |
| Bore of cylinders | 3½ inches | Valve size | 1½ inches |
| Stroke | 5½ inches | Valve lift | ⅜ inch |
| Piston displacement | 314 cu. in. | Carburetor size | 1½ inches |
| Horse power (N. A. C. C. Rating) | 31.25 | Spark plug size | 7/8 inch x 18 |

Engine revolutions per mile (Transmission Direct Drive):

| | | |
|---|---|---|
| Gear Ratio, *Standard* | Tires 35 inches | 2557 (approx.) |
| | Tires 34 inches | 2632 (approx.) |
| Gear Ratio, Low | Tires 35 inches | 2922 (approx.) |
| | Tires 34 inches | 3008 (approx.) |

ENGINE NUMBER: The number of the engine is stamped on the crankcase just back of the right-hand block of cylinders, on the left-hand side of the fan-shaft housing and on the name plate attached to the front face of the dash.

GEAR RATIOS:

Axle:

| | |
|---|---|
| Standard | 4.437-1 |
| Low | 5.071-1 |

Transmission:

| | |
|---|---|
| High | Direct |
| Intermediate | 58.65% of direct |
| Low | 32% of direct |
| Reverse | 26.70% of direct |

Between Engine and Rear Wheels:

Axle gear ratio, Standard:

| | | |
|---|---|---|
| Transmission gear | High | 4.437-1 |
| | Intermediate | 7.565-1 |
| | Low | 13.866-1 |
| | Reverse | 16.618-1 |

Axle gear ratio, Low:

| | | |
|---|---|---|
| Transmission gear | High | 5.071-1 |
| | Intermediate | 8.646-1 |
| | Low | 15.847-1 |
| | Reverse | 18.993-1 |

WHEEL BASE:

| | |
|---|---|
| Seven-Passenger, Phaeton, Four-Passenger, Roadster, Two-Passenger, Victoria and Brougham | 125 inches |
| Limousine, Imperial, Landaulet, Town Limousine, Town Landaulet and Suburban | 132 inches |
| Long Chassis | 145 inches |

TREAD:

| | |
|---|---|
| All Cars | 56 inches |

GASOLINE TANK CAPACITY:

| | |
|---|---|
| Gallons: | |
| United States | 20 |
| *Imperial* | 16.67 |
| Liters | 75.70 |



# PREFACE

The directions, suggestions and information contained in this manual represent actual experience in the shops of the Cadillac Motor Car Company. Part One deals with diagnosis; Part Two with adjustments; Part Three with the removal, inspection and replacement of parts, and Part Four with lubrication. This manual is intended for shop use strictly, and has been compiled with this end in view.

It has always been the practice in the manufacture of Cadillac motor cars to machine parts to limits and to inspect parts before they are assembled into cars to make certain that they have been held to the established limits in manufacture. A result of this practice is that correct clearances between moving parts are assured.

One of the objects of this manual is to establish limits for use in the inspection of parts which have seen service. These limits are supplied in Part Three under headings "Inspection." The limits named are those beyond which it is inadvisable to continue to use parts, if quietness of operation and maximum efficiency are expected in the operation of the car, but not necessarily beyond which some service, in normal use, cannot be obtained.

Suitable micrometers and dial indicators are necessary in making these inspections.

This manual will not only assist the repair man schooled in Cadillac shops, but will make it possible for the trained mechanic without previous Cadillac shop experience to determine the causes for unsatisfactory operation and to adjust, repair and lubricate Cadillac cars correctly.

Our Technical Department invites correspondence with shop foremen and shop superintendents on matters pertaining to the care, adjustment and repair of Cadillac motor cars. Suggestions regarding these matters are appreciated.

CADILLAC MOTOR CAR COMPANY
Detroit, Michigan.

## GENERAL SUGGESTIONS

Do not use shellac on gaskets or on hose connections. Its use is unnecessary and makes practically impossible the removal of parts without injury.

Before replacing gaskets make certain that they are in good condition and that the surfaces which press against them are clean and in good condition.

In removing sprockets, gears, collars, etc., do not tap them off, unless you have no suitable puller and are unable to procure one. If you are forced to tap off parts, do so carefully, using a lead hammer or a drift of soft brass.

Use well fitting wrenches and only enough force to tighten parts properly. The amount of force required depends upon the size of the stud or cap screw and the length of the wrench. Do not tighten a nut or cap screw sufficiently to strain the parts.

Select well fitting screw drivers in removing and replacing screws.

The replacement of parts will be facilitated if a practice is made of observing the manner in which they are assembled, before taking them apart.

If parts do not disassemble readily do not injure or break them by using too much force. Parts will disassemble easily when correct methods are employed and proper tools are used.

Care should be exercised to prevent the loss or injury of parts removed.

In replacing cotter pins use new ones.

Lubricate parts which move upon one another with suitable lubricant before putting them together. This includes such parts as spring shackle bolts, brake rod pins and the like, as well as pistons, engine bearings, etc.

Do not use waste in cleaning cylinders, pistons, bearings, gears, etc. Use cloth free from lint.

# PART I
# DIAGNOSIS

## ENGINE

### *Engine Apparently Lacks Power*

1. Engine fires irregularly. See under "Engine Fires Irregularly," page 8.
2. Incorrect spark timing.
   - A. Incorrectly timed ignition. See under "Timing Ignition," page 44.
   - B. Automatic spark control inoperative. See "Inspection" under "Distributor and Timer," page 126.
   - C. Driving with spark lever too far retarded or too far advanced.
3. Low compression. See under "Compression Low," page 6.
4. Carbon in cylinders. See under "Rapid Accumulation of Carbon in Cylinders," page 9.
5. Engine overheating. See under "Engine Overheats," page 9.
6. Imperfect fuel mixture.
   - A. Carburetor not correctly adjusted. See under "Carburetor," page 58.
   - B. Insufficient flow of gasoline into carburetor bowl. See under "Insufficient Flow of Gasoline into Carburetor Bowl," page 18.
   - C. Low grade gasoline used.
   - D. Thermostats adjusted so they do not close. See under "Adjustment of Thermostat Valves," page 56.
   - E. Punctured thermostatic member. See "Inspection" under "Water Pumps," page 105.
7. High gear ratio which gives the impression of lack of power.
8. Large diameter tires which give the impression of lack of power.
9. Excessive frictional resistance.
   - A. Engine not properly lubricated. See under "Engine Lubrication," page 175.
   - B. Tight brakes. See under "Brakes Drag When Released," page 20.
10. Back pressure in mufflers mufflers clogged with carbon.
11. Accelerator pedal does not open throttle wide incorrect adjustment of control rods.

12. Automatic throttle valve remains closed or nearly so—automatic throttle valve shaft sticking in its bearings. See "Inspection" under "Carburetor," page 130.

***Compression Low***

1. Thin oil.
   - A. Oil used has insufficient viscosity. See under "Lubricants," page 174.
   - B. Oil thinned by gasoline. See under "Gasoline Accumulates in Oil Pan," page 27.
2. Valves not seating.
   - A. Valves timed incorrectly. See under "Adjustment of Cam Slide," page 32.
   - B. Valve stems or cam slides sticking in guides. See under "General Lubrication," page 183.
   - C. Weak or broken valve spring. See "Inspection" under "Valves and Valve Springs," page 116.
3. Valves require regrinding. See under "Grinding Valves," page 33.
4. Worn or imperfectly fitting piston rings. See "Inspection" under "Piston and Piston Rings," page 98.
5. Loose fitting pistons, or scored cylinders or pistons. See "Inspection" under "Cylinder Blocks," page 86 and under "Piston and Piston Rings," page 98.

***Excessive Gasoline Consumption***

1. Habits of driver.
   - A. Failure to push auxiliary air valve lever forward as soon as engine is warm enough to permit it.
   - B. Running the engine more than necessary with car standing.
   - C. Car making short trips with stops between long enough to allow engine to cool.
   - D. Driving with spark lever too far advanced or too far retarded.
2. Incorrect spark timing.
   - A. Spark timed incorrectly. See under "Timing Ignition," page 44.
   - B. Automatic spark control inoperative. See "Inspection" under "Distributor and Timer," page 126.



3. Soft tires.
4. Tight brakes. See under "Brakes Drag When Released," page 20.
5. Imperfect fuel mixture.
   - A. Carburetor not correctly adjusted. See under "Carburetor," page 58.
   - B. Leaning device has no apparent effect on mixture. See under "Carburetor Leaning Device Has No Apparent Effect on Mixture," page 17.
   - C. Thermostat valves held open (pump shaft indicators pointing up).
   - D. Thermostats adjusted so they do not close valves. See under "Adjustment of Thermostat Valves," page 56.
   - E. Punctured thermostatic member. See "Inspection" under "Water Pumps," page 105.
   - F. Carburetor flooding. See under "Carburetor Floods," page 15.
6. Low compression. See under "Compression Low," page 6.
7. Engine firing irregularly. See under "Engine Fires Irregularly," page 8.
8. Carbon in cylinders. See under "Rapid Accumulation of Carbon in Cylinders," page 9.
9. Engine overheating. See under "Engine Overheats," page 9.

***Continued Cranking Necessary to Start Engine***

1. Habits of driver.
   - A. Attempting to start without air pressure.
   - B. Failure to prime carburetor (in cold weather).
   - C. Failure to pull auxiliary air valve lever back when starting with cold engine.
   - D. Auxiliary air valve lever pulled too far back when starting with warm engine.
   - E. Throttle lever not in correct position.
   - F. Spark lever too far retarded (in cold weather).
2. Auxiliary air valve spring not fully compressed when air valve lever is pulled back—auxiliary air valve rod not in proper adjustment. See under "Adjustment of Auxiliary Air Valve Control Rod," page 59.

3. Weak ignition. See under "No Spark or Weak Spark Between Spark Plug Points," page 12.
4. Carburetor flooding. See under "Carburetor Floods," page 15.
5. Insufficient flow of gasoline to carburetor bowl. See under "Insufficient Flow of Gasoline into Carburetor Bowl," page 18.
6. Slow cranking. See under "Starter Does Not Crank Engine," etc., page 11.
7. Incorrect adjustment of spark plug points. See under "Spark Plugs," page 46.
8. Low grade gasoline.
9. Water or dirt in the gasoline.

***Engine Fires Irregularly***

1. Imperfect spark plugs.
   - A. Dirty spark plug cores. See under "Spark Plug Cores Require Frequent Cleaning," page 13.
   - B. Broken spark plug cores.
2. Spark plug points set incorrectly. See under "Spark Plugs," page 46.
3. Weak ignition. See under "No Spark or Weak Spark Between Spark Plug Points," page 12.
4. Dirty track in distributor. See under "Track in Distributor Head Requires Frequent Cleaning," page 13.
5. Imperfect fuel mixture.
   - A. Carburetor not correctly adjusted. See under "Carburetor," page 58.
   - B. Low grade gasoline used.
   - C. Insufficient flow of gasoline into carburetor bowl. See under "Insufficient Flow of Gasoline Into Carburetor Bowl," page 18.
   - D. Thermostat valves held open (pump shaft indicators pointing up).
   - E. Thermostats adjusted so they do not close valves. See under "Adjustment of Thermostat Valves," page 56.
   - F. Punctured thermostatic member. See "Inspection" under "Water Pumps," page 105.
   - G. Leaking intake manifold gasket. See "Replacement" under "Intake Manifold," page 97.
   - H. Worn valve stem or valve guide. See "Inspection" under "Valves and Valve Springs," page 116.



6. Imperfect valve action.
   - A. Valves timed incorrectly. See under "Adjustment of Cam Slide," page 32.
   - B. Valve stems or cam slides sticking in guides. See under "General Lubrication," page 183.
   - C. Weak or broken valve spring. See "Inspection" under "Valves and Valve Springs," page 116.

***Engine Overheats***

1. Imperfect operation of cooling system.
   - A. Clogged strainers between radiator and pumps. See under "Water Pump Strainers," page 56.
   - B. Accumulation of sediment in water jackets of cylinders.
   - C. Thermostat valves stick on seats. See "Inspection" under "Water Pumps," page 105.
   - D. Cooling liquid frozen.
   - E. Not enough liquid in cooling system.
   - F. Accumulation of mud or dirt between radiator fins.
   - G. Too much of radiator covered.
   - H. Too much alcohol in cooling liquid. See under "Anti-Freezing Solution," page 53.
2. Late ignition.
   - A. Driving with spark too far retarded.
   - B. Timer incorrectly set. See under "Timing Ignition," page 44.
   - C. Automatic spark control inoperative. See "Inspection" under "Distributor and Timer," page 126.
3. Pistons not properly lubricated. See under "Not Enough Oil Thrown onto Cylinder Walls," page 25.
4. Carbon in cylinders. See under "Rapid Accumulation of Carbon in Cylinders," page 9.

***Rapid Accumulation of Carbon in Cylinders***

1. Use of oil which has low fire and flash test. See under "Lubricants," page 174.

2. Rich fuel mixture.
   - A. Air valve spring incorrectly adjusted. See under "Adjustment of Auxiliary Air Valve Spring," page 59.
   - B. Leaning device incorrectly adjusted. See under "Adjustment of Leaning Device," page 60.
   - C. Flooding carburetor. See under "Carburetor Floods," page 15.
3. Driving longer than is necessary with auxiliary air valve lever pulled back.
4. Open thermostat.
   - A. Adjustment. See under "Adjustment of Thermostat Valves," page 56.
   - B. Punctured thermostatic member. See "Inspection" under "Water Pumps," page 105.
5. Low-grade gasoline used.
6. Excessive oil consumption. See under "Excessive Oil Consumption," page 25.
7. Late ignition.
   - A. Driving with retarded spark.
   - B. Incorrect ignition setting. See under "Timing Ignition," page 44.
   - C. Automatic spark control inoperative. See "Inspection" under "Timer and Distributor," page 126.

## ELECTRICAL SYSTEM

### *Battery Does Not Keep in Charged Condition*

1. Habits of driver.
   - A. More lights burning than are necessary when car is standing.
   - B. Car driven very little and left standing with lights burning large proportion of time.
   - C. Starter used more than is necessary.
2. Low charging rate. See under "Generator Charging Rate Too Low or Too High," page 11.
3. Low acid level in battery. See under "Adding Water to Storage Battery," page 49.
4. Sediment in battery jars. See "Sediment" under "Storage Battery," page 53.
5. Additional electrical appliances in circuit.



6. Continued cranking necessary to start engine. See under "Continued Cranking Necessary to Start Engine," page 7.

### *One Cell of Battery Regularly Requires More Water Than the Others, and Acid in That Cell Has Lower Specific Gravity*

1. Leaking jar.
2. Short-circuited plates.
   - A. Sediment in battery jars. See "Sediment" under "Storage Battery," page 53.
   - B. Imperfect separators.

### *Addition of Water to All Battery Cells Frequently Necessary*

1. Charging rate too high for service in which car is used. See under "Generator Charging Rate Too Low or Too High," page 11.
2. Short-circuited plates.
   - A. Sediment in battery jars. See "Sediment" under "Storage Battery," page 53.
   - B. Imperfect separators.

### *Generator Charging Rate Too Low or Too High*

1. Incorrect adjustment of generator third brush arm. See under "Current Regulation," page 48.

### *Starter Does Not Crank Engine, or Cranks Engine Slowly*

1. Grounded motor brush does not make contact when starter pedal is pushed down due to wire from front end of generator to generator switch being drawn too tight.
2. Generator circuit does not open when starter pedal is pushed down due to bent generator switch arm.
3. Loose or corroded connections at battery terminals.
4. Imperfect motor brush contact. See "Inspection" under "Motor Generator," page 122.
5. Battery nearly or completely discharged. See under "Battery Does Not Keep in Charged Condition," page 10.
6. Clutch pedal not disengaged when cranking (cold weather).
7. Starter gear hub tight on shaft as a result of lack of lubrication. See under "General Lubrication," page 183.
8. Incorrect adjustment of starter pedal stop.
9. Driver does not push starter pedal all the way down.

### *Sparking at Generator Brushes*

1. High mica on generator commutator. See "Inspection" under "Motor Generator," page 122.

2. Imperfect brush contact. See "Inspection" under "Motor Generator," page 122.
3. Insufficient spring tension on brushes. See "Inspection" under "Motor Generator," page 122.
4. Grease or dirt on commutator.

***Bulbs Short Lived***

1. Low voltage bulbs used. See under "Lamp Bulbs," page 39.
2. Charging rate of generator too high. See under "Charging Rate of Generator Too High or Too Low," page 11.
3. Low acid level. See under "Adding Water to Storage Battery," page 49.
4. Loose or corroded connections at battery terminals.
5. Short-circuited plates.
   - A. Sediment in battery jars. See "Sediment" under "Storage Battery," page 53.
   - B. Imperfect separators.

***Bulbs Dim***

1. High voltage bulbs used. See under "Lamp Bulbs," page 39.
2. Loose or corroded connections at battery terminals.
3. Battery nearly or completely discharged. See under "Battery Does Not Keep in Charged Condition," page 10.
4. Loose connection on circuit breaker.
5. Dirt or corrosion on circuit breaker contacts.

***No Spark or Weak Spark Between Spark Plug Points***

1. Imperfect ignition coil.
   - A. Short-circuited primary or secondary winding.
   - B. Open circuit in primary or secondary winding.
   - C. Grounded primary terminals caused by improper installation of coil in bracket.
2. Timer contact points incorrectly adjusted. See under "Adjustment of Timer Contact Points," page 42.
3. Timer contact points dirty or pitted.
   - A. Broken down condenser. See under "Ignition Condenser," page 45.
   - B. Short-circuited resistance coil.
   - C. Timer contacts too closely adjusted. See under "Adjustment of Timer Contact Points," page 42.
   - D. Oil on timer contact points.



4. Loose connections or open circuit at ignition switch or at vibrating circuit breaker.
5. Dirt or corrosion on contacts of vibrating circuit breaker.
6. Leaking secondary wires.
7. Broken down condenser. See under "Ignition Condenser," page 45.
8. Storage battery discharged. See under "Battery Does Not Keep in Charged Condition," page 10.
9. Dirty or cracked spark plug cores.
10. Dirty track in distributor head. See under "Track in Distributor Head Requires Frequent Cleaning," page 13.

***Track in Distributor Head Requires Frequent Cleaning***

1. Rough surface on rotor contact button.
2. Track in head roughened by use of sandpaper in cleaning. See "Inspection" under "Distributor Head," page 123.

***Non-Vibrating Circuit Breaker Opens***

1. Short circuit in horn, handy or tonneau lamp, or in circuits to these parts. See under "Circuit Breakers," page 46.

***Vibrating Circuit Breaker Operates***

1. Short circuit in ignition apparatus, head, side, dash, or tail lamp, or in circuits to these parts. See under "Circuit Breakers," page 46.

***Spark Plug Cores Require Frequent Cleaning***

1. Too much oil passes pistons. See under "Excessive Oil Consumption," page 25.
2. Rich fuel mixture.
   - A. Driving longer than necessary with auxiliary air valve lever pulled back.
   - B. Rich carburetor adjustment. See under "Carburetor," page 58.
   - C. Carburetor flooding. See under "Carburetor Floods," page 15.
3. Open thermostat.
   - A. Adjustment. See under "Adjustment of Thermostat Valves," page 56.
   - B. Punctured thermostatic member. See "Inspection" under "Water Pumps," page 105.
4. Low-grade gasoline used.
5. Flash and fire test of oil too low.

## COOLING SYSTEM

***Additional Cooling Liquid Frequently Necessary***

1. Water pump glands leaking.
   - A. Gland nuts not tight enough. See under "Water Pump Packing Glands," page 56.
   - B. Glands require repacking. See under "Water Pump Packing Glands," page 56.
2. Engine overheating. See under "Engine Overheats," page 9.
3. Leaking hose connections.
4. Liquid in condenser does not return to radiator. See under "Liquid in Condenser Does Not Return to Radiator," page 14.

***Alcohol Fumes Escape from Condenser***

1. Engine overheating. See under "Engine Overheats," page 9.
2. Not enough liquid in condenser. See under "Anti-Freezing Solution," page 53.

***Liquid in Condenser Does Not Return to Radiator***

1. Air leak at radiator filler cap.
   - A. Radiator cap not tightened.
   - B. Imperfect gasket in radiator cap.
   - C. Air leak around a temperature indicator or ornament in radiator cap.

## GASOLINE SYSTEM

***Gasoline Pressure Not Maintained After Engine is Started***

1. Filler cap or thumb screw on filler cap not tightened.
2. Imperfect filler cap gasket.
3. Leaking air connections.
4. Failure to screw in hand pump handle tightly after using.
5. Insufficient lubrication of air pressure pump on engine. See under "Insufficient Flow of Oil to Chains," etc., page 26.
6. Power air pump cylinder or piston worn or cut.
7. Incorrectly adjusted air pressure regulator. See under "Pressure Relief Valve," page 57.
8. Leaking air pressure regulator.
   - A. Imperfect needle valve or seat.
   - B. Dirt on needle valve or seat.
9. Leaking air pipe.
10. Sharp bend or dent in air or gasoline piping.
11. Pressure gauge inaccurate.



***Low Gasoline Pressure Indicated When Engine is Running***

See under "Gasoline Pressure Not Maintained After Engine is Started," page 14.

***Gasoline Pressure Falls Off Rapidly After Engine Stops***

1. Filler cap or thumb screw on filler cap not tightened.
2. Imperfect filler cap gasket.
3. Leaking air connections.
4. Failure to screw in hand pump handle tightly after using.
5. Leaking check valve at pump.
6. Leaking air pressure regulator.
   - A. Imperfect needle valve or seat.
   - B. Dirt on needle valve or seat.
7. Leaking air pipe.

***High Gasoline Pressure Indicated***

1. Incorrect adjustment of air pressure regulator. See under "Pressure Relief Valve," page 57.
2. Pressure gauge incorrect.

***Insufficient Flow of Gasoline to Carburetor***

1. Valve at tank nearly closed.
2. Low gasoline pressure. See under "Low Gasoline Pressure Indicated When Engine is Running," page 15.
3. Strainer at top of tank, under front floor or at carburetor, clogged with dirt or ice. See under "Removal of Gasoline Strainer," page 134.
4. Dirt or ice in settling chamber at bottom of gasoline tank. See under "Settling Chambers and Strainers," page 58.
5. Sharp bend or dent in gasoline piping.

### CARBURETOR

***Carburetor Floods***

1. Dirt on needle valve or valve seat.
2. Imperfect valve or seat. See "Inspection" under "Carburetor," page 130.
3. Valve sticking in guide.
4. Excessive gasoline pressure. See under "High Gasoline Pressure Indicated," page 15.
5. Float rubbing on carburetor bowl.
6. Incorrect float adjustment. See under "Setting of Carburetor Float," page 61.

7. Bent pin in float arm.
8. Vent pipe in carburetor bowl bent so that float rubs on it. See "Inspection" under "Carburetor," page 130.

***Back-Firing in Carburetor***

1. Low-grade gasoline.
2. Water in the gasoline.
3. Incorrect spark timing
   - A. Incorrectly timed ignition. See under "Timing Ignition," page 44.
   - B. Automatic spark advance inoperative. See "Inspection" under "Distributor and Timer," page 126.
   - C. Driving with spark lever retarded too far.
4. Lean fuel mixture.
   - A. Incorrect adjustment of auxiliary air valve spring. See under "Adjustment of Auxiliary Air Valve Spring," page 59.
   - B. Weak air valve spring. See "Inspection" under "Carburetor," page 130.
   - C. Leaning device adjusting screw too far out. See under "Adjustment of Leaning Device," page 60.
   - D. Insufficient flow of gasoline into carburetor bowl. See under "Insufficient Flow of Gasoline into Carburetor Bowl," page 18.
   - E. Vent tube in carburetor bowl crushed or plugged. See "Inspection" under "Carburetor," page 130.
   - F. Nozzle partly clogged.
   - G. Thermostats adjusted so they do not close. See under "Adjustment of Thermostat Valves," page 56.
   - H. Punctured thermostatic member. See "Inspection" under "Water Pumps," page 105.
5. One or more inlet valve stems or inlet cam slides sticking in guides. See under "General Lubrication," page 183.
6. One or more imperfect spark plug cores.
7. Valve timing incorrect as result of improper chain and sprocket assembly. See "Replacement" under "Camshaft Driving Chain," page 89.



8. Throttle pump disconnected.
9. Disc in bottom of bowl bent down so that it comes below inlet ports in nozzle.
10. Dirty track in distributor head. See under "Track in Distributor Head Requires Frequent Cleaning," page 13.

***Fuel Mixture Lean When Throttle is "Closed"***

1. Incorrect adjustment of auxiliary air valve spring. See under "Adjustment of Auxiliary Air Valve Spring," page 59.
2. Weak air valve spring. See "Inspection" under "Carburetor," page 130.
3. Insufficient flow of gasoline into carburetor bowl. See under "Insufficient Flow of Gasoline Into Carburetor Bowl," page 18.
4. Nozzle partly clogged.
5. Leaking gasket between carburetor and inlet manifold or between inlet manifold and cylinder block. See "Replacement" under "Intake Manifold," page 97.

***Fuel Mixture Lean When Throttle is Partly Open***

1. Incorrect adjustment of auxiliary air valve spring. See under "Adjustment of Auxiliary Air Valve Spring," page 59.
2. Weak air valve spring. See "Inspection" under "Carburetor," page 130.
3. Leaning device adjustment screw too far out. See under "Adjustment of Leaning Device," page 60.
4. Insufficient flow of gasoline into carburetor bowl. See under "Insufficient Flow of Gasoline Into Carburetor Bowl," page 18.
5. Vent tube in carburetor bowl plugged or crushed.
6. Nozzle partly clogged.

***Fuel Mixture Lean When Throttle is Fully Open***

1. Incorrect adjustment of auxiliary air valve spring. See under "Adjustment of Auxiliary Air Valve Spring," page 59.
2. Weak air valve spring. See "Inspection" under "Carburetor," page 130.
3. Insufficient flow of gasoline into carburetor bowl. See under "Insufficient Flow of Gasoline Into Carburetor Bowl," page 18.
4. Nozzle partly clogged.

***Carburetor Leaning Device Has No Apparent Effect on Mixture***

1. Shutter bent away from face of port. See "Inspection" under "Carburetor," page 130.

2. Clogged copper pipe between carburetor diaphragm and carburetor body. See "Inspection" under "Carburetor," page 130.

***Carburetor Air Valve Flutters***

1. Auxiliary throttle valve shaft sticking in bearings. See "Inspection" under "Carburetor," page 130.
2. Spring on auxiliary throttle valve broken or incorrectly adjusted. See under "Automatic Throttle," page 62.
3. Valve timing incorrect as result of improper chain and sprocket assembly. See "Replacement" under "Camshaft Driving Chain," page 89.

***Insufficient Flow of Gasoline Into Carburetor Bowl***

1. Insufficient flow of gasoline to carburetor. See under "Insufficient Flow of Gasoline to Carburetor," page 15.
2. Carburetor inlet valve sticking in its guide.
3. Vent pipe bent out of place. Does not allow float to drop. See "Inspection" under "Carburetor," page 130.
4. Float rubbing on carburetor bowl due to bent float arm.
5. Bent pin in float arm.
6. Incorrect float adjustment. See under "Setting of Carburetor Float," page 61.

## CLUTCH AND TRANSMISSION

### CLUTCH

***Clutch Grabs When Engaging***

1. Dry disc facings.
2. Gummy disc facings.

***Clutch Slips***

1. Incorrect adjustment of clutch pedal. See under "Adjustment of Clutch Pedal Clearance," page 64.
2. Driver allows foot to rest on pedal.
3. Oily disc facings.
4. Badly worn disc facings. See under "Relining Clutch Discs," page 63.
5. Bent or warped clutch plates.

***Clutch Spins When Released***

1. Incorrect adjustment of clutch pedal. See under "Adjustment of Clutch Pedal Clearance," page 64.
2. Driver does not release clutch fully.



3. Worn or dry bearing at front end of clutch connection. (In flywheel.) See "Inspection" under "Flywheel," page 117.
4. Gummy or sticky disc facings.
5. Discs do not slide freely on hub keys or drivers on clutch ring. See "Inspection" under "Clutch," page 136.
6. Bent or warped clutch plates.
7. Thin oil in transmission. See under "Lubricants," page 174.

***Clutch Plates Rattle***

1. Too much freedom between clutch plates and drivers on clutch ring or keys on clutch hub. See "Inspection" under "Clutch," page 136.

***Noisy Clutch Release Ball Race***

1. Worn bearing.

***Clutch Chatters When Engaging***

1. Dry clutch disc facings.
2. Glazed clutch disc facings.

### TRANSMISSION

***Noisy Gear Shifting***

1. Shifting incorrectly done.
2. Clutch spins when released.
   - A. Incorrect adjustment of clutch pedal. See under "Adjustment of Clutch Pedal Clearance," page 64.
   - B. Operator does not release clutch fully.
   - C. Worn or dry bearing at front end of clutch connection. See "Inspection" under "Flywheel," page 117.
   - D. Gummy or sticky disc facings.
   - E. Discs do not slide freely on hub keys or drivers on clutch ring. See "Inspection" under "Clutch," page 136.
   - F. Bent or warped clutch plates.
   - G. Thin oil in transmission. See under "Lubricants," page 174.
   - H. Excessive wear of discs on hub keys or drivers on clutch ring, allowing discs to fall together.

***Noisy Transmission Gears***

1. Insufficient lubricant in transmission. See under "General Lubrication," page 183.

2. Unsuitable lubricant used. See under "Lubricants," page 174.
3. Worn gear teeth.
4. Tire pump gears not fully disengaged.

***Noisy Transmission Bearing***

1. Insufficient lubricant in transmission. See under "General Lubrication," page 183.
2. Unsuitable lubricant used. See under "Lubricants," page 174.
3. Dirt in bearing.
4. Worn bearing.

## REAR AXLE

***Brakes Drag When Released***

1. Incorrect adjustment of bands. See under "Brakes," page 69.
2. Bands out of true. See "Inspection" under "Brakes," page 150.
3. Anchor pins dry or rusty.
4. Drums on wheels out of true. See "Inspection" under "Wheels," page 166.
5. Rusty brake rod connections.
6. Rusty brake mechanism.
7. Releasing spring broken.

***Brakes Do Not Hold***

1. Incorrect adjustment. See under "Brakes," page 69.
2. Wet linings.
3. Anchor pins dry or rusty.
4. Oily linings.
5. Lining worn down to rivets. See under "Relining Brake Bands," page 72.

***Brakes Noisy When Applied***

1. Anchor pins dry or rusty.
2. Dry brake bands.
3. Lining worn down to rivets. See under "Relining Brake Bands," page 72.

***Brake Bands Rattle on Rough Roads***

1. Incorrect adjustment. See under "Brakes," page 69.
2. Worn brake band guides.



***Axle Driving Gears Noisy***

1. Insufficient lubricant in axle. See under "General Lubrication," page 183.
2. Gears incorrectly adjusted. See under "Adjustment of Gears for Proper Meshing," page 67.
3. Use of unsuitable lubricant. See under "Lubricants," page 174.
4. Loose adjustment of bearings on gear mount or pinion shaft. See under "Adjustment of Gear and Pinion Bearings," page 65.
5. Faces of gear teeth badly worn. See "Inspection" under "Differential and Large Driven Gear," page 151, and "Driving Pinion and Pinion Shaft," page 153.

***Axle Noisy When Turning Corners Only***

1. Noisy differential gears.
   - A. Insufficient lubricant in axle. See under "General Lubrication," page 183.
   - B. Use of unsuitable lubricant. See under "Lubricants," page 174.
   - C. Worn differential gears. See "Inspection" under "Differential and Large Driven Gear," page 151.

***Noisy Axle Bearing***

1. Bearing too tightly adjusted. See under "Adjustment of Gear and Pinion Bearings," page 65.
2. Insufficient lubricant in axle. See under "General Lubrication," page 183.
3. Use of unsuitable lubricant. See under "Lubricants," page 174.
4. Bearing worn. See "Inspection" under "Differential and Large Driven Gear," page 151 and "Driving Pinion and Pinion Shaft," page 153.

***Axle Shaft Noisy at Hub Flange***

1. Rear wheel bearings loosely adjusted. See under "Adjusting Rear Wheel Bearings," page 75.
2. Bent axle shaft. See "Inspection" under "Axle Shafts," page 152.
3. Bent axle housing. See "Inspection" under "Rear Axle Housing," page 151.
4. Dry hub clutch.
5. Too much play at hub flange. See "Inspection" under "Axle Shafts," page 152.

***Oil Leaking at Rear Hub Caps***

1. Too much grease in wheel bearings. See under "General Lubrication," page 183.

2. Unsuitable lubricant used in axle. See under "Lubricants," page 174.
3. Oil level too high in axle. See under "General Lubrication," page 183.
4. Imperfect or worn felt oil retainers.

***Rear Hub Caps Forced Off***

1. Bent axle shaft. See "Inspection" under "Axle Shafts," page 152.
2. Bent axle housing. See "Inspection" under "Rear Axle Housing," page 151.

## STEERING GEAR

***Steering Gear Rattles***

1. Too much end play in sector shaft. See under "Adjustment of Sector Shaft," page 74.
2. Too much end play in steering worm. See under "Adjustment of Worm Thrust Bearings," page 73.
3. Too much play between teeth of worm and sector. See under "Adjustment of Worm and Sector," page 74.
4. Steering connecting rod joints loosely adjusted. See "Replacement" under "Steering Connecting Rod," page 164.

***Excessive Play in Steering Gear***

1. Too much end play in sector shaft. See under "Adjustment of Sector Shaft," page 74.
2. Too much end play in steering worm. See under "Adjustment of Worm Thrust Bearings," page 73.
3. Too much play between teeth of worm and sector. See under "Adjustment of Worm and Sector," page 74.
4. Steering connecting rod joints loosely connected. See "Replacement" under "Steering Connecting Rod," page 164.

***Steering Gear Turns Hard***

1. Lack of lubrication. See under "General Lubrication," page 183.
2. Soft tires.
3. Steering gear too tightly adjusted. See under "Steering Gear," page 73.
4. Steering connecting rod joints too tightly adjusted. See "Replacement" under "Steering Connecting Rod," page 164.
5. Dry or cut taper bushings at upper end of housing tube. See under "General Lubrication," page 183.



## TIRES

***Tires Do Not Run True***

1. Rims not trued up after placed on wheels.
2. Wheels out of true. See "Inspection" under "Wheels," page 166.

***Front Tires Wear Out Rapidly***

1. Incorrect alignment of front wheels. See under "Alignment of Front Wheels," page 75.
2. Loose steering connections or arms.

## SPRINGS

***Springs Squeak***

1. Dry or rusty spring leaves. See "Replacement" under "Springs," page 170.
2. No lubricant between spring and bolted spring clamp.
3. Insufficient lubrication of spring shackles. See under "General Lubrication," page 183.

***Spring Action Stiff***

1. Dry or rusty spring leaves. See "Replacement" under "Springs," page 170.
2. Spring shackles adjusted too tight.

***Springs Appear to Be Weak***

1. Unusually fast driving over rough roads.
2. Heavier loads carried than car is designed for.
3. Springs weak.

## LUBRICATING SYSTEM

***No Oil Pressure Indicated on Gauge When Engine Is Running***

1. Gauge incorrect. See "Inspection" under "Oil Pan and Baffle Plate," page 102.
2. Thick oil.
   - A. Cold test of oil too high. See under "Lubricants," page 174.
   - B. Emulsion in oil pan. See under "Emulsion Forms in Oil Pan," page 27.
   - C. Viscosity of oil too great. See under "Lubricants," page 174.
3. Oil pan empty. See under "Filling Lubricating System," page 176.
4. Ice in oil pan. See under "Water or Ice Accumulates in Oil Pan," page 26.

5. Oil pump requires priming. See "Caution" under "Adjustment of Oil Pressure Regulator," page 179.
6. Worn parts in oil pump. See "Inspection" under "Oil Pump," page 103.
7. Oil pressure regulator does not operate properly.
   - A. Dirt on valve seat or valve.
   - B. Broken or weak spring. See "Inspection," under "Oil Pressure Regulator," page 106.
   - C. Imperfect valve or seat. See "Inspection" under "Oil Pressure Regulator," page 106.

***Low Oil Pressure Indicated***

1. Thin oil.
   - A. Oil used has insufficient viscosity. See under "Lubricants," page 174.
   - B. Oil thinned by gasoline. See under "Gasoline Accumulates in Oil Pan," page 27.
2. Oil pressure regulator does not operate properly.
   - A. Dirt on valve seat or valve.
   - B. Broken or weak valve spring. See "Inspection" under "Oil Pressure Regulator," page 106.
   - C. Imperfect valve or seat. See "Inspection" under "Oil Pressure Regulator," page 106.
3. Incorrect adjustment of oil pressure regulator. See under "Adjustment of Oil Pressure Regulator," page 179.
4. Too much oil escapes through crankshaft bearings.
   - A. Loose main or connecting rod bearings. See under "Adjustment of Connecting Rod and Crankshaft Bearings," page 28.
   - B. Excessive end play in connecting rod bearing bushings. See under "Adjustment of Connecting Rod Bearings," page 28.
   - C. Halves of main bearings not properly fitted. See under "Adjustment of Main Crankshaft Bearings," page 28.
5. Worn parts in oil pump. See "Inspection" under "Oil Pump," page 103.
6. Leaking oil connections in crankcase.



7. Gauge incorrect. See "Inspection" under "Oil Pan and Baffle Plate," page 102.

***High Oil Pressure Indicated***

1. Oil pressure regulator incorrectly adjusted. See under "Adjustment of Oil Pressure Regulator," page 179.
2. Viscosity of oil too great. See under "Lubricants," page 174.
3. Gauge incorrect. See "Inspection" under "Oil Pan and Baffle Plate," page 102.

***Excessive Oil Consumption***

1. Too much oil thrown onto cylinder walls.
   - A. Incorrect adjustment of oil pressure regulator. See under "Adjustment of Oil Pressure Regulator," page 179.
   - B. Loose connecting rod bearings. See under "Adjustment of Connecting Rod Bearings," page 28.
   - C. Too much end play in connecting rod bushings. See under "Adjustment of Connecting Rod Bearings," page 28.
   - D. Too much oil in oil pan. See under "Filling Lubricating System," page 176.
   - E. Oil used has insufficient viscosity. See under "Lubricants," page 174.
   - F. Oil thinned by gasoline. See under "Gasoline Accumulates in Oil Pan," page 27.
2. Worn or imperfectly fitting piston rings. See "Inspection" under "Pistons and Piston Rings," page 98.
3. Loose fitting pistons or scored cylinders or pistons. See "Inspection" under "Cylinder Blocks," page 86, and under "Pistons and Piston Rings," page 98.
4. Leakage of oil through air intake port at camshaft air pump.

***Not Enough Oil Thrown Onto Cylinder Walls***

1. Incorrect adjustment of oil pressure regulator. See under "Adjustment of Oil Pressure Regulator," page 179.
2. Too much oil escapes through crankshaft bearings
   - A. Loose main bearings. See under "Adjustment of Main Bearings," page 28.
   - B. Halves of main bearings not properly fitted. See under "Adjustment of Main Bearings," page 28.
3. Worn parts in oil pump. See "Inspection" under "Oil Pump," page 103.
4. Leaky oil connection in crankcase.
5. Viscosity of oil too great. See under "Lubricants," page 174.

***Insufficient Flow of Oil to Chains, Camshaft Bearings and Gasoline System Air Pump***

1. High oil pressure. See under "High Oil Pressure Indicated," page 25.
2. Clogged by-pass in oil pressure regulator. See "Inspection" under "Oil Pressure Regulator," page 106.
3. Worn parts in oil pump. See "Inspection" under "Oil Pump," page 103.
4. Leaking oil connections in crankcase.
5. Too much oil escapes through main crankshaft bearings.
   - A. Loose main or connecting rod bearings. See under "Adjustment of Connecting Rod and Crankshaft Bearings," page 28.
   - B. Excessive end play in connecting rod bearing bushings. See under "Adjustment of Connecting Rod Bearings," page 28.
   - C. Halves of main bearings not properly fitted. See under "Adjustment of Main Bearings," page 28.

***Oil Lever Indicator Does Not Operate***

1. Vertical rod bent so that it does not slide freely in guide. See "Inspection" under "Oil Pan and Baffle Plate," page 102.
2. Emulsion in oil pan. See under "Emulsion Forms in Oil Pan," page 27.
3. Leaking float.

***Water or Ice Accumulates in Oil Pan***

1. Car used in short trip service. Trips not long enough to allow engine to become thoroughly warm.
2. Failure to replace engine oil at frequent intervals. See under "Replace Oil in Engine," page 177.
3. Open thermostat.
   - A. Adjustment. See under "Adjustment of Thermostat Valves," page 56.
   - B. Punctured thermostatic member. See "Inspection" under "Water Pumps," page 105.
4. Loose fitting pistons or scored cylinders or pistons. See "Inspection" under "Cylinder Blocks," page 86, and under "Pistons and Piston Rings," page 98.



5. Imperfectly fitting piston rings. See "Inspection" under "Pistons and Piston Rings," page 98.
6. Unsuitable engine oil used. See under "Lubricants," page 174.

***Gasoline Accumulates in Oil Pan***

1. Car used in short trip service. Trips not long enough to allow engine to become thoroughly warm.
2. Failure to replace engine oil at frequent intervals. See under "Replace oil in Engine," page 177.
3. Driving longer than is necessary with auxiliary air valve lever pulled back.
4. Rich fuel mixture.
   - A. Incorrect adjustment of auxiliary air valve spring. See under "Adjustment of Auxiliary Air Valve Spring," page 59.
   - B. Incorrect adjustment of leaning device. See under "Adjustment of Leaning Device," page 60.
   - C. Flooding carburetor. See under "Carburetor Floods," page 15.
5. Open thermostat.
   - A. Adjustment. See under "Adjustment of Thermostat Valves," page 56.
   - B. Punctured thermostatic member. See "Inspection" under "Water Pumps," page 105.
6. Low-grade gasoline.
7. Loose fitting pistons or scored cylinders or pistons. See "Inspection" under "Cylinder Blocks," page 86; and under "Pistons and Piston Rings," page 98.
8. Imperfectly fitting piston rings. See "Inspection" under "Pistons and Piston Rings," page 98.
9. Unsuitable engine oil used. See under "Lubricants," page 174.
10. Descending grades with transmission in gear, clutch engaged and ignition off.

***Emulsion Forms in Oil Pan***

1. Accumulation in oil pan of gasoline and water. See under "Water or Ice Accumulates in Oil Pan" and "Gasoline Accumulates in Oil Pan," pages 26 and 27.

***Oil Freezes in Oil Pan***

1. Extreme cold.
2. Cold test of oil too high. See under "Lubricants," page 174.
3. Water mixed with oil. See under "Water or Ice Accumulates in Oil Pan," page 26.

# PART II

# ADJUSTMENTS

## ENGINE

### ADJUSTMENT OF CONNECTING ROD AND CRANKSHAFT BEARINGS

#### *Adjustment of Connecting Rod Bearings*

Remove the oil pan and baffle plate. (See "Removal" under "Oil Pan and Baffle Plate," page 102).

The caps at the lower ends of the single connecting rods are adjustable. Liners varying in thickness from .002 inch to .006 inch are placed between the caps and the rods when the engine is assembled. To readjust, remove these liners and substitute thinner ones of the proper thickness.

These bearings should have from .0025 inch to .0035 inch play. Bearing trouble is probable if the clearance is less than .0025 inch.

The crank pin bearings in the forked connecting rods are not adjustable. If there is more than .006 inch clearance between a bearing and the crank pin, or more than .015 inch end play in the bearing, a new bearing should be substituted. (See under "Fitting Crank Pin Bearings," page 29).

#### *Adjustment of Main Crankshaft Bearings*

Remove the oil pan and the baffle plate. (See "Removal" under "Oil Pan and Baffle Plate," page 102).

The three main bearings are provided with liners which are clamped between the crankcase and the bearing caps.

To tighten a main bearing, proceed as follows: Remove the oil feed pipe connecting the bearing cap with the oil manifold. Remove the aluminum bearing cap with the lower half of the bearing and the liners.

Replace the liners with liners which are less in thickness by an amount equal to the amount of "take-up" necessary. The clearance between the shaft and the bearings should be between .001 inch and .002 inch. Liners can be obtained from the Cadillac Motor Car Company varying in thickness by .001 inch.

Carefully reduce the upper edges of the lower half of the bearing *just enough* to allow the aluminum bearing cap to clamp the new liners. This work must be done very accurately, as clearance between the halves of the bearing will cause an oil leak.





The upper edges of the lower half of the bearing may be reduced by rubbing the bearing on a piece of fine emery cloth stretched tightly over a flat, machined, iron surface.

Thoroughly clean the bearing, bearing cap and liners and oil the bearing surface before replacing.

In replacing the bearing cap, tighten the bearing nuts firmly and lock with new cotter pins. Also make sure that the union nuts on the oil pipe are tightened sufficiently to prevent leakage.

If more than one bearing is removed at a time, care should be taken not to mix the liners, as they may not all be the same thickness.

After replacing the oil pan, refill it with 1½ gallons of suitable engine oil. Cadillac Motor Oil is recommended.

### FITTING CRANK PIN BEARINGS

If the crank pins of the crankshaft are scored or out of round more than .003 inch they should be dressed down before used bearings are refitted, or new bushings are installed. (See under "Dressing Down Crankshaft Bearing Surfaces," page 30).

#### *Refitting a Used Bearing*

If the babbitt is scored, rough, or shows only partial bearing on the crank pin, clean it up with a scraper. This work should be attempted only by workmen familiar with bearing scraping. The work must be done carefully to prevent an excessive flow of oil by the bearing.

If, after completing the work, the clearance between the bearing and the crank pin exceeds .006 inch, a new bearing should be substituted.

The end play in a crank pin bearing should not exceed .015 inch.

#### *Fitting a New Standard Size Bearing*

Crank pin bearings of standard size are reamed before shipment and should not be scraped unless the bearing surface becomes injured.

If there is more than .006 inch clearance between a new standard size bearing and the crank pin, an undersize bearing should be fitted. Unreamed bearings .005 inch undersize are furnished by the Cadillac Motor Car Company.

The end play in a crank pin bearing should not exceed .015 inch.

#### *Fitting a New Undersized Bearing*

Unreamed crank pin bearings .005 inch undersize are furnished by the Cadillac Motor Car Company for use where the clearance between a crank pin and a new standard size bearing exceeds .006 inch.

The desired clearance between the bearing and the crank pin is from .002 inch to .003 inch. The clearance must in no case be less than .002 inch or more than .006 inch.

Undersize bearings are unreamed and should be scraped. The work should be attempted only by workmen familiar with bearing scraping.

### FITTING MAIN CRANKSHAFT BEARINGS

If the bearing surface is rough, scored, or shows only a partial bearing on the shaft, it should be cleaned up with a scraper. This work should be attempted only by workmen who thoroughly understand bearing scraping. The work must be carefully done to prevent an excessive flow of oil by the bearing.

When clamped in place the clearance between a main bearing and the shaft should be from .001 inch to .002 inch.

After scraping the bearing halves reduce the edges, which come together, sufficiently to give the proper clearance between the bearing and the shaft. This may be done by rubbing the halves of the bearing over fine emery cloth stretched tightly over a surface plate.

Replace the liners with liners of the proper thickness. (See under "Adjustment of Main Crankshaft Bearings," page 28).

### DRESSING DOWN CRANKSHAFT BEARING SURFACES

#### *Main Bearing Surfaces*

Crankshaft bearing surfaces should be smooth, free from scores and round within .003 inch. If not they should be dressed down.

This work should be attempted only by workmen who thoroughly understand work of this kind. To get the best results the shaft should be removed from the engine and placed on V blocks before starting the work.

Use a fine mill file and finish the work with fine emery cloth and oil. Make frequent tests with micrometers.

After the shaft is in proper condition, refit the bearings in accordance with directions under "Fitting Main Crankshaft Bearings," on this page.

#### *Crank Pin Surfaces*

Follow the directions under "Main Bearing Surfaces" in dressing down crank pins.

If there is more than .006 inch clearance between a crank pin and the bearing after the work is completed a new bearing should be substituted. (See under "Fitting Crank Pin Bearings," page 29).



### FIRING ORDER

The order in which the cylinders fire is indicated in Fig. 1.

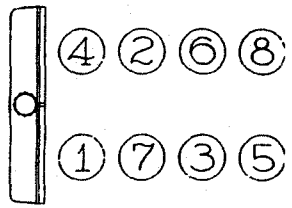



*Fig. 1—Firing Order.*

### TIMING MARKS ON FLYWHEEL

The flywheel marks (see Fig. 2) are arranged in four groups, each group consisting of the following marks in order:

"IN|S"—"Inlet setting"
"IG|A"—"Ignition advance"
"C"—"Center"
"EX|S"—"Exhaust setting"

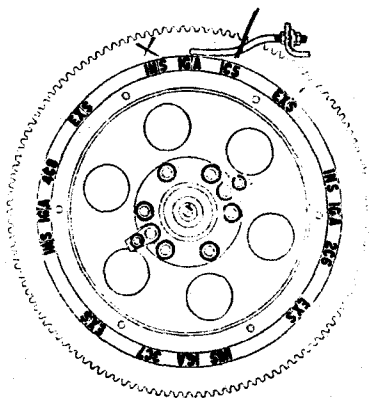


*Fig. 2—Flywheel Showing Timing Marks.*

Each group of marks refers to two cylinders, the numbers of which are stamped one on each side of the "C" in that group.

Complete instructions for using the "inlet setting" and "exhaust setting" marks are given below under "Positions of Cams for Adjustment of Cam Slides." The ignition timing is explained fully under "Timing Ignition," page 44.

### ENGINE VALVES

#### *Positions of Cams for Adjustment of Cam Slides*

In poppet valve gasoline engines it is necessary for a cam roll to be on the circular surface of the cam when the cam slide operated by that cam is being adjusted. The shape of the circular portion of the cams in the Cadillac eight-cylinder engine is such that it is not sufficient for a cam roll simply to be on the circular surface of the cam. The cam roll must be on a certain small arc of the circular surface of the cam when the cam slide is being adjusted.

As no two cams on the camshaft are in the same position at the same time, it is necessary, before adjusting each cam slide, to place the corresponding cam in the proper position by cranking the engine by

hand as described below. The cam slides cannot be properly adjusted with the cams in any but the correct positions.

### *Placing Cam in Position*

To place a cam in position for properly adjusting the cam slide, proceed as follows:

Open the compression relief cocks on the cylinder blocks and with the ignition switched off crank the engine slowly by hand in the direction in which it runs until the piston in the cylinder in which the valve is located is at the end of the compression stroke, or in other words, on firing center. This may be determined by placing a finger over the compression relief cock while cranking the engine. When the piston is exactly on firing center the pointer attached to the crankcase will then be directly over the mark on the flywheel indicating "center" for that cylinder.

INLET VALVE. If the valve operated by the cam slide is an inlet valve, select the first "IN|S" to the left of the center mark and mark it with a piece of chalk.

Crank the engine further by hand in the direction in which it runs until that "IN|S" is directly under the pointer. It will be necessary to crank the engine nearly a complete revolution.

The cam is then in the correct position for adjusting the cam slide operating that inlet valve. (See under "Adjustment of Cam Slide.")

EXHAUST VALVE. If the valve operated by the cam slide is an exhaust valve, after cranking the engine to the proper firing center, select the first "EX|S" to the right of the center mark and mark it with a piece of chalk.

Crank the engine further by hand in the direction in which it runs until this "EX|S" is under the pointer.

Then crank the engine further one complete revolution until this "EX|S" is again directly under the pointer.

The cam is then in the correct position for adjusting the cam slide operating that exhaust valve. (See under "Adjustment of Cam Slide.")

### *Adjustment of Cam Slide*

When the cam is in the proper position (see under "Positions of Cams for Adjustment of Cam Slides"), the clearance between the end of the valve stem "A," Fig. 30, and the adjusting screw "B" in the cam slide "D" should be from .002 inch to .003 inch when the engine is cold.

To adjust a cam slide, loosen the locking nut "C" and turn the adjusting screw "B."

Tighten the locking nut "C" when the proper clearance has been obtained, taking care that in so doing the adjustment of the screw "B" is not disturbed.

### *Grinding Valves*

Remove the valve. (See "Removal" under "Valves and Valve Springs," page 115.)

It is a good plan to wrap soft string around the stem of the valve near the head. This will tend to prevent the grinding compound getting into the valve guide.

In the absence of a good prepared grinding compound, make a paste of powdered glass or flour of emery, mixed with thin oil.

Place the grinding compound on that portion of the valve which bears on the valve seat. Then replace the valve, and with a screw driver, or other suitable tool, rotate it back and forth about one-third revolution, with only a slight pressure on the tool. Lift the valve occasionally and turn it to a new position. Continue the grinding operation only until the valve and its seat show perfect bearing when tested with Prussian blue or pencil marks on the valve seat.

Then thoroughly wash the valve, the valve chamber and the valve guide with kerosene or gasoline. Be very careful to leave none of the grinding compound in any part of the cylinder, as it will cause serious damage if it works into the cylinder bore or other parts of the engine; also remove the string from the valve stem. Replace the valve.

After replacing the valve, retime it. (See under "Adjustment of Cam Slide," page 32.) Retiming is necessary as the amount of clearance between the valve and the adjusting screw in the cam slide is necessarily reduced during the grinding operation.

## RIVETING CHAIN

Each joint of the chain contains two pins, as shown in Fig. 3; a seat pin "A," which is ribbed, and a rocker pin "B," which is plain. If a chain is removed, be very sure in replacing it that the joint pins are inserted as shown.

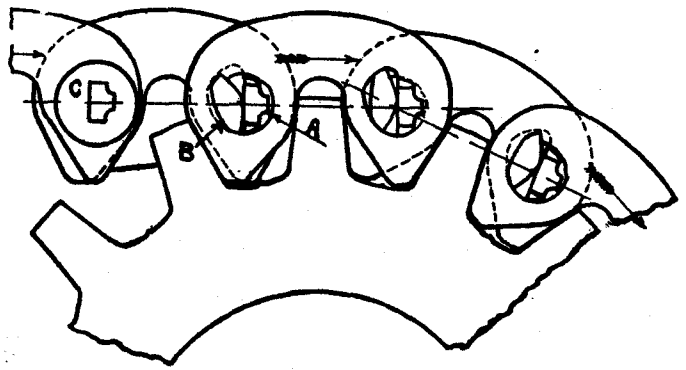



*Fig. 3—Correct Positions for Rocker and Seat Pins in Riveting Chains.*

Bring the ends of the chain together on the larger sprocket. (See "Replacement" under "Camshaft Driving Chain" and "Fanshaft Driving Chain," pages 89 and 90.) Insert the rocker pin and a used or extra seat pin to align the links. Clamp the new seat pin in a vise and rivet the small washer "C" on one end.

Force the used seat pin out by inserting the new seat pin. Insert the new seat pin from the rear. In doing so be careful not to force out the rocker pin. Be sure to recover the used seat pin so that it will not get into the mechanism of the engine.

After the new seat pin is in place, turn the engine so that the connection is mid-way between the sprockets. Then insert a riveting block between the crankcase wall and the inner end of the seat pin to be riveted, place the small washer on the end of the seat pin and carefully peen over the end of the pin. Remove the riveting block.

If, in installing a chain, the rocker pin is inserted backwards it will cause a knock on the small sprocket which will quickly destroy the chain. It is absolutely essential that the joint pins be assembled correctly if the chain is to live and give quiet and satisfactory service.

## STORAGE

### *Engine*

To prepare the engine for storage proceed as follows:

Cover the radiator and run the engine at a speed which shows an ammeter reading of approximately 10 with all lights switched off until the engine is thoroughly warm. It usually requires from two to ten minutes to warm the engine.

After the engine is hot, shut off the flow of gasoline to the carburetor and immediately the engine starts to slow down from a lean mixture inject from three to four tablespoonfuls of clean fresh engine oil into the primary air inlet at the right-hand side of the carburetor. This will stop the engine.

Open the compression cocks. Inject from one to two tablespoonfuls of clean fresh engine oil into each cylinder and, before closing the cocks, crank the engine three or four revolutions with the ignition switched off. This will tend to distribute the oil over the cylinder walls.

### *Storage Battery*

(See under "Preparing Battery for Storage," page 52.)

### *Tires*

During winter storage it is best to remove the tires from the rims and keep the casings and tubes in a fairly warm atmosphere away from the light. It is best to inflate the tubes slightly after the tires have been removed to keep the tires in the position in which they are when inflated on the rim.



If the tires are not removed from the car, and the car is stored in a light place, it is best to cover the tires to protect them from strong light, which has a deteriorating effect on rubber.

The greatest injury that can be done to tires when the car is stored is to allow the weight of the car to rest on them. If the tires are not removed the car should be blocked up so that no weight is borne by the tires and the tires partly deflated.

### *Body and Top*

It is best to put the top up and cover the entire car to protect it from dust.

### *Taking Car Out of Storage*

When the car is taken out of storage and before the engine is started, drain the oil from the oil pan, remove and clean the oil pan and baffle plate and replace the oil with fresh oil. (See under "Replace Oil in Engine," page 177.)

The following directions should be followed carefully in starting the engine:

Open the compression cocks and inject from one to two tablespoonfuls of clean fresh engine oil into each cylinder.

Close the compression cocks and with the ignition turned off turn the engine over slowly a few revolutions by hand.

If the engine is to be started by hand cranking, place the spark lever at the extreme left of the spark and throttle sector. If the starter is to be used, place the spark lever on that portion of the sector marked "Driving Range." Open the gasoline valve at the tank and start the engine in the usual manner.

Immediately the engine starts, run it at a speed which will show an ammeter reading of approximately 10 with all lights switched off, and push the auxiliary air lever down as far as possible without causing the engine to stop, or a material reduction in engine speed.

With the engine running, inject from two to three tablespoonfuls of clean fresh engine oil into the primary air inlet at the right-hand side of the carburetor.

Push the auxiliary air valve lever all the way down as soon as the engine is warm enough to permit it.

# ELECTRICAL SYSTEM

## GENERAL DESCRIPTION

The Cadillac-Delco system is the single wire, single unit system. One side of the motor generator, storage battery, lamps, horn and ignition apparatus is connected to some part of the frame of the car or the engine. The other connections are made with copper wires or cables.

## MOTOR GENERATOR

The motor generator serves both as a generator of current and as an electric motor for cranking the engine when starting. The principal elements of the motor generator are an armature and a field. There are two windings on the armature and two in the field—one on the armature and one on the field are used when the motor generator is used as a generator and the other windings when it is used as a motor.

### *Generator*

The motor generator, when acting as a generator, is driven at engine speeds by the fanshaft which, in turn, is driven by a silent chain from the camshaft at the front end of the engine. Thus driven, it delivers electrical energy for charging the storage battery and for operating the lights, ignition apparatus and horn. To prevent the voltage of the current generated from rising too high when the engine is running at high speeds, the third brush system of current regulation is employed.

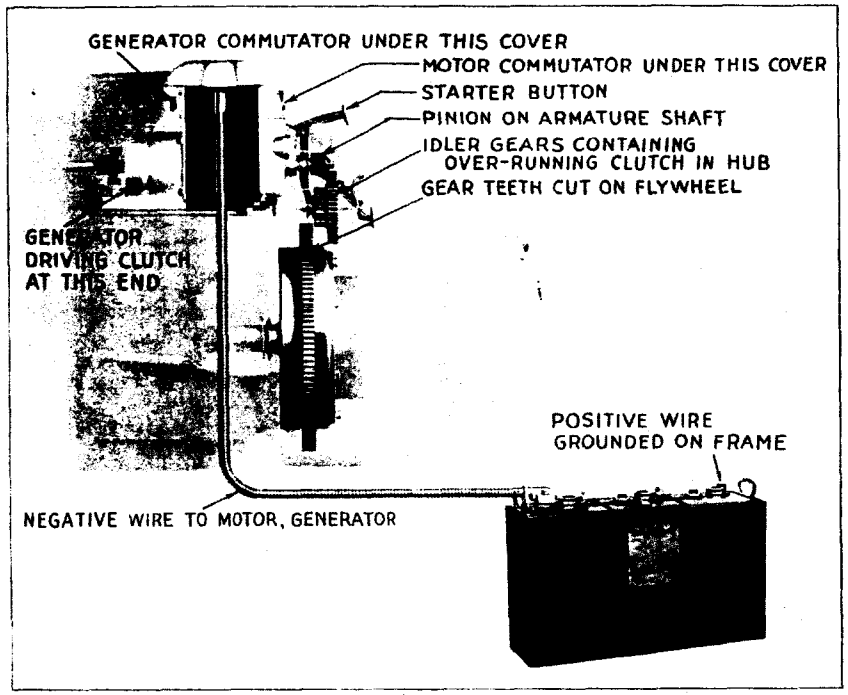



*Fig. 4—Motor Generator and Starting Mechanism.*



### *Motor*

When acting as a motor, the sole function of the motor generator is to crank the engine. In starting, the first thing the operator does is to push down the ignition lever on the combination switch. This closes the ignition circuit and the circuit between the storage battery and the generator windings on the motor generator, causing the armature to revolve slowly.

A ratchet clutch in the front end of the generator allows the armature to rotate ahead of the driving shaft. The clicking noise that is heard when the ignition switch is turned on comes from this clutch.

Next the operator pushes down the starter button. The first movement causes the starter gears to mesh with the teeth on the flywheel. The probability of the ends of the teeth striking and failing to mesh is overcome by the slow rotation of the armature which began as soon as the ignition was turned on.

As the starter button is pushed further down, the circuit between the storage battery and the generator windings of the motor generator is broken. Upon the last movement of the starter button the circuit is closed between the storage battery and the motor windings on the motor generator, causing it to act as a powerful electric motor which rapidly cranks the engine.

As the gear ratio between the armature shaft and the crankshaft is approximately 25 to 1, the armature would be driven at an excessively high rate of speed after starting the engine and before the operator let the starter button back if it were not for an over-running clutch in the hub of the idler gears between the flywheel and the armature shaft. The electric motor cranks the engine through this clutch, but after the engine has started and begins to run faster than the electric motor, the clutch slips.

When the starter button is let up, as soon as the engine is running under its own power, the first movement of the button breaks the circuit between the electric motor and the storage battery, a further movement causes the starter gears to slide out of mesh and the final movement completes the circuit between the generator and the storage battery, which was broken when the starter button was pushed down. The engine running and the circuit being closed between the storage battery and the generator windings of the motor generator, the generation of current begins.

### *Commutators*

Do not under any condition put oil of any kind on the commutators of the motor generator.

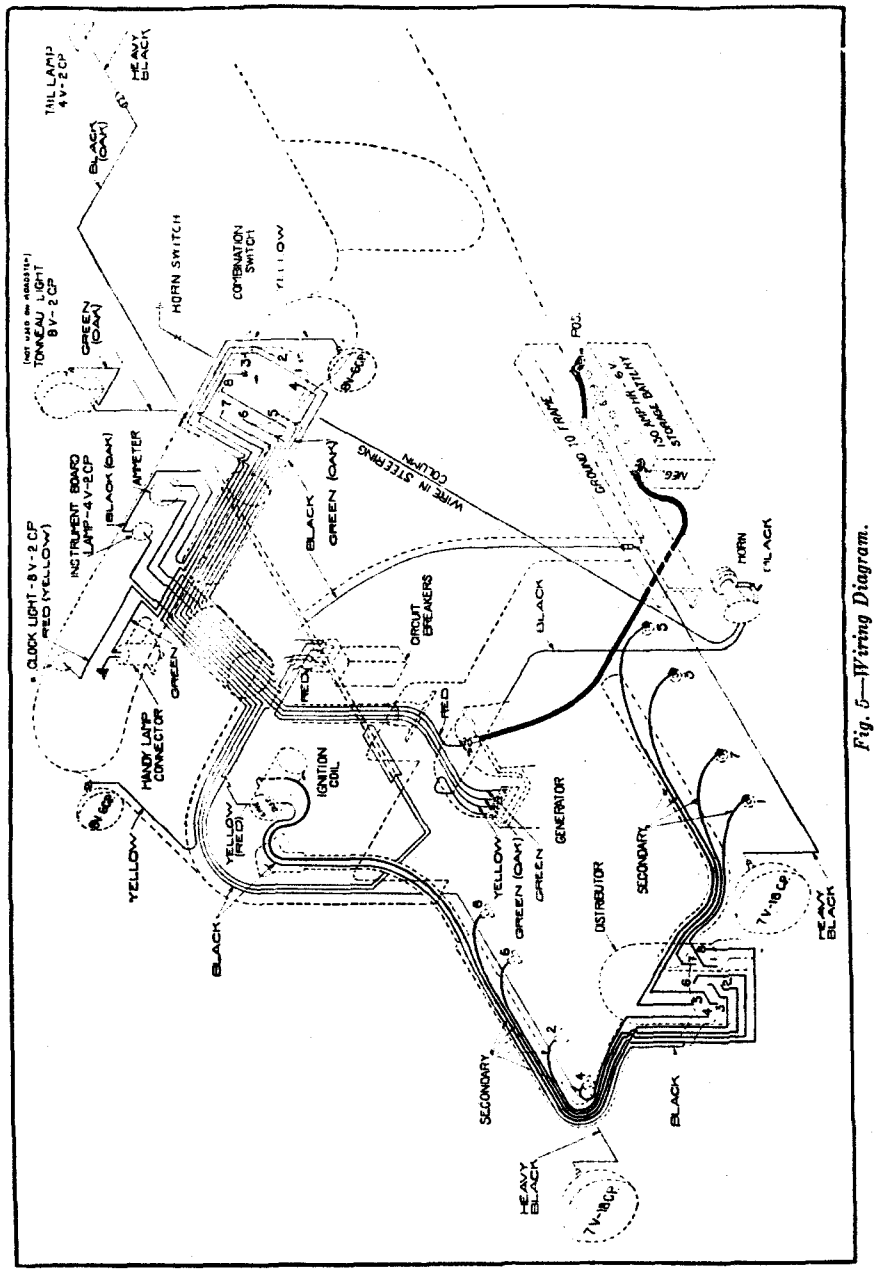



*Fig. 5—Wiring Diagram.*



### *Fitting Motor Generator Brushes*

If the brushes of the motor generator do not have a good full bearing on the commutators, the brushes should be refitted. To do so proceed as follows:

Cut a strip of Number 00 sand paper slightly wider than the brushes. Pass it between the brushes and the commutator and at least one-half way around the commutator. Draw the sandpaper back and forth with sanded side against the brushes.

Do not use emery cloth in fitting the brushes.

## LAMPS

### *Focusing Headlamps*

The adjustment for focusing the headlamp bulb is near the top of the lamp and is accessible after removing the lamp door.

To make the adjustment, run the car head on towards, and at right angles to, a high fence or building, and stop when within from fifteen to twenty feet from it. Then, with the tilting reflector in the straight ahead position, change the adjustment until the bulb is in the proper position.

If in turning the screw to the right, the rays of light appear to spread out, it indicates that the bulb is too far back in the reflector and that it should be brought forward. To do this, turn the adjusting screw to the left until the proper rays are shown.

If the adjusting screw be turned to the left and the rays appear to spread out, it indicates that the bulb is too far forward and it should be brought back. To do this, turn the adjusting screw to the right until the proper rays are shown.

### *Cleaning Reflectors*

The reflectors in the head and side lamps are plated with pure silver. In polishing, extreme care must be used in selecting materials which will not scratch the silver.

Powdered dry rouge and a chamois skin are recommended. If the reflectors are tarnished, moisten the rouge with alcohol, and apply with the chamois. Then polish with a dry chamois and rouge.

The chamois should be soft and must be kept free from dust. Do not use the chamois for any other purpose.

### *Lamp Bulbs*

Bulbs should have the correct voltage and candle power rating. The following is a table of voltage and candle power ratings:

| Lamps | Voltage | Candle Power |
|---|---|---|
| Head | 7 | 18 |
| Side | 8 | 6 |
| Speedometer | 4 | 2 |
| Tail | 4 | 2 |
| Clock | 8 | 2 |
| Tonneau | 8 | 2 |
| Portable | 8 | 6 |
| Dome, enclosed cars | 8 | 6 |
| Quarter, enclosed cars | 8 | 9 |

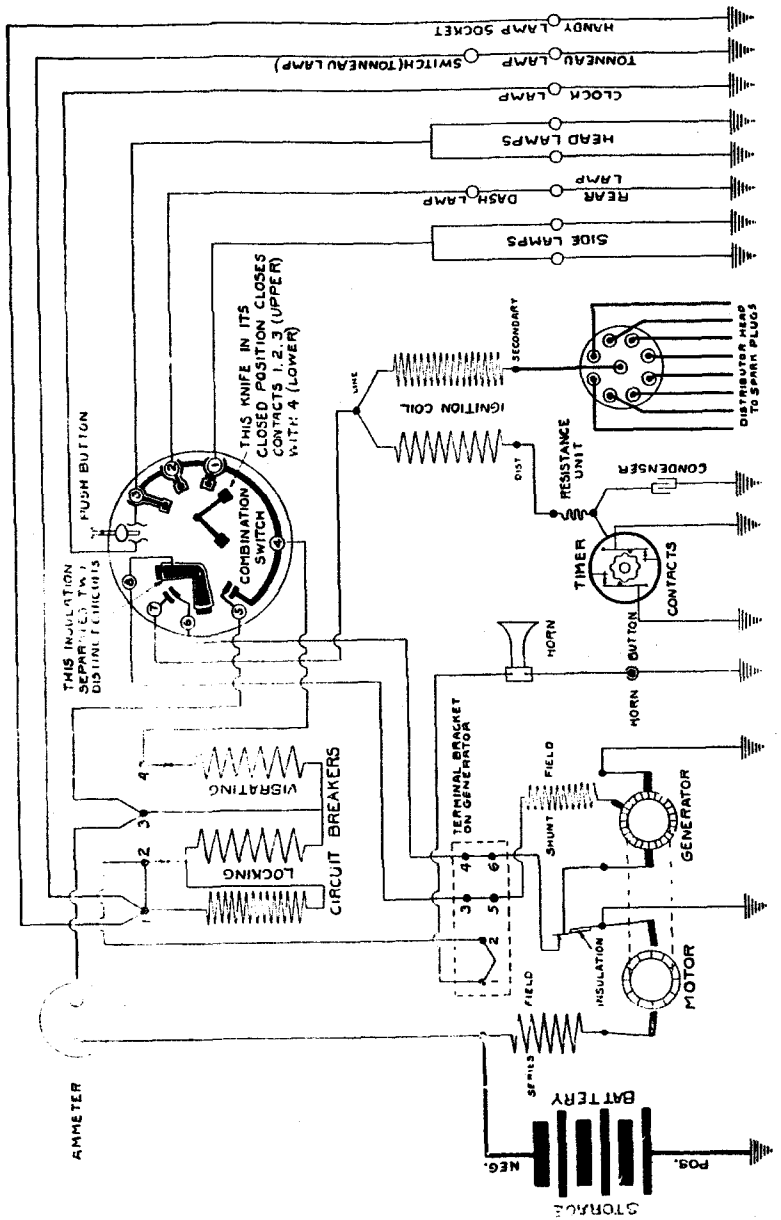



*Fig. 6—Circuit Diagram.*



## IGNITION SYSTEM

### *General Description*

The ignition system embodies the following elements: A source of current, the generator, or at low speeds, the storage battery; an ignition timer, which interrupts the low tension current at the proper instant to produce a spark in the high tension circuit; an induction coil, transforming the primary current of six volts into one of sufficient voltage to jump between the points of the spark plugs; a condenser, which assists the induction coil to raise the voltage, and which protects the contact points of the ignition timer from burning; and a high tension distributor which directs the distribution of the high tension current to the spark plugs in the respective cylinders.

### *Distributor and Timer*

The distributor and timer, Fig. 34, are carried on the fanshaft housing and are driven by the fanshaft through spiral gears.

The distributor consists of a cap or stationary head of insulating material and a rotor of the same material which turns with the timer shaft. The distributor head carries one contact in the center and eight additional contacts placed at equal distances about the center. (Only two of these contacts are shown in Fig. 34.) The center contact is connected to the high tension terminal on the ignition coil. The eight remaining contacts are connected to the spark plugs in the cylinders. The center contact is provided with a spring plunger which is in constant contact with a plate on the rotor. This plate carries a contact button at its outer end. As the rotor revolves, the contact button slides over the eight outer contacts in the distributor head, consecutively completing the high tension circuit to each of the spark plugs from the ignition coil.

The timer, by which the low tension current is interrupted at the proper time to produce the spark, is beneath the rotor. An eight lobed cam "J," Fig. 7, on the timer shaft, operates two contact arms "C" and "O." As the cam revolves, these arms alternately complete and break the primary circuit. The cam is held in place by the lock screw "I."

Two sets of timer contact points are provided. The object is to distribute over two sets the current which would otherwise pass through one. This greatly lessens wear and burning of the points.

The spark timing is automatically controlled by a centrifugal governor which advances or retards the position of the timer cam relative to the driving shaft, as the engine speed increases or decreases. A spark lever at the steering wheel is provided, however, by which the timing may be still further advanced or retarded. This spark lever is connected to the manual control lever at the left of the distributor housing

### *Cleaning Distributor Rotor Button Track*

If the track in the distributor head, against which the rotor button presses, requires cleaning, do not use sandpaper or emery cloth. Clean with a piece of cloth moistened with vaseline, then polish with a dry cloth.

### *Adjustment of Timer Contact Points*

The timer contact points should be adjusted so that both sets open simultaneously and are the same distance apart when open, that is, .020 inch, if the car is new, or .015 inch if the car has been driven more than 2,000 miles.

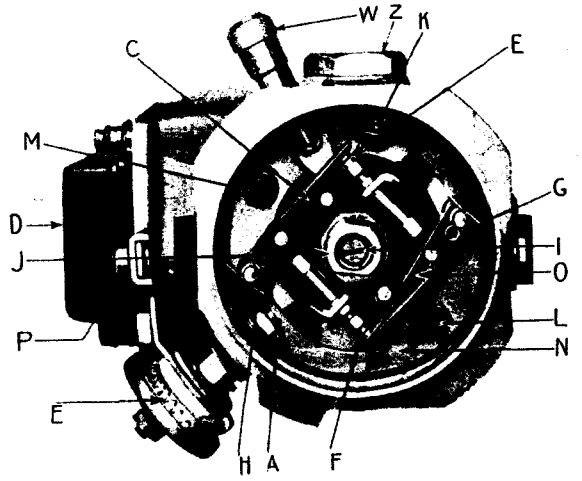



*Fig. 7—Timer.*

ADJUSTMENT OF CONTACTS FOR GAP—To adjust the gaps between the contact points, remove the distributor rotor. (See "Removal" under "Distributor Rotor," page 123.) Crank the engine by hand until one of the contact arms is directly on top of a lobe of the cam "J," Fig. 7. Then adjust the corresponding contact points so that they stand .020 inch apart if the car is new or .015 inch if the car has been driven more than 2,000 miles. Adjust the other contact points in the same manner with the other contact arm on top of a cam lobe. Be sure that both sets of contact points are adjusted exactly alike. If the segment plate, "N," Fig. 7, is correctly adjusted, both contact arms "O" and "C" will be directly on top of lobes of the cam "J" at the same time. If they are not, adjust the contacts for gap as directed above and adjust the segment plate "N" as directed under "Adjustment of Segment Plate," page 43.



DO NOT FILE OR GRIND THE CONTACT POINTS. To clean the points, remove the contact arms after removing the cotter pins "H" and "G," remove the contact screws and simply rub the points over an oil stone two or three times. Do not remove the segment plate nor loosen the screws "M," "K" and "L" in removing the contact points for this work.

It is a good plan after adjusting the timer contact points to check the ignition timing (see under "Timing Ignition," page 44), for the reason that changing the gap at the contact points also changes the timing.

ADJUSTMENT OF CONTACTS FOR SIMULTANEOUS OPENING—To determine whether the contact points open simultaneously proceed as follows: Remove the distributor rotor. (See "Removal" under "Distributor Rotor," page 123). Insulate the contact arm springs from the aluminum housing by inserting pieces of heavy paper or light cardboard no thicker than a common calling card between the springs and the housing. Disconnect the wire from the lower terminal on the end of the ignition coil on the dash and connect it to the upper terminal on the end of the coil.

Connect a six volt lamp to each contact arm, grounding the other terminal of each lamp.

Switch on the ignition and crank the engine slowly by hand. The two lights will be extinguished at the same instant if the contact points open simultaneously. If they do not open simultaneously and the gaps between the contact points are in correct adjustment (see under "Adjustment of Contacts for Gap"), adjust the segment plate "N," Fig. 7. (See below under "Adjustment of Segment Plate").

### *Adjustment of Segment Plate*

The holes in the segment plate "N" for the three screws "M, "L" and "K" are elongated in a direction parallel to the contact arms "O" and "C." This permits adjustment of the position of the contact arms relative to the cam "J." This adjustment is made at the factory and the plate "N" need not be readjusted unless it has been removed or the screws "M," "L" and "K" have been loosened. The plate "N" should not be removed in removing the contact points to clean them.

If the adjustment of the segment plate has been altered proceed as follows in readjusting: Test with lamps to determine which set of contact points open first. (See above, under "Adjustment of Contacts for Simultaneous Opening.") If the test shows that the contact points at "F" open before those at "E," loosen the three screws "M,"

"L" and "K" and the nut "A" and move the segment plate slightly towards the resistance unit. If the contact points at "E" open before those at "F" move the segment plate slightly away from the resistance unit. Move the segment plate only very slightly, as each change in position retards the opening on one side as much as it advances it on the other. After setting the segment plate tighten the screws and test again for simultaneous opening. Continue the adjustment of the segment plate until the test indicates simultaneous opening with both gaps correctly and equally set.

It is necessary to readjust the cam "J," as moving the segment plate affects the timing of the ignition. (See below, under "Timing Ignition.")

### *Timing Ignition*

Unless the timer contact points are in proper adjustment they should be readjusted before proceeding to time the ignition. (See under "Adjustment of Timer Contact Points," page 42.)

To time the ignition proceed as follows:

Move the spark lever to the extreme left on the sector; open the compression relief cocks on the cylinder blocks and crank the engine by hand until the piston in number one cylinder is on firing center. (Number one cylinder is the one nearest the radiator in the left-hand block of cylinders.)

Next remove the distributor head, also the rotor (see "Removal" under "Distributor Rotor," page 123) and loosen the lock screw "I," Fig, 7, just enough to allow the cam "J" to be turned by hand after the rotor is fitted. (The lock screw should not be loosened enough to allow the cam to turn on the shaft when the engine is cranked by hand with the rotor in place.)

Then replace the rotor and turn it by hand until the distributor brush in the rotor is directly under the terminal marked "No. 1" on the distributor head.

Move the spark lever to the extreme right on the sector. (Full advance.)

If the cam "J" is properly set, the contact points will just open when a point one and twenty-one thirty-seconds inches in advance of the center line for each cylinder is directly under the pointer attached to the crankcase of the engine. This point for each cylinder is marked on the fly-wheel by the letters "I G A." (See Fig. 2.) (The letters "IG A" stand for "Ignition Advance.")



Either of two methods may be used for indicating the instant the contact points open. First method: With the distributor head and rotor in place, switch on the ignition and hold a high tension spark plug wire about one-eighth of an inch away from the cylinder casting and crank the engine slowly by hand in the direction in which it runs. Stop cranking immediately a spark occurs between the wire and the casting. (It will be necessary to crank the engine nearly two complete revolutions before the spark occurs.) Second Method: With the ignition switched off, connect a six volt test lamp in series between the No. 3 terminal of the circuit breaker (see Fig. 6) and the terminal "P" on the timer (Fig. 7). Stop cranking immediately the light is extinguished.

If the contact points open early turn the cam "J" slightly in a counter-clockwise direction to correct the adjustment. If the contact points open late, turn the cam slightly in a clockwise direction. After turning the cam "J" test the timing again and readjust if necessary.

After the adjustment has been correctly made lock the cam securely to the distributor shaft by the lock screw "I."

After locking the adjustment it is a good plan to check the timing by fully retarding the spark lever—in other words moving it to the extreme left on the sector. If the ignition is set properly the contact points will open under these conditions when the center line of the fly wheel for each cylinder is directly under the pointer attached to the crankcase or has slightly passed the pointer.

CAUTION: This work must be done accurately and under no condition should the ignition be set so that the contact points open before center with the spark lever at the extreme left of the sector.

### *Resistance Unit*

The resistance unit is a coil of resistance wire wound on a porcelain spool as shown in Fig. 7. Under ordinary conditions it remains cool and offers little resistance to the passage of current. If for any reason the ignition circuit remains closed for any considerable length of time with the engine not running, the current passing through the coil heats the resistance wire, increasing its resistance to a point where very little current passes, and insuring against a waste of current from the battery and damage to the ignition coil and timer contacts.

### *Ignition Condenser*

The purpose of the condenser in the ignition system is to protect the timer contact points against the corrosive action of sparking and

to utilize the tendency to spark to build up a higher voltage in the high tension circuit than would otherwise be obtained.

The ignition condenser is mounted on the right-hand side of the distributor housing in a waterproof casing "D." (See Fig. 7.) It consists of layers of tinfoil separated by sheets of paraffin paper. Alternate layers of tinfoil are connected to opposite terminals. The current does not pass through the condenser and on test the terminals should show open circuit.

There are no adjustments in connection with the condenser.

### *Ignition Coil*

The ignition coil serves to transform the low voltage current in the primary circuit to a current of high voltage in the secondary circuit. The coil consists of a primary winding of coarse wire wound around an iron core in comparatively few turns, and a secondary winding of many turns of fine wire, also the necessary insulation and terminals for wiring connections.

### *Spark Plugs*

In order to get the best results the porcelains of the spark plugs should be clean and the points should be .023 inch apart. If the points are too close, the engine will miss under a light load and when idling. If the points are too far apart, it will miss under heavy loads and when the throttle is opened quickly for acceleration.

## CIRCUIT BREAKERS

The circuit breakers are mounted on the inner face of the dash. These are protective devices which take the place of fuses.

The circuit breakers prevent the discharging of the storage battery, damage to the wiring to the horn, lights and the ignition apparatus, or to any of these parts in case any of the circuits to or in these parts become grounded.

As long as only a normal amount of current is used for horn, lights and ignition the circuit breakers will not open. In the event of a ground, an abnormally heavy current is conducted through one of the circuit breakers, thus producing strong magnetism which attracts the armature and opens the contact. This cuts the flow of current.

The circuit breaker protecting the horn, handy lamp and tonneau lamp circuit is known as a lockout circuit breaker. In case of a ground in any of these circuits, the breaker opens and remains open until the ground is removed.



The circuit to the ignition apparatus and remainder of the lights is protected by a vibrating circuit breaker. In case of a ground in any of the circuits protected by the vibrating circuit breaker, the breaker will start to vibrate and will continue to vibrate until the ground is removed.

## GENERATION OF CURRENT

### *Ammeter*

When the engine is not running and the lights are turned on, the ammeter, which is located on the instrument board, indicates on the "Discharge" side of the dial the amount of current being drawn from the storage battery for this purpose. When the ignition switch is turned on the ammeter indicates, in addition, the current used in slowly rotating the armature of the motor generator. When the starter button is pushed down current is no longer required for slowly rotating the armature of the motor generator. The ammeter then indicates only the current used for the ignition and lights (if turned on). The ammeter does not indicate the amount of current used in the cranking operation.

Before the engine is running fast enough to generate sufficient current to equal the current demand, the ammeter indicates on the "Discharge" side the amount of current being drawn from the storage battery. When the engine has attained a speed sufficient to generate current to more than equal the demand, the ammeter indicates on the "Charge" side the excess current which passes to the storage battery and recharges it.

Ordinarily, with all lights switched off, sufficient current is generated to start recharging the battery when the car is operated in high gear at speeds between four and six miles per hour and, of course, at much lower speeds when the car is operated in low or intermediate gear. With all lights turned on sufficient current is generated to take care of the requirements at a speed of ten to fifteen miles per hour and at speeds greater than this the surplus current passes through the storage battery and recharges it. In other words, the ammeter indicates the rate at which the storage battery is being charged or discharged.

To determine the total output of the generator, turn off all the lights and add the amount of current used for ignition, i. e., two to three amperes, to the ammeter reading.

### *Current Regulation*

The generating capacity of the generator is regulated by means of a third brush on the generator commutator. (See Fig. 31.) The position of this brush relative to the other two generator brushes determines the maximum output of the generator, the length of the brush arm being adjustable. The brush arm is properly adjusted when the car is assembled and should not require readjustment unless its position is altered. To determine whether readjustment is necessary, proceed as follows:

Start the engine in the usual manner. With all the lights turned off slowly increase the speed of the engine by means of the hand throttle lever, meanwhile observing the hand of the ammeter on the instrument board. (*Do not race the engine.* There is no worse abuse, and it is unnecessary in this adjustment to run the engine faster than 1500 revolutions per minute.) The current indicated by the ammeter will increase with the speed of the engine to a point between 950 and 1200 revolutions per minute, and will then decrease. If the amount of current indicated by the ammeter at the maximum point is greater than 18 amperes, stop the engine and readjust the third brush as follows:

Remove the generator front end top cover. Loosen the two screws which hold together the two parts of the third brush arm and shorten the brush arm. After moving the third brush to an approximately correct position, press the brush down so that it makes even contact with the commutator, and hold it down while tightening the screws in the brush arm. The purpose of this is to have the curvature of the end of the brush conform as closely as possible to that of the commutator.

After setting the third brush, refit it to the commutator. (See "Fitting Motor Generator Brushes," page 39).

Start the engine. Again slowly accelerate the engine and check the maximum current. If it is still greater than 18 amperes, reset the third brush and sand it in again.

If the maximum current indicated by the ammeter is less than 18 amperes and the specific gravity of the battery repeatedly shows that the battery is not being properly charged, lengthen the brush arm. Do not, however, lengthen the brush arm unless the condition of the battery makes it necessary and under no circumstances adjust it so that the ammeter indicates a maximum current of more than 18 amperes with all lights turned off. A greater amount of current may result in serious injury to the motor generator.



## STORAGE BATTERY

### *Adding Water to Storage Battery*

The acid solution in the storage battery must cover the plates, and should be even with the bottom of the filling tubes. (See Fig. 8.) Add water to bring up the level. Do not add acid.

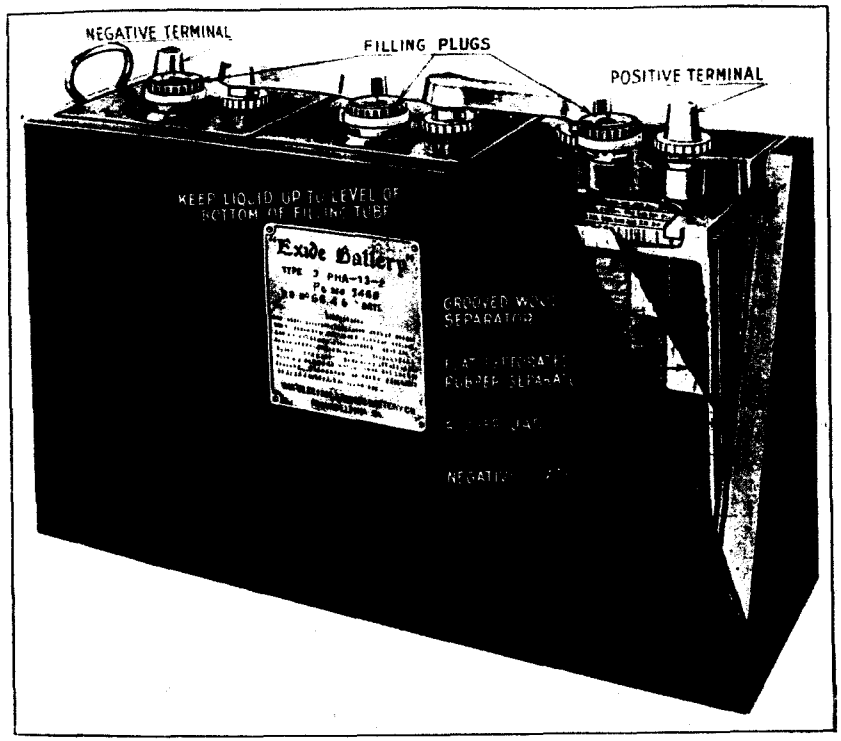



*Fig. 8—Storage Battery, Sectional View.*

To remove a filling plug, turn it as far as possible in the counter-clockwise direction, then lift it straight up. To replace, hold it so that the large arrow is perpendicular to the center line of the car, set the plug in place and turn it in the clockwise direction until tight.

Water for filling the battery must be pure. Distilled water, melted artificial ice or fresh rain water are suitable for this purpose. If rain water is used, it should not be allowed to come in contact with any metal. It should not be caught from a metal roof or in a metal receptacle.

Never keep the water in a metal container, such as a metal bucket or can. It is best to get a bottle of distilled water from a druggist or

from an ice plant. The whole point is to keep metal particles out of the battery. Spring water, well water or hydrant water from iron pipes generally contains iron and other metals in solution, which will ultimately cause trouble if used.

### *Replacing Acid Lost by Spilling*

If any acid solution has been spilled or has leaked from a cell, replace the loss with freshly mixed solution and follow with an overcharge by running the engine for several hours or by charging the battery from an outside source. (See Fig. 9. Also see under "Personal Danger of Running Engine in Closed Garage," page 62.)

The specific gravity of the acid solution used for replacing the loss should be the same as that of adjacent cells. This can be determined by the use of an hydrometer syringe.

The acid solution may be prepared by mixing chemically pure sulphuric acid, which has a specific gravity of 1.840, and distilled water. The proportion for an acid solution having a specific gravity of 1.280 is one part of chemically pure acid and three parts (by volume) of distilled water. *The acid must always be poured slowly into the water. Do not pour the water into the chemically pure acid.*

If, after mixing the acid solution as described above, a solution of a lower specific gravity is desired, it may be prepared by adding additional water to the mixture. But do not under any conditions pour water into the chemically pure acid.

### *Charging from an Outside Source*

It is necessary that the charging be done with *direct current.* The simplest method when there is 110 or 120 volt direct current available, is to connect eight 110 volt, 32 candlepower, 100 watt carbon lamps in parallel with each other and in series with the battery to be charged, this combination giving approximately the proper charging rate—8 amperes. The positive terminal of the battery must be connected to the positive side of the charging circuit and the negative terminal to the negative side. *Very serious injury to the battery will result if connected in the reverse direction.* The terminals of the battery are stamped "Pos." and "Neg."

To determine the polarity of the charging circuit, if a suitable voltmeter is not at hand, dip the ends of the two wires "A" and "B" (Fig. 9) into a glass of water in which a teaspoonful of salt has been dissolved, care being taken to keep the wires at least an inch apart. When the current is turned on, fine bubbles of gas will be given off from the negative wire.

The diagram (Fig. 9) illustrates just how the connection should be made. The charge should be continued until all the cells have been



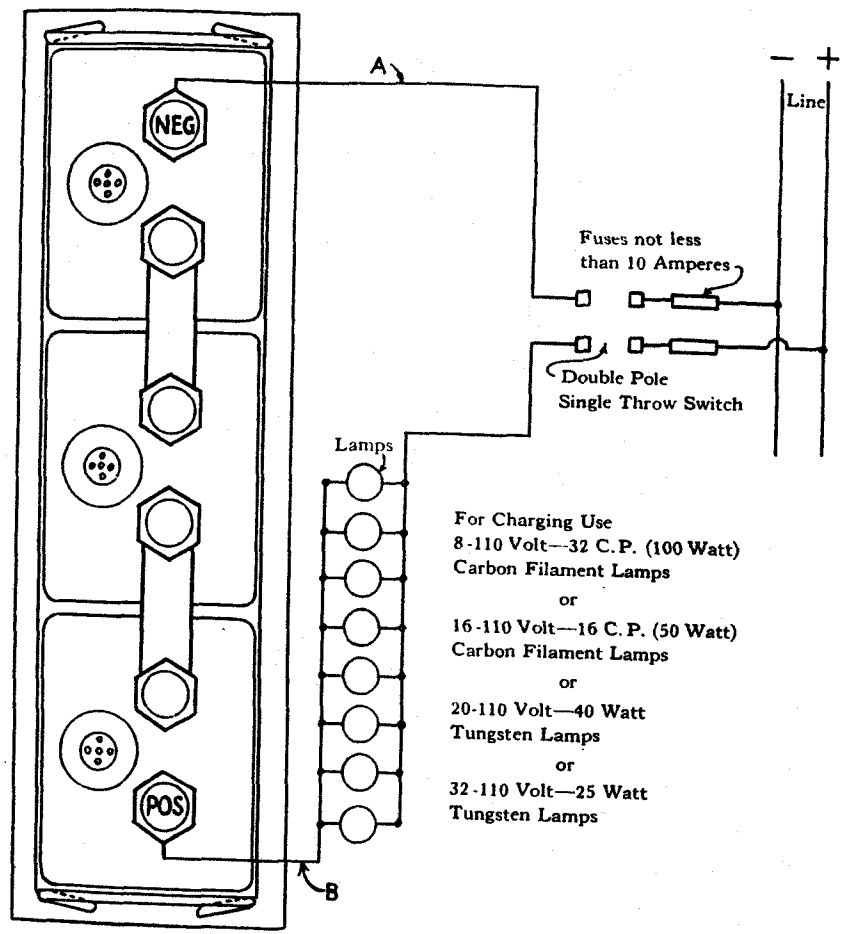



*Fig. 9—Diagram of Connection for Charging Battery from 110 Volt D. C.*

"gassing" or bubbling freely for five hours, and there is no further rise in the voltage of the battery or specific gravity of the acid solution over the same period. A battery in good condition in a discharged state will require about ten hours of re-charging. If it has stood in a discharged condition for several weeks, it will require from twenty-five to fifty hours' charging—all depending upon the condition of the battery and the length of time it has stood discharged.

If only alternating current is available, a current rectifier must be used. Consult your city electrician regarding this matter.

CAUTION—Never run the engine with the storage battery disconnected, or while it is off the car. Very serious damage to the motor generator may result from such action.

### *Preparing Battery for Storage*

When a car is stored for some time the level of the acid solution should be even with the bottom of the filling tubes. (See under "Adding Water to Storage Battery," page 49.) If water is added it should be added just before the last time the car is used so that it will be thoroughly mixed with the acid solution. When the car is stored, the specific gravity of the acid solution should register from 1.270 to 1.290. In this condition there is no danger of the acid solution freezing during cold weather. The specific gravity of water is 1.000 and water freezes at 32 degrees F. above zero.

*Unless the battery is fully charged, or nearly so, during freezing weather, it is probable that the acid solution in the battery will freeze and cause extensive damage.*

The following is a table of the freezing temperatures of sulphuric acid and water solutions of specific gravities from 1.050 to 1.300:

| Specific Gravity (Hydrometer Reading) | Freezing Temperature (Degrees Fahr.) |
|---|---|
| 1.050 | +27° |
| 1.100 | +18° |
| 1.150 | + 5° |
| 1.164 | 0° |
| 1.200 | —17° |
| 1.250 | —61° |
| 1.275 to 1.300 | —90° |

The battery should be charged every two months during the "out of service" period, either by running the engine or charging from an outside source (Fig. 9). If neither of the above is possible, the battery can be allowed to stand without charging during the winter provided the specific gravity of the acid solution registers from 1.270 to 1.290 at the time the car is laid up. Much better results and longer life from the battery will be obtained by giving the periodic charges.

The wires of the battery should be disconnected during the "out of service" period, as a slight leak in the wiring will discharge the battery.

### *Placing Battery in Service Again*

Before putting the battery into service again, inspect it and add water, if necessary. In placing the battery on the car, care should be taken not to tighten the hold-down bolts too tight. If the battery has not been kept charged during the winter, it will be advisable to give it a fifty-hour charge at a four-ampere rate from an outside source before putting it into service again. Make sure that the terminals are free from corrosion and that good connections of the wires are made.

The corrosion, which is a greenish deposit, can be removed from the bolts and terminals by placing them in a solution of water and bicarbonate of soda (cooking soda).



The corrosion can be removed from the posts by saturating a piece of cloth with the solution and wiping them off. Do not allow any of the solution to get into the cells of the battery.

After the parts are free from corrosion they should be washed in warm water, and a light coat of heavy grease or vaseline applied.

If the battery has received periodic charges, it will not be necessary to give it any special attention other than to fill it to the proper height with distilled water. After the car has been driven for a number of hours, read the specific gravity of the acid solution with the hydrometer syringe. It should register from 1.270 to 1.290 if the battery is fully charged.

### *Sediment*

The sediment which gradually accumulates in the bottom of the jars should be removed before it reaches the bottom of the plates, as it is very harmful to the battery. The need of cleaning may be determined by inspection. Its necessity is indicated by lack of capacity, excessive evaporation of the acid solution and excessive heating when charging. When a battery requires removal of sediment, better results follow if the work is done at a place where they are thoroughly familiar with storage battery practice.

### *Exide Depots and Sales Offices*

The Electric Storage Battery Company, whose general offices and works are at Alleghany Avenue and 19th Street, Philadelphia, Pa., has service stations in towns of any considerable size where battery repair work is done, as well as sales offices and Exide battery depots in a number of the larger cities of the country where complete assembled batteries and repair parts are carried in stock. For the location of the nearest Exide depot or service station write the Electric Storage Battery Company, at Philadelphia.

## COOLING SYSTEM

### ANTI-FREEZING SOLUTION

In cold weather a good anti-freezing solution should be used. A solution of commercial glycerine and water is recommended of the correct proportion for the temperature experienced. The following are the freezing temperatures of glycerine and water solutions of various proportions.

| Glycerine (% by volume) | Water (% by volume) | Freezing Temp. (degrees Fahr.) |
|---|---|---|
| 35% | 65% | +10° |
| 40% | 60% | +6° |
| 45% | 55% | +3° |
| 50% | 50% | 0° |
| 55% | 45% | —2° |
| 60% | 40% | [illegible] |

Do not use a solution containing calcium chloride as this is injurious to the metal parts of the cooling system.

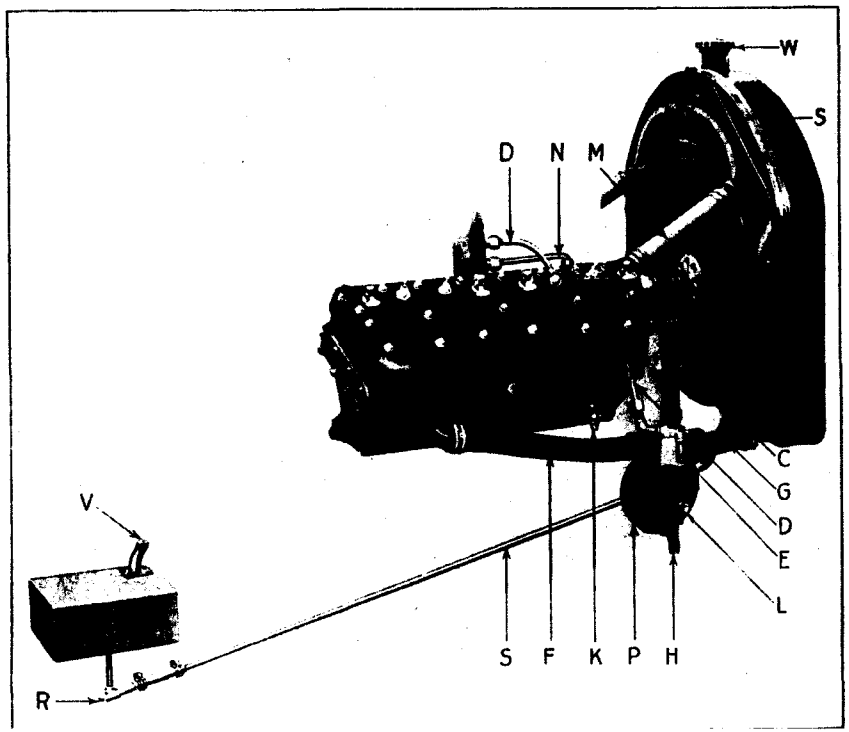
The radiator condenser also makes it possible to use with safety an anti-freezing solution of denatured or wood alcohol and water. The following are the freezing temperatures of denatured alcohol and water solutions of various proportions.

| Denatured Alcohol (% by volume) | Water (% by volume) | Freezing Temperature (degrees Fahr.) | Specific Gravity (Hydrometer reading) |
|---|---|---|---|
| 20% | 80% | +13° | .974 |
| 30% | 70% | — 3° | .964 |
| 40% | 60% | —20° | .953 |
| 50% | 50% | —34° | .936 |

It is a good plan occasionally to draw out a sample of the solution in the radiator and to test its specific gravity with a hydrometer graduated between the limits of the above table.

The capacity of the cooling system is five and one-quarter gallons. The condenser should contain an additional three quarts, making a total of six gallons.

CAUTION—Don't use water in the cooling system during freezing weather. Use a good anti-freezing solution. Water will freeze even though the engine be run continuously.






## FILLING AND DRAINING THE COOLING SYSTEM

### *Filling the Cooling System*

Fill the cooling system with clean water, during warm weather, and with a suitable anti-freezing solution during freezing weather. (See under "Anti-Freezing Solution.")

To fill the cooling system after it has been drained, replace the drain plugs "H," Fig. 10, in the water pumps, close the drain cocks "K" in the cylinder blocks and turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point up. The shafts may be turned in either direction.

Then remove the filler cap "W" from the top of the radiator and fill the cooling system. Replace the filler cap and *screw it down firmly.* This is necessary, to insure the proper operation of the condenser.

After the cooling system is filled, turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point down. These indicators should point up when filling or draining the cooling system and down at all other times.

The cooling system should be full or nearly so. When it is necessary to add only a small amount of liquid to bring up the level, it is not necessary to turn the shafts "L" on the water pumps, but simply to remove the radiator filler cap.

When the cooling system is cold, the condenser should be one-half full of the same liquid as used in the radiator. To add liquid to the condenser, take up the removable floor board and remove the filler cap "V" at the top of the condenser. Any excess liquid which may accumulate in the condenser should be drained off at "R," Fig. 10, and poured back into the radiator.

### *Draining the Cooling System*

To drain the cooling system, remove the drain plugs "H," Fig. 10, from the water pumps and turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point up. The shafts "L" may be turned in either direction. Then open the drain cocks "K" in the cylinder blocks.

To drain the condenser remove the drain plug "R" in the pipe leading from the bottom of the condenser.

## CLEANING THE COOLING SYSTEM

Run the engine with the radiator covered until the liquid in the cooling system is boiling hot. Then turn the shafts "L," Fig. 10, on the water pumps so that the indicators on the ends of the shafts point up.

Shut off the engine and immediately remove the drain plugs "H" from the water pumps and open the drain cocks "K" in the cylinde

blocks. (Bear in mind in removing the drain plugs "H" that the liquid is scalding hot.) Remove the drain plug "R" in the pipe leading from the bottom of the condenser.

If an alcohol anti-freezing solution is drawn off, part of it may be used again if the sediment is allowed to settle. In case it is used again its specific gravity should be tested with an hydrometer, after it has thoroughly cooled.

When the liquid has drained off, replace the drain plugs "H," close the drain cocks "K" and fill the cooling system with clean, hot water. Then repeat the operations outlined above.

If in draining the second time, the water is very dirty, it may be desirable to repeat the flushing operation a third time, using a solution of sal-soda. If the sal-soda solution is used, be sure that it is drained out and the cooling system flushed again with clear water.

The sal-soda solution should not be allowed to get on the finish of the hood or radiator.

During freezing weather be sure to refill with a suitable anti-freezing solution.

### WATER PUMPS

#### *Water Pump Packing Glands*

To tighten the glands of the water pumps first remove the splash pan under the engine, then turn the packing gland "O," Fig. 27, in the direction in which the wheels rotate when the car is moving backward.

To repack water pumps it is necessary to first remove them. (See "Removal of Pump" under "Water Pumps," page 104). Repack with Cadillac packing.

In tightening the glands, tighten them only sufficiently to prevent leakage. Tightening them further causes unnecessary friction on the pump shaft.

#### *Strainers*

The strainer in each radiator outlet must be clean. To remove, see "Removal" under "Water Pump Strainers," page 129.

#### *Adjustment of Thermostat Valves*

The thermostat valves "C," Fig. 27, are screwed onto the threaded stem of the thermostatic member "D" and are held in place by a slotted nut "M" in the center of the valve. The valves are adjusted when the car is assembled and no further attention should be required. In the event that the adjustment has been altered, proceed as follows in making a readjustment:

Drain the cooling system. (See under "Draining the Cooling System," page 55.) Disconnect the hose "B" and the pipe "A" at the pump. Remove the four small screws in the cap to which the hose and pipe were attached and remove the cap.



Turn the shaft "L" so that the indicator on the end of the shaft points in a *horizontal* direction. With a screw-driver loosen the slotted locking nut "M". Then adjust the valve until it just seats without placing any tension on the thermostatic member "D." Hold the valve in this position and tighten the slotted locking nut.

Replace the cap and connect the hose "B" and the pipe "A." Turn the shaft "L" so that the indicator points up and fill the cooling system. After filling the cooling system, turn the indicator down, regardless of weather conditions.

## GASOLINE SYSTEM

### PRESSURE RELIEF VALVE

A pressure relief valve is connected in the air line of the gasoline system for the purpose of preventing excessive pressure. It is attached to the left-hand side of the frame under the front floor boards and is adjusted to release if a pressure of four pounds should be reached. As the pump at the front of the engine is designed to furnish a pressure of considerably less than four pounds, it is evident that the relief valve is not intended to release under normal conditions. The relief valve is intended to operate only in case higher pressures result from the use of gasoline, such as "casing-head" gasoline, containing highly evaporative fractions.

If the pressure gauge on the instrument board shows a pressure of more than four pounds the relief valve should be readjusted. Or, if it is found impossible to maintain sufficient pressure to insure flow of fuel to the carburetor, this condition may indicate need for readjustment of the valve.

As low pressure may also be caused by leakage of air at the gasoline tank filler cap or at the piping connections, or by the presence of dirt on the needle valve "D," Fig. 11, or its seat, do not readjust the relief valve without making certain that the low pressure is due to the valve releasing and not to these other causes.

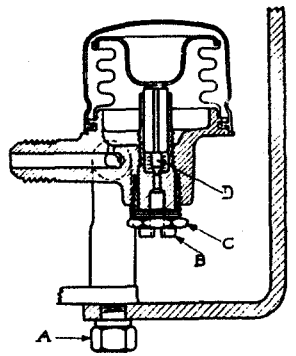


*Fig. 11—Air Pressure Relief Valve, Sectional View.*

To readjust the pressure relief valve remove the cap screw "A" by which the relief valve is attached to the side bar and spring the piping so that access may be had to the nut "C" and screw "B" underneath the relief valve. Loosen the hexagonal gland nut "C." Then turn the hollow, slotted screw "B" in the clockwise direction if the pressure at which the valve releases is too low; or in the counter-clockwise direction if the valve releases at too high a pressure. Tighten the gland nut "C."

Check the results of the adjustment by raising the pressure with the hand pump. (Less pumping will be required if the tank is full or nearly so.) If it is found possible to raise the pressure above four pounds on the gauge, or if the maximum pressure obtainable is less than four pounds, the adjusting screw "B" should be adjusted again.

After the adjustment has been correctly made, make sure that the gland nut "C" is tight.

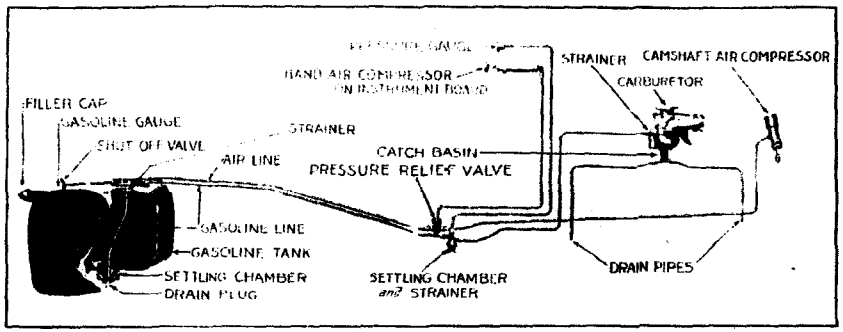



*Fig. 12—Gasoline System.*

### SETTLING CHAMBERS AND STRAINERS

The gasoline system is protected by a settling chamber at the bottom of the gasoline tank, a strainer at the top of the tank, a strainer and a settling chamber under the front floor boards, and a strainer at the carburetor. These settling chambers and strainers must be clean.

### CARBURETOR

The carburetor should not be tampered with unless it needs adjustment. Good carburetor action cannot be expected before the engine is thoroughly warmed up. This is particularly true during cold weather. Imperfect carburetor action while the engine is cold does not indicate that the carburetor requires adjustment, and carburetor adjustment should not be made under these conditions.

Before changing any of the carburetor adjustments be sure it is the carburetor which requires attention.

In adjusting the carburetor select a quiet place, for correct adjustment depends largely upon being able to detect slight changes in engine speed.



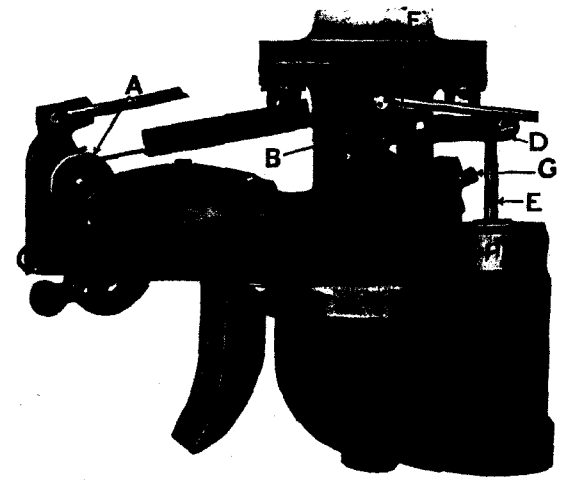



*Fig. 13—Carburetor, Side View.*

### *Adjustment of Auxiliary Air Valve Control Rod*

The end of the control rod running from the steering post to the lever "S," Fig. 36, should stand in the center of the slot in the lever "S" when the control lever on the steering post is pushed down as far as it will go. If the end of the rod does not stand in the center of the slot readjust the end of the rod at the steering post. Make sure at the same time that the lever "S" works freely in its guide.

### *Adjustment of Auxiliary Air Valve Spring*

Before attempting to adjust the auxiliary air valve spring, make sure that the auxiliary air valve control rod is in correct adjustment, and that the lever "S," Fig. 36, works freely in its guide. (See above under "Adjustment of Auxiliary Air Valve Control Rod.")

To determine whether the auxiliary air valve spring requires adjustment and to make the adjustment, proceed as follows:

Start the engine and run it until the water jacket on the intake manifold is hot.

Place the spark lever at the extreme left of the sector (fully retarded) and move the throttle lever to a point which permits an engine speed of about 300 revolutions per minute. If the engine runs faster than this with the throttle lever as far to the left as it will go, unscrew the throttle stop screw "B," Fig. 13, until the engine speed is reduced to 300 revolutions per minute. If unscrewing the stop screw "B" does not permit the throttle in the carburetor to close enough to reduce the engine speed to 300 revolutions per minute, loosen the set screw in the

small collar on the end of the control rod from the steering gear to the bell crank lever at the side of the starter housing.

Then make the following test to determine the necessity for adjusting the auxiliary air valve spring:

Press down gently on the ball-shaped counterweight of the auxiliary air valve and note whether the immediate result is an increase or a decrease in engine speed. Release the counterweight and allow the engine to run a few seconds to regain its normal speed. Then press up gently on the counterweight and note the effect on the engine speed.

If the mixture is correct the immediate result of gentle pressure, up or down, on the counterweight of the auxiliary air valve is a slight decrease in engine speed. If the immediate result of gentle upward pressure on the counterweight is a slight decrease in engine speed, while the result of downward pressure is an increase in engine speed, a rich mixture is indicated. If the immediate result of downward pressure is a decrease in engine speed while the result of upward pressure is an increase in engine speed, a lean mixture is indicated.

If the above test indicates an incorrect mixture first turn the screw "G" in a clockwise direction as far as it will go (screw it in.) Then adjust the auxiliary air valve screw "A," turning it clockwise to correct a lean mixture and counter-clockwise to correct a rich mixture. In other words, turning the screw "A" clockwise enriches the mixture and turning it counter-clockwise leans the mixture. Continue to change the adjustment of the screw "A" and to test as above until a correct mixture is indicated. Do not turn the screw "A" more than a few notches at a time.

Move the throttle lever to the extreme left of the sector unless it is already in that position. The engine should now run at a speed of about 300 revolutions per minute. If it does not, change the adjustment of the throttle stop screw "B" until this speed is obtained. When the stop screw "B" has been correctly adjusted, adjust the collar on the control rod from the steering gear so that the throttle in the carburetor will start to open immediately the throttle lever on the sector is moved from the extreme left hand position. Test the correctness of the mixture as before, and if necessary readjust the screw "A." When the test indicates the correct mixture with the throttle lever at the extreme left of the sector and the engine running 300 revolutions per minute, adjustment of the auxiliary air valve spring is correct, and adjustment of the leaning device should then be made.

### *Adjustment of Leaning Device*

Before attempting to adjust the leaning device test the adjustment of the auxiliary air valve spring and if necessary readjust it. (See



under "Adjustment of Auxiliary Air Valve Spring," page 59.) Also make sure that the auxiliary air valve control rod is in correct adjustment. (See under "Adjustment of Auxiliary Air Valve Control Rod," page 59).

To determine whether the leaning device requires adjustment and to make the adjustment, proceed as follows:

Assuming that the engine has been running long enough to be thoroughly warmed up and the leaning device adjusting screw "G" has been screwed in as far as it will go, see that the spark lever is at the extreme left of the sector and open the throttle until the shutter attached to the right hand end of the throttle shaft just covers the slot in the carburetor body, leaving only the triangular opening formed by the notch in the shutter.

Turn the screw "G" in a counter-clockwise direction (unscrew it). As the screw "G" is unscrewed the first result will be to increase the engine speed slightly. Unscrewing it further will result in a sudden decrease in engine speed. Immediately a decrease in speed is noticed, stop unscrewing the screw "G" and screw it in again a quarter of a turn. Make the test described under "Adjustment of Auxiliary Air Valve Spring," page 38, for determining the correctness of the mixture. If the test indicates a rich mixture turn the screw "G" counter-clockwise to correct the mixture. If the test indicates a lean mixture, turn the screw "G" clockwise. In other words, turning the screw "G" clockwise enriches the mixture, and turning it counter-clockwise leans the mixture. (If the screw "G" turns with difficulty, loosen the binding screw which clamps it.)

Caution: In turning the screw "G" or the binding screw, do not use a wide screw driver as it is liable to strike the shutter, forcing it away from the carburetor body. A slight variation in the clearance between the shutter and the body of the carburetor may render the leaning device inoperative.

In making the adjustment of the leaning device during very cold weather, when a slightly richer mixture is desirable, it may be found best to turn the adjusting screw "G" further in a clockwise direction.

### *Setting of Carburetor Float*

To determine if the float is set correctly, remove the carburetor from the engine and the bowl from the carburetor. (See under "Carburetor," page 129.) Hold the carburetor upside down. Under these conditions dimension "A," Fig. 36, should be ½ inch.

The setting may be corrected by bending slightly the arm to which the float is attached.

### *Throttle Pump*

The rod "Y," Fig. 36, is adjusted at the factory and should require no further adjustment. If the adjustment is changed the rod should be readjusted so that its upper end is flush with the upper face of the arm to which it is attached.

### *Automatic Throttle*

To determine if the spring which controls the automatic throttle is in proper adjustment, proceed as follows: Remove the carburetor. (See "Removal" under "Carburetor," page 129.) In the absence of the tool (Number 67327) furnished by the Cadillac Motor Car Company for making this test, bend a piece of Number 14 copper wire (.064 inch in diameter) 6⅞ inch long in the shape shown in Fig. 37, hooking it over the throttle as shown. With the carburetor in horizontal position, note the position which the throttle disc assumes. The disc should assume the horizontal position. If it does not, and you are sure that the throttle shaft is free in its bearings, slightly loosen the screws on the plate "X," Fig. 36, and turn the large adjusting cap. Turning the cap in a clockwise direction increases the tension of the spring and turning it in a counter-clockwise direction decreases the tension.

#### PERSONAL DANGER OF RUNNING ENGINE IN CLOSED GARAGE

Carbon monoxide, a deadly poisonous gas, is present in the exhaust of gasoline engines. Increasing the proportion of gasoline to air in the mixture fed to the engine, in other words, enriching it, increases the amount of carbon monoxide given off at the exhaust pipe.

Because of the presence of carbon monoxide it is very dangerous to run the engine for any length of time while the car is in a small, closed garage. If the doors and windows are open the danger is very much lessened, but it is far safer, particularly if an adjustment of the carburetor is being made, to run the car into the open.

Serious personal injury may be caused by the presence of carbon monoxide in a garage if the percentage of it in the air is greater than a very small fraction of one per cent. Unconsciousness may result without warning. It is reported that no indication of danger is given by personal discomfort until too late. Deaths resulting from the presence of carbon monoxide in garages have been reported.



## CLUTCH AND TRANSMISSION

### CLUTCH

### *General Description*

The main clutch is of the multiple disc dry-plate type. The eight driving discs, Fig. 39, are covered on both sides with a friction material, composed largely of asbestos, and are driven by gear teeth in the clutch ring which is bolted to the engine flywheel.

The nine driven discs are not covered. These discs are carried on the clutch hub and drive it through six keys on the hub. The clutch hub is keyed to the transmission shaft.

When the clutch is engaged by allowing the clutch pedal to come towards you, the spring forces all of the discs together. The resulting friction between the discs drives the transmission shaft and the car, when the transmission control lever is in other than the neutral position.

There are no adjustments on the clutch proper. The clutch pedal should be adjusted occasionally to compensate for wear on the facings of the clutch discs. This adjustment is explained under "Adjustment of Clutch Pedal Clearance," page 64.

### *Relining Clutch Discs*

Remove the clutch discs in accordance with directions under "Removal of Clutch Discs," page 136.

Determine the amount of clearance between the teeth of the discs and the teeth of the clutch ring. If the clearance is .010 inch or more, new discs should be substituted.

With pliers or a sharp cold chisel and a hammer remove the used linings. Care must be exercised not to spring the discs in removing the linings.

After removing the lining determine if the discs are warped or sprung by laying them face down on a surface plate. If they are warped or sprung they should not be used again.

Cadillac clutch disc lining is supplied with the holes punched for the rivets. Suitable rivets are supplied. It is recommended that Cadillac lining and rivets be used.

Do not have the lining nearer than one-sixteenth of an inch from the bottom of the teeth on the periphery of the discs nor allow it to extend over the inner edge of the discs.

Do not have all rivet heads on one side of the disc. Alternate them. Rivets should be headed over and well drawn in so that they are at least one thirty-second of an inch below the surface of the lining.

## CLUTCH PEDAL

### *Adjustment of Clutch Pedal Clearance*

If the clutch pedal strikes the stop screw before the clutch is fully engaged, readjustment should be made.

Remove the pin "N," Fig. 14, and unscrew the yoke "P," which is threaded on the rod "O," so that when the pin "N," is replaced the clutch pedal has a movement back and forth of one and one-quarter inches without starting to release the clutch. Secure the pin "N" with a cotter pin and tighten the lock nut "V."

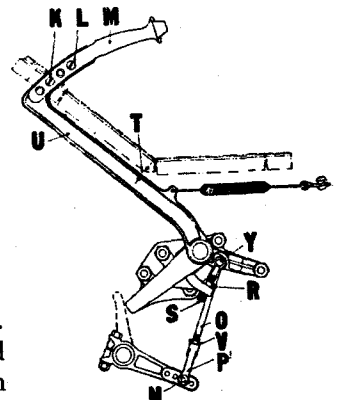


*Fig. 14—Clutch Control.*

### *Adjustment of Clutch Pedal Stop*

The clutch pedal stop screw "S," Fig. 14, is adjusted when the car is assembled and requires no further attention. When in proper adjustment the stop screw "S" should hold the pedal arm "U" so that the distance "T" is approximately one-half inch on the Seven-Passenger, Two-Passenger, Four-Passenger and Victoria and approximately one-quarter inch on all enclosed cars except the Victoria. If the adjustment has been changed, it may be readjusted in the following manner:

Remove the pin "N" from the yoke "P," loosen the lock nut "R" and adjust the stop screw "S" so that the pedal arm "U" is held the required distance from the under side of the toe board at "T" when the pin "Y" is against the stop screw. Tighten the lock nut "R."

Then adjust the yoke "P" so that when the pin "N" is replaced the clutch pedal has a movement back and forth of one and one-quarter inches without starting to release the clutch. Secure the pin "N" with a cotter pin and tighten the lock nut "V."

### *Adjustment of Length of Clutch Pedal*

To change the length of the clutch pedal, remove the bolts "K" and "L," Fig. 14, and slide the forked piece "M" in the desired direction. Do not pull "M" out so far that it is possible to put in only one bolt; two bolts are required properly to hold the parts.

There are four possible positions in this adjustment, Fig. 14 showing the extreme shortened position.

## TRANSMISSION

### *General Construction*

The transmission is of the selective type of sliding gear. It provides for three speeds forward and one reverse. The gear changes



The teeth of the driving gear "A," Fig. 39, are cut on the large end of the clutch connection shaft "B" which revolves on annular ball bearings "C" and "D," and which turns with the crankshaft of the engine when the clutch is engaged, at which time the bearing "D" is inoperative. The gear "A" is in constant mesh with the jackshaft gear "E." The jackshaft gears "E," "F," "G" and "H" revolve together on two Hyatt high-duty flexible roller bearings "I" on a stationary shaft "J." The roller bearings "I" are lubricated by oil forced through the tube "K" which revolves with the gear "F."

The main transmission shaft "L," which is coupled to the forward universal joint, is splined and carries two sliding gears "M" and "N." The shaft "L" is supported by an annular ball bearing "O" at the rear end, and at the front end by a roller bearing "P" which is housed in the rear end of the clutch connection shaft "B."

There are no adjustments in the transmission.

## UNIVERSAL JOINTS AND REAR AXLE

### UNIVERSAL JOINTS

The tubular drive shaft that transmits the power of the engine from the transmission to the rear axle is fitted with a universal joint at each end.

The purpose of the joints is to provide a flexible drive, which is made necessary by the constantly changing alignment due to the play of the springs.

The general arrangement of the joints is shown in Fig. 40. The joints differ only in that the forward joint, which is attached to the transmission shaft, is provided with a sliding connection, or slip sleeve, "K," while the rear joint is welded to the drive shaft. A sliding connection is necessary to take care of the endwise motion of the drive shaft due to variation in the distance between the transmission and the rear axle caused by the action of the springs.

The joints are protected by an inner housing "D" and an outer housing "C," both of pressed steel. The inner housing is bolted to the flange and the outer housing fits over the end of the inner housing and is held in place and kept tight by means of a spring. The packing "H" is for the purpose of preventing grease from working out and dirt from getting in.

### REAR AXLE

### *Adjustment of Gear and Pinion Bearings*

In the design of the axle, provision is made for adjusting the pinion and gear so that the teeth may be correctly meshed, and for locking all the adjusting nuts in position securely.

The large bevel gear "A," Fig. 15, on the gear mount "B," and the

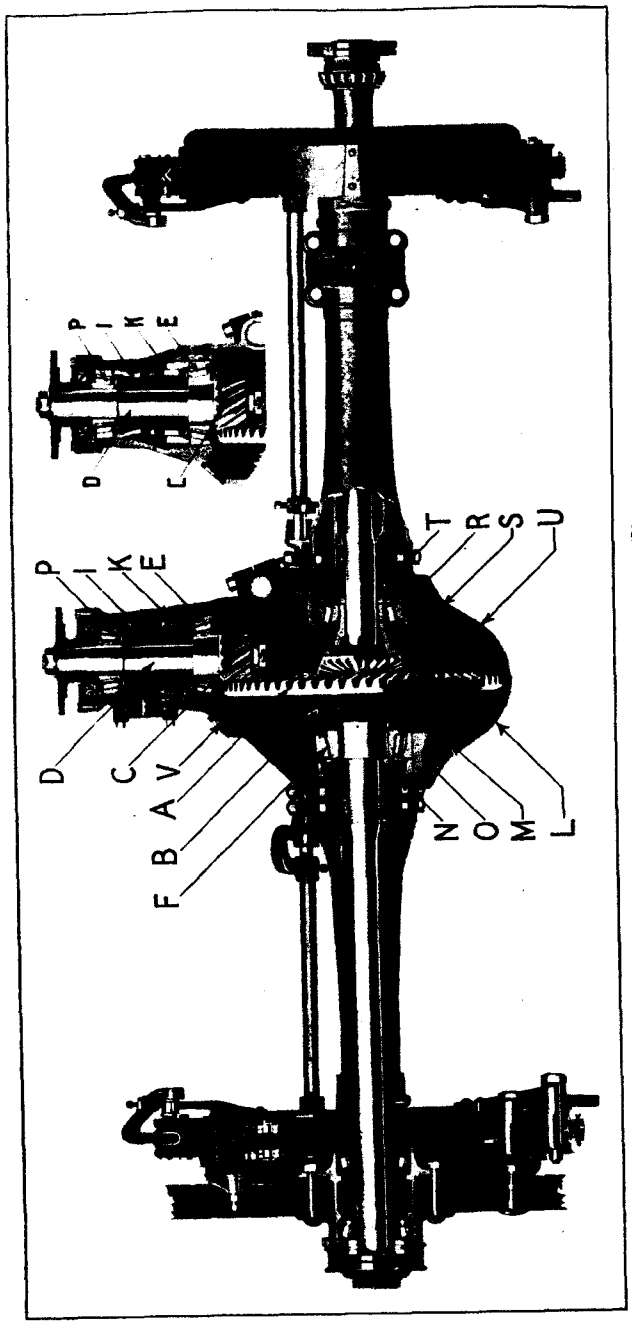



*Fig. 15—Rear Axle, Sectional View.*
*(The insert shows the early type mounting for the pinion shaft bearings.)*



bevel pinion "C" on the driving shaft "D," are correctly meshed when the car is assembled, but after it has been in use for several thousand miles it may be found that the bearings "E" and "F," which take the end thrust of the gears, have become more permanently seated, causing end play in the pinion shaft "D" and side play in the gear mount "B." When this condition exists, bearings "E" and "F" should be readjusted.

If undue end play exists in the pinion shaft "D," the bearing "E" should be adjusted as follows:

Loosen the two long clamping bolts on the pinion barrel and remove the cover plate giving access to the adjusting nuts "I" and "K." (See Note.) Hold the adjusting nut "I" from turning and turn up the adjusting nut "K" as far as possible without making the adjustment of bearing "E" too tight. (See under "Caution in Adjusting Timken Bearings," page 77.) After the adjustment has been made replace the cover plate over the opening and tighten the clamping bolts.

NOTE—The cover plate is at the top of the pinion barrel on some of the Type 57 axles. If the cover plate is at the top it is necessary to entirely remove the two long clamping bolts before the cover can be removed.

If, after removing the rear cover plate "L," undue side play is found in the gear mount "B," the bearing "F" should be adjusted as follows:

Move the key "M" entirely out of the slots in the adjusting nut "N," loosen the cap screws holding the cap "O" and turn the adjusting nut "N" as far as possible without making the adjustment of the bearings too tight. (See under "Caution in Adjusting Timken Bearings," page 77.) After the adjustment has been made, make sure that the key "M" is replaced in one of the slots in adjusting nut "N" and that the cap screws holding the cap "O" are tightened and locked.

### *Adjustment of Gears for Proper Meshing*

If, after adjusting the bearings "E" and "F," Fig. 15, it is found necessary to move the pinion "C" endwise or the bevel gear "A" sidewise in order to bring the gears into proper mesh, it must first be deter, mined whether it is necessary to move the pinion, the large bevel gear or both, and in which direction the gear or gears must be moved.

Bevel gears should be so adjusted that the large ends of the teeth of the gear are practically flush with the large ends of the teeth of the other gear, which can be determined by removing the peep-hole cover "V". Extreme care must be used in adjusting

the most accurately cut gears may be easily ruined by running them when not properly meshed.

In order to adjust the gears to the best advantage a crank should be attached to the forward end of the pinion shaft "D" so that the gears can be turned by hand and the adjustment tried until positions are found for the gears where they run smoothly and do not bind at any point.

If the bearings "E" and "P" on the drive shaft "D" are in proper adjustment, and if it is found necessary to move the pinion "C" endwise, proceed as follows:

Loosen the clamping bolts on the axle housing and the cover plate covering the adjustment hole. (See Note.) Move the adjusting nuts "I" and "K" *together*, moving the pinion in either direction as required. If the adjusting nuts "I" and "K" are moved in the same direction and exactly together, the relative adjustment of the bearings "P" and "E" will not be altered.

NOTE—The cover plate is at the top of the pinion barrel on some of the Type 57 axles. If the cover plate is at the top it is necessary to entirely remove the two long clamping bolts before the cover can be removed.

When the proper position for the pinion has been found, replace the cover plate over the opening and tighten the clamping bolts.

If it is found necessary to move the large bevel gear sidewise, proceed as follows:

First loosen the bolts holding caps "O" and "R." Then move the keys "M" and "S" out of the slots in the adjusting nuts "N" and "T." The adjusting nuts "N" and "T" can now be turned, moving the gear mount with the gear in either direction as required. Be careful not to adjust the bearings too tight. (See under "Caution in Adjusting Timken Bearings," page 77.)

After the correct position for the large driving gear has been found be sure that the keys "M" and "S" are replaced in the slots in the adjusting nuts "N" and "T" and that the bolts holding the caps "O" and "R" are tightened and locked.

Replace the cover "L," and fill with Cadillac Rear Axle and Transmission Lubricant, bringing the level up to the top of the filling hole "U."



## BRAKES

### FOOT BRAKES
(External Contracting)

***Ordinary Adjustment***

Provision is made in each brake for its adjustment. Do not attempt to adjust the brakes by the pull rods. The brakes cannot be properly adjusted in this manner. To adjust each foot brake, proceed as follows:

Remove the cotter pin in the adjusting screw "A," Fig. 16, and turn the screw "A" until that part of the brake band lining opposite the screw just clears the drum. Adjust the two nuts "B" on the yoke bolt so that the lower part of the brake band lining just clears the drum.

Then adjust the nut "C" on the upper end of the yoke bolt so that the lever "D" is brought into the position shown in Fig. 16, when the brake is fully applied—i. e., so that the lower edge of the pin "T" and the upper edge of the pin "S" are tangent to an imaginary horizontal line shown at "X."

***Adjustment of Stop Screws***

The position of the stop screw "E," Fig. 17, is adjusted when the car is assembled and requires no further attention unless its adjustment is altered. Adjustment for wear on the lining should be made as described above by the nuts "A," "B," and "C," Fig. 16; the stop screw "E" should not be adjusted to compensate for wear. If the stop screw "E" should be moved from its original position, it may be readjusted in the following manner:

First adjust the brake as explained above so that the lever "D," Fig. 16, is in the correct position when fully applied. Then release the brake. Remove the pin "A" in the yoke "B," Fig. 17, loosen the clamping screw "C" and push the stop "G" forward out of the way. Then adjust the stop screw "E" and the nuts "B," Fig. 16, so that the upper and lower parts of the brake band lining clear the drum by one thirty-second of an inch.

Then pull the rod "H," Fig. 17, forward until the pin in the equalizing bar is $\frac{3}{16}$ inch from the rear end of the slot in the yoke on the end of the rod "H." Holding the rod "H" in this position, push the stop "G" down against the bracket "F" and tighten the clamping screw "C." Then adjust the yoke "B" so that when the pin "A" is replaced the brake pedal arm "U" is held three-eighths of an inch away from the under side of the toe board.

After the adjustments are completed, be sure to lock all adjusting screws and nuts and to insert and spread all cotter pins.

## HAND BRAKES
(Internal Expanding)

### *Ordinary Adjustment*

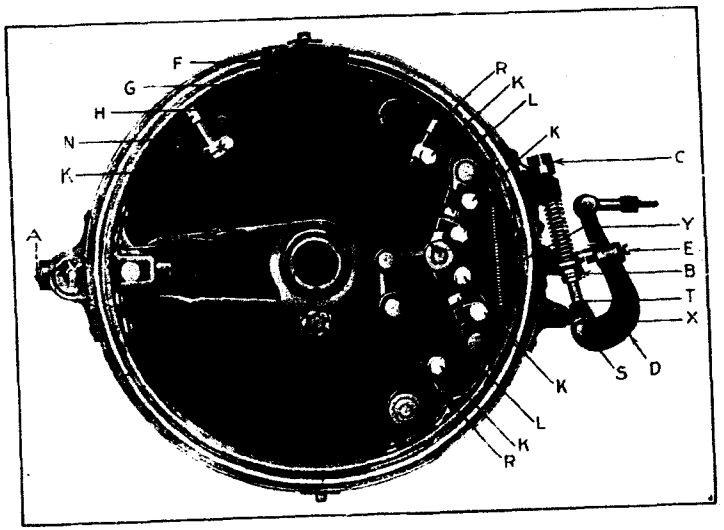
Provision is made in each brake for its adjustment. Do not attempt to adjust the brakes by the pull rods. The brakes cannot be properly adjusted in this manner. To adjust each hand brake proceed as follows:

Place a jack under the rear axle housing and raise the axle so that the wheel can be turned by hand. Remove the cover "F," Fig. 16; this may be done by loosening the lock nut "G" and turning the bolt to the left about one-quarter of a turn, which releases the clamping bar "H."

Rotate the wheel until the opening gives access to the screw "J." Turn the screw "J" until that part of the brake band lining opposite the screw just clears the drum.

Rotate the wheel and through the opening loosen the seven locking screws "K." Then turn the two adjusting screws "L," which have right-hand threads on one end and left-hand threads on the other, so that when the brake is fully applied the center of the pin "M" stands three and three-sixteenths inches to three and one-quarter inches away from the inside of the brake drum at "Y." The screws "L" should be turned equally and in the same direction.

Release the brakes and adjust the stop screws "R" so that the upper and lower parts of the brake band lining are equidistant from






the brake drum. Adjust the stop screw "N" so that the head of the screw just touches the inside of the brake band. Tighten the seven locking screws "K" and replace the cover "F."

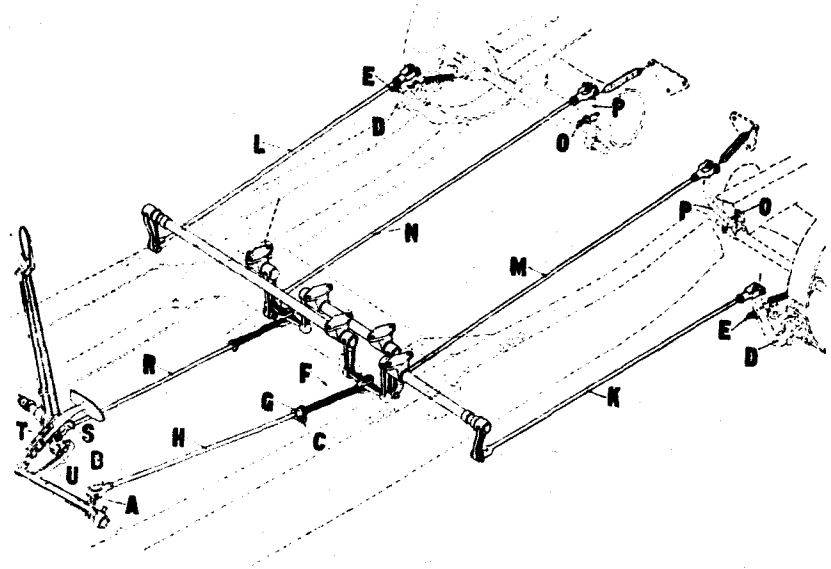
### *Adjustment of Stop Screws*

The stop screw "O," Fig. 17, is adjusted when the car is assembled. and requires no further attention unless its adjustment is altered, Adjustment for wear on the linings should be made as described above by the screws "J," "L" and "R," Fig. 16; the stop screw "O" should not be adjusted to compensate for wear. If the original adjustment of the stop screw "O" has been altered, it may be readjusted in the following manner:

First, adjust the brake as described above by the screws "J" and "L," Fig. 16, but screw the stop screws "R" and "N" away from the brake band.

Then remove the pin "T" in the yoke "S," Fig. 17, and adjust the stop screw "O" so that when the brake is released the center of the pin "M," Fig. 16, stands three and nine-sixteenths inches away from the inside of the brake drum.

Adjust the stop screws "R" so that the upper and lower parts of the brake band are equidistant from the brake drum. Adjust the stop screw "N" so that the head of the screw just touches the inside of the brake band. Tighten the seven locking screws "K" and replace the cover "F."



Then adjust the yoke "S," Fig. 17, so that when the pin "T" is replaced the upper end of the handle on the hand brake lever may be moved back one and one-quarter inches from its extreme forward position without moving the rods "M" and "N."

After the adjustments are completed, be sure to lock all adjusting screws and nuts and to insert and spread all cotter pins.

### *Relining Brake Bands*

To reline a brake band proceed as follows:

Remove the brake band. (See under "Brakes," page 149) and with a sharp cold chisel cut off the rivets which hold the lining, being careful not to spring the brake band.

Place the new lining on the band, being sure that it fits the brake band snugly, and drill holes for the rivets. If solid rivets are used it is best to countersink the holes. (A drill the size of the diameter of the rivet head may be ground to serve this purpose.) Insert the rivets and head them over, being sure that the rivet heads are pulled well into the lining to prevent the rivet heads rubbing on the brake drums.

In relining the external brake bands, it is a good plan to cut the new lining an inch longer than the band and to rivet the ends first. Then force the lining into place so that it is in snug contact with all parts of the band. Drill the remainder of the holes and complete the riveting.

After replacing the brake band, adjust the brake in accordance with directions in this book under "Brakes," page 69.

## FRONT AXLE AND STEERING GEAR

### FRONT AXLE

### *Spindle Arm Stop Screws*

The stop screws "H," Fig. 47, are for the purpose of limiting the angle at which the front wheels can be turned. The stop screw at the left end of the axle limits the angle to which the wheels can be turned to the right. The stop screw at the right end of the axle limits the angle at which the wheels can be turned to the left.

The stop screws are adjustable and should be so set that the wheels are permitted to turn to as great an angle as possible, yet preventing the tires from rubbing on the right side spring, or the steering connecting rod on the left side.

### *Adjustment of Spindle Bearing*

[illegible] into the axle forging. If



nut "B," pulling the bushing "G" up against the under side of the spindle. Then back off the adjusting nut "B" just enough to free the adjustment. (See under "Caution in Adjusting Timken Bearings," page 77.)

### STEERING GEAR

### *Adjustment of Worm Thrust Bearings*

To take up the end play in the worm "K," Fig. 18, remove the plug "B," Fig. 19, and loosen the jamb nuts "J," and lock screws "A." Then with a screw-driver or something else suitable, screw down the adjusting collar "L," Fig. 18, which can be seen through the hole from which the plug "B," Fig. 19, was removed, until the proper adjustment is made.

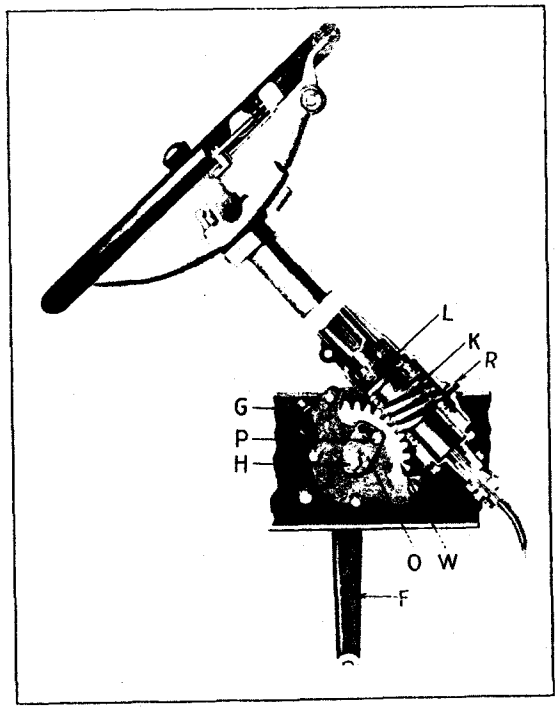



*Fig. 18—Steering Gear, Sectional View.*

Lock screws "A" are positioned in the steering gear housing so that when one is directly over a slot in the adjusting collar, the other is between two slots. Therefore, after adjusting the collar it will be necessary to select a proper screw for locking the adjustment. Both

Do not tighten against the adjusting collar, the screw which is not used for locking the adjustment.

### *Adjustment of Worm and Sector*

An adjustment is provided for taking up wear on the teeth of the worm "K" and sector "W," Fig. 18. The sector "W" has its bearing in an eccentric steel bushing. Wear can be taken up by turning this bushing so that it throws the sector towards the worm.

To do this proceed as follows: First turn the steering wheel so that the front wheels point straight ahead. Remove the locking screw "C," Fig. 19. As the bushing is assembled at the factory it is necessary to move the arm "D" down to tighten the adjustment.

If the wear on the teeth of the worm and sector is very great, it will be necessary to remove the steering arm "F" and to place the arm "D" in a different position on the hexagonal end of the eccentric bushing in order to bring the arm "D" in position so that it can be locked by the screw "C."

After the adjustment is made properly be sure that the lock screw "C" is replaced and properly tightened.

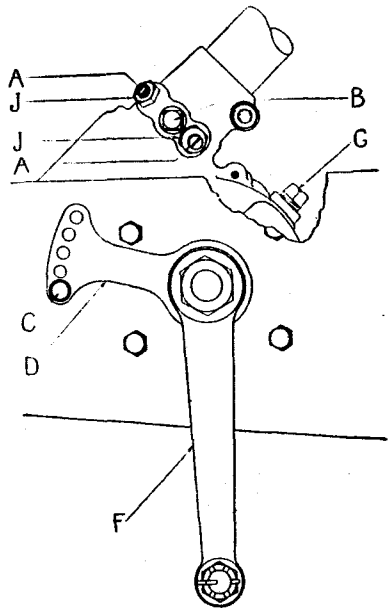


*Fig. 19—Steering Gear Housing and Arm.*

### *Adjustment of Sector Shaft*

An adjustment is provided on the inner face of the steering gear housing for taking up end-play in the sector shaft.

To make this adjustment remove the locking arm "O," Fig. 18, and turn the adjusting screw in until the proper adjustment is made, after which the locking arm "O" should be replaced and the lock screw, "P," replaced and tightened.

CAUTION—Do not turn the steering gear when the car is stand-



## WHEELS

### WHEEL BEARINGS

### *Adjusting Front Wheel Bearings*

Remove the hub cap by unscrewing it; also remove the lock nut "A," Fig. 20, and the washer "B."

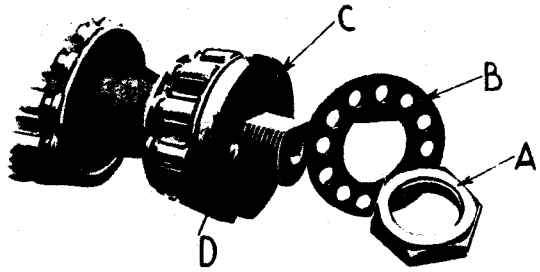


*Fig. 20—Front Wheel Bearings and Adjusting Nuts.*

Adjust the wheel bearings with the adjusting nut "C." (See under "Caution in Adjusting Timken Bearings.")

After completing the adjustment, replace the washer "B," making sure that it fits over the stud "D" properly. Screw on and tighten the lock nut "A."

The thread on the left-hand spindle is a left-hand one.

### *Adjusting Rear Wheel Bearings*

Remove the lubricator "A," Fig. 49, and unscrew the hub cap. Remove the locking ring "K" and withdraw the axle shaft. If the axle shaft sticks it may be removed by tapping a cold chisel between the inner faces of the drivers on the axle flange and the bottoms of the recesses in the hub flange. If one of the axle shafts fits particularly tight, remove the looser one in accordance with directions given here and drive out the other by passing a bar of suitable size and length through the opposite end of the axle housing.

Loosen the lock nut "D" and make the adjustment with the adjusting nut "F," being careful to lock the adjustment with the nut "D" after completing it.

In adjusting the bearings be careful not to get the adjustment too tight. (See under "Caution in adjusting Timken bearings," page 77.)

### ALIGNMENT OF FRONT WHEELS

The ideal condition is to have the front wheels parallel to each other on horizontal lines passing diametrically through their centers. Under no condition should the wheels toe out. It is permissible to have them toe in, providing they do not toe in more than three-eighths of an inch in the diameter of the wheel.

Jack up the front axle until both wheels are clear of the floor and true up the demountable rims on the wheels.

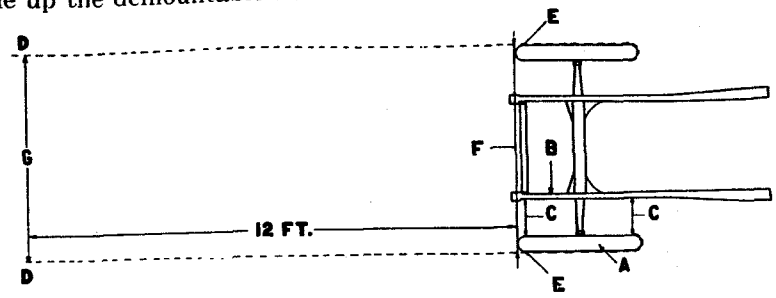



*Fig. 21—Diagram Showing Method of Aligning Front Wheels.*

Move the steering wheel to bring the left front wheel "A," Fig. 21, parallel with the frame "B." This may be determined by taking measurements "C" from the rim of the wheel to the frame.

Tie a string to a rear spoke of each front wheel directly back of the center of the wheel. Carry the strings inward between the spokes, back around the tires and then forward to points "D" as shown. Use strings that will extend exactly twelve feet in front of the tires. Bring the strings in until they *just touch* the forward edges of the tires at "E." The strings must be slightly above or below the hubs so as to clear them.

If the wheels are parallel, the distances "F" and "G" between the strings will be the same at points just ahead of the tires and at points at the ends of the strings.

Under no condition should the wheels toe in enough to allow the twelve-foot strings to converge more than one and one-half inches, that is, so that dimension "G" is not more than one and one-half inches less than dimension "F."

Adjustment is provided in the parallel rod for aligning the front wheels. If adjustment is necessary and the left front wheel is disturbed, care should be taken to have this wheel parallel with the frame before readjusting the strings and taking measurements "F" and "G."

The front wheels camber about one and one-half inches, that is, the measurement between the wheels at the top should be approximately one and one-half inches greater than the corresponding measurement diametrically opposite at the bottom of the wheels.

## STRAIGHTENING BENT PARTS

Modern automobile construction demands the use of the highest grades of alloy steels. A great advantage of alloy steels is that by properly heating and cooling and re-heating such steels great strength



and durability are obtained. However, heat treatment must be given with full and accurate knowledge of the contents of the steel, which cannot be obtained in the ordinary repair shop. Therefore, if any part is heated outside of this factory for the purpose of straightening or for other purposes, the part at once loses the advantage which the original heat treatment gave it.

## CAUTION IN ADJUSTING TIMKEN BEARINGS

When adjusting Timken Bearings, great care must be exercised not to get them tight. These bearings will revolve even when adjusted very tightly, but that condition is sure to prove disastrous. They should be adjusted so that a very slight amount of play or looseness may be discerned.

If, after a bearing has been adjusted to a point that is apparently correct, the locking device cannot be placed in position without changing the adjustment, it is far better to *loosen* the adjustment until it can be secured with the locking device than to *tighten* the bearing adjustment.

## WASHING CARS

The following directions should be followed carefully when washing a car.

Use clean water. Do not use water containing alkali. In parts of the country where the regular water supply contains alkali, rain water should be used.

Never use water colder than 40° Fahrenheit, or warmer than 60°.

If a hose is used never have pressure greater than will force the water six inches beyond the end of the hose. Water under greater pressure will drive the grit and dirt into the finish.

A soft Rock Island natural sheep's wool sponge is best for washing the body and hood.

Begin washing at the top of the body panels and thoroughly wet the surface all over with water from the sponge. Continue until the accumulation of road dirt softens and gives way. Use clean water continuously and plenty of it. Go over the surface with plenty of water two or three times until it is perfectly clean.

Do not wash the hood while it is hot. The effect is the same as washing it with hot water.

Dry off with a clean soft chamois. Do not rub the finish or use pressure more than sufficient to dry off the water. The water will evaporate quickly and leave the finish in good condition.

Do not wash the windshield or the glass of enclosed cars with preparations which contain harmful ingredients. Use only cleaning compounds which are known to have no destructive effects on highly polished glass.

## DOOR BUMPERS

The upper rubber bumper on the doors of the Touring Car and all the bumpers on the enclosed car doors are self-adjusting. The lower bumper on each Touring Car, Phaeton or Roadster door is adjustable. To make the adjustment loosen the wood screw fastening the bumper to the door frame and pull the rubber out part way. The rubber is slotted where the screw passes through to permit this.

Close the door slowly until the latch just catches. As it closes, the door will force the rubber into place and at the instant the latch catches, the rubber will be exactly in the proper position. Open the door and tighten the wood screw until the rubber is clamped firmly.

# PART III

# REMOVAL, INSPECTION AND REPLACEMENT

## ENGINE

### ROCKER ARMS AND SHAFTS

***Removal***

Remove the top cover plate. (See "Removal" under "Top Cover Plate," page 100.) Loosen the set screws holding the rocker arm shafts in place. Mark each rocker arm to be removed so it can be put back as originally assembled.

Remove the rocker arm shafts by lightly tapping them out.

***Inspection***

INSPECTION OF ROCKER ARMS AND SHAFTS—After cleaning the arms with gasoline or kerosene remove the pins which hold the rolls. This should be done with a press. Care must be exercised not to spring the arms.

The clearance between a rocker arm bushing and the shaft should not exceed .004 inch.

The clearance between a rocker arm roll and the pin upon which it rotates should not exceed .003 inch.

All bearing surfaces should be smooth.

The outer circumference of the rolls should be true within .0015 inch.

Rocker arm shafts should be a light press fit into the bronze bushings which receive them.

INSPECTION OF OTHER PARTS—Inspect the cams. They should be smooth and show practically no wear.

***Replacement***

Rocker arm pins should be well lubricated before the rolls are assembled. The rolls should rotate freely after assembly. In replacing reverse the operations under "Removal."

### CRANK PIN BEARINGS

***Removal***

Remove the oil pan and the baffle plate. (See "Removal" under "Oil Pan and Baffle Plate," page 102.)

Open the compression cocks.

Remove the cotter pins and the two nuts from the cap of the straight connecting rod.

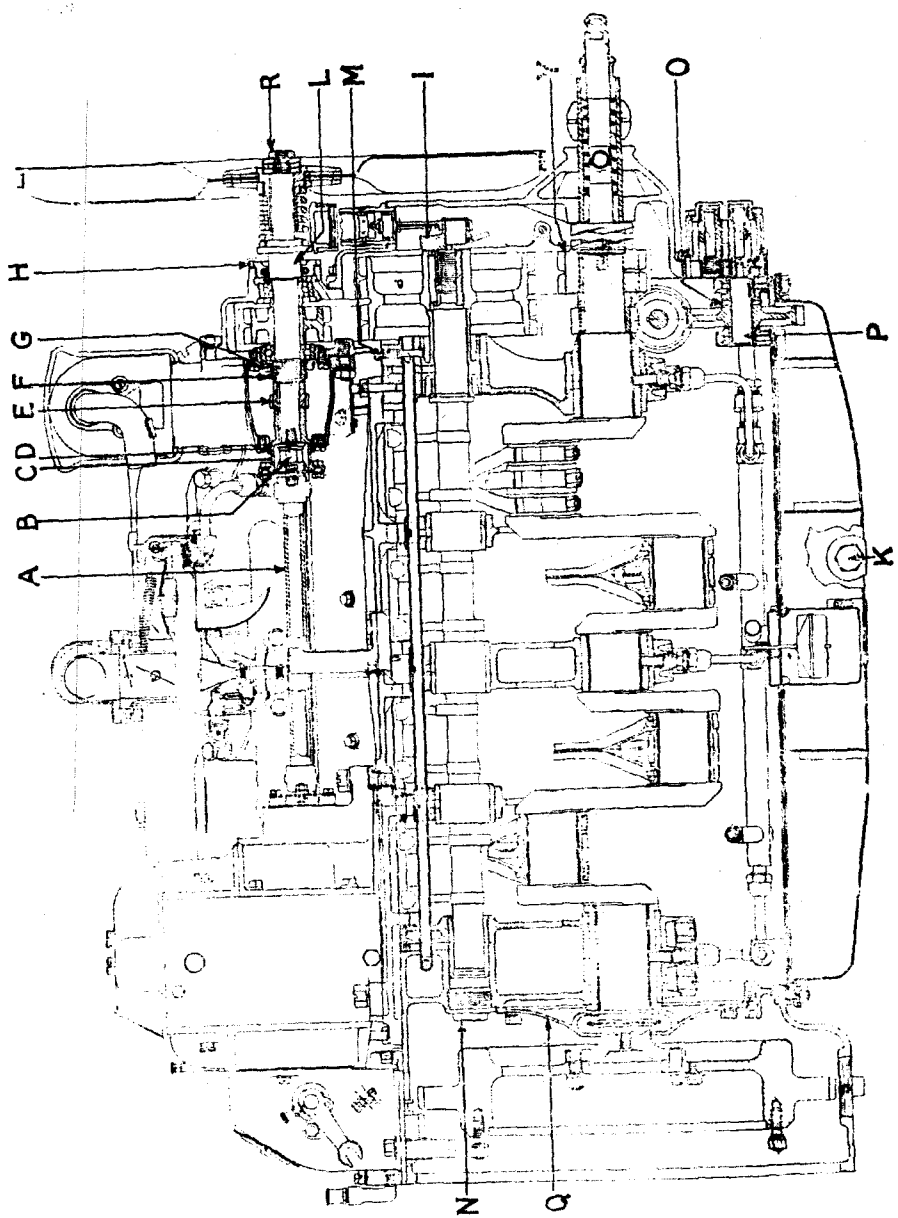



Fig. 82—Cross Section of Engine, Side View.



Remove the cap, being careful not to mix the liners.

Remove the cotter pins and the four nuts from the caps of the forked connecting rod and remove the caps.

Remove the rod with piston. Care must be exercised not to damage the piston in removing it. Do not allow the skirt of the piston to fall against the connecting rod. Do not allow the halves of the crank pin bearing to drop.

Remove the halves of the bearing.

### *Inspection*

INSPECTION OF BEARING—Clean the bearing with gasoline or kerosene and wipe it off with a cloth. In handling, be careful not to drop it or spring or mar it in any other way.

Inspect the bearing metal. If it is cracked, or cut so that it cannot be cleaned up with a scraper, without increasing the clearance between the bearing and crank pin to more than .006 inch, a new bearing should be substituted. (See under "Fitting Crank Pin Bearings," page 29.)

To insure against excessive oil consumption, smoking at the exhaust, the rapid formation of carbon in the cylinders, and noisy operation, the clearance between a crank pin bearing, when clamped in the rod, and the crank pin should not exceed .006 inch. End play in a crank pin bearing should not exceed .015 inch. There is no adjustment on crank pin bearings. Crank pin bearings .005 inch undersize are furnished by the Cadillac Motor Car Company.

Inspect the dowel pin holes in the bearing. The clearance between the pin holes and the pins should not exceed .002 inch.

Examine the oil hole in the bearing, cleaning it out if obstructed.

INSPECTION OF OTHER PARTS—Inspect the crank pin. The crank pin should be round within .003 inch and free from scores; if it is not, it should be dressed down. (See under "Dressing Down Crankshaft Bearing Surfaces," page 30). A new undersize bearing should be fitted if there is more than .006 inch clearance between the pin and bearing after the work is completed. (See under "Fitting Crank Pin Bearings," page 29.)

Examine the oil hole in the crank pin, cleaning it out if obstructed.

Inspect the pistons and piston rings in accordance with directions under "Piston and Piston Rings," page 98. If wear on a piston seems to indicate that the rod is sprung or twisted, test it for alignment. (See "Inspection of Rods" under "Connecting Rods," page 107).

Inspect the cylinder bores. Cylinder bores should be round within .002 inch and free from scores.

***Replacement***

With a cloth wipe off the halves of the bearing and well lubricate the bearing surfaces with engine oil of a suitable quality before replacing these parts.

In replacing reverse operations under "Removal."

Be sure to replace the connecting rods as originally assembled in engine. Connecting rods are numbered on the channel section (see "C," Figs. 28 and 29), indicating the cylinders in which they go. Number one forked rod and number one straight rod go into cylinders nearest the radiator; number two forked rod and number two straight rod into cylinders just back of these, etc. The numbers on the channel sections of the rods should face downward, and the numbered ends of the crank pin bearings should face to the rear.

Care should be exercised that the dowel pins in the forked rod are in the pin holes in the bearing, before tightening the cap nuts.

All nuts and bolts and both bearing caps of forked rods are numbered. One bolt and nut only and the cap of straight rods are numbered. Bolts, nuts and caps should be replaced in accordance with these numbers.

The following will serve to check the assembly of the connecting rods and crank pin bearings: The forked connecting rods should be on the left-hand side of the engine. The edges of the crank pin bearing halves where they come together should be in the horizontal plane when the pistons attached to the forked rods are on upper and lower centers. The longer piston pin bosses on the upper ends of the two center connecting rods in each cylinder block, should face toward each other. The longer piston pin bosses on the upper ends of the end connecting rods in each cylinder block should face from each other.

In adjusting the straight connecting rod follow directions under "Adjustment of Connecting Rod Bearings," page 28.

After replacing the oil pan refill it with one and one half gallons of suitable engine oil. Cadillac Motor oil is recommended.

## MAIN BEARINGS

***Removal***

Remove the oil pan and the baffle plate. (See "Removal" under "Oil Pan and Baffle Plate," page 102.)

Remove the pipe between the main bearing cap and the oil feeder pipe.

Remove the cotter pins and nuts from the main bearing cap.

Remove the bearing cap with the lower half of the bearing. If more than one bearing is to be removed at a time, it is best to first [illegible] rods to insure against springing them, should



under "Connecting Rods," page 106), also to support the crankshaft to prevent it dropping, which might injure it.

Care must be exercised not to mix the liners.

The upper half of the bearing can be removed by rotating it.

***Inspection***

INSPECTION OF BEARING—Clean the bearing with gasoline or kerosene and wipe it off with a cloth.

In handling the bearing be careful not to drop it or spring or mar it in any other way.

Carefully inspect the babbitt. If it is cracked, or cut so that it cannot be easily cleaned up with a scraper, replacement of the bearing should be made. (See under "Fitting Main Crankshaft Bearings," page 30).

The end thrust of the crankshaft is taken by the rear main bearing. The shaft should have no more than .020 inch end play.

INSPECTION OF OTHER PARTS—Inspect the main bearing surfaces of the crankshaft. If any of them are out of round more than .003 inch, or scored, the shaft should be dressed down and the bearings refitted. (See under "Dressing Down Crankshaft Bearing Surfaces," page 30.)

***Replacement***

The bearings, liners and bearing cap should be carefully wiped off and the bearing surfaces lubricated with a good grade of engine oil before replacement is made.

In replacing, reverse operations under "Removal."

The bearings are numbered on one end. The one nearest the radiator is stamped "1," the center bearing "2," and the rear bearing "3." In replacing have the numbered ends toward the radiator.

In readjusting main bearings follow directions under "Adjustment of Main Crankshaft Bearings," page 28.

After replacing the oil pan refill it with one and one-half gallons of suitable engine oil. Cadillac Motor oil is recommended.

If after starting the engine it is found that the pressure gauge does not register pressure, stop the engine at once and prime the oil pump. This may be done by disconnecting at its upper end the oil pipe from the oil pressure regulator and forcing two to three gunfuls of clean engine oil into the pipe. Connect the pipe and tighten the union before starting the engine.

## FANSHAFT AND BEARINGS

***Removal***

Remove the fan. (See "Removal" under "Fan," page 94.)

Remove the carburetor. (See "Removal" under "Carburetor," page 120.)

Remove the generator drive shaft "A." (Fig. 22.)

Remove the large cap screw "B."

Remove the coupling "C." A puller should be used for this.

Remove the distributor and timer. (See "Removal" under "Distributor and Timer," page 124.)

Remove the small spiral gear "E."

Remove the locking nut "F."

Remove the felt washer retainer "G" with washer.

Remove the large brass screw collar "H."

With a soft brass drift, no larger in diameter than the rear end of the fanshaft, carefully tap out the shaft, by tapping on the rear end of it.

Remove the rear fanshaft bearing.

### *Inspection*

Clean all parts with gasoline or kerosene.

INSPECTION OF FANSHAFT AND BEARINGS—Inspect the oil hole "L," Fig. 22, and clean out if obstructed.

The end play in the annular ball bearings should be checked up. Holding the inner race, the outer race should have no more than .015 inch end play.

The bearings should be a hand press fit on the shaft. The races of the bearings should rotate smoothly and quietly.

INSPECTION OF OTHER PARTS—The bearings should be hand press fit in the housing.

There should be no more than .005 inch clearance between the fanshaft and the bushings in the fan hub.

Inspect the fan. (See "Inspection of Fan" under "Fan," page 94.)

### *Replacement*

In replacing, reverse operations under "Removal." In replacing the fanshaft sprocket make sure that the longer side of the hub is placed next to the inner bearing.

All parts should be clean, and bearings well lubricated with a good grade of engine oil before replacement is made.

The inner races of the ball bearings are held from rotating on the fanshaft by the lock nut "F." It is important that this nut be well tightened in replacing.

It is necessary to retime the ignition after replacing the distributor housing (see under "Timing Ignition," page 44), also to put ten ounces of number two grease into the distributor housing. This may be done after removing the breather "Z," Fig. 34.



## CYLINDER BLOCKS

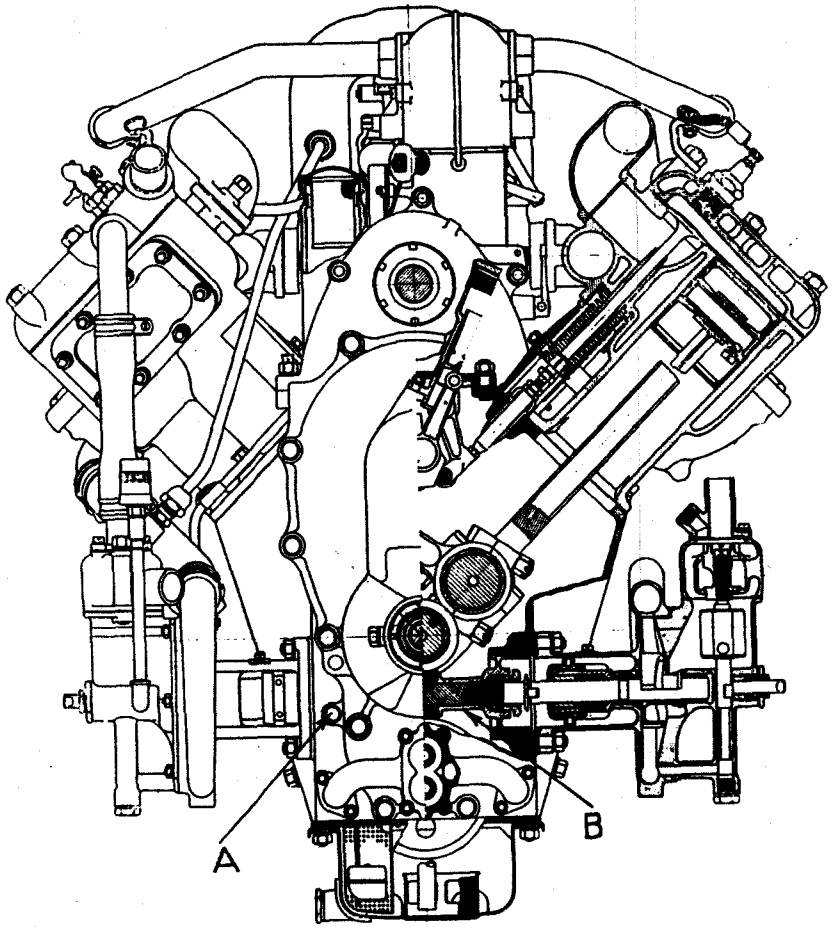
### *Removal*

Drain the Cooling System. (See under "Draining the Cooling System," page 55.)

Remove the connecting rods and pistons. (See "Removal" under "Connecting Rods," page 106.) It is possible to remove the cylinder block without first removing the connecting rods and pistons; to prevent damage to these parts, however, it is recommended that they be removed.

Remove the hose connections from the cylinder blocks.

Disconnect the high tension wires from the spark plugs, and remove the conduit brackets from the cylinder head. Remove the forward end of the conduit from the aluminum cap by removing the two screws holding the bracket on the end of the conduit to the cap. Lay the conduit with wires back out of the way.



Remove the small water pipe between the intake manifold and the cylinder block.

Remove the intake manifold. (See "Removal" under "Intake Manifold," page 97.)

Disconnect the exhaust pipe from the exhaust manifold by removing the two bolts or remove the exhaust manifold from the cylinder block, leaving it attached to the exhaust pipe.

Remove the large threaded dowel pin at each end of the cylinder block by placing a spring washer over the pin large enough to permit the pin to be pulled through it, and screwing down and tightening one of the cylinder hold down nuts. The threaded end of each dowel pin is covered by a removable brass cap.

Remove the exhaust valves from the end cylinders. (See "Removal" under "Valves and Valve Springs," page 115.) This will facilitate the removal of the end hold down nuts on the inner row.

Remove the cylinder hold down nuts.

The cylinder block can now be removed.

***Inspection***

INSPECTION OF CYLINDER BLOCK AND VALVES—Remove the large cover plate at each end of the cylinder block and wash out the water jacket. Replace the end covers, making sure that the gaskets are in good condition and clean the cylinder block with gasoline or kerosene.

Examine all cylinder bores. Cylinder bores should be free from scores and should be round within .002 inch.

There should be no more than .007 inch clearance between a cylinder bore and that part of the piston below the lower piston ring.

Inspect the valve seats, as well as the surfaces of the valves which contact with the seats. This may be done by forcing open the valves by hand. At the same time note if the valve stems work freely in their guides; if not, the valves should be removed and the stems and guides cleaned and lubricated.

Determine the clearance between the valve stems and the bushings in the cylinder blocks. This should not exceed .004 inch.

If a valve or seat is pitted or if it appears that the valve has been leaking, the valve should be reground. (See under "Grinding Valves," page 33.)

INSPECTION OF OTHER PARTS—Inspect the pistons and piston rings. (See "Inspection of Piston and Rings" under "Piston and Piston Rings," page 98.) If the wear on a piston seems to indicate that the rod is sprung or twisted, test the rod for alignment. (See "Inspection of Rods" under "Connecting Rods," page 107.)

Inspect the crank pin bearings. (See "Inspection of Bearings" under "Crank Pin Bearings," page 81.)



Inspect the crank pins. Crank pins should be round within .003 inch and free from scores; if not they should be dressed down. (See under "Dressing Down Crankshaft Bearing Surfaces," page 30.) A new undersize bearing should be fitted if there is more than .006 inch between a pin and bearing after the work is completed. (See under "Fitting Crank Pin Bearings," page 29.)

***Replacement***

Make sure that the cylinders and the pistons are free from carbon. Carbon can be removed with a soft iron scraper.

In replacing, reverse operations under "Removal."

Be careful to replace the connecting rods as originally assembled into the engine. Connecting rods are numbered on the channel section (see "C," Figs. 28 and 29), indicating the cylinders into which they go. Number one forked rod and number one straight rod go into cylinders nearest the radiator; number two forked rod and number two straight rod go into cylinders just back of these, etc. The numbers on the channel sections of the rods should face downward and the numbered ends of the rod bearings should face to the rear.

Care should be exercised that the dowel pins in the forked rods are in the pin holes in the bearings before tightening the cap nuts.

All nuts and bolts and both bearing caps of forked rods are numbered. One bolt and nut only and the cap of straight rods are numbered. Bolts, nuts and caps should be replaced in accordance with these numbers.

The following will serve to check the assembly of the connecting rods and crank pin bearings: The forked connecting rods should be on the left-hand side of the engine. The edges of the crank pin bearing halves where they come together should be in the horizontal plane when the pistons attached to the forked rods are on upper and lower centers. The longer piston pin bosses on the upper ends of the two center connecting rods in each cylinder block should face toward each other. The longer piston pin bosses on the upper ends of the end connecting rods in each cylinder block should face from each other.

In adjusting the straight connecting rod follow directions under "Adjustment of Connecting Rod Bearings," page 28.

After replacing the oil pan refill with one and one-half gallons of engine oil of a suitable quality. Cadillac Motor oil is recommended.

If a new cylinder block is installed it will be necessary to ream the dowel pin holes. With the block in place use a Number 8 standard taper reamer, being careful to catch all chips from the under side. Ream only enough to clean up the holes.

## CRANKCASE

### *Removal*

Remove and disassemble the engine. (See "Removal" and "Disassembly" under "Engine," pages 90 and 92.)

### *Inspection*

With gasoline or kerosene clean all parts.

INSPECTION OF CRANKCASE—Examine the casting carefully and inspect all machined surfaces.

Examine the bushings for the camshaft. There should be no more than .005 inch clearance between the bushings and the shaft. The bushings should be free from scores. If it is necessary to replace one of the three center bushings tap it out carefully and carefully tap in the new bushing. If it is necessary to replace the rear bushing it will be necessary to first remove the cap "N," Fig. 22. The bushing may then be tapped out from the rear. Be sure in replacing a bushing that the oil hole is in line with the oil hole in the crankcase.

Make certain that all crankcase studs are tight in the aluminum and that they are screwed in as far as they should go.

INSPECTION OF OTHER PARTS—Inspect all parts in accordance with directions in this book.

### *Replacement*

After inspecting all parts, reassemble and replace the engine. (See "Reassembly and Replacement" under "Engine," page 94.)

## CAMSHAFT DRIVING CHAIN

### *Looseness of Chains*

The looseness in the two engine chains may be determined by marking the rim of the fan, marking the radiator, and then oscillating the fan as far as possible without moving it on the fanshaft. If it is possible to oscillate the fan two inches or more at the rim, the chains should be inspected. (See below under "Inspection of Chain.")

### *Removal*

Remove the front cover plate. (See "Removal" under "Front Cover Plate," page 99.)

Determine the amount of looseness in the chain to be removed. (See under "Inspection of Chain," page 89.)

Cut off the riveted head of one of the seat pins and remove the seat and the rocker pins. (See Fig. 3). In cutting off the seat pin use a thin chisel with a long point and hold a heavy piece of brass under the end of the pin to prevent the chisel from slipping and damaging the chain.

The chain can now be removed.



### *Inspection*

INSPECTION OF CHAIN—With the chain in place on the sprockets and the front cover plate removed, determine the amount it is possible to move the camshaft sprocket without moving the crankshaft. If there is looseness enough in the chain to permit a movement of three-sixteenths inch or more on the periphery of the camshaft sprocket it is recommended that a new chain be installed.

INSPECTION OF OTHER PARTS—Determine the clearance between the crankshaft and its bearings. If this exceeds .002 inch, readjustment of the bearings should be made. (See under "Adjustment of Main Crankshaft Bearings," page 28.)

Inspect the teeth of the crankshaft and camshaft sprockets. They should show very little wear.

Inspect the fanshaft driving chain. (See "Inspection of Chain" under "Fanshaft Driving Chain," page 90.)

### *Replacement*

If the fanshaft chain has been removed replace it before replacing the camshaft chain. (See "Replacement" under "Fanshaft Driving Chain," page 90.)

In replacing the camshaft chain care must be exercised that the chain is so placed on the sprockets that the valve timing is correct.

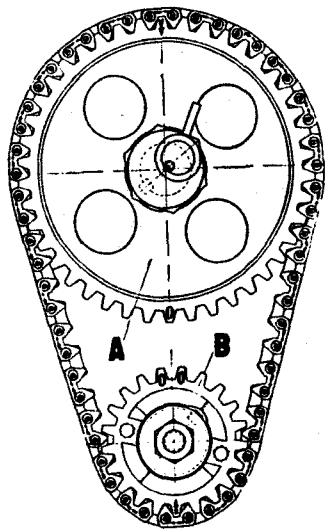



*Fig. 24—Cam Shaft Driving Sprockets and Chain.*

One tooth of the camshaft sprocket "A," Fig. 24, is marked with an arrow and the tooth diametrically opposite with an "O." One tooth on the crankshaft sprocket "B" has a similar arrow stamped on it and each of the two teeth opposite is stamped with an "O" mark.

Turn the camshaft and crankshaft to bring the sprockets into the positions shown in Fig. 24. The arrows on the two sprockets must point toward each other and the tooth marked "O" of the camshaft sprocket must be directly opposite the space between the two similarly marked teeth on the crankshaft sprocket. Without turning either of the sprockets, replace the chain, with the arrows which are stamped on the outside links pointing in the direction in which the chain is to run. Bring the ends of the chain together, preferably on the camshaft sprocket, insert the pins and rivet. (See under "Riveting Chains," page 33.)

## FANSHAFT DRIVING CHAIN

### *Looseness of Chains*

The looseness in the two engine chains may be determined by marking the rim of the fan, marking radiator, and then oscillating the fan as far as possible without moving it on the fanshaft. If it is possible to oscillate the fan two inches or more at the rim the chains should be inspected. (See under "Inspection of Chain," pages 89 and 90.)

### *Removal*

Remove the camshaft driving chain. (See "Removal" under "Camshaft Driving Chain," page 88.)

Determine the amount of looseness in the chain to be removed. (See below, under "Inspection of Chain.")

Cut off the riveted head of one of the seat pins and remove the seat and rocker pins. (See Fig. 3.)

The chain can now be removed.

### *Inspection*

INSPECTION OF CHAIN—With the chain in place on the sprockets and the front cover removed, determine the amount of looseness in it. This may be done in the following manner: Screw on and tighten the fanshaft nut "R," Fig. 22. Place a tight fitting nine-inch wrench on the nut. Determine the length of the arc through which it is possible to pass the end of the wrench without moving the camshaft sprocket. If the arc is one inch long or more it is recommended that a new chain be installed.

INSPECTION OF OTHER PARTS—Inspect the camshaft and fanshaft sprockets. The teeth of these sprockets should show very little wear.

Inspect the camshaft chain and sprockets. (See "Inspection of Chain" under "Camshaft Driving Chain," page 89.)

### *Replacement*

Place the chain on the fanshaft and camshaft sprockets, with the arrows which are stamped on outside links pointing in the direction in which the chain is to run. Bring the ends of the chain together on the camshaft sprocket. Insert the pins and rivet. (See under "Riveting Chains," page 33.)

In replacing the camshaft driving chain, see "Replacement" under "Camshaft Driving Chain," page 89.

After both chains are installed, retime the ignition in accordance with directions under "Timing Ignition," page 44.

## ENGINE

### *Removal*

Remove the hood.



Remove the rod connecting the arm on the steering gear to the arm on the cross shaft at the rear of the radiator.

Remove the two hood shelves.

Remove the radiator splash shield.

Remove the splash shield under the engine.

Remove the radiator. (See "Removal" under "Radiator," page 127.)

Disconnect one of the cables from the storage battery and place a block of wood under it to prevent it touching the terminal on the battery.

Remove the top cover plate from the generator.

Remove the large cable at the generator, also the five smaller wires.

Remove the floor boards.

Remove the pipe connecting the radiator and the radiator condensor.

Remove the transmission. (If the body is off, do not remove transmission from engine.) (See "Removal" under "Transmission," page 145.)

Remove, from the ignition coil, the high tension wire and the low tension wire which pass to the engine through the conduit.

Remove the conduit bracket from the dash and pull the two wires through the dash.

Remove the rod running through the dash to the carburetor.

Remove the two rods running from the steering gear to the engine.

Remove the speedometer cable.

Shut the gasoline valve at the tank and remove, from the body of the car, the pipe which leads from the strainer under the front floor, also remove the pipe which leads from the pressure relief valve under the front floor.

Remove the air pipe between the pressure relief valve and the power compressor at the front end of the engine, also the pipe between the settling chamber and the carburetor.

Disconnect the pipe from the oil pressure regulator.

Disconnect the steering gear bracket from the instrument board.

Remove the rear fenders. (See "Removal of Rear Fender" under "Fenders," page 172.)

Loosen the nuts on the two rear body bolts and remove the nuts from the remainder of the body bolts. Tap up the bolts from which the nuts are removed.

Jack up the front end of the body about eight inches and block it up so that it will not drop.

Disconnect the exhaust pipes from the exhaust manifolds.

Remove the cap screws which hold the cap of the front engine support.

Remove the cotter pins and nuts from the two large bolts which hold the rear engine supports to the frame.

Remove the two large bolts. To facilitate removal, jack up the rear of the engine just enough to relieve the bolts of the weight of the engine.

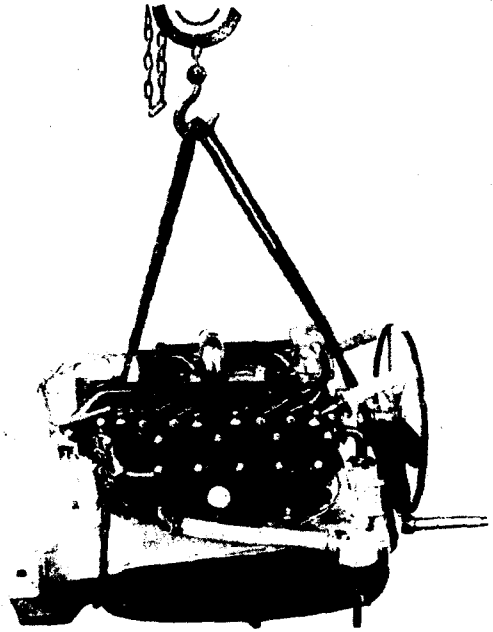


*Fig. 25—Location of Rope in Lifting Engine from Frame.*

With a suitable chain fall attached to a stout rope placed around the engine as shown in Fig. 25 lift out the engine carefully.

***Disassembly***

Remove the engine. (See "Removal.")

Wash off the engine and transmission with gasoline or kerosene.

Remove the transmission if not removed before removing engine. (See "Removal" under "Transmission," page 145.)

Remove the intake manifold with carburetor.

Remove the motor generator. (See "Removal of Motor Generator" under "Motor Generator," page 121.)

Remove the starter gear housing. The housing may be lifted off after removing the six cap screws and the two dowel pins and disconnecting the control rods.

Remove the water pumps. (See "Removal of Pump" under "Water Pumps," page 104.)



Remove the drive shaft for the water pumps. (See "Removal" under "Drive Shaft for Water Pumps," page 114.)

Remove the drain plug from the oil pan and drain out the oil.

Remove the oil pan and the baffle plate. (See "Removal" under "Oil Pan and Baffle Plate," page 102.)

Remove the spiral gear and the shaft which drives the oil pump. (See "Removal" under "Spiral Gear for Oil Pump Drive," page 94.)

Remove the fan. (See "Removal" under "Fan," page 94).

Remove the front cover plate. (See "Removal" under "Front Cover Plate," page 99.)

Remove the camshaft driving chain. (See "Removal" under "Camshaft Driving Chain," page 88.)

Remove the four cylinder head nuts which hold the brackets of the high tension conduits. Remove the distributor head and the low tension wire and remove the conduits with brackets, wires and head.

Remove the distributor rotor. This may be done by lifting it straight up. If the rotor sticks on the shaft force it off with two small screw drivers. The rotor is recessed on the under side at two points to receive screw drivers in removing. Lift both sides evenly and carefully.

Loosen the cap screw on the left rear corner of the fanshaft housing and remove the remaining three cap screws. Remove the two threaded dowel pins which position the fanshaft housing on the crankcase. These may be removed by placing over them spring washers large enough to permit the pins to be pulled through them and screwing on and tightening $\frac{5}{16}$ inch x 18 nuts.

Remove the nut "I" Fig. 22 (left-hand thread) and with a puller remove the camshaft sprocket, at the same time sliding forward the fanshaft housing with distributor housing attached.

Remove the connecting rods and pistons. (See "Removal" under "Connecting Rods," page 106.)

Remove the cylinder blocks. (See "Removal" under "Cylinder Blocks," page 85).

Remove the oil pressure regulator.

Remove the top cover plate. (See "Removal" under "Top Cover Plate," page 100.)

Remove the locking screw "M," Fig. 22.

Remove the camshaft and the forward camshaft bearing by pulling the shaft straight forward. If the bearing is tight in the crankcase it may be necessary to tap the shaft lightly.

Remove the flywheel. (See "Removal" under "Flywheel," page 116.)

Remove the crankshaft. (See "Removal" under "Crankshaft," page 111.)

Remove the oil manifolds from the crankcase.

***Inspection***

Inspect all parts in accordance with directions in this book.

***Reassembly and Replacement***

In reassembling and replacing the engine, reverse operations under "Disassembly" and under "Removal."

After tightening the nuts on the large bolts which hold the rear end of the engine to the frame, loosen them one notch and replace the cotter pins.

## FAN

***Removal***

Remove the radiator. (See "Removal" under "Radiator," page 127.)

Remove the nut "R," Fig. 22. (Left-hand thread.)

The fan with hub can now be removed by pulling it straight forward.

***Inspection***

INSPECTION OF FAN—After cleaning the fan inspect the surfaces against which the friction discs press, also the rivets at the rim of the fan and at the center.

After the fan is put back and the engine is started, note if the fan runs true. If it does not it should be trued up.

INSPECTION OF OTHER PARTS—There should be no more than .005 inch clearance between the fanshaft and the bushings in the fan hub. The oil hole "L" in the fanshaft, Fig. 22, should be cleaned if necessary.

***Replacement***

In replacing the fan reverse the operations under "Removal."

## SPIRAL GEAR FOR OIL PUMP DRIVE

***Removal***

Remove the oil pan and the baffle plate. (See "Removal" under "Oil Pan and Baffle Plate," page 102.)

Remove the front cover. (See "Removal" under "Front Cover," page 99.)

Determine the amount of clearance between the teeth of the gear to be removed and those of the gear with which it meshes. (See under "Inspection.")

Remove the taper pin "O," Fig. 22.

Remove the shaft "P." To do so tap it forward carefully.

***Inspection***

With kerosene or gasoline clean all parts.

There should be no more than .018 inch clearance between the [illegible] of the gear with which it



meshes. The bearing surfaces of the drive shaft, and those of the bushings in which it rotates should be free from scores. There should be no more than .004 inch between the shaft and bushings. If necessary to replace either bushing drive it out carefully. Unless very great care is exercised in removing and replacing, there is a possibility of cracking the aluminum.

Examine the oil holes to each bushing. Clean out if obstructed.

Examine the faces of the thrust washer. They should be free from scores.

The gear should have no more than .008 inch end play.

The driving tongue at the forward end of the shaft should be no more than .004 inch narrower than the groove in the oil pump gear with which it meshes.

***Replacement***

In replacing, reverse operations under "Removal."

After replacing oil pan, refill with one and one half gallons of engine oil of a suitable quality. Cadillac Motor oil is recommended.

If, after starting the engine, it is found that the pressure gauge does not register pressure, stop the engine at once and prime the oil pump. This may be done by disconnecting, at its upper end, the oil pipe from the oil pressure regulator and forcing two to three gunfuls of clean engine oil into the pipe. Connect the pipe and tighten the union before starting the engine.

## CYLINDER HEADS

***Removal***

Drain the cooling system. (See under "Draining the Cooling System," page 55.)

Remove the hose connections from the cylinder head.

Disconnect the high tension wires from the spark plugs and remove the conduit brackets from the cylinder head. Remove the forward end of the conduit from the aluminum cap by removing the two screws holding the bracket at the end of the conduit to the cap. Lay the conduit with wires back out of the way.

Remove the spark plugs. Remove the twenty nuts by which the cylinder head is held to the block.

Remove the cylinder head and the gasket.

***Inspection***

INSPECTION OF HEAD AND GASKET—Inspect the machined surfaces of the cylinder head. Inspect the gasket. Do not use the gasket again unless you are sure it is in condition for further use. Ordinarily a gasket may be used several times unless it is injured in removing.

INSPECTION OF OTHER PARTS—Inspect the cylinder bores. Cylinder bores should be free from scores.

Examine the machined face of the cylinder which presses against the gasket.

***Replacement***

With a soft iron scraper remove all carbon from the cylinder head, cylinder and piston heads.

After replacing the head, screw on the twenty hold-down nuts by hand. Then begin with the center nut in the middle row, work towards the ends, tightening the nuts lightly with a wrench. Then do the same with the nuts on the inner row, and finally with those on the outer row. After all nuts are tightened lightly, go over them again, tightening them firmly.

In refilling the cooling system follow directions under "Filling Cooling System," page 55.)

## FANSHAFT HOUSING

***Removal***

Remove the fan. (See "Removal" under "Fan," page 94.)

Remove the distributor and timer. (See "Removal" under "Distributor and Timer," page 124.)

Remove the fanshaft. (See "Removal" under "Fanshaft and Bearings," page 83.)

Remove the two dowel pins which locate the fanshaft housing on the crankcase. To remove the dowel pins place spring washers over the pins large enough to permit the pins to be pulled through them, and screw on and tighten $\frac{5}{16}$ inch x 18 nuts.

Remove the four cap screws by which the fanshaft housing is held to the crankcase and the two cap screws by which the housing is held to the front cover plate.

The housing can now be removed.

***Inspection***

Clean all parts with gasoline or kerosene.

INSPECTION OF FANSHAFT HOUSING—Examine the machined surfaces of the housing. Also examine the casting.

The annular ball bearings should be a hand press fit in the housing.

INSPECTION OF OTHER PARTS—Inspect the fanshaft and fanshaft bearings. (See "Inspection of Fanshaft and Bearings," under "Fanshaft and Bearings," page 84.)

***Replacement***

In replacing, reverse operations under "Removal."

After replacing the distributor and timer, retime the ignition and place ten ounces of number two cup grease in the housing. The [illegible] be put in after removing the breather "Z," Fig. 34.



## INTAKE MANIFOLD

***Removal***

Drain the cooling system. (See under "Draining the Cooling System," page 55.)

Unscrew the four unions connecting the small copper tubes to the front face of the manifold.

Remove the two cap screws holding the carburetor to the manifold.

Remove the two cap screws holding each intake manifold flange to a cylinder block.

The intake manifold can now be removed.

***Inspection***

INSPECTION OF INTAKE MANIFOLD—After cleaning the manifold inspect the finished surfaces against which the carburetor and cylinder blocks are bolted. The surfaces must be in good condition and perfectly flat to prevent air leaks at these points.

Inspect the water jacket of the manifold for leaks. This may be done by filling the manifold with water, then temporarily plugging three of the union nipples and applying water under approximately forty pounds pressure through the remaining nipple.

INSPECTION OF OTHER PARTS—Inspect the surface of the carburetor and the surface of the cylinder blocks which bolt against the manifold. These surfaces must be in good condition and perfectly flat.

***Replacement***

In replacing the intake manifold, reverse the operations under "Removal." Make sure that all gaskets are in good condition, also that the cap screws holding the manifold to the cylinder blocks and the carburetor to the manifold are drawn down together and well tightened to prevent air leaks.

## PISTON PINS

***Removal***

Remove the piston and connecting rod. (See "Removal" under "Connecting Rods," page 106.)

The piston pin can be removed by pressing it out by hand after the small set screw in the piston pin support is removed.

***Inspection***

Thoroughly clean all parts with gasoline or kerosene and wipe them off with a cloth.

There should be no more than .003 inch clearance between the piston pin and the bushing and no more than .0015 inch clearance between the piston pin and the piston.

### *Replacement*

To facilitate replacement of the screw which locks the piston pin, place the piston on the rod so that the piston pin support, with the screw, is on the side of the rod with the longer piston pin boss.

## PISTON AND PISTON RINGS

### *Removal*

Remove the connecting rods with pistons from the engine and the pistons from the connecting rods. (See "Removal" under "Connecting Rods," page 106.)

With hack saw blades as shown in Fig. 26, remove the piston rings. The teeth should be ground from the saw blades to prevent injury to the piston and rings. Care must be used in removing the rings not to strain them.

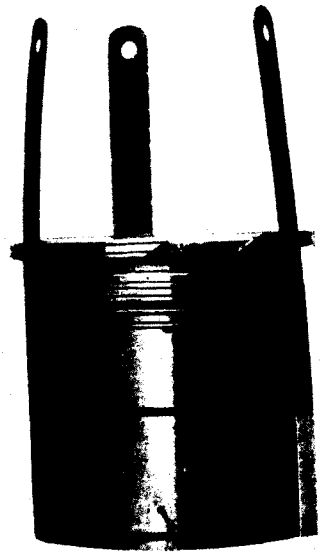


*Fig. 26—Removing Piston Rings.*

### *Inspection*

Clean all parts with gasoline or kerosene

INSPECTION OF PISTON AND RINGS—Pistons should be free from scores and round within .002 inch. The difference in width between the piston rings and the grooves should not exceed .003 inch.

Piston pins should have no more than .0015 inch clearance in the piston.

There should be no more than .007 inch clearance between the cylinder and the skirt of the piston and no more than .020 inch clearance between the ends of the rings when the piston is in place in the cylinder.

INSPECTION OF OTHER PARTS—If wear on a piston seems to indicate that the connecting rod is sprung or twisted, test the rod for alignment. (See "Inspection of Rods" under "Connecting Rods," page 107.)

Inspect the piston pin. (See "Inspection" under "Piston Pins," page 97.)

Inspect the piston pin bushings. (See "Inspection of Rods" under "Connecting Rods," page 107.)

Inspect the crank pin bearing. (See "Inspection of Bearing" under "Crank Pin Bearings," page 81.)

Inspect the crank pin. The crank pin should be round within .003 inch and free from scores; if it is not, it should be dressed down. (See under "Dressing Down Crankshaft Bearing Surfaces," page 30.)



A new standard or undersize bearing should be fitted if there is more than .006 inch clearance between the pin and the bearing after the work is completed. (See under "Fitting Crank Pin Bearings," page 29.)

Inspect the cylinder bores. Cylinder bores should be round within .002 inch and free from scores.

### *Replacement*

With a scraper clean the carbon from the piston head, rings and ring grooves.

Clean all parts carefully and lubricate all bearing surfaces with engine oil of suitable quality.

Be careful to replace the connecting rod as originally assembled into the engine. Connecting rods are numbered on the channel section (see "C," Figs. 28 and 29), indicating the cylinders into which they go. Number one forked rod and number one straight rod go into cylinders nearest the radiator. Number two forked rod and number two straight rod in cylinders just back of these, etc. The numbers on the channel sections of the rods should face downward, and the numbered ends of the crank pin bearings should face to the rear.

All nuts and bolts and both caps of forked rods are numbered. One bolt and nut only and the cap of the straight connecting rod are numbered. Bolts, nuts and caps should be replaced in accordance with these numbers.

Care should be exercised that the dowel pins in the forked rods are in the pin holes in the bearing before tightening the cap nuts.

The following will serve to check the assembly of the connecting rods and crank pin bearings. The forked connecting rods should be on the left-hand side of the engine. The edges of the crank pin bearing halves where they come together should be in the horizontal plane when the pistons attached to the forked rods are on upper and lower centers. The longer piston pin bosses on the upper ends of the two center connecting rods in each cylinder block should face toward each other. The longer piston pin bosses on the upper ends of the end connecting rods in each cylinder block should face from each other.

In adjusting the straight connecting rod follow directions under "Adjustment of Connecting Rod Bearings," page 28.

After replacing the oil pan refill it with one and one-half gallons of engine oil of a suitable quality. Cadillac Motor Oil is recommended.

## FRONT COVER PLATE

### *Removal*

Remove the radiator. (See "Removal" under "Radiator," page 127.)

Remove the hood shelves, also the splash pan at the front of the radiator.

Remove the splash pan under the engine.

Remove the fan. (See "Removal" under "Fan," page 94.)

Remove the air compressor cylinder and piston from the front cover plate. To remove the cylinder, first disconnect the air pipe, then remove the two small hold-down nuts. To remove the piston, crank the engine over by hand until the piston is at the top of its stroke, then move it forward.

Remove the cap of the front engine support.

Remove the two small nuts which hold each oil pump elbow flange to the crankcase.

Disconnect the exhaust pipes from the exhaust manifolds.

Jack up the front end of the engine about four inches.

Remove the two dowel pins which position the cover plate on the crankcase. These pins may be removed by placing over them spring washers large enough to permit the pins to be pulled through, then screwing on and tightening $\frac{3}{8}$ inch x 16 nuts.

Mark the twelve cap screws holding the cover plate in place and remove the screws.

Remove the cover plate.

***Inspection***

Clean the cover plate with kerosene or gasoline.

Carefully inspect all machined surfaces, also the gasket between the plate and crankcase.

Make sure that the starting shaft works freely in its bearings.

***Replacement***

In replacing, reverse operations under "Removal."

Be certain that the twelve cap screws which hold the cover plate to the crankcase are replaced as originally assembled.

## TOP COVER PLATE

***Removal***

Remove the intake manifold with carburetor. (See "Removal" under "Intake Manifold," page 97, and under "Carburetor," page 129.) It is unnecessary, however, to remove the carburetor from the manifold, or to drop the drain pocket located under the carburetor.

Remove the motor generator. (See "Removal of Motor Generator" under "Motor Generator," page 121.)

Remove the distributor and timer. (See "Removal" under "Distributor and Timer," page 124.)

Remove the oil level dial. This may be done after the two small cap screws holding it to the cover plate are removed.

Drain the oil pan by removing the drain plug "K," Fig. 22. It is not absolutely necessary to drain the oil pan, but doing so allows the



float and float tube to drop, reducing the amount exposed above the cover plate. This is desirable as there is less likelihood of damaging the tube.

Remove the small red ball at the top end of the indicator tube. This may be done by tapping lightly upon the under side of the ball.

Remove the unions connecting the drain pipes to the drain pocket under the carburetor, and push the pipes to one side out of the way.

Remove the drain pocket.

Remove the nuts holding the cover plate to the crankcase, also the threaded dowel pin at each end of the cover plate. To remove a threaded dowel pin, place over it a spring washer large enough to permit the pin to be pulled through it, then screw on and tighten a $\frac{5}{16}$ inch x 18 nut.

Remove the cylinder heads. (See "Removal" under "Cylinder Heads," page 95.)

Raise all sixteen valves and hold them in the raised position. This may be done with two valve-lifters of the type (Tool Number 69283) furnished by the Cadillac Motor Car Company. If these tools are not at hand remove all sixteen valves. (See "Removal" under "Valves and Valve Springs," page 115.)

Remove the clamps holding the cam slide bushings in place and raise the cam slides and bushings.

The top cover plate can be removed by lifting it straight up and at the same time cranking the engine over very slowly. Both ends of the cover plate must be lifted evenly.

***Inspection***

Clean all parts with gasoline or kerosene

INSPECTION OF TOP COVER PLATE—Inspect the cover plate.

Test with a straight edge the machined surfaces which bolt against the crankcase.

The bronze bushings in which the rocker arm shafts are held should be tight in the aluminum.

INSPECTION OF OTHER PARTS—Inspect the rocker arms and rocker arm shafts. (See "Inspection of Rocker Arms and Shafts" under "Rocker Arms and Shafts," page 79.)

Inspect the cams. They should show practically no wear.

***Replacement***

Make sure that the gasket between the plate and crankcase is in good condition.

In replacing, reverse the operations under "Removal."

After replacing distributor and timer, retime the ignition (see under "Timing Ignition," page 44) and put ten ounces of number

two cup grease into the distributor housing. This may be done after removing the breather "Z," Fig. 34.

Refill the oil pan with one and one-half gallons of suitable engine oil after replacing it. Cadillac Motor Oil is recommended.

### OIL PAN AND BAFFLE PLATE

#### *Removal*

Remove the splash pan under the engine.

Drain the oil pan. This is done by removing the plug "K," Fig. 22.

Remove the twenty-seven nuts holding the oil pan to the crankcase, and remove the oil pan, being careful not to injure the cork gasket between the oil pan and the baffle plate.

Remove the oil float with the tube to which it is soldered. The small red ball at the upper end of the float tube will prevent the tube dropping down. The ball may be removed, however, by pushing the float up an inch or so and pulling it down, repeating the operation until the ball is forced off.

Remove the two nuts which hold the baffle plate to the oil suction pipe which extends down into the oil pan.

Remove the baffle plate, being careful not to injure the cork gasket between the baffle plate and crankcase.

#### *Inspection*

INSPECTION OF OIL PAN AND BAFFLE PLATE—With gasoline or kerosene clean the oil pan and baffle plate. Make a careful inspection of these parts, also of the cork gaskets. The oil pan should be free from dents. The surface which presses against the gasket must be in good condition.

The screen of the baffle plate must be free from injury.

INSPECTION OF OTHER PARTS—Make sure that the unions are tight on all of the oil pipes inside of the crankcase. To determine this try them with a wrench.

Determine if the float contains oil. If it does it may be repaired by soldering it after the oil has been drained out.

If the float tube is bent in removing, straighten it before replacing.

#### *Replacement*

In replacing, reverse operations under "Removal."

To replace the red ball on the upper end of the indicator tube, it is necessary to remove the oil indicator, which can be done by removing the two screws. The red ball is a taper fit on the oil tube and should be tapped in place lightly.

After replacing the oil pan, refill it with one and one-half gallons of suitable engine oil. Cadillac Motor Oil is recommended.



If after starting the engine it is found that the oil pressure gauge does not register pressure, stop the engine at once and prime the oil pump. This may be done by disconnecting, at its upper end, the oil pipe from the oil pressure regulator and forcing two to three gunfuls of clean engine oil into the pipe. Connect the pipe and tighten the union before starting the engine.

### OIL PUMP

#### *Removal*

Remove the splash pan under the engine.

With gasoline or kerosene wash the pump and the front end of the engine around the pump.

Remove the two small nuts on each pump flange and the four small nuts by which the body of the pump is held to the front cover plate.

Remove the pump by pulling it straight forward. The pump will come off easily if both ends are removed evenly.

#### *Inspection*

Clean all parts with kerosene or gasoline, and inspect the pump body and elbows.

There should be no more than .004 inch clearance between the teeth of the pump gears and the pump body, no more than .004 inch clearance between the bearings at each end of the pump gears and the bushings in which they operate, and no more than .006 inch end play in the pump gears when the pump is bolted in place on the front cover plate. There should be no more than .004 inch clearance between the tongue on the drive shaft for the oil pump and the slot in the lower pump gear.

#### *Replacement*

In replacing, reverse operations under "Removal," first making sure that all gaskets are in good condition, also that the surfaces which press against these gaskets are clean.

If Cadillac made gaskets are not procurable make gaskets of paper .009 inch to .011 inch in thickness. If the gaskets are too thick, too much end play in the pump gears will be permitted resulting in a less efficient pump. All three gaskets must be made of paper of equal thickness.

If after starting the engine it is found that the pressure gauge does not register pressure, stop the engine at once and prime the oil pump. This may be done by disconnecting, at its upper end, the oil pipe from the oil pressure regulator and forcing two to three gunfuls of clean engine oil into the pipe. Connect the pipe and tighten the union before starting the engine.

## WATER PUMPS

### *Removal of Pump*

Drain the cooling system. (See under "Draining the Cooling System," page 55.)

Remove the splash pan under the engine.

Disconnect at the water pump all hose connections, also the copper pipe to the intake manifold.

Remove the two nuts which hold the pump to the crankcase.

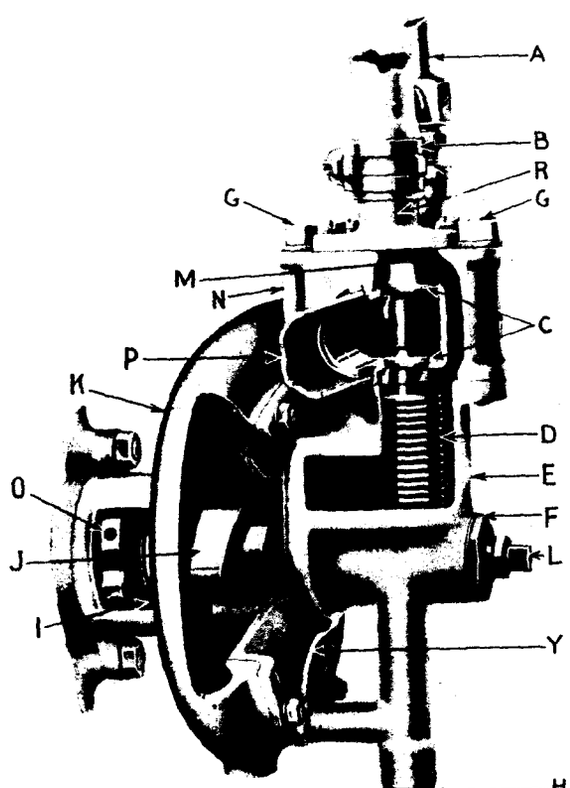
The pump can now be removed. Remove both sides evenly.

### *Removal of Thermostat*

Remove the pump. (See under "Removal of Pump," on this page.)

Remove the thermostat housing cap "R," Fig. 27.

Remove the large brass nut "F" and the shaft "L."






Remove the cap screws "G" on the thermostat housing "N," and remove the thermostat housing with valves and thermostat. Be careful not to injure the thermostat in removing.

Loosen the lock nut "M."

Remove the thermostat from the valves by unscrewing the thermostat.

### *Removal of Thermostat Valve*

Drain the cooling system. (See under "Draining the Cooling System," page 55.)

Disconnect at the water pump, hose connections "P" and "B," Fig. 27, also copper pipe "A."

Remove the thermostat housing cap "R."

Loosen the lock nut "M."

The valve may now be removed by unscrewing.

### *Removal of Pump Impeller*

Remove the pump. (See under "Removal of Pump," page 104.)

Remove the pump cover "Y." Fig. 27.

The impeller with shaft may then be removed. The pump shaft is held to the pump impeller by a taper pin. The shaft may be forced out of the impeller with a press after the pin is removed.

### *Inspection*

Test the thermostat by immersing it in water at a temperature of between forty degrees and sixty degrees Fahrenheit, then immersing it in water heated to a temperature of one hundred and eighty degrees. If the thermostat is in good condition it should expand three-sixteenths inch. Make sure that the thermostat is clean between the coils and in good condition otherwise.

Inspect the valves "C," Fig. 27, and the valve seats. Remove any rust or scale which has accummulated and regrind the valves if necessary.

The pump impeller and the bushings in which it operates, should be free from scores. The clearance between the shaft and either bushing should not exceed .006 inch. If it is necessary to remove the bushing which has the packing gland on its outer end, drive it out with a soft brass drift, after first driving out the $\frac{5}{16}$ inch x $\frac{3}{16}$ inch brass pin "I." The bushing in the pump cover may be removed by pulling it out. This bushing is not pinned.

The pump impeller should have no more than .010 inch clearance in the pump body with the pump cover in place.

Examine the packing in the gland "O." If it is necessary to repack the gland follow directions under "Water Pump Packing Glands," page 56.

***Replacement***

In replacing, reverse operations under "Removal."

If the adjustment between the valves "C," Fig. 27, and the thermostat "D" has been altered, readjust in accordance with directions under "Adjustment of Thermostat Valves," page 56.

## OIL PRESSURE REGULATOR

***Removal***

Remove the oil pipe from the regulator by unscrewing the union.

Remove the four one-fourth inch nuts and washers holding the regulator to the crank case and remove the regulator.

Unscrew the cap from the regulator and remove the spring and ball.

***Inspection***

With kerosene or gasoline clean all parts.

Examine the ball. It should be clean and free from pits.

Examine the ball seat. The seat should be free from pits. It can be removed from the housing by driving it out carefully.

Examine the one-sixteenth inch by-pass hole in the housing. (See Fig. 53.) The by-pass has an outlet in the hole through which oil passes to the pressure gauge pipe. The by-pass should be cleaned if obstructed.

The valve spring should have a free length of two and seven-eighths inches and should support a load of between six and one-half and seven and one-half pounds when compressed to one and three-fourths inches.

The surfaces of the housing which bolt against the crankcase should be in good condition.

***Replacement***

In replacing, reverse operations under "Removal."

If the regulator is in proper adjustment after installation the pressure gauge on the instrument board will indicate a pressure of between five and seven pounds when the engine is warm, idling at approximately 300 revolutions per minute, and the oil in the engine is of a suitable quality and fresh. Cadillac Motor Oil is recommended. If a higher or lower oil pressure is indicated, readjustment should be made in accordance with the directions under "Adjustment of Oil Pressure Regulator," page 179.)

## CONNECTING RODS

***Removal***

Remove the oil pan and the baffle plate. (See "Removal" under "Oil Pan and Baffle Plate," page 102.)

Open the compression cocks.



Remove the cotter pins and the two nuts from the cap of the straight connecting rod. Remove the cap, being careful not to mix the liners.

Remove the rod and piston. Care must be exercised not to damage the piston in removing it. Do not allow the skirt of the piston to fall against the connecting rod.

Remove the cotter pins and the two nuts from each cap of the forked connecting rod and remove the caps.

Remove the rod and piston, being careful not to damage the piston or to allow the halves of the connecting rod bearing to drop.

Remove the bearing halves.

Remove the pistons from the connecting rods. This can be done by first removing the small set screw in the piston pin boss and pushing out the pin by hand.

***Inspection***

With kerosene or gasoline clean all parts removed.

INSPECTION OF RODS—The piston pin bushing should be free from scores. There should be no more than .003 inch clearance between the pin and the bushing. If it is necessary to replace the bushing proceed as follows: With a press force out the used bushing and force in the new one, being sure that the oil holes line up. Be careful not to spring the rod. Then ream the new bushing, using a three-fourths inch reamer. The size of the bushing when reamed should be between .7495 inch and .7502 inch. The rod should be tested for alignment after the bushing is in place and reamed.

The bearing at the lower end of the forked connecting rod must clamp in the rod. To cause this the diameter of that portion of the bearing which is held in the rod must be .001 inch greater than the rod diameter, taken lengthwise of the rod. If the bearing is not clamped, the caps on the rod may be reduced by rubbing them carefully over fine emery cloth stretched tightly over a machined surface plate.

The bearings in the upper and lower ends of the rods should be parallel and in the same plane.

To test the forked connecting rod for alignment, proceed as follows:

Clamp the bearing into the lower end of the rod, being sure that it is clamped properly. The numbered end of the bearing should be to your right when the rod is held large end down and with the number on the channel section (see Fig. 28) toward you. Lightly force a tight fitting mandrel into the bearings at each end. The mandrel should be at least 6 inches long. Lay two parallel bars on a face plate and the connecting rod with the mandrels on the parallel bars as shown in Fig. 28. The mandrels should lay on the parallel bars squarely at all four points. To determine if the bearings are parallel take measurements "A" and "B." The mandrels should be parallel within .001 inch

in their length of 6 inches. A dial indicator can be used in making this test.

To test the straight rod for alignment, bolt the cap in place, then lightly force a tight fitting mandrel into the upper and lower bearings and proceed as in testing the forked rod. (See Fig. 29.)

If the bearings are not in the same plane, or are not parallel, the rod may be trued up by holding it in a vise, being careful to protect it with blocks of wood, and with a wrench springing it.

INSPECTION OF OTHER PARTS—Inspect the crank pin bearing. (See "Inspection of Bearing" under "Crank Pin Bearings," page 81.)

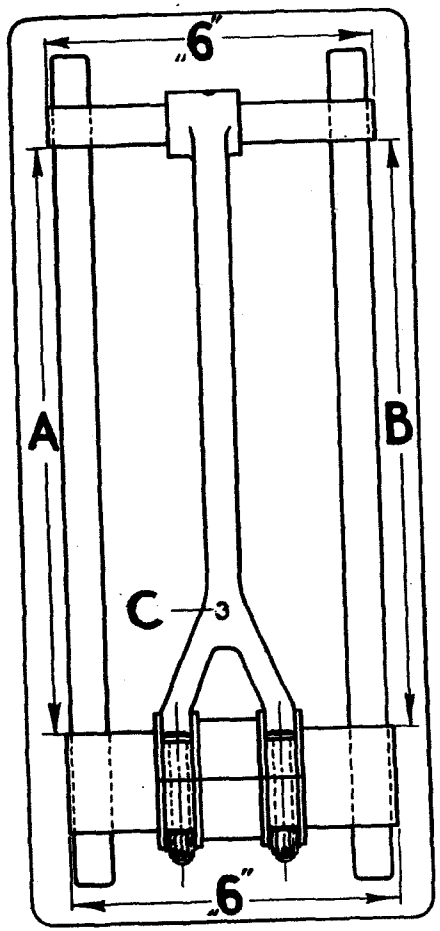



*Fig. 28—Method Employed in Testing Alignment of Forked Connecting Rods.*

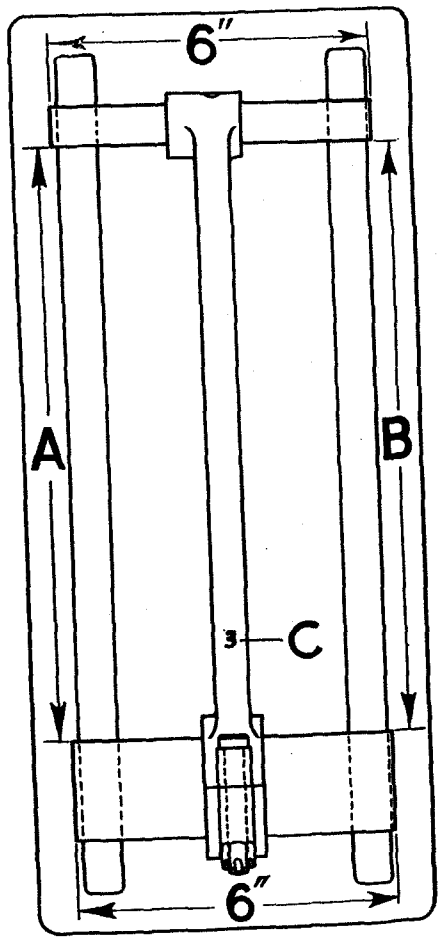



*Fig. 29—Method Employed in Testing Alignment of Straight Connecting Rods.*



Inspect the crank pin. The crank pin should be round within .003 inch and free from scores; if it is not it should be dressed down. (See under "Dressing Down Crankshaft Bearing Surfaces," page 30.) A new undersize bearing should be fitted if there is more than .006 inch clearance between the used bearing and pin, after the work is completed. (See under "Fitting Crank Pin Bearings," page 29.)

Inspect the pistons and the piston rings in accordance with directions under "Piston and Piston Rings," page 98.

Inspect the piston pins. (See "Inspection" under "Piston Pins," page 97.)

Inspect the cylinder bores. They should be round within .002 inch and free from scores.

***Replacement***

With a cloth carefully wipe off the pistons, connecting rods, and bearings and lubricate the bearing surfaces with engine oil of a suitable quality.

To facilitate replacement of the screws which lock the piston pins, pistons should be so placed on the rods that the supports which have the screws are on the sides of the rods which have the longer piston pin bushing bosses.

In replacing, reverse the operations given under "Removal."

Connecting rods are numbered on the channel section (see "C," Figs. 28 and 29), indicating the cylinders into which they go. Number one forked rod and number one straight rod go into cylinders nearest the radiator; number two forked rod and number two straight rod into cylinders just back of these, etc. The numbers on the channel sections of the rods should face downward, and the numbered ends of the bearings at the lower ends of the rods should face to the rear.

Care should be exercised that the dowel pins in the forked rod are in the pin holes in the bearing before the cap nuts are tightened.

All nuts and bolts and both bearing caps on the forked rods are numbered. One bolt and nut and the cap only of the straight rod are numbered. Bolts, nuts and caps should be replaced in accordance with these numbers.

The following will serve to check the assembly of the connecting rods and crank pin bearings: The forked connecting rods should be on the left-hand side of the engine. The edges of the crank pin bearing halves where they come together should be in the horizontal plane when the pistons attached to the forked rods are on upper and lower centers. The longer piston pin bosses on the upper ends of the two center connecting rods in each cylinder block should face toward each other. The longer piston pin bosses on the upper ends of the end connecting rods in each cylinder block should face from each other.

In adjusting the straight connecting rod follow directions under "Adjustment of Connecting Rod Bearings," page 28.

After replacing the oil pan, refill it with one and one-half gallons of suitable engine oil. Cadillac Motor Oil is recommended.

## CAMSHAFT

### *Removal*

Remove the camshaft driving chain. (See "Removal" under "Camshaft Driving Chain," page 88.)

Remove the eccentric nut "I," Fig. 22 (left-hand thread).

Remove the carburetor. (See "Removal" under "Carburetor," page 129.)

Remove the generator drive shaft "A," Fig. 22.

Disconnect the timer control rod.

Remove the two cylinder head nuts which hold the brackets on the left-hand high tension conduit. Loosen the small screws of the brackets which hold the right-hand conduit. Remove the distributor head and the low tension wire and lift the left-hand conduit with wires and head over to the right side.

Remove the distributor rotor. This may be done by lifting it straight up. If the rotor sticks on the shaft, force it off with two small screw drivers. The rotor is recessed on the under side at two points to receive screw drivers in removing. Lift both sides of the rotor evenly and lift it carefully.

Loosen the cap screw on the left rear corner of the fan shaft housing and remove the remaining three cap screws.

Remove the two threaded dowel pins. This may be done by placing a spring washer over them large enough to permit the pins to be pulled through them and screwing on and tightening $\frac{5}{16}$ inch x 18 nuts.

With a puller remove the camshaft sprocket, at the same time sliding forward the fanshaft housing with the distributor and timer attached.

Remove the top cover plate. (See "Removal" under "Top Cover Plate," page 100.)

Remove the set screw "M."

Remove the camshaft and the forward camshaft bearing by pulling the shaft straight forward. If the bearing is tight in the crankcase it may be necessary to tap the shaft lightly.

### *Inspection*

INSPECTION OF CAMSHAFT—Clean the shaft with gasoline or kerosene and wipe it off with a cloth.

Inspect the oil hole at the forward end of the shaft, cleaning it out if necessary.



Inspect the cams carefully. They should show practically no wear.

All bearing surfaces of the camshaft should be round within .003 inch and free from scores. The clearance between the camshaft and the bearings should not exceed .005 inch.

INSPECTION OF OTHER PARTS—Inspect the camshaft bearings in the crankcase. The bearing surfaces should be free from scores. If it is necessary to replace one of the three center bearings tap it out and carefully tap in the new bearing. If it is necessary to replace the rear bearing, first remove the flywheel (see "Removal" under "Flywheel," page 116), then remove the cap "N." The bearing may then be driven out from the rear. Be sure that the oil hole in the bearing lines up with the oil hole in the crankcase.

Inspect the rocker arms and rocker arm shaft. (See "Inspection of Rocker Arms and Shafts" under "Rocker Arms and Shafts," page 79.)

### *Replacement*

In replacing, reverse operations under "Removal."

Be sure to replace the camshaft driving chain correctly. (See "Replacement" under "Camshaft Driving Chain," page 89.)

## CRANKSHAFT

### *Removal*

Remove the top cover plate. (See "Removal" under "Top Cover Plate," page 100.)

Remove the camshaft driving chain. (See "Removal" under "Camshaft Driving Chain," page 88.)

Remove the flywheel. (See "Removal" under "Flywheel," page 116.)

Remove the cover "Q," Fig. 22, at the rear end of the crankcase.

Remove the connecting rods and pistons. (See "Removal" under "Connecting Rods," page 106.)

Determine the amount of clearance between the teeth of the spiral gear on the crankshaft and those of the gear with which it meshes. (See under "Inspection.")

Remove the main bearings, being careful that the shaft does not drop. (See "Removal" under "Main Bearings," page 82.)

Carefully tap up the main bearing bolts until their lower ends are flush with the machined surfaces against which the liners are held.

The crankshaft can now be removed.

### *Inspection*

INSPECTION OF CRANKSHAFT—Remove the seventeen small plug screws by unscrewing them with a large screw driver and clean out

the oil ways thoroughly. Replace the plugs and tighten, locking them by making a fairly light punch mark between the shaft and each screw.

Wash the shaft with gasoline or kerosene and inspect all bearing surfaces. If any of the bearing surfaces are cut, or out of round more than .003 inch they should be dressed down. (See under "Dressing Down Crankshaft Bearing Surfaces," page 30.) If after dressing down a crank pin there is more than .006 inch clearance between the pin and the crank pin bearing, a new standard or undersize bearing should be fitted. (See under "Fitting Crank Pin Bearings," page 29.)

End play in a crank pin bearing should not exceed .015 inch. The clearance between a crank pin bearing and the crank pin should not exceed .006 inch. There is no adjustment on crank pin bearings. Crank pin bearings .005 inch undersize are furnished by the Cadillac Motor Car Company.

The end thrust of the crankshaft is taken by the rear main bearing. The crankshaft should have no more than .020 inch end play in this bearing.

Place the shaft on lathe centers. It should run out of true no more than .004 inch at the center bearing.

INSPECTION OF OTHER PARTS—Examine the oil hole in the spiral gear on the crankshaft. Clean out if obstructed.

Inspect the main and crank pin bearings. (See "Inspection of Bearing" under "Main Bearings" and under "Crank Pin Bearings," pages 81 and 83.)

Inspect the pistons and piston rings. (See "Inspection of Piston and Rings" under "Piston and Piston Rings," page 98.) If the wear on a piston seems to indicate that the rod is sprung or twisted, test the rod for alignment. (See "Inspection of Rods" under "Connecting Rods," page 107.)

Inspect the cylinder bores. They should be round within .002 inch and free from scores.

When the crankshaft is in place there should be no more than .018 inch clearance between the teeth of spiral gear on the shaft and those of the gear with which it meshes.

Inspect the camshaft and fanshaft driving chains and sprockets. (See "Inspection of Chain" under "Camshaft Driving Chain," page 89, and under "Fanshaft Driving Chain," page 90.)

Inspect the flywheel. (See "Inspection" under "Flywheel," page 117).

Inspect the annular ball bearing at the rear end of the crankshaft. The races should rotate smoothly and quietly and have no more than .015 inch end play.



***Replacement***

Before replacing the shaft, wipe it off with a cloth and lubricate the bearing surfaces with engine oil of a suitable quality.

In replacing, reverse the operations under "Removal."

The main bearings are numbered on one end. The bearing nearest to the radiator is stamped "1," the center bearing "2" and the rear bearing "3." In replacing, have the numbered ends toward the radiator. In adjusting the main bearings follow directions under "Adjustment of Main Crankshaft Bearings," page 28.)

Be careful to replace the connecting rods as originally assembled into the engine. Connecting rods are numbered on the channel section (see "C," Figs. 28 and 29), indicating the cylinders into which they go. Number one forked rod and number one straight rod go into cylinders nearest radiator; number two forked rod and number two straight rod go into cylinders just back of these, etc. When placed in the engine the numbers on the channel sections of the rods should face downward, and the numbered ends of the bearings at the lower ends of the rods should face to the rear.

All nuts and bolts and both bearing caps of forked rods are numbered. One bolt and nut only, and the cap of straight rods are numbered. Bolts, nuts and caps should be replaced in accordance with these numbers. Care should be exercised that the dowel pins in the forked rods are in the pin holes in the bearings before the cap nuts are tightened.

The following will serve to check the assembly of the connecting rods and crank pin bearings. The forked connecting rods should be on the left-hand side of the engine. The edges of the crank pin bearing halves where they come together should be in the horizontal plane when the pistons attached to the forked rods are on upper and lower centers. The longer piston pin bosses on the upper ends of the two center connecting rods in each cylinder block should face toward each other. The longer piston pin bosses on the upper ends of the end connecting rods in each cylinder block should face from each other.

In adjusting the straight connecting rods follow directions under "Adjustment of Connecting Rod Bearings," page 28.

After replacing the oil pan refill it with one and one-half gallons of suitable engine oil. Cadillac Motor Oil is recommended.

If after starting the engine it is found that the pressure gauge does not register pressure, stop the engine at once and prime the oil pump. This may be done by disconnecting, at its upper end, the oil pipe from the oil pressure regulator and forcing two to three gunfuls of clean

engine oil into the pipe. Connect the pipe and tighten the union before starting the engine.

### DRIVE SHAFT FOR WATER PUMPS

***Removal***

Remove the splash pan under the engine.

Drain the cooling system. (See under "Draining the Cooling System," page 55.)

Remove the oil pan and the baffle plate. See "Removal" under "Oil Pan and Baffle Plate," page 102.)

Determine the amount of clearance between the teeth of the gear on the drive shaft for the water pumps and those of the gears with which it meshes. (See under "Inspection.")

Remove one of the water pumps. (See "Removal of Pump" under "Water Pumps," page 104.)

Remove the set screw "A," Fig. 23, holding the drive shaft bushing nearest the pump just removed and remove the bushing.

Remove the drive shaft with gear and thrust bearing.

The remaining drive shaft bushing can be removed if desired, after removing the remaining water pump and the set screw "A" which holds the bushing.

***Inspection***

Clean all parts with kerosene or gasoline.

INSPECTION OF DRIVE SHAFT, GEAR, BUSHINGS AND THRUST BEARING—The drive shaft and the bushings in which it rotates should be free from scores. There should be no more than .006 inch clearance between the shaft and bushings.

Inspect the balls of the thrust bearing, also the thrust washer and the side of the gear upon which the balls rotate. The balls should be free from pits and in good condition. The surfaces of the washer and gear should be free from pits and worn no more than .006 inch where the balls contact with them. If these parts are worn or pitted they may be reversed and used again.

There should be no more than .018 inch clearance between the teeth of the gear and those of the gears with which it meshes. If it is necessary to remove the gear from the shaft do so with a press. Be sure in pressing on the gear that it stands exactly in the center of the shaft.

INSPECTION OF OTHER PARTS—Examine the packing in the glands of the water pumps before replacing the pumps. (See under "Water Pump Packing Glands," page 56.)

***Replacement***

In replacing, reverse operations under "Removal."

The grooved end of the shaft should be on the left side.



Be sure that the bushings are so placed that the pilots on the locking screws enter the holes in the bushings.

With the bushings locked in place the drive shaft should have no less than .002 inch end play and no more than .005 inch.

New drive shaft bushings are not drilled for locking screws. In installing new bushings make sure that their outer edges are equally distant from the faces of the crankcase, that the drive shaft has from .002 inch to .003 inch end play and that the inner oil holes of the bushings face up. Then locate positions for the holes for the set screws, remove the bushings and drill these holes. Very great care must be exercised in positioning these holes.

### CAM SLIDES AND GUIDES

***Removal***

Remove the valve, over the cam slide and guide to be removed. (See "Removal" under "Valves and Valve Springs," on this page.) The cam slide may then be lifted out.

Remove the clamp which holds the guide for the cam slide and remove the guide.

***Inspection***

INSPECTION OF CAM SLIDE AND GUIDE—There should be no more than .004 inch clearance between a cam slide and the guide in which it operates.

The upper face of the head of the cam slide adjusting screw should show very little wear.

INSPECTION OF OTHER PARTS—Inspect the valves in accordance with directions in this book. (See "Inspection" under "Valves and Valve Springs," page 116.)

***Replacement***

In replacing, reverse operations under "Removal."

Time the valves in accordance with directions in this book under "Adjustment of Cam Slide," page 32.)

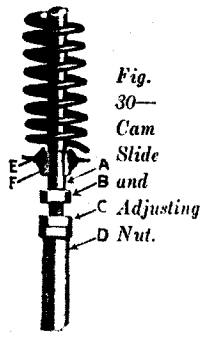



*Fig. 30—Cam Slide and Adjusting Nut.*

### VALVES AND VALVE SPRINGS

***Removal***

Remove the cylinder head. (See "Removal" under "Cylinder Heads," page 95.)

Remove the carburetor. (See "Removal" under "Carburetor," page 129.)

Remove the valve cover plate.

Force up washer "E," Fig. 30, then remove the split collar "F." Let the washer "E" down carefully and both sides evenly.

(If all valves in a block are to be removed at one time, and tool number 69283 furnished by the Cadillac Motor Car Company is at hand, all eight washers "E" may be lifted at one time and the washers and springs held in position while the collars and valves are removed and replaced.)

***Inspection***

Clean all parts with gasoline or kerosene.

INSPECTION OF VALVES—Clean the valve seat in the cylinder block, and the bushing in which the valve stem operates. Any carbon on the valve stem, or in the bushing should be removed.

There should be no more than .004 inch clearance between a valve stem and the valve stem bushing.

Inspect the valve seat in the cylinder block and the surface of the valve which bears on the seat. If the valve or valve seat is pitted or if it appears that the valve has been leaking it should be reground. (See under "Grinding Valves," page 33.)

Inspect the valve spring. Valve springs should have a minimum free length of four and three-fourths inches and a minimum pressure of eighty-five pounds when compressed to three inches.

***Replacement***

In replacing, reverse the operations under "Removal."

The timing of the valves should be checked up after replacement is made. (See under "Adjustment of Cam Slide," page 32.)

### FLYWHEEL

***Removal***

Remove the transmission. (See "Removal" under "Transmission," page 145.)

Remove the two five-sixteenths inch cap screws and clips holding the dowel pins in place.

Remove the dowel pins. This may be done by placing spring washers over them large enough to permit the pins to be pulled through them and screwing on and tightening two of the nuts which hold the flywheel.

Remove the six seven-sixteenths inch nuts which hold the flywheel to the crankshaft, and remove the felt washer retainer, steel washer, felt washer and paper gasket.

The flywheel can now be removed.



***Inspection***

INSPECTION OF FLYWHEEL—Make an inspection of the teeth on the flywheel. If the teeth are burred somewhat on the ends, smooth them up with a mill file.

INSPECTION OF OTHER PARTS—With kerosene or gasoline wash out the annular ball bearing at the rear end of the crankshaft. Inspect this bearing by rotating the inner race and by noting the amount of end play in the race. The race should rotate smoothly and quietly and should have no more than .015 inch end play. The bearing is a close fit in the crankshaft and may be removed either with a suitable puller, or by suitably bent pries.

***Replacement***

Before replacing the felt washer soak it in lubricating oil of a good quality, and fill the space between the races of the bearing with number two cup grease.

Have the forward cylinder in the left-hand block on firing center before replacing the flywheel. Then replace the flywheel, having the number one and five marks, stamped on the wheel, directly under the pointer attached to the crankcase.

## ELECTRICAL SYSTEM

### CIRCUIT BREAKERS

***Inspection***

The left-hand circuit breaker (looking at the dash from the driver's seat) protecting the circuits to the horn, handy lamp and tonneau-lamp, should remain closed under a load of 25 amperes, but should open and remain open under a load of 30 amperes, or more. The right-hand breaker protecting circuits to the ignition apparatus, and the remainder of the lamps should remain closed under a twenty-five ampere load, but should vibrate under a load of thirty amperes or more.

The left-hand circuit breaker may be tested by connecting a rheostat to wires attached to a double connector inserted in the handy lamp socket. The right-hand circuit breaker may be tested by removing one of the head light wires, connecting one wire from a rheostat to the wire and the other wire from the rheostat to the frame of the car. By turning on current to the headlamps and watching the ammeter on the dash the amount of resistance may be determined. The dash ammeter registers 30 amperes only, which is sufficient for testing either circuit breaker. Increasing the load to more than 30 amperes may injure the ammeter.

If either circuit breaker operates under a load of less than 25 amperes, or refuses to operate under a load of 30 amperes, it is recom-

mended that the breakers be replaced and returned to the factory for adjustment.

***Removal***

Disconnect at the storage battery one of the large cables and block it up to prevent it touching the terminal of the storage battery.

Mark the four wires on the circuit breakers so that they may be replaced as originally assembled. Loosen the nuts on the four terminals and remove the wires.

Remove the two small bolts which hold the circuit breakers to the dash.

***Replacement***

In replacing the circuit breakers make sure that the four wires are replaced as originally assembled, that the terminals on the wires and on the circuit breakers are clean and that all connections are well tightened.

## MOTOR GENERATOR

***Testing the Motor Generator. (On Car.)***

Test the generator field windings and the generator armature windings for short circuit, open circuit or ground by turning on ignition and observing the operation of the armature. If there is no short

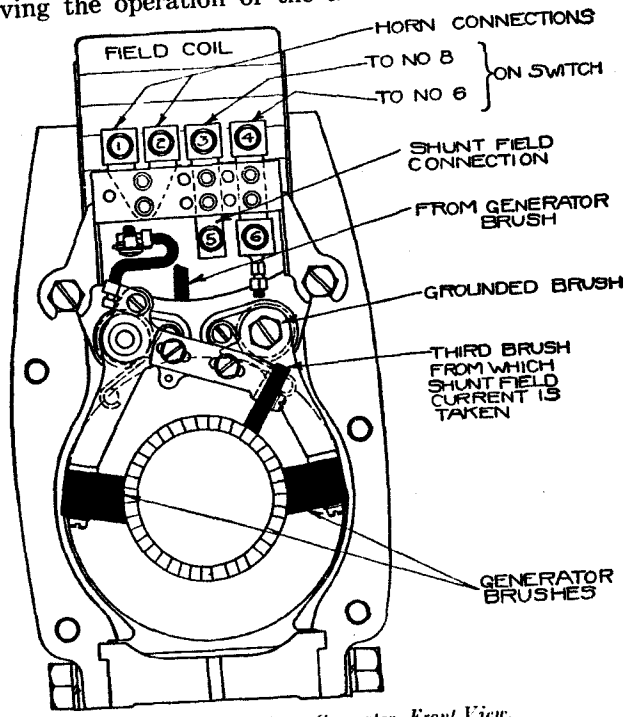



*Fig. 31—Motor Generator, Front View.*



circuit, open circuit or ground in the generator field windings, the armature will rotate at between 175 and 300 revolutions per minute. The speed at which the armature should rotate depends upon the state of charge of the storage battery. If there is a short circuit, open circuit, or ground in the generator armature windings, the armature will fail to rotate or, if it rotates, will do so with a jerky motion.

Test the motor field circuit and the motor armature circuit by turning on ignition, pushing down on the starter pedal and immediately switching off the ignition. Before making this test be sure that the battery is in a charged condition, the motor commutator is clean, the brushes bear properly on the commutator, and that all electrical connections are tight. If the engine turns freely, the motor generator should crank it over at approximately 90 revolutions per minute.

To determine if either generator bearing is noisy, remove the generator drive shaft, and turn on ignition.

***Testing the Motor Generator. (Off Car.)***

If the motor generator is not on the car the foregoing tests may be made by connecting one wire from a charged six volt storage battery

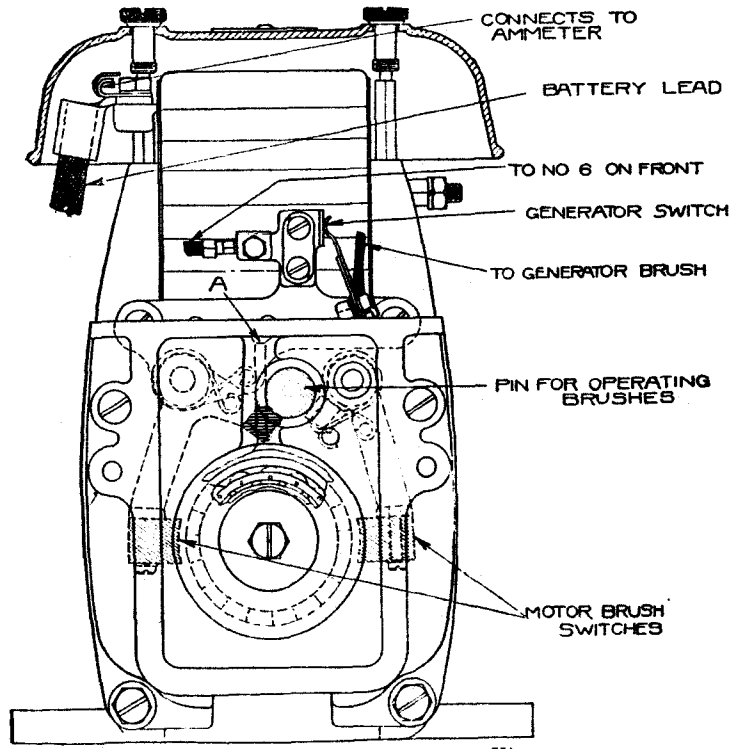



*Fig. 32—Motor Generator, Rear View.*

to number four terminal on the motor generator, Fig. 31, connecting together terminals three and four and connecting the other wire from the battery to the frame of the generator. Test the generator windings with the motor brushes lifted. Test the motor windings with the motor brushes against the commutator and the generator switch open. Operated as a motor, the armature should rotate at high speed.

***Removal and Disassembly of Driving Clutch***

The driving clutch may be removed without removing the generator from the engine.

Remove the carburetor. (See "Removal" under "Carburetor," page 129.)

Remove the generator drive shaft.

Remove the large cap screw in the end of the armature shaft and with puller, tool 65493 furnished by the Cadillac Motor Car Company, remove the complete clutch.

The clutch may be disassembled by removing the locking wire in the space "B," Fig. 33. The ends of the wire come together at a recess "A." The wire can be removed by picking out one end of it with a

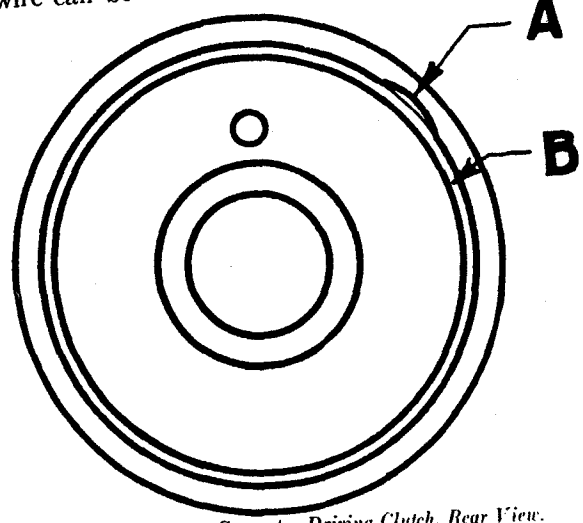



*Fig. 33—Motor Generator Driving Clutch, Rear View.*

sharp pointed instrument and then removing the entire wire. In replacing the wire make sure that the ends come together at the recess "A."

***Removal of Generator Brushes***

The brushes which bear on the generator commutator may be removed without removing the generator from the car. To remove these brushes proceed as follows:

Remove the large cable from the storage battery and block it up with [illegible] of dry wood to prevent it touching the terminal of the battery.



Disconnect the copper strip running from the field coil to the rear of terminal number five, Fig. 31.

Disconnect, at the terminal on the field coil, the wire from the third brush arm.

Remove the two cap screws holding the terminal bracket and the brush arm bracket in place, and remove the terminal bracket and brush arm bracket with brushes.

***Removal of Motor Brushes***

To remove the brushes which bear on the motor commutator, remove the generator in accordance with directions under "Removal of Generator" and remove the rear end housing as directed under "Removal of Roller Bearing." The remaining motor brush can then be removed.

***Removal of Motor Generator***

Disconnect from the storage battery one of the large cables and block it up with a dry piece of wood to prevent it touching the terminal of the battery.

Remove the top cover plate from the motor generator and disconnect the large cable and the five small wires.

Remove the carburetor. (See "Removal" under "Carburetor," page 129.)

Remove the generator drive shaft.

Remove the two filister-head screws holding the motor generator to the starter gear housing.

Remove the three large cap screws which hold the motor generator to the top cover plate and remove the motor generator. Exercise care in removing not to drop the brush control pin into the flywheel housing.

***Removal of Annular Ball Bearing***

Remove the motor generator. (See "Removal of Motor Generator," on this page.)

Remove the driving clutch. (See "Removal and Disassembly of Driving Clutch," page 120.)

Remove the four cap screws holding the aluminum front housing in place and remove the housing.

To remove the ball bearing from the housing, first remove the four machine screws which hold the bearing retainer in place, then tap out the bearing.

***Removal of Roller Bearing***

Remove the motor generator as directed under "Removal of Motor Generator," above.

Remove the left-hand motor brush arm. This is the one which is not attached to the rear end housing.

Remove the four cap screws holding the rear end housing in place, and remove the housing complete with armature and bearing.

Remove the four small machine screws which hold the bearing retainer to the housing and remove the housing.

The mounting for the roller bearing can be removed by tapping it out through the two small holes provided.

### *Removal of Field Coils*

Remove the motor generator in accordance with directions under "Removal of Motor Generator," page 121.

Remove the rear end housing with armature as directed under "Removal of Roller Bearing," page 121.

Remove the front housing with bearing.

Remove the terminal bracket and the brush arm brackets.

The coils can now be removed by taking out the long bolt which passes through the coils and holds the two sides of the frame together.

### *Inspection*

Examine the commutators. Burnt or blackened segments of the generator commutator indicate high mica, a short circuit, ground, open circuit or insufficient spring tension on the brushes. If the commutators require it, place the armature between lathe centers and turn them down with a very sharp tool. Turn off no more than is necessary to clean up the commutators. If the mica between the segments of the generator commutator is above the surface against which the brushes press, or less than $\frac{1}{64}$ inch below, cut down the mica so that it is $\frac{1}{32}$ inch below the surface. Use a hack saw blade ground off on the sides of the teeth so that it will cut a slot between the segments, very slightly wider than the mica. Remove the sharp edges on the segments with a fine three cornered file but do no more than take off the sharp edges.

Examine the insulators on the terminal board, particularly the one which holds terminals numbers four and six, Fig. 31.

Inspect the ball and roller bearings. The races of the ball bearing should rotate smoothly and quietly and should have no more than .005 inch radial play and no more than .015 inch end play. The roller bearings should have no more than .005 inch radial play. The rolls should be free from pits and not chipped on the ends.

The generator and motor brushes should have good bearing on the commutators; if not they should be refitted. (See "Fitting Motor Generator Brushes," page 39.)

The tension of the coil springs on the brush arms should be sufficient to cause a brush pressure of between twenty-five and thirty ounces on the generator commutator, and between thirty and thirty-six ounces on the motor commutator. The pressure between the third brush and the generator commutator should be sixteen to twenty ounces.



### *Replacement*

Make certain that all connections are clean and well tightened.

Before replacing either bearing, fill it well with light cup grease.

The third brush should be so adjusted that the maximum output of the generator is twenty amperes, this means eighteen amperes when current for ignition is deducted. (See "Current Regulation," page 48.)

## DISTRIBUTOR HEAD

### *Removal*

Remove the aluminum cap covering the distributor head. The cap may be removed by lifting it straight up after the two small screws are removed which hold each conduit bracket to the cap and the bail over the top of the cap is pushed to one side.

Press back the finger of the clip on the left-hand side of the distributor head and rotate the head in a counter-clockwise direction until the clips on opposite sides register with the flat places on the head.

Remove the distributor head by lifting it straight up and then to one side. Be careful not to catch the rotor button, and thus injure the rotor button spring.

If it is desired to remove the distributor head from the high tension wires, unscrew the nine terminals.

### *Inspection*

INSPECTION OF DISTRIBUTOR HEAD—Clean the head with gasoline and wipe it off with a clean cloth.

The track against which the rotor button presses should be smooth and clean. Clean with a piece of cloth moistened with vaseline, then polish with a dry cloth. Do not use sand paper, emery cloth, or anything of that nature.

Make sure that the contact in the center of the head works freely in its guide.

INSPECTION OF OTHER PARTS—Inspect the rotor button and rotor button spring. (See "Inspection of Rotor" under "Distributor Rotor," page 124.)

### *Replacement*

In replacing, reverse the operations under "Removal."

## DISTRIBUTOR ROTOR

### *Removal*

Remove the distributor head. (See "Removal" under "Distributor Head," on this page.)

Remove the rotor by lifting it straight up. If the rotor sticks on the shaft it may be forced off by the use of two small screw drivers. The rotor is recessed on the under side at two points to receive screw drivers in removing. Lift both sides evenly and carefully.

### *Inspection*

INSPECTION OF ROTOR—The upper face of the rotor button should be smooth and clean. If it is necessary to clean it use an oil stone.

Inspect the rotor spring for tension. In replacing the spring make sure that it bottoms in the hole which receives it, otherwise the resulting increased pressure will cause cutting in the distributor head. Under a pressure of between five and ten ounces the rotor button flange should just rest on the rotor.

INSPECTION OF OTHER PARTS—Inspect the distributor head. (See "Inspection" under "Distributor Head," page 123).

Inspect the timer contact points. If they are burned or pitted or out of adjustment, see under "Adjustment of Timer Contact Points" page 42.

### *Replacement*

To replace the rotor, reverse the operation under "Removal," first making sure that the shaft over which the rotor sets, as well as the hole in the rotor which receives the shaft, is clean. If the rotor fits tightly tap it lightly at the center with the wooden end of a screw driver.

## DISTRIBUTOR AND TIMER

### *Removal*

Remove the carburetor. (See "Removal" under "Carburetor," page 129).

Remove the generator shaft "A," Fig. 22.

Remove the coupling "C" from the rear end of the fanshaft. To do so first remove the large cap screw "B," then remove the coupling with a puller.

Remove the two cylinder head nuts which hold the brackets of the left-hand high tension conduit. Loosen the small screws in the brackets which hold the right-hand conduit. Remove the distributor head and the low tension wire and lift the left-hand conduit with wires and head over to the right side.

Remove the distributor rotor. This may be done by lifting it straight up. If the rotor sticks on the shaft, force it off with two small screw drivers. The rotor is recessed on the under side at two points to receive drivers in removing. Lift both sides of the rotor evenly and lift it carefully.

Remove the dowel pin "X," Fig. 34, by tapping it out from the front.

Remove the spark control rod.

Remove the three bolts and two nuts which hold the distributor and timer to the fan shaft housing.



The distributor and timer may now be removed by tapping it lightly. As the dowel pin "Y" is still in position, care must be exercised to remove both sides evenly.

### *Removal of Plain Bearing*

Remove the cotter pins "G" and "H," Fig. 7, and the contact arms "C" and "O," being careful not to bend the posts upon which the arms operate.

Remove the nut "A," the resistance unit, and the condenser "D."

Remove the oiler "W."

Remove the screws "K" "L" and "M" and lift out the segment plate "N."

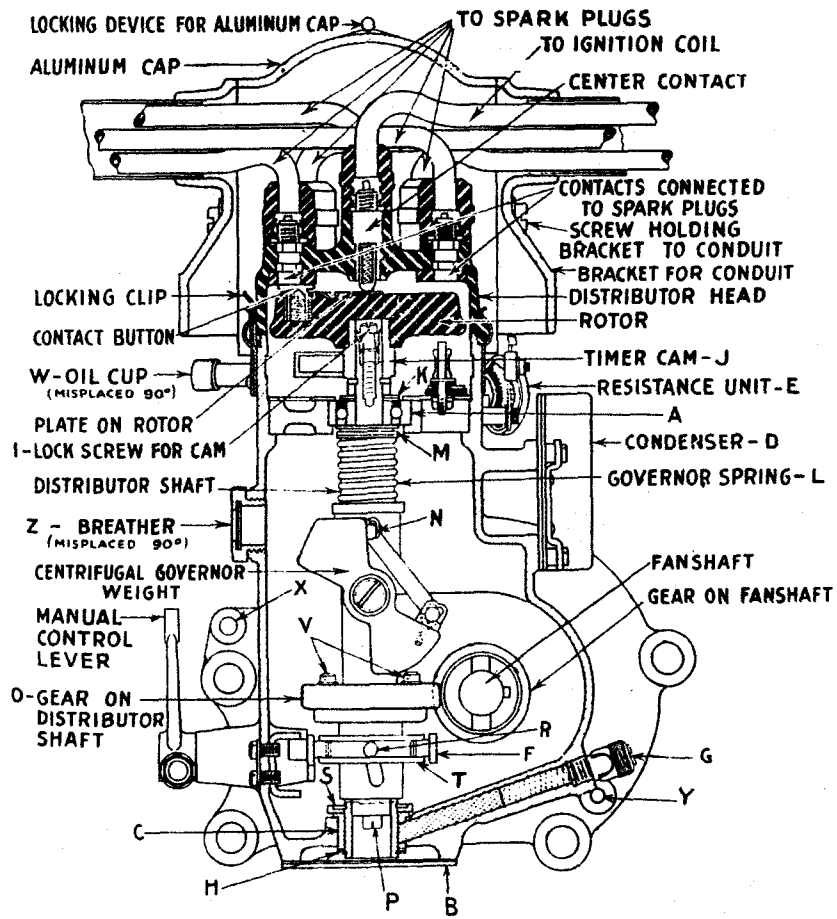



*Fig. 34—Distributor and Timer, Sectional View.*

Remove the headless screw in the yoke "F," Fig. 34, and remove the yoke and shaft to which it is attached.

Remove the oiler "G" by unscrewing it and pull out the oiler spring.

Remove the plate "B."

Remove the locking washer "H."

Remove the distributor shaft complete by pulling it out through the top of the housing.

The bushing "C" can now be removed by tapping it out carefully. In replacing the bushing be sure that the hole for the oiler wick is opposite the hole in the housing for the wick.

### *Removal of Annular Ball Bearing*

Remove the distributor shaft as directed under "Removal of Plain Bearing," page 125.

Loosen the lock screw "I" and remove the cam "J." Fig. 34.

Remove the locking washer "K" and lift out the two steel washers and the felt washer.

Remove the ball bearing by tapping it off carefully.

### *Removal of Spring*

Remove the distributor shaft as directed under "Removal of Plain Bearing," page 125.

Remove the pin "N," Fig. 34, and pull out the shaft with the ball bearing.

Remove the locking washer "M" and remove the spring.

### *Removal of Gear*

Remove the distributor shaft complete in accordance with directions under "Removal of Plain Bearing," page 125.

Remove the screw "P" and drive out the straight pin "R," Fig. 34.

Remove the locking washer "S" and the collar "T."

Remove the locking washer held to the spiral gear "O" by the screws "V." The gear with sleeve can now be removed from the shaft. The gear is held to the sleeve by a taper pin.

### *Inspection*

Check up the amount of side play in the annular ball bearing "A," also in the plain bearing "C." The side play in the ball bearing should not exceed .003 inch. The side play in the plain bearing should not exceed .004 inch.

The ball bearing should rotate smoothly and quietly.

Examine the spring. The spring should compress to .956 inch under a load of between eleven and twelve ounces and to .500 inch under a load of between three pounds seven ounces and four pounds three ounces.



Examine the teeth of the gear "O" and those of the gear with which it meshes.

Examine the timer contact points. They should be clean, fit squarely against each other, and in proper adjustment. (See under "Adjustment of Timer Contact Points," page 42.)

The tension of the springs on the contact arms should be great enough to cause a pressure of eighteen to twenty ounces between the contact points.

INSPECTION OF OTHER PARTS—Inspect the distributor rotor. (See "Inspection of Rotor" under "Distributor Rotor," page 124.)

Inspect the distributor head. (See "Inspection of Distributor Head" under "Distributor Head," page 123.)

### *Replacement*

To replace, reverse operations under "Removal," being careful to replace in their proper positions all the small insulating bushings and washers. After replacing the segment plate "N," Fig. 7, and before tightening the screws "M," "L" and "K" and the nut "A" adjust the segment plate as accurately as possible with the eye, so that the contact arms are directly on top of lobes of the cam "J" at the same time. Then test for simultaneous opening of the contact points (see under "Adjustment of Contacts for Simultaneous Opening") and adjust the segment plate in accordance with the directions under "Adjustment of Segment Plate," page 43.

After replacing the distributor and timer remove the breather "Z" and place ten ounces of number two cup grease in the housing.

Retime the ignition in accordance with directions under "Timing Ignition," page 44.

Exercise care, in replacing the distributor head, not to catch the rotor button on the side of it, also to make sure that the head fits down evenly and that it is locked in place.

## COOLING SYSTEM

### RADIATOR

### *Removal*

Remove the wires from the head lamps. To do so lift up the connectors to which the wires are attached, turn them slightly in the counter-clockwise direction and pull them down.

Disconnect at the head lamps the small rods running from the lamps through the radiator casing.

Remove the two cap screws holding each lamp bracket to the fender support and remove the lamps with brackets and tie rod.

Drain cooling system. (See under "Draining the Cooling System," page 55.)

Remove the hood.

Remove the cross shaft attached to the rear face of the radiator.

Disconnect the tie rod at the radiator by removing the cap screw.

Remove the cotter pins, nuts and springs from the two studs which hold the radiator to the frame.

Disconnect the five radiator hose connections.

Remove the radiator by pulling its upper end forward slightly, then lifting it up.

***Inspection***

Inspect the radiator for leaks. To do so proceed as follows: Plug the four large hose connections on the radiator and screw on and tighten the radiator filler cap. Attach an air hose to the lower end of the radiator over-flow pipe, immerse the radiator in water and turn on air under a pressure of approximately fifteen pounds. Leaks are indicated by air bubbles.

Radiator repair should be attempted only by men who have had experience in this line of work. The following suggestions will assist in repairing a Cadillac radiator:

If a tube leaks where it is soldered to the upper or lower header, resolder it on the inside of the header. This may be done after removing the radiator casing which is held in place by ten small bolts, and removing the tank by unsoldering. If it is necessary to replace a tube, remove both tanks by unsoldering, lay the radiator down flat, and with a blow torch melt the solder the entire length of the tube to be removed. The tube can then be pulled out. Before putting in a new tube, tin it its entire length. After the tube is in place and the fins are lined up, solder the tube to the fins, using a blow torch. With a soldering iron, solder the ends to the headers.

Whenever radiator tanks are removed for any purpose, it is a good plan to test all of the tubes. Test each tube separately by plugging one end and forcing air under approximately fifteen pounds pressure into the open end, while the radiator is immersed in water.

Inspect the radiator fins. They should be parallel to each other and equally distant from each other. To insure maximum radiator efficiency, each fin must be soldered to each tube.

Inspect the radiator cap gaskets.

***Replacement***

Before replacing radiator flush it out with water and remove the radiator strainers and clean them.

In replacing, reverse operations under "Removal."

Unless the radiator is properly lined up the hood will not fit properly. The radiator is lined up by increasing or decreasing the number of shims



upon which it rests, and by altering the length of the rod which ties it to the body of the car.

### WATER PUMP STRAINERS

***Removal***

There is a strainer in each outlet at the bottom of the radiator. Holes are provided in the lower part of the front face of the radiator shield permitting easy access to the screw caps which cover them.

To remove the strainers first drain the cooling system, (see under "Draining the Cooling System," page 55), then remove the caps by unscrewing and pull the strainers out.

An offset socket wrench should be used in removing the caps.

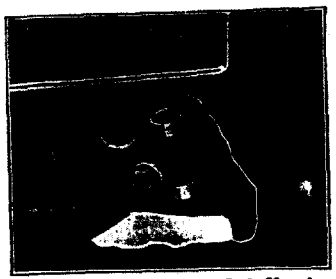


*Fig. 35—Removal of Left-Hand Water Strainer.*

***Inspection***

Inspect the strainers. They should be clean and in good condition.

***Replacement***

Before replacing the strainers it is a good plan to flush out the radiator by allowing water from a hose to run through it.

After replacing the strainers make sure that the screw caps are well tightened against the lead gaskets.

Refill the cooling system in accordance with directions under "Filling the Cooling System," page 55.

## GASOLINE SYSTEM

### CARBURETOR

***Removal***

Relieve the pressure in the gasoline system by removing the gasoline tank filler cap.

Shut off the gasoline at the tank and replace the cap.

Disconnect the gasoline feed pipe at the carburetor.

Loosen the clamp screw holding the drain pocket under the carburetor and force the pocket down.

Remove the carburetor control rods at the carburetor.

Remove the two cap screws which hold the carburetor to the intake manifold and remove the carburetor.

***Disassembly***

Remove the carburetor bowl. To do so, proceed as follows: Remove the pin "Z," Fig. 36. Remove the screw "C" and the packing gland "D" with packing.

Remove the throttle pump plunger "W." To do so, first remove the cap "B" by rotating it in either direction one-eighth turn or more, then lift it straight up. Then pull out the plunger.

Remove the spray nozzle "E" by unscrewing it, and the cork float "F." The float can be removed after the hinge pin is pulled out. Remove the diaphragm from the carburetor body. This may be done after removing the three long screws which hold these parts together.

### *Inspection*

Inspect the face of the carburetor body which bolts against the intake manifold. This face must be in good condition and perfectly flat to insure against air leaks when the carburetor is bolted in place.

The throttle "G" must move freely from the open to the closed position. When the disc is squarely across the mixing chamber the sum of clearances on opposite sides of the disc should be no more than .007 inch. Greater clearance will make it impossible to throttle the engine down to the recommended speed of 300 revolutions per minute. Also make sure that the disc is not bent and that the small screw holding it in place is well tightened.

End play in the throttle shaft should not exceed .004 inch. Clearance between the throttle shaft and the bronze bushings in which it operates should not exceed .010 inch.

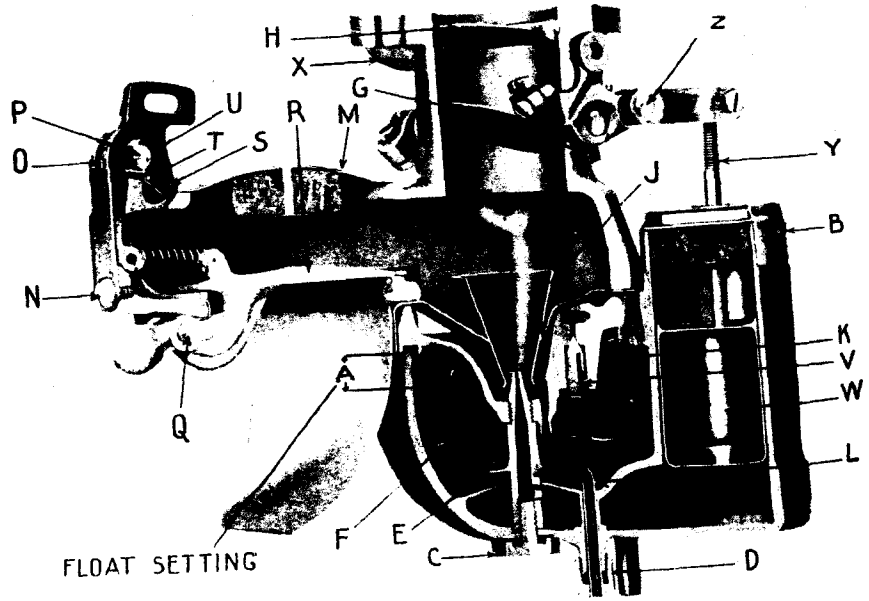



*Fig. 36—Carburetor, Sectional View.*



The shutter attached to the throttle shaft should clear the face of the carburetor body, but have no more than .005 inch clearance. Greater clearance will interfere with the operation of the leaning device.

The shaft of the automatic throttle "H" must work freely in its bearings. Test this by rotating the shaft approximately 180 degrees from the normal position and allowing it to return slowly. If there is any tendency of the shaft to stick, remove it in the following manner and clean the bearings: Remove the two small screws holding the plate "X." Remove the small screw holding the throttle disc to the shaft and remove the disc. Remove the shaft, being careful not to damage the spring.

After making sure that the shaft of the automatic throttle works freely in its bearings, check up the tension of the spring on this shaft. This may be done with tool number 67327, furnished by the Cadillac Motor Car Company, or with six and seven-eighths inches of number 14 copper wire (.064 inch in diameter) bent in shape shown in Fig. 37,

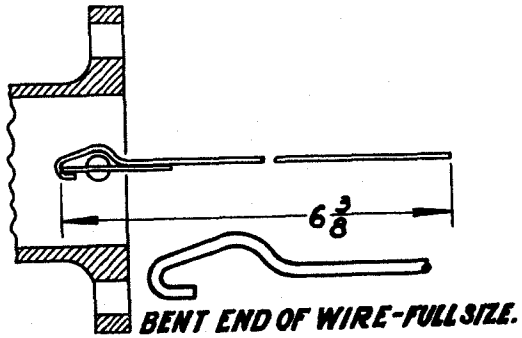



*Fig. 37—Testing Spring of Carburetor Automatic Throttle.*

hooking it over the throttle as shown, and with the carburetor in the horizontal position, noting the position which the throttle disc assumes. The disc should assume the horizontal position. If it does not and you are sure that the throttle shaft is free in its bearings, slightly loosen the screws holding the plate "X," Fig. 36, and turn the large adjusting cap. Turning this cap in the clockwise direction increases the tension of the spring; turning it in the counter-clockwise direction decreases the tension.

Make sure that the conical tube "J" is firmly fastened to its support.

Inspect the cork gasket against which the carburetor bowl presses. Also inspect the edge of the bowl which bears against the gasket. The gasket and the edge of the bowl must be in good condition.

Examine the tube which runs between the carburetor diaphragm and carburetor body. Also tubes "K" and "L." These tubes must not be crushed or obstructed in any way.

Remove the air valve spring and check it up. To remove proceed as follows: Remove the cover plate "M." Loosen the screw "N" and slide the cover "O" to one side. Remove the pins "P" and "Q." This will make it possible to so place the air valve "R" and the lever "S" that the spring may be removed without injuring it. The spring should have a free length of 1.040 inches to 1.080 inches and support a weight of four and three-fourths ounces avoirdupois when compressed five-sixteenths inch. When replacing the spring, insert the ends from the side of the lever and the side of the valve boss, which are nearest the adjusting screw "A," Fig. 13.

When replacing the lever "S," Fig. 36, be sure that the pin "T" is between the spring "U" and the lever "S." Also that the tongue at the upper end of the cover "O" does not bear against the lever.

The auxiliary air valve "R" must swing freely on the pin "Q" and must rest on the pin, not on the leather seat over the pin. The clearance between the valve and the leather seat at a point directly over the pin should be from one sixty-fourth inch to three sixty-fourths inch when the tip of the valve is seated.

The leather air valve seat should be in good condition. If replacement is necessary use tool number 55405 furnished by the Cadillac Motor Car Company.

The lever "S" must work freely in its guide. Test this by unscrewing the adjusting screw "A," Fig. 13, until the notches are free from the locking plunger, then forcing the upper end of the lever forward (away from the neck of the carburetor) as far as it will go and allowing it to return slowly to the normal position. The lever should be sufficiently free in its guide so that a normal spring in the lever arm will return it until its lower end touches the cover "O," Fig. 36.

The inlet needle valve "V" and its seat should be inspected carefully. The valve and seat should be clean and free from pits. The valve should be free from wear, which causes a shoulder on the tapered portion and results in a slow leak.

After replacing the diaphragm, inlet needle valve and carburetor float, set the float in accordance with directions in this book under "Setting of Carburetor Float," page 61. While holding the carburetor upside down observe the clearance between the float lever and the lower end of the needle valve guide. This clearance should be no less than .035 inches. If the required clearance does not exist, remove the float and valve and, with a mill file, file squarely across the guide. Be sure to remove all filings before replacing valve and float.



Remove the strainer at the carburetor inlet. Clean the strainer and inspect it.

Inspect the machined surface of the diaphragm against which the spray nozzle screws, also the machined surface of the nozzle which screws against the diaphragm. These surfaces must be in good condition. Replace the nozzle and tighten.

The throttle pump plunger "W" should work freely the entire length of the pump well, but the clearance should not exceed .006 inch.

To prevent the float striking it, the vent tube "K" must stand parallel with the bore of the throttle pump cylinder. The top end of the tube should stand nine sixty-fourths inch away from the edge of the bowl.

Replace the carburetor bowl, tightening the screw "C" before tightening the gland "D." If the adjustment of the rod "Y" has been altered re-adjust it so that its upper end is flush with the top face of lever to which it is attached.

***Replacement***

In replacing the carburetor reverse operations under "Removal." Be sure that the gasket between the carburetor and intake manifold is in good condition and that the cap screws holding the carburetor to the manifold are drawn down together and well tightened, also that the rod running from the steering post to the lever "S" stands in the center of the slot in the lever, when the auxiliary air valve lever on the steering post is pushed down as far as it will go. This rod is adjusted at the lever on the steering post.

After the carburetor is in place do not neglect to pull up the drain pocket tightly under it and lock it in place with the small set screw.

Adjust carburetor in accordance with directions under "Adjustment of Carburetor," page 58.

## POWER AIR COMPRESSOR IN THE GASOLINE SYSTEM

***Removal***

Disconnect the air pipe from the compressor by unscrewing the union.

Remove the two one-fourth inch nuts and washers and remove the compressor body.

Crank the engine over until the compressor piston is at the top of its stroke.

Remove the piston with connecting rod by sliding the connecting rod forward, then upward.

***Inspection***

Clean all parts with kerosene or gasoline and with a cloth wipe out the cylinder and wipe off the piston.

The cylinder and piston should be free from scores. There should be no more than .003 inch clearance between these parts.

There should be no more than .002 inch clearance between the piston pin and the piston and no more than .003 inch between the bearing at the lower end of the connecting rod and the eccentric upon which it operates.

Dissemble the check valve on the pump and thoroughly clean the valve and valve seat.

***Replacement***

Wipe out the cylinder, wipe off the piston and lubricate these parts with engine oil of a suitable quality before replacing.

See that the check valve stands in the upright position.

In replacing, reverse operations under "Removal."

## GASOLINE TANK

***Removal of Gasoline Quantity Gauge***

To remove the gasoline gauge, first remove the large nickel plated nut and the glass. The gauge can then be lifted out with a pointed tool inserted in the hole in the dial. Care must be exercised not to injure the cork gaskets.

***Removal of Tank***

Relieve the tank of all air pressure by removing the filler cap.

Remove the drain plug and drain the tank.

Disconnect the air and gasoline pipes from the tank by unscrewing the unions.

The tank can now be removed after removing the nut at the rear and the cotter pins and the two nuts at the front and pushing the tank forward. In removing the two forward nuts observe the manner in which the washers are placed. These washers must be replaced as originally assembled.

***Removal of Gasoline Strainer***

Remove the gasoline tank. (See on this page under "Removal of Tank.") This is necessary on all cars with the exception of touring cars. Touring cars are provided with a removable floor over the tank.

Remove the cotter pin from the valve stem. Remove the packing gland and remove the valve by unscrewing it.

Remove the four small cap screws and remove the connection plate with strainer and stand pipe.



***Inspection***

With the gasoline tank removed test it by screwing on and tightening the filler cap, replacing the drain plug, temporarily plugging the nipple from which the gasoline pipe was disconnected, attaching an air hose to the nipple from which the air pipe was disconnected, and with the tank immersed in water turning on an air pressure of approximately six pounds. As the valve on the gasoline tank is open under normal conditions it should be open during this test. Do not use a pressure greater than six pounds.

Test the gasoline quantity gauge by draining the gasoline tank, then refilling it with five measured gallons of gasoline. The gauge should indicate five. If it does not, remove it as directed under "Removal of Gasoline Quantity Gauge," page 134, and slightly bend the float arm.

Examine the valve and the valve seat. These should be in good condition.

***Replacement***

In replacing the stand pipe in the gasoline tank be sure that its lower end enters the hole in the support.

In replacing the washers on the forward tank supports make sure that they are replaced as originally assembled. When assembled correctly, a spherical joint is provided at the bottom of each forward support.

Before replacing the connection plate make sure that the gasket is in good condition.

# CLUTCH AND TRANSMISSION

## TRANSMISSION CASE

***Removal***

Remove and disassemble the transmission. (See "Removal and Disassembly" under "Transmission," pages 145 and 146.)

***Inspection***

With kerosene or gasoline clean all parts removed.

INSPECTION OF TRANSMISSION CASE—Carefully examine the transmission case and inspect all machined surfaces.

INSPECTION OF OTHER PARTS—Before replacing, inspect all parts removed in accordance with directions in this book.

***Replacement***

After inspecting all parts, reassemble and replace the transmission. (See "Reassembly and Replacement" under "Transmission," page 147.)

Refill the transmission with two quarts of suitable transmission lubricant. Cadillac Rear Axle and Transmission Lubricant is recommended.

## CLUTCH

The amount of wear on the clutch discs may be determined roughly, by noting the distance which the ends of the six studs "V," Fig. 39, project beyond the retainer plate "W." This inspection may be made after removing the floor boards and the hand hole plate "X." If the ends of the studs project more than one-half inch beyond the retainer plate, the clutch discs should be removed and recovered.

### *Removal of Clutch*

Remove the transmission. (See "Removal" under "Transmission," page 145.)

Remove the nut "T" and pull off the clutch.

### *Removal of Ball Thrust Bearing*

Remove the clutch. (See on this page under "Removal of Clutch.")

Remove the retainer which holds the thrust bearing to the clutch spider and remove the bearing. Ordinarily the bearing can be removed by pulling it off by hand.

### *Removal of Clutch Spring*

Remove the clutch. (See on this page under "Removal of Clutch.")

Place the clutch under an arbor press with the ball thrust bearing up. Place a block of wood over the upper end of the clutch spider and with the arbor press slightly compress the clutch spring.

Remove the nuts from the six long studs "V," Fig. 39.

Remove the clutch from the arbor press and remove the clutch spider and clutch spring.

### *Removal of Clutch Discs*

Remove the transmission. (See "Removal" under "Transmission," page 145.)

Compress the clutch spring by pushing down on the clutch pedal and place a piece of metal nine-sixteenths inch long between the screw collar which locks the rear annular ball bearing to the clutch connection shaft and the rear face of the clutch spider.

Remove the nuts from the six long studs "V" and remove the clutch discs.

### *Inspection*

Examine the ball thrust bearing. If the bearing is noisy or feels rough in spinning the races, replace it by a new one.

Be sure that the bearing is well filled with suitable lubricant. Cadillac Rear Axle and Transmission Oil is recommended.

The clutch spring should have a minimum free length of seven and one-half inches and should support a load of from 290 to 310 pounds when compressed to three and one-quarter inches.



Examine the clutch discs. There should be no more than .008 inch clearance between the driven discs and the keys of the clutch hub, and no more than .010 inch clearance between the teeth of the driving discs and the teeth in the clutch ring.

Examine the linings on the discs. If the total thickness of a disc with the two linings is less than five-sixteenths inch, the disc should be recovered. (See under "Relining Clutch Discs," page 63.)

Warped clutch discs should be straightened or replaced.

Examine the faces of the driven discs.

The six long studs should be tight in the plate to which they are fastened.

The clutch hub should be a sliding fit on the splines of the clutch connection.

### *Replacement*

In replacing, reverse operations under "Removal."

In replacing the discs, make sure that the small reinforcements on the driven discs are on the driving sides of the keys of the clutch hub. Also that the teeth of driving discs line up.

In replacing the nuts on the six long studs, screw them down until their upper faces are just flush with the ends of the studs.

## TIRE AIR COMPRESSOR

### *Removal*

Remove the floor boards.

Remove the drain plug "Q," Fig. 39, and drain the transmission.

Remove the copper pipe which connects the compressor and the frame of the car.

Remove the pull back spring from the connecting link on the compressor shifter shaft.

Remove the set screw which holds the shifter shaft in place and remove the shaft with connecting link.

Remove the four nuts which hold the body of the compressor to the transmission case and remove the compressor.

### *Disassembly*

Remove the plate at front end of the crankcase of the compressor, Fig. 38.

Remove the nut at the top of the compressor cylinder, also the valve and spring.

Remove the four machine screws holding the cylinder in place and remove the cylinder.

Remove the two pieces of felt and the felt retainers.

Remove the connecting rod with piston. With the piston at the highest point in its stroke the connecting rod can be removed by sliding it forward.

Remove the locking ring at the rear of the forward crankshaft bearing and pull out the crankshaft.

To remove the shifter yoke from the shaft, drive out the taper pin between these parts. The taper pin can be driven out after removing the small machine screw in the side of the case.

The bushings in which the crankshaft rotates can be removed by tapping them out.

The piston pin can be removed by first pulling out the cotter pin, then lightly tapping it out.

### *Inspection*

Clean all parts with kerosene or gasoline.

Inspect the cylinder bore. It should be free from scores.

Clearance between the piston and cylinder should not exceed .006 inch.

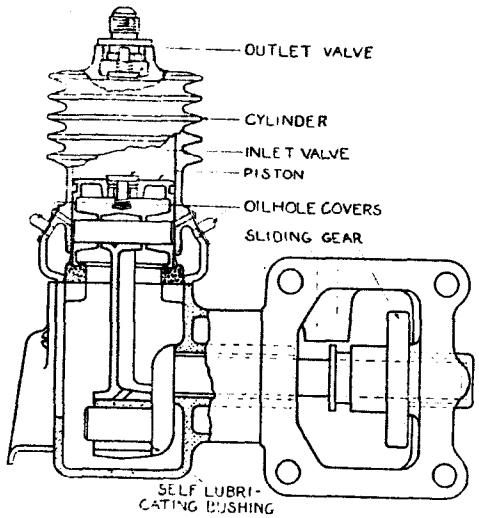



*Fig. 38—Tire Air Compressor, Sectional View*

The clearance between the crankshaft and its bearings should not exceed .004 inch.

The clearance between the crankshaft and the driving gear should not exceed .005 inch.

Inspect the teeth of the driving gear.

The clearance between the piston pin and the piston should not exceed .003 inch.



The clearance between the crank pin bearing and the crank pin should not exceed .004 inch.

Placed on lathe centers, the crankshaft should run true within .002 inch.

Inspect the felts. They should be in good condition and well soaked with engine oil.

Inspect the inlet and exhaust valves, regrinding them if necessary.

Inspect the intake and exhaust valve springs. The intake and exhaust valve springs should have a free length of one-half inch. When the valve is opened one-sixteenth inch, the exhaust valve spring should show a pressure of seven and one-half ounces, the inlet valve spring four and one-half ounces.

### *Replacement*

In replacing, reverse operations under "Removal."

After replacing the drain plug "Q" refill the transmission with suitable transmission lubricant. Cadillac Rear Axle and Transmission Lubricant is recommended. Two quarts of lubricant are required.

## CLUTCH CONNECTION AND CLUTCH CONNECTION REAR BEARING

### *Removal*

Remove the clutch. (See "Removal of Clutch" under "Clutch," page 136.)

Remove the transmission cover plate.

Remove the six cap screws which hold the clutch connection bearing cap in place, and remove the clutch connection with bearing.

Remove the locking ring which holds the check nut in place and remove the nut (left-hand thread).

Remove the oil throw-off ring.

The bearing can be removed from the shaft by tapping it off.

### *Inspection*

With gasoline or kerosene clean all parts removed.

INSPECTION OF THE CLUTCH CONNECTION AND REAR BEARING—Examine the clutch connection. Placed between lathe centers it should run true within .0025 inch. The bore in which the roller bearing operates should be smooth and free from pits. The faces of the gear teeth should show very little wear and should be free from pits. The clutch hub should be a light press fit on the splines of the clutch connection.

Inspect rear bearing on the clutch connection. The bearings should rotate smoothly. There should be no more than .015 inch end play in the races.

INSPECTION OF OTHER PARTS—Examine the roller bearing. The rolls should be free from pits and not chipped on the ends.

Examine the ball bearing which supports the forward end of the clutch connection. It should rotate smoothly and quietly and have no more than .015 inch end play. With the clutch connection, main transmission shaft, and roller bearing in place, there should be no more than .004 inch shake between the shaft and the clutch connection.

***Replacement***

In replacing, reverse operations under "Removal."

SHIPPER GEARS

***Removal of High and Intermediate Shipper Gear***

Remove the jackshaft. (See "Removal" under "Jackshaft and Jackshaft Gears," page 142.)

Remove the transmission shaft. (See "Removal" under "Main Transmission Shaft and Main Transmission Shaft Rear Bearing," page 144.) In pulling out the shaft do not allow the shipper gears to drop.

The high and intermediate shipper gear can now be removed.

***Removal of Low and Reverse Shipper Gear***

Remove the jackshaft. (See "Removal" under "Jackshaft and Jackshaft Gears," page 142.)

Remove the main transmission shaft. (See "Removal" under "Main Transmission Shaft and Main Transmission Shaft Rear Bearing," page 144.) In pulling out the shaft do not allow the shipper gears to drop.

Remove the top cover plate.

Remove the right-hand shifter shaft (see "Removal" under "Shifter Forks and Shafts," page 144), and remove the low and reverse shipper gear.

***Inspection***

With kerosene or gasoline clean all parts removed.

INSPECTION OF GEARS—The clearance between the sides of the splines of the shaft and the sides of the spline ways of the shipper gears should not exceed .004 inch.

The teeth of the gears should show very little wear and be free from pits.

There should be no more than .015 inch between the shifter fork and groove in the gear in which it operates.

INSPECTION OF OTHER PARTS—Inspect the main transmission shaft and its bearings. (See "Inspection" under "Main Transmission Shaft and Main Transmission Shaft Rear Bearing," page 145.)

Inspect the jackshaft gears and bearings. (See "Inspection of Jackshaft and Jackshaft Gears" under "Jackshaft and Jackshaft Gears," page 142.)



Inspect the teeth of the clutch connection gear and of the reverse gear. The faces of the teeth should show very little wear and be free from pits.

***Replacement***

In replacing, reverse operations under "Removal of High and Intermediate Shipper Gear" and under "Removal of Low and Reverse Shipper Gear," page 140.

Refill the transmission up to the proper level with suitable transmission lubricant. Cadillac Rear Axle and Transmission Lubricant is recommended. Two quarts are required.

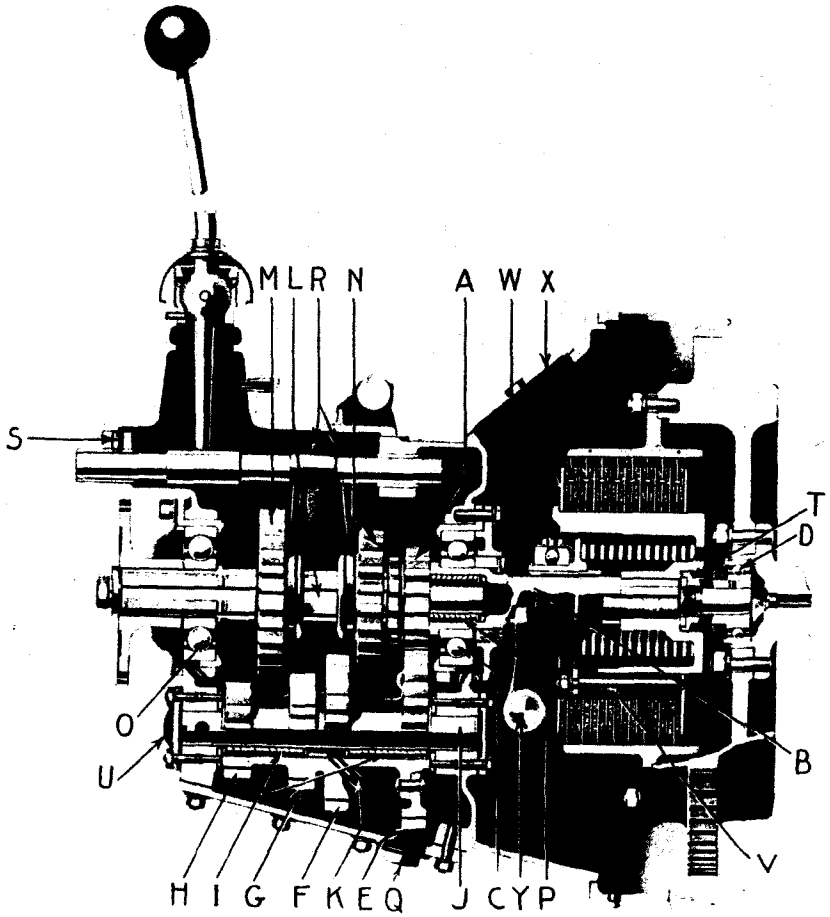



Fig. 39—Clutch and T...

## JACKSHAFT AND JACKSHAFT GEARS

### *Removal*

Remove the plug "Q," Fig. 39, and drain the transmission.

Remove the bottom cover plate. The plate is held in place by nine five-sixteenth inch nuts.

Determine the amount of end play in the jackshaft. (See under "Inspection of Jackshaft and Jackshaft Gears," page 142.)

Remove the shield over the forward universal joint.

Remove the lower shield bracket.

Remove the cap "U."

Remove the screw which holds the shaft "J" in place.

Remove the shaft "J." To do so, screw a ½ inch x 12 cap screw into the rear end of the shaft and with the cap screw pull out the shaft. Be careful in removing the shaft that neither the jackshaft, nor the spacer washers drop.

### *Inspection*

With kerosene or gasoline, clean all parts removed.

INSPECTION OF JACKSHAFT AND JACKSHAFT GEARS—Inspect the teeth of the gears. Gear teeth faces should show but little wear and be free from pits.

Examine the bore of the jackshaft which carries the gears.

With the roller bearings, and the shaft "J," Fig. 39, in place there should be no more than .004 inch play between the shaft "J" and the jackshaft.

The jackshaft when in place in the transmission should have no more than .015 inch end play.

INSPECTION OF OTHER PARTS—Inspect the roller bearings. The rolls should be free from pits and not chipped at the ends.

Inspect the bearing surfaces of the shaft "J."

Inspect the teeth of the gears which mesh with teeth of the jackshaft gears. The faces of the teeth should show but little wear and be free from pits.

### *Replacement*

In replacing, reverse operations under "Removal."

After replacing the bottom cover plate and the drain plug, refill the transmission with enough transmission lubricant of suitable quality to bring the level up to the filling hole. This will require approximately two quarts. Cadillac Rear Axle and Transmission Lubricant is recommended.

## CONTROL LEVER

### *Removal*

Remove the ball at the top of the control lever by unscrewing it.



Remove the nut which holds the nickel plated dust cover in place and remove the dust cover.

Remove the large adjusting collar by unscrewing it and remove the felt washer.

The control lever can now be removed by lifting it out. Care must be exercised not to drop the centralizing pin into the transmission.

### *Inspection*

INSPECTION OF CONTROL LEVER—Inspect the ball on the control lever which supports it. If the ball has been injured clean it up with a fine mill file.

INSPECTION OF OTHER PARTS—Inspect the centralizing pin.

Inspect the felt washers.

Inspect the seat in which the ball of the control lever rests.

### *Replacement*

In replacing, make sure that the centralizing pin is properly in place before replacing the felt washer and screwing down the collar.

## REVERSE PINION

### *Removal*

Remove the drain plug "Q," Fig. 39, and drain the transmission.

Remove the tire air compressor. (See "Removal" under "Tire Air Compressor," page 137.)

Determine the amount of end play in the reverse pinion. (See on this page under "Inspection.")

Remove the set screw which holds the reverse pinion shaft in place. This screw is in the left-hand side of the transmission case.

Remove the reverse pinion, being careful not to drop the spacing washer at the rear end of the pinion.

### *Inspection*

With kerosene or gasoline carefully clean all parts.

There should be no more than .004 inch clearance between the bearing in the pinion and the shaft. If it is necessary to replace the bearing press it out and press in the new one. Ream the new bearing to .937 inch to .938 inch after it is in place.

When the gear is in place in the transmission case there should be no more than .015 inch end play.

Inspect the pinion teeth. The faces of the teeth should be free from pits and show very little wear.

### *Replacement*

In replacing, reverse operations under "Removal."

In replacing the pinion have the beveled ends of the teeth forward.

After bolting the tire air compressor in place and replacing the drain plug "Q," refill the transmission case up to the level of the filling plug with transmission lubricant of the proper quality. Cadillac Rear Axle Transmission Lubricant is recommended. Two quarts of lubricant are required.

### SHIFTER FORKS AND SHAFTS

#### *Removal*

Remove the transmission top cover plate. The plate is held in place by six cap screws.

Remove the threaded dowel pin "R," Fig. 39. To do so place over it a washer large enough to permit the pin to be pulled through it, and screw on and tighten a ¼ inch x 20 nut.

Remove the dowel pin screw "S."

Remove the cotter pin, spring and plunger from the front end of the shifter fork shaft. These are located at each side of the transmission case.

The shaft may now be removed by tapping it out through the rear end of the transmission case, at the same time driving out the rear bearing. There is a nine-sixteenth inch ball between the bearings which support the front ends of the shifter fork shafts. The purpose of the ball is to make it impossible to bring both shipper gears into mesh at the same time. Do not allow this ball to drop into the transmission case, and be sure to remove it in case it does.

#### *Inspection*

With kerosene or gasoline clean all parts removed.

INSPECTION OF SHIFTER FORK AND SHAFT—There should be no more than .004 inch clearance between the shaft and the bushings in which it operates.

There should be no more than .015 inch between the shifter fork and the groove in the gear in which it operates.

The shaft placed on lathe centers should run true within .003 inch.

INSPECTION OF OTHER PARTS—The plunger spring should have a free length of one and one-half inches, and when compressed to one and one-eighth inches should support a load of 12 pounds.

Examine the locking plunger. It should be free from scores.

#### *Replacement*

In replacing, reverse operations under "Removal."

### MAIN TRANSMISSION SHAFT AND MAIN TRANSMISSION SHAFT REAR BEARING

#### *Removal*

Remove the floor boards.

Remove the plug "Q," Fig. 39, and drain the transmission.



Remove the top cover plate. The plate is held in place by six cap screws.

Remove the shield over the forward universal joint. The shield is held in place by two small machine screws.

Remove the six bolts holding the front universal joint to the flange on the transmission shaft and remove the joint. Be careful in removing the bolts that the joint does not drop.

Remove the six cap screws directly back of the flange and remove the transmission drive shaft and bearing.

Remove the large cap screw which holds the flange to the shaft and remove the flange with a puller or by tapping it off.

Remove the felt washer, felt washer retainer, steel plate and gasket.

Remove the spacing collar and the oil throw-off ring.

The bearing can now be removed from the shaft by tapping it off.

#### *Inspection*

With gasoline or kerosene clean all parts removed.

INSPECTION OF SHAFT AND BALL BEARINGS—The main transmission shaft placed on lathe centers should run out of true no more than .0025 inch.

There should be no more than .004 inch clearance between the sides of the splines on the shaft and the sides of the spline ways in the shipper gears.

The large annular ball bearing should rotate smoothly and quietly and should have no more than .015 inch end play.

There should be no more than .004 inch shake between the front end of the main transmission shaft and the clutch connection when these parts are in place with the roller bearing.

INSPECTION OF OTHER PARTS—Inspect the roller bearing. It should be free from pits and chips.

Examine the teeth of the gears. These should show very little wear and be free from pits.

Examine the felt washer. If it is worn replace it. It should be well soaked in engine oil.

Inspect the forward universal joint. (See "Inspection" under "Universal Joints," page 148.)

#### *Replacement*

In replacing, reverse operations under "Removal."

### TRANSMISSION

#### *Removal*

Remove the floor boards.

Disconnect the brake rods at the hand brake lever and at the brake pedal.

Remove the accelerator pedal. Then remove the accelerator shaft with arm, and disconnect at the engine the rod between the arm and the engine.

Remove the shield over the forward universal joint. The shield is held in place by two small screws.

Disconnect the universal joint from the flange on the transmission shaft. The joint is held to the flange by six bolts.

Remove the copper tube between the tire air compressor and the frame of the car.

Disconnect the clutch control rod from the lever at the bottom end of the rod, and remove the clutch pedal pull-back spring.

Remove the starter pedal.

Lift front end of car about twelve inches.

Remove the eight bolts holding the transmission to the crankcase. Remove the transmission by moving it straight back. Care must be exercised in removing the transmission not to drop it.

### *Disassembly*

Remove the clutch. (See "Removal of Clutch" under "Clutch," page 136.)

Remove the drain plug "Q," Fig. 39, and drain the transmission.

Remove the tire air compressor. (See "Removal" under "Tire Air Compressor," page 137.)

Remove the clutch release shaft "Y." To remove the shaft proceed as follows: Remove the lever from the left-hand end of the shaft, also remove the Woodruff key.

Remove the two taper pins which hold the clutch release yoke to the shaft. The shaft may now be removed, tapping it out from the left side.

Remove the transmission top cover plate by removing the six cap screws.

Remove the transmission bottom cover plate.

Remove the shifter forks and shafts. (See "Removal" under "Shifter Forks and Shafts," page 144.)

Remove the reverse pinion. (See "Removal" under "Reverse Pinion," page 143.)

Remove the main transmission shaft. (See "Removal" under "Main Transmission Shaft and Main Transmission Shaft Rear Bearing," page 144.)

Remove the jackshaft with gears. (See "Removal" under "Jackshaft and Jackshaft Gears," page 142.)

Remove the clutch connection and the large annular ball bearing. (See "Removal" under "Clutch Connection and Clutch Connection Rear Bearing," page 139.)



Remove the mounting for the annular ball bearing. This may be removed by tapping it out.

Remove the hand brake lever ratchet.

Remove the hand hole cover "X."

### *Inspection*

Inspect all parts removed in accordance with directions in this book.

### *Reassembly and Replacement*

In reassembling and replacing the transmission, reverse operations under "Disassembly" and under "Removal."

Before replacing the transmission make sure that the annular ball bearing "D" is in good condition and well lubricated.

The forward end of the clutch connection shaft is milled off to receive the key in collar which fits into the annular ball bearing "D." In replacing the transmission, first make certain that the key in the collar and the key-way in the shaft, line up. This is very important. Care must be exercised in replacing the transmission not to damage the ball bearing or the clutch connection shaft.

## UNIVERSAL JOINTS AND REAR AXLE

### UNIVERSAL JOINTS

### *Removal of Forward Universal Joint*

Remove the shield over the joint. The shield is held in place by two small machine screws.

Remove the six bolts which hold the joint to the flange on the rear end of the transmission shaft. Care must be exercised not to allow the joint or shaft to drop.

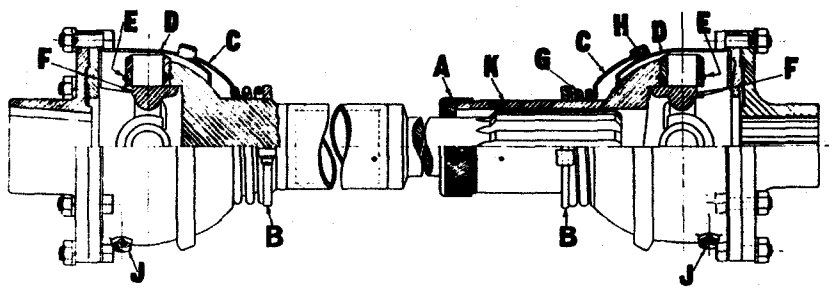



*Fig. 40—Universal Joints and Drive Shaft.*

Remove the collar "A," Fig. 40, by unscrewing it. The joint can now be removed.

### *Removal of Rear Universal Joint*

Remove the six bolts holding the universal joint to the flange on the shaft of the axle. Care must be exercised not to allow the joint to drop.

Remove the collar "A" by unscrewing it.

The joint with drive shaft can now be removed by lowering it and pulling it back. Do not allow the forward end of the shaft to drop.

***Disassembly of Universal Joints***

Remove the joints as directed under headings "Removal of Forward Universal Joint," and "Removal of Rear Universal Joint," page 147.

Remove the clamps "B" and the shields "C" and "D."

Remove the locking rings "E" and tap out the bushings. The crosses can then be removed.

***Inspection***

Thoroughly clean all parts with kerosene or gasoline.

The drive shaft, placed between lathe centers, should run true within .020 inch.

There should be no more than .003 inch clearance between the sides of the splines of the drive shaft and the sides of the spline ways in the hub of the forward joint.

The clearance between the six bolts which attach each joint and the holes in the flanges should not exceed .002 inch.

There should be no more than .005 inch clearance between the arms of the crosses of the joints and the bushings in which they operate, and no more than .010 inch clearance between the sides of the yokes and the shoulders of the crosses.

Inspect the welded joints of the drive shaft.

Inspect the housings "C" and "D," also the packing washers "H."

Inspect the threads of the filler plugs "J" and the threads in the housings "D" into which they screw.

***Replacement***

In reassembling, have the "O" on the drive shaft and the "O" on the hub of the forward joint point directly toward each other. This will bring the yokes on the drive shaft ends in the same plane.

Make sure that the filling holes in the casings "D" do not come opposite the ends of the universal crosses, but directly between the ends. This will make it easier to fill the joints.

After replacing the joints refill each with eleven ounces of suitable lubricant. Cadillac Universal Joint Lubricant is recommended.

## REAR AXLE

***Removal***

Block the front wheels and jack up the rear end of the frame at least six inches. Block up the frame securely.

Disconnect the four brake rods at the brake arms on the axle.

Disconnect the rear universal joint by removing the six bolts. Do not allow the joint to drop.



Disconnect the front end of the torque arm from the torque arm bolt, by removing the cotter pin and the nut at the bottom of the bolt. Do not allow the torque arm to drop.

Remove the nuts from the two spring clips at each side, and disconnect the rebound straps.

The axle complete with wheels can now be rolled from under the car.

***Disassembly***

Remove the wheels. (See "Removal of Rear Wheel and Bearings" under "Wheels," page 165.)

Remove the brake bands. (See under "Brakes," page 149.)

Remove the differential complete with gear. (See "Removal" under "Differential and Large Driven Gear," page 150.)

Remove the driving pinion and pinion shaft. (See "Removal" under "Driving Pinion and Pinion Shaft," page 153.)

The adjusting collars "I" and "K," Fig. 15, may be removed after loosening the large clamping bolts across the top of the housing and taking off the cover plate on the side of the housing. (If the axle is the early type with the locking plate on top, it will be necessary to remove the clamping bolts.)

Remove the long brake shafts. These may be pulled out after removing the cotter pins just back of the dust shields for the brakes and then loosening the clamp bolts on the brake arms.

Remove the torsion arm by taking out the torsion arm bolt. This bolt is held in place by a nut on one end and two clamps in the housing.

Remove the differential carrier from the housing. The carrier is held in place by sixteen nuts.

Remove the tie rod.

Remove the felt oil retainers in the housing. To do so, remove at east two of the three small cotter pins and remove the split retainer.

***Inspection***

Inspect all parts in accordance with directions in this book.

***Reassembly and Replacement***

In reassembling and replacing the axle, reverse operations under "Disassembly" and under "Removal."

## BRAKES

***Removal of External Brake Band***

Remove the wheel. (See "Removal of Rear Wheel and Bearings" under "Wheels," page 165.)

Remove the brake pull rod and the pull back spring from the upper end of the lever "D," Fig. 16.

Remove the cotter pin, the adjusting nut "A" and the spring.

Remove the nut from the rear end of the bracket which acts as a stop for the two nuts "B."

Remove the nut "C" and the brake band.

***Removal of Internal Brake Band***

Remove the wheel. (See "Removal of Rear Wheel and Bearings" under "Wheels," page 165.)

Remove the cotter pins from the support just to the rear of the adjusting screws "R," Fig. 16.

Remove the cotter pin, the adjusting nut "J" and the spring.

Remove the pin "M" and remove the brake band.

***Inspection***

Inspect the brake band lining. The lining should be at least three thirty-seconds inch thick and not glazed. If it is glazed clean it up with gasoline and a stiff wire brush. Lining rivets should be tight and the heads should be beneath the surface of the lining. If it is necessary to reline a brake band follow directions under "Relining Brake Bands," page 72.

All brake pins should fit the shackles and levers within .005 inch.

Brake bands when in place, in correct adjustment and released, should be equally distant at all points from the brake drum. If not. the bands should be reshaped.

***Replacement***

After replacing the brake bands adjust them in accordance with directions in this book under "Brakes," page 69.

## DIFFERENTIAL AND LARGE DRIVEN GEAR

***Removal***

It is unnecessary to remove the axle in order to take out the differential.

Remove the axle shafts by removing the hub caps and locking rings and pulling them out.

Remove the sixteen nuts which hold the rear cover plate "L" in place, Fig. 15, and remove the plate.

Remove the wires which lock the four large cap screws and loosen the screws. Unscrew the adjusting collars "T" and "N" one-half turn or more, then remove the four large cap screws and the bearing caps "O" and "R." Be careful not to drop the differential.

Remove the differential complete with driven gear.

***Disassembly***

To remove the large driven gear cut off the rivet heads, being careful not to spring the gear or flange of the differential housing, and tap out the rivets.

To disassemble the differential remove the twelve cap screws and separate the halves of the housing.



***Inspection***

With gasoline or kerosene thoroughly clean all parts.

INSPECTION OF DIFFERENTIAL AND DRIVEN GEAR—The flange of the differential housing should run true laterally and radially within .002 inch.

Examine the faces of the teeth of the driven gear, and of those of the six differential gears. They should show but little wear and should not be pitted. The teeth should not be chipped on the ends.

The hubs of the two large differential gears should have no more than .005 inch clearance in the hub of the cross. The end play in these two gears when the differential halves are bolted together should not exceed .008 inch.

The four small differential gears should have no more than .006 inch clearance on the arms of the cross and no more than .010 inch end play, when in place in the differential housing.

The ends of the cross should fit tightly into the differential housing.

INSPECTION OF OTHER PARTS—Examine the mountings, cones and rolls of the roller bearings. They should be smooth, free from pits and not chipped on the ends. The cages for the rolls should be in good condition.

With the bearing caps bolted in place the mounting for the roller bearings and the adjusting collars should be clamped.

Examine the faces of the pinion teeth. They should show but little wear and should be free from pits. The ends of the teeth should not be chipped.

***Replacement***

In replacing, reverse operations under "Removal."

After replacing differential adjust the bearings in accordance with directions in this book under "Adjustment of Gear and Pinion Bearings," page 65.

After replacing the rear cover plate and tightening the sixteen nuts, refill the housing with suitable lubricant. Cadillac Rear Axle and Transmission Lubricant is recommended. Five quarts are required.

## REAR AXLE HOUSING

***Removal***

Remove and disassemble axle. (See "Removal and Disassembly" under "Rear Axle," pages 148 and 149.)

***Inspection***

With kerosene or gasoline clean all parts.

INSPECTION OF HOUSING—Draw a line through the axle having it pass through the centers of the axle ends at "A" and "B," Figs. 41 and 42. Dimensions "C" and "D," Fig. 41, taken from the line to the front and rear machined faces of the housing should vary by no more

than one thirty-second inch. Dimensions "E" and "F," Fig. 42, taken from the line to the centers of bolt holes "H" and "I" in the front face of the housing should vary by no more than one-thirty second inch.

The spring seats should have no more than .010 inch lateral play and no more than .006 inch radial play. The radial play can be taken up by reducing the edges of the caps with a mill file.

All rivets should be tight.

The threads on the ends of the housing should be in good condition.

INSPECTION OF OTHER PARTS—Inspect all parts removed in accordance with directions in this book.




*Fig. 41—Rear Axle Housing, Top View.*

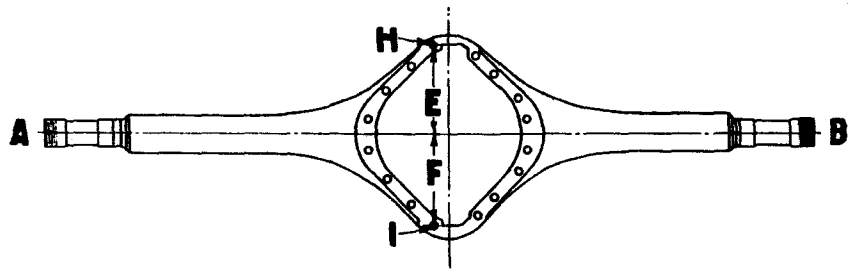



*Fig. 42—Rear Axle Housing, Side View.*

***Reassembly and Replacement***

After inspecting all parts reassemble and replace the axle. (See "Reassembly and Replacement" under "Axle," page 149.)

## AXLE SHAFTS

***Removal***

Remove the oiler "A," Fig. 49, and remove the hub cap "B" by unscrewing.

Remove the locking ring "K."

Determine the amount of clearance between the drivers on the axle flange and the recesses which receive the drivers in the hub of the wheel. (See under "Inspection.")

Withdraw the axle shaft. If the axle shaft sticks it may be removed by tapping a cold chisel between the inner faces of the drivers on the axle flange and the bottoms of the recesses in the hub flange. If one of the axle shafts fits particularly tight, remove the looser one in accordance with these directions and drive out the other, by passing a bar of suitable size and length through the opposite end of the axle housing.

***Inspection***

There should be no more than .010 inch clearance between the drivers on the flange of the axle shaft and the recesses in the hub which receive the drivers.



The clearance between the splines of the axle shaft and the spline ways in the hub of the differential gears should not exceed .006 inch.

Placed on lathe centers the axle shaft should run out of true no more than .004 inch.

***Replacement***

The longer axle shaft goes on the right side.

After replacing the hub cap lock it with the oiler "A."

## DRIVING PINION AND PINION SHAFT

***Removal***

It is unnecessary to remove the axle to remove the pinion and shaft.

Remove the differential complete with driven gear. (See "Removal" under "Differential and Large Driven Gear," page 150.)

Disconnect the rear universal joint by removing the six bolts. Do not allow the joint to drop.

Remove the nut which holds the flange to the axle shaft and remove the flange either with a puller or by tapping it off.

Remove the six small screws directly at the rear of the flange and remove the dust washer, packing, packing washer and spring.

Pull out through the rear of the housing the pinion with the shaft and the rear bearing. The front bearing may be removed through the front end of the housing.

The bearing mountings can be removed after loosening the two long clamping bolts across the top of the housing.

To remove the pinion from the shaft, first remove the cotter pin and the large nut on the end of the shaft, then remove the pinion from the shaft either with a press or by tapping it off.

***Inspection***

Clean all parts with kerosene or gasoline.

INSPECTION OF PINION AND SHAFT—Inspect the faces of the teeth of the pinion. They should show very little wear, and be free from pits. The teeth should not be chipped on the ends.

The shaft placed on lathe centers should run true within .002 inch.

The pinion should be tight on the end of the shaft.

Examine the threads on each end of the pinion shaft, also those in the nuts.

INSPECTION OF OTHER PARTS—Examine the bearing mountings, rolls and cones. These parts should be smooth and free from pits and not chipped. The bearing cages should be in good condition.

The cone of the rear bearing should have no more than .002 inch

clearance on the hub of the pinion. The cone of the forward bearing should have no more than .002 inch clearance on the shaft.

With the bolts across the top of the housing tightened, the bearing mountings and the adjusting collars should be clamped in the housing.

Examine the faces of the teeth of the driven gear. They should show but little wear and should be free from pits. The ends of the teeth should not be chipped.

### *Replacement*

In replacing the pinion and pinion shaft, reverse operations under "Removal." In replacing the bearings, the driven gear and the driving pinion, make adjustments in accordance with directions in this book under "Rear Axle," page 65.

Refill the axle with suitable lubricant. Cadillac Rear Axle and Transmission Lubricant is recommended. Five quarts are required.

## FRONT AXLE AND STEERING GEAR

### STEERING ARMS

### *Removal*

Remove the nut "P," Fig. 47, from the parallel rod bolt.

In removing the left steering arm, next disconnect the steering connecting rod from the arm. (See "Disconnecting Front End" under "Steering Connecting Rod," page 164.)

Remove the cotter pin and the large nut from the rear end of the arm and drive out the arm.

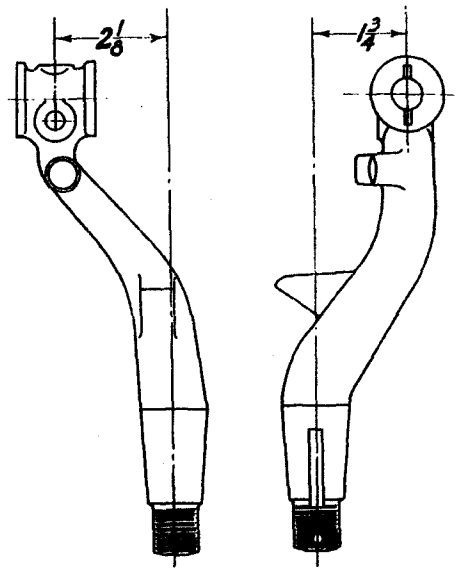



*Fig. 43—Right Spindle Arm.*



### *Inspection*

INSPECTION OF ARM—Examine the threads on the steering arm, also the threads in the large nut.

Determine if the arm is bent or sprung. (See Figs. 43 and 44.) (See under "Straightening Bent Parts," page 76.)

Examine the forging carefully.

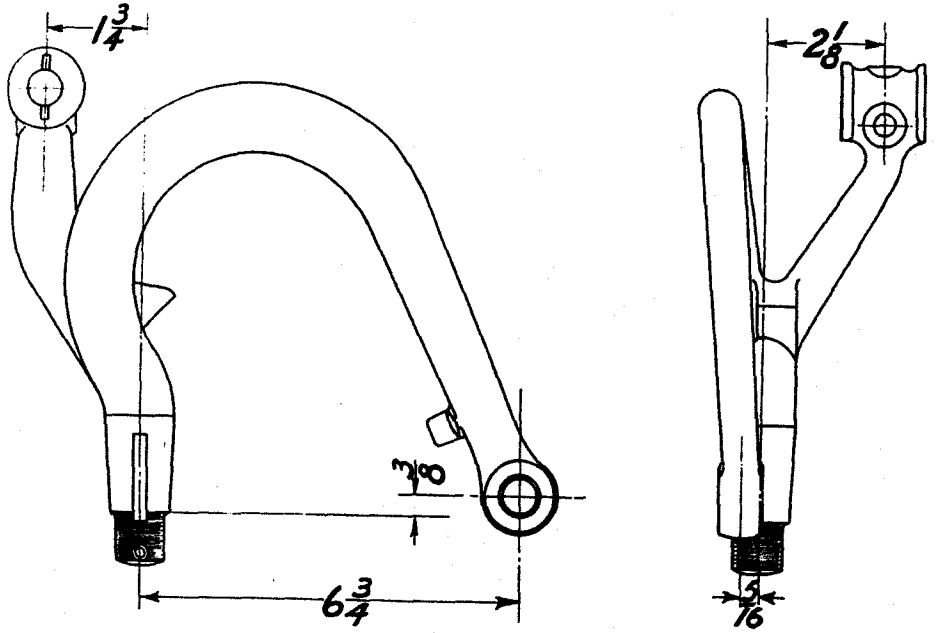



*Fig. 44—Left Spindle Arm.*

INSPECTION OF OTHER PARTS—There should be no more than .005 inch clearance between the bushings in the parallel rod yoke and the bolt. If it is necessary to remove one of these bushings, do so with a press or drive it out, and press or drive in the new one.

If the left-hand steering spindle is removed examine the pivot on the arm. It should be round within .010 inch.

Examine the threads in the end of the steering connecting rod, also the threads on the adjusting screw and the surfaces of the bronze bearings.

### *Replacement*

In adjusting the screw at the front end of the steering connecting rod do not take it up too tightly. Tighten it only sufficiently to take up all shake.

Do not tighten the nut "P," Fig. 47, sufficiently to bind the yoke on the steering arm.

## FRONT AXLE

### *Removal*

Jack up the front end of the car until the front wheels are free from the ground.

Remove the front wheels. (See "Removal of Front Wheel and Bearings" under "Wheels," page 164.)

Disconnect the speedometer cable at the spindle.

Disconnect the front end of the steering connecting rod. (See "Disconnecting Front End" under "Steering Connecting Rod," page 164.)

Remove the nuts on the four spring clips which hold the axle to the spring and remove the spring clips and axle complete with spindles.

### *Disassembly*

Remove the grease cups from the spindles and steering arms.

Remove the parallel rod. (See "Removal" under "Parallel Rod," page 157.)

Remove the spindles with steering arms. (See "Removal" under "Front Axle Spindles," page 158.)

Remove the roller bearing mountings in the upper ends of the axle yokes and the plain bearings at the lower ends of the axle yokes by tapping them out.

### *Inspection*

Lines "C" and "D," Fig. 45, drawn through the centers of the bores in the axle yokes from which the bearing mountings and bearing bushings were removed, should be in the same plane and parallel. (See under "Straightening Bent Parts," page 76.)

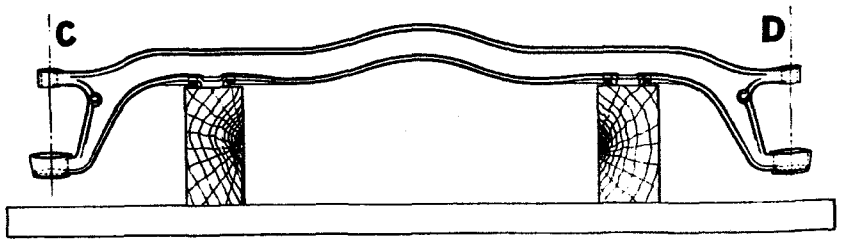



*Fig. 45—Inverted Front Axle, Side View.*

The center line of the bores in the yokes should incline one-eighth inch from the upper face of the upper yoke to the lower face of the lower yoke. This may be tested by placing the axle upside down upon parallel bars as shown in Figs. 45 and 46, and with a square as shown in Fig. 46, taking dimensions "A" and "B." These dimensions should differ by approximately one-eighth inch.



The mountings at the upper ends of the yokes, and the bushings in the lower ends of the yokes should be a press fit into the axle.

The mountings, cones and rolls of the roller bearings should be smooth, free from pits and not chipped. The cages should be in good condition.

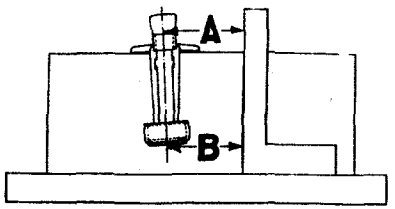



*Fig. 46—Inverted Front Axle, End View.*

There should be no more than .005 inch clearance between the spindle bolt and the bushing at the lower end of the axle yoke.

Inspect the spindles. (See "Inspection of Spindle" under "Front Axle Spindles," page 159.)

### *Replacement*

In replacing the spindle bolts adjust the nuts at the lower ends in accordance with directions under "Adjustment of Spindle Bearing," page 72.

Adjust the front wheel bearings in accordance with directions under "Adjusting Front Wheel Bearings," page 75.

In adjusting the nut at the front end of the steering connecting rod do not adjust it too tightly. Tighten it only sufficiently to take up all shake.

Adjust the spindle arm stop screws "H," Fig. 47, in accordance with directions under "Spindle Arm Stop Screws," page 72.

## PARALLEL ROD

### *Removal*

Remove the nut "P," Fig. 47, at each end of the parallel rod.

Remove the taper pins which prevent the parallel rod bolts from turning and tap out the bolts, being careful not to damage the threads.

### *Inspection*

INSPECTION OF PARALLEL ROD—Examine the rod. It should be straight and free from dents. The threads on the ends of the rod and in the rod yokes should be in good condition.

There should be no more than .005 inch clearance between the bushings in the yokes and the bolts. If it is necessary to replace

one of the bushings remove it with a press, or by driving it out, and press, or carefully drive in, the new bushing.

INSPECTION OF OTHER PARTS—Examine the bearing surfaces of the spindle bolts, also the threads on the ends of the bolts and the threads in the nuts.

### *Replacement*

In replacing the yokes on the rod have the threaded ends at each end extend an equal amount into the yokes.

After replacing the rod, align the front wheels in accordance with directions in this book under "Alignment of Front Wheels," page 75. Do not re-align the front wheels by adjusting one yoke only. Adjust both yokes so that the parallel rod will extend into each yoke an equal amount after the work is completed. Be sure that the parallel rod extends into each yoke at least one inch.

Do not tighten the nuts "P" sufficiently to bind the yokes on the steering arm.

## FRONT AXLE SPINDLES

### *Removal*

Jack up the axle and remove the wheel. (See "Removal of Front Wheel and Bearings" under "Wheels," page 164.)

Remove the nut "P," Fig. 47, from the parallel rod bolt.

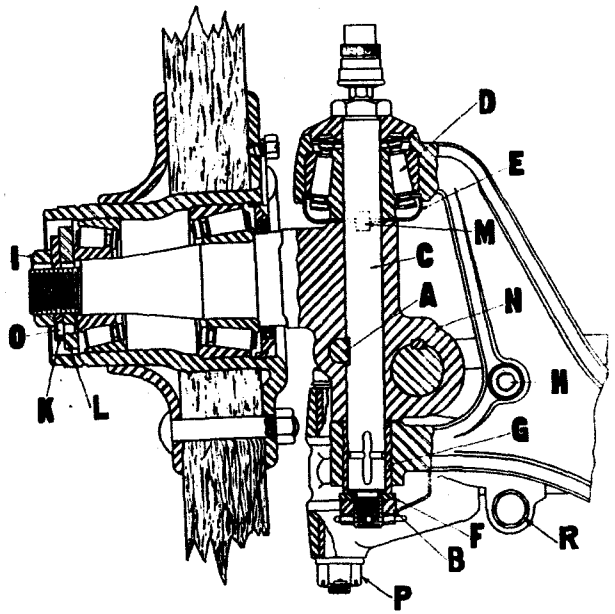



*Fig. 47—Left Front Spindle.*



Remove the taper pin which prevents the parallel rod bolt from turning and tap out the bolt, being careful not to damage the threads.

If removing a left spindle, next disconnect the steering connecting rod from the steering arm. (See "Disconnecting Front End" under "Steering Connecting Rod," page 164.)

Remove the nut "B."

Remove the taper pin "A."

Drive out the spindle bolt "C," being careful not to injure the threads.

Remove the spindle.

To remove the steering arm, first remove the large nut, then either press or drive it out, being careful not to injure the threads.

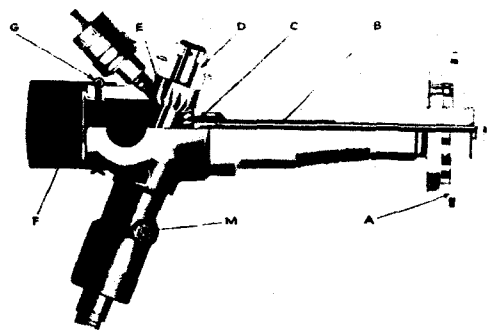



*Fig. 48—Right Front Spindle, Sectional View.*

Remove the speedometer gears in the right hand spindle by unscrewing the nut "D," Fig. 48, pulling out the cotter pin "G" and removing the cap "F."

### *Inspection*

With kerosene or gasoline clean all parts removed.

INSPECTION OF SPINDLE—Placed on lathe centers, that part of the spindle which receives the wheel bearings should run true within .002 inch. (See under "Straightening Bent Parts," page 76.)

There should be no more than .002 inch clearance between the cones of the roller bearings and the spindle.

The threads on the spindle should be in good condition.

INSPECTION OF OTHER PARTS—Inspect the roller bearings. The cones, rolls and mountings should be smooth and free from pits and chips. The roller cage should be in good condition.

There should be no more than .005 inch clearance between the lower end of the spindle bolt and the bushing in the axle yoke.

The threads on the lower end of the spindle bolt in the nut and in the front wheel adjusting nut and lock nut must be in good condition

Inspect the spindle arm. (See "Inspection of Arm" under "Steering Arms," page 155.)

***Replacement***

In replacing, reverse operations under "Removal."

In adjusting the nut at the front end of the steering connecting rod, do not adjust it too tightly. Tighten it only sufficiently to take up all shake.

In adjusting front wheel bearings follow directions in this book under "Adjusting Front Wheel Bearings," page 75.

In replacing the nut "B" make the adjustment in accordance with directions in this book under "Adjustment of Spindle Bearing," page 72.

Adjust the spindle arm stop screws "H," Fig. 47, in accordance with directions under "Spindle Arm Stop Screws," page 72.

## STEERING GEAR

***Removal—(Body on Car)***

Remove the splash pan under the engine.

Remove the steering arm "F," Fig. 19, from the sector shaft. The end of the sector shaft and the hole in the steering arm are tapered and serrated, the parts being held together by a large nut locked with a spring washer. After removing the nut and lock washer, remove the arm with a puller.

Remove the cap screw "C" and the wrench "D," and pull out the long eccentric adjusting bushing.

Remove the two one-eighth inch control rods between the steering gear and engine.

Remove the cover plate on the rear face of the steering gear housing. This plate is held in place by five five-sixteenth inch cap screws.

Push in the sector shaft until its outer end is just beyond the inner face of the frame.

Disconnect at the horn the wire running from the steering gear to the horn and remove the connector from the end of the wire by unsoldering it.

*Remove the small bronze segment gears from the lower ends of the spark and throttle control tubes. These gears are clamped to the tubes by one-quarter inch cap screws.

*Lay back the top and pull out the spark and throttle tubes complete with the sector upon which they operate and the tube to which the sector is attached. The sector tube is clamped in place at the lower end by a five-sixteenths inch cap screw in the housing support bracket which is bolted to the lower end of the steering gear housing.



*Remove the nut which holds the steering wheel in place and with a puller tool number 56479, furnished by the Cadillac Motor Car Company, remove the wheel. Then remove the key.

*Disconnect the steering gear bracket from the instrument board.

Remove the rod between the carburetor and the arm on the steering gear.

Remove the support for the headlight control tube and rods.

Remove the four three-eighths inch bolts which hold the steering gear housing to the frame.

Raise the front end of the car about six inches and remove the steering gear by passing it down between the crankcase of the engine and the frame of the car.

***Removal—(Body off Car)***

*To remove the steering gear with the body off the car, omit operations preceded by asterisks.

***Disassembly***

It is necessary to partly disassemble the steering gear before removing it, provided the engine or body are in place. With the steering gear removed in accordance with directions under "Removal (Body on Car)," proceed as follows in completing the disassembly.

Remove the steering sector.

Remove the support bracket at the lower end of the steering gear housing. The bracket is held to the steering gear housing by four three-eighths inch cap screws. In removing the bracket do not allow the thrust bearing to drop.

Through the lower end of the housing remove the steering tube with worm, upper thrust bearing for the worm and the spring, washer and cone of the bearing at the upper end of the housing tube.

Loosen the clamping screw at the upper end of the steering gear housing and remove the housing tube. If the tube does not pull out easily, open the clamp by carefully tapping in a small chisel. Open the jaws of the clamp only sufficiently to make possible the removal of the tube.

Remove the set screws "A," Fig. 19, and the collar "L," Fig. 18, by unscrewing.

***Inspection***

Inspect the teeth of the worm and sector. They should show very little wear and be free from scores.

There should be no more than .004 inch clearance between the sector shaft and the eccentric bushing in which it has its bearing. The eccentric bushing should be a snug sliding fit in the housing and free from scores.

There should be no more than .004 inch clearance between the hubs of the steering worm and the bearings which receive them.

Inspect the balls and races of the thrust bearings. They should be free from pits and in good condition.

Examine the serrations on the end of the sector shaft and in the steering arm, also the threads on the end of the sector shaft.

The adjusting spring at the upper end of the steering tube should have a minimum free length of three inches. The cone and cup of the bearing should be in good condition. The cone should move freely on the steering tube.

The plunger springs in the spark and throttle levers should have a free length of thirteen-sixteenths inch and have sufficient tension to hold the levers where set.

The serrations at the bottom ends of the spark and throttle tubes and in the segment gears should be in good condition.

Inspect the housing, also all machined surfaces of the housing.

### *Reassembly and Replacement*

In reassembling and replacing steering gear, reverse operations under "Removal and Disassembly."

Adjust the thrust bearings for the worm in accordance with directions under "Adjustment of Worm Thrust Bearings," page 73.

In replacing the sector have the hinge of the steering wheel ahead, then mesh the teeth of the worm and sector so that four teeth are out of mesh on each end of the sector. If none of the steering arms or shafts have become bent and the worm and sector teeth are properly meshed, the front wheels should be approximately straight ahead when the hinge of the steering wheel is directly forward.

In replacing the long eccentric adjusting bushing have the thick side of the bushing face in the direction of the worm of the steering gear, and make certain that the tongues on the inner end of the bushing enter the tongue ways in the thrust ring. Before putting the wrench "D", Fig. 19, onto the outer end of the bushing, rotate the bushing in a counter-clockwise direction until the correct adjustment between the worm and sector is made. (See under "Adjustment of Worm and Sector," page 74.)

In replacing the small segment gears on the lower ends of the spark and throttle tubes, so mesh the teeth with the teeth of the larger segment gears, that the end teeth of the smaller gears do not pass the ends of the larger gears in moving the spark or throttle levers from the extreme left to the extreme right, or vice versa.

The adjustment of the control rods should be checked. The throttle in the carburetor should be permitted to "close" but should



start to open immediately the throttle lever on the steering post is moved from the extreme left position.

The lever on the distributor and timer should be permitted to reach the fully retarded position but should move immediately the spark lever is moved from the left position.

After completing this work it is a good plan to recheck the ignition timing. (See under "Timing Ignition," page 44.)

Refill the steering gear housing with suitable lubricant. Cadillac Steering Gear Lubricant is recommended.

In readjusting the rod which runs from the hand lever on the steering gear to the carburetor, have its forward end stand in the center of the slot in the lever "S," Fig. 36, when the auxiliary air valve lever on the steering post is all the way down.

If the adjustment of screw "H," Fig. 18, has been changed, it should be readjusted in accordance with directions in this book under "Adjustment of Worm and Sector." Make sure that the cap screws in cover plate are tight before making this adjustment.

In replacing the nut which holds the steering arm to the sector shaft, be sure that it is well tightened.

## HOUSING FOR STEERING GEAR WORM AND SECTOR

### *Removal*

Remove and disassemble the steering gear. (See "Disassembly" under "Steering Gear," page 161.)

### *Inspection*

With kerosene or gasoline clean all parts removed.

INSPECTION OF HOUSING—Inspect the housing carefully.

The long eccentric bushing should be a sliding fit in the housing.

INSPECTION OF OTHER PARTS—Inspect all parts in accordance with directions in this book.

### *Reassembly and Replacement of Steering Gear*

After inspecting all parts in accordance with directions in this book, reassemble the steering gear and replace it. (See "Reassembly and Replacement" under "Steering Gear," page 162).

## STEERING CONNECTING ROD

### *Disconnecting Rear End*

Remove the grease cup.

Remove the leather boot.

Remove the cotter pin, adjusting screw and spring.

The rear end of the rod can now be removed from the pivot on the steering arm.

To remove the rear pivot bearing, screw into it a one-fourth inch rod threaded on the end with number 20 thread.

***Disconnecting Front End***

Remove the grease cup.

Remove the leather boot.

Remove the cotter pin and adjusting screw.

The front end of the rod can now be removed from the pivot on the steering arm.

***Inspection***

With gasoline or kerosene clean all parts removed.

INSPECTION OF STEERING CONNECTING ROD—Examine the rod. It should be true and free from dents.

Examine the welds at each end of the rod.

The thread in each end should be in good condition.

Inspect the adjusting screws. The threads should be in good condition.

Examine the bronze bearings. All machined surfaces should be in good condition.

The springs should have a free length of approximately five-eighths inch.

INSPECTION OF OTHER PARTS—Examine the pivots on the steering arms. These should be in good condition and out of round no more than .010 inch.

***Replacement***

In replacing pack the bearings with cup grease. Cadillac Cup Grease is recommended.

Take up the adjustment just enough to take up all play in the bearings, but not sufficiently to bind the bearings on the pivots. If the adjusting screws are too tightly drawn up, excessive wear on the pivots and bearings, and stiff steering will result.

Do not replace the used cotter pins. Use new ones.

## WHEELS

Before starting to remove a wheel, jack up the axle, turn the wheel slowly and determine if it is out of true. A wheel should run out of true no more than five thirty-seconds inch. Do not make this test either on the tire, or on the demountable rim, but on the felloe band of the wheel.

***Removal of Front Wheel and Bearings***

Jack up the axle until the wheel is free from the ground.

Remove the hub cap by unscrewing it.



Remove the locking nut "I," Fig. 47, (left-hand thread on left-hand spindle).

Remove the washer "K."

Remove the adjusting nut "L," (left-hand thread on left-hand spindle).

Remove the wheel, being careful not to drop the outer roller bearing.

The inner roller bearing can be removed, after removing the retainer. The inner and outer mountings can be removed by driving them out.

In removing the right-hand wheel, pull out the speedometer drive shaft "A," Fig. 48, after removing the hub cap.

***Removal of Rear Wheel and Bearings***

Remove the lubricator "A," Fig. 49, and remove the hub cap by unscrewing it.

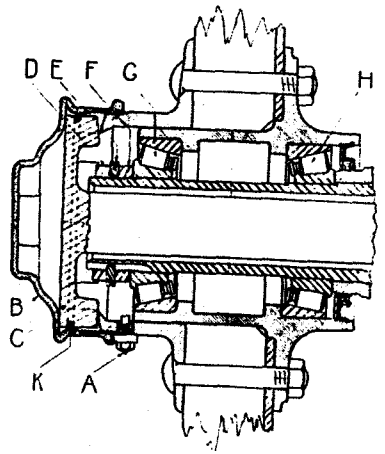



*Fig. 49—Rear Wheel Bearings and Adjusting Nuts.*

Remove the locking ring "K" and withdraw the axle shaft. If the axle shaft sticks it may be removed by tapping a cold chisel between the rear faces of the drivers on the axle flange and the bottoms of the recesses in the hub flange. If one of the axle shafts fits particularly tight, remove the looser one in accordance with these directions and drive out the other, by passing a bar of suitable size and length through the opposite end of the axle housing.

Jack up the axle until the wheel is free from the ground and remove the lock nut "D," the washer "E," and the adjusting nut "F."

Remove the wheel, being careful not to drop the outer bearing The removal of the wheel is facilitated if it is removed

The inner bearing may be removed after removing the retainer. The inner and outer mountings can be removed by driving them out.

### *Inspection*

INSPECTION OF WHEEL—The wood parts should be free from cracks and fitted together tightly.

The nuts on all hub and brake drum bolts should be tight. The ends of the bolts should be headed over slightly to prevent the nuts loosening.

Bearing mountings should be a driving fit into the wheel hubs.

Wheels at the felloe band should run true within five thirty-seconds inch laterally.

The brake drums on the rear wheels should run true within one-sixteenth inch radially.

INSPECTION OF OTHER PARTS—Examine the bearing surfaces of the mountings, cones and rolls. The surfaces should be smooth and free from pits and chips. The roller cages should be in good condition.

The bearing cone should have no more than .002 inch clearance on the spindles of the axle.

The bolts for the rim wedges should be straight. The threads on the bolts and in the wedges should be in good condition.

Inspect the demountable rims. Demountable rims should be free from dents or other injuries, and when off the wheel should be round within one-eighth inch. The locking ring, the lock, and the rivet which holds the lock to the rim, should be in good condition. When off the rim, the ends of the locking ring should point directly toward each other and come together.

### *Replacement*

Before replacing the bearings, fill between the rolls with suitable lubricant. Approximately three ounces are required for each wheel. Cadillac Wheel Bearing Grease is recommended.

Adjust the bearings in accordance with directions in this book under "Adjusting Front Wheel Bearings," page 75.

## FRAME AND SPRINGS

### FRAME

### *Removal*

Remove the tire carrier and the tail lamp.

Remove the body complete with top and windshield. (See "Removal" under "Body," page 170.)

Remove the front fenders. (See "Removal of Front Fender" under "Fenders," page 172.)

Remove the running boards and dust shields. (See under "Running Boards and Dust Shields," page 171.)



Remove the radiator. (See "Removal" under "Radiator," page 127.)

Remove the dust shield over the forward universal joint, and disconnect the joint from the drive shaft on the transmission. Do not allow the joint to drop.

Disconnect the brake rods from the brake pedal and the hand brake levers.

Remove the pull-back spring between the clutch pedal and the frame and remove the copper pipe between the tire air compressor and the frame.

Remove the engine in accordance with directions under "Engine," page 66, but do not disconnect the transmission from the engine.

Remove the front axle by first removing the four spring clips, then disconnecting the steering connecting rod at the front end.

Remove the rear axle. (See "Removal" under "Rear Axle," page 148.)

Remove the three rear springs by removing the spring bolts at the front ends of the side springs and the two spring clips at the center of the cross spring.

Remove the front springs by removing the bolts at the front ends of the springs and those at the upper ends of the shackles at the rear ends.

Remove the gasoline tank by disconnecting the unions on the two pipes to the tank and removing the three nuts. In removing the washers under the two forward nuts observe the manner in which they are assembled. These washers must be put back as originally assembled.

Remove the piping from the frame.

Remove the brake cross shafts.

Remove the steering gear by first removing the steering arm and then removing the four three-eighth inch bolts.

### *Inspection*

Determine if the frame has become bent or sprung. To do so take the following dimensions:

From the machined face of bracket "C," Fig. 51, to the machined face of bracket "D" should be from 25⅞ inches to 26 inches.

Dimensions "A" and "B" taken from the center of the socket "E" to the centers of the large bolt holes in the brackets "C" and "D" should vary by no more than .020 inch.

Pass a center line through the center of the bracket "E" and through a point equally distant from the machined faces of the bracket "C" and "D." Dimensions "F" and "J," taken from the line to the centers of brackets "H" and "I," should vary by no more than .060 inch. Dimensions "O" and "P" taken from the centers of the taper holes in brackets

"M" and "N" should vary by no more than .100 inch. Dimensions "R" and "S" taken from the centers of brackets "K" and "L" should vary by no more than .025 inch.

The distance "A," Fig. 50, from the center of the spring bolt hole in the brackets at the front ends of the side bars (fenders and hood shelves removed) should be four and eleven-sixteenths inches.

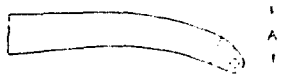



*Fig. 50—Front End of Side Bar.*

To determine if the frame side bars are parallel, lay parallel bars across the frame directly over the front engine support and over brackets "H" and "I." By sighting across these bars it may be determined if the frame is twisted.

Examine all rivets. They should be tight in the frame.

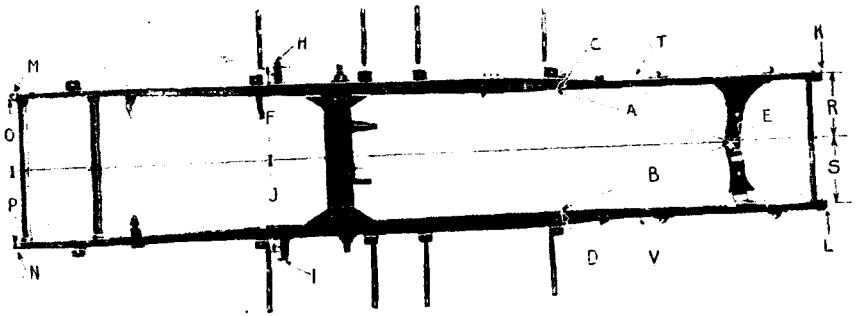



*Fig. 51—Frame.*

Examine the machined surfaces of socket "E," also the threads for the socket cap screws.

Inspect the bronze bushings "T" and "V." There should be no more than .004 inch clearance between these bushings and the bolts. The bushings should be a tight driving fit into the frame brackets.

The clearance between the sides of the brackets "K," "L," "I" and "H" and the spring ends with the washers in place should not exceed .004 inch. Washers of different thicknesses are provided to take up play at these points.

Examine the bushings in which the brake shafts operate. There should be no more than .004 inch clearance between a brake shaft and brake shaft bearing.

Examine the tubular cross members. They should be straight and



### *Replacement*

In replacing, reverse operations under "Removal."

All spring bolts, brake shafts, etc., should be well lubricated before they are replaced.

Do not tighten spring bolts sufficiently to bind the spring ends. After tightening the large bolts which hold the rear engine supports to the frame, loosen the nuts one notch before putting in the cotter pins.

## SPRINGS

### *Removal of Front Spring*

Jack up the front end of the car approximately four inches.

Remove the nuts from the two spring clips.

Remove the bolts at each end of the spring and remove the spring.

### *Removal of Rear Side Spring*

Jack up the rear end of the car approximately four inches.

Remove the nuts from the two spring clips.

Remove the bolt at each end of the spring and remove the spring.

A small door is provided in each dust shield to facilitate the removal of the forward bolts.

### *Removal of Cross Spring*

Jack up the rear end of the car approximately five inches.

Remove the nuts from the two spring clips.

Remove the bolts at each end of the spring and remove the spring.

### *Disassembly*

Remove the bolt in the center of the spring and the bolts in the clips which enclose a portion of the leaves. These bolts are headed over on the ends. File the ends off flush with the nuts and remove the nuts. Use new bolts in reassembling springs.

### *Inspection*

Examine the spring leaves; they should be unbroken, free from cracks and smooth where they contact with other leaves. If they are not smooth, clean them up.

Examine the bronze bushings in the eyes of the longest leaf. The bushings should be a tight driving fit into the spring eyes and have no more than .004 inch clearance on the spring bolts.

### *Replacement*

All rust should be cleaned from the surfaces of the leaves, which contact with other leaves, and the surfaces should be well lubricated with suitable lubricant before the spring is reassembled. Graphite grease is recommended.

Care must be exercised in drawing up the spring shackle bolts not to bind the spring ends in the shackles.

If there is more than .004 inch clearance between the front ends of the rear and front side springs and the brackets, replace the washers by thicker ones.

All spring clips should be well tightened.

## BODY, RUNNING BOARDS AND SHEET METAL PARTS

### BODY

### *Removal*

Remove the tire carrier.

Remove the rear fenders. (See "Removal of Rear Fender" under "Fenders," page 172.)

Remove the floor boards.

Disconnect the steering gear bracket from the instrument board.

Remove the tie rod between the body and the radiator.

Disconnect the three small nickel plated copper pipes at the dash by unscrewing the unions and removing the four clips which support them.

Remove the speedometer cable.

Disconnect from the storage battery the large cable, and block it up with a dry piece of wood to prevent it touching the terminal of the battery. Remove the generator top cover plate and remove from the generator the four small wires.

Disconnect from the front face of the dash the flexible tube which runs to the right-hand high tension conduit. Disconnect the low tension and high tension wires from the coil and remove these wires through the hole in the dash.

Disconnect the two headlight wires from the body. Connectors are provided at the front end of the body on each side.

Remove the rod between the lever on the steering post and the carburetor.

Remove the nuts which hold the body to the frame and remove the



### *Replacement*

Before replacing body make sure that the "anti-squeak" material is in good condition. All body bolts should be drawn down firmly.

Before replacing the wires to the generator, or to the coil or the cable to the storage battery, make sure that the terminals are clean. All terminals should be well tightened.

In setting on the body, care must be exercised not to allow it to strike the steering wheel.

### RUNNING BOARDS AND DUST SHIELDS

### *Removal of Right Running Board and Dust Shield*

Remove the two cap screws which hold the rear fender to the running board and the three bolts which hold the fender to the dust shield.

Remove the front fender. (See "Removal of Front Fender" under "Fenders," page 172.)

Remove the nut which holds the dust shield bracket to the frame of the car. This bracket is between the dust shield and the frame, approximately midway between the fenders.

Remove the nine nuts which hold the running board to the running board brackets and the six nuts which hold the dust shield to the running board.

Remove the running board.

Loosen the forward body bolts and remove the dust shield.

### *Removal of Left Running Board and Dust Shield*

Remove the two cap screws which hold the rear fender to the running board and the three bolts which hold the fender to the dust shield.

Remove the front fender. (See "Removal of Front Fender" under "Fenders," page 172.)

Remove the storage battery. This may be done after the two cables are removed, also the nuts on the two long hold-down bolts. Care must be exercised in removing the battery not to drop it or to spill the contents.

Remove the four bolts which hold the dust shield to the frame. The four nuts are directly back of the storage battery.

Disconnect at the dust shield, the terminal on the end of the tube from the tire air compressor.

Remove the nine nuts which hold the running board to the running board brackets and the five nuts which hold the dust shield to the running board.

Remove the running board.

Remove the horn and pull the horn wires through the dust shield.

Loosen the forward body bolts and remove the dust shield.

***Inspection***

Examine the dust shields for cracks and dents.

The running board should be free from cracks and should not be warped.

Examine the threads on the running board hold-down bolts and nuts.

***Replacement***

In replacing the dust shield make sure that the "anti-squeak" material between the fenders and shield is in good condition.

All bolts and nuts should be well tightened.

## FENDERS

***Removal of Front Fender***

Remove the hood.

Remove the head lamp with the bracket.

Remove the two hood pulls. Each hood pull is held in place by two small machine screws.

Remove the hood shelf. The hood shelf is held in place by four bolts.

Disconnect, at the body, the wires to the head lamp. The connector is at the forward end of the body.

Remove the two cap screws which hold the fender to the running board.

Remove the seven small machine screws which hold the fender to the dust shield.

Remove the two large nuts which hold the fender support arms to the fender brackets on the frame, and remove the fender.

***Removal of Rear Fender***

Remove the two cap screws which hold the fender to the running board.

Remove the six small bolts which hold the fender to the dust shield.

Remove the cap screws which hold the fender to the body and remove the fender.

***Inspection***

Examine the fenders for cracks and dents.



***Replacement***

Make sure that the "anti-squeak" material between the front fender and the frame, between the rear fender and the body and between the front and rear fenders and dust shield is put back as originally assembled, or replaced by new if not in good condition.

## MUFFLERS

***Removal***

Disconnect from the side bar the bracket supporting the front end of the tail pipe. Loosen the clamping screws at the ends of the muffler and slide the muffler toward the rear until it is clear of the exhaust pipe. Remove the muffler by pulling it off from the tail pipe.

***Disassembly***

Remove the twenty machine screws holding the ends of the muffler to the center section.

Remove the baffle plates, noting their relative positions so they can be re-assembled in the same order.

***Inspection***

Clean the carbon from the inside of the muffler shell and from the baffle plates. Inspect the shell and plates, making sure all holes are free.

***Reassembly and Replacement***

Reassemble the baffle plates in their original order and replace the muffler, reversing the operation under "Removal." Make sure that the end of the muffler with the conical shaped plates is toward the front.

# PART IV

# LUBRICATION

## LUBRICANTS

There are many grades of oils. There are none too good. Naturally, we have experimented a great deal with numerous lubricants to determine which are best adapted for the various parts of the Cadillac car. It is not always an easy matter to obtain suitable lubricants. The constant demand made upon us has induced us to provide suitable lubricants.

### *Cadillac Motor Oil*

Cadillac Motor Oil is recommended and may be used for summer and winter. In the absence of Cadillac Motor Oil we recommend lubricant of the following specifications:

Gravity not lower than 26½ Baume at 60 degrees Fahrenheit. Flash test not below 400. Fire test not below 460. Viscosity not less than 220 at 70 degrees Fahrenheit. The oil should be a filtered one, not an acid, or alkali treated oil.

The cold test of the oil should be such that it will circulate in the engine at a temperature of from 15 degrees to 20 degrees Fahrenheit below zero. The laboratory cold test should be zero Fahrenheit or below.

The oil should be refined from Pennsylvania Crude, or its equivalent.

Veedol Zero Light Oil can be used summer and winter. Mobiloil A, Monogram Medium, or Amalie Non-Carbon Oil can be used in summer, and Mobiloil Arctic in winter.

*Engine oil should be strained through cheese cloth or fine mesh wire cloth before using.*

### *Cadillac Rear Axle and Transmission Lubricant*

Cadillac Rear Axle and Transmission Lubricant is recommended for the rear axle and transmission. In its absence we recommend a mixture of steam cylinder oil and a small amount of cup grease mixed to such a consistency that the mixture flows easily at temperatures from sixty degrees to seventy degrees Fahrenheit.

### *Cadillac Cup Grease*

Cadillac Cup Grease is recommended for use in the grease cups. In its absence, number three cup grease is recommended.

### *Cadillac Wheel Bearing Grease*

Cadillac Wheel Bearing Grease is recommended for the wheel bearings. In its absence, number one cup grease is recommended.



### *Cadillac Universal Joint Grease*

Cadillac Universal Joint Grease is recommended for the universal joints on the drive shaft. In its absence, number three fibre grease is recommended.

### *Cadillac Steering Gear Grease*

Cadillac Steering Gear Grease is recommended for the steering gear. In its absence, a mixture consisting of seventy-five per cent 600 W. lubricant, and twenty-five per cent number one cup grease is recommended.

## ENGINE LUBRICATION

### *Lubricating System*

The lubrication of Cadillac eight-cylinder engines is by oil under pressure. A supply of oil is carried in the oil pan "A," Fig. 52. Oil is drawn from the oil pan by the oil pump "C" through the pipe "B" and forced to the main bearings "E," "F" and "G," through the supply pipe "D."

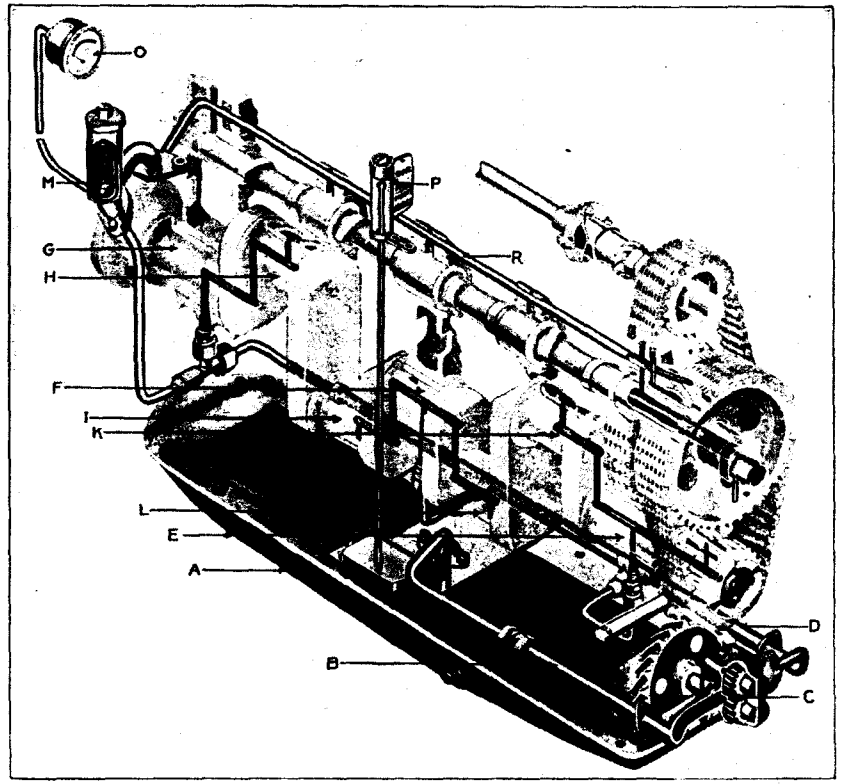



*Fig. 52—Engine Lubricating System*

The pressure of the oil is regulated by an overflow valve or pressure regulator "M," containing a valve under spring tension. When the pressure is reached for which the valve is set, the valve is forced open and the oil overflows past the valve. A small hole "D," Fig. 54, drilled in the regulator housing allows oil to by-pass the valve when the valve is seated. Oil flowing through the by-pass and oil forced past the valve is carried to the camshaft bearings and power air compressor in the gasoline system through the pipe "R," Fig. 52, above and parallel to the camshaft. The forward end of this pipe is fitted with two nozzles from which oil flows into the camshaft sprockets and to the chains through holes drilled in the camshaft sprockets.

The crank pin bearings, "H," "I," "K" and "L," on the crankshaft, are lubricated by oil from the main bearings forced through holes drilled in the crankshaft. The hole drilled in the forward end of the crankshaft communicates with a hole drilled in the crankshaft sprocket through which oil is supplied to the camshaft chain. The cylinders are lubricated by oil thrown from the lower ends of the connecting rods.

There is one gauge and one indicator in the lubricating system. The pressure gauge "O" is located on the instrument board. The indicator "P" is attached to the upper cover of the crankcase near the carburetor and indicates the level of the oil in the oil pan "A."

### *Filling Lubricating System*

A filling hole is provided on the fanshaft housing just forward of the distributor and timer. It is of the utmost importance that engine oil be free from dirt and lint and of suitable quality. (See under "Lubricants.")

Add oil if the oil level indicator "P," Fig. 52, is down to the line marked "Fill."

There is an oil level plug in the right-hand side of the oil pan. This is shown in Fig. 53. If the oil level gauge does not operate from any cause, or fails to register correctly, remove the oil level plug before starting to add oil, then add oil as above directed until it just starts to flow from the hole left by the removal of the plug. Then replace the plug and filling cap.

NOTE—If, on removing the level plug, oil flows from the hole for a few seconds, do not assume that the oil in the pan is up to the proper level. The level plug is at the lower end of a short standpipe which usually remains full of oil after the level of the oil in the oil pan has fallen below the upper end of the standpipe. The only way to be sure that the oil is up to the proper level is to allow the one or two teaspoonfuls of oil which has accumulated in the standpipe to drain off and then to add oil until it starts to flow from the hole.



When adding oil with the level plug removed, the oil level indicator should register "Full" when the oil just starts to flow from the hole left by removing the plug.

### *Replace Oil in Engine*

At the end of each 500 miles of travel the engine oil should be replaced. To replace the oil proceed as follows:

Remove the drain plug, Fig. 53, and drain out all of the oil. Replace the drain plug and through the filler on the fanshaft housing, refill the oil pan with one and one-half gallons of fresh engine oil.

At the end of the first 1000 miles the car is driven, and at the end of each 5000 miles thereafter, the lubricating system should be cleaned and the oil pan and baffle plate removed and cleaned.

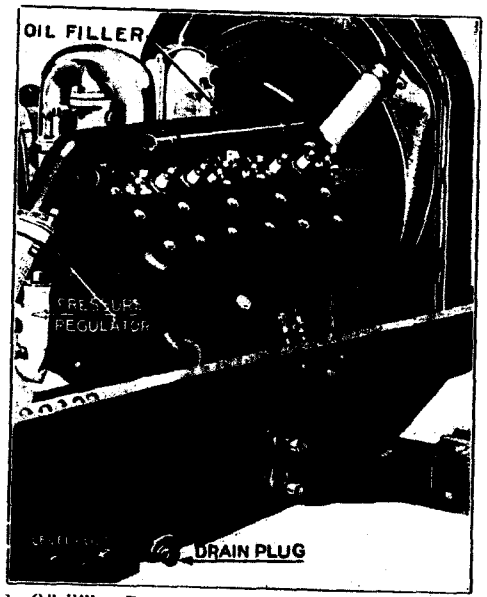



*Fig. 53—Oil Filler, Pressure Regulator, Level Plug and Drain Plug.*

To clean the lubricating system, first drain the oil, then refill the oil pan with a mixture consisting of three quarts of kerosene oil and one quart of engine oil. Run the engine at a speed of between 600 and 800 revolutions per minute for not more than one minute. Then stop the engine, drain the oil and remove the oil pan and baffle plate. Wash out the oil pan and clean the screen of the baffle plate. After replacing the oil pan, refill it with one and one-half gallons of fresh engine oil.

It is a good plan to clean the overflow valve and valve seat of the pressure regulator, Fig. 54, as well as the housing in which they are con-

tained, after forcing the mixture of kerosene and engine oil through the lubricating system. It is also important to make sure that the small by-pass hole is clean and free from any obstruction. A clean cloth, free from lint, should be used in cleaning the overflow valve. Do not use waste. The pressure regulator is located at the side of the crankcase just back of the right-hand block of cylinders.

### *Replace Oil Frequently During Cold Weather*

The mileages given at which the oil should be drained and the oil pan and screen removed are those at which the work should be done during warm weather.

During cold weather a certain amount of water accumulates in the crankcase of the engine as a result of condensation. The water thus formed either freezes, preventing the pump from drawing oil, or mixes with the oil, forming a thick substance which the pump cannot draw. It is necessary, therefore, during cold weather to drain the oil pan and clean the oil pan and screen much more frequently than during warm weather.

The frequency with which it is necessary to do this work during cold weather depends very largely upon the manner in which the car is driven. In case the car is driven short distances only and frequent stops are made so that the engine base and the oil in the oil pan remain cold, it will be found necessary to drain the oil pan and clean the oil pan and screen much more frequently than if the car is driven longer distances with fewer stops, so that the engine base becomes thoroughly warmed.

A car that is constantly making very short trips in cold weather should have the oil drained every 350 miles, or once a week, and the oil pan and screen of the baffle plate cleaned once a month.

*Unless the oil is drained and the oil pan and screen are cleaned frequently enough in cold weather, serious damage to the engine may result, particularly on cars in short trip service.*

### *Oil Pressure*

The pressure indicated by the gauge on the instrument board varies with the speed and temperature of the engine and the viscosity of the oil. When the engine is warm and supplied with fresh Cadillac Motor Oil or oil of approximately the same viscosity, the pressure as indicated by the gauge should be from five to seven pounds when the engine is idling. (When idling the engine should run at approximately 300 revolutions per minute, if the screw "B," Fig. 13, is adjusted properly.) At higher speeds a higher pressure should be indicated and at lower speeds, a lower pressure. Before the engine has become warm, higher pressures will be indicated at given speeds. In other words, maximum



pressures will be indicated at given speeds when the engine is cold and the oil is fresh; minimum pressures, when the engine is hot and the oil has become thin from use.

### *Adjustment of Oil Pressure Regulator*

If, when the engine is supplied with fresh Cadillac Motor Oil, or oil of approximately the same viscosity, and the engine is warm and running at approximately 300 revolutions per minute, the pressure of the oil is more than seven pounds, a readjustment of the pressure regulator should be made. If the pressure is less than five pounds, dirt between the valve and its seat, or an incorrect adjustment of the regulator is indicated. To readjust proceed as follows:

Remove the cap "A," Fig. 54, by unscrewing it and loosen the lock nut "C."

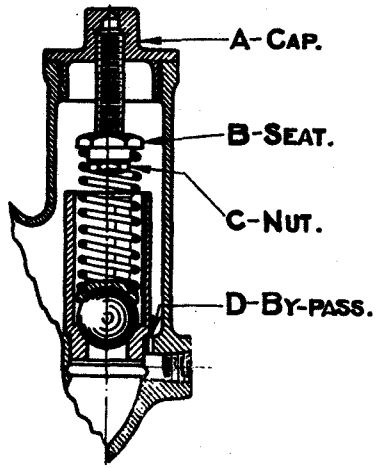



*Fig. 54—Oil Pressure Regulator, Sectional View.*

If a pressure of more than seven pounds is indicated, screw up on the spring seat "B." If a pressure of less than five pounds is indicated and the valve and its seat are clean, unscrew the seat "B."

Lock the adjustment with the nut "C."

If it is found upon replacing the cap and starting the engine that the pressure is still incorrect, remove the cap again and make further adjustment.

Caution—If when starting the engine after replacing the oil it is found that the gauge does not register pressure, stop the engine immediately and prime the oil pump. This may be done by disconnecting at its upper end the oil pipe from the pressure regulator and forcing two to three gunfuls of clean engine oil into the pipe. Connect the pipe and tighten the union before starting the engine.

## TRANSMISSION AND REAR AXLE

### *Replace Lubricant in Transmission and Rear Axle*

At the end of every 4000 miles of travel all of the lubricant should be drained from the transmission and rear axle, and these parts refilled with the correct amount of fresh lubricant. Cadillac Rear Axle and Transmission Lubricant is recommended.

## SPEEDOMETER SHAFT

Do not under any circumstances, attempt to lubricate the speedometer head. Any parts of the speedometer head which require lubrication were amply supplied with lubricant before they were assembled.

Cars fitted with Waltham speedometers have a grease cup at the instrument end of the speedometer cable. A grease cup is not provided on the speedometer cable of Van Sicklen speedometers.

The flexible shaft on the speedometer should be removed from the cable and lubricated at the end of every 2,500 miles with cup grease or a light non-fluid lubricant.

To lubricate the flexible shaft for the Van Sicklen speedometer disconnect the cable from the speedometer by unscrewing the knurled nut "L," Fig. 55, which is back of the instrument board. Pull the flexible shaft out of the cable from the upper end, first starting the shaft with a small hook bent on the end of a piece of stiff light wire. Wipe the shaft clean, coat it with a good light non-fluid lubricant and replace it in the cable. Connect the cable to the speedometer, taking care before screwing up the knurled nut, that the small projection from the shaft in the speedometer enters the slot in the end of the flexible shaft.

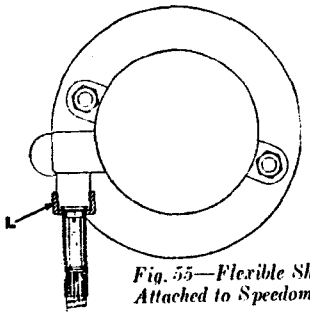



*Fig. 55—Flexible Shaft Attached to Speedometer*

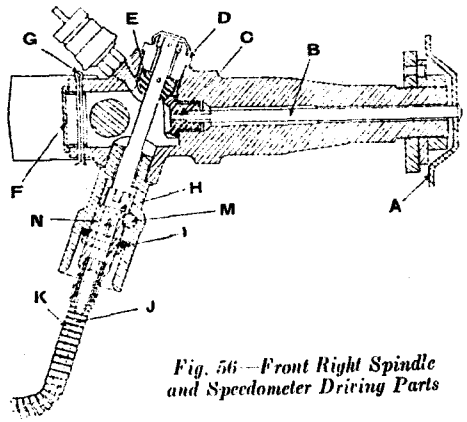



*Fig. 56—Front Right Spindle and Speedometer Driving Parts*

The cable for the Waltham speedometer may be disconnected from the sleeve or socket at the speedometer end after removing the small screw in the side of the socket. The flexible shaft may then be pulled out, cleaned and lubricated with medium grease.



The lower end or driving end "N," Fig. 56, of the cable should be disconnected and the loose end "H" cleaned and lubricated once a month. A heavy non-fluid oil or a light non-fluid grease should be used.

To disconnect the cable at the lower end remove the holding bolt "M" and then pull the end of the cable out of its socket. After cleaning and lubricating thoroughly replace the cable in the socket, taking care that the holding bolt "M" is properly installed.

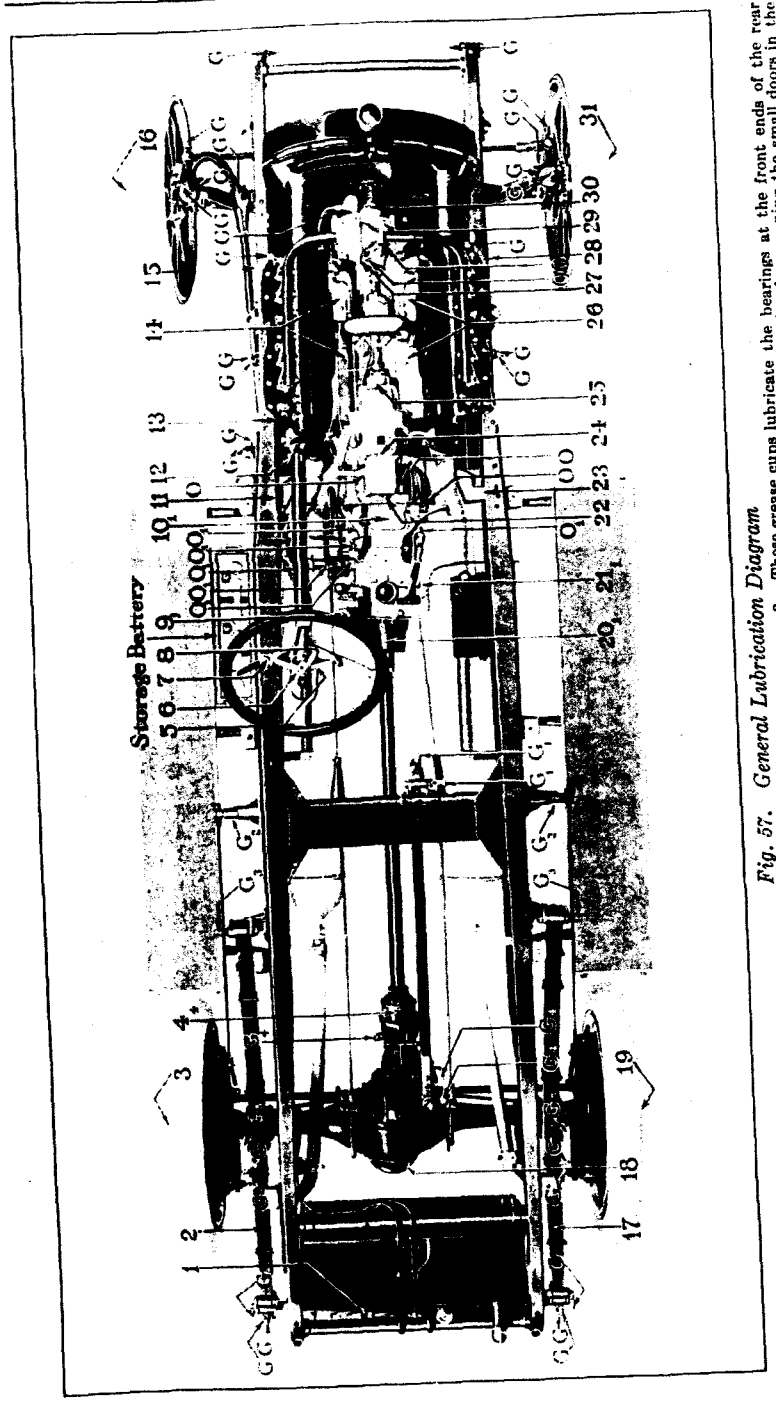



*Fig. 57. General Lubrication Diagram*

Each "G" indicates a grease cup. Each "O" indicates an oiling point at which a few drops of engine oil should be applied. Each number indicates a lubricating point for which instructions are given under "General Lubrication." Accessibility: The small figures at the right of and below the numbers and letters on the above diagram refer to the following notes as to the accessibility of the lubricating points.

1. These are lubricating points which are accessible after removing the floor boards forward of the front seat.
2. These grease cups lubricate the foot brake rocker shafts. They are provided with extensions which bring the grease cups within reach from under the running board.
3. These grease cups lubricate the bearings at the front ends of the rear side springs. The grease cups are accessible after opening the small doors in the dust shields just forward of the rear fenders.
4. These lubricating points are accessible through hand holes in the rear floor on all cars except the Roadster and Victoria. (On the Phaeton there is only one hand hole.)
5. These grease cups lubricate the rear spring seats on the rear axle and are underneath the springs just back of the axle.



## GENERAL LUBRICATION

| Part of Car | Lubricant to Use | Total Amount | Location of Filler | |
|---|---|---|---|---|
| Engine | Engine oil | One and one-half gallons | On fan shaft housing | 29 |
| Bearings in fan hub | Engine oil | Several drops | Oil hole in fan shaft | 30 |
| Engine rear supports | Engine oil | Several drops | Felts in oil holes | 11, 23 |
| Valve stems | Engine oil | Spray from oil gun | Remove valve cover plates | 14, 26 |
| Bearings on armature shaft | Engine oil | Several drops | At front and rear of generator | 24, 25 |
| Tire air compressor | Engine oil | Several drops in each oil hole | At front and rear of bottom of compressor cylinder | 9 |
| Bearing at upper end of steering shaft | Engine oil | Several drops | Oil holes at steering wheel | 5, 6 |
| Springs | Engine oil or Cadillac Rear Axle and Transmission Lubricant | | Apply to sides and ends of leaves | 1, 2, 15, 17, 28 |
| Wheel bearings | Number one cup grease | Three ounces in each wheel | Remove wheels | 3, 16, 19, 31 |
| Starter gear shaft | Cadillac Rear Axle and Transmission Lubricant. | One quarter grease gun full. | Screw cap under nickeled plate on floor boards near accelerator | 22 |
| Mechanism in distributor housing | Number two cup grease | Ten ounces | Breather at rear of distributor housing | 27 |
| Transmission | Cadillac Rear Axle and Transmission Lubricant | Two Quarts | On right side of transmission case | 21 |
| Rear axle | Cadillac Rear Axle and Transmission Lubricant | Five quarts | On rear cover plate | 18 |
| Clutch thrust ball race | Cadillac Rear Axle and Transmission Lubricant | One ounce | On collar of ball race | 10 |
| Universal joints | Cadillac Universal Joint Grease or Number three fibre grease | Eleven ounces each | On casings around joints | 4, 20 |
| Steering gear | Cadillac Steering Gear Grease or a mixture consisting of ¾ 600 W Lubricant and ¼ number one cup grease | Three pounds | At "R" and "G" Fig. 18 | 12, 13 |

NOTE—The figures in the last column refer to he "General Lubrication Diagram," Fig. 57.

# INDEX


A — Page

Acid in storage battery ..... 50
Adjustments—
Bearings, Caution in adjusting Timken ..... 77
Bearings, Connecting rod ..... 28
Bearings, Crankshaft, Main ..... 28
Bearings, Gear and pinion (Rear axle) ..... 65
Bearings, Spindle ..... 72
Bearings, Wheel, Front ..... 75
Bearings, Wheel, Lubrication of ..... 183
Bearings, Wheel, Rear ..... 75
Bearings, Worm thrust (Steering gear) ..... 73
Brakes, Foot (External) ..... 69
Brakes, Hand (Internal) ..... 70
Cam slide ..... 32
Carburetor ..... 58
Clutch pedal clearance ..... 64
Clutch pedal, Length of ..... 64
Clutch pedal stop ..... 64
Contact points, Timer ..... 42
Gears for proper meshing (Rear axle) ..... 67
Headlamps, Focusing ..... 39
Oil pressure regulator ..... 179
Rear axle gears ..... 65-68
Sector shaft (Steering gear) ..... 74
Steering gear ..... 73
Valves, Thermostat ..... 56
Wheels, Front, Alignment of ..... 75
Alcohol fumes escape from condenser ..... 14
Alignment of front wheels ..... 75
Ammeter ..... 47
Anti-freezing solution ..... 53
Automatic throttle ..... 62
Axle bearing noisy, Rear ..... 21
Axle driving gears noisy, Rear ..... 21
Axle noisy when turning corners only, Rear ..... 21
Axle shaft noisy at hub flanges, Rear ..... 21
Axle shafts (Removal, Inspection, Replacement) ..... 152-153
Axles (See Front Axle and Rear Axle) ..... 65 and 72

B

Baffle plate (Oil pan) ..... 102
Bands, Brake, Relining ..... 72
Bands, Brake, rattle on rough roads ..... 20
Battery, Storage (see Storage Battery) ..... 49
Bearings—
Ball, Annular, Removal of (Distributor and Timer) ..... 126
Ball thrust, Removal of (Clutch) ..... 136
Caution in adjusting Timken ..... 77
Adjustment of ..... 28

Bearings—*Continued* — Page

Crank pin (Removal, Inspection, Replacement) ..... 79-82
Crank pin, Fitting ..... 29
Crank pin, Fitting new standard size ..... 29
Crank pin, Fitting new undersized ..... 29
Crank pin, Refitting used ..... 29
Crankshaft, Main, Adjustment of ..... 28
Crankshaft, Main, Fitting ..... 30
Crankshaft, Main (Removal, Inspection, Replacement) ..... 82-83
Dressing down crankshaft bearing surfaces ..... 30
Fanshaft (Removal, Inspection, Replacement ..... 83-84
Gear and pinion, Adjustment of (Rear axle) ..... 65
Grease for wheels ..... 174
Plain, Removal of (Distributor and Timer) ..... 125
Rear axle, Noisy ..... 21
Removal of annular ball bearing (Motor generator) ..... 121
Removal roller bearing (Motor generator) ..... 121
Spindle, Adjustment of ..... 72
Transmission clutch connection [Rear bearing] (Removal, Inspection, Replacement) ..... 139-140
Transmission shaft, Main [Rear bearing] (Removal, Inspection, Replacement) ..... 145-147
Wheel, Front, Adjustment of ..... 75
Wheel, Front, Removal of (Inspection, Replacement) ..... 164-166
Wheel, Rear, Adjustment of ..... 75
Wheel, Rear, Removal of (Inspection, Replacement) ..... 164-166
Worm thrust, Adjustment of ..... 73
Bent parts, Straightening ..... 76
Blocks, Cylinder (Removal, Inspection, Replacement) ..... 85-87
Body (Removal, Replacement) ..... 170
Body and top, Storage of ..... 35
Breakers, Circuit ..... 46
Brakes (Adjustments) ..... 69-72
Foot (External) Adjustment of ..... 69
Hand (Internal) Adjustment of ..... 70
Illustration of ..... 70
Relining ..... 72
Brakes—
Bands rattle on rough roads ..... 20
Do not hold ..... 20
Drag when released ..... 20
Noisy when applied ..... 20
Brushes—
Fitting motor generator ..... 39
Removal of generator ..... 120
Removal of motor ..... 121
Bulbs, Lamp ..... 39





C — Page

Cam, Placing in position ..... 32
Cams, Positions of, for adjusting cam slides ..... 31
Camshaft (Removal, Inspection, Replacement) ..... 110-111
Camshaft bearings, Insufficient flow of oil to ..... 26
Cam slides—
Adjustment of ..... 32
Position of cams for adjustment of ..... 31
Cam slides and guides (Removal, Inspection, Replacement) ..... 115
Carbon, Rapid accumulation of, in cylinders ..... 9
Carburetor (Diagnosis) ..... 15-18
Air valve flutters ..... 18
Back-firing in ..... 16
Bowl, Insufficient flow of gasoline into ..... 18
Floods ..... 15
Fuel mixture lean when throttle is closed ..... 17
Fuel mixture lean when throttle is fully open ..... 17
Fuel mixture lean when throttle is partly open ..... 17
Gasoline consumption excessive ..... 6
Leaning device has no apparent effect on mixture ..... 17
Carburetor (Removal, Disassembly, Inspection, Replacement) ..... 129-133
Adjustment of ..... 58
Automatic throttle ..... 62
Float, Setting of ..... 61
Illustration of ..... 59 and 130
Throttle pump ..... 62
Caution in adjusting Timken bearings ..... 77
Chains—
Camshaft driving chain (Removal, Inspection, Replacement) ..... 88-89
Fan shaft driving chain (Removal, Inspection, Replacement) ..... 90
Insufficient flow of oil to ..... 26
Looseness of [Camshaft] (Removal, Inspection, Replacement) ..... 88
Looseness of [Fanshaft] (Removal, Inspection, Replacement) ..... 90
Riveting ..... 33
Chambers, Settling ..... 58
Circuit breakers ..... 46
Non-vibrating opens ..... 13
Vibrating operates ..... 13
Cleaning cooling system ..... 55
Clutch (Diagnosis) ..... 18
Chatters when engaging ..... 19
Grabs when engaging ..... 18
Plates rattle ..... 19
Release ball race, Noisy ..... 19
Slips ..... 18
Spins when released ..... 18

Page

Clutch (General description) ..... 63
Clutch (Removal, Inspection, Replacement) ..... 136-137
Connection [Transmission] (Removal, Inspection, Replacement) ..... 139-140
Connection, Rear bearing (Removal, Inspection, Replacement) ..... 139-140
Discs, Relining ..... 63
Discs, Removal of ..... 136
Driving, Removal and Disassembly of (Motor generator) ..... 120
Illustration of ..... 141
Pedal, Adjustment of length of ..... 64
Pedal clearance, Adjustment of ..... 64
Pedal stop, Adjustment of ..... 64
Removal of ..... 136
Spring, Removal of ..... 136
Thrust ball race, Lubrication of ..... 183
Commutator ..... 37
Compression low ..... 6
Compressor—
Power air [Gasoline system] (Removal, Inspection, Replacement) ..... 133-134
Tire air (Removal, Inspection, Replacement) ..... 137-139
Condenser, Alcohol fumes escape from ..... 14
Connecting rods (Removal, Inspection, Replacement) ..... 106-110
Bearings, Adjustment of ..... 28
Steering (Disassembly, front and rear, Inspection, Replacement) ..... 163-164
Control lever (Removal, Inspection, Replacement) ..... 142-143
Cooling System (Description) ..... 53-57
Cooling System (Diagnosis) ..... 14
Additional cooling liquid frequently necessary ..... 14
Liquid in condenser does not return to radiator ..... 14
Cooling system (Removal, Inspection, Replacement) ..... 127-129
Anti-freezing solution ..... 53
Cleaning ..... 55
Draining ..... 55
Filling ..... 55
Illustration showing path of circulation ..... 54
Pump packing glands, Water ..... 56
Radiator (Removal, Inspection, Replacement) ..... 127-128
Strainers, Water pump ..... 56 and 129
Thermostat valves, Adjustment of ..... 56

Page

Cover plate—
Front (Removal, Inspection, Replacement) 99–100
Top (Removal, Inspection, Replacement) 100–101
Crank case (Removal, Inspection, Replacement) 88
Crank pin—
Bearings (Removal, Inspection, Replacement) 79–82
Bearings, Fitting 29
Bearings, Fitting new standard size 29
Bearings, Fitting new undersize 29
Bearings, Refitting used 29
Surfaces, Dressing down 30
Crankshaft—
Bearings, Main, Adjustment of 28
Bearings, Main, Fitting 30
Cup grease, Cadillac 174
Cylinder—
Blocks (Removal, Inspection, Replacement) 85–87
Heads (Removal, Inspection, Replacement) 95–96
Rapid accumulation of carbon in 9
Cylinder walls, Insufficient oil thrown onto 25

D

Danger of running engine in closed garage, Personal 62
Delco electrical system (see Electrical system) 35–53
Depots, Exide 53
Diagnosis—
Alcohol fumes escape from condenser 14
Axle bearing noisy, Rear 21
Axle driving gears noisy, Rear 21
Axle noisy when turning corners only, Rear 21
Axle shaft noisy at hub flange, Rear 21
Battery, frequent addition of water to 11
Battery does not keep charged 10
Battery, One cell of, requires more water than others 11
Brake bands rattle on rough roads 20
Brakes do not hold 20
Brakes drag when released 20
Brakes noisy when applied 20
Carbon, Rapid accumulation of, in cylinders 9
Carburetor air valve flutters 17
Carburetor, Back-firing in 16
Carburetor bowl, insufficient flow of gasoline into 18
Carburetor floods 15
Carburetor leaning device has no apparent effect on mixture 17

Diagnosis—*Continued* Page

Circuit breaker, Vibrating, operates 13
Clutch chatters when engaging 19
Clutch grabs when engaging 18
Clutch plates rattle 19
Clutch release ball race, Noisy 19
Clutch slips 18
Clutch spins when released 18
Compression low 6
Condenser, Liquid in, does not return to radiator 14
Condenser, Alcohol fumes escape from 14
Cooling liquid, Additional, frequently necessary 14
Distributor head, Track in, requires frequent cleaning 13
Engine apparently lacks power 5
Engine fires irregularly 8
Engine overheats 9
Fuel mixture lean when throttle is closed 17
Fuel mixture lean when throttle is fully open 17
Fuel mixture lean when throttle is partly open 17
Gasoline consumption, Excessive 6
Gasoline pressure falls off rapidly after engine stops 15
Gasoline pressure indicated, High 15
Gasoline pressure indicated when engine is running, Low 15
Gasoline pressure not maintained after engine is started 14
Gear shifting, Noisy 19
Generator brushes, Sparking at 11
Generator charging rate too low or too high 11
Hub caps, Oil leaking at rear 21
Hub caps, Rear, forced off 22
Lamp bulbs dim 12
Lamp bulbs short-lived 12
Oil consumption, Excessive 25
Oil, Insufficient flow to chains, camshaft bearings 26
Oil, Insufficient, thrown onto cylinder walls 25
Oil level indicator does not operate 26
Oil pan, Emulsion forms in 27
Oil pan, Gasoline accumulates in 27
Oil pan, Oil freezes in 27
Oil pan, Water or ice accumulates in 26
Oil pressure, High, indicated 25
Oil pressure, Low, indicated 24
Oil pressure, None indicated when engine is running 23
Spark, No, or weak, between spark plug points 12
Spark plug cores require frequent cleaning 13
Spring action, stiff 23
Springs appear to be weak 23
Springs squeak 23
Springs, Excessive 22

Diagnosis—*Continued* Page

Steering gear rattles 22
Steering gear turns hard 22
Starter does not crank engine or cranks engine slowly 11
Start engine, Continued cranking necessary to, 7
Tires do not run true 23
Tires, Front, wear out rapidly 23
Transmission bearing, Noisy 20
Transmission gears, Noisy 19
Diagram—
Charging battery from 110 volt D. C. circuit 51
Circuit 40
Lubrication 182
Wiring 38
Differential and large driven gear (Removal, Inspection, Replacement) 150-151
Disassembly—
Axle, Front 156
Axle, Rear 149
Carburetor 129
Compressor, Tire air 137
Differential and large driven gear 150
Engine 92
Joints, Universal 148
Springs 169
Steering gear 161
Transmission 146
Discs, Clutch, Relining 63
Distributor and Timer (Description) 41
Distributor and Timer (Removal, Inspection, Replacement) 124–127
Contact points, Adjustment of 42
Head (Removal, Inspection, Replacement) 123
Head, Track in, requires frequent cleaning 13
Ignition, Timing 44
Illustration of 42 and 125
Lubrication mechanism in distributor housing 127
Rotor (Removal, Inspection, Replacement) 123–124
Rotor button track, Cleaning 42
Door bumpers 78
Draining cooling system 55
Dressing down bearing surfaces—
Crankpin 30
Crankshaft 30
Main 30
Driving pinion and pinion shaft (Removal, Inspection, Replacement) 153–154

E

Electrical system (Description) 35–53
Electrical system (Diagnosis) 10
Electrical system (Removal, Inspection, Replacement) 117–127
Circuit breakers 46 and 117
Current, Generation of 47

Electrical System—*Continued* Page

Diagram, Circuit 40
Diagram, Wiring 38
Distributor head (Removal, Inspection, Replacement) 123
Distributor rotor (Removal, Inspection, Replacement) 123–124
Distributor and Timer (Removal, Inspection, Replacement) 124–127
Ignition system 41
Lamps 39
Motor generator 36
Motor generator (Testing, Removal, Inspection, Replacement) 118–123
Storage battery 49
Engine (Diagnosis) 5–10
Compression low 6
Condenser, Liquid in, does not return to radiator 14
Continued cranking necessary to start 7
Fires irregularly 8
Overheats 5
Power, Apparently lacks 9
Engine (Removal, Inspection, Replacement of parts) 79–117
Engine (Adjustments) 28–34
Bearings, Crankpin (Removal, Inspection, Replacement) 79–82
Bearings, Fanshaft (Removal, Inspection, Replacement) 83–84
Bearings, Main (Removal, Inspection, Replacement) 82–83
Camshaft (Removal, Inspection, Replacement) 110–111
Cam slides and guides (Removal, Inspection, Replacement) 114
Chain, Camshaft driving (Removal, Inspection, Replacement) 88–89
Chain, Fanshaft driving (Removal, Inspection, Replacement) 90
Chains, Riveting 33
Connecting rods (Removal, Inspection, Replacement) 106–110
Connecting rod and crankshaft bearings, Adjustment of 28
Cover plate, Front (Removal, Inspection, Replacement) 99–100
Cover plate, Top (Removal, Inspection, Replacement) 100–101
Crankcase (Removal, Inspection, Replacement) 88
Crankpin bearings, Fitting 29
Crankshaft (Removal, Inspection, Replacement) 111–113
Crankshaft bearing surfaces, Dressing down 30
Cylinder blocks (Removal, Inspection, Replacement) 85–87
Cylinder heads (Removal, Inspection, Replacement) 95–96
Data, General 2
Fan, (Removal, Inspection, Replacement) 94

Engine—*Continued* Page

Firing order ..... 31
Flywheel (Removal, Inspection, Replacement) ..... 116–117
Gear Spiral, for oil pump (Removal, Inspection, Replacement) ..... 94–95
Illustration of ..... 80 and 85
Lubrication ..... 175
Manifold, Intake (Removal, Inspection, Replacement) ..... 97
Number, Location ..... 2
Oil pan and baffle plate (Removal, Inspection, Replacement) ..... 102
Piston pins (Removal, Inspection, Replacement) ..... 97–98
Piston and piston rings (Removal, Inspection, Replacement) ..... 98–99
Pump, Oil (Removal, Inspection, Replacement) ..... 103
Pumps, Water (Removal, Inspection, Replacement) ..... 104–106
Regulator, Oil pressure (Removal, Inspection, Replacement) ..... 106
Rocker arms and shafts (Removal, Inspection, Replacement) ..... 79
Shaft, Drive, for water pump (Removal, Inspection, Replacement) 114
Storage ..... 34
Valves ..... 31
Valves and Valve Springs (Removal, Inspection, Replacement) ..... 115–116

Exide battery depots ..... 53
External brakes, Adjustment of ..... 69
External brakes (Removal, Inspection, Replacement) ..... 149–150

F

Fan (Removal, Inspection, Replacement) ..... 94
Fanshaft driving chain (Removal, Inspection, Replacement) ..... 90
Looseness of ..... 90
Fanshaft housing (Removal, Inspection, Replacement) ..... 96
Fenders (Removal, Inspection, Replacement) ..... 172–173
Filling the cooling system ..... 55
Filling the lubricating system ..... 176
Firing order (Engine) ..... 31
Fitting bearings—
Crankpin ..... 29
Crankshaft, Main ..... 30
Standard size, New ..... 29
Undersize, New ..... 29
Fitting brushes, Motor generator ..... 39
Float, Carburetor, Setting ..... 61
Flywheel (Removal, Inspection, Replacement) ..... 116–117
Timing marks on ..... 31

Page

Focusing headlamps ..... 39
Forks, Shifter [Transmission] (Removal, Inspection, Replacement) 144
Frame (Removal, Inspection, Replacement) ..... 166–169
Front axle (Adjustments) ..... 72
Front axle (Removal, Inspection, Replacement) ..... 156
Bearings, Front wheels, Adjusting 75
Bearings, Spindle, Adjustment of 72
Parallel rod (Removal, Inspection, Replacement) ..... 157–158
Spindles (Removal, Inspection, Replacement) ..... 158–159
Stop screws, Spindle arms ..... 72
Steering arms (Removal, Inspection, Replacement) ..... 154–155
Wheel and bearings, Front (Removal, Inspection, Replacement) ..... 164–166
Wheels, Front, Alignment of ..... 75
Front cover plate (Removal, Inspection, Replacement) ..... 99–100
Front wheels (Removal, Inspection, Replacement) ..... 164–166
Alignment of ..... 75
Bearings, Adjusting ..... 75
Bearings (Removal, Inspection, Replacement) ..... 164–166
Lubrication ..... 174, 183

G

Garage, Personal danger of running car in ..... 62
Gasoline system (Description and Adjustments) ..... 57–62
Gasoline system (Removal, Inspection, Replacement) ..... 129–135
Carburetor (Adjustments) ..... 58
Carburetor (Removal, Inspection, Replacement) ..... 129–133
Compressor, Power air (Removal, Inspection, Replacement) ..... 133–134
Illustration of ..... 58
Pressure relief valve ..... 57
Settling chambers ..... 58
Strainers ..... 58
Tank (Removal, Inspection, Replacement) ..... 134–135
Gasoline system (Diagnosis) ..... 14
Flow, Insufficient flow of gasoline to carburetor bowl ..... 15
Gasoline consumption, Excessive .. 6
Gasoline pressure falls off rapidly after engine stops ..... 15
Gasoline pressure not maintained after engine is started ..... 14
High gasoline pressure indicated ... 15
Low gasoline pressure indicated when engine is running ..... 15





Page

Gasoline tank capacity ..... 2
Gauge, Gasoline quantity, Removal of ..... 134
Gears—
Differential and large driven (Removal, Disassembly, Inspection, Replacement) ..... 150–151
Noisy rear axle driving ..... 21
Spiral, for oil pump drive (Removal, Inspection, Replacement) ..... 94–95
Steering (Adjustments) ..... 73
Steering (Removal, Inspection, Replacement) ..... 160–162
Gear and pinion bearings, Adjustment of (Rear axle) ..... 65
Gear ratio—
Axle ..... 2
Between engine and rear wheels .. 2
Transmission ..... 2
Gears—
Adjustment of for proper meshing (Rear axle) ..... 67
Jackshaft (Removal, Inspection, Replacement) ..... 142
Shipper (Removal, Inspection, Replacement ..... 140
Gear shifting noisy ..... 19
Generator, Motor (Electrical system) ..... 36
Brushes, Fitting ..... 39
Generator Motor—
Brushes, Sparking at ..... 11
Charging rate too low or too high ... 11
Generation of current ..... 47
Grease—
Cup, Cadillac ..... 174
Steering Gear, Cadillac ..... 175
Universal joint, Cadillac ..... 175
Wheel bearing, Cadillac ..... 174
Grinding valves ..... 33
Guides for cam slides (Removal, Inspection, Replacement) ..... 115

H

Hand brakes (External) ..... 70
Adjustment ..... 70
Relining brake bands ..... 72
Headlamps—
Bulbs ..... 39
Focusing ..... 39
Reflectors, Cleaning ..... 39
Heads—
Cylinder (Removal, Inspection, Replacement) ..... 95–96
Distributor (Removal, Inspection, Replacement) ..... 123
Housing—
Axle, Rear (Removal, Inspection, Replacement) ..... 151–152

Housing—*Continued* Page

Fanshaft, (Removal, Inspection, Replacement) ..... 96
Worm and Sector, Steering gear (Removal, Inspection, Replacement) ..... 163
Hub flanges, Rear axle shafts noisy at ..... 21
Hub caps, Oil leaking at rear ..... 21
Hub caps, Rear, forced off ..... 22

I

Ignition (Description, Adjustment) .. 41
Coil ..... 46
Condenser ..... 45
Contact points, timer, Adjustment of ..... 42
Distributor and timer ..... 41
Distributor rotor button track, Cleaning ..... 42
Resistance unit ..... 45
Segment Plate, Adjustment of ..... 43
Spark, None or weak, between spark plug points ..... 12
Spark plug cores require frequent cleaning ..... 13
Spark plugs ..... 46
Timing ignition ..... 44
Inspection—
Axle, Front ..... 156
Axle, Rear ..... 149
Baffle plate, (Oil pan) ..... 102
Bearing, Fanshaft ..... 84
Bearing, Main ..... 83
Bearing, Rear, Clutch connection (Transmission) ..... 139
Bearing, Rear, Main transmission shaft ..... 145
Bearings, Crankpin ..... 81
Brakes ..... 150
Carburetor ..... 130
Camshaft ..... 110–111
Cam slides and guides ..... 115
Chain, Camshaft driving ..... 89
Chain, Fanshaft driving ..... 90
Circuit breakers ..... 117
Clutch ..... 136
Clutch connection (Transmission) 139
Compressor, Power air, in Gasoline system ..... 134
Compressor, Tire air ..... 138
Connecting rods ..... 107
Control lever ..... 143
Cover plate, Front ..... 100
Cover plate, Top ..... 101
Crank case ..... 88
Crankshaft ..... 111
Cylinder blocks ..... 86
Cylinder heads ..... 95
Differential and large driven gear 151
Distributor head ..... 123
Distributor rotor ..... 124
Distributor and timer ..... 126
Dust shields ..... 171
Engine ..... 94
Fan ..... 94

Inspection—*Continued* Page

Fanshaft ... 84
Fanshaft housing ... 96
Fenders ... 172
Flywheel ... 117
Frame ... 167
Gasoline tank ... 134
Gear, Large driven (Rear axle) ... 151
Gear, Spiral, for oil pump ... 94
Gears, Jackshaft ... 142
Gears, Shipper ... 140
Generator ... 122
Guides, for cam slides ... 115
Housing for steering gear worm and sector ... 163
Housing, Rear axle ... 151
Intake manifold ... 97
Jackshaft and jackshaft gears ... 142
Joints, Universal ... 148
Motor generator ... 122
Muffler ... 173
Oil pan and baffle plate ... 102
Oil pump ... 103
Parallel rod ... 157
Pinion, Driving, and pinion shaft ... 153
Pinion, Reverse (Transmission) ... 143
Piston and piston rings ... 98
Piston pins ... 97
Pumps, water ... 105
Radiator ... 128
Regulator, Oil pressure ... 106
Rings, Piston ... 98
Rocker arms and shafts ... 79
Rotor, Distributor ... 124
Running boards and dust shields ... 172
Shaft, axle ... 152
Shaft, Drive, for water pumps ... 114
Shaft, Main, Transmission ... 145
Shaft, Pinion ... 153
Shafts, for shifter forks ... 144
Shifter forks and shafts ... 144
Spindles, Axle, Front ... 159
Springs ... 169
Springs, Valve ... 116
Steering arms ... 155
Steering connecting rod ... 164
Steering gear ... 161
Strainers, Water pumps ... 129
Tank, Gasoline ... 134
Timer ... 126
Transmission ... 147
Transmission case ... 135
Universal joints ... 148
Valves and valve springs ... 116
Wheels ... 166
Intake manifold (Removal, Inspection, Replacement) ... 97
Internal brakes (Hand) ... 70
Adjustment of ... 70

J

Jackshaft and jackshaft gears [Transmission] (Removal, Inspection, Replacement) ... 142
Jackshaft gears (Removal, Inspection, Replacement) ... 142

Page

Joints, Universal (Description) ... 65
Joints, Universal (Removal, Inspection, Replacement) ... 147–148

L

Lamps ... 39
Lamp bulbs ... 39
Lamp bulbs dim ... 12
Lamp bulbs short-lived ... 12
Leaning device has no apparent effect on mixture ... 17
Lever, Control (Removal, Inspection, Replacement) ... 142–143
Lubricating system (Diagnosis) ... 23
Lubrication (General) ... 183
Bearings on armature shaft ... 183
Bearings in fan hub ... 183
Bearing at upper end of steering shaft ... 183
Chains, camshaft bearings, Insufficient flow of oil to ... 26
Clutch thrust ball race ... 183
Cylinder walls, Insufficient oil thrown onto ... 25
Diagram ... 182
Emulsion forms in oil pan ... 27
Engine ... 175
Engine rear support ... 183
Gasoline accumulates in oil pan ... 27
Oil (see Lubricants) ... 174
Oil consumption Excessive ... 25
Oil freezes in oil pan ... 27
Oil level indicator does not operate ... 26
Pressure, Oil, High ... 25
Pressure, Oil, Low ... 24
Pressure, Oil, None indicated when engine is running ... 23
Rear axle ... 180
Speedometer shaft ... 180
Springs ... 183
Starter gear shaft ... 183
Steering gear ... 183
Tire air compressor ... 183
Transmission ... 180
Universal joints ... 183
Valve stems ... 183
Water or ice accumulates in oil pan ... 26
Wheel bearings ... 183
Lubrication (Engine) ... 175
Cold weather, Replacing oil frequently during ... 178
Filling lubricating system ... 176
Illustration of lubricating system ... 175
Lubricating system ... 175
Oil pressure ... 178
Regulator, Oil pressure, Adjustment of ... 179
Replace oil in engine ... 177
Lubricants— ... 174
Cadillac cup grease ... 174
Cadillac motor oil ... 174





Lubricants—*Continued* Page

Cadillac rear axle and transmission lubricant ... 174
Cadillac steering gear grease ... 175
Cadillac wheel bearing grease ... 174
Cadillac universal joint grease ... 175

M

Main bearings, (Removal, Inspection, Replacement) ... 82–83
Main bearing surfaces, Dressing down ... 30
Main crankshaft bearings, Adjustment of ... 28
Main crankshaft bearings, Fitting ... 30
Manifold, Intake (Removal, Inspection, Replacement) ... 97
Marks on flywheel, Timing ... 31
Motor ... 37
Motor generator (Description) ... 36
Motor generator (Removal, Inspection, Replacement) ... 118–123
Illustration ... 36, 118 and 119
Inspection ... 122
Removal and disassembly of driving clutch ... 120
Removal of annular ball bearing ... 121
Removal of field coils ... 122
Removal of generator brushes ... 120
Removal of motor brushes ... 121
Removal of motor generator ... 121
Removal of roller bearing ... 121
Testing (on car) ... 118
Testing (off car) ... 119
Motor generator brushes, Fitting ... 39
Muffler (Removal, Inspection, Replacement) ... 173

N

Number, Engine ... 2

O

Oil, Cadillac motor ... 174
Oil in engine, Replace ... 177
Oil in engine, Replace frequently during cold weather ... 178
Oil, Insufficient flow of, to chains, camshaft bearings ... 26
Oil, Insufficient, thrown onto cylinder walls ... 25
Oil leaking at rear hub caps ... 21
Oil level indicator does not operate ... 26
Oil pan and baffle plate (Removal, Inspection, Replacement) ... 102
Oil pan, Emulsion forms in ... 27
Oil pan, Gasoline accumulates in ... 27
Oil pan, Oil freezes in ... 27
Oil pan, Water or ice accumulates in ... 26

Page

Oil pressure, High ... 25
Oil pressure, Low ... 24
Oil pressure, None indicated when engine is running ... 23
Oil pressure ... 178
Oil pressure regulator (Removal, Inspection, Replacement) ... 106
Adjustment of ... 179
Oil pump (Removal, Inspection, Replacement) ... 103
Order of firing (Engine) ... 31

P

Packing glands, Water pumps ... 56
Pan, Oil (Removal, Inspection, Replacement) ... 102
Parallel rod (Removal, Inspection, Replacement) ... 157–158
Parts, Straightening bent ... 76
Pedal, Clutch ... 64
Length, Adjustment of ... 64
Stop, Adjustment of ... 64
Pinion—
Driving, and pinion shaft [Rear axle] (Removal, Inspection, Replacement) ... 153–154
Reverse [Transmission] (Removal, Inspection, Replacement) ... 143
Shaft (Removal, Inspection, Replacement) ... 153–154
Piston and piston rings (Removal, Inspection, Replacement) ... 98–99
Piston pins (Removal, Inspection, Replacement) ... 97–98
Piston rings (Removal, Inspection, Replacement) ... 98–99
Plate—
Baffle (Removal, Inspection, Replacement) ... 102
Front cover (Removal, Inspection, Replacement) ... 99–100
Top cover (Removal, Inspection, Replacement) ... 100–101
Plugs, Spark ... 46
Points, Timer contact, Adjustment of ... 42
Position of cams for adjustment of cam slides ... 31
Power air compressor [Gasoline system] (Removal, Inspection, Replacement) ... 133–134
Pressure regulator, Oil (Removal, Inspection, Replacement) ... 106
Pressure relief valve ... 57
Pump—
Illustration of water pump ... 104
Oil (Removal, Inspection, Replacement) ... 103
Throttle (Carburetor) ... 62
Water (Adjustments) ... 56

Pump—*Continued* Page

Water (Removal, Inspection, Replacement) 104–106
Water, Drive shaft for (Removal, Inspection, Replacement) 114
Water, Packing glands 56
Water, Strainers (Removal, Inspection, Replacement) 129

R

Radiator (Removal, Inspection, Replacement) 127–128
Additional cooling liquid frequently necessary 14
Anti-freezing solution 53
Draining 55
Filling 55
Rear axle (Adjustments) 65–68
Rear Axle (Diagnosis) 20
Rear axle (Removal, Inspection, Replacement) 148–149
Bearing noisy 21
Brakes (Adjustments) 69–72
Brakes (Removal, Inspection, Replacement) 149–150
Differential and large driven gear (Removal, Inspection, Replacement) 150–151
Driving gears noisy 21
Gear and pinion bearings, Adjustment of 65
Gears for proper meshing, Adjustment of 67
Housing (Removal, Inspection, Replacement) 151–152
Illustration of 66
Lubrication of rear axle 180
Noisy when turning corners only 21
Pinion, Driving, and pinion shafts (Removal, Inspection, Replacement) 153–154
Shafts noisy at hub flanges 21
Rear axle and transmission lubricant, Cadillac 174
Rear wheels (Adjustments) 75
Rear wheels (Removal, Inspection, Replacement) 164–166
Bearings, Adjustment of 75
Lubrication 183
Reassembly and replacement of transmission 147
Refitting a used crank pin bearing 29
Regulator, Oil pressure (Removal, Inspection, Replacement) 106
Reflectors, Cleaning headlamp 39
Relief valve, Pressure (Gasoline system) 57
Relining clutch discs 63
Removal—
Axle, Front 156

Removal—*Continued* Page

Baffle plate (Oil pan) 102
Bearing, Annular ball (Motor generator) 121
Bearing, Fanshaft 83
Bearing, Main 82
Bearing, Rear, Clutch connection (Transmission) 139
Bearing, Rear, Main transmission shaft 144
Bearing, Roller (Motor generator) 121
Bearings, Crankpin 79
Brakes 149–150
Brake band, External 149
Brake band, Internal 150
Carburetor 129
Camshaft 110
Cam slides and guides 115
Chain, Camshaft driving 88
Chain, Fanshaft driving 90
Circuit breakers 118
Clutch 136
Clutch ball thrust bearing 136
Clutch connection (Transmission) 139
Clutch discs 136
Clutch spring 136
Compressor, Power air (Gasoline) 133
Compressor, Tire air 137
Connecting rods 106
Control lever 142
Cover plate, Front 99
Cover plate, Top 100
Crankcase 88
Crankshaft 111
Cylinder blocks 85
Cylinder heads 95
Differential and large driven gear 150
Distributor head 123
Distributor rotor 123
Distributor and timer 124
Distributor annular ball bearing 126
Distributor gear 126
Distributor plain bearing 125
Distributor spring 126
Dust shields 171
Engine 90
Fan 94
Fanshaft 83
Fanshaft housing 96
Fenders, Front 172
Fenders, Rear 172
Field coils 122
Flywheel 116–117
Frame 166
Gasoline quantity gauge 134
Gasoline strainer 134
Gasoline tank 134
Gear, large driven (Rear axle) 150
Gear, Spiral, for oil pump 94
Gears, Jackshaft 142
Gears, Shipper 140
Generator 121
Generator brushes 120
Guides for cam slides 115
Housing for steering gear worm and sector 163





Removal—*Continued* Page

Housing, Rear axle 151
Intake manifold 97
Jackshaft and jackshaft gears 142
Joints, Universal 147
Motor brushes 121
Motor generator 121
Muffler 173
Oil pan and baffle plate 102
Oil pump 103
Parallel rod 157
Pinion, Driving, and pinion shaft 153
Pinion, Reverse (Transmission) 143
Piston and piston rings 98
Piston pins 97
Pump impeller 105
Pumps, Water 104
Radiator 127
Regulator, Oil pressure 106
Rings, Piston 98
Rocker arms and shafts 79
Rotor, Distributor 124
Running boards and dust shields 171
Shaft, Axle 152
Shaft, Drive, for water pump 114
Shaft, Main, Transmission 144
Shaft, Pinion 153
Shafts, for shifter forks 144
Shifter forks and shafts 144
Spindles, Axle, Front 158
Spring, Front 169
Spring, Rear 169
Springs, Valve 115
Steering arms 154
Steering connecting rod 163–164
Steering gear 160–161
Strainers, Water pumps 129
Tank, Gasoline 134
Thermostat 104
Thermostat valve 105
Timer 124
Transmission 145
Transmission case 135
Universal joints 147
Valves and valve springs 115
Wheels, Front, and bearings 164
Wheels, Rear, and bearings 165
Replace lubricant in transmission and rear axle 180
Replace oil in engine 177
Replace oil in engine frequently during cold weather 178
Replacement—
Acid, in storage battery, lost by spilling 50
Axle, Front 157
Axle, Rear 149
Baffle plate (Oil pan) 102
Bearing, Fanshaft 84
Bearing, Main 83
Bearing, Rear, Clutch connection (Transmission) 140
Bearing, Rear, Main transmission shaft 145
Bearings, Crankpin 81

Replacement—*Continued* Page

Brakes 150
Carburetor 133
Camshaft 110–111
Cam slides and guides 115
Chain, Camshaft driving 89
Chain, Fanshaft driving 90
Circuit breaker 118
Clutch 137
Clutch connection (Transmission) 140
Compressor, Power air (Gasoline system) 134
Compressor, Tire air 139
Connecting rods 109
Control lever 143
Cover plate, Front 100
Cover plate, Top 101
Crank case 88
Crankshaft 113
Cylinder blocks 87
Cylinder heads 96
Differential and large driven gear 151
Distributor head 123
Distributor rotor 124
Distributor and timer 127
Dust shields 172
Fan 94
Fanshaft 84
Fanshaft housing 96
Fenders 173
Flywheel 117
Frame 169
Gasoline tank 134
Gear, Large driven (Rear Axle) 151
Gear, Spiral, for oil pump 95
Gears, Jackshaft 142
Gears, Shipper 141
Generator 123
Guides for cam slides 115
Housing for worm and sector 163
Housing, Rear axle 151
Intake manifold 97
Jackshaft and jackshaft gears 142
Joints, Universal 148
Motor generator 123
Muffler 173
Oil pan and baffle plate 102
Oil pump 103
Parallel rod 158
Pinion, Driving, and pinion shaft 153
Pinion, Reverse (Transmission) 143
Piston and piston rings 99
Piston pins 98
Pumps, Water 106
Radiator 128
Regulator, Oil pressure 106
Rings, Piston 99
Rocker arms and shafts 79
Rotor, Distributor 124
Running boards and dust shields 172
Shaft, Axle 153
Shaft, Drive, for water pumps 114
Shaft, Main, Transmission 145
Shaft, Pinion 153
Shafts for shifter forks 144
Shifter forks and shafts 144

Replacement—*Continued* Page

Spindles, Axle, Front ..... 160
Springs ..... 170
Springs, Valve ..... 116
Steering arms ..... 155
Steering connecting rod ..... 164
Steering gear ..... 162
Strainers, Water pumps ..... 129
Tank, Gasoline ..... 134
Timer ..... 127
Transmission ..... 147
Transmission case ..... 135
Universal joints ..... 148
Valves and valve springs ..... 116
Wheels ..... 166
Resistance unit ..... 45
Reverse pinion [Transmission] (Removal, Inspection, Replacement) .. 143
Rings, Piston (Removal, Inspection, Replacement) ..... 98–99
Riveting chains (Engine) ..... 33
Rocker arms and shafts (Removal, Inspection, Replacement) ..... 79
Rod—
  Connecting, Bearings, Adjustment of ..... 28
  Connecting (Removal, Inspection, Replacement) ..... 106–110
  Parallel rod (Removal, Inspection, Replacement) ..... 157–158
  Steering connecting rod (Removal, Inspection, Replacement) .. 163–164
Rotor button track, Distributor, Cleaning ..... 42
Rotor, Distributor (Removal, Inspection, Replacement) ..... 123–124
Running boards and dust shields (Removal, Inspection, Replacement) ..... 171–172

S

Setting of carburetor float ..... 61
Shafts—
  Axle (Removal, Inspection, Replacement) ..... 152–153
  Drive shaft for water pumps (Removal, Inspection, Replacement) 114
  Pinion shaft (Removal, Inspection, Replacement) ..... 153–154
  Rear axle, noisy at hub flanges .... 21
  Rocker arm (Removal, Inspection, Replacement) ..... 79
  Shifter fork (Removal, Inspection, Replacement) ..... 144
  Speedometer, Lubrication of ..... 180
  Transmission, Main (Removal, Inspection, Replacement) .... 145–147
Shields, Dust (Removal, Inspection, Replacement) ..... 171–172
Shifter forks and shafts (Removal, Inspection, Replacement) ..... 144

Page

Shipper gears (Removal, Inspection, Replacement) ..... 140
Spark, None or weak, between spark plug points ..... 12
Spark plug cores require frequent cleaning ..... 13
Spark plugs ..... 46
Spindles—
  Front axle (Removal, Inspection, Replacement) ..... 158–159
  Illustration of ..... 158–159
Spindle arm stop screws ..... 72
Spindle bearing, Adjustment of ..... 72
Spiral gear for oil pump drive (Removal, Inspection, Replacement) .. 94
Springs (Diagnosis) ..... 23
  Action stiff ..... 23
  Squeak ..... 23
  Weak, Appear to be ..... 23
Springs (Removal, Inspection, Replacement) ..... 169
  Lubrication of ..... 183
  Removal of distributor and timer spring ..... 126
  Valve (Removal, Inspection, Replacement) ..... 115–116
Start engine, Continued cranking necessary to ..... 7
Starter does not crank engine or cranks engine slowly ..... 11
Starter gear shaft, Lubrication of .... 183
Starting mechanism, Illustration of ... 36
Steering arms (Removal, Inspection, Replacement) ..... 154–155
Steering connecting rod (Removal, Inspection, Replacement) .... 163–164
Steering gear (Adjustments) ..... 73
Steering gear (Diagnosis) ..... 22
  Excessive play in ..... 22
  Rattles ..... 22
  Turns hard ..... 22
Steering gear (Removal, Inspection, Replacement) ..... 160–162
  Illustration of ..... 74
  Lubrication ..... 183
  Sector shaft, Adjustment of ..... 74
  Thrust bearing, Worm, Adjustment of ..... 73
  Worm and sector, Adjustment of .. 74
Storage (Winter)—
  Body and top ..... 35
  Engine ..... 34
  Storage battery ..... 34
  Taking car out of storage ..... 35
  Tires ..... 34
Storage battery (Description) ..... 49
  Acid, Replacing ..... 50
  Charging from an outside source .. 50
  Illustration ..... 49
  Placing battery in service (after storage) ..... 52
  Preparing battery for storage ..... 52
  Sediment in ..... 53





Page

Storage Battery—
  Does not keep charged ..... 10
  Frequent addition of water to ..... 11
  Generator charging rate too low or too high ..... 11
  One cell of, requires more water than others ..... 11
Stop, Clutch pedal, Adjustment of ... 64
Stop screws, Adjustment of (Brakes) ..... 69 and 70
Stop screws, Spindle arm ..... 72
Straightening bent parts ..... 76
Strainers—
  Cooling system ..... 56
  Gasoline system ..... 58
  Water pumps (Removal, Inspection, Replacement) ..... 129
Surfaces—
  Crank pin, Dressing down ..... 30
  Crankshaft bearing, Dressing down 30
  Main bearing, Dressing down ..... 30

T

Tank capacity, Gasoline ..... 2
Thermostat—
  Illustration of ..... 104
  Removal of ..... 104
Thermostat valves—
  Adjustment of ..... 56
  Removal of ..... 105
Throttle—
  Automatic ..... 62
  Pump (Carburetor) ..... 62
Timer [see Distributor and Timer] (Description) ..... 41
Timer [see Distributor and Timer] (Removal, Inspection, Replacement) ..... 124–127
  Contact points, Adjustment of ... 42
Timing ignition ..... 44
Timing marks on flywheel ..... 31
Timken bearings, Caution in adjusting ..... 77
Tire air compressor (Removal, Inspection, Replacement) ..... 137–139
  Lubrication ..... 183
Tires (Diagnosis) ..... 23
  Tires do not run true ..... 23
  Tires, Front, wear out rapidly .... 23
Tires, Storage of ..... 34
Top, Storage of ..... 35
Transmission (Description) ..... 64
Transmission (Diagnosis) ..... 19
  Gear shifting noisy ..... 19
  Bearing noisy ..... 20
  Gears noisy ..... 19

Page

Transmission (Removal, Inspection, Replacement) ..... 145
  Bearing, Rear, Main shaft (Removal, Inspection, Replacement) ..... 145–147
  Case (Removal, Inspection, Replacement) ..... 135
  Construction ..... 64
  Illustration ..... 141
  Lubrication ..... 183
  Shaft, Main ..... 145–147
Tread ..... 2

U

Universal joints (Description) ..... 65
Universal joints (Removal, Inspection, Replacement) ..... 147–148
  Disassembling of ..... 148
  Lubrication of ..... 183

V

Valve—
  Pressure relief ..... 57
  Springs (Removal, Inspection, Replacement) ..... 115–116
Valve and valve springs (Removal, Inspection, Replacement) .... 115–116
Valve stems, Lubrication of ..... 183
Valves, Engine ..... 31
  Cam slide, Adjustment of ..... 32
  Cam slides, Position of cams for adjustment of ..... 31
  Grinding ..... 33
  Placing cam in position ..... 32

W

Washing cars ..... 77
Water, Adding to storage battery ... 49
Water, Frequent addition of, to battery ..... 11
Water, One cell of battery requires more than others ..... 11
Water pumps (Adjustments) ..... 56
Water pumps (Removal, Inspection, Replacement) ..... 104–106
  Packing glands ..... 56
  Strainers ..... 56
  Strainers (Removal, Inspection, Replacement) ..... 129
  Thermostat valves, Adjustment of 56
Wheel base ..... 2
Wheel bearings, Lubrication of ..... 183
Wheels (Adjustments) ..... 75
Wheels (Removal, Inspection, Replacement) ..... 164–166
  Alignment of front wheels ..... 75
  Bearings, Adjustment of front wheel ..... 75
  Bearings, Adjustment of rear wheel 75
  Illustration rear wheel hub and bearings ..... 165
  Lubrication of ..... 183
Wiring diagram ..... 38

# ILLUSTRATIONS


| Name | Fig. | Page |
|---|---|---|
| **AXLE, FRONT:** | | |
| Arm, Spindle—Left | 44 | 155 |
| Arm, Spindle—Right | 43 | 154 |
| Axle—Inverted Front, End View | 46 | 157 |
| Axle—Inverted Front, Side View | 45 | 156 |
| Spindle—Left Front | 47 | 158 |
| Spindle—Right Front, Sectional View | 48 | 159 |
| **AXLE, REAR:** | | |
| Brake Rods | 17 | 71 |
| Brakes—Internal and External | 16 | 70 |
| Housing—Rear Axle, Side View | 42 | 152 |
| Housing—Rear Axle, Top View | 41 | 152 |
| Rear Axle, Sectional View | 15 | 66 |
| **CLUTCH AND TRANSMISSION:** | | |
| Clutch Control | 14 | 64 |
| Clutch and Transmission, Sectional View | 39 | 141 |
| Compressor, Tire Air—Sectional View | 38 | 138 |
| **COOLING SYSTEM:** | | |
| Cooling System | 10 | 54 |
| Strainer, Left-Hand Water—Removal of | 35 | 129 |
| **ELECTRICAL SYSTEM:** | | |
| Battery—Storage, Sectional View | 8 | 49 |
| Clutch—Motor Generator Driving, Rear View | 33 | 120 |
| Diagram—Circuit | 6 | 40 |
| Diagram—Wiring | 5 | 38 |
| Diagram of Connections for Charging Battery from 110 Volt D. C. | 9 | 51 |
| Distributor and Timer, Sectional View | 34 | 125 |
| Motor Generator, Front View | 31 | 118 |
| Motor Generator, Rear View | 32 | 119 |
| Motor Generator and Starting Mechanism | 4 | 36 |
| Timer | 7 | 42 |







| Name | Fig. | Page |
|---|---|---|
| **ENGINE:** | | |
| Diagram—General Lubrication | 57 | 182 |
| Engine—Cross Section of, Front View | 23 | 85 |
| Engine—Cross Section of, Side View | 22 | 80 |
| Firing Order | 1 | 31 |
| Flywheel, Showing Timing Marks | 2 | 31 |
| Lubricating System—Engine | 52 | 175 |
| Oil Filler, Pressure Regulator, Level Plug and Drain Plug | 53 | 177 |
| Pins, Rocker and Seat—Correct Positions for, in Riveting Chains | 3 | 33 |
| Pump—Water, Sectional View | 27 | 104 |
| Regulator—Oil Pressure, Sectional View | 54 | 179 |
| Rings, Piston—Removing | 26 | 98 |
| Rods, Forked Connecting—Method Employed in Testing Alignment of | 28 | 108 |
| Rods, Straight Connecting—Method Employed in Testing Alignment of | 29 | 108 |
| Rope—Location of, in Lifting Engine from Frame | 25 | 92 |
| Slide—Cam, and Adjusting Nut | 30 | 115 |
| Sprockets and Chain—Cam Shaft Driving | 24 | 89 |
| **FRAME:** | | |
| Frame | 51 | 168 |
| Front End of Side Bar | 50 | 168 |
| **GASOLINE SYSTEM:** | | |
| Automatic Throttle, Carburetor—Testing Spring of | 37 | 131 |
| Carburetor, Sectional View | 36 | 130 |
| Carburetor, Side View | 13 | 59 |
| Gasoline System | 12 | 58 |
| Valve—Air Pressure Relief, Sectional View | 11 | 57 |
| **STEERING GEAR:** | | |
| Housing and Arm—Steering Gear | 19 | 74 |
| Steering Gear, Sectional View | 18 | 73 |
| **UNIVERSAL JOINTS:** | | |
| Universal Joints and Drive Shaft | 40 | 147 |
| **WHEELS:** | | |
| Bearings and Adjusting Nuts—Front Wheel | 20 | 75 |
| Bearings and Adjusting Nuts—Rear Wheel | 49 | 165 |
| Front Wheels—Diagram Showing Method of Aligning | 21 | 76 |
| **SPEEDOMETER:** | | |
| Flexible Shaft Attached to Speedometer | 55 | 180 |
| Front Right Spindle and Speedometer Driving Parts | 56 | 180 |

1918-1919

Cadillac Eight

# MANUAL

of

## CARE AND OPERATION

## TYPE 57

Cadillac Motor Car Co.

Detroit, Michigan, U. S. A.

THIRD EDITION

Form 1930 2M 2-15 F. B. P. Co.

PACKER'S TICKET

# CADILLAC MOTOR CAR CO.

ALL PARTS FOR SHIPMENT MUST BE LISTED HEREON BY THIS PACKER'S TICKET

*Sales No.* _____ *Date* _____

*Shipped to* _____

*City* _____ *State* _____

| Number Wanted | LIST OF TOOL EQUIPMENT FOR TYPE 57 CARS—STANDARD | CHECK | SYMBOL No. |
|---|---|---|---|
| 1 | *Pliers | | B825 |
| 1 | Cold Chisel, 6-inch | | 3921 |
| 1 | File and Handle, 6-inch | | 3922 |
| 1 | *Screw Driver (Small) | | 3923 |
| 1 | *Bicycle Wrench | | 3929 |
| 1 | *Monkey Wrench | | 3936 |
| 1 | *Screw Driver (Large) | | 6753 |
| 1 | Octagonal Punch | | 6754 |
| 1 | *Spark Plug Gasket | | 8819 |
| 1 | Jack Handle | | 9979½ |
| 1 | Hammer, 12 oz. | | 13594 |
| 1 | Brace and Socket Wrench for Kelsey Universal Demountable Rims | | 14903 |
| 1 | Tire Tool (Tongs) for Kelsey Universal Demountable Rims | | 16052 |
| 1 | *Spark Plug | | 19865 |
| 1 | Auto Jack | | 19874 |
| 1 | *Wrench for Headless Set Screw | | 19982 |
| 1 | Handy Lamp | | 21814 |
| 1 | Starting Crank | | 22872 |
| 1 | Wrench for Spark Plug and Air Cock | | 30222 |
| 2 | Wrench for Adjusting Outside Brakes | | 30223 |
| 1 | Rubber Rain Strip for Windshield (Open Cars) | | 32040 |
| 1 | Tool Bag (Small) | | 32813 |
| 1 | *Wrench for Distributor (Plain) | | 33352 |
| 1 | *Wrench for Distributor (With Gauges) | | 33353 |
| 1 | Wrench for Hub Cap | | 34011 |
| 1 | Wrench for Water Pump | | 37070 |
| 1 | Oil Gun | | 37646 |
| 1 | Hose and Gauge for Tire Air Pump | | 37669 |
| 1 | Tool Bag (Large) | | 37672 |
| 1 | Manual | | |
| 1 | Chart | | |

19-8-19

*Type 57*

Cadillac

*Eight*



# MANUAL

*of*

## CARE AND OPERATION

PRICE, 25 CENTS

A Manual is packed in the tool kit of each car. If lost, a duplicate will be mailed on receipt of the price. When ordering be sure to specify Type 57 Cadillac Manual and the engine number of your car

Cadillac Motor Car Co.

Detroit, Michigan, U. S. A.

THIRD EDITION

## THE USER'S RESPONSIBILITY

The information, advice and instruction contained in this Manual are published because the user of a motor car needs them. But if the user fails to heed the advice given, the loss is not wholly his but partly ours as well.

The Cadillac car in the hands of an operator who will give it the reasonable consideration to which it is entitled, and which every car requires, will run as smoothly and as quietly as is possible for any motor car to run. No car will give more satisfaction nor will any car stand more abuse. But no car can be expected to stand continual abuse without resenting it sooner or later.

We want Cadillac cars to render unfailing service and satisfaction. They are built for that purpose but the user must do his part after the car comes into his possession. We furnish a car that is capable of rendering the best of service and we furnish the instructions which will guide the user toward obtaining that service. But if he persists in ignoring these instructions and in substituting his own ideas there is no one but himself upon whom he can rightfully place the responsibility for any difficulties which may result.

There is a wealth of information, advice and instruction contained in this Manual. There is much that the owner may never have to use, but it is here to be used in the event that it is needed. There is other information which a user cannot get along without, no matter how much he may think he knows, nor how much previous automobile experience he may have had.

***Read carefully the following portions of this book:***


Driving and Caring for a Motor Car....9
Placing Car in Running Condition....10
General Operation....11-18
Care of Finish....19
Top and Side Curtains....20-21
Tires....23-26
Tire Air Compressor....27
Demounting Rim with Tire....28
Mounting Rim with Tire....28
Winter Storage....33-34
Lubrication....35-47
Personal Danger of Running Engine in Closed Garage....52
Adding Water to Storage Battery....78




# TABLE OF CONTENTS


**PART I—OPERATION AND GENERAL CARE....7–34**

Driving and Caring for a Motor Car 9
Placing Car in Running Condition 10
General Operation....11-18
Body and Top....19-22
Tires....23-27
Demountable Rims....28-30
Cold Weather Suggestions....31-34

**PART II—LUBRICATION....35–47**

Importance of Lubrication....36
Lubricants....37
Engine Lubrication....38-42
General Lubrication....43-47

**PART III—ADJUSTMENTS....47–99**

Gasoline System....47-54
Cooling System....54-58
Engine Adjustments....58-64
Cadillac-Delco Electrical System 65-82
Transmission and Clutch....82-85
Steering Gear....86-87
Wheels....87-89
Brakes....90-93
Universal Joints on Drive Shaft 93
Front Axle....94-95
Rear Axle....95-97
Straightening Bent Parts....97
Springs....98-99


# INDEX


Acid in Storage Battery....79
Adjustments—
Alignment of Front Wheels....88
Bearings, Main Crankshaft....59
Bearings, Connecting Rod....59
Bearings, Front Wheel....88
Bearings, Rear Wheel....89
Bearings, Spindle....94
Bearings, Caution in Adjusting Timken..87
Brakes, External (foot)....90
Brakes, Internal (hand)....91
Carburetor....51
Clutch Pedal....85
Contact Points, Timer....73
Front Axle Stop Screws....94
Headlamps, Focusing....60
Ignition, Timing....74
Rear Axle Pinion and Driving Gear....95
Snubbers, Gabriel....98
Spark Plugs....75
Steering Gear....86
Third Brush, Generator....77
Thermostat Valves....58
Valves—Adjustment of Cam Slides....60
Water Pump Glands....57
Air Compressor for Tires—
Operation and Use....27
Lubrication of....27
Air Pressure—
Relief Valve in Gasoline System....51
Tires, Correct Pressure for....25
Alignment of Front Wheels....88
Ammeter....76
Anti-Freezing Solution....32
Axles (see Front Axle and Rear Axle)....94

Battery, Storage (see Storage Battery)....77
Bearings—
Connecting Rod Bearings....59
Front Wheel Bearings....88
Main Crankshaft Bearings....59
Rear Wheel Bearings....89
Spindle Bearings....94
Steering Gear Bearings....86
Timken Bearings, Caution in Adjusting 87
Body of Car—
Bolts, Body....19
Finish, Care of....19
Washing....19
Brakes—
Description of....90
Foot Brakes, Adjustment....90
Hand Brakes, Adjustment....91
Pedal, Length of Brake....85
Bulbs, Lamp....71

Camshaft Driving Chain....63
Cam Slides, Adjustment....60
Carbon Deposit....47
Carburetor—
Adjustment of....51
Automatic Throttle....54
Float, Setting....53
Leaning Device....52
Throttle Pump....54
Chains, Engine—
Camshaft Driving Chain....63
Fanshaft Driving Chain....63
Riveting, Directions for....64
Charging Battery from Outside Source..81
Circuit Breakers....75
Clock—
Clock Light Switch....67
Winding and Setting Clock....22
Clutch—
Description of....84
Lubrication of Thrust Bearing....85
Pedal, Clearance of....85
Pedal, Length of....85
Pedal Stop Pin....85
Coasting....17
Coil, Ignition....75
Cold Weather Suggestions—
Anti-Freezing Solution....32
Oil, Frequent Changing of....33
Spark Lever, Position of....31
Starter Button, Use of....32
Starting the Engine....33
Strainers in Gasoline System....33
Use of Throttle Pump....31
Winter Storage of Car....34
Commutators, Motor Generator....67
Condenser, Ignition....75
Condenser, Radiator....55
Connecting Rod Bearings, Adjustment....59
Contact Points, Adjustment of Timer....73
Cooling System—
Anti-Freezing Solution....32
Cleaning Cooling System....57
Condenser, Radiator....55
Description of Cooling System....54

Draining Cooling System ..... 57
Filling Cooling System ..... 56
Path of Water Circulation ..... 55
Pump Packing Glands ..... 57
Strainers ..... 58
Thermostat Valves, Adjustment ..... 58
Thermostatic Control ..... 54
Winter Storage ..... 33
**Cup Grease** ..... 37
**Curtains, Side** ..... 21
**Cushions, Seat** ..... 19
**Cylinder Heads, Removable** ..... 59

**Danger in Running Engine in Closed Garage, Personal** ..... 52
**Delco Electrical System (see Electrical System)** ..... 65
**Demountable Rims (see Rims)** ..... 28
**Diagram, Circuit** ..... 70
**Diagram, Lubrication** ..... 42
**Diagram, Wiring** ..... 68
**Distributor and Timer—**
Contact Points, Adjustment ..... 73
Description of ..... 72
Ignition, Timing ..... 74
Illustration of ..... 72
**Don'ts for General Operation** ..... 18
**Don'ts for Transmission Operation** ..... 14
**Draining the Cooling System** ..... 57
**Drive Shaft** ..... 93
**Driving Suggestions** ..... 17
**Driving Gear and Pinion, Adjustment** ..... 95
**Dust Hood for Top** ..... 21

**Electrical System, Cadillac-Delco—**
Ammeter ..... 76
Circuit Breakers ..... 75
Coil, Ignition ..... 75
Condenser, Ignition ..... 75
Diagram, Circuit ..... 70
Diagram, Wiring ..... 68
Distributor and Timer ..... 72
Exide Battery Depots ..... 82
Generation of Current ..... 76
Headlamps ..... 69
Hydrometer Syringe ..... 79
Ignition System ..... 71
Lighting System ..... 67
Motor Generator ..... 65
Resistance Unit ..... 74
Spark Plugs ..... 75
Storage Battery ..... 77
Switch, Ignition and Lighting ..... 71, 67
**Engine—**
Firing Order ..... 15
Four Cycle, Principle of ..... 15
Lubrication of Engine ..... 38
Number, Engine ..... 6
Operation of Engine ..... 15
Start, Failure to ..... 11
Starting Engine in Cold Weather ..... 33
Stopping Engine ..... 14
Winter Storage, Preparing for ..... 33
**Engine Adjustments—**
Bearings, Main Crankshaft ..... 59
Bearings, Connecting Rod ..... 59
Chains ..... 62
Cylinder Heads, Removable ..... 59
Flywheel, Timing Marks on ..... 60
Valves ..... 60
**Exide Battery Depots** ..... 82
**External Brakes, Adjustment** ..... 90

**Fanshaft Driving Chain** ..... 63
**Filling Cooling System** ..... 56
**Filling Lubricating System** ..... 39
**Finish, Care of** ..... 19
**Firing Order** ..... 15
**Flywheel, Timing Marks on** ..... 60
**Focusing Headlamps** ..... 69
**Four Cycle Engine** ..... 15
**Front Axle—**
Alignment of Front Wheels ..... 88
Bearings, Front Wheels ..... 88
Bearings, Spindle ..... 94
Speedometer Drive in Right Spindle ..... 94
Spindle, Removing and Replacing ..... 94
Stop Screws, Adjustment ..... 94
Wheel, Removing and Replacing Front ..... 88
**Front Wheels—**
Alignment of ..... 88
Bearings, Adjustment ..... 88
Lubrication ..... 87
Removing and Replacing ..... 88

**Garage, Personal Danger in Running Engine in Closed** ..... 52
**Gasoline System—**
Description of ..... 50
Filling Gasoline Tank ..... 10
Pressure Relief Valve ..... 51
Settling Chambers ..... 50
Strainers ..... 50
**Gear Shifting—**
Reversing ..... 13
Starting Car ..... 12
Stopping Car ..... 13
**Gear and Pinion, Rear Axle** ..... 95
**Generation of Current** ..... 76
**Grease, Cup** ..... 37
**Grinding Valves** ..... 61

**Headlamps—**
Focusing ..... 69
Reflectors, Cleaning ..... 71
Tilting Reflector Control ..... 69
**Hydrometer Syringe** ..... 79

**Ignition—**
Automatic Spark Control ..... 16
Coil ..... 75
Condenser ..... 75
Contact Points, Timer ..... 73
Distributor and Timer ..... 72
Resistance Unit ..... 74
Spark Plugs ..... 75
Switch, Ignition ..... 71
Timing Ignition ..... 74
**Inflation of Tires** ..... 25
**Internal Brakes, Adjustment** ..... 91

**Lamps (see Lighting System)** ..... 67
**Leaning Device** ..... 52
**License Data** ..... 6
**Lighting System—**
Bulbs, Lamp ..... 71
Headlamps, Focusing ..... 69
Headlamp Reflectors, Tilting ..... 69
Portable Lamp Socket ..... 71
Reflectors, Cleaning ..... 71
Switch, Lighting ..... 67
**Lubrication, General—**
Chart, Lubrication ..... 41
Diagram, General Lubrication ..... 42
Importance of Lubrication ..... 36
Oil (see Lubricants) ..... 37
**Lubrication, Engine—**
Carbon Deposit ..... 47
Description of Lubricating System ..... 38
Filling Lubricating System ..... 39
Oil Pressure ..... 40
Replacing Oil in Engine ..... 40
**Lubricants—**
Cadillac Motor Oil ..... 37
Cadillac Rear Axle and Transmission Lubricant ..... 37
Cadillac Cup Grease ..... 37
Cadillac Wheel Bearing Grease ..... 37
Specifications of Engine Oil ..... 37

**Main Bearings, Adjustment** ..... 59
**Motor Generator—**
Commutators ..... 67
Description of ..... 65
Operation of ..... 67
Regulation of Current Generated ..... 65





Third Brush, Adjustment ..... 65
**Mounting Rim** ..... 28
**Number, Location of Engine** ..... 6

**Operation and General Care** ..... 9
**Operation of Engine** ..... 15
**Oil (see Lubricants)** ..... 37

**Parts—**
New Parts, Ordering ..... 100
Returning Parts ..... 100
**Pedals, Clutch and Brake** ..... 85
**Plugs, Spark** ..... 75
**Portable Lamp Socket** ..... 71
**Preparing Car for Winter Storage** ..... 33
**Pressure—**
Relief Valve in Gasoline System ..... 51
Oil Pressure ..... 40
Tires, Air Pressure for ..... 25
**Pump—**
Gasoline System, Hand Pump ..... 50
Gasoline System, Power Pump ..... 50
Tire Air Compressor ..... 27
Throttle Pump ..... 54

**Radiator—**
Anti-Freezing Solution ..... 32
Draining Radiator ..... 57
Filling Radiator ..... 56
**Repair Parts** ..... 100
**Rear Axle—**
Bearings, Rear Wheel ..... 89
Bearings, Gear and Pinion ..... 95
Brakes ..... 90
Description of Rear Axle ..... 95
Gear and Pinion, Adjustment ..... 95
Illustration of Rear Axle ..... 96
Lubrication of Rear Axle ..... 95
Wheel, Removing and Replacing Rear ..... 89
**Rear Wheels—**
Bearings, Adjustment ..... 89
Lubrication of ..... 87
Removing and Replacing ..... 89
**Reflectors, Cleaning Headlamp** ..... 71
**Relief Valve in Gasoline System** ..... 51
**Resistance Unit** ..... 74
**Rims, Demountable—**
Demounting Rim ..... 28
Mounting Rim ..... 28
Placing Tire on Rim ..... 30
Removing Tire from Rim ..... 29
**Riveting Engine Chains** ..... 64
**Rules of the Road** ..... 17

**Seat Cushions** ..... 19
**Settling Chambers in Gasoline System** ..... 50
**Side Curtains** ..... 21
**Shaft, Drive** ..... 93
**Shifting Gears** ..... 12
**Snubbers, Gabriel—**
Adjustment ..... 98
Lubrication ..... 98
**Spark—**
Automatic Spark Control ..... 16
Lever, Position of Spark ..... 31
Lubrication of Spark Lever ..... 47
Manual Spark Control ..... 16
**Spark Plugs—**
Accumulation of Carbon on ..... 75
Cores, Cleaning ..... 75
Points, Setting ..... 75
**Speedometer—**
Repairs to ..... 22
Speedometer drive in right spindle ..... 94
**Spindle—**
Bearing, Adjustment ..... 94
Removing and Replacing Spindle ..... 94
**Springs—**
Care of ..... 98
Clips, Spring ..... 98
Lubrication of Springs ..... 98
Snubbers, Adjustment ..... 98
Snubbers, Lubrication ..... 98
**Starting—**
Car, Starting ..... 12
Engine, Starting ..... 11
Engine, Starting in Cold Weather ..... 33
Failure of Engine to Start ..... 11
**Steering Gear—**
Lubrication ..... 87
Sector Shaft, Adjustment ..... 87
Thrust Bearing, Adjustment ..... 86
Worm and Sector, Adjustment ..... 86
**Stopping—**
Car, Stopping ..... 13
Engine, Stopping ..... 14
Traffic, Stopping in ..... 17
**Storage Battery—**
Acid, Replacing ..... 79
Charging from Outside Source ..... 81
Description of ..... 77
Exide Battery Depots ..... 82
Hydrometer Syringe ..... 79
Regulation of Current Generated ..... 76
Sediment ..... 82
Water, Adding ..... 78
Winter Storage, Preparing For ..... 81
**Storage of Car for Winter** ..... 34
**Straightening of Bent Parts** ..... 97
**Strainers in Gasoline System** ..... 50
**Strainers in Cooling System** ..... 58
**Switch, Ignition and Lighting** ..... 67, 71
**Syringe, Hydrometer** ..... 79
**Thermostatic Control of Cooling System** ..... 54
**Thermostat Valves, Adjustment** ..... 58
**Third Brush, Adjustment** ..... 77
**Throttle—**
Automatic Throttle ..... 54
Lubrication of Throttle Lever ..... 47
Position of Lever in Starting ..... 32
Throttle Pump, Adjustment ..... 54
**Tilting Headlamp Reflectors** ..... 69
**Timer (See Distributor and Timer)** ..... 72
**Timing Ignition** ..... 74
**Timing Valves** ..... 60
**Timken Bearings, Caution in Adjusting** ..... 87
**Tires—**
Air Compressor for ..... 27
Care of Tires ..... 23
Guaranty ..... 23
Holder, Tire ..... 26
Injuries to Tires ..... 23
Placing Tire on Rim ..... 30
Pressure for Tires ..... 25
Removing Tire from Rim ..... 29
Repairs to Tires ..... 26
Winter Storage of Tires ..... 26
**Top—**
Curtains, Side ..... 21
Dust Hood for Top ..... 21
Folding Top ..... 20
Lubrication of Top ..... 21
Raising Top ..... 21
Winter Storage of Top ..... 34
**Transmission—**
Description of ..... 83
Illustration of ..... 83
Lubrication of ..... 84
Operation of ..... 84

**Universal Joints** ..... 93

**Valves, Engine—**
Cam Slides, Adjustment ..... 60
Grinding Valves ..... 61
**Valve, Pressure Relief** ..... 50
**Water, Adding to Storage Battery** ..... 78
**Water Pump Packing Glands** ..... 57
**Windshield, Positions Of** ..... 22
**Winter Storage—**
Preparing Car For ..... 34
Storage Battery ..... 81
Taking Car Out of Winter Storage ..... 34
Tires ..... 34
**Wheels (See Front and Rear Wheels)** ..... 87
**Wiring Diagram** ..... 68

## LICENSE DATA

The following information may be found useful in making license application:

No. of cylinders.....8 Piston displacement.....314 cu. in.
Cylinder bore.....3½ in. Stroke .....5½ in.

Horsepower (S. A. E. rating) .....31.25

Engine number:

The engine number is stamped on the crankcase just back of the right hand block of cylinders and also on the aluminum casting directly back of the fan hub. The engine number of each Type 57 car begins with the figures "57."

Wheelbase:

Seven-Passenger, Phaeton, Roadster, Victoria, and Brougham.125 in.
Limousine, Imperial, Landaulet, Town Limousine, Town Landaulet .....132 in.
Long chassis .....145 in.
Tread ..... 56 in.

# Part I

# OPERATION AND GENERAL CARE

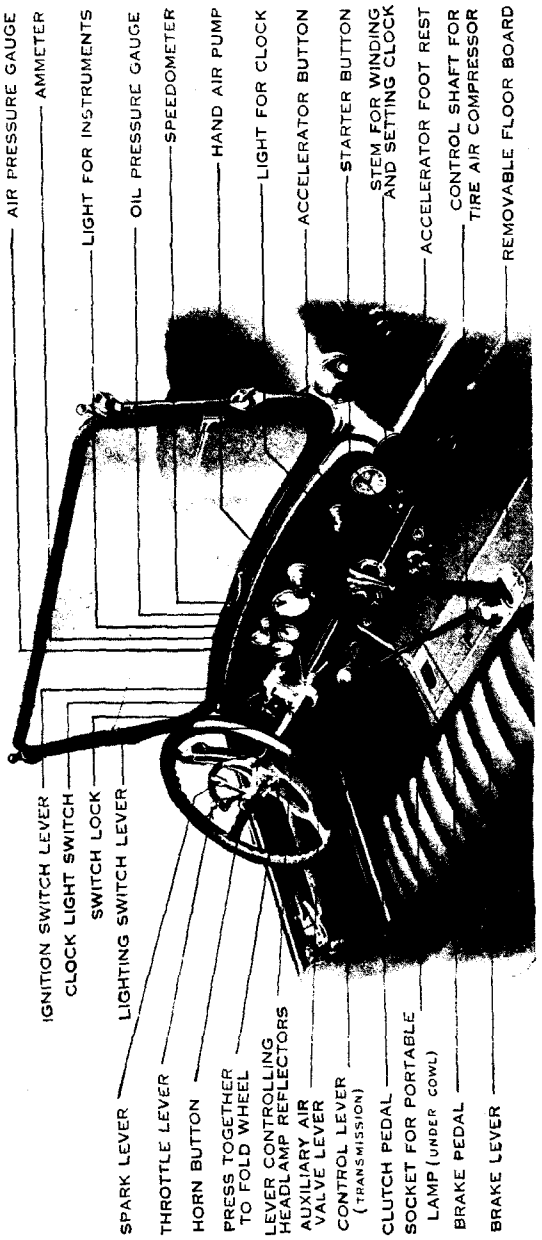



*Fig. 1. Instruments, Control Levers and Pedals on Standard Seven Passenger Car.*



# DRIVING AND CARING FOR A MOTOR CAR

Driving an automobile does not mean simply starting, steering and stopping. To drive an automobile properly requires an understanding of the principles involved and the exercise of intelligence and judgment.

We believe that we are safe in saying that, with well designed and correctly built automobiles, 95 per cent. of so-called troubles are directly traceable to lack of lubrication, abuse, carelessness, a lack of understanding of the principles involved and improper handling generally.

Some drivers seem to think that so long as the car "goes" that is all there is to it. It is not.

To begin with, the driver should study the construction of his car and thoroughly acquaint himself with its mechanism, the functions of its various parts and the "why" of everything connected with it. If he understands these he is better able to realize why certain things must be done and why certain other things must not be done, if he is to obtain the most satisfactory results, the greatest efficiency and the greatest economy, together with durability and long life of the engine and car. Remember that the difference between a comprehensive understanding of your automobile and the superficial knowledge possessed by many drivers is the difference between having troubles and not having them.

The old adage, "A stitch in time saves nine," applies with special significance to the motor car. Intelligent care and proper attention will often correct a *needed adjustment or lubricate a part that is becoming dry, but which, if neglected,* may cause serious and possibly expensive damage.

On the other hand is frequently found the user who is constantly tinkering with his car when there is no necessity for it. Avoid both extremes. If, after seeing that all parts are properly lubricated and that all bolts, nuts and screws are tight, your car is running well, let it alone. Many users drive their Cadillacs for months without finding an adjustment necessary. If adjustment seems necessary and you are not sufficiently acquainted with the construction of the car to know what adjustment is necessary or how to make it, *don't experiment* but take the car to a Cadillac service station.

The most important thing in the care of an automobile is its proper lubrication. It will be readily understood that where one part moves or works upon another, there is always more or less friction and these parts must be oiled more or less frequently. Part Two of this Manual gives detailed instructions regarding lubricating. Be sure to read and observe them carefully.

Care is also necessary to see that all nuts, bolts and screws about the car are kept properly tightened. Most important parts subject to wear are, wherever possible, provided with adjustments for taking up such wear and these should be inspected occasionally and receive attention whenever required.

By far the greater portion of "automobile troubles" is the result of negligence and carelessness, while the reasonable care to which any piece of machinery is entitled will insure long life and satisfactory service.

# PLACING CAR IN RUNNING CONDITION

Before cars are shipped from the factory the gasoline tank and the cooling system are drained. When the car is received and before it is placed in use, the supply of gasoline and water must be replenished. During freezing weather the cooling system should be filled with an anti-freezing solution instead of water. (See under "Anti-Freezing Solution," page 32.)

The car should also be thoroughly lubricated in accordance with the instructions contained in this Manual. (See under "Lubrication," page 35.)

## *Filling Cooling System*

Fill the cooling system with clean water during warm weather and with a suitable anti-freezing solution during freezing weather. (See under "Anti-Freezing Solution, page 32.)

To fill the cooling system, replace the drain plugs "H," Fig. 40, in the water pumps, close the drain cocks "K" in the cylinder blocks and turn the shafts "L" so that the indicators on the ends of the shafts point up. The shafts may be turned in either direction.

Then remove the filler cap "W" from the top of the radiator and fill the cooling system. Replace the filler cap and screw it down firmly. *This is important.* (See under "Condenser," page 55.)

After the cooling system is filled, turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point down.

To fill the radiator condenser, which is attached to the right hand side of the frame, take out the removable floor board just forward of the control lever and replace the drain plug "R," Fig. 40, in the pipe leading from the bottom of the condenser. Then remove the filler cap "V" at the top of the condenser and fill the condenser one-half full, using the same liquid as in the radiator. Replace the condenser filler cap making sure that the vent hole in the side of the cap is open.

***Caution:—Do not use water in the cooling system during freezing weather. Use a good anti-freezing solution. Water will freeze even though the engine be run continuously.***

## *Filling Gasoline Tank*

The gasoline tank is at the rear of the car. (See Fig. 36.) The filler cap may be removed after loosening the thumb screw on the top of the cap.

Gasoline should be strained through a wire cloth of very fine mesh before it is poured into the tank. If dirt or water is allowed to enter the gasoline system it may cause great annoyance by getting under the carburetor inlet needle and causing the carburetor to flood.

After filling the tank, screw on the filler cap and carefully tighten the thumb screw. This is necessary to prevent leakage of the pressure by which the gasoline is forced to the carburetor.



# GENERAL OPERATION

## STARTING THE ENGINE

Be sure that the transmission control lever is in neutral position and that the hand brake is set. (See Fig. 1.)

Note the pressure of air in the gasoline tank. (This is indicated by the gasoline pressure gauge on the instrument board.) If the pressure is less than one pound, it should be increased to that pressure by means of the hand air pump. After the engine is started the pressure is automatically maintained.

Place the spark lever in the driving range on the sector (in extremely cold weather place the spark lever at the extreme right on the sector), and the throttle lever about two inches from the extreme left. (See note below.) Move the ignition switch lever down, thereby switching on ignition. Then push down on the starter button. This will bring the starter into operation and will cause the engine to "turn over." (See below under "Caution.")

In cool weather, also in warm weather, if the engine has been standing for some time, pull back the auxiliary air valve lever before you press the starter button.

As soon as the engine fires and commences to run under its own power, which should be in a few seconds, remove your foot from the starter button.

If the auxiliary air valve lever is pulled back when starting the engine, it should be pushed forward about one-half the way immediately the engine starts, and all the way forward as soon as the engine is warm enough to permit doing so.

*If the engine does not start in thirty seconds, do not continue to crank, but look for the cause. You may have forgotten to turn on the switch, or maybe you have no gasoline, or there may not be sufficient air pressure in the gasoline tank to force gasoline to the carburetor. No matter how sure you feel, look and see. Bear in mind that the starter will crank the engine only. Ignition and gas must be present to make it run.*

Additional suggestions for starting the engine in cold weather will be found on page 31 under "Cold Weather Suggestions."

Note:—If you crank the engine by hand always place the spark lever at the extreme left on the sector. If this caution is not observed a "back kick" may occur, resulting in injury to the person cranking.

## *Caution*

The action which causes the engine to "turn over" is produced by a gear of the electric motor sliding into mesh with teeth on the flywheel; similar to the meshing of the gear teeth in the transmission. When pushing down on the starter button to throw these gears into mesh, if it should happen that they are in just such positions that the ends of the teeth of the starter gear come against the ends of the teeth on the flywheel instead of the teeth of one sliding between the teeth of the other, do not force them. Simply remove your foot from the starter button and again push down on the button. In the meantime the gears will probably have changed their relative positions sufficiently to allow the teeth to mesh.

***Do not press the starter button while the engine is running.***

## GEAR SHIFTING

As the Cadillac transmission is of the selective type, the operator may shift from any gear to any other gear without "going through" a third. It must be borne in mind, however, that the clutch must be released before the gears can be shifted. The clutch pedal is the left pedal.

Referring to Figure 2, the ball at the top of the transmission control or gear shifting lever is shown at "N" in the neutral position, "L" in the low gear position, at "I" in the intermediate gear position, at "H" in the high gear position and at "R" in the reverse gear position.

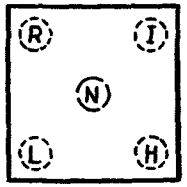



*Fig. 2.*
*Control Lever Positions.*

### *Starting the Car*

To start the car, push forward on the left pedal which is the clutch pedal, thereby releasing the main engine clutch. Then disengage the hand brake by means of the hand lever—still holding forward on the clutch pedal. If the car is standing on a grade it will be necessary to hold it with the foot brake until ready to start. Next place the control lever in the low gear position. (Fig. 3.)

To do so, move the lever as far as possible to the left and then pull it back as far as it will go. Then open the throttle slightly by means of the accelerator pedal or the throttle lever at the steering wheel, and engage the main clutch gradually by allowing your foot to come towards you.

If it should so happen that the transmission gears which mesh to make low gear are in just such positions that the ends of the teeth of one gear come against the ends of the teeth of the other gear instead of the teeth of one sliding between the teeth of the other, do not force them, but place the transmission control lever back in the neutral position, engage the clutch by allowing the clutch pedal to come all the way towards you, again release the clutch and again attempt to shift into low gear as above directed.

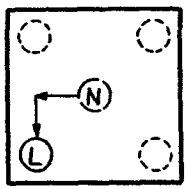



*Fig. 3.*
*Neutral to Low Gear.*

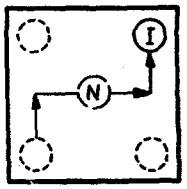



*Fig. 4.*
*Low Gear to Intermediate Gear.*

After the car is under way on low gear, release the clutch and shift the control lever into the intermediate gear position. (Fig. 4.) To do this move the lever back to the neutral position, then to the right and push it forward as far as it will go. Then engage the clutch. In shifting from low to intermediate gear, it is advisable to pause for a moment in the neutral position before shifting into intermediate, if you notice a tendency of the gears to clash.

After the car is under way on the intermediate gear, release the clutch and shift to the high gear position. (Fig. 5.) To do this simply pull the control lever straight back from the intermediate gear position. Then engage the clutch.



### *Reversing*

If you desire to start the car backward, release the clutch and place the lever in the reverse gear position. (Fig. 6.) To do this from the neutral position, move the control lever to the left and push it forward as far as it will go. The throttle should then be opened slightly and the clutch allowed to engage slowly as directed when starting on low gear.

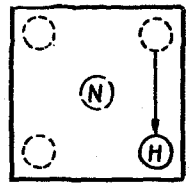



*Fig. 5.*
*Intermediate Gear to High Gear.*

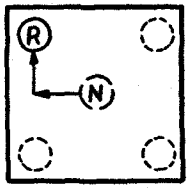



*Fig. 6.*
*Neutral to Reverse Gear.*

### *Shifting into Lower Gear*

If, when ascending steep grades or pulling through soft mud roads or deep sand, the speed of the car is reduced until the engine labors, release the clutch and shift the control lever into the intermediate gear position. To do this push the control lever forward as far as it will go. Then engage the clutch. It is best to allow the car to slow down before making the shift and then after releasing the clutch to shift the lever quickly.

An experienced driver may find it more satisfactory to shift from the high gear position to the intermediate gear position in the following manner:

Release the clutch, place the control lever in the neutral position, engage the clutch at the same time slightly accelerating the engine; then release the clutch again and *instantly* shift the control lever into the intermediate gear position. Engage the clutch.

This entire change may be made in less time than it takes to read these instructions by one who becomes familiar with the method. Shifting in this manner may be accomplished satisfactorily at a higher speed than is allowable when the control lever is shifted directly into the intermediate gear position in the usual manner. However, it is not recommended that the operator shift from high to intermediate gear in this manner until he has had considerable experience in making this shift in the ordinary way.

### *Stopping the Car*

First close the throttle and then release the engine clutch by pushing forward on the left pedal. Next shift the transmission control lever to the neutral position. The clutch may then be allowed to re-engage. Then stop the car by pushing forward on the right pedal which applies the foot brake. After the car has been brought to a stop by the foot brake, apply the hand brake by means of the hand brake lever.

### *Don'ts for Transmission Operation*

Do not attempt to shift from neutral to any gear, or from one gear to another gear without first releasing the clutch.

Do not attempt to shift from the reverse gear to any other gear when the car is moving.

Do not attempt to shift from any forward gear to the reverse gear when the car is moving.

Do not attempt to shift from the high gear to the low gear when the car is moving.

Do not shift from the low to the high gear. This is mechanically possible but is not advisable.

Do not attempt to shift from the intermediate gear to the low gear when the car is moving, unless it is moving very slowly. Ordinarily it is best to stop the car altogether before shifting from the intermediate gear to the low gear.

Do not attempt to shift from the high gear to the intermediate gear when the car is running at a high rate of speed. Allow the car to slow down before shifting gears.

Do not drive with your foot resting on the clutch pedal. The operation of the clutch has purposely been made extremely easy and even a slight pressure may release it sufficiently to cause it to slip.

Do not engage the main clutch suddenly. This causes excessive strain on the entire driving mechanism. Always allow the clutch to engage gradually.

## STOPPING THE ENGINE

After stopping the car and applying the hand brake, move the ignition switch lever to the horizontal position and at the same time pull back the auxiliary air valve lever. Pulling back the auxiliary air valve lever when stopping the engine "enriches" the mixture which is drawn into the cylinders and makes it easier to start the engine the next time.



## OPERATION OF ENGINE

### *General Principle*

The production of power by the Cadillac engine may be described briefly as follows:

Gasoline is forced by air pressure from the tank to the carburetor. The carburetor is the instrument by the action of which gasoline is mixed with air in the proper proportion forming an explosive vapor or gas. The gas thus formed is drawn through the intake pipe and through the inlet valves into the cylinders of the engine where it is compressed and ignited by electric sparks, the pressure of the resulting explosions producing the power.

The quantity of gas supplied to the engine is regulated by a throttle valve at the carburetor which is operated by means of the throttle lever at the steering wheel (the throttle lever is the longer of the two), or by the accelerator button at the right of the brake pedal.

### *The Four-Cycle Engine*

The Cadillac engine is of the four-cycle type, that is, there are four movements or strokes of each piston and two revolutions of the flywheel to complete each power producing cycle. The four strokes of the cycle each have a different function and follow one another in the same order as follows:

*Suction Stroke.* The suction stroke commences with the piston at its highest point in the cylinder and with the inlet and exhaust valves closed. Immediately the piston starts to descend the inlet valve opens and through this valve a charge of gas from the carburetor is drawn into the space above the piston.

*Compression Stroke.* As the piston starts upward again after completing the suction stroke, the inlet valve closes. As there is then no escape for the gas in the cylinder it is compressed, the maximum compression being reached when the piston is at the top of its stroke.

*Power Stroke.* At the completion of the compression stroke, the spark takes place at the spark plug, igniting the compressed charge of gas. The heat resulting from the rapid combustion causes the pressure of the confined gas to rise almost instantaneously to several times its pressure before the explosion. This pressure exerted on the piston forces down the piston and produces the impulse which is transmitted by the connecting rod to the crankshaft, causing it to rotate.

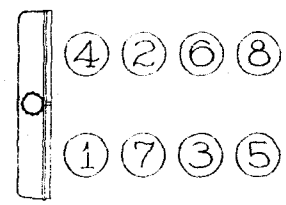



*Fig. 7. Firing Order.*

*Exhaust Stroke.* Just before the piston reaches the end of the power stroke, the exhaust valve opens. It remains open as the piston travels upward again on the exhaust stroke, driving the burned gas out from the cylinders. By the time the piston has reached its highest point it has forced out the burned gas and the exhaust valve closes. Having completed the four strokes, the piston is now ready to draw in a new charge and to repeat the cycle.

The same cycle of events takes place in all of the cylinders but no two pistons are at the same point in the cycle at the same time. In the Cadillac Eight Cylinder V-Type engine, the impulses in the eight cylinders are so timed that a power stroke is begun every quarter turn of the crankshaft. In other words, the crankshaft receives four overlapping impulses every revolution. The order in which the impulses take place is shown in Fig. 7.

### *Automatic Spark Control*

When each piston is at its highest position in the cylinder is, of course, the time when the charge is at its greatest compression, or, in other words, when the gas is "jammed in the tightest." Ignition occurring exactly at this instant produces a much more forceful explosion than if it occurred at a time when the charge was not so tightly compressed.

If the charge were ignited the instant the contact is made in the ignition timer, regardless of the speed of the engine, the spark could be set permanently in one position and would not require changing. But a certain amount of time elapses from the instant the circuit is closed at the ignition timer until the charge is ignited in the cylinder. While this time is but the merest fracton of a second, in fact, almost infinitesimal, yet it is time just the same and must be taken into account when dealing with such a rapidly acting mechanism as an automobile engine.

The lapse of time required to ignite the charge is always the same regardless of the speed of the engine and pistons. You will realize that when the engine is running, say 3000 R. P. M., the pistons are traveling many times as fast as they do when it is running only 300 R. P. M. and that when the engine is running 3000 R. P. M. it is necessary to start the ignition process earlier.

In the Cadillac this is accomplished by means of a ring governor located directly under the ignition timer. (See Fig. 50.) As the speed of the engine increases, the ring in the governor assumes a position more nearly horizonal, forcing the timer contact cam slightly ahead on the shaft by which it is driven. This causes the timer contact points to break earlier, thereby starting the ignition process earlier in relation to the positions of the pistons. When the engine slows down, the ring in the governor assumes a position more nearly vertical, forcing the contact cam back on the shaft by which it is driven, causing the contact points to break later and thereby starting the ignition process later in the strokes of the pistons.

### *Manual Spark Control*

The automatic control takes care of the spark position for all ordinary driving. A spark lever is provided, however, by which the ignition timing may be still further advanced or retarded. The spark lever is the shorter lever just above the steering wheel.

Ordinarily the spark lever should be carried in that portion of the sector marked "Driving Range." To get the best results, however, the spark lever should be retarded further for extremely low speeds and advanced further for extremely high speeds. The car should be driven at all times with the greatest possible spark advance which the speed of the engine will permit.

Advancing the spark too far for a given engine speed will usually cause a slight pounding noise, which is sometimes not noticed by the beginner as it is usually but slight, owing to the substantial character of the crankshaft and bearings.

When starting the engine, place the spark lever in the "Driving Range" on the sector except during extremely cold weather when it should be placed at the extreme right or in the fully advanced position. If the engine should be cranked by hand, the spark lever should be placed at the extreme left on the sector or in the fully retarded position. If this caution is not observed a "back kick" may occur, probably resulting in injury to the person cranking.



## DRIVING SUGGESTIONS

### *Rules of the Road*

Road and traffic laws vary greatly in different localities. It is, therefore, impossible to set down a complete list of rules which may be followed in all parts of the country. The following are some of the rules which are practically universal in all parts of the United States.

In meeting a vehicle going in the opposite direction *pass to the right.*

In passing a vehicle going in the same direction *pass to the left.*

Always stop with the right hand side of the car next to the curb. If it is necessary to turn around to do this it should be done.

Never turn around or turn off onto another road without making absolutely sure that there is no other vehicle directly behind you.

Never enter upon street car tracks without making sure that there is no car directly behind you—*no matter how sure you feel, look and see.*

Do not cross street car or steam railroad tracks without making sure that it is absolutely safe to do so.

In crowded traffic do not apply the brakes suddenly unless it is absolutely necessary. It may be that the vehicle following you cannot stop as quickly as you can. If this is the case a collision is sure to result.

On wet asphalt streets or slippery roads do not apply the brakes suddenly unless it is absolutely necessary. If the brakes are applied suddenly under these conditions disastrous skidding is apt to occur.

In crowded traffic it is a good plan to signal cars at the rear, before turning, slowing down or stopping.

It is a good plan to slow down in passing vehicles going in the opposite direction.

One of the most essential things to remember is that you should *never "take a chance."* You will find that the more experienced drivers never permit themselves to take a chance.

### *Coasting*

To coast on the level, close the throttle and then release the main engine clutch by pushing forward on the left pedal.

When descending grades a good method is to close the throttle and, with the clutch engaged, allow the engine to do the holding back as much as possible. This saves much wear on the brake band lining.

When descending steep grades, the resistance offered by allowing the car to drive the engine when "high gear" or "direct drive" is engaged is usually sufficient to control the speed. When the engine does not offer sufficient resistance the speed may be further checked by applying the foot brake.

When it is necessary to descend a very steep grade it is best to engage the intermediate or possibly the low speed gears *before commencing the descent,* and if the resistance of the engine thus obtained is not sufficient, supplement it by the foot brake. Bear in mind that the more the resistance of the engine is used in coasting the longer the brake band linings will wear and the brakes retain their adjustment.

The principle of this method will be understood when you realize that the same combination of gearing which changes the ratio between the engine shaft and the rear axle, which makes it easier for the engine to drive the car, will, when the car is compelled to drive the engine, have exactly the opposite effect, which is the case when the above method is used in descending a hill.

### *Don'ts for General Operation*

Don't run the car at sustained high speed when it is new.

Don't put oil in the engine without first straining it through cheese cloth or fine wire mesh and making sure that it is free from dirt and lint.

Don't allow the clutch to engage suddenly.

Don't prime the carburetor too much.

Don't attempt to shift from neutral to any gear, or from one gear to another gear without first releasing the clutch.

Don't attempt to shift from the reverse gear to any other gear when the car is moving.

Don't attempt to shift from any forward gear to the reverse gear when the car is moving.

Don't attempt to shift from the high gear to the low gear when the car is moving.

Don't attempt to shift from the intermediate gear to the low gear when the car is moving, unless it is moving very slowly. Ordinarily it is best to stop the car altogether before shifting from the intermediate gear to the low gear.

Don't push the starter button when the engine is running.

Don't turn the steering gear when the car is standing. This is not only unnecessary but is also bad practice.

Don't fail to investigate any unusual sound which may develop in the car. The car should be inspected at the service station of a Cadillac distributor or dealer.

Don't neglect to inspect the level of the acid in the storage battery every 1,000 miles.

Don't turn corners at high speed.

Don't neglect to keep the cooling system filled with water and with a good anti-freezing solution in cold weather.

Don't drive fast or attempt to stop suddenly on wet pavements.

Don't attempt to start the engine with the switch turned off, without air pressure or without gasoline in the tank.

Don't fill the lubricating system in the engine only and neglect to lubricate all other parts of the car.

Don't neglect the lubrication of any part of the car.

Don't neglect to keep the tires properly inflated.

*Don't race the engine when it is not driving the car. There is no worse abuse.*



## BODY AND TOP

### *Care of Finish*

The best materials are used in finishing Cadillac cars. These are applied in the most expert manner. In spite of these facts, it cannot be expected that the finish will stand up unless it is given proper attention.

The finish of an automobile requires more careful and frequent attention when the car is new than when it is older and the varnish is harder.

You should be particularly careful to keep mud from the body and hood of the car while new. Have the car washed immediately in case mud spatters on it.

The following instructions should be followed very carefully when the car is washed:

Always use clean water. Never use water containing alkali. In parts of the country where the regular water supply consists of "alkali" water, rain water should be used for washing the finish.

Never use water colder than forty degrees or warmer than sixty degrees. If a hose is used in washing, never have a greater pressure than will carry the water six inches beyond the end of the hose. Water under greater pressure will drive the grit and dirt into the varnish.

A soft, Rock Island natural sheep's wool sponge is the best for washing the body and hood of the car. Begin at the top of the body panels and thoroughly wet the surface all over with water from the sponge. Continue until the accumulation of road dirt softens up and gives way.

Use clean water continually, and plenty of it. Go over the surface with plenty of water two or three times until the surface is perfectly clean.

Do not wash the hood while it is hot. The effect is the same as washing it with hot water. Unless the hood is allowed to cool before washing the luster will soon disappear.

Dry off with a clean soft chamois. Do not rub the finish or use hand pressure more than sufficient to dry off the water. The water evaporates quickly and leaves the finish in good condition.

Wash the car frequently, especially when it is new, as often, in fact, as the car returns from the road with a soiled appearance. This practice in the case of a new car, heightens the brilliancy of the finish, hardens it, keeps it from spotting and adds greatly to the general appearance of the car.

Do not wash the glass of the windshield or the glass of the enclosed cars with preparations which may contain harmful ingredients. Use only cleaning compounds which are known to have no destructive effect on the highly polished surface of the glass.

### *Seat Cushions*

The easiest and best way to replace a seat cushion is to first place the front side of the cushion against the retaining strip on the seat and then to force the rear end of the cushion into place.

### *Body Bolts*

As the body bolts become more firmly seated after the car has been operated, it is a good plan to tighten all of the body bolts at the end of the first 1000 miles of travel.

## TOP AND SIDE CURTAINS

### *Folding Top*

Unbutton the rear curtains "A," Fig. 8, from the bows and also from the top of the body. Fold the curtains in smoothly against the back curtain. Open the top rest clamps "B."

Release the front end of the top from the windshield standards by loosening the clamps at "C." After the top is released tighten the clamps again to prevent them from rattling.

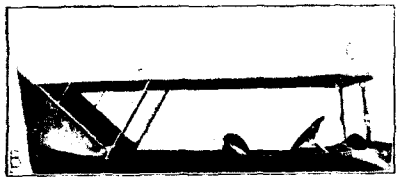



*Fig. 8. Top in Raised Position.*

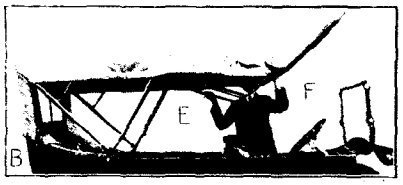



*Fig. 9. Top Partially Folded, First Position.*




*Fig. 10. Top Partially Folded, Second Position.*

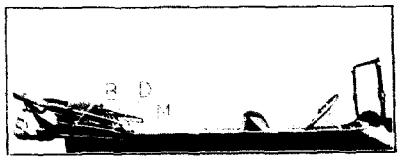



*Fig. 11. Top Folded.*




*Fig. 12. Top Partially Raised, First Position.*

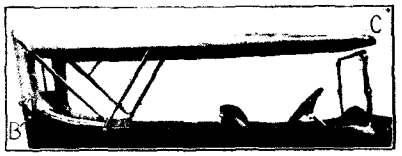



*Fig. 13. Top Partially Raised, Second Position.*

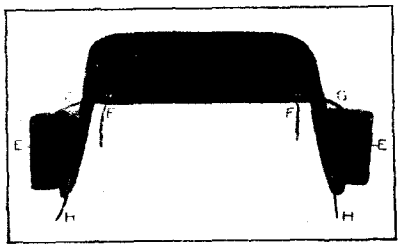



*Fig. 14. Dust Hood.*

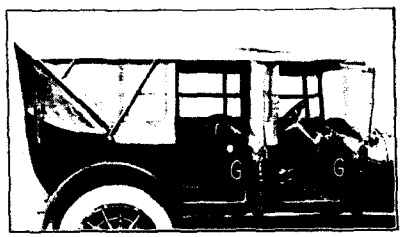



*Fig. 15. Side Curtains in Place.*



"Break down" the joints at each side of the horizontal bow by pushing up with one hand on the bow at "F," Fig. 9, and pulling down with the other hand at "E." Fold the front part of the top back until it closes as shown in Fig. 10. Insert the pins on the sockets of the center bow in the holes at "D."

Carefully lower the top into the top rests, being careful to tuck the material between the bows so that it rests smoothly and is not pinched. (See Fig. 11.) Then close and lock the top rest clamps "B."

Unfold and open up the dust hood (Fig. 14) so that the flaps, "E" are at the top. Draw the hood on over the folded top and tuck the flaps down between the bows and the body, taking care not to scratch the body. Be careful to draw the hood up evenly on both sides. Loop the straps "F" on the under side of the dust hood around the lower bow on each side, draw them tight and buckle. Pass the straps "G" through the top rest clamps "B," Fig. 11. Pass the straps "H" through the loops on the nuts "M" on the top supports just back of the rear doors. Button the snap fasteners on the lower edges of the flaps under the bows.

### *Raising Top*

Unbutton the fasteners along the lower edges of the parts of the dust hood protecting the bows at the sides. Unbuckle all the dust hood straps and carefully pull off the dust hood from the rear.

Open the top rest clamps "B," Fig. 11, and release the pins from the holes at "D."

Then, standing behind the car as shown in Fig. 12, push up and forward on the rear bow. The top should then assume the position shown in Fig. 13. Pull down the front end of the top until the ball on each windshield standard is well into the socket attached to the top bow and tighten the clamps "C."

Place the rear curtain "A," Fig. 8, in position and button the fasteners on the body and also on the rear bows. Close and lock the top rest clamps "B."

### *Lubrication of Top Joints*

It may be found, after use, that the joints of the top require lubrication. When lubricating the joints you should be very careful not to get oil on the top material and not to put too much oil on the joints, which will afterwards run out onto the top material. Wipe the joints off carefully after lubricating.

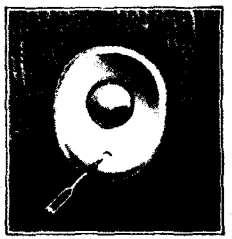


*Fig. 16. Curtain Fastener.*

### *Side Curtains*

The front curtains are carried in the top just back of the windshield and the remainder of the curtains at the extreme rear part of the top. Each section of the curtains is tagged to indicate where it belongs.

Removable supporting rods are provided for the doors to carry the side curtains when the doors are opened. The supports are attached without screws or bolts, simply by inserting them in the brackets at "G," Fig. 15.

The curtains are fastened in place with fasteners of two kinds. One of these is the usual "glove fastener" type, which snaps on and off. The other type of fastener becomes locked on three sides when snapped into place and must be lifted on the side which is not locked in order to release it. This side is indicated by a small projection on the fastener as shown by the arrow in Fig. 16. This type of fastener cannot be released by lifting it at any other side.

Before the curtains are stowed away they should be dry and clean.

## WINDSHIELD POSITIONS

### *For Inclement Weather*

The normal position of the windshield for inclement weather is with the upper and lower sections closed and with the removable rubber strip between the glasses. If, as the result of rain or snow on the windshield glass, it becomes impossible to see through it, the upper section may be tilted out at an angle. This is known as the "rain vision" position. The driver may then look between the sections of the shield, at the same time being protected to some extent from the rain and snow. The clamping nuts at the top of the windshield standards must be loosened before the upper section can be tilted and should be tightened after it is in the desired position to hold it in place.

### *For Ventilation*

There is a row of rectangular slots through the cowl just back of the windshield. When ventilation in the driver's compartment is desired, the lower section of the windshield should be tilted *in* at a slight angle so that the lower edge is just back of the ventilating slots in the cowl. If it is desired, the lower section may be tilted in at a greater angle. The clamping nuts half way up the windshield standards must be loosened before the lower section can be tilted and should be tightened after it is in the desired position.

If more ventilation is desired the upper section of the shield may be tilted toward the driver so as to deflect a current of air directly into the compartment.

## SPEEDOMETER AND CLOCK

### *Speedometer*

The speedometer on the instrument board registers on its three dials the rate at which the car is traveling, the total number of miles traveled by the car and a trip reading which may be reset to zero. The total mileage dial cannot be reset.

Do not under any circumstances attempt to lubricate the speedometer head. Any parts of the speedometer head requiring lubrication were amply supplied with lubricant before they were assembled. Do not, however, neglect the grease cup on the instrument end of the driving cable. (See under "Grease Cups," page 43.)

A repair man should never be allowed to attempt to adjust or repair the speedometer head. Repairs or adjustments are impossible without a special calibrating machine. The guarantee on the speedometer head does not hold good if the head is disassembled or tampered with.

If the speedometer head is removed for any reason, handle it with the same care that you would a fine watch. The speedometer head may very easily be damaged by rough handling.

If a new glass is necessary, or repairs or adjustments, remove the speedometer head, pack it carefully, and return it to the makers or one of their service stations or branches.

### *Clock*

The clock is set and wound exactly as a stem winding watch. When setting or winding the clock use reasonable care.

With reasonable care the clock will stand the hard usage automobile service gives and to meet which the clock is constructed.



## TIRES

### *Guarantee*

The tires used on Cadillac automobiles are guaranteed by their respective makers. In case of claims, tires should be sent to the factory or any of the branches of the makers (not to us), transportation charges prepaid.

## CARE OF TIRES

Each tire maker publishes a booklet with instructions for care and repair of tires and every motorist should provide himself with one of these and thoroughly familiarize himself with the contents. We give here suggestions that apply to pneumatic tires in general.

Probably 75% of so-called "tire trouble" is the result of misuse. In the following we have illustrated some of the more common causes of tire breakdown.

### *Result of Improperly Adjusted Tire Chains*

Fig. 17 illustrates a tire which has been badly damaged through the use of tire chains which were improperly adjusted or fastened to the spokes holding the chains tightly in one place. You will note that the tread is cut through to the fabric, and in fact loosened up and torn badly in many places.

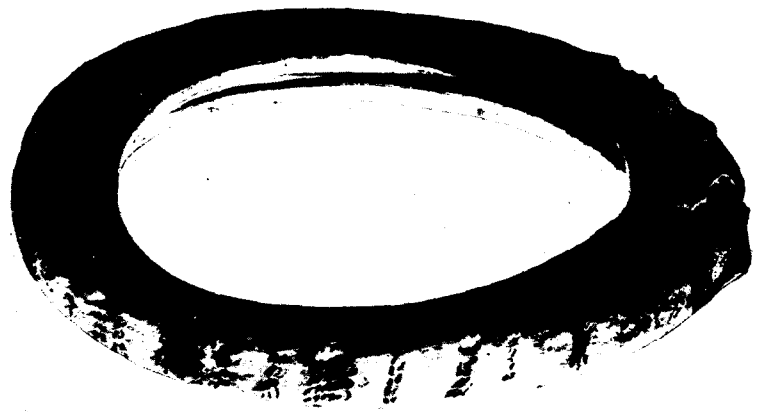


*Fig. 17. Result of Improperly Adjusted Tire Chains.*

The least injury results when chains are loosely applied, and have play enough to work themselves around the tire, distributing the chain on all points alike. Probably the greatest amount of injury comes from using chains unnecessarily on paved streets.

### *Neglect of Small Cuts*

Fig. 18 illustrates a tire damaged from the neglect of two small cuts extending to the fabric. (Note the two prominent "bumps," which show plainly.)



*Fig. 18. Result of Small Tire Cuts Which Were Neglected.*

If cuts extending to the fabric are neglected, fabric deterioration and blistering of the tread is bound to result.

It is unnecessary to remove a tire to treat a small cut of this nature. Tire companies furnish a plastic compound for filling cuts, thus preventing moisture and dirt from getting to the fabric.

### *Result of Improperly Aligned Front Wheels*

Fig. 19 shows the result of running a car with the front wheels out of alignment. This usually affects both tires similarly, although sometimes one tire only is affected. An improper adjustment of the parallel rod in front of the axle, or a bent steering arm is responsible for this condition. Unless the wheels are kept in proper alignment, the tread of the front tires will wear away in a remarkably short time.



*Fig. 19. Result of Improperly Aligned Front Wheels.*

If the front wheels are badly enough out of alignment, the entire tread of both front wheels may be worn off in less than 100 miles. If the wheels are only slightly out of alignment, the result is the same, although the wearing off is slower. (See under "Alignment of Front Wheels," page 88.)



### *Result of Sudden Application of Brakes*

You will note from Fig. 20 that the tread and several plies of fabric have been worn or rather scraped off at one place. This has been brought about by sudden application of the brakes, which resulted in sliding the wheels. It is remarkable how soon a tire will give away from this severe treatment.



*Fig. 20. Result of Suddenly Applying Brakes.*

### *Result of Under Inflation*

Fig. 21 shows the most common result of under-inflation. The lower the pressure in the tire the more the tire flattens out under load. This flattening causes the side walls of the tire to bend more sharply as the wheel revolves. The final result of this is the breaking of the fabric in the side walls as shown in the illustration. There are unquestionably more tires ruined from under-inflation than from any other cause.

Different makes and types of tires require a different air pressure. Instructions issued by the various makers should be followed.

### *Additional Suggestions*

The tires are constructed for the purpose of carrying up to certain maximum loads and no more. Owners should realize, therefore, that overloading a car beyond the intended carrying capacity is sure to materially shorten the life of the tires.

Do not turn corners or run over sharp obstructions, like car tracks, at a high rate of speed. Such practice is sure to strain or possibly break the fabric, with the result that the further life of the tires will be limited. Remember that most tire troubles are the result of abuse more than use.

Avoid scraping the tires against the curb and running in ruts. This kind of wear scrapes off the rubber side wall and exposes the fabric to dirt and moisture which soon starts to rot the threads.

In turning in a narrow street, avoid striking the curb.

If a tire goes flat, see that the valve is not leaking. A little moisture on the tip will show bubbles if the air is escaping.

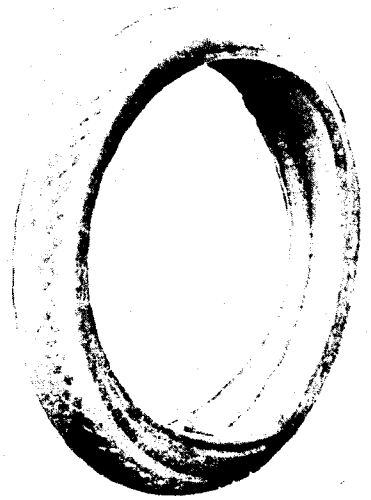


*Fig. 21. Result of Insufficient Inflation of Tire.*

In case of puncture, the car should be stopped at once and the tube repaired or replaced, or the tire replaced by the extra one. The tire should also be examined carefully and the cause of the puncture ascertained and the nail, glass or whatever it may be, should be extracted. Before replacing the tire on the rim, examine the inside of the casing to see that the cause of the puncture is not still protruding, because it would, if allowed to remain, continue to cut the inner tube. It is also advisable to look over the outside of the tires frequently and take out any pieces of glass or other particles which may have become imbedded in the casing.

Don't run in ruts or car tracks; the sides of a tire will soon wear out under such treatment. Avoid large stones or other obstructions in the road. To hit one of these may break the fabric even though no external injury be visible.

Experience has taught the careful driver to carry one or more spare tubes, as a cemented roadside repair will not always hold, especially in warm weather, as the heat generated in the tire may loosen the patch. When touring, a spare casing should always be carried.

The garage floor should be kept free from oil or gasoline. The tires on a car left standing on a grease-covered floor deteriorate quickly, the natural enemies of tires being oil and gasoline. These destroy the nature of the rubber, rendering it soft, so that it cuts and wears away quickly.

Tires that show wear on one side from use on rutty roads or from other causes may be turned around, thereby lengthening the life of the tire.

Spare tubes should be kept lightly inflated. This keeps them in good condition and prolongs their life. They should not be stored in a greasy tool box under any circumstances.

If the car is not used during the winter, it is better to remove the tires from the rims, keeping casings and tubes in a fairly warm atmosphere away from the light. It will be better to slightly inflate the tubes, as that keeps them very nearly in the position in which they will be used later on.

If the tires are not removed and the car is stored in a light place, it will be well to cover the tires to protect them from the strong light, which has a deteriorating effect on rubber.

The greatest injury that can be done to tires on a car stored for the winter is to allow the weight of the car to rest on the tires. The car should be blocked up, so that no weight is borne by the tires, and the tires should then be deflated partially. This will relieve the tires of all strain, so that in the spring they should be practically no worse for the winter's storage.

## TIRE HOLDER

The tire holder is designed to carry two standard size tires inflated on rims.

To remove the tire with rim, remove the lock and then unscrew the clamp as far as it will go. Move the bottom of the tire back until it is entirely free from the holder. The tire then may be removed by slightly lifting it straight up.

To put a tire on the holder proceed in the reverse manner.

Care should be used not to allow the inner tire to strike the body of the car when removing or replacing it.



## TIRE AIR COMPRESSOR

### *Operation and Use*

The air compressor for the tires is bolted to the left hand side of the transmission case. It is driven by a sliding gear which meshes with the reverse idler gear. The sliding gear is thrown into or out of mesh with the transmission gear by a shaft extending up through the front floor boards at the left of the transmission control lever, and just back of the brake pedal. (See Fig. 1.) The head of this shaft has a screw-driver slot which permits the shaft to be turned easily.

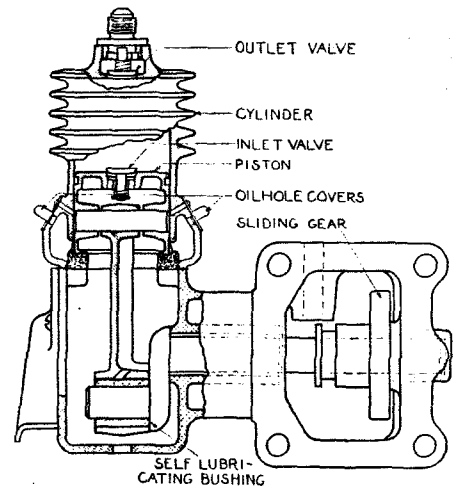



*Fig. 22. Tire Air Compressor, Sectional View.*

To use the compressor, first attach the air hose to the air connection . (See Note.) Then connect the other end of the hose to the valve of the tire to be inflated. Do not connect the hose to the tire first or the air will escape from the tire before the pump end is connected. Then bring the compressor into operation proceeding as follows:

First, either stop the engine or release the clutch and hold the clutch pedal down until you are sure that the transmission gears have ceased to rotate, then, with the engine not running or with the clutch pedal still held down, turn the slotted head of the shaft in a clockwise direction as far as it will go. This will throw the sliding gear into mesh with the reverse idler gear.

Then start the engine, or in case the engine is running, engage the main clutch, first being sure that the transmission control lever is in the neutral position.

The engine should be run at a speed between 900 and 1100 revolutions per minute when the compressor is in operation. (If the third brush on the motor generator is properly adjusted, the correct speed of the engine may be determined by noting the ammeter on the instrument board. When the engine is running between 900 and 1100 revolutions per minute the ammeter should indicate a charging current of 16 to 18 amperes with all lights switched off.) Do not race the engine when inflating tires.

Do not turn the slotted head of the shaft to mesh the compressor gear when the engine is running and the clutch engaged. If this is attempted it will probably result in stripping the compressor driving gear.

To throw the compressor driving gear out of mesh, turn the slotted head of the control shaft in a counter-clockwise direction.

Note:—The connection for the air hose is in the tool box of cars fitted with the dust shield tool box, and in the left hand dust shield just back of the battery box cover on cars in which the tool box is under the front seat.

### *Lubrication*

The compressor piston is lubricated through two oil holes—one in front of the compressor cylinder and one just behind. Each oil hole is protected by a small sliding cover.

Apply engine oil at these points every 1000 miles, or oftener if the pump is used frequently. (See Fig. 22.)

# DEMOUNTABLE RIMS

## *Demounting Rim with Tire*

Jack up the axle until the wheel is free from the ground. Then remove the valve cap; loosen the eight clamp nuts, with the brace wrench furnished with the tool kit, and turn each clamp to the left until it strikes the stop pin in the felloe band. Turn the wheel so that the valve is at the top and pull the bottom of the rim towards you until it clears the wheel. The rim with tire can then be removed by lifting it straight up. (Fig. 23.)

## *Mounting Rim with Tire*

If the rim you are mounting has no split clamping ring, take the one from the rim you have removed. Turn the wheel so that the hole for the valve stem is at the top. Hold the rim so that the valve stem is at the top and so that the rim joint latch and the clamping ring are towards you. Insert the valve stem in the valve stem hole in the wheel and then push the bottom of the rim into place. (Fig. 24.)



*Fig. 23.*
*Demounting Rim from Wheel.*



*Fig. 24.*
*Mounting Rim on Wheel.*

Turn each clamp to its original position and turn the clamping ring so that the split in the ring comes directly under one of the clamps. Tighten each clamp slightly. Then continue around the wheel, tightening each clamp firmly. Screw on the valve cap.

*If the rim does not run true,* mark the part that runs "out" from the face of the wheel. Then slightly loosen the clamps diametrically opposite this part and tighten the clamps at the marked part. Proceed in this manner until the rim does run true.



## *Removing Tire from Rim*

The tire may be removed without removing the rim from the wheel.

*Deflate the tire.* Then open the lock with the pointed end of the tire tool or with a screw-driver.

Raise one end of the ring with the tool as shown (Fig. 25) until the lug is clear of the slot in the rim.



*Fig. 25. Removing Tire from Rim, First Position.*



*Fig. 26. Removing Tire from Rim, Second Position.*

Raise the end of the ring further and force the lug out over the edge of the rim. (Fig. 26.)

Start at the end of the ring, which is out of the groove, and remove the entire ring from the rim. (Fig. 27.) (See note.)

Turn the wheel until the valve stem is at the top, and pull the lower part of the tire towards you until it is clear of the rim. The tire may then be removed from the rim by lifting it straight up.

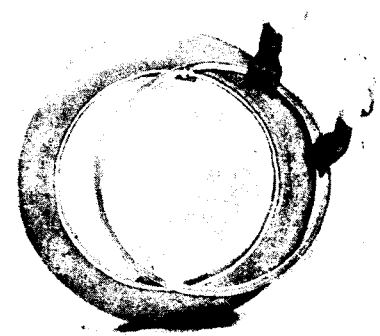


*Fig. 27. Removing Tire from Rim, Third Position.*

*Note*—In removing the ring from the rim, care should be taken to avoid opening the ring beyond its elastic limit. When the ring is free from the rim the ends of the ring should overlap from ½ to 1½ inches, which it will not do if it has been stretched in removal.

If the ends of the ring do not overlap they should be closed together before replacing. If this is not done there is a possibility of the lock failing to properly engage the lugs on the ends of the ring, which might later be the cause of an accident.

***Caution—Do not attempt to remove a tire from a demountable rim without first completely deflating the tire. Serious personal injury may result if this is attempted.***

### *Placing Tire on Rim*

If the demountable rim is on the wheel, jack up the axle and turn the wheel until the hole for the valve is at the top.

Hold the tire so that the valve stem is at the top and insert the valve stem in the valve stem hole in the rim and wheel. Then push the bottom of the tire into place.



*Fig. 28. Placing Tire on Rim, First Position.*



*Fig. 29. Placing Tire on Rim, Second Position.*

Insert one end of the locking ring in the slot in the rim. Then with the tool as a lever, force the tire back far enough to allow the ring to go on easily. (Fig. 28.)

Starting at the end of the ring which is inserted in the slot in the rim, force the remainder of the ring into place by using the tire tool as pliers. (Fig. 29.)



*Fig. 30. Placing Tire on Rim, Third Position.*



*Fig. 31. Placing Tire on Rim, Fourth Position.*

Insert the flat end of the tool between the rim and the ring, and turn the tool up edgewise. (Fig. 30.) This will lift the loose end of the ring and force it into place.

Draw the ends of the locking ring together with the tool. (Fig. 31.) Then swing the lock into place.

Then inflate the tire. (See under "Tire Air Compressor," page 27.)

If the demountable rim is not attached to a wheel, lay the rim with the tire flat on the ground when removing or replacing a tire.



# COLD WEATHER SUGGESTIONS

## STARTING THE ENGINE

### *Use of Throttle Pump as Primer*

In *extremely* cold weather, if the engine is not started in 15 or 20 seconds, remove your foot from the starter button. This will stop the cranking operation. Now open and close the throttle once or twice with the hand throttle or the foot accelerator. *Do not* open and close the throttle more than twice.

Opening and closing the throttle operates the throttle pump on the carburetor. This raises the level of the gasoline in the carburetor, thereby priming it. If the throttle is opened and closed more than twice, gasoline is forced out of the carburetor.

### *Position of Spark Lever*

Except in extremely cold weather, the spark lever should be placed in the position marked "driving range" when starting. In extremely cold weather, it should be fully advanced when starting. (If the engine is to be cranked by hand, the spark lever should be placed at the extreme left on the sector.)

It is the practice of some drivers to place the spark lever at the extreme left on the sector when starting the engine. While this is the proper position for the spark lever if the engine be hand cranked, there is no reason for retarding the spark when the engine is electrically cranked and starting is facilitated if the spark lever is advanced to the "driving range." In extremely cold weather there is no reason why the spark lever cannot be placed in the fully advanced position if the engine be electrically cranked and a quicker start is assured if this is done. The following will explain why it is possible to fully advance the spark lever at such times:

The mixture in a cold engine does not burn as rapidly, nor is there so much energy in it, as when the engine is warmer and the fuel is better vaporized. When the engine is cold a large percentage of the heat of each explosion is instantly dissipated by reason of the cold combustion chambers and cylinder walls, the result being that an explosion which in a hot engine would occur early enough and have energy enough to produce a "spark knock" or "back kick," occurs so much later and is so much less intense, that neither of these results is produced.

It is best to have the spark lever in the fully advanced position for cold weather starting for the following reasons:

As explained before, a cold mixture ignites much more slowly than a hot mixture. A cold, slow-burning mixture, if ignited on top dead center on account of the spark being in the retarded position, may burn through the power stroke, through the exhaust stroke and may be still burning in the combustion chamber when the inlet valve is opened to draw in another charge. When this happens, the flame sets fire to the incoming charge, igniting the mixture in the intake pipe and carburetor, producing a "pop back" in the carburetor. The possibility of this happening is very much less if ignition is started earlier by placing the spark lever in the fully advanced position.

### *Position of Throttle Lever*

In winter weather the throttle lever should be open about two inches on the sector for starting. Many drivers make a practice of opening the throttle wide or nearly so immediately the engine is started and after shifting the transmission into gear. The full suction of each piston through the carburetor under these conditions causes the auxiliary air valve in the carburetor to open wide, allowing a large volume of cold air to rush into the carburetor.

The proportion of air to gasoline drawn in under these conditions is practically the same as when the engine is hotter, but as only a portion of the gasoline drawn in is vaporized, and as only the vaporized portion burns, the proportion of air to gasoline burned is greater than when the engine is warmer, thus producing a 'lean" mixture. A "lean" mixture is slow burning, whether it is warm or hot, and a cold "lean" mixture is particularly slow burning. Thus if the throttle is opened suddenly before the engine is thoroughly warm, the cold "lean" mixture resulting, burns so slowly that a "pop back" in the carburetor is almost sure to occur.

### *Use of Starter Button*

In extremely cold weather, when the car has been standing long enough to become thoroughly chilled, it is a good plan to release the clutch before pressing down the starter button and to hold the clutch pedal down during the cranking operation.

If the clutch is engaged during the cranking operation the starter turns the jackshaft in the transmission in addition to cranking the engine. While at ordinary temperatures the additional energy thus required is almost negligible, in extremely cold weather the lubricant in the transmission may offer enough resistance to the gears to increase considerably the demand upon the battery during the cranking operation. It is obvious that with the clutch in the released position while the starter button is pushed down, less work is done by the starter and the battery charge is conserved.

## ANTI-FREEZING SOLUTION

The radiator condenser makes it possible to use with safety an anti-freezing solution of denatured or wood alcohol and water. Do not use a solution containing calcium chloride as this is injurious to the metal parts of the cooling system.

The capacity of the cooling system is five and one-quarter gallons. The condenser should contain an additional three quarts, making a total of six gallons.

The following are the freezing temperatures of denatured alcohol and water solutions of various proportions.

| Denatured Alcohol (% by volume) | Water (% by volume) | Freezing Temperature (degrees Fahr.) | Specific Gravity (Hydrometer reading) |
|---|---|---|---|
| 20% | 80% | +13° | .974 |
| 30% | 70% | — 3° | .964 |
| 40% | 60% | —20° | .953 |
| 50% | 50% | —34° | .936 |

It is a good plan occasionally to draw out a sample of the solution in the radiator and to test its specific gravity with a hydrometer graduated between the limits of the above table.

***Caution:—Do not use water in the cooling system during freezing weather. Use a good anti-freezing solution. Water will freeze even though the engine be run continuously.***



## ADDITIONAL SUGGESTIONS

### *Starting in Intermediate or High Gear*

The car should not be started in intermediate or high gear. Start the car in low gear.

Starting in intermediate or high gear should not be done at any time, but this is particularly unfair to a cold engine, as it necessitates a further opening of the throttle than is necessary when starting on low gear, with the probability of a "pop back" in the carburetor.

### *Cold Test of Engine Oil*

Be careful to use an oil having a low cold test. In other words, use an oil which flows freely at low temperature. (See under "Lubricants," page 37.)

### *Frequent Changing of Oil*

Water may accumulate in the crank case of the engine during cold weather as a result of condensation. It is necessary, therefore, to drain the oil frequently and replace it by clean, fresh engine oil. (See under "Replace Oil Frequently During Cold Weather," page 40.) If water is allowed to accumulate in the crank case, serious damage to the engine may result.

### *Strainers in Gasoline System*

It may be found necessary to remove the strainers in the gasoline line more frequently during cold weather in order to prevent an accumulation of water at these points which would freeze and prevent the gasoline from going to the carburetor. (See under "Settling Chambers and Strainers," page 51.)

## WINTER STORAGE

### *Engine*

To prepare the engine for winter storage proceed as follows: Start the engine, cover the radiator and run the engine until it is hot. (See under "Personal Danger in Running Engine in Closed Garage," page 52.) The engine should be run at a speed which will show an ammeter reading of about 10 with all lights switched off. It usually requires from two to ten minutes to heat up the engine.

After the engine is hot and with the engine still running, inject one to two tablespoonfuls of clean, fresh engine oil into the carburetor through the primary air inlet. (See Fig. 38.) The oil gun may be used for this purpose.

Then immediately shut the gasoline valve at the tank. Let the engine run until the gasoline in the carburetor is used and the engine stops. Then turn off the switch.

Open the relief cocks on all the cylinders to relieve compression. Then close the cocks.

If the engine is started again repeat the series of operations given in paragraphs one, two, three and four.

Drain the cooling system. You will find complete instructions in this book under "Draining the Cooling System," page 57.

### *Storage Battery* (*see under "Preparing Battery for Winter Storage," page 81.*)

### *Tires*

During winter storage it is best to remove the tires from the rims and keep the casings and tubes in a fairly warm atmosphere away from the light. It is best to inflate the tubes slightly after the tires have been removed to keep the tires in the position in which they are when inflated on the rim.

If the tires are not removed from the car, and the car is stored in a light place, it is best to cover the tires to protect them from strong light, which has a deteriorating effect on rubber.

The greatest injury that can be done to tires when the car is stored for the winter is to allow the weight of the car to rest on them. If the tires are not removed the car should be blocked up so that no weight is borne by the tires and the tires partly deflated.

### *Body and Top*

It is best to put the top up and cover the entire car to protect it from dust.

### *Taking Car Out of Storage*

When the car is taken out of storage the following instructions should be followed carefully in starting the engine:

Remove the spark plugs and with the oil gun inject one or two tablespoonfuls of clean, fresh engine oil into each cylinder.

Replace the spark plugs. Turn the engine over a few revolutions either with the starter or with the hand crank with ignition switched off. This will tend to distribute the oil over the cylinder walls.

Turn on the gasoline at the tank and start the engine in the usual manner.

Immediately the engine starts, inject one or two tablespoonfuls of clean, fresh engine oil into the carburetor through the primary air inlet.

# Part II

# LUBRICATION

## IMPORTANCE OF LUBRICATION

There is no one thing which is the primary cause of more trouble and the cause of more expense in maintenance to the mechanism of an automobile than insufficient lubrication.

All moving parts of the Cadillac car are manufactured with an unusual degree of accuracy and the parts are carefully assembled. In order to maintain the splendid running qualities of the car it becomes necessary systematically to introduce suitable lubricants between all surfaces which move in contact with one another.

The special object of this chapter is to point out the places in the Cadillac which require oiling. While it is manifestly impossible to give exact instructions in every instance as to just how frequently each individual point should be oiled or exactly how much lubricant should be applied we give this approximately, based on average use.

*It should be borne in mind constantly that where one part moves upon or in contact with another friction is created. Friction means wear, and the wear will be of the metal itself unless there is oil, and oil is much cheaper than metal. The use of too much oil is better than too little, but just enough is best.*

Proper lubrication not only largely prevents the wearing of the parts, but it makes the car run more easily, consequently with less expense for fuel and makes its operation easier in every way.

The oiling diagram shown in this chapter indicates the more important points which require attention. But do not stop at these. Notice the numerous little places where there are moving parts, such as the yokes on the ends of various brake rod connections, etc. A few drops of oil on these occasionally will make them work more smoothly.

Oil holes sometimes become stopped up with dirt or grease. When they do, clean them out and be careful not to overlook them. Also be careful not to allow dirt or grit to get into any bearings.

Judicious lubrication is one of the greatest essentials to the satisfactory running and the long life of the motor car. Therefore, lubricate, and lubricate judiciously.



## LUBRICANTS

There are many grades of oils. There are none too good. Naturally, we have experimented a great deal with numerous lubricants to determine which are best adapted for the various parts of the Cadillac car. It is not always an easy matter for users to obtain suitable lubricants. The constant demand made upon us by Cadillac dealers and Cadillac users has induced us to provide suitable lubricants which may be obtained from Cadillac dealers.

### *Cadillac Motor Oil*

Cadillac Motor Oil is recommended and may be used both summer and winter. In the absence of Cadillac Motor Oil, Mobiloil A, Monogram Medium, or Amalie Non-Carbon Oil may be used during summer weather and Mobiloil Arctic Oil during winter weather.

The oil used should be a filtered one and not an acid or alkali treated oil. It should be refined from Pennsylvania crude or its equivalent.

We cannot hold ourselves responsible for damage resulting from the use of oil not suited to the Cadillac engine.

*Engine oil should be strained through cheese cloth or fine mesh wire cloth before using.*

### *Cadillac Rear Axle and Transmission Lubricant*

Cadillac Real Axle and Transmission Lubricant is recommended for the rear axle and transmission. In its absence we recommend a mixture of steam cylinder oil and a small amount of cup grease mixed to such a consistency that the mixture flows easily at temperatures from 60° to 70° Fahrenheit.

### *Cadillac Cup Grease*

Cadillac Cup Grease is recommended for use in the grease cups. In its absence we recommend a neutral grease of medium consistency, made from an animal oil base.

### *Cadillac Wheel Bearing Grease*

Cadillac Wheel Bearing Grease is recommended for the wheel bearings. In its absence we recommend neutral grease of vaseline consistency (soft), made from an animal oil base. Do not use a heavy grease for wheel bearings as it will roll away from the path of the rollers and will not return.

# ENGINE LUBRICATION

## *Lubricating System*

The lubrication of Cadillac eight-cylinder engines is by oil under pressure. A supply of oil is carried in the oil pan "A," Fig. 32. Oil is drawn from the oil pan by the oil pump "C" through the pipe "B" and forced to the main bearings "E," "F" and "G," through the supply pipe "D."

The pressure of the oil is regulated by an overflow valve or pressure regulator "M," containing a valve under spring tension. When the pressure is reached for which the valve is set, the valve is forced open and the oil overflows past the valve. A small hole drilled in the regulator housing allows oil to by-pass the valve when the valve is seated. Oil flowing through the by-pass and oil forced past the valve is carried to the camshaft bearings and power pressure pump in the gasoline system through the pipe "R" above and parallel to the camshaft. The forward end of this pipe is fitted with two nozzles from which oil flows into the camshaft sprockets and to the chains through holes drilled in the camshaft sprockets.

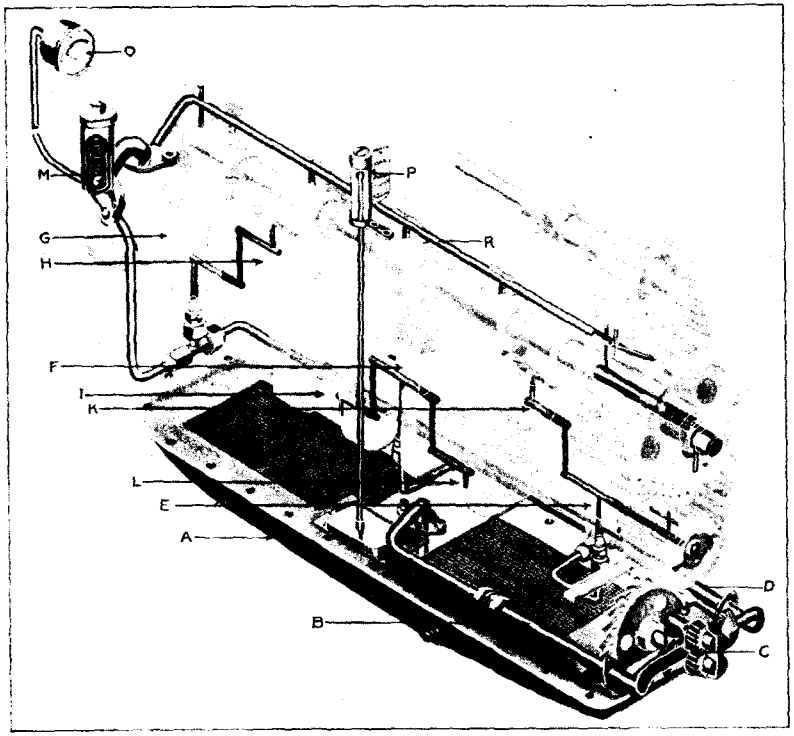



*Fig. 32. Engine Lubricating System.*



The connecting rod bearings, "H," "I," "K" and "L," on the crank shaft, are lubricated by oil from the main bearings forced through holes drilled in the crank shaft. The hole drilled in the forward end of the crankshaft communicates with a hole drilled in the crankshaft sprocket through which oil is supplied to the camshaft chain. The cylinders are lubricated by oil thrown from the lower ends of the connecting rods.

There is one gauge and one indicator in the lubricating system. The pressure gauge "O" is located on the instrument board and indicates the pressure of the oil. The indicator "P" is attached to the upper cover of the crank case near the carburetor and indicates the level of the oil in the oil pan "A."

## *Filling Lubricating System*

It is of the utmost importance that oil be free from dirt and lint and that it be of a suitable quality. (See under "Lubricants").

A filling hole is provided on the tanshaft housing just forward of the distributor.

Whenever the oil level indicator between the cylinder blocks reaches the line marked "Fill," oil should be added.

Do not risk running the engine after the oil level indicator has dropped down to the line marked "Fill."

If the oil level indicator should point to "Empty," the engine should be stopped immediately and supplied with oil.

There is an oil level plug in the right hand side of the oil pan shown in Fig. 33. If the oil level gauge on the engine should become inoperative from any cause or fail to register correctly, remove the oil level plug before starting to add oil, then add oil as above directed until it just starts to flow from the hole left by the removal of the plug. Then replace the plug and filling cap.

Note—If, on removing the level plug, oil flows from the hole for a few seconds, do not assume that the oil in the pan is up to the proper level. The level plug is at the lower end of a short standpipe which usually remains full of oil after the level of the oil in the oil pan has fallen below the upper end of the standpipe. The only way to be sure that the oil is up to the proper level is to allow the one or two teaspoonfuls of oil which has accumulated in the standpipe to drain off and then to add oil until it starts to flow from the hole.




*Fig. 33. Oil Filler, Pressure Regulator, Level Plug and Drain Plug.*

When adding oil with the level plug removed, the oil level indicator should register "Full" when the oil just starts to flow from the hole left by removing the plug. The oil pan then contains approximately one and one-half gallons of oil.

### *Replace Oil in Engine*

At the end of each 500 miles of travel, remove the drain plug located at the right side of the oil pan and drain out all of the oil. Then replace the drain plug and add sufficient fresh oil to bring the level of the oil up to the proper height. (See below under "Replace Oil Frequently During Cold Weather.")

At the end of the first 1000 miles of travel and at the end of every 4000 miles of travel thereafter, drain the oil pan and refill it with a mixture consisting of three quarts of kerosene oil and one quart of engine oil. The mixture must be entirely free from dirt and lint. Then run the engine at a speed of between 600 and 1000 R. P. M. for about one minute. Then drain the oil pan, remove it and the screen from the engine and thoroughly clean the oil pan and screen. Fill the oil pan to the proper height with clean, fresh engine oil after replacing it.

It is a good plan to clean the overflow valve and valve seat, as well as the housing in which they are contained, after forcing the mixture of kerosene and engine oil through the lubricating system. It is also important to make sure that the small by-pass hole is clean and free from any obstruction. A clean cloth, free from lint, should be used in cleaning the overflow valve. The housing, containing the overflow valve (pressure regulator), is located at the side of the crankcase just back of the right hand block of cylinders.

### *Replace Oil Frequently During Cold Weather*

The mileages given at which the oil should be drained and the oil pan and screen removed are those at which the work should be done during summer weather.

During cold weather a certain amount of water may accumulate in the crankcase of the engine as a result of condensation. The water thus formed either freezes, preventing the pump from drawing oil, or mixes with the oil, forming a thick substance which the pump cannot draw. It is necessary, therefore, during cold weather to drain the oil pan and clean the oil pan and screen much more frequently than during warm weather.

The frequency with which it is necessary to do this work during cold weather depends very largely upon the manner in which the car is driven. In cases where the car is driven short distances only and frequent stops are made so that the engine base and the oil in the oil pan remain cold it will be found necessary to drain the oil pan and clean the oil pan and screen much more frequently than in cases where the car is driven for longer distances with fewer stops, so that the engine base becomes thoroughly warmed.

The car that is constantly making very short trips in cold weather should have the oil drained every 350 miles or once a week and the oil pan and screen cleaned once a month.

***Unless the oil is drained out and the oil pan and screen are cleaned frequently enough in cold weather, serious damage to the engine may result, particularly on cars in short trip service.***

### *Oil Pressure*

Oil is fed under pressure to the main and connecting rod bearings of the engine. To prevent the pressure of the oil from rising too high, a spring controlled overflow valve known as a pressure regulator is provided. The pressure regulator is set when the car is assembled and requires no further attention except that it may be necessary occasionally to remove the valve from the regulator and clean the valve and its seat, as well as the by-pass hole.



The amount of pressure indicated by the pressure gauge on the instrument board varies with the speed and temperature of the engine and the viscosity of the oil. When the engine is warm and supplied with fresh Cadillac Motor Oil or oil of approximately the same viscosity, the pressure as indicated by the gauge should be from five to seven pounds when the engine is idling. (When idling the engine should run at approximately 300 revolutions per minute, if the screw "B," Fig. 37, is properly adjusted.) At higher speeds a higher pressure should be indicated and at lower speeds, a lower pressure. Before the engine has become warm, higher pressures will be indicated at given speeds. In other words, maximum pressures will be indicated at given speeds when the engine is cold and the oil is fresh; minimum pressures, when the engine is hot and the oil becomes thin from use.

Practically all engine lubricating oils become less viscous from use even under normal conditions. Running the engine too long with the auxiliary air control lever pulled back will cause the oil to be thinned more rapidly, due to the condensation of gasoline from the rich mixture.

### *Caution*

If after starting the engine it is found that the oil pressure gauge does not register pressure, stop the engine immediately and prime the oil pump. This may be done by disconnecting, at its upper end, the oil pipe running from the engine around the right hand side of the dash, and forcing clean engine oil into the pipe with the oil gun furnished in the tool kit. Connect the pipe and tighten the union before starting the engine.

*Do not continue to run the engine if, as a result of low viscosity of the oil, or other cause, pressure is not indicated on the gauge when the engine is running.* *(See under "Replace Oil in Engine," page 40.)*

### *Lubrication Chart*

A lubrication chart is supplied with the tool kit. The chart is intended to be hung in the garage as a reminder.

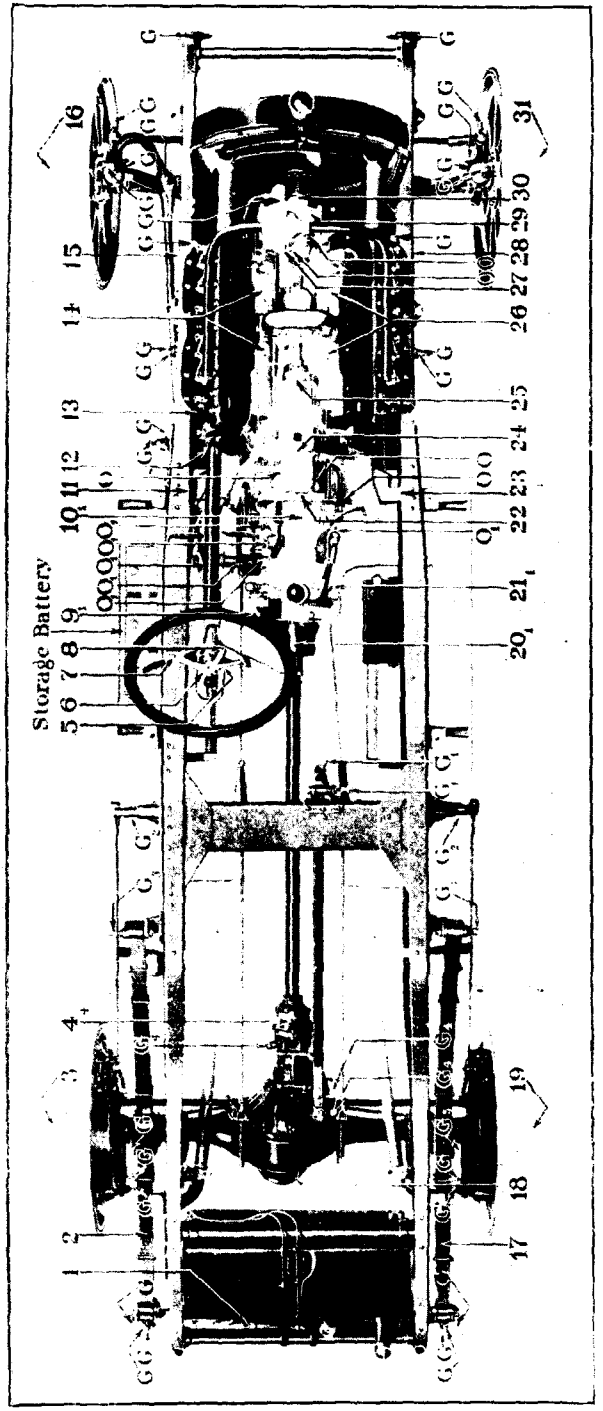



*Fig. 34. General Lubrication Diagram.*

*Each "G" Indicates a Grease Cup. Each "O" Indicates An Oiling Point at Which Engine Oil Should Be Applied.*

*Each Number Indicates a Lubricating Point for Which Instructions Are Given Under "General Lubrication."*

*Accessibility: The small figures at the right of and below the numbers and letters on the above diagram refer to the following notes as to the accessibility of the lubricating points.*

1. *These are lubricating points which are accessible after removing the floor boards forward of the front seat.*
2. *These grease cups lubricate the foot brake rocker shafts. They are provided with extensions which bring the grease cups within reach from under the running boards.*
3. *These grease cups lubricate the bearings at the front ends of the rear side springs. The grease cups are accessible after opening the small doors in the dash shields just forward of the rear fenders.*
4. *These lubricating points are accessible through hand holes in the rear floor on all cars except the Roadster and Victoria. (On the Phaeton one of the hand holes is under the rear seat cushion.)*
5. *These grease cups lubricate the rear spring seats on the rear axle and are underneath the springs just back of the axle.*



# GENERAL LUBRICATION

## EVERY 150 MILES

### *Engine: 29*

The engine should be supplied with oil as often as required. Add oil until it just starts to flow from the hole left by removing the level plug in the right hand side of the oil pan. The oil level indicator under the carburetor is for the purpose of indicating when the supply is low and when a sufficient amount has been added. (See under "Filling Lubricating System," page 39.) As a rule oil should be added about every 150 miles of travel. (See under "Replace Oil in Engine," page 40.)

## EVERY 500 MILES

### *Grease Cups: G*

Turn down grease cups "G" and the grease cup on the instrument end of the speedometer cable every 500 miles.

### *Starter Gear Shaft: 22*

The shaft on which the starter idler gears revolve is provided at its rear end with an elbow connection which fits the oil gun furnished in the tool kit. Cadillac Rear Axle and Transmission Lubricant should be injected at this point every 500 miles.

There is a small cover plate on the front floor boards, the removal of which renders the connection accessible without removing the floor boards. It is necessary to remove the screw plug in the elbow before the oil gun can be connected.

### *Oil Hole for Fan Bearing: 30*

The fan is driven by a spring and is free to oscillate slightly on the fan shaft. The hole through which the bearing at the fan hub is lubricated is just back and at the base of the flange on the fan shaft against which the spring presses. A few drops of engine oil should be applied every 500 miles. It may be necessary to crank the engine in order to bring the oil hole to the top.

### *Springs: 1, 2, 15, 17, 28*

It is recommended that the springs be lubricated once every 500 to 1000 miles by painting the edges and ends of the spring leaves with cylinder oil. A small, stiff brush should be used. After applying the oil to the springs, the car should not be washed until it has been driven some distance to allow the lubricant to work in between the leaves.

### *Replace Oil in Engine*

Replace the oil in the engine at the end of each 500 miles of travel. (See under "Replace Oil in Engine" and "Replace Oil Frequently During Cold Weather," page 40.)

## EVERY 1000 MILES

### *Oil Cups and Oil Holes: O*

A few drops of engine oil should be applied at points "O" every 1000 miles.

### *Drive Shaft and Universal Joints: 4, 20*

Fill the forward and rear universal joints on the drive shaft with No. 1½ cup grease every 1000 miles. A special connection to fit these places is furnished with the oil gun which is a part of the tool kit.

The forward universal joint is covered with a cylindrical shield to prevent grease from being thrown on the floor boards. To fill the joint, it is necessary first to detach this shield from the transmission case and to slide it back over the drive shaft. This may be done after loosening the two screws which hold the shield to the transmission case and turning the shield through a small angle in a counter-clockwise direction. If the filling plug does not appear at the top it will be necessary to move the car until it does. The filling plug may be removed by unscrewing it.

The filling plug in the rear universal joint is accessible through a hand hole in the rear floor on all cars except the Roadster and Victoria.

### *Bearings on Armature: 24, 25*

These are oil cups for the lubrication of the bearings on the armature shaft. A few drops of engine oil should be applied every one thousand miles.

The oil cup "24," which lubricates the rear bearing, is under the front part of the floor boards but on the Seven Passenger, Phaeton, Roadster and Victoria it may be reached from in front of the dash when the hood is raised. On the enclosed cars, with the exception of the Victoria, it is more convenient to remove the aluminum cover plate on the front part of the floor boards.

### *Oil Holes in Steering Wheel Hub: 5, 6*

One of these oil holes is above the steering wheel and the other is accessible after folding the steering wheel. A few drops of engine oil should be applied at each point every 1000 miles.

### *Rear Engine Supports: 11, 23*

There is a slight movement between the side bars of the frame and the rear engine supports when the car is traveling over rough roads. It is necessary, therefore, to apply lubricant at these points.

There is an oil hole with a felt wick in each engine support where it is bolted to the side bar of the frame. Engine oil should be applied at these points every 1000 miles or oftener if found necessary.

### *Tire Air Compressor: 9*

The compressor piston is lubricated through two oil holes—one in front of the compressor cylinder and one just behind. Each oil hole is protected by a small sliding cover.

Apply engine oil at these points every 1000 miles, or oftener if the pump is used frequently. (See Fig. 22.)



### *Clutch Thrust Ball Race: 10*

The clutch thrust ball race is accessible after removing the front floor boards and the cover plate shown at 10. If necessary, reach in and turn the ball race to bring the screw plug to the top. Remove the plug and inject Cadillac Rear Axle and Transmission Lubricant every 1000 miles. A special connection to fit this place is furnished with the oil gun which is a part of the tool kit.

### *Clean Lubricating System and Replace Oil*

At the end of the first 1000 miles of travel and at the end of every 4000 miles of travel thereafter, drain the oil pan and clean the lubricating system with kerosene. Then remove the oil pan and clean the pan and screen. Replace the oil pan and refill it to the proper level with clean engine oil. (See under "Replace Oil in Engine" and "Replace Oil Frequently During Cold Weather," page 40.)

### *Water in Storage Battery*

Every one thousand miles or oftener inspect the level of the acid in the storage battery and add *distilled* water if the level is low. (See under "Adding Water to Storage Battery," page 78.)

The storage battery is carried in a compartment in the left hand dust shield. The cover of this compartment forms a part of the dust shield and may be removed after unscrewing the two nickel plated screws with a screw-driver.

## EVERY 2000 MILES

### *Transmission: 21*

The transmission case should always contain sufficient lubricant to bring it up to the level of the filling hole in the right hand side of the case. It should be inspected every 2000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended for this purpose.

### *Rear Axle: 18*

The rear axle should contain enough lubricant to bring it up to the level of the filling hole in the rear cover plate. It should be inspected every 2000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended for this purpose.

### *Timer and Distributor: 27*

Every 2000 miles of travel remove the small breather by unscrewing it and pack cup grease around the gears by which the timer and distributor are driven.

### *Lubrication of Valve Stems: 14, 26*

It is a good practice to apply engine oil to the valve stems and the cam slides every 2,000 miles. This may be done by lifting the valve compartment covers and inserting the spout of the oil gun.

## EVERY 3000 MILES

### *Wheels: 3, 16, 19, 31*

Every 3000 miles or every six months, if the car is driven but little, all the wheels should be removed, the bearings thoroughly washed and cleaned in either gasoline or kerosene and the bearings examined to determine whether any foreign substances have gotten into them that might damage them. The bearings should be thoroughly lubricated with a thin grease. Cadillac Wheel Bearing Grease is recommended for this purpose. Do not use heavy grease, as it will roll away from the path of the rolls and will not return. Then the wheels should be replaced and adjusted as per instructions on this subject.

There is an oil cup in the hub of each rear wheel. Inject some engine oil here whenever you are oiling the car. Wipe the dirt from the cups first so that it will not get into the bearings.

### *Steering Gear: 12, 13*

The internal mechanism of the steering gear should be lubricated about every 3000 miles. This can be done by removing the screw plugs at "R" and "G," Fig. 57. The hole at "R" is tapped to fit the nozzle of the oil gun. Cadillac Rear Axle and Transmission Lubricant mixed with two or three per cent. of flake graphite is a good lubricant for this part.

## EVERY 4000 MILES

### *Clean Lubricating System and Replace Oil*

At the end of every 4000 miles of travel drain the oil pan and clean the lubricating system with kerosene. Then remove the oil pan and clean the pan and screen. Replace the oil pan and refill it to the proper height with clean, fresh engine oil. (See under "Replace Oil In Engine" and "Replace Oil Frequently During Cold Weather," page 40.)

### *Transmission: 21*

At the end of every 4000 miles of travel drain all of the lubricant from the transmission and refill with clean, fresh lubricant to the level of the filling hole in the right hand side of the case. Cadillac Rear Axle and Transmission Lubricant is recommended for this purpose.

### *Rear Axle: 18*

At the end of every 4000 miles of travel drain all of the lubricant from the rear axle and refill it with enough clean, fresh lubricant to bring it up to the level of the filling hole. Cadillac Rear Axle and Transmission Lubricant is recommended for this purpose.

## EVERY 5000 MILES

### *Gabriel Snubbers (attached to frame over rear axle)*

Every 5000 miles remove and lubricate the snubbers in accordance with the instructions given under "Lubrication of Gabriel Snubbers," page 98.



## ADDITIONAL

### *Spark and Throttle Levers: 7, 8*

The plungers in the spark and throttle levers should be lubricated occasionally. If the spark and throttle levers stick, rub a little oil on the sector where the friction shoes come in contact with it.

---

In addition to the places specially mentioned, note carefully and oil all of the small connections and joints throughout the car, such as the various brake rod connections and joints in the brake mechanism. The joints of the internal brakes may be lubricated after removing the small cover "F," Fig. 62, on each brake drum. Care should be taken not to apply too much oil to the internal brake joints as it may get on the brake band linings and impair the efficiency of the brakes.

Remember that wherever one part moves in contact with another, the ease of movement will be assisted and wear will be reduced to the minimum by lubrication.

## CARBON DEPOSIT

A rapid formation of carbon in the cylinders of the engine may be the result of using an oil of inferior quality, or not suited to the engine, or to the addition of too much oil to the oil pan.

When the accumulation of carbon becomes great enough it will cause the engine to pound and lose power. The pounding is usually first noticed when the throttle is opened for hill climbing, pulling through sand or mud or quick acceleration.

When the accumulation of carbon becomes great enough to cause the engine to pound it should be removed. The cylinder heads are removable to facilitate access to the combustion chambers for scraping out carbon. (See under "Removable Cylinder Heads," page 59.)

The spark plug cores should be kept clean. A good method of cleaning them is to wash them in alcohol.

Carbon deposited on the spark plug cores forms a path which offers less resistance to the high tension current than the gap between the points of the spark plugs. The current following the path of least resistance does not jump between the points, the result being that the engine misses fire. This condition is usually first noticed when the throttle is opened for hill climbing, or acceleration. Under these conditions the compression of the gas through which the spark must jump is greater than at other times. A spark which will jump in the neighborhood of .38" in the open air will jump no more than 1/16" through gas under compression.

# Part III

# ADJUSTMENTS

# GASOLINE SYSTEM

## General Principle

The supply of gasoline is carried in a tank at the rear of the car and is forced to the carburetor by an air pressure of from one to two pounds. A valve is provided by which the gasoline may be shut off at the tank. (See Fig. 36.) The handle of the valve is just at the left of the gasoline gauge. A float controlled needle valve in the carburetor maintains the gasoline at the proper level in the carburetor bowl.

The pressure is indicated by a gauge on the instrument board. A hand pump on the instrument board is provided by which pressure for starting may be obtained when the car has been standing long enough to make this necessary. When the engine is running the pressure is automatically maintained by a pump on the engine driven by an eccentric on the front end of the cam shaft.

The pipe extending almost to the bottom of the gasoline tank is a continuation of the gasoline line. The air line simply enters the gasoline tank at the top and does not extend into the gasoline.

## Filling the Gasoline Tank (*see under this heading on page 10.*)

## Settling Chambers and Strainers

There are two settling chambers in the gasoline system, one at the under side of the gasoline tank and the other attached to the left hand side of the frame of the car just under the front floor boards.

There is a drain plug at the bottom of each of these settling chambers. Every one thousand miles or oftener the plug in the settling chamber under the floor boards should be removed and the plug in the settling chamber underneath the gasoline tank should be unscrewed several turns, to drain the settling chambers of any dirt or water which has accumulated.

Before unscrewing either of the plugs the gasoline system should be relieved of all air pressure by removing the gasoline filler cap on the tank.

There are two strainers in the gasoline system which require cleaning periodically—one at the point where the gasoline feed pipe is attached to the carburetor, and the other attached to the drain plug in the settling chamber under the front floor boards. (See Fig. 36.)

The strainers should be removed and cleaned every one thousand miles or oftener. Shut off the gasoline at the tank before removing either strainer. In cold weather it may be found necessary to remove the strainers more frequently in order to prevent an accumulation of water at these points which would freeze and prevent gasoline from flowing to the carburetor.

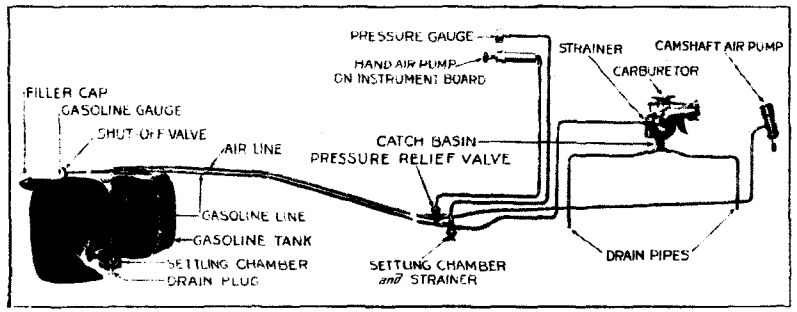
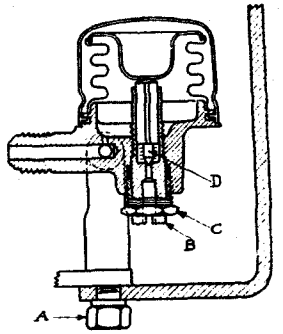



*Fig. 36. Gasoline System.*



## Pressure Relief Valve

A pressure relief valve is connected in the air line of the gasoline system for the purpose of preventing excessive pressure. It is attached to the left hand side of the frame under the front floor boards and is adjusted to release if a pressure of four pounds should be reached. As the pump at the front of the engine is designed to furnish a pressure of considerably less than four pounds it is evident that the relief valve is not intended to release under normal conditions. The relief valve is intended to operate only in case higher pressures result from the use of gasoline such as "casing-head" gasoline, containing highly evaporative fractions.




*Sectional View of Air Pressure Relief Valve.*

The relief valve is properly adjusted when the car is assembled and it should require no further attention. However, if at any time the pressure gauge on the instrument board should show a pressure of more than four pounds the relief valve should be readjusted. Or if it is found impossible to maintain sufficient pressure to insure flow of fuel to the carburetor, this condition may indicate need for readjustment of the relief valve.

As low pressure may also be caused by leakage of air at the gasoline tank filler cap or at the piping connections, or by the presence of dirt on the needle valve "D" or its seat, do not readjust the relief valve without making certain that the low pressure is due to the valve releasing and not to these other causes.

To readjust the pressure relief valve remove the cap screw "A" by which the relief valve is attached to the side bar and spring the piping so that access may be had to the nut "C" and screw "B" underneath the relief valve. Loosen the hexagonal gland nut "C." Then turn the hollow, slotted screw "B" in the clockwise direction if the pressure at which the valve releases is too low; or in the counter-clockwise direction if the valve releases at too high a pressure. Tighten the gland nut "C."

Check the results of the adjustment by raising the pressure with the hand pump. (Less pumping will be required if the tank is full or nearly so.) If it is found possible to raise the pressure above four pounds on the gauge, or if the maximum pressure obtainable is less than four pounds, the adjusting screw "B" should be adjusted again.

After the adjustment has been correctly made, make sure that the gland nut "C" is tight.

# CARBURETOR

## Adjustment of Carburetor

The carburetor should not be tampered with unless it needs adjustment. Good carburetor action cannot be expected until the engine is thoroughly warmed up. This is particularly true during cold weather. Imperfect carburetor action while the engine is cold does not indicate that the carburetor requires adjustment and carburetor adjustment should not be made under these conditions.

Before changing any of the carburetor adjustments be sure it is the carburetor which requires attention. It is possible that the ignition system requires adjustment.

Before making any carburetor adjustments be sure that the points on the spark plugs are .028 inches apart, that the spark plug cores are clean, that the timer is properly set and that the timer contact points are clean and in proper adjustment. In fact, see that the entire ignition system in is good working order.

When it is certain that the carburetor requires adjusting, proceed as follows:

### *Method of Adjustment*

Open the throttle about two inches on the sector at the steering wheel. Place the spark lever in the "Driving Range" on the sector and start the engine. If the engine is cranked by hand the spark lever should be placed at the extreme left on the sector.

Run the engine until the water jacket on the intake pipe is hot.

Move the spark lever to the extreme left on the sector and the throttle lever to a position which leaves the throttle in the carburetor slightly open. Adjust the air valve screw "A," Fig. 37, to a point which produces the highest engine speed. Turning the screw "A" in a clockwise direction increases the proportion of gasoline to air in the mixture and vice versa.

Close the throttle (move it to the extreme left on the sector) and adjust the throttle stop screw "B" to a point which causes the engine to run at a speed of about 300 revolutions per minute. The spark lever should be at the extreme left on the sector when this adjustment is made.

With the spark and throttle levers at the extreme left on the sector, adjust the air valve screw "A" to a point which produces the highest engine speed.

Open the throttle until the shutter attached to the right hand end of the throttle shaft *just* covers the slot in the carburetor body. Then adjust the screw "G" to a point which produces the highest engine speed or to a point where the engine slows down slightly from a lean mixture. Turning the screw "G" in a clockwise direction increases the proportion of gasoline to air in the mixture and vice versa.

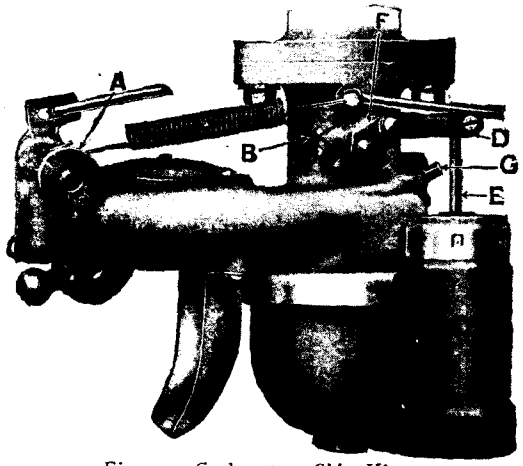



*Fig. 37. Carburetor, Side View.*

During very cold weather when a slightly richer mixture is desirable it may be found best to turn the adjusting screw "G" further in a clockwise direction.

### *Personal Danger of Running Engine in Closed Garage*

Carbon monoxide, a deadly poisonous gas, is present in the exhaust of gasoline engines. Increasing the proportion of gasoline to air in the mixture fed to the engine, in other words, enriching it, increases the amount of carbon monoxide given off at the exhaust pipe.

Because of the presence of carbon monoxide it is very dangerous to run the engine for any length of time while the car is in a small, closed garage. If the doors and windows are open the danger is very much lessened, but it is far safer, particularly if an adjustment of the carburetor is being made, to run the car into the open.

Serious personal injury may be caused by the presence of carbon monoxide in a garage if the percentage of it in the air is greater than a very small fraction of one per cent. Unconsciousness may result without warning. It is reported that no indication of danger is given by personal discomfiture until too late. Deaths resulting from the presence of carbon monoxide in garages have been reported.



### *Leaning Device*

A leaning device, sometimes called a "gas-saver," is provided which may be adjusted to cause, for ordinary driving speeds, a mixture in which the proportion of gasoline to air is cut down. The mixture is not affected by the leaning device at the closed or nearly closed position of the throttle, or at the open or nearly open position.

The leaning device is adjusted at "G," Fig. 37. When the adjusting screw "G" is screwed in as far as it will go the leaning device has no influence on the mixture at any throttle position.

The leaning device consists of a shutter, attached to the right hand end of the throttle shaft, which covers a slot in the carburetor body when the throttle is opened slightly, again uncovering the slot when the throttle is opened wide or nearly so. A hole is drilled through the carburetor body from the mixing chamber to the slot and another hole is drilled from the carburetor bowl to the slot.

When the slot is covered by the shutter a passage is formed from the mixing chamber to the carburetor bowl. The partial vacuum in the mixing chamber causes a lowering of the atmospheric pressure in the carburetor bowl resulting in less gasoline being fed through the spray nozzle. When the shutter uncovers the slot the partial vacuum in the mixing chamber has no effect on the atmospheric pressure in the carburetor bowl and the amount of gasoline fed through the spray nozzle is not affected.

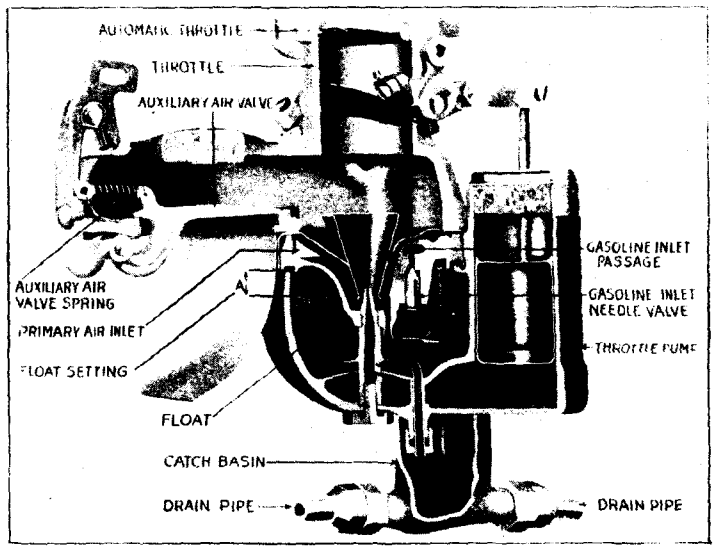



*Fig. 38. Carburetor, Sectional View.*

### *Setting of Carburetor Float*

After the carburetor has been in use for some time, there may be a slight amount of wear at the point of the inlet needle and its seat. If this should occur, the height of the gasoline in the carburetor bowl will rise.

To determine if the float is properly set, remove the carburetor from the engine, and the bowl from the carburetor. Raise the float until the inlet needle valve is just closed. The dimension "A," Fig. 38, should then be one-half inch.

The setting may be corrected by bending slightly the arm to which the float is attached.

### *Throttle Pump*

The object of the throttle pump is to force gasoline through the spraying nozzle when the throttle is opened quickly for acceleration. When the throttle is opened slowly the throttle pump has practically no effect on the amount of gasoline passing through the spraying nozzle.

The cylinder "C," Fig. 37, on the carburetor bowl contains a plunger which is operated by the throttle by means of the connecting rod "E."

When the throttle is opened the plunger is forced into the gasoline in the carburetor bowl. The plunger is drawn out of the gasoline when the throttle is closed.

The rod "E" is adjusted at the factory and should require no further adjustment. If the adjustment is changed the rod should be readjusted so that its upper end is flush with the upper face of the arm "D."

### *Automatic Throttle*

The carburetor is equipped with an automatic throttle, Fig. 38, controlled by a spring. Its purpose is to prevent pulsations of air in the intake manifold from causing the air valve to flutter when the engine is running slowly with the throttle fully opened. The automatic throttle is adjusted when the carburetor is assembled and requires no further attention.

## COOLING SYSTEM

The cooling system is of the water forced circulation type. The circulation through each cylinder block is independent of the circulation through the other, two separate pumps being provided. The pumps, which are of the centrifugal type, are located at the front end of the crank case on each side and are driven from the crank shaft through helical gears.

The temperature of the liquid circulated by these pumps is under thermostatic control, the purpose of which is to permit water circulated through the water jackets on the cylinders and carburetor intake manifold to warm up to the temperature at which the engine operates best very soon after the engine is started and to prevent the temperature dropping below this point while the engine is running.

### *Thermostatic Control*

A housing containing a Sylphon thermostat and a valve controlled by the thermostat, are located on the cover of each water pump.

The thermostat "A," Fig. 39, is accordion shaped. It contains a liquid which is driven into gas when heated. The resulting pressure elongates the thermostat, forcing the valve "B" from its seat. A drop in temperature changes the gas back to a liquid, reducing the pressure in the thermostat and allowing it to contract, thereby bringing the valve "B" back to its seat.

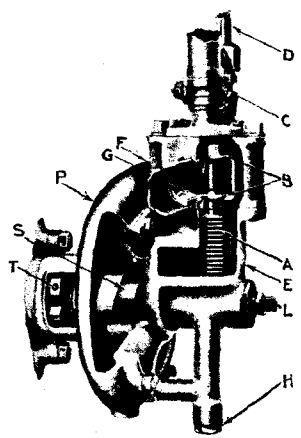



*Fig. 39. Water Pump, Sectional View.*



When the temperature of the water in the water jackets on the cylinders and intake manifold is below a predetermined point the valve "B" is held tightly closed by the thermostat. When the temperature of the water tends to rise above the predetermined point, the valve "B" is forced open by the thermostat, permitting the water pump "P" to draw water from the radiator.

Provision is made for forcing the valves operated by the thermostats from their seats. This is necessary to drain the radiator.

There is a horizontal shaft "L" extending from the cover of each water pump. There is an indicator on the end of each of these shafts. By turning the shafts until the indicators point directly up, the valves operated by the thermostats are forced and held from their seats. By turning the shafts until the indicators point down, as shown in Fig. 39, the valves are returned to their seats and the thermostatic control is again brought into operation.

### *Path of Circulation*

When the engine is first started and is cold the valves operated by the thermostats are held tightly on their seats. This prevents the water pumps from drawing water from the radiator. Under these conditions the water is circulated as follows:

From the water pump "P," Figs. 39 and 40, through the hose "F" to the water jackets on the cylinders. From the water jackets on the cylinders some of the water returns to the pump "P" through the hose "C" and the thermostat housing "E." The remainder is carried by a small pipe "N" to the water jacket around the intake manifold and from the intake manifold to the pump "P" through the pipe "D" and the thermostat housing "E."

After the engine has become warm and the thermostats have forced from their seats the valves between the pumps and radiator the circulation is as follows:

Water is drawn from the radiator through the hose "G" and forced to the water jackets on the cylinders through the hose "F." From the water jackets the water returns to the radiator through the hose "M" connecting the cylinder block and radiator.

Water is still forced to the water jacket on the intake manifold through the small pipe "N" and from the intake manifold to the pump "P," through the pipe "D" and the thermostat housing "E." Some of the water still flows back to the pump through the hose "C" and the thermostat housing "E."

As the temperature of the water returning to the pump through the pipe "D," hose "C" and thermostat housing "E," rises or falls, the thermostat expands or contracts, opening or closing the valve, thereby admitting a larger or smaller amount of cooled water from the radiator.

### *Condenser*

A condenser, the purpose of which is to prevent the loss of the cooling medium by evaporation, when an alcohol solution is used, is attached to the right hand side of the frame just beneath the front floor boards. A pipe "S," Fig. 40, connected to the overflow tube of the radiator leads to the condenser.

The action of the condenser is as follows: The vapor given off from the liquid in the radiator when it is heated passes through the overflow tube to the condenser. As it passes into the liquid in the condenser the vapor is condensed.

When the engine has stopped, the cooling of the radiator and its contents results in the contraction and condensation of the vapor left in the upper part of the radiator. The vacuum thus caused allows the atmospheric pressure in the condenser to force condensed vapor back into the radiator in liquid form.

The proper operation of the condenser requires an air tight joint at the radiator filler cap. To make it possible to screw down and tighten the cap without injury to the rubber gasket, two metal washers are interposed between the head of the cap and the gasket. It is important that nothing be installed on the radiator filler cap which causes a leak at the cap or which makes necessary the elimination of the steel washers or cutting a hole through the rubber gasket.

### *Filling the Cooling System*

Fill the cooling system with clean water, during warm weather, and with a suitable anti-freezing solution during freezing weather. (See under "Anti-Freezing Solution," page 32.)

To fill the cooling system after it has been drained, replace the drain plugs "H," Fig. 40, in the water pumps, close the drain cocks "K" in the cylinder blocks and turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point up. The shafts may be turned in either direction.

Then remove the filler cap "W" from the top of the radiator and fill the cooling system. Replace the filler cap and *screw it down firmly.* This is necessary, to insure the proper operation of the condenser.

After the cooling system is filled, turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point down. These indicators should point up when filling or draining the cooling system and down at all other times.

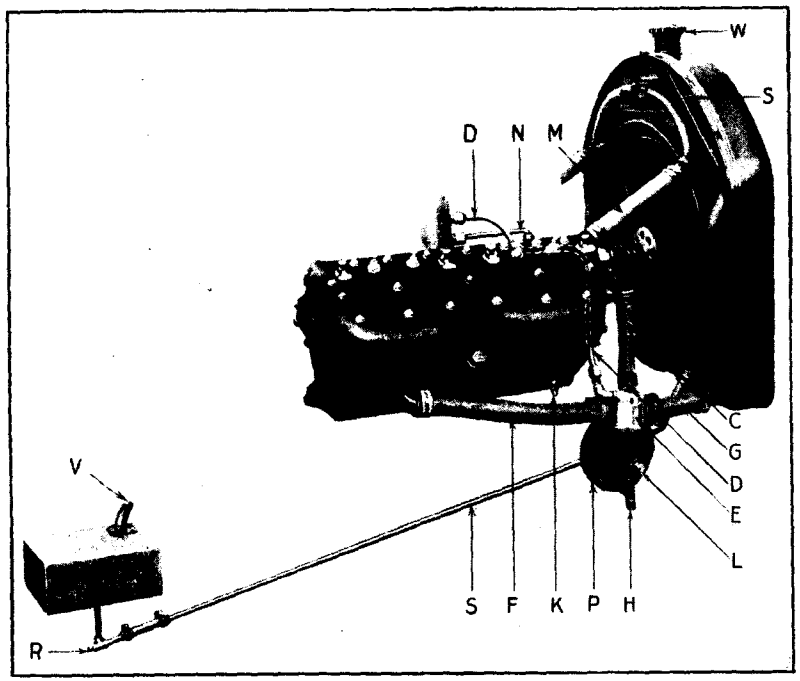



*Fig. 40. Cooling System, Showing Path of Circulation.*



The cooling system should be kept full or nearly so. When it is necessary to add only a small amount of liquid to bring up the level, it is not necessary to turn the shafts "L" on the water pumps, but simply to remove the radiator filler cap.

When the cooling system is cold, the condenser should be one-half full of the same liquid as used in the radiator. To add liquid to the condenser, take up the removable floor board and remove the filler cap "V" at the top of the condenser. Any excess liquid which may accumulate in the condenser should be drained off at "R," Fig. 40, and poured back into the radiator.

### *Draining the Cooling System*

To drain the cooling system, remove the drain plugs "H" from the water pumps and turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point up. The shafts "L" may be turned in either direction. Then open the drain cocks "K" in the cylinder blocks.

To drain the condenser remove the drain plug "R" in the pipe leading from the bottom of the condenser.

### *Cleaning the Cooling System*

The cooling system should be drained and flushed out every two or three months. This may be done in the following manner:

Run the engine with the radiator covered until the liquid in the cooling system is boiling hot. Then turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point up.

Shut off the engine and immediately remove the drain plugs "H" from the water pumps and open the drain cocks "K" in the cylinder blocks. (Bear in mind in removing the drain plugs "H" that the liquid is scalding hot.) Remove the drain plug "R" in the pipe leading from the bottom of the condenser.

If an alcohol anti-freezing solution is drawn off part of it may be used again if the sediment is allowed to settle. In case it is used again its specific gravity should be tested with an hydrometer, after it has thoroughly cooled.

When the liquid has drained off, replace the drain plugs "H," close the drain cocks "K" and fill the cooling system with clean, hot water. Then repeat the operations outlined above.

If in draining the second time, the water is very dirty, it may be desirable to repeat the flushing operation a third time, using a solution of sal-soda. If the sal-soda solution is used, be sure that it is drained out and the cooling system flushed again with clear water.

The sal-soda solution should not be allowed to get on the finish of the hood or radiator.

During freezing weather be sure to refill with a suitable anti-freezing solution.

### *Water Pump Packing Glands*

If leaks should appear at the water pump packing glands, remove the splash shield under the engine and turn the packing gland nuts "T," Fig. 39. To tighten, turn the gland nuts in the direction in which the wheels turn when the car moves backward. As one gland nut has a right hand thread and the other a left hand thread, both are turned in the same direction to tighten. Tighten the gland nuts only sufficiently to prevent leaks. A spring locking device at the rear of each pump engages the notches in the gland nut and prevents the gland nut from turning of its own accord. In tightening a gland nut turn it a whole number of notches so that when the nut is screwed up as far as desired the locking device will rest in one of the notches.

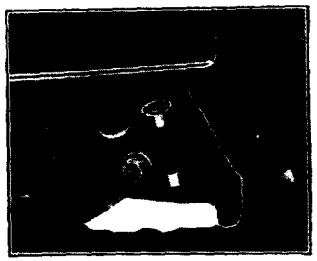
If a water pump gland requires repacking remove the pump from the engine and remove the gland nut by unscrewing it in the direction opposite to that in tightening it. Remove the gland and renew the packing. Then replace the gland and tighten the gland nut. Replace the water pump and splash shield.

We strongly urge that only Cadillac packing be used. This may be obtained from any Cadillac distributor or dealer.

### *Strainers*

There are two strainers in the cooling system, one in each radiator outlet. They should be removed and cleaned at the end of the first 500 miles of travel and every 2,000 miles thereafter. If sediment is allowed to accumulate at these points the circulation of water is interfered with or prevented and, as a result, the engine may overheat and pound.

The location of the strainers is illustrated in the figure in which the radiator splash shield is cut away to show the removal of the left hand strainer. The strainer may be withdrawn after simply unscrewing the plug.



*Showing Left Hand Strainer Removed.*

### *Adjustment of Thermostat Valves*

The thermostat valve "B," Fig 39, is screwed onto the threaded stem of the thermostatic member "A" and is held in place by a slotted nut in the center of the valve. The valve is adjusted when the car is assembled and no further attention should be required. In the event that the adjustment has been altered, proceed as follows in making a readjustment:

Drain the cooling system. (See page 57.) Disconnect the hose "C" and the pipe "D" at the pump. Remove the four small screws in the cap to which the hose and pipe were attached and remove the cap.

Turn the shaft "L" so that the indicator on the end of the shaft points in a *horizontal* direction. With a screw-driver loosen the slotted adjusting nut in the center of the valve. Then adjust the valve until it just seats without placing any tension on the thermostatic member "A." Hold the valve in this position and tighten the slotted adjusting nut.

Replace the cap and connect the hose "C" and the pipe "D." Turn the shaft "L" so that the indicator points up and fill the cooling system. After filling the cooling system turn the indicator down regardless of weather conditions.

## ENGINE ADJUSTMENTS

### CRANKSHAFT BEARINGS

If a good grade of lubricating oil is used, if the oil is replaced and the oil pan removed and cleaned out at frequent intervals as recommended in this book under "Replace Oil in Engine," page 40, the crankshaft bearings should give many thousands of miles of use without attention. If, as a result of improper lubrication or long use, the bearings require adjustment, these instructions should be followed carefully.

### *Adjustment of Connecting Rods*

The connecting rods to which the pistons in the left hand block of cylinders are attached are forked at their lower ends. Bronze backed babbitt lined bushings clamped in these rods have their bearings on the crank shaft.



The connecting rods to which the pistons in the right hand block of cylinders are attached have single lower ends and have their bearing on the outer surface of the bushings clamped in the forked rods.

The caps at the lower ends of the single connecting rods are adjustable. Liners varying in thickness from .002 to .006 of an inch are placed between the caps and the rods when the engine is assembled. To readjust, remove these liners and substitute thinner ones of the proper thickness. To get the best results, these bearings should have from .0025 to .0035 play.

***CAUTION:—Do not under any condition adjust these bearings closer than .0025, as this amount of clearance is necessary to allow for the greater expansion of the bronze backed bushings than the steel connecting rods when the engine is heated.***

The bronze backed bushings in the forked connecting rods are not adjustable. If, as the result of long use or improper lubrication, these bushings have too much play on the crank shaft, they should be replaced by new ones.

### *Adjustment of Main Crankshaft Bearings*

There are three main crankshaft bearings. These bearings are provided with liners which are clamped between the crank case and the bearing caps.

To tighten a main bearing, proceed as follows: Remove the oil feed pipe connecting the bearing cap with the oil manifold. Remove the aluminum bearing cap with the lower half of the bearing and the liners.

Replace the liners with liners which are less in thickness by an amount equal to the amount of "take-up" necessary. Liners can be obtained varying in thickness by .001 of an inch. Each liner is stamped indicating its thickness.

Carefully reduce the upper edges of the lower half of the bearing *just enough* to allow the aluminum bearing cap to clamp the new liners. This work must be done very accurately, as clearance between the halves of the bearing will cause an oil leak which may prove disastrous to the bearing.

Thoroughly clean the bearing, bearing cap and liners and oil the bearing surface before replacing.

In replacing the bearing cap tighten the bearing nuts firmly and lock with cotter pins. Also make sure that the union nuts on the oil pipe are tightened sufficiently to prevent leakage.

The upper edges of the lower half of the bearing may be reduced by rubbing the bearing on a piece of fine emery cloth stretched tightly over a flat, machined, iron surface.

If more than one bearing is removed at a time care should be taken not to mix the liners, as they may not all be the same thickness.

### REMOVABLE CYLINDER HEADS

The cylinder heads are detachable, facilitating access to the valves and combustion chambers.

To remove a cylinder head, first drain the cooling system (see page 57), and disconnect the water outlet hoses from the connections at the front end. Disconnect the ignition wires at the spark plugs, and remove the ignition conduit brackets from the cylinder head. Unscrew and remove the nuts on the studs holding the head to the cylinder block. Remove the cylinder head and the gasket, being careful not to injure the latter.

Before replacing the cylinder head see that there is no carbon or gritty substance in the cylinders or around the valves. Clean the surfaces on the cylinder block and removable head which contact with the gasket and make sure that the gasket is in good condition. If care is taken in handling the gasket in removing it, it should be possible to use the same gasket again. If there is any question as to the condition of the gasket, it should be replaced by a new one.

Place the gasket in position. Carefully put the cylinder head on over the studs. In screwing down the nuts, it is best to begin with the center nut in the middle row and work towards the ends, taking alternate nuts on each side of the center. Then do the same with the nuts in the inner row and finally with those in the outer row. All of the nuts should be tightened lightly at first and then, starting again at the center, they should be drawn down firmly.

## TIMING MARKS ON FLYWHEEL

The flywheel marks (see Fig. 41) are arranged in four groups, each group consisting of the following marks in order:

"IN|S"—"Inlet setting"

"IG|A"—"Ignition advance"

"C"—"Center"

"EX|S"—"Exhaust setting"

Each group of marks refers to two cylinders, the numbers of which are stamped one on each side of the "C" in that group.

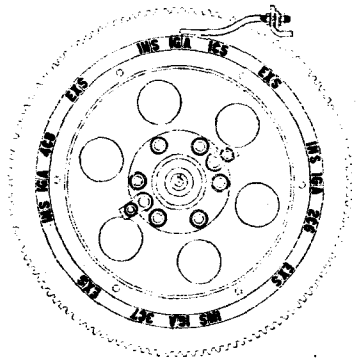


*Fig. 41. Flywheel, Showing Timing Marks.*

Complete instructions for using the "inlet setting" and "exhaust setting" marks are given below under "Positions of Cams for Adjustment of Cam Slides." The ignition timing is explained fully under "Timing Ignition," page 74.

## ENGINE VALVES

### *Positions of Cams for Adjustment of Cam Slides*

In poppet valve gasoline engines it is necessary for a cam roll to be on the circular surface of the cam when the cam slide operated by that cam is being adjusted. The shape of the circular portion of the cams in the Cadillac eight-cylinder engine is such that it is not sufficient for a cam roll simply to be on the circular surface of the cam. The cam roll must be on a certain small arc of the circular surface of the cam when the cam slide is being adjusted.

As no two cams on the cam shaft are in the same position at the same time, it is necessary before adjusting each cam slide to place the corresponding cam in the proper position by cranking the engine by hand as described below. The cam slides cannot be properly adjusted with the cams in any but the correct positions.



### *Placing Cam in Position*

To place a cam in position for properly adjusting the cam slide proceed as follows:

Open the compression relief cocks on the cylinder blocks and with the ignition switched off crank the engine slowly by hand in the direction in which it runs until the piston in the cylinder in which the valve is located is at the end of the compression stroke, or in other words, on firing center. This may be determined by placing a finger over the compression relief cock while cranking the engine. When the piston is exactly on firing center the pointer attached to the crank case will then be directly over the mark on the flywheel indicating "center" for that cylinder.

*Inlet Valve.* If the valve operated by the cam slide is an inlet valve, select the first "IN|S" to the left of the center mark and mark it with a piece of chalk.

Crank the engine further by hand in the direction in which it runs until that "IN|S" is directly under the pointer. It will be necessary to crank the engine nearly a complete revolution.

The cam is then in the correct position for adjusting the cam slide operating that inlet valve. (See under "Adjustment of Cam Slide.")

*Exhaust Valve.* If the valve operated by the cam slide is an exhaust valve, after cranking the engine to the proper firing center, select the first "EX|S" to the right of the center mark and mark it with a piece of chalk.

Crank the engine further by hand in the direction in which it runs until this "EX|S" is under the pointer.

Then crank the engine further one complete revolution until this "EX|S" is again directly under the pointer.

The cam is then in the correct position for adjusting the cam slide operating that exhaust valve. (See under "Adjustment of Cam Slide.")

### *Adjustment of Cam Slide*

When the cam is in the proper position (see under "Positions of Cams for Adjustment of Cam Slides"), the clearance between the end of the valve stem "A," Fig. 42, and the adjusting screw "B" in the cam slide "D" should be from .002 to .003 of an inch when the engine is cold.

To adjust a cam slide, loosen the locking nut "C" and turn the adjusting screw "B." Turning the adjusting screw "B" to the left (screwing it out) decreases the clearance between the end of the valve stem and the head of the adjusting screw; turning the screw to the right (screwing it down) increases the clearance. Tighten the locking nut "C" when the proper clearance has been obtained, taking care that in so doing the adjustment of the screw "B" is not disturbed.

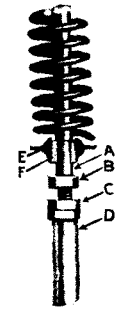



*Fig. 42. Cam Slide and Adjusting Nuts.*

### *Grinding Valves*

The valves are carefully ground when the engine is assembled and should not soon require further attention.

When it has been determined that a valve requires regrinding, proceed as follows:

Remove the cylinder head (see under "Removable Cylinder Heads"), and remove the valve cover plate from the cylinder block.

Force up the washer "E," Fig. 42, and then remove the split locking collar "F." Then remove the valve, being careful to mark it in case more than one valve is taken out at a time, so that it can be replaced as originally assembled.

It is a good plan to wrap soft string around the stem of the valve near the head. This will tend to prevent the grinding compound getting into the valve guide.

In the absence of a good prepared grinding compound, make a paste of powdered glass or flour of emery, mixed with thin oil.

Place the grinding compound on that portion of the valve which bears on the valve seat. Then replace the valve, and with a screw driver or other suitable tool, rotate it back and forth about one-third revolution, with only a slight pressure on the tool. Lift the valve occasionally and turn it to a new position. Continue the grinding operation until the valve and its seat show perfect bearing.

Then thoroughly wash the valve, the valve chamber and the valve guide with gasoline. Be very careful to leave none of the grinding compound in any part of the cylinder, as it will cause serious damage if it works into the cylinder bore or other parts of the engine; also remove the string from the valve stem. Replace the valve.

When all of the valves requiring it have been ground, replace the cylinder head and re-time the valves that have been ground. (See under "Adjustment of Cam Slide," page 61.) Re-timing is necessary, as the amount of clearance between the valve and the adjusting screw in the cam slide is necessarily reduced during the grinding operation.

## ENGINE CHAINS

The camshaft is driven from the crankshaft and the fanshaft is driven from the camshaft by silent chain drive. A double sprocket is keyed to the front end of the camshaft. The camshaft driving chain meshes with the front half of this double sprocket and with a sprocket on the crankshaft. The rear half of the double camshaft sprocket drives the fanshaft driving chain.

To examine or remove either chain, it is first necessary to remove the front cover plate of the engine. To do this proceed as follows:

### *Removing Front Cover Plate*

Remove the headlights and the radiator.

Remove the fan.

Disconnect the oil pump elbows from the crankcase.

Remove the cap from front engine support.

Remove the splash shield under the engine.

Remove the bolts connecting the exhaust pipes to the manifolds on the engine.

Block the car so it will not roll on the floor.

Carefully jack up the front end of the engine.

Disconnect the pipe at the air pump.



Remove the cap screws holding the front cover plate to the crankcase of the engine.

Draw the threaded dowel pins.

Remove the front cover.

### *Removing Camshaft Driving Chain*

To remove the camshaft driving chain cut off the riveted head of one of the seat pins on the camshaft driving chain and remove the seat pin and rocker pin.

### *Removing Fanshaft Driving Chain*

To remove the fanshaft driving chain the camshaft chain must first be removed. (See above.)

Cut off the riveted head of one of the seat pins on the fanshaft driving chain and remove the seat pin and rocker pin.

Remove the fanshaft driving chain.

### *Replacing Fanshaft Driving Chain*

Place the chain on the fanshaft and camshaft driving sprockets with the arrows, which are stamped on the outside links, pointing in the direction in which the chain is to run. If the chain is so placed on the sprockets that it runs in the opposite direction, *it will very quickly destroy itself.*

Bring the ends of the chain together, preferably on the larger sprocket. Insert pins and rivet. (See under "Riveting Chains," page 64.)

It is unnecessary when installing a fanshaft driving chain to pay any attention to the relative positions of the sprockets upon which the chain operates, but the ignition must be re-timed after both chains have been replaced. (See under "Timing Ignition," page 74.)

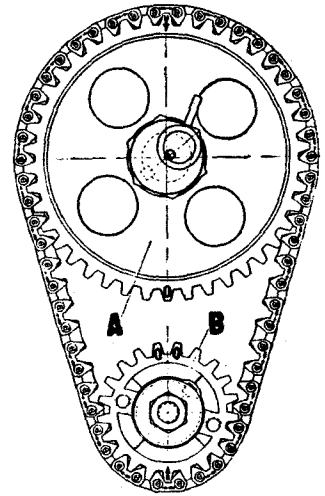



*Fig. 43. Crankshaft and Camshaft Sprockets and Chain.*

### *Replacing Camshaft Driving Chain*

If the fanshaft driving chain has been removed, it will be necessary to replace it before replacing the camshaft driving chain. (See above under "Replacing Fanshaft Driving Chain.")

In replacing the camshaft driving chain care must be used to see that the chain is so placed on the sprockets that the valve timing is correct.

One tooth of the camshaft driven sprocket "A," Fig. 43, is marked with an arrow and the tooth diametrically opposite with an "O." A tooth on the crankshaft sprocket "B" has a similar arrow upon it and the two teeth opposite each have an "O" mark.

Turn the camshaft and crankshaft to bring the sprockets into the positions shown (Fig. 43). The arrows on the two sprockets must point towards each other and the tooth of the camshaft sprocket marked "O" must be directly opposite the space between the two similarly marked teeth on the crankshaft sprocket.

Without turning either of the sprockets, place the chain on the sprockets with the arrows, which are stamped on the outside links, pointing in the direction in which the chain is to run. If the chain is so placed on the sprockets that it runs in the opposite direction, *it will very quickly destroy itself.*

Bring the ends of the chain together, preferably on the larger sprocket. Insert pins and rivet. (See below.)

### *Riveting Chains*

Each joint of the chain contains two pins, as shown in Fig. 44; a seat pin "A," which is ribbed, and a rocker pin "B," which is plain. If a chain is removed, be very sure in replacing it that the joint pins are inserted as shown.

Bring the ends of the chains together on the larger sprockets. (See under "Replacing Camshaft Driving Chain" and "Replacing Fanshaft Driving Chain," page 63.) Insert the rocker pin and a used or extra seat pin to align the links. Clamp the new seat pin in a vise and rivet the small washer "C" on one end.

Force the used seat pin out by inserting the new seat pin. Insert the new seat pin from the rear. In doing so be careful not to force out the rocker pin. Be sure to recover the used seat pin so that it will not get into the mechanism of the engine.

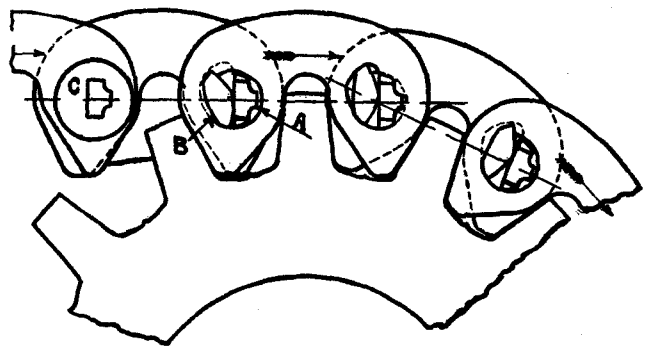



*Fig. 44. Correct Positions of Rocker and Seat Pins in Riveting Chains.*

After the new seat pin is in place turn the engine so that the connection is mid-way between the sprockets. Then insert a riveting block between the crank case wall and the inner end of the seat pin to be riveted, place the small washer on the end of the seat pin and carefully peen over the end of the pin. Remove the riveting block.

If, in installing a chain the rocker pin is inserted backwards it will cause a knock on the small sprocket which will quickly destroy the chain. It is absolutely essential that the joint pins be assembled correctly if the chain is to live and give quiet and satisfactory service.



# CADILLAC-DELCO ELECTRICAL SYSTEM

### *Single Wire System*

The Cadillac-Delco system is the single wire, single unit system. One side of the motor generator, storage battery, lamps, horn and ignition apparatus is connected to some part of the frame of the car or the engine. The other connections are made with copper wires or cables.

## MOTOR GENERATOR

The motor generator serves both as a generator of current and as an electric motor for cranking the engine when starting. The principal elements of the motor generator are an armature and a field. There are two windings on the armature and two in the field—one on the armature and one on the field are used when the motor generator is used as a generator and the other windings when it is used as a motor.

### *Generator*

The motor generator, when acting as a generator, is driven at engine speeds by the fan shaft which in turn is driven by a silent chain from the cam shaft at the front end of the engine. Thus driven, it delivers electrical energy for charging the storage battery and for operating the lights, ignition apparatus and horn. To prevent the voltage of the current generated from rising too high when the engine is running at high speeds, the third brush system of current regulation is employed.

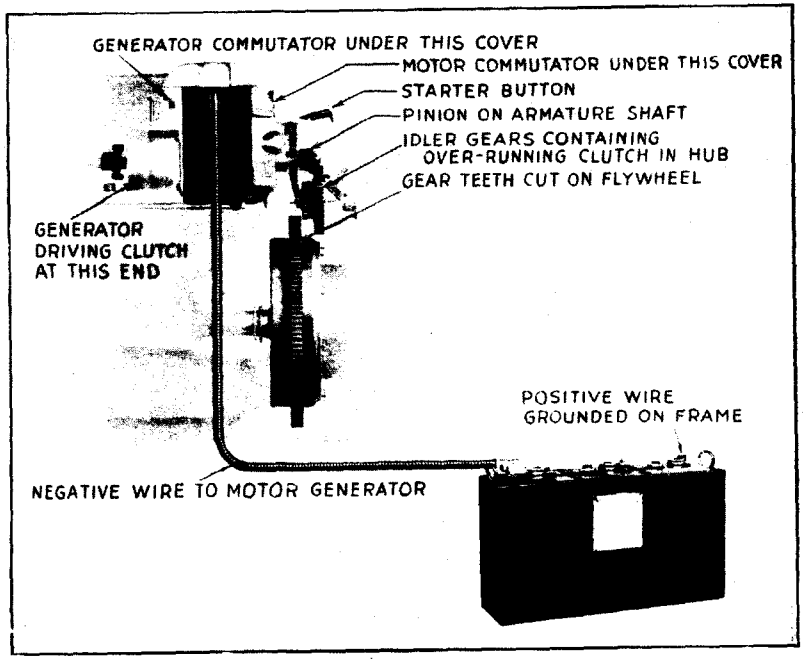



*Fig. 45. Motor Generator and Starting Mechanism.*

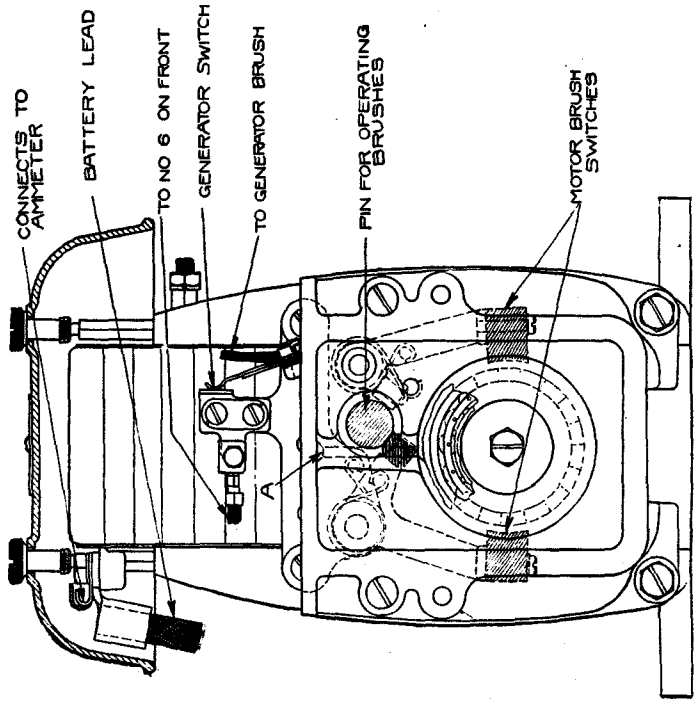



*Fig. 47. Motor Generator, Rear View.*

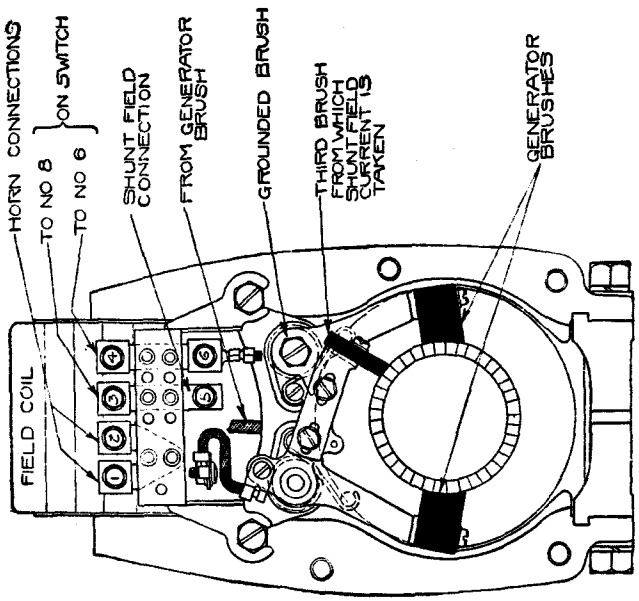



*Fig. 46. Motor Generator, Front View.*



### *Motor*

When acting as a motor the sole function of the motor generator is to crank the engine. In starting, the first thing the operator does is to push down the ignition lever on the combination switch. This closes the ignition circuit and the circuit between the storage battery and the generator windings on the motor generator causing the armature to revolve slowly.

A ratchet clutch in the front end of the generator allows the armature to rotate ahead of the driving shaft. The clicking noise that is heard when the ignition switch is turned on comes from this clutch.

Next the operator pushes down the starter button. The first movement causes the starter gears to mesh with the teeth on the flywheel. The probability of the ends of the teeth striking and failing to mesh is overcome by the slow rotation of the armature which began as soon as the ignition was turned on.

As the starter button is pushed further down the circuit between the storage battery and the generator windings of the motor generator is broken. Upon the last movement of the starter button the circuit is closed between the storage battery and the motor windings on the motor generator causing it to act as a powerful electric motor which rapidly cranks the engine.

As the gear ratio between the armature shaft and the crank shaft is approximately 25 to 1 the armature would be driven at an excessively high rate of speed after starting the engine and before the operator let the starter button back if it were not for an over-running clutch in the hub of the idler gears between the flywheel and the armature shaft. The electric motor cranks the engine through this clutch but after the engine has started and begins to run faster than the electric motor, the clutch slips.

When the starter button is let up, as soon as the engine is running under its own power, the first movement of the button breaks the circuit between the electric motor and the storage battery, a further movement causes the starter gears to slide out of mesh and the final movement completes the circuit between the generator and the storage battery, which was broken when the starter button was pushed down. The engine running and the circuit being closed between the storage battery and the generator windings of the motor generator, the generation of current begins.

### *Commutators*

Do not under any condition put oil of any kind on the commutators of the motor generator.

## LIGHTING SYSTEM

### *Lighting Switch*

All of the lamps are controlled from the instrument board with the exception of the tonneau lamp on the Seven-Passenger and Phaeton and the dome and quarter lights on enclosed cars. The left hand lever on the combination switch makes the necessary connections for the head lamps, side lamps, speedometer lamp and tail lamp. A switch button at the top of the combination switch controls the clock lamp on the instrument board. To turn on this light pull out on the switch button. To extinguish the light, push in.

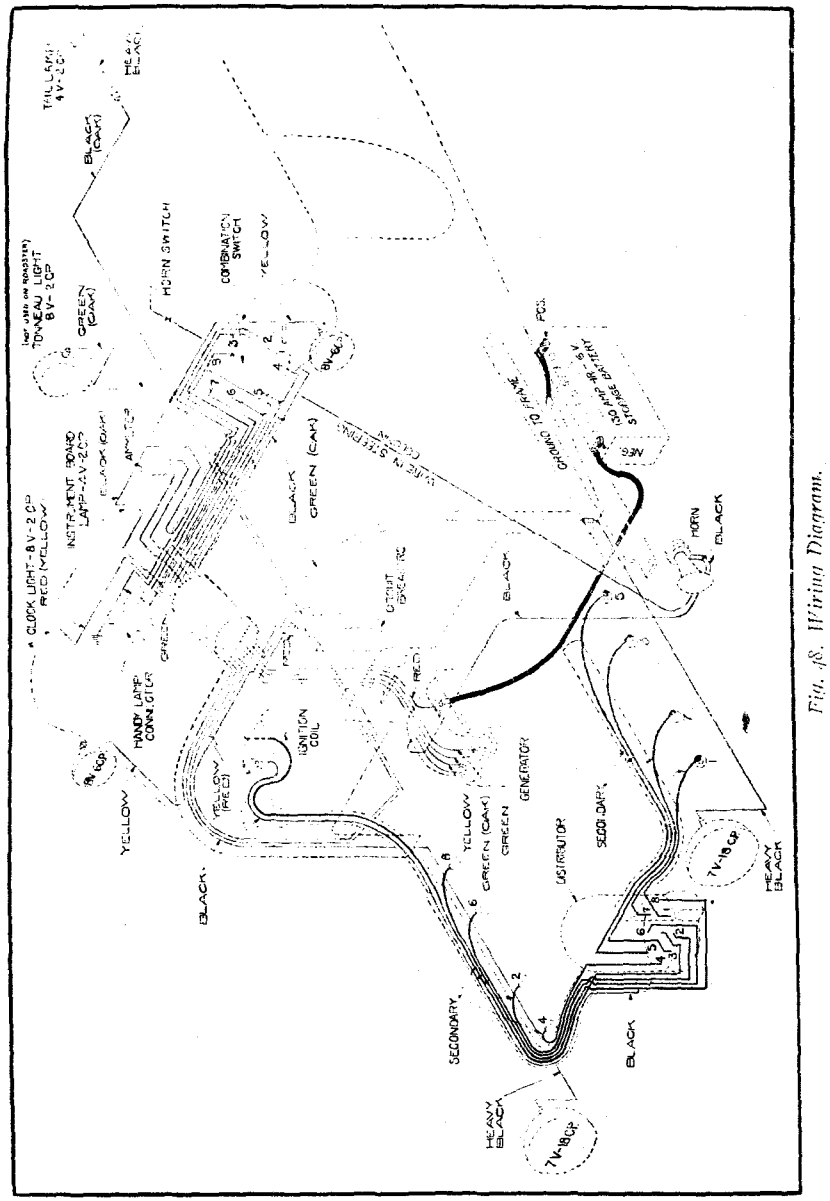



*Fig. 8. Wiring Diagram.*



## *Tilting Head Lamp Reflectors*

Traffic regulations in most localities now include some requirements as to the control of glaring rays from automobile head lamps. The customary rule is that there shall be no glare when meeting vehicles going in the opposite direction or when driving through towns.

The devices commonly employed to meet these requirements make use of one or another of the following principles: Reducing the amount of light at its source, diffusion or spreading of the pencil rays, deflection of the pencil rays below the level at which glare is objectionable.

Reducing the amount of light as is done by dimmers has the obvious disadvantage of placing the road in semi-darkness just at the time when the maximum illumination is needed. Diffusion of the rays, as by lenses, may conform to the requirements of the law but the rays are so spread out that the illumination of the road any considerable distance ahead of the car is insufficient for satisfactory driving.

Deflection of the pencil rays below the level at which they are objectionable intensifies the illumination of the road directly in front of the car but renders distant objects less distinct, particularly those in the upper part of the field of vision. The first result is an advantage at the moment when passing a vehicle going in the opposite direction but the second is not desirable on the open road where highway signs and overhanging obstructions must be easily visible. Prismatic shaped lenses, which employ this principle, are, therefore, not altogether satisfactory except just for the short time an oncoming vehicle is approaching.

A device is employed in the Cadillac which makes use of the advantage of the third principle but which eliminates the disadvantage of having the rays permanently deflected. The reflectors in the head lamps are pivoted so that they may be tilted, and are controlled by a lever on the steering column. When the road is clear and the illumination of the distant road is desired, the reflectors direct the light straight ahead. When a vehicle traveling in the opposite direction approaches, by simply raising the lever on the steering column the reflectors are tilted down, deflecting the rays below the level of the occupants of the approaching car and increasing the illumination directly in front of the car where it is most needed.

In a few states the law specifies that at no time shall there be any glaring rays higher than 42 inches above the road at a point 75 feet ahead of the car. When in the tilted position, the Cadillac head lamps conform to this requirement.

The head lamp reflector control is adjusted when the car is assembled and should require no further attention.

## *Focusing Headlamps*

The adjustment for focusing the headlamp bulbs is near the top of the lamps and is accessible after removing the lamp door.

To make the adjustment, run the car head on towards, and at right angles to, a high fence or building, and stop when within from fifteen to twenty feet from it. Then with the tilting reflector in the straight ahead position, change the adjustment until the bulb is in the proper position.

If in turning the screw to the right, the rays of light appear to spread out, it indicates that the bulb is too far back in the reflector and that it should be brought forward. To do this, turn the adjusting screw to the left until the proper rays are shown.

If the adjusting screw be turned to the left and the rays appear to spread out, it indicates that the bulb is too far forward and it should be brought back. To do this, turn the adjusting screw to the right until the proper rays are shown.

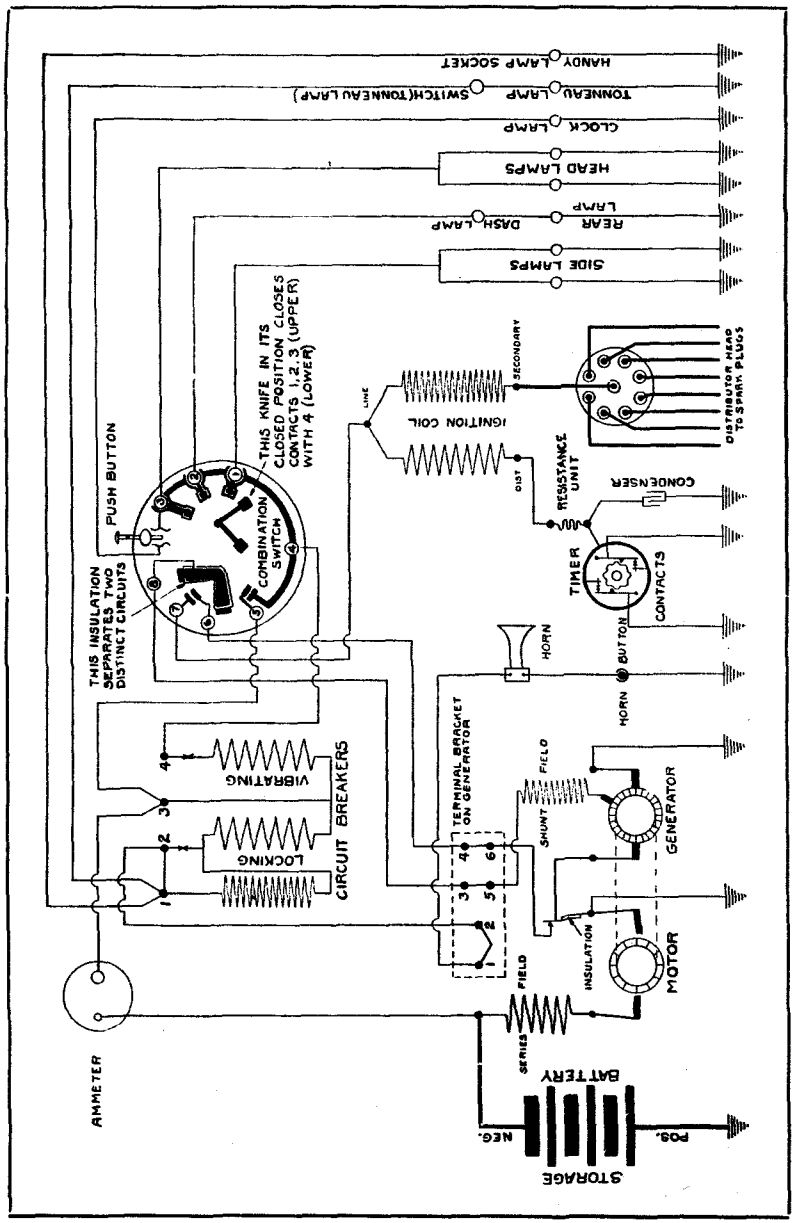



*Fig. 49. Circuit Diagram.*



### *Cleaning Reflectors*

The reflectors in the head and side lamps are plated with pure silver. In polishing extreme care must be used in selecting materials which will not scratch the silver.

Powdered dry rouge and a chamois skin are recommended. If the reflectors are tarnished, moisten the rouge with alcohol, and apply with the chamois. Then polish with a dry chamois and rouge.

The chamois should be soft and must be kept free from dust. Do not use the chamois for any other purpose.

### *Socket for Portable Lamp*

A socket for the portable lamp is attached to the back of the instrument board just to the right of the hand air pump.

### *Lamp Bulbs*

It is recommended that bulbs for the lamps be purchased from a Cadillac dealer. In any event bulbs should be used which have the correct voltage and candle power rating. The following is a table of voltage and candle power for the lamps in the lighting system:

| *Lamps* | *Voltage* | *Candle Power* |
|---|---|---|
| Head | 7 | 18 |
| Side | 8 | 6 |
| Speedometer | 4 | 2 |
| Tail | 4 | 2 |
| Clock | 8 | 2 |
| Tonneau | 8 | 2 |
| Portable | 8 | 6 |
| Dome, enclosed cars | 8 | 6 |
| Quarter, enclosed cars | 8 | 2 |

## IGNITION SYSTEM

The ignition system embodies the following elements: A source of current, the generator, or at low speeds, the storage battery; an ignition timer, which interrupts the low tension current at the proper instant to produce a spark in the high tension circuit; an induction coil, transforming the primary current of six volts into one of sufficient voltage to jump between the points of the spark plugs; a condenser, which assists the induction coil to raise the voltage, and which protects the contact points of the ignition timer from burning; and a high tension distributor which directs the distribution of the high tension current to the spark plugs in the respective cylinders.

### *Ignition Switch*

The current for ignition is controlled by means of the right hand lever on the combination switch on the instrument board. This lever also controls the generator circuit as explained under "Motor Generator" on page 67.

## *Distributor and Timer*

The distributor and timer, Fig. 50, are carried on the fanshaft housing and are driven by the fanshaft through spiral gears.

The distributor consists of a cap or stationary head of insulating material and a rotor of the same material which turns with the timer shaft. The distributor head carries one contact in the center and eight additional contacts placed at equal distances about the center. (Only two of these contacts are shown in Fig. 50.) The center contact is connected to the high tension terminal on the ignition coil. The eight remaining contacts are connected to the spark plugs in the cylinders. The center contact is provided with a spring plunger which is in constant communication with a plate on the rotor. This plate carries at its outer end a contact button. As the rotor revolves, the contact button slides over the eight outer contacts in the distributor head, consecutively completing the high tension circuit to each of the spark plugs from the ignition coil.

The timer, by which the low tension current is interrupted at the proper time to produce the spark, is beneath the rotor. An eight lobed cam "B," Fig. 51, on the timer shaft, operates two contact arms "C" and "D." As the cam revolves, these arms alternately complete and break the primary circuit. The cam is held in place by the lock screw "A."

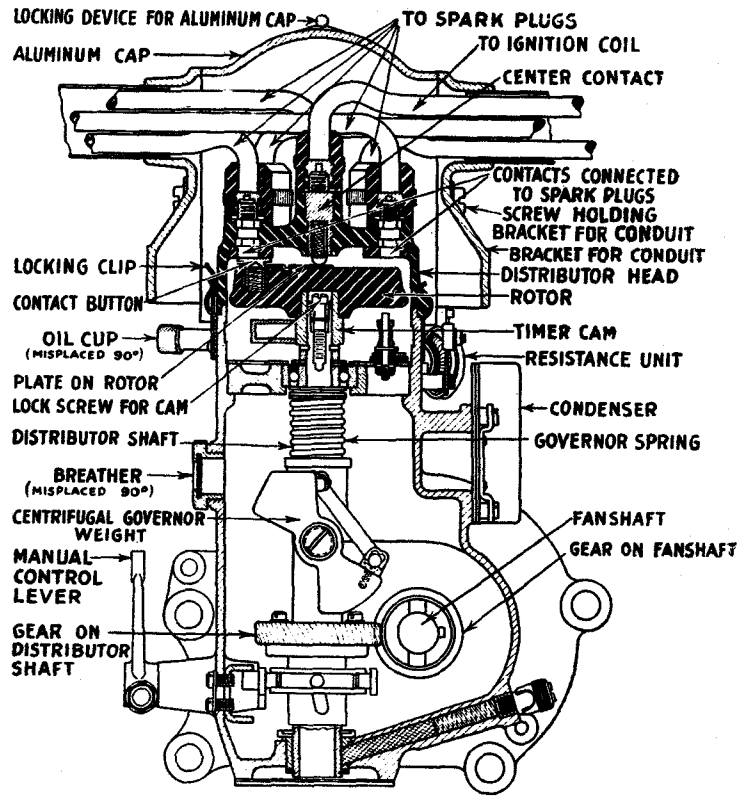



*Fig. 50. Distributor and Timer, Sectional View.*



Two sets of timer contact points are provided. The object is to distribute over two sets the current which would otherwise pass through one. This greatly lessens wear and burning of the points.

The spark timing is automatically controlled by a centrifugal governor which advances or retards the position of the timer cam relative to the driving shaft, as the engine speed increases or decreases. (See under "Automatic Spark Control," page 16.) A spark lever at the steering wheel is provided, however, by which the timing may be still further advanced or retarded. This spark lever is connected to the manual control lever at the left of the distributor housing.

## *Cleaning Rotor Button Track*

If the track in the distributor head, against which the rotor button presses, requires cleaning, do not use sandpaper or emery cloth. Clean with a piece of cloth moistened with vaseline, then polish with a dry cloth.

## *Adjustment of Timer Contact Points*

The distributor head is protected by an aluminum cap, to which are attached the conduits which carry the high tension wires to the spark plugs and ignition coil and the low tension wire from the ignition coil to the resistance unit. The timer contact points are accessible after removing the aluminum cap, the distributor head and the rotor. To do this proceed as follows:

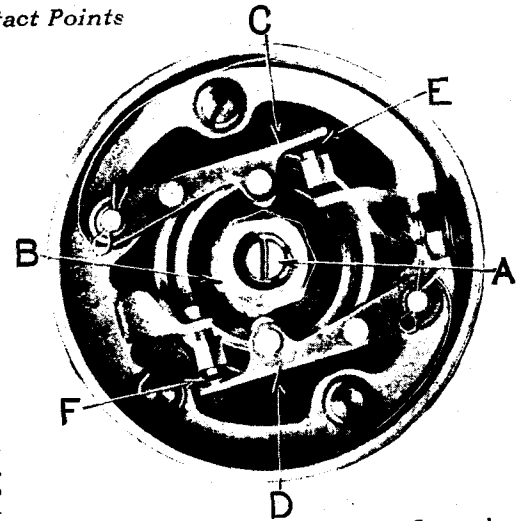



*Fig. 51. Timer Contacts, Distributor Cap and Rotor Removed.*

Remove the screws holding the conduit brackets to the aluminum cap. Move the locking device on top of the cap to one side and remove the cap. Press back the finger of the clip on the left side of the distributor head and rotate the head until both clips are opposite the flat places on the head. Then lift the head straight up. Remove the rotor by carefully lifting it straight up. The contact points are then accessible, appearing as shown in Fig. 51.

## *Method of Adjustment*

To set the contact points proceed as follows:

Crank the engine by hand until the contact arms "D" and "C" are directly on top of lobes of the cam "B." Then adjust the contact points at "E" and "F" so that they stand twenty thousandths of an inch apart. Both sets of contact points should be adjusted exactly alike.

*Do not file or grind the contact points.* To clean the points remove them and simply rub them over an oil stone two or three times. Then replace and adjust, following instructions given.

It is a good plan after adjusting the timer contact points to check the ignition timing. See under "Timing Ignition," page 74.

### *Timing Ignition*

Unless the timer contact points are in proper adjustment they should be re-adjusted before proceeding to time the ignition.

To time the ignition proceed as follows:

Move the spark lever to the extreme left on the sector; open the compression relief cocks on the cylinder blocks, and crank the engine by hand until the piston in No. 1 cylinder is on firing center. (No. 1 cylinder is the one nearest the radiator in the left hand block of cylinders.)

Next remove the distributor cap and head; also the rotor, and loosen the lock screw "A" just enough to allow the cam "B" to be turned by hand after the rotor is fitted. (The lock screw should not be loosened enough to allow the cam to turn on the shaft when the engine is cranked by hand.)

Then replace the rotor and turn it by hand until the distributor brush in the rotor is directly under the terminal marked No. 1 on the distributor cover.

Replace the distributor cover, and move the spark lever to the extreme right on the sector.

Then switch on ignition; hold the high tension wire to the spark plug in No. 1 cylinder about one-eighth of an inch away from the cylinder casting and crank the engine slowly by hand in the direction in which it runs. Stop cranking immediately a spark occurs between the wire and the casting. (It will be necessary to crank the engine nearly two complete revolutions before the spark occurs.)

If the cam "B" is properly set a spark will occur when a point on the flywheel one and twenty-one thirty-seconds inches in advance of the center line for No. 1 cylinder is directly under the pointer attached to the crank case of the engine. This point for each cylinder is marked on the flywheel by the letters "IG|A." (See Fig. 41.)

If the spark occurs before this, rotate the cam "B" slightly in a counter clockwise direction to correct the adjustment. If the spark occurs later than this, rotate the cam slightly in a clockwise direction.

After the adjustment has been properly made, lock the cam securely to the distributor shaft by the lock screw "A."

After locking the adjustment it is a good plan to check the timing by fully retarding the spark lever; in other words moving it to the extreme left on the sector, holding the high tension wire to the spark plug in No. 1 cylinder about one-eighth of an inch away from the cylinder casting, and again cranking the engine slowly by hand in the direction in which it runs, stopping immediately a spark occurs.

If the ignition is properly set the spark will occur under these conditions when the center line on the flywheel for No. 1 cylinder is directly under the pointer attached to the crankcase, or has passed the pointer.

*Caution*—Do not set the ignition so that the spark occurs before center with the spark lever at the extreme left on the sector.

### *Resistance Unit*

The resistance unit is a coil of resistance wire wound on a porcelain spool as shown in Fig. 50. Under ordinary conditions it remains cool and offers little resistance to the passage of current. If for any reason the ignition circuit remains closed for any considerable length of time with the engine not running, the current passing through the coil heats the resistance wire, increasing its resistance to a point where very little current passes, and insuring against a waste of current from the battery and damage to the ignition coil and timer contacts.



### *Ignition Condenser*

The purpose of the condenser in the ignition system is to protect the timer contact points against the corrosive action of sparking and to utilize the tendency to spark to build up a higher voltage in the high tension circuit than would otherwise be obtained.

The ignition condenser is mounted on the right hand side of the distributor housing in a waterproof casing. (See Fig. 50.) It consists of layers of tinfoil separated by sheets of paraffin paper. Alternate layers of tinfoil are connected to opposite terminals. The current does not pass through the condenser and on test the terminals should show open circuit.

There are no adjustments in connection with the condenser and it requires no attention.

### *Ignition Coil*

The ignition coil serves to transform the low voltage current in the primary circuit to a current of high voltage in the secondary circuit. The coil consists of a primary winding of coarse wire wound around an iron core in comparatively few turns, and a secondary winding of many turns of fine wire, also the necessary insulation and terminals for wiring connections.

The ignition coil is mounted on the inner face of the dash and should require no attention except occasional inspections to insure that there are good connections between the wires and terminals.

### *Spark Plugs*

Spark plugs should be kept clean. When carbon or soot is permitted to collect on them, it causes a short circuiting of the current and prevents the proper ignition of the charge in the cylinder. A good method of cleaning plugs is to wash them in alcohol.

In order to get the best results the points on the spark plug should be .028 of an inch apart. If the points are too close together, the engine will miss under a light load and when idling. If the points are too far apart, it will miss under heavy loads, and when the throttle is opened quickly for acceleration.

## CIRCUIT BREAKERS

The circuit breakers are mounted on the inner face of the dash. These are protective devices which take the place of fuses.

The circuit breakers prevent the discharging of the storage battery, damage to the wiring to the horn, lights and the ignition apparatus, or to any of these parts in case any of the circuits to or in these parts become grounded.

As long as only a normal amount of current is used for horn, lights and ignition the circuit breakers will not open. In the event of a ground, an abnormally heavy current is conducted through one of the circuit breakers thus producing strong magnetism which attracts the armature and opens the contact. This cuts the flow of current.

The circuit breaker protecting the horn, handy lamp and tonneau lamp circuit is known as a lockout circuit breaker. In case of a ground in any of these circuits, the breaker opens and remains open until the ground is removed.

The circuit to the ignition apparatus and remainder of the lights is protected by a vibrating circuit breaker. In case of a ground in any of the circuits protected by the vibrating circuit breaker, the breaker will start to vibrate and will continue to vibrate until the ground is removed.

## GENERATION OF CURRENT

### *Ammeter*

When the car is standing with lights turned on, the ammeter, which is located on the instrument board, indicates on the "Discharge" side of the dial the amount of current being drawn from the storage battery for this purpose. When the ignition switch is turned on the ammeter indicates, in addition, the current used in slowly rotating the armature of the motor generator. When the starter button is pushed down current is no longer required for slowly rotating the armature of the motor generator. The ammeter then indicates only the current used for the ignition and lights (if turned on). The ammeter does not indicate the amount of current used in the cranking operation.

Before the engine is running fast enough to generate sufficient current to equal the current demand, the ammeter indicates on the "Discharge" side the amount of current being drawn from the storage battery. When the engine has attained a speed sufficient to generate current to more than equal the demand, the ammeter indicates on the "Charge" side the excess current which passes to the storage battery and recharges it.

Ordinarily, with all lights switched off, sufficient current is generated to start recharging the battery when the car is operated in high gear at speeds between four and six miles per hour and, of course, at much lower speeds when the car is operated in low or intermediate gear. With all lights turned on sufficient current is generated to take care of the requirements at a speed of ten to fifteen miles per hour and at speeds greater than this the surplus current passes through the storage battery and recharges it. In other words, the ammeter indicates the rate at which the storage battery is being charged or discharged.

To determine the total output of the generator turn off all the lights and add the amount of current used for ignition, i. e., two to three amperes, to the ammeter reading.

### *Current Regulation*

The generating capacity of the generator is regulated by means of a third brush on the generator commutator. (See Fig. 46.) The position of this brush relative to the other two generator brushes determines the maximum output of the generator, the length of the brush arm being adjustable. The brush arm is properly adjusted when the car is assembled and should not require readjustment unless its position is altered. To determine whether readjustment is necessary proceed as follows:

Start the engine in the usual manner. With all the lights turned off slowly increase the speed of the engine by means of the hand throttle lever, meanwhile observing the hand of the ammeter on the instrument board. (*Do not race the engine.* There is no worse abuse and it is unnecessary in this adjustment to run the engine faster than 1500 revolutions per minute.) The current indicated by the ammeter will increase with the speed of the engine to a point between 950 and 1200 revolutions per minute, and will then decrease. If the amount of current indicated by the ammeter at the maximum point is greater than 18 amperes, stop the engine and readjust the third brush as follows:



Remove the generator front end top cover. Loosen the two screws which hold together the two parts of the third brush arm and shorten the brush arm. After moving the third brush to an approximately correct position, press the brush down so that it makes even contact with the commutator, and hold it down while tightening the screws in the brush arm. The purpose of this is to have the curvature of the end of the brush conform as closely as possible to that of the commutator.

After setting the third brush, sand it in with a strip of No. 00 (fine) sandpaper slightly wider than the brush. Pass one end of the strip of sandpaper down between the right hand side of the front casing of the generator and the pin on which the third brush arm pivots, then over to the left and between the third brush and the commutator. The sand side of the sandpaper should be up. Then pressing down firmly on the third brush, draw the sandpaper from under the brush by pulling on the free end of the sandpaper. Repeat this operation until there is even contact between the brush and commutator. Usually five or six times will be sufficient.

Start the engine. Again slowly accelerate the engine and check the maximum current. If it is still greater than 18 amperes, reset the third brush and sand it in again.

If the maximum current indicated by the ammeter is less than 18 amperes and the specific gravity of the battery repeatedly shows that the battery is not being properly charged, lengthen the brush arm. Do not, however, lengthen the brush arm unless the condition of the battery makes it necessary and under no circumstances adjust it so that the ammeter indicates a maximum current of more than 18 amperes with all lights turned off. A greater amount of current may result in serious injury to the motor generator.

## STORAGE BATTERY

### *General Description*

The storage battery consists of three cells, each containing thirteen plates—six positive and seven negative—contained in a wooden box, which is carried in a compartment in the left hand dust shield. The cover of this compartment forms a part of the dust shield and may be removed after unscrewing the two nickel-plated screws with a screw-driver.

The battery is designed especially for the Cadillac-Delco electrical cranking, lighting and ignition system and is made by the Electric Storage Battery Co. of Philadelphia, Pa., whose products for the trade are known as "Exide" batteries.

The specific gravity of the acid solution in the battery is an indication of the state of charge of the battery. (See under "Hydrometer Syringe.") In a fully charged battery the specific gravity should be from 1.270 to 1.290. If the specific gravity registers from 1.150 to 1.170 it indicates that the battery is practically discharged. A battery discharged below a specific gravity of 1.150 will not crank the engine nor will it burn the lights to full candlepower when the engine is not running.

*Caution*—Never run the engine with the storage battery disconnected or while it is off the car. Very serious damage to the motor generator may result from such action. Do not remove the motor generator or attempt any adjustment of the circuit breakers or remove any of the wires to the circuit breakers, without first disconnecting the storage battery.

### *Adding Water to Storage Battery*

The acid solution in the battery must always cover the plates and the level of the acid solution should be kept even with the bottom of the filling tubes. Water should be added frequently enough to keep the level up to this point. *Do not add acid.* Ordinarily water should be added every 1,000 miles. but it should be added more frequently if found necessary. Usually it will require only a teaspoonful or so of water; in hot weather it may require more Be sure to replace and tighten the filling plugs after adding water.

To remove a filling plug, turn it as far as possible in the counter-clockwise direction, then lift it straight up. To replace, hold it so that the large arrow is perpendicular to the center line of the car, set the plug in place and turn it in the clockwise direction until tight.

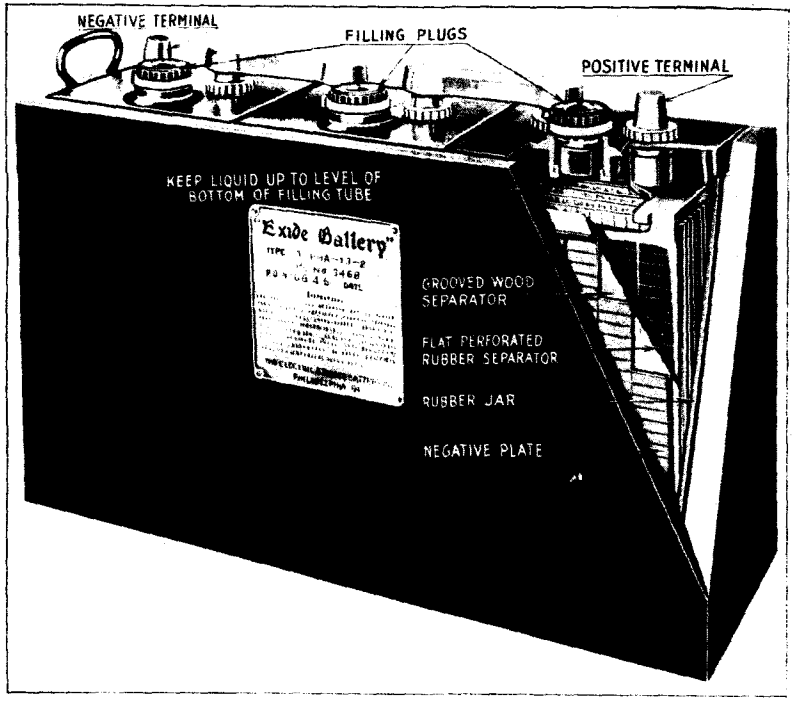



*Fig. 52. Storage Battery, Sectional View.*

If a plug is left out or is loose, the acid solution will escape from the cell, especially when the battery is being charged. If a plug is lost or broken, you should obtain a new one and install it as soon as possible.

If one cell regularly requires more water than the others, thus lowering the specific gravity of the acid solution in that cell, a leaky jar is indicated. Even a very slow leak will in time result in the loss of all the acid solution in the cell. A leaky jar should immediately be replaced by a new one.

The water for filling the battery must be pure. Distilled water, melted artificial ice or fresh rain water are suitable for this purpose. If rain water is used, it should not be allowed to come in contact with any metal. It should not be caught from a metal roof or in a metal receptacle.



Never keep the water in a metal container, such as a metal bucket or can. It is best to get a bottle of distilled water from a druggist or from an ice plant. A quart will last a long time. The whole point is to keep metal particles out of the battery. Spring water, well water or hydrant water from iron pipes generally contains iron and other metals in solution, which will ultimately cause trouble if used.

### *Replacing Acid Lost by Spilling*

If any of the acid solution has been spilled or has leaked from a cell, replace the loss with freshly mixed solution and follow with an overcharge by running the engine for several hours or by charging the battery from an outside source. (See Fig. 54. Also see under "Personal Danger in Running Engine in Closed Garage," page 52.)

The specific gravity of the acid solution used for replacing the loss should be the same as that of an adiacent cell. This can be determined by the use of an hydrometer syringe (Fig. 53).

The acid solution may be prepared by mixing chemically pure sulphuric acid, which has a specific gravity of 1.840, and distilled water. The proportion for an acid solution having a specific gravity of 1.280 is one part of chemically pure acid and three parts (by volume) of distilled water. *The acid must always be poured slowly into the water. Do not pour the water into the chemically pure acid.*

If, after mixing the acid solution as described above, a solution of a lower specific gravity is desired, it may be prepared by adding additional water to the mixture. But do not under any conditions pour water into the chemically pure acid.

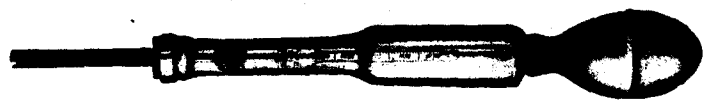


*Fig. 53. Hydrometer Syringe.*

A glass, earthenware or other acid-proof vessel, should be used for mixing. After mixing, the acid solution should be allowed to cool thoroughly before using.

### *Hydrometer Syringe*

An hydrometer is an instrument for testing the specific gravity of a liquid. An hydrometer syringe is an hydrometer specially designed for convenience in testing the specific gravity of the acid solution in storage batteries. Hydrometer syringes are not a part of the electrical system but can be purchased from any "Exide" service station.

The hydrometer syringe, Fig. 53, is shipped unassembled, and to assemble, hold the glass barrel, to which is attached the rubber bulb, in a horizontal position, and insert the hydrometer stem end first. Wet the soft rubber plug which is attached to the hard rubber pipette (nozzle) and force the rubber plug, grooved end first, into the end of the glass barrel as far as it will go, or until it strikes the shoulder of the barrel. It is important not to force the pipette too much in making this attachment, as the end of the pipette must not extend beyond the base of the grooves of the rubber plug; otherwise the flow of the liquid will be retarded in emptying the hydrometer syringe.

After removing the filling plug from the cover of the cell, compress the rubber bulb of the syringe and insert the pipette in the solution of the cell to be tested. Holding the instrument as nearly vertical as possible, gradually lessen the pressure on the bulb until acid solution rising in the barrel causes the hydrometer to float. In general, only enough acid solution should be drawn to float the hydrometer free of the bottom by about one-half to three quarters of an inch. The specific gravity reading is taken on the hydrometer at the surface of the acid solution in the glass barrel.

If the acid solution is below the top of the plates, or so low that enough cannot be drawn into the barrel to allow of a proper reading of the hydrometer, fill the cell to the proper level (see Fig. 52) by adding pure water, then do not take a reading until the water has been thoroughly mixed with the acid solution. This can be accomplished by running the engine for several hours.

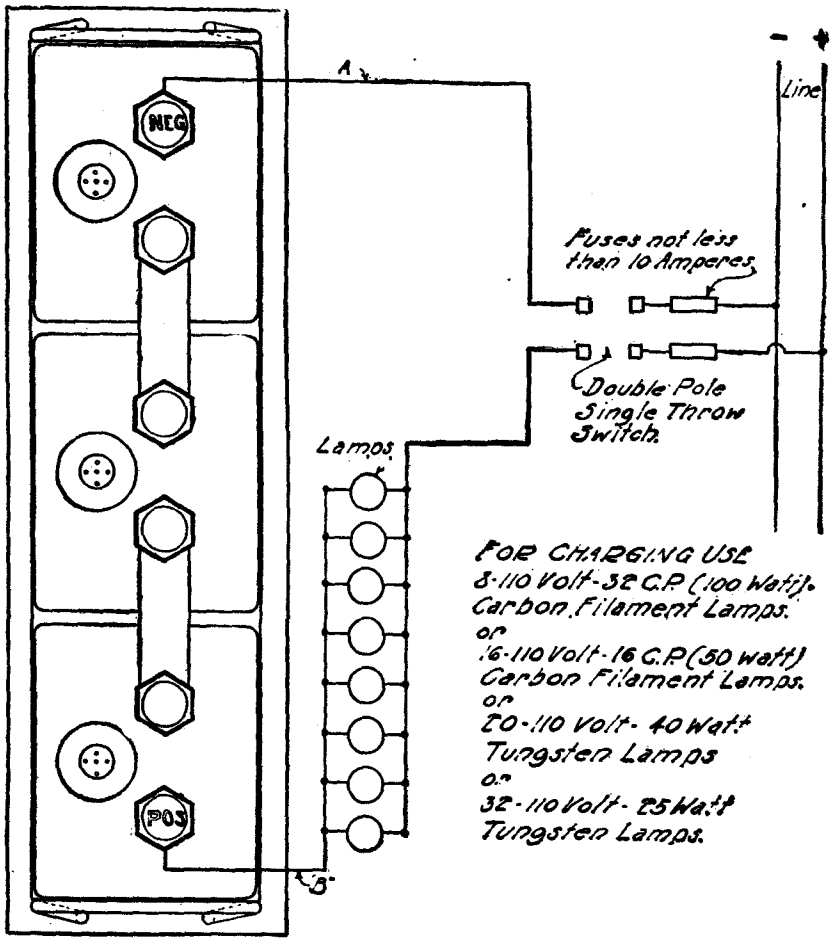



*Fig. 54. Diagram of Connections for Charging Battery from 110 Volt D. C. Circuit.*



## *Charging from an Outside Source*

It is necessary that the charging be done with *direct current.* The simplest method when there is 110 or 120 volt direct current available, is to connect eight 110 volt, 32 candlepower, 100 watt carbon lamps in parallel with each other and in series with the battery to be charged, this combination giving approximately the proper charging rate—8 amperes. The positive terminal of the battery must be connected to the positive side of the charging circuit and the negative terminal to the negative side. *Very serious injury to the battery will result if connected in the reverse direction.* The terminals of the battery are stamped "Pos." and "Neg."

To determine the polarity of the charging circuit, if a suitable voltmeter is not at hand, dip the ends of the two wires "A" and "B" (Fig. 54) into a glass of water in which a teaspoonful of salt has been dissolved, care being taken to keep the wires at least an inch apart. When the current is turned on, fine bubbles of gas will be given off from the negative wire.

The diagram (Fig. 54) illustrates just how the connection should be made. The charge should be continued until all the cells have been "gassing" or bubbling freely for five hours, and there is no further rise in the voltage of the battery or specific gravity of the acid solution over the same period. A battery in good condition in a discharged state will require about ten hours of re-charging. If it has stood in a discharged condition for several weeks, it will require from twenty-five to fifty hours' charging—all depending upon the condition of the battery and the length of time it has stood discharged.

If only alternating current is available, a current rectifier must be used. Consult your city electrician regarding this matter.

*Caution:*—Never run the engine with the storage battery disconnected, or while it is off the car. Very serious damage to the motor generator may result from such action.

## *Preparing Battery for Winter Storage*

When the car is stored for the winter the level of the acid solution should be even with the bottom of the filling tubes. (See under "Adding Water to Storage Battery," page 78.) If water is added it should be added just before the last time the car is used so that it will be thoroughly mixed with the acid solution. When the car is stored, the specific gravity of the acid solution should register from 1.270 to 1.290. In this condition there is no danger of the acid solution freezing. The specific gravity of water is 1.000 and water freezes at 32 degrees F. above zero.

*Unless the battery is fully charged or nearly so it is probable that the acid solution in the battery will freeze and cause extensive damage.*

The following is a table of the freezing temperatures of sulphuric acid and water solutions of specific gravities from 1.050 to 1.300.

| Specific Gravity (Hydrometer Reading) | Freezing Temperature (Degrees Fahr.) |
|---|---|
| 1.050 | +27° |
| 1.100 | +18° |
| 1.150 | + 5° |
| 1.164 | 0° |
| 1.200 | —17° |
| 1.250 | —61° |
| 1.275 to 1.300 | —90° |

The battery should be charged every two months during the "out of service" period, either by running the engine or charging from an outside source (Fig. 54). If either of the above is impossible, and there is no garage equipped for charging batteries to which it may be conveniently sent, the battery may be allowed to stand without charging during the winter, provided the specific gravity of the acid solution registers from 1.270 to 1.290 at the time the car is laid up. Much better results and longer life from the battery will be obtained by giving the periodic charges.

The wires of the battery should be disconnected during the "out of service" period, as a slight leak in the wiring will discharge the battery.

### *Placing Battery in Service Again*

Before putting the battery into service again, inspect it and add water, if necessary. In placing the battery on the car, care should be taken not to tighten the hold down bolts too tight. If the battery has not been kept charged during the winter, it will be advisable to give it a fifty-hour charge at a four-ampere rate from an outside source before putting it into service again. Make sure that the terminals are free from corrosion and that good connections of the wires are made.

The corrosion, which is a greenish deposit, can be removed from the bolts and terminals by placing them in a solution of water and bicarbonate of soda (cooking soda).

The corrosion can be removed from the posts by saturating a piece of cloth with the solution and wiping them off. Do not allow any of the solution to get into the cells of the battery.

After the parts are free from corrosion they should be washed in warm water, and a light coat of heavy grease or vaseline applied.

If the battery has received periodic charges, it will not be necessary to give it any special attention other than to fill it to the proper height with distilled water. After the car has been driven for a number of hours, read the specific gravity of the acid solution with the hydrometer syringe. It should register from 1.270 to 1.290 if the battery is fully charged.

### *Sediment*

The sediment which gradually accumulates in the bottom of the jars, should be removed before it reaches the bottom of the plates, as it is very harmful to the battery. The need of cleaning may be determined by inspection. Its necessity is indicated by lack of capacity, excessive evaporation of the acid solution and excessive heating when charging. When a battery requires removal of sediment, better results follow if the work is done at a place where they are thoroughly familiar with storage battery practice. If a battery is in need of cleaning or repairs, it is best to communicate with a Cadillac dealer or with the nearest Exide Depot, who will advise you where to ship the battery. *Do not ship batteries without receiving instructions.*

### *Exide Depots and Sales Offices*

The Electric Storage Battery Company, whose general offices and works are at Alleghany Avenue and 19th Street, Philadelphia, Pa., has service stations in towns of any considerable size where battery repair work is done, as well as sales offices and Exide battery depots in a number of the larger cities of the country where complete assembled batteries and repair parts are carried in stock. For the location of the nearest Exide depot or service station write the local Cadillac dealer or, if preferred, the Electric Storage Battery Company, at Philadelphia.



# TRANSMISSION AND CLUTCH

## TRANSMISSION

### *General Construction*

The transmission is the selective type of sliding gear. It provides for three speeds forward, and one reverse. The gear changes are accomplished by the movement of a hand lever at the driver's right.

The teeth of the driving gear "F" (Fig. 55) are cut on the large end of the clutch shaft "P" which revolves on the annular ball bearings "Y" and "N" and which turns with the crankshaft of the engine when the clutch is engaged, at which time the bearing "N" is inoperative. The gear "F" is in constant mesh with the countershaft gear "W." The countershaft gears "W," "U," "T" and "R" revolve together on two Hyatt high-duty, flexible roller bearings "S" on a stationary shaft. The roller bearings "S" are lubricated by oil forced through the tube "V," which revolves with the gear "U."

The main transmission shaft "B," which is coupled to the forward universal joint, is splined and carries the two sliding gears "A" and "C." The shaft "B" is supported by an annular ball bearing "Q" at the rear end and at the front end by a roller bearing "Z," which is housed in the rear end of the clutch shaft "P."

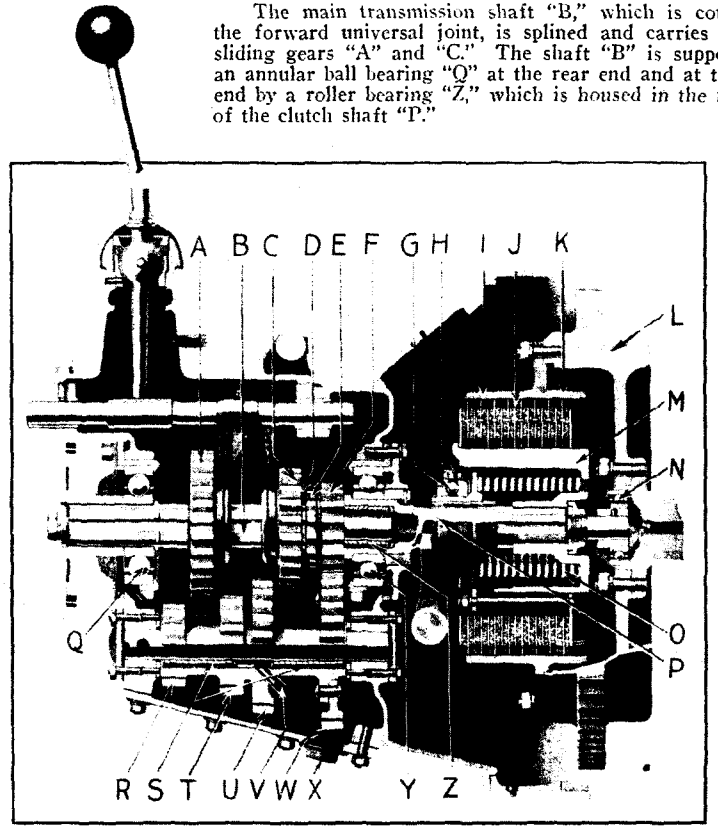



*Fig. 55. Transmission and Clutch, Sectional View.*

### Operation

The transmission control lever accomplishes the gear changes by moving the sliding gears "A" and "C." Fig. 55 shows these gears not in mesh with other gears, or in other words in the "neutral" position. The "neutral" position of the control lever is shown in Fig. 2. In "neutral" position the car is not driven even though the clutch be engaged.

Low gear is obtained by shifting the control lever into the position shown in Fig. 3. This movement of the lever slides the gear "A" forward from the position shown in Fig. 55, bringing it into mesh with the countershaft gear "T."

Intermediate gear is obtained by moving the transmission control lever as shown in Fig. 4. The first half of this movement slides the gear "A" towards the rear, returning it to the "neutral" position and leaving it in that position. The second half slides the gear "C" towards the rear from the neutral position, causing it to mesh with the countershaft gear "U."

High gear is obtained by moving the transmission control lever straight back from intermediate gear position as shown in Fig. 5. This slides the gear "C" forward out of mesh with the gear "U" and interlocks the internal teeth "D" on this gear "C" with the teeth "E" on the end of the clutch shaft "P." The clutch shaft "P" and splined shaft "B" then revolve as a unit on the annular ball bearings "Q" and "Y" and the drive is "direct."

It is necessary before each shifting of the gears to release the clutch, moving the control lever while the clutch pedal is held down. The necessity for this may be explained in the following manner. In meshing gears by sliding the teeth of one between the teeth of the other it is necessary that one of the gears be free to rotate at the same peripheral speed as the other. Only after the teeth are fully in mesh should the clutch be re-engaged.

If the gears to be meshed are both revolving at the same peripheral speed the meshing operation will be practically noiseless. The more closely this ideal condition is approached the more quietly may gear shifting be accomplished. This explains why it is advisable to pause for an instant in the neutral position when shifting from "low" to "intermediate." It also explains why the method given on page 13 for shifting from "high" to "intermediate," if followed, will result in a practically noiseless shift.

When stopping the car the control lever must always be shifted into the neutral position.

### Lubrication

Keep sufficient lubricant in the transmission case to bring the level up to the filling hole in the right hand side of the case. When the lubricant is up to the level of the filling hole the transmission case contains approximately two quarts. The best lubricant for the transmission is Cadillac Rear Axle and Transmission Lubricant. In its absence we recommend a mixture of steam cylinder oil and a small amount of cup grease mixed to such a consistency that the mixture flows easily at temperatures from 60° to 70° Fahrenheit.

## CLUTCH

### General Description

The main clutch is of the multiple disc dry plate type. The eight driving discs "I," Fig. 55, are covered on both sides with a friction material, composed largely of asbestos, and are driven by gear teeth in the clutch ring "K" which is bolted to the engine flywheel "L."

The nine driven discs "J" are not covered. These discs are carried on the clutch hub "M" and drive it through six keys on the hub. The clutch hub is keyed to the transmission shaft "P."



When the clutch is engaged by allowing the clutch pedal to come towards you, the spring "O" forces all of the discs together. The resulting friction between the discs "I" and "J" drives the transmission shaft "P" and the car, when the transmission control lever is in other than the neutral position.

There are no adjustments on the clutch proper. The clutch pedal should be adjusted occasionally to compensate for wear on the facings of the clutch discs. This adjustment is explained below under "Adjustment of Clutch Pedal Clearance."

There is but one point on the clutch for lubrication. This is the clutch release ball race "G." Instructions for lubricating this part will be found under "General Lubrication" on page 45.

### Adjustment of Clutch Pedal Clearance

After the car has been run for some time it may be found that the facings on the clutch discs have become compressed or worn to some extent and that consequently the clutch pedal strikes the stop screw before the clutch is fully engaged. When this condition exists a readjustment may be made as follows:

Remove the pin "N," Fig. 56, and unscrew the yoke "P," which is threaded on the rod "O," so that when the pin "N" is replaced the clutch pedal has a movement back and forth of one and one-quarter inches without starting to release the clutch. Secure the pin "N" with a cotter pin and tighten the lock nut "V."

### Adjustment of Clutch Pedal Stop

The clutch pedal stop screw "S" is adjusted when the car is assembled and requires no further attention. When in proper adjustment the stop screw "S" should hold the pedal arm "U" so that the distance "T" is approximately one-half inch on the Seven-Passenger, Roadster, Phaeton and Victoria and approximately one-quarter inch on all enclosed cars except the Victoria. If the adjustment has been changed, it may be readjusted in the following manner:

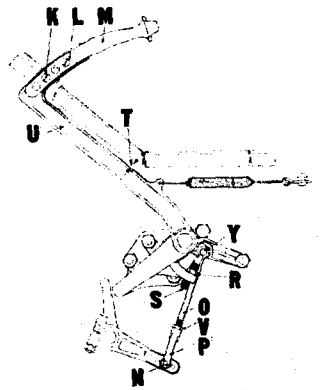


*Fig. 56. Clutch Control.*

Remove the pin "N" from the yoke "P," loosen the lock nut "R" and adjust the stop screw "S" so that the pedal arm "U" is held the required distance from the under side of the toe board at "T" when the pin "Y" is against the stop screw. Tighten the lock nut "R."

Then adjust the yoke "P" so that when the pin "N" is replaced the clutch pedal has a movement back and forth of one and one-quarter inches without starting to release the clutch. Secure the pin "N" with a cotter pin and tighten the lock nut "V."

### Adjustment of Length of Clutch Pedal

The clutch pedal is made in two parts slidingly adjustable to accommodate different drivers.

To change the length of the clutch pedal remove the bolts "K" and "L," Fig. 56, and slide the forked piece "M" in the desired direction. Do not pull "M" out so far that it is possible to put in only one bolt; two bolts are required properly to hold the parts.

There are four possible positions in this adjustment, Fig. 56 showing the extreme shortened position.

The brake pedal may be lengthened or shortened in the same manner.

## STEERING GEAR

### *Adjustment of Worm Thrust Bearings*

To take up the end play in the worm "K," Fig. 57, remove the plug "B," Fig. 58, and loosen the jamb nuts "J," and lock screws "A." Then with a screw-driver or something else suitable, screw down the adjusting collar "L," Fig. 57, which can be seen through the hole from which the plug "B," Fig. 58, was removed, until the proper adjustment is made.

Lock screws "A" are positioned in the steering gear housing so that when one is directly over a slot in the adjusting collar the other is between two slots. Therefore after adjusting the collar it will be necessary to select the proper screw for locking the adjustment. Both lock screws should be held from turning by locking the jamb nuts.

### *Adjustment of Worm and Sector*

The second adjustment is for taking up wear on the teeth of the worm "K" and sector "W," Fig. 57. The sector "W" has its bearing in an eccentric steel bushing and should wear occur, it may be taken up by turning this bushing so that it throws the sector towards the worm.

To do this proceed as follows: First turn the steering wheel so that the front wheels point straight ahead. Remove the locking screw "C," Fig. 58. As the bushing is assembled at the factory it is necessary to move the arm "D" down to tighten the adjustment.

If the wear on the teeth of the worm and sector is very great, it will be necessary to remove the steering arm "F" and to place the arm "D" in a different position on the hexagonal end of the eccentric bushing in order to bring the arm "D" in position so that it can be locked by the screw "C."

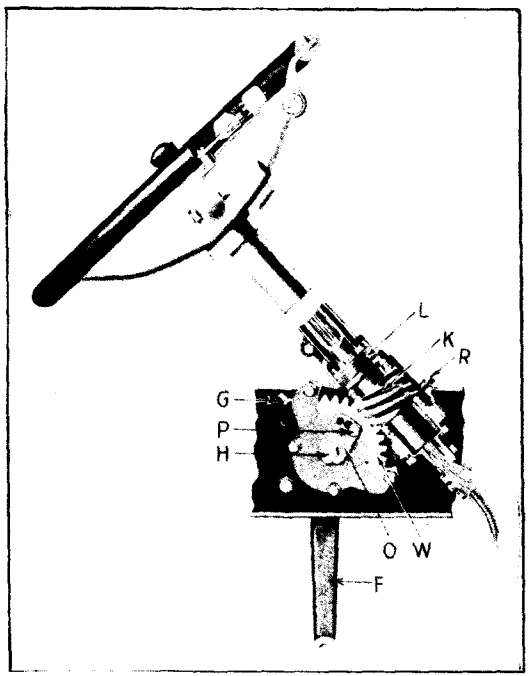



*Fig. 57. Steering Gear, Sectional View.*

After the adjustment is made properly be sure that the lock screw "C" is replaced and properly tightened.



### *Adjustment of Sector Shaft*

An adjustment is provided on the inner face of the steering gear housing for taking up end-play in the sector shaft.

To make this adjustment remove the locking arm "O," Fig. 57, and turn the adjusting screw in until the proper adjustment is made, after which the locking arm "O" should be replaced and the lock screw "P," replaced and tightened.

*Caution*—Do not turn the steering gear when the car is standing. This is not only unnecessary but is also bad practice.

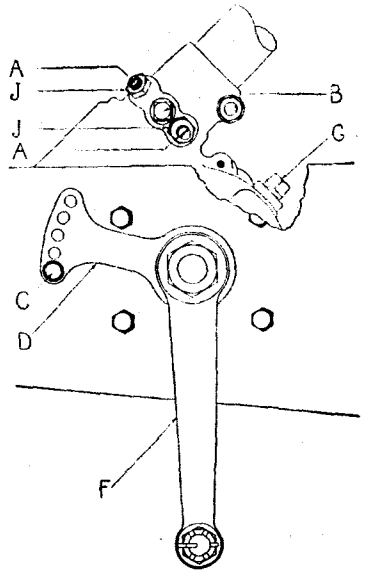



*Fig. 58. Steering Gear Housing and Arm.*

### *Lubrication*

The internal mechanism of the steering gear may be lubricated at "R" and "G," Fig. 57, after taking out the screw plugs. The hole at "R" is tapped to fit the nozzle of the oil gun. Cadillac Rear Axle and Transmission Lubricant, mixed with about two or three per cent of flake graphite is a good lubricant for this part.

## CAUTION IN ADJUSTING TIMKEN BEARINGS

When adjusting Timken Bearings, great care must be exercised not to get them tight. These bearings will revolve even when adjusted very tightly, but that condition is sure to prove disastrous. They should be adjusted so that a very slight amount of play or looseness may be discerned.

If, after a bearing has been adjusted to a point that is apparently correct, the locking device cannot be placed in position without changing the adjustment, it is far better to *loosen* the adjustment until it can be secured with the locking device than to *tighten* the bearing adjustment.

## WHEELS

### *Lubrication*

Both the front and rear wheels should be removed every three or four thousand miles or at least every six months, the bearings examined and carefully lubricated with light grease. Cadillac Wheel Bearing Grease is recommended for this purpose. A few drops of lubricating oil should be put in occasionally through the oil holes in the rear wheels.

## FRONT WHEELS

### *Removing Front Wheel*

Jack up the axle until the wheel is free from the ground.

Remove the hub cap by unscrewing it.

Remove the lock nut "I," Fig. 59.

Remove the washer "K."

Remove the adjusting nut "L."

The wheel may now be removed.

In removing the right front wheel remove the speedometer driver "A," Fig. 65, after removing the hub cap.

Before replacing the wheel see that the bearings are clean and that they are filled with light grease. Be sure that the grease is free from dirt and grit.

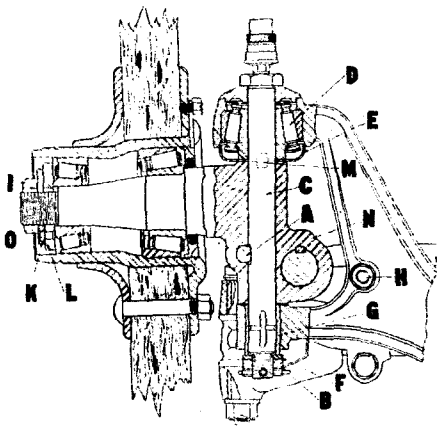



*Fig. 59. Front Left Spindle and Hub, Showing Bearings.*

### *Replacing Front Wheel and Adjusting Bearings*

In replacing the wheel adjust the nut "L" very carefully. (See under "Caution in Adjusting Timken Bearings," page 87.) Replace washer "K" being sure that one of the holes in the washer fits over the stud "O." Replace the lock nut "I" and tighten carefully.

The thread on the right hand spindle is a right hand thread; the thread on the left hand spindle is a left hand thread. Therefore, in tightening the adjusting and lock nuts, "I" and "L," they should be turned in the same direction in which the wheels turn when the car moves forward.

It is better to adjust Timken bearings a little too loose than tight. If, after the adjustment is apparently correct a hole in the washer "K" is not directly over the stud "O" it is best to loosen the adjustment rather than to tighten it.

### *Alignment of Front Wheels*

The ideal condition is to have the front wheels parallel to each other on horizontal lines passing diametrically through their centers. Under no condition should the wheels toe out. It is permissible to have them toe in, providing they do not toe in more than 3/8 of an inch in the diameter of the wheel. (See "Result of Improperly Aligned Front Wheels," page 24.)

Jack up the front axle until both wheels are clear of the floor and true up the demountable rims. (See under "Mounting Rim With Tire," page 28.)

Move the steering wheel to bring the left front wheel "A," Fig. 60, parallel with the frame "B." This may be determined by taking measurements "C" from the rim of the wheel to the frame.

Tie a string to a rear spoke of each front wheel directly back of the center of the wheel. Carry the strings inward between the spokes, back around the tires and then forward to points "D" as shown. Use strings that will extend exactly twelve feet in front of the tires. Bring the strings in until they *just touch* the forward edges of the tires at "E." The strings must be slightly above or below the hubs so as to clear them.



If the wheels are parallel, the distances "F" and "G" between the strings will be the same at points just ahead of the tires and at points at the ends of the strings.

Under no condition should the wheels toe in more than enough to allow the twelve foot strings to converge more than 1¼ inches, that is, so that dimension "G" is not more than 1½ inches less than dimension "F."

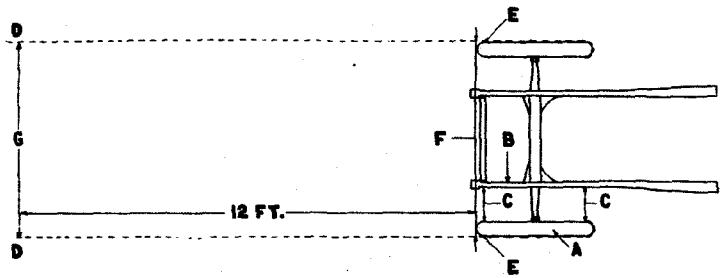



*Fig. 60. Diagram Showing Method of Aligning Front Wheels.*

Adjustment is provided in the parallel rod for aligning the front wheels. If adjustment is necessary and the left front wheel is disturbed, care should be taken to have this wheel parallel with the frame before readjusting the strings and taking measurements "F" and "G."

The front wheels camber about 1½ inches, that is, the measurement between the wheels at the top should be approximately 1½ inches greater than the corresponding measurement diametrically opposite at the bottom of the wheels.

## REAR WHEELS

### *Removing Rear Wheel*

Remove the lubricator "A," Fig. 61.

Remove the hub cap "B" by unscrewing it.

Remove the spring locking ring "K."

Withdraw the axle shaft "C."

Jack up the axle so that the wheel will clear the floor.

Remove the lock nut "D," the washer "E" and the adjusting nut "F."

The wheel can then be taken off.

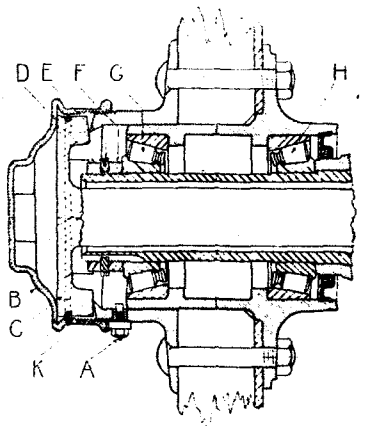



*Fig. 61. Sectional View of Rear Hub, Showing Bearings.*

### *Replacing Rear Wheel and Adjusting Bearings*

Before putting the wheel on again see that the bearings "G" and "H" are clean and filled with light grease which is free from dirt and grit.

In putting the wheel on again set the adjusting nut "F" very carefully. (See under "Caution in Adjusting Timken Bearings.") Place the washer "E" in position, and tighten the lock nut "D."

# BRAKES

## *General Construction*

There are two pairs of brakes. The regular service brakes, which are operated by the right pedal, contract upon the outside of the drums. The hand brakes, operated by a hand lever, expand within the drums.

Connections from the right pedal and hand lever are made through equalizing bars so that each drum will be gripped with practically the same pressure. While these equalizing bars compensate for a certain amount of inequality in the tension, it is desirable to adjust the brakes as nearly alike as possible.

The brake band linings can be renewed when necessary.

If the brake band linings become too dry and grip the drums too suddenly, apply a very small amount of a mixture of graphite and oil.

When the brake band linings are wet and muddy they are less effective than at other times. Hence more care must be exercised in driving at such times.

The brakes and all parts relating thereto should be examined and tested occasionally to be sure that they are in serviceable condition.

The joints and all working parts should be oiled occasionally to avoid any possibility of the parts rusting and sticking together. The internal brake joints are accessible after removing the small covers "F," Fig. 62, from the brake drums. Care should be taken not to apply too much oil to the internal brake joints, as it may get on the brake band linings and impair the efficiency of the brakes.

If the brakes are in good condition, either pair will offer sufficient resistance to lock and slide the wheels, but doing this is bad practice excepting in case of emergency, as it is very injurious to the tires.

The brake band linings should not be allowed to drag on the drums when released, as that will cause unnecessary wear.

The length of the brake pedal is adjustable to accommodate different drivers. To adjust it, see "Adjustment of Length of Clutch Pedal," page 85.

It is necessary that the rear wheel bearings be in proper adjustment before an adjustment of the brakes is made.

***Do not attempt to adjust the brakes by the pull rods, as that will not properly compensate for wear on the linings.***

## FOOT BRAKES

### (External Contracting)

## *Ordinary Adjustment*

Provision is made in each brake for its adjustment. Do not attempt to adjust the brakes by the pull rods. The brakes cannot be properly adjusted in this manner. To adjust each foot brake, proceed as follows:

Remove the cotter pin in the adjusting screw "A," Fig. 62, and turn the screw "A" until that part of the brake band lining opposite the screw just clears the drum. Adjust the two nuts "B" on the yoke bolt so that the lower part of the brake band lining just clears the drum.

Then adjust the nut "C" on the upper end of the yoke bolt so that the lever "D" is brought into the position shown in Fig. 62 when the brake is fully applied—i. e., so that the lower edge of the pin "T" and the upper edge of the pin "S" are tangent to an imaginary horizontal line shown at "X."



## *Adjustment of Stop Screws*

The position of the stop screw "E," Fig. 63, is adjusted when the car is assembled and requires no further attention unless its adjustment is altered. Adjustment for wear on the lining should be made as described above by the nuts "A," "B" and "C," Fig. 62; the stop screw "E" should not be adjusted to compensate for wear. If the stop screw "E" should be moved from its original position, it may be readjusted in the following manner:

First adjust the brake as explained above so that the lever "D," Fig. 62, is in the correct position when fully applied. Then release the brake. Remove the pin "A" in the yoke "B," Fig. 63, loosen the clamping screw "C" and push the stop "G" forward out of the way. Then adjust the stop screw "E" and the nuts "B," Fig. 62, so that the upper and lower parts of the brake band lining clear the drum by 1/32 of an inch.

Then pull the rod "H," Fig. 63, as far forward as it will go without moving the rods "K" and "L." Holding the rod "H" in this position, push the stop "G" down against the bracket "F" and tighten the clamping screw "C." Then adjust the yoke "B" so that when the pin "A" is replaced the brake pedal arm "U" is held 3/8 of an inch away from the under side of the toe board.

After the adjustments are completed, be sure to lock all adjusting screws and nuts and to insert and spread all cotter pins.

## HAND BRAKES

### (Internal Expanding)

## *Ordinary Adjustment*

Provision is made in each brake for its adjustment. Do not attempt to adjust the brakes by the pull rods. The brakes cannot be properly adjusted in this manner. To adjust each hand brake proceed as follows:

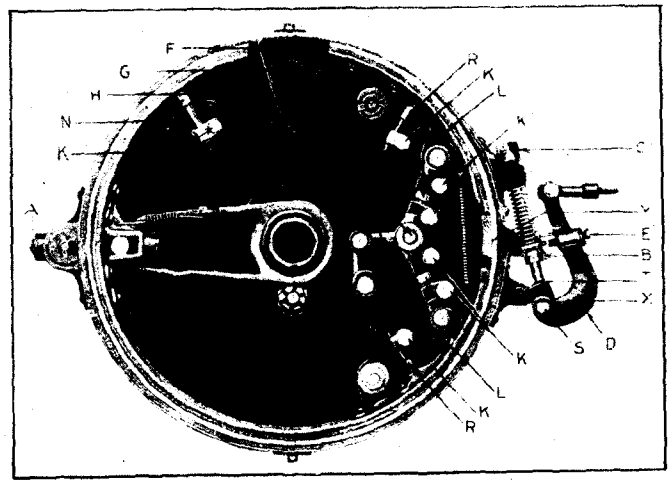



*Fig. 62. Internal and External Brakes.*

Place a jack under the rear axle housing and raise the axle so that the wheel can be turned by hand. Remove the cover "F," Fig. 62; this may be done by loosening the lock nut "G" and turning the bolt to the left about one-quarter of a turn, which releases the clamping bar "H."

Rotate the wheel until the opening gives access to the screw "J." Turn the screw "J" until that part of the brake band lining opposite the screw just clears the drum.

Rotate the wheel and through the opening loosen the seven locking screws "K." Then turn the two adjusting screws "L," which have right-hand threads on one end and left-hand threads on the other, so that when the brake is fully applied the center of the pin "M" stands 3 3/16 inches to 3¼ inches away from the inside of the brake drum at "Y." The screws "L" should be turned equally and in the same direction.

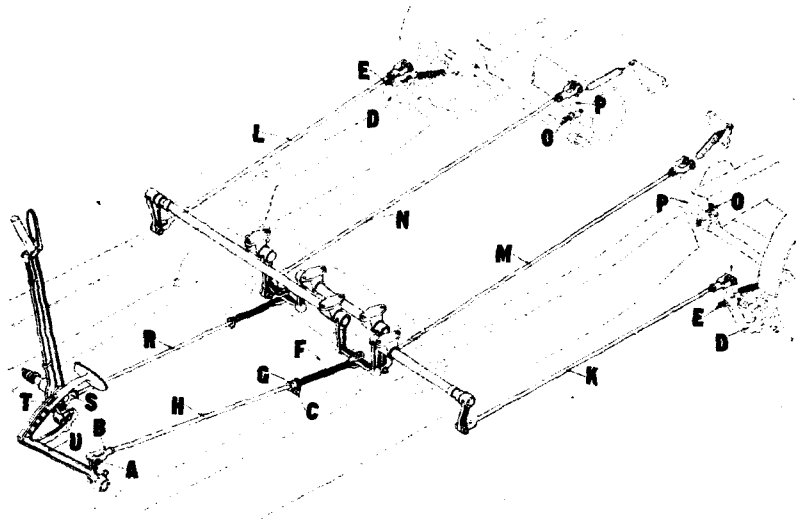



*Fig. 63. Brake Rods.*

Release the brakes and adjust the stop screws "R" so that the upper and lower parts of the brake band lining are equidistant from the brake drum. Adjust the stop screw "N" so that the head of the screw just touches the inside of the brake band. Tighten the seven locking screws "K" and replace the cover "F."

### *Adjustment of Stop Screws*

The stop screw "O," Fig. 63, is adjusted when the car is assembled, and requires no further attention unless its adjustment is altered. Adjustment for wear on the linings should be made as described above by the screws "J," "L" and "R," Fig. 62; the stop screw "O" should not be adjusted to compensate for wear. If the original adjustment of the stop screw "O" has been altered, it may be readjusted in the following manner:

First adjust the brake as described above by the screws "J" and "L," Fig. 62, but screw the stop screws "R" and "N" away from the brake band.

Then remove the pin "T" in the yoke "S," Fig. 63, and adjust the stop screw "O" so that when the brake is released the center of the pin "M," Fig. 62, stands 3 9/16 inches away from the inside of the brake drum.



Adjust the stop screws "R" so that the upper and lower parts of the brake band are equidistant from the brake drum. Adjust the stop screw "N" so that the head of the screw just touches the inside of the brake band. Tighten the seven locking screws "K" and replace the cover "F."

Then adjust the yoke "S," Fig. 63, so that when the pin "T" is replaced the upper end of the handle on the hand brake lever may be moved back one and one-quarter inches from its extreme forward position without moving the rods "M" and "N."

After the adjustments are completed, be sure to lock all adjusting screws and nuts and to insert and spread all cotter pins.

## UNIVERSAL JOINTS ON DRIVE SHAFT

The tubular drive shaft that transmits the power of the engine from the transmission to the rear axle is fitted with a Spicer universal joint at each end.

The purpose of the joints is to provide a flexible drive which is made necessary by the constantly changing alignment due to the play of the springs.

The general arrangement of the joints is shown in Fig. 64. The joints differ only in that the forward joint "B," which is attached to the transmission shaft, is provided with a sliding connection or slip sleeve "C," while the rear joint is welded to the drive shaft. A sliding connection is necessary to take care of the endwise motion of the drive shaft due to variation in the distance between the transmission and the rear axle caused by the action of the springs.

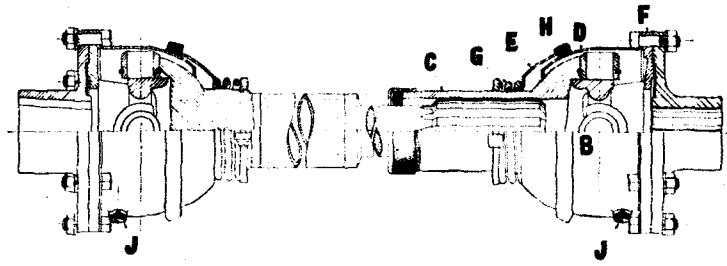



*Fig. 64. Drive Shaft and Universal Joints.*

The joints are protected by an inner housing "D" and an outer housing "E," both of pressed steel. The inner housing is bolted to the flange "F" and the outer housing fits over the end of the inner housing and is held in place and kept tight by means of a spring "G." The felt washer "H" is for the purpose of preventing grease from working out and dirt from getting in.

The joints are lubricated by grease contained in the housings. Filling holes "J" are provided. (See page 44 under "General Lubrication.")

As the construction of the joints is such that adjustments are unnecessary, no adjustments are provided.

If for any reason the drive shaft is dis-assembled, care should be taken in assembling it to have the "O" on the splined end of the shaft correspond with the "O" on the sleeve of the forward universal joint.

# FRONT AXLE

## *Adjustment of Stop Screws*

The stop screws "H," Fig. 59, at each end of the axle are for the purpose of limiting the angle at which the front wheels can be turned. The stop screw at the left end of the axle is for the purpose of limiting the angle at which the wheels can be turned to the right. The stop screw at the right end of the axle is for the purpose of limiting the angle at which the wheels can be turned to the left.

## *Removing and Replacing Spindle*

The illustration shows the construction of the front wheel hubs and bearings; the spindle bolts and the upper and lower bearings for the spindles.

The spindle bolt "C" is forced into the spindle "N" and is held from rotating in the spindle by the taper pin "A."

To remove a spindle, first jack up the axle until the wheel is clear of the floor. Remove the wheel. (See under "Removing Front Wheel," page 88.) Then remove the adjusting nut "B," drive out the taper pin "A" and drive out the spindle bolt "C."

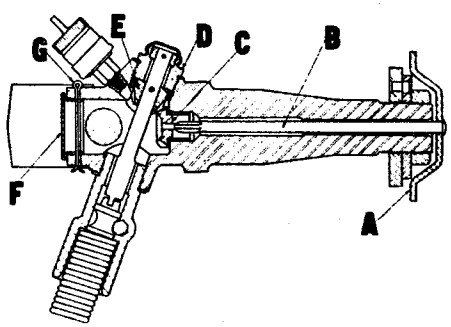



*Fig. 65. Front Right Spindle and Speedometer Driving Gears.*

To replace a spindle proceed as follows: Place the bearing "D," the retainer "E" and the key "M" in position in the axle yoke. Place the spindle in position and carefully drive in the spindle bolt "C," being careful that it is so turned that the flat place on it will be in the correct position to receive the taper pin "A" when driven in. Drive in the taper pin "A." Replace the adjusting nut "B" and adjust properly.

## *Adjustment of Spindle Bearing*

The bushing "G" is pressed into the axle forging. If there is too much end play in the bearing "D" draw up on the adjusting nut "B," pulling the bushing "G" up against the under side of the spindle. Then back off the adjusting nut "B" just enough to free the adjustment. (See under "Caution in Adjusting Timken Bearings," page 87.)

## *Speedometer Drive Gears in Right Spindle*

The flexible shaft to the speedometer is driven from the hub on the right-hand front wheel through the driver "A," Fig. 65, the shaft "B" and the gears "C" and "E."

To remove these parts from the spindle, proceed as follows:

Remove hub cap from the wheel.

Pull out driver "A."

Unscrew nut "D" and remove.



The gear "E" and the shaft to which it is attached will come out with the nut "D."

Remove the cotter pin "G."

Remove the cap "F."

The gear "C" may then be removed.

The parts may be assembled in the reverse order.

# REAR AXLE

## *General Construction*

The rear axle is of the full floating type. The wheels rotate on the axle housing. The axle shafts do not carry the weight of the car, but simply transmit the power from the differential to rotate the wheels.

## *Lubrication*

The level of the lubricant in the differential housing should be kept up to the filling hole in the rear cover plate. When the level of the lubricant is up to the filling hole the housing contains approximately three quarts. The best lubricant for the rear axle is Cadillac Rear Axle and Transmission Lubricant. In its absence, we recommend a mixture of steam cylinder oil and a small amount of cup grease mixed to such a consistency that the mixture flows easily at temperatures from 60° to 70° Fahrenheit.

## *Adjustment of Gear and Pinion Bearings*

In the design of the axle provision is made for adjusting the pinion and gear so that the teeth may be correctly meshed, and for locking all the adjusting nuts securely in position.

The large bevel gear "A," Fig. 66, on the gear mount "B," and the bevel pinion "C" on the driving shaft "D," are correctly meshed when the car is assembled, but after it has been in use for several thousand miles it may be found that the bearings "E" and "F," which take the end thrust of the gears, have become more permanently seated, causing end play in the pinion shaft "D" and side play in the gear mount "B." When this condition exists, bearings "E" and "F" should be readjusted.

If undue end play exists in the pinion shaft "D," the bearing "E" should be adjusted as follows:

Loosen the two long clamping bolts on the pinion barrel and remove the cover plate giving access to the adjusting nuts "I" and "K." (See Note.) Hold the adjusting nut "I" from turning and turn up the adjusting nut "K" as far as possible without making the bearing "E" too tight. (See under "Caution in Adjusting Timken Bearings," page 87.) After the adjustment has been made replace the cover plate over the opening and tighten the clamping bolts.

NOTE:—The cover plate is at the top of the pinion barrel on some of the Type 57 axles. If the cover plate is at the top it is necessary to entirely remove the two long clamping bolts before the cover can be removed.

If, after removing the rear cover plate "L," undue side play is found in the gear mount "B," the bearing "F" should be adjusted as follows:

Move the key "M" entirely out of the slots in the adjusting nut "N," loosen the cap screws holding the cap "O" and turn the adjusting nut "N" as far as possible without making the bearings too tight. (See under "Caution in Adjusting Timken Bearings," page 87.) After the adjustment has been made, make sure that the key "M" is replaced in one of the slots in adjusting nut "N" and that the cap screws holding the cap "O" are tightened and locked.

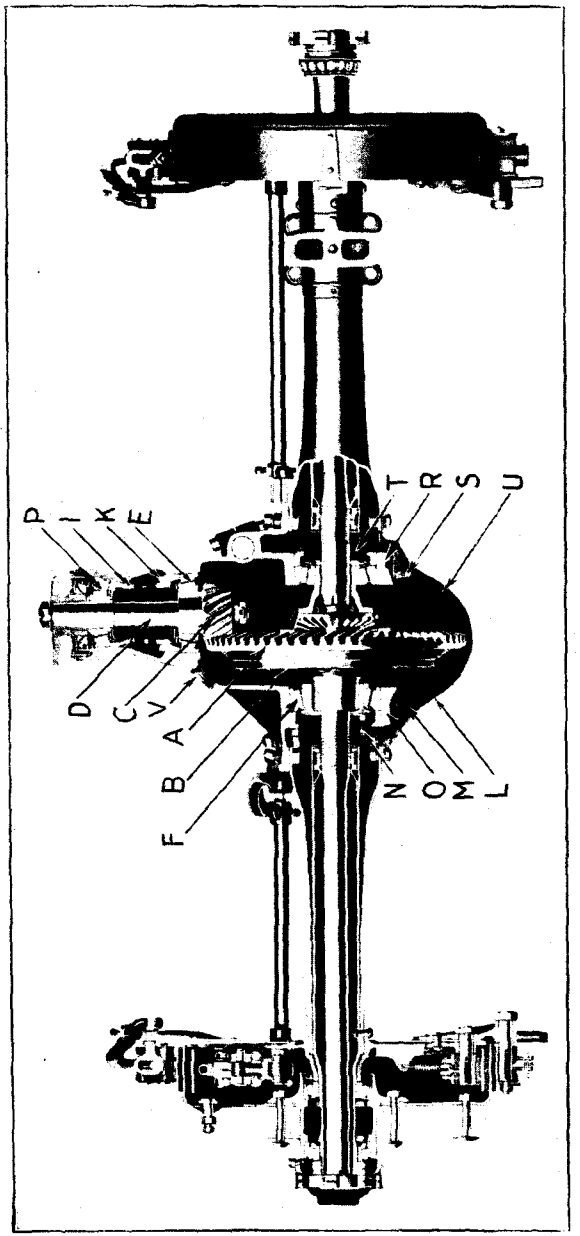



*Fig. 66. Rear Axle, Sectional View.*



### *Adjustment of Gears for Proper Meshing*

If, after adjusting the bearings "E" and "F," Fig. 66, it is found necessary to move the pinion "C" endwise or the bevel gear "A" sidewise in order to bring the gears into proper mesh, it must first be determined whether it is necessary to move the pinion, the large bevel gear, or both, and in which direction the gear or gears must be moved.

Bevel gears should be so adjusted that the large ends of the teeth of one gear are practically flush with the large ends of the teeth of the other gear, which can be determined by removing the peep-hole cover "V." Extreme care must be used in adjusting, as the tooth forms of the most accurately cut gears may be easily ruined by running them when not properly meshed.

In order to adjust the gears to the best advantage a crank should be attached to the forward end of the pinion shaft "D" so that the gears can be turned by hand and the adjustment tried until positions are found for the gears where they run smoothly and do not bind at any point.

If the bearings "E" and "P" on the drive shaft "D" are in proper adjustment, and if it is found necessary to move the pinion "C" endwise, proceed as follows:

Loosen the clamping bolts on the axle housing and the cover plate covering the adjustment hole. (See Note.) Move the adjusting nuts "I" and "K" *together*, moving the pinion in either direction as required. If the adjusting nuts "I" and "K" are moved in the same direction and exactly together, the relative adjustment of the bearings "P" and "E" will not be altered.

NOTE:—The cover plate is at the top of the pinion barrel on some of the Type 57 axles. If the cover plate is at the top it is necessary to entirely remove the two long clamping bolts before the cover can be removed.

When the proper position for the pinion has been found, replace the cover plate over the opening and tighten the clamping bolts.

If it is found necessary to move the large bevel gear sidewise, proceed as follows:

First loosen the bolts holding caps "O" and "R." Then move the keys "M" and "S" out of the slots in the adjusting nuts "N" and "T." The adjusting nuts "N" and "T" can now be turned, moving the gear mount with the gear in either direction as required. Be careful not to adjust the bearings too tight. (See under "Caution in Adjusting Timken Bearings," page 87.)

After the correct position for the large driving gear has been found be sure that the keys "M" and "S" are replaced in the slots in the adjusting nuts "N" and "T" and that the bolts holding the caps "O" and "R" are tightened and locked.

Replace the cover "L," and fill with Cadillac Rear Axle and Transmission Lubricant, bringing the level up to the top of the filling hole "U."

## STRAIGHTENING BENT PARTS

Modern automobile construction demands the use of the highest grades of alloy steels. A great advantage of alloy steels is that by properly heating and cooling and re-heating such steels great strength and durability are obtained. However, heat treatment must be given with full and accurate knowledge of the contents of the steel, which cannot be obtained in the ordinary repair shop. Therefore, if any part is heated outside of this factory for the purpose of straightening or for other purposes, the part at once loses the advantage which the original heat treatment gave it.

# SPRINGS

## *Spring Clips*

As a matter of life insurance for the springs, it is well to tighten all clip nuts at the end of the first 1,000 miles of travel and at the end of every 2,000 miles of travel thereafter.

## *Lubrication of Spring Leaves*

When springs are not lubricated water works its way in between the leaves and causes them to rust, often to such an extent that they become almost like solid pieces. This causes them to lose much of their spring action.

It is recommended that the springs be lubricated once every 500 to 1,000 miles by painting the edges and ends of the spring leaves with cylinder oil. A small, stiff brush should be used. After applying the oil to the springs the car should not be washed until it has been driven some distance to allow the lubricant to work in between the leaves.

It is also a good plan about once a year to have all the springs taken apart, the surfaces thoroughly cleaned and coated with a thick mixture of oil and graphite.

## *Adjustment of Snubbers*

The snubbers should be readjusted after the first 500 to 800 miles of travel. Further adjustment should not soon be necessary.

When the snubbers are adjusted there should be no passengers in the car, the radiator and gasoline tank should be full, the top up and there should be two spare tires in the tire holder. If no spare tires are carried it is best to have a light weight person sit in the middle of the rear seat during the adjustment.

To adjust the snubbers, pull the belt out of the housing as far as possible. Then allow two inches of the belt to return into the housing and insert a wedge between the belt and the housing to prevent more of the belt from being drawn in.

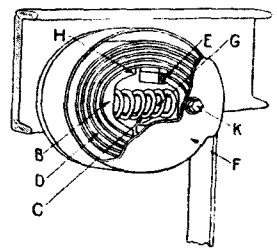



*Fig. 67. Gabriel Snubber.*

Remove the clamp on the belt at the axle and adjust the length of the belt so that all slack is taken out between the snubber housing and the axle. Replace the clamp, cut off the surplus belt and remove the wedge.

## *Lubrication of Snubbers*

Every 5,000 miles it is recommended that the snubbers be disassembled and lubricated with graphite grease in accordance with the following instructions:

Disconnect the snubber belt from the axle. Unscrew the cap screws which fasten the snubber base to the side bar of the frame and remove the snubber.



Clamp the base casting in a vise. Unscrew the cap screw "K," Fig. 67, on the snubber cover or housing "F" and remove the housing. Unwind the coils of the belt "D" and remove the sleeve casting "B" and the spring "C." Thoroughly lubricate the plunger "G," which slides in the sleeve "B." Lubricate the face of the casting "B" where it slides on the base casting. Replace the sleeve "B," making sure that the long arm "H" is opposite the end of the snubber belt where it is riveted at "E." Pack the coil spring "C" well with the grease.

Do not lubricate any surfaces which contact with the snubber belt except to place a small amount of grease on the rivets at "E" where the belt is fastened to the base casting.

Coil the belt "D" four and a quarter times around the base casting "A" and the sleeve "B" and work the coils a few times to make sure the coil spring compresses properly. Replace the cover "F" and the screw "K."

Bolt the snubber to the side bar and adjust it in accordance with the instructions given under "Adjustment of Snubbers."

# REPAIR PARTS

## *Ordering New Parts*

With more than a hundred thousand Cadillac automobiles in use it is obviously impractical for us to deal directly with each Cadillac owner. We cannot open accounts with or sell at a discount to any except regular distributors with whom we make annual contracts.

To avoid unnecessary delay and useless correspondence new parts should, where possible, be ordered from the distributor or dealer from whom the car was purchased or from the nearest Cadillac distributor or dealer, who is generally in a position to know what is desired and to supply it from his stock. If he cannot do so, he can order it for you.

Where, however, conditions are such as in our judgment to warrant it, we will fill orders for parts at current list prices, f. o. b. factory, provided the order is accompanied by cash. In ordering, send us the engine number and type of the car with an accurate description of the part desired, preferably accompanied by a sketch with dimensions. If this cannot be done, return the part properly tagged, transportation charges prepaid. (See below under "Returning Parts.") Otherwise we cannot promise prompt service or fill the order intelligently.

Our responsibility in all cases ceases with delivery to the transportation company.

## *Returning Parts*

In the event that parts are returned to the factory, the transportation charges must be prepaid or the parts will not be accepted. They should be properly tagged with the name of the owner and the engine number of the car, and a letter should be sent giving complete instructions regarding the disposition of the parts.

## *Tires, Speedometers and Clocks*

In cases of repairs to tires, speedometers or clocks correspondence should be opened directly with the manufacturers or one of their branches. If necessary the parts should be sent to them. Transportation charges should be prepaid.

Type 57

Cadillac Eight

# MANUAL

*of*

## CARE AND OPERATION

PRICE, 25 CENTS

A Manual is packed in the tool kit of each car. If lost, a duplicate will be mailed on receipt of the price. When ordering be sure to specify Type 57 Cadillac Manual and the engine number of your car

Cadillac Motor Car Co.

Detroit, Michigan, U. S. A.

FIRST EDITION

## THE USER'S RESPONSIBILITY

The information, advice and instruction contained in this Manual are published because the user of a motor car needs them. But if the user fails to heed the advice given, the loss is not wholly his but partly ours as well.

The Cadillac car in the hands of an operator who will give it the reasonable consideration to which it is entitled, and which every car requires, will run as smoothly and as quietly as is possible for any motor car to run. No car will give more satisfaction nor will any car stand more abuse. But no car can be expected to stand continual abuse without resenting it sooner or later.

We want Cadillac cars to render unfailing service and satisfaction. They are built for that purpose but the user must do his part after the car comes into his possession. We furnish a car that is capable of rendering the best of service and we furnish the instructions which will guide the user toward obtaining that service. But if he persists in ignoring these instructions and in substituting his own ideas there is no one but himself upon whom he can rightfully place the responsibility for any difficulties which may result.

There is a wealth of information, advice and instruction contained in this Manual. There is much that the owner may never have to use, but it is here to be used in the event that it is needed. There is other information which a user cannot get along without, no matter how much he may think he knows, nor how much previous automobile experience he may have had.

***Read carefully the following portions of this book:***


**Driving and Caring for a Motor Car** ..... 9
**Placing Car in Running Condition** ..... 10
**General Operation** ..... 11-18
**Care of Finish** ..... 19
**Top and Side Curtains** ..... 20-21
**Tires** ..... 23-26
**Tire Air Compressor** ..... 27
**Demounting Rim with Tire** ..... 28
**Mounting Rim with Tire** ..... 28
**Winter Storage** ..... 33-34
**Lubrication** ..... 35-47
**Personal Danger of Running Engine in Closed Garage** ..... 52
**Adding Water to Storage Battery** ..... 78




## TABLE OF CONTENTS


**PART I—OPERATION AND GENERAL CARE** ..... 7-34

**Driving and Caring for a Motor Car** 9
**Placing Car in Running Condition** 10
**General Operation** ..... 11-18
**Body and Top** ..... 19-22
**Tires** ..... 23-27
**Demountable Rims** ..... 28-30
**Cold Weather Suggestions** .... 31-34

**PART II—LUBRICATION** ..... 35-47

**Importance of Lubrication** .... 36
**Lubricants** ..... 37
**Engine Lubrication** ..... 38-42
**General Lubrication** ..... 43-47

**PART III—ADJUSTMENTS** ..... 47-99

**Gasoline System** ..... 47-54
**Cooling System** ..... 54-58
**Engine Adjustments** ..... 58-64
**Cadillac-Delco Electrical System** 65-82
**Transmission and Clutch** ..... 82-85
**Steering Gear** ..... 86-87
**Wheels** ..... 87-89
**Brakes** ..... 90-93
**Universal Joints on Drive Shaft** . 93
**Front Axle** ..... 94-95
**Rear Axle** ..... 95-97
**Straightening Bent Parts** ..... 97
**Springs** ..... 98-99


## INDEX


**Acid in Storage Battery** ..... 79
**Adjustments—**
Alignment of Front Wheels ..... 88
Bearings, Main Crankshaft ..... 59
Bearings, Connecting Rod ..... 59
Bearings, Front Wheel ..... 88
Bearings, Rear Wheel ..... 89
Bearings, Spindle ..... 94
Bearings, Caution in Adjusting Timken .. 87
Brakes, External (foot) ..... 90
Brakes, Internal (hand) ..... 91
Carburetor ..... 51
Clutch Pedal ..... 85
Contact Points, Timer ..... 78
Front Axle Stop Screws ..... 94
Headlamps, Focusing ..... 69
Ignition, Timing ..... 74
Rear Axle Pinion and Driving Gear .... 95
Snubbers, Gabriel ..... 98
Spark Plugs ..... 75
Steering Gear ..... 86
Third Brush, Generator ..... 77
Thermostat Valves ..... 58
Valves—Adjustment of Cam Slides ..... 60
Water Pump Glands ..... 57
**Air Compressor for Tires—**
Operation and Use ..... 27
Lubrication of ..... 27
**Air Pressure—**
*Gasoline System, in* ..... 50
Tires, Correct Pressure for ..... 25
**Alignment of Front Wheels** ..... 88
**Ammeter** ..... 76
**Anti-Freezing Solution** ..... 32
**Axles (see Front Axle and Rear Axle)** .... 94

**Battery, Storage (see Storage Battery)** .... 77
**Bearings—**
Connecting Rod Bearings ..... 59
Front Wheel Bearings ..... 88
Main Crankshaft Bearings ..... 59
Rear Wheel Bearings ..... 89
Spindle Bearings ..... 94
Steering Gear Bearings ..... 86
Timken Bearings, Caution in Adjusting 87
**Body of Car—**
Bolts, Body ..... 19
Finish, Care of ..... 19
Washing ..... 19
**Brakes—**
Description of ..... 90
Foot Brakes, Adjustment ..... 90
Hand Brakes, Adjustment ..... 91
Pedal, Length of Brake ..... 85
**Bulbs, Lamp** ..... 71

***Camshaft Driving Chain*** ..... 68
**Cam Slides, Adjustment** ..... 60
**Carbon Deposit** ..... 47
**Carburetor—**
Adjustment of ..... 51
Automatic Throttle ..... 54
Float, Setting ..... 53
Leaning Device ..... 52
Throttle Pump ..... 54
**Chains, Engine—**
Camshaft Driving Chain ..... 68
Fanshaft Driving Chain ..... 68
Riveting, Directions for ..... 64
**Charging Battery from Outside Source** .. 81
**Circuit Breakers** ..... 75
**Clock—**
Clock Light Switch ..... 67
Winding and Setting Clock ..... 22
**Clutch—**
Description of ..... 84
Lubrication of Thrust Bearing ..... 85
Pedal, Clearance of ..... 85
Pedal, Length of ..... 85
Pedal Stop Pin ..... 85
**Coasting** ..... 17
**Coil, Ignition** ..... 75
**Cold Weather Suggestions—**
Anti-Freezing Solution ..... 32
Oil, Frequent Changing of ..... 33
Spark Lever, Position of ..... 31
Starter Button, Use of ..... 32
Starting the Engine ..... 33
Strainers in Gasoline System ..... 33
*Use of Throttle Pump* ..... 31
Winter Storage of Car ..... 33
**Commutators, Motor Generator** ..... 67
**Condenser, Ignition** ..... 75
**Condenser, Radiator** ..... 55
**Connecting Rod Bearings, Adjustment** .... 59
**Contact Points, Adjustment of Timer** ..... 78
**Cooling System—**
Anti-Freezing Solution ..... 32
Cleaning Cooling System ..... 57
Condenser, Radiator ..... 55
Description of Cooling System ..... 54

Draining Cooling System ... 57
Filling Cooling System ... 56
Path of Water Circulation ... 57
Pump Packing Glands ... 57
Strainers ... 58
Thermostat Valves, Adjustment ... 58
Thermostatic Control ... 54
Winter Storage ... 33
**Cup Grease** ... 37
**Curtains, Side** ... 21
**Cushions, Seat** ... 19
**Cylinder Heads, Removable** ... 59

**Danger in Running Engine in Closed Garage, Personal** ... 52
**Delco Electrical System (see Electrical System)** ... 65
**Demountable Rims (see Rims)** ... 28
**Diagram, Circuit** ... 70
**Diagram, Lubrication** ... 42
**Diagram, Wiring** ... 68
**Distributor and Timer—**
Contact Points, Adjustment ... 73
Description of ... 72
Ignition, Timing ... 14
Illustration of ... 72
**Don'ts for General Operation** ... 18
**Don'ts for Transmission Operation** ... 14
**Draining the Cooling System** ... 57
**Drive Shaft** ... 93
**Driving Suggestions** ... 17
**Driving Gear and Pinion, Adjustment** ... 95
**Dust Hood for Top** ... 21

**Electrical System, Cadillac-Delco—**
Ammeter ... 76
Circuit Breakers ... 75
Coil, Ignition ... 75
Condenser, Ignition ... 75
Diagram, Circuit ... 70
Diagram, Wiring ... 68
Distributor and Timer ... 72
Exide Battery Depots ... 82
Generation of Current ... 76
Headlamps ... 69
Hydrometer Syringe ... 79
Ignition System ... 71
Lighting System ... 67
Motor Generator ... 65
Resistance Unit ... 74
Spark Plugs ... 75
Storage Battery ... 77
Switch, Ignition and Lighting ... 71, 67
**Engine—**
Firing Order ... 15
Four Cycle, Principle of ... 15
Lubrication of Engine ... 38
Number, Engine ... 6
Operation of Engine ... 15
Start, Failure to ... 11
Starting Engine in Cold Weather ... 33
Stopping Engine ... 14
Winter Storage, Preparing for ... 33
**Engine Adjustments—**
Bearings, Main Crankshaft ... 59
Bearings, Connecting Rod ... 59
Chains ... 62
Cylinder Heads, Removable ... 59
Flywheel, Timing Marks on ... 60
Valves ... 60
**Exide Battery Depots** ... 82
**External Brakes, Adjustment** ... 90

**Fanshaft Driving Chain** ... 63
**Filling Cooling System** ... 56
**Filling Lubricating System** ... 39
**Finish, Care of** ... 19
**Firing Order** ... 15
**Flywheel, Timing Marks on** ... 60
**Focusing Headlamps** ... 69
**Four Cycle Engine** ... 15
**Front Axle—**
Alignment of Front Wheels ... 88
Bearings, Front Wheels ... 88
Bearings, Spindle ... 94
Speedometer Drive in Right Spindle ... 94
Spindle, Removing and Replacing ... 94
Stop Screws, Adjustment ... 94
Wheel, Removing and Replacing Front ... 88
**Front Wheels—**
Alignment of ... 88
Bearings, Adjustment ... 88
Lubrication ... 87
Removing and Replacing ... 88

**Garage, Personal Danger in Running Engine in Closed** ... 52
**Gasoline System—**
Description of ... 50
Filling Gasoline Tank ... 50
Pressure Relief Valve ... 50
Settling Chambers ... 51
Strainers ... 51
**Gear Shifting—**
Reversing ... 13
Starting Car ... 12
Stopping Car ... 13
**Gear and Pinion, Rear Axle** ... 95
**Generation of Current** ... 76
**Grease, Cup** ... 37
**Grinding Valves** ... 61

**Headlamps—**
Focusing ... 69
Reflectors, Cleaning ... 71
Tilting Reflector Control ... 69
**Hydrometer Syringe** ... 79

**Ignition—**
Automatic Spark Control ... 16
Coil ... 75
Condenser ... 75
Contact Points, Timer ... 73
Distributor and Timer ... 72
Resistance Unit ... 74
Spark Plugs ... 75
Switch, Ignition ... 71
Timing Ignition ... 74
**Inflation of Tires** ... 25
**Internal Brakes, Adjustment** ... 91

**Lamps (see Lighting System)** ... 67
**Leaning Device** ... 52
**Lighting System—**
Bulbs, Lamp ... 71
Headlamps, Focusing ... 69
Headlamp Reflectors, Tilting ... 69
Portable Lamp Socket ... 71
Reflectors, Cleaning ... 71
Switch, Lighting ... 67
**Lubrication, General—**
Chart, Lubrication ... 41
Diagram, General Lubrication ... 42
Importance of Lubrication ... 36
Oil (see Lubricants) ... 37
**Lubrication, Engine—**
Carbon Deposit ... 47
Description of Lubricating System ... 38
Filling Lubricating System ... 39
Oil Pressure ... 40
Replacing Oil in Engine ... 40
**Lubricants—**
Cadillac Motor Oil ... 37
Cadillac Rear Axle and Transmission Lubricant ... 37
Cadillac Cup Grease ... 37
Cadillac Wheel Bearing Grease ... 37
Specifications of Engine Oil ... 37

**Main Bearings, Adjustment** ... 59
**Motor Generator—**
Commutators ... 67
Description of ... 65
Operation of ... 67
Regulation of Current Generated ... 65
Third Brush, Adjustment ... 65
**Mounting Rim** ... 28





**Number, Location of Engine** ... 6

**Operation and General Care** ... 9
**Operation of Engine** ... 15
**Oil (see Lubricants)** ... 37

**Parts—**
New Parts, Ordering ... 6
Returning Parts ... 6
**Pedals, Clutch and Brake** ... 85
**Plugs, Spark** ... 75
**Portable Lamp Socket** ... 71
**Preparing Car for Winter Storage** ... 33
**Pressure—**
Gasoline System, Air Pressure in ... 50
Oil Pressure ... 40
Relief Valve in Gasoline System ... 50
Tires, Air Pressure for ... 25
**Pump—**
Gasoline System, Hand Pump ... 50
Gasoline System, Power Pump ... 50
Tire Air Compressor ... 27
Throttle Pump ... 54

**Radiator—**
Anti-Freezing Solution ... 32
Draining Radiator ... 57
Filling Radiator ... 56
**Repair Parts** ... 6
**Rear Axle—**
Bearings, Rear Wheel ... 89
Bearings, Gear and Pinion ... 95
Brakes ... 90
Description of Rear Axle ... 95
Gear and Pinion, Adjustment ... 95
Illustration of Rear Axle ... 96
Lubrication of Rear Axle ... 95
Wheel, Removing and Replacing Rear ... 89
**Rear Wheels—**
Bearings, Adjustment ... 89
Lubrication of ... 87
Removing and Replacing ... 89
**Reflectors, Cleaning Headlamp** ... 71
**Resistance Unit** ... 74
**Rims, Demountable—**
Demounting Rim ... 28
Mounting Rim ... 28
Placing Tire on Rim ... 30
Removing Tire from Rim ... 29
**Riveting Engine Chains** ... 64
**Rules of the Road** ... 17

**Seat Cushions** ... 19
**Settling Chambers in Gasoline System** ... 51
**Side Curtains** ... 21
**Shaft, Drive** ... 93
**Shifting Gears** ... 12
**Snubbers, Gabriel—**
Adjustment ... 98
Lubrication ... 98
**Spark—**
Automatic Spark Control ... 16
Lever, Position of Spark ... 31
Lubrication of Spark Lever ... 47
Manual Spark Control ... 16
**Spark Plugs—**
Accumulation of Carbon on ... 75
Cores, Cleaning ... 75
Points, Setting ... 75
**Speedometer—**
Repairs to ... 92
Speedometer drive in right spindle ... 94
**Spindle—**
Bearing, Adjustment ... 94
Removing and Replacing Spindle ... 94
**Springs—**
Care of ... 98
Clips, Spring ... 98
Lubrication of Springs ... 98
Snubbers, Adjustment ... 98
Snubbers, Lubrication ... 98
**Starting—**
Car, Starting ... 12
Engine, Starting ... 11
Engine, Starting in Cold Weather ... 33
Failure of Engine to Start ... 11
**Steering Gear—**
Lubrication ... 87
Sector Shaft, Adjustment ... 87
Thrust Bearing, Adjustment ... 86
Worm and Sector, Adjustment ... 86
**Stopping—**
Car, Stopping ... 13
Engine, Stopping ... 14
Traffic, Stopping in ... 17
**Storage Battery—**
Acid, Replacing ... 79
Charging from Outside Source ... 81
Description of ... 77
Exide Battery Depots ... 82
Hydrometer Syringe ... 79
Regulation of Current Generated ... 76
Sediment ... 82
Water, Adding ... 78
Winter Storage, Preparing For ... 81
**Storage of Car for Winter** ... 33
**Straightening of Bent Parts** ... 97
**Strainers in Gasoline System** ... 51
**Strainers in Cooling System** ... 58
**Switch, Ignition and Lighting** ... 67, 71
**Syringe, Hydrometer** ... 79

**Thermostatic Control of Cooling System** ... 54
**Thermostat Valves, Adjustment** ... 58
**Third Brush, Adjustment** ... 65
**Throttle—**
Automatic Throttle ... 54
Lubrication of Throttle Lever ... 47
Position of Lever in Starting ... 32
Throttle Pump, Adjustment ... 54
**Tilting Headlamp Reflectors** ... 69
**Timer (See Distributor and Timer)** ... 72
**Timing Ignition** ... 74
**Timing Valves** ... 60
**Timken Bearings, Caution in Adjusting** ... 87
**Tires—**
Air Compressor for ... 27
Care of Tires ... 23
Guaranty ... 23
Holder, Tire ... 26
Injuries to Tires ... 23
Placing Tire on Rim ... 30
Pressure for Tires ... 25
Removing Tire from Rim ... 29
Repairs to Tires ... 26
Winter Storage of Tires ... 26
**Top—**
Curtains, Side ... 21
Dust Hood for Top ... 21
Folding Top ... 20
Lubrication of Top ... 21
Raising Top ... 21
Winter Storage of Top ... 34
**Transmission—**
Description of ... 83
Illustration of ... 83
Lubrication of ... 84
Operation of ... 84

**Universal Joints** ... 93

**Valves, Engine—**
Cam Slides, Adjustment ... 60
Grinding Valves ... 61
**Valve, Pressure Relief** ... 50

**Water, Adding to Storage Battery** ... 78
**Water Pump Packing Glands** ... 57
**Windshield, Positions Of** ... 22
**Winter Storage—**
Preparing Car For ... 33
Storage Battery ... 34
Taking Car Out of Winter Storage ... 34
Tires ... 34
**Wheels (See Front and Rear Wheels)** ... 87
**Wiring Diagram** ... 68

# REPAIR PARTS

### *Ordering New Parts*

With more than a hundred thousand Cadillac automobiles in use it is obviously impractical for us to deal directly with each Cadillac owner. We cannot open accounts with or sell at a discount to any except regular dealers with whom we make annual contracts.

To avoid unnecessary delay and useless correspondence new parts should, where possible, be ordered from the dealer from whom the car was purchased or from the nearest Cadillac dealer, who is generally in a position to know what is desired and to supply it from his stock. If he cannot do so, he can order it for you.

Where, however, conditions are such as in our judgment to warrant it, we will fill orders for parts at current list prices, f. o. b. factory, provided the order is accompanied by cash. In ordering, send us the engine number and type of the car with an accurate description of the part desired, preferably accompanied by a sketch with dimensions. If this cannot be done, return the part properly tagged. transportation charges prepaid. (See below under "Returning Parts.") Otherwise we cannot promise prompt service or fill the order intelligently.

Our responsibility in all cases ceases with delivery to the transportation company.

### *Returning Parts*

In the event that parts are returned to the factory, the transportation charges must be prepaid or the parts will not be accepted. They should be properly tagged with the name of the owner and the engine number of the car, and a letter should be sent giving complete instructions regarding the disposition of the parts.

### *Tires, Speedometers and Clocks*

In cases of repairs to tires. speedometers or clocks correspondence should be opened directly with the manufacturers or one of their branches. If necessary the parts should be sent to them. Transportation charges should be prepaid.

## ENGINE NUMBER

On the Type 57 the engine number is stamped on the crankcase of the engine just back of the right hand block of cylinders and on the fan shaft housing. The engine number of each Type 57 car begins with the figures "57."

# Part I

# OPERATION

# AND

# GENERAL CARE

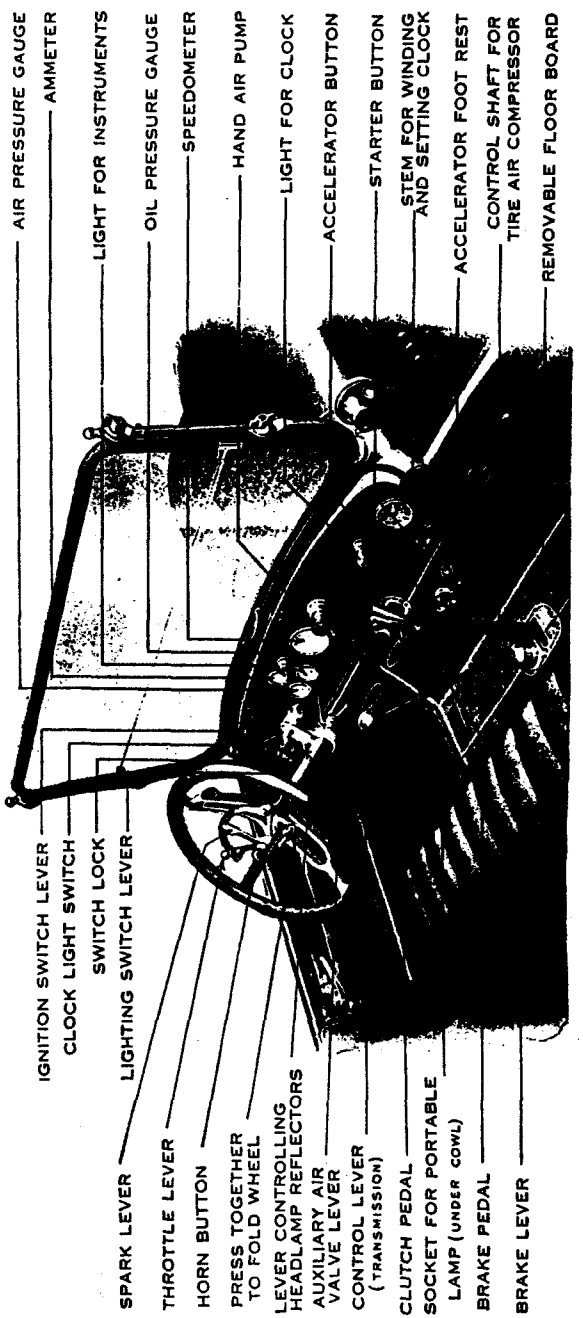



*Fig. 1. Instruments, Control Levers and Pedals on Standard Seven Passenger Car.*

# DRIVING AND CARING FOR A MOTOR CAR

Driving an automobile does not mean simply starting, steering, applying the brakes and stopping. Pushing a wheelbarrow is one thing. Driving a more or less intricate piece of mechanism like an automobile necessarily is, to some extent, and doing it right, is quite another. To drive an automobile properly requires an understanding of the principles involved and the exercise of some intelligence and judgment.

We believe that we are safe in saying that, with well designed and correctly built automobiles, 95 per cent. of so-called troubles are directly traceable to lack of lubrication, abuse, carelessness, a lack of understanding of the principles involved and improper handling generally.

Some drivers seem to think that so long as the car "goes" that is all there is to it. It is not.

To begin with, the driver should study the construction of his car and thoroughly acquaint himself with its mechanism, the functions of its various parts and the "why" of everything connected with it. If he understands these he is better able to realize why certain things must be done and why certain other things must not be done, if he is to obtain the most satisfactory results, the greatest efficiency and the greatest economy, together with durability and long life of the engine and car. Remember that the difference between a comprehensive understanding of your automobile and the superficial knowledge possessed by many drivers is the difference between having troubles and not having them.

The old adage, "A stitch in time saves nine," applies with special significance to the motor car. Intelligent care and proper attention will often correct a needed adjustment or lubricate a part that is becoming dry, but which, if neglected, may cause serious and possibly expensive damage.

On the other hand is frequently found the user who is constantly tinkering with his car when there is no necessity for it. Avoid both extremes. If, after seeing that all parts are properly lubricated and that all bolts, nuts and screws are tight, your car is running well, let it alone. Many users drive their Cadillacs for months without finding an adjustment necessary. If adjustment seems necessary and you are not sufficiently acquainted with the construction of the car to know what adjustment is necessary or how to make it, *don't experiment* but take the car to a Cadillac service station.

The most important thing in the care of an automobile is its proper lubrication. It will be readily understood that where one part moves or works upon another, there is always more or less friction and these parts must be oiled more or less frequently. Part Two of this Manual gives detailed instructions regarding lubricating. Be sure to read and observe them carefully.

Care is also necessary to see that all nuts, bolts and screws about the car are kept properly tightened. Most important parts subject to wear are, wherever possible, provided with adjustments for taking up such wear and these should be inspected occasionally and receive attention whenever required.

By far the greater portion of "automobile troubles" is the result of negligence and carelessness, while the reasonable care to which any piece of machinery is entitled will insure long life and satisfactory service.

# PLACING CAR IN RUNNING CONDITION

Before cars are shipped from the factory the gasoline tank and the cooling system are drained. When the car is received and before it is placed in use, the supply of gasoline and water must be replenished. During freezing weather the cooling system should be filled with an anti-freezing solution instead of water. (See under "Anti-Freezing Solution," page 32.)

The car should also be thoroughly lubricated in accordance with the instructions contained in this Manual. (See under "Lubrication," page 35.)

## *Filling Cooling System*

Fill the cooling system with clean water during warm weather and with a suitable anti-freezing solution during freezing weather. (See under "Anti-Freezing Solution, page 32.)

To fill the cooling system, replace the drain plugs "H," Fig. 40, in the water pumps, close the drain cocks "K" in the cylinder blocks and turn the shafts "L" so that the indicators on the ends of the shafts point up. The shafts may be turned in either direction.

Then remove the filler cap "W" from the top of the radiator and fill the cooling system. Replace the filler cap and screw it down firmly. *This is important.* (See under "Condenser," page 55.)

After the cooling system is filled, turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point down.

To fill the radiator condenser, which is attached to the right hand side of the frame, take out the removable floor board just forward of the control lever and replace the drain plug "R," Fig. 40, in the pipe leading from the bottom of the condenser. Then remove the filler cap "V" at the top of the condenser and fill the condenser one-half full, using the same liquid as in the radiator. Replace the condenser filler cap making sure that the vent hole in the side of the cap is open.

***Caution:—Do not use water in the cooling system during freezing weather. Use a good anti-freezing solution. Water will freeze even though the engine be run continuously.***

## *Filling Gasoline Tank*

The gasoline tank is at the rear of the car. (See Fig. 36.) The filler cap may be removed after loosening the thumb screw on the top of the cap.

Gasoline should be strained through a wire cloth of very fine mesh before it is poured into the tank. If dirt or water is allowed to enter the gasoline system it may cause great annoyance by getting under the carburetor inlet needle and causing the carburetor to flood.

After filling the tank, screw on the filler cap and carefully tighten the thumb screw. This is necessary to prevent leakage of the pressure by which the gasoline is forced to the carburetor.



# GENERAL OPERATION

## STARTING THE ENGINE

Be sure that the transmission control lever is in neutral position and that the hand brake is set. (See Fig. 1.)

Note the pressure of air in the gasoline tank. (This is indicated by the gasoline pressure gauge on the instrument board.) If the pressure is less than one pound, it should be increased to that pressure by means of the hand air pump. After the engine is started the pressure is automatically maintained.

Place the spark lever in the driving range on the sector (in extremely cold weather place the spark lever at the extreme right on the sector), and the throttle lever about two inches from the extreme left. (See note below.) Move the ignition switch lever down, thereby switching on ignition. Then push down on the starter button. This will bring the starter into operation and will cause the engine to "turn over." (See below under "Caution.")

In cool weather, also in warm weather, if the engine has been standing for some time, pull back the auxiliary air valve lever before you press the starter button.

As soon as the engine fires and commences to run under its own power, which should be in a few seconds, remove your foot from the starter button.

If the auxiliary air valve lever is pulled back when starting the engine, it should be pushed forward about one-half the way immediately the engine starts, and all the way forward as soon as the engine is warm enough to permit doing so.

*If the engine does not start in thirty seconds, do not continue to crank, but look for the cause. You may have forgotten to turn on the switch, or maybe you have no gasoline, or there may not be sufficient air pressure in the gasoline tank to force gasoline to the carburetor. No matter how sure you feel, look and see. Bear in mind that the starter will crank the engine only. Ignition and gas must be present to make it run.*

Additional suggestions for starting the engine in cold weather will be found on page 31 under "Cold Weather Suggestions."

Note:—If you crank the engine by hand always place the spark lever at the extreme left on the sector. If this caution is not observed a "back kick" may occur, resulting in injury to the person cranking.

## *Caution*

The action which causes the engine to "turn over" is produced by a gear of the electric motor sliding into mesh with teeth on the flywheel; similar to the meshing of the gear teeth in the transmission. When pushing down on the starter button to throw these gears into mesh, if it should happen that they are in just such positions that the ends of the teeth of the starter gear come against the ends of the teeth on the flywheel instead of the teeth of one sliding between the teeth of the other, do not force them. Simply remove your foot from the starter button and again push down on the button. In the meantime the gears will probably have changed their relative positions sufficiently to allow the teeth to mesh.

***Do not press the starter button while the engine in running.***

## GEAR SHIFTING

As the Cadillac transmission is of the selective type, the operator may shift from any gear to any other gear without "going through" a third. It must be borne in mind, however, that the clutch must be released before the gears can be shifted. The clutch pedal is the left pedal.

Referring to Figure 2, the ball at the top of the transmission control or gear shifting lever is shown at "N" in the neutral position, "L" in the low gear position, at "I" in the intermediate gear position, at "H" in the high gear position and at "R" in the reverse gear position.

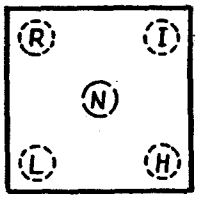



*Fig. 2.*
*Control Lever Positions.*

### *Starting the Car*

To start the car, push forward on the left pedal which is the clutch pedal, thereby releasing the main engine clutch. Then disengage the hand brake by means of the hand lever—still holding forward on the clutch pedal. If the car is standing on a grade it will be necessary to hold it with the foot brake until ready to start. Next place the control lever in the low gear position. (Fig. 3.)

To do so, move the lever as far as possible to the left and then pull it back as far as it will go. Then open the throttle slightly by means of the accelerator pedal or the throttle lever at the steering wheel, and engage the main clutch gradually by allowing your foot to come towards you.

If it should so happen that the transmission gears which mesh to make low gear are in just such positions that the ends of the teeth of one gear come against the ends of the teeth of the other gear instead of the teeth of one sliding between the teeth of the other, do not force them, but place the transmission control lever back in the neutral position, engage the clutch by allowing the clutch pedal to come all the way towards you, again release the clutch and again attempt to shift into low gear as above directed.

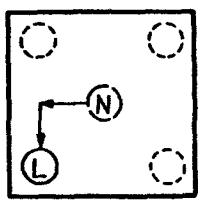



*Fig. 3.*
*Neutral to Low Gear.*

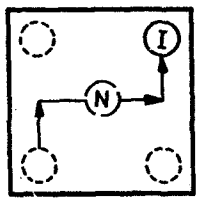



*Fig. 4.*
*Low Gear to Intermediate Gear.*

After the car is under way on low gear, release the clutch and shift the control lever into the intermediate gear position. (Fig. 4.) To do this move the lever back to the neutral position, then to the right and push it forward as far as it will go. Then engage the clutch. In shifting from low to intermediate gear, it is advisable to pause for a moment in the neutral position before shifting into intermediate, if you notice a tendency of the gears to clash.

After the car is under way on the intermediate gear, release the clutch and shift to the high gear position. (Fig. 5.) To do this simply pull the control lever straight back from the intermediate gear position. Then engage the clutch.



### *Reversing*

If you desire to start the car backward, release the clutch and place the lever in the reverse gear position. (Fig. 6.) To do this from the neutral position, move the control lever to the left and push it forward as far as it will go. The throttle should then be opened slightly and the clutch allowed to engage slowly as directed when starting on low gear.

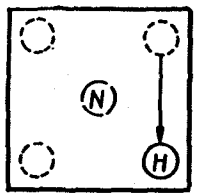



*Fig. 5.*
*Intermediate Gear to High Gear.*

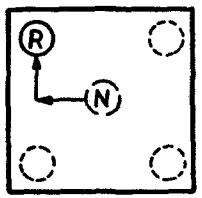



*Fig. 6.*
*Neutral to Reverse Gear.*

### *Shifting into Lower Gear*

If, when ascending steep grades or pulling through soft mud roads or deep sand, the speed of the car is reduced until the engine labors, release the clutch and shift the control lever into the intermediate gear position. To do this push the control lever forward as far as it will go. Then engage the clutch. It is best to allow the car to slow down before making the shift and then after releasing the clutch to shift the lever quickly.

An experienced driver may find it more satisfactory to shift from the high gear position to the intermediate gear position in the following manner:

Release the clutch, place the control lever in the neutral position, engage the clutch at the same time slightly accelerating the engine; then release the clutch again and *instantly* shift the control lever into the intermediate gear position. Engage the clutch.

This entire change may be made in less time than it takes to read these instructions by one who becomes familiar with the method. Shifting in this manner may be accomplished satisfactorily at a higher speed than is allowable when the control lever is shifted directly into the intermediate gear position in the usual manner. However, it is not recommended that the operator shift from high to intermediate gear in this manner until he has had considerable experience in making this shift in the ordinary way.

### *Stopping the Car*

First close the throttle and then release the engine clutch by pushing forward on the left pedal. Next shift the transmission control lever to the neutral position. The clutch may then be allowed to re-engage. Then stop the car by pushing forward on the right pedal which applies the foot brake. After the car has been brought to a stop by the foot brake, apply the hand brake by means of the hand brake lever.

### *Don'ts for Transmission Operation*

Do not attempt to shift from neutral to any gear, or from one gear to another gear without first releasing the clutch.

Do not attempt to shift from the reverse gear to any other gear when the car is moving.

Do not attempt to shift from any forward gear to the reverse gear when the car is moving.

Do not attempt to shift from the high gear to the low gear when the car is moving.

Do not shift from the low to the high gear. This is mechanically possible but is not advisable.

Do not attempt to shift from the intermediate gear to the low gear when the car is moving, unless it is moving very slowly. Ordinarily it is best to stop the car altogether before shifting from the intermediate gear to the low gear.

Do not attempt to shift from the high gear to the intermediate gear when the car is running at a high rate of speed. Allow the car to slow down before shifting gears.

Do not drive with your foot resting on the clutch pedal. The operation of the clutch has purposely been made extremely easy and even a slight pressure may release it sufficiently to cause it to slip.

Do not engage the main clutch suddenly. This causes excessive strain on the entire driving mechanism. Always allow the clutch to engage gradually.

## STOPPING THE ENGINE

After stopping the car and applying the hand brake, move the ignition switch lever to the horizontal position and at the same time pull back the auxiliary air valve lever. Pulling back the auxiliary air valve lever when stopping the engine "enriches" the mixture which is drawn into the cylinders and makes it easier to start the engine the next time.



## OPERATION OF ENGINE

### *General Principle*

The production of power by the Cadillac engine may be described briefly as follows:

Gasoline is forced by air pressure from the tank to the carburetor. The carburetor is the instrument by the action of which gasoline is mixed with air in the proper proportion forming an explosive vapor or gas. The gas thus formed is drawn through the intake pipe and through the inlet valves into the cylinders of the engine where it is compressed and ignited by electric sparks, the pressure of the resulting explosions producing the power.

The quantity of gas supplied to the engine is regulated by a throttle valve at the carburetor which is operated by means of the throttle lever at the steering wheel (the throttle lever is the longer of the two), or by the accelerator button at the right of the brake pedal.

### *The Four-Cycle Engine*

The Cadillac engine is of the four-cycle type, that is, there are four movements or strokes of each piston and two revolutions of the flywheel to complete each power producing cycle. The four strokes of the cycle each have a different function and follow one another in the same order as follows:

*Suction Stroke.* The suction stroke commences with the piston at its highest point in the cylinder and with the inlet and exhaust valves closed. Immediately the piston starts to descend the inlet valve opens and through this valve a charge of gas from the carburetor is drawn into the space above the piston.

*Compression Stroke.* As the piston starts upward again after completing the suction stroke, the inlet valve closes. As there is then no escape for the gas in the cylinder it is compressed, the maximum compression being reached when the piston is at the top of its stroke.

*Power Stroke.* At the completion of the compression stroke, the spark takes place at the spark plug, igniting the compressed charge of gas. The heat resulting from the rapid combustion causes the pressure of the confined gas to rise almost instantaneously to several times its pressure before the explosion. This pressure exerted on the piston forces down the piston and produces the impulse which is transmitted by the connecting rod to the crankshaft, causing it to rotate.

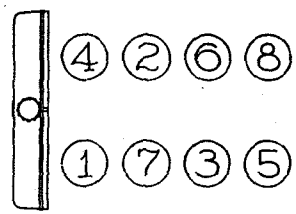


*Fig. 7. Firing Order.*

*Exhaust Stroke.* Just before the piston reaches the end of the power stroke, the exhaust valve opens. It remains open as the piston travels upward again on the exhaust stroke, driving the burned gas out from the cylinders. By the time the piston has reached its highest point it has forced out the burned gas and the exhaust valve closes. Having completed the four strokes, the piston is now ready to draw in a new charge and to repeat the cycle.

The same cycle of events takes place in all of the cylinders but no two pistons are at the same point in the cycle at the same time. In the Cadillac Eight Cylinder V-Type engine, the impulses in the eight cylinders are so timed that a power stroke is begun every quarter turn of the crankshaft. In other words, the crankshaft receives four overlapping impulses every revolution. The order in which the impulses take place is shown in Fig. 7.

### *Automatic Spark Control*

When each piston is at its highest position in the cylinder is, of course, the time when the charge is at its greatest compression, or, in other words, when the gas is "jammed in the tightest." Ignition occurring exactly at this instant produces a much more forceful explosion than if it occurred at a time when the charge was not so tightly compressed.

If the charge were ignited the instant the contact is made in the ignition timer, regardless of the speed of the engine, the spark could be set permanently in one position and would not require changing. But a certain amount of time elapses from the instant the circuit is closed at the ignition timer until the charge is ignited in the cylinder. While this time is but the merest fracton of a second, in fact, almost infinitesimal, yet it is time just the same and must be taken into account when dealing with such a rapidly acting mechanism as an automobile engine.

The lapse of time required to ignite the charge is always the same regardless of the speed of the engine and pistons. You will realize that when the engine is running, say 3000 R. P. M., the pistons are traveling many times as fast as they do when it is running only 300 R. P. M. and that when the engine is running 3000 R. P. M. it is necessary to start the ignition process earlier.

In the Cadillac this is accomplished by means of a ring governor located directly under the ignition timer. (See Fig. 50.) As the speed of the engine increases, the ring in the governor assumes a position more nearly horizonal, forcing the timer contact cam slightly ahead on the shaft by which it is driven. This causes the timer contact points to break earlier, thereby starting the ignition process earlier in relation to the positions of the pistons. When the engine slows down, the ring in the governor assumes a position more nearly vertical, forcing the contact cam back on the shaft by which it is driven, causing the contact points to break later and thereby starting the ignition process later in the strokes of the pistons.

### *Manual Spark Control*

The automatic control takes care of the spark position for all ordinary driving. A spark lever is provided, however, by which the ignition timing may be still further advanced or retarded. The spark lever is the shorter lever just above the steering wheel.

Ordinarily the spark lever should be carried in that portion of the sector marked "Driving Range." To get the best results, however, the spark lever should be retarded further for extremely low speeds and advanced further for extremely high speeds. The car should be driven at all times with the greatest possible spark advance which the speed of the engine will permit.

Advancing the spark too far for a given engine speed will usually cause a slight pounding noise, which is sometimes not noticed by the beginner as it is usually but slight, owing to the substantial character of the crankshaft and bearings.

When starting the engine, place the spark lever in the "Driving Range" on the sector except during extremely cold weather when it should be placed at the extreme right or in the fully advanced position. If the engine should be cranked by hand, the spark lever should be placed at the extreme left on the sector or in the fully retarded position. If this caution is not observed a "back kick" may occur, probably resulting in injury to the person cranking.

## DRIVING SUGGESTIONS

### *Rules of the Road*

Road and traffic laws vary greatly in different localities. It is, therefore, impossible to set down a complete list of rules which may be followed in all parts of the country. The following are some of the rules which are practically universal in all parts of the United States.

In meeting a vehicle going in the opposite direction *pass to the right.*

In passing a vehicle going in the same direction *pass to the left.*

Always stop with the right hand side of the car next to the curb. If it is necessary to turn around to do this it should be done.

Never turn around or turn off onto another road without making absolutely sure that there is no other vehicle directly behind you.

Never enter upon street car tracks without making sure that there is no car directly behind you—*no matter how sure you feel, look and see.*

Do not cross street car or steam railroad tracks without making sure that it is absolutely safe to do so.

In crowded traffic do not apply the brakes suddenly unless it is absolutely necessary. It may be that the vehicle following you cannot stop as quickly as you can. If this is the case a collision is sure to result.

On wet asphalt streets or slippery roads do not apply the brakes suddenly unless it is absolutely necessary. If the brakes are applied suddenly under these conditions disastrous skidding is apt to occur.

In crowded traffic it is a good plan to signal cars at the rear, before turning, slowing down or stopping.

It is a good plan to slow down in passing vehicles going in the opposite direction.

One of the most essential things to remember is that you should *never "take a chance."* You will find that the more experienced drivers never permit themselves to take a chance.

### *Coasting*

To coast on the level, close the throttle and then release the main engine clutch by pushing forward on the left pedal.

When descending grades a good method is to close the throttle and allow the engine to do the holding back as much as possible. This saves much wear on the brake band lining.

When descending steep grades, the resistance offered by allowing the car to drive the engine when "high gear" or "direct drive" is engaged is usually sufficient to control the speed. When the engine does not offer sufficient resistance the speed may be further checked by applying the foot brake.

When it is necessary to descend a very steep grade it is best to engage the intermediate or possibly the low speed gears *before commencing the descent,* and if the resistance of the engine thus obtained is not sufficient, supplement it by the foot brake. Bear in mind that the more the resistance of the engine is used in coasting the longer the brake band linings will wear and the brakes retain their adjustment.

The principle of this method will be understood when you realize that the same combination of gearing which changes the ratio between the engine shaft and the rear axle, which makes it easier for the engine to drive the car, will, when the car is compelled to drive the engine, have exactly the opposite effect, which is the case when the above method is used in descending a hill.

### *Don'ts for General Operation*

Don't run the car at sustained high speed when it is new.

Don't put oil in the engine without first straining it through cheese cloth or fine wire mesh and making sure that it is free from dirt and lint.

Don't allow the clutch to engage suddenly.

Don't prime the carburetor too much.

Don't attempt to shift from neutral to any gear, or from one gear to another gear without first releasing the clutch.

Don't attempt to shift from the reverse gear to any other gear when the car is moving.

Don't attempt to shift from any forward gear to the reverse gear when the car is moving.

Don't attempt to shift from the high gear to the low gear when the car is moving.

Don't attempt to shift from the intermediate gear to the low gear when the car is moving, unless it is moving very slowly. Ordinarily it is best to stop the car altogether before shifting from the intermediate gear to the low gear.

Don't push the starter button when the engine is running.

Don't turn the steering gear when the car is standing. This is not only unnecessary but is also bad practice.

Don't fail to investigate any unusual sound which may develop in the car. The car should be inspected at a Cadillac dealer's Service Station.

Don't neglect to inspect the level of the acid in the storage battery every 1,000 miles.

Don't turn corners at high speed.

Don't neglect to keep the cooling system filled with water and with a good anti-freezing solution in cold weather.

Don't drive fast or attempt to stop suddenly on wet pavements.

Don't attempt to start the engine with the switch turned off, without air pressure or without gasoline in the tank.

Don't fill the lubricating system in the engine only and neglect to lubricate all other parts of the car.

Don't neglect the lubrication of any part of the car.

Don't neglect to keep the tires properly inflated.

*Don't race the engine when it is not driving the car. There is no worse abuse.*



## BODY AND TOP

### *Care of Finish*

The best materials are used in finishing Cadillac cars. These are applied in the most expert manner. In spite of these facts, it cannot be expected that the finish will stand up unless it is given proper attention.

The finish of an automobile requires more careful and frequent attention when the car is new than when it is older and the varnish is harder.

You should be particularly careful to keep mud from the body and hood of the car while new. Have the car washed immediately in case mud spatters on it.

The following instructions should be followed very carefully when the car is washed:

Always use clean water. Never use water containing alkali. In parts of the country where the regular water supply consists of "alkali" water, rain water should be used for washing the finish.

Never use water colder than forty degrees or warmer than sixty degrees. If a hose is used in washing, never have a greater pressure than will carry the water six inches beyond the end of the hose. Water under greater pressure will drive the grit and dirt into the varnish.

A soft, Rock Island natural sheep's wool sponge is the best for washing the body and hood of the car. Begin at the top of the body panels and thoroughly wet the surface all over with water from the sponge. Continue until the accumulation of road dirt softens up and gives way.

Use clean water continually, and plenty of it. Go over the surface with plenty of water two or three times until the surface is perfectly clean.

Do not wash the hood while it is hot. The effect is the same as washing it with hot water. Unless the hood is allowed to cool before washing the luster will soon disappear.

Dry off with a clean soft chamois. Do not rub the finish or use hand pressure more than sufficient to dry off the water. The water evaporates quickly and leaves the finish in good condition.

Wash the car frequently, especially when it is new, as often, in fact, as the car returns from the road with a soiled appearance. This practice in the case of a new car, heightens the brilliancy of the finish, hardens it, keeps it from spotting and adds greatly to the general appearance of the car.

Do not wash the glass of the windshield or the glass of the enclosed cars with preparations which may contain harmful ingredients. Use only cleaning compounds which are known to have no destructive effect on the highly polished surface of the glass.

### *Seat Cushions*

The easiest and best way to replace a seat cushion is to first place the front side of the cushion against the retaining strip on the seat and then to force the rear end of the cushion into place.

### *Body Bolts*

As the body bolts become more firmly seated after the car has been operated, it is a good plan to tighten all of the body bolts at the end of the first 1000 miles of travel.

## TOP AND SIDE CURTAINS

### *Folding Top*

Unbutton the rear curtains "A," Fig. 8, from the bows and also from the top of the body. Fold the curtains in smoothly against the back curtain. Open the top rest clamps "B."

Release the front end of the top from the windshield standards by loosening the clamps at "C." After the top is released tighten the clamps again to prevent them from rattling.

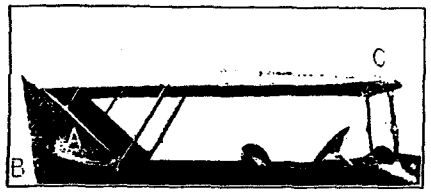



*Fig. 8. Top in Raised Position.*

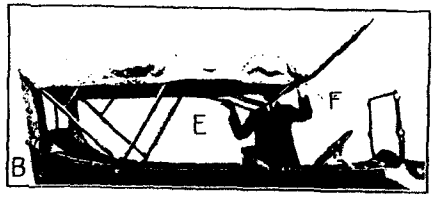



*Fig. 9. Top Partially Folded, First Position.*

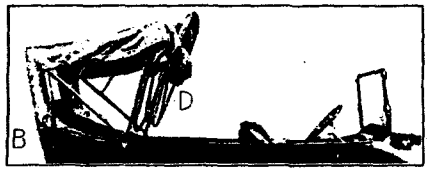



*Fig. 10. Top Partially Folded, Second Position.*

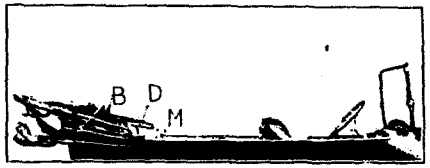



*Fig. 11. Top Folded.*

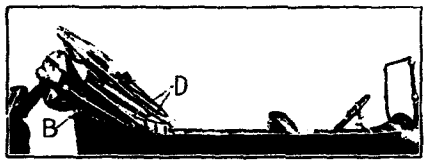



*Fig. 12. Top Partially Raised, First Position.*

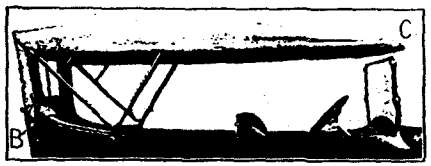
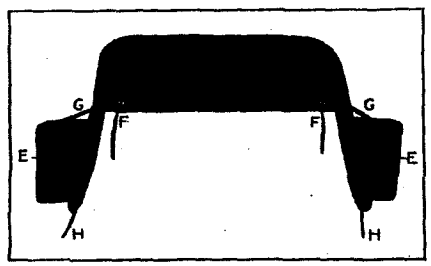
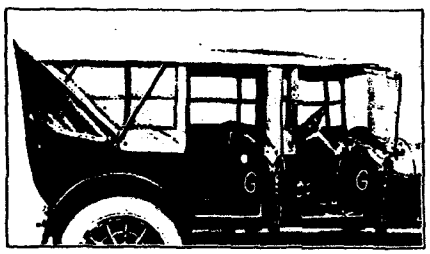



*Fig. 13. Top Partially Raised, Second Position.*






"Break down" the joints at each side of the horizontal bow by pushing up with one hand on the bow at "F," Fig. 9, and pulling down with the other hand at "E." Fold the front part of the top back until it closes as shown in Fig. 10. Insert the pins on the sockets of the center bow in the holes at "D."

Carefully lower the top into the top rests, being careful to tuck the material between the bows so that it rests smoothly and is not pinched. (See Fig. 11.) Then close and lock the top rest clamps "B."

*Unfold and open up the dust hood* (Fig. 14) so that the flaps, "E" are at the top. Draw the hood on over the folded top and tuck the flaps down between the bows and the body, *taking care not to scratch the body.* Be careful to draw the hood up evenly on both sides. Loop the straps "F" on the under side of the dust hood around the lower bow on each side, draw them tight and buckle. Pass the straps "G" through the top rest clamps "B," Fig. 11. Pass the straps "H" through the loops on the nuts "M" on the top supports just back of the rear doors. Button the snap fasteners on the lower edges of the flaps under the bows.

### *Raising Top*

Unbutton the fasteners along the lower edges of the parts of the dust hood protecting the bows at the sides. Unbuckle all the dust hood straps and carefully pull off the dust hood from the rear.

Open the top rest clamps "B," Fig. 11, and release the pins from the holes at "D."

Then, standing behind the car as shown in Fig. 12, push up and forward on the rear bow. The top should then assume the position shown in Fig. 13. Pull down the front end of the top until the ball on each windshield standard is well into the socket attached to the top bow and tighten the clamps "C."

Place the rear curtain "A," Fig. 8, in position and button the fasteners on the body and also on the rear bows. Close and lock the top rest clamps "B."

### *Lubrication of Top*

It may be found, after use, that the joints of the top require lubrication. When lubricating the joints you should be very careful not to get oil on the top material and not to put too much oil on the joints, which will afterwards run out onto the top material. Wipe the joints off carefully after lubricating.



*Fig. 16. Curtain Fastener.*

### *Side Curtains*

The front curtains are carried in the top just back of the windshield and the remainder of the curtains at the extreme rear part of the top. Each section of the curtains is tagged to indicate where it belongs.

Removable supporting rods are provided for the doors to carry the side curtains when the doors are opened. The supports are attached without screws or bolts, simply by inserting them in the brackets at "G," Fig. 15.

The curtains are fastened in place with fasteners of two kinds. One of these is the usual "glove fastener" type, which snaps on and off. The other type of fastener becomes locked on three sides when snapped into place and must be lifted on the side which is not locked in order to release it. This side is indicated by a small projection on the fastener as shown by the arrow in Fig. 16. This type of fastener cannot be released by lifting it at any other side.

## WINDSHIELD POSITIONS

### *For Inclement Weather*

The normal position of the windshield for inclement weather is with the upper and lower sections closed and with the removable rubber strip between the glasses. If, as the result of rain or snow on the windshield glass, it becomes impossible to see through it, the upper section may be tilted out at an angle. This is known as the "rain vision" position. The driver may then look between the sections of the shield, at the same time being protected to some extent from the rain and snow. The clamping nuts at the top of the windshield standards must be loosened before the upper section can be tilted and should be tightened after it is in the desired position to hold it in place.

### *For Ventilation*

There is a row of rectangular slots through the cowl just back of the windshield. When ventilation in the driver's compartment is desired, the lower section of the windshield should be tilted *in* at a slight angle so that the lower edge is just back of the ventilating slots in the cowl. If it is desired, the lower section may be tilted in at a greater angle. The clamping nuts half way up the windshield standards must be loosened before the lower section can be tilted and should be tightened after it is in the desired position.

If more ventilation is desired the upper section of the shield may be tilted toward the driver so as to deflect a current of air directly into the compartment.

## SPEEDOMETER AND CLOCK

### *Speedometer*

The speedometer on the instrument board registers on its three dials the rate at which the car is traveling, the total number of miles traveled by the car and a trip reading which may be reset to zero. The total mileage dial cannot be reset.

Do not under any circumstances attempt to lubricate the speedometer head. Any parts requiring lubrication were amply supplied with lubricant before they were assembled.

A repair man should never be allowed to attempt to adjust or repair the speedometer head. Repairs or adjustments are impossible without a special calibrating machine. The guarantee on the speedometer head does not hold good if the head is disassembled or tampered with.

If the speedometer head is removed for any reason, handle it with the same care that you would a fine watch. The speedometer head may very easily be damaged by rough handling.

If a new glass is necessary, or repairs or adjustments, remove the speedometer head, pack it carefully, and return it to the makers or one of their service stations or branches.

### *Clock*

The clock is set and wound exactly as a stem winding watch. When setting or winding the clock use reasonable care.

With reasonable care the clock will stand the hard usage automobile service gives and to meet which the clock is constructed.



## TIRES

### *Guarantee*

The tires used on Cadillac automobiles are guaranteed by their respective makers. In case of claims, tires should be sent to the factory or any of the branches of the makers (not to us), transportation charges prepaid.

Each tire maker publishes a booklet with instructions for care and repair of tires and every motorist should provide himself with one of these and thoroughly familiarize himself with the contents. We give here suggestions that apply to pneumatic tires in general.

## CARE OF TIRES

Probably 75% of so-called "tire trouble" is the result of misuse. "Neglected trifles" is a fair summary of the whole question. In the following we have illustrated some of the more common causes of tire breakdown.

### *Result of Improperly Adjusted Tire Chains*

Fig. 17 illustrates a tire which has been badly damaged through the use of tire chains which were improperly adjusted or fastened to the spokes holding the chains tightly in one place. You will note that the tread is cut through to the fabric, and in fact loosened up and torn badly in many places.

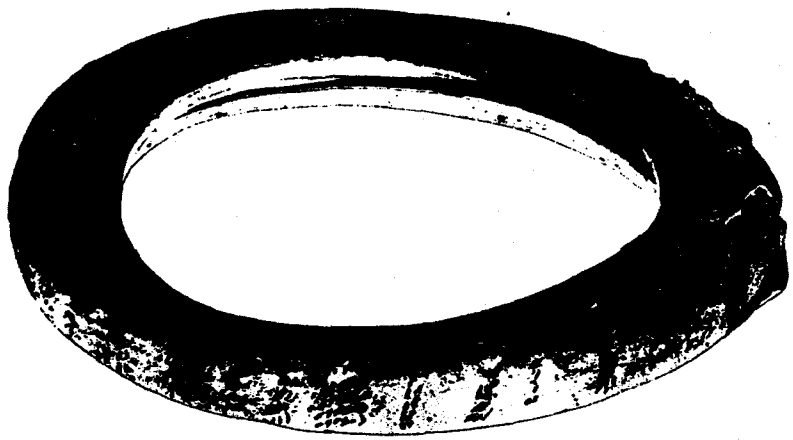


*Fig. 17. Result of Improperly Adjusted Tire Chains.*

The least injury results when chains are loosely applied, and have play enough to work themselves around the tire, distributing the chain on all points alike. Probably the greatest amount of injury comes from using chains unnecessarily on paved streets.

### *Neglect of Small Cuts*

Fig. 18 illustrates a tire damaged from the neglect of two small cuts extending to the fabric. (Note the two prominent "bumps," which show plainly.)



*Fig. 18. Result of Small Tire Cuts Which Were Neglected.*

If cuts extending to the fabric are neglected, fabric deterioration and blistering of the tread is bound to result.

It is unnecessary to remove a tire to treat a small cut of this nature. Tire companies furnish a plastic compound for filling cuts, thus preventing moisture and dirt from getting to the fabric.

### *Result of Improperly Aligned Front Wheels*

Fig. 19 shows the result of running a car with the front wheels out of alignment. This usually affects both tires similarly, although sometimes one tire only is affected. An improper adjustment of the parallel rod in front of the axle, or a bent steering arm is responsible for this condition. Unless the wheels are kept in proper alignment, the tread of the front tires will wear away in a remarkably short time.

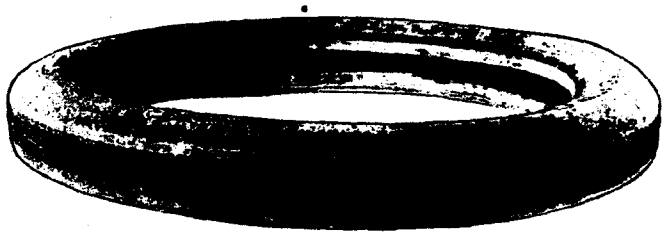


*Fig. 19. Result of Improperly Aligned Front Wheels.*

If the front wheels are badly enough out of alignment, the entire tread of both front wheels may be worn off in less than 100 miles. If the wheels are only slightly out of alignment, the result is the same, although the wearing off is slower. (See under "Alignment of Front Wheels," page 88.)



### *Result of Sudden Application of Brakes*

You will note from Fig. 20 that the tread and several plies of fabric have been worn or rather scraped off at one place. This has been brought about by sudden application of the brakes, which resulted in sliding the wheels. It is remarkable how soon a tire will give away from this severe treatment.



*Fig. 20. Result of Suddenly Applying Brakes.*

### *Result of Under Inflation*

Fig. 21 shows the most common result of under-inflation. The lower the pressure in the tire the more the tire flattens out under load. This flattening causes the side walls of the tire to bend more sharply as the wheel revolves. The final result of this is the breaking of the fabric in the side walls as shown in the illustration. There are unquestionably more tires ruined from under-inflation than from any other cause.

Five inch tires, which are standard on the Type 57, should be inflated to from 75 to 80 pounds pressure.

### *Additional Suggestions*

The tires are constructed for the purpose of carrying up to certain maximum loads and no more. Owners should realize, therefore, that overloading a car beyond the intended carrying capacity is sure to materially shorten the life of the tires.

Do not turn corners or run over sharp obstructions, like car tracks, at a high rate of speed. Such practice is sure to strain or possibly break the fabric, with the result that the further life of the tires will be limited. Remember that most tire troubles are the result of abuse more than use.

Avoid scraping the tires against the curb and running in ruts. This kind of wear scrapes off the rubber side wall and exposes the fabric to dirt and moisture which soon starts to rot the threads.

If a tire goes flat, see that the valve is not leaking. A little moisture on the tip will show bubbles if the air is escaping.

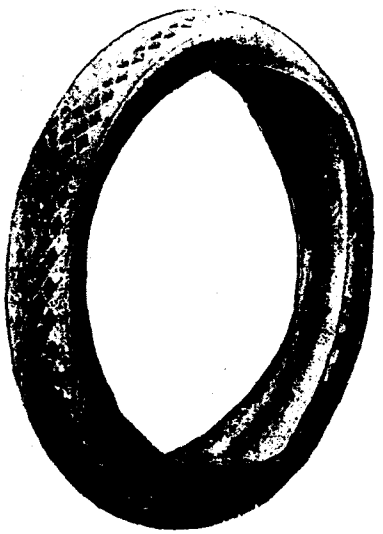


*Fig. 21. Result of Insufficient Inflation of Tire.*

In case of puncture, the car should be stopped at once and the tube repaired or replaced, or the tire replaced by the extra one. The tire should also be examined carefully and the cause of the puncture ascertained and the nail, glass or whatever it may be, should be extracted. Before replacing the tire on the rim, examine the inside of the casing to see that the cause of the puncture is not still protruding, because it would, if allowed to remain, continue to cut the inner tube. It is also advisable to look over the outside of the tires frequently and take out any pieces of glass or other particles which may have become imbedded in the casing.

Don't run in ruts or car tracks; the sides of a tire will soon wear out under such treatment. Avoid large stones or other obstructions in the road. To hit one of these may break the fabric even though no external injury be visible.

Experience has taught the careful driver to carry one or more spare tubes, as a cemented roadside repair will not always hold, especially in warm weather, as the heat generated in the tire may loosen the patch. When touring, a spare casing should always be carried.

The garage floor should be kept free from oil or gasoline. The tires on a car left standing on a grease-covered floor deteriorate quickly, the natural enemies of tires being oil and gasoline. These destroy the nature of the rubber, rendering it soft, so that it cuts and wears away quickly.

Tires that show wear on one side from use on rutty roads or from other causes may be turned around, thereby lengthening the life of the tire.

Spare tubes should be kept lightly inflated. This keeps them in good condition and prolongs their life. They should not be stored in a greasy tool box under any circumstances.

If the car is not used during the winter, it is better to remove the tires from the rims, keeping casings and tubes in a fairly warm atmosphere away from the light. It will be better to slightly inflate the tubes, as that keeps them very nearly in the position in which they will be used later on.

If the tires are not removed and the car is stored in a light place, it will be well to cover the tires to protect them from the strong light, which has a deteriorating effect on rubber.

The greatest injury that can be done to tires on a car stored for the winter is to allow the weight of the car to rest on the tires. The car should be blocked up, so that no weight is borne by the tires, and the tires should then be deflated partially. This will relieve the tires of all strain, so that in the spring they should be practically no worse for the winter's storage.

## TIRE HOLDER

The tire holder is designed to carry two standard size tires inflated on rims.

To remove the tire with rim, remove the lock and then unscrew the clamp as far as it will go. Move the bottom of the tire back until it is entirely free from the holder. The tire then may be removed by slightly lifting it straight up.

To put a tire on the holder proceed in the reverse manner.

Care should be used not to allow the inner tire to strike the body of the car when removing or replacing it.



## TIRE AIR COMPRESSOR

### *Operation and Use*

The air compressor for the tires is bolted to the left hand side of the transmission case. It is driven by a sliding gear which meshes with the reverse idler gear. The sliding gear is thrown into or out of mesh with the transmission gear by a shaft extending up through the front floor boards at the left of the transmission control lever, and just back of the brake pedal. (See Fig. 1.) The head of this shaft has a screw-driver slot which permits the shaft to be turned easily.

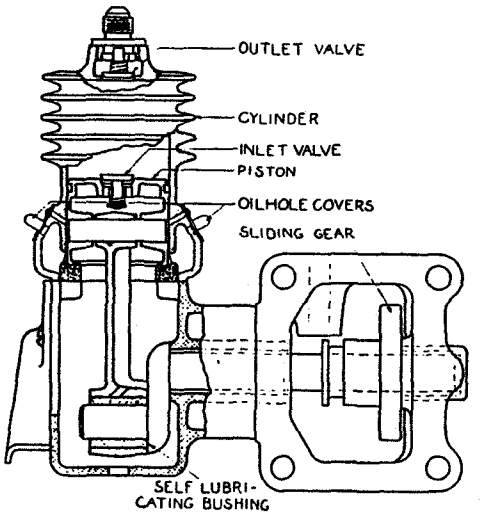



*Fig. 22. Tire Air Compressor, Sectional View.*

To use the compressor, first attach the air hose to the air connection in the tool box concealed in the right hand dust shield. Then connect the other end of the hose to the valve of the tire to be inflated. Do not connect the hose to the tire first or the air will escape from the tire before the pump end is connected. Then bring the compressor into operation proceeding as follows:

First, either stop the engine or release the clutch and hold the clutch pedal down until you are sure that the transmission gears have ceased to rotate, then, with the engine not running or with the clutch pedal still held down, turn the slotted head of the shaft in a clockwise direction as far as it will go. This will throw the sliding gear into mesh with the reverse idler gear.

Then start the engine, or in case the engine is running, engage the main clutch, first being sure that the transmission control lever is in the neutral position.

The engine should be run at a speed between 900 and 1100 revolutions per minute when the compressor is in operation. (If the third brush on the motor generator is properly adjusted, the correct speed of the engine may be determined by noting the ammeter on the instrument board. When the engine is running between 900 and 1100 revolutions per minute the ammeter should indicate a charging current of 16 to 18 amperes with all lights switched off.) Do not race the engine when inflating tires.

Do not turn the slotted head of the shaft to mesh the compressor gear when the engine is running and the clutch engaged. If this is attempted it will probably result in stripping the compressor driving gear.

To throw the compressor driving gear out of mesh, turn the slotted head of the control shaft in a counter-clockwise direction.

### *Lubrication*

The compressor piston is lubricated through two oil holes—one in front of the compressor cylinder and one just behind. Each oil hole is protected by a small sliding cover.

Apply engine oil at these points every 1000 miles, or oftener if the pump is used frequently. (See Fig. 22.)

# DEMOUNTABLE RIMS

## *Demounting Rim with Tire*

Jack up the axle until the wheel is free from the ground. Then remove the valve cap; loosen the eight clamp nuts, with the brace wrench furnished with the tool kit, and turn each clamp to the left until it strikes the stop pin in the felloe band. Turn the wheel so that the valve is at the top and pull the bottom of the rim towards you until it clears the wheel. The rim with tire can then be removed by lifting it straight up. (Fig. 23.)

## *Mounting Rim with Tire*

If the rim you are mounting has no split clamping ring, take the one from the rim you have removed. Turn the wheel so that the hole for the valve stem is at the top. Hold the rim so that the valve stem is at the top and so that the rim joint latch and the clamping ring are towards you. Insert the valve stem in the valve stem hole in the wheel and then push the bottom of the rim into place. (Fig. 24.)



*Fig. 23.*
*Demounting Rim from Wheel.*



*Fig. 24.*
*Mounting Rim on Wheel.*

Turn each clamp to its original position and turn the clamping ring so that the split in the ring comes directly under one of the clamps. Tighten each clamp slightly. Then continue around the wheel, tightening each clamp firmly. Screw on the valve cap.

*If the rim does not run true*, mark the part that runs "out" from the face of the wheel. Then slightly loosen the clamps diametrically opposite this part and tighten the clamps at the marked part. Proceed in this manner until the rim does run true.



## *Removing Tire from Rim*

The tire may be removed without removing the rim from the wheel.

*Deflate the tire.* Then open the lock with the pointed end of the tire tool or with a screw-driver.

Raise one end of the ring with the tool as shown (Fig. 25) until the lug is clear of the slot in the rim.



*Fig. 25. Removing Tire from Rim, First Position.*



*Fig. 26. Removing Tire from Rim, Second Position.*

Raise the end of the ring further and force the lug out over the edge of the rim. (Fig. 26.)

Start at the end of the ring, which is out of the groove, and remove the entire ring from the rim. (Fig. 27.) (See note.)

Turn the wheel until the valve stem is at the top, and pull the lower part of the tire towards you until it is clear of the rim. The tire may then be removed from the rim by lifting it straight up.

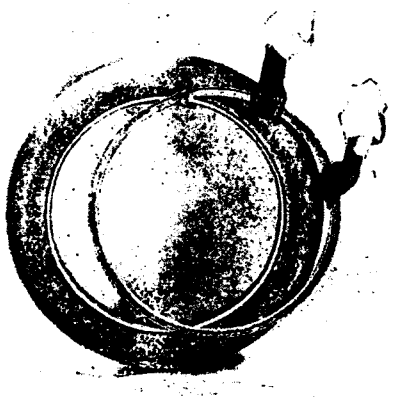


*Fig. 27. Removing Tire from Rim, Third Position.*

*Note*—In removing the ring from the rim, care should be taken to avoid opening the ring beyond its elastic limit. When the ring is free from the rim the ends of the ring should overlap from ½ to 1½ inches, which it will not do if it has been stretched in removal.

If the ends of the ring do not overlap they should be closed together before replacing. If this is not done there is a possibility of the lock failing to properly engage the lugs on the ends of the ring, which might later be the cause of an accident.

*Caution—Do not attempt to remove a tire from a demountable rim without first completely deflating the tire. Serious personal injury may result if this is attempted.*

### *Placing Tire on Rim*

If the demountable rim is on the wheel, jack up the axle and turn the wheel until the hole for the valve is at the top.

Hold the tire so that the valve stem is at the top and insert the valve stem in the valve stem hole in the rim and wheel. Then push the bottom of the tire into place.



*Fig. 28. Placing Tire on Rim, First Position.*



*Fig. 29. Placing Tire on Rim, Second Position.*

Insert one end of the locking ring in the slot in the rim. Then with the tool as a lever, force the tire back far enough to allow the ring to go on easily. (Fig. 28.)

Starting at the end of the ring which is inserted in the slot in the rim, force the remainder of the ring into place by using the tire tool as pliers. (Fig. 29.)



*Fig. 30. Placing Tire on Rim, Third Position.*



*Fig. 31. Placing Tire on Rim, Fourth Position.*

Insert the flat end of the tool between the rim and the ring, and turn the tool up edgewise. (Fig. 30.) This will lift the loose end of the ring and force it into place.

Draw the ends of the locking ring together with the tool. (Fig. 31.) Then swing the lock into place.

Then inflate the tire. (See under "Tire Air Compressor," page 27.)

If the demountable rim is not attached to a wheel, lay the rim with the tire flat on the ground when removing or replacing a tire.



# COLD WEATHER SUGGESTIONS

## STARTING THE ENGINE

### *Use of Throttle Pump as Primer*

In *extremely* cold weather, if the engine is not started in 15 or 20 seconds, remove your foot from the starter button. This will stop the cranking operation. Now open and close the throttle once or twice with the hand throttle or the foot accelerator. *Do not* open and close the throttle more than twice.

Opening and closing the throttle operates the throttle pump on the carburetor. This raises the level of the gasoline in the carburetor, thereby priming it. If the throttle is opened and closed more than twice, gasoline is forced out of the carburetor. If, as a result of extreme cold, it is necessary to prime the carburetor, *do not open and close the throttle more than twice.*

### *Position of Spark Lever*

Except in extremely cold weather, the spark lever should be placed in the position marked "driving range" when starting. In extremely cold weather, it should be fully advanced when starting. (If the engine is to be cranked by hand, the spark lever should be placed at the extreme left on the sector.)

It is the practice of some drivers to place the spark lever at the extreme left on the sector when starting the engine. While this is the proper position for the spark lever if the engine be hand cranked, there is no reason for retarding the spark when the engine is electrically cranked and starting is facilitated if the spark lever is advanced to the "driving range." In extremely cold weather there is no reason why the spark lever cannot be placed in the fully advanced position if the engine be electrically cranked and a quicker start is assured if this is done. The following will explain why it is possible to fully advance the spark lever at such times:

The mixture in a cold engine does not burn as rapidly, nor is there so much energy in it, as when the engine is warmer and the fuel is better vaporized. When the engine is cold a large percentage of the heat of each explosion is instantly dissipated by reason of the cold combustion chambers and cylinder walls, the result being that an explosion which in a hot engine would occur early enough and have energy enough to produce a "spark knock" or "back kick," occurs so much later and is so much less intense, that neither of these results is produced.

It is best to have the spark lever in the fully advanced position for cold weather starting for the following reasons:

As explained before, a cold mixture ignites much more slowly than a hot mixture. A cold, slow-burning mixture, if ignited on top dead center on account of the spark being in the retarded position, may burn through the power stroke, through the exhaust stroke and may be still burning in the combustion chamber when the inlet valve is opened to draw in another charge. When this happens, the flame sets fire to the incoming charge, igniting the mixture in the intake pipe and carburetor, producing a "pop back" in the carburetor. The possibility of this happening is very much less if ignition is started earlier by placing the spark lever in the fully advanced position.

### *Position of Throttle Lever*

In winter weather the throttle lever should be open about two inches on the sector for starting. Many drivers make a practice of opening the throttle wide or nearly so immediately the engine is started and after shifting the transmission into gear. The full suction of each piston through the carburetor under these conditions causes the auxiliary air valve in the carburetor to open wide, allowing a large volume of cold air to rush into the carburetor.

The proportion of air to gasoline drawn in under these conditions is practically the same as when the engine is hotter, but as only a portion of the gasoline drawn in is vaporized, and as only the vaporized portion burns, the proportion of air to gasoline burned is greater than when the engine is warmer, thus producing a "lean" mixture. A "lean" mixture is slow burning, whether it is warm or hot, and a cold "lean" mixture is particularly slow burning. Thus if the throttle is opened suddenly before the engine is thoroughly warm, the cold "lean" mixture resulting, burns so slowly that a "pop back" in the carburetor is almost sure to occur.

### *Use of Starter Button*

In extremely cold weather, when the car has been standing long enough to become thoroughly chilled, it is a good plan to release the clutch before pressing down the starter button and to hold the clutch pedal down during the cranking operation.

If the clutch is engaged during the cranking operation the starter turns the jackshaft in the transmission in addition to cranking the engine. While at ordinary temperatures the additional energy thus required is almost negligible, in extremely cold weather the lubricant in the transmission may offer enough resistance to the gears to increase considerably the demand upon the battery during the cranking operation. It is obvious that with the clutch in the released position while the starter button is pushed down, less work is done by the starter and the battery charge is conserved.

## ANTI-FREEZING SOLUTION

The radiator condenser makes it possible to use with safety an anti-freezing solution of denatured or wood alcohol and water. Do not use a solution containing calcium chloride as this is injurious to the metal parts of the cooling system.

The capacity of the cooling system is five and one-quarter gallons. The condenser should contain an additional three quarts, making a total of six gallons.

The following are the freezing temperatures of denatured alcohol and water solutions of various proportions.

| Denatured Alcohol (% by volume) | Water (% by volume) | Freezing Temperature (degrees Fahr.) | Specific Gravity (Hydrometer reading) |
|---|---|---|---|
| 20% | 80% | +13° | .974 |
| 30% | 70% | — 3° | .964 |
| 40% | 60% | —20° | .953 |
| 50% | 50% | —34° | .936 |

It is a good plan occasionally to draw out a sample of the solution in the radiator and to test its specific gravity with a hydrometer graduated between the limits of the above table.

***Caution:—Do not use water in the cooling system during freezing weather. Use a good anti-freezing solution. Water will freeze even though the engine be run continuously.***



## ADDITIONAL SUGGESTIONS

### *Starting in Intermediate or High Gear*

The car should not be started in intermediate or high gear. Start the car in low gear.

Starting in intermediate or high gear should not be done at any time, but this is particularly unfair to a cold engine, as it necessitates a further opening of the throttle than is necessary when starting on low gear, with the probability of a "pop back" in the carburetor.

### *Cold Test of Engine Oil*

Be careful to use an oil having a low cold test. In other words, use an oil which flows freely at low temperature. (See under "Lubricants," page 37.)

### *Frequent Changing of Oil*

Water may accumulate in the crank case of the engine during cold weather as a result of condensation. It is necessary, therefore, to drain the oil frequently and replace it by clean, fresh engine oil. (See under "Replace Oil Frequently During Cold Weather," page 40.) If water is allowed to accumulate in the crank case, serious damage to the engine may result.

### *Strainers in Gasoline System*

It may be found necessary to remove the strainers in the gasoline line more frequently during cold weather in order to prevent an accumulation of water at these points which would freeze and prevent the gasoline from going to the carburetor. (See under "Settling Chambers and Strainers," page 51.)

## WINTER STORAGE

### *Engine*

To prepare the engine for winter storage proceed as follows: Start the engine, cover the radiator and run the engine until it is hot. (See under "Personal Danger in Running Engine in Closed Garage," page 52.) The engine should be run at a speed which will show an ammeter reading of about 10 with all lights switched off. It usually requires from two to ten minutes to heat up the engine.

After the engine is hot and with the engine still running, inject one to two tablespoonfuls of clean, fresh engine oil into the carburetor through the primary air inlet. (See Fig. 38.) The oil gun may be used for this purpose.

Then immediately shut the gasoline valve at the tank. Let the engine run until the gasoline in the carburetor is used and the engine stops. Then turn off the switch.

Open the relief cocks on all the cylinders to relieve compression. Then close the cocks.

If the engine is started again repeat the series of operations given in paragraphs one, two, three and four.

Drain the cooling system. You will find complete instructions in this book under "Draining the Cooling System," page 57.

### *Storage Battery*

When the car is stored for the winter the level of the acid solution should be even with the bottom of the filling tubes. (See under "Adding Water to Storage Battery," page 78.) If water is added it should be added just before the last time the car is used so that it will be thoroughly mixed with the acid solution. When the car is stored, the specific gravity of the acid solution should register from 1.270 to 1.290. In this condition there is no danger of the acid solution freezing. The specific gravity of water is 1.000 and water freezes at 32 degrees F. above zero.

*Unless the battery is fully charged or nearly so it is probable that the acid solution in the battery will freeze and cause extensive damage.*

The battery should be charged every two months during the "out of service" period, either by running the engine or charging from an outside source (Fig. 54). If either of the above is impossible, and there is no garage equipped for charging batteries to which it may be conveniently sent, the battery may be allowed to stand without charging during the winter, provided the specific gravity of the acid solution registers from 1.270 to 1.290 at the time the car is laid up. Much better results and longer life from the battery will be obtained by giving the periodic charges.

The wires of the battery should be disconnected during the "out of service" period, as a slight leak in the wiring will discharge the battery.

### *Tires*

During winter storage it is best to remove the tires from the rims and keep the casings and tubes in a fairly warm atmosphere away from the light. It is best to inflate the tubes slightly after the tires have been removed to keep the tires in the position in which they are when inflated on the rim.

If the tires are not removed from the car, and the car is stored in a light place, it is best to cover the tires to protect them from strong light, which has a deteriorating effect on rubber.

The greatest injury that can be done to tires when the car is stored for the winter is to allow the weight of the car to rest on them. If the tires are not removed the car should be blocked up so that no weight is borne by the tires and the tires partly deflated.

### *Body and Top*

It is best to put the top up and cover the entire car to protect it from dust.

### *Taking Car Out of Storage*

When the car is taken out of storage the following instructions should be followed carefully in starting the engine:

Remove the spark plugs and with the oil gun inject one or two tablespoonfuls of clean, fresh engine oil into each cylinder.

Replace the spark plugs. Turn the engine over a few revolutions either with the starter or with the hand crank with ignition switched off. This will tend to distribute the oil over the cylinder walls.

Turn on the gasoline at the tank and start the engine in the usual manner.

Immediately the engine starts, inject one or two tablespoonfuls of clean, fresh engine oil into the carburetor through the primary air inlet.

# Part II

# LUBRICATION

# IMPORTANCE OF LUBRICATION

There is no one thing which is the primary cause of more trouble and the cause of more expense in maintenance to the mechanism of an automobile than insufficient lubrication.

All moving parts of the Cadillac car are manufactured with an unusual degree of accuracy and the parts are carefully assembled. In order to maintain the splendid running qualities of the car it becomes necessary systematically to introduce suitable lubricants between all surfaces which move in contact with one another.

The special object of this chapter is to point out the places in the Cadillac which require oiling. While it is manifestly impossible to give exact instructions in every instance as to just how frequently each individual point should be oiled or exactly how much lubricant should be applied we give this approximately, based on average use.

*It should be borne in mind constantly that where one part moves upon or in contact with another friction is created. Friction means wear, and the wear will be of the metal itself unless there is oil, and oil is much cheaper than metal. The use of too much oil is better than too little, but just enough is best.*

Proper lubrication not only largely prevents the wearing of the parts, but it makes the car run more easily, consequently with less expense for fuel and makes its operation easier in every way.

The oiling diagram shown in this chapter indicates the more important points which require attention. But do not stop at these. Notice the numerous little places where there are moving parts, such as the yokes on the ends of various brake rod connections, etc. A few drops of oil on these occasionally will make them work more smoothly.

Oil holes sometimes become stopped up with dirt or grease. When they do, clean them out and be careful not to overlook them. Also be careful not to allow dirt or grit to get into any bearings.

Judicious lubrication is one of the greatest essentials to the satisfactory running and the long life of the motor car. Therefore, lubricate, and lubricate judiciously.



# LUBRICANTS

There are many grades of oils. There are none too good. Naturally, we have experimented a great deal with numerous lubricants to determine which are best adapted for the various parts of the Cadillac car. It is not always an easy matter for users to obtain suitable lubricants. The constant demand made upon us by Cadillac dealers and Cadillac users has induced us to provide suitable lubricants which may be obtained from Cadillac dealers.

## *Cadillac Motor Oil*

Cadillac Motor Oil is recommended for both summer and winter use in the engine and for light oiling. In the absence of Cadillac Motor Oil we recommend a lubricant of the following specifications as suitable for use in the engine and for light oiling:

| | |
|---|---|
| Gravity at 60° F. | not below 28° Baume |
| Flash test | not below 400° F. |
| Fire test | not below 460° F. |
| Viscosity: | |
| Tagliabue viscosimeter— | |
| at 70° F. | not below 240 |
| at 100° F. | not below 130 |
| Saybolt viscosimeter— | |
| at 70° F. | about 540 |
| at 100° F. | from 220 to 240 |
| Cold test | not above 0° F. |

(The oil should circulate freely in the engine at temperatures from 15° to 20° below zero.)

The oil should be a filtered one and not an acid or alkali treated oil. It should be refined from Pennsylvania crude or its equivalent.

We cannot hold ourselves responsible for damage resulting from the use of oil not suited to the Cadillac engine.

*Engine oil should be strained through cheese cloth or fine mesh wire cloth before using.*

## *Cadillac Rear Axle and Transmission Lubricant*

Cadillac Real Axle and Transmission Lubricant is recommended for the rear axle and transmission. In its absence we recommend a mixture of steam cylinder oil and a small amount of cup grease mixed to such a consistency that the mixture flows easily at temperatures from 60° to 70° Fahrenheit.

## *Cadillac Cup Grease*

Cadillac Cup Grease is recommended for use in the grease cups. In its absence we recommend a neutral grease of medium consistency, made from an animal oil base.

## *Cadillac Wheel Bearing Grease*

Cadillac Wheel Bearing Grease is recommended for the wheel bearings. In its absence we recommend neutral grease of vaseline consistency (soft), made from an animal oil base. Do not use a heavy grease for wheel bearings as it will roll away from the path of the rollers and will not return.

# ENGINE LUBRICATION

## *Lubricating System*

The lubrication of Cadillac eight-cylinder engines is by oil under pressure. A supply of oil is carried in the oil pan "A," Fig. 32. Oil is drawn from the oil pan by the oil pump "C" through the pipe "B" and forced to the main bearings "E," "F" and "G," through the supply pipe "D."

The pressure of the oil is regulated by an overflow valve or pressure regulator "M," containing a valve under spring tension. When the pressure is reached for which the valve is set, the valve is forced open and the oil overflows past the valve. A small hole drilled in the regulator housing allows oil to by-pass the valve when the valve is seated. Oil flowing through the by-pass and oil forced past the valve is carried to the camshaft bearings and power pressure pump in the gasoline system through the pipe "R" above and parallel to the camshaft. The forward end of this pipe is fitted with two nozzles from which oil flows into the camshaft sprockets and to the chains through holes drilled in the camshaft sprockets.

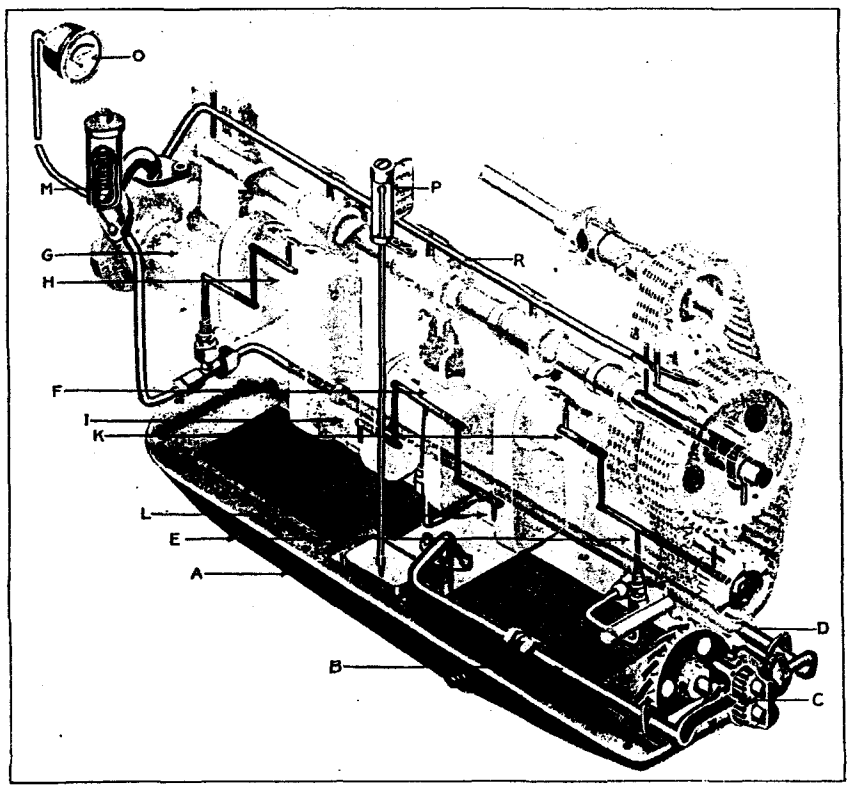



*Fig. 32. Engine Lubricating System.*



The connecting rod bearings, "H," "I," "K" and "L," on the crank shaft, are lubricated by oil from the main bearings forced through holes drilled in the crank shaft. The hole drilled in the forward end of the crankshaft communicates with a hole drilled in the crankshaft sprocket through which oil is supplied to the camshaft chain. The cylinders are lubricated by oil thrown from the lower ends of the connecting rods.

There is one gauge and one indicator in the lubricating system. The pressure gauge "O" is located on the instrument board and indicates the pressure of the oil. The indicator "P" is attached to the upper cover of the crank case near the carburetor and indicates the level of the oil in the oil pan "A."

## *Filling Lubricating System*

Cadillac Motor Oil is recommended. It is of the utmost importance that the oil be free from dirt and lint, and that it be of a suitable quality.

A filling hole is provided on the fanshaft housing just forward of the distributor.

Whenever the oil level indicator between the cylinder blocks reaches the line marked "Fill," oil should be added.

Do not risk running the engine after the oil level indicator has dropped down to the line marked "Fill."

If the oil level indicator should point to "Empty," the engine should be stopped immediately and supplied with oil.

There is an oil level plug in the right hand side of the oil pan shown in Fig. 33. If the oil level gauge on the engine should become inoperative from any cause or fail to register correctly, remove the oil level plug before starting to add oil, then add oil as above directed until it just starts to flow from the hole left by the removal of the plug. Then replace the plug and filling cap.

Note—If, on removing the level plug, oil flows from the hole for a few seconds, do not assume that the oil in the pan is up to the proper level. The level plug is at the lower end of a short standpipe which usually remains full of oil after the level of the oil in the oil pan has fallen below the upper end of the standpipe. The only way to be sure that the oil is up to the proper level is to allow the one or two teaspoonfuls of oil which has accumulated in the standpipe to drain off and then to add oil until it starts to flow from the hole.

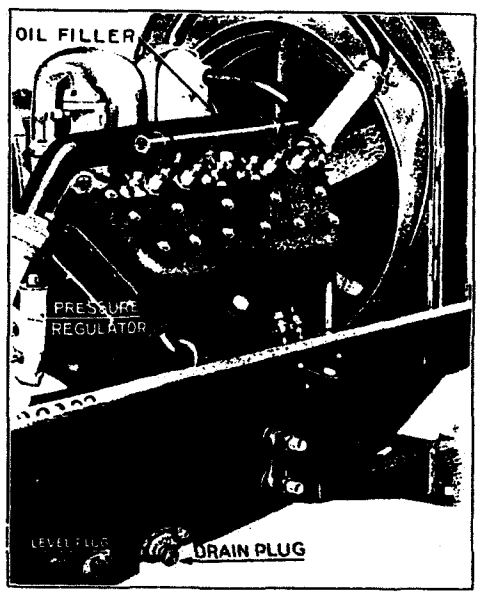



*Fig. 33. Oil Filler, Pressure Regulator, Level Plug and Drain Plug.*

When adding oil with the level plug removed, the oil level indicator should register "Full" when the oil just starts to flow from the hole left by removing the plug. The oil pan then contains approximately one and one-half gallons of oil.

### *Replace Oil in Engine*

At the end of the first 500 miles of travel and at the end of each 1000 miles thereafter, remove the drain plug located at the right side of the oil pan and drain out all of the oil. Then replace the drain plug and add sufficient fresh oil to bring the level of the oil up to the proper height. (See below under "Replace Oil Frequently During Cold Weather.")

At the end of the first 1000 miles of travel and at the end of every 4000 miles of travel thereafter, drain the oil pan and refill it with a mixture consisting of three quarts of kerosene oil and one quart of engine oil. The mixture must be entirely free from dirt and lint. Then run the engine at a speed of between 600 and 1000 R. P. M. for about one minute. Then drain the oil pan, remove it and the screen from the engine and thoroughly clean the oil pan and screen. Fill the oil pan to the proper height with clean, fresh engine oil after replacing it.

It is a good plan to clean the overflow valve and valve seat, as well as the housing in which they are contained, after forcing the mixture of kerosene and engine oil through the lubricating system. It is also important to make sure that the small by-pass hole is clean and free from any obstruction. A clean cloth, free from lint, should be used in cleaning the overflow valve. The housing, containing the overflow valve (pressure regulator), is located at the side of the crankcase just back of the right hand block of cylinders.

### *Replace Oil Frequently During Cold Weather*

The mileages given at which the oil should be drained and the oil pan and screen removed are those at which the work should be done during summer weather.

During cold weather a certain amount of water may accumulate in the crankcase of the engine as a result of condensation. The water thus formed either freezes, preventing the pump from drawing oil, or mixes with the oil, forming a thick substance which the pump cannot draw. It is necessary, therefore, during cold weather to drain the oil pan and clean the oil pan and screen much more frequently than during warm weather.

The frequency with which it is necessary to do this work during cold weather depends very largely upon the manner in which the car is driven. In cases where the car is driven short distances only and frequent stops are made so that the engine base and the oil in the oil pan remain cold it will be found necessary to drain the oil pan and clean the oil pan and screen much more frequently than in cases where the car is driven for longer distances with fewer stops, so that the engine base becomes thoroughly warmed.

The car that is constantly making very short trips in cold weather should have the oil drained every 500 miles or once a week and the oil pan and screen cleaned once a month.

*Unless the oil is drained out and the oil pan and screen are cleaned frequently enough in cold weather, serious damage to the engine may result, particularly on cars in short trip service.*

### *Oil Pressure*

Oil is fed under pressure to the main and connecting rod bearings of the engine. To prevent the pressure of the oil from rising too high, a spring controlled overflow valve known as a pressure regulator is provided. The pressure regulator is set when the car is assembled and requires no further attention except that it may be necessary occasionally to remove the valve from the regulator and clean the valve and its seat, as well as the by-pass hole.



The amount of pressure indicated by the pressure gauge on the instrument board varies with the speed and temperature of the engine and the viscosity of the oil. When the engine is warm and supplied with fresh Cadillac Motor Oil or oil of approximately the same viscosity, the pressure as indicated by the gauge should be from ten to fifteen pounds when the engine is idling. At higher speeds a higher pressure should be indicated and at lower speeds, a lower pressure. Before the engine has become warm, higher pressures will be indicated at given speeds. In other words, maximum pressures will be indicated at given speeds when the engine is cold and the oil is fresh; minimum pressures, when the engine is hot and the oil becomes thin from use.

Practically all engine lubricating oils become less viscous from use even under normal conditions. Running the engine too long with the auxiliary air control lever pulled back will cause the oil to be thinned more rapidly, due to the condensation of gasoline from the rich mixture.

### *Caution*

If after starting the engine it is found that the oil pressure gauge does not register pressure, stop the engine immediately and prime the oil pump. This may be done by disconnecting, at its upper end, the oil pipe running from the engine around the right hand side of the dash, and forcing clean engine oil into the pipe with the oil gun furnished in the tool kit. Connect the pipe and tighten the union before starting the engine.

*Do not continue to run the engine if, as a result of low viscosity of the oil, or other cause, pressure is not indicated on the gauge when the engine is running.* (*See under "Replace Oil in Engine," page 40.*)

### *Lubrication Chart*

A lubrication chart is supplied with the tool kit. The chart is intended to be hung in the garage as a reminder.

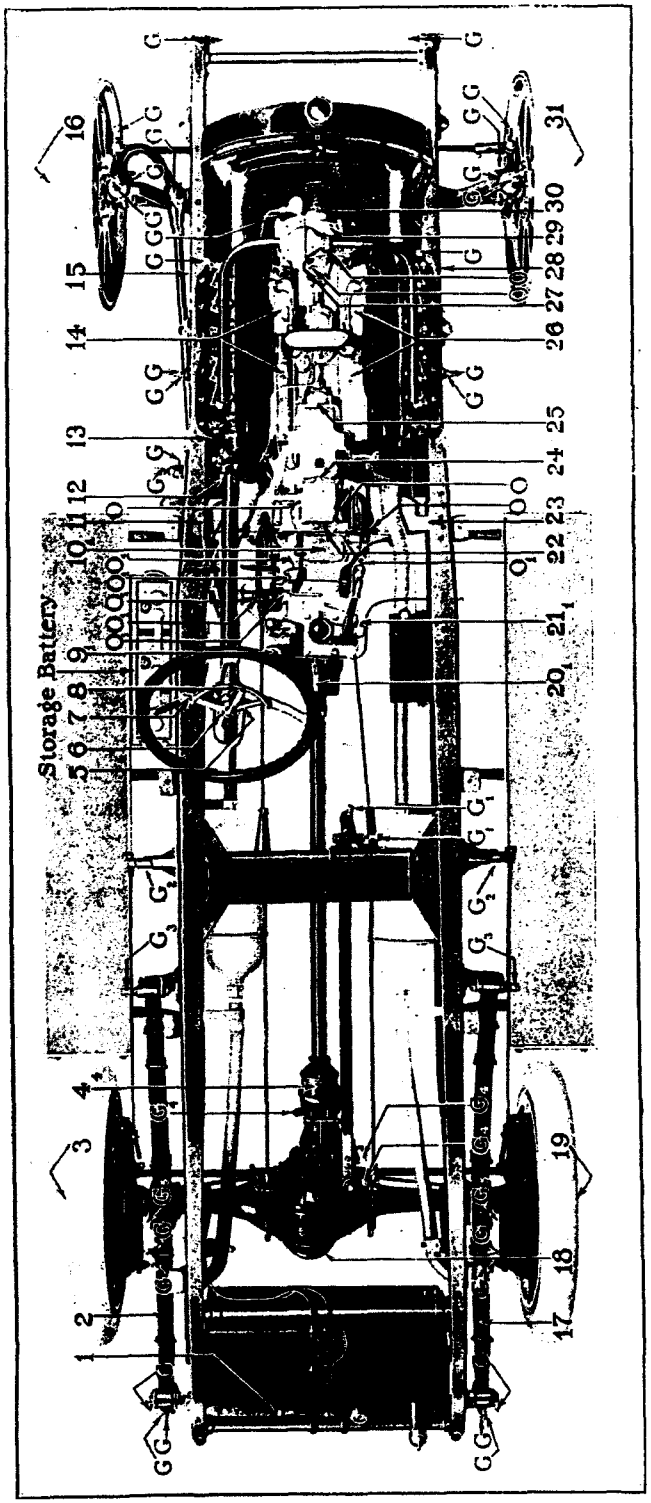



*Fig. 31. General Lubrication Diagram.*

*Each "G" Indicates a Grease Cup. Each "O" Indicates An Oiling Point at Which Engine Oil Should Be Applied. Each Number Indicates a Lubricating Point for Which Instructions Are Given Under "General Lubrication." Accessibility: The small figures at the right of and below the numbers and letters on the above diagram refer to the following notes as to the accessibility of the lubricating points.*

*1. These are lubricating points which are accessible after removing the floor boards forward of the front seat.*

*2. These grease cups lubricate the foot brake rocker shafts. They are provided with extensions which bring the grease cups within reach from under the running boards.*

*3. These grease cups lubricate the bearings at the front ends of the rear side springs. The grease cups are accessible after opening the small doors in the dust shields just forward of the rear fenders.*

*4. These lubricating points are accessible through hand holes in the rear floor on all cars except the Roadster and Victoria. (On the Phaeton one of the hand holes is under the rear seat cushion.)*

*5. These grease cups lubricate the rear spring seats on the rear axle and are underneath the springs just back of the axle.*



# GENERAL LUBRICATION

## EVERY 250 MILES

### *Engine: 29*

The engine should be supplied with oil as often as required. Add oil until it just starts to flow from the hole left by removing the level plug in the right hand side of the oil pan. The oil level indicator under the carburetor is for the purpose of indicating when the supply is low and when a sufficient amount has been added. (See under "Filling Lubricating System," page 39.) As a rule oil should be added about every 250 miles of travel. (See under "Replace Oil in Engine," page 40.)

## EVERY 500 MILES

### *Grease Cups: G*

Turn down grease cups "G" and the grease cup on the instrument end of the speedometer cable every 500 miles.

### *Starter Gear Shaft: 22*

The shaft on which the starter idler gears revolve is provided at its rear end with an elbow connection which fits the oil gun furnished in the tool kit. Cadillac Rear Axle and Transmission Lubricant should be injected at this point every 500 miles.

There is a small cover plate on the front floor boards, the removal of which renders the connection accessible without removing the floor boards. It is necessary to remove the screw plug in the elbow before the oil gun can be connected.

### *Oil Hole for Fan Bearing: 30*

The fan is driven by a spring and is free to oscillate slightly on the fan shaft. The hole through which the bearing at the fan hub is lubricated is just back and at the base of the flange on the fan shaft against which the spring presses. A few drops of engine oil should be applied every 500 miles. It may be necessary to crank the engine in order to bring the oil hole to the top.

### *Springs: 1, 2, 15, 17, 28*

It is recommended that the springs be lubricated once every 500 to 1000 miles by painting the edges and ends of the spring leaves with cylinder oil. A small, stiff brush should be used. After applying the oil to the springs, the car should not be washed until it has been driven some distance to allow the lubricant to work in between the leaves.

### *Replace Oil in Engine*

Replace the oil in the engine at the end of the first 500 miles of travel and at the end of every 1000 miles of travel thereafter. (See under "Replace Oil in Engine" and "Replace Oil Frequently During Cold Weather," page 40.)

## EVERY 1000 MILES

### *Oil Cups and Oil Holes: O*

A few drops of engine oil should be applied at points "O" every 1000 miles.

### *Drive Shaft and Universal Joints: 4, 20*

Fill the forward and rear universal joints on the drive shaft with No. 1½ cup grease every 1000 miles. A special connection to fit these places is furnished with the oil gun which is a part of the tool kit.

The forward universal joint is covered with a cylindrical shield to prevent grease from being thrown on the floor boards. To fill the joint, it is necessary first to detach this shield from the transmission case and to slide it back over the drive shaft. This may be done after loosening the two screws which hold the shield to the transmission case and turning the shield through a small angle in a counter-clockwise direction. If the filling plug does not appear at the top it will be necessary to move the car until it does. The filling plug may be removed by unscrewing it.

The filling plug in the rear universal joint is accessible through a hand hole in the rear floor on all cars except the Roadster and Victoria.

### *Bearings on Armature: 24, 25*

These are oil cups for the lubrication of the bearings on the armature shaft. A few drops of engine oil should be applied every one thousand miles.

The oil cup "24," which lubricates the rear bearing, is under the front part of the floor boards but on the Seven Passenger, Phaeton, Roadster and Victoria it may be reached from in front of the dash when the hood is raised. On the enclosed cars, with the exception of the Victoria, it is more convenient to remove the aluminum cover plate on the front part of the floor boards.

### *Oil Holes in Steering Wheel Hub: 5, 6*

One of these oil holes is above the steering wheel and the other is accessible after folding the steering wheel. A few drops of engine oil should be applied at each point every 1000 miles.

### *Rear Engine Supports: 11, 23*

There is a slight movement between the side bars of the frame and the rear engine supports when the car is traveling over rough roads. It is necessary, therefore, to apply lubricant at these points.

There is an oil hole with a felt wick in each engine support where it is bolted to the side bar of the frame. Engine oil should be applied at these points every 1000 miles or oftener if found necessary.

### *Tire Air Compressor: 9*

The compressor piston is lubricated through two oil holes—one in front of the compressor cylinder and one just behind. Each oil hole is protected by a small sliding cover.

Apply engine oil at these points every 1000 miles, or oftener if the pump is used frequently. (See Fig. 22.)



### *Clutch Thrust Ball Race: 10*

The clutch thrust ball race is accessible after removing the front floor boards and the cover plate shown at 10. If necessary, reach in and turn the ball race to bring the screw plug to the top. Remove the plug and inject Cadillac Rear Axle and Transmission Lubricant every 1000 miles. A special connection to fit this place is furnished with the oil gun which is a part of the tool kit.

### *Replace Oil in Engine and Clean Lubricating System*

Replace the oil in the engine at the end of every 1000 miles of travel. (See under "Replace Oil in Engine" and "Replace Oil Frequently During Cold Weather," page 40.)

*At the End of the First 1000 Miles*

At the end of the first 1000 miles of travel and at the end of every 4000 miles of travel thereafter, drain the oil pan and clean the lubricating system with kerosene. Then remove the oil pan and clean the pan and screen. Replace the oil pan and refill it to the proper level with clean engine oil. (See under "Replace Oil in Engine" and "Replace Oil Frequently During Cold Weather," page 40.)

### *Water in Storage Battery*

Every one thousand miles or oftener inspect the level of the acid in the storage battery and add *distilled* water if the level is low. (See under "Adding Water to Storage Battery," page 78.)

The storage battery is carried in a compartment in the left hand dust shield. The cover of this compartment forms a part of the dust shield and may be removed after unscrewing the two nickel plated screws with a screw-driver.

## EVERY 2000 MILES

### *Transmission: 21*

The transmission case should always contain sufficient lubricant to bring it up to the level of the filling hole in the right hand side of the case. It should be inspected every 2000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended for this purpose.

### *Rear Axle: 18*

The rear axle should contain enough lubricant to bring it up to the level of the filling hole in the rear cover plate. It should be inspected every 2000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended for this purpose.

### *Timer and Distributor: 27*

Every 2000 miles of travel remove the small breather by unscrewing it and pack cup grease around the gears by which the timer and distributor are driven.

### *Lubrication of Valve Stems: 14, 26*

The valve stems are lubricated by oil vapor conducted to the valve compartments through ports in the crank case and cylinder blocks. It is good practice to supply additional lubrication every 2000 miles by lifting up the edges of the valve compartment cover plates enough to insert the spout of the oil can and apply engine oil to each valve stem and cam slide.

## EVERY 3000 MILES

### *Wheels: 3, 16, 19, 31*

Every 3000 miles or every six months, if the car is driven but little, all the wheels should be removed, the bearings thoroughly washed and cleaned in either gasoline or kerosene and the bearings examined to determine whether any foreign substances have gotten into them that might damage them. The bearings should be thoroughly lubricated with a thin grease. Cadillac Wheel Bearing Grease is recommended for this purpose. Do not use heavy grease, as it will roll away from the path of the rolls and will not return. Then the wheels should be replaced and adjusted as per instructions on this subject.

There is an oil cup in the hub of each rear wheel. Inject some engine oil here whenever you are oiling the car. Wipe the dirt from the cups first so that it will not get into the bearings.

### *Steering Gear: 12, 13*

The internal mechanism of the steering gear should be lubricated about every 3000 miles. This can be done by removing the screw plugs at "R" and "G," Fig. 57. The hole at "R" is tapped to fit the nozzle of the oil gun. Cadillac Rear Axle and Transmission Lubricant mixed with two or three per cent. of flake graphite is a good lubricant for this part.

## EVERY 4000 MILES

### *Replace Oil in Engine and Clean Lubricating System*

At the end of every 4000 miles of travel drain the oil pan and clean the lubricating system with kerosene. Then remove the oil pan and clean the pan and screen. Replace the oil pan and refill it to the proper height with clean, fresh engine oil. (See under "Replace Oil In Engine" and "Replace Oil Frequently During Cold Weather," page 40.)

### *Transmission: 21*

At the end of every 4000 miles of travel drain all of the lubricant from the transmission and refill with clean, fresh lubricant to the level of the filling hole in the right hand side of the case. Cadillac Rear Axle and Transmission Lubricant is recommended for this purpose.

### *Rear Axle: 18*

At the end of every 4000 miles of travel drain all of the lubricant from the rear axle and refill it with enough clean, fresh lubricant to bring it up to the level of the filling hole. Cadillac Rear Axle and Transmission Lubricant is recommended for this purpose.

## EVERY 5000 MILES

### *Gabriel Snubbers (attached to frame over rear axle)*

Every 5000 miles remove and lubricate the snubbers in accordance with the instructions given under "Lubrication of Gabriel Snubbers," page 98.



## ADDITIONAL

### *Spark and Throttle Levers: 7, 8*

The plungers in the spark and throttle levers should be lubricated occasionally. If the spark and throttle levers stick, rub a little oil on the sector where the friction shoes come in contact with it.

---

In addition to the places specially mentioned, note carefully and oil all of the small connections and joints throughout the car, such as the various brake rod connections and joints in the brake mechanism. The joints of the internal brakes may be lubricated after removing the small cover "F," Fig. 62, on each brake drum. Care should be taken not to apply too much oil to the internal brake joints as it may get on the brake band linings and impair the efficiency of the brakes.

Remember that wherever one part moves in contact with another, the ease of movement will be assisted and wear will be reduced to the minimum by lubrication.

## CARBON DEPOSIT

A rapid formation of carbon in the cylinders of the engine may be the result of using an oil of inferior quality, or not suited to the engine, or to the addition of too much oil to the oil pan.

When the accumulation of carbon becomes great enough it will cause the engine to pound and lose power. The pounding is usually first noticed in pulling and when the throttle is open for hill climbing or acceleration.

When the accumulation of carbon becomes great enough to cause the engine to pound it should be removed. The cylinder heads of the Cadillac engine are removable to facilitate access to the combustion chambers for scraping out carbon. (See under "Removable Cylinder Heads," page 59.)

The spark plug cores should be kept clean. A good method of cleaning them is to wash them in alcohol.

Carbon deposited on the spark plug cores forms a circuit which offers less resistance to the high tension current than the gap between the spark plug points. The current therefore follows the path of least resistance instead of jumping between the points, and causes the engine to miss fire.

This is particularly true when the throttle is open for hill climbing or acceleration as under these conditions the compression of the gas, through which the spark must jump, is increased. A spark which will jump in the neighborhood of ⅛" in the open air will not jump more than 1/16" in gas under compression.

# Part III

# ADJUSTMENTS

# GASOLINE SYSTEM

## *General Principle*

The supply of gasoline is carried in a tank at the rear of the car and is forced to the carburetor by an air pressure of from one to two pounds. A valve is provided by which the gasoline may be shut off at the tank. (See Fig. 36.) The handle of the valve is just at the left of the gasoline gauge. A float controlled needle valve in the carburetor maintains the gasoline at the proper level in the carburetor bowl.

The pressure is indicated by a gauge on the instrument board. A hand pump on the instrument board is provided by which pressure for starting may be obtained when the car has been standing long enough to make this necessary. When the engine is running the pressure is automatically maintained by a pump on the engine driven by an eccentric on the front end of the cam shaft.

Excessive pressure in the gasoline system is prevented by a relief valve in the air line. The relief valve is properly adjusted when the car is assembled and should not require further attention.

The pipe extending almost to the bottom of the gasoline tank is a continuation of the gasoline line. The air line simply enters the gasoline tank at the top and does not extend into the gasoline.

## *Filling the Gasoline Tank*

The gasoline tank is at the rear of the car. The filler cap may be removed after loosening the thumb screw on the top of the cap.

Gasoline should be strained through a wire cloth of very fine mesh before it is poured into the tank. If dirt or water is allowed to enter the gasoline system it may cause great annoyance by getting under the carburetor inlet needle and causing the carburetor to flood.

After filling the tank, screw on the filler cap and carefully tighten the thumb screw. This is necessary to prevent leakage of the pressure by which the gasoline is forced to the carburetor.

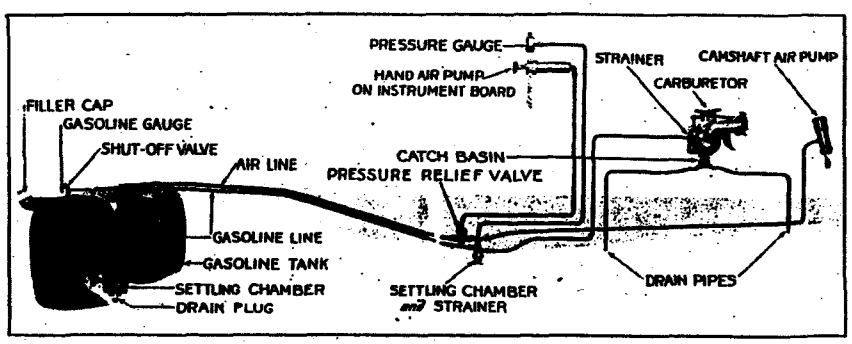



*Fig. 36. Gasoline System.*



## *Settling Chambers and Strainers*

There are two settling chambers in the gasoline system, one at the under side of the gasoline tank and the other attached to the left hand side of the frame of the car just under the front floor boards.

There is a drain plug at the bottom of each of these settling chambers. Every one thousand miles or oftener the plug in the settling chamber under the floor boards should be removed and the plug in the settling chamber underneath the gasoline tank should be unscrewed several turns, to drain the settling chambers of any dirt or water which has accumulated.

Before unscrewing either of the plugs the gasoline system should be relieved of all air pressure by removing the gasoline filler cap on the tank.

There are two strainers in the gasoline system which require cleaning periodically—one at the point where the gasoline feed pipe is attached to the carburetor, and the other attached to the drain plug in the settling chamber under the front floor boards. (See Fig. 36.)

The strainers should be removed and cleaned every one thousand miles or oftener. Shut off the gasoline at the tank before removing either strainer. In cold weather it may be found necessary to remove the strainers more frequently in order to prevent an accumulation of water at these points which would freeze and prevent gasoline from flowing to the carburetor.

# CARBURETOR

## *Adjustment of Carburetor*

The carburetor should not be tampered with unless it needs adjustment. Good carburetor action cannot be expected until the motor is thoroughly warmed up. This is particularly true during cold weather. Imperfect carburetor action while the engine is cold does not indicate that the carburetor requires adjustment and carburetor adjustment should not be made under these conditions.

Before changing any of the carburetor adjustments be sure it is the carburetor which requires attention. It is possible that the ignition system requires adjustment.

Before making any carburetor adjustments be sure that the points on the spark plugs are .028 inches apart, that the spark plug cores are clean, that the timer is properly set and that the timer contact points are clean and in proper adjustment. In fact, see that the entire ignition system in is good working order.

When it is certain that the carburetor requires adjusting, proceed as follows:

## *Method of Adjustment*

Open the throttle about two inches on the sector at the steering wheel. Place the spark lever in the "Driving Range" on the sector and start the engine. If the engine is cranked by hand the spark lever should be placed at the extreme left on the sector.

Run the engine until the water jacket on the intake pipe is hot.

Move the spark lever to the extreme left on the sector and the throttle lever to a position which leaves the throttle in the carburetor slightly open. Adjust the air valve screw "A," Fig. 37, to a point which produces the highest engine speed. Turning the screw "A" in a clockwise direction increases the proportion of gasoline to air in the mixture and vice versa.

Close the throttle (move it to the extreme left on the sector) and adjust the throttle stop screw "B" to a point which causes the engine to run at a speed of about 300 revolutions per minute. The spark lever should be at the extreme left on the sector when this adjustment is made.

With the spark and throttle levers at the extreme left on the sector, adjust the air valve screw "A" to a point which produces the highest engine speed.

Open the throttle until the shutter attached to the right hand end of the throttle shaft *just* covers the slot in the carburetor body. Then adjust the screw "G" to a point which produces the highest engine speed or to a point where the engine slows down slightly from a lean mixture. Turning the screw "G" in a clockwise direction increases the proportion of gasoline to air in the mixture and vice versa.

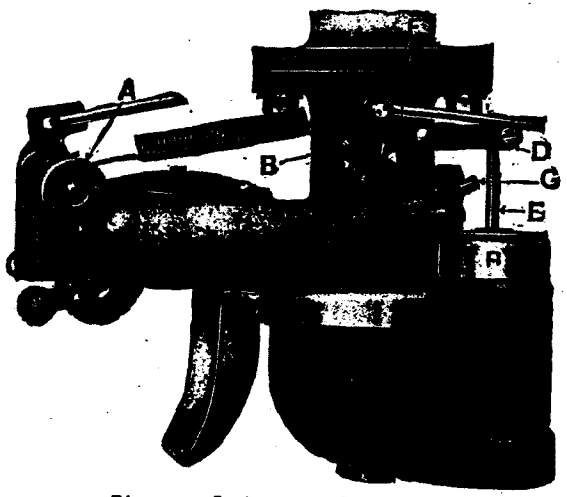



*Fig. 37. Carburetor, Side View.*

During very cold weather when a slightly richer mixture is desirable it may be found best to turn the adjusting screw "G" further in a clockwise direction.

## *Personal Danger of Running Engine in Closed Garage*

Carbon monoxide, a deadly poisonous gas, is present in the exhaust of gasoline engines. Increasing the proportion of gasoline to air in the mixture fed to the engine, in other words, enriching it, increases the amount of carbon monoxide given off at the exhaust pipe.

Because of the presence of carbon monoxide it is very dangerous to run the engine for any length of time while the car is in a small, closed garage. If the doors and windows are open the danger is very much lessened, but it is far safer, particularly if an adjustment of the carburetor is being made, to run the car into the open.

Serious personal injury may be caused by the presence of carbon monoxide in a garage if the percentage of it in the air is greater than a very small fraction of one per cent. Unconsciousness may result without warning. It is reported that no indication of danger is given by personal discomfiture until too late. Deaths resulting from the presence of carbon monoxide in garages have been reported.

## *Leaning Device*

A leaning device, sometimes called a "gas-saver," is provided which may be adjusted to cause, for ordinary driving speeds, a mixture in which the proportion of gasoline to air is cut down. The mixture is not affected by the leaning device at the closed or nearly closed position of the throttle, or at the open or nearly open position.



The leaning device is adjusted at "G," Fig. 37. When the adjusting screw "G" is screwed in as far as it will go the leaning device has no influence on the mixture at any throttle position.

The leaning device consists of a shutter, attached to the right hand end of the throttle shaft, which covers a slot in the carburetor body when the throttle is opened slightly, again uncovering the slot when the throttle is opened wide or nearly so. A hole is drilled through the carburetor body from the mixing chamber to the slot and another hole is drilled from the carburetor bowl to the slot.

When the slot is covered by the shutter a passage is formed from the mixing chamber to the carburetor bowl. The partial vacuum in the mixing chamber causes a lowering of the atmospheric pressure in the carburetor bowl resulting in less gasoline being fed through the spray nozzle. When the shutter uncovers the slot the partial vacuum in the mixing chamber has no effect on the atmospheric pressure in the carburetor bowl and the amount of gasoline fed through the spray nozzle is not affected.

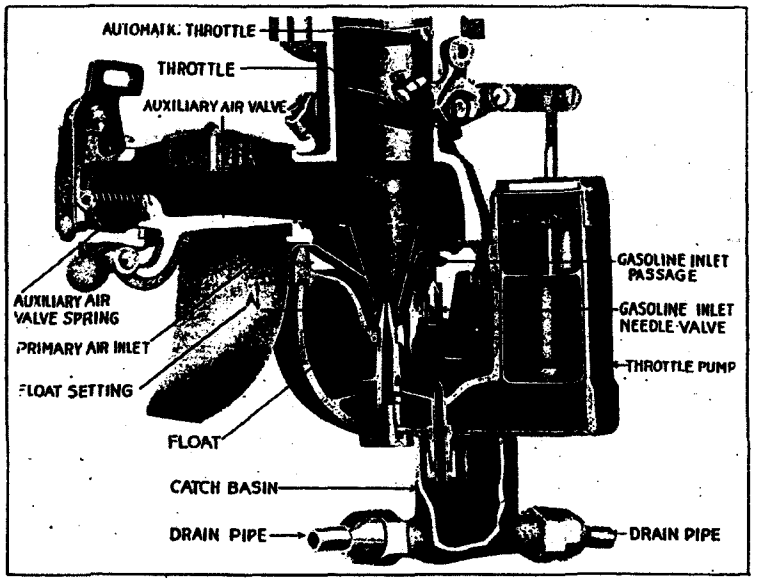



*Fig. 38. Carburetor; Sectional View.*

## *Setting of Carburetor Float*

After the carburetor has been in use for some time, there may be a slight amount of wear at the point of the inlet needle and its seat. If this should occur, the height of the gasoline in the carburetor bowl will rise.

To determine if the float is properly set, remove the carburetor from the engine, and the bowl from the carburetor. Raise the float until the inlet needle valve is just closed. The dimension "A," Fig. 38, should then be one-half inch.

The setting may be corrected by bending slightly the arm to which the float is attached.

### *Throttle Pump*

The object of the throttle pump is to force gasoline through the spraying nozzle when the throttle is opened quickly for acceleration. When the throttle is opened slowly the throttle pump has practically no effect on the amount of gasoline passing through the spraying nozzle.

The cylinder "C," Fig. 37, on the carburetor bowl contains a plunger which is operated by the throttle by means of the connecting rod "E."

When the throttle is opened the plunger is forced into the gasoline in the carburetor bowl. The plunger is drawn out of the gasoline when the throttle is closed.

The rod "E" is adjusted at the factory and should require no further adjustment. If the adjustment is changed the rod should be readjusted so that its upper end is flush with the upper face of the arm "D."

### *Automatic Throttle*

The carburetor is equipped with an automatic throttle, Fig. 38, controlled by a spring. Its purpose is to prevent pulsations of air in the intake manifold from causing the air valve to flutter when the engine is running slowly with the throttle fully opened. The automatic throttle is adjusted when the carburetor is assembled and requires no further attention.

## COOLING SYSTEM

The cooling system is of the water forced circulation type. The circulation through each cylinder block is independent of the circulation through the other, two separate pumps being provided. The pumps, which are of the centrifugal type, are located at the front end of the crank case on each side and are driven from the crank shaft through helical gears.

The temperature of the liquid circulated by these pumps is under thermostatic control, the purpose of which is to permit water circulated through the water jackets on the cylinders and carburetor intake manifold to warm up to the temperature at which the engine operates best very soon after the engine is started and to prevent the temperature dropping below this point while the engine is running.

### *Thermostatic Control*

A housing containing a Sylphon thermostat and a valve controlled by the thermostat, are located on the cover of each water pump.

The thermostat "A," Fig. 39, is accordion shaped. It contains a liquid which is driven into gas when heated. The resulting pressure elongates the thermostat, forcing the valve "B" from its seat. A drop in temperature changes the gas back to a liquid, reducing the pressure in the thermostat and allowing it to contract, thereby bringing the valve "B" back to its seat.

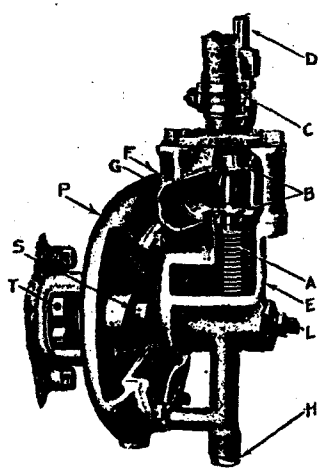



*Fig. 39. Water Pump, Sectional View.*



When the temperature of the water in the water jackets on the cylinders and intake manifold is below a predetermined point the valve "B" is held tightly closed by the thermostat. When the temperature of the water tends to rise above the predetermined point, the valve "B" is forced open by the thermostat, permitting the water pump "P" to draw water from the radiator.

Provision is made for forcing the valves operated by the thermostats from their seats. This is necessary to drain the radiator.

There is a horizontal shaft "L" extending from the cover of each water pump. There is an indicator on the end of each of these shafts. By turning the shafts until the indicators point directly up, the valves operated by the thermostats are forced and held from their seats. By turning the shafts until the indicators point down, as shown in Fig. 39, the valves are returned to their seats and the thermostatic control is again brought into operation.

### *Path of Circulation*

When the engine is first started and is cold the valves operated by the thermostats are held tightly on their seats. This prevents the water pumps from drawing water from the radiator. Under these conditions the water is circulated as follows:

From the water pump "P," Figs. 39 and 40, through the hose "F" to the water jackets on the cylinders. From the water jackets on the cylinders some of the water returns to the pump "P" through the hose "C" and the thermostat housing "E." The remainder is carried by a small pipe "N" to the water jacket around the intake manifold and from the intake manifold to the pump "P" through the pipe "D" and the thermostat housing "E."

After the engine has become warm and the thermostats have forced from their seats the valves between the pumps and radiator the circulation is as follows:

Water is drawn from the radiator through the hose "G" and forced to the water jackets on the cylinders through the hose "F." From the water jackets the water returns to the radiator through the hose "M" connecting the cylinder block and radiator.

Water is still forced to the water jacket on the intake manifold through the small pipe "N" and from the intake manifold to the pump "P," through the pipe "D" and the thermostat housing "E." Some of the water still flows back to the pump through the hose "C" and the thermostat housing "E."

As the temperature of the water returning to the pump through the pipe "D," hose "C" and thermostat housing "E," rises or falls, the thermostat expands or contracts, opening or closing the valve, thereby admitting a larger or smaller amount of cooled water from the radiator.

### *Condenser*

A condenser, the purpose of which is to prevent the loss of the cooling medium by evaporation, when an alcohol solution is used, is attached to the right hand side of the frame just beneath the front floor boards. A pipe "S," Fig. 40, connected to the overflow tube of the radiator leads to the condenser.

The action of the condenser is as follows: The vapor given off from the liquid in the radiator when it is heated passes through the overflow tube to the condenser. As it passes into the liquid in the condenser the vapor is condensed.

When the engine has stopped, the cooling of the radiator and its contents results in the contraction and condensation of the vapor left in the upper part of the radiator. The vacuum thus caused allows the atmospheric pressure in the condenser to force condensed vapor back into the radiator in liquid form.

The proper operation of the condenser requires an air tight joint at the radiator filler cap. To make it possible to screw down and tighten the cap without injury to the rubber gasket, two metal washers are interposed between the head of the cap and the gasket. It is important that nothing be installed on the radiator filler cap which causes a leak at the cap or which makes necessary the elimination of the steel washers or cutting a hole through the rubber gasket.

### *Filling the Cooling System*

Fill the cooling system with clean water, during warm weather, and with a suitable anti-freezing solution during freezing weather. (See under "Anti-Freezing Solution," page 32.)

To fill the cooling system after it has been drained, replace the drain plugs "H," Fig. 40, in the water pumps, close the drain cocks "K" in the cylinder blocks and turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point up. The shafts may be turned in either direction.

Then remove the filler cap "W" from the top of the radiator and fill the cooling system. Replace the filler cap and *screw it down firmly.* This is necessary, to insure the proper operation of the condenser.

After the cooling system is filled, turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point down. These indicators should point up when filling or draining the cooling system and down at all other times.

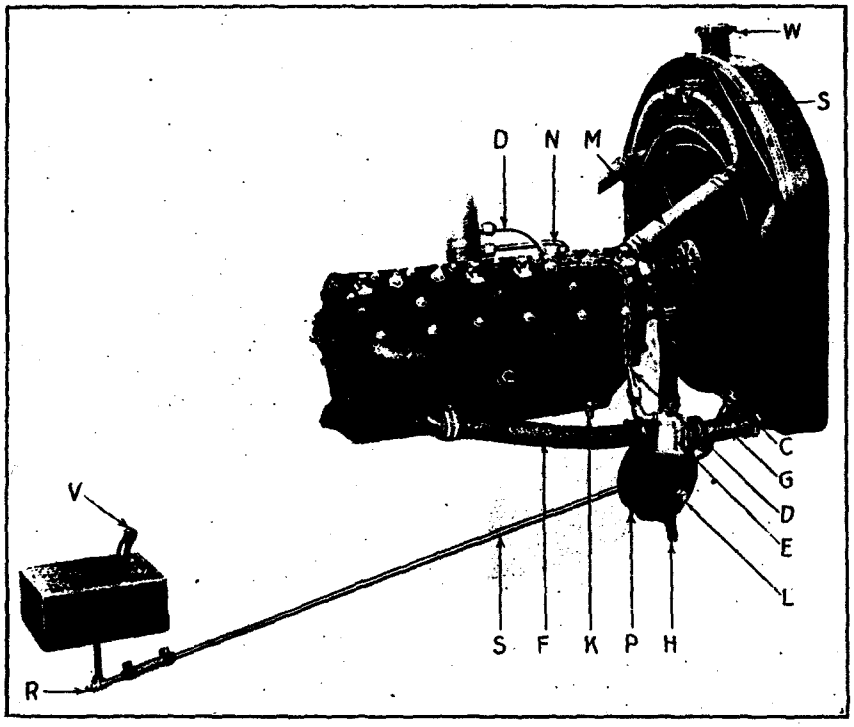



*Fig. 40. Cooling System, Showing Path of Circulation.*



The cooling system should be kept full or nearly so. When it is necessary to add only a small amount of liquid to bring up the level, it is not necessary to turn the shafts "L" on the water pumps, but simply to remove the radiator filler cap.

When the cooling system is cold, the condenser should be one-half full of the same liquid as used in the radiator. To add liquid to the condenser, take up the removable floor board and remove the filler cap "V" at the top of the condenser. Any excess liquid which may accumulate in the condenser should be drained off at "R," Fig. 40, and poured back into the radiator.

### *Draining the Cooling System*

To drain the cooling system, remove the drain plugs "H" from the water pumps and turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point up. The shafts "L" may be turned in either direction. Then open the drain cocks "K" in the cylinder blocks.

To drain the condenser remove the drain plug "R" in the pipe leading from the bottom of the condenser.

### *Cleaning the Cooling System*

The cooling system should be drained and flushed out every two or three months. This may be done in the following manner:

Run the engine with the radiator covered until the liquid in the cooling system is boiling hot. Then turn the shafts "L" on the water pumps so that the indicators on the ends of the shafts point up.

Shut off the engine and immediately remove the drain plugs "H" from the water pumps and open the drain cocks "K" in the cylinder blocks. (Bear in mind in removing the drain plugs "H" that the liquid is scalding hot.) Remove the drain plug "R" in the pipe leading from the bottom of the condenser.

If an alcohol anti-freezing solution is drawn off part of it may be used again if the sediment is allowed to settle. In case it is used again its specific gravity should be tested with an hydrometer, after it has thoroughly cooled.

When the liquid has drained off, replace the drain plugs "H," close the drain cocks "K" and fill the cooling system with clean, hot water. Then repeat the operations outlined above.

If in draining the second time, the water is very dirty, it may be desirable to repeat the flushing operation a third time, using a solution of sal-soda. If the sal-soda solution is used, be sure that it is drained out and the cooling system flushed again with clear water.

The sal-soda solution should not be allowed to get on the finish of the hood or radiator.

During freezing weather be sure to refill with a suitable anti-freezing solution.

### *Water Pump Packing Glands*

If leaks should appear at the water pump packing glands, remove the splash shield under the engine and turn the packing gland nuts "T," Fig. 39. To tighten, turn the gland nuts in the direction in which the wheels turn when the car moves backward. As one gland nut has a right hand thread and the other a left hand thread, both are turned in the same direction to tighten. Tighten the gland nuts only sufficiently to prevent leaks. A spring locking device at the rear of each pump engages the notches in the gland nut and prevents the gland nut from turning of its own accord. In tightening a gland nut turn it a whole number of notches so that when the nut is screwed up as far as desired the locking device will rest in one of the notches.

If a water pump gland requires repacking remove the pump from the engine and remove the gland nut by unscrewing it in the direction opposite to that in tightening it. Remove the gland and renew the packing. Then replace the gland and tighten the gland nut. Replace the water pump and splash shield.

We strongly urge that only Cadillac packing be used, which may be obtained from any Cadillac dealer.

### *Strainers*

There are two strainers in the cooling system, one in each radiator outlet. If the sediment accumulates at these points, the circulation of water in the cooling system is interfered with and as a result the engine may overheat and pound.

The strainers should be removed and cleaned at the end of the first 500 miles of travel and at the end of every 2000 miles of travel thereafter. Any sediment collecting in the outlet passages around the strainers should also be cleaned out at the same time.

The strainers are easily accessible. In the front of the radiator casing opposite each outlet, just underneath the horizontal portion of the radiator splash shield, are openings giving access to two screw plugs with hexagonal heads. After unscrewing these plugs the strainers may be withdrawn.

### *Adjustment of Thermostat Valves*

The thermostat valve "B," Fig 39, is screwed onto the threaded stem of the thermostatic member "A" and is held in place by a slotted nut in the center of the valve. The valve is adjusted when the car is assembled and no further attention should be required. In the event that the adjustment has been altered, proceed as follows in making a readjustment:

Drain the cooling system. (See page 57.) Disconnect the hose "C" and the pipe "D" at the pump. Remove the four small screws in the cap to which the hose and pipe were attached and remove the cap.

Turn the shaft "L" so that the indicator on the end of the shaft points in a *horizontal* direction. With a screw-driver loosen the slotted adjusting nut in the center of the valve. Then adjust the valve until it just seats without placing any tension on the thermostatic member "A." Hold the valve in this position and tighten the slotted adjusting nut.

Replace the cap and connect the hose "C" and the pipe "D." Turn the shaft "L" so that the indicator points up and fill the cooling system. After filling the cooling system turn the indicator down regardless of weather conditions.

## ENGINE ADJUSTMENTS

## ENGINE BEARINGS

If a good grade of lubricating oil is used, if the oil is replaced and the oil pan removed and cleaned out at frequent intervals as recommended in this book under "Replace Oil in Engine," page 40, the engine bearings should give many thousands of miles of use without attention. If, as a result of improper lubrication or long use, the bearings require adjustment, these instructions should be followed carefully.

The connecting rods to which the pistons in the left hand block of cylinders are attached are forked at their lower ends. Bronze backed babbitt lined bushings clamped in these rods have their bearings on the crank shaft.



The connecting rods to which the pistons in the right hand block of cylinders are attached are straight and have their bearing on the outer surface of the bushings clamped in the forked rods.

### *Adjustment of Connecting Rod Bearings*

The bearings at the lower ends of the straight connecting rods are adjustable. Liners varying in thickness from .002 to .006 of an inch are placed between the caps and the rods when the engine is assembled. To readjust, remove these liners and substitute thinner ones of the proper thickness. To get the best results, these bearings should have from .002 to .003 play.

***CAUTION:—Do not under any condition adjust these bearings closer than .002, as this amount of clearance is necessary to allow for the greater expansion of the bronze backed bushings than the steel connecting rods when the engine is heated.***

The bronze backed bushings in the forked connecting rods are not adjustable. If, as the result of long use or improper lubrication, these bushings have too much play on the crank shaft, they should be replaced by new ones.

### *Adjustment of Main Bearings*

There are three main crankshaft bearings. These bearings are provided with liners which are clamped between the crank case and the bearing caps.

To tighten a main bearing, proceed as follows: Remove the oil feed pipe connecting the bearing cap with the oil manifold. Remove the aluminum bearing cap with the lower half of the bearing and the liners.

Replace the liners with liners which are less in thickness by an amount equal to the amount of "take-up" necessary. Liners can be obtained varying in thickness by .001 of an inch. Each liner is stamped indicating its thickness.

Carefully reduce the upper edges of the lower half of the bearing *just enough* to allow the aluminum bearing cap to clamp the new liners. This work must be done very accurately, as clearance between the halves of the bearing will cause an oil leak which may prove disastrous to the bearing.

Thoroughly clean the bearing, bearing cap and liners and oil the bearing surface before replacing.

In replacing the bearing cap tighten the bearing nuts firmly and lock with cotter pins. Also make sure that the union nuts on the oil pipe are tightened sufficiently to prevent leakage.

The upper edges of the lower half of the bearing may be reduced by rubbing the bearing on a piece of fine emery cloth stretched tightly over a flat, machined, iron surface.

If more than one bearing is removed at a time care should be taken not to mix the liners, as they may not all be the same thickness.

## REMOVABLE CYLINDER HEADS

The cylinder heads on the Cadillac engine are detachable, facilitating access to the valves and combustion chambers.

To remove a cylinder head, first drain the cooling system (see page 57), and disconnect the water outlet hoses from the connections at the front end. Disconnect the ignition wires at the spark plugs, and remove the ignition conduit brackets from the cylinder head. Unscrew and remove the nuts on the studs holding the head to the cylinder block. Remove the cylinder head and the gasket, being careful not to injure the latter.

Before replacing the cylinder head see that there is no carbon or gritty substance in the cylinders or around the valves. Clean the surfaces on the cylinder block and removable head which contact with the gasket and make sure that the gasket is in good condition. If care is taken in handling the gasket in removing it, it should be possible to use the same gasket again. If there is any question as to the condition of the gasket, it should be replaced by a new one.

Place the gasket in position. Carefully put the cylinder head on over the studs. In screwing down the nuts, it is best to begin with the center nut in the middle row and work towards the ends, taking alternate nuts on each side of the center. Then do the same with the nuts in the inner row and finally with those in the outer row. All of the nuts should be tightened lightly at first and then, starting again at the center, they should be drawn down firmly.

## TIMING MARKS ON FLYWHEEL

The flywheel marks (see Fig. 41) are arranged in four groups, each group consisting of the following marks in order:

"IN|S"—"Inlet setting"

"IG|A"—"Ignition advance"

"C"—"Center"

"EX|S"—"Exhaust setting"

Each group of marks refers to two cylinders, the numbers of which are stamped one on each side of the "C" in that group.

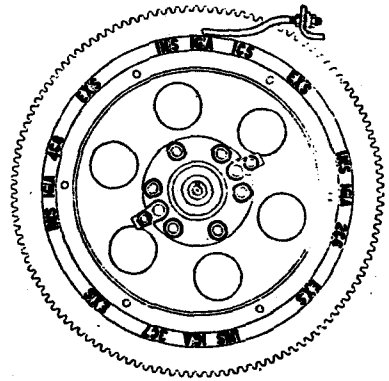


*Fig. 41. Flywheel, Showing Timing Marks.*

Complete instructions for using the "inlet setting" and "exhaust setting" marks are given below under "Positions of Cams for Adjustment of Cam Slides." The ignition timing is explained fully under "Timing Ignition," page 74.

## ENGINE VALVES

### *Positions of Cams for Adjustment of Cam Slides*

In poppet valve gasoline engines it is necessary for a cam roll to be on the circular surface of the cam when the cam slide operated by that cam is being adjusted. The shape of the circular portion of the cams in the Cadillac eight-cylinder engine is such that it is not sufficient for a cam roll simply to be on the circular surface of the cam. The cam roll must be on a certain small arc of the circular surface of the cam when the cam slide is being adjusted.

As no two cams on the cam shaft are in the same position at the same time, it is necessary before adjusting each cam slide to place the corresponding cam in the proper position by cranking the engine by hand as described below. The cam slides cannot be properly adjusted with the cams in any but the correct positions.



### *Placing Cam in Position*

To place a cam in position for properly adjusting the cam slide proceed as follows:

Open the compression relief cocks on the cylinder blocks and with the ignition switched off crank the engine slowly by hand in the direction in which it runs until the piston in the cylinder in which the valve is located is at the end of the compression stroke, or in other words, on firing center. This may be determined by placing a finger over the compression relief cock while cranking the engine. When the piston is exactly on firing center the pointer attached to the crank case will then be directly over the mark on the flywheel indicating "center" for that cylinder.

*Inlet Valve.* If the valve operated by the cam slide is an inlet valve, select the first "IN|S" to the left of the center mark and mark it with a piece of chalk.

Crank the engine further by hand in the direction in which it runs until that "IN|S" is directly under the pointer. It will be necessary to crank the engine nearly a complete revolution.

The cam is then in the correct position for adjusting the cam slide operating that inlet valve. (See under "Adjustment of Cam Slide.")

*Exhaust Valve.* If the valve operated by the cam slide is an exhaust valve, after cranking the engine to the proper firing center, select the first "EX|S" to the right of the center mark and mark it with a piece of chalk.

Crank the engine further by hand in the direction in which it runs until this "EX|S" is under the pointer.

Then crank the engine further one complete revolution until this "EX|S" is again directly under the pointer.

The cam is then in the correct position for adjusting the cam slide operating that exhaust valve. (See under "Adjustment of Cam Slide.")

### *Adjustment of Cam Slide*

When the cam is in the proper position (see under "Positions of Cams for Adjustment of Cam Slides"), the clearance between the end of the valve stem "A," Fig. 42, and the adjusting screw "B" in the cam slide "D" should be from .002 to .003 of an inch when the engine is cold.

To adjust a cam slide, loosen the locking nut "C" and turn the adjusting screw "B." Turning the adjusting screw "B" to the left (screwing it out) decreases the clearance between the end of the valve stem and the head of the adjusting screw; turning the screw to the right (screwing it down) increases the clearance. Tighten the locking nut "C" when the proper clearance has been obtained, taking care that in so doing the adjustment of the screw "B" is not disturbed.

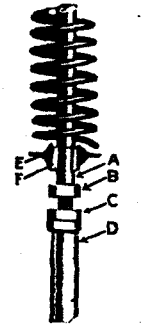



*Fig. 42. Cam Slide and Adjusting Nuts.*

### *Grinding Valves*

The valves are carefully ground when the engine is assembled and should not soon require further attention.

When it has been determined that a valve requires regrinding, proceed as follows:

Remove the cylinder head (see under "Removable Cylinder Heads"), and remove the valve cover plate from the cylinder block.

Force up the washer "E," Fig. 42, and then remove the split locking collar "F." Then remove the valve, being careful to mark it in case more than one valve is taken out at a time, so that it can be replaced as originally assembled.

It is a good plan to wrap soft string around the stem of the valve near the head. This will tend to prevent the grinding compound getting into the valve guide.

In the absence of a good prepared grinding compound, make a paste of powdered glass or flour of emery, mixed with thin oil.

Place the grinding compound on that portion of the valve which bears on the valve seat. Then replace the valve, and with a screw driver or other suitable tool, rotate it back and forth about one-third revolution, with only a slight pressure on the tool. Lift the valve occasionally and turn it to a new position. Continue the grinding operation until the valve and its seat show perfect bearing.

Then thoroughly wash the valve, the valve chamber and the valve guide with gasoline. Be very careful to leave none of the grinding compound in any part of the cylinder, as it will cause serious damage if it works into the cylinder bore or other parts of the engine; also remove the string from the valve stem. Replace the valve.

When all of the valves requiring it have been ground, replace the cylinder head and re-time the valves that have been ground. (See under "Adjustment of Cam Slide," page 61.) Re-timing is necessary, as the amount of clearance between the valve and the adjusting screw in the cam slide is necessarily reduced during the grinding operation.

## ENGINE CHAINS

The camshaft is driven from the crankshaft and the fanshaft is driven from the camshaft by silent chain drive. A double sprocket is keyed to the front end of the camshaft. The camshaft driving chain meshes with the front half of this double sprocket and with a sprocket on the crankshaft. The rear half of the double camshaft sprocket drives the fanshaft driving chain.

To examine or remove either chain, it is first necessary to remove the front cover plate of the engine. To do this proceed as follows:

### *Removing Front Cover Plate*

Remove the headlights and the radiator.

Remove the fan.

Disconnect the oil pump elbows from the crankcase.

Remove the cap from front engine support.

Remove the splash shield under the engine.

Remove the bolts connecting the exhaust pipes to the manifolds on the engine.

Block the car so it will not roll on the floor.

Carefully jack up the front end of the engine.

Disconnect the pipe at the air pump.



Remove the cap screws holding the front cover plate to the crankcase of the engine.

Draw the threaded dowel pins.

Remove the front cover.

### *Removing Camshaft Driving Chain*

To remove the camshaft driving chain cut off the riveted head of one of the seat pins on the camshaft driving chain and remove the seat pin and rocker pin.

### *Removing Fanshaft Driving Chain*

To remove the fanshaft driving chain the camshaft chain must first be removed. (See above.)

Cut off the riveted head of one of the seat pins on the fanshaft driving chain and remove the seat pin and rocker pin.

Remove the fanshaft driving chain.

### *Replacing Fanshaft Driving Chain*

Place the chain on the fanshaft and camshaft driving sprockets with the arrows, which are stamped on the outside links, pointing in the direction in which the chain is to run. If the chain is so placed on the sprockets that it runs in the opposite direction, *it will very quickly destroy itself.*

Bring the ends of the chain together, preferably on the larger sprocket. Insert pins and rivet. (See under "Riveting Chains," page 64.)

It is unnecessary when installing a fanshaft driving chain to pay any attention to the relative positions of the sprockets upon which the chain operates, but the ignition must be re-timed after both chains have been replaced. (See under "Timing Ignition," page 74.)

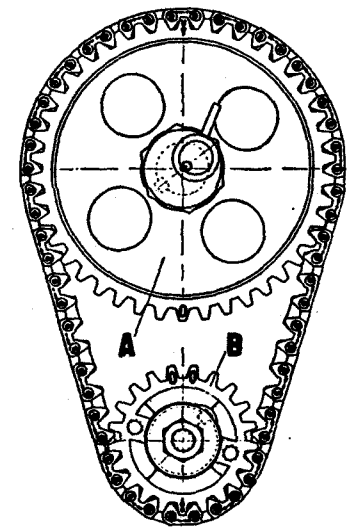



*Fig. 43. Crankshaft and Camshaft Sprockets and Chain.*

### *Replacing Camshaft Driving Chain*

If the fanshaft driving chain has been removed, it will be necessary to replace it before replacing the camshaft driving chain. (See above under "Replacing Fanshaft Driving Chain.")

In replacing the camshaft driving chain care must be used to see that the chain is so placed on the sprockets that the valve timing is correct.

One tooth of the camshaft driven sprocket "A," Fig. 43, is marked with an arrow and the tooth diametrically opposite with an "O." A tooth on the crankshaft sprocket "B" has a similar arrow upon it and the two teeth opposite each have an "O" mark.

Turn the camshaft and crankshaft to bring the sprockets into the positions shown (Fig. 43). The arrows on the two sprockets must point towards each other and the tooth of the camshaft sprocket marked "O" must be directly opposite the space between the two similarly marked teeth on the crankshaft sprocket.

Without turning either of the sprockets, place the chain on the sprockets with the arrows, which are stamped on the outside links, pointing in the direction in which the chain is to run. If the chain is so placed on the sprockets that it runs in the opposite direction, *it will very quickly destroy itself.*

Bring the ends of the chain together, preferably on the larger sprocket. Insert pins and rivet. (See below.)

### *Riveting Chains*

Each joint of the chain contains two pins, as shown in Fig. 44; a seat pin "A," which is ribbed, and a rocker pin "B," which is plain. If a chain is removed, be very sure in replacing it that the joint pins are inserted as shown.

Bring the ends of the chains together on the larger sprockets. (See under "Replacing Camshaft Driving Chain" and "Replacing Fanshaft Driving Chain," page 63.) Insert the rocker pin and a used or extra seat pin to align the links. Clamp the new seat pin in a vise and rivet the small washer "C" on one end.

Force the used seat pin out by inserting the new seat pin. Insert the new seat pin from the rear. In doing so be careful not to force out the rocker pin. Be sure to recover the used seat pin so that it will not get into the mechanism of the engine.

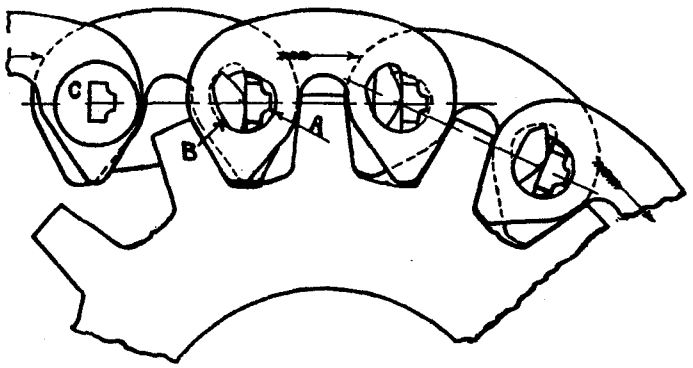



*Fig. 44. Correct Positions of Rocker and Seat Pins in Riveting Chains.*

After the new seat pin is in place turn the engine so that the connection is mid-way between the sprockets. Then insert a riveting block between the crank case wall and the inner end of the seat pin to be riveted, place the small washer on the end of the seat pin and carefully peen over the end of the pin. Remove the riveting block.

If, in installing a chain the rocker pin is inserted backwards it will cause a knock on the small sprocket which will quickly destroy the chain. It is absolutely essential that the joint pins be assembled correctly if the chain is to live and give quiet and satisfactory service.



## CADILLAC-DELCO ELECTRICAL SYSTEM

### *Single Wire System*

The Cadillac-Delco system is the single wire, single unit system. One side of the motor generator, storage battery, lamps, horn and ignition apparatus is connected to some part of the frame of the car or the engine. The other connections are made with copper wires or cables.

## MOTOR GENERATOR

The motor generator serves both as a generator of current and as an electric motor for cranking the engine when starting. The principal elements of the motor generator are an armature and a field. There are two windings on the armature and two in the field—one on the armature and one on the field are used when the motor generator is used as a generator and the other windings when it is used as a motor.

### *Generator*

The motor generator, when acting as a generator, is driven at engine speeds by the fan shaft which in turn is driven by a silent chain from the cam shaft at the front end of the engine. Thus driven, it delivers electrical energy for charging the storage battery and for operating the lights, ignition apparatus and horn. To prevent the voltage of the current generated from rising too high when the engine is running at high speeds, the third brush system of current regulation is employed.

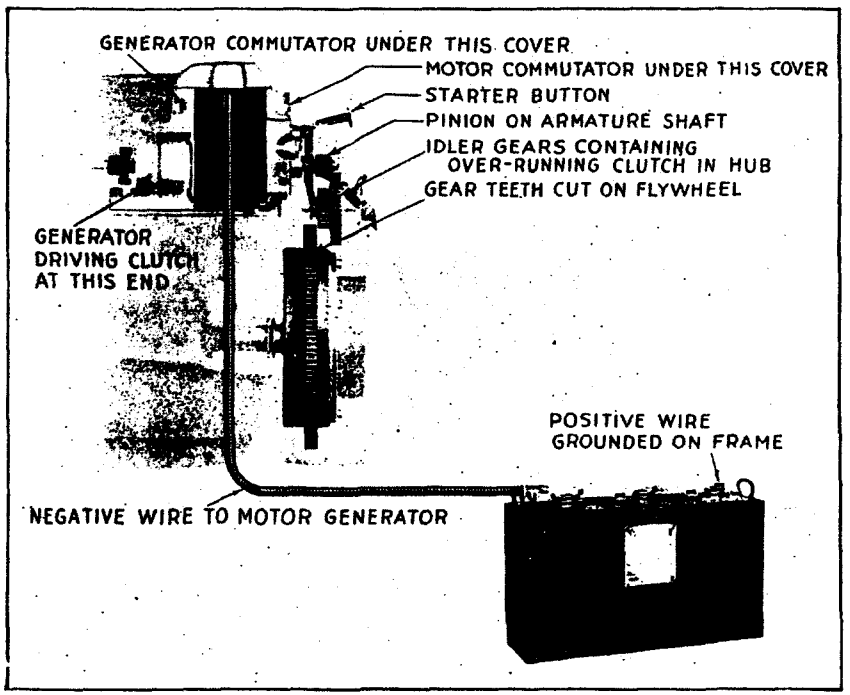



*Fig. 45. Motor Generator and Starting Mechanism.*

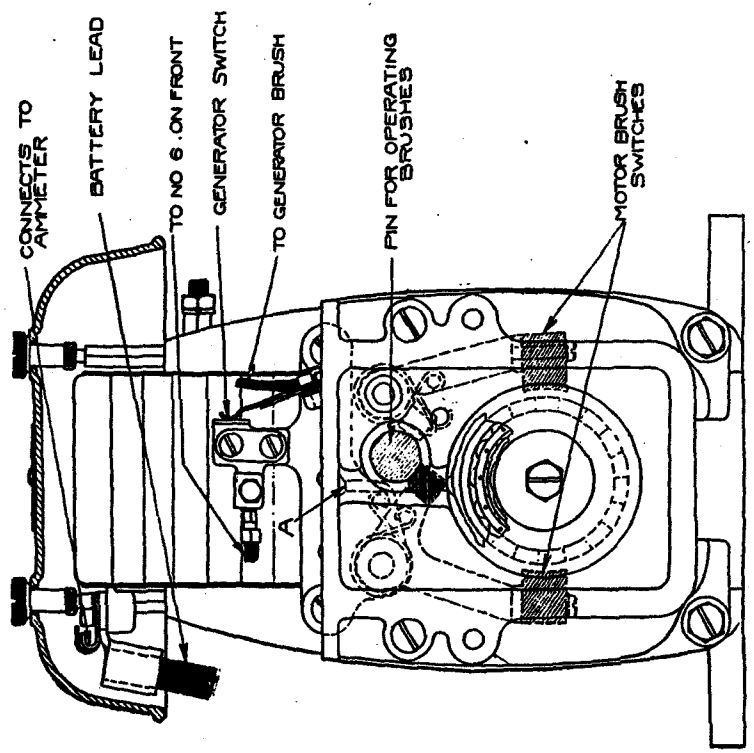



*Fig. 47. Motor Generator, Rear View.*

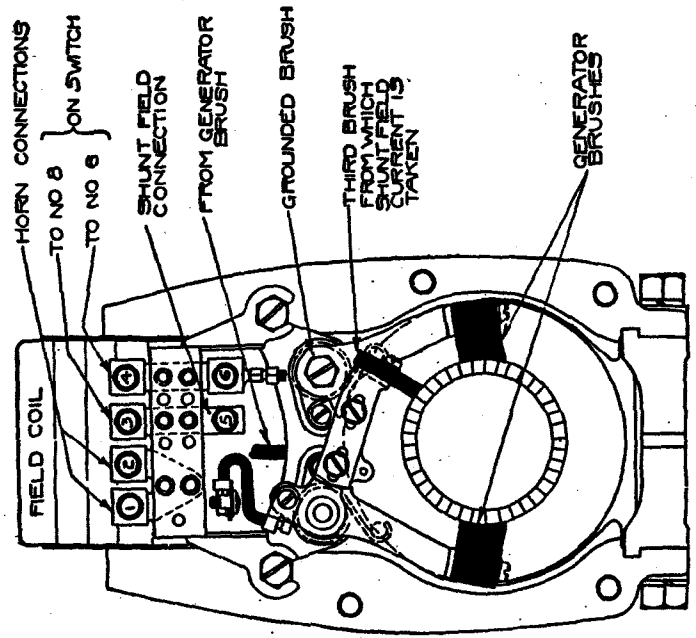



*Fig. 46. Motor Generator, Front View.*



### *Motor*

When acting as a motor the sole function of the motor generator is to crank the engine. In starting, the first thing the operator does is to push down the ignition lever on the combination switch. This closes the ignition circuit and the circuit between the storage battery and the generator windings on the motor generator causing the armature to revolve slowly.

A ratchet clutch in the front end of the generator allows the armature to rotate ahead of the driving shaft. The clicking noise that is heard when the ignition switch is turned on comes from this clutch.

Next the operator pushes down the starter button. The first movement causes the starter gears to mesh with the teeth on the flywheel. The probability of the ends of the teeth striking and failing to mesh is overcome by the slow rotation of the armature which began as soon as the ignition was turned on.

As the starter button is pushed further down the circuit between the storage battery and the generator windings of the motor generator is broken. Upon the last movement of the starter button the circuit is closed between the storage battery and the motor windings on the motor generator causing it to act as a powerful electric motor which rapidly cranks the engine.

As the gear ratio between the armature shaft and the crank shaft is approximately 25 to 1 the armature would be driven at an excessively high rate of speed after starting the engine and before the operator let the starter button back if it were not for an over-running clutch in the hub of the idler gears between the flywheel and the armature shaft. The electric motor cranks the engine through this clutch but after the engine has started and begins to run faster than the electric motor, the clutch slips.

When the starter button is let up, as soon as the engine is running under its own power, the first movement of the button breaks the circuit between the electric motor and the storage battery, a further movement causes the starter gears to slide out of mesh and the final movement completes the circuit between the generator and the storage battery, which was broken when the starter button was pushed down. The engine running and the circuit being closed between the storage battery and the generator windings of the motor generator, the generation of current begins.

### *Commutators*

Do not under any condition put oil of any kind on the commutators of the motor generator.

## LIGHTING SYSTEM

### *Lighting Switch*

All of the lamps are controlled from the instrument board with the exception of the tonneau lamp on the Seven-Passenger and Phaeton and the dome and quarter lights on enclosed cars. The left hand lever on the combination switch makes the necessary connections for the head lamps, side lamps, speedometer lamp and tail lamp. A switch button at the top of the combination switch controls the clock lamp on the instrument board. To turn on this light pull out on the switch button. To extinguish the light, push in.

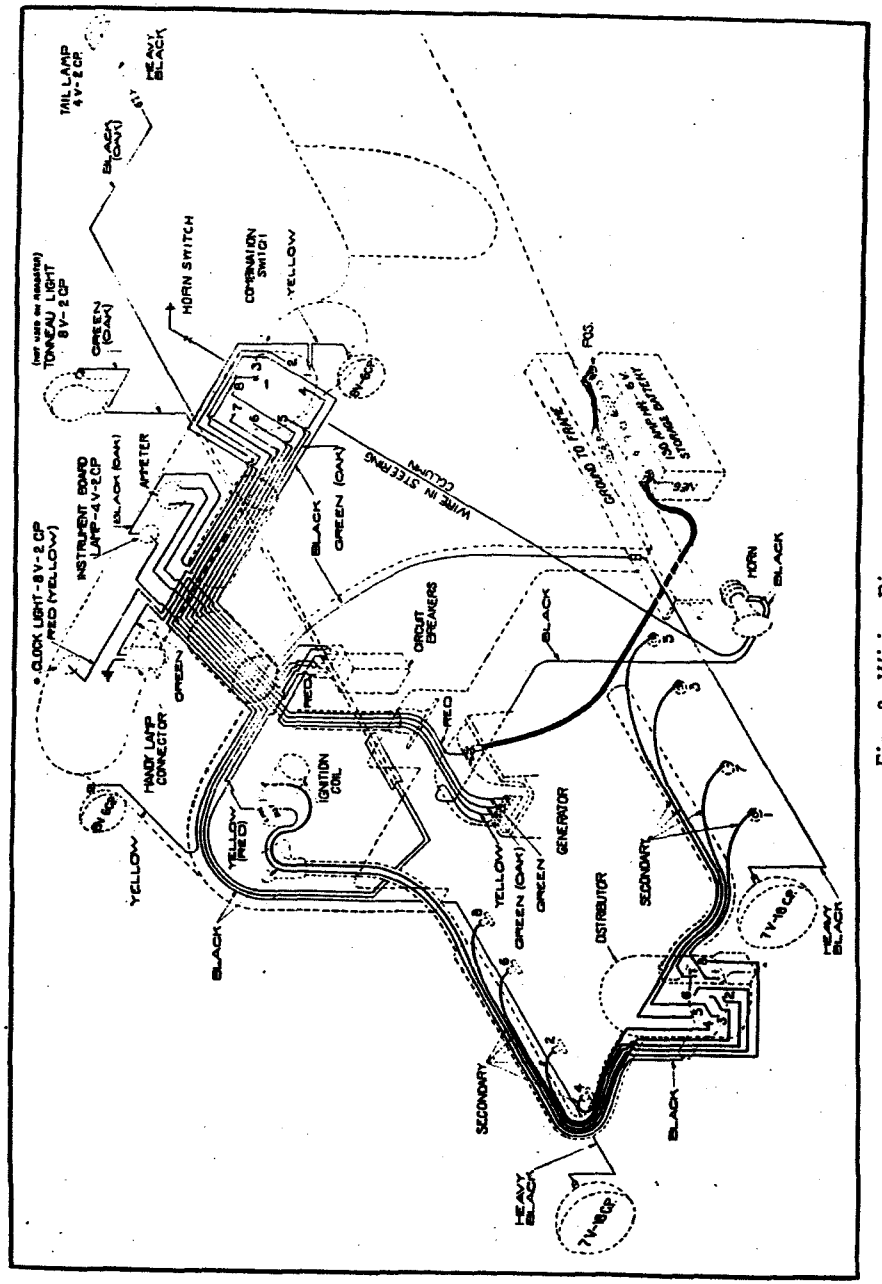



*Fig. 48. Wiring Diagram.*



## *Tilting Head Lamp Reflectors*

Traffic regulations in most localities now include some requirements as to the control of glaring rays from automobile head lamps. The customary rule is that there shall be no glare when meeting vehicles going in the opposite direction or when driving through towns.

The devices commonly employed to meet these requirements make use of one or another of the following principles: Reducing the amount of light at its source, diffusion or spreading of the pencil rays, deflection of the pencil rays below the level at which glare is objectionable.

Reducing the amount of light as is done by dimmers has the obvious disadvantage of placing the road in semi-darkness just at the time when the maximum illumination is needed. Diffusion of the rays, as by lenses, may conform to the requirements of the law but the rays are so spread out that the illumination of the road any considerable distance ahead of the car is insufficient for satisfactory driving.

Deflection of the pencil rays below the level at which they are objectionable intensifies the illumination of the road directly in front of the car but renders distant objects less distinct, particularly those in the upper part of the field of vision. The first result is an advantage at the moment when passing a vehicle going in the opposite direction but the second is not desirable on the open road where highway signs and overhanging obstructions must be easily visible. Prismatic shaped lenses, which employ this principle, are, therefore, not altogether satisfactory except just for the short time an oncoming vehicle is approaching.

A device is employed in the Cadillac which makes use of the advantage of the third principle but which eliminates the disadvantage of having the rays permanently deflected. The reflectors in the head lamps are pivoted so that they may be tilted, and are controlled by a lever on the steering column. When the road is clear and the illumination of the distant road is desired, the reflectors direct the light straight ahead. When a vehicle traveling in the opposite direction approaches, by simply raising the lever on the steering column the reflectors are tilted down, deflecting the rays below the level of the occupants of the approaching car and increasing the illumination directly in front of the car where it is most needed.

In a few states the law specifies that at no time shall there be any glaring rays higher than 42 inches above the road at a point 75 feet ahead of the car. When in the tilted position, the Cadillac head lamps conform to this requirement.

The head lamp reflector control is adjusted when the car is assembled and should require no further attention.

## *Focusing Headlamps*

The adjustment for focusing the headlamp bulbs is near the top of the lamps and is accessible after removing the lamp door.

To make the adjustment, run the car head on towards, and at right angles to, a high fence or building, and stop when within from fifteen to twenty feet from it. Then with the tilting reflector in the straight ahead position, change the adjustment until the bulb is in the proper position.

If in turning the screw to the right, the rays of light appear to spread out, it indicates that the bulb is too far back in the reflector and that it should be brought forward. To do this, turn the adjusting screw to the left until the proper rays are shown.

If the adjusting screw be turned to the left and the rays appear to spread out, it indicates that the bulb is too far forward and it should be brought back. To do this, turn the adjusting screw to the right until the proper rays are shown.

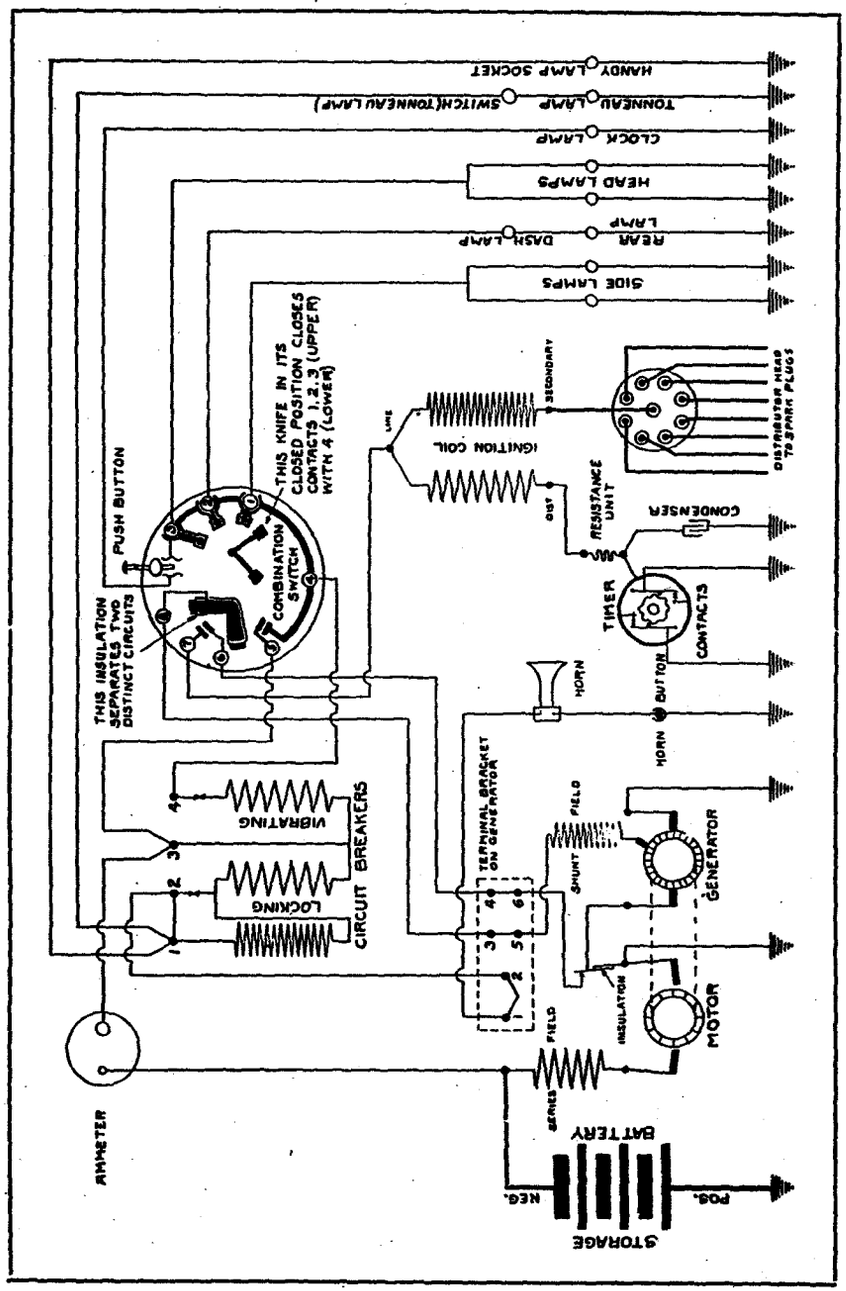



*Fig. 49. Circuit Diagram.*



### *Cleaning Reflectors*

The reflectors in the head and side lamps are plated with pure silver. In polishing extreme care must be used in selecting materials which will not scratch the silver.

Powdered dry rouge and a chamois skin are recommended. If the reflectors are tarnished, moisten the rouge with alcohol, and apply with the chamois. Then polish with a dry chamois and rouge.

The chamois should be soft and must be kept free from dust. Do not use the chamois for any other purpose.

### *Socket for Portable Lamp*

A socket for the portable lamp is attached to the back of the instrument board just to the right of the hand air pump.

### *Lamp Bulbs*

It is recommended that bulbs for the lamps be purchased from a Cadillac dealer. In any event bulbs should be used which have the correct voltage and candle power rating. The following is a table of voltage and candle power for the lamps in the lighting system:

| *Lamps* | *Voltage* | *Candle Power* |
|---|---|---|
| Head | 7 | 18 |
| Side | 8 | 6 |
| Speedometer | 4 | 2 |
| Tail | 4 | 2 |
| Clock | 8 | 2 |
| Tonneau | 8 | 2 |
| Portable | 8 | 6 |
| Dome, enclosed cars | 8 | 6 |
| Quarter, enclosed cars | 8 | 2 |

## IGNITION SYSTEM

The ignition system embodies the following elements: A source of current, the generator, or at low speeds, the storage battery; an ignition timer, which interrupts the low tension current at the proper instant to produce a spark in the high tension circuit; an induction coil, transforming the primary current of six volts into one of sufficient voltage to jump between the points of the spark plugs; a condenser, which assists the induction coil to raise the voltage, and which protects the contact points of the ignition timer from burning; and a high tension distributor which directs the distribution of the high tension current to the spark plugs in the respective cylinders.

### *Ignition Switch*

The current for ignition is controlled by means of the right hand lever on the combination switch on the instrument board. This lever also controls the generator circuit as explained under "Motor Generator" on page 87.

## *Distributor and Timer*

The distributor and timer, Fig. 50, are carried on the fanshaft housing and are driven by the fanshaft through spiral gears.

The distributor consists of a cap or stationary head of insulating material and a rotor of the same material which turns with the timer shaft. The distributor head carries one contact in the center and eight additional contacts placed at equal distances about the center. (Only two of these contacts are shown in Fig. 50.) The center contact is connected to the high tension terminal on the ignition coil. The eight remaining contacts are connected to the spark plugs in the cylinders. The center contact is provided with a spring plunger which is in constant communication with a plate on the rotor. This plate carries at its outer end a contact button. As the rotor revolves, the contact button slides over the eight outer contacts in the distributor head, consecutively completing the high tension circuit to each of the spark plugs from the ignition coil.

The timer, by which the low tension current is interrupted at the proper time to produce the spark, is beneath the rotor. An eight lobed cam "B," Fig. 51, on the timer shaft, operates two contact arms "C" and "D." As the cam revolves, these arms alternately complete and break the primary circuit. The cam is held in place by the lock screw "A."

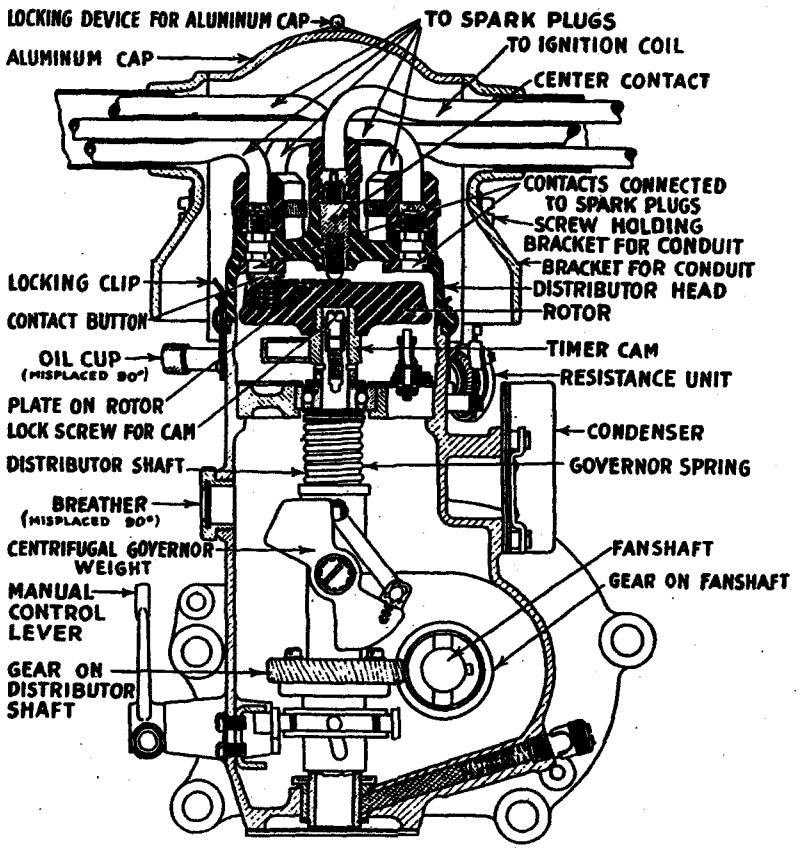



*Fig. 50. Distributor and Timer, Sectional View.*



Two sets of timer contact points are provided. The object is to distribute over two sets the current which would otherwise pass through one. This greatly lessens wear and burning of the points.

The spark timing is automatically controlled by a centrifugal governor which advances or retards the position of the timer cam relative to the driving shaft, as the engine speed increases or decreases. (See under "Automatic Spark Control," page 16.) A spark lever at the steering wheel is provided, however, by which the timing may be still further advanced or retarded. This spark lever is connected to the manual control lever at the left of the distributor housing.

## *Adjustment of Timer Contact Points*

The distributor head is protected by an aluminum cap, to which are attached the conduits which carry the high tension wires to the spark plugs and ignition coil and the low tension wire from the ignition coil to the resistance unit. The timer contact points are accessible after removing the aluminum cap, the distributor head and the rotor. To do this proceed as follows:

Remove the screws holding the conduit brackets to the aluminum cap. Move the locking device on top of the cap to one side and remove the cap. Press back the finger of the clip on the left side of the distributor head and rotate the head until both clips are opposite the flat places on the head. Then lift the head straight up. Remove the rotor by carefully lifting it straight up. The contact points are then accessible, appearing as shown in Fig. 51.

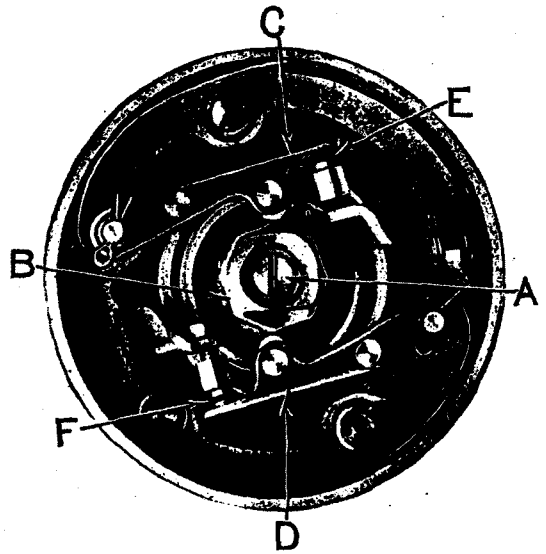



*Fig. 51. Timer Contacts, Distributor Cap and Rotor Removed.*

## *Method of Adjustment*

To set the contact points proceed as follows:

Crank the engine by hand until the contact arms "D" and "C" are directly on top of lobes of the cam "B." Then adjust the contact points at "E" and "F" so that they stand twenty thousandths of an inch apart.

Both sets of contact points should be adjusted exactly alike.

*Do not file or grind the contact points.* To clean the points remove them and simply rub them over an oil stone two or three times. Then replace and adjust, following instructions given.

It is a good plan after adjusting the timer contact points to check the ignition timing. See under "Timing Ignition," page 74.

### *Timing Ignition*

Unless the timer contact points are in proper adjustment they should be readjusted before proceeding to time the ignition.

To time the ignition proceed as follows:

Move the spark lever to the extreme left on the sector; open the compression relief cocks on the cylinder blocks, and crank the engine by hand until the piston in No. 1 cylinder is on firing center. (No. 1 cylinder is the one nearest the radiator in the left hand block of cylinders.)

Next remove the distributor cap and head; also the rotor, and loosen the lock screw "A" just enough to allow the cam "B" to be turned by hand after the rotor is fitted. (The lock screw should not be loosened enough to allow the cam to turn on the shaft when the engine is cranked by hand.)

Then replace the rotor and turn it by hand until the distributor brush in the rotor is directly under the terminal marked No. 1 on the distributor cover.

Replace the distributor cover, and move the spark lever to the extreme right on the sector.

Then switch on ignition; hold the high tension wire to the spark plug in No. 1 cylinder about one-eighth of an inch away from the cylinder casting and crank the engine slowly by hand in the direction in which it runs. Stop cranking immediately a spark occurs between the wire and the casting. (It will be necessary to crank the engine nearly two complete revolutions before the spark occurs.)

If the cam "B" is properly set a spark will occur when a point on the flywheel one and twenty-one thirty-seconds inches in advance of the center line for No. 1 cylinder is directly under the pointer attached to the crank case of the engine. This point for each cylinder is marked on the flywheel by the letters "IG|A." (See Fig. 41.)

If the spark occurs before this, rotate the cam "B" slightly in a counter clockwise direction to correct the adjustment. If the spark occurs later than this, rotate the cam slightly in a clockwise direction.

After the adjustment has been properly made, lock the cam securely to the distributor shaft by the lock screw "A."

After locking the adjustment it is a good plan to check the timing by fully retarding the spark lever; in other words moving it to the extreme left on the sector, holding the high tension wire to the spark plug in No. 1 cylinder about one-eighth of an inch away from the cylinder casting, and again cranking the engine slowly by hand in the direction in which it runs, stopping immediately a spark occurs.

If the ignition is properly set the spark will occur under these conditions when the center line on the flywheel for No. 1 cylinder is directly under the pointer attached to the crankcase, or has passed the pointer.

*Caution*—Do not set the ignition so that the spark occurs before center with the spark lever at the extreme left on the sector.

### *Resistance Unit*

The resistance unit is a coil of resistance wire wound on a porcelain spool as shown in Fig. 50. Under ordinary conditions it remains cool and offers little resistance to the passage of current. If for any reason the ignition circuit remains closed for any considerable length of time with the engine not running, the current passing through the coil heats the resistance wire, increasing its resistance to a point where very little current passes, and insuring against a waste of current from the battery and damage to the ignition coil and timer contacts.



### *Ignition Condenser*

The purpose of the condenser in the ignition system is to protect the timer contact points against the corrosive action of sparking and to utilize the tendency to spark to build up a higher voltage in the high tension circuit than would otherwise be obtained.

The ignition condenser is mounted on the right hand side of the distributor housing in a waterproof casing. (See Fig. 50.) It consists of layers of tinfoil separated by sheets of paraffin paper. Alternate layers of tinfoil are connected to opposite terminals. The current does not pass through the condenser and on test the terminals should show open circuit.

There are no adjustments in connection with the condenser and it requires no attention.

### *Ignition Coil*

The ignition coil serves to transform the low voltage current in the primary circuit to a current of high voltage in the secondary circuit. The coil consists of a primary winding of coarse wire wound around an iron core in comparatively few turns, and a secondary winding of many turns of fine wire, also the necessary insulation and terminals for wiring connections.

The ignition coil is mounted on the inner face of the dash and should require no attention except occasional inspections to insure that there are good connections between the wires and terminals.

### *Spark Plugs*

Spark plugs should be kept clean. When carbon or soot is permitted to collect on them, it causes a short circuiting of the current and prevents the proper ignition of the charge in the cylinder. A good method of cleaning plugs is to wash them in alcohol.

In order to get the best results the points on the spark plug should be .028 of an inch apart. If the points are too close together, the engine will miss under a light load and when idling. If the points are too far apart, it will miss under heavy loads, and when the throttle is opened quickly for acceleration.

## CIRCUIT BREAKERS

The circuit breakers are mounted on the inner face of the dash. These are protective devices which take the place of fuses.

The circuit breakers prevent the discharging of the storage battery, damage to the wiring to the horn, lights and the ignition apparatus, or to any of these parts in case any of the circuits to or in these parts become grounded.

As long as only a normal amount of current is used for horn, lights and ignition the circuit breakers will not open. In the event of a ground, an abnormally heavy current is conducted through one of the circuit breakers thus producing strong magnetism which attracts the armature and opens the contact. This cuts the flow of current.

The circuit breaker protecting the horn, handy lamp and tonneau lamp circuit is known as a lockout circuit breaker. In case of a ground in any of these circuits, the breaker opens and remains open until the ground is removed.

The circuit to the ignition apparatus and remainder of the lights is protected by a vibrating circuit breaker. In case of a ground in any of the circuits protected by the vibrating circuit breaker, the breaker will start to vibrate and will continue to vibrate until the ground is removed.

## GENERATION OF CURRENT

### *Ammeter*

When the car is standing with lights turned on, the ammeter, which is located on the instrument board, indicates on the "Discharge" side of the dial the amount of current being drawn from the storage battery for this purpose. When the ignition switch is turned on the ammeter indicates, in addition, the current used in slowly rotating the armature of the motor generator. When the starter button is pushed down current is no longer required for slowly rotating the armature of the motor generator. The ammeter then indicates only the current used for the ignition and lights (if turned on). The ammeter does not indicate the amount of current used in the cranking operation.

Before the engine is running fast enough to generate sufficient current to equal the current demand, the ammeter indicates on the "Discharge" side the amount of current being drawn from the storage battery. When the engine has attained a speed sufficient to generate current to more than equal the demand, the ammeter indicates on the "Charge" side the excess current which passes to the storage battery and recharges it.

Ordinarily, with all lights switched off, sufficient current is generated to start recharging the battery when the car is operated in high gear at speeds between four and six miles per hour and, of course, at much lower speeds when the car is operated in low or intermediate gear. With all lights turned on sufficient current is generated to take care of the requirements at a speed of ten to fifteen miles per hour and at speeds greater than this the surplus current passes through the storage battery and recharges it. In other words, the ammeter indicates the rate at which the storage battery is being charged or discharged.

To determine the total output of the generator turn off all the lights and add the amount of current used for ignition, i. e., two to three amperes, to the ammeter reading.

### *Current Regulation*

The generating capacity of the generator is regulated by means of a third brush on the generator commutator. (See Fig. 46.) The position of this brush relative to the other two generator brushes determines the maximum output of the generator, the length of the brush arm being adjustable. The brush arm is properly adjusted when the car is assembled and should not require readjustment unless its position is altered. To determine whether readjustment is necessary proceed as follows:

Start the engine in the usual manner. With all the lights turned off slowly increase the speed of the engine by means of the hand throttle lever, meanwhile observing the hand of the ammeter on the instrument board. (*Do not race the engine.* There is no worse abuse and it is unnecessary in this adjustment to run the engine faster than 1500 revolutions per minute.) The current indicated by the ammeter will increase with the speed of the engine to a point between 950 and 1200 revolutions per minute, and will then decrease. If the amount of current indicated by the ammeter at the maximum point is greater than 18 amperes, stop the engine and readjust the third brush as follows:



Remove the generator front end top cover. Loosen the two screws which hold together the two parts of the third brush arm and shorten the brush arm. After moving the third brush to an approximately correct position, press the brush down so that it makes even contact with the commutator, and hold it down while tightening the screws in the brush arm. The purpose of this is to have the curvature of the end of the brush conform as closely as possible to that of the commutator.

After setting the third brush, sand it in with a strip of No. 00 (fine) sandpaper slightly wider than the brush. Pass one end of the strip of sandpaper down between the right hand side of the front casing of the generator and the pin on which the third brush arm pivots, then over to the left and between the third brush and the commutator. The sand side of the sandpaper should be up. Then pressing down firmly on the third brush, draw the sandpaper from under the brush by pulling on the free end of the sandpaper. Repeat this operation until there is even contact between the brush and commutator. Usually five or six times will be sufficient.

Start the engine. Again slowly accelerate the engine and check the maximum current. If it is still greater than 18 amperes, reset the third brush and sand it in again.

If the maximum current indicated by the ammeter is less than 18 amperes and the specific gravity of the battery repeatedly shows that the battery is not being properly charged, lengthen the brush arm. Do not, however, lengthen the brush arm unless the condition of the battery makes it necessary and under no circumstances adjust it so that the ammeter indicates a maximum current of more than 18 amperes with all lights turned off. A greater amount of current may result in serious injury to the motor generator.

## STORAGE BATTERY

### *General Description*

The storage battery consists of three cells, each containing thirteen plates—six positive and seven negative—contained in a wooden box, which is carried in a compartment in the left hand dust shield. The cover of this compartment forms a part of the dust shield and may be removed after unscrewing the two nickel-plated screws with a screw-driver.

The battery is designed especially for the Cadillac-Delco electrical cranking, lighting and ignition system and is made by the Electric Storage Battery Co. of Philadelphia, Pa., whose products for the trade are known as "Exide" batteries.

The specific gravity of the acid solution in the battery is an indication of the state of charge of the battery. (See under "Hydrometer Syringe.") In a fully charged battery the specific gravity should be from 1.270 to 1.290. If the specific gravity registers from 1.150 to 1.170 it indicates that the battery is practically discharged. A battery discharged below a specific gravity of 1.150 will not crank the engine nor will it burn the lights to full candlepower when the engine is not running.

*Caution*—Never run the engine with the storage battery disconnected or while it is off the car. Very serious damage to the motor generator may result from such action. Do not remove the motor generator or attempt any adjustment of the circuit breakers or remove any of the wires to the circuit breakers, without first disconnecting the storage battery.

## *Adding Water to Storage Battery*

The acid solution in the battery must always cover the plates and the level of the acid solution should be kept even with the bottom of the filling tubes. Water should be added frequently enough to keep the level up to this point. *Do not add acid.* Ordinarily water should be added every 1,000 miles, but it should be added more frequently if found necessary. Usually it will require only a teaspoonful or so of water; in hot weather it may require more Be sure to replace and tighten the filling plugs after adding water.

To remove a filling plug, turn it as far as possible in the counter-clockwise direction, then lift it straight up. To replace, hold it so that the large arrow is perpendicular to the center line of the car, set the plug in place and turn it in the clockwise direction until tight.

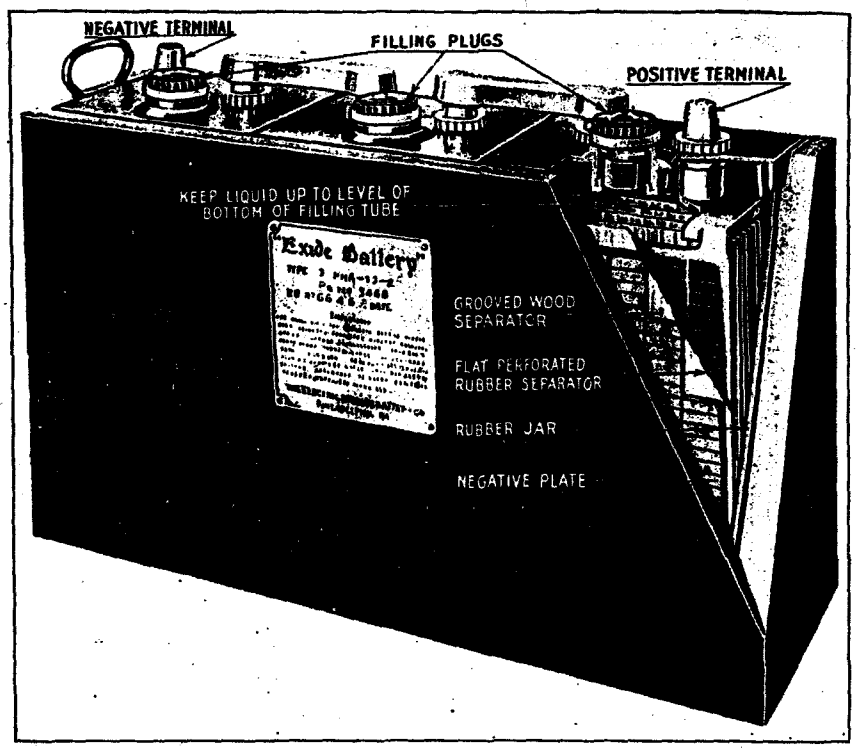



*Fig. 52. Storage Battery, Sectional View.*

If a plug is left out or is loose, the acid solution will escape from the cell, especially when the battery is being charged. If a plug is lost or broken, you should obtain a new one and install it as soon as possible.

If one cell regularly requires more water than the others, thus lowering the specific gravity of the acid solution in that cell, a leaky jar is indicated. Even a very slow leak will in time result in the loss of all the acid solution in the cell. A leaky jar should immediately be replaced by a new one.

The water for filling the battery must be pure. Distilled water, melted artificial ice or fresh rain water are suitable for this purpose. If rain water is used, it should not be allowed to come in contact with any metal. It should not be caught from a metal roof or in a metal receptacle.



Never keep the water in a metal container, such as a metal bucket or can. It is best to get a bottle of distilled water from a druggist or from an ice plant. A quart will last a long time. The whole point is to keep metal particles out of the battery. Spring water, well water or hydrant water from iron pipes generally contains iron and other metals in solution, which will ultimately cause trouble if used.

## *Replacing Acid Lost by Spilling*

If any of the acid solution has been spilled or has leaked from a cell, replace the loss with freshly mixed solution and follow with an overcharge by running the engine for several hours or by charging the battery from an outside source. (See Fig. 54. Also see under "Personal Danger in Running Engine in Closed Garage," page 52.)

The specific gravity of the acid solution used for replacing the loss should be the same as that of an adjacent cell. This can be determined by the use of an hydrometer syringe (Fig. 53).

The acid solution may be prepared by mixing chemically pure sulphuric acid, which has a specific gravity of 1.840, and distilled water. The proportion for an acid solution having a specific gravity of 1.280 is one part of chemically pure acid and three parts (by volume) of distilled water. *The acid must always be poured slowly into the water. Do not pour the water into the chemically pure acid.*

If, after mixing the acid solution as described above, a solution of a lower specific gravity is desired, it may be prepared by adding additional water to the mixture. But do not under any conditions pour water into the chemically pure acid.



*Fig. 53. Hydrometer Syringe.*

A glass, earthenware or other acid-proof vessel, should be used for mixing. After mixing, the acid solution should be allowed to cool thoroughly before using.

## *Hydrometer Syringe*

An hydrometer is an instrument for testing the specific gravity of a liquid. An hydrometer syringe is an hydrometer specially designed for convenience in testing the specific gravity of the acid solution in storage batteries. Hydrometer syringes are not a part of the electrical system but can be purchased from this company.

The hydrometer syringe, Fig. 53, is shipped unassembled and to assemble, hold the glass barrel, to which is attached the rubber bulb, in a horizontal position, and insert the hydrometer stem end first. Wet the soft rubber plug which is attached to the hard rubber pipette (nozzle) and force the rubber plug, grooved end first, into the end of the glass barrel as far as it will go, or until it strikes the shoulder of the barrel. It is important not to force the pipette too much in making this attachment, as the end of the pipette must not extend beyond the base of the grooves of the rubber plug; otherwise the flow of the liquid will be retarded in emptying the hydrometer syringe.

After removing the filling plug from the cover of the cell, compress the rubber bulb of the syringe and insert the pipette in the solution of the cell to be tested. Holding the instrument as nearly vertical as possible, gradually lessen the pressure on the bulb until acid solution rising in the barrel causes the hydrometer to float. In general, only enough acid solution should be drawn to float the hydrometer free of the bottom by about one-half to three quarters of an inch. The specific gravity reading is taken on the hydrometer at the surface of the acid solution in the glass barrel.

If the acid solution is below the top of the plates, or so low that enough cannot be drawn into the barrel to allow of a proper reading of the hydrometer, fill the cell to the proper level (see Fig. 52) by adding pure water, then do not take a reading until the water has been thoroughly mixed with the acid solution. This can be accomplished by running the engine for several hours.

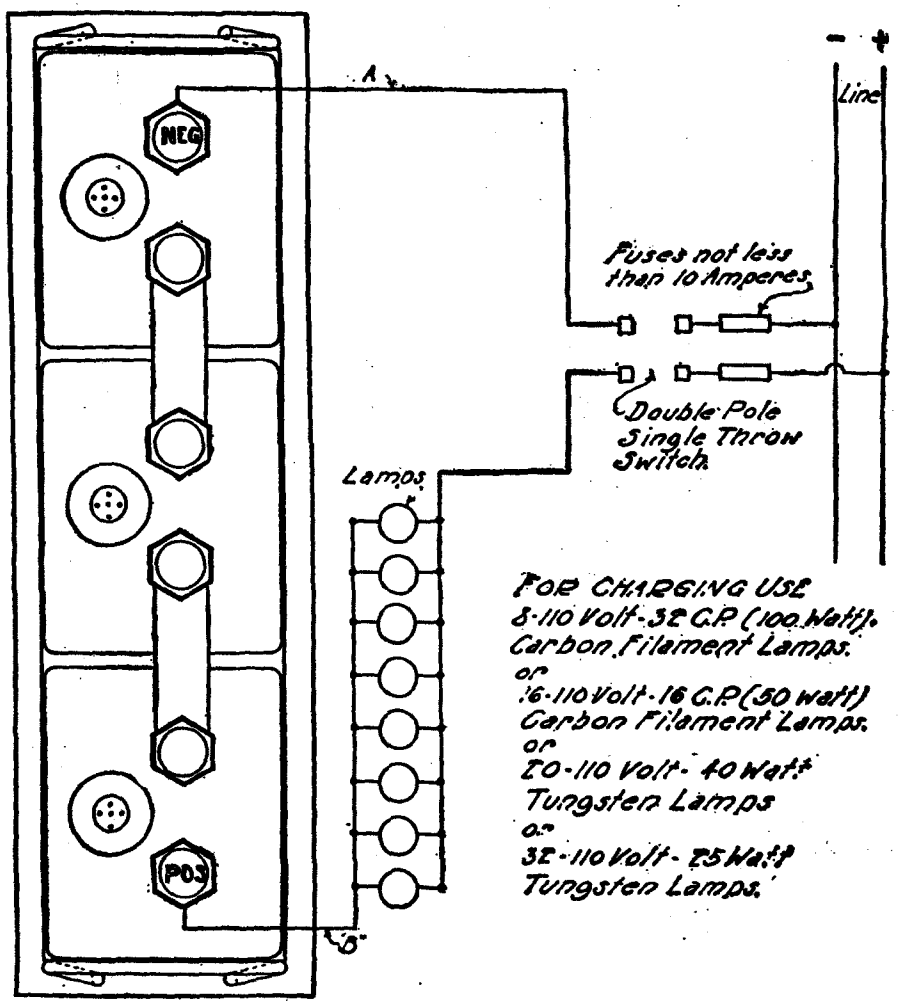



*Fig. 54. Diagram of Connections for Charging Battery from 110 Volt D. C. Circuit.*



## *Charging from an Outside Source*

It is necessary that the charging be done with *direct current.* The simplest method when there is 110 or 120 volt direct current available, is to connect eight 110 volt, 32 candlepower, 100 watt carbon lamps in parallel with each other and in series with the battery to be charged, this combination giving approximately the proper charging rate—8 amperes. The positive terminal of the battery must be connected to the positive side of the charging circuit, and the negative terminal to the negative side. *Very serious injury to the battery will result if connected in the reverse direction.* The terminals of the battery are stamped "Pos." and "Neg."

To determine the polarity of the charging circuit, if a suitable voltmeter is not at hand, dip the ends of the two wires "A" and "B" (Fig. 54) into a glass of water in which a teaspoonful of salt has been dissolved, care being taken to keep the wires at least an inch apart. When the current is turned on, fine bubbles of gas will be given off from the negative wire.

The diagram (Fig. 54) illustrates just how the connection should be made. The charge should be continued until all the cells have been "gassing" or bubbling freely for five hours, and there is no further rise in the voltage of the battery or specific gravity of the acid solution over the same period. A battery in good condition in a discharged state will require about ten hours of re-charging. If it has stood in a discharged condition for several weeks, it will require from twenty-five to fifty hours' charging—all depending upon the condition of the battery and the length of time it has stood discharged.

If only alternating current is available, a current rectifier must be used. Consult your city electrician regarding this matter.

*Caution:*—Never run the engine with the storage battery disconnected, or while it is off the car. Very serious damage to the motor generator may result from such action.

## *Preparing Battery for Winter Storage*

When the car is stored for the winter the level of the acid solution should be even with the bottom of the filling tubes. (See under "Adding Water to Storage Battery," page 78.) If water is added it should be added just before the last time the car is used so that it will be thoroughly mixed with the acid solution. When the car is stored, the specific gravity of the acid solution should register from 1.270 to 1.290. In this condition there is no danger of the acid solution freezing. The specific gravity of water is 1.000 and water freezes at 32 degrees F. above zero.

*Unless the battery is fully charged or nearly so it is probable that the acid solution in the battery will freeze and cause extensive damage.*

The following is a table of the freezing temperatures of sulphuric acid and water solutions of specific gravities from 1.050 to 1.300.

| Specific Gravity (Hydrometer Reading) | Freezing Temperature (Degrees Fahr.) |
|---|---|
| 1.050 | +27° |
| 1.100 | +18° |
| 1.150 | + 5° |
| 1.164 | 0° |
| 1.200 | —17° |
| 1.250 | —61° |
| 1.275 to 1.300 | |

The battery should be charged every two months during the "out of service" period, either by running the engine or charging from an outside source (Fig. 54). If either of the above is impossible, and there is no garage equipped for charging batteries to which it may be conveniently sent, the battery may be allowed to stand without charging during the winter, provided the specific gravity of the acid solution registers from 1.270 to 1.290 at the time the car is laid up. Much better results and longer life from the battery will be obtained by giving the periodic charges.

The wires of the battery should be disconnected during the "out of service" period, as a slight leak in the wiring will discharge the battery.

### *Placing Battery in Service Again*

Before putting the battery into service again, inspect it and add water, if necessary. In placing the battery on the car, care should be taken not to tighten the hold down bolts too tight. If the battery has not been kept charged during the winter, it will be advisable to give it a fifty-hour charge at a four-ampere rate from an outside source before putting it into service again. Make sure that the terminals are free from corrosion and that good connections of the wires are made.

The corrosion, which is a greenish deposit, can be removed from the bolts and terminals by placing them in a solution of water and bicarbonate of soda (cooking soda).

The corrosion can be removed from the posts by saturating a piece of cloth with the solution and wiping them off. Do not allow any of the solution to get into the cells of the battery.

After the parts are free from corrosion they should be washed in warm water, and a light coat of heavy grease or vaseline applied.

If the battery has received periodic charges, it will not be necessary to give it any special attention other than to fill it to the proper height with distilled water. After the car has been driven for a number of hours, read the specific gravity of the acid solution with the hydrometer syringe. It should register from 1.270 to 1.290 if the battery is fully charged.

### *Sediment*

The sediment which gradually accumulates in the bottom of the jars, should be removed before it reaches the bottom of the plates, as it is very harmful to the battery. The need of cleaning may be determined by inspection. Its necessity is indicated by lack of capacity, excessive evaporation of the acid solution and excessive heating when charging. When a battery requires removal of sediment, better results follow if the work is done at a place where they are thoroughly familiar with storage battery practice. If a battery is in need of cleaning or repairs, it is best to communicate with a Cadillac dealer or with the nearest Exide Depot, who will advise you where to ship the battery. *Do not ship batteries without receiving instructions.*

### *Exide Depots and Sales Offices*

The Electric Storage Battery Company, whose general offices and works are at Alleghany Avenue and 19th Street, Philadelphia, Pa., has service stations in towns of any considerable size where battery repair work is done, as well as sales offices and Exide battery depots in a number of the larger cities of the country where complete assembled batteries and repair parts are carried in stock. For the location of the nearest Exide depot or service station write the local Cadillac dealer or, if preferred, the Electric Storage Battery Company, at Philadelphia.



# TRANSMISSION AND CLUTCH

## TRANSMISSION

### *General Construction*

The transmission is the selective type of sliding gear. It provides for three speeds forward, and one reverse. The gear changes are accomplished by the movement of a hand lever at the driver's right.

The teeth of the driving gear "F" (Fig. 55) are cut on the large end of the clutch shaft "P" which revolves on the annular ball bearings "Y" and "N" and which turns with the crankshaft of the engine when the clutch is engaged, at which time the bearing "N" is inoperative. The gear "F" is in constant mesh with the countershaft gear "W." The countershaft gears "W," "U," "T" and "R" revolve together on two Hyatt high-duty, flexible roller bearings "S" on a stationary shaft. The roller bearings "S" are lubricated by oil forced through the tube "V," which revolves with the gear "U."

The main transmission shaft "B," which is coupled to the forward universal joint, is splined and carries the two sliding gears "A" and "C." The shaft "B" is supported by an annular ball bearing "Q" at the rear end and at the front end by a roller bearing "Z," which is housed in the rear end of the clutch shaft "P."

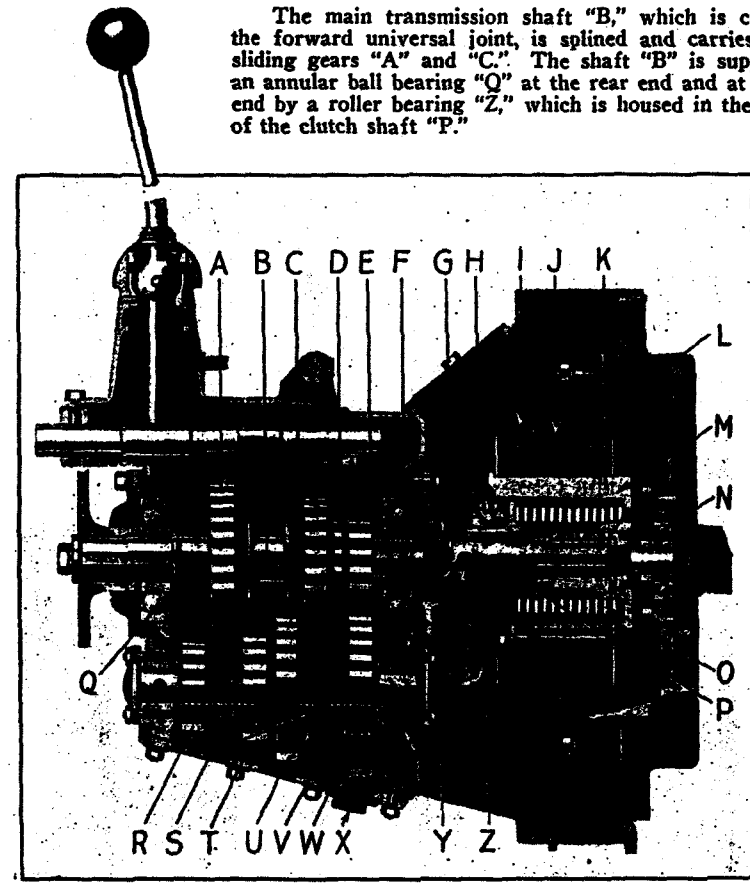



*Fig. 55. Transmission and Clutch Sectional View*

### *Operation*

The transmission control lever accomplishes the gear changes by moving the sliding gears "A" and "C." Fig. 55 shows these gears not in mesh with other gears, or in other words in the "neutral" position. The "neutral" position of the control lever is shown in Fig. 2. In "neutral" position the car is not driven even though the clutch be engaged.

Low gear is obtained by shifting the control lever into the position shown in Fig. 3. This movement of the lever slides the gear "A" forward from the position shown in Fig. 55, bringing it into mesh with the countershaft gear "T."

Intermediate gear is obtained by moving the transmission control lever as shown in Fig. 4. The first half of this movement slides the gear "A" towards the rear, returning it to the "neutral" position and leaving it in that position. The second half slides the gear "C" towards the rear from the neutral position, causing it to mesh with the countershaft gear "U."

High gear is obtained by moving the transmission control lever straight back from intermediate gear position as shown in Fig. 5. This slides the gear "C" forward out of mesh with the gear "U" and interlocks the internal teeth "D" on this gear "C" with the teeth "E" on the end of the clutch shaft "P." The clutch shaft "P" and splined shaft "B" then revolve as a unit on the annular ball bearings "Q" and "Y" and the drive is "direct."

It is necessary before each shifting of the gears to release the clutch, moving the control lever while the clutch pedal is held down. The necessity for this may be explained in the following manner. In meshing gears by sliding the teeth of one between the teeth of the other it is necessary that one of the gears be free to rotate at the same peripheral speed as the other. Only after the teeth are fully in mesh should the clutch be re-engaged.

If the gears to be meshed are both revolving at the same peripheral speed the meshing operation will be practically noiseless. The more closely this ideal condition is approached the more quietly may gear shifting be accomplished. This explains why it is advisable to pause for an instant in the neutral position when shifting from "low" to "intermediate." It also explains why the method given on page 13 for shifting from "high" to "intermediate," if followed, will result in a practically noiseless shift.

When stopping the car the control lever must always be shifted into the neutral position.

### *Lubrication*

Keep sufficient lubricant in the transmission case to bring the level up to the filling hole in the right hand side of the case. When the lubricant is up to the level of the filling hole the transmission case contains approximately two quarts. The best lubricant for the transmission is Cadillac Rear Axle and Transmission Lubricant. In its absence we recommend a mixture of steam cylinder oil and a small amount of cup grease mixed to such a consistency that the mixture flows easily at temperatures from 60° to 70° Fahrenheit.

## CLUTCH

### *General Description*

The main clutch is of the multiple disc dry plate type. The eight driving discs "I," Fig. 55, are covered on both sides with a friction material, composed largely of asbestos, and are driven by gear teeth in the clutch ring "K" which is bolted to the engine flywheel "L."

The nine driven discs "J" are not covered. These discs are carried on the clutch hub "M" and drive it through six keys on the hub. The clutch hub is keyed to the transmission shaft "P."



When the clutch is engaged by allowing the clutch pedal to come towards you, the spring "O" forces all of the discs together. The resulting friction between the discs "I" and "J" drives the transmission shaft "P" and the car, when the transmission control lever is in other than the neutral position.

There are no adjustments on the clutch proper. The clutch pedal should be adjusted occasionally to compensate for wear on the facings of the clutch discs. This adjustment is explained below under "Adjustment of Clutch Pedal Clearance."

There is but one point on the clutch for lubrication. This is the clutch release ball race "G." Instructions for lubricating this part will be found under "General Lubrication" on page 45.

### *Adjustment of Clutch Pedal Clearance*

After the car has been run for some time it may be found that the facings on the clutch discs have become compressed or worn to some extent and that consequently the clutch pedal strikes the stop screw before the clutch is fully engaged. When this condition exists a readjustment may be made as follows:

Remove the pin "N," Fig. 56, and unscrew the yoke "P," which is threaded on the rod "O," so that when the pin "N" is replaced the clutch pedal has a movement back and forth of one and one-quarter inches without starting to release the clutch. Secure the pin "N" with a cotter pin and tighten the lock nut "V."

### *Adjustment of Clutch Pedal Stop*

The clutch pedal stop screw "S" is adjusted when the car is assembled and requires no further attention. When in proper adjustment the stop screw "S" should hold the pedal arm "U" so that the distance "T" is about one-half inch on the Seven-Passenger, Roadster, Phaeton and Victoria and about one-quarter inch on all enclosed cars except the Victoria. If the adjustment has been changed, it may be readjusted in the following manner:

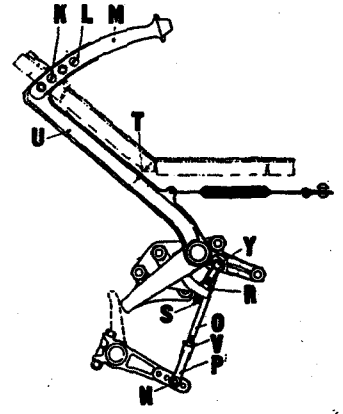



*Fig. 56. Clutch Control.*

Remove the pin "N" from the yoke "P," loosen the lock nut "R" and adjust the stop screw "S" so that the pedal arm "U" is held the required distance from the under side of the toe board at "T" when the pin "Y" is against the stop screw. Tighten the lock nut "R."

Then adjust the yoke "P" so that when the pin "N" is replaced the clutch pedal has a movement back and forth of one and one-quarter inches without starting to release the clutch. Secure the pin "N" with a cotter pin and tighten the lock nut "V."

### *Adjustment of Length of Clutch Pedal*

The clutch pedal is made in two parts slidingly adjustable to accommodate different drivers.

To change the length of the clutch pedal remove the bolts "K" and "L," Fig. 56, and slide the forked piece "M" in the desired direction. Do not pull "M" out so far that it is possible to put in only one bolt; two bolts are required properly to hold the parts.

There are four possible positions in this adjustment, Fig. 56 showing the extreme shortened position.

The brake pedal may be lengthened or shortened in the same manner.

## STEERING GEAR

### *Adjustment of Worm Thrust Bearings*

To take up the end play in the worm "K," Fig. 57, remove the plug "B," Fig. 58, and loosen the jamb nuts "J," and lock screws "A." Then with a screw-driver or something else suitable, screw down the adjusting collar "L," Fig. 57, which can be seen through the hole from which the plug "B," Fig. 58, was removed, until the proper adjustment is made.

Lock screws "A" are positioned in the steering gear housing so that when one is directly over a slot in the adjusting collar the other is between two slots. Therefore after adjusting the collar it will be necessary to select the proper screw for locking the adjustment. Both lock screws should be held from turning by locking the jamb nuts.

### *Adjustment of Worm and Sector*

The second adjustment is for taking up wear on the teeth of the worm "K" and sector "W," Fig. 57. The sector "W" has its bearing in an eccentric steel bushing and should wear occur, it may be taken up by turning this bushing so that it throws the sector towards the worm.

To do this proceed as follows: First turn the steering wheel so that the front wheels point straight ahead. Remove the locking screw "C," Fig. 58. As the bushing is assembled at the factory it is necessary to move the arm "D" down to tighten the adjustment.

If the wear on the teeth of the worm and sector is very great, it will be necessary to remove the steering arm "F" and to place the arm "D" in a different position on the hexagonal end of the eccentric bushing in order to bring the arm "D" in position so that it can be locked by the screw "C."

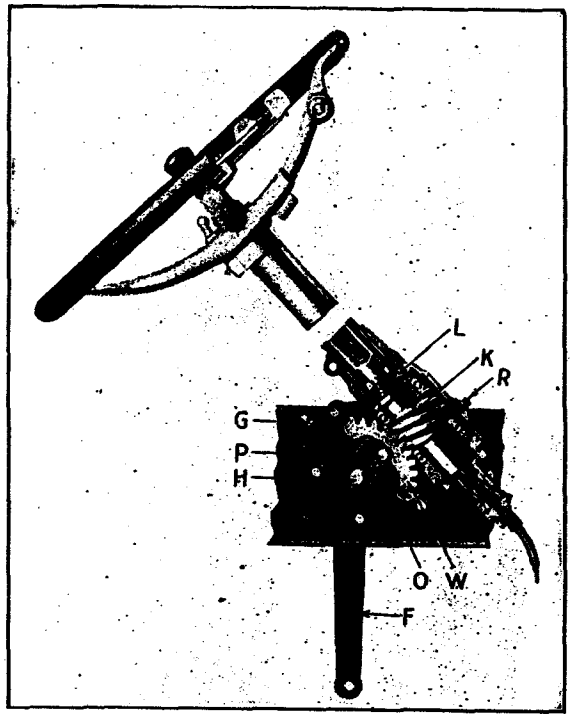



*Fig. 57. Steering Gear, Sectional View.*

After the adjustment is made properly be sure that the lock screw "C" is replaced and properly tightened.



### *Adjustment of Sector Shaft*

An adjustment is provided on the inner face of the steering gear housing for taking up end-play in the sector shaft.

To make this adjustment remove the locking arm "O," Fig. 57, and turn the adjusting screw in until the proper adjustment is made, after which the locking arm "O" should be replaced and the lock screw "P," replaced and tightened.

*Caution*—Do not turn the steering gear when the car is standing. This is not only unnecessary but is also bad practice.

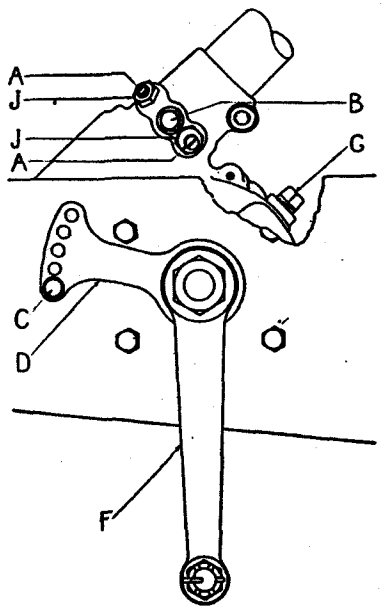



*Fig. 58. Steering Gear Housing and Arm.*

### *Lubrication*

The internal mechanism of the steering gear may be lubricated at "R" and "G," Fig. 57, after taking out the screw plugs. The hole at "R" is tapped to fit the nozzle of the oil gun. Cadillac Rear Axle and Transmission Lubricant mixed with about two or three per cent of flake graphite is a good lubricant for this part.

## WHEELS

### *Caution in Adjusting Timken Bearings*

When adjusting Timken Bearings, great care must be exercised not to get them tight. These bearings will revolve even when adjusted very tightly, but that condition is sure to prove disastrous. They should be adjusted so that a very slight amount of play or looseness may be discerned.

If, after a bearing has been adjusted to a point that is apparently correct, the locking device cannot be placed in position without changing the adjustment, it is far better to *loosen* the adjustment until it can be secured with the locking device than to *tighten* the bearing adjustment.

### *Lubrication*

Both the front and rear wheels should be removed every three or four thousand miles or at least every six months, the bearings examined and carefully lubricated with light grease. Cadillac Wheel Bearing Grease is recommended for this purpose. A few drops of lubricating oil should be put in occasionally through the oil holes in the rear wheels.

## FRONT WHEELS

### *Removing Front Wheel*

Jack up the axle until the wheel is free from the ground.

Remove the hub cap by unscrewing it.

Remove the lock nut "I," Fig. 59.

Remove the washer "K."

Remove the adjusting nut "L."

The wheel may now be removed.

In removing the right front wheel remove the speedometer driver "A," Fig. 65, after removing the hub cap.

Before replacing the wheel see that the bearings are clean and that they are filled with light grease. Be sure that the grease is free from dirt and grit.

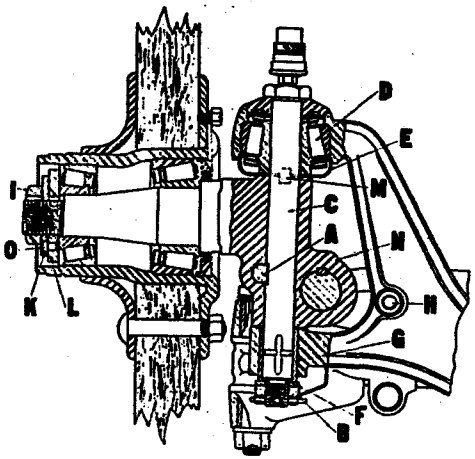



*Fig. 59. Front Left Spindle and Hub, Showing Bearings.*

### *Replacing Front Wheel and Adjusting Bearings*

In replacing the wheel adjust the nut "L" very carefully. (See under "Caution in Adjusting Timken Bearings," page 87.) Replace washer "K" being sure that one of the holes in the washer fits over the stud "O." Replace the lock nut "I" and tighten carefully.

The thread on the right hand spindle is a right hand thread; the thread on the left hand spindle is a left hand thread. Therefore, in tightening the adjusting and lock nuts, "I" and "L," they should be turned in the same direction in which the wheels turn when the car moves forward.

It is better to adjust Timken bearings a little too loose than tight. If, after the adjustment is apparently correct a hole in the washer "K" is not directly over the stud "O" it is best to loosen the adjustment rather than to tighten it.

### *Alignment of Front Wheels*

The ideal condition is to have the front wheels parallel to each other on horizontal lines passing diametrically through their centers. Under no condition should the wheels toe out. It is permissible to have them toe in, providing they do not toe in more than ⅛ of an inch in the diameter of the wheel. (See "Result of Improperly Aligned Front Wheels," page 24.)

Jack up the front axle until both wheels are clear of the floor and true up the demountable rims. (See under "Mounting Rim With Tire," page 28.)

Move the steering wheel to bring the left front wheel "A," Fig. 60, parallel with the frame "B." This may be determined by taking measurements "C" from the rim of the wheel to the frame.

Tie a string to a rear spoke of each front wheel directly back of the center of the wheel. Carry the strings inward between the spokes, back around the tires and then forward to points "D" as shown. Use strings that will extend exactly twelve feet in front of the tires. Bring the strings in until they *just touch* the forward edges of the tires at "E." The strings must be slightly above or below the hubs so as to clear them.



If the wheels are parallel, the distances "F" and "G" between the strings will be the same at points just ahead of the tires and at points at the ends of the strings.

Under no condition should the wheels toe in more than enough to allow the twelve foot strings to converge more than 1½ inches, that is, so that dimension "G" is not more than 1½ inches less than dimension "F."

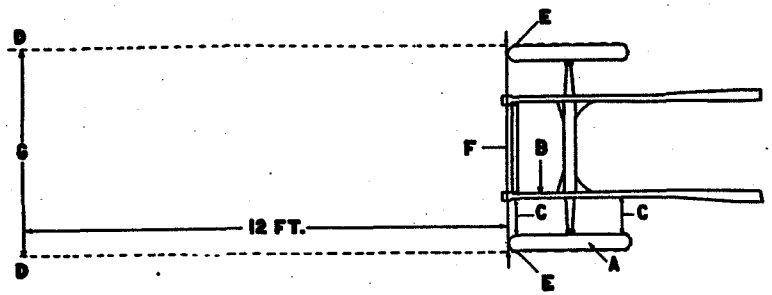



*Fig. 60. Diagram Showing Method of Aligning Front Wheels.*

Adjustment is provided in the parallel rod for aligning the front wheels. If adjustment is necessary and the left front wheel is disturbed, care should be taken to have this wheel parallel with the frame before readjusting the strings and taking measurements "F" and "G."

The front wheels camber about 1½ inches, that is, the measurement between the wheels at the top should be approximately 1½ inches greater than the corresponding measurement diametrically opposite at the bottom of the wheels.

## REAR WHEELS

### *Removing Rear Wheel*

Remove the lubricator "A," Fig. 61.

Remove the hub cap "B" by unscrewing it.

Remove the spring locking ring "K."

Withdraw the axle shaft "C."

Jack up the axle so that the wheel will clear the floor.

Remove the lock nut "D," the washer "E" and the adjusting nut "F."

The wheel can then be taken off.

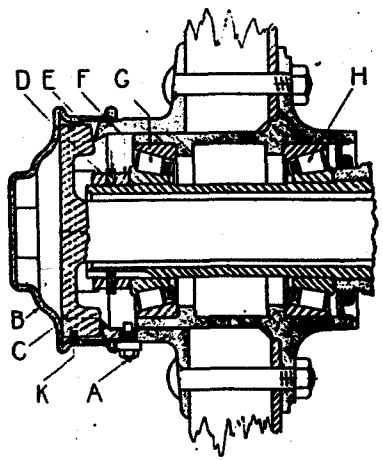



*Fig. 61. Sectional View of Rear Hub, Showing Bearings.*

### *Replacing Rear Wheel and Adjusting Bearings*

Before putting the wheel on again see that the bearings "G" and "H" are clean and filled with light grease which is free from dirt and grit.

In putting the wheel on again set the adjusting nut "F" very carefully. (See under "Caution in Adjusting Timken Bearings.") Place the washer "E" in position, and tighten the lock nut "D."

# BRAKES

## General Construction

There are two pairs of brakes. The regular service brakes, which are operated by the right pedal, contract upon the outside of the drums. The hand brakes, operated by a hand lever, expand within the drums.

Connections from the right pedal and hand lever are made through equalizing bars so that each drum will be gripped with practically the same pressure. While these equalizing bars compensate for a certain amount of inequality in the tension, it is desirable to adjust the brakes as nearly alike as possible.

The brake band linings can be renewed when necessary.

If the brake band linings become too dry and grip the drums too suddenly, apply a very small amount of a mixture of graphite and oil.

When the brake band linings are wet and muddy they are less effective than at other times. Hence more care must be exercised in driving at such times.

The brakes and all parts relating thereto should be examined and tested occasionally to be sure that they are in serviceable condition.

The joints and all working parts should be oiled occasionally to avoid any possibility of the parts rusting and sticking together. The internal brake joints are accessible after removing the small covers "F," Fig. 62, from the brake drums. Care should be taken not to apply too much oil to the internal brake joints, as it may get on the brake band linings and impair the efficiency of the brakes.

If the brakes are in good condition, either pair will offer sufficient resistance to lock and slide the wheels, but doing this is bad practice excepting in case of emergency, as it is very injurious to the tires.

The brake band linings should not be allowed to drag on the drums when released, as that will cause unnecessary wear.

The length of the brake pedal is adjustable to accommodate different drivers. To adjust it, see "Adjustment of Length of Clutch Pedal," page 85.

It is necessary that the rear wheel bearings be in proper adjustment before an adjustment of the brakes is made.

*Do not attempt to adjust the brakes by the pull rods, as that will not properly compensate for wear on the linings.*

## FOOT BRAKES

### (External Contracting)

## Ordinary Adjustment

Provision is made in each brake for its adjustment. Do not attempt to adjust the brakes by the pull rods. The brakes cannot be properly adjusted in this manner. To adjust each foot brake, proceed as follows:

Remove the cotter pin in the adjusting screw "A," Fig. 62, and turn the screw "A" until that part of the brake band lining opposite the screw just clears the drum. Adjust the two nuts "B" on the yoke bolt so that the lower part of the brake band lining just clears the drum.

Then adjust the nut "C" on the upper end of the yoke bolt so that the lever "D" is brought into the position shown in Fig. 62 when the brake is fully applied—i. e., so that the lower edge of the pin "T" and the upper edge of the pin "S" are tangent to an imaginary horizontal line shown at "X."



## Adjustment of Stop Screws

The position of the stop screw "E," Fig. 63, is adjusted when the car is assembled and requires no further attention unless its adjustment is altered. Adjustment for wear on the lining should be made as described above by the nuts "A," "B" and "C," Fig. 62; the stop screw "E" should not be adjusted to compensate for wear. If the stop screw "E" should be moved from its original position, it may be readjusted in the following manner:

First adjust the brake as explained above so that the lever "D," Fig. 62, is in the correct position when fully applied. Then release the brake. Remove the pin "A" in the yoke "B," Fig. 63, loosen the clamping screw "C" and push the stop "G" forward out of the way. Then adjust the stop screw "E" and the nuts "B," Fig. 62, so that the upper and lower parts of the brake band lining clear the drum by 1/32 of an inch.

Then pull the rod "H," Fig. 63, as far forward as it will go without moving the rods "K" and "L." Holding the rod "H" in this position, push the stop "G" down against the bracket "F" and tighten the clamping screw "C." Then adjust the yoke "B" so that when the pin "A" is replaced the brake pedal arm "U" is held 3/8 of an inch away from the under side of the toe board.

After the adjustments are completed, be sure to lock all adjusting screws and nuts and to insert and spread all cotter pins.

## HAND BRAKES

### (Internal Expanding)

## Ordinary Adjustment

Provision is made in each brake for its adjustment. Do not attempt to adjust the brakes by the pull rods. The brakes cannot be properly adjusted in this manner. To adjust each hand brake proceed as follows:

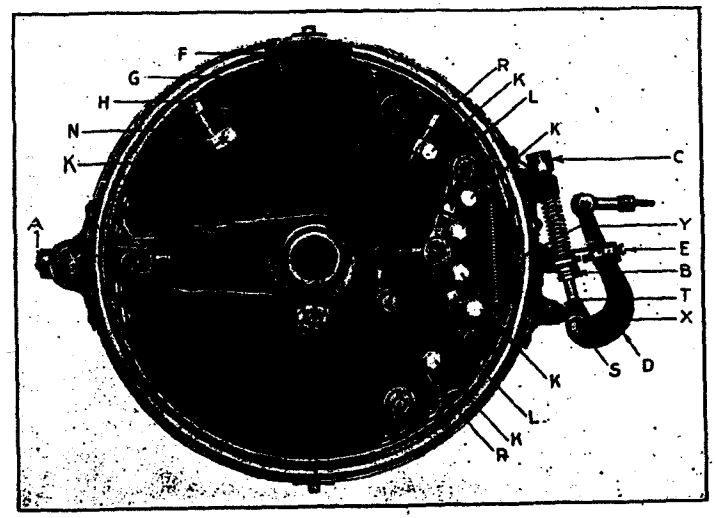



*Fig. 62. Internal and External Brakes.*

Place a jack under the rear axle housing and raise the axle so that the wheel can be turned by hand. Remove the cover "F," Fig. 62; this may be done by loosening the lock nut "G" and turning the bolt to the left about one-quarter of a turn, which releases the clamping bar "H."

Rotate the wheel until the opening gives access to the screw "J." Turn the screw "J" until that part of the brake band lining opposite the screw just clears the drum.

Rotate the wheel and through the opening loosen the seven locking screws "K." Then turn the two adjusting screws "L," which have right-hand threads on one end and left-hand threads on the other, so that when the brake is fully applied the center of the pin "M" stands 3 3/16 inches to 3¼ inches away from the inside of the brake drum at "Y." The screws "L" should be turned equally and in the same direction.

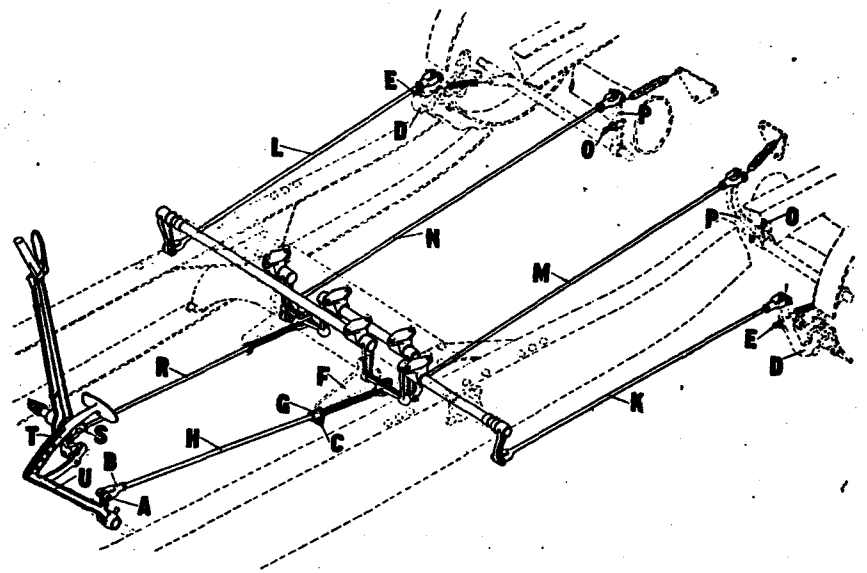



*Fig. 63. Brake Rods.*

Release the brakes and adjust the stop screws "R" so that the upper and lower parts of the brake band lining are equidistant from the brake drum. Adjust the stop screw "N" so that the head of the screw just touches the inside of the brake band. Tighten the seven locking screws "K" and replace the cover "F."

### *Adjustment of Stop Screws*

The stop screw "O," Fig. 63, is adjusted when the car is assembled, and requires no further attention unless its adjustment is altered. Adjustment for wear on the linings should be made as described above by the screws "J," "L" and "R," Fig. 62; the stop screw "O" should not be adjusted to compensate for wear. If the original adjustment of the stop screw "O" has been altered, it may be readjusted in the following manner:

First adjust the brake as described above by the screws "J" and "L," Fig. 62, but screw the stop screws "R" and "N" away from the brake band.

Then remove the pin "T" in the yoke "S," Fig. 63, and adjust the stop screw "O" so that when the brake is released the center of the pin "M," Fig. 62, stands 3 9/16 inches away from the inside of the brake drum.



Adjust the stop screws "R" so that the upper and lower parts of the brake band are equidistant from the brake drum. Adjust the stop screw "N" so that the head of the screw just touches the inside of the brake band. Tighten the seven locking screws "K" and replace the cover "F."

Then adjust the yoke "S," Fig. 63, so that when the pin "T" is replaced the upper end of the handle on the hand brake lever may be moved back one and one-quarter inches from its extreme forward position without moving the rods "M" and "N."

After the adjustments are completed, be sure to lock all adjusting screws and nuts and to insert and spread all cotter pins.

## UNIVERSAL JOINTS ON DRIVE SHAFT

The tubular drive shaft that transmits the power of the engine from the transmission to the rear axle is fitted with a Spicer universal joint at each end.

The purpose of the joints is to provide a flexible drive which is made necessary by the constantly changing alignment due to the play of the springs.

The general arrangement of the joints is shown in Fig. 64. The joints differ only in that the forward joint "B," which is attached to the transmission shaft, is provided with a sliding connection or slip sleeve "C," while the rear joint is welded to the drive shaft. A sliding connection is necessary to take care of the endwise motion of the drive shaft due to variation in the distance between the transmission and the rear axle caused by the action of the springs.

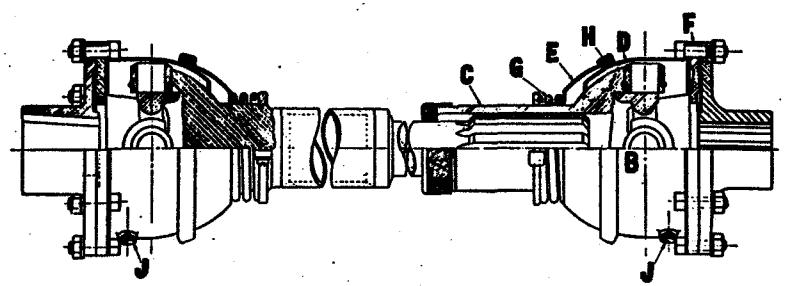



*Fig. 64. Drive Shaft and Universal Joints.*

The joints are protected by an inner housing "D" and an outer housing "E," both of pressed steel. The inner housing is bolted to the flange "F" and the outer housing fits over the end of the inner housing and is held in place and kept tight by means of a spring "G." The felt washer "H" is for the purpose of preventing grease from working out and dirt from getting in.

The joints are lubricated by grease contained in the housings. Filling holes "J" are provided. (See page 44 under "General Lubrication.")

As the construction of the joints is such that adjustments are unnecessary, no adjustments are provided.

If for any reason the drive shaft is dis-assembled, care should be taken in assembling it to have the "O" on the splined end of the shaft correspond with the "O" on the sleeve of the forward universal joint.

# FRONT AXLE

## *Adjustment of Stop Screws*

The stop screws "H," Fig. 59, at each end of the axle are for the purpose of limiting the angle at which the front wheels can be turned. The stop screw at the left end of the axle is for the purpose of limiting the angle at which the wheels can be turned to the right. The stop screw at the right end of the axle is for the purpose of limiting the angle at which the wheels can be turned to the left.

## *Removing and Replacing Spindle*

The illustration shows the construction of the front wheel hubs and bearings; the spindle bolts and the upper and lower bearings for the spindles.

The spindle bolt "C" is forced into the spindle "N" and is held from rotating in the spindle by the taper pin "A."

To remove a spindle, first jack up the axle until the wheel is clear of the floor. Remove the wheel. (See under "Removing Front Wheel," page 88.) Then remove the adjusting nut "B," drive out the taper pin "A" and drive out the spindle bolt "C."

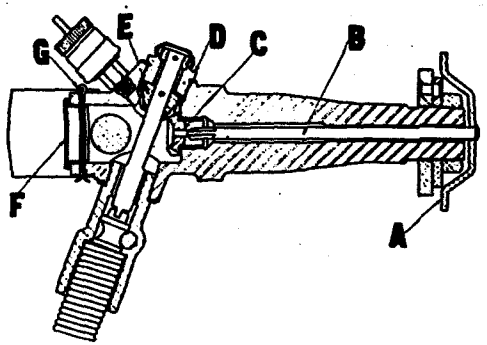



*Fig. 65. Front Right Spindle and Speedometer Driving Gears.*

To replace a spindle proceed as follows: Place the bearing "D," the retainer "E" and the key "M" in position in the axle yoke. Place the spindle in position and carefully drive in the spindle bolt "C," being careful that it is so turned that the flat place on it will be in the correct position to receive the taper pin "A" when driven in. Drive in the taper pin "A." Replace the adjusting nut "B" and adjust properly.

## *Adjustment of Spindle Bearing*

The bushing "G" is pressed into the axle forging. If there is too much end play in the bearing "D" draw up on the adjusting nut "B," pulling the bushing "G" up against the under side of the spindle. Then back off the adjusting nut "B" just enough to free the adjustment. (See under "Caution in Adjusting Timken Bearings," page 87.)

## *Speedometer Drive Gears in Right Spindle*

The flexible shaft to the speedometer is driven from the hub on the right-hand front wheel through the driver "A," Fig. 65, the shaft "B" and the gears "C" and "E."

To remove these parts from the spindle, proceed as follows:

Remove hub cap from the wheel.

Pull out driver "A."

Unscrew nut "D" and remove.



The gear "E" and the shaft to which it is attached will come out with the nut "D."

Remove the cotter pin "G."

Remove the cap "F."

The gear "C" may then be removed.

The parts may be assembled in the reverse order.

# REAR AXLE

## *General Construction*

The rear axle is of the full floating type. The wheels rotate on the axle housing. The axle shafts do not carry the weight of the car, but simply transmit the power from the differential to rotate the wheels.

## *Lubrication*

The level of the lubricant in the differential housing should be kept up to the filling hole in the rear cover plate. When the level of the lubricant is up to the filling hole the housing contains approximately three quarts. The best lubricant for the rear axle is Cadillac Rear Axle and Transmission Lubricant. In its absence, we recommend a mixture of steam cylinder oil and a small amount of cup grease mixed to such a consistency that the mixture flows easily at temperatures from 60° to 70° Fahrenheit.

## *Adjustment of Gear and Pinion Bearings*

In the design of the axle provision is made for adjusting the pinion and gear so that the teeth may be correctly meshed, and for locking all the adjusting nuts securely in position.

The large bevel gear "A," Fig. 66, on the gear mount "B," and the bevel pinion "C" on the driving shaft "D," are correctly meshed when the car is assembled, but after it has been in use for several thousand miles it may be found that the bearings "E" and "F," which take the end thrust of the gears, have become more permanently seated, causing end play in the pinion shaft "D" and side play in the gear mount "B." When this condition exists, bearings "E" and "F" should be readjusted.

If undue end play exists in the pinion shaft "D," the bearing "E" should be adjusted as follows:

Remove the two long clamping bolts on the pinion barrel and remove the cover plate giving access to the adjusting nuts "I" and "K." Hold the adjusting nut "I" from turning and turn up the adjusting nut "K" as far as possible without making the bearing "E" too tight. (See under "Caution in Adjusting Timken Bearings," page 87.) After the adjustment has been made replace the cover plate over the opening and tighten the clamping bolts.

If, after removing the rear cover plate "L," undue side play is found in the gear mount "B," the bearing "F" should be adjusted as follows:

Move the key "M" entirely out of the slots in the adjusting nut "N," loosen the cap screws holding the cap "O" and turn the adjusting nut "N" as far as possible without making the bearings too tight. (See under "Caution in Adjusting Timken Bearings," page 87.) After the adjustment has been made, make sure that the key "M" is replaced in one of the slots in adjusting nut "N" and that the cap screws holding the cap "O" are tightened and locked.

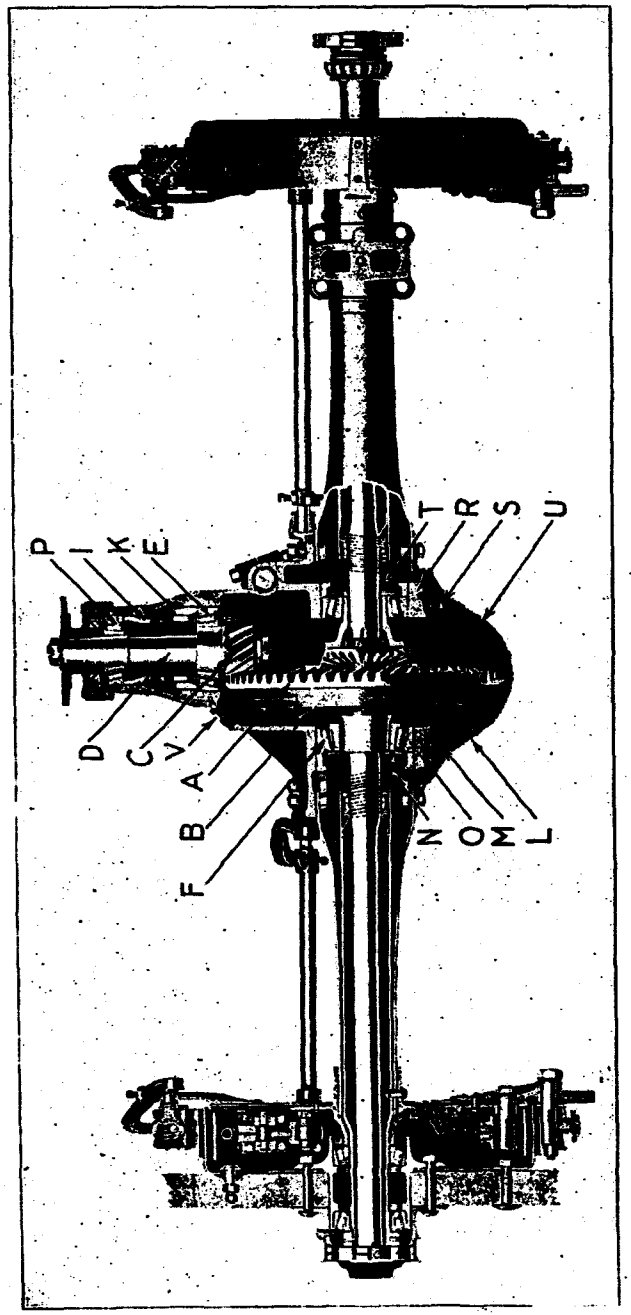



*Fig. 66. Rear Axle, Sectional View.*



### *Adjustment of Gears for Proper Meshing*

If, after adjusting the bearings "E" and "F," Fig. 66, it is found necessary to move the pinion "C" endwise or the bevel gear "A" sidewise in order to bring the gears into proper mesh, it must first be determined whether it is necessary to move the pinion, the large bevel gear, or both, and in which direction the gear or gears must be moved.

Bevel gears should be so adjusted that the large ends of the teeth of one gear are practically flush with the large ends of the teeth of the other gear, which can be determined by removing the peep-hole cover "V." Extreme care must be used in adjusting, as the tooth forms of the most accurately cut gears may be easily ruined by running them when not properly meshed.

In order to adjust the gears to the best advantage a crank should be attached to the forward end of the pinion shaft "D" so that the gears can be turned by hand and the adjustment tried until positions are found for the gears where they run smoothly and do not bind at any point.

If the bearings "E" and "P" on the drive shaft "D" are in proper adjustment, and if it is found necessary to move the pinion "C" endwise, proceed as follows:

Remove the clamping bolts on the axle housing and the cover plate covering the adjustment hole. Move the adjusting nuts "I" and "K" *together*, moving the pinion in either direction as required. If the adjusting nuts "I" and "K" are moved in the same direction and exactly together, the relative adjustment of the bearings "P" and "E" will not be altered.

When the proper position for the pinion has been found, replace the cover plate over the opening and tighten the clamping bolts.

If it is found necessary to move the large bevel gear sidewise, proceed as follows:

First loosen the bolts holding caps "O" and "R." Then move the keys "M" and "S" out of the slots in the adjusting nuts "N" and "T." The adjusting nuts "N" and "T" can now be turned, moving the gear mount with the gear in either direction as required. Be careful not to adjust the bearings too tight. (See under "Caution in Adjusting Timken Bearings," page 87.)

After the correct position for the large driving gear has been found be sure that the keys "M" and "S" are replaced in the slots in the adjusting nuts "N" and "T" and that the bolts holding the caps "O" and "R" are tightened and locked.

Replace the cover "L," and fill with Cadillac Rear Axle and Transmission Lubricant, bringing the level up to the top of the filling hole "U."

## STRAIGHTENING BENT PARTS

Modern automobile construction demands the use of the highest grades of alloy steels. A great advantage of alloy steels is that by properly heating and cooling and re-heating such steels great strength and durability are obtained. However, heat treatment must be given with full and accurate knowledge of the contents of the steel, which cannot be obtained in the ordinary repair shop. Therefore, if any part is heated outside of this factory for the purpose of straightening or for other purposes, the part at once loses the advantage which the original heat treatment gave it.

# SPRINGS

## *Spring Clips*

As a matter of life insurance for the springs, it is well to tighten all clip nuts at the end of the first 1,000 miles of travel and at the end of every 2,000 miles of travel thereafter.

## *Lubrication of Spring Leaves*

When springs are not lubricated water works its way in between the leaves and causes them to rust, often to such an extent that they become almost like solid pieces. This causes them to lose much of their spring action.

It is recommended that the springs be lubricated once every 500 to 1,000 miles by painting the edges and ends of the spring leaves with cylinder oil. A small, stiff brush should be used. After applying the oil to the springs the car should not be washed until it has been driven some distance to allow the lubricant to work in between the leaves.

It is also a good plan about once a year to have all the springs taken apart, the surfaces thoroughly cleaned and coated with a thick mixture of oil and graphite.

## *Adjustment of Snubbers*

The snubbers should be readjusted after the first 500 to 800 miles of travel. Further adjustment should not soon be necessary.

When the snubbers are adjusted there should be no passengers in the car, the radiator and gasoline tank should be full, the top up and there should be two spare tires in the tire holder. If no spare tires are carried it is best to have a light weight person sit in the middle of the rear seat during the adjustment.

To adjust the snubbers, pull the belt out of the housing as far as possible. Then allow two inches of the belt to return into the housing and insert a wedge between the belt and the housing to prevent more of the belt from being drawn in.

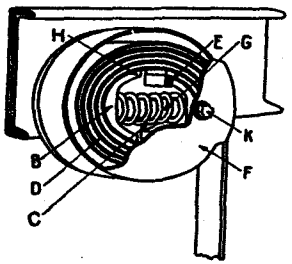



*Fig. 67. Gabriel Snubber.*

Remove the clamp on the belt at the axle and adjust the length of the belt so that all slack is taken out between the snubber housing and the axle. Replace the clamp, cut off the surplus belt and remove the wedge.

## *Lubrication of Snubbers*

Every 5,000 miles it is recommended that the snubbers be disassembled and lubricated with graphite grease in accordance with the following instructions:

Disconnect the snubber belt from the axle. Unscrew the cap screws which fasten the snubber base to the side bar of the frame and remove the snubber.



Clamp the base casting in a vise. Unscrew the cap screw "K," Fig. 67, on the snubber cover or housing "F" and remove the housing. Unwind the coils of the belt "D" and remove the sleeve casting "B" and the spring "C." Thoroughly lubricate the plunger "G," which slides in the sleeve "B." Lubricate the face of the casting "B" where it slides on the base casting. Replace the sleeve "B," making sure that the long arm "H" is opposite the end of the snubber belt where it is riveted at "E." Pack the coil spring "C" well with the grease.

Do not lubricate any surfaces which contact with the snubber belt except to place a small amount of grease on the rivets at "E" where the belt is fastened to the base casting.

Coil the belt "D" four and a quarter times around the base casting "A" and the sleeve "B" and work the coils a few times to make sure the coil spring compresses properly. Replace the cover "F" and the screw "K."

Bolt the snubber to the side bar and adjust it in accordance with the instructions given under "Adjustment of Snubbers."

CADILLAC MOTOR CAR COMPANY
1918-19 Instruction books
Type 57, 6th ed.

LIBRARY REFERENCE COPY
NOT TO CIRCULATE

# MANUAL

*of*

# CARE AND OPERATION

FOR OPERATOR'S USE

## TYPE 57

CONTENTS


| | | | |
|---|---|---|---|
| Part I. | Operation . . . | Page 7 |
| Part II. | Lubrication . . . | Page 25 |
| Part III. | General Care . . | Page 39 |


Price, 25 Cents


**Cadillac Motor Car Co.**

Detroit, Michigan, U. S. A.

SIXTH EDITION

Copyrighted 1919 By Cadillac Motor Car Co.
Detroit, Mich.

# LICENSE DATA

The following information may be found useful in making license application:

| | | | |
|---|---|---|---|
| No. of cylinders | 8 | Piston displacement | 314 cu. in. |
| Cylinder bore | 3 1/8 in. | Stroke | 5 1/8 in. |

Horsepower (N. A. C. C. rating) ..... 31.25

Engine number:

The engine number is stamped on the crank case just back of the right-hand block of cylinders, on the aluminum casting directly back of the fan and on the name plate which is attached to the forward face of the dash.

The engine number of each Type 57 car begins with the figures "57."

Wheelbase:

Seven-Passenger, Phaeton, Roadster, Victoria, and Sedan (Brougham) .. 125 in.

Limousine, Imperial, Landaulet, Town Limousine, Town Landaulet and Suburban ..... 132 in.

Long chassis ..... 145 in.

Tread (All Type 57 Cars) ..... 56 in.

# STARTING THE ENGINE

1. First make certain that the transmission control lever is in the neutral position and that the hand brake is applied (see Figure 1.)

2. If the gasoline pressure gauge on the instrument board indicates a pressure of less than one pound, increase the pressure by means of the hand air pump. The handle of the pump is screwed into place. Loosen it by unscrewing it a few turns in the counter-clockwise direction. After the pressure has been brought up to at least one pound, lock the plunger in place by holding it in and turning it in the clockwise direction.

3. Place the spark lever in the "Driving Range" of the sector, except in cold winter weather, when it should be at the extreme right of the sector. If the engine should be cranked by hand, always place the spark lever at the extreme left of the sector. If this caution is not observed, a back kick will occur, resulting in personal injury.

4. In extremely cold winter weather, prime the carburetor by placing the throttle lever at the extreme left of the sector, then pushing the accelerator button down to the floor and permitting it to return. Twice repeat this operation. Do not prime the carburetor except in extremely cold winter weather.

5. Place the throttle lever approximately two inches from the extreme left of the sector.

6. In cold weather, or in warm weather if the engine has been standing for some time, pull back the auxiliary air-valve lever.

7. Switch on ignition by moving the ignition switch lever down.

8. Push down on the starter button. This will bring the starter into operation and will cause the engine to "turn over." (See under "Caution.") In extremely cold weather, when the car has been standing long enough to have become thoroughly chilled, it is a good plan to release the clutch before pressing down on the starter button, and to hold the clutch down during the cranking operation.

9. Immediately the engine commences to run under its own power, which should be in a few seconds, permit the starter button to return to the normal position. If the auxiliary air valve lever was pulled back before starting the engine, push it as far forward as possible without causing the engine to stop, or a material reduction in engine speed, as soon as the engine commences to run under its own power, and as far forward as it goes as soon as the engine is warm enough to permit it. *It is important that the lever be left back no longer than is absolutely necessary.*

If the engine does not start within thirty seconds, do not continue to operate the starter, but permit the starter pedal to return to the normal position and determine the cause for the failure of the engine to start readily. Be certain that the ignition is turned on, that there is gasoline in the tank, and sufficient pressure to force it to the carburetor. Bear in mind that the starter will crank the engine only, that ignition and gasoline must be present before it will run.

## *Caution*

*Caution:—The action which causes the engine to "turn over" is produced by a gear of the electric motor sliding into mesh with the teeth of the fly wheel. When pushing down on the starter button to throw these gears into mesh, if it should so happen that they are in just such positions that the ends of the teeth of the starter gear come against the ends of the teeth of the fly wheel, instead of the teeth of one sliding between the teeth of the other, do not force them. Simply permit the starter button to return to the normal position and then push it down again. In the meantime, the gears will probably have changed their relative positions sufficiently to allow the teeth to mesh.*



## *Oil Pressure*

Lubricating oil is fed under pressure to the main and connecting rod bearings of the engine (see under "Engine Lubrication," page 28). The pressure of the oil is indicated by the oil pressure gauge on the instrument board. (See Fig. 1.)

When the engine is not running, the hand of the oil pressure gauge should remain at zero, but immediately the engine starts and while the engine is in operation, pressure should be indicated. The pressure indicated depends upon the speed of the engine and the viscosity of the lubricating oil.

If at any time while the engine is in operation, the hand of the oil pressure gauge remains at zero, stop the engine at once and determine the cause. Serious engine trouble is the result of continuing to run the engine without oil pressure.

# GEAR SHIFTING

The transmission is of the selective type. The operator may shift from any gear to any other gear without shifting through a third gear.

*Caution:—Do not attempt to shift from neutral to any gear, or from one gear to any other gear without first disengaging the main engine clutch by pushing down on the clutch pedal (see Figure 1.)*

Referring to Fig. 2, the ball at the top of the transmission control or gear shifting lever is shown at "N" in the neutral position, "L" in the low gear position, at "I" in the intermediate gear position, at "H" in the high gear position, and at "R" in the reverse gear position.

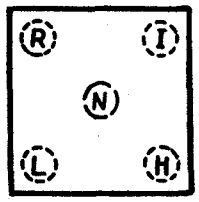



*Fig. 2. Control Lever Positions.*

## *Starting the Car*

To start the car, after starting the engine, push forward on the left pedal, which is the clutch pedal, thereby releasing the main engine clutch. Then disengage the hand brake by means of the hand lever—still holding forward on the clutch pedal. (If the car is standing on a grade it will be necessary to hold it with the foot brake until ready to start.) Next shift into low gear.

To do so, move the control lever as far as possible to the left and then pull it back as far as it will go (Fig. 3.) Open the throttle slightly by means of the accelerator pedal or throttle lever and engage the main clutch gradually, by allowing the pedal to come towards you.

If it should so happen that the gears which mesh to make low gear are in just such positions that the ends of the teeth of one gear come against the ends of the teeth of the other gear instead of the teeth of one sliding between the teeth of the other, do not force them but place the transmission control lever back in the neutral position, engage the clutch by allowing the clutch pedal to come towards you, again release the clutch and shift into low gear as above directed.

## THE USER'S RESPONSIBILITY

The information, advice and instruction contained in this Manual are furnished because the user of a motor car needs them. But if the user fails to heed the advice given, the loss is not wholly his but partly ours as well.

A Cadillac car in the hands of an operator who will give it the reasonable consideration to which it is entitled, and which every car requires, will run as smoothly and as quietly as is possible for any motor car to run. No car will give more satisfaction nor will any car stand more abuse. But no car can be expected to stand continued abuse without showing the results of it sooner or later.

We want Cadillac cars to render unfailing service and satisfaction. They are built for that purpose but the user must do his part after the car comes into his possession. We furnish a car that is capable of rendering the best of service and we furnish the directions which will guide the user toward obtaining that service. But if he persists in ignoring these directions and in substituting his own ideas there is no one but himself upon whom he can rightfully place the responsibility for any difficulties which may result.

## DRIVING AND CARING FOR A MOTOR CAR

Driving an automobile does not mean simply starting, steering and stopping. To drive an automobile properly requires an understanding of the principles involved and the exercise of intelligence and judgment.

We believe that we are safe in saying that, with well designed and correctly built automobiles, 95 per cent of so-called "troubles" are directly traceable to lack of lubrication, abuse, carelessness, and a lack of an understanding of the principles involved.

To begin with, the driver should study the construction of his car and thoroughly acquaint himself with its mechanism, the functions of its various parts and the "why" of everything connected with it. If he understands these he is better able to realize why certain things must be done and why certain other things must not be done, if he is to obtain the most satisfactory results, the greatest efficiency and the greatest economy, together with durability and long life of the engine and car. Remember that the difference between a comprehensive understanding of your automobile and the superficial knowledge possessed by drivers is the difference between having "troubles" and not having them.

Intelligent care and proper attention will often correct a needed adjustment or lubricate a part that is becoming dry, but which, if neglected, may cause serious and possibly expensive damage.

On the other hand is frequently found the user who is constantly tinkering with his car when there is no necessity for it. Avoid both extremes. If, after seeing that all parts are properly lubricated and that all bolts, nuts and screws are tight, your car is running well, let it alone. Many users drive their Cadillacs for months without finding an adjustment necessary. If adjustment seems necessary and you are not sufficiently acquainted with the construction of the car to know what adjustment is necessary or how to make it, *don't experiment* but take the car to a Cadillac service station.

The most important thing in the care of an automobile is its proper lubrication. Part Two of this Manual gives detailed directions regarding lubricating. Be sure to read and observe them carefully.

## PLACING A NEW CAR IN RUNNING CONDITION

Before cars are shipped from the factory the gasoline and cooling systems are drained. When the car is received and before it is placed in use, the supply of gasoline and water must be replenished. During freezing weather an anti-freezing solution should be used instead of water. (See under "Anti-Freezing Solution," page 22.)

The car should be lubricated thoroughly in accordance with directions contained in this Manual. (See under "Lubrication," page 25.)

### *Refilling the Cooling System*

Fill the cooling system with water during warm weather and with a suitable anti-freezing solution during freezing weather. (See under "Anti-Freezing Solution," page 22.) To fill the cooling system, proceed as follows:

Replace the water pump drain plugs "H" (Figure 35), and close the cylinder drain cocks "K."

The points of the triangular-shaped indicators on the ends of the shafts "L" should point up. If they do not, turn the shafts to bring the points up. The shafts may be turned in either direction.

There is a drain cock "K" in each cylinder block, and a drain plug "H," and a shaft "L" in each water pump.

Remove the radiator filler cap "W" and fill the cooling system. Screw down the radiator filler cap firmly in replacing it. This is important. Turn the water pump shafts "L" so that the points of the triangular indicators point down.

To fill the radiator condenser (see under "Condenser," page 48), take out the removable floor board just forward of the transmission control lever (see Figure 1) and replace the drain plug "R." (Figure 35.) Remove the condenser filler cap "V" and fill the condenser one-half full, using the same liquid as in the radiator. Replace the filler cap, making sure that the vent hole in the side of the cap is open.

*Note*—On the Victoria, the condenser filler is accessible through an opening in the floor just forward of the auxiliary seat. This opening is provided with a sliding cover and is concealed by the carpet and by the seat when folded down.

***Caution:—Do not use water in the cooling system during freezing weather. Use a good anti-freezing solution. Water will freeze even though the engine be run continuously.***

### *Filling the Gasoline Tank*

The gasoline tank is at the rear of the car. (See Figure 34.) The filler cap can be removed after loosening the thumb screw on the top of the cap.

Gasoline should be strained through a wire cloth of very fine mesh before it is poured into the tank. If dirt or water is allowed to enter the gasoline system it may cause great annoyance.

After filling the tank, screw on the filler cap and tighten the thumb screw. This is necessary to prevent leakage of the air pressure by which gasoline is forced to the carburetor.

### *Operation of a New Car*

It is recommended that the operator of a new car refrain from driving it at its maximum capacity and speed until the car has been driven at least five hundred miles.

Although the parts of a Cadillac car are machined and ground with the greatest possible accuracy and fineness of finish, manufacturing processes cannot give to bearing surfaces the fine polish which results from actual operation at moderate speed and under light loads.

For this reason, it is advised that a car be driven no faster than twenty miles per hour for the first two hundred and fifty miles, and no faster than twenty-five miles per hour for the second two hundred and fifty miles.

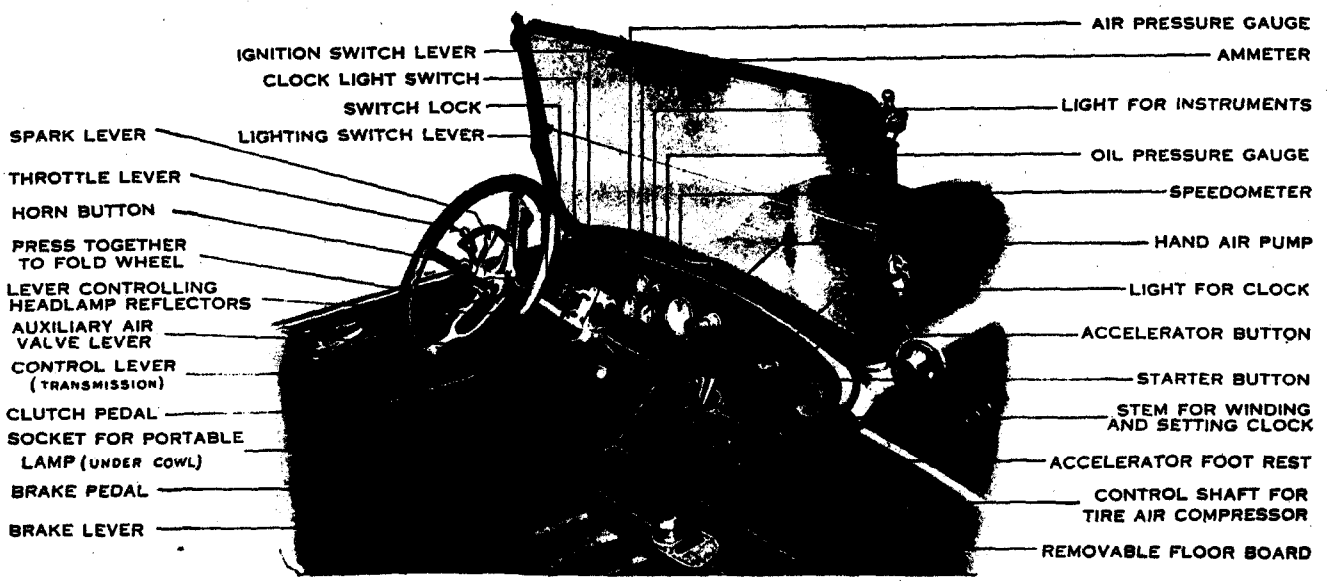



*Fig. 1. Instruments, Control Levers and Pedals on Standard Seven Passenger Car.*

# Part I

# OPERATION

After the car is under way on low gear, release the clutch and shift into intermediate gear. To do this move the control lever back to the neutral position, then to the right and push it forward as far as it will go (Fig. 4.) Then engage the clutch. In shifting from low to intermediate gear, it is advisable to pause for a moment in the neutral position if there is a tendency of the gears to clash.

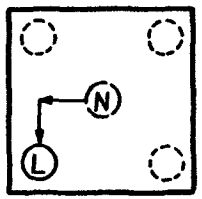



*Fig. 3.*
*Neutral to Low Gear.*

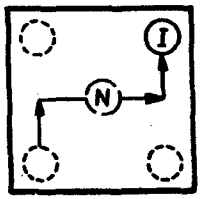



*Fig. 4.*
*Low Gear to Intermediate Gear.*

After the car is under way on the intermediate gear, shift into high gear. To do this, simply release the clutch and then pull the control lever straight back (Fig. 5.) Then engage the clutch.

With the Cadillac eight-cylinder engine it is possible when starting the car on level ground to shift from low gear to intermediate gear and from intermediate to high gear at very low speeds, and shifting can be done more quietly than at high speeds. In starting on an incline a higher rate of speed should be attained before shifting gears.

### *Reversing*

To start the car backwards, release the clutch, move the control lever to the left and push it forward as far as it will go. Open the throttle slightly by means of the accelerator pedal or throttle lever and engage the main clutch gradually.

If it should so happen that the transmission gears which mesh to make reverse are in just such positions that the ends of the teeth of one gear come against the ends of the teeth of the other gear, do not force them, but place the transmission control lever back in the neutral position, engage the clutch, again release the clutch and shift into reverse gear as directed.

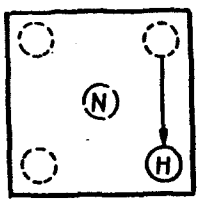



*Fig. 5.*
*Intermediate Gear to High Gear.*

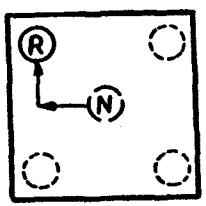



*Fig. 6.*
*Neutral to Reverse Gear.*



### *Shifting into Lower Gear*

If, when ascending steep grades or pulling through soft mud roads or deep sand in high gear, the speed of the car is reduced until the engine labors, shift into intermediate gear. To do this, release the clutch, then push the control lever forward as far as it will go. Then engage the clutch. It is best to allow the car to slow down before making the shift and then, after releasing the clutch, to shift quickly. An experienced driver may find it more satisfactory to shift from high into intermediate gear in the following manner:

Release the clutch, place the control lever in the neutral position, engage the clutch, at the same time slightly accelerating the engine; then release the clutch again, and *instantly* shift into intermediate gear. Engage the clutch.

This entire change may be made in less time than it takes to read these directions by one who becomes familiar with this method. Shifting in this manner may be accomplished satisfactorily at higher speeds than is possible when shifting in the usual manner. It is not recommended, however, that the operator attempt to shift from high to intermediate gear in this manner until he has had considerable experience in shifting in the ordinary way.

### *Stopping the Car*

First close the throttle and then release the engine clutch. Next shift the transmission control lever into the neutral position. The clutch may then be re-engaged. Stop the car by pushing forward on the brake pedal. After the car has been brought to a stop, apply the hand brake by means of the hand brake lever.

## STOPPING THE ENGINE

After stopping the car and applying the hand brake, move the ignition switch lever to the horizontal position and at the same time pull back the auxiliary air valve lever. Pulling back the auxiliary air valve lever when stopping the engine "enriches" the mixture drawn into the cylinders and makes it easier to start the engine the next time.

## TILTING HEAD LAMP REFLECTORS

The reflectors in the head lamps are pivoted so that they can be tilted and are controlled by a lever on the left-hand side of the steering column (see Fig. 1.) When the road is clear and illumination of the distant road is desired, the reflectors direct the rays straight ahead. When a vehicle traveling in the opposite direction approaches, the rays from the headlight can be deflected below the level of the occupants of the approaching car and the illumination directly in front of the car increased by simply raising the lever on the steering column and thereby tilting down the reflectors.

In a few states the law specifies that at no time shall there be any glaring rays from headlights higher than 42 inches above the road at a point 75 feet ahead of the car. When the reflectors are in the tilted position, Cadillac head lamps conform to this requirement.

# DRIVING SUGGESTIONS

## *Rules of the Road*

Road and traffic laws vary greatly in different localities. It is, therefore, impossible to set down a complete list of rules which may be followed in all parts of the country. The following are some of the rules which are practically universal in all parts of the United States.

In meeting a vehicle going in the opposite direction *pass to the right.*

In passing a vehicle going in the same direction *pass to the left.*

Always stop with the right hand side of the car next to the curb. If it is necessary to turn around to do this it should be done.

Never turn around or turn off onto another road without making absolutely sure that there is no other vehicle directly behind you.

Never enter upon street car tracks without making sure that there is no car directly behind you—*no matter how sure you feel, look and see.*

Do not cross street car or steam railroad tracks without making certain that it is absolutely safe to do so.

In crowded traffic do not apply the brakes suddenly unless it is absolutely neccessary. It may be that the vehicle following you cannot stop as quickly as you can.

On wet asphalt streets or slippery roads do not apply the brakes suddenly unless it is absolutely necessary. If the brakes are applied suddenly under these conditions disastrous skidding is apt to occur.

In crowded traffic it is a good plan to signal cars at the rear, before turning, slowing down or stopping.

It is a good plan to slow down in passing vehicles going in the opposite direction.

One of the most essential things to remember is that you should *never "take a chance."*

## *Coasting*

To coast on the level, close the throttle and then release the main engine clutch by pushing forward on the left pedal.

When descending grades a good method is to close the throttle and, with the clutch engaged, allow the engine to do the holding back as much as possible. This saves much wear on the brake band linings, as the resistance offered by causing the car to drive the engine when "high gear" or "direct drive" is engaged is usually sufficient to control the speed. When the engine does not offer sufficient resistance the speed may be further checked by applying the foot brake.

When it is necessary to descend a very steep grade it is best to engage the intermediate or possibly the low speed gear *before commencing the descent,* and if the resistance thus obtained is not sufficient, supplement it by the foot brake. Bear in mind that the more the resistance of the engine is used in coasting the longer the brake band linings will last and the longer the brakes will retain their adjustment.



The principle of this method will be understood when it is realized that the same combination of gearing which changes the ratio between the engine and the rear axle, which makes it easier for the engine to drive the car, will, when the car is compelled to drive the engine, have exactly the opposite effect.

# DON'TS FOR GENERAL OPERATION

Don't fail to change the engine oil frequently.

Don't fill the lubricating system in the engine only and neglect to lubricate all other parts of the car.

Don't neglect the lubrication of any part of the car.

Don't fail to push the auxiliary air valve lever forward as soon after starting as possible.

Don't run the car at sustained high speed when it is new.

Don't put oil in the engine without first straining it through cheese cloth or fine wire mesh and making sure that it is free from dirt and lint.

Don't allow the clutch to engage suddenly.

Don't prime the carburetor too much.

Don't attempt to shift from neutral to any gear, or from one gear to another gear without first releasing the clutch.

Don't attempt to shift from the reverse gear to any other gear when the car is moving.

Don't attempt to shift from any forward gear to the reverse gear when the car is moving.

Don't attempt to shift from the high gear to the low gear when the car is moving.

Don't attempt to shift from the intermediate gear to the low gear when the car is moving, unless it is moving very slowly. Ordinarily it is best to stop the car altogether.

Don't push the starter button when the engine is running.

Don't turn the steering gear when the car is standing. This is not only unnecessary but is also bad practice.

Don't fail to investigate any unusual sound which may develop in the car. The car should be inspected at the service station of a Cadillac distributor or dealer.

Don't neglect to inspect the level of the acid in the storage battery every 500 miles.

Don't turn corners at high speed.

Don't neglect to keep the cooling system filled.

Don't drive fast or attempt to stop suddenly on wet pavements.

Don't attempt to start the engine with the switch turned off, without pressure or without gasoline in the tank.

Don't neglect to keep the tires properly inflated.

*Don't race the engine when it is not driving the car. There is no worse abuse.*

# TOP AND SIDE CURTAINS

## *Folding the Top*

Unbutton the rear curtains "A," Fig. 7, from the bows and also from the top of the body. Fold the curtains in smoothly against the back curtain. Open the top rest clamps "B."

Release the front end of the top from the windshield standards by loosening the clamps at "C." After the top is released tighten the clamps to prevent them from rattling.

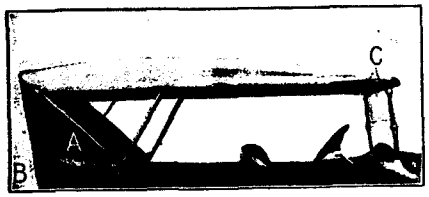



*Fig. 7. Top in Raised Position.*

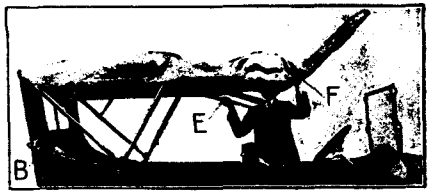



*Fig. 8. Top Partially Folded, First Position.*

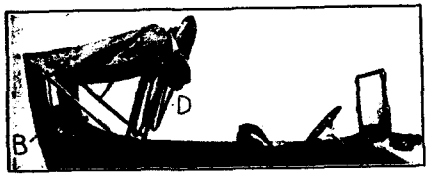



*Fig. 9. Top Partially Folded, Second Position.*

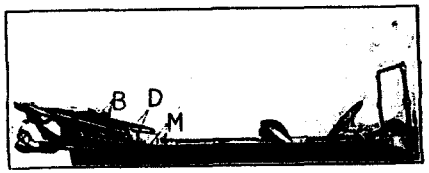



*Fig. 10. Top Folded.*

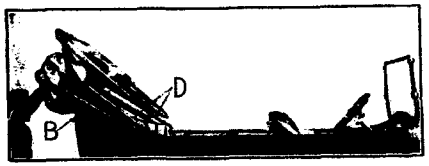



*Fig. 11. Top Partially Raised, First Position.*

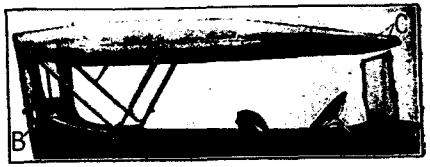



*Fig. 12. Top Partially Raised, Second Position.*



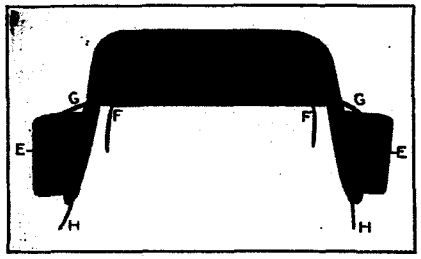



*Fig. 13. Dust Hood.*

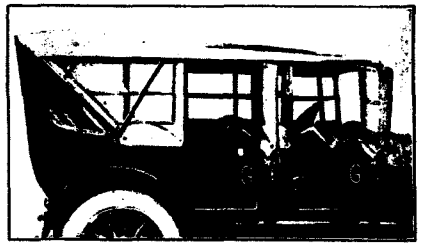


*Fig. 14. Side Curtains in Place.*

"Break down" the joints at each side of the horizontal bow by pushing up with one hand on the bow at "F," Fig. 8, and pulling down with the other hand at "E." Fold the front part of the top back until it closes as shown in Fig. 9. Insert the pins on the sockets of the center bow in the holes at "D."

With the top rests in place, carefully lower the top into the rests, being careful to tuck the material between the bows so that it rests smoothly and is not pinched. (See Fig. 10.) Then close and lock the top rest clamps "B."

Unfold and open up the dust hood (Fig. 13) so that the flaps, "E," are at the top. Draw the hood on over the folded top and tuck the flaps down between the bows and the body, taking care not to scratch the body. Be careful to draw the hood up evenly on both sides. Loop the straps "F" on the under side of the dust hood around the lower bow on each side, draw them tight and buckle. Pass the straps "G" through the top rest clamps "B," Fig. 10. Pass the straps "H" through the loops on the nuts "M" on the top supports just back of the rear doors. Button the snap fasteners on the lower edges of the flaps under the bows.

## *Raising the Top*

Unbutton the fasteners along the lower edges of the parts of the dust hood protecting the bows at the sides. Unbuckle all the dust hood straps and carefully pull off the dust hood from the rear.

If the car is fitted with an automatic spring top as used in the early Type 57 season, open the top rest clamps "B," Fig. 10, and release the pins from the holes at "D." Then stand behind the car as shown in Fig. 11, and push up and forward on the rear bow. The top should then assume the position shown in Fig. 12.

If the car is not fitted with an automatic spring top open the top rest clamps "B," step inside the tonneau, take hold of the second bow from the front and raise the top until the front part balances so that it does not fall back. The top will have a position similar to that shown in Fig. 9. Loosen the pins "D" and taking a position under the top push forward on the second bow until the top assumes the position shown in Fig. 12.

Pull down the front end of the top until the ball on each windshield standard is well into the socket attached to the top bow and tighten the clamps "C."

Place the rear curtain "A," Fig. 7, in position and button the fasteners on the body and also on the rear bows. Close and lock the top rest clamps "B."

## *Side Curtains*

Removable supporting rods are provided for the doors to carry the side curtains when the doors are opened. The supports are attached simply by inserting them in the holes in the brackets at "G," Fig. 14.

The curtains are fastened in place with fasteners of two kinds. One of these is the usual "glove fastener" type, which snaps on and off. The other type of fastener becomes locked on three sides when snapped into place and must be lifted on the side which is not locked in order to release it. This side is indicated by a small projection on the fastener as shown by the arrow (Fig. 15). This type of fastener cannot be released by lifting it at any other side.

Before the curtains are stowed away they should be dry and clean.



*Figure 15.*
*Curtain Fastener.*

## WINDSHIELD POSITIONS

### *For Inclement Weather*

The normal position of the windshield for inclement weather is with the upper and lower sections closed and with the removable rubber strip between the glasses. If, as the result of rain or snow on the windshield glass, it becomes impossible to see through it, the upper section may be tilted out at an angle. This is known as the "rain vision" position.. The driver may then look between the sections of the shield, at the same time being protected to some extent from the rain and snow. The clamping nuts at the top of the windshield standards must be loosened before the upper section can be tilted and should be tightened after it is in the desired position to hold it in place.

### *For Ventilation*

There is a row of rectangular slots through the cowl just back of the windshield. When ventilation in the driver's compartment is desired, the lower section of the windshield should be tilted *in* at a slight angle so that the lower edge is just back of the ventilating slots in the cowl. If it is desired, the lower section may be tilted in at a greater angle. The clamping nuts half way up the windshield standards must be loosened before the lower section can be tilted and should be tightened after it is in the desired position.

If more ventilation is desired the upper section of the shield may be tilted toward the driver so as to deflect a current of air directly into the compartment.

## CLOCK AND SPEEDOMETER

### *Clock*

The clock is set and wound exactly as a stem winding watch. When setting or winding the clock use reasonable care.

### *Speedometer*

The speedometer registers the speed at which the car is traveling, the total number of miles traveled, and the trip mileage. The total mileage cannot be reset but the trip mileage can be reset to zero.

An automobile repairman should never be allowed to attempt to adjust or repair the speedometer head. This work can be done only by men experienced in speedometer work and only with special machinery and tools.

If the speedometer head is removed, handle it with the same care that you would a fine watch. The speedometer head may easily be damaged by rough handling.



## DEMOUNTABLE RIMS

### *Demounting Rim with Tire*

Jack up the axle until the wheel is free from the ground. Then remove the valve cap; loosen the eight clamp nuts, with the brace wrench furnished with the tool kit, and turn each clamp to the left until it strikes the stop pin in the felloe band. Turn the wheel so that the valve is at the top and pull the bottom of the rim towards you until it clears the wheel. The rim with tire can then be removed by lifting it straight up. (Fig. 16.)

### *Mounting Rim with Tire*

If the rim you are mounting has no split clamping ring, take the one from the rim removed. Turn the wheel so that the hole for the valve stem is at the top. Hold the rim so that the valve stem is at the top and so that the rim joint latch and the clamping ring are towards you. Insert the valve stem in the valve stem hole in the wheel and then push the bottom of the rim into place. (Fig. 17.)



*Fig 16.*
*Demounting Rim from Wheel.*



*Fig. 17.*
*Mounting Rim on Wheel.*

Turn each clamp to its original position and turn the clamping ring so that the split in the ring comes directly under one of the clamps. Tighten each clamp slightly. Then continue around the wheel, tightening each clamp firmly. Screw on the valve cap.

*If the rim does not run true,* mark the part that runs "out" from the face of the wheel. Then slightly loosen the clamps diametrically opposite this part and tighten the clamps at the marked part. Proceed in this manner until the rim does run true.

### *Removing Tire from Rim*

The tire may be removed without removing the rim from the wheel.

*Deflate the tire.* Then open the lock with the pointed end of the tire tool or with a screw-driver.

Raise one end of the ring with the tool as shown (Fig. 18) until the lug is clear of the slot in the rim.



*Fig. 18. Removing Tire from Rim, First Position.*



*Fig. 19. Removing Tire from Rim, Second Position.*

Raise the end of the ring further and force the lug out over the edge of the rim. (Fig. 19.)

Start at the end of the ring, which is out of the groove, and remove the entire ring from the rim. (Fig. 20.) (See note.)

Turn the wheel until the valve stem is at the top, and pull the lower part of the tire towards you until it is clear of the rim. The tire may then be removed from the rim by lifting it straight up.

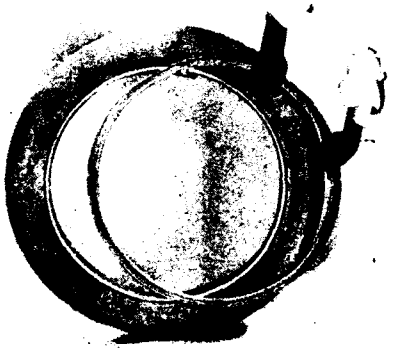


*Fig. 20. Removing Tire from Rim, Third Position.*

*Note*—In removing the ring from the rim, care should be taken to avoid opening the ring beyond its elastic limit. When the ring is free from the rim the ends of the ring should overlap from ½ to 1½ inches, which it will not do if it has been stretched in removal.

If the ends of the ring do not overlap they should be closed together before replacing. If this is not done there is a possibility of the lock failing to properly engage the lugs on the ends of the ring, which might later be the cause of an accident.

*Caution—Do not attempt to remove a tire from a demountable rim without first completely deflating the tire. Serious personal injury may result if this is attempted.*

## *Placing Tire on Rim*

If the demountable rim is on the wheel, jack up the axle and turn the wheel until the hole for the valve is at the top.

Hold the tire so that the valve stem is at the top and insert the valve stem in the valve stem hole in the rim and wheel. Then push the bottom of the tire into place.





*Fig. 21. Placing Tire on Rim, First Position.*



*Fig. 22. Placing Tire on Rim, Second Position.*

Insert one end of the locking ring in the slot in the rim. Then with the tool as a lever, force the tire back far enough to allow the ring to go on easily. (Fig. 21.)

Starting at the end of the ring which is inserted in the slot in the rim, force the remainder of the ring into place by using the tire tool as pliers. (Fig. 22.)



*Fig. 23. Placing Tire on Rim, Third Position.*



*Fig. 24. Placing Tire on Rim, Fourth Position.*

Insert the flat end of the tool between the rim and the ring and turn the tool up edgewise. (Fig. 23.) This will lift the loose end of the ring and force it into place.

Draw the ends of the locking ring together with the tool. (Fig. 24.) Then swing the lock into place.

Then inflate the tire. (See under "Tire Air Compressor," page 20.)

If the demountable rim is not attached to a wheel, lay the rim with the tire flat on the ground when removing or replacing a tire.

## TIRE HOLDER

The tire holder is designed to carry two standard size tires inflated on rims.

To remove the tire with rim, remove the lock and then unscrew the clamp as far as it will go. Move the bottom of the tire back until it is entirely free from the holder. The tire then may be removed by slightly lifting it straight up.

To put a tire on the holder proceed in the reverse manner.

Care should be exercised not to permit the inner tire to strike the body of the car when removing or replacing it.

## TIRE AIR COMPRESSOR

### *Using the Compressor*

To inflate a tire, first attach the air hose to the air connection from the compressor (see note), then connect the other end to the valve of the tire to be inflated. Do not connect the hose to the tire first, if there is air pressure in the tire, or the air will escape.

If the engine is running, release the clutch by pushing forward on the left pedal. Hold the pedal down until you are certain that the transmission gears have ceased to revolve, and then turn the slotted head of the compressor control shaft in the clockwise direction (see Fig. 1.) If the engine is not running, it is unnecessary to disengage the clutch before bringing the compressor into operation.

Run the engine at a speed of approximately 1,000 revolutions per minute. Unless the third brush of the electric generator is incorrectly adjusted the ammeter on the instrument board will register approximately sixteen at 1,000 revolutions per minute of the engine and the ammeter may be used in determining the correct engine speed.

The compressor operates at its most efficient speed at 1,000 revolutions per minute of the engine. Do not race the engine in operating the compressor, or at any other time when it is not driving the car.

To stop the compressor, turn the slotted head of the control shaft in the counter-clockwise direction.

NOTE: The connection for the air hose is in the tool box of cars fitted with the dust shield tool box, and projects from the left-hand dust shield just back of the battery box cover on cars having no tool box in the dust shield.

*Caution:—Do not turn the compressor control shaft to bring the compressor into operation when the engine is running and the clutch is engaged, nor neglect the lubrication of the compressor. See page 35 for complete directions covering lubrication.*

# COLD WEATHER SUGGESTIONS

## STARTING THE ENGINE

### *Priming the Carburetor*

In *extremely* cold weather, if the engine is not started in 30 seconds, remove your foot from the starter button. This will stop the cranking operation. Now open and close the throttle once or twice with the hand throttle or the foot accelerator. *Do not* open and close the throttle more than twice.

Opening and closing the throttle operates the throttle pump of the carburetor. This raises the level of the gasoline in the carburetor, thereby priming it. If the throttle is opened and closed more than twice, gasoline is forced out of the carburetor.



### *Position for Spark Lever*

Except in extremely cold weather the spark lever should be placed in the position marked "driving range" when starting. In extremely cold weather, it should be fully advanced when starting. (If the engine is to be cranked by hand, the spark lever should be placed at the extreme left on the sector.)

It is the practice of some drivers to place the spark lever at the extreme left on the sector when starting the engine. While this is the proper position for the spark lever if the engine be hand cranked, there is no reason for retarding the spark when the engine is electrically cranked and starting is facilitated if the spark lever is advanced to the "driving range." In extremely cold weather there is no reason why the spark lever cannot be placed in the fully advanced position if the engine be electrically cranked and a quicker start is assured if this is done. The following will explain why it is possible to fully advance the spark lever at such times:

The mixture in a cold engine does not burn as rapidly, nor is there so much energy in it, as when the engine is warmer and the fuel is better vaporized. When the engine is cold a large percentage of the heat of each explosion is instantly dissipated by reason of the cold combustion chambers and cylinder walls, the result being that an explosion which in a hot engine would occur early enough and have energy enough to produce a "spark knock" or "back kick," occurs so much later and is so much less intense, that neither of these results is produced.

It is best to have the spark lever in the fully advanced position for cold weather starting for the following reasons:

As explained before, a cold mixture ignites much more slowly than a hot mixture. A cold, slow-burning mixture, if ignited on top dead center on account of the spark being in the retarded position, may burn through the power stroke, through the exhaust stroke and may be still burning in the combustion chamber when the inlet valve is opened to draw in another charge. When this happens, the flame sets fire to the incoming charge, igniting the mixture in the intake pipe and carburetor, producing a "pop back" in the carburetor. The possibility of this happening is very much less if ignition is started earlier by placing the spark lever in the fully advanced position.

### *Position for Throttle Lever*

In winter weather the throttle lever should be open about two inches on the sector for starting. Many drivers make a practice of opening the throttle wide or nearly so immediately the engine is started and after shifting the transmission into gear. The full suction of each piston through the carburetor under these conditions causes the auxiliary air valve in the carburetor to open wide, allowing a large volume of cold air to rush into the carburetor.

The proportion of air to gasoline drawn in under these conditions is practically the same as when the engine is hotter, but as only a portion of the gasoline drawn in is vaporized, and as only the vaporized portion burns, the proportion of air to gasoline burned is greater than when the engine is warmer, thus producing a "lean" mixture. A "lean" mixture is slow burning, whether it is warm or hot, and a cold "lean" mixture is particularly slow burning. Thus if the throttle is opened suddenly before the engine is thoroughly warm, the cold "lean" mixture resulting, burns so slowly that a "pop back" in the carburetor is almost sure to occur.

### *Use of Starter Button*

**Do not press the starter button while the engine is running.**

In extremely cold weather, when the car has been standing long enough to become thoroughly chilled, it is a good plan to release the clutch before pressing down the starter button and to hold the clutch pedal down during the cranking operation. If this is not done, the starter is called upon to turn the jackshaft in the transmission in addition to cranking the engine. While at ordinary temperatures the additional energy required is almost negligible, in extremely cold weather the lubricant in the transmission may offer enough resistance to the transmission gears to increase considerably the demand upon the battery.

## ANTI-FREEZING COOLING SOLUTION

In cold weather a good anti-freezing solution should be used. A solution of commercial glycerine and water is recommended of the correct proportion for the temperature experienced. The following are the freezing temperatures of glycerine and water solutions of various proportions:

| Glycerine (% by volume) | Water (% by volume) | Freezing Temperature (degrees Fahr.) |
|---|---|---|
| 35% | 65% | —10° |
| 40% | 60% | —6° |
| 45% | 55% | —3° |
| 50% | 50% | 0° |
| 55% | 45% | —2° |
| 60% | 40% | —4° |

Do not use a solution containing calcium chloride, as this is injurious to the metal parts of the cooling system.

The radiator condenser also makes it possible to use with safety an anti-freezing solution of denatured or wood alcohol and water. The following are the freezing temperatures of denatured alcohol and water solutions of various proportions.

| Denatured Alcohol (% by volume) | Water (% by volume) | Freezing Temperature (degrees Fahr.) | Specific Gravity (Hydrometer reading) |
|---|---|---|---|
| 20% | 80% | +13° | .974 |
| 30% | 70% | — 3° | .964 |
| 40% | 60% | —20° | .953 |
| 50% | 50% | —34° | .936 |

It is a good plan to draw out a sample of the solution occasionally and to test its specific gravity with a hydrometer graduated between the limits of the above table.

The capacity of the cooling system is five and one quarter gallons. The condenser should contain an additional three quarts, making a total of six gallons.

***Caution—Do not use water in the cooling system during freezing weather. Use a good anti-freezing solution. Water will freeze even though the engine be run continuously.***

## ADDITIONAL COLD WEATHER SUGGESTIONS

### *Starting in Intermediate or High Gear*

Starting in intermediate or high gear should not be done at any time, but this is particularly unfair to a cold engine, as it necessitates a further opening of the throttle than is necessary when starting on low gear, with the probability of a "pop back" in the carburetor.

### *Cold Test of Engine Oil*

Be careful to use an oil having a low cold test In other words, use an oil which flows freely at low temperature. (See under "Lubricants," page 27.)

### *Frequent Changing of Oil*

Water may accumulate in the crank case of the engine during cold weather as a result of condensation. It is necessary, therefore, to drain the oil frequently and replace it by clean, fresh engine oil. (See under "Replace Oil Frequently During Cold Weather," page 30.) If water is allowed to accumulate in the crank case, serious damage to the engine may result.

### *Strainers in Gasoline System*

It may be found necessary to remove the strainers in the gasoline line more frequently during cold weather in order to prevent an accumulation of water at these points which would freeze and prevent the gasoline from flowing to the carburetor. (See under "Settling Chambers and Strainers," page 46.)



# OPERATION OF ENGINE

### *General Principle*

The production of power by the engine may be described briefly as follows:

Gasoline is forced by air pressure from the tank to the carburetor. The carburetor is the instrument by the action of which gasoline is mixed with air in the proper proportion, forming an explosive vapor or gas. The gas thus formed is drawn through the intake manifold and through the inlet valves into the cylinders of the engine, where it is compressed and ignited by electric sparks, the pressure of the resulting explosions producing the power.

The quantity of gas supplied to the engine is regulated by a throttle valve at the carburetor, which is operated by means of the throttle lever at the steering wheel or by the accelerator button at the right of the brake pedal.

### *The Four-Cycle Engine*

The Cadillac engine is of the four-cycle type, that is, there are four movements or strokes of each piston and two revolutions of the flywheel to complete each power producing cycle. The four strokes of the cycle each have a different function and follow one another in the same order as follows:

*Suction Stroke.* The suction stroke commences with the piston at its highest point in the cylinder and with the inlet and exhaust valves closed. Immediately the piston starts to descend the inlet valve opens and through this valve a charge of gas from the carburetor is drawn into the space above the piston.

*Compression Stroke.* As the piston starts upward again after completing the suction stroke, the inlet valve closes. As there is then no escape for the gas in the cylinder, it is compressed, the maximum compression being reached when the piston is at the top of its stroke.

*Power Stroke.* At the completion of the compression stroke, the spark takes place at the spark plug, igniting the compressed charge of gas. The heat resulting from the rapid combustion causes the pressure of the confined gas to rise almost instantaneously to several times its pressure before the explosion. This pressure exerted on the piston forces down the piston and produces the impulse which is transmitted by the connecting rod to the crankshaft, causing it to rotate.

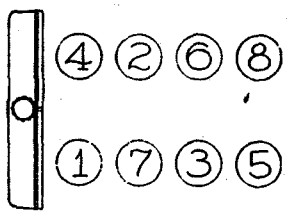


*Fig. 25. Firing Order.*

*Exhaust Stroke.* Just before the piston reaches the end of the power stroke, the exhaust valve opens. It remains open as the piston travels upward again on the exhaust stroke, driving the burned gas out from the cylinders. By the time the piston has reached its highest point it has forced out the burned gas and the exhaust valve closes. Having completed the four strokes, the piston is now ready to draw in a new charge and to repeat the cycle.

The same cycle of events takes place in all of the cylinders but no two pistons are at the same point in the cycle at the same time. In the Cadillac Eight Cylinder V-Type engine, the impulses in the eight cylinders are so timed that a power stroke is begun every quarter turn of the crankshaft. In other words, the crankshaft receives four overlapping impulses every revolution. The order in which the impulses take place is shown in Fig. 25.

### *Automatic Spark Control*

When each piston is at its highest position in the cylinder is, of course, the time when the charge is at its greatest compression, or, in other words, when the gas is "jammed in the tightest." Ignition occurring exactly at this instant produces a much more forceful explosion than if it occurred at a time when the charge was not so tightly compressed.

If the charge were ignited the instant the contact is made in the ignition timer, regardless of the speed of the engine, the spark could be set permanently in one position and would not require changing. But a certain amount of time elapses from the instant the circuit is closed at the ignition timer until the charge is ignited in the cylinder. While this time is but the merest fraction of a second, in fact, almost infinitesimal, yet it is time just the same and must be taken into account when dealing with such a rapidly acting mechanism as an automobile engine.

The lapse of time required to ignite the charge is always the same regardless of the speed of the engine and pistons. You will realize that when the engine is running, say 3000 R. P. M., the pistons are traveling many times as fast as they do when it is running only 300 R. P. M. and that when the engine is running 3000 R. P. M. it is necessary to start the ignition process earlier.

In the Cadillac this is accomplished by means of a ring governor located directly under the ignition timer. As the speed of the engine increases, the ring in the governor assumes a position more nearly horizontal, forcing the timer contact cam slightly ahead on the shaft by which it is driven. This causes the timer contact points to break earlier, thereby starting the ignition process earlier in relation to the positions of the pistons. When the engine slows down, the ring in the governor assumes a position more nearly vertical, forcing the contact cam back on the shaft by which it is driven, causing the contact points to break later and thereby starting the ignition process later in the strokes of the pistons.

### *Manual Spark Control*

The automatic control takes care of the spark position for all ordinary driving. A spark lever is provided, however, by which the ignition timing may be still further advanced or retarded. The spark lever is the shorter lever just above the steering wheel.

Ordinarily the spark lever should be carried in that portion of the sector marked "Driving Range." To get the best results, however, the spark lever should be retarded further for extremely low speeds and advanced further for extremely high speeds. The car should be driven at all times with the greatest possible spark advance which the speed of the engine will permit.

Advancing the spark too far for a given engine speed will usually cause a slight pounding noise, which is sometimes not noticed by the beginner, as it is usually but slight, owing to the substantial character of the crankshaft and bearings.

When starting the engine, place the spark lever in the "Driving Range" on the sector except during extremely cold weather when it should be placed at the extreme right or in the fully advanced position. If the engine should be cranked by hand, the spark lever should be placed at the extreme left on the sector or in the fully retarded position. If this caution is not observed a "back kick" may occur, probably resulting in personal injury.

# Part II

# LUBRICATION

# IMPORTANCE OF LUBRICATION

There is no one thing which is the primary cause of more trouble and the cause of more expense in maintenance to the mechanism of an automobile than insufficient lubrication.

All moving parts of the Cadillac car are manufactured with an unusual degree of accuracy and the parts are carefully assembled. In order to maintain the splendid running qualities of the car it becomes necessary systematically to introduce suitable lubricants between all surfaces which move in contact with one another.

*It should be borne in mind constantly that where one part moves upon or in contact with another friction is created. Friction means wear, and the wear will be of the metal itself unless there is oil, and oil is much cheaper than metal. The use of too much oil is better than too little, but just enough is best.*

Proper lubrication not only largely prevents the wearing of the parts, but it makes the car run more easily, consequently with less expense for fuel and makes its operation easier in every way.

The oiling diagram shown on page 32 indicates the more important points which require attention. But do not stop at these. Notice the numerous little places where there are moving parts, such as the yokes on the ends of various brake rod connections, etc. A few drops of oil on these occasionally will make them work more smoothly.

Oil holes sometimes become stopped up with dirt or grease. When they do, clean them out and be careful not to overlook them. Also be careful not to allow dirt or grit to get into any bearings.

Judicious lubrication is one of the greatest essentials to the satisfactory running and the long life of the motor car. Therefore, lubricate, and lubricate judiciously.



# LUBRICANTS

There are many grades of oils. There are none too good. Naturally, we have experimented a great deal with numerous lubricants to determine which are best adapted for the various parts of the Cadillac car. It is not always an easy matter for users to obtain suitable lubricants. The constant demand made upon us by Cadillac dealers and Cadillac users has induced us to provide suitable lubricants which may be obtained from Cadillac dealers.

## *Cadillac Motor Oil*

Cadillac Motor Oil is recommended and may be used both summer and winter. In the absence of Cadillac Motor Oil, Veedol Zero Light Oil may be used summer and winter; Mobiloil A, Monogram Medium, or Amalie Non-Carbon Oil may be used during summer weather and Mobiloil Arctic Oil during winter weather.

The oil used should be a filtered one and not an acid or alkali treated oil. It should be refined from Pennsylvania crude or its equivalent.

We cannot hold ourselves responsible for damage resulting from the use of oil not suited to the Cadillac engine.

*Engine oil should be strained through cheese cloth or fine mesh wire cloth before using.*

## *Cadillac Rear Axle and Transmission Lubricant*

Cadillac Rear Axle and Transmission Lubricant is recommended for the rear axle and transmission or in its absence a mixture of steam cylinder oil and a small amount of cup grease mixed to such a consistency that the mixture flows easily at temperatures from 60° to 70° Fahrenheit.

## *Cadillac Cup Grease*

Cadillac Cup Grease is recommended for use in the grease cups or, in its absence, number three cup grease.

## *Cadillac Wheel Bearing Grease*

Cadillac Wheel Bearing Grease is recommended for the wheel bearings or, in its absence, number one cup grease.

## *Cadillac Universal Joint Grease*

Cadillac Universal Joint Grease is recommended for the universal joints on the drive shaft or, in its absence, number three fibre grease.

## *Cadillac Steering Gear Grease*

Cadillac Steering Gear Grease is recommended for the steering gear or, in its absence, a mixture consisting of seventy-five per cent 600 W. lubricant, and twenty-five per cent number one cup grease.

# ENGINE LUBRICATION

## *Lubricating System*

The lubrication of Cadillac eight-cylinder engines is by oil under pressure. A supply of oil is carried in the oil pan "A," Fig 26. Oil is drawn from the oil pan by the oil pump "C" through the pipe "B" and forced to the main bearings "E," "F" and "G," through the supply pipe "D."

The pressure of the oil is regulated by an overflow valve or pressure regulator "M," containing a valve under spring tension. When the pressure is reached for which the valve is set, the valve is forced open and the oil overflows past the valve. A small hole drilled in the regulator housing allows oil to by-pass the valve when the valve is seated. Oil flowing through the by-pass and oil forced past the valve is carried to the camshaft bearings and power pressure pump in the gasoline system through the pipe "R" above and parallel to the camshaft. The forward end of this pipe is fitted with two nozzles from which oil flows into the camshaft sprockets and to the chains through holes drilled in the camshaft sprockets.

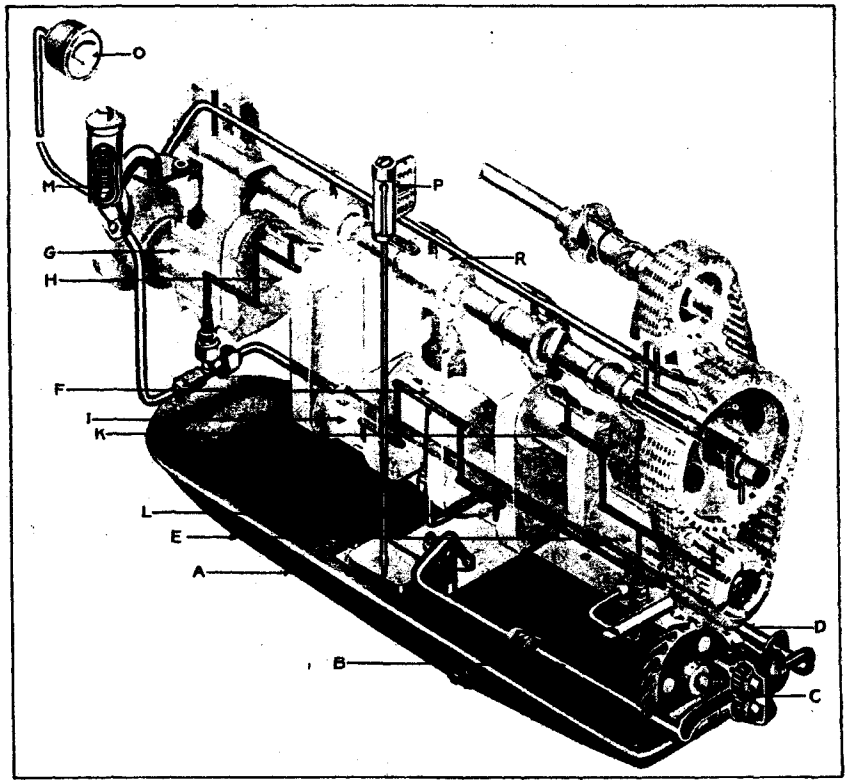



*Fig. 26. Engine Lubricating System.*



The connecting rod bearings, "H," "I," "K" and "L," on the crank shaft, are lubricated by oil from the main bearings forced through holes drilled in the crank shaft. The hole drilled in the forward end of the crank shaft communicates with a hole drilled in the crank shaft sprocket through which oil is supplied to the camshaft chain. The cylinders are lubricated by oil thrown from the lower ends of the connecting rods.

There is one gauge and one indicator in the lubricating system. The pressure gauge "O" is located on the instrument board and indicates the pressure of the oil. The indicator "P" is attached to the upper cover of the crank case near the carburetor and indicates the level of the oil in the oil pan "A."

## *Filling Lubricating System*

An oil level indicator "P," Figure 26, is for the purpose of indicating when the supply of engine oil is low and when a sufficient amount has been added. The indicator is between the cylinder blocks and is under the intake manifold, on the right hand side.

Oil should be added whenever the red ball of the indicator is down to the line marked "Fill." Do not risk running the engine after the red ball has reached the line marked "Fill." If, through oversight, the red ball should reach the line marked "Empty" the engine should be stopped immediately and supplied with oil. The oil filler is just forward of the oil level indicator. (See Fig. 27.)

Use only oil which is suitable (see under "Lubricants," page 27), and be certain that the oil is free from dirt or lint before pouring it into the engine. It is a good practice to strain the oil through cheese cloth or fine mesh wire cloth.

There is an oil level plug in the right hand side of the oil pan shown in Fig. 27. If the oil level gauge on the engine should become inoperative from any cause or fail to register correctly, remove the oil level plug before starting to add oil, then add oil as above directed until it just starts to flow from the hole left by the removal of the plug. Then replace the plug and filling cap.

Note—If, on removing the level plug, oil flows from the hole for a few seconds, do not assume that the oil in the pan is up to the proper level. The level plug is at the lower end of a short standpipe which usually remains full of oil after the level of the oil in the oil pan has fallen below the upper end of the standpipe. The only way to be sure that the oil is up to the proper level is to allow the one or two teaspoonfuls of oil which has accumulated in the standpipe to drain off and then to add oil until it starts to flow from the hole.

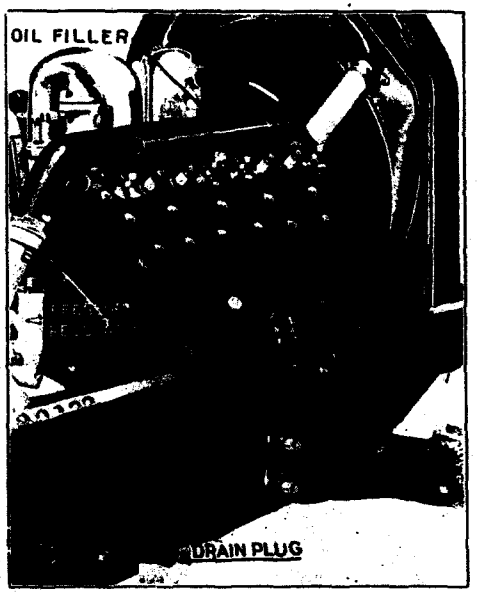



*Fig. 27. Oil Filler, Pressure Regulator, Level Plug and Drain Plug. (Fender and Hood Removed.)*

When adding oil with the level plug removed, the oil level indicator should register "Full" when the oil just starts to flow from the hole left by removing the plug. The oil pan then contains approximately one and one-half gallons of oil.

## Replace Oil in Engine

At the end of each 500 miles of travel remove the drain plug in the engine oil pan (see Fig. 27) and drain out the oil, then replace the plug and through the oil filler on the housing just back of the fan, add one and one-half gallons of fresh engine oil (see under "Replace Oil Frequently During Cold Weather," page 30). A socket wrench with a long handle is supplied with the tool equipment to facilitate the removal and replacement of the drain plug.

At the end of the first 1,000 miles of travel and at the end of every 4,000 miles of travel thereafter drain the oil pan as directed in the preceding paragraph and through the filler add a mixture consisting of three quarts of kerosene oil and one quart of engine oil. The mixture must be entirely free from dirt and lint. Run the engine at a speed of between 600 and 1,000 revolutions per minute for the period of one minute. Then drain the oil pan, remove it and the screen from the engine and thoroughly clean the oil pan and screen. Do not fail to add one and one-half gallons of fresh engine oil after replacing the oil pan.

After cleaning the lubricating system with a mixture of kerosene and engine oil it is a good plan to clean the valve and seat of the pressure regulator "M," Fig. 26. The regulator is located just back of the right hand block of cylinders. The valve can be removed after removing the regulator cover by unscrewing it. It is important also to make certain that the small by-pass hole by which oil is permitted to escape when the regulator valve is closed, is clean and free from any obstruction.

Do not use waste in cleaning the regulator valve or its seat. Use cloth free from lint.

*Caution:—Do not fail to replace the engine oil as frequently as suggested.*

## Replace Oil Frequently During Cold Weather

The mileages given under "Replace Oil in Engine" at which engine oil should be replaced and the oil pan and screen cleaned are those at which this work should be done during warm weather.

During cold weather a certain amount of water may accumulate in the crankcase of the engine as a result of condensation. The water thus formed either freezes, preventing the pump from drawing oil, or mixes with the oil, forming a thick substance which the pump cannot draw. It is necessary, therefore, during cold weather to drain the oil pan and clean the oil pan and screen much more frequently than during warm weather.

The frequency with which it is necessary to do this work during cold weather depends very largely upon the manner in which the car is driven. In cases where the car is driven short distances only and frequent stops are made so that the engine base and the oil in the oil pan remain cold it will be necessary to drain the oil pan and clean the oil pan and screen much more frequently than in cases where the car is driven for longer distances with fewer stops, so that the engine base becomes thoroughly warmed.

The car that is constantly making very short trips in cold weather should have the oil drained every 350 miles or once a week and the oil pan and screen cleaned once a month.

*Unless the oil is drained out and the oil pan and screen are cleaned frequently enough in cold weather, serious damage to the engine may result, particularly on cars in short trip service.*



## Oil Pressure

The pressure indicated by the oil gauge on the instrument board varies with the speed and temperature of the engine and the viscosity of the oil. When the engine is warm and supplied with fresh Cadillac Motor Oil or oil of approximately the same viscosity, the pressure as indicated by the gauge should be from five to seven pounds when the engine is idling. (When idling the engine should run at approximately 300 revolutions per minute, if the throttle stop-screw at the carburetor is properly adjusted.) At higher speeds a higher pressure should be indicated and at lower speeds, a lower pressure. Before the engine has become warm, higher pressures will be indicated at given speeds. In other words, maximum pressures will be indicated at given speeds when the engine is cold and the oil is fresh; minimum pressures, when the engine is hot and the oil becomes thin from use.

Practically all engine lubricating oils become less viscous from use even under normal conditions. Running the engine too long with the auxiliary air control lever pulled back will cause the oil to be thinned more rapidly, due to the condensation of gasoline from the rich mixture.

## Caution

If when starting the engine after replacing the oil it is found that the pressure gauge does not register pressure, stop the engine immediately and prime the oil pump. This may be done by disconnecting, at its upper end, the oil pipe running from the engine around the right hand side of the dash, and forcing clean engine oil into the pipe with the oil gun furnished in the tool kit. Connect the pipe and tighten the union before starting the engine.

*Do not continue to run the engine if, as a result of low viscosity of the oil, or other cause, pressure is not indicated on the gauge when the engine is running. (See under "Replace Oil in Engine," page 30.)*

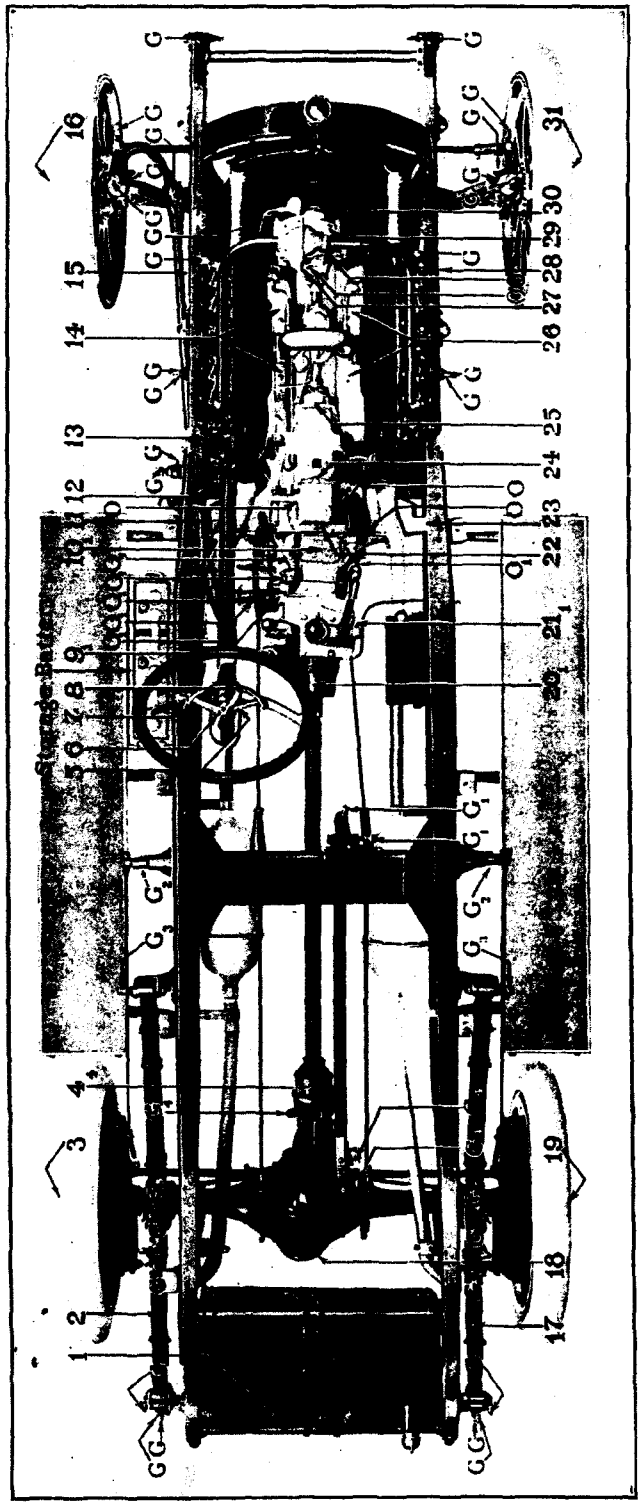


*Fig. 28. General Lubrication Diagram.*

*Each "G" Indicates a Grease Cup. Each "O" Indicates An Oiling Point at Which Engine Oil Should Be Applied.*

*Each Number Indicates a Lubricating Point for Which Instructions Are Given Under "General Lubrication."*

*Accessibility: The small figures at the right of and below the numbers and letters on the above diagram refer to the following notes as to the accessibility of the lubricating points.*

1. *These are lubricating points which are accessible after removing the floor boards forward of the front seat.*
2. *These grease cups lubricate the foot brake rocker shafts. They are provided with extensions which bring the grease cups within reach from under the running boards.*
3. *These grease cups lubricate the bearings at the front ends of the rear side springs. The grease cups are accessible after opening the small doors in the dust shields just forward of the rear fenders.*
4. *These lubricating points are accessible through hand holes in the rear floor on all cars except the Roadster and Victoria. (On the Phaeton and Sedan (Brougham) there is only one hand hole.)*
5. *These grease cups lubricate the rear spring seats on the rear axle and are underneath the springs just back of the axle.*



# GENERAL LUBRICATION

It is manifestly impossible to give exact instructions in every instance as to just how frequently each individual point should be oiled or exactly how much lubricant should be applied. In the following instructions this is given approximately, based on average or normal use.

With the tool equipment of each car is packed a lubrication chart, with a schedule for the lubrication of the car. This is intended to be hung in the garage to serve as a reminder.

## EVERY 125 MILES

### *Engine: 29*

Every 125 miles of travel, or oftener, determine the quantity of oil in the engine (see under "Filling Lubricating System," page 29, and under "Replace Oil in Engine," page 30).

## EVERY 500 MILES

### *Grease Cups: G*

Turn down grease cups "G" every 500 miles. Some of the Type 57 cars have a grease cup at the instrument end of the speedometer cable. This cup should be turned down every 500 miles.

### *Starter Gear Shaft: 22*

Every 500 miles of travel remove the small nickel plated plate on the floor boards just above the accelerator foot rest, also the small plug directly under the plate. With the oil gun furnished with the tool kit inject suitable lubricant. Cadillac Rear Axle and Transmission Lubricant is recommended for this purpose. One half the contents of the oil gun or less is required. A connection furnished with the oil gun fits the threaded hole left by the removal of the small plug.

This lubricates the shaft upon which operate the idler gears of the starter.

### *Fan Bearings: 30*

The engine fan is driven by a spring and is free to oscillate on the fan shaft. The hole through which the fan hub bearings are lubricated is just back and at the base of the flange on the fan shaft against which the spring presses. A few drops of engine oil should be applied every 500 miles. It may be necessary to crank the engine in order to bring the oil hole to the top.

### *Springs: 1, 2, 15, 17, 28*

It is recommended that the springs be lubricated every 500 miles by painting the edges and ends of the spring leaves with engine oil. A small, stiff brush should be used. After applying the oil the car should not be washed until it has been driven some distance to allow the lubricant to work in between the leaves.

### *Replace Engine Oil*

Replace the engine oil at the end of every 500 miles of travel. (See under "Replace Oil in Engine," and "Replace Oil Frequently During Cold Weather," page 30).

### *Water in Storage Battery*

Every five hundred miles or at least every two weeks inspect the level of the acid in the storage battery and add *distilled* water if the level is low. (See under "Adding Water to Storage Battery," page 53.)

## EVERY 1000 MILES

### *Oil Cups and Oil Holes: O*

A few drops of engine oil should be applied at points "O" every 1,000 miles.

### *Universal Joints: 4, 20*

Fill the forward and rear universal joints on the drive shaft between the transmission and rear axle, with Cadillac Universal Joint Grease every 1,000 miles. A connection is furnished with the grease gun which fits the threaded holes left by the removal of the filler plugs in the casings around the joints.

The forward joint is covered by a cylindrical shield to prevent the grease from being thrown onto the under side of the floor board. To fill this joint it is necessary first to detach this shield from the transmission case and to slide it back over the drive shaft. This may be done after loosening the two screws which hold the shield and turning the shield through a small arc in a counter-clockwise direction.

The filler plug of the rear universal joint is accessible through a hand hole in the floor of all cars with the exceptions of the Roadster and Victoria.

### *Generator Bearings: 24, 25*

The oil cup 24 is under the front part of the floor board on the Seven-passenger, Phaeton, Roadster, and Victoria. It can be reached from in front of the dash when the hood is raised. On enclosed cars, with the exception of the Victoria and Suburban, it is more convenient to remove the large aluminum cover plate on the front part of the floor board.

Oil cups 24 and 25 conduct lubricant to the forward and rear bearings on the armature shaft of the motor generator.

### *Oil Holes in Steering Wheel Hub: 5, 6*

One of these oil holes is above the steering wheel and the other is accessible after folding the wheel. A few drops of engine oil should be applied at each point every 1,000 miles.

### *Engine Rear Supports: 11, 23*

There is a slight movement between the side bars of the frame and the engine rear supports when the car is traveling over rough roads. It is necessary, therefore, to apply lubricant at these points.

There is an oil hole with a felt wick in each frame bracket to which the engine rear supports are bolted. Engine oil should be applied at these points every 1,000 miles of travel or oftener if necessary.



### *Tire Air Compressor: 9*

The compressor piston is lubricated through two oil holes—one in front of the compressor cylinder and one just to the rear. Each oil hole is protected by a small sliding cover.

Apply engine oil at these points every 1,000 miles, or oftener if the compressor is used frequently.

### *Clutch Thrust Ball Race: 10*

Every 1,000 miles remove the cover plate shown at 10, turn the clutch thrust ball race so that the small filler screw is at the top and remove the screw with a screw driver. Care must be exercised not to drop the screw into the clutch case. With the oil gun furnished in the tool kit inject suitable lubricant. Cadillac Rear Axle and Transmission Lubricant is recommended. A connection furnished with the oil gun fits the threaded hole left by the removal of the screw plug.

### *Clean Engine Lubricating System*

At the end of the first 1,000 miles of travel and at the end of every 4,000 miles of travel thereafter, clean the lubricating system and the oil pan and screen. (See under "Replace Oil in Engine" and "Replace Oil Frequently During Cold Weather," page 30).

## EVERY 2500 MILES

### *Transmission: 21*

The transmission case should always contain sufficient lubricant to bring it up to the level of the filling hole in the right hand side of the case. It should be inspected every 2,500 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended for this purpose.

### *Rear Axle: 18*

The rear axle should contain enough lubricant to bring it up to the level of the filling hole in the rear cover plate. It should be inspected every 2,500 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended for this purpose.

### *Timer and Distributor: 27*

Every 2,500 miles of travel remove the small breather at the rear of the distributor housing and pack number two cup grease around the gears by which the timer and distributor are driven. The breather can be removed by unscrewing it.

### *Valve Stems: 14, 26*

It is a good practice to apply engine oil to the valve stems and cam slides every 2,500 miles. This may be done by lifting the valve compartment covers and inserting the spout of the oil gun.

### *Wheels: 3, 16, 19, 31*

Every 2,500 miles or every six months, if the car is driven but little, all the wheels should be removed (see under "Wheels," page 57), the bearings thoroughly washed and cleaned in either gasoline or kerosene and the bearings examined to determine whether any foreign substances have gotten into them that might damage them. The bearings should be thoroughly lubricated with a thin grease. Cadillac Wheel Bearing Grease is recommended for this purpose. Do not use heavy grease, as it will roll away from the path of the rolls and will not return.

There is an oil cup in the hub of each rear wheel. Inject engine oil here whenever you are oiling the car. Wipe the dirt from the cups first so that it will not get into the bearings.

### *Steering Gear: 12, 13*

The internal mechanism of the steering gear should be lubricated every 2,500 miles. This can be done by removing the screw plugs at "12" and "13." The hole left by the removal of plug "13" is tapped to fit a connection furnished with the oil gun. Cadillac Steering Gear Lubricant is recommended for this part.

### *Speedometer Flexible Drive Shaft*

The flexible shaft by which the speedometer is driven is carried in a flexible casing. The shaft should be removed from the casing and lubricated at the end of every 2,500 miles of travel.

Some of the Type 57 cars are fitted with Waltham speedometers, the remainder with Van Sicklen speedometers.

To remove the Van Sicklen flexible shaft, first disconnect the flexible casing from the speedometer head by unscrewing the knurled nut, then pull out the shaft through the upper end of the casing. A small hook bent from a piece of stiff wire of small diameter will facilitate the removal of the shaft.

The Waltham flexible shaft may be pulled out of its casing after disconnecting the casing from the socket at the speedometer end. The casing is held to the socket by a small set-screw.

Clean the flexible shaft by wiping it off and then lubricate it by applying Cadillac Cup Grease. After replacing the shaft in the casing it will probably be found necessary to rotate the shaft by hand in order that the connection on the lower end of the shaft and the connection on the drive shaft in the axle spindle may be meshed together. Re-attach the cable to the speedometer, first making certain that the tongue and groove at the speedometer end of the flexible shaft fit together.

The steering spindle end of the Waltham speedometer cable should be removed at least once a month and the bearing on the lower end of the flexible shaft cleaned and lubricated. The cable can be removed from the connection on the spindle by taking out the small bolt.

Do not under any circumstances attempt to lubricate the head of the speedometer. Any parts in the head which require lubrication are amply supplied before the head is assembled.



## EVERY 5000 MILES

### *Clean Engine Lubricating System*

At the end of every 5,000 miles of travel clean the lubricating system and the oil pan and screen. Replace the oil pan and refill it to the proper height with clean, fresh engine oil. (See under "Replace Oil in Engine" and "Replace Oil Frequently During Cold Weather," page 30.)

### *Replace Transmission Lubricant: 21*

At the end of every 5,000 miles of travel remove the drain plug from the under side of the transmission case and drain out all of the lubricant. Refill the transmission with three quarts of suitable lubricant. Cadillac Rear Axle and Transmission Lubricant is recommended. The filler is shown at "21."

### *Replace Rear Axle Lubricant: 18*

At the end of every 5,000 miles of travel remove the drain plug from the axle and drain out all lubricant. Refill with 5 quarts of suitable lubricant. Cadillac Rear Axle and Transmission Lubricant is recommended. The filler is shown at "18."

## ADDITIONAL

### *Spark and Throttle Levers: 7, 8*

The plungers in the spark and throttle levers should be lubricated occasionally. If the spark and throttle levers stick, rub a little oil on the sector where the friction shoes come in contact with it.

### *Top Joints*

It may be found, after use, that the joints of the top require lubrication. Be very careful not to get oil on the top material and not to put too much oil on the joints, which will afterwards run out onto the material. Wipe off the joints carefully after lubricating.

---

In addition to the places specially mentioned, note carefully and oil all of the small connections and joints throughout the car, such as the various brake rod connections and joints in the brake mechanism. The joints of the internal brakes may be lubricated after removing the small cover "F," Fig. 43, on each brake drum. Care should be taken not to apply too much oil to the internal brake joints, as it may get on the brake band linings and impair the efficiency of the brakes.

Remember that wherever one part moves in contact with another, the ease of movement will be assisted and wear will be reduced to the minimum by lubrication.

# Part III

# GENERAL CARE

# TIRES

Each tire maker publishes a booklet with instructions for care and repair of tires and every motorist should provide himself with one of these and thoroughly familiarize himself with the contents. We give here suggestions that apply to pneumatic tires in general.

Probably 75% of so-called "tire trouble" is the result of misuse. In the following we have illustrated some of the more common causes of tire breakdown.

## *Result of Improperly Adjusted Tire Chains*

Fig. 29 illustrates a tire which has been badly damaged through the use of tire chains which were improperly adjusted or fastened to the spokes holding the chains tightly in one place. You will note that the tread is cut through to the fabric, and in fact loosened up and torn badly in many places.

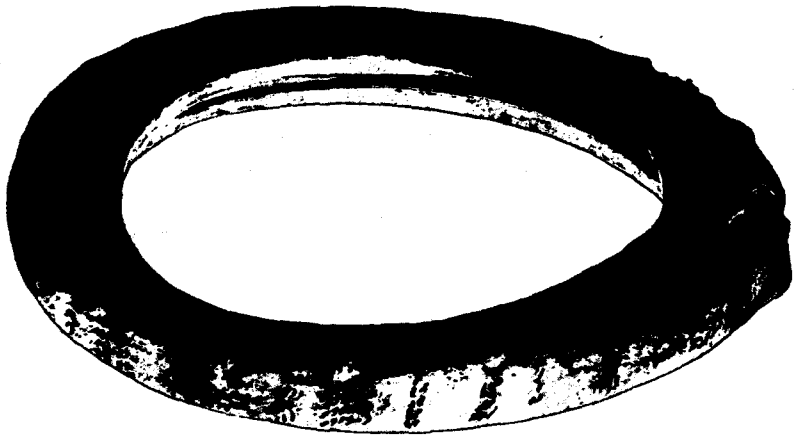


*Fig. 29. Result of Improperly Adjusted Tire Chains.*

The least injury results when chains are loosely applied, and have play enough to work themselves around the tire, distributing the chain on all points alike. Probably the greatest amount of injury comes from using chains unnecessarily on paved streets.

## *Neglect of Small Cuts*

Fig. 30 illustrates a tire damaged from the neglect of two small cuts extending to the fabric. (Note the two prominent "bumps," which show plainly.)

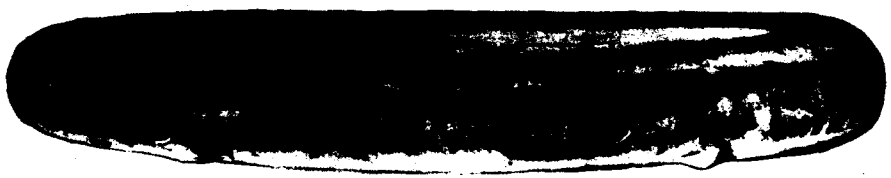


*Fig. 30. Result of Small Tire Cuts Which Were Neglected.*

If cuts extending to the fabric are neglected, fabric deterioration and blistering of the tread is bound to result.

It is unnecessary to remove a tire to treat a small cut of this nature. Tire companies furnish a plastic compound for filling cuts, thus preventing moisture and dirt from getting to the fabric.



## *Result of Improperly Aligned Front Wheels*

Fig. 31 shows the result of running a car with the front wheels out of alignment. This usually affects both tires similarly, although sometimes one tire only is affected. An improper adjustment of the parallel rod in front of the axle, or a bent steering arm is responsible for this condition. Unless the wheels are kept in proper alignment, the tread of the front tires will wear away in a remarkably short time.



*Fig. 31. Result of Improperly Aligned Front Wheels.*

If the front wheels are badly enough out of alignment, the entire tread of both front wheels may be worn off in less than 100 miles. If the wheels are only slightly out of alignment, the result is the same, although the wearing off is slower.

## *Result of Sudden Application of the Brakes*

You will note from Fig. 32 that the tread and several plies of fabric have been worn or, rather, scraped off at one place. This has been brought about by sudden application of the brakes, which resulted in sliding the wheels. It is remarkable how soon a tire will give away from this severe treatment.



*Fig. 32. Result of Suddenly Applying Brakes.*

## *Result of Under Inflation*

Fig. 33 shows the most common result of under-inflation. The lower the pressure in the tire the more the tire flattens out under load. This flattening causes the side walls of the tire to bend more sharply as the wheel revolves. The final result of this is the breaking of the fabric in the side walls as shown in the illustration.

## *Tire Pressures*

Undoubtedly, more tires are ruined from under inflation than any other source. Over inflation, however, results in hard riding. It is essential, therefore, that correct air pressures be maintained.

The following table was supplied for the Type 57 Cadillac, by one of the large tire manufacturers. The pressures shown are correct for a three or four passenger load and for 35x5" tires, except in the case of the Roadster, in which case the pressures shown are correct for a two-passenger load and for 34x4½" tires.

If the load is increased or decreased, a slightly greater or lesser pressure should be maintained. In no case, however, should tires be inflated to pressures *of more than five pounds above or below the pressures given in this table.*

| | Inflation-Cord | | Inflation-Fabric | |
|---|---|---|---|---|
| | Front | Rear | Front | Rear |
| Body Style | lbs. | lbs. | lbs. | lbs. |
| Touring | 55 | 70 | 60 | 80 |
| Sedan (Brougham) | 55 | 75 | 60 | 85 |
| Victoria | 55 | 70 | 60 | 80 |
| Limousine | 60 | 75 | 65 | 85 |
| Landaulet | 60 | 75 | 65 | 85 |
| Imperial | 60 | 75 | 65 | 85 |
| Town Limousine | 55 | 75 | 60 | 85 |
| Phaeton | 55 | 65 | 60 | 75 |
| Seven-Passenger Brougham | 60 | 75 | 65 | 85 |
| Roadster | 55 | 60 | 60 | 70 |
| Suburban | 60 | 75 | 65 | 85 |

## *Additional Suggestions*

The tires are constructed for the purpose of carrying up to certain maximum loads and no more. It should be realized that overloading a car beyond the intended carrying capacity is sure to materially shorten the life of the tires.

Do not turn corners or run over sharp obstructions, like car tracks, at a high rate of speed. Such practice is sure to strain or possibly break the fabric, with the result that the further life of the tires will be limited. Remember that most tire troubles are the result of abuse.

Avoid scraping the tires against the curb and running in ruts. This kind of wear scrapes off the rubber side wall and exposes the fabric to dirt and moisture, which soon starts to rot the threads.

In turning in a narrow street, avoid striking the curb.

If a tire goes flat, see that the valve is not leaking. A little moisture on the tip will show bubbles if the air is escaping.

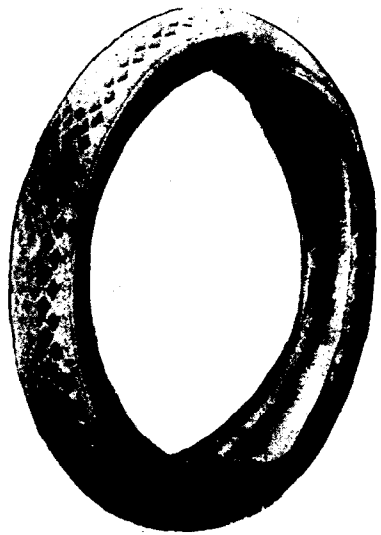


*Fig. 33. Result of Insufficient Inflation of Tire.*



In case of puncture, the car should be stopped at once and the tube repaired or replaced, or the tire replaced by the extra one. The tire should also be examined carefully and the cause of the puncture ascertained and the nail, glass or whatever it may be, should be extracted. Before replacing the tire on the rim, examine the inside of the casing to see that the cause of the puncture is not still protruding. It is also advisable to look over the outside of the tires frequently and take out any pieces of glass or other particles which may have become imbedded in the casing.

Don't run in ruts or car tracks; the sides of a tire will soon wear out under such treatment. Avoid large stones or other obstructions in the road. To hit one of these may break the fabric even though no external injury be visible.

The garage floor should be kept free from oil or gasoline. The tires on a car left standing on a grease-covered floor deteriorate quickly, the natural enemies of tires being oil and gasoline. These destroy the nature of the rubber, rendering it soft, so that it cuts and wears away quickly.

If the car is not used during the winter, it is better to remove the tires from the rims, keeping casings and tubes in a fairly warm atmosphere away from the light. It will be better to slightly inflate the tubes, as that keeps them very nearly in the position in which they will be used later on. If the tires are not removed and the car is stored in a light place, it will be well to cover the tires to protect them from the strong light, which has a deteriorating effect on rubber.

The greatest injury that can be done to tires on a car stored for the winter is to allow the weight of the car to rest on the tires. The car should be blocked up, so that no weight is borne by the tires, and the tires should then be deflated partially. This will relieve the tires of all strain, so that in the spring they should be practically no worse for the winter's storage.

# STORAGE

## *Engine*

To prepare the engine for storage proceed as follows: Start the engine, cover the radiator and run the engine until it is hot. (See under "Personal Danger in Running Engine in Closed Garage," page 48.) The engine should be run at a speed which will show an ammeter reading of about 10 with all lights switched off. It usually requires from two to ten minutes to heat up the engine.

After the engine is hot, shut off the flow of gasoline to the carburetor by closing the gasoline valve at the tank and immediately the engine starts to slow down from a "lean mixture" inject from three to four tablespoonfuls of clean fresh engine oil into the primary air inlet at the right-hand side of the carburetor. This will stop the engine.

Open the compression cocks. Inject from two to three tablespoonfuls of clean fresh engine oil into each cylinder and before closing the cocks crank the engine three or four revolutions with the ignition switched off. This will tend to distribute the oil over the cylinder walls.

If the engine is started again repeat the series of operations given in Paragraphs 1, 2 and 3.

Drain the cooling system. You will find complete directions in this book under "Draining the Cooling System," page 50.

## *Storage Battery* *(see under "Preparing Battery for Winter Storage," page 56).*

## *Tires*

During winter storage it is best to remove the tires from the rims and keep the casings and tubes in a fairly warm atmosphere away from the light. It is best to inflate the tubes slightly after the tires have been removed to keep the tires in the position in which they are when inflated on the rim.

If the tires are not removed from the car, and the car is stored in a light place, it is best to cover the tires to protect them from strong light, which has a deteriorating effect on rubber.

The greatest injury that can be done to tires when the car is stored is to allow the weight of the car to rest on them. If the tires are not removed the car should be blocked up so that no weight is borne by the tires and the tires partly deflated.

## *Body and Top*

It is best to put the top up and cover the entire car to protect it from dust.

## *Taking the Car Out of Storage*

When the car is taken out of storage and before the engine is started, drain the oil from the oil pan, remove and clean the oil pan and baffle plate and replace the oil with fresh oil. (See under "Replace Oil in Engine," page 30.)

The following instructions should be followed carefully in starting the engine:

Open the compression relief cocks and inject from two to three tablespoonfuls of clean fresh engine oil into each cylinder.

Close the cocks and with the ignition turned off turn the engine over a few revolutions by hand. This will tend to distribute the oil over the cylinder walls.

Turn on the gasoline at the tank and start the engine in the usual manner.

Immediately the engine starts push the auxiliary air valve lever as far down as possible without causing the engine to stop or a material reduction in engine speed and open the throttle to a point which causes an ammeter reading of approximately 10 with all lights switched off. With the engine running inject from two to three tablespoonfuls of clean fresh engine oil into the primary air inlet at the right hand side of the carburetor.

Push the auxiliary air valve lever down as far as it will go as soon as the engine is warm enough to permit it.



# BODY AND TOP

## *Care of the Finish*

The finish of an automobile requires more careful and frequent attention when the car is new than when it is older and the varnish is harder. Particular care should be taken to keep mud from the body and hood of the car while new.

Never permit mud to remain on the finish over night or long enough to dry. If it is not possible to wash the car thoroughly before putting it away for the night, flush it off and then thoroughly wash and polish the car the next morning. Mud permitted to remain on the car until it has dried, is not only difficult to remove but stains and dulls the finish.

## *Washing the Car*

Use clean water and plenty of it. Do not use water containing alkali. In parts of the country where the regular water supply contains alkali use rain water. Do not use hot water, as it destroys the lustre. The temperature of the water should be between 40 and 60 degrees Fahrenheit. Do not wash the hood while it is hot. The effect on the finish is the same as washing it with hot water. Unless the hood is allowed to cool before washing, the lustre will soon disappear.

If a hose is used in washing, do not have a water pressure greater than will carry the water 6" beyond the end of the hose. Water under higher pressure drives the grit and dirt into the varnish. It is best not to use a nozzle.

Start at one of the front wheels, first going over the underside of the fender, the wheel and the chassis nearby, with water flowing gently from the hose. This will flush off most of the mud and dirt.

If it is necessary to use soap to remove road oil from the underside of the fenders or machine oil or grease from the chassis, use a little good automobile soap dissolved in a pail of water and apply the soapy solution with a sponge. Do not let this soapy solution remain on the finish more than two or three minutes but immediately wash it off thoroughly with a good soft carriage sponge. Then proceed to wash the under surfaces of the remaining fenders, the wheels and the remainder of the chassis in a similar manner.

When the washing of the chassis is completed begin at the front of the car and with the water running gently from the hose, flow on the body, hood and upper surfaces of the fenders. This will soften the accumulation of road dirt and remove most of it. Then go over the car again and remove all dirt by rubbing lightly with a soft wool sponge, which is used exclusively for the body, hood and upper surfaces of the fenders. At the same time, apply gently from a hose an abundance of water. Rinse the sponge frequently in clean water to remove any grit. After the washing is completed squeeze the sponge as dry as possible and pick up all water from crevices.

Then thoroughly wet a clean soft chamois, wring it as dry as possible, and dry the finish. Rinse the chamois and wring it out frequently. Do not rub the finish or apply more pressure than is necessary to dry off the water. Water evaporates quickly and leaves the finish in good condition.

If it is desired to chamois the wheels and chassis, wet the parts with clean water if they have become dry, and then wipe them. Use a separate chamois for the chassis. Do not use on the body a chamois that has been used on the chassis or wheels.

Do not use soap, gasoline, kerosene or anything of this nature on the finish. Such ingredients attack the varnish.

Do not clean the glass with preparations which may contain harmful ingredients. Use only cleaning compounds which are known to have no destructive effects on highly polished glass.

# GASOLINE SYSTEM

## *General Description*

The supply of gasoline is carried in a tank at the rear of the car and is forced to the carburetor by air under a pressure of one to two pounds. A float controlled needle valve in the carburetor maintains the gasoline at the correct level in the carburetor bowl.

The gasoline pressure is indicated by a gauge on the instrument board (see Fig. 1.) A hand air compressor on the instrument board is provided, by which pressure for starting may be obtained when the car has been standing long enough to make this necessary. When the engine is running, pressure is automatically maintained by an air compressor on the engine, driven by an eccentric on the front end of the cam shaft. An air pressure relief valve connected in the air line prevents the pressure rising above that for which the valve is set.

The pipe extending almost to the bottom of the gasoline tank is a continuation of the gasoline line. The air line simply enters the tank at the top and does not extend into the gasoline.

A valve is provided by which the gasoline may be shut off at the tank. The handle of the valve is just to the left of the quantity gauge.

## *Filling the Gasoline Tank*

The gasoline tank is at the rear of the car. (See Fig. 34.) The filler cap may be removed after loosening the thumb screw on the top of the cap.

Gasoline should be strained through a wire cloth of very fine mesh before it is poured into the tank. If dirt or water is allowed to enter the gasoline system it may cause great annoyance by getting under the carburetor inlet needle and causing the carburetor to flood.

After filling the tank, screw on the filler cap and tighten the thumb screw. This is necessary to prevent leakage of the air pressure by which the gasoline is forced to the carburetor.

## *Settling Chambers and Strainers*

There are two settling chambers in the gasoline system, one at the under side of the gasoline tank and the other attached to the left hand side of the frame of the car just under the front floor boards.

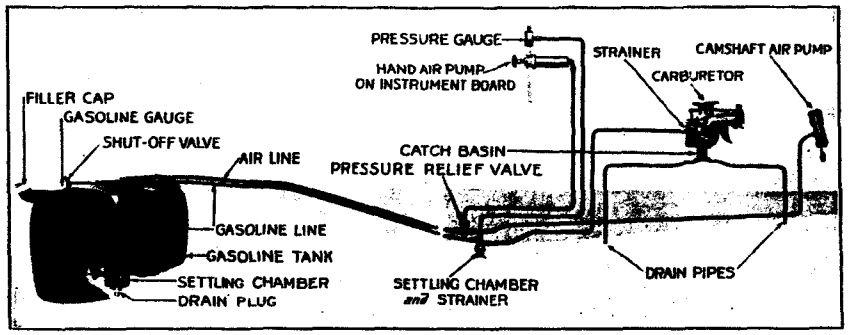



*Fig. 34. Gasoline System.*



There is a drain plug at the bottom of each of these settling chambers. Every one thousand miles or oftener the plug in the settling chamber under the floor boards and the plug in the settling chamber underneath the gasoline tank should be removed to drain the settling chambers of any dirt or water which has accumulated. Before unscrewing either of the plugs, the car should be driven out of the garage into the open and the gasoline system relieved of all air pressure by removing the gasoline filler cap on the tank. Be sure there is no fire near the car when these plugs are removed.

There are two strainers in the gasoline system which require cleaning periodically—one at the point where the gasoline feed pipe is attached to the carburetor, and the other attached to the drain plug in the settling chamber under the front floor boards. (See Fig. 34.)

The strainers should be removed and cleaned every one thousand miles or oftener. Shut off the gasoline at the tank before removing either strainer. In cold weather it may be found necessary to remove the strainers more frequently, to prevent an accumulation of water at these points which would freeze and prevent gasoline from flowing to the carburetor.

# CARBURETOR

The carburetor is correctly adjusted when the car is assembled and unless tampered with should not require readjustment. It is unnecessary to change the adjustment for changes in season and weather.

Good carburetor action cannot be expected until the engine is thoroughly warmed up. Imperfect carburetor action while the engine is cold does not indicate that the carburetor requires adjustment.

If adjustment of the carburetor seems to be necessary, the car should be taken to a Cadillac distributor or dealer. The adjustment should not be attempted by anyone unfamiliar with adjustments of this nature.

## *Personal Danger of Running Engine in Closed Garage*

Carbon monoxide, a deadly poisonous gas, is present in the exhaust of gasoline engines. Increasing the proportion of gasoline to air in the mixture fed to the engine, in other words, enriching it, increases the amount of carbon monoxide given off.

Because of the presence of carbon monoxide it is very dangerous to run the engine for any length of time while the car is in a small, closed garage. If the doors and windows are open the danger is very much lessened, but it is far safer, particularly if an adjustment of the carburetor is being made, to run the car into the open.

Serious personal injury may be caused by the presence of carbon monoxide in a garage if the percentage of it in the air is greater than a very small fraction of one per cent. Unconsciousness may result without warning. It is reported that no indication of danger is given by personal discomfort until too late. Deaths resulting from the presence of carbon monoxide in garages have been reported.

# COOLING SYSTEM

## General Description

The cooling system is of the water forced circulation type. The circulation through each cylinder block is independent of the circulation through the other, two pumps being provided.

The temperature of the liquid circulated by the pumps is under thermostatic control, the purpose of which is to permit water circulated through the water jackets of the cylinders and carburetor intake manifold to warm up to the temperature at which the engine operates best very soon after the engine is started and to prevent the temperature dropping below this point while the engine is running.

## Condenser

A condenser, the purpose of which is to prevent the loss of the cooling medium by evaporation, is attached to the right hand side of the frame just beneath the front floor boards.

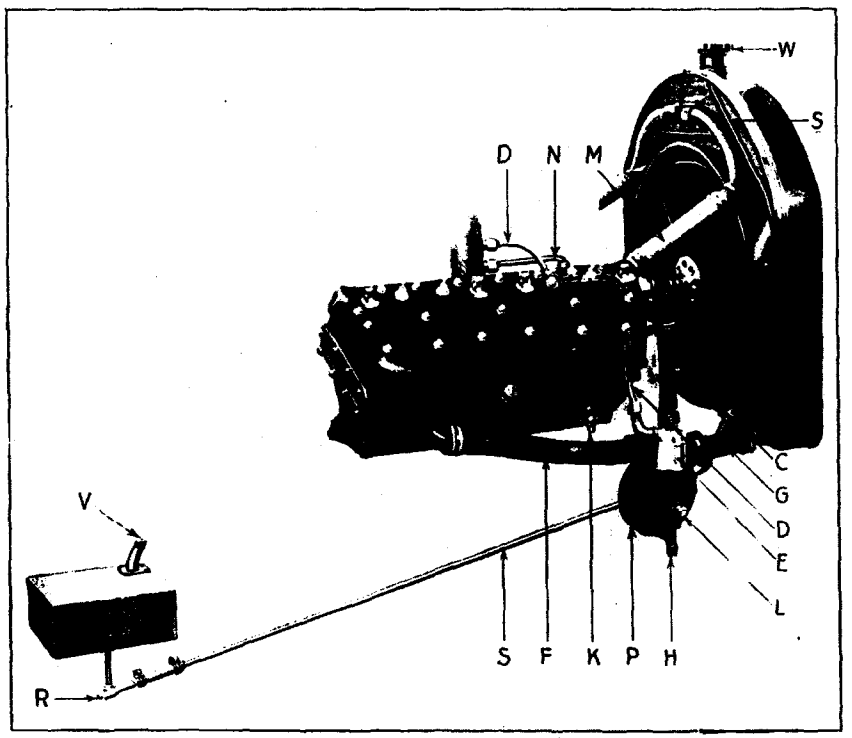



*Fig. 35. Cooling System, Showing Path of Circulation.*



The proper operation of the condenser requires an air tight joint at the radiator filler cap. To make it possible to screw down and tighten the cap without injury to the rubber gasket, two metal washers are interposed between the head of the cap and the gasket. It is important that nothing be installed on the radiator filler cap which causes a leak at the cap or which makes necessary the elimination of the steel washers or cutting a hole through the rubber gasket.

## Refilling the Cooling System

Fill the cooling system with water during warm weather and with a suitable anti-freezing solution during freezing weather. (See under "Anti-freezing Solution," page 22.) To fill the cooling system proceed as follows:

Replace the water pump drain plugs "H," (Fig. 35), and close the cylinder drain cocks "K."

The points of the triangular shaped indicators on the ends of the shafts "L" should point up. If they do not, turn the shafts to bring the points up. The shafts may be turned in either direction.

There is a drain cock "K" in each cylinder block and drain plug "H" and a shaft "L" in each water pump.

Remove the radiator filler cap "W" and fill the cooling system. Screw down the radiator filler cap firmly in replacing it. This is important. (See under "Condenser," page 49.) Turn the water pump shaft "L," so that the point of the triangular indicator points down.

To fill the radiator condenser, take out the removable floor board just forward of the transmission control lever. (See Figure 1.) Remove the condenser filler cap "V" (Fig. 35), and fill the condenser one-half full, using the same liquid as in the radiator. Replace the filler cap, making sure that the vent hole in the side of the cap is open.

*Note*—On the Victoria, the condenser filler is accessible through an opening in the floor just forward of the auxiliary seat. This opening is provided with a sliding cover and is concealed by the carpet and by the seat when folded down.

## Adding Cooling Solution

If only a small amount of cooling solution is necessary to fill the cooling system, it is necessary only to remove the radiator filler cap and pour in the required amount.

Screw down the radiator filler cap firmly after replacing it. This is necessary to insure the proper operation of the condenser.

## Draining the Cooling System

To drain the cooling system, remove the water pump drain plugs "H" (Fig. 35) and turn the water pump shafts "L" so that the points of the triangular indicators on the ends of the shafts point up. The shafts may be turned in either direction. Then open the cylinder drain cocks "K."

There is a drain cock "K" in each cylinder block and a drain plug "H" and a thermostat shaft "L" in each water pump.

To drain the condenser, remove the drain plug "R."

## Cleaning the Cooling System

The cooling system should be drained and flushed out every two or three months. This can be done in the following manner:

Run the engine with the radiator covered until the liquid in the cooling system is boiling hot, then turn the water pump shafts "L" (Fig. 35) so that the points of the triangular indicators on the ends of the shafts point up.

Shut off the engine, immediately remove the water pump drain plugs "H," and open the cylinder drain cocks "K." (Bear in mind in removing the drain plugs "H" that the liquid is scalding hot.) Remove the condenser drain plug "R."

If an alcohol anti-freezing solution is drawn off part of it may be used again if the sediment is allowed to settle. In case it is used the specific gravity should be tested with an hydrometer, after it has thoroughly cooled.

When the liquid has drained off, replace the drain plugs "H," close the drain cocks "K" and fill the cooling system with hot water. Then repeat the operations outlined above.

If, in draining the second time, the water is very dirty, it may be desirable to repeat the flushing operation a third time, using a solution of sal-soda. If the sal-soda solution is used, be sure that it is drained out and the cooling system flushed again with clear water.

The sal-soda solution should not be allowed to get on the finish of the hood or radiator.

During freezing weather be sure to refill with a suitable anti-freezing solution.

### *Cleaning the Water Strainers*

There are two strainers in the cooling system, one in each radiator outlet. They should be removed and cleaned at the end of the first 500 miles of travel and every 2,000 miles thereafter. If sediment is allowed to accumulate at these points the circulation of water is interfered with or prevented and, as a result, the engine overheats and pounds.

The location of the strainers is illustrated in Figure 36. The radiator splash shield is cut away to show the removal of the left hand strainer. The strainer may be withdrawn after simply unscrewing the plug.

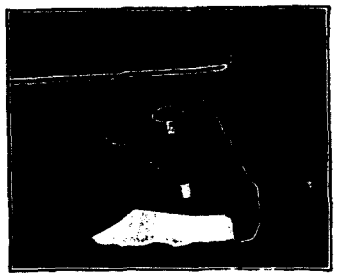


*Fig. 36. Showing Left Hand Strainer Removed.*

## CADILLAC-DELCO ELECTRICAL SYSTEM

### *General Description*

The Cadillac-Delco system is the single wire, single unit system. One side of the motor, generator, storage battery, lamps, horn and ignition apparatus is connected to some part of the frame of the car or the engine. The other connections are made with copper wires or cables.

The motor generator serves both as a generator of current and as an electric motor for cranking the engine when starting. The principal elements of the motor generator are an armature and a field. There are two windings on the armature and two in the field—one on the armature and one on the field are used when the motor generator is used as a generator and the other windings when it is used as a motor.



### GENERATION OF CURRENT

When the engine is not running and the lights are turned on, the ammeter, which is located on the instrument board (See Figure 1) indicates on the "discharge" side of the dial, the amount of current being drawn from the storage battery for the lights. When the ignition switch is turned on the ammeter indicates in addition the current used in slowly rotating the armature of the motor generator. When the starter button is pushed down, the current is no longer required for slowly rotating the armature of the motor generator. The ammeter then indicates only the current used for ignition and lights (if turned on.) The ammeter does not indicate the amount of current used in the cranking operation.

Before the engine is running fast enough to generate sufficient current to equal the current demand, the ammeter indicates on the "Discharge" side the amount of current being drawn from the storage battery. When the engine has attained a speed sufficient to generate current to more than equal the demand, the ammeter indicates on the "Charge" side the excess current which passes to the storage battery and recharges it.

Ordinarily, with all lights switched off, sufficient current is generated to start recharging the battery when the car is operated in high gear at speeds between four and six miles per hour and, of course, at much lower speeds when the car is operated in low or intermediate gear. With all lights turned on sufficient current is generated to take care of the requirements at a speed of ten to fifteen miles per hour and at speeds greater than this the surplus current passes through the storage battery and recharges it. In other words, the ammeter indicates the rate at which the storage battery is being charged or discharged.

To determine the total output of the generator turn off all the lights and add the amount of current used for ignition, i. e., two to three amperes, to the ammeter reading.

### MOTOR GENERATOR COMMUTATORS

Do not under any conditions put oil of any kind on the commutators of the motor generator.

### IGNITION SYSTEM

The ignition system embodies the following elements: A source of current, the generator, or at low speeds, the storage battery; an ignition timer, which interrupts the low tension current at the proper instant to produce a spark in the high tension circuit; an induction coil, transforming the primary current of six volts into one of sufficient voltage to jump between the points of the spark plugs; a condenser, which assists the induction coil to raise the voltage, and which protects the contact points of the ignition timer from burning; and a high tension distributor which directs the distribution of the high tension current to the spark plugs in the respective cylinders.

### *Spark Plugs*

Spark plugs should be clean. When carbon or soot is permitted to collect on them, it causes a short circuiting of the current and prevents the proper ignition of the charge in the cylinder. A good method of cleaning plugs is to wash them in alcohol. Use gasoline in the absence of alcohol.

In order to get the best results the points on the spark plug should be .023 of an inch apart.

### Cleaning Lamp Reflectors

The reflectors of the head and side lamps are plated with pure silver. In polishing, extreme care must be exercised in selecting materials which will not scratch the silver.

Powdered dry rouge and a chamois skin are recommended. If the reflectors are tarnished, moisten the rouge with alcohol, and apply with the chamois. Then polish with a dry chamois and rouge.

The chamois should be soft and must be kept free from dust. Do not use the chamois for any other purpose.

### Socket for Portable Lamp

A socket for a portable lamp is attached to the back of the instrument board just to the right of the hand air pump.

### Lamp Bulbs

It is recommended that bulbs for the lamps be purchased from a Cadillac distributor or dealer. In any event bulbs should be used which have the correct voltage and candle power rating. The following is a table of correct voltages and candle powers:

| *Lamps* | *Voltage* | *Candle Power* |
|---|---|---|
| Head | 7 | 18 |
| Side | 8 | 6 |
| Speedometer | 4 | 2 |
| Tail | 4 | 2 |
| Clock | 8 | 2 |
| Tonneau | 8 | 2 |
| Portable | 8 | 6 |
| Dome, enclosed cars | 8 | 6 |
| Quarter, enclosed cars | 8 | 2 |

## STORAGE BATTERY

### General Description

The storage battery consists of three cells. It is carried in a compartment in the left hand dust shield. The cover of this compartment forms a part of the dust shield and may be removed after unscrewing the two nickel-plated screws with a screw-driver.

The battery is designed especially for the Cadillac-Delco electrical cranking, lighting and ignition system and is made by the Electric Storage Battery Co. of Philadelphia, Pa., whose products for the trade are known as "Exide" batteries.

The specific gravity of the acid solution in the battery is an indication of the state of charge of the battery. (See under "Hydrometer Syringe," page 54.) In a fully charged battery the specific gravity should be from 1.270 to 1.290. If the specific gravity registers from 1.150 to 1.170 it indicates that the battery is practically discharged. A battery discharged below a specific gravity of 1.150 will not crank the engine nor will it burn the lights to full candle-power when the engine is not running.



*Caution:—Never run the engine with the storage battery disconnected or while it is off the car. Very serious damage to the motor generator may result from such action. Do not remove the motor generator or attempt any adjustment of the circuit breakers or remove any of the wires to the circuit breakers, without first disconnecting the storage battery.*

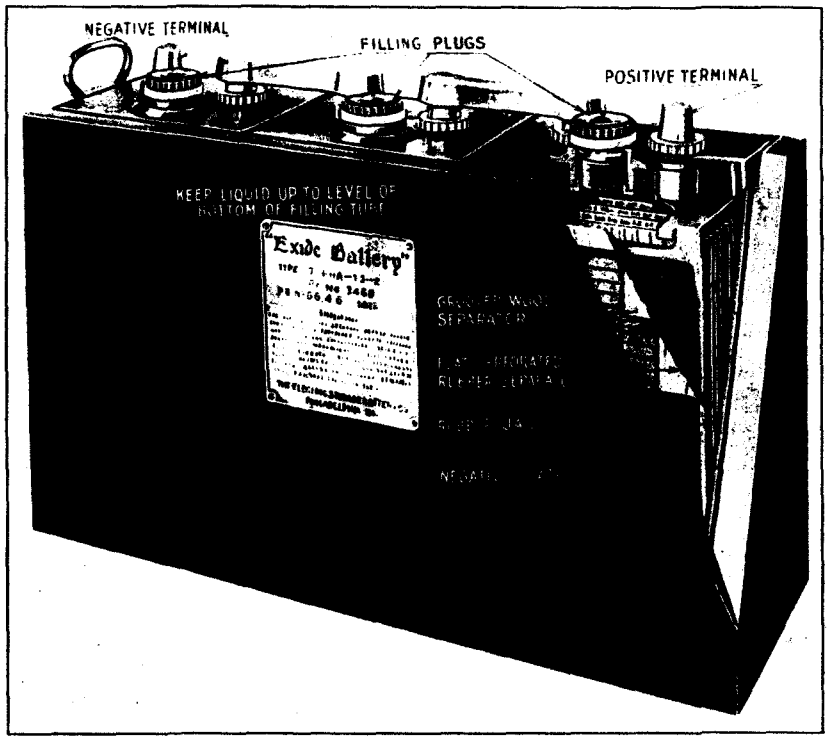



*Fig. 37. Storage Battery, Sectional View.*

### Adding Water to Storage Battery

The acid solution in the battery must always cover the plates and the level of the acid solution should be kept even with the bottom of the filling tubes. Water should be added frequently enough to keep the level up to this point. *Do not add acid.* Ordinarily water should be added every 500 miles, but it should be added at least every two weeks and more frequently if found necessary. Usually it will require only a teaspoonful or so of water; in hot weather it may require more. Be sure to replace and tighten the filling plugs after adding water.

To remove a filling plug, turn it as far as possible in the counter-clockwise direction, then lift it straight up. To replace, hold it so that the large arrow is perpendicular to the center line of the car, set the plug in place and turn it in the clockwise direction until tight.

If a plug is left out or is loose, the acid solution will escape from the cell, especially when the battery is being charged. If a plug is lost or broken, you should obtain a new one and install it as soon as possible.

If one cell regularly requires more water than the others, thus lowering the specific gravity of the acid solution in that cell, a leaky jar is indicated. Even a very slow leak will in time result in the loss of all the acid solution in the cell. A leaky jar should immediately be replaced by a new one.

The water for filling the battery must be pure. Distilled water, melted artificial ice or fresh rain water are suitable for this purpose. If rain water is used, it should not be allowed to come in contact with any metal. It should not be caught from a metal roof or in a metal receptacle.

Never keep the water in a metal container, such as a metal bucket or can. It is best to get a bottle of distilled water from a druggist or from an ice plant. A quart will last a long time. The whole point is to keep metal particles out of the battery. Spring water, well water or hydrant water from iron pipes generally contains iron and other metals in solution, which will ultimately cause trouble if used.

## *Hydrometer Syringe*

*An hydrometer (Fig. 38) is an instrument for testing the specific gravity of a* liquid. An hydrometer syringe is an hydrometer specially designed for convenience in testing the specific gravity of the acid solution in storage batteries. Hydrometer syringes are not a part of the electrical system but can be purchased from any "Exide" service station.

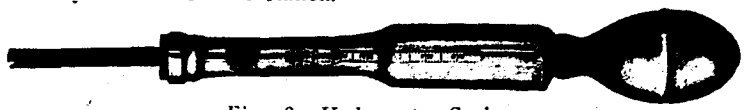


*Fig. 38. Hydrometer Syringe.*

To test the solution in the storage battery with an hydrometer syringe, proceed as follows:

Remove the filling plug from the cell to be tested, compress the rubber bulb of the syringe, and insert the pipette into the solution of the cell. Hold the syringe as nearly vertical as possible, and gradually lessen the pressure on the bulb until enough of the acid solution is drawn into the syringe to float the hydrometer. The specific gravity reading is taken on the hydrometer at the surface of the acid solution in the glass barrel.

If the acid solution is below the top of the battery plate, or so low that it is not possible to draw enough of the solution into the barrel to float the hydrometer, fill the cell to the proper level (see Figure 37), by adding pure water, run the engine until the water has become thoroughly mixed with the acid solution, and then take the reading as above described. The engine should run for several hours after water is added before an hydrometer reading is taken.

## *Preparing Battery for Winter Storage*

When the car is stored for the winter the level of the acid solution should be even with the bottom of the filling tubes. (See under "Adding Water to Storage Battery," page 53.) If water is added it should be added just before the last time the car is used so that it will be thoroughly mixed with the acid solution. When the car is stored, the specific gravity of the acid solution should register from 1.270 to 1.290. In this condition there is no danger of the acid solution freezing. The specific gravity of water is 1.000 and water freezes at 32 degrees F. above zero.

*Unless the battery is fully charged or nearly so it is probable that the acid solution in the battery will freeze and cause extensive damage.*

The following is a table of the freezing temperatures of sulphuric acid and water solutions of specific gravities from 1.050 to 1.300.



| Specific Gravity (Hydrometer Reading) | Freezing Temperature (Degrees Fahr.) |
|---|---|
| 1.050 | +27° |
| 1.100 | +18° |
| 1.150 | + 5° |
| 1.164 | 0° |
| 1.200 | −17° |
| 1.250 | −61° |
| 1.275 to 1.300 | −90° |

The battery should be charged every two months during the "out of service" period, by running the engine. If the above is impossible, and there is no garage equipped for charging batteries to which it may be conveniently sent, the battery may be allowed to stand without charging during the winter, provided the specific gravity of the acid solution registers from 1.270 to 1.290 at the time the car is laid up. Much better results and longer life from the battery will be obtained by giving the periodic charges.

The wires of the battery should be disconnected during the "out of service" period, as a slight leak in the wiring will discharge the battery.

## *Placing Battery in Service Again*

If the battery has received periodic charges it will be unnecessary to give it any special attention, other than to fill it to the proper height with distilled water and connect the wires which were disconnected when the car was stored. After the car has been driven for a number of hours, the specific gravity of the acid solution should be taken with a hydrometer syringe. The solution should register from 1.270 to 1.290 if the battery is fully charged.

A greenish deposit sometimes exists on the terminals of a storage battery which has been stored. This deposit may be removed with a solution of bicarbonate of soda (common cooking soda) in water. Do not allow any of this solution to get into the cells of the battery.

If the battery has not been kept charged during the winter, it is advisable to remove it from the car and have a plant equipped to take care of the work, give it a fifty-hour charge at a 4-ampere rate, before putting it into service again.

## *Sediment*

The sediment which gradually accumulates in the bottom of the jars, should be removed before it reaches the bottom of the plates, as it is very harmful to the battery. The need of cleaning may be determined by inspection. Its necessity is indicated by lack of capacity, excessive evaporation of the acid solution and excessive heating when charging. If a battery is in need of cleaning or repairs, it is best to communicate with a Cadillac distributor or dealer or with the nearest Exide Depot, who will advise you where to ship the battery. *Do not ship batteries without receiving instructions.*

## *Exide Depots and Sales Offices*

The Electric Storage Battery Company, whose general offices and works are at Alleghany Avenue and 19th Street, Philadelphia, Pa., has service stations in towns of any considerable size where battery repair work is done, as well as sales offices and Exide battery depots in a number of the larger cities of the country, where complete assembled batteries and repair parts are carried in stock. For the location of the nearest Exide depot or service station, write the local Cadillac distributor or dealer, or, if preferred, the Electric Storage Battery Company, at Philadelphia.

# TRANSMISSION AND CLUTCH

## TRANSMISSION

### General Description

The transmission is in unit with the engine, and is of the selective type of sliding gear. The gear changes are accomplished by the movement of a hand lever at the driver's right (see Figure 1, also under "Gear Shifting," page 10.)

When traveling in high gear, power from the engine is transmitted through the transmission without passing through any of the transmission gears. Power is transmitted through transmission gears when the car is operated in intermediate, low, or reverse gear.

Changes of gear must never be attempted without first disengaging the clutch by holding down on the clutch pedal.

### Lubrication

The transmission case should always contain lubricant enough to bring the level up to the filler plug in the right-hand side of the case. The level should be inspected at least every 2,500 miles, and lubricant added if necessary.

At the end of every 5,000 miles the transmission case should be thoroughly drained and refilled with fresh lubricant.

Cadillac Rear Axle and Transmission Lubricant is recommended for the transmission. In its absence steam cylinder oil mixed with cup grease may be used. The consistency of the mixture should be such that the mixture will flow easily at temperatures of from 60° to 70° Fahrenheit.

## CLUTCH

### General Description

The main clutch is of the multiple disc dry plate type. The driving discs are covered on both sides with a friction material composed largely of asbestos, and are driven by gear teeth in a clutch ring bolted to the fly wheel of the engine.

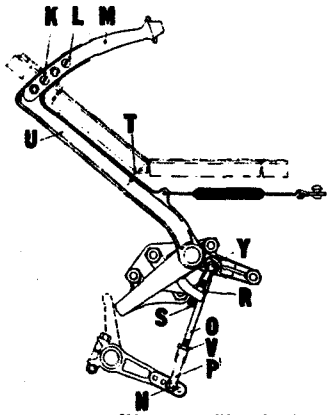



*Fig. 39. Clutch Control.*

The driven discs are not covered. These discs are carried on a clutch hub and drive the clutch hub through keys. The clutch hub in turn drives the transmission shaft.

When the clutch is engaged by allowing the clutch pedal to come toward you, the clutch spring forces all of the discs together. The resulting friction between the driving and driven discs drives the transmission shaft and the car when the transmission control lever is in other than neutral position.

The clutch pedal should be adjusted occasionally to compensate for wear on the facings of the clutch discs. This adjustment is explained below under "Adjustment of Clutch Pedal Clearance."



### Adjustment of Clutch Pedal Clearance

After the car has been run for some time it may be found that the facings on the clutch discs have become compressed or worn to some extent and that consequently the clutch pedal strikes the stop screw before the clutch is fully engaged. When this condition exists a readjustment may be made as follows:

Remove the pin "N," Fig. 39, and unscrew the yoke "P," which is threaded on the rod "O," so that when the pin "N" is replaced the clutch pedal has a movement back and forth of one and one-quarter inches without starting to release the clutch. Secure the pin "N" with a cotter pin and tighten the lock nut "V."

### Adjustment of Length of Clutch and Brake Pedals

The clutch and brake pedals are each made in two parts slidingly adjustable to accommodate different drivers.

## STEERING GEAR

### General Description

The steering gear is of the worm and sector type. Adjustments are provided in the steering gear for taking up play, which may result after long use.

### Lubrication

The mechanism of the steering gear is lubricated through fillers "A" and "B," Figure 40. The filler at "A" is threaded to fit a connection furnished with the oil gun.

Cadillac Steering Gear Lubricant should be used for this part. In its absence, Cadillac Rear Axle and Transmission Lubricant mixed with two to three per cent of flake graphite can be used.

Filling at "B" is facilitated by first turning the steering wheel so that the front wheels face to the right as far as they go. The car should be in motion when the steering wheel is turned.

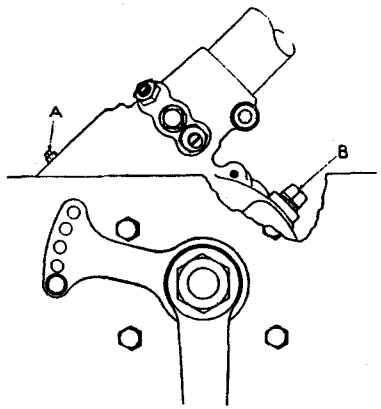



*Fig. 40.*

*Steering Gear Lubrication*

## WHEELS

The adjustment of wheel bearings or the removal of wheels should not be attempted by one unfamiliar with work of this nature. It is recommended that the car be taken to a Cadillac distributor or dealer for this work.

### Removing Front Wheel

Jack up the axle until the wheel is free from the ground.
Remove the hub cap by unscrewing it.
Remove the lock nut "A," Fig. 41.
Remove the washer "B."
Remove the adjusting nut "C."
The wheel may now be removed.
In removing the right front wheel remove the speedometer driver.

Before replacing the wheel, see that the bearings are clean and that they are filled with light grease. Be sure that the grease is free from dirt and grit.

### *Replacing Front Wheel and Adjusting Bearings*

In replacing the wheel, adjust the nut "C" very carefully. (See under "Caution in Adjusting Wheel Bearings," page 59.) Replace washer "B," being sure that one of the holes in the washer fits over the stud "D." Replace the lock nut "A" and tighten carefully.

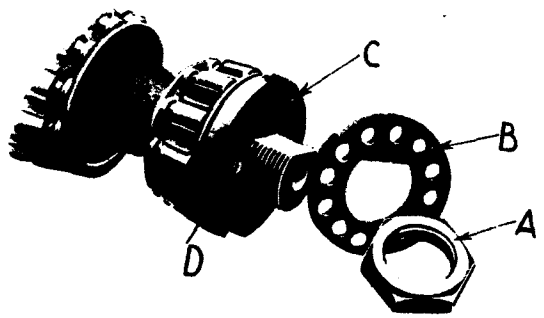



*Fig. 41. Front Wheel Bearings and Adjusting Nuts.*

The thread on the right hand spindle is a right hand thread; the thread on the left hand spindle is a left hand thread. Therefore, in tightening the adjusting and lock nuts, "C" and "A," they should be turned in the same direction in which the wheels turn when the car moves forward.

It is better to adjust the wheel bearings a little too loose than tight. If, after the adjustment is apparently correct, a hole in the washer "B" is not directly over the stud "D," it is best to loosen the adjustment rather than to tighten it.

### *Removing Rear Wheel*

Remove the lubricator "A," Fig. 42.

Remove the hub cap "B" by unscrewing it.

Remove the spring locking ring "K."

Withdraw the axle shaft "C."

Jack up the axle so that the wheel will clear the floor.

Remove the lock nut "D," the washer "E" and the adjusting nut "F."

The wheel can then be taken off.

### *Replacing Rear Wheel and Adjusting Bearings*

Before putting the wheel on again, see that the bearings "G" and "H" are clean and filled with light grease which is free from dirt and grit.

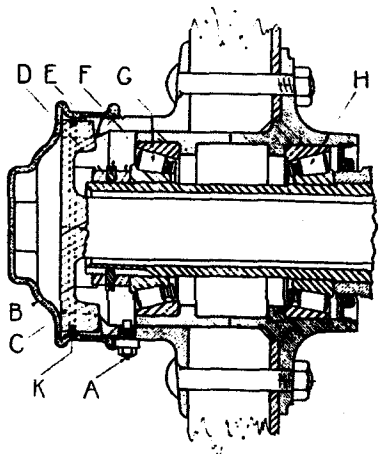



*Fig. 42. Sectional View of Rear Hub, Showing Bearings.*



In putting the wheel on again, set the adjusting nut "F" very carefully. (See under "Caution in Adjusting Wheel Bearings.") Place the washer "E" in position, and tighten the lock nut "D."

## CAUTION IN ADJUSTING WHEEL BEARINGS

When adjusting the wheel bearings, with which the wheels are equipped, great care must be exercised not to get them tight. These bearings will revolve even when adjusted very tightly, but that condition is sure to prove disastrous. They should be adjusted so that a very slight amount of play or looseness may be discerned.

If, after a bearing has been adjusted to a point that is apparently correct, the locking device cannot be placed in position without changing the adjustment, it is far better to *loosen* the adjustment until it can be secured with the locking device than to *tighten* the bearing adjustment.

## REAR AXLE

### *General Description*

The rear axle is of the full floating type. The wheels rotate on the axle housing. The axle shafts do not carry the weight of the car, but simply transmit power from the differential to rotate the wheels.

## BRAKES

### *General Description*

There are two pairs of brakes. The regular service brakes, which are operated by the right pedal, contract upon the outside of the drums. The hand brakes, operated by a hand lever, expand within the drums.

Connections from the right pedal and hand lever are made through equalizing bars so that each drum will be gripped with practically the same pressure. While these equalizing bars compensate for a certain amount of inequality in the tension, it is desirable to adjust the brakes as nearly alike as possible.

The brake band linings can be renewed when necessary.

When the brake band linings are wet and muddy they are less effective than at other times. Hence more care must be exercised in driving at such times.

The brakes and all parts relating thereto should be examined and tested occasionally to be sure that they are in serviceable condition.

The joints and all working parts should be oiled occasionally to avoid any possibility of the parts rusting and sticking together. The internal brake joints are accessible after removing the small covers "F," Fig. 43, from the brake drums. Care should be taken not to apply too much oil to the internal brake joints, as it may get on the brake band linings and impair the efficiency of the brakes.

### *Adjustment of Foot Brakes*

Brake adjustment should not be attempted by one unfamiliar with work of this kind. It is recommended that the car be taken to a Cadillac distributor or dealer.

Provision is made in each brake for its adjustment. Do not attempt to adjust the brakes by the pull rods. The brakes cannot be properly adjusted in this manner. To adjust each foot brake, proceed as follows:

Remove the cotter pin in the adjusting screw "A," Fig. 43, and turn the screw "A" until that part of the brake band lining opposite the screw just clears the drum. Adjust the two nuts "B" on the yoke bolt so that the lower part of the brake band lining just clears the drum.

Then adjust the nut "C" on the upper end of the yoke bolt so that the lever "D" is brought into the position shown in Fig. 43, when the brake is fully applied—*i. e.*, so that the lower edge of the pin "T" and the upper edge of the pin "S" are tangent to an imaginary horizontal line shown at "X." Lock all adjustments.

### *Adjustment of Hand Brakes*

Brake adjustment should not be attempted by one unfamiliar with work of this kind. It is recommended that the car be taken to a Cadillac distributor or dealer.

Provision is made in each brake for its adjustment. Do not attempt to adjust the brakes by the pull rods. The brakes cannot be properly adjusted in this manner. To adjust each hand brake proceed as follows:

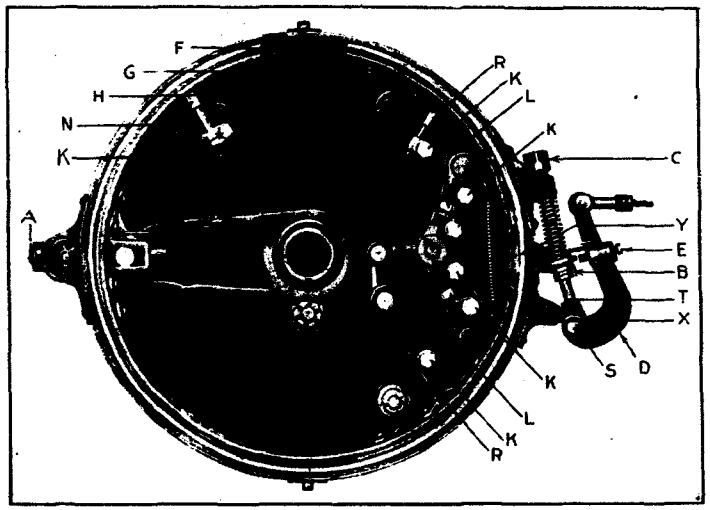



*Fig. 43. Internal and External Brakes. Wheel Removed.*

Place a jack under the rear axle housing and raise the axle so that the wheel can be turned by hand. Remove the cover "F," Fig. 43; this may be done by loosening the lock nut "G" and turning the bolt to the left about one-quarter of a turn, which releases the clamping bar "H."

Rotate the wheel until the opening gives access to the screw "J." Turn the screw "J" until that part of the brake band lining opposite the screw just clears the drum.

Rotate the wheel and through the opening loosen the seven locking screws "K." Then turn the two adjusting screws "L," which have right-hand threads on one end and left-hand threads on the other, so that when the brake is fully applied the center of the pin "M" stands 3 3/16 inches to 3¼ inches away from the inside of the brake drum at "Y." The screws "L" should be turned equally and in the same direction.

Release the brakes and adjust the stop screws "R" so that the upper and lower parts of the brake band lining are equidistant from the brake drum. Adjust the stop screw "N" so that the head of the screw just touches the inside of the brake band. Tighten the seven locking screws "K" and replace the cover "F."

# INDEX


**Adjustments—**
Bearings, Front Wheel ... 57
Bearings, Rear Wheel ... 58
Bearings, Caution in Adjusting Wheel ... 59
Brakes, External (foot) ... 59
Brakes, Internal (hand) ... 60
Clutch Pedal ... 57
Spark Plugs ... 51

**Air Compressor for Tires—**
Operation and Use of ... 20
Lubrication of ... 34

**Air Pressure—**
Tires, Correct Pressure for ... 42

**Ammeter** ... 51

**Anti-Freezing Solution** ... 22

**Battery, Storage (see Storage Battery)** ... 53

**Bearings—**
Front Wheel Bearings ... 57
Rear Wheel Bearings ... 58
Timken Bearings, Caution in Adjusting ... 59

**Body of Car—**
Finish, Care of ... 45
Washing ... 45

**Brakes—**
Description of ... 59
Foot Brakes, Adjustment ... 59
Hand Brakes, Adjustment ... 60
Pedal, Length of Brake ... 57

**Bulbs, Lamp** ... 52

**Carburetor** ... 47

**Clock—**
Winding and Setting Clock ... 16

**Clutch—**
Description of ... 56
Lubrication of Release Ball Race ... 35
Pedal, Clearance of ... 57
Pedal, Length of ... 57

**Coasting** ... 12

**Cold Weather Suggestions—**
Anti-Freezing Solution ... 22
Oil, Frequent Changing of ... 22
Priming the Carburetor ... 20
Spark Lever, Position of ... 21
Starter Button, Use of ... 21
Starting the Engine ... 20
Strainers in Gasoline System ... 22
Storage of Car ... 44

**Commutators, Motor Generator** ... 51

**Condenser, Radiator** ... 48

**Cooling System—**
Anti-Freezing Solution ... 22
Cleaning Cooling System ... 49
Condenser, Radiator ... 48
Description of Cooling System ... 48
Draining Cooling System ... 49
Re-filling Cooling System ... 49
Strainers ... 50
Storage ... 44

**Cup Grease** ... 27

**Curtains, Side** ... 15

**Danger in Running Engine in Closed Garage, Personal** ... 47

**Demountable Rims (see Rims)** ... 17

**Diagram, Lubrication** ... 32

**Don'ts for General Operation** ... 13

**Draining the Cooling System** ... 49

**Driving Suggestions** ... 12

**Dust Hood for Top** ... 15

**Electrical System—**
Ammeter ... 51
Exide Battery Depots ... 55
Generation of Current ... 51
Headlamps ... 11
Hydrometer Syringe ... 54
Ignition System ... 51
Motor Generator ... 50
Spark Plugs ... 51
Storage Battery ... 52

**Engine—**
Firing Order ... 23
Four Cycle, Principle of ... 23
Lubrication of Engine ... 28
Number, Engine ... 6
Operation of Engine ... 23
Start, Failure to ... 8
Starting Engine in Cold Weather ... 20
Stopping Engine ... 11
Storage, Preparing for ... 44

**Exide Battery Depots** ... 55

**External Brakes, Adjustment** ... 59

**Filling Cooling System** ... 49

**Filling Lubricating System** ... 29

**Finish, Care of** ... 45

**Four Cycle Engine** ... 23

**Front Wheels—**
Bearings, Adjustment ... 57
Lubrication ... 36
Removing and Replacing ... 57

**Garage, Personal Danger in Running Engine in Closed** ... 47

**Gasoline System—**
Description of ... 46
Filling Gasoline Tank ... 46
Settling Chambers ... 46
Strainers ... 46

**Gear Shifting—**
Reversing ... 10
Starting Car ... 9
Stopping Car ... 11

**Grease, Cup** ... 27

**Headlamps—**
Reflectors, Cleaning ... 52
Tilting Reflector Control ... 11

**Hydrometer Syringe** ... 54

**Inflation of Tires** ... 42

**Internal Brakes, Adjustment** ... 60

**Lamps (see Lighting System)** ... 52

**License Data** ... 6

**Lighting System—**
Bulbs, Lamp ... 52
Headlamp Reflectors, Tilting ... 11
Portable Lamp Socket ... 52
Reflectors, Cleaning ... 52





**Lubrication, General—**
Chart, Lubrication ... 31
Diagram, General Lubrication ... 32
Importance of Lubrication ... 26
Oil (see Lubricants) ... 27

**Lubrication, Engine—**
Description of Lubricating System ... 28
Filling Lubricating System ... 29
Oil Pressure ... 31
Replacing Oil in Engine ... 30

**Lubricants—**
Cadillac Motor Oil ... 27
Cadillac Rear Axle and Transmission Lubricant ... 27
Cadillac Cup Grease ... 27
Cadillac Wheel Bearing Grease ... 27
Specifications of Engine Oil ... 27

**Motor Generator—**
Commutators ... 51
Description of ... 51

**Mounting Rim** ... 17

**Number, Location of Engine** ... 6

**Operation** ... 7

**Operation of Engine** ... 23

**Operation of a New Car** ... 5

**Oil (see Lubricants)** ... 27

**Parts—**
New Parts, Ordering ... 64
Returning Parts ... 64

**Pedals, Clutch and Brake** ... 57

**Plugs, Spark** ... 51

**Portable Lamp Socket** ... 52

**Preparing Car for Storage** ... 44

**Pressure—**
Oil Pressure ... 31
Tires, Air Pressure for ... 42

**Pump—**
Gasoline System, Hand Pump ... 46
Gasoline System, Power Pump ... 46
Tire Air Compressor ... 20

**Radiator—**
Anti-Freezing Solution ... 22
Draining Radiator ... 49
Filling Radiator ... 49

**Repair Parts** ... 64

**Rear Axle—**
Bearings, Rear Wheel ... 58
Brakes ... 59
Description of Rear Axle ... 59
Lubrication of Rear Axle ... 35
Wheel, Removing and Replacing Rear ... 58

**Rear Wheels—**
Bearings, Adjustment ... 58
Lubrication of ... 36
Removing and Replacing ... 58

**Reflectors, Cleaning Headlamp** ... 52

**Rims, Demountable—**
Demounting Rim ... 17
Mounting Rim ... 17
Placing Tire on Rim ... 18
Removing Tire from Rim ... 17

**Rules of the Road** ... 12

**Settling Chambers in Gasoline System** ... 46

**Side Curtains** ... 15

**Shifting Gears** ... 9

**Spark—**
Automatic Spark Control ... 24
Lever, Position of Spark ... 21
Lubrication of Spark Lever ... 37
Manual Spark Control ... 24

**Spark Plugs—**
Accumulation of Carbon on ... 51
Cores, Cleaning ... 51
Points, Setting ... 51

**Speedometer—**
Lubrication ... 16
Repairs to ... 16

**Springs—**
Lubrication of Springs ... 33

**Starting—**
Car, Starting ... 9
Engine, Starting ... 8
Engine, Starting in Cold Weather ... 20
Failure of Engine to Start ... 8

**Steering Gear—**
Lubrication ... 36

**Stopping—**
Car, Stopping ... 11
Engine, Stopping ... 11
Traffic, Stopping in ... 12

**Storage Battery—**
Description of ... 52
Hydrometer Syringe ... 54
Sediment ... 55
Water, Adding ... 53
Storage, Preparing For ... 55

**Storage of Car** ... 44

**Strainers in Gasoline System** ... 46

**Strainers in Cooling System** ... 50

**Syringe, Hydrometer** ... 54

**Thermostatic Control of Cooling System** ... 48

**Throttle—**
Lubrication of Throttle Lever ... 37
Position of Lever in Starting ... 21

**Tilting Headlamp Reflectors** ... 11

**Tires—**
Air Compressor for ... 20
Care of Tires ... 40
Holder, Tire ... 19
Injuries to Tires ... 40
Placing Tire on Rim ... 18
Pressure for Tires ... 42
Removing Tire from Rim ... 17
Repairs to Tires ... 64
Storage of Tires ... 44

**Top—**
Curtains, Side ... 15
Dust Hood for Top ... 15
Folding Top ... 14
Lubrication of Top ... 37
Raising Top ... 15
Storage of Top ... 44

**Transmission—**
Description of ... 56
Lubrication of ... 56

**Washing Car** ... 45

**Water, Adding to Storage Battery** ... 53

**Windshield, Positions of** ... 16

**Wheels (see Front and Rear Wheels)** ... 57

**Wheel Bearings, Caution in Adjusting** ... 59

# REPAIR PARTS

## *Ordering New Parts*

With more than a hundred thousand Cadillac automobiles in use, it is obviously impractical for us to deal directly with each Cadillac owner. We cannot open accounts with or sell at a discount to any except regular distributors with whom annual contracts are made.

To avoid unnecessary delay and useless correspondence new parts should, where possible, be ordered from the distributor or dealer from whom the car was purchased or from the nearest Cadillac distributor or dealer, who is generally in a position to know what is desired and to supply it from his stock. If he cannot do so, he can order it for you.

Where, however, conditions are such as in our judgment to warrant it, we will fill orders for parts at current list prices, f. o. b. factory, provided the order is accompanied by cash. In ordering, send the engine number and type of the car with an accurate description of the part desired, preferably accompanied by a sketch with dimensions. If this cannot be done, return the part properly tagged, transportation charges prepaid. (See below under "Returning Parts.") Otherwise, we cannot promise prompt service or to fill the order intelligently.

Our responsibility in all cases ceases with delivery to the transportation company.

## *Returning Parts*

In the event that parts are returned to the factory, the transportation charges must be prepaid or the parts will not be accepted. They should be properly tagged with the name of the owner and the engine number of the car, and a letter should be sent, giving complete instructions regarding the disposition of the parts.

## *Tires, Speedometers and Clocks*

In cases of repairs to tires, speedometers or clocks, correspondence should be opened directly with the manufacturers or one of their branches. If necessary the parts should be sent to them. Transportation charges should be prepaid.

LIBRARY REFERENCE COPY
NOT TO CIRCULATE

Miscellaneous
1922

# Index of all Cadillac Models using Delco Equipment

## 1910 CADILLAC MODEL

**Delco System No. 142**

| | |
|---|---|
| No. 2004 | COIL BOX |
| No. 1018 | IGNITION SWITCH |
| No. 5661 | IGNITION RELAY |

## 1911 CADILLAC MODEL

**Delco System No. 4411**

| | |
|---|---|
| No. 5001 | DRY CELL DISTRIBUTOR |
| No. 5661 | IGNITION RELAY |
| No. 2022 | IGNITION COIL |
| No. 1007 | IGNITION SWITCH |
| No. 1009 | IGNITION SWITCH |

## 1912 CADILLAC MODEL

**Delco System No. 1**

| | |
|---|---|
| No. 1 | MOTOR GENERATOR |
| No. 5401 | BATTERY BOX |
| No. 5001 | DRY CELL DISTRIBUTOR |
| No. 2022 | IGNITION COIL |
| No. 1018 | IGNITION SWITCH |
| No. 5661 | IGNITION RELAY |
| No. 5049 | GENERATOR DISTRIBUTOR |
| No. 2045 | IGNITION COIL |
| No. 10678 | RESISTANCE UNIT |
| No. 1991 | STARTING SWITCH |
| No. 5442 | CLUTCH MAGNET |

## 1913 CADILLAC MODEL

**Delco System No. 4**

| | |
|---|---|
| No. 4 | MOTOR GENERATOR |
| No. 5404 | BATTERY BOX |
| No. 5440 | CLUTC HMAGNET |
| No. 10686 | RESISTANCE UNIT |
| No. 1978 | IGNITION SWITCH |
| No. 5055 | GENERATOR DISTRIBUTOR |
| No. 2093 | IGNITION COIL |
| No. 5059 | DRY CELL DISTRIBUTOR |
| No. 2092 | IGNITION COIL |
| No. 6051 | AMMETER |
| No. 5677 | IGNITION RELAY |
| No. 1979 | IGNITION SWITCH |
| No. 10131 | TERMINAL BOARD |

# Index of all Cadillac Models using Delco Equipment

## 1910 CADILLAC MODEL

**Delco System No. 142**

| | |
|---|---|
| No. 2004 | COIL BOX |
| No. 1018 | IGNITION SWITCH |
| No. 5661 | IGNITION RELAY |

## 1911 CADILLAC MODEL

**Delco System No. 4411**

| | |
|---|---|
| No. 5001 | DRY CELL DISTRIBUTOR |
| No. 5661 | IGNITION RELAY |
| No. 2022 | IGNITION COIL |
| No. 1007 | IGNITION SWITCH |
| No. 1009 | IGNITION SWITCH |

## 1912 CADILLAC MODEL

**Delco System No. 1**

| | |
|---|---|
| No. 1 | MOTOR GENERATOR |
| No. 5401 | BATTERY BOX |
| No. 5001 | DRY CELL DISTRIBUTOR |
| No. 2022 | IGNITION COIL |
| No. 1018 | IGNITION SWITCH |
| No. 5661 | IGNITION RELAY |
| No. 5049 | GENERATOR DISTRIBUTOR |
| No. 2045 | IGNITION COIL |
| No. 10678 | RESISTANCE UNIT |
| No. 1991 | STARTING SWITCH |
| No. 5442 | CLUTCH MAGNET |

## 1913 CADILLAC MODEL

**Delco System No. 4**

| | |
|---|---|
| No. 4 | MOTOR GENERATOR |
| No. 5404 | BATTERY BOX |
| No. 5440 | CLUTC HMAGNET |
| No. 10686 | RESISTANCE UNIT |
| No. 1978 | IGNITION SWITCH |
| No. 5055 | GENERATOR DISTRIBUTOR |
| No. 2093 | IGNITION COIL |
| No. 5059 | DRY CELL DISTRIBUTOR |
| No. 2092 | IGNITION COIL |
| No. 6051 | AMMETER |
| No. 5677 | IGNITION RELAY |
| No. 1979 | IGNITION SWITCH |
| No. 10131 | TERMINAL BOARD |

## 1914 CADILLAC MODEL

**Delco System No. 27**

| | |
|---|---|
| No. 24 | MOTOR GENERATOR |
| No. 5506 | APPARATUS BOX |
| No. 5105 | DISTRIBUTOR |
| No. 2104 | IGNITION COIL |
| No. 1035 | COMBINATION SWITCH |
| No. 1042 | COMBINATION SWITCH |
| No. 5447 | CLUTCH MAGNET |
| No. 5692 | CIRCUIT BREAKER |

## 51 MODEL—1915 CADILLAC

**Delco System No. 69**

| | |
|---|---|
| No. 44 | MOTOR GENERATOR |
| No. 10726 | MOTOR CLUTCH |
| No. 2115 | IGNITION COIL |
| No. 1045 | COMBINATION SWITCH |
| No. 5696 | CIRCUIT BREAKER |
| No. 5308 | AUTO HORN |
| No. 5695 | CIRCUIT BREAKER |

## 53 MODEL—1916 CADILLAC

**Delco System No. 98**

| | |
|---|---|
| No. 78 | MOTOR GENERATOR |
| No. 5150 | AUTOMATIC DISTRIBUTOR |
| No. 11973 | MOTOR CLUTCH |
| No. 2115 | IGNITION COIL |
| No. 1062 | COMBINATION SWITCH |
| No. 1069 | COMBINATION SWITCH |
| No. 5705 | CIRCUIT BREAKER |
| No. 5310 | AUTO HORN |
| No. 1061 | AUTO HORN SWITCH |

## 55 MODEL—1917 CADILLAC

**Delco System No. 130**

| | |
|---|---|
| No. 98 | MOTOR GENERATOR |
| No. 12677 | MOTOR CLUTCH |
| No. 5150 | DISTRIBUTOR |
| No. 2115 | IGNITION COIL |
| No. 1077 | COMBINATION SWITCH |
| No. 5705 | CIRCUIT BREAKER |
| No. 5311 | AUTO HORN |
| No. 1061 | AUTO HORN SWITCH |

## 57 MODEL—1918 CADILLAC

**Delco System No. 177**

| | |
|---|---|
| No. 98 | MOTOR GENERATOR |
| No. 12677 | MOTOR CLUTCH |
| No. 5166 | DISTRIBUTOR |
| No. 2115 | IGNITION COIL |
| No. 1099 | COMBINATION SWITCH |
| No. 5705 | CIRCUIT BREAKER |
| No. 5312 | AUTO HORN |

## 57 MODEL—1919 CADILLAC

**Delco System No. 177**

| | |
|---|---|
| No. 98 | MOTOR GENERATOR |
| No. 12677 | MOTOR CLUTCH |
| No. 5166 | DISTRIBUTOR |
| No. 2115 | IGNITION COIL |
| No. 1099 | COMBINATION SWITCH |
| No. 5742 | CIRCUIT BREAKER |
| No. 5312 | HORN (EXTRA) |

## 59 MODEL—1920 AND 1921 CADILLAC

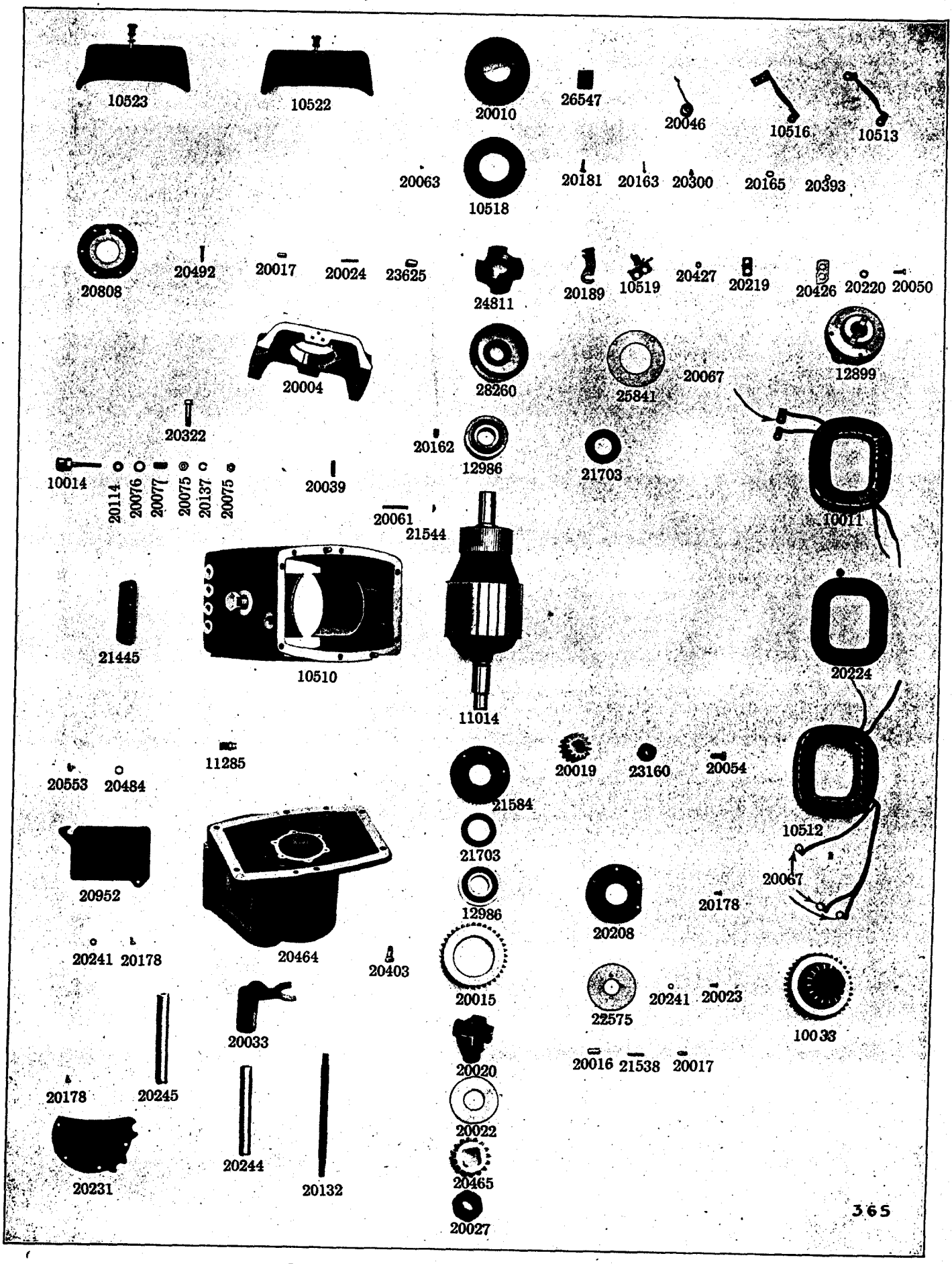
**Delco System No. 291**

| | |
|---|---|
| No. 162 | MOTOR GENERATOR |
| No. 1150 | COMBINATION SWITCH |
| No. 2115 | IGNITION COIL |
| No. 5206 | DISTRIBUTOR |
| No. 5742 | CIRCUIT BREAKER |
| No. 12677 | MOTOR CLUTCH |

# Chart Showing Cadillac Models and the Delco Apparatus Used on Each Model

| Cadillac Models | Year Used | Delco System | Motor Generator | Ignition Switch | Combination Switch | Ignition Coils and Boxes | Distributor | Apparatus Boxes | Ignition Relays | Circuit Breakers | Motor Clutch | Resistance Units | Clutch Magnet | Battery Box | Starting Switch | Auto Horns | Horn Switch | Terminal Boards |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1910 | 1910 | IGN 142 | | 1018 | | 2004 | | | 5661 | | | | | | | | | |
| 1911 | 1911 | IGN 4411 | | 1007* 1009 | | 2022 | 5001 | | 5661 | | | | | | | | | |
| 1912 | 1912 | 1 | 1 | 1018 | | 2022 2045 | 5001 5049 | | 5661 | | | 10678* | 5442 | 5401 | 1991 | | | |
| 1913 | 1913 | 4 | 4 | 1978 1979 | | 2093 2092 | 5055 5059 | | 5677 | | | 10686 | 5440 | 5404 | | | | 10131 |
| 1914 | 1914 | 27 | 24 | | 1035* 1042* | 2104 | 5105 | 5506 | | 5692 | | | 5447 | | | | | |
| 51 | 1915 | 69 | 44 | | 1045 | 2115 | | | | 5696 5695 | 10724 | | | | | 5308 | | |
| 53 | 1916 | 98 | 78* | | 1062* 1069 | 2115 | 5150* | | | 5705* | 11973 | | | | | 5310 | 1061 | |
| 55 | 1917 | 130 | 98 | | 1077 | 2115 | 5150* | | | 5705* | 12677 | | | | | 5311 | 1061 | |
| 57 | 1918 | 177 | 98 | | 1099* | 2115 | 5166 | | | 5705* | 12677 | | | | | 5312 | | |
| 57 | 1919 | 177 | 98 | | 1099* | 2115 | 5166 | | | 5742 | 12677 | | | | | 5312 | | |
| 59 | 1920 1921 | 291 | 162 | | 1150 | 2115 | 5206 | | | 5742 | 12677 | | | | | | | |

*Refer to the note under the piece of apparatus in the catalog to determine the correct part to order.



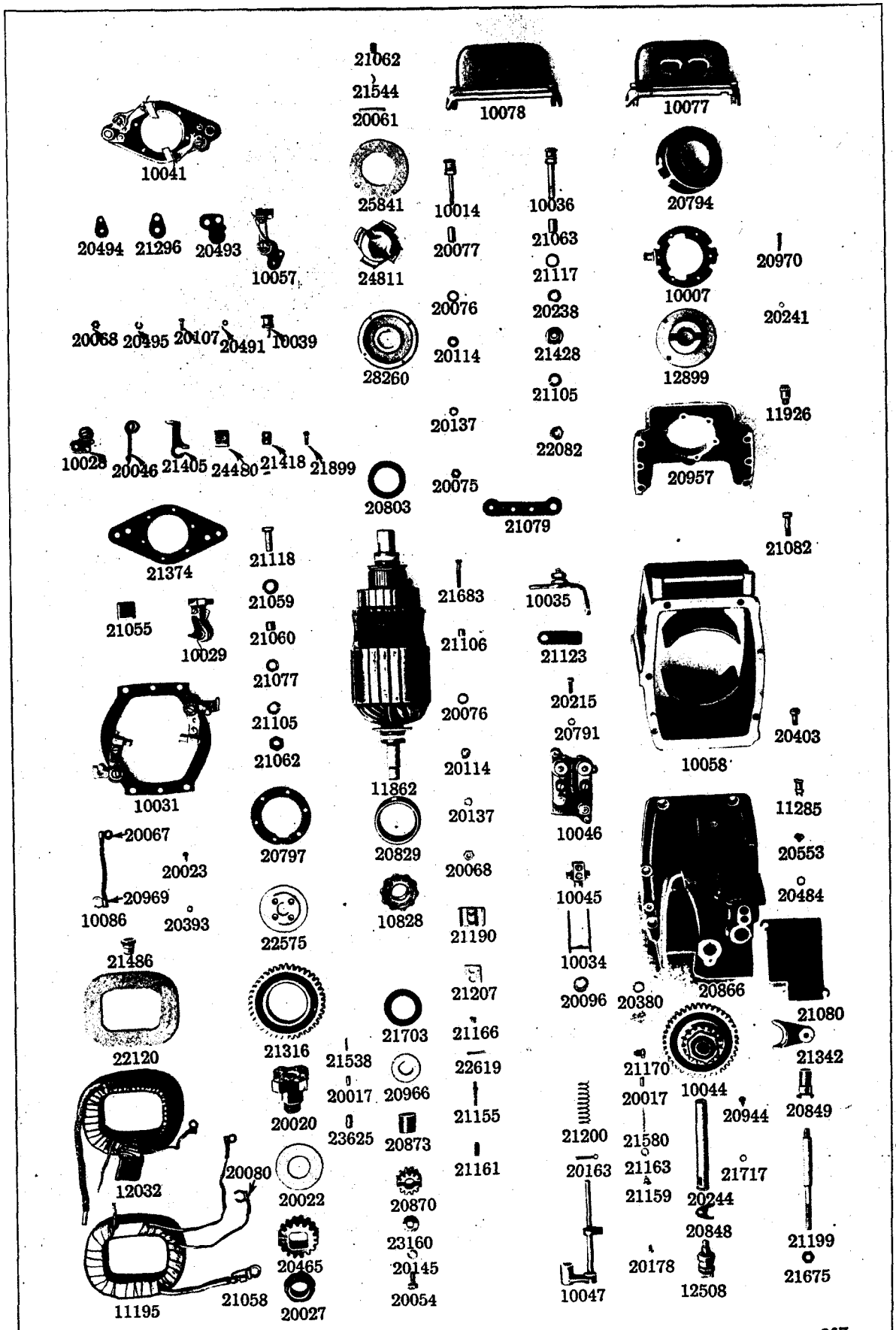

No. 1 MOTOR GENERATOR

# No. 1 MOTOR GENERATOR

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1 | **MOTOR GENERATOR COMPLETE** | 1 |
| 10510 | **Generator Frame Assembly** | 1 |
| | (Includes the next 2 Items) | |
| 20041 | Pole Piece Screw (Not shown in Illustration) | 2 |
| 20039 | Dowel Pin for Pole Piece | 4 |
| 10011 | **Upper Field Coil Assembly Complete** | 1 |
| | (Includes the next Item) | |
| 20067 | Terminal Clip for Spring Terminal Assembly 10014 | 2 |
| 10512 | **Lower Field Coil Assembly Complete** | 1 |
| | (Includes the next Item) | |
| 20067 | Terminal Clip for Spring Terminal Assembly 10014 | 3 |
| 10513 | **Brush Connector Lead Assembly Complete** | 1 |
| | (Includes the next 2 Items) | |
| 22517 | Sleeving for Lead Assembly 10513 (Not shown in Illustration) | 1 |
| 20067 | Clip for Lead Assembly 10513 (Not shown in Illustration) | 2 |
| 10014 | **Spring Terminal Assembly for connecting Generator** | 4 |
| 21445 | Insulator for Spring Terminal Assembly 10014 (Outer) | 1 |
| 20077 | Insulating Bushing for Spring Terminal Assembly 10014 | 4 |
| 20076 | Insulating Washer for Spring Terminal Assembly 10014 (Inner) | 4 |
| 20114 | Plain Washer for Spring Terminal Assembly 10014 | 4 |
| 20075 | Nut for retaining Spring Terminal Assembly 10014 | 8 |
| 20137 | Lock Washer for Nut 20075 | 4 |
| 20224 | Shield for Field Coil Assemblies 10011 and 10512 | 2 |
| 20004 | Frame for Driving Clutch End of Generator | 1 |
| 12986 | **Ball Bearing Assembly for Frame 20004** | 1 |
| 21703 | Oil Retainer (Felt) (For Ball Bearing Assembly 12986 (Inner) | 1 |
| 20208 | Retainer for Ball Bearing Assembly 12986 (Inner) | 1 |
| 20492 | Screw for retaining Retainer 20208 and Bearing Retainer Assembly 10518 | 6 |
| 10518 | **Bearing Retainer Assembly for Ball Bearing Assembly 12986 (Outer)** | 1 |
| 20062 | Stud for Retainer Assembly 10518 (Not shown in Illustration) | 1 |
| 10519 | **Generator Brush Bracket Assembly Complete** | 2 |
| | (Includes the next 2 Items) | |
| 20187 | Stud for holding Generator Brush Arm Assembly 13516 (Not shown in Illustration) | 1 |
| 20188 | Stop Stud for Generator Brush Arm Assembly 13516 (Not shown in Illustration) | 1 |
| 20050 | Screw for attaching Generator Brush Bracket Assembly 10519 | 4 |
| 20220 | Plain Washer for Screw 20054 | 4 |
| 20219 | Insulator for Generator Brush Bracket Assembly 10519 (Upper) | 2 |
| 20426 | Insulator for Generator Brush Bracket Assembly 10519 (Lower) | 2 |
| 20427 | Insulating Bushing for Screw 20050 | 4 |
| 20189 | Generator Brush Arm | 2 |
| 26547 | Brush for Brush Arm 20189 | 1 |
| 20181 | Screw for attaching Brush 26547 | 2 |
| 21418 | Lock Plate for Screw 20181 (Not shown in Illustration) | 1 |
| 10516 | **Generator Brush Lead Assembly Complete** | 2 |
| | (Includes the next 3 Items) | |
| 22517 | Sleeving for Lead Assembly 10516 (Not shown in Illustration) | 1 |
| 20067 | Clip for Spring Terminal End of Lead Assembly 10516 (Not shown in Illustration) | 1 |
| 20180 | Clip for Brush Arm End of Lead Assembly 10516 (Not shown in Illustration) | 1 |
| 11014 | **Armature Assembly for Motor Generator** | 1 |
| 20046 | Spring for Generator Brush Arm 20189 | 2 |
| 20163 | Cotter Pin for retaining Generator Brush Arm 20189 | 2 |
| 20065 | Screw for retaining Cover 20010 (Not shown in Illustration) | 1 |
| 20010 | Cover for Generator Clutch Assembly 12899 | 1 |
| 20162 | Clamp Screw for retaining Clutch Assembly 12899 (Not shown in Illustration) | 1 |
| 21544 | Key for Generator Clutch Assembly 12899 | 1 |
| 13671 | **Generator Clutch Assembly Complete (Not shown in Illustrated)** | 1 |
| | (Includes the next 8 Items) | |
| 22262 | Cam for Generator Clutch Assembly 13671 (Not shown in Illustration) | 1 |
| 28260 | Shell for Generator Clutch Assembly 13671 | 1 |
| 23625 | Roll for Cam 22262 | 4 |
| 20024 | Spring for Plunger 20017 | 4 |
| 20017 | Plunger for Roll 24625 | 4 |
| 25841 | Retainer for Roll 23625 | 1 |
| 20063 | Screw for retaining Retainer 25841 | 4 |
| 20061 | Pin for retaining Clutch | 1 |
| 20464 | Housing for Pinion End for Generator | 1 |
| 21584 | Retainer for Ball Bearing Assembly 12986 (Outer) (Pinion End) | 1 |
| 20178 | Screw for retaining Retainer 21584 | 6 |
| 20241 | Lock Washer for Screw 20178 | 6 |
| 11285 | **Oiler Assembly for Housing 20464** | 1 |
| 10522 | **Cover Assembly Complete (Upper)** | 1 |
| | (Includes the next 4 Items) | |
| 10521 | **Screw Assembly (Not shown in Illustration)** | 1 |
| 20056 | Nut for Screw Assembly 10521 Not shown in Illustration) | 1 |

# No. 1 MOTOR GENERATOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 20211 | Lock Washer for Nut 20056 (Not shown in Illustration) | 1 |
| 20059 | Pin for Nut 20056 (Not shown in Illustration) | 1 |
| 10523 | **Cover Assembly Complete (Lower)** (Includes the next 4 Items) | 1 |
| 10521 | **Screw Assembly (Not shown in Illustration)** | 1 |
| 20056 | Nut for Screw Assembly 10521 (Not shown in Illustration) | 1 |
| 20211 | Lock Washer for Nut 20056 (Not shownin Illustration) | 1 |
| 20059 | Pin for Nut 20056 (Not shown in Illustration) | 1 |
| 20484 | Spring Washer for Screw 20553 | 2 |
| 20553 | Screw for attaching Cover 20952 | 2 |
| 20952 | Cover for End Housing Assembly 10520 (Top | 1 |
| 20178 | Screw for attaching Cover 20231 | 4 |
| 20241 | Lock Washer for Screw 20178 | 4 |
| 20231 | Cover for End Housing Assembly 10520 (End) | 1 |
| 20245 | Shaft for Shifting Yoke 20033 | 1 |
| 20244 | Shaft for Motor Clutch | 1 |
| 20132 | **Shifting Rod for Motor Clutch** | 1 |
| 20033 | Shifting Yoke for Shifting Rod 20132 | 1 |
| 23160 | Clamp Washer for Motor Pinion 20019 | 1 |
| 20054 | Clamp Screw for retaining Motor Pinion 20019 | 1 |
| 20145 | Lock Washer for Clamp Screw 20054 (Not shown in Illustration) | 1 |
| 20019 | Motor Pinion for Armature Shaft | 1 |
| 20403 | Screw for attaching End Housing 20464 | 6 |
| 20775 | Sleeve for Armature Shaft (Pinion Shaft) (Not shown in Illustration) | 1 |
| 12986 | **Ball Bearing Assembly for Pinion End of Armature Shaft** | 1 |
| 21703 | Oil Retainer (Felt) for Ball Bearing Assembly 12986 | 2 |
| 21584 | Retainer for Ball Bearing Assembly (Outer) (Pinion End) | 1 |
| 20322 | Screw for attaching End Frame 20004 | 4 |
| 20042 | Dowel Pin for End Frame 20004 (Not shown in Illustration) | 2 |
| 20039 | Dowel Pin for End Housing 20464 | 2 |
| 20178 | Screw for attaching Retainer 21584 | 6 |
| 20241 | Lock Washer for Screw 20178 | 6 |
| 20300 | Screw for attaching Generator Brush Lead Assembly 10516 to Generator Brush Bracket | 4 |
| 20165 | Plain Washer for Screw 20300 | 4 |
| 20393 | Lock Washer for Screw 20300 | 4 |
| 12809 | **Motor Clutch Assembly Complete (Old Style before Cadillac No. 65800)** (Includes the next 11 Items) | 1 |
| 20232 | Pinion for Motor Clutch Assembly 12809 (Not shown in Illustration) | 1 |
| 20020 | Cam for Motor Clutch Assembly 12809 | 1 |
| 20027 | Clamp Nut for Motor Clutch Assembly 12809 | 1 |
| 20015 | Gear for Motor Clutch Assembly 12809 | 1 |
| 20022 | Retainer for Roll 23625 (Inner) | 1 |
| 22575 | Retainer for Roll 23625 (Outer) | 1 |
| 20017 | Plunger for Roll 23625 | 4 |
| 21538 | Spring for Plunger 20017 | 4 |
| 23625 | Roll for Cam 20020 | 4 |
| 20023 | Screw for Retainer 20022 and 22575 | 4 |
| 20393 | Lock Washer for Screw 20023 | 4 |
| 10033 | **Motor Clutch Assembly Complete (After Cadillac Motor No. 65800)** (Includes the next 11 Items) | 1 |
| 20465 | Pinion for Motor CLlutch Assembly 10033 | 1 |
| 20020 | Cam for Motor Clutch Assembly 10033 | 1 |
| 20027 | Clamp Nut for Motor Clutch Assembly 10033 | 1 |
| 20015 | Gear for Motor Clutch Assembly 10033 | 1 |
| 20022 | Retainer for Roll 23625 (Inner) | 1 |
| 22575 | Retainer for Roll 23625 (Outer) | 1 |
| 21538 | Spring for Plunger 20017 | 4 |
| 20017 | Plunger for Roll 23625 | 4 |
| 23625 | Roll for Cam 20020 | 4 |
| 20023 | Screw for Retainers 20022 and 22575 | 4 |
| 20241 | Lock Washer for Screw 20023 | 4 |




# No. 4 MOTOR GENERATOR

# No. 4 MOTOR GENERATOR

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 4 | **MOTOR GENERATOR** | 1 |
| 10058 | **Generator Frame Assembly** (Includes the next 2 Items) | 1 |
| 20041 | Screw for Pole Piece (Not shown in Illustration) | 2 |
| 20039 | Dowel Pin for Pole Piece (Not shown in Illustration) | 4 |
| 10079 | **Field Coil Assembly Complete** (Includes the next 10 Items) | 1 |
| 21486 | Insulating Bushing for Series Lead | 1 |
| 20080 | Terminal Clip for Spring Terminal Assembly 10036 | 1 |
| 20067 | Terminal Clip for Spring Terminal Assembles 10014 and 10037 | 2 |
| 21058 | Terminal Clip for Spring Terminal Assembly 10080 | 1 |
| 21681 | Terminal Clip for attaching Series Lead to Switch Cover Assembly 10046 | 1 |
| 22285 | Binding Strip for Field Coil Assembly 10079 (Not shown in Illustration) | 2 |
| 22284 | Insulating Binding Strip for Field Coil Assembly 10079 (Outer) (Not shown in Illustration) | 2 |
| 22283 | Insulating Binding Strip for Field Coil Assembly 10079 (Inner) (Not shown in Illustration) | 2 |
| 10029 | **Motor Brush Arm Assembly Complete** (Includes the next 9 Items) | 2 |
| 21051 | Arm for Motor Brush Arm Assembly 10029 (Right Hand) (Not shown in Illustration) | 1 |
| 21052 | Arm for Motor Brush Arm Assembly 10029 (Left Hand) (Not shown in Illustration) | 1 |
| 20970 | Bolt for connecting Arm 21051 and 21052 (Not shown in Illustration) | 1 |
| 21055 | Brush for Motor Brush Arm Assembly 10029 | 1 |
| 21068 | Hub for Arms 21051 and 21052 (Not shown in Illustration) | 1 |
| 20495 | Lock Washer for Nut 20068 | 1 |
| 20068 | Nut for Bolt 20970 | 1 |
| 21124 | Spring for Motor Brush Arm Assembly 10029 (Outer) (Not shown in Illustration) | 1 |
| 21258 | Stud for Arms 21051 and 21052 (Not shown in Illustration) | 1 |
| 10028 | **Motor Brush Connector Assembly Complete** | 2 |
| 21413 | Spring for Motor Brush Arm Assembly 10029 (Inner) | 2 |
| 21077 | Plain Washer for Screw 21118 | 2 |
| 20791 | Lock Washer for Screw 21118 | 2 |
| 21118 | Screw for retaining Motor Brush Arm Assembly 10029 | 2 |
| 21057 | Plate for mounting Motor Brush Arm Assembly 10029 (Not shown in Illustration) | 1 |
| 21407 | Stud for Plate 21057 for holding Motor Brush Arm Assembly 10029 (Not shown in Illustration) | 2 |
| 20125 | Insulating Washer for Stud 21407 (Outer) (Not shown in Illustration) | 2 |
| 20076 | Insulating Washer for Stud 21407 (Inner) (Not shown in Illustration) | 2 |
| 20114 | Plain Washer for Nut 20075 (Not shown in Illustration) | 2 |
| 20137 | Lock Washer for Nut 20075 (Not shown in Illustration) | 2 |
| 20075 | Nut for retaining Stud 21407 (Not shown in Illustration) | 2 |
| 21078 | Insulating Bushing for Stud 21407 (Not shown in Illustration) | 2 |
| 21428 | Plain Washer for retaining Spring 21413 (Not shown in Illustration) | 2 |
| 10014 | **Spring Terminal Assembly for connecting Generator (No. 1-2-3 Terminal from Left Side of Generator** | 3 |
| 10036 | **Spring Terminal Assembly for connecting Generator (No. 4 Terminal from Left Side of Generator)** | 1 |
| 10035 | **Motor Terminal Assembly Complete** (Includes the next 2 Items) | 1 |
| 21087 | Strap for connecting Motor Terminal to Spring Terminal Assembly 10036 (Not shown in Illustration) | 1 |
| 21372 | Stud for Strap 21987 (Not shown in Illustration) | 1 |
| 20079 | Washer for Stud 21062 | 1 |
| 21062 | Nut for Stud 21372 | 1 |
| 21105 | Lock Washer for Nut 21062 | 1 |
| 21106 | Insulating Bushing for Screw 21683 | 1 |
| 20077 | Insulating Bushing for Spring Terminal Assembly 10014 | 3 |
| 21063 | Insulating Bushing for Spring Terminal Assembly 10036 | 1 |
| 21059 | Insulating Collar for Screw 21073 | 1 |
| 21079 | Insulator for Spring Terminal Assemblies 10014 and 10036 | 1 |
| 21073 | Screw for retaining Brush Terminal (Not shown in Illustration) | 1 |
| 21123 | Insulator for Strap 21087 | 1 |
| 20075 | Nut for Spring Terminal Assemblies 10014 and 10036 and Screw 21683 | 7 |
| 20039 | Dowel Pin for locating Pole Piece (Not shown in Illustration) | 2 |
| 21683 | Screw for retaining Strap 21087 | 1 |
| 21060 | Insulating Washer for Screw 21073 (Not shown in Illustration) | 1 |
| 22120 | Shield for Field Coil Assembly 10079 | 2 |
| 20114 | Plain Washer for Screw 21683 and Spring Terminal Assembly 10014 | 4 |
| 20137 | Lock Washer for Screw 21683 and Spring Terminal Assembly 10014 | 4 |
| 20076 | Insulating Washer for Screw 21683 and Spring Terminal Assembly 10014 | 4 |
| 21117 | Insulating Washer for Spring Terminal Assembly 10036 | 2 |
| 20238 | Plain Washer for Spring Terminal Assembly 10036 | 2 |

# No. 4 MOTOR GENERATOR (Continued)

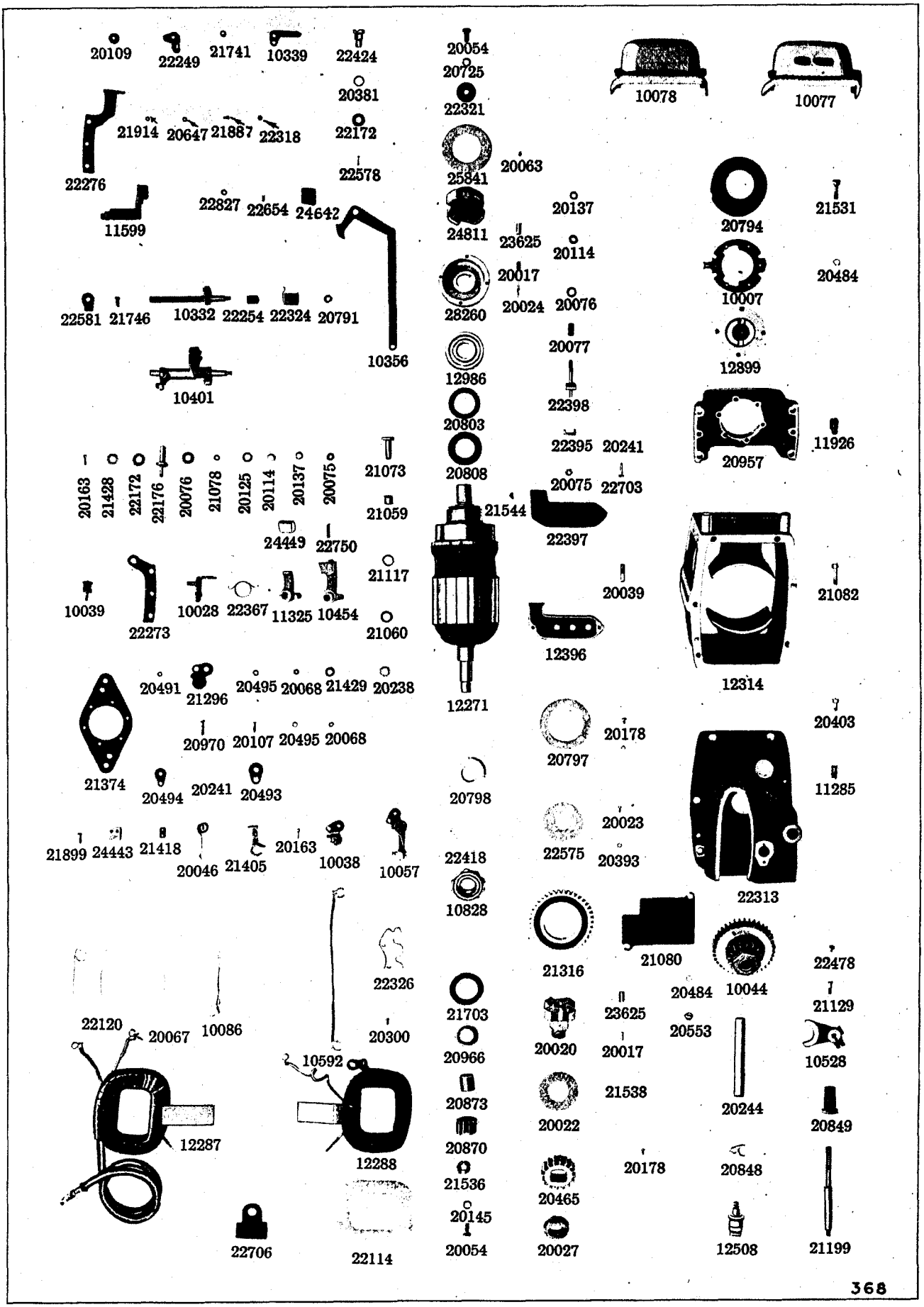
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 22082 | Clamp Nut for Spring Terminal Assembly 10036 | 1 |
| 11862 | **Armature Assembly for Motor Generator** | 1 |
| 21405 | Generator Brush Arm | 1 |
| 24480 | Brush for Arm 21405 | 1 |
| 21418 | Plate for Arm 21405 | 2 |
| 21899 | Screw for attaching Brush 24480 | 2 |
| 22826 | Lock Plate for Screw 21899 (Not shown in Illustration) | 1 |
| 10038 | **Generator Brush Holder Plate Assembly Complete (Not shown in Illustration)** (Includes the next Item) | 2 |
| 12422 | Stud for Plate Assembly 10038 (Not shown in Illustration) | 1 |
| 10039 | **Spring Terminal Assembly for Generator Brush Holder Assembly 10041** | 2 |
| 21374 | Holder for Generator Brush Holder Plate Assembly 10038 | 2 |
| 21296 | Insulator for Plate 21209 | 2 |
| 23623 | Insulator for Holder 21374 (Not shown in Illustration) | 2 |
| 20494 | Plate for Generator Brush Holder Assembly 10041 (Outer) | 2 |
| 20495 | Lock Washer for Nut 20068 | 4 |
| 20068 | Nut for retaining Generator Brush Spring Terminal Assembly 10039 and Screw 20107 | 4 |
| 20107 | Screw for retaining Plate 20494 | 2 |
| 20491 | Insulating Bushing for Generator Brush Spring Terminal Assembly 10039 and Screw 20107 | 4 |
| 10007 | **Bearing Retainer Assembly Complete** (Includes the next 5 Items) | 1 |
| 10201 | **Bearing Retainer Assembly (Not shown in Illustration)** (Includes the next Item) | 1 |
| 20062 | Stud for Retainer Assembly 10201 (Not shown in Illustration) | 1 |
| 20802 | Spring Nut for Bearing Retainer Assembly 10007 (Not shown in Illustration) | 1 |
| 20801 | Screw for Spring Nut 20802 (Not shown in Illustration) | 1 |
| 20307 | Spring for Screw 20801 (Not shown in Illustration) | 1 |
| 20957 | End Frame for Generator | 1 |
| 12989 | **Ball Bearing Assembly for Armature Shaft (Not shown in Illustration)** | 1 |
| 22736 | Shim for Ball Bearing Assembly 12989 (Not shown in Illustration) | 2 |
| 20970 | Screw for retaining Bearing Retainer Assembly 10007 | 6 |
| 20241 | Lock Washer for Screw 20970 | 6 |
| 21704 | Pipe Plug for Oil Hole in End Frame 20957 (Not shown in Illustration) | 1 |
| 12899 | **Generator Clutch Assembly Complete** (Includes the next 8 Items) | 1 |
| 24811 | Cam for Generator Clutch Assembly 12899 | 1 |
| 28260 | Shell for Generator Clutch Assembly 12899 | 1 |
| 23625 | Roll for Cam 24811 | 4 |
| 20024 | Spring for Plunger 20017 (Not shown in Illustration) | 4 |
| 20017 | Plunger for Roll 23625 | 4 |
| 25841 | Retainer for Roll 23625 | 1 |
| 20063 | Screw for retaining Retainer 25841 (Not shown in Illustration) | 4 |
| 20061 | Pin for Shell 28260 | 1 |
| 20794 | Cover for Generator Clutch Assembly 12899 | 1 |
| 20966 | Collar for retaining Ball Bearing Assembly 12989 (Pinion End of Armature Shaft) | 1 |
| 21544 | Key for Generator Clutch Assembly 12899 | 1 |
| 20163 | Cotter Pin for Motor Brush Arm Assembly 10029 | 2 |
| 20061 | Pin for Set Screw 20162 | 1 |
| 20870 | Motor Pinion for Armature Shaft | 1 |
| 20808 | Retainer for Ball Bearing Assembly 12989 (Commutator End) (Inner) (Not shown in Illustration) | 1 |
| 21703 | Oil Retainer (Felt) for Ball Bearing Assembly 12989 (Outer, Both Ends of Armature Shaft) | 2 |
| 20803 | Oil Retainer (Felt) for Ball Bearing Assembly 12989 (Inner, Both Ends of Armature Shaft) | 2 |
| 20054 | Screw for retaining Motor Pinion 20870 | 1 |
| 20162 | Set Screw for Commutator End of Armature Shaft (Not shown in Illustration) | 1 |
| 20873 | Sleeve for retaining Collar 20966 (Pinion End of Armature Shaft) | 1 |
| 20046 | Spring for Motor Brush Arm Assembly 10029 | 2 |
| 23160 | Clamp Washer for Screw 20054 (Pinion End of Armature Shaft) | 1 |
| 20725 | Lock Washer for Screw 20054 | 1 |
| 20798 | Washer for retaining Ball Bearing Assembly 12989 (Pinion End of Armature Shaft, Inner) (Not shown in Illustration) | 1 |
| 22735 | Washer (Shim) for Armature Shaft (Not shown in Illustration) | 1 |
| 10034 | **Switch Latch Arm Assembly for Switch Contact Block Assembly 10045** | 1 |
| 22620 | Block for Operating Switch Cover Assembly 10046 (Not shown in Illustration) | 1 |
| 21173 | Roll for Block 22620 (Not shown in Illustration) | 2 |
| 21174 | Screw for retaining Roll 21173 (Not shown in Illustration) | 2 |
| 10044 | **Motor Clutch Assembly Complete** (Includes the next 11 Items) | 1 |
| 20465 | Pinion for Motor Clutch Assembly 10044 | 1 |
| 20020 | Cam for Motor Clutch Assembly 10044 | 1 |
| 20027 | Clamp Nut for Motor Clutch Assembly 10044 | 1 |
| 21316 | Gear for Motor Clutch Assembly 10044 | 1 |
| 20022 | Retainer for Roll 23625 (Inner) | 1 |
| 22575 | Retainer for Roll 23625 (Outer) | 1 |
| 21538 | Spring for Plunger 20017 | 4 |

# No. 4 MOTOR GENERATOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 20017 | Plunger for Roll 23625 | 4 |
| 23625 | Roll for Cam 20020 | 4 |
| 20023 | Screw for Retainers 22575 and 20022 | 4 |
| 20393 | Lock Washer for Screw 20023 | 4 |
| 10046 | **Switch Cover Assembly Complete** (Includes the next 29 Items) | 1 |
| 10049 | **Generator Switch Common Conductor Assembly (Large)** | 1 |
| 10050 | **Switch Conductor Assembly (Generator) (Small)** | 1 |
| 10051 | **Switch Conductor Assembly (Motor) (Medium)** | 1 |
| 10040 | **Insulator Assembly for Terminal Plate Assembly 10052 and Plate 21188** (Includes the next 3 Items) | 1 |
| 21368 | Insulator for Insulator Assembly 10040 | 1 |
| 21176 | Separator for Insulator 21368 | 1 |
| 22009 | Screw for Insulator Assembly 10040 | 2 |
| 10158 | **Spring Terminal Assembly for connecting Switch Cover Assembly 10046** | 1 |
| 10052 | **Switch Terminal Plate Assembly for Top Cover 21151** (Includes the next 3 Items) | 1 |
| 10162 | **Spacing Terminal Assembly for Switch Terminal Plate Assembly 10052** | 1 |
| 21189 | Plate for Switch Terminal Plate Assembly | 1 |
| 20137 | Lock Washer for Spring Terminal Assembly 10162 | 1 |
| 21106 | Insulating Bushing for Screw 21530 | 1 |
| 21158 | Insulating Bushing for Spring Terminal Assembly 10158 and Switch Conductor Assemblies 10040 and 10051 | 3 |
| 21156 | Insulating Bushing for Screw 21169 | 1 |
| 21150 | Cover for Switch Cover Assembly 10046 | 1 |
| 20347 | Nut for Rod 21183 | 1 |
| 21456 | Nut for Switch Conductor Assembly 10051 (Thin) | 1 |
| 21062 | Nut for Switch Conductor Assemblies 10051 and 10049 | 2 |
| 21455 | Insulating Plate for Switch Conductor Assemblies 10051 and 10049 (Inner) | 1 |
| 21188 | Clamp Plate for Conductor Assembly 10051 and Screw 21169 | 2 |
| 21183 | Rod for Switch Conductor Assemblies 10050 and 10051 and Generator Switch Common Conductor Assembly 10049 | 2 |
| 20076 | Insulating Washer for Screw 21530 and 21169 | 2 |
| 20114 | Plain Washer for Screws 21530 and 21169 | 2 |
| 20791 | Lock Washer for Screws 21530 and 21169 | 2 |
| 21165 | Insulating Washer for Spring Terminal Assembly 10158 (Outer) | 1 |
| 20146 | Lock Washer for Spring Terminal Assembly 10158 and Nut 21062 | 3 |
| 20393 | Lock Washer for Nut 20347 | 2 |
| 21454 | Insulating Washer for Spring Terminal Assembly 10158 (Inner) | 1 |
| 21168 | Plain Washer for Spring Terminal Assembly 10158 | 1 |
| 21169 | Screw for retaining Clamp Plate 21188 | 1 |
| 21530 | Screw for retaining Switch Terminal Plate Assembly 10052 | 1 |
| 21895 | Insulating Bushing for Switch Conductor Assemblies 10050 and 10051 and Generator Switch Common Conductor Assembly 10049 | 4 |
| 21896 | Insulating Bushing between Switch Conductor Assemblies 10051 and 10050 | 1 |
| 21190 | Switch Contact Plate for Switch Conductor Assemblies 10050 and 10051 and Generator Switch Common Conductor Assembly 10049 | 1 |
| 20866 | End Housing for Generator | 1 |
| 20849 | Bushing in End Housing 20866 for Shift Rod 21199 | 1 |
| 20944 | Screw for connecting Shift Rod 21199 | 1 |
| 21717 | Lock Washer for Screw 20944 | 1 |
| 12989 | **Ball Bearing Assembly for Armature Shaft (Not shown in Illustration)** | 1 |
| 22736 | Shim for Ball Bearing Assembly 12989 (Not shown in Illustration) | 2 |
| 20178 | Screw for retaining Retainer 20797 | 6 |
| 20797 | Retainer for Ball Bearing Assembly 12989 | 1 |
| 20241 | Lock Washer for Screw 20178 | 6 |
| 21704 | Pipe Plug for Oil Hole in End Housing 20866 (Not shown in Illustration) | 1 |
| 10047 | **Switch Rod Operating Assembly Complete** (Includes the next Items) | 1 |
| 21162 | Pin for retaining Arms to Rod (Not shown in Illustration) | 2 |
| 20244 | Shaft for Motor Clutch Assembly 10044 | 1 |
| 21544 | Key for Shaft 20244 | 1 |
| 21704 | Pipe Plug for Shaft 20244 (Not shown in Illustration) | 1 |
| 21166 | Insulating Bushing for Switch Contact Plate 21190 | 2 |
| 20848 | Clip for Shaft 20244 | 1 |
| 21080 | Cover for End Housing Rod Assembly 10054 (Bottom) | 1 |
| 20096 | Cup for Spring 21200 | 1 |
| 21207 | Insulator for Switch Contact Plate 21190 | 1 |
| 21675 | Nut for Shift Rod 21199 | 1 |
| 21162 | Pin for Arm 21178 (Not shown in Illustration) | 1 |
| 21201 | Pin for locating Switch Cover Assembly 10046 (Not shown in Illustration) | 2 |
| 20163 | Cotter Pin for retaining Cup 20096 | 1 |
| 20017 | Plunger for Switch Latch Arm Assembly 10034 | 1 |
| 21199 | Shift Rod for Motor Clutch Assembly 10044 | 1 |

# No. 4 MOTOR GENERATOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 21147 | Screw for attaching Switch Cover Assembly 10046 (Outer) (Not shown in Illustration) | 1 |
| 20215 | Screw for attaching Switch Cover Assembly 10046 (Inner) | 1 |
| 22618 | Screw for Switch Contact Plate 21190 (Not shown in Illustration) | 2 |
| 22619 | Cotter Pin for Screw | 1 |
| 21159 | Screw for retaining Plunger 20017 | 1 |
| 21170 | Screw for attaching Switch Latch Arm Assembly 10034 | 2 |
| 20178 | Screw for attaching Clip 20848 | 1 |
| 20553 | Screw for attaching Cover 21080 | 2 |
| 21161 | Spring for Switch Contact Plate 21190 | 2 |
| 21200 | Spring for Switch Operating Rod Assembly 10047 | 1 |
| 21580 | Spring for Plunger 20017 | 1 |
| 20791 | Lock Washer for Screws 21147 and 20215 | 2 |
| 20380 | Lock Washer for Screw 21170 | 2 |
| 21105 | Lock Washer for Nut 21675 | 1 |
| 20484 | Spring Washer for Screw 20553 | 2 |
| 20142 | Lock Washer for Screw 20178 (Not shown in Illustration) | 1 |
| 21163 | Lock Washer for Screw 21159 (Not shown in Illustration) | 1 |
| 21342 | Yoke for Shift Rod 21199 | 1 |
| 10077 | **Lower Generator End Cover Assembly Complete** (Includes the next 5 Items) | 1 |
| 20737 | Plate for Screen 20736 (Not shown in Illustration) | 1 |
| 20736 | Screen for Cover Assembly (Not shown in Illustration) | 1 |
| 21673 | Rivet retaining Plate 20737 and Screen 20736 (Not shown in Illustration) | 1 |
| 21531 | Screw for attaching Lower Generator End Cover Assembly 10077 (Not shown in Illustration) | 2 |
| 20484 | Spring Washer for Screw 21531 (Not shown in Illustration) | 2 |
| 10078 | **Upper Generator End Cover Assembly Complete** (Includes the next 2 Items) | 1 |
| 21531 | Screw for attaching Upper Generator Cover Assembly 10078 (Not shown in Illustration) | 2 |
| 20484 | Spring Washer for Screw 21531 (Not shown in Illustration) | 2 |
| 20403 | Screw for attaching Generator End Housing | 5 |
| 10086 | **Brush Connector Lead Assembly** (Includes the next 3 Items) | 1 |
| 22386 | Clip for Brush End of Lead Assembly 10086 (Not shown in Illustration) | 1 |
| 20067 | Clip for Field Coil End of Lead Assembly 10086 | 1 |
| 22451 | Insulator for Lead Assembly 10086 (Not shown in Illustration) | 1 |
| 21082 | Screw for attaching Generator End Frame | 4 |
| 11285 | **Oiler Assembly for Ball Bearing Assembly 12989 (Commutator End)** | 1 |
| 11926 | **Oiler Assembly for Ball Bearing Assembly 12989 (Pinion End)** | 1 |
| 12508 | **Grease Cup Assembly in End Housing 20866 for Motor Clutch 10044** | 1 |
| 21370 | Terminal Clip for connecting Series Lead to Switch Cover Assembly 10046 (Not shown in Illustration) | 1 |
| 21699 | Terminal Clip for Motor Terminal (Not shown in Illustration) | 1 |
| 20969 | Terminal Clip for Spring Terminal Assembly 10014, 10080, 10037, 10036 and 10158 (Not shown in Illustration) | 5 |
| 21315 | Terminal Clip for connecting Switch Conductor Assembly 10051 and Generator Switch Common Conductor Assembly 10049 (Not shown in Illustration) | 2 |




No. 24 MOTOR GENERATOR

# No. 24 MOTOR GENERATOR

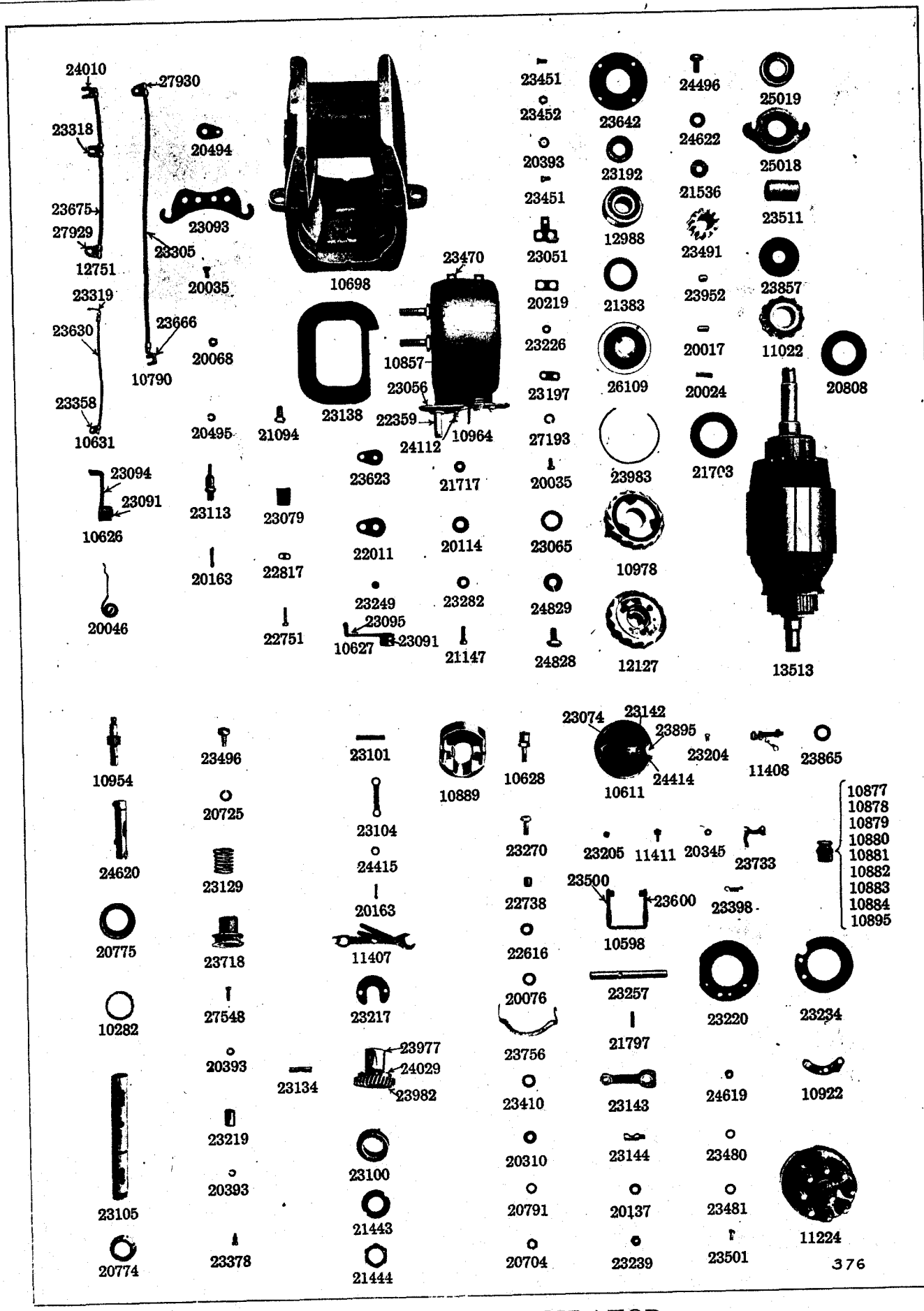
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 24 | **MOTOR GENERATOR COMPLETE** | 1 |
| 12314 | **Generator Frame Assembly** (Includes the next 2 Items) | 1 |
| 20041 | Screw for Pole Piece (Not shown in Illustration) | 2 |
| 20039 | Dowel Pin for Pole Piece (Not shown in Illustration) | 4 |
| 10384 | **Field Coil Assembly Complete (Not shown in Illustration)** (Includes the next 6 Items) | 1 |
| 22289 | Terminal Clip for Series Lead (Not shown in Illustration) | 1 |
| 20300 | Screw for Terminal Clip 22289 (Not shown in Illustration) | 2 |
| 22283 | Insulating Strip for Field Coil Assembly 10384 (Inner) (Not shown in Illustration) | 2 |
| 22284 | Insulating Strip for Field Coil Assembly 10384 (Outer) (Not shown in Illustration) | 2 |
| 22285 | Binding Strip for Field Coil Assembly | 2 |
| 20067 | Terminal Clip for Terminal Stud 22398 | 3 |
| 10356 | **Brush Switch Link and Lever Assembly Complete** (Includes the next 3 Items) | 1 |
| 22240 | Link for connecting Shift Rod 21199 (Not shown in Illustration) | 1 |
| 14253 | **Lever Assembly (Not shown in Illustration)** | 1 |
| 12396 | **Terminal Block Assembly for Motor Generator** | 1 |
| 22273 | Motor Brush Stud Plate | 1 |
| 22176 | Stud for holding Lower Motor Brush Arm | 1 |
| 10028 | **Motor Brush Connector Assembly Complete** | 1 |
| 20114 | Plain Washer for Stud 22176 | 1 |
| 21078 | Insulating Washer for Stud 22176 | 1 |
| 20076 | Insulting Wsher for Stud 22176 (Inner) | 1 |
| 20125 | Insulating Washer for Stud 22176 (Outer) | 1 |
| 20137 | Lock Washer for Nut 20075 | 1 |
| 20075 | Nut for attaching Stud 22176 | 1 |
| 10332 | **Brush Arm Shaft Assembly** (Includes the next 2 Items) | 1 |
| 22256 | Spring Stud for Arm Shaft Assembly 10332 (Not shown in Illustration) | 1 |
| 21162 | Taper Pin for attaching Arm to Shaft (Not shown in Illustration) | 1 |
| 11599 | **Motor Brush Switch Arm Assembly** (Includes the next 4 Items) | 1 |
| 22256 | Spring Stud for Arm Assembly 11599 (Not shown in Illustration) | 1 |
| 21173 | Roll for Stud 22243 | 1 |
| 22243 | Stud for attaching Roll 21173 to Arm Assembly 11599 (Not shown in Illustration) | 1 |
| 22247 | Contact for Motor Brush Switch Arm Assembly 11599 (Not shown in Illustration) | 1 |
| 24642 | Brush for Motor Brush Switch Arm Assembly 11599 | 2 |
| 22654 | Screw for attaching Brush 24642 | 1 |
| 22827 | Lock Plate for Screw 22654 | 1 |
| 22581 | Collar for Shaft 22250 | 1 |
| 21746 | Screw for retaining Collar 22581 | 1 |
| 22254 | Sleeve for Shaft 22250 | 1 |
| 22324 | Spring for Brush Arm Shaft Assembly 10332 | 1 |
| 22424 | Screw for attaching Brush Switch Link and Lever Assembly 10356 | 1 |
| 20381 | Lock Washer for Screw 22424 | 1 |
| 22578 | Cotter Pin for Screw 22424 | 1 |
| 22398 | Terminal Stud for connecting Motor Generator | 3 |
| 20075 | Nut for Terminal Stud 22398 | 9 |
| 20077 | Insulating Bushing for Terminal Stud 22398 | 3 |
| 22395 | Clip for Terminal Stud 22398 | 3 |
| 20076 | Insulating Washer for Nut 20075 | 3 |
| 20114 | Plain Washer for Nut 20075 | 3 |
| 20137 | Lock Washer for Nut 20075 | 6 |
| 21073 | Screw for attaching Field Coil Assembly 10384 (Lower) | 1 |
| 21059 | Collar for Screw 21073 | 1 |
| 21060 | Insulating Bushing for Screw 21073 | 1 |
| 21117 | Insulating Washer for Screw 21073 | 1 |
| 20238 | Plain Washer for Screw 21073 | 1 |
| 22114 | Insulator for Field Coil Assembly 10384 (Lower) | 1 |
| 22120 | Insulator for Field Coil Assembly 10384 (Upper) | 1 |
| 20065 | Screw for Shaft 22250 (Not shown in Illustration) | 1 |
| 20345 | Lock Washer for Screw 20065 | 1 |
| 22172 | Plain Washer for under Cotter Pin 22578 | 1 |
| 10086 | **Brush Connector Lead Assembly Complete** (Includes the next 3 Items) | 1 |
| 22386 | Clip for Brush End for Lead Assembly 10086 (Not shown in Illustration) | 1 |
| 20067 | Clip for Brush Plate End of Lead Assembly 10086 (Not shown in Illustration) | 1 |
| 22451 | Insulator for Lead Assembly 10086 (Not shown in Illustration) | 1 |
| 11325 | **Lower Motor Brush Arm Assembly** (Includes the next Item) | 1 |
| 22084 | Spring Stud for Brush Arm Assembly 11325 (Not shown in Illustration) | 1 |
| 24449 | Brush for Lower Motor Brush Arm Assembly 11325 | 2 |
| 22750 | Screw for attaching Brush 24449 | 1 |
| 22827 | Lock Plate for Screw 22750 | 1 |

# No. 24 MOTOR GENERATOR (Continued)

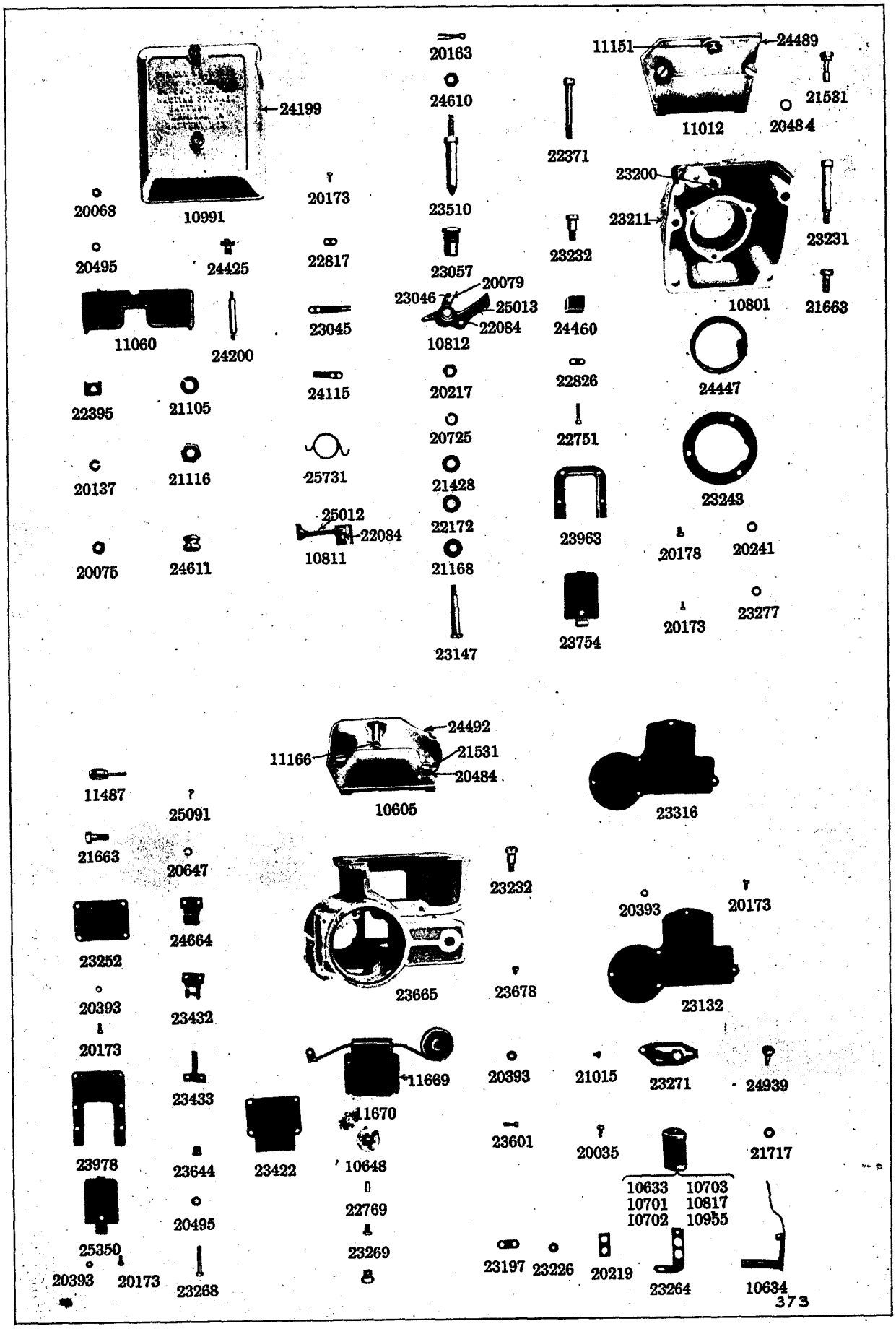
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 22542 | Stud for End of Shaft 22250 (Not shown in Illustration) | 1 |
| 20791 | Lock Washer for Stud 22542 | 1 |
| 21428 | Plain Washer for retaining Lower Motor Brush Arm Assembly 11325 | 1 |
| 22570 | Wedge for Field Coil Assembly 10384 (Not shown in Illustration) | 2 |
| 22367 | Spring for Lower Motor Brush Arm Assembly 11325 | 1 |
| 22172 | Spring Washer under Cotter Pin 20163 | 1 |
| 20163 | Cotter Pin retaining Plain Washer 21428 | 1 |
| 20039 | Dowel Pin for locating Pole Piece | 1 |
| 12271 | **Armature Assembly for Motor Generator** | 1 |
| 10038 | **Generator Brush Holder Plate Assembly Complete** (Includes the next Item) | 2 |
| 21422 | Stud for Plate Assembly 10038 (Not shown in Illustration) | 1 |
| 10039 | **Generator Brush Spring Terminal Assembly for Generator Brush Holder Assembly 10038** | 2 |
| 21374 | Holder for Generator Brush Holder Plate Assembly 10038 | 1 |
| 21296 | Insulator for Plate 21209 | 2 |
| 23623 | Insulator for Holder 21374 (Not shown in Illustration) | 2 |
| 20494 | Plate for Generator Brush Holder Assembly 10038 (Outer) | 2 |
| 20495 | Lock Washer for Nut 20068 | 4 |
| 20068 | Nut for retaining Generator Brush Spring Terminal Assembly 10039 and Screw 20107 | 4 |
| 20107 | Screw for retaining Plate 20494 | 2 |
| 20491 | Insulating Bushing for Generator Brush Spring Terminal Assembly 10039 Screw 20107 | 4 |
| 10007 | **Bearing Retainer Assembly Complete for Ball Bearing Assembly 12986** (Includes the next 5 Items) | 1 |
| 10201 | **Bearing Retainer Assembly (Not shown in Illustration)** | 1 |
| 20062 | Stud for Retainer Assembly 10201 (Not shown in Illustration) | 1 |
| 20802 | Spring Nut for Bearing Retainer Assembly 10007 (Not shown in Illustration) | 1 |
| 20801 | Screw for Spring Nut 20802 (Not shown in Illustration) | 1 |
| 20307 | Spring for Screw 20801 (Not shown in Illustration) | 1 |
| 20957 | End Frame for Generator | 1 |
| 12986 | **Ball Bearing Assembly for Commutator End of Armature Shaft** | 1 |
| 20970 | Screw for retaining Bearing Retainer Assembly 10007 | 6 |
| 20241 | Lock Washer for Screw 20970 | 6 |
| 21704 | Pipe Plug for Oil Hole in End Frame 20957 (Not shown in Illustration) | 1 |
| 10592 | **Generator Brush Connector Lead Assembly Complete** (Includes the next 2 Items) | 1 |
| 22386 | Clip for Lead Assembly 10592 (Not shown in Illustration) | 2 |
| 23089 | Sleeving for Lead Assembly 10592 (Not shown in Illustration) | 1 |
| 22326 | Insulating Guard Plate for Lead Assembly 10592 | 1 |
| 10382 | **Generator Clutch Assembly Complete (Smooth Type) (Not shown in Illustration)** (Includes the next 8 Items) (When ordering a Complete Clutch always order the New Style "Ratchet Type" No. 11348) | 1 |
| 24811 | Cam for Generator Clutch Assembly 10382 (Not shown in Illustration) | 1 |
| 22286 | Shell for Generator Clutch Assembly 10382 (Not shown in Illustration) | 1 |
| 20878 | Retainer for Roll 23625 (Not shown in Illustration) | 1 |
| 23625 | Roll for Cam 24811 | 1 |
| 20024 | Spring for Plunger 20017 | 1 |
| 20017 | Plunger for Roll 23625 | 1 |
| 21477 | Screw for retaining Retainer 20878 (Not shown in Illustration) | 1 |
| 22321 | Plain Washer for Generator Clutch Assembly (Not shown in Illustration) | 1 |
| 11348 | **Generator Clutch Assembly Complete (Ratchet Type)** (Includes the next 8 Items) | 1 |
| 24811 | Cam for Generator Clutch Assembly 11348 | 1 |
| 24812 | Shell for Generator Clutch Assembly 11348 (Not shown in Illustration) | 4 |
| 23625 | Roll for Cam 24811 | 4 |
| 20024 | Spring for Plunger 20017 | 4 |
| 20017 | Plunger for Roll 23625 | 1 |
| 25841 | Retainer for Roll 23625 | 4 |
| 20063 | Screw for retaining Retainer 25841 | 1 |
| 22321 | Clamp Washer for Clutch Assembly | 1 |
| 20054 | Clamp Screw for Generator Clutch Assembly 11348 | 1 |
| 20725 | Lock Washer for Clamp Screw 20054 | 1 |
| 21544 | Key for Generator Clutch Assembly 12899 | 2 |
| 21703 | Oil Retainer (Felt) for Ball Bearing Assembly 12986 | 1 |
| 20808 | Retainer for Ball Bearing Assembly 12986 (Inner) | 1 |
| 20798 | Washer for retaining Ball Bearing Assembly 12986 (Outer) | 1 |
| 10828 | **Inner Race and Balls Assembly for Pinion End of Armature Shaft** | 2 |
| 20803 | Oil Retainer (Felt) for Inner Race and Balls Assembly 10828 | 1 |
| 20966 | Washer for retaining Inner Race and Balls Assembly 10828 (Outer) | 1 |
| 20873 | Sleeve on Armature Shaft for retaining Washer 20966 | 1 |
| 20870 | Motor Pinion for Armature Shaft | 1 |
| 21536 | Clamp Washer for Motor Pinion 20870 | 1 |
| 20054 | Clamp Screw for Motor Pinion 20870 | 1 |
| 20725 | Lock Washer for Clamp Screw 20054 | 1 |
| 21405 | Generator Brush Arm | 1 |

# No. 24 MOTOR GENERATOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 24443 | Brush for Arm 21405 | 1 |
| 21418 | Plate for Arm 21405 | 1 |
| 21899 | Screw for attaching Brush24443 | 2 |
| 22826 | Lock Plate for Screw 21899 (Not shown in Illustration) | 1 |
| 20163 | Cotter Pin for retaining Generator Brush Arm 21405 | 2 |
| 20794 | Cover for Generator Clutch Assembly 11348 | 1 |
| 20046 | **Spring for Generator Brush Arm 21405** | 1 |
| 22313 | End Housing for Generator | 1 |
| 22418 | Outer Race for Inner Race and Balls Assembly 10828 | 1 |
| 20797 | Retainer for Outer Race 22418 (Inner) | 1 |
| 20178 | Screw for retaining Retainer 20797 | 6 |
| 20241 | Lock Washer for Screw 20178 | 6 |
| 20849 | Bushing in End Housing 22313 for Shift Rod 21199 | 1 |
| 21704 | Pipe Plug for Oil Hole in End Housing 22313 (Not shown in Illustration) | 2 |
| 10339 | **Contact Spring Assembly for Generator** | 1 |
| 10039 | **Spring Terminal Assembly for attaching Contact Spring Assembly 10339** | 1 |
| 22276 | Bracket for mounting Contact Assembly 10339 | 1 |
| 22249 | Insulator under Contact Spring Assembly 10339 | 1 |
| 21741 | Insulating Bushing for Spring Terminal Assembly 10039 | 1 |
| 21429 | Insulating Washer for Spring Terminal Assembly 10039 | 1 |
| 20109 | Plain Washer for Spring Terminal Assembly 10039 | 1 |
| 20495 | Lock Washer for Nut 20068 | 1 |
| 20068 | Nut for attaching Spring Terminal Assembly 10039 | 1 |
| 21887 | Screw for retaining Bracket 22276 | 1 |
| 20647 | Lock Washer for Screw 21887 | 1 |
| 21914 | Plain Washer for Screw 21887 | 1 |
| 22318 | Insulating Bushing for Screw 21887 | 1 |
| 20244 | Shaft for Motor Clutch | 1 |
| 21544 | Key for Shaft 20244 | 1 |
| 21704 | Pipe Plug for Shaft 20244 (Not shown in Illustration) | 1 |
| 10528 | **Generator Shifting Yoke Assembly Complete** (Includes the next 2 Items) | 1 |
| 22883 | Stud for attaching Link to Shift Rod (Not shown in Illustration) | 1 |
| 20390 | Pin for retaining Stud 22883 (Not shown in Illustration) | 1 |
| 10078 | **Upper Generator End Cover Assembly Complete** (Includes the next 2 Items) | 1 |
| 21531 | Screw for attaching Upper Generator End Cover Assembly 10078 | 2 |
| 20484 | Spring Washer for Screw 21531 | 2 |
| 10077 | **Lower Generator End Cover Assembly Complete** (Includes the next 5 Items) | 1 |
| 20737 | Plate for retaining Screen 20736 (Not shown in Illustration) | 1 |
| 20736 | Screen for Cover Assembly 10077 (Not shown in Illustration) | 1 |
| 21673 | Rivet for retaining Plate 20737 and Screen 20736 (Not shown in Illustration) | 1 |
| 21531 | Screw for attaching Lower Generator End Cover Assembly 10077 | 2 |
| 20484 | Spring Washer for Screw 21531 | 2 |
| 20039 | Dowel Pin for Generator End Frame 20957 and End Housing 22313 | 4 |
| 21082 | Screw for attaching Generator End Frame 20957 | 4 |
| 20403 | Screw for attaching End Housing 22313 | 5 |
| 20848 | Clip for Shaft 20244 | 1 |
| 20178 | Screw for retaining Clip 20848 | 1 |
| 20142 | Lock Washer for Screw 20178 | 1 |
| 21199 | Shift Rod for Generator Shifting Yoke and Motor Brush Switch Arm | 1 |
| 20722 | Plain Washer for Stud 22883 | 1 |
| 20163 | Cotter Pin for Stud 22883 | 1 |
| 21080 | Cover for nd Housing 22313 | 1 |
| 20553 | Screw for attaching Cover 21080 | 2 |
| 20484 | Spring Washer for Screw 20553 | 2 |
| 21129 | Clamp Screw for Yoke 22307 | 1 |
| 22706 | Terminal Clip for Battery Lead | 1 |
| 22622 | Ferrule for Terminal Clip 22706 (Not shown in Illustration) | 1 |
| 22397 | Conduit Cover (On Top of Generator) | 1 |
| 22703 | Screw for attaching Conduit Cover 22397 | 1 |
| 12508 | **Grease Cup Assembly in End Housing 22313 for Motor Clutch** | 1 |
| 11285 | **Oil Cup Assembly for Ball Bearing Assembly 12986** | 1 |
| 11926 | **Oil Cup Assembly for Inner Race and Balls Assembly 10828** | 1 |
| 22452 | Terminal Clip for Terminal 22398 (Not shown in Illustration) | 3 |
| 10044 | **Motor Clutch Assembly Complete** (Includes the next 11 Items) | 1 |
| 20465 | Pinion for Motor Clutch Assembly 10044 | 1 |
| 20020 | Cam for Motor Clutch Assembly 10044 | 1 |
| 20027 | Clamp Nut for Motor Clutch Assembly 10044 | 1 |
| 21316 | Gear for Motor Clutch Assembly 10044 | 1 |
| 20022 | Retainer for Roll 23625 (Inner) | 1 |
| 22575 | Retainer for Roll 23625 (Outer) | 1 |
| 21538 | Spring for Plunger 20017 | 4 |
| 20017 | Plunger for Roll 23625 | 4 |
| 23625 | Roll for Cam 20020 | 4 |
| 20023 | Screw for retainers 22575 and 20022 | 4 |
| 20393 | Lock Washer for Screw 20023 | 4 |




No. 44 MOTOR GENERATOR




No. 44 MOTOR GENERATOR

# No. 44 MOTOR GENERATOR

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 44 | **MOTOR GENERATOR** | 1 |
| 10698 | **Generator Frame Assembly** | 1 |
| | (Includes the next 5 Items) | |
| 24228 | Screw for Binding Generator Frame (Upper) (Not shown in Illustration) | 1 |
| 24126 | Screw for Binding Generator (Lower) (Not shown in Illustration) | 4 |
| 24494 | Lock Washer for Screw 24126 (Not shown in Illustration) | 4 |
| 21147 | Dowel Screw for Pole Piece (Not shown in Illustration) | 1 |
| 21717 | Lock Washer for Screw 21147 (Not shown in Illustration) | 1 |
| 10964 | **Field Coil Assembly Complete** | 1 |
| | (Includes the next 17 Items) | |
| 14279 | **Field Coil Assembly (Not shown in Illustration)** | 1 |
| | (Includes the next Item) | |
| 10660 | **Motor Brush Plate Assembly (Not shown in Illustration)** | 1 |
| | (Includes the next 3 Items) | |
| 24112 | Spring Stud for Brush Plate Assembly 10660 | 1 |
| 22359 | Stud for holding Series Motor Brush Arm Assembly 11189 | 1 |
| 22007 | Plain Washer for Stud 22359 (Not shown in Illustration) | 1 |
| 22520 | Rivet for retaining Motor Brush Plate Assembly 10660 (Not shown in Illustration) | 3 |
| 23051 | Clip for Spring 23045 | 1 |
| 23197 | Lock Plate for Screw 20035 | 1 |
| 20219 | Insulator for Clip 23051 | 2 |
| 23226 | Insulating Bushing for Screw 20035 | 2 |
| 20035 | Screw for retaining Clip 23051 | 2 |
| 23451 | Screw for retaining Lead Assembly 12790 | 1 |
| 23452 | Nut for Screw 23451 | 1 |
| 20393 | Lock Washer for Nut 23452 | 1 |
| 23451 | Screw for retaining Terminal Clip on Field Coil Assembly 10964 | 2 |
| 23452 | Nut for Screw 23451 | 2 |
| 20393 | Lock Washer for Nut 23452 | 2 |
| 10811 | **Series Motor Brush Arm Assembly** | 1 |
| | (Includes the next 3 Items) | |
| 22084 | Spring Stud for Brush Arm Assembly 10811 | 1 |
| 25017 | Insulating Bushing for Stud 25016 (Not shown in Illustration) | 1 |
| 25016 | Stud for Screw 24621 (Not shown in Illustration) | 1 |
| 24460 | Brush for Brush Arm Assembly 10811 | 1 |
| 22751 | Screw for attaching Brush 24012 | 2 |
| 22826 | Lock Plate for Screw 22751 | 1 |
| 11060 | **Terminal Block Assembly** | 1 |
| 20137 | Lock Washer for Nut 20075 | 1 |
| 20068 | Nut for attaching Stud 23655 | 1 |
| 23655 | Stud for attaching Clip 22395 | 1 |
| 20495 | Lock Washer for Nut 20068 | 1 |
| 22395 | Clip for Stud 23655 | 1 |
| 20075 | Nut for attaching Clip 22395 | 1 |
| 21428 | Plain Washer for Series Motor Brush Arm Assembly 10811 | 2 |
| 22172 | Spring Washer for retaining Series Motor Brush Arm Assembly 10811 | 1 |
| 20163 | Cotter Pin for retaining Spring Washer 22172 | 1 |
| 25731 | Spring for Series Motor Brush Arm Assembly 10811 | 1 |
| 23138 | Insulator for Field Coil Assembly 10964 | 2 |
| 27193 | Insulating Washer for Screw 21147 (Not shown in Illustration) | 8 |
| 20114 | Plain Washer for Screw 21147 | 2 |
| 21717 | Lock Washer for Screw 21147 | 2 |
| 21147 | Screw for attaching Motor Brush Plate Assembly 10660 | 2 |
| 23282 | Insulating Bushing for Screw 21147 (Not shown in Illustration) | 2 |
| 21116 | Nut for Terminal Stud under Terminal Block Assembly 11060 (Small) | 2 |
| 21105 | Lock Washer for Nut 24611 | 2 |
| 24611 | Nut for Terminal Stud under Terminal Block Assembly 11060 (Large) | 2 |
| 22570 | Wedge for Field Coil Assembly 10964 (Not shown in Illustration) | 7 |
| 10889 | **Governor Ring Assembly for Distributor Shaft** | 1 |
| | (Includes the next 2 Items) | |
| 23448 | Clip for Governor Ring Assembly 10889 (Not shown in Illustration) | 1 |
| 24198 | Screw for attaching Clip 23448 (Not shown in Illustration) | 2 |
| 10954 | **Distributor Cam Adjustment Assembly Complete** | 1 |
| | (Includes the next 3 Items) | |
| 23874 | Cam for Cam Adjustment Assembly 10954 (Not shown in Illustration) | 1 |
| 23468 | Pin for Cam 23874 (Not shown in Illustration) | 1 |
| 23117 | Screw for Distributor Cam Adjustment Assembly 10954 (Not shown in Illustration) | 1 |
| 10922 | **Distributor Segment Assembly for mounting Contact Arm Assembly 11408** | 1 |
| | (Includes the next 3 Items) | |
| 24070 | Stud for mounting Stop 23733 (Not shown in Illustration) | 1 |
| 24071 | Stud for mounting Contact Arm Assembly 11408 (Not shown in Illustration) | 1 |
| 24073 | Stud for connecting Current Regulator Bracket | 1 |
| 11408 | **Contact Arm Assembly for Distributor** | 1 |
| | (Includes the next 3 Items. Do not count Old Style Parts) | |

# No. 44 MOTOR GENERATOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 11379 | **Connector Assembly for Contact Arm Assembly 11408 (Not shown in Illustration)** | 1 |
| 21801 | Hub for Contact Arm Assembly 11408 (Not shown in Illustration) | 1 |
| 24069 | Terminal Wire (Old Style) (Not shown in Illustration | 1 |
| 24947 | Screw for attaching Hub 24069 (Not shown in Illustration) | 2 |
| 10282 | **Retainer and Balls Assembly for Distributor Shaft Assembly 10699** | 2 |
| 11061 | **Pinion and Hub Assembly for Distributor Shaft (Not shown in Illustration)** (Includes the next 3 Items) | 1 |
| 27548 | Screw for attaching Pinion to Hub | 2 |
| 20393 | Lock Washer for Screw 27548 | 2 |
| 24029 | Dowel Pin for Pinion and Hub Assembly 11061 | 1 |
| 23217 | Retainer Plate for Pinion and Hub Assembly 11061 | 1 |
| 21836 | Screw for retaining Stop 23733 (Not shown in Illustration) | 1 |
| 23733 | Stop for Contact Arm Assembly 11408 | 1 |
| 23480 | Plain Washer for Screw 23501 | 2 |
| 23481 | Insulating Bushing for Screw 23501 | 2 |
| 20035 | Screw for attaching Distributor Segment Assembly 10922 | 2 |
| 20345 | Lock Washer for Screw 21836 | 1 |
| 23100 | Advance Ring on Shaft 23105 for Hand Advance | 1 |
| 23220 | Mounting Plate for Shaft 23105 | 1 |
| 23134 | Pin for Advance Ring 23100 | 1 |
| 21443 | Clamp Nut for Shaft 23105 | 1 |
| 21444 | Lock Nut for Clamp Nut 21443 | 1 |
| 23218 | Clamp for Pin 23134 | 1 |
| 23378 | Screw for retaining Clamp 23218 | 1 |
| 20393 | Lock Washer for Screw 23378 | 1 |
| 11094 | **Distributor Shaft and Cone Assembly (Not shown in Illustration)** (Includes the next 2 Items) | 1 |
| 23105 | Shaft for Distributor | 1 |
| 27222 | Cone for Shaft 23105 (Not shown in Illustration) | 2 |
| 23234 | Insulating Washer for Distributor Segment Assembly 10922 | 1 |
| 23129 | Spring for Collar 23718 on Shaft 23105 | 1 |
| 23718 | Collar for Automatic Advance on Shaft 23105 | 1 |
| 23101 | Pin for retaining Collar 23718 and Governor Ring Assembly 10889 | 2 |
| 24415 | Plain Washer for Pin 23101 | 4 |
| 20163 | Cotter Pin for retaining Pin 23101 | 4 |
| 23104 | Advance Arm for connecting Collar 23718 to Governor Ring Assembly 10889 | 2 |
| 23496 | Screw for retaining Governor Ring Assembly 10889 | 2 |
| 24493 | Lock Washer for Screw 23496 | 2 |
| 23098 | Shaft for Distributor Cam Adjustment Assembly 10954 | 1 |
| 20775 | Cup for Retainer and Balls Assembly 10282 | 2 |
| 23398 | Spring for Contact Arm Assembly 11408 | 1 |
| 12988 | **Ball Bearing Assembly for Distributor End of Armature Shaft** | 1 |
| 10634 | **Current Regulator Contact Arm Assembly** (Includes the next 3 Items) | 1 |
| 23262 | Roll for Contact Arm Assembly 10634 (Not shown in Illustration) | 1 |
| 23263 | Stud for Contact Arm Assembly 10634 (Not shown in Illustration) | 1 |
| 24247 | Rivet for Contact Arm Assembly 10634 (Not shown in Illustration) | 2 |
| 10631 | **Resistance Unit Connector Lead Assembly Complete** (Includes the next 2 Items) | 1 |
| 23319 | Clip for Resistance Unit End of Lead Assembly 10631 | 1 |
| 23358 | Clip for Field Coil End of Lead Assembly 10631 | 1 |
| 10611 | **Distributor Rotor Assembly Complete** (Includes the next 4 Items) | 1 |
| 23074 | Connector for Distributor Rotor Assembly 10611 | 1 |
| 23142 | Screw for connecting Connector 23074 | 1 |
| 23895 | Brush for Distributor Rotor Assembly 10611 | 1 |
| 24414 | Spring for Brush 23895 | 1 |
| 10633<br>10701<br>10702<br>10703<br>10817<br>10955 | **Current Regulator Resistance Unit Assembly**<br>**(One to be used. Order by number stamped on Current Regulator Resistance Unit Assembly)** | 1 |
| 10648 | **Resistance Unit Assembly for Distributor** | 1 |
| 10598 | **Advance Yoke Assembly** | 1 |
| 23257 | Shaft for Advance | 1 |
| 23144 | Clamp Screw for Advance Lever 23143 | 1 |
| 23239 | Nut for Clamp Screw 23144 | 1 |
| 20137 | Lock Washer for Nut 23239 | 1 |
| 23143 | Advance Lever for Advance Lever Shaft 23257 | 1 |
| 11868 | **Spring Terminal Assembly for connecting Distributor** | 1 |
| 12411 | **Contact Screw Assembly for Contact Arm Assembly 11408 (Not shown in Illustration)** | 1 |
| 23665 | End Frame for Generator | 1 |
| 21383 | Washer (Felt) for Ball Bearing Assembly 12988 | 2 |

# No. 44 MOTOR GENERATOR (Continued)

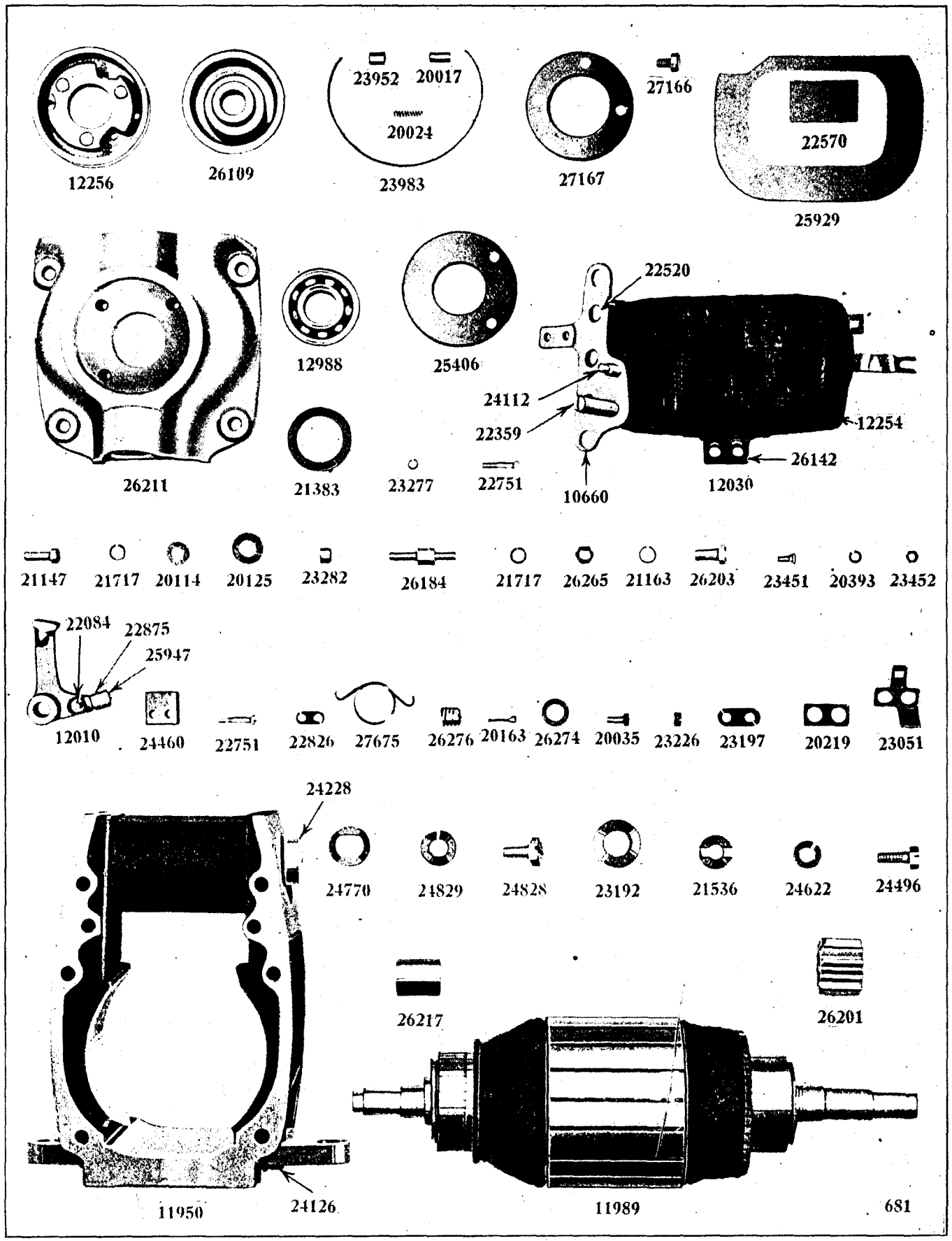
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 23642 | Retainer for Ball Bearing Assembly 12988 (Inner) | 1 |
| 21094 | Screw for retaining Retainer 23642 | 4 |
| 23271 | Bracket for Current Regulator Resistance Unit Assembly 10703 ,etc. (Upper) | 1 |
| 23678 | Screw for attaching Bracket 23271 | 1 |
| 20373 | Lock Washer for Screw 23678 | 3 |
| 23268 | Screw for retaining Stud 23270 | 1 |
| 23269 | Insulating Bushing for Stud 23270 | 1 |
| 22769 | Insulating Bushing for Resistance Unit Assembly 10648 | 1 |
| 20495 | Lock Washer for Nut 23644 | 1 |
| 23644 | Nut for retaining Resistance Unit Assembly 10648 | 1 |
| 23270 | Bushing for Resistance Unit Assembly 10648 | 1 |
| 24664 | Clip for attaching Distributor Head Assembly 12568 (Single) | 1 |
| 20647 | Lock Washer for Screws 21015 and 21531 | 5 |
| 25091 | Screw for attaching Clips 24664, 23433 and 23432 | 4 |
| 23433 | Clip for attaching Distributor Head Assembly 12568 (Long Tongue Clip) | 1 |
| 23432 | Clip for attaching Distributor Head Assembly 12568 (With Clip 23433) | 1 |
| 21797 | Screw for attaching Advance Yoke Assembly 10598 | 1 |
| 21015 | Screw for retaining Bracket 23271 | 1 |
| 23978 | Guide Plate for Cover Plate 25350 | 1 |
| 25350 | Cover Plate for End Frame 23665 | 1 |
| 23264 | Bracket for Current Regulator Resistance Unit Assembly 10703, etc. (Lower) | 1 |
| 20219 | Insulator for Bracket 23264 | 2 |
| 23197 | Lock Plate for Screw 20035 | 1 |
| 23226 | Insulating Bushing for Screw 20035 | 2 |
| 24939 | Screw for attaching Current Regulator Resistance Unit Assembly 10703, etc. | 2 |
| 21717 | Lock Washer for Screw 24939 | 2 |
| 20173 | Screw for attaching Guide Plate 23978 | 6 |
| 20393 | Lock Washer for Screw 20173 | 6 |
| 20035 | Screw for attaching Distributor Segment Assembly 10922 | 1 |
| 20495 | Lock Washer for Screw 20035 | 1 |
| 22616 | Plain Washer for Screw 23205 and Spring Terminal Assembly 10628 | 2 |
| 20076 | Insulating Washer for Screw 23205 and Spring Terminal Assembly 10628 (Outer) | 2 |
| 22738 | Insulating Bushing for Screw 23205 and Spring Terminal Assembly 10628 | 2 |
| 23410 | Insulating Washer for Screw 23205 and Spring Terminal Assembly 10628 (Inner) | 2 |
| 23756 | Connector for connecting Spring Terminal Assembly 10628 and Screw 23205 | 1 |
| 20704 | Nut for Screw 23205 and Spring Terminal Assembly 10628 | 2 |
| 20791 | Lock Washer for Nut 20704 | 2 |
| 20310 | Plain Washer for Nut 20704 | 2 |
| 23205 | Screw for Contact Screw Assembly 12411 | 1 |
| 12127 | **Generator Clutch Assembly Complete** (Includes the next 6 Items) | 1 |
| 10978 | **Spiral Gear and Cam Assembly for Generator Clutch Assembly 12127** | 1 |
| 26109 | Shell for Generator Clutch Assembly 12127 | 1 |
| 23952 | Roll for Spiral Gear and Cam Assembly 10978 | 3 |
| 20017 | Plunger for Roll 23952 | 3 |
| 20024 | Spring for Plunger 20017 | 3 |
| 23983 | Binding Spring for Generator Clutch Assembly 12127 | 1 |
| 14898 | **Ball Bearing Assembly for Pinion End of Armature Shaft** | 1 |
| 13513 | **Armature Assembly for Motor Generator** | 1 |
| 21703 | Oil Retainer (Felt) for Inner Race and Balls Assembly 14898 | 2 |
| 20808 | Retainer for Oil Retainer 21703 (Inner) | 1 |
| 24622 | Lock Washer for Clamp Screw 24496 | 1 |
| 24496 | Clamp Screw for Motor Pinion 23491 | 1 |
| 21536 | Clamp Washer for Motor Pinion 23491 | 1 |
| 24829 | Lock Washer for Clamp Screw 24828 (Clutch End) | 1 |
| 23065 | Clamp Washer for Generator Clutch Assembly 12127 | 1 |
| 24828 | Clamp Screw for retaining Generator Clutch Assembly 12127 | 1 |
| 23192 | Spacing Collar on Armature Shaft next to Generator Clutch Assembly 12127 | 1 |
| 23511 | Spacing Sleeve on Armature Shaft for retaining Washer 23857 | 1 |
| 23491 | Motor Pinion for Armature Shaft | 1 |
| 23857 | Washer for retaining Inner Race and Balls Assembly 14898 | 1 |
| 10801 | **Motor End Frame Assembly** (Includes the next Item) | 1 |
| 23200 | Spring Stud for End Frame Assembly 10801 | 1 |
| 10812 | **Grounded Motor Brush Arm Assembly** (Includes the next 3 Items) | 1 |
| 22084 | Spring Stud for Brush Arm Assembly 10812 | 1 |
| 23046 | Roll for Brush Arm Assembly 10812 | 1 |
| 20079 | Plain Washer for Roll 23046 | 1 |
| 24460 | Brush for Grounded Motor Brush Arm Assembly 10812 | 1 |
| 22751 | Screw for attaching Brush 24460 | 2 |
| 22826 | Lock Plate for Screw 22751 | 1 |
| 23045 | Spring for Generator Switch on Grounded Motor Brush Arm Assembly 10812 | 1 |
| 20173 | Screw for attaching Spring 23045 | 2 |

# No. 44 MOTOR GENERATOR (Continued)

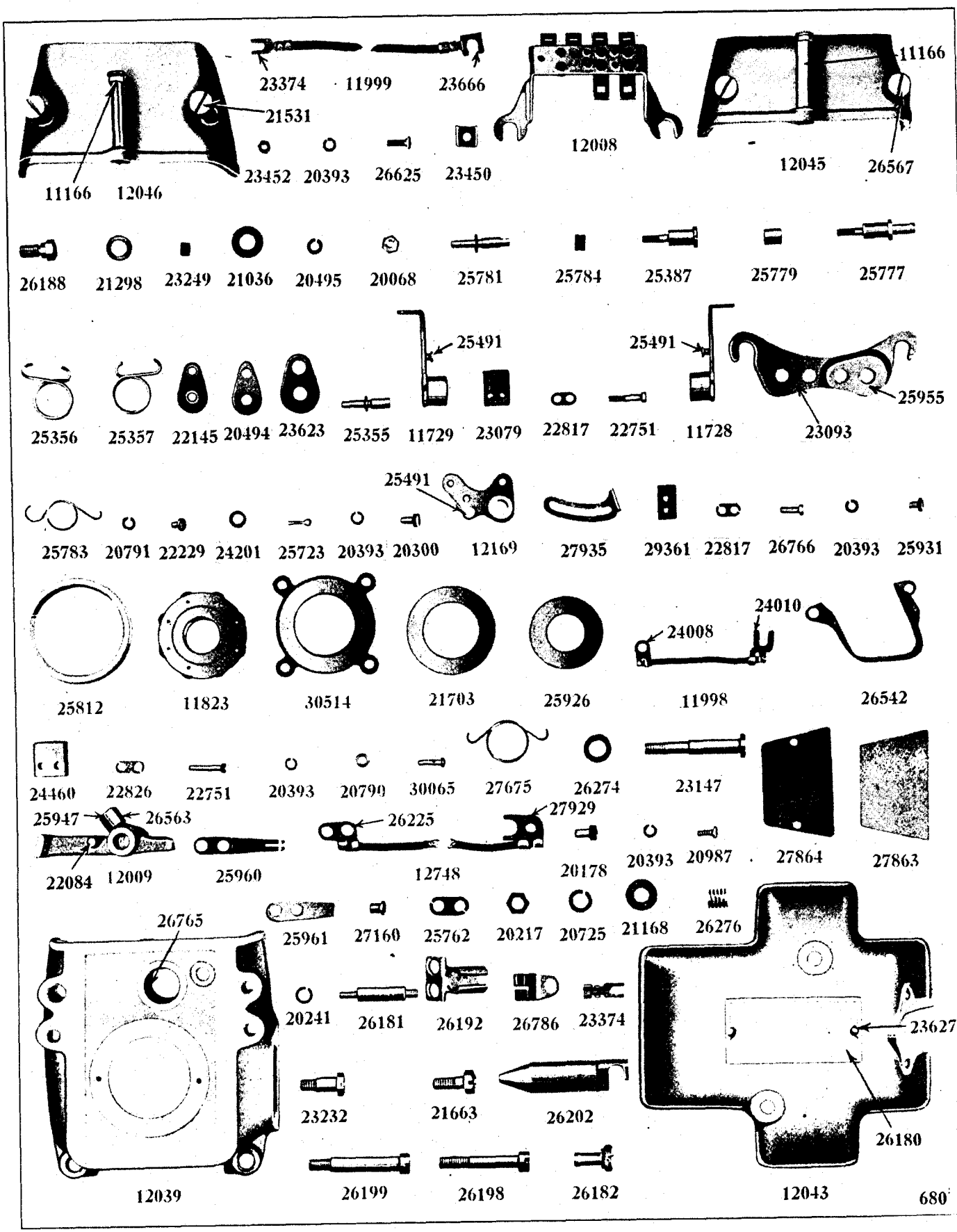
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 22817 | Lock Plate for Screw 20173 | 1 |
| 24115 | Plate for Spring 23045 | 1 |
| 24621 | Screw for Adjusting Grounded Motor Brush Arm Assembly 10812 | 1 |
| 24619 | Nut for Screw 24621 | 1 |
| 21717 | Lock Washer for Nut 24619 | 1 |
| 23147 | Stud for Holding Grounded Motor Brush Arm Assembly 10812 | 1 |
| 20217 | Nut for Stud 23147 | 1 |
| 20725 | Lock Washer for Nut 20217 | 1 |
| 21168 | Plain Washer for retaining Grounded Motor Brush Arm Assembly 10812 (Outer) | 1 |
| 21428 | Plain Washer for retaining Grounded Brush Arm Assembly 10812 (Inner) | 1 |
| 22172 | Spring Washer for retaining Grounded Motor Brush Arm Assembly 10812 | 1 |
| 25731 | Spring for Grounded Motor Brush Arm Assembly 10812 | 1 |
| 23243 | Retainer for Ball Bearing Assembly 14898 | 3 |
| 20241 | Lock Washer for Screw 20178 | 3 |
| 20178 | Screw for retaining Retainer 23243 | 1 |
| 23057 | Bushing for Rod 23510 | 1 |
| 23754 | Cover Slide for Motor End Frame Assembly 10801 | 1 |
| 23963 | Guide for Cover Slide 23754 (Outer) | 1 |
| 23964 | Guide for Cover Slide 23754 (Inner) (Not shown in Illustration) | 4 |
| 20173 | Screw for Guides 23963 and 23964 | 4 |
| 23277 | Lock Washer for Screw 20173 | 1 |
| 24111 | Felt Plug for Oil Hole (Not shown in Illustration) | 1 |
| 10626 | **Generator Brush Arm Assembly (Left)** | 1 |
| 23079 | Brush for Generator Brush Arm Assembly 10626 | 2 |
| 22751 | Screw for attaching Brush 23709 | 1 |
| 22817 | Lock Plate for Screw 22751 | 1 |
| 10627 | **Generator Brush Arm Assembly (Right)** (Include sthe next Item) | 1 |
| 23079 | Brush for Generator Brush Arm Assembly 10627 | 3 |
| 22751 | Screw for attaching Brush 23079 | 1 |
| 22817 | Lock Plate for Screw 22751 | 1 |
| 12790 | **Ground Connector Lead Assembly Complete** (Includes the next 2 Items) | 1 |
| 23666 | Clip for Generator Switch End of Lead Assembly 12790 | 1 |
| 27930 | Clip for Brush Plate End of Lead Assembly 12790 | 1 |
| 12751 | **Outside Terminal Connector Lead Assembly Complete** (Includes the next 3 Items) | 1 |
| 27929 | Clip for Brush Plate End of Lead Assembly 12751 | 1 |
| 23318 | Clip for Field Coil (Center of Lead Assembly 12751) | 1 |
| 24010 | Clip for Spring Terminal End of LeadAssembly 12751 | 2 |
| 20046 | Spring for Generator Brush Arm Assemblies 10626 and 10627 | 2 |
| 20163 | Cotter Pin for retaining Spring 20046 | 1 |
| 23093 | Generator Brush Holder Bracket | 2 |
| 20494 | Plate for Stud 23113 (Inner) | 4 |
| 23623 | Insulator for Stud 23113 | 2 |
| 23113 | Stud for Holding Generator Brush Arm Assemblies 10626 and 10627 | 4 |
| 23249 | Insulating Bushing for Stud 23113 and Screw 20035 | 2 |
| 20068 | Nut for Stud 23113 | 2 |
| 20495 | Lock Washer for Nut 20068 | 2 |
| 22011 | Plate for Stud 23113 (Outer) | 2 |
| 20035 | Screw for retaining Plates 22011 and 20494 | 1 |
| 10991 | **Generator Top Cover Assembly Complete** (Includes the next Item) | 2 |
| 24425 | Clamp Nut for Top Cover Assembly 10991 | 1 |
| 11012 | **Motor End Top Cover Assembly Complete** (Includes the next 3 Items) | 2 |
| 20484 | Spring Washer for Screw 21531 | 2 |
| 21531 | Screw for attaching Top Cover Assembly 11012 | 1 |
| 11151 | **Oiler Assembly for Motor End Top Cover Assembly 11012** | 1 |
| 10605 | **Generator End Top Cover Assembly Complete** (Includes the next 3 Items) | 2 |
| 21531 | Screw for attaching Top Cover Assembly 10605 | 2 |
| 20484 | Spring Washer for Screw 21531 | 1 |
| 14043 | **Oiler Assembly for Generator End Top Cover Assembly 10605** | 1 |
| 11383 | **Flange and Washer Assembly Complete (Not shown in Illustration)** (Includes the next Item) | 1 |
| 25019 | Felt Washer for Flange Assembly 11383 | 1 |
| 23510 | Brush Lifting Rod | 2 |
| 24610 | Nut for Rod 23510 | 1 |
| 25307 | Cotter Pin for retaining Nut 24610 | 1 |
| 11487 | **Distributor Bearing Oiler Assembly** | 1 |
| 23108 | Screw for attaching Generator Brush Holder Bracket 23093 | 1 |
| 21663 | Screw for attaching Motor End Frame Assembly 10801 (Short) (Plain) | 1 |
| 23232 | Screw for attaching Motor End Frame Assembly 10801 (Short) (Dowel) | 1 |
| 23231 | Screw for attaching Motor End Frame Assembly 10801 (Long) (Dowel) | 1 |
| 22371 | Screw for attaching Motor End Frame Assembly 10801 (Long) (Plain) | 1 |

# No. 44 MOTOR GENERATOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 21663 | Screw for attaching Generator End Frame 23665 (Plain) | 2 |
| 23232 | Screw for attaching Generator End Frame 23665 (Dowel) | 2 |
| 23132 | Bottom Plate for Generator End Frame 23665 | 1 |
| 23316 | Gasket for Bottom Plate 23132 | 1 |
| 20393 | Lock Washer for Screw 20173 | 5 |
| 20173 | Screw for attaching Bottom Plate 23132 and Name Plate 23252 | 9 |
| 23252 | Name Plate for Generator End Frame 23665 | 1 |
| 20393 | Lock Washer for Screw 20173 | 4 |
| 24200 | Stud for attaching Nut 24425 (On Generator Top Cover Assembly 10991) | 2 |
| 23204 | Screw for attaching Condenser Assembly 11670 to Screw 23205 | 1 |
| 20345 | Lock Washer for Screw 23204 | 1 |
| 23422 | Gasket for Condenser Assembly 10861 | 1 |
| 24527 | Insulator for Resistance Unit Guard (Not shown in Illustration) | 1 |
| 10861 | **Condenser Assembly Complete** (Includes the next Item) | 1 |
| 23601 | Screw for attaching Condenser Assembly 10861 | 4 |
| 12568 | **Distributor Head Assembly Complete (Not shown in Illustration)** (Includes the next 2 Items. Do not count Old Style Parts) | 1 |
| 21425 | Plunger (Old Style) for Distributor Head Assembly 12568 (Approximately ⅛/ Diameter) (Not shown in Illustration) | 1 |
| 27608 | Plunger for Distributor Head Assembly 12568 (Approximately ¼" Diameter) (Not shown in Illustration) | 1 |
| 21424 | Spring (Old Style) for Plunger 21425 (Approximately ⅛" Diameter) (Not shown in Illustration) | 1 |
| 27607 | Spring for Plunger 27608 (Approximately ¼" Diameter) (Not shown in Illustration) | 1 |
| 10697 | **Motor Terminal Clip Assembly Complete (Not shown in Illustration)** (Includes the next 5 Items) | 1 |
| 23654 | Terminal Clip for Motor Terminal Assembly 10697 (Not shown in Illustration) | 1 |
| 22395 | Clip for Terminal Clip 23654 (Not shown in Illustration) | 1 |
| 23656 | Stud for attaching Clip 22395 to Terminal Clip 23654 (Not shown in Illustration) | 1 |
| 20137 | Lock Washer for Nut 20075 | 1 |
| 20075 | Nut for Stud 23656 | 1 |
| 24453 | Terminal Clip for connecting Generator Brush Arm Assemblies 10626 and 10627 (Not shown in Illustration) | 2 |
| 23365 | Fibre Ferrule for Terminal Clip 24453 (Not shown in Illustration) | 2 |
| 23360 | Terminal Clip for Spring Terminal Assembly 10628 (Not shown in Illustration) | 1 |
| 23365 | Fibre Ferrule for Terminal Clip 23360 (Not shown in Illustration) | 1 |
| 25092 | Insulator for Series Lead on Generator Top Cover Assembly 10991 (Not shown in Illustration) | 1 |
| 23865 | Rubber Washer for High Tension Terminal Assemblies | 9 |
| 11407 | **Wrench for Distributor** | 1 |
| 10877 | **High Tension Terminal Assembly for Distributor Head Assembly 12568 (Blank)** | 1 |
| 10878 | **High Tension Terminal Assembly for Distributor Head Assembly 12568 (1)** | 1 |
| 10879 | **High Tension Terminal Assembly for Distributor Head Assembly 12568 (2)** | 1 |
| 10880 | **High Tension Terminal Assembly for Distributor Head Assembly 12568 (3)** | 1 |
| 10881 | **High Tension Terminal Assembly for Distributor Head Assembly 12568 (4)** | 1 |
| 10882 | **High Tension Terminal Assembly for Distributor Head Assembly 12568 (5)** | 1 |
| 10883 | **High Tension Terminal Assembly for Distributor Head Assembly 12568 (6)** | 1 |
| 10884 | **High Tension Terminal Assembly for Distributor Head Assembly 12568 (7)** | 1 |
| 10885 | **High Tension Terminal Assembly for Distributor Head Assembly 12568 (8)** | 1 |




# No. 78 MOTOR GENERATOR




No. 78 MOTOR GENERATOR

# No. 78 MOTOR GENERATOR

Note: No. 78 Motor Generator superseded by No. 98 Motor Generator, when ordering a complete new unit, order No. 98.

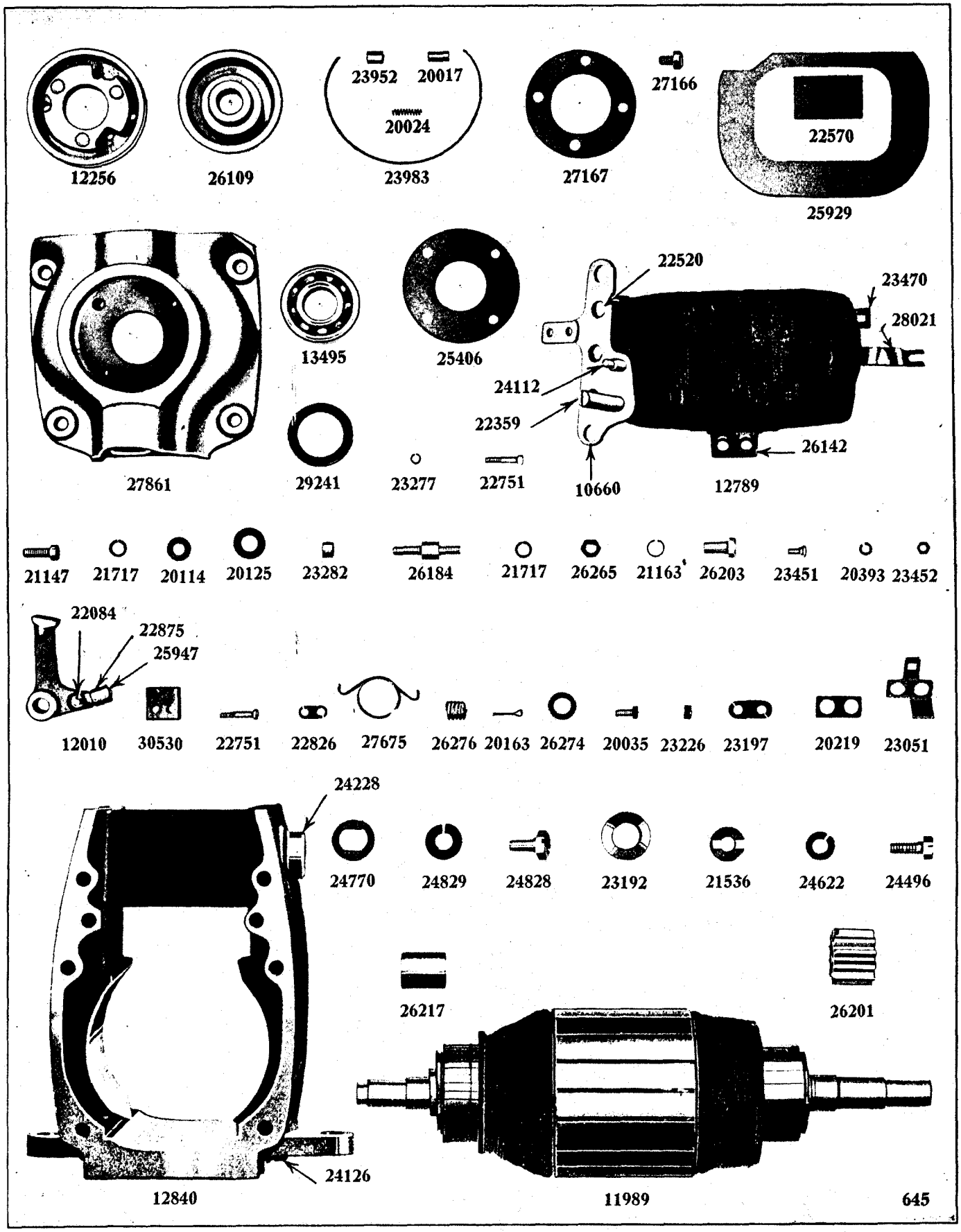
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 78 | **MOTOR GENERATOR COMPLETE** | 1 |
| 11950 | **Generator Frame Assembly** (Includes the next 3 Items) | 1 |
| 24228 | Screw for binding Generator Frame (Upper) | 1 |
| 24126 | Screw for binding Generator Frame (Lower) | 2 |
| 24494 | Lock Washer for Screw 24126 (Not shown in Illustration) | 2 |
| 12254 | **Field Coil and Motor Brush Plate Assembly** (Includes the next 7 Items) | 1 |
| 10660 | **Motor Brush Plate Assembly** (Includes the next 3 Items) | 1 |
| 24112 | Spring Stud for Brush Plate Assembly 10660 | 1 |
| 22359 | Stud for holding Series Motor Brush Arm Assembly 12010 | 1 |
| 22007 | Washer for Stud 22359 (Not shown in Illustration) | 1 |
| 22520 | Rivet for retaining Motor Brush Plate Assembly 10660 | 3 |
| 26185 | Clip on Field Coil Assembly for Terminal Plate (Not shown in Illustration) | 1 |
| 26142 | Strap for Motor Terminal Clip 26192 | 1 |
| 23051 | Clip on Motor Brush Plate Assembly 10660 for Generator Switch | 1 |
| 23197 | Lock Plate for Screw 20035 | 1 |
| 20219 | Insulator for Clip 23051 | 2 |
| 23226 | Insulating Bushing for Screw 20035 | 2 |
| 20035 | Screw for retaining Clip 23051 | 2 |
| 23451 | Screw on Clip 23051 for retaining Lead Assembly 11999 | 1 |
| 23452 | Nut for Screw 23451 | 1 |
| 20393 | Lock Washer for Nut 23452 | 1 |
| 23451 | Screw for retaining Terminal Clip on Field Coil Assembly 12254 | 1 |
| 23452 | Nut for Screw 23451 | 1 |
| 20393 | Lock Washer for Nut 23452 | 1 |
| 26203 | Screw for attaching Motor Terminal Clip 26192 | 2 |
| 21163 | Lock Washer for Screw 26203 | 2 |
| 12010 | **Series Motor Brush Arm Assembly** (Includes the next 3 Items) | 1 |
| 22084 | Spring Stud for Brush Arm Assembly 12010 | 1 |
| 22875 | Roll for Brush Arm Assembly 12010 | 1 |
| 25947 | Plain Washer for retaining Roll 22875 | 1 |
| 24460 | Brush for Series Motor Brush Arm Assembly 12010 | 1 |
| 22751 | Screw for attaching Brush 24460 | 2 |
| 22826 | Lock Plate for Screw 22751 | 1 |
| 26276 | Spring for Series Motor Brush Arm Assembly 12010 (Inner) | 1 |
| 26274 | Plain Washer for retaining Series Motor Brush Arm Assembly 12010 | 1 |
| 20163 | Cotter Pin for retaining Series Motor Brush Arm Assembly 12010 | 1 |
| 27675 | Spring for Series Motor Brush Arm Assembly 12010 (Outer) | 1 |
| 25929 | Insulator for Field Coil Assembly 12254 | 2 |
| 20125 | Insulating Washer for Screw 21147 | 4 |
| 20114 | Plain Washer for Screw 21147 | 2 |
| 21717 | Lock Washer for Screw 21147 | 2 |
| 21147 | Screw for attaching Motor Brush Plate Assembly 10660 | 2 |
| 23282 | Insulating Bushing for Screw 21147 | 2 |
| 22570 | Wedge for Field Coil Assembly 12254 | 7 |
| 26184 | Dowel Stud for connecting Ground Lead (On Side of Frame) | 1 |
| 21717 | Lock Washer for Nut 26285 | 2 |
| 26265 | Nut for Dowel Stud 26184 | 1 |
| 26211 | End Frame for Generator | 1 |
| 12988 | **Ball Bearing Assembly for Generator Clutch End of Armature Shaft** | 1 |
| 25406 | Retainer for Ball Bearing Assembly 12988 (Inner) | 1 |
| 22751 | Screw for attaching Retainer 25406 | 4 |
| 23277 | Lock Washer for Screw 22751 | 4 |
| 24111 | Felt Plug for Oil Hole in End Frame 26211 | 1 |
| 21383 | Oil Retainer (Felt) for Ball Bearing Assembly 12988 | 2 |
| 12035 | **Generator Clutch Assembly Complete (Old Style before Serial No. 352610)** (Includes the next 6 Items) | 1 |
| 12034 | **Generator Clutch Shell and Cam Assembly** | 1 |
| 26109 | **Shell for Generator Clutch Assembly 12035** (Inner) | 1 |
| 23952 | Roll for Generator Clutch Shell and Cam Assembly 12034 | 3 |
| 20024 | Spring for Plunger 20017 | 3 |
| 20017 | Plunger for Roll 23952 | 3 |
| 23983 | Binding Spring for Generator Clutch Assembly 12035 | 1 |
| 12257 | **Generator Clutch Assembly Complete** (Includes the next 8 Items) | 1 |
| 12256 | **Generator Clutch Shell and Cam Assembly** | 1 |
| 26109 | Shell for Generator Clutch Shell and Cam Assembly 12256 (Inner) | 1 |
| 23952 | Roll for Generator Clutch Shell and Cam Assembly 12256 | 3 |
| 20017 | Plunger for Roll 23952 | 3 |
| 20024 | Spring for Plunger 20017 | 3 |

# No. 78 MOTOR GENERATOR (Continued)

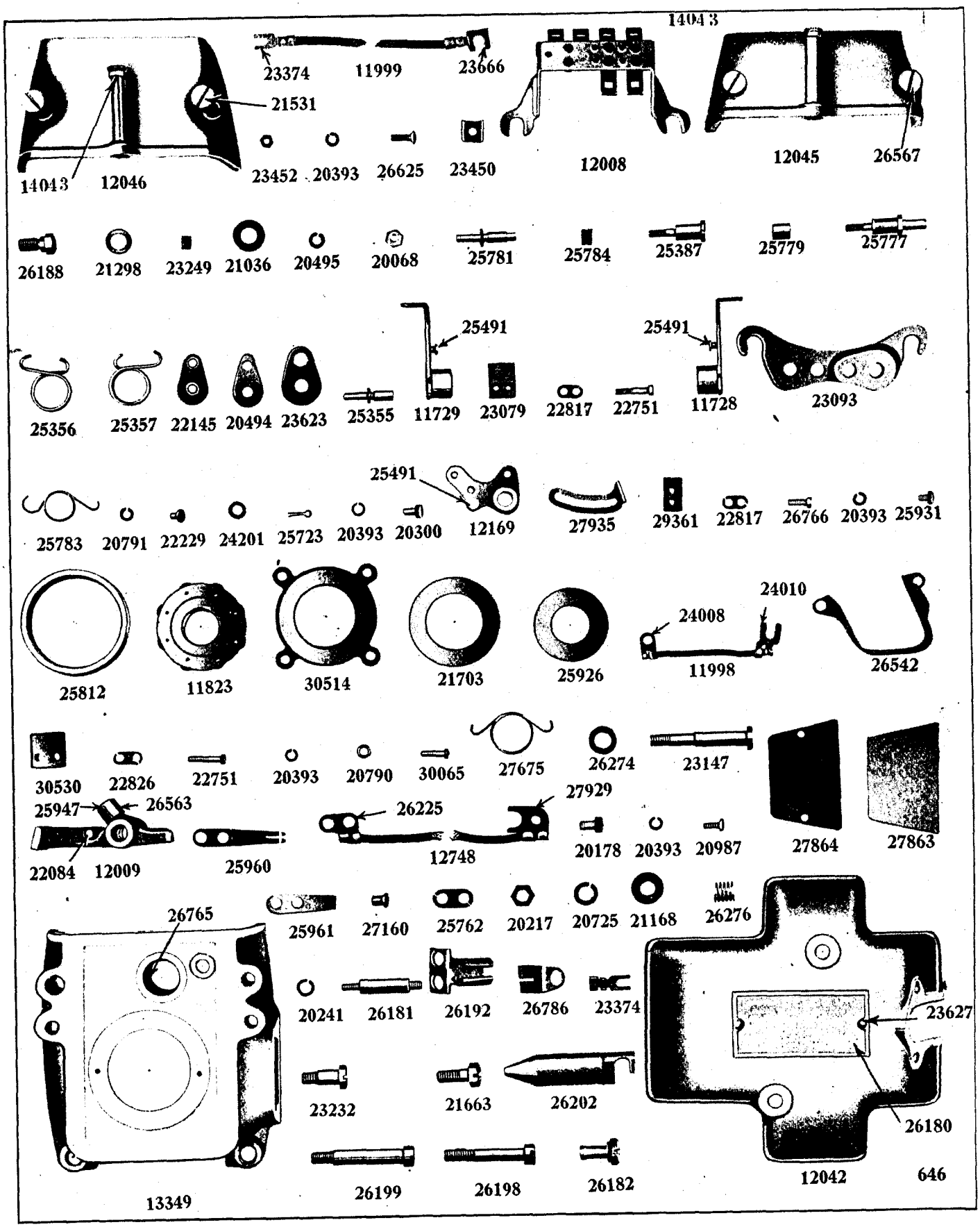
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 23983 | Binding Spring for Generator Clutch Assemby 12257 | 1 |
| 27167 | Coupling for Generator Clutch Assembly 12257 | 1 |
| 27166 | Screw for attaching Coupling 27167 | 1 |
| 11823 | **Inner Race and Balls Assembly for Pinion End of Armature Shaft** | 1 |
| 11989 | **Armature Assembly for Motor Generator** | 1 |
| 21703 | Oil Retainer (Felt) for Inner Race and Balls Assembly 11823 | 2 |
| 20808 | Retainer for Oil Retainer 21703 (Inner) (Not shown in Illustration) | 1 |
| 24622 | Lock Washer for Clamp Screw 24496 | 1 |
| 24496 | Clamp Screw for Motor Pinion 26201 | 1 |
| 21536 | Clamp Washer for Motor Pinion 26201 | 1 |
| 24829 | Lock Washer for Clamp Screw 24828 | 1 |
| 24770 | Clamp Washer for Generator Clutch Assembly 12257 | 1 |
| 24828 | Clamp Screw for Generator | 1 |
| 23192 | Spacing Collar for Generator Clutch Assembly 12257 | 1 |
| 26217 | Spacing Sleeve on Armature Shaft next to Washer 25926 (Pinion End) | 1 |
| 26201 | Motor Pinion for Armature Shaft | 1 |
| 25926 | Washer for retaining Inner Race and Balls Assembly 11823 (Outer) | 1 |
| 12039 | **Motor End Frame Assembly** (Includes the next 2 Items) | |
| 23200 | Spring Stud for End Frame Assembly 12039 (Not shown in Illustration) | 1 |
| 26765 | Bushing for Rod 26202 | 1 |
| 12009 | **Grounded Motor Brush Arm Assembly** (Includes the next 3 Items) | |
| 22084 | Spring Stud for Brush Arm Assembly 12009 | 1 |
| 26563 | Roll for Brush Arm Assembly 12009 | 1 |
| 25947 | Plain Washer for retaining Roll 26563 | 1 |
| 24460 | Brush for Grounded Motor Brush Arm Assembly 12009 | 1 |
| 22751 | Screw for attaching Brush 24460 | 2 |
| 22826 | Lock Plate for Screw 22751 | 1 |
| 25960 | Spring on Grounded Motor Brush Arm Assembly 12009 for Generator Switch | 1 |
| 25961 | Plate for Spring 25960 | 1 |
| 25762 | Insulating Plate for Spring 25960 | 3 |
| 27160 | Insulating Bushing for Screw 22654 | 2 |
| 21899 | Screw for attaching Spring 25960 | 2 |
| 12748 | **Generator Brush Bracket to Switch Arm Lead Assembly Complete** (Includes the next 2 Items) | 1 |
| 27929 | Clip for Brush Bracket End of Lead Assembly 12748 | 1 |
| 26225 | Clip for Switch Arm End of Lead Assembly 12748 | 1 |
| 20790 | Plain Washer for Screw 22654 | 2 |
| 20393 | Lock Washer for Screw 22654 | 2 |
| 23147 | Stud for holding Grounded Motor Brush Arm Assembly 12009 | 1 |
| 20217 | Nut for Stud 23147 | 1 |
| 20725 | Lock Washer for Nut 20217 | 1 |
| 21168 | Plain Washer for Grounded Motor Brush Arm Assembly 12009 (Outer) | 1 |
| 26276 | Spring for Grounded Motor Brush Arm Assembly 12009 (Inner) | 1 |
| 26274 | Plain Washer for Grounded Motor Brush Arm Assembly 12009 (Inner) | 1 |
| 27675 | Spring for Grounded Motor Brush Arm Assembly 12009 (Outer) | 1 |
| 30514 | Retainer for Outer Race 25812 | 1 |
| 26193 | Retainer for Outer Race 25812 (Old Style) before Serial No. 386208 | 1 |
| 20241 | Lock Washer for Screw 20178 | 4 |
| 20178 | Screw for attaching Retainer 30514 | 4 |
| 25812 | Outer Race for Inner Race and Balls Assembly 11823 | 1 |
| 24111 | Felt Plug for Oil Hole in End Frame Assembly 12039 | 1 |
| 11728 | **Generator Brush Arm Assembly (Right)** (Includes the next Item) | 1 |
| 25491 | Spring Stud for Brush Arm Assembly 11728 | 1 |
| 23079 | Brush for Generator Brush Arm Assembly 11728 | 2 |
| 22751 | Screw for attaching Brush 23079 | 1 |
| 22817 | Lock Plate for Screw 22751 | 1 |
| 11729 | **Generator Brush Arm Assembly (Left)** (Includes the next Item) | 1 |
| 25491 | Spring Stud for Brush Arm Assembly 11729 | 1 |
| 23079 | Brush for Generator Brush Arm Assembly 11729 | 2 |
| 22751 | Screw for attaching Brush 23079 | 1 |
| 22817 | Lock Plate for Screw 22751 | 1 |
| 11815 | **Third Generator Brush Arm Assembly (Old Style) (Straight)** | 1 |
| 12169 | **Third Generator Brush Arm Assembly (Radial)** (Includes the next Item) | 1 |
| 25491 | Spring Stud for Brush Arm Assembly 12169 | 1 |
| 25782 | Extension Brush Arm for Third Generator Brush Arm Assembly 11815 (Old Style) (Straight) | 1 |
| 27935 | Extension Brush Arm for Third Generator Brush Arm Assembly 12169 | 1 |
| 29361 | Third Brush for Extension Brush Arm 27935 | 1 |
| 22817 | Lock Plate for Screw 26766 | 1 |
| 26766 | Screw for attaching Third Brush 29361 | 2 |
| 25931 | Screw for attaching Extension Brush Arm Assembly 12169 | 2 |

# No. 78 MOTOR GENERATOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 20393 | Lock Washer for Screw 25931 | 2 |
| 20810 | Plain Washer for Screw 25931 | 2 |
| 11998 | **Third Generator Brush to Field Coil Lead Assembly Complete** (Includes the next 2 Items) | 1 |
| 24010 | Clip for Field Coil End of Lead Assembly 11998 | 1 |
| 24008 | Clip for Third Brush End of Lead Assembly 11998 | 1 |
| 25356 | Spring for Generator Brush Arm Assembly 11729 | 1 |
| 25357 | Spring for Generator Brush Arm Assembly 11728 | 1 |
| 25783 | Spring for Third Generator Brush Arm Assembly 12169 | 1 |
| 23093 | Generator Brush Holder Bracket | 1 |
| 20494 | Plate for Studs 14547, 25777, 25355 and 25387 (Inner) | 2 |
| 22145 | Plate for Studs 14547, 25777, and 25387 (Outer) | 2 |
| 25955 | Plate for Studs 25355 and 25387 next to Bracket 23093 | 2 |
| 23623 | Insulator for Studs 14547 and 25777 | 2 |
| 25355 | Stop Stud for Generator Brush Arm Assembly 11728 | 1 |
| 25387 | Stud for holding Generator Brush Arm Assembly 11728 | 1 |
| 23249 | Insulating Bushing for Studs 25777 and 14547 | 2 |
| 20068 | Nut for Studs 14547, 25777, 25355 and 25387 | 4 |
| 20495 | Lock Washer for Nut 20068 | 4 |
| 25777 | Stud for holding Third Generator Brush Arm Assembly 12169 and Generator Brush Arm Assembly 11729 | 1 |
| 14547 | **Stop Assembly Stud for Generator Brush Arm Assembly 11729** | 1 |
| 25784 | Insulating Sleeve for Stop Stud 14547 | 1 |
| 25779 | Insulating Bushing for Third Generator Brush Arm Assembly 12169 | 1 |
| 21036 | Insulating Washer for Third Generator Brush Arm Assembly 12169 (Inner) | 1 |
| 21298 | Insulating Washer for Third Generator Brush Arm Assembly 12169 (Outer) | 1 |
| 25723 | Cotter Pin for retaining Third Generator Brush Arm Assembly 12169 | 1 |
| 24201 | Plain Washer under Cotter Pin 25723 | 1 |
| 20300 | Screw for attaching Third Generator Brush to Field Coil Lead Assembly 11998 | 1 |
| 20393 | Lock Washer for Screw 20300 | 1 |
| 12008 | **Terminal Bracket Assembly** | 1 |
| 11999 | **Motor Brush Plate to Terminal Bracket Lead Assembly Complete** (Includes the next 2 Items) | 1 |
| 23666 | Clip for Motor Brush Plate End of Lead Assembly 11999 | 1 |
| 23374 | Clip for Terminal Bracket End of Lead Assembly 11999 | 1 |
| 26625 | Screw for attaching Clip 23450 | 6 |
| 20393 | Lock Washer for Nut 23452 | 6 |
| 23452 | Nut for Screw 26625 | 6 |
| 23450 | Clip for Terminal Bracket Assembly 12008 | 6 |
| 12043 | **Generator Top Cover Assembly Complete** (Includes the next 3 Items) | 1 |
| 26180 | Name Plate for Generator Top Cover Assembly 12043 | 1 |
| 23627 | Rivet for attaching Name Plate 26180 | 2 |
| 26182 | Screw for attaching Generator Top Cover Assembly 12043 | 2 |
| 12045 | **Motor End Top Cover Assembly Complete** (Includes the next 3 Items) | 1 |
| 20484 | Spring Washer for Screw 26567 | 2 |
| 26567 | Screw for attaching Cover Assembly 12045 | 2 |
| 14043 | **Bearing Oiler Assembly for Motor End Top Cover Assembly 12045** | 1 |
| 12046 | **Generator End Top Cover Assembly Complete** (Includes the next 3 Items) | 1 |
| 21531 | Screw for attaching Cover Assembly 12046 | 2 |
| 20484 | Spring Washer for Screw 21531 | 2 |
| 14043 | **Bearing Oiler Assembly for Generator End Top Cover Assembly 12046** | 1 |
| 26202 | Rod for Lifting Motor Brush Arms | 1 |
| 26188 | Screw for attaching Generator Brush Holder Bracket 23093 | 2 |
| 21663 | Screw for attaching Motor End Frame Assembly 12039 (Short, Plain) | 1 |
| 23232 | Screw for attaching Motor End Frame Assembly 12039 (Short, Dowel) | 1 |
| 26199 | Screw, for attaching Motor End Frame Assembly 12039 (Long, Dowel) | 1 |
| 26198 | Screw for attaching Motor End Frame Assembly 12039 (Long, Plain) | 1 |
| 21663 | Screw for attaching Generator End Frame 26211 (Plain) | 2 |
| 23232 | Screw for attaching Generator End Frame 26211 (Dowel) | 2 |
| 26181 | Stud for Screw 26182 | 2 |
| 26542 | Guard for Motor Terminal Clip 26192 | 1 |
| 20791 | Lock Washer for Screw 22229 | 1 |
| 22229 | Screw for attaching Guard 26542 | 1 |
| 26826 | Insulating Plate for Terminal Clip 26192 | 1 |
| 23374 | Terminal Clip for connecting Terminal Bracket Assembly 12044 | 4 |
| 26786 | Terminal Clip used with Motor Terminal Clip 26192 | 1 |
| 26192 | Motor Terminal Clip | 1 |




# No. 98 MOTOR GENERATOR




No. 98 MOTOR GENERATOR

# No. 98 MOTOR GENERATOR

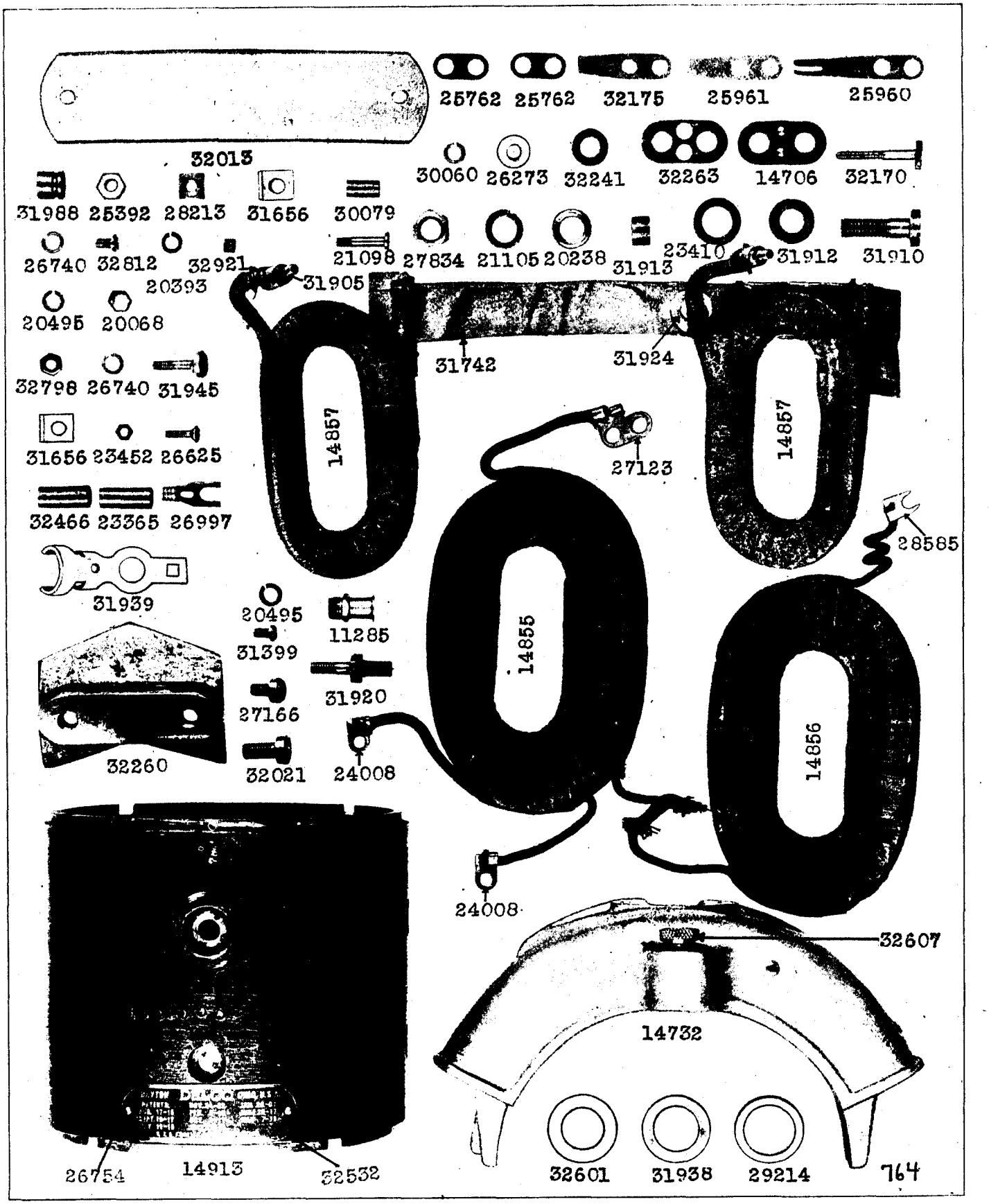
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 98 | **MOTOR GENERATOR COMPLETE** | 1 |
| 12840 | **Generator Frame Assembly** | 1 |
| | (Includes the next 3 Items) | |
| 24228 | Screw for Binding Generator Frame (Upper) | 1 |
| 24126 | Screw for Binding Generator Frame (Lower) | 2 |
| 24494 | Lock Washer for Screw 24126 | 2 |
| 13076 | **Field Coil Assembly** | 1 |
| | (Includes the next 7 Items) | |
| 26142 | Strap for Motor Terminal Clip 26192 | 1 |
| 23470 | Clip on Field Coil Assembly for Third Brush | 1 |
| 28021 | Clip on Field Coil Assembly for Terminal Plate | 1 |
| 10660 | **Motor Brush Plate Assembly** | 1 |
| | (Includes the next 2 Items) | |
| 24112 | Spring Stud for Motor Brush Plate Assembly 10660 | 1 |
| 22359 | Stud for Holding Series Motor Brush Arm Assembly | 1 |
| 22520 | Rivet for retaining Motor Brush Plate Assembly | 3 |
| 23051 | Clip on Motor Brush Plate Assembly 10660 for Generator Switch | 1 |
| 23197 | Lock Plate for Screw 20035 | 1 |
| 20219 | Insulator for Clip 23051 | 2 |
| 23226 | Insulating Bushing for Screw 20035 | 2 |
| 20035 | Screw for retaining Clip 23051 | 2 |
| 23451 | Screw for Clip 23051 for retaining Lead Assembly 11999 | 1 |
| 23452 | Nut for Screw 23451 | 1 |
| 20393 | Lock Washer for Nut 23452 | 1 |
| 26203 | Screw for retaining Motor Terminal Clip 26192 | 2 |
| 21163 | Lock Washer for Screw 26203 | 2 |
| 12010 | **Series Motor Brush Arm Assembly** | 1 |
| | (Includes the next 3 Items) | |
| 22084 | Spring Stud for Brush Arm Assembly 12010 | 1 |
| 22875 | Roll for Brush Arm Assembly 12010 | 1 |
| 25947 | Plain Washer for retaining Roll 22875 | 1 |
| 30530 | Brush for Series Motor Brush Arm Assembly 12010 | 1 |
| 22751 | Screw for attaching Brush 24460 | 2 |
| 22826 | Lock Plate for Screw 22751 | 1 |
| 26276 | Spring for Series Motor Brush Arm Assembly 12010 (Inner) | 1 |
| 26274 | Plain Washer for retaining Series Motor Brush Arm Assembly 12010 | 1 |
| 20163 | Cotter Pin for retaining Series Motor Brush Arm Assembly 12010 | 1 |
| 27675 | Spring for Series Motor Brush Arm Assembly 12010 (Outer) | 1 |
| 25929 | Insulator for Field Coil Assembly 12849 | 2 |
| 20125 | Insulating Washer for Screw 21147 | 4 |
| 20114 | Plain Washer for Screw 21147 | 2 |
| 21717 | Lock Washer for Screw 21147 | 2 |
| 21147 | Screw for attaching Motor Brush Plate Assembly 10660 | 2 |
| 23282 | Insulating Bushing for Screw 21147 | 2 |
| 22570 | Wedge for Field Coil Assembly 12849 | 7 |
| 26184 | Dowel Stud for connecting Ground Lead (On Side of Frame) | 1 |
| 21717 | Lock Washer for Nut 26265 | 2 |
| 26265 | Nut for Dowel 26184 | 1 |
| 27861 | End Frame for Generator | 1 |
| 12988 | **Ball Bearing Assembly for Clutch End of Armature Shaft** | 1 |
| 25406 | Retainer for Ball Bearing Assembly 12988 (Inner) | 1 |
| 22751 | Screw for Retainer 25406 | 4 |
| 23277 | Lock Washer for Screw 22751 | 4 |
| 24111 | Felt Plug for Oil Hole in End Frame 27861 (Not shown in Illustration) | 1 |
| 21383 | Oil Retainer (Felt) for Ball Bearing Assembly 13495 | 2 |
| 12257 | **Generator Clutch Assembly Complete** | 1 |
| | (Includes the next 8 Items) | |
| 12256 | **Generator Clutch Shell and Cam Assembly** | 1 |
| 26109 | Shell for Generator Clutch Shell and Cam Assembly 12256 (Inner) | 1 |
| 23952 | Roll for Generator Clutch Shell and Cam Assembly 12256 | 3 |
| 20017 | Plunger for Roll 23952 | 3 |
| 20024 | Spring for Plunger 20017 | 3 |
| 23983 | Binding Spring for Generator Clutch Assembly 12257 | 1 |
| 27167 | Coupling for Generator Clutch Assembly 12257 | 1 |
| 27166 | Screw for attaching Coupling 27167 | 2 |
| 11989 | **Armature Assembly for Motor Generator** | 1 |
| 24829 | Lock Washer for Clamp Screw 24828 | 1 |
| 24770 | Clamp Washer for Generator Clutch Assembly 12257 | 1 |
| 24828 | Clamp Screw for Generator Clutch Assembly 12257 | 1 |
| 23192 | Spacing Collar on Armature Shaft next to Generator Clutch Assembly 12257 | 1 |
| 13349 | **Motor End Frame Assembly** | 1 |
| | (Includes the next 2 Items) | |
| 23200 | Spring Stud for Motor End Frame Assembly 13349 (Not shown in Illustration) | 1 |
| 26765 | Bushing for Rod 26202 | 1 |

# No. 98 MOTOR GENERATOR (Continued)

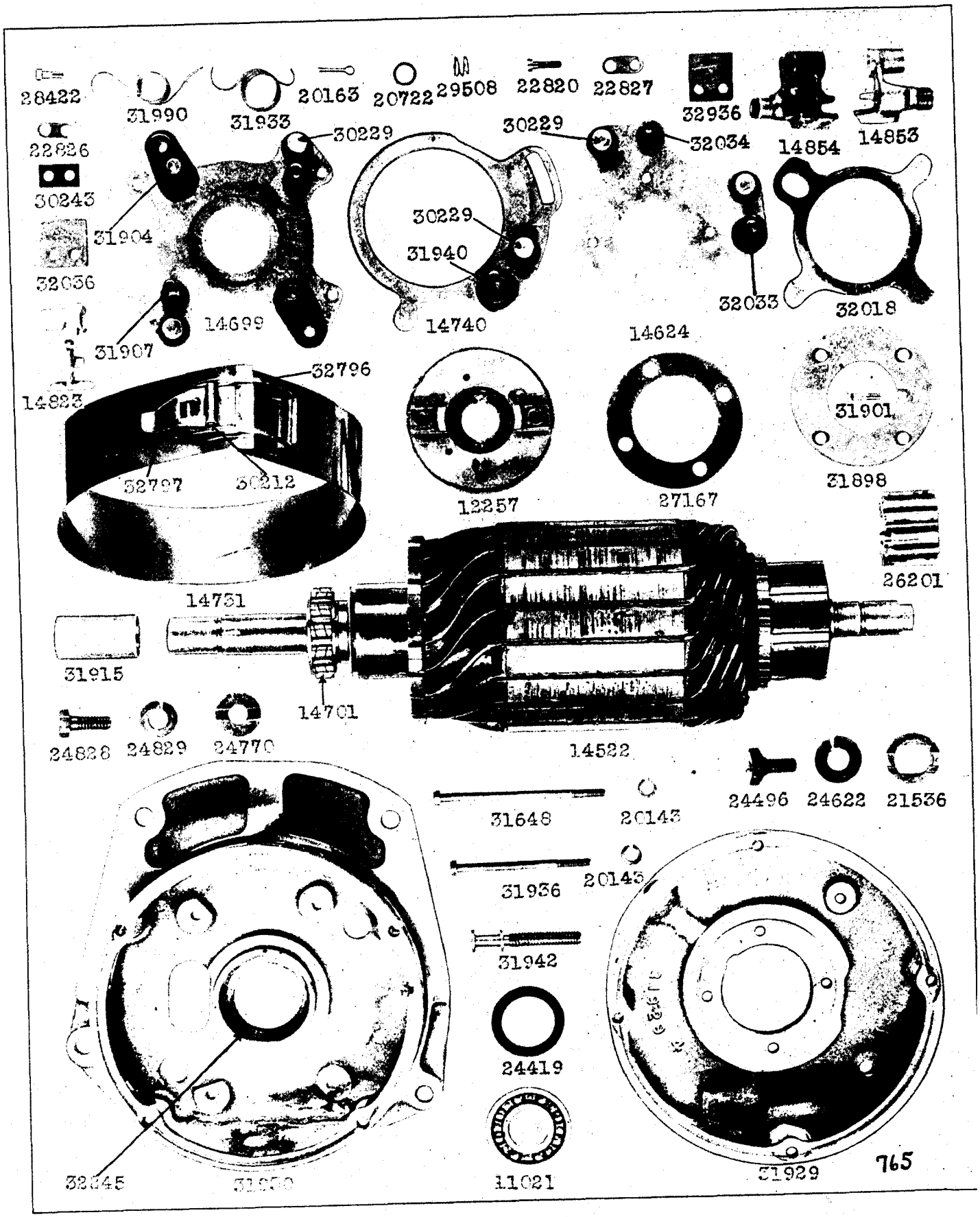
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 27147 | Retainer for Outer Race 25812 (Old Style before Serial No. 9809528) (Not shown in Illustration) | 1 |
| 30514 | Retainer for Outer Race 25812 | 1 |
| 20241 | Lock Washer for Screw 20178 | 1 |
| 20178 | Screw for retaining Retainer 30514 | 4 |
| 24111 | Felt Plug Oil Hole in Motor End Frame Assembly 13349 (Not shown in Illustration) | 4 |
| 15499 | **Ball Bearing Assembly (Pinion End of Armature Shaft)** | 1 |
| | Note: When it is necessary to replace either an Old Style Outer Race or Inner Race and Rolls on the Old Style **Roller** Bearing on this Generator an entire new **Ball** Bearing Assembly must be ordered. | |
| | (Includes the next 2 Items) | |
| 15526 | **Inner Race and Balls Assembly for Ball Bearing Assembly 15499** | 1 |
| 24447 | Outer Race for Inner Race and Balls Assembly 15526 | 1 |
| 21703 | Oil Retainer (Felt) for Inner Race Balls Assembly 15526 | 2 |
| 12009 | **Grounded Motor Brush Arm Assembly** | 1 |
| | (Includes the next 3 Items) | |
| 22084 | Spring Stud for Grounded Motor Brush Arm Assembly 12009 | 1 |
| 26563 | Roll for Brush Arm Assembly 12009 | 1 |
| 25947 | Plain Washer for retaining Roll 26563 | 1 |
| 30530 | Brush for Grounded Motor Brush Arm Assembly 12009 | 1 |
| 22751 | Screw for attaching Brush 30530 | 1 |
| 22826 | Lock Plate for Screw 22751 | 2 |
| 25960 | Spring on Grounded Motor Brush Arm Assembly 12009 for Generator Switch | 1 |
| 25961 | Plate for Spring 25960 | 1 |
| 25762 | Insulating Plate for Spring 25960 | 3 |
| 27160 | Insulating Bushing for Screw 21899 | 2 |
| 21899 | Screw for attaching Spring 25960 | 2 |
| 12748 | **Generator Brush Brackets to Switch Arm Lead Assembly Complete** | 1 |
| | (Includes the next 2 Items) | |
| 27929 | Clip for Brush Bracket End of Lead Assembly 12748 | 1 |
| 26225 | Clip for Switch Arm End of Lead Assembly 12748 | 1 |
| 20790 | Plain Washer for Screw 30065 | 2 |
| 20393 | Lock Washer for Screw 30065 | 2 |
| 23147 | Stud for Holding Grounded Motor Brush Arm Assembly 12009 | 1 |
| 20217 | Nut for Stud 23147 | 1 |
| 20725 | Lock Washer for Nut 20217 | 1 |
| 21168 | Plain Washer for Grounded Motor Brush Arm Assembly 12009 (Outer) | 1 |
| 26276 | Spring for Grounded Motor Brush Arm Assembly 12009 (Inner) | 1 |
| 26274 | Plain Washer Grounded Motor Brush Arm Assembly 12009 (Inner) | 1 |
| 27675 | Spring for Grounded Motor Brush Arm Assembly 12009 (Outer) | 1 |
| 11728 | **Generator Brush Arm Assembly (Right)** | 1 |
| | (Includes the next Item) | |
| 25491 | Spring Stud for Brush Arm Assembly 11728 | 1 |
| 23079 | Brush for Generator Brush Arm Assembly 11728 | 1 |
| 22751 | Screw for attaching Brush 23079 | 2 |
| 22817 | Lock Plate for Screw 22751 | 1 |
| 11729 | **Generator Brush Arm Assembly (Left)** | 1 |
| | (Includes the next Item) | |
| 25491 | Spring Stud for Brush Arm Assembly 11729 | 1 |
| 23079 | Brush for Generator Brush Arm Assembly 11729 | 1 |
| 22751 | Screw for attaching Brush 23079 | 2 |
| 22817 | Lock Plate for Screw 22751 | 1 |
| 12169 | **Third Generator Brush Arm Assembly (Radial)** | 1 |
| | (Includes the next Item) | |
| 25491 | Spring Stud for Brush Arm Assembly 12169 | 1 |
| 27935 | Extension Brush Arm for Third Generator Brush Arm Assembly 12169 | 1 |
| 29361 | Third Brush for Third Generator Brush Arm Assembly 12169 | 1 |
| 22817 | Lock Plate for Screw 26766 | 2 |
| 26766 | Screw for attaching Third Brush 29361 | 2 |
| 25931 | Screw for attaching Extension Brush Arm 27935 | 2 |
| 20393 | Lock Washer for Screw 25931 | 2 |
| 20810 | Plain Washer for Screw 25931 (Not shown in Illustration) | 2 |
| 11998 | **Third Generator Brush to Field Coil Lead Assembly Complete** | 1 |
| | (Includes the next 2 Items) | |
| 24010 | Clip for Field Coil End of Lead Assembly 11998 | 1 |
| 24008 | Clip for Third Brush End of Lead Assembly 11998 | 1 |
| 25356 | Spring for Generator Brush Arm Assembly 11729 | 1 |
| 25357 | Spring for Generator Brush Arm Assembly 11728 | 1 |
| 25783 | Spring for Third Generator Brush Arm Assembly 12169 | 1 |
| 23093 | Bracket for Brush Arms | 1 |
| 20494 | Plate for Studs 14547, 25777, 25355 and 25387 (Inner) | 2 |
| 22145 | Plate for Studs 14547, 25777, 25355 and 25387 (Outer) | 2 |
| 25955 | Plate for Studs 25355 and 25387 next to Bracket 23093 (Not shown in Illustration) | 2 |
| 23623 | Insulator for Studs 14547 and 25777 | 2 |
| 25355 | Stop Stud for Generator Brush Arm Assembly 11728 | 1 |
| 25387 | Stud for holding Generator Brush Arm Assembly 11728 | 1 |

# No. 98 MOTOR GENERATOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 23249 | Insulating Bushing for Studs 25777 and 14547 | 2 |
| 20068 | Nut for Studs 14547, 25777, 25355 and 25387 | 4 |
| 20495 | Lock Washer for Nut 20068 | 4 |
| 25777 | Stud for holding Third Generator Brush Arm Assembly 12169 and Generator Brush Arm Assembly 11729 | 1 |
| 14547 | **Stop Stud Assembly for Third Brush Arm Assembly 12169** | 1 |
| 25784 | Insulating Sleeve for Stop Stud 14547 | 1 |
| 25779 | Insulating Bushing for Third Generator Brush Arm Assembly 12169 | 1 |
| 21036 | Insulating Washer for Third Generator Brush Arm Assembly 12169 (Inner | 1 |
| 21298 | Insulating Washer for Third Generator Brush Arm Assembly 12169 (Outer) | 1 |
| 25723 | Cotter Pin for retaining Third Generator Brush Arm Assembly 12169 | 1 |
| 24201 | Plain Washer under Cotter Pin 25723 | 1 |
| 20300 | Screw for attaching Third Generator Brush to Field Coil Lead Assembly 11998 | 1 |
| 20393 | Lock Washer for Screw 20300 | 1 |
| 12008 | **Terminal Bracket Assembly** | 1 |
| 11999 | **Motor Brush Plate to Terminal Bracket Lead Assembly Complete** (Includes the next 2 Items) | 1 |
| 23666 | Clip for Motor Brush Plate End of Lead Assembly 11999 | 1 |
| 23374 | Clip for Terminal Bracket End of Lead Assembly 11999 | 1 |
| 26625 | Screw for attaching Clip 23450 | 6 |
| 20393 | Lock Washer for Nut 23452 | 6 |
| 23452 | Nut for Screw 26625 | 6 |
| 23450 | Clip for Terminal Bracket Assembly 12008 | 6 |
| 12043 | **Generator Top Cover Assembly Complete** (Includes the next 3 Items) | 1 |
| 26180 | Name Plate for Top Cover Assembly 12043 | 1 |
| 23627 | Rivet for attaching Name Plate 26180 | 2 |
| 26182 | Screw for attaching Generator Top Cover Assembly 12043 | 2 |
| 12045 | **Motor End Top Cover Assembly Complete** (Includes the next 4 Items) | 1 |
| 20484 | Spring Washer for Screw 26567 (Not shown in Illustration) | 2 |
| 26567 | Screw for attaching Cover Assembly 12045 | 2 |
| 14043 | **Bearing Oiler Assembly for Motor End Top Cover Assembly 12045** | 1 |
| 30639 | Wick for Oiler Assembly 14043 (Not shown in Illustration) | 1 |
| 12046 | **Generator End Top Cover Assembly Complete** (Includes the next 4 Items) | 1 |
| 21531 | Screw for attaching Cover Assembly 12046 | 2 |
| 20484 | Spring Washer for Screw 21531 (Not shown in Illustration) | 2 |
| 14043 | **Oiler Assembly for Generator End Top Cover Assembly 12046** | 1 |
| 30639 | Wick for Oiler Assembly 14043 (Not shown in Illustration) | 1 |
| 26202 | Rod for Grounded and Series Motor Brush Arm Assembly 12009 and 12010 | 1 |
| 26188 | Screw for attaching Generator Brush Holder Bracket Assembly 12845 | 2 |
| 21663 | Screw for attaching Motor End Frame Assembly 13349 (Short) (Plain) | 1 |
| 33529 | Screw for attaching Motor End Frame Asembly 13349 (Short) (Dowel) | 1 |
| 26199 | Screw for attaching Motor End Frame Assembly 13349 (Long) (Dowel) | 1 |
| 26198 | Screw for attaching Motor End Fram Assembly 13349 (Long) (Plain) | 1 |
| 21663 | Screw for attaching Generator End Frame 27861 (Plain) | 2 |
| 33529 | Screw for attaching Generator End Frame 27861 (Dowel) | 2 |
| 26181 | Stud for Screw 26182 | 2 |
| 26542 | Guard for Motor Terminal Clip 26192 | 1 |
| 20791 | Lock Washer for Screw 22229 | 1 |
| 22229 | Screw for attaching Guard 26542 | 1 |
| 33530 | Cover for Motor End Frame (Side) | 1 |
| 27864 | Gasket for Cover 33530 | 1 |
| 27863 | Cover End Frame Assemblies (Bottom) | 2 |
| 27864 | Gasket for Cover 33530 | 2 |
| 20987 | Screw for attaching Cover 33530 | 4 |
| 33215 | Screw for attaching Cover 33530 | 2 |
| 32817 | Lock Washer for Screws 20987 and 33215 | 6 |
| 20808 | Retainer for Oil Retainer 21703 (Inner) (Not shown in Illustration) | 1 |
| 25926 | Washer for retaining Inner Race and Rolls Assembly 11823 (Outer) | 1 |
| 26217 | Spacing Sleeve on Armature Shaft for retaining Washer 25926 (Pinion End) | 1 |
| 26201 | Motor Pinion for Armature Shaft | 1 |
| 21536 | Clamp Washer for Motor Pinion 26201 | 1 |
| 24622 | Lock Washer for Clamp Screw 24496 | 1 |
| 24496 | Clamp Screw for Motor Pinion 26201 | 1 |
| 26826 | Insulating Plate for Motor Terminal Clip 26192 (Not shown in Illustration) | 1 |
| 23374 | Terminal Clip for connecting Terminal Bracket Assembly 12008 | 4 |
| 26786 | Terminal Clip used with Motor Terminal Clip 26192 | 1 |
| 26192 | Motor Terminal Clip | 1 |




No. 162 MOTOR GENERATOR




No. 162 MOTOR GENERATOR

# No. 162 MOTOR GENERATOR

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 162 | **MOTOR GENERATOR COMPLETE** | 1 |
| 31932 | **Frame for Motor Generator** | 1 |
| 32532 | Name Plate for Motor Generator | 1 |
| 32821 | Pin for attaching Name Plate | 2 |
| 32260 | Pole Piece for Frame | 4 |
| 32021 | Screw for attaching Pole Piece | 7 |
| 31920 | Stud Screw for attaching Pole Piece | 1 |
| 14857 | **Motor Field Coil Assembly** (Includes next Item) | 2 |
| 31905 | Stud for connecting Motor Field Coil | 1 |
| 31924 | Connector for Connecting Motor Field Coil | 1 |
| 31742 | Insulator for Connector 31924 | 1 |
| 32445 | Insulator between Motor Field Coil and Pole Piece | 4 |
| 14856 | **Generator Field Coil Assembly (On same side as Generator Switch** (Includes the next 3 Items) | 1 |
| 27123 | Clip for connecting Coils to Generator Switch | 1 |
| 24008 | Clip for connecting Field Coil to Brush Plate | 1 |
| 28585 | Clip for connecting Field Coil to Brush Plate | 1 |
| 14855 | **Generator Field Coil Assembly (Opposite Field Coil Assembly 14856** (Includes the next Item) | 1 |
| 24008 | Clip for connecting Field Coil to Brush Plate | 1 |
| 31910 | Motor Terminal Stud | 1 |
| 31912 | Insulating Washer for Terminal Stud 31910 (Outside) | 1 |
| 23410 | Insulating Washer for Terminal Stud 31910 (Inside) | 1 |
| 20238 | Plain Washer for Terminal Stud 31910 | 1 |
| 31913 | Insulating Bushing for Terminal Stud 31910 | 1 |
| 21105 | Lock Washer for Nut 27834 | 2 |
| 27834 | Nut for Terminal Stud | 2 |
| 31929 | End Frame for Generator end of Armature Shaft | 1 |
| 11021 | **Ball Bearing Assembly** | 1 |
| 15386 | **Third Brush Arm Plate Assembly** (Includes the next 7 Items) | 1 |
| 31940 | Stud for Third Brush Arm | 1 |
| 32147 | Insulating Bushing for Stud 31940 | 1 |
| 29240 | Insulating Washer for Stud 31940 | 2 |
| 20238 | Plain Washer for Stud 31940 | 1 |
| 33526 | Stud for Third Brush Arm Spring 30241 | 1 |
| 30241 | Bushing for Stud 33526 | 1 |
| 30227 | Insulating Washer for Stud 33526 | 3 |
| 14624 | **Generator Brush Arm Plate Assembly** (Includes the next 8 Items) | 1 |
| 32033 | Stud for Generator Brush Arm (Grounded) | 1 |
| 32034 | Stud for Generator Brush Arm (Insulated) | 1 |
| 32147 | Insulating Bushing for Stud 32034 | 1 |
| 29240 | Insulating Washer for Stud 32034 | 2 |
| 30238 | Plain Washer for Stud 32034 | 1 |
| 30229 | Stud for Generator Brush Arm Spring | 2 |
| 30241 | Insulating Bushing for Stud 30229 | 2 |
| 30227 | Insulating Washer for Stud 30229 | 2 |
| 24419 | Felt Washer for Ball Bearing Assembly 11021 | 1 |
| 33294 | Retainer for Ball Bearing | 1 |
| 31898 | Retainer for Ball Bearing Assembly 11021 | 1 |
| 31901 | Screw for attaching Retainer 31898 | 4 |
| 31945 | Screw for locking Third Brush Plate | 1 |
| 20165 | Plain Washer for Screw 31945 | 1 |
| 26740 | Lock Washer for Screw 31945 | 1 |
| 32798 | Nut for Screw 31945 | 1 |
| 31942 | Screw for adjusting Brushes (Old Style) | 1 |
| 14823 | **Generator and Third Brush Arm Assembly (Old Style used before Serial No. 162-21351)** | 3 |
| 33220 | Stop for Brush Arm (Old Style) | 3 |
| 22826 | Lock Plate for Screw 22820 | 3 |
| 22820 | Screw for attaching Brush (Before Serial No. 162-21351) | 6 |
| 29508 | Tension Spring for Generator Brush Arm (Small) | 3 |
| 20722 | Plain Washer for retaining Springs 29508 | 3 |
| 20163 | Cotter Pin for retaining Springs 29508 | 3 |
| 15319 | **Generator Brush Arm Assembly** (Includes next 2 Items) | 2 |
| 33353 | Hub for Generator Brush Arm Assembly | 1 |
| 31990 | Spring for Generator Brush Arm Assembly | 1 |

# No. 162 MOTOR GENERATOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 15411 | **Thermostat and Third Brush Arm Assembly** (Includes next 5 Items) | 1 |
| 33353 | Hub for Third Brush Arm Assembly | 1 |
| 31990 | Spring for Third Brush Assembly | 1 |
| 15166 | **Thermostat Resistance Assembly** | 1 |
| 25091 | Screw for attaching Resistance Assembly | 2 |
| 20647 | Lock Washer for Screw 25091 | 2 |
| 33362 | Brush for Generator and Third Brush Arm Assembly | 3 |
| 33355 | Screw for attaching Brush 33362 | 6 |
| 33354 | Stop Plate for Brush 33362 | 3 |
| 33357 | Plate for Brush 33362 | 3 |
| 25091 | Screw for attaching Lead to Thermostat and Third Brush Arm Assembly | 1 |
| 20647 | Lock Washer for Screw 25091 | 1 |
| 31930 | Motor End Frame | 1 |
| 14701 | **Inner Race and Rolls Assembly for Drive End of Armature Shaft** | 1 |
| 32245 | Outer Race for Inner Race and Rolls Assembly 14701 | 1 |
| 32170 | Generator Switch Terminal Stud | 2 |
| 32920 | Lock Plate for Switch Terminal Stud | 1 |
| 32263 | Insulator for Stud 32170 (Next to end Frame) | 1 |
| 30079 | Insulating Bushing for Stud 32170 | 2 |
| 32241 | Insulating Washer for Stud 32170 | 2 |
| 26273 | Plain Washer for Stud 32170 | 2 |
| 28213 | Nut for Stud 32170 | 2 |
| 31656 | Clip for Stud 32170 | 2 |
| 30060 | Lock Washer for Stud 32170 | 2 |
| 25392 | Nut for connecting Generator Lead to Stud 32170 | 2 |
| 14706 | **Insulator Assembly for separating Studs 32170** | 1 |
| 14699 | **Motor Brush Plate Assembly** (Includes the next 9 Items) | 1 |
| 31907 | Stud for Motor Brush Arms (Grounded) | 2 |
| 31904 | Stud for Motor Brush Arm (Insulated) | 2 |
| 30229 | Spring Stud for Grounded Motor Brush Arm Spring | 2 |
| 30241 | Insulating Bushing for Stud 30229 | 2 |
| 30227 | Insulating Washer for Stud 30229 | 2 |
| 30140 | Insulating Bushing for Stud 31904 | 2 |
| 32017 | Insulator for Stud 31904 | 4 |
| 31991 | Plate for retaining Insulated Brush Arm Studs 31904 | 2 |
| 29499 | Plate for retaining Insulated Brush Arm Studs 31904 | 2 |
| 14852 | **Motor Brush Arm Assembly (Insulated)** | 2 |
| 15209 | **Motor Brush Arm Assembly (Grounded)** | 1 |
| 14854 | **Motor Brush Arm Assembly (For Generator Switch)** | 1 |
| 32936 | Brush for Motor Brush Arms | 4 |
| 22820 | Screw for attaching Brushes 32936 | 8 |
| 22827 | Lock Plate for Screw 22820 | 4 |
| 31933 | Brush Arm Springs (For Grounded Motor Brush Arm) | 2 |
| 32255 | Brush Arm Springs for Insulated Brush Arms | 2 |
| 29508 | Tension Spring for Motor Brush Arm | 4 |
| 20722 | Plain Washer for Spring 29508 | 4 |
| 20163 | Cotter Pin retaining Tension Springs 29508 | 4 |
| 14522 | **Armature Assembly** | 1 |
| 32601 | Spacing Washer for Armature Shaft (Drive end) | 1 |
| 32528 | Washer for Armature Shaft | 1 |
| 32529 | Washer for Armature Shaft | 1 |
| 32530 | Fibre Plug for End Housing | 1 |
| 31938 | Spacing Washer for Armature Shaft (For Roller Bearing (Inner) | 1 |
| 29214 | Washer for Armature Shaft (Next to Generator Clutch) | 1 |
| 29886 | Washer for Armature Shaft (For Roller Bearing Outer) | 1 |
| 31915 | Sleeve for Armature Shaft (Next to Pinion) | 1 |
| 26201 | Pinion for Armature Shaft | 1 |
| 21536 | Clamp Washer for Pinion | 1 |
| 24496 | Screw for retaining Pinion | 1 |
| 24622 | Lock Washer for Screw 24496 | 1 |
| 20068 | Nut for attaching Field Coil Stud | 2 |
| 20495 | Lock Washer for Nut 20068 | 2 |
| 31988 | Bushing for Insulating Field Coil Stud on Motor Brush Plate | 2 |
| 32018 | Lifting Plate for Motor Brushes | 1 |
| 20492 | Screw for attaching Plate 32018 | 4 |
| 20495 | Lock Washer for Screws 20492 | 4 |
| 31648 | Screw for attaching Motor End Frame | 4 |
| 20143 | Lock Washer for Screws 31648 and 31946 | 8 |
| 31936 | Screw for attaching Generator End Frame | 4 |
| 26740 | Lock Washer for Screw 31936 | 4 |
| 12257 | **Generator Clutch Assembly** (Includes the next 8 Items) | 1 |
| 12256 | **Generator Clutch Shell and Cam Assembly** | 1 |
| 26109 | Shell for Clutch Shell and Cam Assembly 12256 | 1 |
| 23952 | Roll for Clutch Shell and Cam Assembly | 3 |

# No. 162 MOTOR GENERATOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 20017 | Plunger for Roll | 3 |
| 20024 | Spring for Plunger | 3 |
| 23983 | Binding Spring for Generator Clutch Assembly | 1 |
| 27167 | Coupling for Generator Clutch Assembly | 1 |
| 27166 | Screw for attaching Coupling 27167 | 3 |
| 11285 | **Oiler Assembly for Drive end of Generator** | 1 |
| 24770 | Clamp Washer for Generator Clutch | 1 |
| 24828 | Screw for retaining Generator Clutch | 1 |
| 24829 | Lock Washer for Screw 24828 | 1 |
| 31399 | Screw for attaching Brush connecting Lead | 1 |
| 20495 | Lock Washer for Screw 31399 | 2 |
| 25762 | Insulated Plate for Generator Switch Arm (Short) | 1 |
| 32175 | Insulator for Switch Arm (Long) (Old Style) | 1 |
| 25960 | Contact for Generator Switch | 1 |
| 25961 | Support Plate for Switch Contact | 2 |
| 32257 | Bushing for Screw 26068 (Old Style) | 1 |
| 32169 | Locking Plate for Screw 26068 (Old Style) | 2 |
| 26068 | Screw for attaching Switch Contacts (Old Style) | 2 |
| 32921 | Bushing for Screw 21098 | 2 |
| 21098 | Screw for attaching Switch Contacts | 2 |
| 20790 | Plain Washer for Screw 21098 | 2 |
| 20393 | Lock Washer for Screw 21098 | 1 |
| 14732 | **Top Cover Assembly** (Includes the next 2 Items) | 1 |
| 32289 | Insulator for Top Cover | 2 |
| 24315 | Rivet for attaching Insulator 32289 | 1 |
| 32051 | Nut for attaching Top Cover Assembly (Old Style) (Used with Cover without Non-loseable Screw) | 1 |
| 20137 | Lock Washer for Nut 32051 | 1 |
| 27041 | Plain Washer for Nut 32051 | 1 |
| 32607 | Nut for attaching Top Cover Assembly (Used with Cover with Non-losable Screws) | 1 |
| 32608 | Plain Washer for Nut 32607 | 1 |
| 14731 | Cover Band Assembly (Includes next 3 Items) | 1 |
| 32796 | Clamp Spring for Cover Band | 1 |
| 32797 | Latch for Cover Band | 1 |
| 30212 | Pin for attaching Latch | 1 |
| 32013 | Cover Strap for Generator (Lower) | 2 |
| 32812 | Screw for attaching Strap 32013 | 2 |
| 26740 | Lock Washer for Screw 32812 | 1 |
| 31939 | Motor Terminal Clip | 3 |
| 26997 | Generator Terminal Clip (Open) | 3 |
| 23365 | Fibre Ferrule for Clip 26997 | 1 |
| 21656 | Clamp Clip for connecting Motor Generator | 1 |
| 23553 | Screw for Clamp Clip 31656 | 1 |
| 23277 | Lock Washer for Nut 23452 | 1 |
| 23452 | Nut for Screw 23553 | 1 |

# No. 1007 IGNITION SWITCH

Note: No. 1007 Ignition Switch superseded by No. 1009 Ignition Switch. When ordering a Complete new unit, order No. 1009)

(Not Illustrated)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1007 | **IGNITION SWITCH COMPLETE** | 1 |
| 12094 | **Cover Assembly Complete** | 1 |
| | (Includes the next 6 Items) | |
| 26477 | Cover for Cover Assembly 12094 | 1 |
| 26478 | Push Button for Cover 26477 | 1 |
| 24916 | Stud for Push Button 26478 | 1 |
| 24593 | Spring for Stud 24916 | 1 |
| 23578 | Name Plate for Cover 26477 | 1 |
| 25197 | Rivet for Name Plate 23578 | 2 |
| 14106 | **Frame Assembly (Service)** | 1 |
| | (Includes the next 7 Items) | |
| 25251 | Stud for mounting, Switch (Short) | 1 |
| 24657 | Stud for mounting Switch (Long) | 1 |
| 25187 | Spring Stud for Frame Assembly 14106 | 1 |
| 25277 | Stud for Retaining Cam 25276 | 1 |
| 25276 | Cam for Locking Switch | 1 |
| 24956 | Nut for retaining Screw 25370 | 4 |
| 25193 | Dowel Pin for retaining Stud 24657 | 1 |
| 24285 | Nut for Frame Assembly 14106 | 4 |
| 24809 | Plain Washer for Nut 24285 | 3 |
| 11529 | **Locking Plate Assembly** | 1 |
| | (Includes the next Item) | |
| 25349 | Spring Stud for Locking Plate Assembly 11529 | 1 |
| 24590 | Spring for Locking Plate Assembly 11529 | 1 |
| 11405 | **Key for locking Ignition Switch 1007** | 1 |
| 24808 | Screw for retaining Cover Assembly 12094 | 4 |
| 11253 | **Spring Terminal Assembly (Battery and Magneto)** | 2 |
| | (Includes the next 3 Items) | |
| 11437 | **Spring Terminal Assembly for Spring Terminal Assembly 11253** | 1 |
| 24833 | Terminal Post for Spring Terminal Assembly 11253 | 1 |
| 25191 | Dowel Pin for Spring Terminal Assembly 11253 | 1 |
| 11359 | **Spring Terminal Assembly (Center)** | 1 |
| | (Includes the next 3 Items) | |
| 11437 | **Spring Terminal Assembly for Spring Terminal Assembly 11359** | 1 |
| 14004 | **Terminal Post for Spring Terminal Assembly 11359** | 1 |
| 24614 | Dowel Pin for Spring Terminal Assembly 11359 | 1 |
| 11614 | **Contact Assembly for Push Button (Long)** | 1 |
| 11314 | **Contact Assembly (Long Contact for Battery)** | 1 |
| 11315 | **Contact Assembly (Short Contact for Battery)** | 1 |
| 11375 | **Contact Assembly (Outer Contact for Magneto)** | 1 |
| 11357 | **Contact Assembly (Inner Contact for Magneto)** | 1 |
| 25370 | Screw for retaining Contact Assemblies 11314, 11315, 11357 and 11375 | 4 |
| 25375 | Screw for retaining Contact Assembly 11614 | 2 |
| 24803 | Insulating Bushing for Screw 25375 | 2 |
| 24804 | Insulating Bushing for Screw 25370 | 4 |
| 24656 | Insulating Bushing for Lever Assembly 11155 | 2 |
| 11155 | **Lever Assembly** | 1 |
| 25162 | Plate for retaining Lever Assembly 11155 | 1 |
| 24867 | Screw for retaining Plate 25162 (Large) | 1 |
| 24957 | Screw for retaining Plate 25162 (Small) | 1 |
| 25255 | Plain Washer for Screw 24957 | 1 |
| 24598 | Connector for Contact Assemblies 11614 and 11315 | 1 |
| 24592 | Separator between Contact Assemblies 11314 and 11357 and Frame Assembly 11534 (Short) | 2 |
| 24837 | Insulator for Contact Assembly 11614 | 3 |
| 24658 | Insulator for Contact Assemblies 11314 and 11315 | 5 |
| 24838 | Insulator between Contact Assemblies 11357 and 11375 (Long) | 1 |
| 24897 | Insulating Washer for Screws 25370 and 25375 | 6 |
| 24954 | Insulating Plate for Ignition Switch Assembly 1007 | 1 |
| 24971 | Bushing for retaining Screw 25375 | 2 |
| 24591 | Separator between Contact Assemblies 11314 and 11357 and Frame Assembly 14106 | 2 |
| 24959 | Stop Screw for Locking Plate Assembly 11529 | 1 |

# No. 1009 IGNITION SWITCH

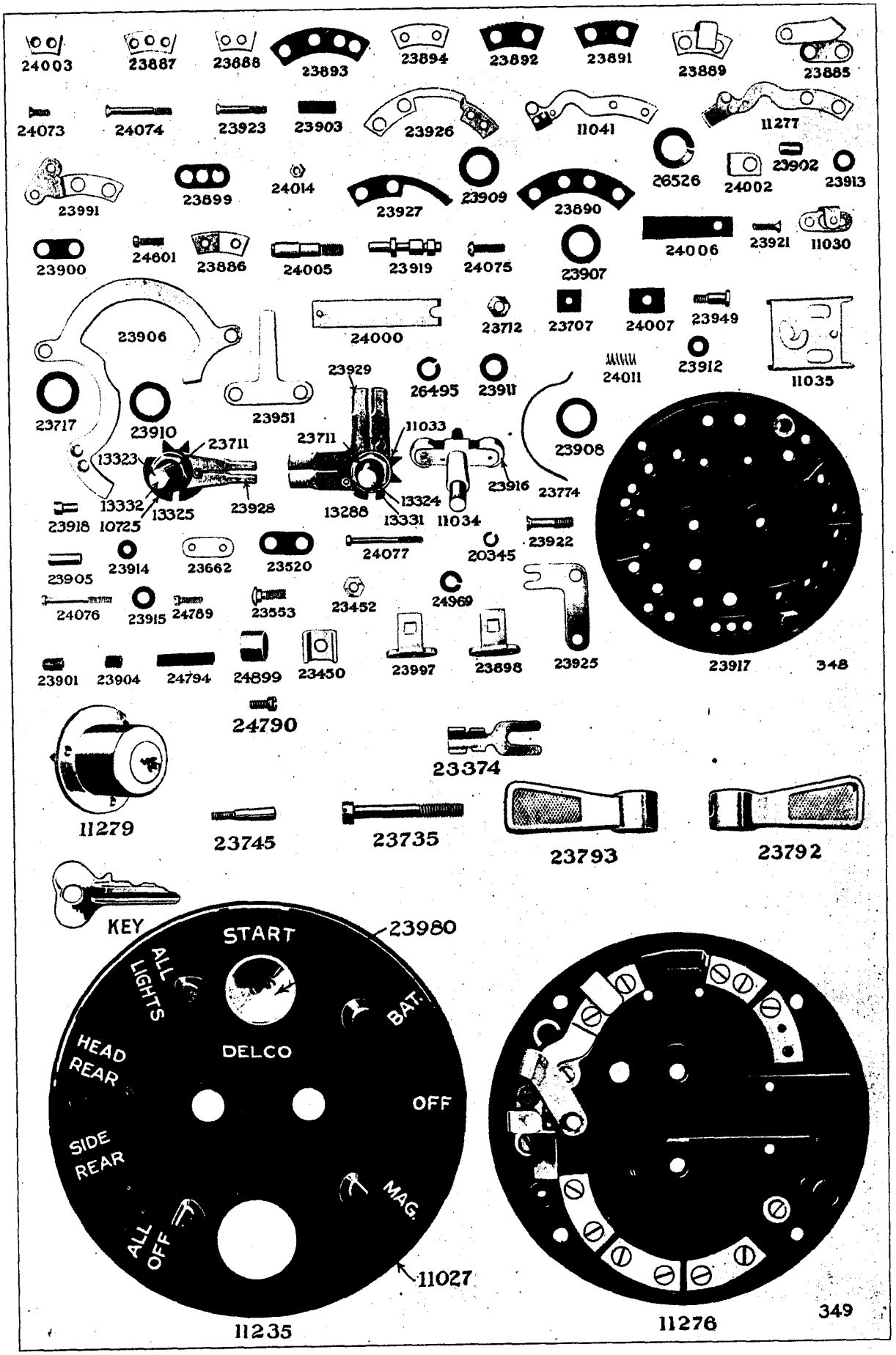
(Not Illustrated)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1009 | **IGNITION SWITCH COMPLETE** | 1 |
| 11506 | **Cover Assembly Complete** | 1 |
| | (Includes the next 6 Items) | |
| 26477 | Cover for Cover Assembly 11506 | 1 |
| 28166 | Push Button for Cover 26477 | 1 |
| 25200 | Stud for Push Button 28166 | 1 |
| 24593 | Spring for Stud 25200 | 1 |
| 23576 | Name Plate for Cover 26477 | 2 |
| 14107 | **Frame Assembly (Service)** | 1 |
| | (Includes the next 7 Items) | |
| 24786 | Stud for mounting Switch (Short) | 1 |
| 24759 | Stud for mounting Switch (Long) | 1 |
| 25193 | Pin for retaining Stud 24759 | 1 |
| 25187 | Spring Stud for Frame Assembly 14107 | 1 |
| 25277 | Stud for retaining Cam 25276 | 1 |
| 25276 | Cam for Locking Switch | 1 |
| 24956 | Nut for retaining Screw 25370 | 4 |
| 24285 | Nut for Frame Assembly 14107 | 3 |
| 24809 | Plain Washer for Nut 24285 | 2 |
| 11529 | **Locking Plate Assembly** | 1 |
| | (Includes the next Item) | |
| 25349 | Spring Stud for Locking Plate Assembly 11529 | 1 |
| 24590 | Spring for Locking Plate Assembly 11529 | 1 |
| 11405 | **Key for locking Ignition Switch 1009** | 1 |
| 24808 | Screw for retaining Cover Assembly 11506 | 4 |
| 11394 | **Terminal Asssembly (Center)** | 1 |
| 11437 | **Spring Terminal Assembly for Spring Terminal Assembly 11394** | 1 |
| | (Includes the next 3 Items) | |
| 25120 | Terminal Post for Spring Terminal Assembly 11394 | 1 |
| 24614 | Dowel Pin for Spring Terminal Assembly 11394 | 1 |
| 11253 | **Terminal Assembly (Magneto and Battery)** | 2 |
| | (Includes the next 3 Items) | |
| 11437 | **Spring Terminal Assembly for Spring Terminal Assembly 11253** | 1 |
| 24833 | Terminal Post for Spring Terminal Assembly 11253 | 1 |
| 25191 | Dowel Pin for Spring Terminal Assembly 11253 | 1 |
| 11504 | **Contact Assembly (Short Contact for Push Button)** | 1 |
| 11614 | **Contact Assembly (Long Contact for Push Button)** | 1 |
| 11592 | **Contact Assembly (Center Contact for Battery)** | 1 |
| 11315 | **Contact Assembly (Outer Contact for Battery)** | 1 |
| 11314 | **Contact Assembly (Inner Contact for Battery)** | 1 |
| 11357 | **Contact Assembly (Inner Contact for Magneto)** | 1 |
| 11375 | **Contact Assembly (Outer Contact for Magneto)** | 1 |
| 25370 | Screw for retaining Contact Assemblies 11357, 11375, 11314, 11315 and 11592 | 4 |
| 24968 | Insulating Bushing on Screw 25370 for Contact Assemblies 11375 and 11357 | 2 |
| 24805 | Insulating Bushing on Screw 25370 for Contact Assemblies 11314, 11315 and 11592 | 2 |
| 24971 | Bushing for retaining Screw 24810 | 2 |
| 24605 | Insulating Bushing for Screw 24810 | 2 |
| 24810 | Screw for retaining Contact Assemblies 11504 and 11614 | 2 |
| 11307 | **Spring Terminal Assembly for Frame Assembly 14107** | 1 |
| 24954 | Insulating Plate for Ignition Switch 1009 | 1 |
| 25162 | Plate for retaining Lever Assembly 11305 | 1 |
| 24867 | Screw for retaining Plate 25162 (Large) | 1 |
| 24957 | Screw for retaining Plate 25162 (Small) | 1 |
| 25255 | Plain Washer for Screw 24957 | 1 |
| 24959 | Stop Screw for Locking Plate Assembly 11529 | 1 |
| 24656 | Insulating Bushing for Lever Assembly 11305 | 2 |
| 24598 | Connector (Wide) | 1 |
| 24807 | Connector (Narrow) | 1 |
| 24837 | Insulator (Thick) | 3 |
| 24658 | Insulator (Thin) | 6 |
| 24838 | Insulator for Contact Assembly 11375 (Long) | 1 |
| 24603 | Insulator for Contact Assembly 11504 (Long) | 1 |
| 24591 | Separator for Contact Assemblies 11314 and 11357 | 2 |
| 24897 | Insulating Washer for Screws 25370 and 24810 | 6 |
| 11305 | **Lever Assembly** | 1 |

# No. 1018 IGNITION SWITCH

(Not Illustrated)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1018 | **IGNITION SWITCH COMPLETE** | 1 |
| 11542 | **Cover Assembly Complete** | 1 |
| | (Includes the next 6 Items) | |
| 25231 | Cover for Cover Assembly 11542 | 1 |
| 24644 | Push Button for Cover Assembly 11542 | 1 |
| 24916 | Stud for Push Button 24644 | 1 |
| 24593 | Spring for Stud 24916 | 1 |
| 23580 | Name Plate for Cover 25231 | 1 |
| 24304 | Rivet for Name Plate 23580 | 2 |
| 14107 | **Frame Assembly (Service)** | 1 |
| | (Includes the next 7 Items) | |
| 24786 | Stud for mounting Switch (Short) | 1 |
| 24759 | Stud for mounting Switch (Long) | 1 |
| 25193 | Pin for retaining Stud 24759 | 1 |
| 25187 | Spring Stud for Frame Assembly 14107 | 1 |
| 25277 | Stud for retaining Cam 25276 | 1 |
| 25276 | Cam for locking Switch | 1 |
| 24956 | Nut for retaining Screw 25370 | 4 |
| 24285 | Nut for Frame Assembly 14107 | 3 |
| 24809 | Plain Washer for Nut 24285 | 2 |
| 11529 | **Locking Plate Assembly** | 1 |
| | (Includes the next Item) | |
| 25349 | Spring Stud for Locking Plate Assembly 11529 | 1 |
| 24590 | Spring for Locking Plate Assembly 11529 | 1 |
| 11405 | **Key Assembly for locking Ignition Switch 1018** | 1 |
| 11359 | **Terminal Assembly (Short Contact for Push Button)** | 1 |
| | (Includes the next 3 Items) | |
| 11437 | **Spring Terminal Assembly for Spring Terminal Assembly 11359** | 1 |
| 14004 | **Terminal Post for Spring Terminal Assembly 11359** | 1 |
| 24614 | Dowel Pin for Spring Terminal Assembly 11359 | 1 |
| 11614 | **Contact Spring Assembly (Long Contact for Push Button)** | 1 |
| 24808 | Screw for retaining Cover Assembly 11542 | 4 |
| 24837 | Insulator between Terminal Assembly 11359 and Contact Spring Assembly 11614 | 2 |
| 24598 | Connector for Contact Spring Assembly 11614 and Contact Spring Assembly 11315 | 1 |
| 24897 | Plain Washer for Screw 25375 | 1 |
| 24658 | Insulating Plate for Screw 25375 | 1 |
| 24971 | Bushing for retaining Screw 25375 | 2 |
| 25375 | Screw for retaining Contact Spring Assembly 11614 | 1 |
| 11253 | **Spring Terminal Assembly (Outer)** | 2 |
| | (Includes the next 3 Items) | |
| 11437 | **Spring Terminal Assembly for Spring Terminal Assembly 11253** | 1 |
| 24833 | Terminal Post for Spring Terminal Assembly 11253 | 1 |
| 25191 | Dowel Pin for Spring Terminal Assembly 11253 | 1 |
| 11252 | **Spring Terminal Assembly (Inner)** | 1 |
| | (Includes the next 3 Items) | |
| 11437 | **Spring Terminal Assembly for Spring Terminal Assembly 11252** | 1 |
| 25378 | Terminal Post for Spring Terminal Assembly 11252 | 1 |
| 25191 | Dowel Pin for Spring Terminal Assembly 11252 | 1 |
| 11307 | **Spring Terminal Assembly for Frame Assembly 14107** | 1 |
| 11315 | **Contact Spring Assembly for Battery and Magneto (Short)** | 2 |
| 11314 | **Contact Spring Assembly for Battery and Magneto (Long)** | 2 |
| 25370 | Screw for retaining Contact Spring Assemblies 11314 and 11315 | 4 |
| 24805 | Insulating Bushing for Screw 25370 | 4 |
| 25162 | Plate for retaining Lever Assembly 11260 | 1 |
| 24867 | Screw for retaining Plate 25162 (Large) | 1 |
| 24957 | Screw for retaining Plate 25162 (Small) | 1 |
| 24656 | Insulating Bushing for Lever Assembly 11260 | 2 |
| 25255 | Plain Washer for Screw 24957 | 1 |
| 24591 | Separator for Contact Spring Assembly 11314 (Long) | 1 |
| 24592 | Separator for Contact Spring Assembly 11314 (Short) | 1 |
| 24959 | Stop Screw for Locking Plate Assembly 11529 | 1 |
| 24803 | Insulating Bushing for Screw 25375 | 2 |
| 25084 | Insulating Plate for Ignition Switch 1018 | 1 |
| 24897 | Plain Washer for Screw 25370 | 4 |
| 11260 | **Lever Assembly** | 1 |




No. 1035 COMBINATION SWITCH

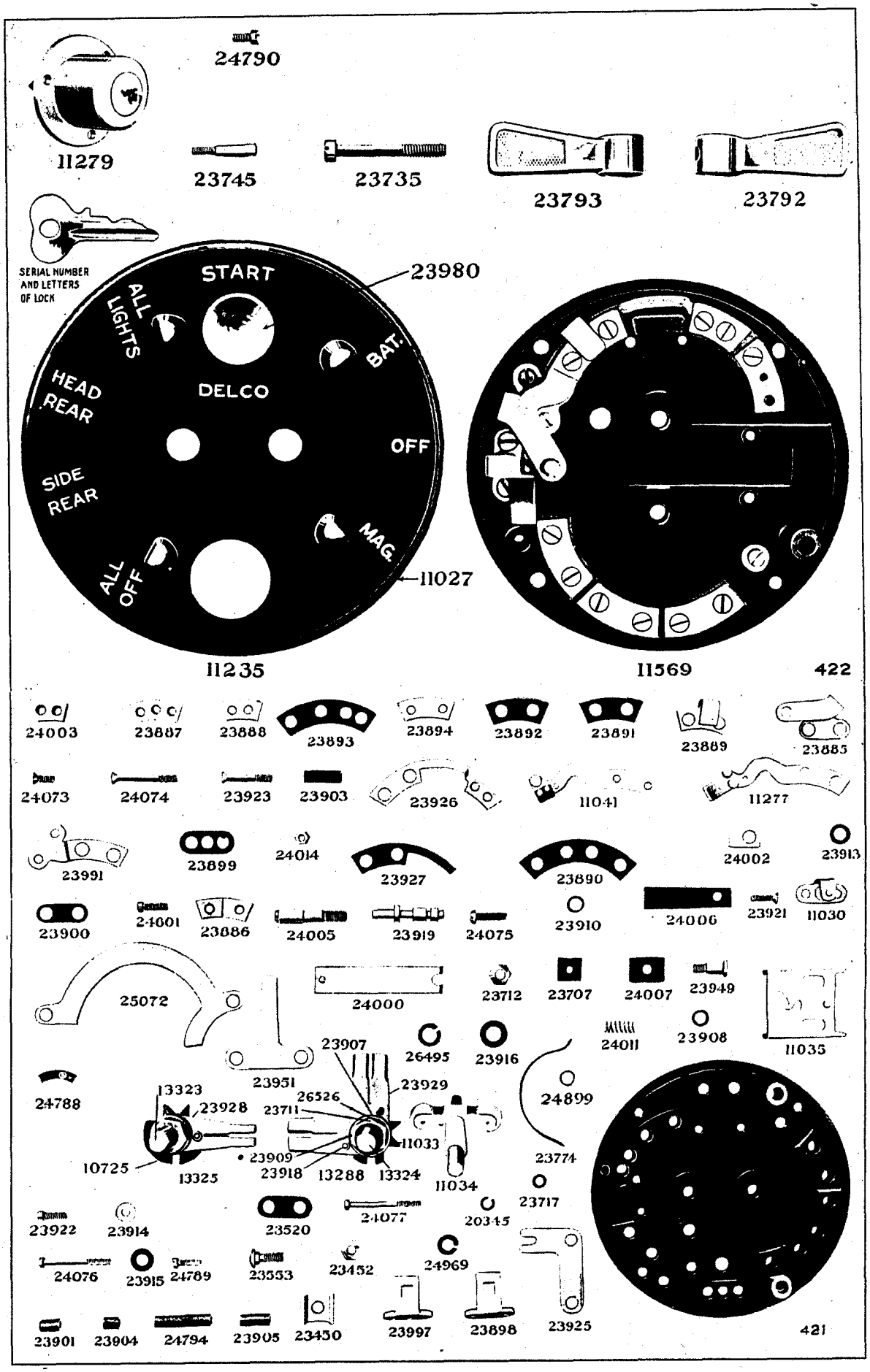
# No. 1035 COMBINATION SWITCH

(No. 1035 Combination Switch is superseded by No. 1040 Combination Switch. When ordering a complete new Switch order No. 1040.)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1035 | **COMBINATION SWITCH COMPLETE** | 1 |
| 11235 | **Housing Assembly Complete** (Includes the next 3 Items) | 1 |
| 11027 | **Housing Assembly** | 1 |
| 23980 | Push Button for Housing Assembly 11235 | 1 |
| 23979 | Screw Stud for Push Button 23980 (Not shown in Illustration) | 1 |
| 11279 | **Lock Assembly for locking Switch** (Includes the next Item) | 2 |
| 29958 | Key for Lock Assembly 11279 (Give Series No. of Lock) | 8 |
| 23374 | Terminal Clip for connecting Switch | 1 |
| 23917 | Mounting Plate for Switch | 7 |
| 23898 | Terminal Post for Terminals 1, 2, 3, 4, 6,7 and 8 | 8 |
| 23553 | Screw for retaining Clip 23450 | 8 |
| 23452 | Nut for Screw 23553 | 8 |
| 24969 | Lock Washer for Nut 23452 | 1 |
| 23450 | Clip for retaining Terminal Clip 23374 | 1 |
| 23997 | Terminal Post for Terminal Post No. 5 | 1 |
| 23991 | Connector for Terminal No. 8 and Contact Spring Assembly 11277 | 1 |
| 23662 | Plate for Blank Terminal | 1 |
| 11041 | **Contact Spring Assembly (Upper Contact Arm) for Starting Button** | 1 |
| 11277 | **Contact Spring Assembly (Lower Contact Arm) for Starting Button** | 1 |
| 23926 | Plate for connecting Terminals No. 5 and 6 | 1 |
| 23885 | Bracket for supporting Plunger 23919 | 1 |
| 11030 | **Contact Bracket Assembly for Starting Button** | 1 |
| 23919 | Plunger Stud for operating Contact Spring Assemblies 11041 and 11277 | 1 |
| 23894 | Contact Plate for connecting Terminals No. 2, 3 and 6 | 1 |
| 23886 | Plate for connecting Terminal No. 1 | 1 |
| 23887 | Plate for connecting Plate 23888 and Plate 23906 | 1 |
| 23888 | Plate for connecting Terminal No. 5 | 1 |
| 23889 | Plate for connecting Plate 23926 and Terminal No. 6 | 1 |
| 23927 | Insulating Plate under Plate 23926 | 1 |
| 23890 | Insulating Plate for Contact Plate 23894 for Terminals No. 2 and 3 | 2 |
| 23891 | Insulating Plate for Plates 23886 and 23894 | 2 |
| 23892 | Insulating Plate for Contact Spring Assembly 11041 (Thin) | 1 |
| 23893 | Insulating Plate for Plates 23887 and 23888 | 1 |
| 23900 | Insulator for Connector 23991 | 10 |
| 23520 | Insulating Plate for Terminal Post No. 1, 2, 3, 4, 6, 7, 8 | 1 |
| 23899 | Insulating Plate for Terminal Post No. 5 | 1 |
| 23901 | Insulating Bushing for Screw 24077 | 2 |
| 23902 | Insulating Bushing for Screw 23921 | 10 |
| 23903 | Insulating Bushing for Screw 23923 | 1 |
| 23904 | Insulating Bushing for Screw 23789 | 2 |
| 23905 | Insulating Bushing for Screw 23922 | 1 |
| 23912 | Plain Washer for Screw 23789 | 1 |
| 23911 | Insulating Washer for Screw 23789 | 10 |
| 23923 | Screw for retaining Terminals 1, 2, 3, 5, and 6 | 2 |
| 24601 | Screw for retaining Terminal No. 8 | 1 |
| 23922 | Screw for retaining Terminal No. 1 (Short Screw) | 1 |
| 24789 | Screw for retaining Terminal No. 4 (Short Screw) | 2 |
| 23921 | Screw for retaining Terminal No. 7 | 1 |
| 15454 | **Brush Assembly Complete (For Lighting)** (Includes the next 14 Items) | 1 |
| 13324 | **Stud Assembly** (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13324 (Not shown in Illustration) | 2 |
| 23929 | Contact Arm for Brush Assembly 15454 | 1 |
| 11033 | **Stop Disc Assembly** (Includes the next Item) | 1 |
| 23946 | Stud for Stop Disc Assembly 11033 (Not shown in Illustration) | 1 |
| 23918 | Insulating Bushing for Stop Disc Assembly 11033 | 1 |
| 24899 | Insulating Bushing for Stud Assembly 13324 | 1 |
| 23717 | Plain Washer for Stop Disc Assembly 11033 | 1 |
| 23910 | Insulating Washer for Stop Disc Assembly 11033 | 1 |
| 23711 | Nut for Clamping Brush Assembly 15454 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 23907 | Insulating Washer for Nut 23711 | 2 |
| 23908 | Plain Washer between Contact Arms 23929 | |

# No. 1035 COMBINATION SWITCH (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 15453 | **Brush Assembly Complete (For Ignition)** (Includes the next 14 Items) | 1 |
| 13323 | **Stud Assembly** (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13323 (Not shown in Illustration) | 1 |
| 23928 | Contact Arm for Brush Assembly 15453 | 2 |
| 10725 | **Stop Disc Assembly** (Includes the next Item) | 1 |
| 23946 | Stud for Stop Disc Assembly 10725 (Not shown in Illustration) | 1 |
| 23918 | Insulating Bushing for Stop Disc Assembly 10725 | 1 |
| 24899 | Insulating Bushing for Stud Assembly 13332 | 1 |
| 23717 | Plain Washer for Stop Disc Assembly 10725 | 1 |
| 23910 | Insulating Washer for Stop Disc Assembly 10725 | 1 |
| 23711 | Nut for clamping Brush Assembly 13323 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 23907 | Insulating Washer for Nut 23711 | 2 |
| 23908 | Plain Washer for Contact Arms 23928 | 2 |
| 24005 | Screw for retaining Brush Assemblies 15454 and 15453 | 2 |
| 23712 | Nut for Screw 24005 | 2 |
| 20495 | Lock Washer for Nut 23712 | 1 |
| 11034 | **Roller Arm Assembly** | 1 |
| 24002 | Contact Plate for Contact Spring Assembly 11277 | 1 |
| 23906 | Upper Contact Plate for Brush Assemblies 15453 and 15454 | 1 |
| 23925 | Plate for retaining Spring 23951 | 1 |
| 11035 | **Tumbler Assembly (Sliding Plate for Locking Switch)** (Includes the next Item) | 1 |
| 23938 | Pin for Tumbler Assembly 11035 (Not shown in Illustration) | 1 |
| 24000 | Slide (For Locking Plunger 23919) | 2 |
| 23774 | Tension Spring for Roller Arm Assembly 11034 | 1 |
| 23951 | Spring for operating Plunger 23919 | 1 |
| 24006 | Insulator Plate for Spring 23951 | 1 |
| 24007 | Insulator Plate for Tension Spring 23774 | 1 |
| 24003 | Spacing Plate between Plates 23906 and 23887 | 1 |
| 24011 | Spring for Tumbler Assembly 11035 | 1 |
| 24014 | Nut for Screw 24077 | 1 |
| 23707 | Nut for Screw 24075 | 1 |
| 24794 | Insulating Bushing for Screw 24076 | 1 |
| 23901 | Insulating Bushing for Screw 24601 | 4 |
| 24969 | Lock Washer for Screw 23735 | 1 |
| 20345 | Lock Washer for Nut 24014 | 2 |
| 23915 | Insulating Washer for Plates 23906 and 24007 | 1 |
| 23916 | Insulating Washer for Roller Arm Assembly 11034 | 1 |
| 23913 | Insulating Washer for Screw 24077 | 2 |
| 23914 | Plain Washer for Screws 24076 and 24077 | 2 |
| 23793 | Lever for operating Brush Assembly 15453 | 2 |
| 23745 | Screw for retaining Lever 23793 | 3 |
| 24790 | Screw for retaining Lock Assembly 11279 | 2 |
| 23949 | Screw for retaining Tumbler Assembly 11035 | 1 |
| 24077 | Screw for retaining Plates 23906 and 24002 | 1 |
| 24074 | Screw for connecting Plate 23906 and Blank Terminal (Long Screw) | 1 |
| 24076 | Screw for retaining Terminal No. 4 (Long Screw) | 1 |
| 24073 | Screw for retaining Plate 23906 (Short) | 1 |
| 24075 | Screw for retaining Tension Spring 23774 | 4 |
| 23735 | Screw for retaining Housing Assembly 11235 | |




No. 1042 COMBINATION SWITCH

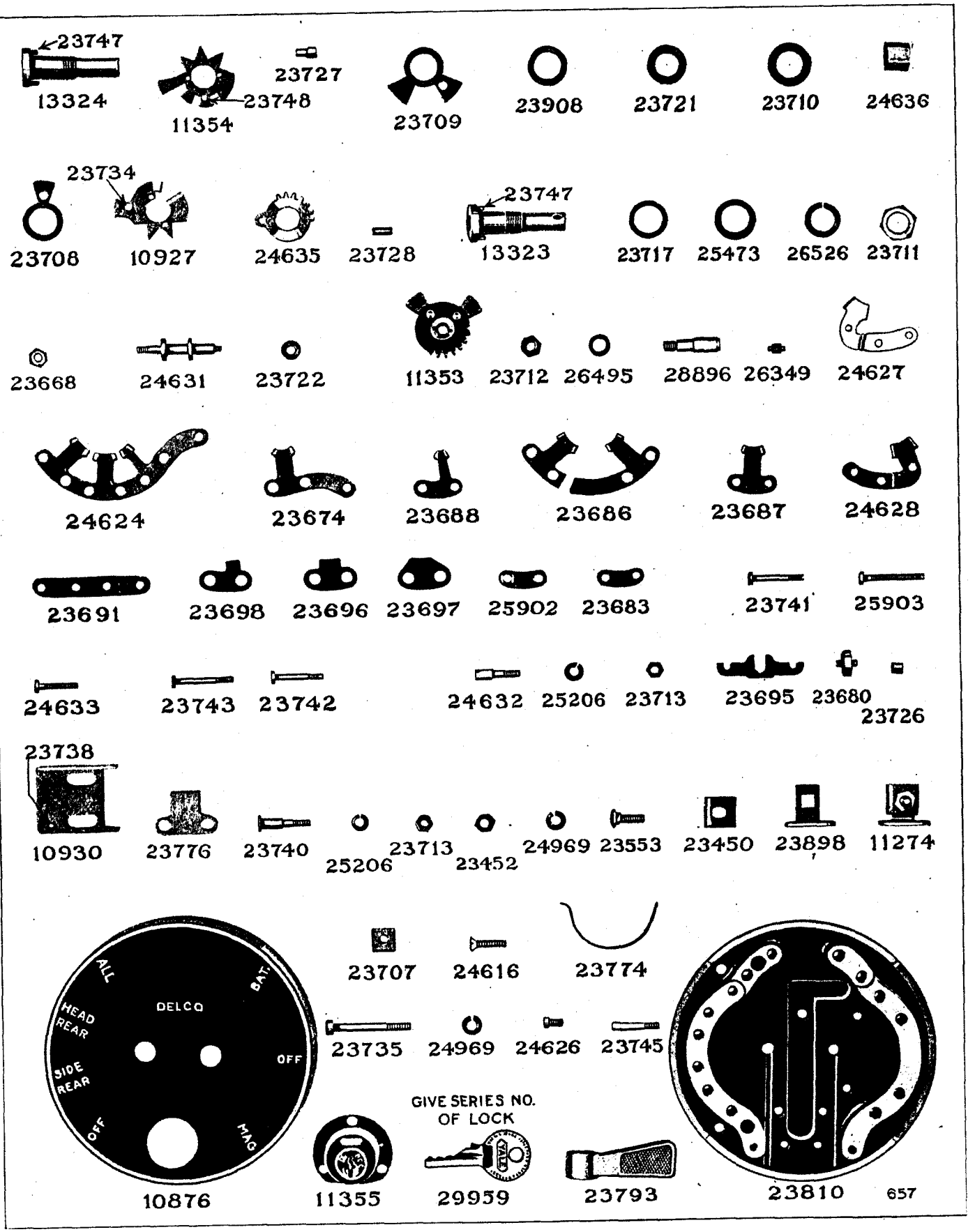
# No. 1042 COMBINATION SWITCH

(No. 1042 Combination Switch is superseded by No. 1040 Combination Switch. When ordering a complete new switch order No. 1040.

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1042 | **COMBINATION SWITCH COMPLETE** | 1 |
| 11235 | **Housing Assembly Complete** (Includes the next 3 Items) | 1 |
| 11027 | **Housing Assembly for Housing Assembly 11235** | 1 |
| 23980 | Push Button for Housing Assembly 11235 | 1 |
| 23979 | Screw Stud for Push Button 23980 (Not shown in Illustration) | 1 |
| 24952 | Mounting Plate for Mounting Assembly 11569 | 8 |
| 23898 | Terminal Post for Terminals 1, 2, 3, 4, 6, 7, 8 and 9 | 9 |
| 23553 | Screw for retaining Clip 23450 | 9 |
| 23452 | Nut for Screw 23553 | 9 |
| 20393 | Lock Washer for Nut 23452 | 9 |
| 23450 | Clip for retaining Terminal Clips to Combination Switch | 1 |
| 23997 | Terminal Post for Terminal Post No. 5 | 1 |
| 23991 | Connector for Terminal No. 8 and Contact Spring Assembly 11277 | 1 |
| 11041 | **Contact Spring Assembly (Upper Contact Arm for Starting Button)** | 1 |
| 11277 | **Contact Spring Assembly (Lower Contact Arm for Starting Button)** | 1 |
| 23926 | Plate connecting Terminals Nos 5 and 6 | 1 |
| 23885 | Bracket for supporting Plunger Stud 23919 | 1 |
| 11030 | **Contact Bracket Assembly for Starting Button** | 1 |
| 23919 | Plunger Stud for operating Contact Spring Assemblies 11041 and 11277 | 3 |
| 23894 | Plate for connecting Terminals Nos. 2, 3, and 6 | 1 |
| 23886 | Plate for connecting Terminal No. 1 | 1 |
| 23887 | Plate for connecting Plates 23888 and 23926 | 1 |
| 23888 | Plate for connecting Terminal No. 5 | 1 |
| 23889 | Plate for connecting Plate 23926 and Terminal No. 6 | 1 |
| 23927 | Insulating Plate under Plate 23926 | 2 |
| 23890 | Insulating Plate for Plate 23894 and Terminals Nos. 2 and 3 | 2 |
| 23891 | Insulating Plate for Plates 23886 and 23894 and Contact Spring Assembly 11041 (Thick) | 2 |
| 23892 | Insulating Plate for Contact Spring Assembly 11041 (Thin) | 1 |
| 23893 | Insulating Plate for Plates 23887 and 23888 | 1 |
| 23900 | Insulating Plate for Connector 23991 | 10 |
| 23520 | Insulating Plate for Terminal Post No. 1, 2, 3, 4, 6, 7, 8, 9 | 1 |
| 23899 | Insulating Plate for Terminal Post No. 5 | 3 |
| 23901 | Insulating Bushing for Screws 24077 and 24601 | 2 |
| 23902 | Insulating Bushing for Screw 23921 (Not shown in Illustration) | 10 |
| 23903 | Insulating Bushing for Screw 23923 | 1 |
| 23904 | Insulating Bushing for Screw 23789 | 2 |
| 23905 | Insulating Bushing for Screw 23922 | 1 |
| 23912 | Plain Washer for Screw 24789 (Not shown in Illustration) | 1 |
| 23911 | Insulating Washer for Screw 24789 (Not shown in Illustration) | 10 |
| 23923 | Screw for retaining Terminals Nos. 1, 2, 3, 6, and 5 | 2 |
| 24601 | Screw for retaining Terminal No. 8 | 1 |
| 23922 | Screw for retaining Terminal No. 1 (Short Screw) | 1 |
| 24789 | Screw for retaining Terminal No. 4 (Short Screw) | 2 |
| 23921 | Screw for retaining Terminal No. 7 | 1 |
| 15454 | **Brush Assembly Complete (For Lighting)** (Includes the next 14 Items) | 1 |
| 13324 | **Stud Assembly** (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13324 (Not shown in Illustration) | 2 |
| 23929 | Contact Arm for Brush Assembly 15454 (Includes the next Item) | 1 |
| 11033 | **Stop Disc Assembly** (Includes the next Item) | 1 |
| 23946 | Stud for Stop Disc Assembly 11033 (Not shown in Illustration) | 1 |
| 23918 | Insulating Bushing for Stop Disc Assembly 11033 | 1 |
| 24899 | Insulating Bushing for Stud Assembly 13324 | 1 |
| 23717 | Plain Washer for Stop Disc Assembly 11033 | 1 |
| 23910 | Insulating Washer for Stop Disc Assembly 11033 | 1 |
| 23711 | Nut for clamping Brush Assembly 13288 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 23907 | Insulating Washer for Nut 23711 | 2 |
| 23908 | Plain Washer for Contact Arm 23929 | 1 |
| 15453 | **Brush Assembly Complete (For Ignition)** (Includes the next 14 Items) | 1 |
| 13323 | **Stud Assembly** (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13323 (Not shown in Illustration) | 2 |
| 23928 | Contact Arm for Brush Assembly 15453 | |

# No. 1042 COMBINATION SWITCH (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 10725 | **Stop Disc Assembly** (Includes the next Item) | 1 |
| 23946 | Stud for Stop Disc Assembly 10725 (Not shown in Illustration) | 1 |
| 23918 | Insulating Bushing for Stop Disc Assembly 10725 | 1 |
| 24899 | Insulating Bushnig for Stud Assembly 13323 (Not shown in Illustration) | 1 |
| 23717 | Plain Washer for Stop Disc Assembly 10725 | 1 |
| 23910 | Insulating Washer for Stop Disc Assembly 10725 | 1 |
| 23711 | Nut for clamping Brush Assembly 15453 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 23908 | Plain Washer for Contact Arm 13928 | 2 |
| 23907 | Insulating Washer for Nut 23711 | 1 |
| 24005 | Screw for retaining Brush Assemblies 15453 and 15454 | 2 |
| 23712 | Nut for Screw 24005 | 2 |
| 20495 | Lock Washer for Nut 23712 | 2 |
| 23913 | Insulating Washer for Screw 24077 | 1 |
| 23914 | Plain Washer for Screws 24076 and 24077 | 1 |
| 23793 | Lever for operating Brush Assembly 15453 | 2 |
| 23745 | Screw for retaining Lever 23793 | 2 |
| 24788 | Segment for Terminal No. 5 (Upper) | 1 |
| 11279 | **Lock Assembly for connecting Switch** (Includes the next Item) | 1 |
| 29958 | Key for Lock Assembly 11279 (Give Series No. of Lock) | 2 |
| 24790 | Screw for retaining Lock ssembly 11279 | 3 |
| 24077 | Screw for retaining Plate 24002 and Segment 24788 | 1 |
| 24074 | Screw for retaining Terminal No. 9 (Long Screw) | 1 |
| 24076 | Screw for retaining Terminal No. 4 (Long Screw) | 1 |
| 24073 | Screw for retaining Plate 25072 (Short Screw) | 1 |
| 24075 | Screw for retaining Spring 23774 | 1 |
| 23735 | Screw for retaining Housing Assembly 11235 | 4 |
| 11034 | **Roller Arm Assembly** | 1 |
| 24002 | Contact Plate for Contact Spring Assembly 11277 | 1 |
| 25072 | Upper Contact Plate for Brush Assembly 13288 | 1 |
| 23925 | Plate for retaining Spring 23951 | 1 |
| 11035 | **Tumbler Assembly for Locking Switch** (Includes the next Item) | 1 |
| 23938 | Pin for Tumbler Assembly 11035 (Not shown in Illustration) | 1 |
| 24000 | Slide (For locking Push Button) | 1 |
| 23774 | Tension Spring for Roller Arm Assembly 11034 | 2 |
| 23951 | Spring for operating Plunger Stud 23919 | 1 |
| 24006 | Insulating Plate for Spring 23774 | 1 |
| 24007 | Insulating Plate for Tension Spring 23774 | 1 |
| 24003 | Spacing Plate between Plate 23887 and Segment 24788 | 1 |
| 24011 | Spring for Tumbler Assembly 11035 | 1 |
| 24014 | Nut for Screw 24077 | 1 |
| 23707 | Nut for Screw 24075 | 1 |
| 24794 | Insulating Bushing for Screw 24076 | 1 |
| 20393 | Lock Washer for Screw 23735 | 2 |
| 20345 | Lock Washer for Nut 24014 | 1 |
| 23916 | Insulating Washer for Roller Arm Assembly 11034 | 1 |
| 23915 | Insulating Washer for Plates 25072 and 24007 | 2 |
| 23949 | Screw for retaining Tumbler Assembly 11035 | 2 |



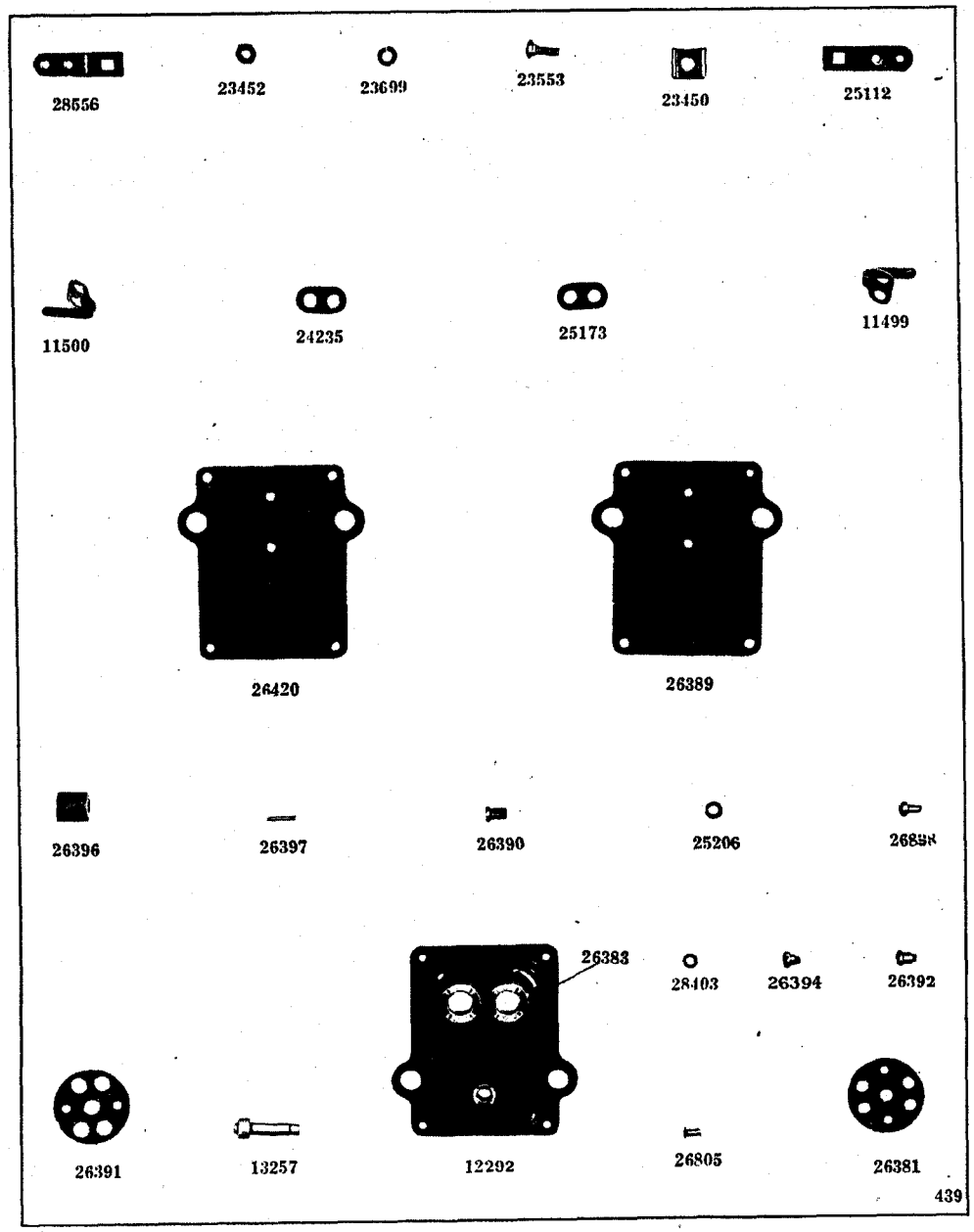

No. 1045 COMBINATION SWITCH

# No. 1045 COMBINATION SWITCH

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1045 | **COMBINATION SWITCH COMPLETE** | 1 |
| 10876 | **Housing Assembly** | 1 |
| 10930 | **Tumbler Assembly for locking Switch** (Includes the next Item) | 1 |
| 23738 | Stud for Tumbler Assembly 10930 | 2 |
| 23740 | Screw for retaining Tumbler Assembly 10930 | 1 |
| 23776 | Spring for retaining Tumbler Assembly 10930 | 5 |
| 23713 | Nut for Screws 23740, 24632 and Stud 24631 | 5 |
| 25206 | Lock Washer for Nut 23713 | 2 |
| 24632 | Stop Screw for Blade Assemblies 13326 and 13327 | 1 |
| 11353 | **Gear Wheel Assembly** | 3 |
| 23668 | Nut for retaining Gear Wheel Assembly 11353 and Screw 23742 | 1 |
| 23722 | Plain Washer for Nut 23668 | 1 |
| 23695 | Retainer for Roller 23680 | 2 |
| 23680 | Roller for Blade Assemblies 13326 and 13327 | 1 |
| 24631 | Stud for Retainer 23695 | 1 |
| 11355 | **Lock Assembly** (Includes the next Item) | 2 |
| 29959 | Key for Lock Assembly 11355 (Give Series No. of Lock) | 3 |
| 24626 | Screw for retaining Lock Assembly 11355 | 4 |
| 23735 | Screw for retaining Housing Assembly 10876 | 4 |
| 20393 | Lock Washer for Screw 23735 | 2 |
| 23793 | Lever for operating Blade Assemblies 13326 and 13327 | 2 |
| 23745 | Screw for retaining Lever 23793 | 2 |
| 28896 | Stud for retaining Blade Assemblies 13326 and 13327 | 2 |
| 23712 | Nut for Stud 28896 | 2 |
| 20495 | Lock Washer for Nut 23712 | 8 |
| 23898 | Terminal Post for Terminal Post | 8 |
| 23553 | Screw for retaining Clip 23450 | 8 |
| 23452 | Nut for Screw 23553 | 8 |
| 20393 | Lock Washer for Nut 23452 | 8 |
| 23450 | Clip for retaining Terminal Clip 23774 | 10 |
| 23743 | Screw for retaining Terminals Nos. 1, 2, 3, 5 and 6 | 10 |
| 23726 | Insulating Bushing for Screw 23743 | 1 |
| 23691 | Plate under Terminal No. 4 | 2 |
| 23742 | Screw for retaining Plate 23691 | 1 |
| 24616 | Screw for retaining Spring 23774 | 2 |
| 23774 | Spring for Retainer 23695 | 1 |
| 23707 | Nut for Screw 24616 | 1 |
| 23683 | Plate for retaining Screw 23741 | 2 |
| 23741 | Screw for retaining Terminal No. 4 | 2 |
| 25903 | Screw for retaining Brush 24628 | 1 |
| 24628 | Brush for Terminal No. 7 | 1 |
| 24627 | Brush for Terminal No. 8 | 1 |
| 26349 | Insulating Stud for Brushes 24627 and 24628 | 1 |
| 23810 | Mounting Plate for Terminal Post | |
| 23686 | Brush for Terminals Nos. 5 and 6 (Upper for Terminal No. 5 and Lower for Terminal No. 6) | 1 |
| 23674 | Brush for Terminal No. 5 (Lower) | 1 |
| 23687 | Brush for Terminals Nos. 2, 3 and 6 (Upper) | 3 |
| 23688 | Brush for Terminal No. 1 (Upper) | 1 |
| 24624 | Brush for Terminals Nos. 1, 2 and 3 (Lower) | 1 |
| 23698 | Insulating Plate for Terminal No. 1 | 1 |
| 23697 | Insulating Plate for Terminal No. 6 (Lower) | 4 |
| 23696 | Insulating Plate for Terminals Nos. 2, 3 and 5 | 2 |
| 25902 | Spacing Plate for Brush 24628 | 2 |
| 24633 | Screw for retaining Brush 24627 | 1 |
| 13326 | **Blade Assembly Complete (For Ignition)** (Includes the next 13 Items) | 1 |
| 13323 | **Stud Assembly** (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13323 | 1 |
| 10927 | **Stop Disc Assembly** (Includes the next Item) | 1 |
| 23734 | Stud for Stop Disc Assembly 10927 | 1 |
| 24635 | Gear for Blade Assembly 13326 | 1 |
| 23711 | Nut for Clamping Blade Assembly 13326 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23708 | Blade for Blade Assembly 13326 | 2 |
| 23710 | Insulating Washer for Blade 23708 | 2 |
| 23717 | Plain Washer for Stop Disc Assembly 10927 (Thick) | 2 |
| 25473 | Plain Washer for Gear 24635 (Thin) | |

# No. 1045 COMBINATION SWITCH (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 24636 | Insulating Bushing for Stud Assembly 13323 | 1 |
| 23728 | Insulating Bushing for Stop Disc Assembly 10927 | 1 |
| 13327 | **Blade Assembly Complete (For Lighting)** (Includes the next 14 Items) | 1 |
| 13324 | **Stud Assembly** (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13324 | 1 |
| 11354 | **Stop Wheel Assembly** (Includes the next Item) | 1 |
| 23748 | Stud for Stop Wheel Assembly 11354 | 1 |
| 23727 | Insulating Bushing for Stop Wheel Assembly 11354 | 1 |
| 23737 | Insulating Bushing for Stud Assembly 13324 (Not shown in Illustration) | 1 |
| 23711 | Nut for Clamping Blade Assembly 13327 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23721 | Plain Washer for Nut 23711 (Thick) | 1 |
| 23710 | Insulating Washer for Blade 23709 | 2 |
| 23717 | Plain Washer for Stop Wheel Assembly 11354 (Thick) | 2 |
| 25473 | Plain Washer for Stop Wheel Assembly 11354 (Thin) | 2 |
| 23709 | Blade for Blade Assembly 13327 | 1 |
| 23908 | Plain Washer for Nut 23711 (Thin) | 1 |
| 23375 | Terminal Clip for connecting Switch (Large) (Not shown in Illustration) | 2 |
| 23374 | Terminal Clip for connecting Switch (Small) (Not shown in Illustration) | 6 |




# No. 1061 AUTO HORN SWITCH

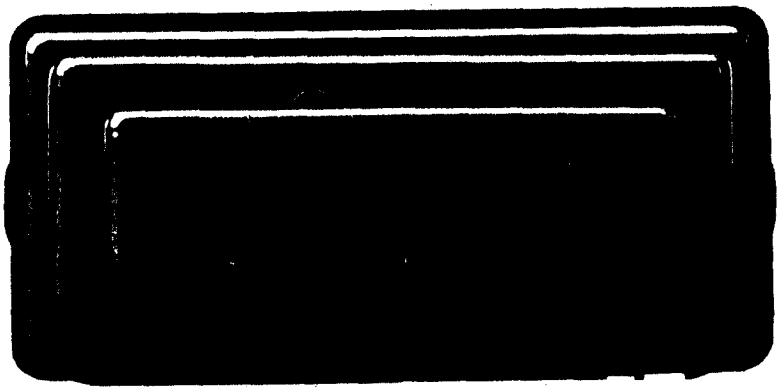
# No. 1061 AUTO HORN SWITCH

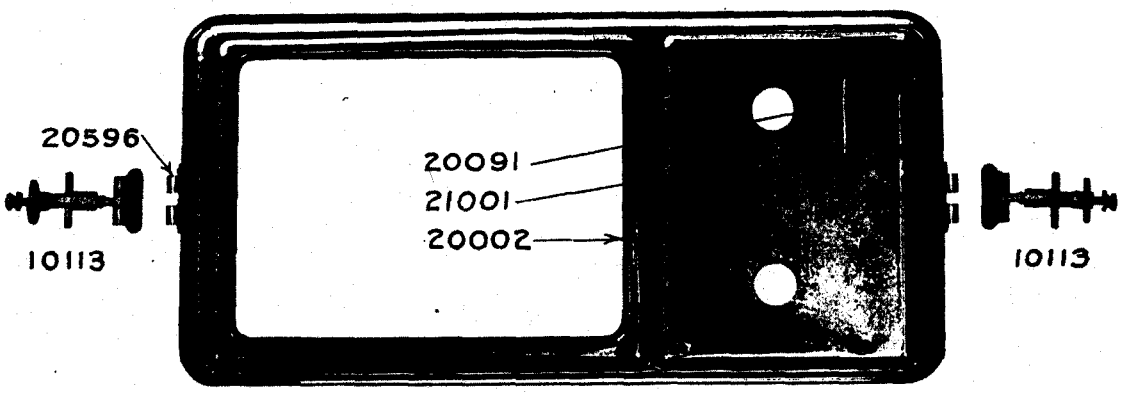
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1061 | **AUTO HORN SWITCH COMPLETE** | 1 |
| 14110 | **Cover Assembly Complete (Service)** (Includes the next 6 Items) | 1 |
| 12292 | **Cover Assembly** (Includes the next 2 Items) | 2 |
| | Bushing for Plunger Assembly 13257 (Not shown in Illustration) | 2 |
| 26963 | Hub for Cover Assembly 14110 | 1 |
| 26383 | **Plunger Assembly** | 1 |
| 13257 | Cap for Plunger Assembly 13257 | 1 |
| 26396 | Pin for retaining Cap 26396 | 4 |
| 26397 | Screw for retaining Cover Assembly 12292 | 4 |
| 26898 | Lock Washer for Screw 26898 | 1 |
| 25206 | | |
| 12077 | **Base Assembly Complete** (Includes the next 25 Items) | 1 |
| | Base for Base Assembly 12077 | 1 |
| 26420 | Insulator for Base 26393 | 1 |
| 26389 | Insulator (Thick) (Round) | 1 |
| 26391 | Insulator (Thin) (Round) | 1 |
| 26381 | Stud Stop for Contact Spring Assembly 11500 | 2 |
| 26390 | Screw for attaching Terminal Assembly 12076 | 2 |
| 26394 | Screw for attaching Terminal Assembly 13095 | 1 |
| 26392 | | |
| 12076 | **Terminal Assembly Complete (Crooked Terminal)** (Includes the next 5 Items) | 1 |
| | Terminal for Terminal Assembly 12076 | 1 |
| 28556 | Clip for retaining Terminal Clip 23374 | 1 |
| 23450 | Screw for retaining Clip 23450 | 1 |
| 23553 | Nut for Screw 23553 | 1 |
| 23452 | Lock Washer for Nut 23452 | 1 |
| 23699 | | |
| 11507 | **Terminal Assembly Complete (Straight Terminal)** (Includes the next 5 Items) | 1 |
| | Terminal for Terminal Assembly 11507 | 1 |
| 25112 | Clip for retaining Terminal Clip 23374 | 1 |
| 23450 | Screw for retaining Clip 23450 | 1 |
| 23553 | Nut for Screw 23553 | 1 |
| 23452 | Lock Washer for Nut 23452 | 1 |
| 23699 | Insulator for Contact Spring Assembly 11499 (Lower) | 1 |
| 24235 | Insulator for Contact Spring Assembly 11499 (Upper) | 1 |
| 25173 | **Contact Spring Assembly (Lower Contact)** | 1 |
| 11500 | **Contact Spring Assembly (Upper Contact)** | 2 |
| 11499 | Rivet for retaining Insulators 26391 and 26381 | 2 |
| 26805 | Washer for Rivet 26805 (Not shown in Illustration) | 2 |
| 28403 | Terminal Clip for connecting Switch | |
| 23374 | | |

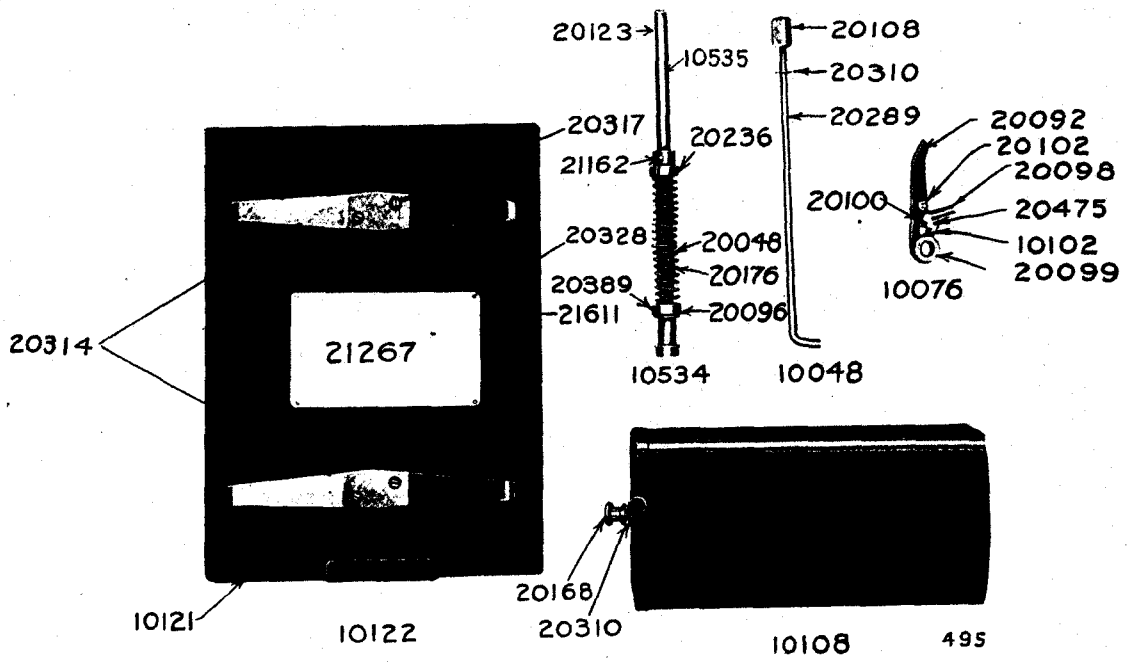



423

# No. 1062 COMBINATION SWITCH



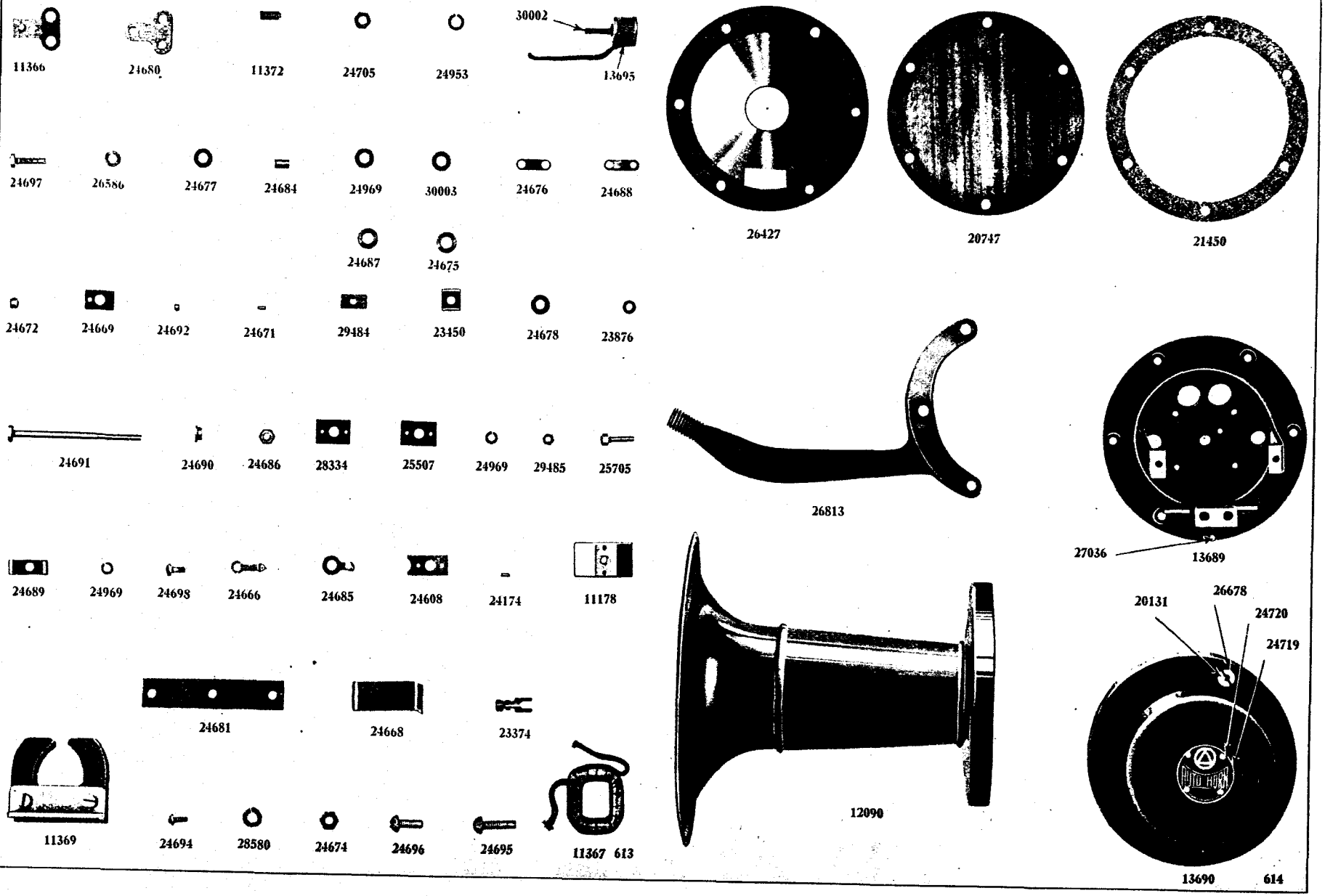




No. 5401 BATTERY BOX

# No. 5312 AUTO HORN

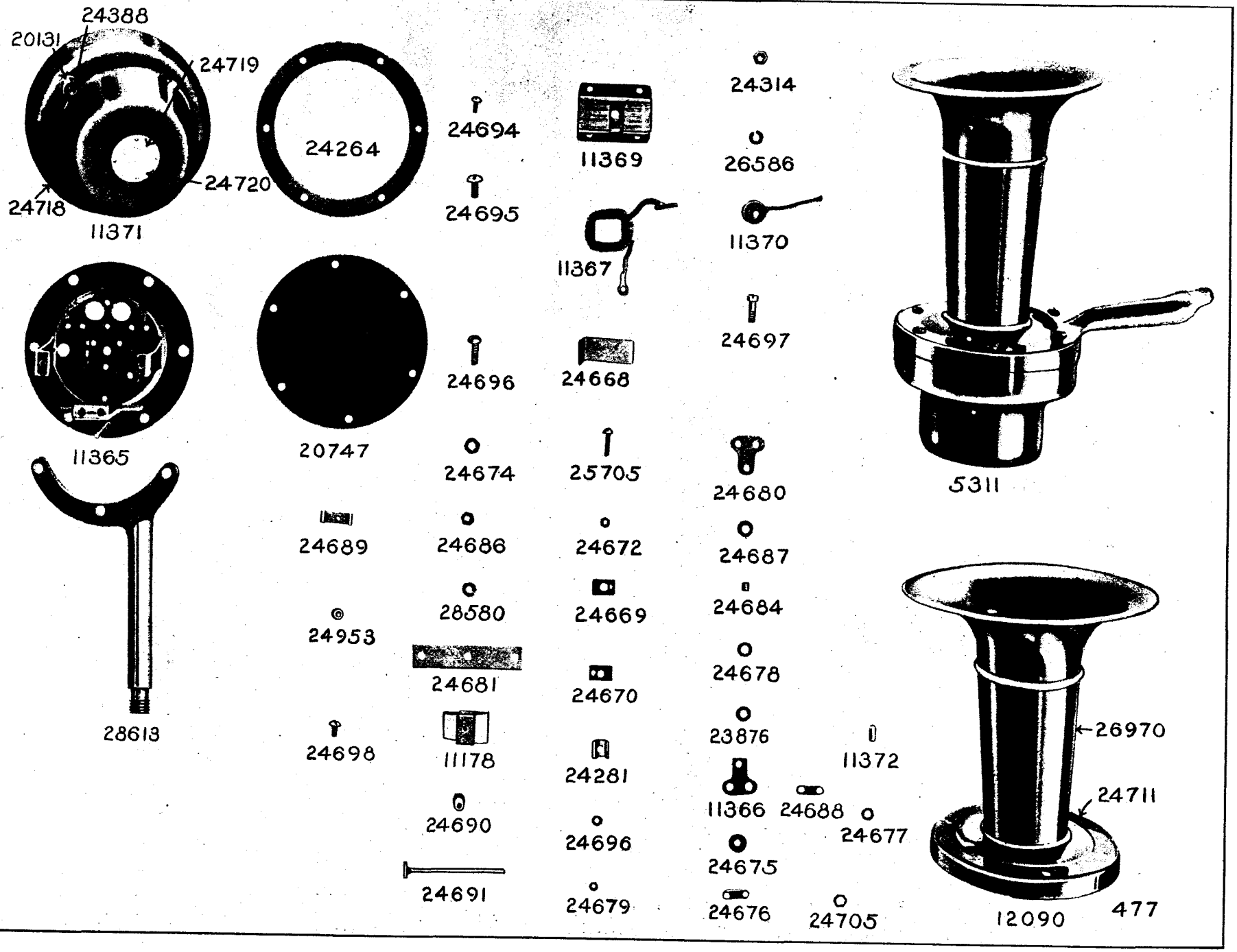
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5312 | **AUTO HORN ASSEMBLY** | 1 |
| 13690 | **Shell Assembly Complete** | 1 |
| | (Includes the next 5 Items) | |
| 24719 | Name Plate for Shell Assembly 13690 | 1 |
| 26838 | Rivet for attaching Name Plate 24719 | 4 |
| 26678 | Thumb Nut for retaining Shell Assembly 13690 | 1 |
| 20131 | Lock Washer for Thumb Nut 26678 | 1 |
| 24389 | Plain Washer for retaining Thumb Nut 26678 (Not shown in Illustration) | 1 |
| 12090 | **Horn Assembly Complete (Front)** | 1 |
| 28613 | Bracket for connecting Auto Horn | 1 |
| 26427 | Protector for Diaphragm | 1 |
| 11367 | **Coil Assembly for Horn** | 1 |
| 13689 | **Housing Assembly for Horn** | 1 |
| | (Includes the next Item) | |
| 27036 | Stud for retaining Shell Assembly 13690 | 1 |
| 12140 | **Contact Spring Assembly (Lower Contact)** | 1 |
| 11369 | **Core Assembly for Coil Assembly 11367** | 1 |
| 11372 | **Contact Screw Assembly** | 1 |
| 24705 | Nut for Contact Screw Assembly 11372 | 1 |
| 24953 | Lock Washer for Nut 24705 | 1 |
| 11178 | **Armature Assembly Complete** | 1 |
| | (Includes the next Item) | |
| 24174 | Pin for Armature 24158 | 2 |
| 13695 | **Resistance Coil Assembly for Horn** | 1 |
| 29777 | Screw for Resistance Coil Assembly 13695 | 1 |
| 24969 | Lock Washer for Screw 29777 | 1 |
| 30003 | Plain Washer for Screw 29777 | 1 |
| 26586 | Lock Washer for Nuts 24686 and Screw 24697 | 3 |
| 24666 | Clip connecting Coil Assembly 11367 to Screw 25705 and Resistance Coil Assembly 13695 | 4 |
| 24668 | Retainer for Coil Assembly 11367 | 1 |
| 24669 | Insulator for Terminal Base 29484 and Clip 24666 | 4 |
| 29484 | Terminal Base for retaining Terminal Clip 23374 | 2 |
| 24671 | Pin for Terminal Base 29484 | 2 |
| 24672 | Bushing for Screw 25705 | 1 |
| 25705 | Screw for retaining Terminal Clamp 24281 and Clip 24666 | 1 |
| 23450 | Terminal Clamp for retaining Terminal Clip 23374 | 2 |
| 29485 | Nut for retaining Screw 25705 and Resistance Coil 13695 | 2 |
| 24969 | Lock Washer for Nut 29485 and Screws 25705 and 24698 | 6 |
| 28580 | Lock Washer for Nut 24674 | 6 |
| 24674 | Nut for Screws 24695 and 24696 | 6 |
| 24695 | Screw for retaining Horn Assembly 12090 (Short) | 3 |
| 24696 | Screw for retaining Horn Assembly 12090 (Long) | 3 |
| 24675 | Plain Washer for Contact Spring Assembly 11366 (Thin) | 2 |
| 24687 | Spacing Washer for Contact Spring Assembly 11365 (Thick) | 2 |
| 24678 | Plain Washer for Contact Spring Assembly 11366 (Thick) | 2 |
| 24677 | Insulating Washer for Contact Spring Assembly 11366 | 2 |
| 24680 | Terminal Plate for retaining Contact | 1 |
| 24697 | Screw for retaining Plate 24680 and Contact Spring Assembly 11366 | 2 |
| 24688 | Block for retaining Screw 24697 | 1 |
| 24676 | Insulating Plate for Block 24688 | 2 |
| 24681 | Spring Plate for operating Armature Assembly 11178 | 6 |
| 28334 | Insulator for Stop Plate 24608 (Lower) | 1 |
| 25507 | Insulator for Stop Plate 24608 (Upper) | 1 |
| 24608 | Stop Plate for operating Contact Spring Assembly 11366 | 1 |
| 24684 | Insulator Bushing for Screw 24697 | 2 |
| 24685 | Clip for connecting Coil Assembly 11367 and Contact Spring Assembly 11366 | 1 |
| 24686 | Nut for Tapper 24691 | 1 |
| 24691 | Tapper for operating Diaphragm 20747 | 1 |
| 20747 | Diaphragm for Horn Assembly 12090 | 1 |
| 21450 | Insulating Ring for Diaphragm 20747 (Narrow) | 1 |
| 24264 | Insulating Ring for Diaphragm 20747 (Wide) (Not shown in Illustration) | 1 |
| 24689 | Clip for retaining Spring Plate 24681 | 2 |
| 24690 | Bushing for Tapper 24691 | 1 |
| 24692 | Bushing for Terminal Base 24670 | 1 |
| 23876 | Plain Washer for Screw 25705 | 1 |
| 24694 | Screw for retaining Core Assembly 11369 | 4 |
| 24698 | Screw for retaining Spring Plate 24681 | 2 |
| 23374 | Terminal Clip for connecting Auto Horn 5312 | 1 |

# No. 5312 AUTO HORN



# No. 5311 AUTO HORN

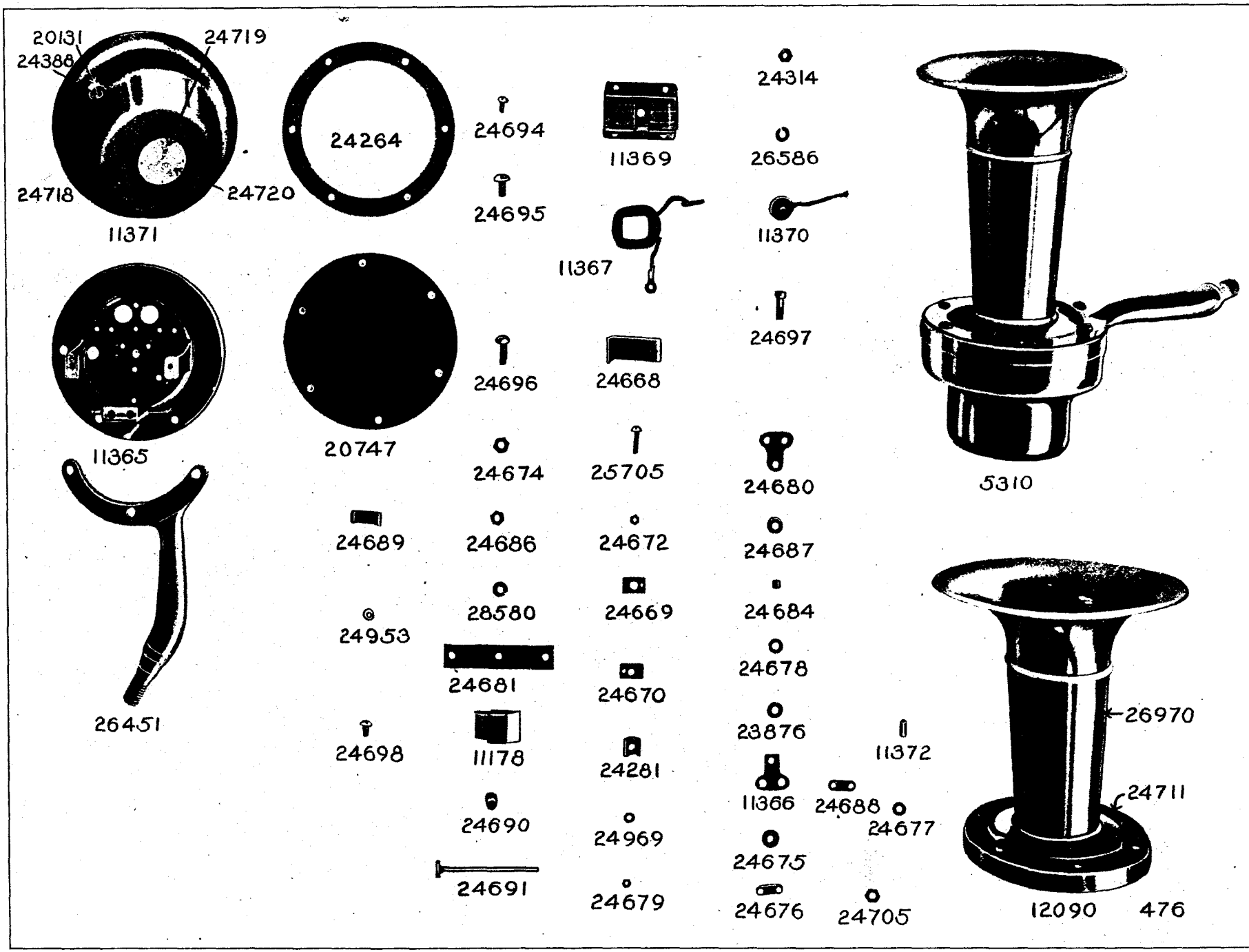
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5311 | **AUTO HORN COMPLETE** | 1 |
| 11371 | **Shell Assembly Complete** | 1 |
| | (Includes the next 5 Items) | |
| 24719 | Name Plate for Shell Assembly 11371 | 1 |
| 26838 | Rivet for Name Plate 24719 (Not shown in Illustration) | 4 |
| 26678 | Thumb Nut for Shell Assembly 11371 (Not shown in Illustration) | 1 |
| 20131 | Lock Washer for Thumb Nut 26678 (Not shown in Illustration) | 1 |
| 24389 | Plain Washer for retaining Thumb Nut 26678 | 1 |
| 12090 | **Horn Assembly Complete (Front)** | 1 |
| 28613 | Bracket for connecting Horn Assembly | 1 |
| 26427 | Protector for Diaphragm 20747 (Not shown in Illustration) | 1 |
| 11367 | **Coil Assembly** | 1 |
| 24668 | Retainer for Coil Assembly 11367 | 1 |
| 13689 | **Housing Assembly** | 1 |
| | (Includes the next Item) | |
| 27036 | Stud for retaining Shell Assembly 11371 (Not shown in Illustration) | 1 |
| 11366 | **Contact Spring Assembly (Lower Contact)** | 1 |
| 12140 | **Core Assembly for Coil Assembly 11367** | 4 |
| 24694 | Screw for retaining Core Assembly 12140 | 1 |
| 11372 | **Contact Screw Assembly (Upper Contact)** | 1 |
| 24705 | Nut for Contact Screw Assembly 11372 | 1 |
| 24953 | Lock Washer for Nut 24705 | 1 |
| 11178 | **Armature Assembly Complete** | 1 |
| | (Includes the next Item) | |
| 24174 | Pin for Armature Assembly 11178 (Not shown in Illustration) | 1 |
| 11370 | **Resistance Coil Assembly** | 1 |
| 24314 | Nut for retaining Resistance Coil Assembly 11370 | 4 |
| 26586 | Lock Washer for Nuts 24314, 24686 and Screw 24697 | 1 |
| 24666 | Clip for connecting Coil Assembly 11367 and Screw 25705 (Not shown in Illustration) | 2 |
| 24669 | Insulator for Terminal Base 24670 and Clip 24666 | 1 |
| 29484 | Terminal Base for retaining Terminal Clip 23374 (Not shown in Illustration) | 1 |
| 24671 | Pin for Terminal Base 29484 (Not shown in Illustration) | 1 |
| 24672 | Bushing for Screw 25705 | 1 |
| 25705 | Screw for retaining Terminal Clamp 24281 and Clip 24666 | 1 |
| 23450 | Terminal Clamp for retaining Terminal Clip 23374 (Not shown in Illustration) | 1 |
| 29485 | Nut for Screw 25705 (Not shown in Illustration) | 4 |
| 24969 | Lock Washer for Nut 29485 and Screws 25705 and 24698 (Not shown in Illustration) | 6 |
| 28580 | Lock Washer for Nut 24674 | 6 |
| 24674 | Nut for Screws 24695 and 24696 | 3 |
| 24695 | Screw for retaining Horn Assembly 12090 (Short) | 3 |
| 24696 | Screw for retaining Horn Assembly 12090 (Long) | 1 |
| 24675 | Plain Washer for Contact Spring Assembly 11366 (Thin) | 2 |
| 24687 | Spacing Washer for Contact Spring Assembly 11366 (Thick) | 2 |
| 24678 | Plain Washer for Contact Spring Assembly 11366 (Thick) | 2 |
| 24677 | Insulating Washer for Contact Spring Assembly 11366 | 1 |
| 24680 | Terminal Plate for retaining Contact and Nut Assembly 13494 | 2 |
| 24697 | Screw for retaining Terminal Plate 24698 and Contact Spring Assembly 11366 | 1 |
| 24688 | Plate for retaining Screw 24697 | 2 |
| 24676 | Insulating Plate for Plate 24688 | 1 |
| 27036 | Stud for retaining Shell Assembly 11371 (Not shown in Illustration) | 6 |
| 24681 | Spring Plate for operating Armature Assembly 11178 | 1 |
| 28334 | Insulator for Stop Plate 24608 (Lower) (Not shown in Illustration) | 1 |
| 25507 | Insulator for Stop Plate 24608 (Upper) (Not shown in Illustration) | 1 |
| 24608 | Stop Plate for operating Contact Spring Assembly 11366 (Not shown in Illustration) | 2 |
| 24684 | Insulating Bushing for Screw 24697 | 1 |
| 24685 | Clip for connecting Coil Assembly 11367 and Spring Terminal Assembly 11366 (Not shown in Illustration) | 1 |
| 24686 | Nut for Tapper 24691 | 1 |
| 24691 | Tapper for operating Diaphragm 20747 | 1 |
| 20747 | Diaphragm for Horn Assembly 12090 next to Housing Assembly 13689 | 1 |
| 21450 | Insulating Ring for Diaphragm 20747 (Narrow) (Not shown in Illustration) | 1 |
| 24264 | Insulating Ring for Diaphragm 20747 (Wide) | 2 |
| 24689 | Clip for retaining Spring Plate 24681 | 1 |
| 24690 | Bushing for Tapper 24691 | 1 |
| 24692 | Bushing for Terminal Base 24670 (Not shown in Illustration) | 1 |
| 23876 | Plain Washer for Screw 25705 | 2 |
| 24698 | Screw for retaining Spring Terminal 24681 | 1 |
| 23374 | Terminal Clip for connecting Auto Horn 5311 (Not shown in Illustration) | |


24388
20131
24719
24720
24718
11371
24264
24694
24695
11369
24314
26586
11370
11367
24697
24696
24668
11365
20747
24674
25705
24680
5311
24689
24686
24672
24687
24953
28580
24669
24684
24681
24670
24678
28613
24698
11178
24281
23876
11372
24690
11366
24688
24677
24696
24675
24691
24679
24676
24705
26970
24711
12090
477

# No. 5310 AUTO HORN

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5310 | **AUTO HORN COMPLETE** | 1 |
| 11371 | **Shell Assembly Complete** (Includes the next 5 Items) | 1 |
| 24719 | Name Plate for Shell Assembly 11371 | 1 |
| 26838 | Rivet for Name Plate 24719 (Not shown in Illustration) | 1 |
| 26678 | Thumb Nut for Shell Assembly 11371 | 4 |
| 20131 | Lock Washer for Thumb Nut 26678 | 1 |
| 24389 | Plain Washer for retaining Thumb Nut 26678 (Not shown in Illustration) | 1 |
| 12090 | **Horn Assembly Complete (Front)** | 1 |
| 26451 | Bracket for connecting Auto Horn | 1 |
| 26427 | Projector for Diaphragm 20747 (Not shown in Illustration) | 1 |
| 11367 | **Coil Assembly** | 1 |
| 13689 | **Housing Assembly** (Includes the next Item) | 1 |
| 27036 | Stud for retaining Shell Assembly 11371 (Not shown in Illustration) | 1 |
| 11366 | **Contact Spring Assembly (Lower Contact)** | 1 |
| 12140 | **Core Assembly for Coil Assembly 11367** | 1 |
| 11372 | **Contact Screw Assembly (Upper Contact)** | 1 |
| 24705 | Nut for Contact Screw Assembly 11372 | 1 |
| 24953 | Lock Washer for Nut 24705 | 1 |
| 11178 | **Armature Assembly Complete** (Includes the next Item) | 1 |
| 24174 | Pin for Armature Assembly 11178 (Not shown in Illustration) | 2 |
| 11370 | **Resistance Coil Assembly** | 1 |
| 24314 | Nut for retaining Resistance Assembly 11370 | 1 |
| 26586 | Lock Washer for Nuts 24314, 24686 and Screw 24697 | 4 |
| 24666 | Clip for connecting Coil Assembly 11367 and Screw 25705 (Not shown in Illustration) | 1 |
| 24668 | Retainer for Coil Assembly 11367 | 1 |
| 24669 | Insulator for Terminal Base 24670 and Clip 24666 | 2 |
| 29484 | Terminal Base for retaining Terminal Clip 23374 (Not shown in Illustration) | 1 |
| 24671 | Pin for Terminal Base 29484 (Not shown in Illustration) | 1 |
| 24672 | Bushing for Screw 25705 | 1 |
| 25705 | Screw for retaining Clamp 24281 and Clip 24666 | 1 |
| 23450 | Terminal Clamp for retaining Terminal Clip 23374 (Not shown in Illustration) | 1 |
| 29485 | Nut for Screw 25705 (Not shown in Illustration) | 1 |
| 20393 | Lock Washer for Nut 29485 and Screws 25705 and 24698 | 4 |
| 28580 | Lock Washer for Nut 24674 | 6 |
| 24674 | Nut for Screws 24695 and 24696 | 6 |
| 24695 | Screw for retaining Horn Assembly 12090 (Short) | 3 |
| 24696 | Screw for retaining Horn Assembly 12090 (Long) | 3 |
| 24675 | Plain Washer for Contact Spring Assembly (Thin) | 1 |
| 24687 | Spacing Washer for Contact Spring Assembly 11366 (Thick) | 2 |
| 24678 | Plain Washer for Contact Spring Assembly 11366 (Thick) | 2 |
| 24677 | Insulating Washer for Contact Spring Assembly 11366 | 2 |
| 24680 | Terminal Plate for retaining Contact Nut Assembly 13494 | 1 |
| 24697 | Screw for retaining Terminal Plate 24680 and Contact Spring Assembly 11366 | 2 |
| 24688 | Block for retaining Screw 24697 | 1 |
| 24676 | Insulating Plate for Block 24688 | 2 |
| 27036 | Stud for retaining Shell Assembly 11371 (Not shown in Illustration) | 1 |
| 24681 | Spring Plate for operating Armature Assembly 11178 | 6 |
| 28334 | Insulator for Stop Plate 24608 (Lower) (Not shown in Illustration) | 1 |
| 25507 | Insulator for Stop Plate 24608 (Upper) (Not shown in Illustration) | 1 |
| 24608 | Stop Plate for operating Contact Spring Assembly 11366 (Not shown in Illustration) | 1 |
| 24684 | Insulating Bushing for Screw 24697 | 2 |
| 24685 | Clip for connecting Coil Assembly 11367 and Contact Spring Assembly 11366 (Not shown in Illustration) | 1 |
| 24686 | Nut for Tapper 24691 | 1 |
| 24691 | Tapper for operating Diaphragm 20747 | 1 |
| 20747 | Diaphragm for Horn Assembly 12090 between Horn Assembly 12090 and Housing Assembly 11365 | 1 |
| 21450 | Insulating Ring for Diaphragm 20747 (Narrow) (Not shown in Illustration) | 1 |
| 24264 | Insulating Ring for Diaphragm 20747 (Wide) | 1 |
| 24689 | Clip for retaining Spring Plate 24681 | 2 |
| 24690 | Bushing for Tapper 24691 | 1 |
| 24692 | Bushing for Terminal Base 24670 (Not shown in Illustration) | 1 |
| 23876 | Plain Washer for Screw 25705 | 1 |
| 24694 | Screw for retaining Core Assembly 11369 | 4 |
| 24698 | Screw for retaining Spring Plate 24681 | 2 |
| 23374 | Terminal Clip for connecting Horn 5310 (Not shown in Illustration) | 1 |

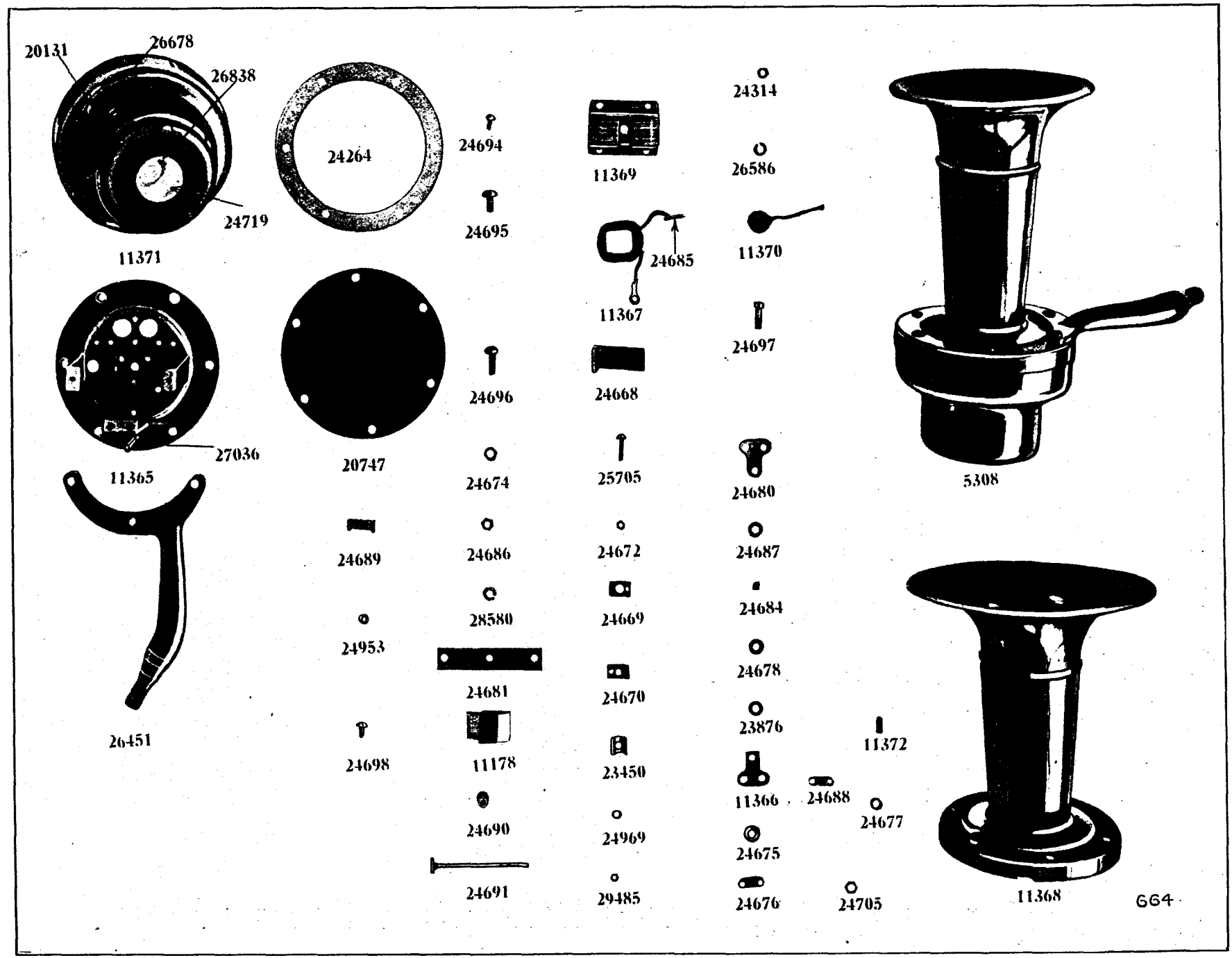
# No. 5310 AUTO HORN



# No. 5308 AUTO HORN

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5308 | **AUTO HORN COMPLETE** | 1 |
| 11371 | **Shell Assembly Complete** (Includes the next 5 Items) | 1 |
| 24719 | Name Plate for Shell Assembly 11371 | 1 |
| 26838 | Rivet for Name Plate 24719 | 4 |
| 26678 | Thumb Nut for Shell Assembly 11371 | 1 |
| 20131 | Lock Nut for Thumb Nut 26678 | 1 |
| 24389 | Plain Washer for retaining Thumb Nut 26678 (Not shown in Illustration) | 1 |
| 11368 | **Horn Assembly Complete (Front)** | 1 |
| 26451 | Bracket for connecting Auto Horn Assembly | 1 |
| 11367 | **Coil Assembly** | 1 |
| 13689 | **Housing Assembly** (Includes the next Item) | 1 |
| 27036 | Stud for retaining Shell Assembly 11371 | 1 |
| 11366 | **Contact Spring Assembly (Lower Contact)** | 1 |
| 12140 | **Core Assembly for Coil Assembly 11367** | 1 |
| 11372 | **Contact Screw Assembly (Upper Contact)** | 1 |
| 24705 | Nut for Contact Screw Assembly 11372 | 1 |
| 24953 | Lock Washer for Nut 24705 | 1 |
| 11178 | **Armature Assembly Complete** (Includes the next Item) | 1 |
| 24174 | Pin for Armature Assembly 11178 (Not shown in Illustration) | 1 |
| 11370 | **Resistance Coil Assembly** | 1 |
| 24314 | Nut for retaining Resistance Coil Assembly 11370 | 1 |
| 26586 | Lock Washer for Nuts 24314 and 24686 and Screw 24697 | 4 |
| 24666 | Clip for connecting Coil Assembly 11367 and Screw 25705 (Not shown in Illustration) | 1 |
| 24668 | Retainer for Coil Assembly 11367 | 1 |
| 24669 | Insulator for Terminal Base 24670 and Clip 24666 | 2 |
| 29484 | Terminal Base for retaining Terminal Clip 23374 (Not shown in Illustration) | 1 |
| 24671 | Pin for Terminal Base 29484 (Not shown in Illustration) | 1 |
| 24672 | Bushing for Screw 25705 | 1 |
| 25705 | Screw for retaining Terminal Clamp 23450 and Clip 24666 | 1 |
| 23450 | Terminal Clamp for retaining Terminal Clip 23374 | 1 |
| 29485 | Nut for Screw 25705 | 1 |
| 20393 | Lock Washer for Nut 29485 and Screws 25705 and 24698 | 4 |
| 28580 | Lock Washer for Nut 24674 | 7 |
| 24674 | Nut for Screws 24695 and 24696 | 6 |
| 24695 | Screw for retaining Horn Assembly 11368 (Short) | 3 |
| 24696 | Screw for retaining Horn Assembly 11368 (Long) | 3 |
| 24675 | Plain Washer for Contact Spring Assembly 11366 (Thin) | 1 |
| 24687 | Spacing Washer for Contact Spring Assembly 11366 (Thick) | 2 |
| 24678 | Plain Washer for Contact Spring Assembly 11366 (Thick) | 2 |
| 24677 | Insulating Washer for Contact Spring Assembly 11366 | 2 |
| 24680 | Terminal Plate for retaining Contact and Nut Assembly 13494 | 1 |
| 24697 | Screw for retaining Terminal Plate 24680 and Contact Spring Assembly 11366 | 2 |
| 24688 | Block for retaining Screw 24697 | 1 |
| 24676 | Insulating Plate for Block 24688 | 2 |
| 27036 | Stud for retaining Shell Assembly 11371 | 1 |
| 24681 | Spring Plate for Operating Armature Assembly 11178 | 6 |
| 28334 | Insulator for Stop Plate 24608 (Lower) | 1 |
| 25507 | Insulator for Stop Plate 24608 (Upper) (Not shown in Illustration) | 1 |
| 24608 | Stop Plate for Operating Contact Spring Assembly 11366 (Not shown in Illustration) | 1 |
| 24684 | Insulating Bushing for Screw 24697 | 2 |
| 24685 | Clip for connecting Coil Assembly 11367 and Spring Terminal Assembly 11366 | 1 |
| 24686 | Nut for Tapper 24691 | 1 |
| 24691 | Tapper for Operating Diaphragm 20747 | 1 |
| 20747 | Diaphragm for Horn Assembly 11368 between Horn Assembly 11368 and Housing Assembly 11365 | 1 |
| 21450 | Insulating Ring for Diaphragm 20747 (Narrow) (Not shown in Illustration) | 1 |
| 24264 | Insulating Ring for Diaphragm 20747 (Wide) | 1 |
| 24689 | Clip for retaining Spring Plate 24681 | 2 |
| 24690 | Bushing for Tapper 24691 | 1 |
| 24692 | Bushing for Terminal Base 24670 (Not shown in Illustration) | 1 |
| 23876 | Plain Washer for Screw 25705 | 1 |
| 24694 | Screw for retaining Core Assembly 12140 | 4 |
| 24698 | Screw for retaining Spring Plate 24681 | 2 |
| 23374 | Terminal Clip for connecting Auto Horn 5308 (Not shown in Illustration) | 1 |

# No. 5308 AUTO HORN

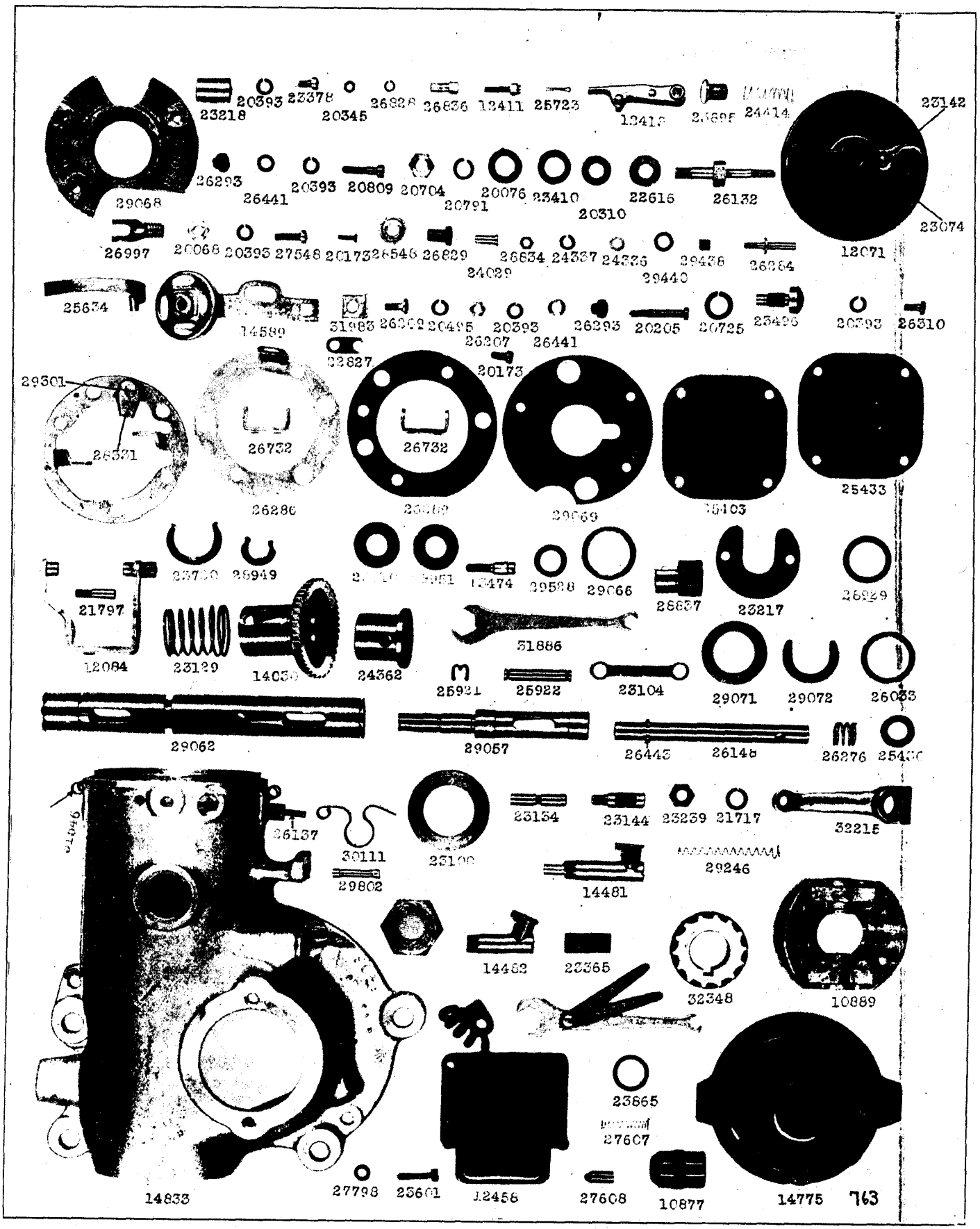


# No. 5206 DISTRIBUTOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 26209 | Screw for retaining Clip 31983 | 1 |
| 20393 | Lock Washer for Nut 26207 | 1 |
| 31983 | Clip for retaining Terminal Clip 26997 | 1 |
| 26207 | Nut for Screw 26209 | 1 |
| 12458 | **Condenser Assembly Complete** | 1 |
| | (Includes the next 2 Items) | 1 |
| 23601 | Screw for attaching Condenser Assembly 12458 | 4 |
| 27798 | Bushing for Screw 23601 | 4 |
| 12084 | **Advance Yoke Assembly for Distributor** | 1 |
| 26148 | Shaft for Advance | 1 |
| 32215 | Advance Lever for Shaft 26148 | 1 |
| 26443 | Clip for retaining Spring 26276 | 1 |
| 23144 | Screw for Advance Lever 32215 | 1 |
| 23239 | Nut for Screw 23144 | 1 |
| 21717 | Lock Washer for Nut 23239 | 1 |
| 20205 | Screw for attaching Plate Assembly 13514 (Long) | 2 |
| 20393 | Lock Washer for Screw 20205 | 2 |
| 26293 | Insulating Bushing for Screw 20205 | 2 |
| 26441 | Plain Washer for Screw 20205 | 2 |
| 29072 | Clip for retaining Bearing (Lower) | 1 |
| 26033 | Plain Washer above Clip 29072 | 1 |
| 12413 | **Contact Arm Assembly for Distributor** | 2 |
| 25723 | Cotter Pin for retaining Contact Arm Assembly | 2 |
| 25634 | Spring for Contact Arm Assembly 12413 | 2 |
| 28548 | Plain Washer for Nut 26208 | 1 |
| 26132 | Stud for mounting Resistance Unit | 1 |
| 22616 | Plain Washer for Stud 26132 (Outer) | 1 |
| 20068 | Nut for retaining Resistance Unit | 1 |
| 20495 | Lock Washer for Nut 26208 | 1 |
| 20076 | Insulating Washer for Stud 26132 (Outer) | 1 |
| 22738 | Insulating Bushing for Stud 26132 (Not shown in Illustration) | 1 |
| 23410 | Insulating Washer for Nut 20704 | 1 |
| 20310 | Plain Washer for Nut 20704 | 1 |
| 20791 | Lock Washer for Nut 20704 | 1 |
| 20704 | Nut for Stud 26132 (Inner) | 1 |
| 28837 | Cam for operating Contact Arm Assembly | 1 |
| 13474 | **Screw Assembly for retaining Cam 28837** | 1 |
| 21797 | Screw for Advance Yoke Assembly 12084 | 1 |
| 25430 | Felt Washer for Advance Shaft 26148 | 1 |
| 26276 | Spring for Advance Shaft 26148 | 1 |
| 26829 | Insulating Bushing for Resistance Unit | 1 |
| 14482 | **Oiler Assembly for Distributor (Upper)** | 1 |
| 14481 | **Oiler Assembly for Distributor (Lower)** | 1 |
| 29074 | Wick for Oiler Assembly 14481 (Not shown in Illustration) | 1 |
| 29246 | Spring for Wick 29074 | 1 |
| 12071 | **Distributor Rotor Assembly Complete** | 1 |
| | (Includes the next 4 Items) | 1 |
| 23074 | Connector for Distributor Rotor Assembly 12071 (Old Style) | 1 |
| 26803 | Screw for retaining Connector 23074 (Old Style) | 1 |
| 23895 | Brush for Rotor Assembly 12071 | 1 |
| 24414 | Spring for Brush 23895 | 1 |
| 25405 | Cover Plate for Housing Assembly (Lower) | 1 |
| 25433 | Gasket for Cover Plate 25405 | 1 |
| 26310 | Screw for attaching Cover Plate 25405 | 4 |
| 20393 | Lock Washer for Screw 26310 | 4 |
| 26997 | Terminal Clip for connecting Distributor | 1 |
| 23365 | Fibre Ferrule for Terminal Clip | 1 |
| 10877 | **High Tension Terminal Assembly No. Blank** | 1 |
| 10878 | **High Tension Terminal Assembly No. 1** | 1 |
| 10879 | **High Tension Terminal Assembly No. 2** | 1 |
| 10880 | **High Tension Terminal Assembly No. 3** | 1 |
| 10881 | **High Tension Terminal Assembly No. 4** | 1 |
| 10882 | **High Tension Terminal Assembly No. 5** | 1 |
| 10883 | **High Tension Terminal Assembly No. 6** | 1 |
| 10884 | **High Tension Terminal Assembly No. 7** | 1 |
| 10885 | **High Tension Terminal Assembly No. 8** | 1 |
| 23865 | Rubber Washer for High Tension Terminal Assemblies | 9 |
| 14775 | **Distributor Head Assembly Complete** | 1 |
| | (Includes the next 2 Items) | |
| 27608 | Plunger for Distributor Head Assembly 14775 | 1 |
| 27607 | Spring for Plunger 27608 | 1 |
| 12741 | **Distributor Wrench Assembly (With Gauge)** | 1 |
| 31886 | Distributor Wrench (Plain) | 1 |
| 32348 | Spiral Gear for Driving Spiral Gear 26151 | 1 |

# No. 5206 DISTRIBUTOR

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5206 | **DISTRIBUTOR** | 1 |
| 14833 | **Distributor Housing Assembly** | 1 |
| | (Includes the next 9 Items) | |
| 31546 | Clip for retaining Clamp 30111 | 1 |
| 30111 | Clamp for retaining Distributor Head | 1 |
| 29802 | Pin for retaining Clamp 30111 | 1 |
| 25049 | Rivet for retaining Clip 31546 (Not shown in Illustration) | 3 |
| 26137 | Stud for resistance Unit Guide | 1 |
| 32532 | Name Plate for Distributor (Not shown in Illustration) | 1 |
| 32821 | Pin for retaining Name Plate 32532 (Not shown in Illustration) | 2 |
| 12075 | **Breather Nut Assembly Complete** | 1 |
| 32957 | Bearing for Distributor Housing | 1 |
| 26732 | Stop for Advance Yoke Assembly | 1 |
| 20173 | Screw for retaining Stop 26732 | 2 |
| 22827 | Lock Plate for Screw 20173 | 1 |
| 13511 | **Inner Shaft and Bearing Assembly Complete** | 1 |
| | (Includes the next 3 Items) | |
| 13342 | **Ball Bearing Assembly for Distributor (Upper) (Not shown in Illustration)** | 1 |
| 29057 | Inner Shaft for Distributor | 1 |
| 29066 | Plain Washer for Ball Bearing Assembly 13342 | 1 |
| 30298 | Plain Washer for Ball Bearing Assembly 13342 (Used when necessary instead of 29066) | 1 |
| 28929 | Washer (Felt) for Ball Bearing Assembly 13342 (Upper) | 1 |
| 29528 | Spacing Washer under Cam 28837 (When necessary) | 1 |
| 28951 | Collar retaining Washer 29066 | 1 |
| 28949 | Clip retaining Collar 28951 | 1 |
| 29069 | Retainer for Ball Bearing Assembly 13342 (Upper) | 1 |
| 29068 | Plate under Retainer 29069 | 1 |
| 26289 | Insulator for Plate 26286 | 1 |
| 26286 | Connector Plate for Contact Plate Assembly 13514 | 1 |
| 13514 | **Distributor Contact Plate and Oil SpoutAssembly Complete** | 1 |
| | (Includes the next 2 Items) | |
| 28331 | Oil Spout for Contact Plate Assembly 13514 | 1 |
| 29301 | Rivet for Oil Spout 28331 | 1 |
| 26284 | Stud for Mounting Contact Arm Assemblies | 2 |
| 29438 | Insulating Bushing for Stud 26284 | 2 |
| 29440 | Insulating Washer for Stud 26284 (Upper) | 2 |
| 24336 | Plain Washer for Stud 26284 | 2 |
| 24337 | Lock Washer for Nut 28834 | 2 |
| 28834 | Nut for attaching Stud 26284 | 2 |
| 12411 | **Contact Screw Assembly** | 2 |
| 26828 | Nut for Contact Screw Assembly (Small) | 2 |
| 20345 | Lock Washer for Nut 26836 | 2 |
| 26836 | Nut for Contact Screw Assembly (Large) | 2 |
| 20809 | Screw for attaching Plate Assembly 13514 (Short) | 1 |
| 20393 | Lock Washer for Screw 20809 | 1 |
| 26441 | Plain Washer for Screw 20809 | 1 |
| 26293 | Insulating Bushing for Screw 20809 | 1 |
| 29062 | Outer Shaft for Distributor | 1 |
| 33466 | Washer for end of Distributor Shaft (When necessary) | 1 |
| 29072 | Clip for retaining Washer 29066 | 1 |
| 26033 | Plain Washer for Spring 23129 (Upper) | 1 |
| 23129 | Spring for Outer Shaft 29062 | 1 |
| 24362 | Advance Collar for Outer Shaft 29062 | 1 |
| 25922 | Pin for Advance Collar 24362 and Governor Ring Assembly 10889 | 2 |
| 25921 | Clip for retaining Pin 25922 | 4 |
| 23104 | Advance Arm for Advance Collar 24362 | 2 |
| 10889 | **Governor Ring Assembly for Distributor** | 1 |
| 23496 | Screw for attaching Governor Ring Assembly 10889 | 2 |
| 24493 | Lock Washer for Screw 23496 | 2 |
| 14030 | **Distributor Shaft Pinion and Hub Assembly** | 1 |
| | (Includes the next 3 Items) | |
| 27548 | Screw for attaching Plate 23217 | 2 |
| 20393 | Lock Washer for Screw 27548 | 2 |
| 24029 | Dowel Pin for Distributor Shaft Pinion and Hub Assembly 14030 | 1 |
| 23217 | Plate for Distributor Shaft Pinion and Hub Assembly 14030 | 1 |
| 23100 | Advance Ring for Outer Shaft 29062 | 1 |
| 23134 | Pin for retaining Advance Ring 23100 | 1 |
| 23218 | Clamp for Pin 23134 | 1 |
| 23378 | Screw for Clamp 23218 | 1 |
| 20393 | Lock Washer for Screw 23378 | 1 |
| 23720 | Clip for retaining Washer 29071 | 1 |
| 29071 | Plain Washer above Lower Distributor Shaft Bearing | 1 |
| 14589 | **Resistance Unit Assembly for Distributor** | 1 |



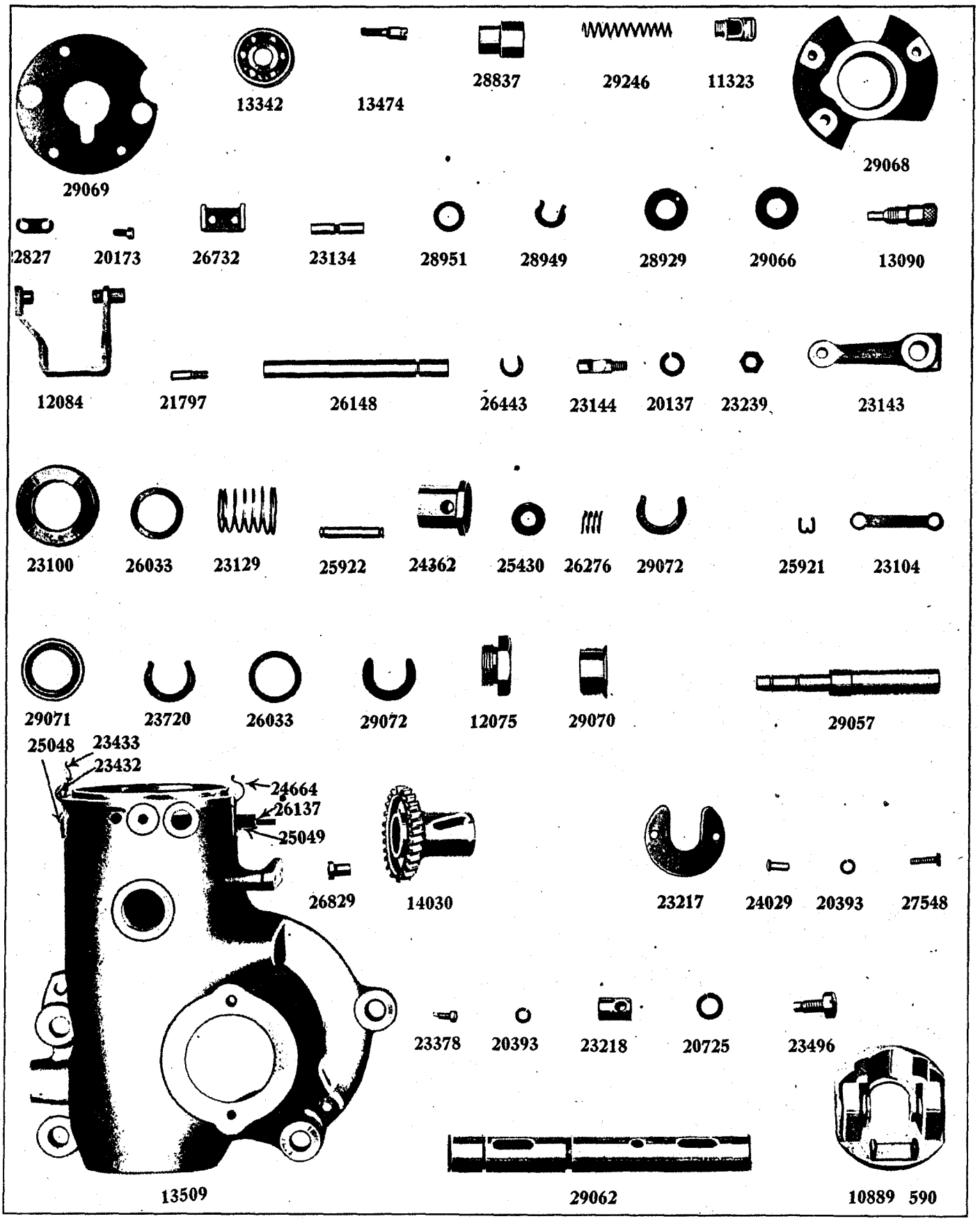

## No. 5206 DISTRIBUTOR

# No. 5166 DISTRIBUTOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 26207 | Nut for Screw 26209 | 1 |
| 12458 | **Condenser Assembly Complete** (Includes the next 2 Items) | 1 |
| 23601 | Screw for attaching Condenser Assembly 12458 | 4 |
| 27798 | Bushing for Screw 23601 | 4 |
| 12084 | **Advance Yoke Assembly for Distributor** | 1 |
| 26148 | Shaft for Advance | 1 |
| 23143 | Advance Lever for Shaft 26148 | 1 |
| 26443 | Clip for retaining Spring 26276 | 1 |
| 23144 | Screw for Advance Lever 23143 | 1 |
| 23239 | Nut for Screw 23144 | 1 |
| 21717 | Lock Washer for Nut 23239 | 1 |
| 20205 | Screw for attaching Plate Assembly (Long) | 2 |
| 20393 | Lock Washer for Screw 20205 | 2 |
| 26293 | Insulating Bushing for Screw 20205 | 2 |
| 26441 | Plain Washer for Screw 20205 | 2 |
| 29072 | Clip for retaining Bearing 29070 (Lower) | 1 |
| 26033 | Plain Washer above Clip 29072 | 1 |
| 12413 | **Contact Arm Assembly for Distributor** | 2 |
| 25723 | Cotter Pin for retaining Contact Arm Assembly | 2 |
| 25634 | Spring for Contact Arm Assembly 12413 | 2 |
| 28548 | Plain Washer for Nut 26208 | 1 |
| 26132 | Stud for Mounting Resistance Unit | 1 |
| 22616 | Plain Washer for Stud 26132 (Outer) | 1 |
| 20068 | Nut for retaining Resistance Unit | 1 |
| 20495 | Lock Washer for Nut 26208 | 1 |
| 20076 | Insulating Washer for Stud 26132 (Outer) | 1 |
| 22738 | Insulating Bushing for Stud 26132 | 1 |
| 23410 | Insulating Washer for Nut 20704 | 1 |
| 20310 | Plain Washer for Nut 20704 | 1 |
| 20791 | Lock Washer for Nut 20704 | 1 |
| 20704 | Nut for Stud 26132 (Inner) | 1 |
| 28837 | Cam for operating Contact Arm Assembly | 1 |
| 13474 | **Screw Assembly for retaining Cam 28837** | 1 |
| 21797 | Screw for Advance Yoke Assembly 12084 | 1 |
| 25430 | Felt Washer for Advance Shaft 26148 | 1 |
| 26276 | Spring for Advance Shaft 28148 | 1 |
| 26829 | Insulating Bushing for Resistance Unit | 1 |
| 13090 | **Oiler Assembly for Distributor (Upper)** | 1 |
| 11323 | **Oiler Assembly for Distributor (Lower)** | 1 |
| 29074 | Wick for Oiler Assembly 11323 (Not shown in Illustration) | 1 |
| 29246 | Spring for Wick 29074 | 1 |
| 12071 | **Distributor Rotor Assembly Complete** (Includes the next 4 Items) | 1 |
| 23074 | Connector for Distributor Rotor Assembly 12071 (Old Style) | 1 |
| 26803 | Screw for retaining Connector 23074 (Old Style) | 1 |
| 23895 | Brush for Rotor Assembly 12071 | 1 |
| 24414 | Spring for Brush 23895 | 1 |
| 25405 | Cover Plate for Housing Assembly 14219 (Lower) | 1 |
| 25433 | Gasket for Cover Plate 25405 | 1 |
| 26310 | Screw for attaching Cover Plate 25405 | 4 |
| 20393 | Lock Washer for Screw 26310 | 4 |
| 23374 | Terminal Clip for connecting Distributor (Not shown in Illustration) | 1 |
| 10877 | **High Tension Terminal Assembly No. Blank** | 1 |
| 10878 | **High Tension Terminal Assembly No. 1** | 1 |
| 10879 | **High Tension Terminal Assembly No. 2** | 1 |
| 10880 | **High Tension Terminal Assembly No. 3** | 1 |
| 10881 | **High Tension Terminal Assembly No. 4** | 1 |
| 10882 | **High Tension Terminal Assembly No. 5** | 1 |
| 10883 | **High Tension Terminal Assembly No. 6** | 1 |
| 10884 | **High Tension Terminal Assembly No. 7** | 1 |
| 10885 | **High Tension Terminal Assembly No. 8** | 1 |
| 23865 | Rubber Washer for High Tension Terminal Assemblies | 9 |
| 12568 | **Distributor Head Assembly Complete** (Includes the next 2 Items) | 1 |
| 27608 | Plunger for Distributor Head Assembly 12568 | 1 |
| 27607 | Spring for Plunger 27608 | 1 |
| 12741 | **Distributor Wrench Assembly (With Gauge) (Not shown in Illustration)** | 1 |
| 31886 | Distributor Wrench (Plain) (Not shown in Illustration) | 1 |
| 26795 | Spiral Gear for Driving Spiral Gear 26151 (Not shown in Illustration) | 1 |

# No. 5166 DISTRIBUTOR

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5166 | **DISTRIBUTOR** | 1 |
| 14219 | **Distributor Housing Assembly** (Includes the next 9 Items) | 1 |
| 23433 | Clip for retaining Distributor Head (Long Tongue) | 1 |
| 23432 | Clip for retaining Distributor Head (Used with Clip 23433) | 1 |
| 24664 | Clip for retaining Distributor Head (Single) | 1 |
| 25048 | Rivet for retaining Clips 23432 and 23433 | 2 |
| 25049 | Rivet for retaining Clip 24664 | 2 |
| 26137 | Stud for retaining Clip 24664 | 1 |
| 32232 | Name Plate for Housing 29149 (Not shown in Illustration) | 1 |
| 32821 | Pin for retaining Name Plate 32232 (Not shown in Illustration) | 2 |
| 32957 | Bearing for Distributor Housing | 1 |
| 12075 | **Breather Nut Assembly Complete** | 1 |
| 26732 | Stop for Advance Yoke Assembly 12084 | 1 |
| 20173 | Screw for retaining Stop 26732 | 2 |
| 22827 | Lock Plate for Screw 20173 | 1 |
| 13511 | **Inner Shaft and Bearing Assembly Complete** (Includes the next 3 Items) | 1 |
| 13342 | **Ball Bearing Assembly for Distributor (Upper)** | 1 |
| 29057 | Inner Shaft for Distributor | 1 |
| 29066 | Plain Washer for Ball Bearing Assembly 13342 | 1 |
| 30298 | Plain Washer for Ball Bearing Assembly 13342 (Used when necessary instead of 29066) (Not shown in Illustration) | 1 |
| 28929 | Washer (Felt) for Ball Bearing Assembly 13342 (Upper) | 1 |
| 29528 | Spacing Washer under Cam 28837 (Not shown in Illustration) (When necessary) | 1 |
| 28951 | Collar retaining Washer 29006 | 1 |
| 28949 | Clip retaining Collar 28951 | 1 |
| 29069 | Retainer for Ball Bearing Assembly 13342 (Upper) | 1 |
| 29068 | Plate under Retainer 29069 | 1 |
| 26289 | Insulator for Plate 26286 | 1 |
| 26286 | Connector Plate for Contact Plate Assembly 13514 | 1 |
| 13514 | **Distributor Contact Plate and Oil Spout Assembly Complete** (Includes the next 2 Items) | 1 |
| 28331 | Oil Spout for Contact Plate Assembly 13514 | 1 |
| 29301 | Rivet for Oil Spout 28331 | 1 |
| 26284 | Stud for mounting Contact Arm Assemblies | 2 |
| 29438 | Insulating Bushing for Stud 26284 | 2 |
| 29440 | Insulating Washer for Stud 26284 (Upper) | 2 |
| 24336 | Plain Washer for Stud 26284 | 2 |
| 24337 | Lock Washer for Nut 28834 | 2 |
| 28834 | Nut for attaching Stud 26284 | 2 |
| 12411 | **Contact Screw Assembly** | 2 |
| 26828 | Nut for Contact Screw Assembly (Small) | 2 |
| 20345 | Lock Washer for Nut 26836 | 2 |
| 26836 | Nut for Contact Screw Assembly (Large) | 2 |
| 20809 | Screw for attaching Plate Assembly 13514 (Short) | 1 |
| 20393 | Lock Washer for Screw 20809 | 1 |
| 26441 | Plain Washer for Screw 20809 | 1 |
| 26293 | Insulating Bushing for Screw 20809 | 1 |
| 29062 | Outer Shaft for Distributor | 1 |
| 29072 | Clip for retaining Washer 29066 | 1 |
| 26033 | Plain Washer for Spring 23129 (Upper) | 1 |
| 23129 | Spring for Outer Shaft 29062 | 1 |
| 24362 | Advance Collar for Outer Shaft 29062 | 1 |
| 25922 | Pin for Advance Collar 24362 and Governor Ring Assembly 10889 | 2 |
| 25921 | Clip for retaining Pin 25922 | 4 |
| 23104 | Advance Arm for Advance Collar 24362 | 2 |
| 10889 | **Governor Ring Assembly for Distributor** | 1 |
| 23496 | Screw for attaching Governor Ring Assembly 10889 | 2 |
| 20725 | Lock Washer for Screw 23496 | 2 |
| 14030 | **Distributor Shaft Pinion and Hub Assembly** (Includes the next 3 Items) | 1 |
| 27548 | Screw for attaching Plate 23217 | 2 |
| 20393 | Lock Washer for Screw 27548 | 2 |
| 24029 | Dowel Pin for Distributor Shaft Pinion and Hub Assembly 14030 | 1 |
| 23217 | Plate for Distributor Shaft Pinion and Hub Assembly 14030 | 1 |
| 23100 | Advance Ring for Outer Shaft 29062 | 1 |
| 23134 | Pin for retaining Advance Ring 23100 | 1 |
| 23218 | Clamp for Pin 23134 | 1 |
| 23378 | Screw for Clamp 23218 | 1 |
| 20393 | Lock Washer for Screw 23378 | 1 |
| 23720 | Clip for retaining Washer 29071 | 1 |
| 29071 | Plain Washer above Bearing 29070 | 1 |
| 12013 | **Resistance Unit Assembly for Distributor** | 1 |
| 26209 | Screw for retaining Clip 26153 | 1 |
| 20393 | Lock Washer for Nut 26207 | 1 |
| 26153 | Clip for retaining Terminal Clip 23374 | 1 |




No. 5166 DISTRIBUTOR

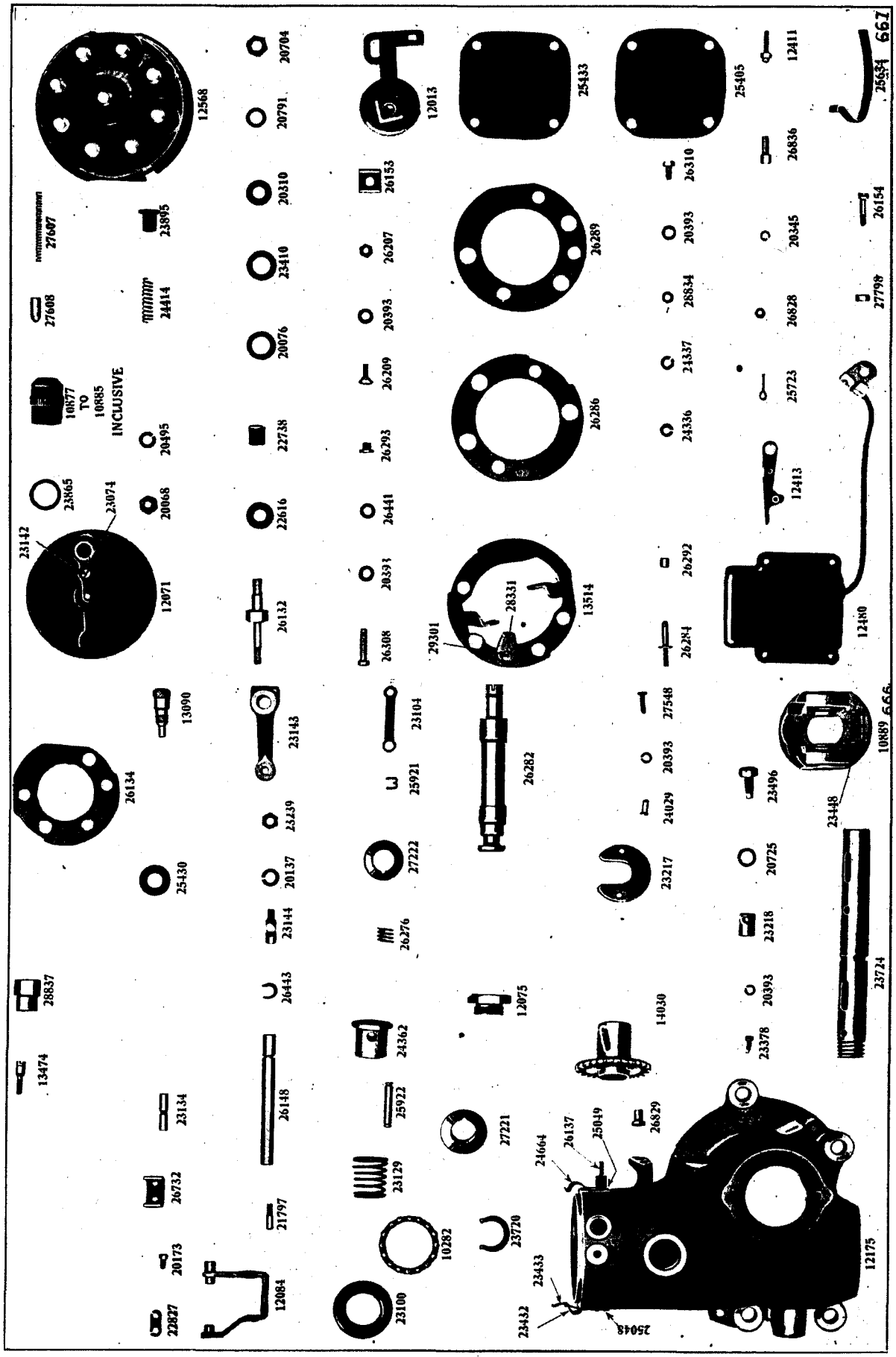
# No. 5150 DISTRIBUTOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 12458 | **Condenser Assembly (Service)** (Includes the next 2 Items) | 1 |
| 23601 | Screw for attaching Condenser Assembly 12458 | 4 |
| 27798 | Bushing for Screw 23601 | 4 |
| 12084 | **Advance Yoke Assembly** | 1 |
| 26148 | Shaft for Advance Shaft Assembly | 1 |
| 23143 | Advance Lever for Shaft 26148 | 1 |
| 26443 | Clip for retaining Spring 26276 | 1 |
| 23144 | Screw for Advance Lever 23143 | 1 |
| 23239 | Nut for Screw 23144 | 1 |
| 21717 | Lock Washer for Nut 23239 | 1 |
| 26308 | Screw for retaining Mounting Plate 26134 | 1 |
| 20393 | Lock Washer for Screw 26308 | 1 |
| 26293 | Insulating Bushing for Screw 26308 | 2 |
| 25634 | Spring for Contact Arm Assembly 12413 | 2 |
| 26132 | Stud for Resistance Unit Assembly | 1 |
| 22616 | Plain Washer for Stud 26132 (Outer) | 1 |
| 20068 | Nut for retaining Resistance Unit Assembly (Outer) | 1 |
| 20495 | Lock Washer for Nut 20068 | 1 |
| 28548 | Plain Washer for Nut 20068 | 1 |
| 20076 | Insulating Washer for Stud 26132 (Outer) | 1 |
| 22738 | Insulating Bushing for Stud 26132 | 1 |
| 23410 | Insulating Washer for Nut 20704 (Inner) | 1 |
| 20791 | Lock Washer for Nut 20704 | 1 |
| 20310 | Plain Washer for Nut 20704 | 1 |
| 20704 | Nut for Stud 26132 (Inner) | 1 |
| 28837 | Cam for Operating Contact Arm Assembly 12413 | 1 |
| 13474 | **Distributor Cam Adjustment Screw Assembly for retaining Cam 28837** | 1 |
| 21797 | Screw for Advance Yoke Assembly 12084 | 1 |
| 25430 | Felt Washer for Shaft 26148 | 1 |
| 26276 | Spring for Shaft 26148 | 1 |
| 26829 | Insulating Bushing for Resistance Unit Assembly | 1 |
| 13090 | **Oiler Assembly** | 1 |
| 12071 | **Distributor Rotor Assembly Complete** (Includes the next 4 Items. Do not count Service Part) | 1 |
| 23074 | Connector for Distributor Rotor Assembly 12071 (Old Style) | 1 |
| 26803 | Screw for retaining Connector 23074 (Service) (Old Style) | 1 |
| 23895 | Brush for Distributor Rotor Assembly 12071 | 1 |
| 24414 | Spring for Brush 23895 | 1 |
| 25405 | Cover Plate for Bottom of Housing 26150 | 1 |
| 25433 | Gasket for Cover Plate 25405 | 1 |
| 26310 | Screw for attaching Cover Plate 25405 | 4 |
| 20393 | Lock Washer for Screw 26310 | 4 |
| 12568 | **Distributor Head Assembly Complete** | 1 |
| 27608 | Plunger for Distributor Head Assembly 12568 | 1 |
| 21424 | Spring (Old Style) for Plunger 21425 | 1 |
| 21425 | Plunger (Old Style) for Distributor Head Assembly 12568 | 1 |
| 27607 | Spring for Plunger 27608 | 1 |
| 10877 | **High Tension Terminal Assembly (Blank)** | 1 |
| 10878 | **High Tension Terminal Assembly (1)** | 1 |
| 10879 | **High Tension Terminal Assembly (2)** | 1 |
| 10880 | **High Tension Terminal Assembly (3)** | 1 |
| 10881 | **High Tension Terminal Assembly (4)** | 1 |
| 10882 | **High Tension Terminal Assembly (5)** | 1 |
| 10883 | **High Tension Terminal Assembly (6)** | 1 |
| 10884 | **High Tension Terminal Assembly (7)** | 1 |
| 10885 | **High Tension Terminal Assembly (8)** | 1 |
| 23865 | Rubber Washer for High Tension Terminal Assemblies | 9 |
| 12741 | **Wrench Assembly (With Gauge) (Not shown in Illustration)** | 1 |
| 31886 | Wrench (Plain) (Not shown in Illustration) | 1 |
| 23374 | Terminal Clip for connecting Distributor (Not shown in Illustration) | 1 |

# No. 5150 DISTRIBUTOR

Note: No. 5150 Distributor superseded by No. 5166 Distributor. When ordering a complete new unit, order No. 5166.

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5150 | **DISTRIBUTOR COMPLETE** | 1 |
| 12175 | **Distributor House Assembly** (Includes the next 8 Items) | 1 |
| 23432 | Clip for retaining Distributor Head Assembly 12568 (With Clip 23433) | 1 |
| 23433 | Clip for retaining Distributor Head Assembly 12568 (Long Tongue Clip) | 1 |
| 24664 | Clip for retaining Distributor Head Assembly 12568 (Single) | 1 |
| 25048 | Rivet for retaining Clips 23432 and 23433 | 2 |
| 25049 | Rivet for retaining Clip 24664 | 1 |
| 26137 | Stud for retaining Clip 24664 | 1 |
| 32232 | Name Plate for Housing 26150 (Not shown in Illustration) | 1 |
| 32821 | Pin for retaining Name Plate 32232 (Not shown in Illustration) | 2 |
| 20775 | Cup for Retainer and Balls Assembly 10282 | 1 |
| 12075 | **Breather Nut Assembly** | 1 |
| 26732 | Stop for Advance Yoke Assembly 12084 | 1 |
| 20173 | Screw for retaining Stop 26372 | 2 |
| 22827 | Lock Plate for Screw 20173 | 2 |
| 10889 | **Governor Ring Assembly** (Includes the next 2 Items) | 1 |
| 23448 | Clip for Governor Ring Assembly 10889 | 1 |
| 24198 | Screw for attaching Clip 23448 (Not shown in Illustration) | 2 |
| 10282 | **Retainer and Balls Assembly** | 2 |
| 23724 | Shaft for Distributor (Outer) | 1 |
| 26282 | Shaft for Distributor (Inner) | 1 |
| 12413 | **Contact Arm Assembly for Distributor** | 2 |
| 12411 | **Contact Screw Assembly for Contact Arm Assembly 12413** | 2 |
| 26828 | Nut for Contact Screw Assembly 12411 (Short) | 1 |
| 26836 | Nut for Contact Screw Assembly 12411 (Long) | 2 |
| 25723 | Cotter Pin for retaining Contact Arm Assembly 12413 | 2 |
| 20345 | Lock Washer for Nut 26836 | 2 |
| 13514 | **Plate Assembly for Contact Arm Assembly** | 1 |
| 28331 | Oiler Spout for Plate Assembly 13514 | 1 |
| 29301 | Rivet for retaining Oiler Spout 28331 | 1 |
| 26289 | Insulator for Plate 26295 | 1 |
| 26286 | Connector for Plate 26295 | 1 |
| 26284 | Stud for Contact Arm Assembly 12413 | 1 |
| 29438 | Insulating Bushing for Stud 26284 | 2 |
| 29440 | Insulating Washer for Stud 26284 | 2 |
| 28834 | Nut for Stud 26284 | 2 |
| 24336 | Plain Washer for 28834 | 2 |
| 24337 | Lock Washer for Nut 28834 | 2 |
| 27221 | Cone for Shaft 23724 (Upper) | 1 |
| 23720 | Clip for retaining Cone 27221 | 1 |
| 27216 | Stud for Cones 27221 and 27219 (Not shown in Illustration) | 2 |
| 26134 | Mounting Plate for Distributor Shaft Assembly 12004 | 1 |
| 20775 | Cup for Retainer and Balls 10282 (Upper) | 1 |
| 23129 | Spring for Shaft 23724 | 1 |
| 24362 | Advance Collar for Governor Ring Assembly 10889 | 1 |
| 25922 | Pin for retaining Arm 23104 | 2 |
| 25921 | Clip for retaining Pin 25922 | 4 |
| 23104 | Arm for connecting Advance Collar 24362 and Governor Ring Assembly 10889 | 2 |
| 23496 | Screw for retaining Governor Ring Assembly 10889 | 2 |
| 24493 | Lock Washer for Screw 23496 | 2 |
| 14030 | **Distributor Shaft Pinion and Hub Assembly (Service)** (Includes the next 2 Items) | 1 |
| 27548 | Screw for Spiral Gear 25151 | 2 |
| 20393 | Lock Washer for Screws 27548, 23378 and 23879 | 11 |
| 23217 | Plate for Spiral Gear 26151 | 1 |
| 24029 | Pin for Hub 23977 | 1 |
| 26795 | Spiral Gear for Driving Pinion and Hub Assembly 14030 (Not shown in Illustration) | 1 |
| 26210 | Spiral Gear (Old Style) (Used before Motor Generator Serial No. 352610) | 1 |
| 23100 | Advance Ring for Shaft 23724 | 1 |
| 23134 | Pin for Advance Shaft 23100 | 1 |
| 23218 | Clamp for Pin 23134 | 1 |
| 23378 | Screw for Clamp 23218 | 1 |
| 27222 | Cone for Shaft 23724 (Lower) | 1 |
| 21443 | Nut for Shaft 23724 (Round) (Not shown in Illustration) | 1 |
| 21444 | Nut for Shaft 23724 (Hexagon) (Not shown in Illustration) | 1 |
| 23879 | Screw for retaining Plate 26296 (Not shown in Illustration) | 2 |
| 26293 | Insulating Bushing for Screw 23879 | 2 |
| 23876 | Plain Washer for Screw 23879 (Not shown in Illustration) | 2 |
| 12013 | **Resistance Unit Assembly** | 1 |
| 26209 | Screw for retaining Clip 25153 | 1 |
| 26153 | Clip for retaining Terminal Clip 23374 | 1 |
| 26207 | Nut for Screw 26209 | 1 |
| 20393 | Lock Washer for Nut 26207 | 1 |



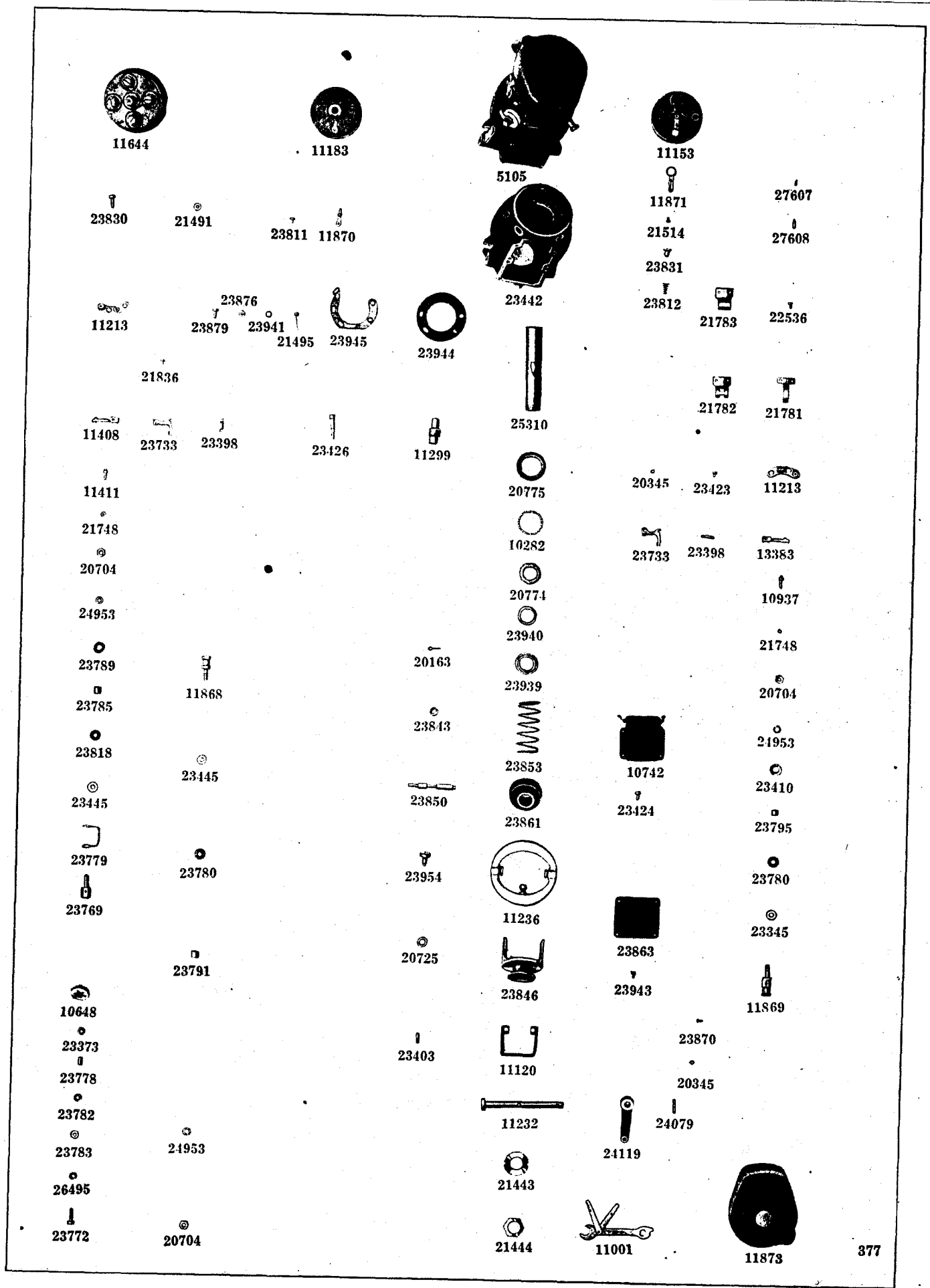

No. 5150 DISTRIBUTOR

# No. 5105 DISTRIBUTOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 23783 | Plain Washer for Screw 23772 | 1 |
| 23782 | Insulating Washer for Screw 23772 | 1 |
| 23778 | Insulating Bushing for Screw 23772 | 1 |
| 23773 | Washer for Resistance Unit Assembly 10648 (Shoulder) | 1 |
| 23770 | Protector for Resistance Unit Assembly 10648 (Not shown in Illustration) | 1 |
| 23779 | Connector for Resistance Unit Assembly 10648 and Housing 23442 | 1 |
| 11213 | **Segment Assembly for retaining Contact Assemblies 14383 and 11408** (Includes the next 2 Items) | 2 |
| 21493 | Stud for mounting Stop 23733 (Not shown in Illustration) | 1 |
| 21494 | Stud for mounting Contact Arm Assemblies 11408 and 14383 (Not shown in Illustration) | 1 |
| 23879 | Screw for retaining Segment Assembly 11213 | 4 |
| 23876 | Plain Washer for Screw 23879 | 4 |
| 23941 | Insulating Washer for Screw 23879 | 4 |
| 21495 | Insulating Bushing for Screw 23879 | 4 |
| 23945 | Connector for Segment Assembly 11213 | 1 |
| 23944 | Insulator for Segment Assembly 11213 | 1 |
| 14383 | **Contact Arm Assembly (Battery) (Not shown in Illustration)** (Includes the next 2 Items) | 1 |
| 24069 | Hub for Contact Arm Assembly 14383 (Not shown in Illustration) | 1 |
| 24947 | Screw for attaching Hub 24069 (Not shown in Illustration) | 2 |
| 11408 | **Contact Arm Assembly (Magneto)** (Includes the next 3 Items. Do not count Old Style Parts) | 1 |
| 11379 | **Connector Assembly for Contact Arm Assembly 11408 (Not shown in Illustration(** | 1 |
| 21801 | Terminal Wire (Old Style) | 1 |
| 24069 | Hub for Contact Arm Assembly 11408 (Not shown in Illustration) | 1 |
| 24947 | Screw for attaching Hub 24069 (Not shown in Illustration) | 2 |
| 12411 | **Contact Screw Assembly (Battery)** | 1 |
| 12411 | **Contact Screw Assembly (Magneto) (Not shown in Illustration)** | 1 |
| 21748 | Nut for Contact Screw Assembly 12411 | 2 |
| 23733 | Stop for Contact Arm Assemblies 14383 and 11408 | 2 |
| 23398 | Spring for Contact Arm Assemblies 14383 and 11408 | 2 |
| 21836 | Screw for retaining Stop 23733 | 2 |
| 11407 | **Wrench for Distributor** | 1 |
| 23835 | Terminal Clip for Distributor Head Assembly 11644 (Not shown in Illustration) | 5 |
| 20953 | Terminal Clip for Spring Terminal Assemblies 11868 and 11869 (Not shown in Illustration) | 2 |
| 11644 | **Distributor Head Assembly Complete** (Includes the next 4 Items. Do not count Old Style Parts) | 1 |
| 21425 | Plunger (Old Style) for Distributor Head Assembly 11644 (Approximately ⅛" Diameter) | 1 |
| 21424 | Spring (Old Style) for Plunger 21425 (Approximately ⅛" Diameter) | 1 |
| 27608 | Plunger for Distributor Head Assembly 11644 (Approximately ¼" Diameter) | 1 |
| 27607 | Spring for Plunger 27608 (Approximately ¼" Diameter) | 1 |
| 23830 | Screw for Distributor Head Assembly 11644 | 4 |
| 21491 | Nut for Distributor Head Assembly 11644 | 1 |

# No. 5105 DISTRIBUTOR

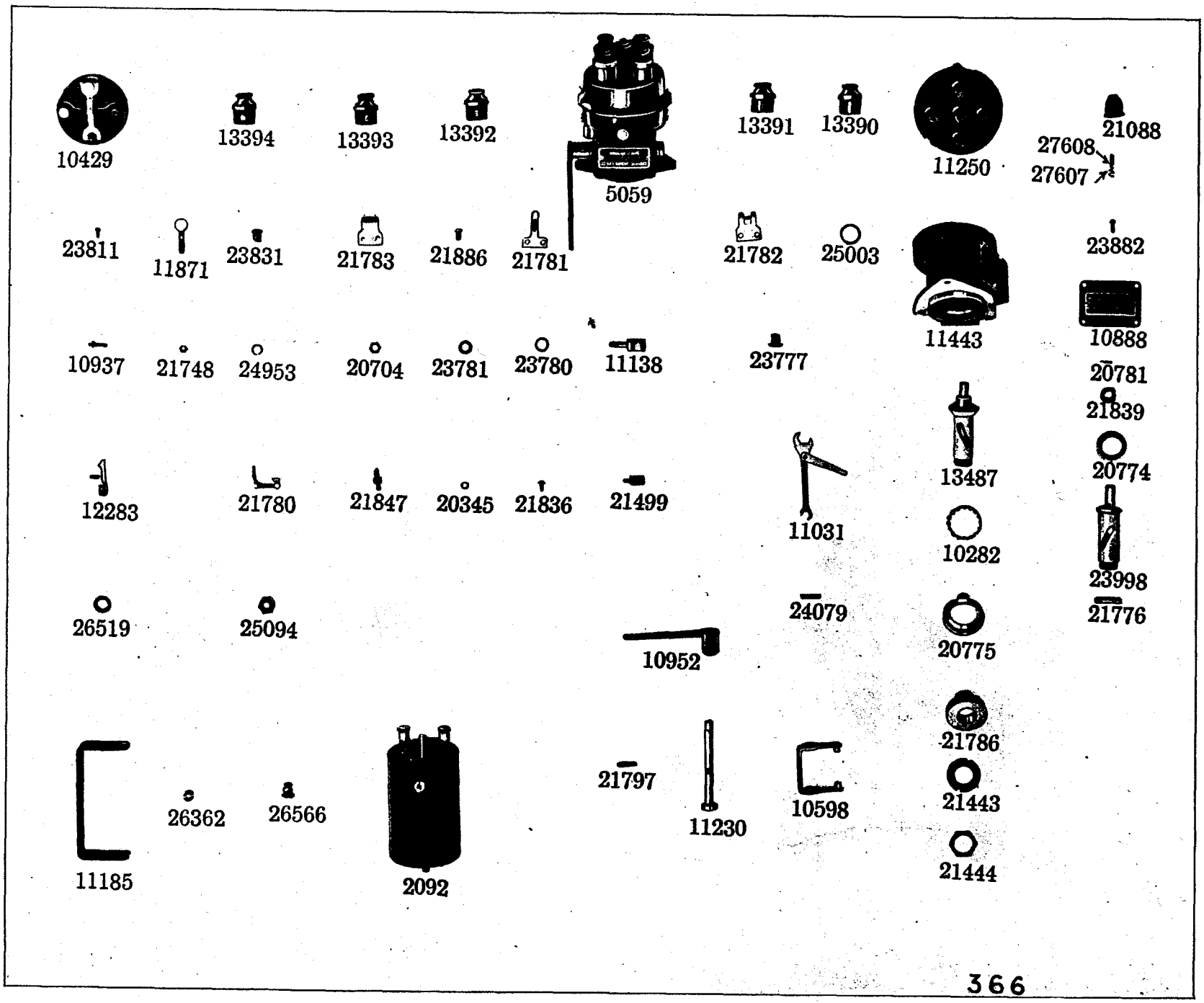
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5105 | **DISTRIBUTOR COMPLETE** | 1 |
| 23442 | Housing for Distributor Assembly 5105 | 1 |
| 14123 | **Shaft Assembly (Service) (Including Shaft 25310 and Upper Cone) (Not shown in Illustration)** | 1 |
| 25310 | Shaft for Distributor | 1 |
| 27222 | Cone for Shaft 25310 (Not shown in Illustration) | 2 |
| 21443 | Clamp Nut for Shaft 25310 (Round) | 1 |
| 21444 | Lock Nut for Clamp Nut 21443 (Hexagon) | 1 |
| 11299 | **Cam Adjustment Assembly** (Includes the next 3 Items) | 1 |
| 23458 | Cam for Cam Adjustment Assembly 11299 (Not shown in Illustration) | 1 |
| 23736 | Pin for Cam 23458 | 1 |
| 23426 | Screw for Cam Adjustment Assembly 11299 | 1 |
| 11153 | **Distributor Rotor Assembly Complete** (Includes the next 6 Items) | 1 |
| 11871 | **Connector Assembly (Contact)** | 1 |
| 21514 | Screw for retaining Connector Assembly 11871 | 1 |
| 11870 | **Clip Assembly for locating Distributor Rotor Assembly 11153** | 1 |
| 23811 | Screw for retaining Clip Assembly 11870 | 1 |
| 23831 | Brush for Distributor Rotor Assembly 11153 | 1 |
| 23812 | Spring for Brush 23831 | 1 |
| 11232 | **Advance Shaft Assembly** | 1 |
| 24119 | Advance Lever for Advance Shaft Assembly 11232 | 1 |
| 24079 | Dowel Pin for retaining Advance Lever 24119 | 1 |
| 11120 | **Advance Yoke Assembly** | 1 |
| 23403 | Screw for Advance Yoke Assembly 11120 | 1 |
| 11236 | **Governor Ring Assembly** | 1 |
| 23954 | Screw for retaining Governor Ring Assembly 11236 | 2 |
| 20725 | Lock Washer for Screw 23954 | 2 |
| 23940 | Spacing Washer for Shaft 25310 between Cone 27222 and Advance Ring 23861 | 1 |
| 23861 | Advance Ring (for Manual Advance) | 1 |
| 23846 | Sleeve on Shaft 25310 for Governor Ring Assembly 11236 (Not shown in Illustration) | 1 |
| 23939 | Sleeve Collar on Shaft 25310 next to Upper Cone 27222 for Spring 23853 | 1 |
| 23853 | Spring for Shaft 25310 | 1 |
| 20775 | Cup for Retainer and Balls Assembly 10282 | 2 |
| 10282 | **Retainer and Balls Assembly** | 2 |
| 10745 | **Condenser Assembly** (Includes the next Item) | 1 |
| 32141 | Screw for retaining Condenser Assembly 10745 | 4 |
| 23863 | Cover Plate for Housing 23442 | 1 |
| 23943 | Screw for retaining Cover Plate 23863 | 4 |
| 21782 | Clip for retaining Distributor Head Assembly 11644 (With Clip 21781) | 1 |
| 21781 | Clip for retaining Distributor Head Assembly 11644 (Long Tongue Clip) | 1 |
| 21783 | Clip for retaining Distributor Head Assembly 11644 (Single) | 1 |
| 22556 | Screw for retaining Clips 21781 and 21782 (Not shown in Illustration) | 2 |
| 23423 | Screw for retaining Clip 21783 | 2 |
| 23850 | Pin for connecting Shaft 25310 and Sleeve 23846 | 1 |
| 23843 | Washer for retaining Pin 23850 | 2 |
| 20163 | Cotter Pin for retaining Washer 23843 | 2 |
| 23870 | Screw for connecting Condenser Assembly 10745 to Spring Terminal Assembly 11869 and Stud 23769 | 2 |
| 20345 | Lock Washer on Screws 23870 and 21836 | 4 |
| 11873 | **Protector Assembly for Distributor Head Assembly 11644** | 1 |
| 11869 | **Spring Terminal Assembly (Common)** | 1 |
| 11868 | **Spring Terminal Assembly (Battery)** | 1 |
| 23769 | Stud for Resistance Unit Assembly 10648 | 1 |
| 20704 | Nut for Spring Terminal Assemblies 11868 and 11869 and Stud 23769 | 3 |
| 24953 | Lock Washer for Nut 20704 | 3 |
| 23445 | Plain Washer for Nut 20704 and Spring Terminal Assemblies 11868 and 11869 and Stud 23769 | 6 |
| 23785 | Insulating Bushing for Stud 23769 | 1 |
| 23795 | Insulating Bushing for Spring Terminal Assembly 11869 | 1 |
| 23791 | Insulating Bushing for Spring Terminal Assembly 11868 | 1 |
| 23818 | Insulating Washer for Stud 23769 (Outer) | 1 |
| 23789 | Insulating Washer for Stud 23769 and Spring Terminal 11888 (Inner) | 2 |
| 23780 | Insulating Washer for Spring Terminal Assemblies 11868 and 11869 (Outer) | 2 |
| 23410 | Insulating Washer for Spring Terminal Assembly 11869 (Inner) | 1 |
| 10648 | **Resistance Unit Assembly** | 1 |
| 23772 | Screw for retaining Resistance Unit Assembly 10648 | 1 |
| 20495 | Lock Washer for Screw 23772 | 1 |




No. 5105 DISTRIBUTOR

# No. 5059 DISTRIBUTOR

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5059 | **DISTRIBUTOR ASSEMBLY COMPLETE** | 1 |
| 24399 | Housing for Distributor (Not shown in Illustration) | 1 |
| 20775 | Cup for Housing 24399 | 2 |
| 21443 | Clamp Nut for Shaft Assembly 13487 (Round) | 1 |
| 21444 | Lock Nut for Clamp Nut 21443 (Hexagon) | 1 |
| 27222 | Cone for Shaft Assembly 13487 (Not shown in Illustration) | 2 |
| 13487 | **Shaft Assembly (Service) (Includes Shaft, Cam and Pin)** | 1 |
| 10429 | **Distributor Rotor Assembly Complete** (Includes the next 6 Items) | 1 |
| 11871 | **Connector Assembly (Contact)** | 1 |
| 23811 | Screw for retaining Connector Assembly 11871 | 1 |
| 11870 | **Clip Assembly for locating Distributor Rotor Assembly (Not shown in Illustration)** | 1 |
| 21514 | Screw for retaining Clip Assembly 11870 (Not shown in Illustration) | 1 |
| 23831 | Brush for Distributor Rotor Assembly | 1 |
| 23812 | Spring for Brush 23831 (Not shown in Illustration) | 1 |
| 10952 | **Advance Lever Assembly** | 1 |
| 11230 | **Advance Shaft Assembly** | 1 |
| 24079 | Dowel Pin for retaining Advance Lever Assembly 10952 | 1 |
| 10888 | **Cover Assembly for Housing 24399** (Includes the next 2 Items) | 1 |
| 23849 | Name Plate Cover Assembly 10888 (Not shown in Illustration) | 1 |
| 23839 | Rivet for Name Plate 23849 (Not shown in Illustration) | 2 |
| 10598 | **Advance Yoke Assembly** | 1 |
| 11868 | **Spring Terminal Assembly** | 1 |
| 14383 | **Contact Arm Assembly** (Includes the next 2 Items) | 1 |
| 24069 | Hub for Contact Arm Assembly 14383 (Not shown in Illustration) | 1 |
| 24947 | Screw for attaching Hub 24069 (Not shown in Illustration) | 1 |
| 12411 | **Contact Screw Assembly** | 1 |
| 21748 | Clamp Nut for Contact Screw Assembly 12411 | 1 |
| 23398 | Spring for Contact Arm Assembly 14383 (Not shown in Illustration) | 1 |
| 21780 | Stop for Contact Arm Assembly 14383 | 1 |
| 21836 | Screw for retaining Stop 21780 | 1 |
| 20345 | Lock Washer for Screw 21836 | 1 |
| 10282 | **Retainer and Balls Assembly** | 2 |
| 21786 | Advance Ring for Advance Yoke Assembly 10598 | 1 |
| 21776 | Pin for Advance Ring | 1 |
| 23777 | Insulating Bushing for Spring Terminal Assembly 11868 | 1 |
| 23780 | Insulating Washer for Spring Terminal Assembly 11868 (Inner) | 1 |
| 23781 | Insulating Washer for Spring Terminal Assembly 11868 (Outer) | 1 |
| 23784 | Plain Washer for Spring Terminal Assembly 11868 (Not shown in Illustration) | 1 |
| 20704 | Nut for Spring Terminal Assembly 11868 | 1 |
| 24953 | Lock Washer for Nut 20704 | 1 |
| 23445 | Plain Washer for Spring Terminal Assembly 11868 (Not shown in Illustration) | 1 |
| 21782 | Clip for Distributor Head Assembly 11250 (With Clip 21781) | 1 |
| 21781 | Clip for Distributor Head Assembly 11250 (Long Tongue Clip) | 1 |
| 21783 | Clip for Distributor Head Assembly 11250 (Single) | 1 |
| 21847 | Stud for retaining Contact Arm Assembly 14383 | 1 |
| 21499 | Stud for retaining Stop 21780 | 1 |
| 21886 | Screw for retaining Clip 21783 | 2 |
| 21887 | Screw for retaining Clips 21781 and 21782 (Not shown in Illustration) | 2 |
| 21797 | Screw for Advance Yoke Assembly 10598 | 1 |
| 23882 | Screw for retaining Cover Assembly 10888 | 4 |
| 12969 | **High Tension Terminal Assembly for Distributor Head Assembly 11250 (Blank) (Not shown in Illustration)** | 1 |
| 12970 | **High Tension Terminal Assembly for Distributor Head Assembly 11250 (1) (Not shown in Illustration)** | 1 |
| 12971 | **High Tension Terminal Assembly for Distributor Head Assembly 11250 (2) (Not shown in Illustration)** | 1 |
| 12972 | **High Tension Terminal Assembly for Distributor Head Assembly 11250 (3) (Not shown in Illustration)** | 1 |
| 12973 | **High Tension Terminal Assembly for Distributor Head Assembly 11250 (4) (Not shown in Illustration)** | 1 |
| 20953 | Terminal Clip for connecting Distributor (Not shown in Illustration) | 1 |
| 11250 | **Distributor Head Assembly Complete** (Includes the next 2 Items. Do not count Old Style Parts) | 1 |
| 21425 | Plunger (Old Style) for Distributor Head Assembly 11250 (Approximately 1/8" Diameter) | 1 |
| 29764 | Plunger for Distributor Head Assembly 11250 (Not shown in Illustration) (Approximately 1/4" Diameter) | 1 |
| 21424 | Spring (Old Style) for Plunger 21425 (Approximately 1/8" Diameter) | 1 |
| 27607 | Spring for Plunger 29764 (Approximately 1/4" Diameter) | 1 |
| 11407 | **Wrench for Distributor** | 1 |
| 25003 | Rubber Washer for High Tension Terminal Assemblies | 5 |

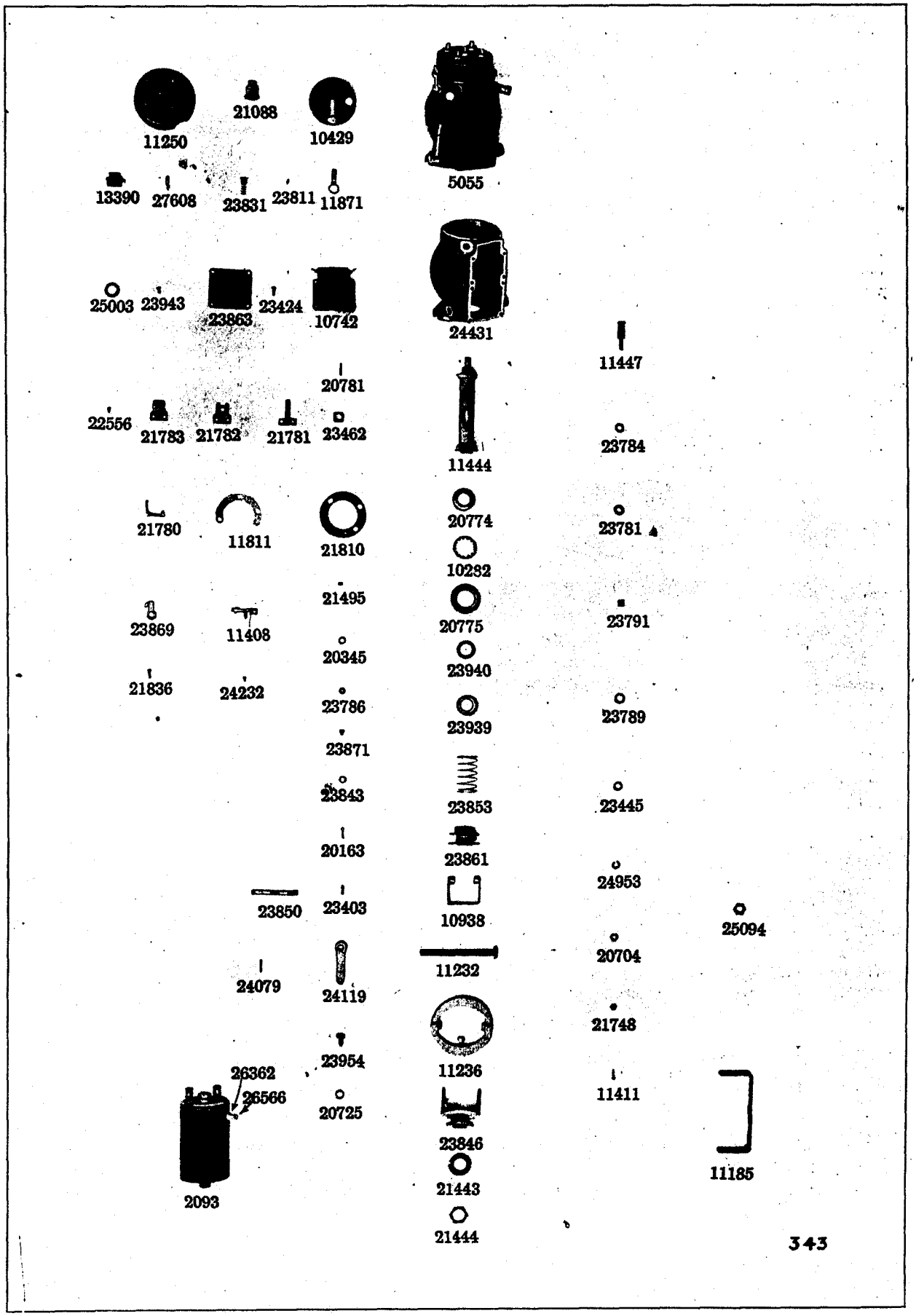

10429
13394
13393
13392
5059
13391
13390
11250
27608
27607
21088
23811
11871
23831
21783
21886
21781
21782
25003
23882
11443
10888
10937
21748
24953
20704
23781
23780
11138
23777
20781
21839
20774
13487
12283
21780
21847
20345
21836
21499
11031
10282
23998
21776
26519
25094
24079
20775
10952
21786
21797
11230
10598
21443
26362
26566
21444
11185
2092
366

# No. 5055 DISTRIBUTOR (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 10282 | **Retainer and Balls Assembly** | 2 |
| 23940 | Spacing Washer on Shaft 24973 between Cone 20774 and Advance Ring 23861 | 1 |
| 23861 | Advance Ring (for Manual Advance) | 1 |
| 23846 | Sleeve on Shaft 24973 for Governor Ring Assembly 11236 | 1 |
| 11236 | **Governor Ring Assembly** | 1 |
| 23939 | Sleeve Collar on Shaft 24973 next to Upper Cone 27222 for Spring 23853 | 1 |
| 23853 | Spring for Shaft 24973 | 1 |
| 23954 | Screw for retaining Governor Ring Assembly 11236 | 1 |
| 20725 | Lock Washer for Screw 23954 | 2 |
| 23850 | Pin for connecting Shaft 24973 and Sleeve 23846 | 2 |
| 23843 | Washer for retaining Pin 23850 | 1 |
| 20163 | Cotter Pin for retaining Washer 23843 | 2 |
| 11250 | **Distributor Head Assembly Complete** (Includes the next 2 Items. Do not count Old Style Parts) | 2 |
| 21425 | Plunger (Old Style) for Distributor Head Assembly 11250 (Approximately ⅛" Diameter) | 1 |
| 29764 | Plunger for Distributor Assembly 11250 (Approximately ¼" Diameter) (Not shown in Illustration) | 1 |
| 21424 | Spring (Old Style) for Plunger 21425 (Approximately ⅛" Diameter) | 1 |
| 27607 | Spring for Plunger 29764 (Approximately ¼" Diameter) (Not shown in Illustration) | 1 |
| 20953 | Terminal Clip for connecting Distributor (Not shown in Illustration) | 1 |
| 12741 | **Wrench for Distributor (Not shown in Illustration)** | 2 |
| 12969 | **High Tension Terminal Assembly for Distributor Head Assembly 11250 (Blank) (Not shown in Illustration)** | 1 |
| 12970 | **High Tension Terminal Assembly for Distributor Head Assembly 11250 (1) (Not shown in Illustration)** | 1 |
| 12971 | **High Tension Terminal Assembly for Distributor Head Assembly 11250 (2) (Not shown in Illustration)** | 1 |
| 12972 | **High Tension Terminal Assembly for Distributor Head Assembly 11250 (3) (Not shown in Illustration)** | 1 |
| 12973 | **High Tension Terminal Assembly for Distributor Head Assembly 11250 (4) (Not shown in Illustration)** | 1 |
| 25003 | Rubber Washer for High Tension Terminal Assemblies | 1 |
| | | 5 |

# No. 5055 DISTRIBUTOR

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5055 | **DISTRIBUTOR COMPLETE** | 1 |
| 24431 | Housing for Distributor 5055 | 1 |
| 20775 | Cup for Retainer and Balls Assembly 10282 | 2 |
| 14005 | **Shaft Assembly (Service) (Includes Shaft, Cam and Pin)** | 1 |
| 14116 | **Shaft and Cone Assembly (Service) (Includes Shaft Assembly 14005 and Upper Cone) (Not shown in Illustration)** | 1 |
| 27222 | Cone for Shaft Assembly 14005 (Not shown in Illustration) | 1 |
| 21443 | Clamp Nut for Shaft Assembly 14005 (Round) | 1 |
| 21444 | Lock Nut for Clamp Nut 21443 | 1 |
| 10745 | **Condenser Assembly** (Includes the next Item) | 1 |
| 32141 | Screw for attaching Condenser Assembly 10745 | 4 |
| 23863 | Cover Plate for Housing 24431 | 1 |
| 23943 | Screw for retaining Cover Plate 23863 | 4 |
| 11869 | **Spring Terminal Assembly (Common)** | 2 |
| 20704 | Nut for Spring Terminal Assembly 11869 | 2 |
| 24953 | Lock Washer for Nut 20704 | 2 |
| 23445 | Plain Washer for Nut 20704 | 2 |
| 23784 | Plain Washer for Spring Terminal Assembly 11869 | 2 |
| 23781 | Insulating Washer for Spring Terminal Assembly 11869 | 2 |
| 23789 | Insulating Washer for Nut 20704 on Spring Terminal Assembly 11869 | 2 |
| 23791 | Insulating Bushing for Spring Terminal Assemblies 11869 | 1 |
| 11408 | **Contact Arm Assembly** (Includes the next 3 Items. Do not count Old Style Parts) | 1 |
| 11379 | **Connector Assembly for Contact Arm Assembly 11408 (Not shown in Illustration)** | 1 |
| 21801 | Terminal Wire (Old Style) | 1 |
| 24069 | Hub for Contact Arm Assembly 11408 (Not shown in Illustration) | 1 |
| 24947 | Screw for attaching Hub 24069 (Not shown in Illustration) | 2 |
| 23398 | Spring for Contact Arm Assembly 11408 (Not shown in Illustration) | 1 |
| 21780 | Stop for Contact Arm Assembly 11408 | 1 |
| 21836 | Screw for retaining Stop 21780 | 1 |
| 20345 | Lock Washer for Screws 21836 and 23871 | 3 |
| 23871 | Screw for connecting Condenser Assembly 10745 to Spring Terminal Assembly 11869 | 2 |
| 12411 | **Contact Screw Assembly (Not shown in Illustration)** | 1 |
| 21748 | Nut for Contact Screw Assembly 12411 | 1 |
| 21782 | Clip for Distributor Head Assembly 11250 (With Clip 21781) | 1 |
| 21781 | Clip for Distributor Head Assembly 11250 (With Long Tongue Clip) | 1 |
| 21783 | Clip for Distributor Head Assembly (Single) | 1 |
| 22556 | Screw for retaining Clips 21781 and 21782 | 2 |
| 23423 | Screw for retaining Clip 21783 (Not shown in Illustration) | 2 |
| 11232 | **Advance Shaft Assembly** | 1 |
| 24119 | Advance Lever for Advance Shaft Assembly 11232 | 1 |
| 24079 | Pin for retaining Advance Lever 24119 | 1 |
| 10938 | **Advance Yoke Assembly** | 1 |
| 23403 | Screw for Advance Yoke Assembly 10938 | 1 |
| 10429 | **Distributor Rotor Assembly Complete** (Includes the next 6 Items) | 1 |
| 11871 | **Connector Assembly (Contact)** | 1 |
| 23811 | Screw for retaining Connector Assembly 11871 (Not shown in Illustration) | 1 |
| 11870 | **Clip Assembly for locating Distributor Rotor Assembly 10429 (Not shown in Illustration)** | 1 |
| 21514 | Screw for retaining Clip Assembly 11870 (Not shown in Illustration) | 1 |
| 23831 | Brush for Distributor Rotor Assembly 10429 | 1 |
| 23812 | Spring for Brush 23831 (Not shown in Illustration) | 1 |
| 11811 | **Plate Assembly for retaining Contact Arm Assembly 11408** (Includes the next 2 Items) | 1 |
| 21493 | Stud for mounting Stop 21780 (Not shown in Illustration) | 1 |
| 21494 | Stud for mounting Contact Arm Assembly 11408 (Not shown in Illustration) | 1 |
| 23879 | Screw for retaining Plate Assembly 11811 (Not shown in Illustration) | 3 |
| 23876 | Plain Washer for Screw 23879 (Not shown in Illustration) | 3 |
| 23941 | Insulating Washer for Screw 23879 (Not shown in Illustration) | 3 |
| 21945 | Insulating Bushing for Screw 23879 | 3 |
| 21810 | Insulator for Plate Assembly 11811 | 1 |
| 23869 | Terminal for connecting Plate Assembly 11811 and Spring Terminal Assembly 11869 | 1 |
| 24232 | Screw for retaining Terminal 23869 | 1 |




No. 5055 DISTRIBUTOR

# No. 5049 DISTRIBUTOR

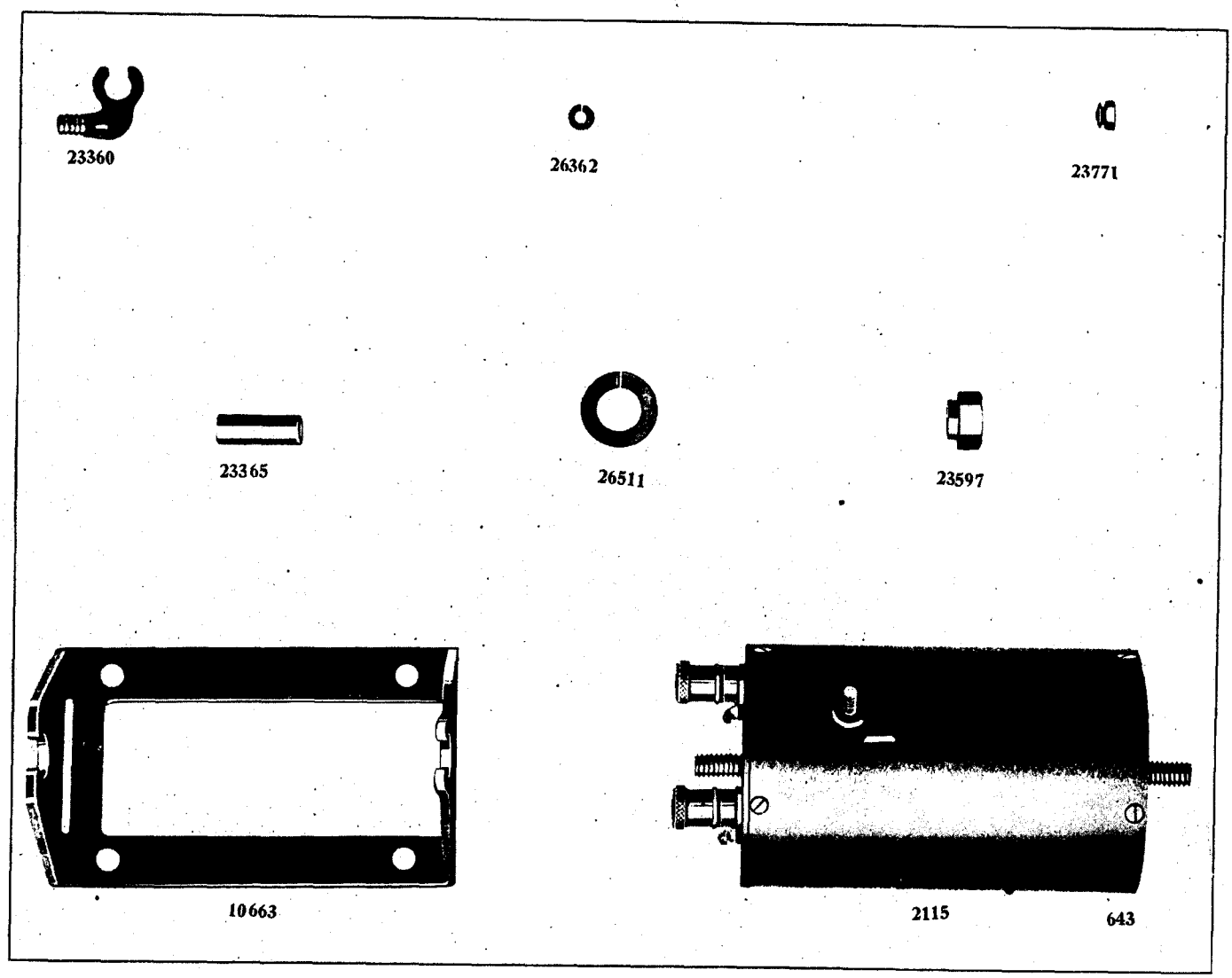
(Not Illustrated)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5049 | **DISTRIBUTOR ASSEMBLY COMPLETE** | 1 |
| 11442 | Housing Assembly Complete | 1 |
| | (Includes the next 2 Items) | |
| 24406 | Housing for Housing Assembly 11442 | 1 |
| 20775 | Cup for Retainer and Balls Assembly 10282 | 2 |
| 21443 | Clamp Nut for Shaft Assembly 11440 (Round) | 1 |
| 21444 | Lock Nut for Clamp Nut 21443 | 1 |
| 27222 | Cone for Shaft Assembly 11440 | 2 |
| 11440 | **Shaft Assembly (Includes Shaft, Cam, and Pin)** | 1 |
| 14115 | **Shaft and Cone Assembly Includes Shaft Assembly 11440) (Service) (and Upper Cone) (Service)** | 1 |
| 10282 | **Retainer and Balls Assembly** | 2 |
| 10598 | **Advance Yoke Assembly** | 1 |
| 21797 | Screw for Advance Yoke Assembly 10598 | 1 |
| 21786 | Advance Ring for Advance Yoke Assembly 10598 | 1 |
| 21776 | Pin for Advance Ring 21786 | 1 |
| 11869 | **Spring Terminal Assembly (Magneto)** | 2 |
| 10745 | **Condenser Assembly** | 1 |
| | (Includes the next Item) | |
| 32141 | Screw for attaching Condenser Assembly 10740 | 4 |
| 23875 | Separator for Condenser Assembly 10745 | 1 |
| 11408 | **Contact Arm Assembly for Distributor** | 1 |
| | (Includes the next 3 Items. Do not count Old Style Parts) | |
| 11379 | **Connector Assembly for Contact Arm Assembly 11408** | 1 |
| 21801 | Terminal Wire (Old Style) | 1 |
| 24069 | Hub for Contact Arm Assembly 11408 | 1 |
| 24947 | Screw for attaching Hub 24069 | 2 |
| 12411 | **Contact Screw Assembly for Contact Arm Assembly 11408** | 1 |
| 21748 | Nut for Contact Screw Assembly 11411 | 1 |
| 23398 | Spring for Contact Arm Assembly 11408 | 1 |
| 21780 | Stop for Contact Arm Assembly 11408 | 1 |
| 21836 | Screw for retaining Stop 21780 | 1 |
| 20345 | Lock Washer for Screws 21836 and 23870 | 3 |
| 23870 | Screw for connecting Condenser Assembly 10745 to Spring Terminal Assembly 11869 | 2 |
| 11111 | **Advance Shaft Assembly** | 1 |
| 23841 | Collar for Shaft Assembly 11111 | 1 |
| 24079 | Pin for retaining Collar 23841 | 1 |
| 11643 | **Distributor Head Assembly Complete** | 1 |
| | (Includes the next 2 Items. Do not count Old Style Parts) | |
| 21425 | Plunger (Old Style) for Distributor Head Assembly 11643 (Approximately ⅛" Diameter) | 1 |
| 27608 | Plunger for Distributor Head Assembly 11643 (Approximately ¼" Diameter) | 1 |
| 21424 | Spring (Old Style) for Plunger 21425 (Approximately ⅛" Diameter) | 1 |
| 27607 | Spring for Plunger 27608 (Approximately ¼" Diameter) | 1 |
| 10429 | **Distributor Rotor Assembly Complete** | 1 |
| | (Includes the next 6 Items) | |
| 11871 | **Connector Assembly Contact** | 1 |
| 23811 | Screw for retaining Connector Assembly 11871 | 1 |
| 11870 | **Clip Assembly for locating Distributor Rotor Assembly 10429** | 1 |
| 21514 | Screw for retaining Clip Assembly 11870 | 1 |
| 23831 | Brush for Distributor Rotor Assembly 10429 | 1 |
| 23812 | Spring for Brush 23831 | 1 |
| 21782 | Clip for Distributor Head Assembly 11643 (With Clip 21781) | 1 |
| 21781 | Clip for Distributor Head Assembly 11643 (Long Tongue Clip) | 1 |
| 21783 | Clip for Distributor Head Assembly 11643 (Single) | 1 |
| 21886 | Screw for retaining Clip 21783 | 2 |
| 21887 | Screw for retaining Clips 21781 and 21782 | 2 |
| 11811 | **Plate Assembly for retaining Contact Arm Assembly 11408** | 1 |
| | (Includes the next 2 Items) | |
| 21493 | Stud for mounting Stop 21780 | 1 |
| 21494 | Stud for mounting Contact Arm Assembly 11408 | 1 |
| 21747 | Screw for retaining Plate Assembly 11811 | 3 |
| 23876 | Plain Washer for Screw 21747 | 3 |
| 21495 | Insulating Bushing for Screw 21747 | 3 |
| 23941 | Insulating Washer for Screw 21747 | 3 |
| 23810 | Insulator under Plate 11811 | 1 |
| 23869 | Terminal for connecting Plate Assembly 11811 | 1 |
| 24232 | Screw for retaining Terminal 23869 | 1 |
| 23777 | Insulating Bushing for Spring Terminal Assembly 11869 | 2 |
| 23780 | Insulating Washer for Spring Terminal Assembly 11869 | 4 |
| 20704 | Nut for Spring Terminal Assembly 11869 | 2 |
| 24953 | Lock Washer for Nut 20704 | 2 |
| 23445 | Plain Washer for Spring Terminal Assembly 11869 | 4 |
| 12741 | **Wrench for Distributor** | 1 |
| 11863 | **High Tension Terminal Assembly for Distributor Head Assembly 11643 (Blank)** | 5 |
| 25003 | Rubber Washer for High Tension Terminal Assemblies | 5 |

# No. 5001 DISTRIBUTOR

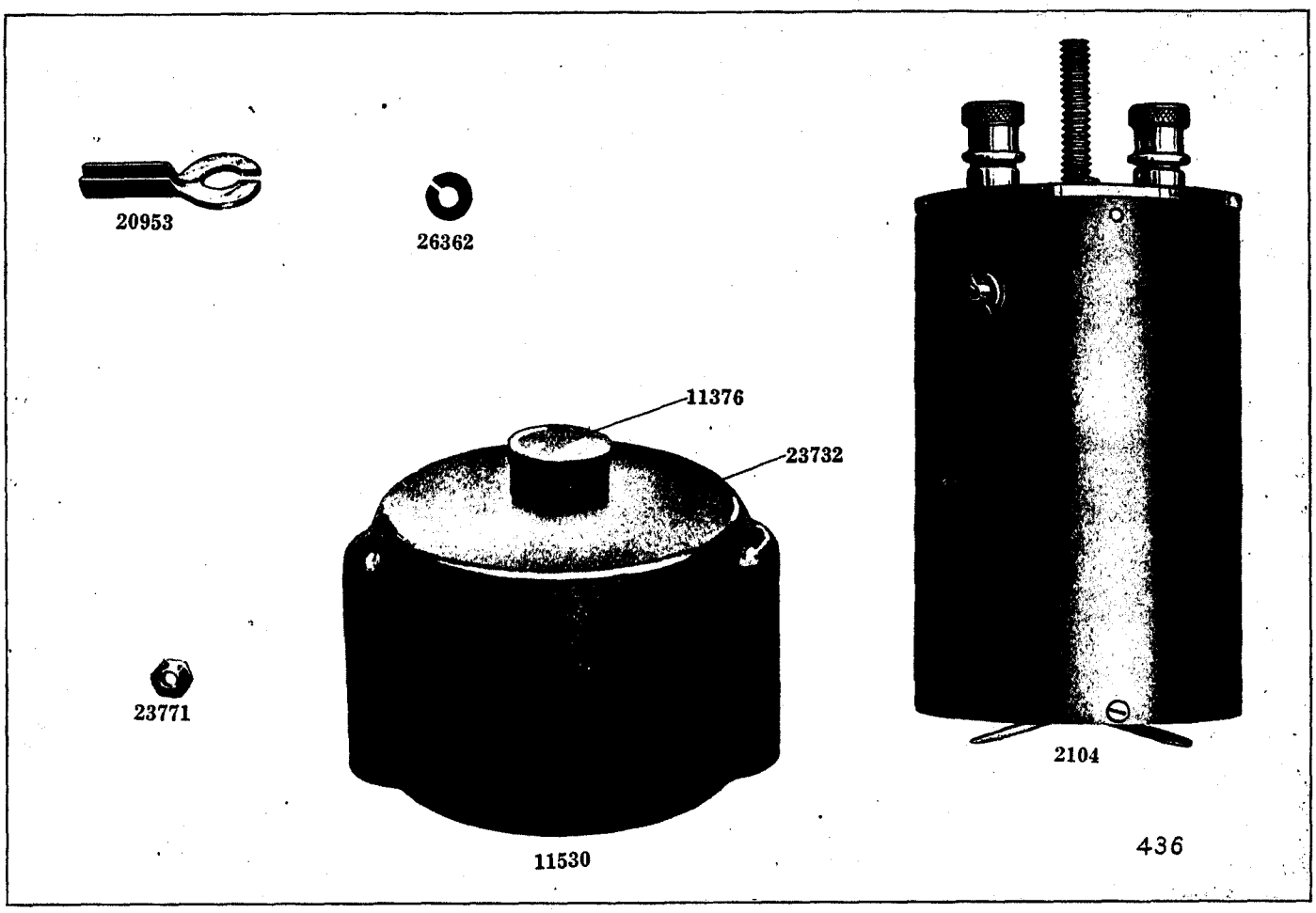
(Not Illustrated)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5001 | **DRY CELL DISTRIBUTOR COMPLETE** | 1 |
| 11991 | **Housing Assembly Complete** | 1 |
| | (Includes the next 2 Items) | |
| 24367 | Housing for Housing Assembly 11991 | 1 |
| 20775 | Cup for retainer and Balls Assembly 10282 | 1 |
| 14114 | **Shaft Assembly (Service) Including Shaft 11435 and Upper Cone)** | 1 |
| 21443 | Clamp Nut for Shaft Assembly 11435 (Round) | 1 |
| 21444 | Lock Nut for Clamp Nut 21443 (Hexagon) | 1 |
| 27222 | Cone for Shaft Assembly 11435 | 2 |
| 11435 | **Shaft Assembly (Includes the Shaft, Cam and Pin)** | 1 |
| 11667 | **Shaft and Cone Assembly** | 1 |
| 11226 | **Advance Lever Assembly** | 1 |
| 11230 | **Advance Shaft Assembly** | 1 |
| 24079 | Dowel Pin for retaining Advance Lever Assembly 11226 | 1 |
| 10888 | **Cover Assembly for Housing 24367** | 1 |
| | (Includes the next 2 Items) | |
| 23849 | Name Plate for Cover Assembly 10888 | 1 |
| 23839 | Rivet for Name Plate 23849 | 2 |
| 10282 | **Retainer and Balls Assembly** | 2 |
| 12411 | **Contact Screw Assembly** | 1 |
| 11868 | **Spring Terminal Assembly** | 1 |
| 14383 | **Contact Arm Assembly** | 1 |
| | (Includes the next 2 Items) | |
| 24069 | Hub for Contact Arm Assembly 14383 | 1 |
| 24947 | Screw for attaching Hub 24069 | 2 |
| 10598 | **Advance Yoke Assembly** | 1 |
| 21797 | Screw for Advance Yoke Assembly 10598 | 1 |
| 10429 | **Distributor Rotor Assembly Complete** | 1 |
| | (Includes the next 6 Items) | |
| 11871 | **Distributor Rotor Connector Assembly (Contact)** | 1 |
| 23811 | Screw for retaining Connector Assembly 11871 | 1 |
| 11870 | **Clip Assembly for locating Distributor Rotor Assembly 10429** | 1 |
| 21514 | Screw for retaining Clip Assembly 11870 | 1 |
| 23831 | Brush for Distributor Rotor Assembly 10429 | 1 |
| 23812 | Spring for Brush 23831 | 1 |
| 11643 | **Distributor Head Assembly Complete** | 1 |
| | (Includes the next 2 Items. Do not Count Old Style Parts) | |
| 21425 | Plunger (Old Style) for Distributor Head Assembly 11643 (Approximately ⅛" Diameter) | 1 |
| 27608 | Plunger for Distributor Head Assembly 11643 (Approximately ¼" Diameter) | 1 |
| 21424 | Spring (Old Style) for Plunger 21425 (Approximately ⅛" Diameter) | 1 |
| 27607 | Spring for Plunger 27608 (Approximately ¼" Diameter) | 1 |
| 21782 | Clip for Distributor Head Assembly 11643 (With Clip 21781) | 1 |
| 21781 | Clip for Distributor Head Assembly 11643 (Long Tongue Clip) | 1 |
| 21783 | Clip for Distributor Head Assembly 11643 (Single) | 1 |
| 21887 | Screw for retaining Clips 21781 and 21782 | 2 |
| 21886 | Screw for retaining Clip 21783 | 2 |
| 23777 | Insulating Bushing for Spring Terminal Assembly 11868 | 1 |
| 23780 | Insulating Washer for Spring Terminal Assembly 11868 | 2 |
| 23445 | Plain Washer for Spring Terminal Assembly 11868 | 2 |
| 20704 | Nut for Spring Terminal Assembly 11868 | 1 |
| 24953 | Lock Washer for Nut 20704 | 1 |
| 21748 | Lock Nut for Contact Screw Assembly 12411 | 1 |
| 21847 | Stud for retaining Contact Arm Assembly 14383 | 1 |
| 21499 | Stud for retaining Stop 21780 | 1 |
| 21780 | Stop for Contact Arm Assembly 14383 | 1 |
| 21836 | Screw for retaining Stop 21780 | 1 |
| 20345 | Lock Washer for Screw 21836 | 1 |
| 23398 | Spring for operating Contact Arm Assembly 14383 | 1 |
| 23882 | Screw for attaching Cover Assembly 10888 | 4 |
| 21776 | Pin for Advance Ring 21786 | 1 |
| 21786 | Advance Ring for Advance Yoke Assembly 10598 | 1 |
| 13502 | **Lead Assembly for connecting Distributor 5001** | 1 |
| | (Includes the next Item) | |
| 20953 | Terminal Clip for Lead Assembly 13502 | 2 |
| 12741 | **Wrench for Distributor** | 1 |
| 11863 | **High Tension Terminal Assembly for Distributor Head Assembly 11643 (Blank)** | 5 |
| 25003 | Rubber Washer for High Tension Terminal Assemblies | 5 |



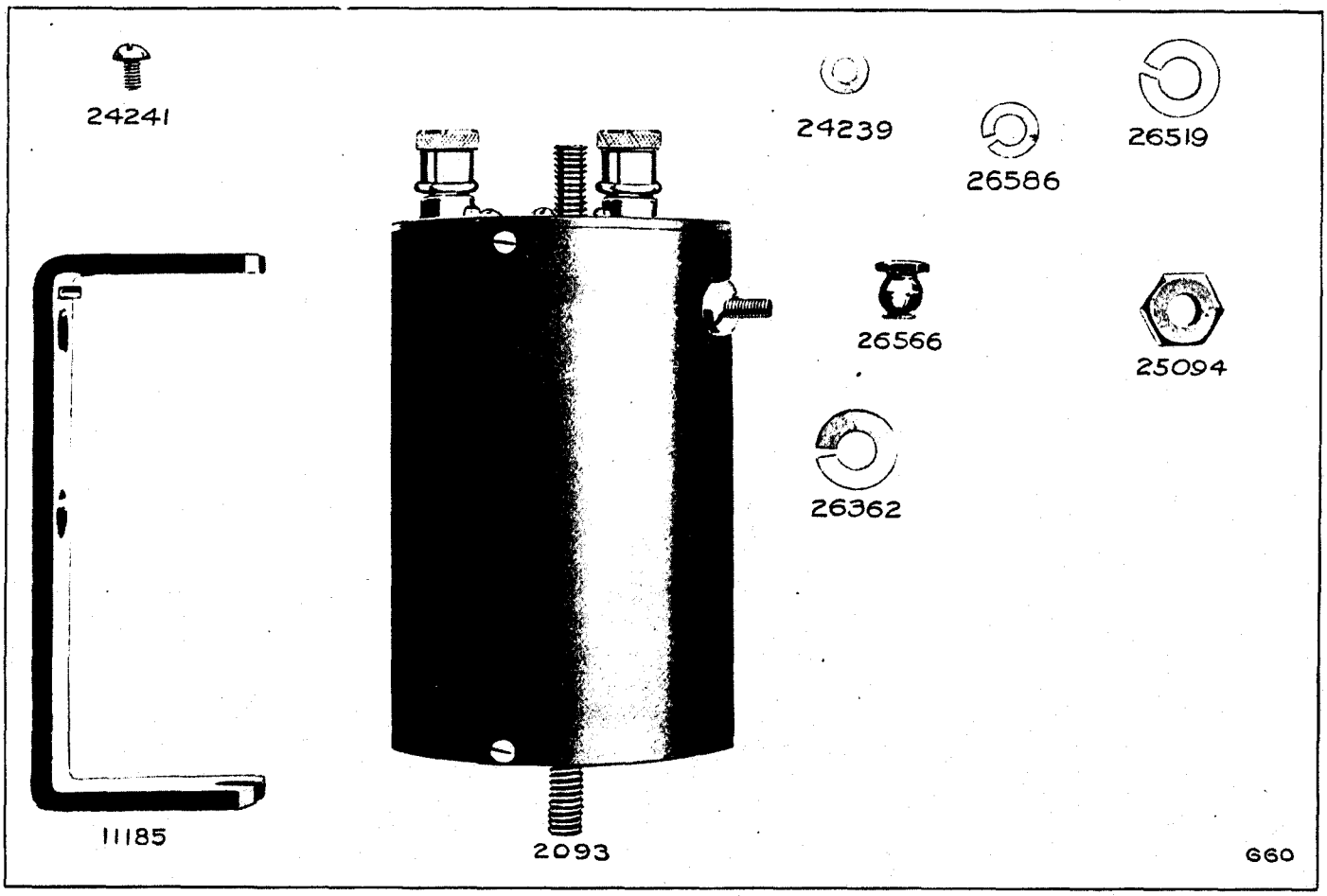

# No. 2115 IGNITION COIL

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **2115** | **IGNITION COIL COMPLETE** (Includes the next 4 Items) | 1 |
| **32115** | Nut for High Tension Terminal | 1 |
| **26362** | Lock Washer for Nut 23771 | 1 |
| **23597** | Nut for retaining Bracket Assembly 10663 | 2 |
| **26511** | Lock Washer for Nut 23597 | 2 |
| **23360** | Terminal Clip for connecting Ignition Coil 21115 | 1 |
| **23365** | Fibre Ferrule for Terminal Clip 23360 | 1 |
| **10663** | **Bracket Assembly for mounting Ignition Coil 2115** | 1 |



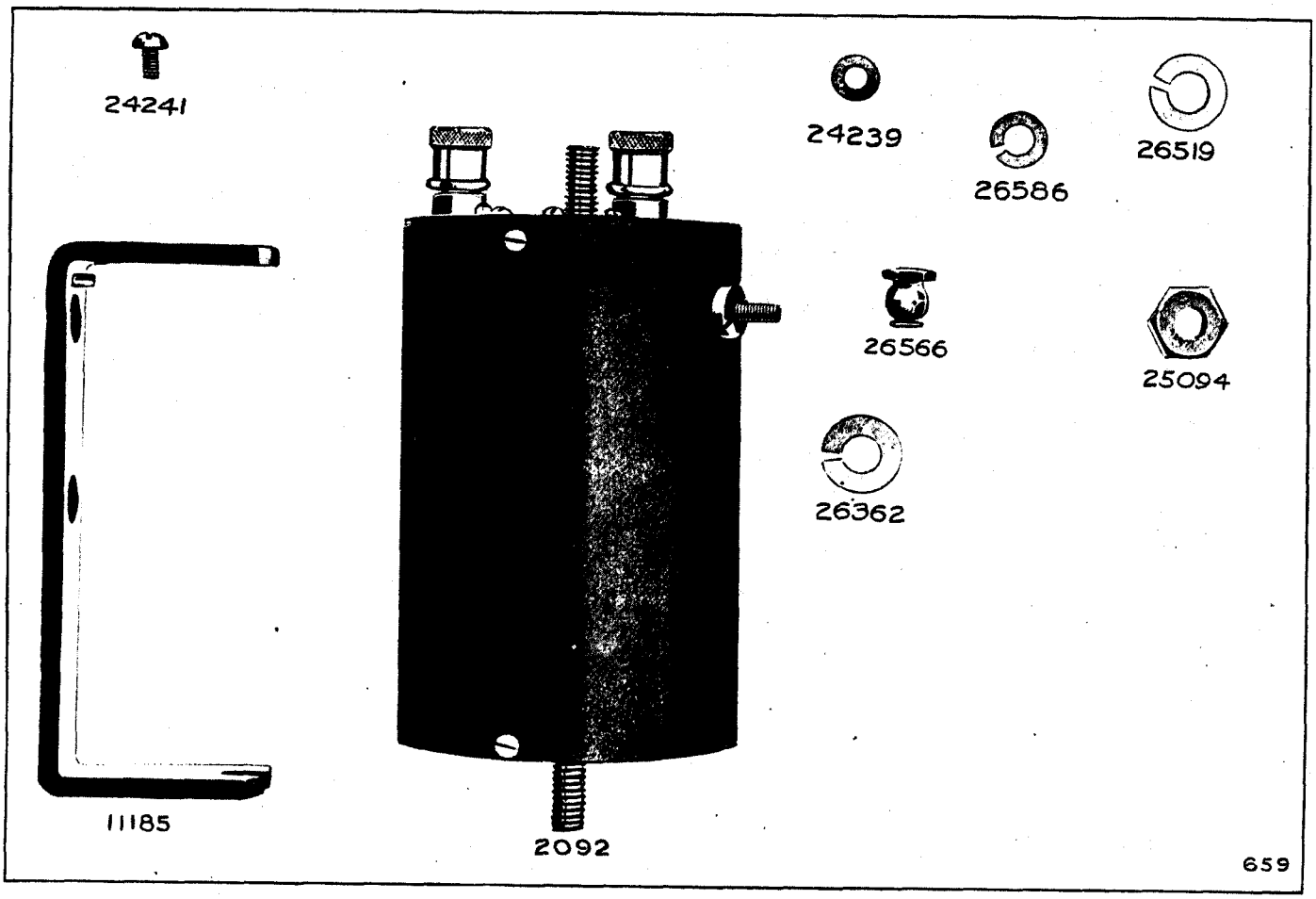

# No. 2104 IGNITION COIL

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **2104** | **IGNITION COIL COMPLETE** | 1 |
| **23771** | Nut for High Tension Terminal | 1 |
| **26362** | Lock Washer for Nut 23771 | 1 |
| **11530** | **Protector Assembly Complete** (Includes the next 3 Items) | 1 |
| **23732** | Protector for Protector Assembly 11530 | 1 |
| **11376** | **Nut Assembly** | 1 |
| **23447** | Plain Washer for Nut Assembly 11376 (Not shown in Illustration) | 1 |
| **20953** | Terminal Clip for connecting Ignition Coil 2104 | 2 |
| **23835** | Terminal Clip for High Tension Terminal (Not shown in Illustration) | 1 |



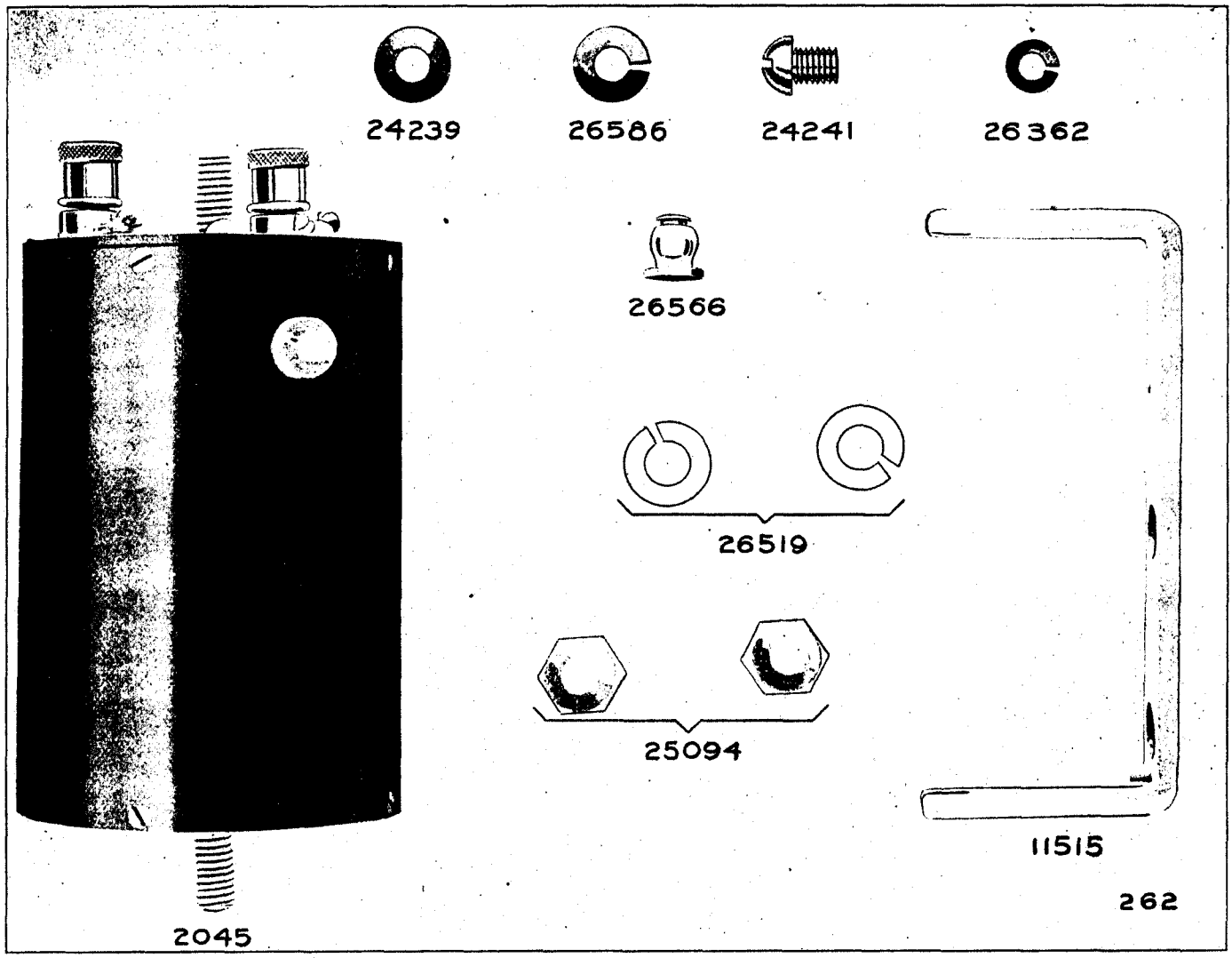

# No. 2093 IGNITION COIL

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **2093** | **IGNITION COIL COMPLETE** | 1 |
| **26566** | Nut for High Tension Terminal | 1 |
| **26362** | Lock Washer for Nut 26566 | 1 |
| **25094** | Nut for attaching Bracket Assembly 11185 | 2 |
| **26519** | Lock Washer for Nut 25094 | 2 |
| **11185** | **Bracket Assembly for mounting Ignition Coil 2093** | 1 |
| **24241** | Screw for Bracket Assembly 11185 | 1 |
| **26586** | Lock Washer for Screw 24241 | 1 |
| **24239** | Plain Washer for Screw 24241 | 1 |
| **20953** | Terminal Clip for connecting Ignition Coil 2093 (Not shown in Illustration) | 2 |




# No. 2092 IGNITION COIL

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **2092** | **IGNITION COIL COMPLETE** | 1 |
| **26566** | Nut for High Tension Terminal | 1 |
| **26362** | Lock Washer for Nut 26566 | 1 |
| **11185** | **Bracket Assembly for attaching Ignition Coil 2092** | 1 |
| **25094** | Nut for retaining Bracket Assembly 11185 | 2 |
| **26519** | Lock Washer for Nut 25094 | 2 |
| **24241** | Screw for Bracket Assembly 11185 | 1 |
| **26586** | Lock Washer for Screw 24241 | 1 |
| **24239** | Plain Washer for Screw 24241 | 1 |
| **20953** | Terminal Clip for connecting Ignition Coil 2092 (Not shown in Illustration) | 1 |




# No. 2045 IGNITION COIL

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **2045** | **IGNITION COIL COMPLETE** | 1 |
| **11515** | **Bracket Assembly for mounting Coil** | 1 |
| **25094** | Nut for mounting Coil | 2 |
| **26519** | Lock Washer for Nut 25094 | 2 |
| **26566** | Nut for High Tension Terminal | 1 |
| **26362** | Lock Washer for Nut 26566 | 1 |
| **24241** | Screw for Bracket Assembly 11515 | 1 |
| **26586** | Lock Washer for Screw 24241 | 1 |
| **24239** | Plain Washer for Screw 24241 | 1 |

# No. 2022 IGNITION COIL

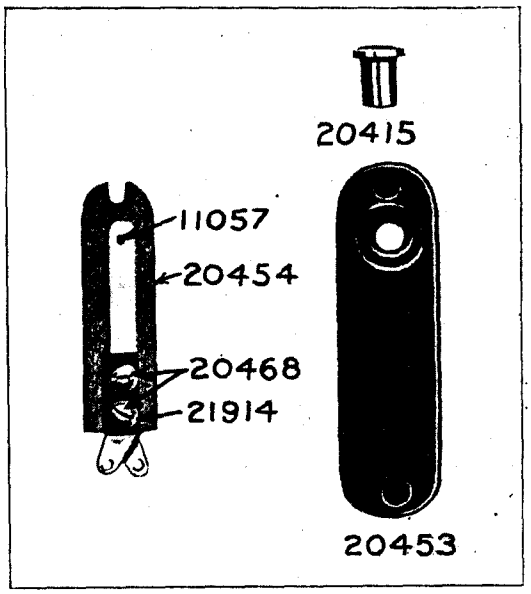
(Not Illustrated)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 2022 | **IGNITION COIL COMPLETE** | 1 |
| 26566 | Nut for High Tension Terminal | 1 |
| 26362 | Lock Washer for Nut 26566 | 1 |
| 25094 | Nut for retaining Bracket 21497 | 2 |
| 26519 | Lock Washer for Nut 25094 | 2 |
| 21497 | Bracket for attaching Coil 2022 | 1 |
| 24241 | Screw for Bracket 21497 | 1 |
| 26586 | Lock Washer for Screw 24241 | 1 |
| 24239 | Plain Washer for Screw 24241 | 1 |
| 23573 | Number Plate for Coil 2022 | 1 |
| 24747 | Screw for attaching Number Plate 23573 | 2 |

# No. 2004 COIL BOX

(Not Illustrated)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **2004** | **COIL BOX COMPLETE** | 1 |
| **10707** | **Spring Terminal Assembly** | 5 |
| **12882** | **Coil Assembly** | 1 |
| **12994** | **Box Assembly** | 1 |
| | (Includes the next 2 Items) | |
| **23568** | Name Plate for Box Assembly 13013 | 2 |
| **24963** | Rivet for Name Plate 23568 | 1 |
| **24960** | Screw for retaining Box Assembly 12994 | 5 |
| **24694** | Screw for retaining Spring Terminal Assembly 10707 | 5 |
| **28335** | Plain Washer for Screw 24694 | 5 |
| **28333** | Box for retaining Coil Assembly 12882 | 1 |
| **25374** | Separator for Coil Assembly 12882 | 3 |
| **24487** | Nut for High Tension Terminal | 4 |
| **24744** | Nut for retaining Coil Assembly 12882 | 4 |
| **25207** | Plain Washer for Nut 24744 | 4 |
| **25373** | Insulator for High Tension Terminal | 4 |
| **25119** | Plain Washer for Insulator 25373 (Large) | 4 |
| **25189** | Insulator for Separator 25374 | 1 |
| **25188** | Bracket for mounting Coil Box 2004 | 1 |
| **28326** | Screw for attaching Bracket 25188 | 4 |
| **28337** | Strip for mounting Spring Terminal Assembly 10707 | 1 |
| **28336** | Strip for retaining Coil Assembly 12882 | 1 |

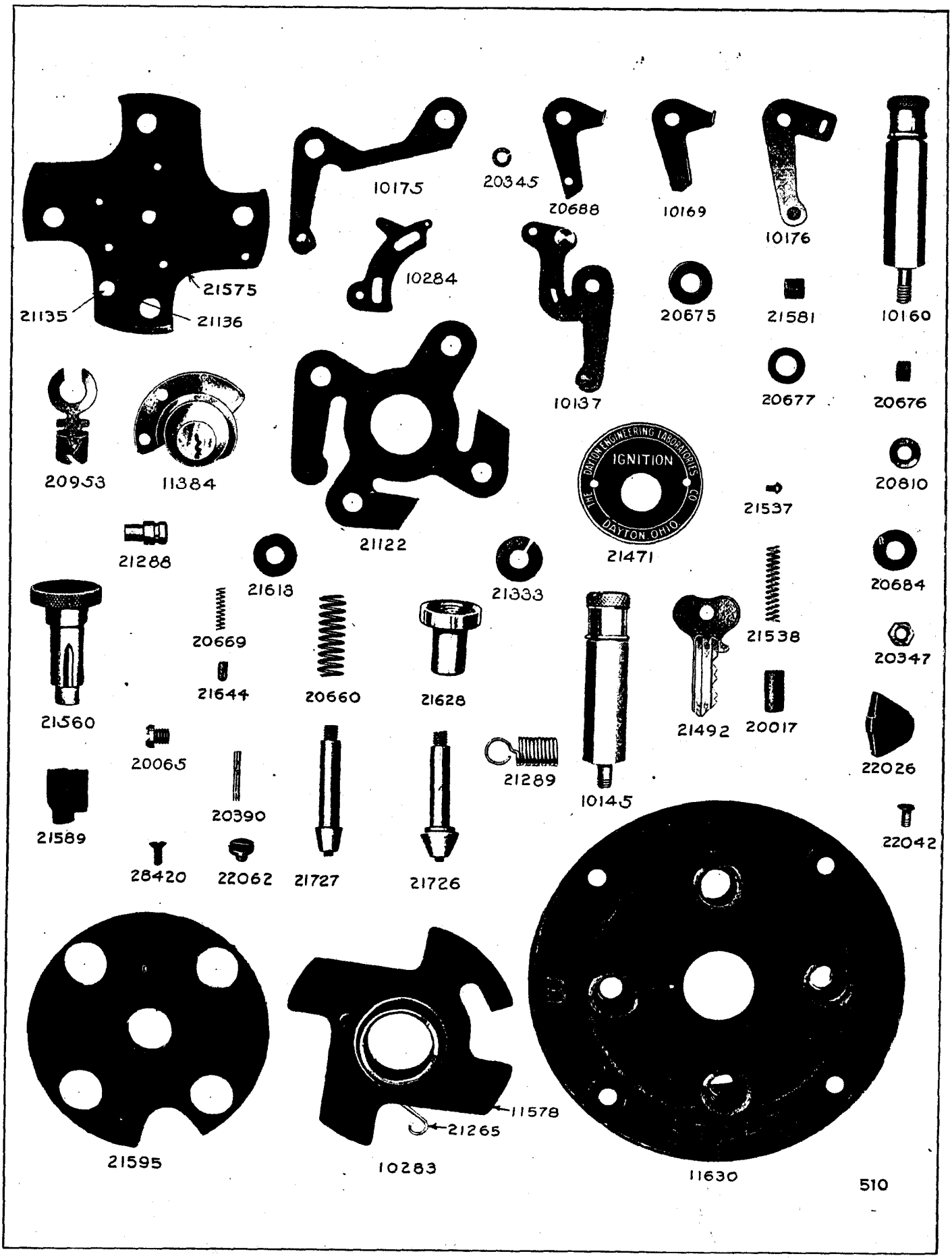



# No. 1991 STARTING SWITCH

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **1991** | **STARTING SWITCH COMPLETE** | 1 |
| **20453** | Cover for Switch | 1 |
| **20415** | Plunger for operating Contact Spring Assembly 11057 | 1 |
| **20454** | Plate for mounting Contact Spring Assembly 11057 | 1 |
| **11057** | **Contact Spring Assembly for Switch** | 2 |
| **20468** | Screw for mounting Contact Spring Assembly 11057 | 2 |
| **20418** | Insulating Bushing for Screw 20468 (Not shown in Illustration) | 2 |
| **21914** | Lock Washer for Screw 20468 | 2 |
| **20201** | Insulator between Contact Spring Assembly 11057 (Not shown in Illustration) | 3 |
| **20467** | Insulator (Long) for Contact Spring Assembly 11057 (Not shown in Illustration) | 1 |
| **20200** | Insulator for Contact Spring Assembly 11057 under Screw 20468 (Not shown in Illustration) | 1 |

# No. 1979 IGNITION SWITCH

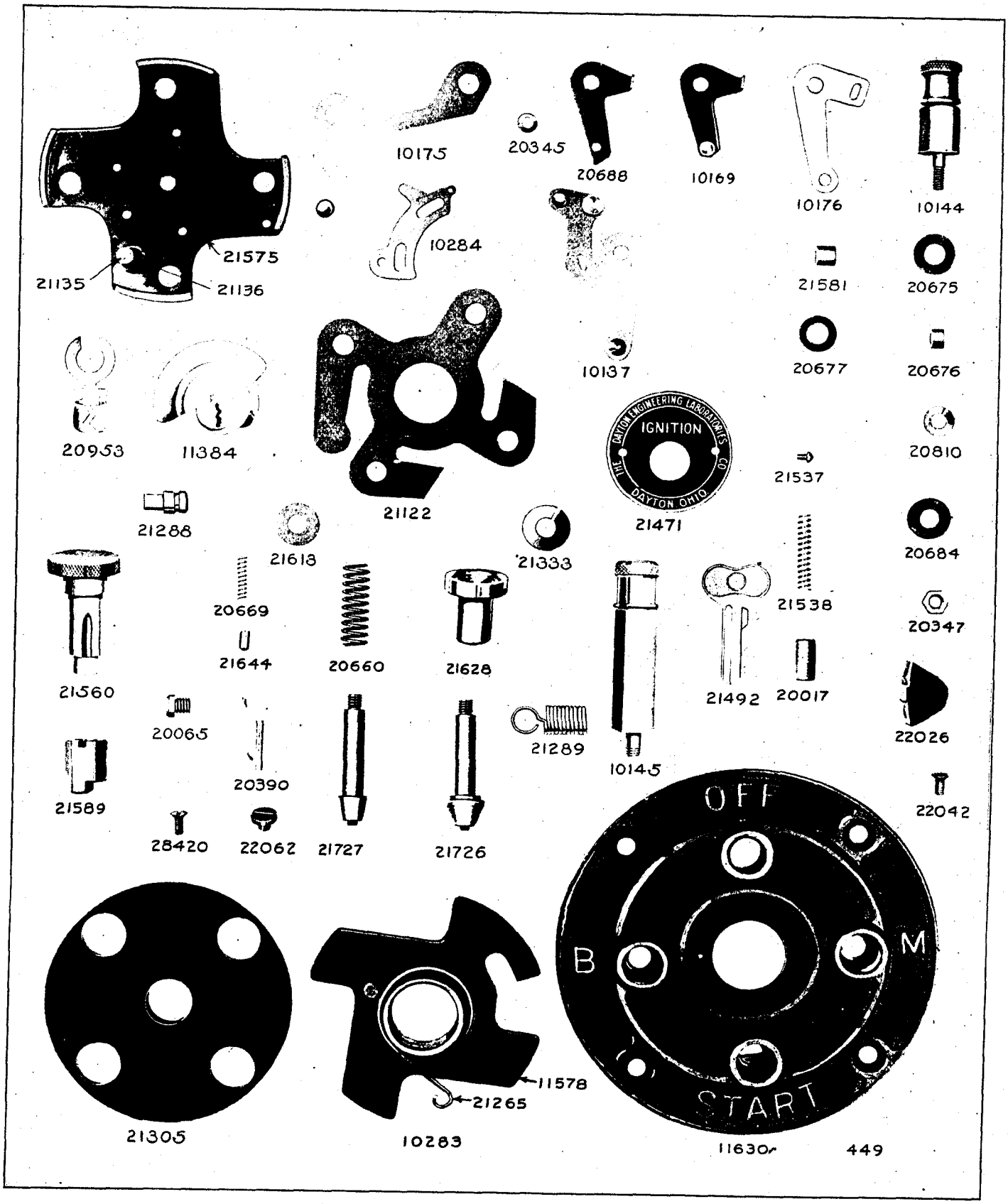
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1979 | **IGNITION SWITCH COMPLETE** | 1 |
| 10289 | **Shell Assembly Complete** (Includes the next 16 Items) | 1 |
| 10287 | **Shell Assembly** (Includes the next 6 Items) | 1 |
| 13836 | **Shell Assembly** | 1 |
| 21628 | Button for Studs 21726 and 21727 | 3 |
| 21726 | Stud for operating Contacts (Battery and Magneto) | 2 |
| 21727 | Stud for operating Contacts (Start) | 1 |
| 20660 | Spring for Push Button 21628 | 3 |
| 29284 | Lock Washer for Button 21628 (Not shown in Illustration) | 3 |
| 21560 | Button for locking Switch | 1 |
| 21644 | Plunger for Button 21560 | 1 |
| 20669 | Spring for Plunger 21644 | 1 |
| 20017 | Plunger for Spring 21538 | 1 |
| 21538 | Spring for Button 21560 | 1 |
| 22026 | Bracket for retaining Spring 21538 and Plunger 20017 | 1 |
| 22042 | Screw for retaining Bracket 22026 | 2 |
| 21589 | Locking Cam for Button 21560 | 1 |
| 20390 | Pin for Locking Cam 21589 | 1 |
| 10288 | **Switch Mechanism Assembly Complete** (Includes the next 28 Items) | 1 |
| 10285 | **Support Plate Assembly** (Includes the next 6 Items) | 1 |
| 10284 | **Locking Cam Assembly** | 1 |
| 21289 | Spring for Locking Cam Assembly 10284 | 1 |
| 21288 | Stud for Spring 21289 | 1 |
| 21137 | Stud for Locking Cam Assembly 10284 (Not shown in Illustration) | 1 |
| 21136 | Plain Washer for Stud 21135 | 1 |
| 21135 | Stud for retaining Spring 21265 | 1 |
| 10169 | **Contact Arm Assembly (Short)** | 1 |
| 10176 | **Contact Arm Assembly (Single)** | 1 |
| 10137 | **Contact Arm Assembly (Double)** | 1 |
| 10175 | **Contact Arm Assembly (Common)** | 1 |
| 10160 | **Spring Terminal Assembly (Outer)** | 1 |
| 10145 | **Spring Terminal Assembly (Center)** | 1 |
| 21122 | Insulator for Contact Arm Assembly 10175 | 1 |
| 20677 | Insulating Washing for Contact Arm Assemblies 10169 and 10176 | 2 |
| 20675 | Insulating Washer for Nut 20347 | 4 |
| 20810 | Plain Washer for Nut 20347 | 4 |
| 20684 | Plain Washer for (Common) Spring Terminal Assembly (Thick) | 1 |
| 21613 | Plain Washer for Spring Terminal Assembly 10160 (Thin) | 1 |
| 20347 | Nut for Spring Terminal Assemblies 10145 and 10160 | 5 |
| 24240 | Lock Washer for Spring Terminal Assembly 10145 (Not shown in Illustration) | 1 |
| 20676 | Insulating Bushing for Spring Terminal Assembly 10160 (Long) | 3 |
| 21581 | Insulating Bushing for Spring Terminal Assembly 10160 (Short) | 1 |
| 20688 | Support Plate for Contact Arm Assembly 10176 | 2 |
| 20345 | Lock Washer for Screw 20065 | 3 |
| 20065 | Screw for retaining Lock Assembly 11384 | 3 |
| 11384 | **Lock Assembly Complete** (Includes the next Items) | 1 |
| 29958 | Key for Lock Assembly 11384 (Give Series No. of Lock) | 2 |
| 10283 | **Detent Assembly Complete** (Includes the next 2 Items) | 1 |
| 21262 | Stud for Spring 21265 (Not shown in Illustration) | 1 |
| 21265 | Spring for Detent Assembly 10283 | 1 |
| 21595 | Cover Plate for Switch | 1 |
| 21471 | Name Plate for Switch | 1 |
| 21537 | Screw for retaining Name Plate 21471 | 2 |
| 28420 | Screw for retaining Cover Plate 21595 | 4 |
| 22062 | Screw for retaining Switch Mechanism Assembly 10268 | 4 |
| 20953 | Terminal Clip for connecting Switch 1979 | 4 |




No. 1979 IGNITION SWITCH

# No. 1978 IGNITION SWITCH

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1978 | **IGNITION SWITCH COMPLETE** | 1 |
| 10289 | **Shell Assembly Complete** (Includes the next 16 Items) | 1 |
| 10287 | **Shell Assembly** (Includes the next 6 Items) | 1 |
| 13836 | **Shell Assembly** | 3 |
| 21628 | Button for Studs 21726 and 21727 | 2 |
| 21726 | Stud (Battery and Magneto) for operating Contacts | 1 |
| 21727 | Stud for operating Contacts (Start) | 3 |
| 20660 | Spring for Push Button 21628 | 3 |
| 29284 | Lock Washer for Button 21628 (Not shown in Illustration) | 1 |
| 21560 | Button for locking Switch | 1 |
| 21644 | Plunger for Button 21560 | 1 |
| 20669 | Spring for Plunger 21644 | 1 |
| 20017 | Plunger for Spring 21538 | 1 |
| 21538 | Spring for Plunger 21560 | 1 |
| 22026 | Bracket for retaining Spring 21538 and Plunger 20017 | 2 |
| 22042 | Screw for retaining Bracket 22026 | 1 |
| 21589 | Locking Cam for Button 21560 | 1 |
| 20390 | Pin for Locking Cam 21589 | 1 |
| 10286 | **Switch Mechanism Assembly Complete** (Includes the next 28 Items) | 1 |
| 10285 | **Support Plate Assembly** (Includes the next 6 Items) | 1 |
| 10284 | **Locking Cam Assembly** | 1 |
| 21289 | Spring for Locking Cam Assembly 10284 | 1 |
| 21288 | Stud for Spring 21289 | 1 |
| 21137 | Stud for Locking Cam Assembly 10284 (Not shown in Illustration) | 1 |
| 21136 | Plain Washer for Locking Cam Assembly 10284 | 1 |
| 21135 | Stud for retaining 21265 | 1 |
| 10169 | **Contact Arm Assembly (Short)** | 1 |
| 10176 | **Contact Arm Assembly (Single)** | 1 |
| 10137 | **Contact Arm Assembly (Double)** | 1 |
| 10175 | **Contact Arm Assembly (Common)** | 4 |
| 10144 | **Spring Terminal Assembly (Short)** | 1 |
| 10145 | **Spring Terminal Assembly (Long)** | 1 |
| 21122 | Insulator for Contact Arm Assembly 10175 | 2 |
| 26677 | Insulating Washer for Contact Arm Assemblies 10169 and 10176 | 4 |
| 20675 | Insulating Washer for Nut 20347 | 4 |
| 20810 | Plain Washer for Nut 20347 | 1 |
| 20684 | Plain Washer for (Common) Spring Terminal Assembly 10144 (Thick) | 1 |
| 21613 | Plain Washer for Spring Terminal Assembly 10144 (Thin) | 5 |
| 20347 | Nut for Spring Terminal Assemblies 10144 and 10145 | 1 |
| 24240 | Lock Washer for Spring Terminal Assembly 10145 (Not shown in Illustration) | 3 |
| 20676 | Insulating Bushing for Spring Terminal Assembly 10144 (Long) | 1 |
| 21581 | Insulating Bushing for Spring Terminal Assembly 10144 (Short) | 2 |
| 20688 | Support Plate for Contact Arm Assembly 10176 | 3 |
| 20345 | Lock Washer for Screw 20065 | 3 |
| 20065 | Screw for retaining Lock Assembly 11384 | 1 |
| 11384 | **Lock Assembly** (Includes the next Item) | 2 |
| 29958 | Key for Lock Assembly 11384 (Give Series No. of Lock) | 1 |
| 10283 | **Detent Assembly Complete** (Includes the next 2 Items) | 1 |
| 21262 | Stud for Spring 21265 (Not shown in Illustration) | 1 |
| 21265 | Spring for Detent Assembly 10283 | 1 |
| 21305 | Cover Plate for Switch | 1 |
| 21471 | Name Plate for Switch | 2 |
| 21537 | Screw for retaining Name Plate 21471 | 4 |
| 28420 | Screw for retaining Cover Plate 21305 | 4 |
| 22062 | Screw for retaining Switch Mechanism Assembly 10286 | 5 |
| 20953 | Terminal Clip for connecting Ignition Switch 1978 | |



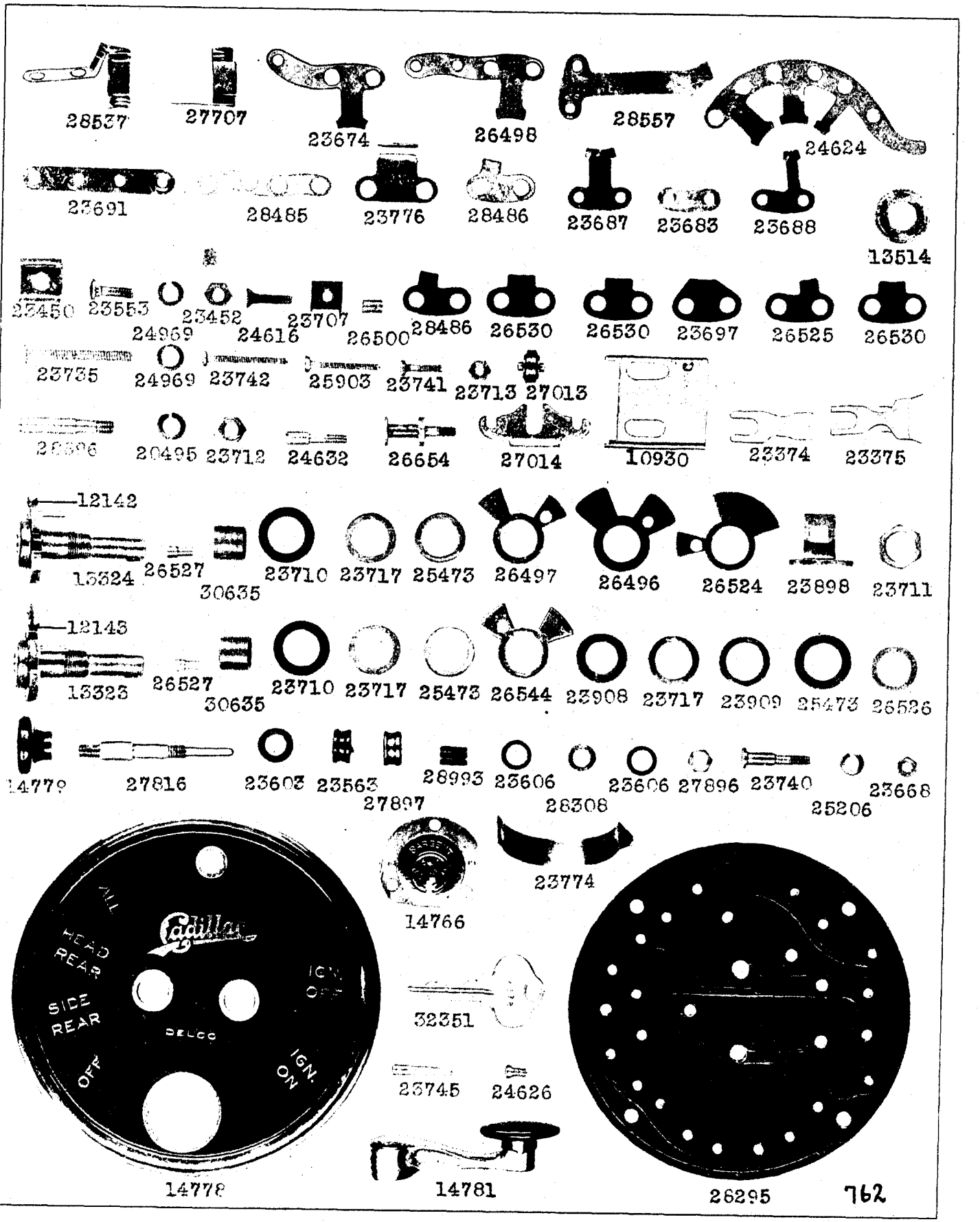

## No. 1978 IGNITION SWITCH

# No. 1150 COMBINATION SWITCH (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 26525 | Insulating Plate for Terminals No. 1 and 8 | 5 |
| 26530 | Insulating Plate for Terminals Nos. 2, 3, 5 and 6 | 11 |
| 28483 | Insulating Bushing for Terminal No. 3 (Not shown in Illustration) | 2 |
| 28486 | Separator Plate for Terminal No. 8 | 2 |
| 28537 | Contact Spring for connecting Terminal No. 8 and Plunger Assembly 13086 | 1 |
| 27705 | Contact Spring for connecting Plunger Assembly 13086 and Terminal No. 9 | 1 |
| 23741 | Screw for retaining Contact Spring 27707 and Terminal No. 4 | 4 |
| 23740 | Screw for retaining Tumbler Assembly 10930 | 2 |
| 23683 | Plate for retaining Screws 23741 on Terminal No. 4 | 1 |
| 23697 | Insulating Plate for Terminal No. 6 under Brush 26498 (Large) | 1 |
| 28485 | Plate connecting Terminal No. 3 and Contact Spring 28537 | 1 |
| 23713 | Nut for Screws 23740, 24632 and Stud 26654 | 5 |
| 23668 | Nut for retaining Screw 23742 | 2 |
| 26654 | Stud for retaining Roller Bracket 27014 | 1 |
| 25206 | Lock Washer for Nut 23713 | 5 |
| 20495 | Lock Washer for Nut 23712 | 2 |
| 20393 | Lock Washer for Screw 23735 | 4 |
| 23735 | Screw for retaining Housing Assembly | 4 |
| 23707 | Nut for Screw 24616 | 1 |
| 24616 | Screw for retaining Spring 23774 | 1 |
| 23742 | Screw for retaining Brushes 23674 and 24624 (Short) | 2 |
| 24632 | Stop Screw for Blade Assemblies | 2 |
| 26523 | Screw for retaining Terminal No. 7 (Not shown in Illustration) | 2 |
| 31009 | Spacing Washer for Blade Assemblies | 2 |
| 28896 | Stud for retaining Blade Assemblies | 2 |
| 23712 | Nut for retaining Stud 28896 | 2 |
| 23691 | Terminal Plate under Terminal Plate No. 4 | 1 |
| 23374 | Terminal Clip for connecting Switch (Small) | 7 |
| 23375 | Terminal Clip for connecting Switch (Large) | 2 |

# No. 1150 COMBINATION SWITCH

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1150 | **COMBINATION SWITCH** | 1 |
| 14777 | **Housing Assembly Complete** (Includes the next 12 Items) | 1 |
| 32291 | Escutcheon Plate for Switch | 1 |
| 28612 | Ferrule for retaining Plate 32291 | 2 |
| 14779 | **Button Assembly for Plunger Assembly 15307** | 1 |
| 28308 | Insulating Washer for Plunger Assembly 15307 | 1 |
| 15307 | **Plunger Assembly Complete** (Includes the next 7 Items) | 1 |
| 27816 | Plunger for Plunger Assembly 15307 | 1 |
| 23563 | Insulating Collar for Plunger 27816 | 1 |
| 28993 | Insulating Bushing for Plunger 27816 | 1 |
| 27897 | Contact Collar for Plunger 27816 | 1 |
| 23606 | Plain Washer for Nut 27896 | 1 |
| 23603 | Insulating Washer for Contact Collar 27897 | 1 |
| 27896 | Nut for Clamping Plunger Assembly 15307 | 1 |
| 23898 | Terminal Post for connecting Switch | 1 |
| 23553 | Screw for retaining Terminal Clip 23450 | 1 |
| 23452 | Nut for Screw 23553 | 1 |
| 20393 | Lock Washer for Nut 23452 | 1 |
| 23450 | Clip for Terminal Clip 23374 | 1 |
| 13290 | **Blade Assembly Complete (Ignition)** (Includes the next 15 Items) | 1 |
| 13323 | **Stud Assembly** | 1 |
| 12143 | **Stop Wheel Assembly** | 1 |
| 26527 | Insulating Bushing for Stop Wheel Assembly 12143 | 1 |
| 30635 | Insulating Bushing for Stud Assembly 13323 | 1 |
| 26497 | Blade for Blade Assembly 13290 (Lower) | 1 |
| 26524 | Blade for Blade Assembly 13290 (Upper) | 1 |
| 26496 | Insulator between Blade 26497 and 26524) | 1 |
| 23710 | Insulating Washer for Blade 26497 and 26524 | 2 |
| 23717 | Plain Washer for Stop Wheel Assembly 12143 (Thick) | 2 |
| 25473 | Plain Washer for Stop Wheel Assembly 12143 (Thin) | 1 |
| 23908 | Plain Washer for Blade 26524 (Thick) | 1 |
| 23711 | Nut for Clamping Blade Assembly 13290 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 25473 | Plain Washer for Blades 26524 (Thin) | 1 |
| 13291 | **Blade Assembly Complete (For Lighting)** (Includes the next 13 Items) | 1 |
| 13324 | **Stud Assembly** | 1 |
| 12142 | **Stop Wheel Assembly** | 1 |
| 26527 | Insulating Bushing for Stop Wheel Assembly 12142 | 1 |
| 30635 | Insulating Bushing for Stud Assembly 13324 | 1 |
| 26544 | Blade for Blade Assembly 13291 | 1 |
| 23717 | Plain Washer for Stop Wheel Assembly 12142 (Thick) | 1 |
| 25473 | Plain Washer for Stop Wheel Assembly 12142 (Thin) | 1 |
| 23710 | Insulating Washer for Blade 26544 | 2 |
| 25473 | Plain Washer for Blade 26544 (Thin) | 1 |
| 23908 | Plain Washer for Blade 26544 (Thick) | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23711 | Nut for Clamping Blade Assembly 13291 | 1 |
| 14766 | **Lock Assembly for Switch** (Includes the next Item) | 1 |
| 32351 | Key for Lock Assembly 14766 (Give Series No. of Lock | 2 |
| 24626 | Screw for retaining Lock Assembly 14766 | 3 |
| 10930 | **Tumbler Assembly for Locking Blade Assemblies 13290 and 13291** | 1 |
| 14781 | **Lever Assembly for operating Blade Assemblies** | 2 |
| 23745 | Screw for retaining Lever | 2 |
| 27014 | Roller Bracket for retaining Roller 27013 | 1 |
| 27013 | Roller for Blade Assemblies 13290 and 13291 | 2 |
| 23774 | Spring for Roller Bracket 27014 | 2 |
| 23776 | Spring for Tumbler Assembly 10930 | 1 |
| 28295 | Mounting Plate for Switch | 1 |
| 23674 | Brush for Terminal No. 5 (Lower) | 1 |
| 23687 | Brush for Terminals No. 2, 3, 5, 6 (Upper) | 4 |
| 23688 | Brush for Terminal No. 1 (Upper) | 1 |
| 28557 | Brush for connecting Terminal No. 8 and Blade Assembly | 1 |
| 24624 | Brush for Terminals No. 1, 2 and 3 (Lower) | 1 |
| 26498 | Brush for Terminals No. 6 and 7 (Lower) | 1 |
| 25903 | Screw for retaining Terminals No. 1, 2, 3, 5, 6 and 8 | 12 |
| 26500 | Insulating Bushing for Screw 25903 | 10 |




No. 1150 COMBINATION SWITCH

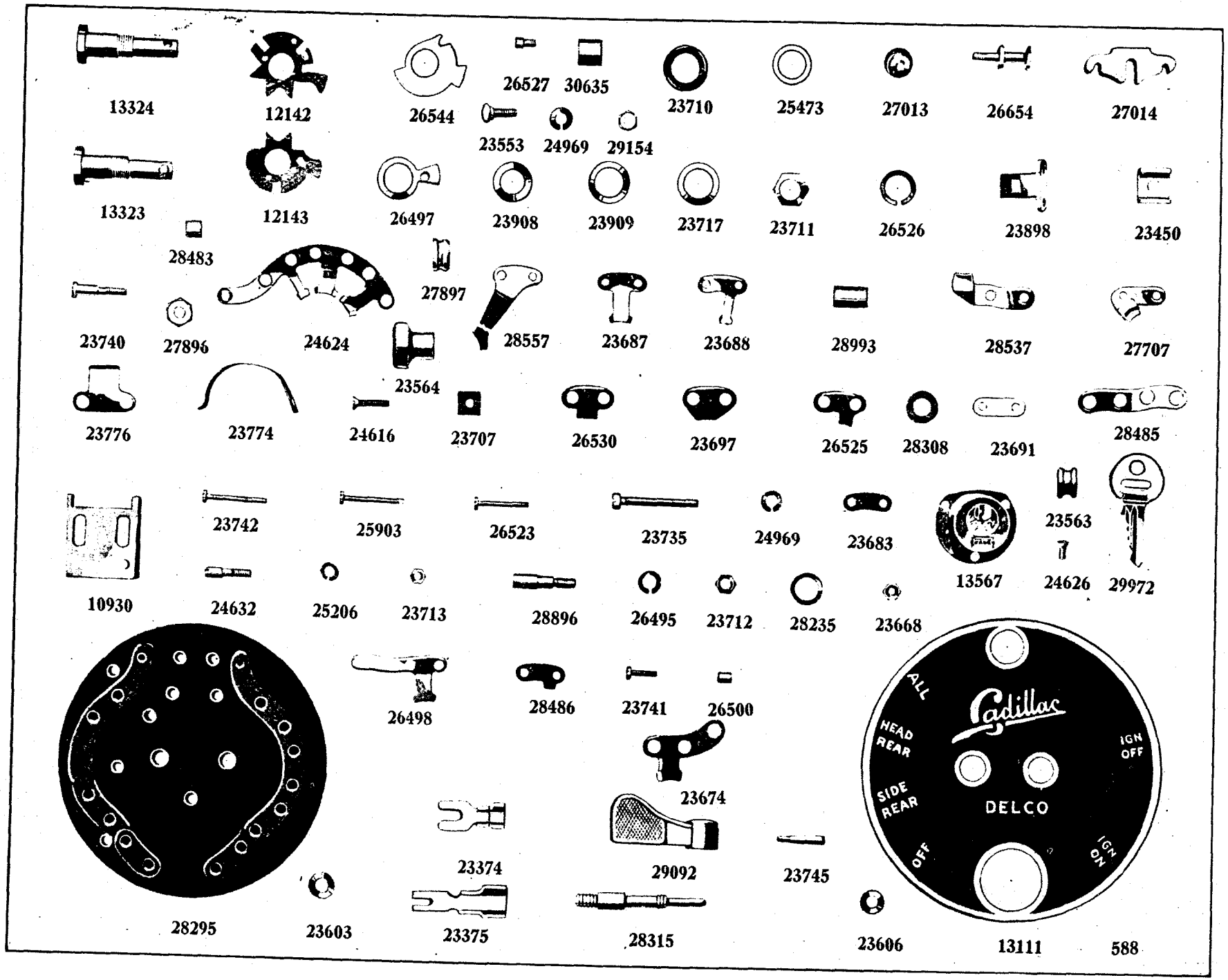
# No. 1099 COMBINATION SWITCH (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 26498 | Brush for Terminals No. 6 and 7 (Lower) | 1 |
| 25903 | Screw for retaining Terminals No. 1, 2, 3, 5, 6 and 8 | 12 |
| 26500 | Insulating Bushing for Screw 25903 | 10 |
| 26525 | Insulating Plate for Terminals No. 1 and No. 8 | 5 |
| 26530 | Insulating Plate for Terminals No. 2, 3, 5 and 6 | 11 |
| 28483 | Insulating Bushing for Terminal No. 8 | 2 |
| 28486 | Separator Plate for Terminal No. 8 | 2 |
| 28537 | Contact Spring for connecting Terminal No. 3 and Plunger Assembly 13110 | 1 |
| 27707 | Contact Spring for connecting Plunger Assembly 13110 and Terminal No. 9 | 1 |
| 23741 | Screw for retaining Contact Spring 27707 and Terminal No. 4 | 1 |
| 23740 | Screw for retaining Tumbler Assembly 10930 | 2 |
| 23683 | Plate for retaining Screws 23741 on Terminal No. 4 | 1 |
| 23697 | Insulating Plate for Terminal No. 6 under Brush 26498 (Large) | 1 |
| 28485 | Plate connecting Terminal No. 3 and Contact Spring 28537 | 1 |
| 23713 | Nut for Screws 23740, 24632 and Stud 26654 | 5 |
| 23668 | Nut for retaining Screw 23742 | 2 |
| 26654 | Stud for retainng Roller Bracket 27014 | 1 |
| 25206 | Lock Washer for Nut 23713 | 5 |
| 20495 | Lock Washer for Nut 23712 | 2 |
| 20393 | Lock Washer for Screw 23735 | 4 |
| 23735 | Screw for retaining Housing Assembly 13112 | 4 |
| 23707 | Nut for Screw 24616 | 1 |
| 24616 | Screw for retaining Spring 23774 | 1 |
| 23742 | Screw for retaining Brushes 23674 and 24624 (Short) | 2 |
| 24632 | Stop Screw for Blade Assemblies 13290 and 13291 | 2 |
| 26523 | Screw for retaining Terminal No. 7 | 2 |
| 31009 | Spacing Washer for Blade Assemblies 13290 and 13291 | 2 |
| 28896 | Stud for retaining Blade Assemblies 13290 and 13291 | 2 |
| 23712 | Nut for retaining Stud 28896 | 2 |
| 23691 | Terminal Plate under Termnal Plate No. 4 | 1 |
| 23374 | Terminal Clip for connecting Switch (Small) | 7 |
| 23375 | Terminal Clip for connecting Switch (Large) | 2 |

# No. 1099 COMBINATION SWITCH

Note: No. 1099 Combination Switch superseded by No. 1150 Combination Switch. When ordering a complete new unit, order No. 1150.

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1099 | **COMBINATION SWITCH** | 1 |
| 13112 | **Housing Assembly Complete** (Includes the next 12 Items) | 1 |
| 28627 | Escutcheon Plate for Switch | 1 |
| 28612 | Ferrule for Retaining Plate | 2 |
| 23564 | Button for Plunger Assembly 13110 | 1 |
| 28308 | Insulating Washer for Plunger Assembly 13110 | 1 |
| 13110 | **Plunger Assembly Complete** (Includes the next 7 Items) | 1 |
| 28315 | Plunger for Plunger Assembly 13110 | 1 |
| 23563 | Insulating Collar for Plunger 28315 | 1 |
| 28993 | Insulating Bushing for Plunger 28315 | 1 |
| 27897 | Contact Collar for Plunger 28315 | 1 |
| 23606 | Plain Washer for Nut 27896 | 1 |
| 23603 | Insulating Washer for Contact Collar 27897 | 1 |
| 27896 | Nut for Clamping Plunger Assembly 13110 | 1 |
| 23898 | Terminal Post for connecting Switch | 1 |
| 23553 | Screw for retaining Terminal Clip 23450 | 1 |
| 23452 | Nut for Screw 23553 | 1 |
| 20393 | Lock Washer for Nut 23452 | 1 |
| 23450 | Clip for Terminal Clip 23374 | 1 |
| 13290 | **Blade Assembly Complete (For Ignition)** (Includes the next 15 Items) | 1 |
| 13323 | **Stud Assembly** | 1 |
| 12143 | **Stop Wheel Assembly** | 1 |
| 26527 | Insulating Bushing for Stop Wheel Assembly 12143 | 1 |
| 30635 | Insulating Bushing for Stud Assembly 13323 | 1 |
| 26497 | Blade for Blade Assembly 13290 (Lower) | 1 |
| 26524 | Blade for Blade Assembly 13290 (Upper) (Not shown in Illustration) | 1 |
| 26496 | Insulator between Blades 26497 and 26524 (Not shown in Illustration) | 1 |
| 23710 | Insulating Washer for Blades 26497 and 26524 | 2 |
| 23717 | Plain Washer for Stop Wheel Assembly 12143 (Thick) | 2 |
| 25473 | Plain Washer for Stop Wheel Assembly 12143 (Thin) | 1 |
| 23908 | Plain Washer for Blade 26524 (Thick) | 1 |
| 23711 | Nut for Clamping Blade Assembly 13290 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 25473 | Plain Washer for Blades 26524 (Thin) | 1 |
| 13291 | **Blade Assembly Complete (For Lighting)** (Includes the next 13 Items) | 1 |
| 13324 | **Stud Assembly** | 1 |
| 12142 | **Stop Wheel Assembly** | 1 |
| 26527 | Insulating Bushing for Stop Wheel Assembly 12142 | 1 |
| 30635 | Insulating Bushing for Stud Assembly 13324 | 1 |
| 26544 | Blade for Blade Assembly 13291 | 1 |
| 23717 | Plain Washer for Stop Wheel Assembly 12142 (Thick) | 1 |
| 25473 | Plain Washer for Stop Wheel Assembly 12142 (Thin) | 1 |
| 23710 | Insulating Washer for Blade 26544 | 2 |
| 25473 | Plain Washer for Blade 26544 (Thin) | 1 |
| 23908 | Plain Washer for Blade 26544 (Thick) | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 26526 | Plain Washer for Nut 23711 | 1 |
| 23711 | Nut for Clamping Blade Assembly 13291 | 1 |
| 13567 | **Lock Assembly for Locking Switch (Used on Model No. 57 Cadillac 1918)** (Includes the next Item) | 1 |
| 29972 | Key for Lock Assembly 13567 (Give Series No. of Lock) | 2 |
| 14308 | **Lock Assembly for Switch (Used on Model No. 59 Cadillac 1919)** (Includes the next Item) | 1 |
| 31533 | Key for Lock Assembly 14308 (Give Serial No. of Lock) | 2 |
| 24626 | Screw for retaining Lock Assembly 13567 | 3 |
| 10930 | **Tumbler Assembly for Locking Blade Assemblies 13290 and 13291** | 1 |
| 29092 | Lever for operating Blade Assemblies 13290 and 13291 | 2 |
| 23745 | Screw for retaining Lever 29092 | 2 |
| 27014 | Roller Bracket for retaining Roller 27013 | 1 |
| 27013 | Roller for Blade Assemblies 13290 and 13291 | 2 |
| 23774 | Spring for Roller Bracket 27014 | 2 |
| 23776 | Spring for Tumbler Assembly 10930 | 1 |
| 28295 | Mounting Plate for Switch | 1 |
| 23674 | Brush for Terminal No. 5 (Lower) | 1 |
| 23687 | Brush for Terminals No. 2, 3, 5, 6 (Upper) | 4 |
| 23688 | Brush for Terminal No. 1 (Upper) | 1 |
| 28557 | Brush for connecting Terminal No. 8 and Blade Assembly 12176 | 1 |
| 24624 | Brush for Terminals No. 1, 2 and 3 (Lower) | 1 |

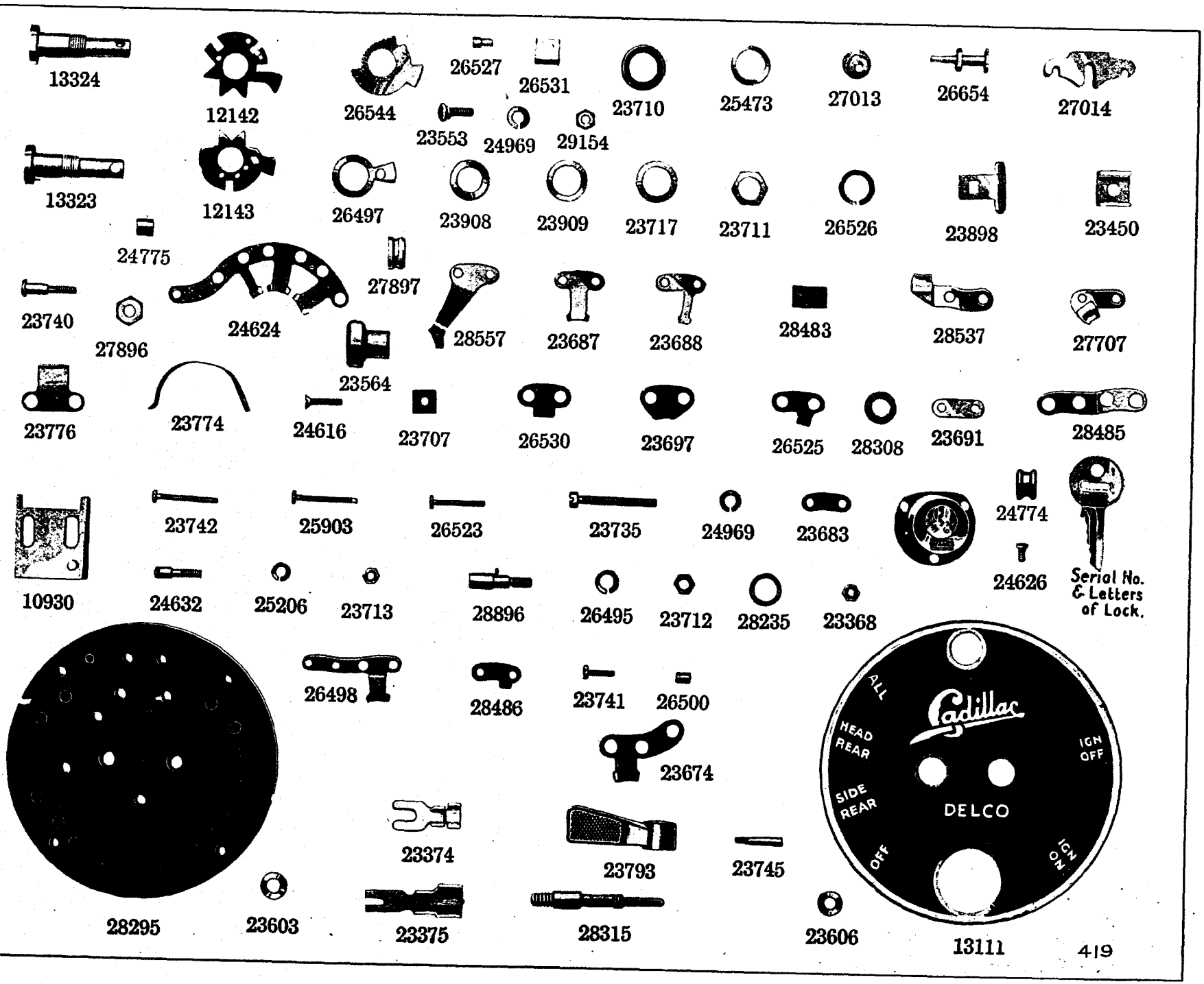

13324
12142
26544
26527
30635
23710
25473
27013
26654
27014
23553
24969
29154
13323
12143
26497
23908
23909
23717
23711
26526
23898
23450
28483
23740
27896
24624
27897
28557
23687
23688
28993
28537
27707
23564
23776
23774
24616
23707
26530
23697
26525
28308
23691
28485
23742
25903
26523
23735
24969
23683
23563
24626
29972
13567
10930
24632
25206
23713
28896
26495
23712
28235
23668
26498
28486
23741
26500
23674
23374
29092
23745
28295
23603
23375
28315
23606
13111
588
ALL
HEAD REAR
SIDE REAR
OFF
Cadillac
DELCO
IGN OFF
IGN ON

# No. 1077 COMBINATION SWITCH (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 23688 | Brush for Terminal No. 1 (Upper) | 1 |
| 28557 | Brush for connecting Terminal No. 8 and Blade Assembly 13290 | 1 |
| 24624 | Brush for Terminals No. 1, 2 and 3 (Lower) | 1 |
| 26498 | Brush for Terminals No. 6 and 7 (Lower) | 1 |
| 25903 | Screw for retaining Terminals No. 1, 2, 3, 5, 6 and 8 | 12 |
| 26500 | Insulating Bushing for Screw 25903 | 10 |
| 26525 | Insulating Plate for Terminals No. 1 and 8 | 5 |
| 23696 | Insulating Plate for Terminals No. 2, 3, 5 and 6 | 11 |
| 28483 | Insulating Bushing for Terminal No. 8 | 2 |
| 28486 | Separator Plate for Terminal No. 8 | 2 |
| 28537 | Contact Spring for connecting Terminal No. 3 and Plunger Assembly 13110 | 1 |
| 27707 | Contact Spring for connecting Plunger Assembly 13110 and Terminal No. 9 | 1 |
| 23741 | Screw for retaining Contact Spring 27707 and Terminal No. 4 | 4 |
| 23740 | Screw for retaining Tumbler Assembly 10930 | 2 |
| 23683 | Plate for retaining Screws 23741 and Terminal No. 4 | 1 |
| 23697 | Insulating Plate for Terminal No. 6 under Brush 26498 (Large) | 1 |
| 28485 | Plate connecting Terminal No. 3 and Contact Spring 28537 | 1 |
| 23713 | Nut for Screws 23740 and 24632 and Stud 26654 | 5 |
| 23668 | Nut for retaining Screw 23742 (Not shown in Illustration) | 2 |
| 26654 | Stud for retaining Roller Bracket 27014 | 1 |
| 25206 | Lock Washer for Nut 23713 | 5 |
| 20495 | Lock Washer for Nut 23712 | 2 |
| 20393 | Lock Washer for Screw 23735 | 4 |
| 23735 | Screw for retaining Housing Assembly 13112 | 4 |
| 23707 | Nut for Screw 24616 | 1 |
| 24616 | Screw for retaining Spring 23774 | 1 |
| 23742 | Screw for retaining Brushes 23674 and 24624 (Short) | 2 |
| 24626 | Screw for retaining Lock Assembly 13039 | 3 |
| 24632 | Stop Screw for Blade Assembly 13290 | 2 |
| 26523 | Screw for retaining Terminal No. 7 | 2 |
| 31009 | Spacing Washer for Blade Assemblies 13290 and 13291 (Not shown in Illustration) | 2 |
| 28896 | Stud for retaining Blade Assemblies 13290 and 13291 | 2 |
| 23712 | Nut for retaining Stud 28896 | 2 |
| 23691 | Terminal Plate under Terminal No. 4 | 1 |
| 23374 | Terminal Clip for connecting Switch (Small) | 7 |
| 23375 | Terminal Clip for connecting Switch (Large) | 2 |

# No. 1077 COMBINATION SWITCH

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1077 | **COMBINATION SWITCH COMPLETE** | 1 |
| 13112 | **Housing Assembly Complete** (Includes the next 12 Items) | 1 |
| 28627 | Escutcheon Plate for Switch | 2 |
| 28612 | Ferrule for retaining Plate 28627 | 1 |
| 23564 | Button for Plunger Assembly 13110 | 1 |
| 28308 | Insulating Washer for Plunger Assembly 13110 | 1 |
| 13110 | **Plunger Assembly** (Includes the next 7 Items) | 1 |
| 28315 | Plunger for Plunger Assembly 13110 | 1 |
| 23563 | Insulating Collar for Plunger 28315 (Not shown in Illustration) | 1 |
| 28993 | Insulating Bushing for Plunger 28315 (Not shown in Illustration) | 1 |
| 27897 | Contact Collar for Plunger 28315 | 1 |
| 23606 | Plain Washer for Nut 27896 | 1 |
| 23603 | Insulating Washer for Contact Collar 27897 | 1 |
| 27896 | Nut for clamping Plunger Assembly 13110 | 9 |
| 23898 | Terminal Post | 9 |
| 23553 | Screw for retaining Clip 23450 | 9 |
| 23452 | Nut for Screw 23553 (Not shown in Illustration) | 9 |
| 20393 | Lock Washer for Nut 23452 | 1 |
| 23450 | Clip for retaining Terminal Clip 23374 | 1 |
| 13290 | **Blade Assembly Complete (For Ignition)** (Includes the next 16 Items) | 1 |
| 13323 | **Stud Assembly** (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13323 (Not shown in Illustration) | 1 |
| 12143 | **Stop Wheel Assembly** (Includes the next Item) | 1 |
| 23946 | Stud for Stop Wheel Assembly 12143 (Not shown in Illustration) | 1 |
| 26527 | Insulating Bushing for Stop Wheel Assembly 12143 | 1 |
| 30635 | Insulating Bushing for Stud Assembly 13323 (Not shown in Illustration) | 1 |
| 26497 | Blade for Blade Assembly 13290 (Lower) | 1 |
| 26524 | Blade for Blade Assembly 13290 (Upper) Not shown in Illustration) | 1 |
| 26496 | Insulator between Blades 26497 and 26524 (Not shown in Illustration) | 2 |
| 23710 | Insulating Washer for Blades 26497 and26524 | 2 |
| 23717 | Plain Washer for Stop Wheel Assembly 12143 (Thick) | 1 |
| 25473 | Plain Washer for Stop Wheel Assembly 12143 (Thin) | 1 |
| 23908 | Plain Washer for Blade 26524 (Thick) | 1 |
| 23711 | Nut for clamping Blade Assembly 13290 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 13291 | **Blade Assembly Complete (For Lighting)** (Includes the next 14 Items) | 1 |
| 13324 | **Stud Assembly** (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13324 (Not shown in Illustration) | 1 |
| 12142 | **Stop Wheel Assembly** (Includes the next Item) | 1 |
| 23946 | Stud for Stop Wheel Assembly 12142 (Not shown in Illustration) | 1 |
| 26527 | Insulating Bushing for Stop Wheel Assembly 12142 | 1 |
| 30635 | Insulating Bushing for Stud Assembly 13324 (Not shown in Illustration) | 1 |
| 26544 | Blade for Blade Assembly 13291 | 2 |
| 23717 | Plain Washer for Stop Wheel Assembly 12142 (Thick) | 1 |
| 25473 | Plain Washer for Stop Wheel Assembly 12142 (Thin) | 2 |
| 23710 | Insulating Washer for Blade 26544 | 1 |
| 23908 | Plain Washer for Blade 26544 (Thick) | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23711 | Nut for clamping Blade Assembly 13291 | 1 |
| 13039 | **Lock Assembly for Locking Switch** (Includes the next Item) | 2 |
| 29962 | Key for Lock Assembly 13039 (Give Series No. of Lock) | 1 |
| 10930 | **Tumbler Assembly for locking Switch** (Includes the next Item) | 1 |
| 23738 | Stud for Tumbler Assembly 10930 (Not shown in Illustration) | 2 |
| 23793 | Lever for operating Blade Assemblies 13290 and 13291 | 2 |
| 23745 | Screw for retaining Lever 23793 | 1 |
| 27014 | Roller Bracket for retaining Roller 27013 | 2 |
| 27013 | Roller for Blade Assemblies 13290 and 13291 | 2 |
| 23774 | Spring for Roller Bracket 27014 | 1 |
| 23776 | Spring for Tumbler Assembly 10930 | 1 |
| 28295 | Mounting Plate (Back of Switch) | 1 |
| 23674 | Brush for Terminal No. 5 (Lower) | 4 |
| 23687 | Brush for Terminals No. 2, 3, 5 and 6 (Upper) | |

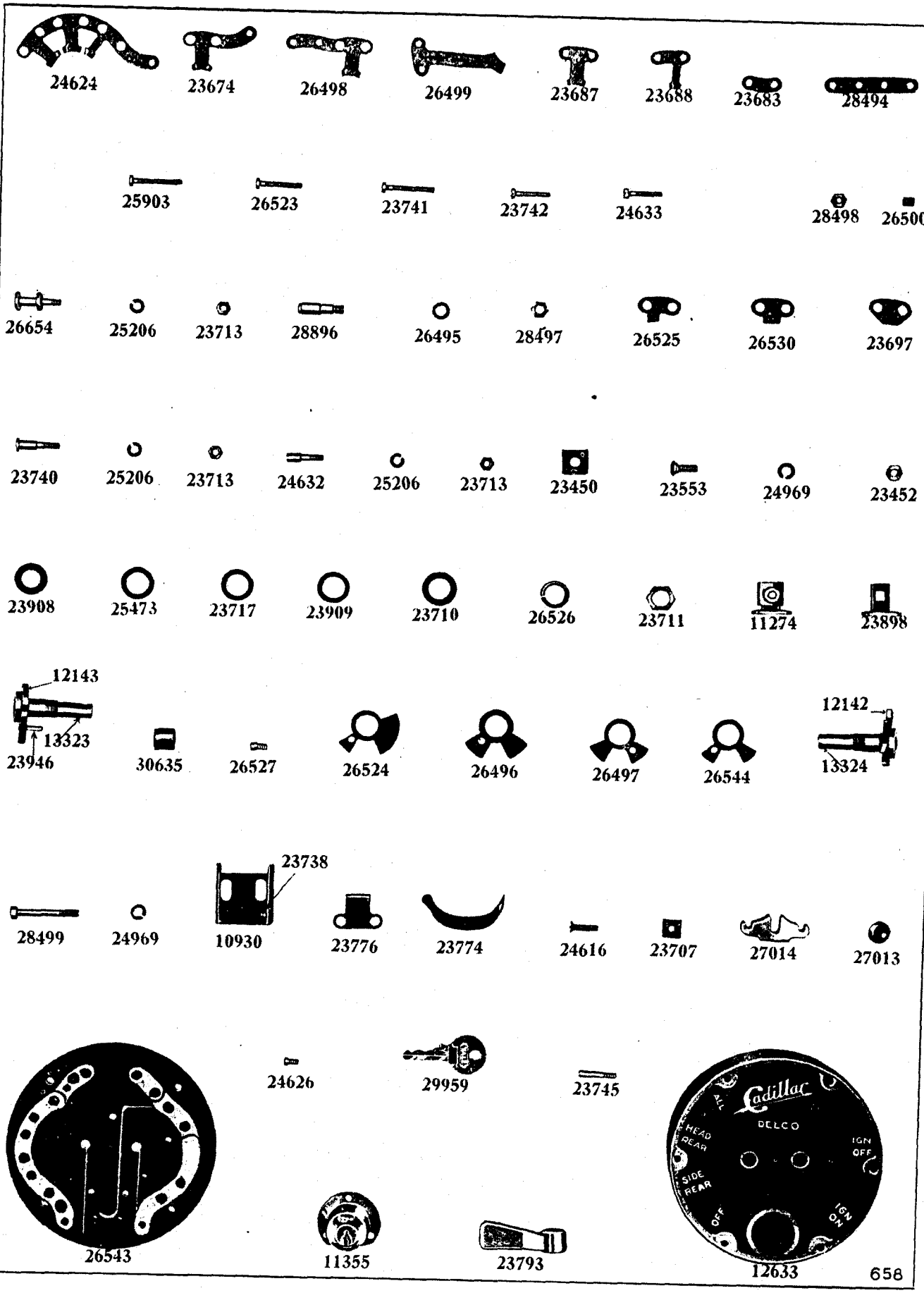

13324
12142
26544
26527
26531
23710
25473
27013
26654
27014
23553
24969
29154
13323
12143
26497
23908
23909
23717
23711
26526
23898
23450
24775
27897
23740
27896
24624
28557
23687
23688
28483
28537
27707
23564
23776
23774
24616
23707
26530
23697
26525
28308
23691
28485
23742
25903
26523
23735
24969
23683
24774
24626
Serial No. & Letters of Lock.
10930
24632
25206
23713
28896
26495
23712
28235
23368
26498
28486
23741
26500
23674
23374
23793
23745
28295
23603
23375
28315
23606
13111
ALL
HEAD REAR
SIDE REAR
OFF
Cadillac
DELCO
IGN OFF
IGN ON
419

# No. 1069 COMBINATION SWITCH (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 26496 | Insulator between Blades 26497 and 26524 | 1 |
| 23710 | Insulating Washer for Blades 26497 and 26524 | 2 |
| 23717 | Plain Washer for Stop Wheel Assembly 12143 (Thick) | 2 |
| 25473 | Plain Washer for Stop Wheel Assembly 12143 (Thin) | 1 |
| 23908 | Plain Washer for Blade 26524 (Thick) | 1 |
| 23711 | Nut for clamping Blade Assembly 13290 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 13291 | **Blade Assembly Complete (For Lighting)** (Includes the next 13 Items) | 1 |
| 13324 | **Stud Assembly** (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13324 (Not shown in Illustration) | 1 |
| 12142 | **Stop Wheel Assembly** (Includes the next Item) | 1 |
| 23946 | Stud for Stop Wheel Assembly 12142 (Not shown in Illustration) | 1 |
| 26527 | Insulating Bushing for Stop Wheel Assembly 12142 | 1 |
| 30635 | Insulating Bushing for Stud Assembly 13324 | 1 |
| 26544 | Blade for Blade Assembly 13291 | 1 |
| 23717 | Plain Washer for Stop Wheel Assembly 12142 (Thick) | 2 |
| 25473 | Plain Washer for Stop Wheel Assembly 12142 (Thin) | 1 |
| 23710 | Insulating Washer for Blade 26544 | 2 |
| 23908 | Plain Washer for Blade 26544 (Thick) | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23711 | Nut for clamping Blade Assembly 13291 | 1 |
| 31009 | Plain Washer for Blade Assemblies 13290 and 13291 (Not shown in Illustration) | 2 |
| 23375 | Terminal Clip for connecting Switch (Large) (Not shown in Illustration) | 2 |
| 23374 | Terminal Clip for connecting Switch (Small) (Not shown in Illustration) | 6 |

# No. 1069 COMBINATION SWITCH

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1069 | **COMBINATION SWITCH COMPLETE** | 1 |
| 12633 | **Housing Assembly** (Includes next 2 Items) | 1 |
| 27586 | Escutcheon Plate for Switch | 6 |
| 27229 | Rivet for retaining Plate 27586 | 1 |
| 11355 | **Lock Assembly Complete** (Includes the next Item) | 2 |
| 29959 | Key for Lock Assembly 11355 (Give Series No. of Lock) | 1 |
| 10930 | **Tumbler Assembly for locking Switch** (Includes the next Item) | 1 |
| 23738 | Stud for Tumbler Assembly 10930 | 1 |
| 26543 | Mounting Plate for Terminal Post | 8 |
| 23898 | Terminal Plate | 8 |
| 23553 | Screw for retaining Clip 23450 | 8 |
| 23452 | Nut for Screw 23553 | 8 |
| 20393 | Lock Washer for Nut 23452 | 8 |
| 23450 | Clip for retaining Terminal Clip | 2 |
| 27013 | Roller for Blade Assemblies 13290 and 13291 | 1 |
| 27014 | Roller Bracket for Roller 27013 | 1 |
| 23674 | Brush for Terminal No. 5 (Lower) | 4 |
| 23687 | Brush for Terminals No. 2, 3, 5 and 6 Upper) | 1 |
| 23688 | Brush for Terminal No. 1 (Upper) | 1 |
| 26499 | Brush for connecting Terminal No. 8 and Blade Assembly 13290 | 1 |
| 24624 | Brush for Terminals Nos. 1, 2 and 3 (Lower) | 1 |
| 26498 | Brush for Terminals Nos. 7 and 6 (Lower) | 1 |
| 26654 | Stud for retaining Roller Bracket 27014 | 5 |
| 23713 | Nut for Stud 26654 and Screws 23740 and 24632 | 5 |
| 25206 | Lock Washer for Nut 23713 | 2 |
| 23740 | Screw for retaining Tumbler Assembly 10930 | 2 |
| 24632 | Stop Screw for Blade Assemblies 13290 and 13291 | 1 |
| 23776 | Spring for Tumbler Assembly 10930 | 2 |
| 28896 | Stud for retaining Blade Assemblies 13290 and 13291 | 2 |
| 23712 | Nut for retaining Stud 28896 | 2 |
| 20495 | Lock Washer for Nut 23712 | 4 |
| 23735 | Screw for retaining Housing Assembly 12633 | 4 |
| 20393 | Lock Washer for Screw 23735 | 2 |
| 26523 | Screw for retaining Terminal No. 7 | 10 |
| 25903 | Screw for retaining Terminals Nos. 1, 2, 3, 5 and 6 | 2 |
| 23793 | Lever for operating Blade Assemblies 13290 and 13291 | 2 |
| 23745 | Screw for retaining Lever 23793 | 2 |
| 24633 | Screw for retaining Terminal No. 8 | 1 |
| 24616 | Screw for retaining Spring 23774 | 2 |
| 23774 | Spring for Roller Bracket 27014 | 2 |
| 23668 | Nut for retaining Terminal Plate 23691 | 1 |
| 23691 | Terminal Plate under Terminal No. 4 | 1 |
| 23683 | Plate for retaining Screw 23741 | 1 |
| 23741 | Screw for retaining Terminal No. 4 | 2 |
| 23742 | Screw for retaining Brushes 23674 and 24624 (Short Screws) | 1 |
| 23707 | Nut for Screw 24616 | 3 |
| 24626 | Screw for retaining Lock Assembly 11355 | 10 |
| 26500 | Insulating Bushing for Screw 25903 | 1 |
| 23697 | Insulating Plate for Terminal No. 6 (Lower) | 12 |
| 26530 | Insulating Plate for Terminals No. 2, 3 and 5 | 3 |
| 26525 | Insulating Plate for Terminal No. 1 | 1 |
| 23696 | Insulating Plate for Terminal No. 6 | 1 |
| 13290 | **Blade Assembly Complete (For Ignition)** | 1 |
| 13323 | **Stud Assembly** (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13323 (Not shown in Illustration) | 1 |
| 12143 | **Stop Wheel Assembly** (Includes the next Item) | 1 |
| 23946 | Stud for Stop Wheel Assembly 12143 | 1 |
| 26527 | Insulating Bushing for Stop Wheel Assembly 12143 | 1 |
| 30635 | Insulating Bushing for Stud Assembly 13323 | 1 |
| 26497 | Blade for Blade Assembly 13290 (Lower) | 1 |
| 26524 | Blade for Blade Assembly 13290 (Upper) | |




# No. 1069 COMBINATION SWITCH

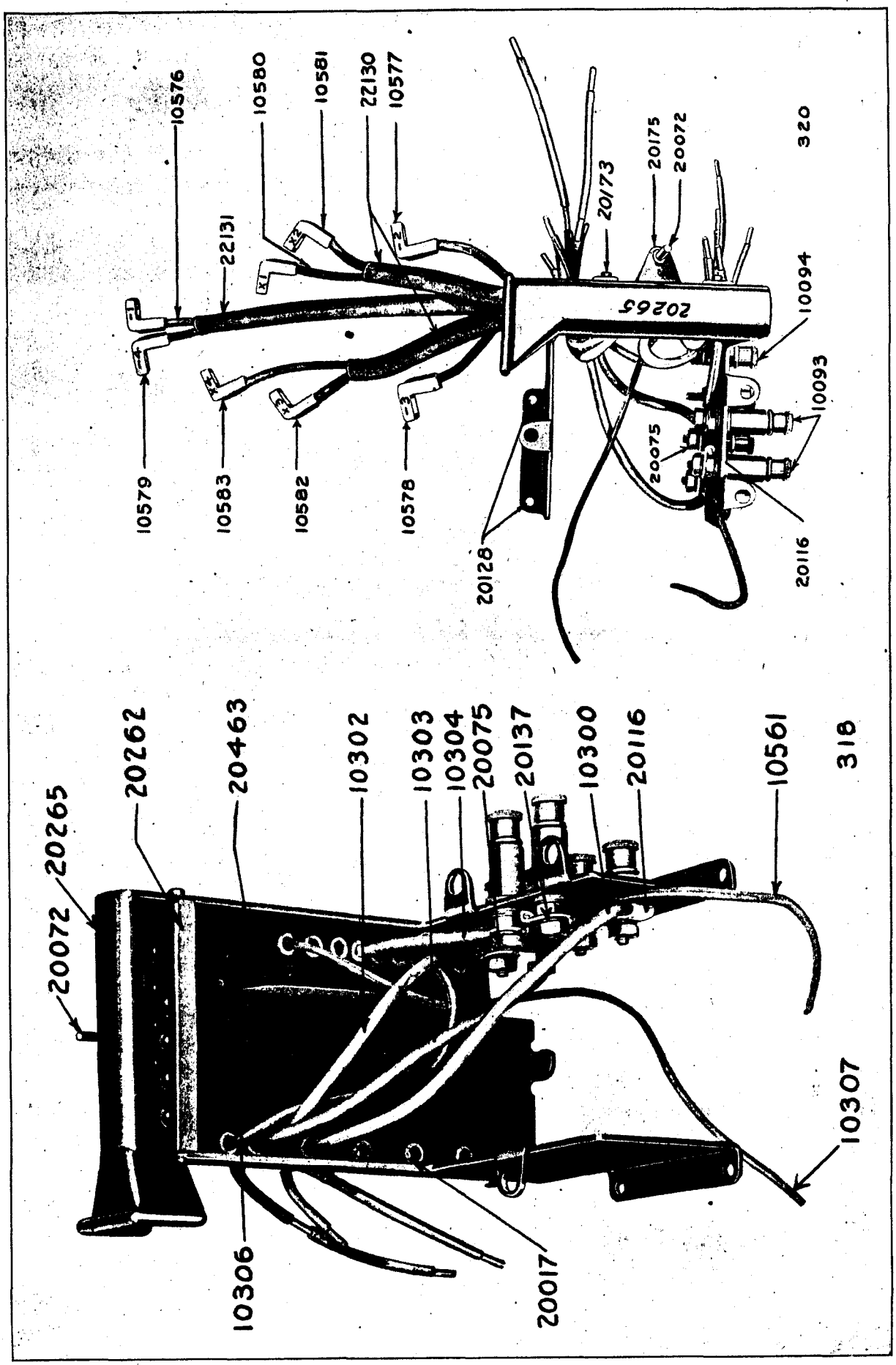
# No. 1062 COMBINATION SWITCH (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 23908 | Plain Washer for Blade 26524 (Thick) | 1 |
| 23711 | Nut for Clamping Blade Assembly 13290 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 25473 | Plain Washer for Blade 26524 (Thin) | 1 |
| 13291 | **Blade Assembly Complete (For Lighting)** | 1 |
| | (Includes the next 13 Items) | 1 |
| 13324 | **Stud Assembly** | |
| | (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13324 (Not shown in Illustration) | 1 |
| 12142 | **Stop Wheel Assembly** | 1 |
| | (Includes the next Item) | 1 |
| 23946 | Stud for Stop Wheel Assembly 12142 (Not shown in Illustration) | 1 |
| 26527 | Insulating Bushing for Stop Wheel Assembly 12142 | 1 |
| 30635 | Insulating Bushing for Stud Assembly 13324 | 1 |
| 26544 | Blade for Blade Assembly 13291 | 1 |
| 23717 | Plain Washer for Stop Wheel Assembly 12142 (Thick) | 1 |
| 25473 | Plain Washer for Stop Wheel Assembly 12142 (Thin) | 2 |
| 23710 | Insulating Washer for Blade 26544 | 1 |
| 23908 | Plain Washer for Blade 26544 (Thick) | 2 |
| 23909 | Plain Washer for Nut 23711 | 1 |
| 26526 | Lock Washer for Nut 23711 | 1 |
| 23711 | Nut for clamping Blade Assembly 13291 | 1 |
| 23375 | Terminal Clip for connecting Switch (Large) (Not shown in Illustration) | 1 |
| 23374 | Terminal Clip for connecting Switch (Small) (Not shown in Illustration) | 2 |
| | | 6 |

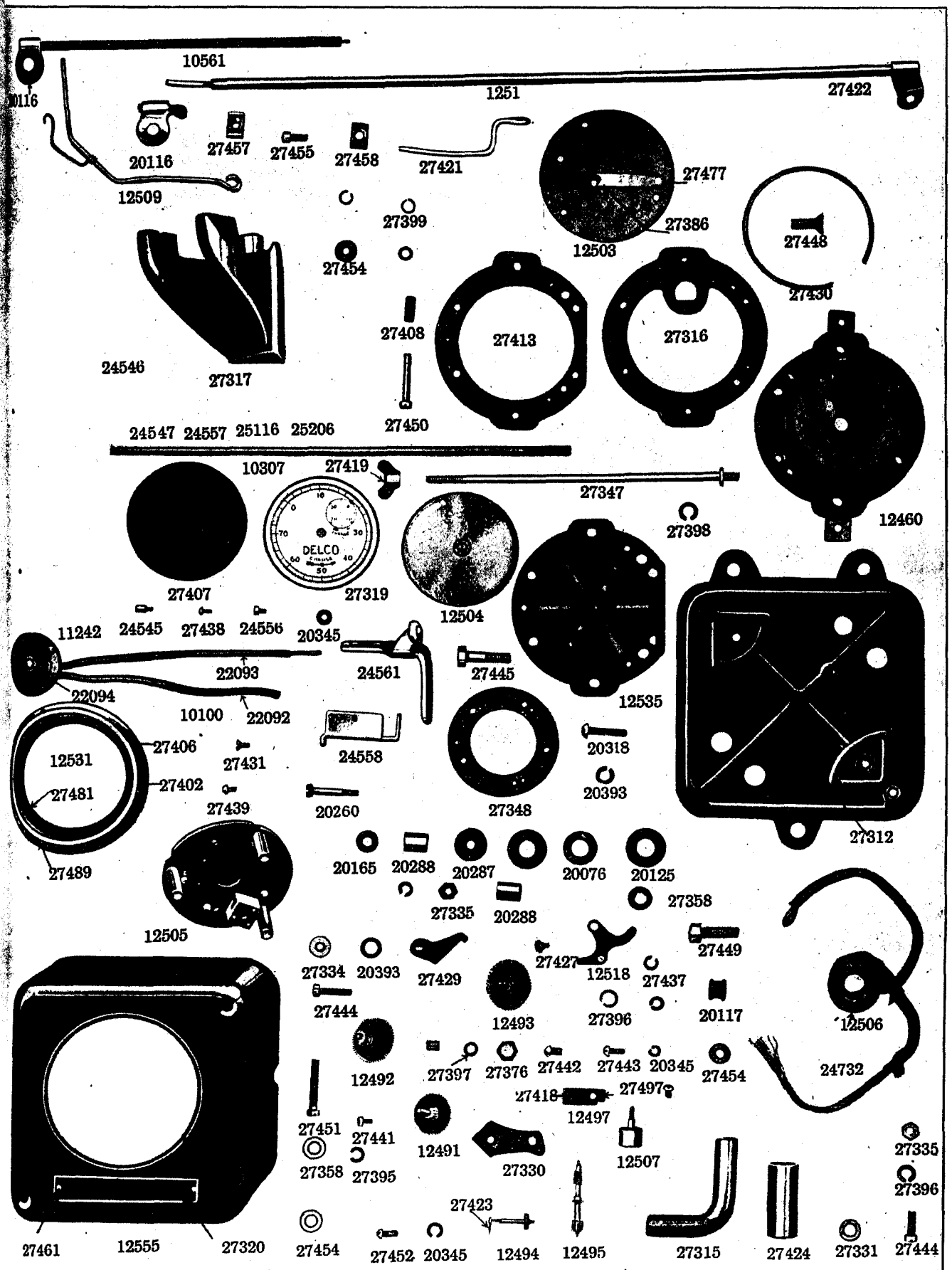
# No. 1062 COMBINATION SWITCH

Note: No. 1062 Combination Switch superseded by No. 1069 Combination Switch. When ordering a complete new unit, order No. 1069.

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 1062 | **COMBINATION SWITCH COMPLETE** | 1 |
| 14631 | **Housing Assembly** | 1 |
| 11355 | **Lock Assembly Complete** (Includes the next Item) | 1 |
| 29959 | Key for Lock Assembly 11355 (Give Series No. of Lock) | 2 |
| 10930 | **Tumbler Assembly for Locking Blade Assemblies 13290 and 13291** (Includes the next Item) | 1 |
| 23738 | Stud for Tumbler Assembly 10930 (Not shown in Illustration) | 1 |
| 26543 | Mounting Plate for Terminal Post 23898 | 1 |
| 23898 | Terminal Post | 8 |
| 23553 | Screw for retaining Clip 23450 | 8 |
| 23452 | Nut for Screw 23553 | 8 |
| 20393 | Lock Washer for Nut 23452 | 8 |
| 23450 | Clip for retaining Terminal Clip | 8 |
| 27013 | Roller for Blade Assemblies 13290 and 13291 | 2 |
| 27014 | Roller Bracket for Roller 27013 | 1 |
| 23674 | Brush for Terminal No. 5 (Lower) | 1 |
| 23687 | Brush for Terminals Nos. 2, 3, 5 and 6 (Lower) | 4 |
| 23688 | Brush for Terminal No. 1 (Upper) | 1 |
| 26499 | Brush for connecting Terminal No. 8 and Blade Assembly 13290) | 1 |
| 24624 | Brush for Terminals Nos. 1, 2 and 3 (Lower) | 1 |
| 26498 | Brush for Terminals Nos. 7 and 6 (Lower) | 1 |
| 26654 | Stud for retaining Roller Bracket 27014 | 1 |
| 23713 | Nut for Stud 26654 and Screws 23740 and 24632 | 5 |
| 25206 | Lock Washer for Nut 23713 | 5 |
| 23740 | Screw for retaining Tumbler Assembly 10930 | 2 |
| 24632 | Stop Screw for Blade Assemblies 13290 and 13291 | 2 |
| 23776 | Spring for Tumbler Assembly 10930 | 1 |
| 28896 | Stud for retaining Blade Assemblies 13290 and 13291 | 2 |
| 23712 | Nut for retaining Stud 28896 | 2 |
| 20495 | Lock Washer for Nut 23712 | 2 |
| 23735 | Screw for retaining Housing Assembly 12144 | 4 |
| 20393 | Lock Washer for Screw 23735 | 4 |
| 26523 | Screw for retaining Terminal No. 7 | 2 |
| 25903 | Screw for retaining Terminals Nos. 1, 2, 3, 5 and 6 | 10 |
| 23793 | Lever for operating Blade Assemblies 13290 and 13291 | 2 |
| 23745 | Screw for retaining Lever 23793 | 2 |
| 24633 | Screw for retaining Terminal No. 8 (Not shown in Illustration) | 2 |
| 24616 | Screw for retaining Spring 23774 | 1 |
| 23774 | Spring for Roller Bracket 27014 | 2 |
| 23668 | Nut for retaining Terminal Plate 23691 (Not shown in Illustration) | 2 |
| 23691 | Terminal Plate under Terminal No. 4 | 1 |
| 23683 | Plate for retaining Screw 23741 | 1 |
| 23741 | Screw for retaining Terminal No. 4 | 2 |
| 23742 | Screw for retaining Brushes 23674 and 24624 (Short Screw) | 2 |
| 23707 | Nut for Screw 24616 | 1 |
| 24626 | Screw for retaining Lock Assembly 11355 | 3 |
| 26500 | Insulating Bushing for Screw 25903 | 10 |
| 23697 | Insulating Plate for Terminal No. 6 (Lower) | 1 |
| 26530 | Insulating Plate for Terminals Nos. 2, 3 and 5 | 12 |
| 23698 | Insulating Plate for Terminal No. 1 (Not shown in Illustration) | 3 |
| 23696 | Insulating Plate for Terminal No. 6 (Not shown in Illustration) | 1 |
| 13290 | **Blade Assembly Complete (For Ignition)** (Includes the next 15 Items) | 1 |
| 13323 | **Stud Assembly** (Includes the next Item) | 1 |
| 23747 | Pin for Stud Assembly 13323 (Not shown in Illustration) | 1 |
| 12143 | **Stop Wheel Assembly** (Includes the next Item) | 1 |
| 23946 | Stud for Stop Wheel Assembly 12143 (Not shown in Illustration) | 1 |
| 26527 | Insulating Bushing for Stop Wheel Assembly 12143 | 1 |
| 30635 | Insulating Bushing for Stud Assembly 13323 | 1 |
| 26497 | Blade for Blade Assembly 13290 (Lower) | 1 |
| 26524 | Blade for Blade Assembly 13290 (Upper) | 1 |
| 26496 | Insulator between Blades 26497 and 26524 | 2 |
| 23710 | Insulating Washer for Blades 26497 and 26524 | 1 |
| 23717 | Plain Washer for Stop Wheel Assembly 12143 (Thick) | 2 |
| 25473 | Plain Washer for Stop Wheel Assembly 12143 (Thin) | 1 |

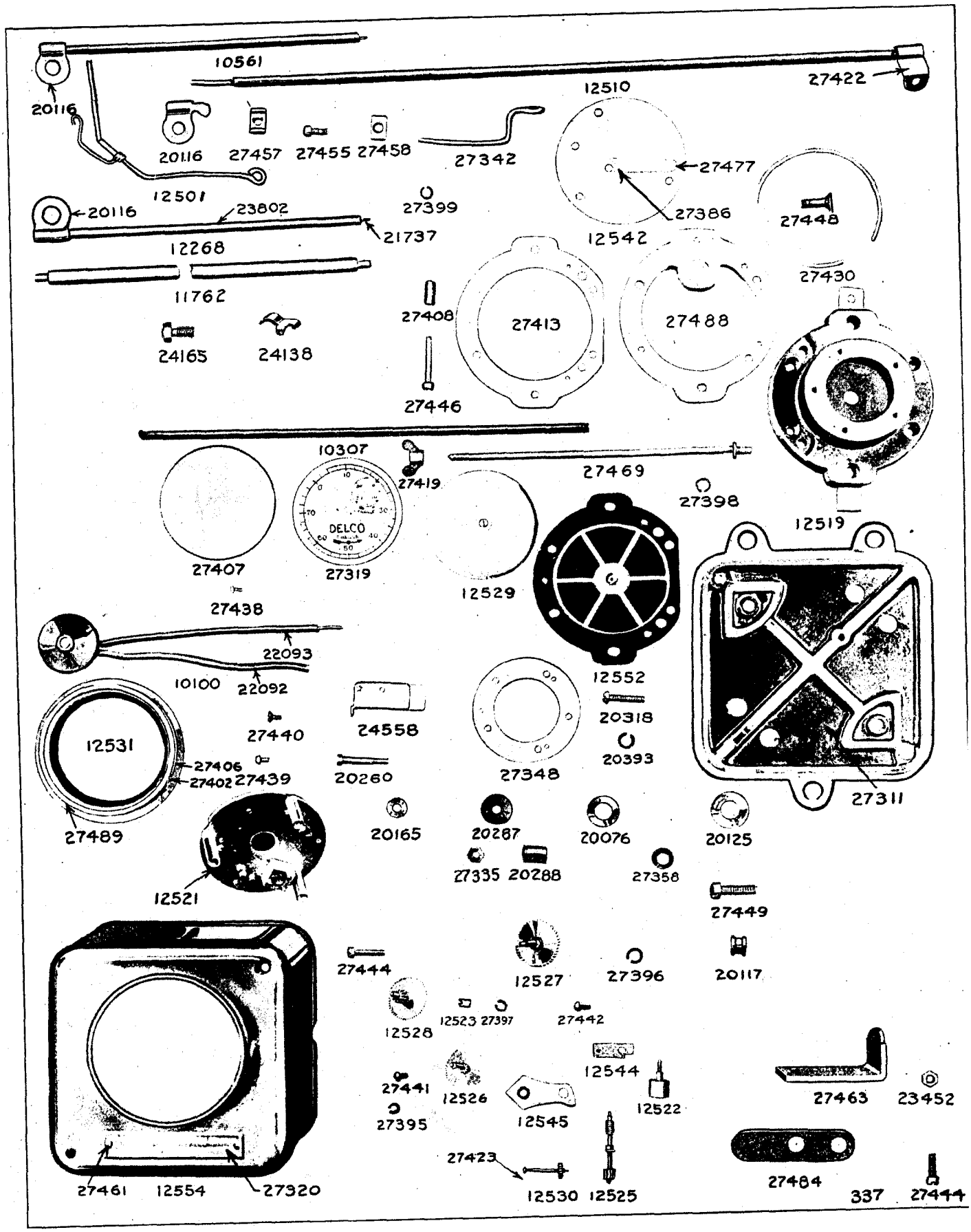



No. 5401 BATTERY BOX

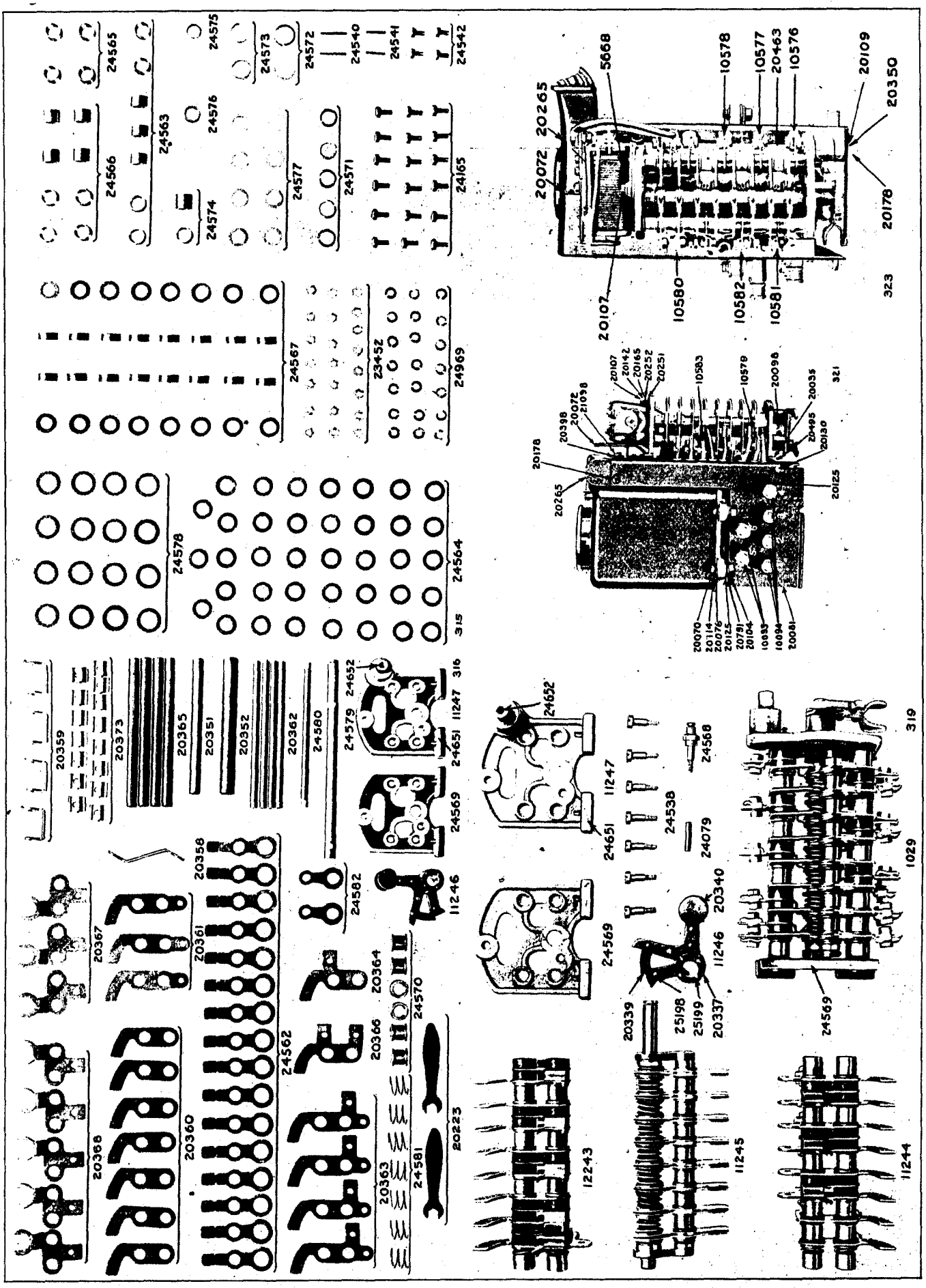



No. 5401 BATTERY BOX

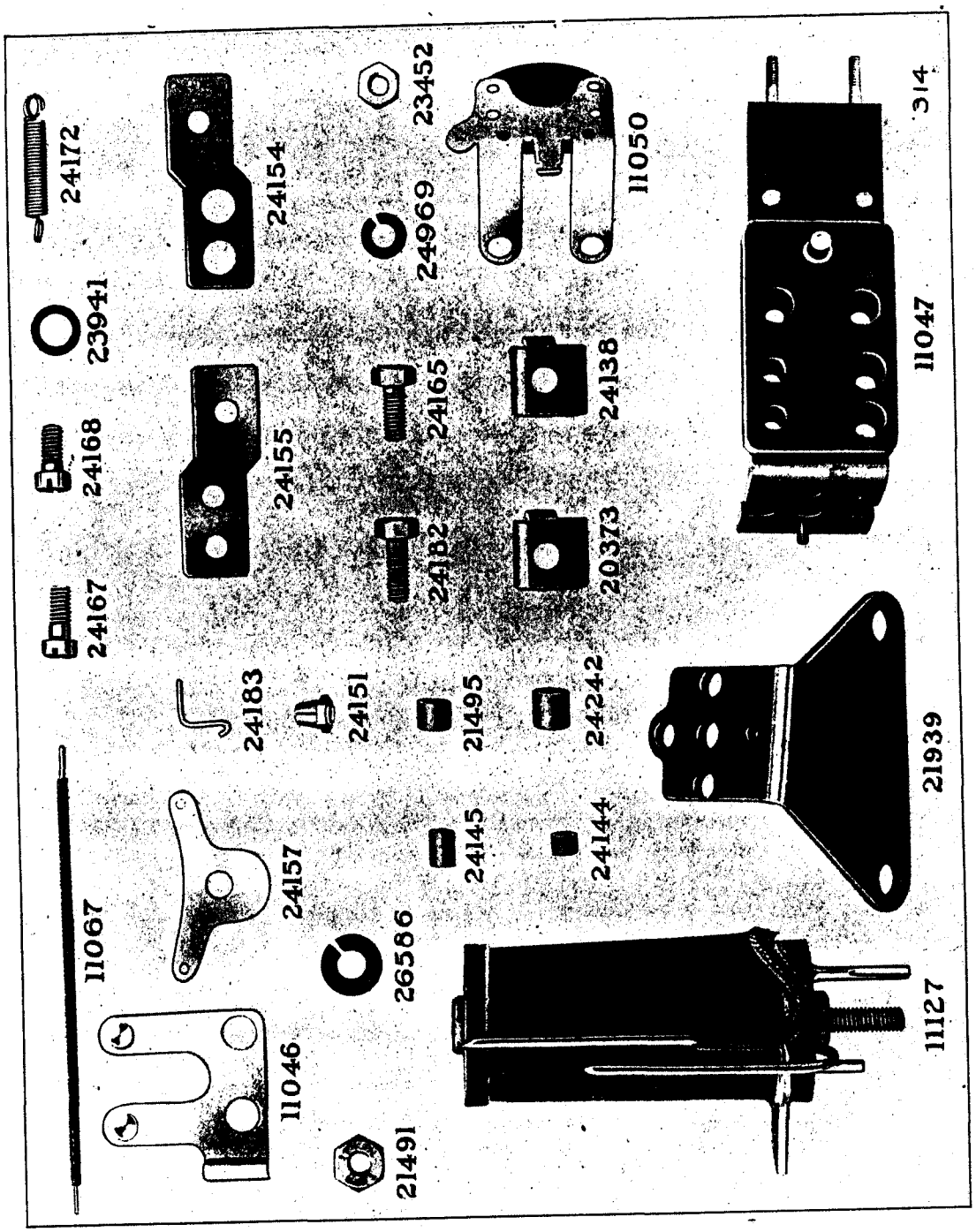
THE DAYTON ENGINEERING LABORATORIES CO., DAYTON, OHIO




No. 5401 BATTERY BOX




No. 5401 BATTERY BOX




No. 5401 BATTERY BOX

# No. 5401 BATTERY BOX

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5401 | **BATTERY BOX COMPLETE** | 1 |
| 10099 | **Controller Bracket Assembly Complete for Battery Box Base Assembly 10533** (Includes the next 305 Items) | 1 |
| 10091 | **Controller Bracket Assembly (Not shown in Illustration)** (Includes the next 4 Items) | 1 |
| 10090 | **Controller Cover Clamp Stud Assembly Complete (Not shown in Illustration)** (Includes the next Item) | 1 |
| 20072 | Stud for Controller Cover Clamp Stud Assembly 10090 | 1 |
| 20197 | Rivet for Bracket (Not shown in Illustration) | 3 |
| 20130 | Guide Stud for Cover Assembly 10108 | 2 |
| 20262 | Conduit for retaining Battery Leads (Fiber Block) | 1 |
| 20178 | Screw for Conduit 20262 | 2 |
| 20265 | Condulet for covering Battery Leads (Metal) | 1 |
| 21098 | Screw for Condulet 20265 | 2 |
| 20393 | Lock Washer for Screw 21098 | 2 |
| 10094 | **Spring Terminal for Bracket 20082 (Short)** | 6 |
| 10095 | **Controller Lead Assembly Complete for connecting Controller Switch** (Includes the next 14 Items) | 1 |
| 10300 | **Lead Assembly from Terminal No. 1 on Controller Bracket to the Fourth Terminal from the Bottom, on the Right Side of Controller Switch** (Includes the next 2 Items) | 1 |
| 20116 | Clip for Lead Assembly 10300 | 1 |
| 21737 | Ferrule for Lead Assembly 10300 (Not shown in Illustration) | 1 |
| 10561 | **Lead Assembly from Terminal No. 2 on Controller Bracket to B. on Meter Contact Assembly 10766** (Includes the next Item) | 1 |
| 20116 | Clip for Lead Assembly 10561 | 1 |
| 10302 | **Lead Assembly from Terminal No. 4 on Controller Bracket to Third Terminal from the Top on the Right Side of Controller Switch** (Includes the next 2 Items) | 1 |
| 21737 | Ferrule for Lead Assembly 10302 (Not shown in Illustration) | 1 |
| 20116 | Clip for Lead Assembly 10302 | 1 |
| 10303 | **Lead Assembly from Terminal No. 5 on Controller Bracket to the Second Terminal from the Top on Right Side of Controller Switch** (Includes the next 2 Items) | 1 |
| 20116 | Clip for Lead Assembly 10303 | 1 |
| 21737 | Ferrule for Lead Assembly 10303 (Not shown in Illustration) | 1 |
| 10304 | **Lead Assembly from Terminal No. 6 on Controller Bracket to the First Terminal from the Bottom on Left Side of Controller Switch** (Includes the next 2 Items) | 1 |
| 20116 | Clip for Lead Assembly 10304 | 1 |
| 21737 | Ferrule for Lead Assembly 10304 (Not shown in Illustration) | 1 |
| 20115 | Insulating Bushing for Spring Terminal Assembly 10094 (Not shown in Illustration) | 6 |
| 20125 | Insulating Washer for Spring Terminal Assembly 10094 (Not shown in Illustration) | 6 |
| 20076 | Insulating Washer for Spring Terminal Assembly 10094 (Not shown in Illustration) | 6 |
| 20137 | Lock Washer for Nut 20075 | 6 |
| 20114 | Plain Washer for Nut 20075 (Not shown in Illustration) | 6 |
| 20075 | Nut for Spring Terminal Assembly 10094 | 12 |
| 20117 | Insulating Bushing for Bracket 20082 | 16 |
| 20272 | Wire (Relay Controller Lead Wire) (Not shown in Illustration) | 1 |
| 10096 | **Battery Lead Assembly Complete (Not shown in Illustration)** (Includes the next 10 Items) | 1 |
| 10580 | **Lead Assembly from Positive Terminal on Battery to the Second Terminal from the Top on the Left Side of Controller Switch** (Includes the next Item) | 1 |
| 22237 | Ferrule for Lead Assembly 10580 (Not shown in Illustration) | 1 |
| 10581 | **Lead Assembly from Positive No. 2 Terminal on Battery to the Second Terminal from the Bottom on the Left Side of Controller Switch** (Includes the next Item) | 1 |
| 22237 | Ferrule for Lead Assembly 10581 (Not shown in Illustration) | 1 |
| 10582 | **Lead Assembly from Positive No. 3 Terminal on Battery to the Fourth Terminal from the Bottom on the Left Side of Controller Switch** (Includes the next Item) | 1 |
| 22237 | Ferrule for Lead Assembly 10582 (Not shown in Illustration) | 1 |
| 10583 | **Lead Assembly from Positive No. 4 on Battery to the Third Terminal from the Top on the Left Side of Controller Switch** (Includes the next Item) | 1 |
| 22237 | Ferrule for Lead Assembly 10583 (Not shown in Illustration) | 1 |
| 10576 | **Lead Assembly from Negative No. 1 on Battery, to the First Terminal from the Bottom, on Right Side of Switch** (Includes the next Item) | 1 |
| 22237 | Ferrule for Lead Assembly 10576 (Not shown in Illustration) | 1 |

# No. 5401 BATTERY BOX (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 10577 | **Lead Assembly from Negative No. 2 on Battery to the Second Terminal from the Bottom on the Right Side of Controller Switch** | 1 |
| | (Includes the next 2 Items) | |
| 22237 | Ferrule for Lead Assembly 10577 (Not shown in Illustration) | 1 |
| 10578 | **Lead Assembly from Negative No. 3 on Battery to the Third Terminal from the Bottom on the Right Side of Controller Switch** | 1 |
| | (Includes the next Item) | |
| 22237 | Ferrule for Lead Assembly 10578 (Not shown in Illustration) | 1 |
| 10579 | **Lead Assembly from Negative No. 4 on Battery to the First Terminal from the Bottom on the Right Side of Controller Switch** | 1 |
| | (Includes the next Item) | |
| 22237 | Ferrule for Lead Assembly 10579 (Not shown in Illustration) | 1 |
| 22130 | Tube for Lead Assemblies 10582, 10583, 10580 and 10581 | 2 |
| 22131 | Tube for Lead Assemblies 10576 and 10579 | 1 |
| 13476 | **Ampere Hour Meter Assembly Complete** | 1 |
| | (Includes the next 120 Items) | |
| | (13476 Ampere Hour Meter Assembly has a single set of Magnets. 10101 Amper Hour Meter Assembly has two sets of Magnets. When ordering repair parts, order for the correct Meter. The two Amper Hour Meters as a whole are interchangeable. When ordering a complete new Ampere Hour Meter always order 10101. The above Ampere Hour Meter must be returned to Delco when any extensive repairs are required or when it is necessary to disassemble the unit to make internal repairs or adjustments. Delco will furnish parts for minor repairs that can be easily taken care of in the field. | |
| 10100 | **Resistance Button Assembly Complete** | 1 |
| | (Includes the next 2 Items) | |
| 22092 | Lead for Simplex Resistance Button 22094 (Short) | 1 |
| 22093 | Lead for Simplex Resistance Button 22094 (Long) | 1 |
| 20125 | Insulating Washer for Resistance Button Assembly 10100 and Meter Base 28311 (Large) | 4 |
| 20287 | Insulating Washer for Resistance Button Assembly 10100 (Small) | 1 |
| 20318 | Screw for retaining Resistance Button Assembly 10100 | 1 |
| 20165 | Plain Washer for Screw 20318 | 1 |
| 20288 | Insulating Bushing for Meter Base 27311 | 3 |
| 20076 | Insulating Washer for Meter Base 27311 (Small) | 3 |
| 10766 | **Contact Assembly** | 1 |
| | (Includes the next 2 Items) | |
| 24556 | Screw for attaching Guard 24558 | 2 |
| 24558 | Guard for Contact Assembly 10766 | 1 |
| 20260 | Screw for retaining Contact Assembly 10766 | 2 |
| 20393 | Lock Washer for Screw 20260 and Nut 23452 | 4 |
| 20117 | Insulating Bushing for Meter Base 27311 | 4 |
| 11762 | **Lead Assembly from Terminal No. 2 on Meter, attached to Lead Assembly 10579 at Terminal on Controller Switch** | 1 |
| 21737 | Ferrule for Lead Assembly 11762 | 1 |
| 12268 | **Lead Assembly from Terminal No. 3 on Controller Bracket to Terminal No. 1 on Meter** | 1 |
| | (Includes the next 2 Items) | |
| 20116 | Clip for Lead Assembly 12268 | 1 |
| 21737 | Ferrule for Lead Assembly 12268 | 1 |
| 10307 | **Lead Assembly from (C) on Meter Contact to the First Terminal from Top on Left Side of Controller Switch** | 1 |
| | (Includes the next Item) | |
| 21737 | Ferrule for Lead Assembly 10307 | 1 |
| 10561 | **Lead Assembly from Terminal No. 2 on Controller Bracket to (B) on Meter Contact** | 1 |
| | (Includes the next Item) | |
| 20116 | Clip for Lead Assembly 10561 | 1 |
| 24165 | Screw for Meter Terminals | 2 |
| 23452 | Nut for Screw 24165 | 2 |
| 24138 | Clip for Meter Terminals | 2 |
| 12554 | **Case Assembly Complete** | 1 |
| | (Includes the next 2 Items) | |
| 27320 | Name Plate for Case 27313 | 1 |
| 27461 | Pin for retaining Name Plate 27320 | 2 |
| 12520 | **Large Hand Assembly** | 1 |
| 12542 | **Train Plate Assembly** | 1 |
| | (Includes the next 2 Items) | |
| 27386 | Spring for Train Plate Assembly 12542 | 1 |
| 27477 | Rivet for Spring 27386 | 1 |
| 12530 | **Fifth Staff Assembly** | 1 |
| 12528 | **Fourth Staff Assembly** | 1 |
| 12527 | **Third Staff Assembly** | 1 |
| 12526 | **Second Staff Assembly** | 1 |
| 12525 | **Worm Staff Assembly** | 1 |
| 12544 | **Bracket Assembly for Worm Staff Assembly 12525** | 1 |
| | (Includes the next Item) | |
| 27466 | Pin for Bracket Assembly 12544 (Not shown in Illustration) | 1 |

# No. 5401 BATTERY BOX (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 12521 | **Hopper Plate Assembly** | 1 |
| | (Includes the next 6 Items) | |
| 12545 | **Bridge Assembly** | 1 |
| 27441 | Screw for attaching Bridge Assembly 12545 | 1 |
| 27395 | Lock Washer for Screw 27441 | 1 |
| 27475 | Support for Worm Staff Assembly 12525 (Not shown in Illustration) | 1 |
| 27484 | Bracket for Worm Staff Assembly 12525 | 1 |
| 27479 | Rivet for retaining Bracket 27484 (Not shown in Illustration) | 2 |
| 12523 | **Bearing Assembly (Upper)** | 1 |
| 12519 | **Armature Box Assembly** | 1 |
| 12522 | **Worm Spindle Assembly** | 1 |
| 12529 | **Armature Assembly** | 1 |
| 12552 | **Pole Plate Assembly** | 1 |
| 12531 | **Bezel Ring Assembly Complete** | 1 |
| | (Includes the next 7 Items) | |
| 12551 | **Bezel Ring Assembly (Not shown in Illustration)** | 1 |
| | (Includes the next 2 Items) | |
| 27489 | Ring for Bezel Ring Assembly 12551 | 1 |
| 27402 | Dowel Pin for Ring 27489 | 2 |
| 27406 | Snap Ring for Bezel Ring Assembly 12531 | 1 |
| 27407 | Glass for Bezel Ring Assembly 12531 | 1 |
| 27430 | Bezel Ring for Bezel Ring Assembly 12531 | 1 |
| 27481 | Gasket for Glass 27407 (Not shown in Illustration) | 1 |
| 27311 | Base for Ampere Hour Meter Assembly 6077 | 1 |
| 27319 | Dial for Ampere Hour Meter Assembly 6077 | 1 |
| 28471 | Nut for Screw 27446 | 2 |
| 27348 | Washer for Hopper Plate Assembly 12521 (Small Gasket) | 1 |
| 27358 | Plain Washer for Screw 27446 | 2 |
| 13839 | **Magnet Assembly** | 1 |
| | (Includes the next Item) | |
| 27448 | Screw for Magnet Assembly 13839 | 4 |
| 27376 | Nut for Bearing Assembly 12523 | 1 |
| 26088 | Spacing Washer for damping Pole (Not shown in Illustration) | 4 |
| 27395 | Lock Washer for Screws 27439, 27441, 27442 and 27465 | 10 |
| 27396 | Lock Washer for Screws 27446 and 27444 | 8 |
| 27397 | Lock Washer for Nut 27376 | 1 |
| 27398 | Lock Washer for Stud 27469 | 2 |
| 27399 | Lock Washer for Screws 27449 and 27446 | 5 |
| 27408 | Insulator for Screw 27446 | 2 |
| 27413 | Washer for Armature Box Assembly 12519 (Large Gasket) | 1 |
| 27419 | Nut for Stud 27469 (Wing Nut) | 2 |
| 20117 | Insulating Bushing for Meter Base 27311 | 4 |
| 27423 | Small Hand for Third Staff Assembly 12527 | 1 |
| 27438 | Screw for mounting Dial 27319 | 3 |
| 27439 | Screw for Bracket 27464 (Small) | 1 |
| 27440 | Screw for mounting Train Plate Assembly 12542 (Flat Head) | 1 |
| 27442 | Screw for mounting Hopper Plate Assembly 12521 | 1 |
| 27444 | Screw for Meter Terminals and for retaining Clamp Ring 27488 | 6 |
| 27446 | Screw for mounting Armature Box Assembly 12519 | 2 |
| 27449 | Screw for retaining Meter Base 27311 | 2 |
| | (Includes the next 3 Items) | |
| 14189 | **Clamp Assembly (Not shown in Illustration)** | 1 |
| 27455 | Screw for connecting Friction Slider 27457 and Friction Clamp 27458 | 1 |
| 27457 | Friction Slider for connecting Right Hand Shunt Lead Assembly 12501 and Left Hand Shunt Lead 27342 | 1 |
| 27458 | Friction Clamp for connecting Right Hand Shunt Lead Assembly 12501 and Left Hand Shunt Lead 27342 | 1 |
| 27459 | Insulating Tube for Case Stud 27469 (Not shown in Illustration) | 2 |
| 27463 | Ear Clip for Metal Terminals | 2 |
| 27464 | Bracket for Armature Box Assembly 12519 (Not shown in Illustration) | 1 |
| 27465 | Screw for Train Plate Assembly 12542 (Head Milled Down) (Not shown in Illustration) | 2 |
| 27469 | Case Stud for mounting Case Assembly 12554 | 2 |
| 27482 | Gasket on Meter Base 27311 for Case Assembly 12554 (Not shown in Illustration) | 1 |
| 27488 | Clamp Ring under Pole Plate Assembly 12552 | 1 |
| 12501 | **Right Hand Shunt Lead Assembly** | 1 |
| 27342 | Left Hand Shunt Lead, connecting Meter Terminal and Right Hand Shunt Lead Assembly 12501 | 1 |
| 10101 | **Ampere Hour Meter Assembly Complete** | 1 |
| | (Includes the next 134 Items) | |
| | (No. 13476 Ampere Hour Meter Assembly has a single set of Magnets, the No. 10101 Ampere Hour Meter Assembly has two sets of Magnets. When ordering repair parts, order for the correct Meter. The two Ampere Hour Meters are interchangeable as a whole. When ordering a complete new Ampere Hour Meter, always order No. 10101. The above Ampere Hour Meter must be returned to Delco when any extensive repairs are required or when it is necessary to disassemble the unit to make internal repairs or adjustment. Delco will furnish parts for minor repairs that can be easily taken care of in the field. | |

# No. 5401 BATTERY BOX (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 20117 | Insulating Bushing for Meter Base 23712 | 4 |
| 10100 | **Resistance Button Assembly** (Includes the next 2 Items) | 1 |
| 22092 | Lead (Short) for Resistance Button | 1 |
| 22093 | Lead for Simplex Resistance Button (Long) | 1 |
| 20125 | Insulating Washer for Resistance Button Assembly 10100 (Large) | 1 |
| 20287 | Insulating Washer for Resistance Button Assembly 10100 (Small) | 1 |
| 20165 | Plain Washer for Resistance Button 10100 | 1 |
| 20318 | Screw for mounting Resistance Button Assembly 10100 | 1 |
| 20288 | Insulating Bushing for Screw 20070 | 3 |
| 20076 | Insulating Washer for Screw 20070 (Large, for Top of Meter Base) | 3 |
| 20125 | Insulating Washer for Screw 20070 (Large, under Top of Meter Base) | 3 |
| 10766 | **Contact Assembly Complete (Not shown in Illustration)** (Includes the next 2 Items) | 1 |
| 24556 | Screw for mounting Guard 24558 | 2 |
| 24558 | Guard for Contact Spring Assemblies | 1 |
| 20260 | Screw for retaining Contact Assembly 10766 | 2 |
| 20393 | Lock Washer for Screw 20260 | 2 |
| 20345 | Lock Washer for Nut 27334 on Meter Dial | 1 |
| 12555 | Case Assembly Complete with Name Plate (Cover for Meter) (Includes the next 2 Items) | 1 |
| 27320 | Name Plate for Case 27495 | 1 |
| 27461 | Pin for retaining Name Plate 27320 | 2 |
| 12503 | **Train Plate Assembly Complete** (Includes the next 2 Items) | 1 |
| 27386 | Lifting Spring for Train Plate 27393 | 1 |
| 27477 | Rivet for Lifting Spring 27386 | 1 |
| 12493 | **Center Staff Assembly** | 1 |
| 12492 | **Compound Staff for Driving Center Staff Assembly** | 1 |
| 12491 | **Worm Wheel Staff for Driving Compound Staff 12492** | 1 |
| 12494 | **Counting Staff for Small Indicator Hand 27423** | 1 |
| 12495 | **Worm Staff for Driving Worm Wheel Staff 12491** | 1 |
| 12497 | **Worm Wheel Bracket for Worm Staff Assembly 12495** (Includes the next Item) | 1 |
| 27418 | Pin for Worm Wheel Bracket 12497 | 1 |
| 12505 | **Hopper Plate Assembly Complete (Lower Plate for mounting Compound Staff Assembly 12492 and Worm Wheel Staff 12491)** (Includes the next 3 Items) | 1 |
| 27330 | Bridge for Center Staff Assembly 12493 | 1 |
| 27441 | Screw for retaining Bridge 27330 | 1 |
| 27395 | Lock Washer for Screw 27441 | 1 |
| 12460 | **Armature Box Assembly for Meter** | 1 |
| 12523 | **Upper Bearing Assembly (For Coupling Spindle Assembly 12507 (Not shown in Illustration)** | 1 |
| 12507 | **Coupling Spindle Assembly for Driving Worm Staff Assembly 12495** | 1 |
| 12504 | **Armature Assembly for Meter** | 1 |
| 12535 | **Pole Plate Assembly (For retaining Armature Assembly 12504)** | 1 |
| 12506 | **Compensation Coil Assembly Complete for Meter** | 1 |
| 12509 | **Right Hand Lead Assembly for connecting No. 1 and No. 2 Terminals on Meter** | 1 |
| 27421 | Left Hand Lead for connecting Right Hand Lead Assembly 12509 to Terminal No. 2 on Meter | 1 |
| 14189 | **Clamp Assembly (Not shown in Illustration)** (Includes the next 3 Items) | 1 |
| 27458 | Clamp (Outside) for connecting Right Hand Lead Assembly 12509 and Left Hand Lead 27421 | 1 |
| 27457 | Slide( Inside) for connecting Right Hand Lead Assembly 12509 and Left Hand Lead 27421 | 1 |
| 27455 | Screw for Clamp 27458 and Slide 27457 | 1 |
| 12518 | **Contact Lever Assembly Complete for Operating Contact Assembly 10766** | 1 |
| 12531 | **Bezel Ring Assembly Complete** (Includes the next 7 Items) | 1 |
| 12551 | **Bezel Ring Assembly (Not shown in Illustration)** (Includes the next Item) | 1 |
| 27402 | Dowel Pin for Bezel Ring Assembly 12551 | 2 |
| 27406 | Snap Ring for Bezel Ring Assembly 12531 | 1 |
| 27407 | Glass for Bezel Ring Assembly 12531 | 1 |
| 27430 | Spring for Bezel Ring Assembly 12531 | 1 |
| 27481 | Gasket for Glass 27407 (Not shown in Illustration) | 1 |
| 27312 | Base for Ampere Hour Meter | 1 |
| 13840 | **Magnet Assembly** (Includes the next Item) | 1 |
| 27448 | Screw for Magnet Assembly 13840 | 8 |
| 26088 | Spacing Washer for Damping Pole (Not shown in Illustration) | 4 |
| 27315 | Compensating Pole (Mounted in Compensating Coil Assembly 12506) | 1 |
| 27316 | Clamp Ring (Mounted between Pole Plate Assembly 12535 and Pole Pieces) | 1 |
| 27319 | Dial for Meter | 1 |
| 27331 | Washer between Compensating Pole 27315 and Driving Pole 27318 | 1 |
| 27334 | Nut for retaining Hand Lever 27429 on Center Shaft Assembly 12493 | 1 |
| 28471 | Hexagon Nut on Screw 27445 | 2 |
| 27347 | Case Stud for Meter Case Assembly 12555 | 2 |

# No. 5401 BATTERY BOX (Continued)

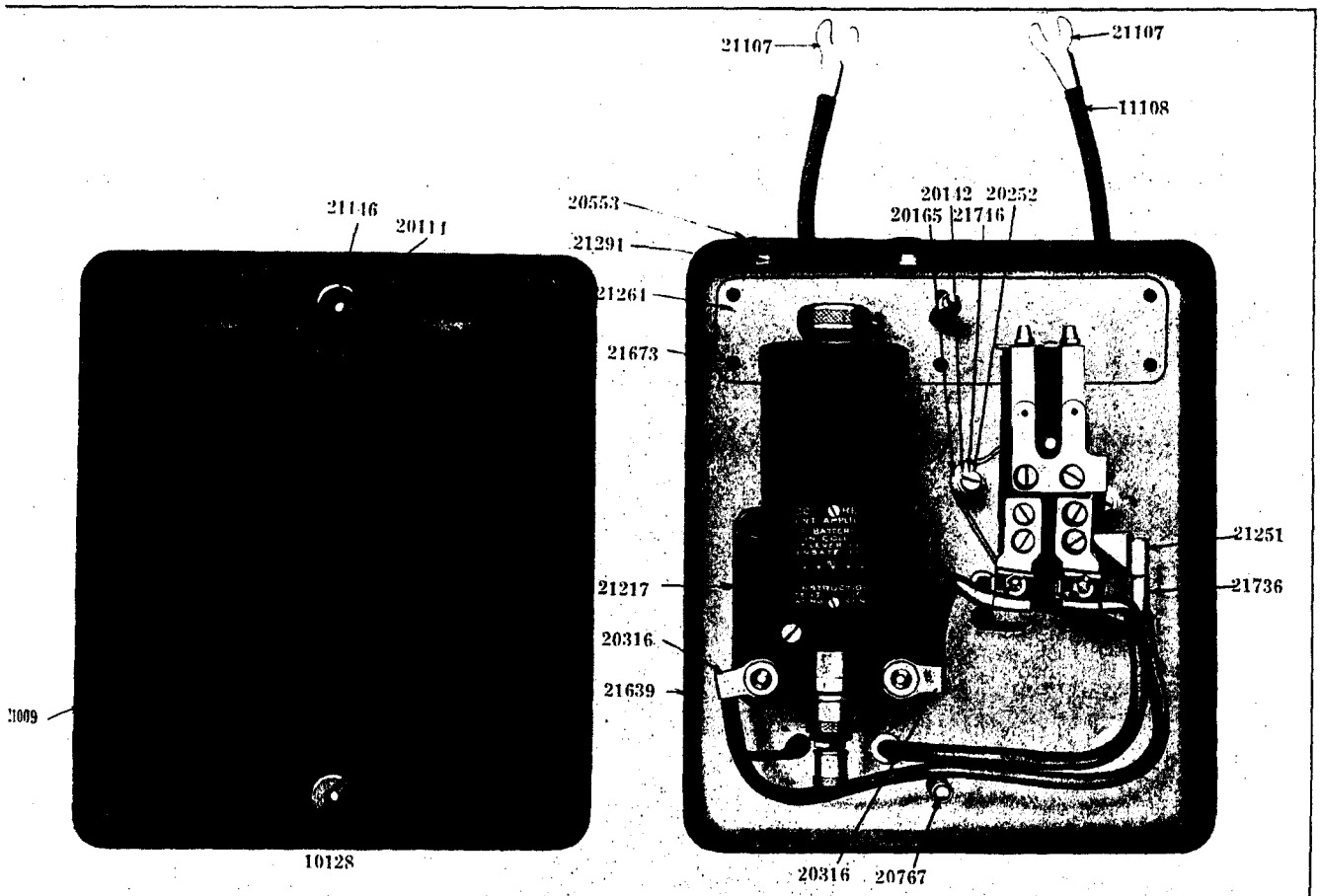
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 27348 | Washer for Hopper Plate Assembly 12505 (Small) | 1 |
| 27358 | Plain Washer for Screws 27444 and 27445 | 3 |
| 27376 | Nut for Upper Bearing Assembly 12523 | 1 |
| 27395 | Lock Washer for Screws 27452, 27439, 27443 and 27442 | 8 |
| 27396 | Lock Washer for Screws 27450, 27444 and 27445, 27451 | 11 |
| 25397 | Lock Washer for Nut 27376 (For Upper Bearing) | 1 |
| 27398 | Lock Washer for Case Stud 27347 | 2 |
| 27399 | Lock Washer for Screw 27449 | 2 |
| 27431 | Screw for mounting Upper Train Plate Assembly 12503 (Taper Head) | 1 |
| 27408 | Insulating Tube for Screw 27450 | 1 |
| 27413 | Washer for Armature Box (Large Paper Gasket) | 1 |
| 27419 | Wing Nut for retaining Case Assembly 12555 (Wing Nut) | 2 |
| 20117 | Insulating Bushing for Insulating Leads through Meter Base 27312 | 4 |
| 27423 | Small Indicator Hand on Dial 27319 | 1 |
| 27427 | Screw for Contact Lever 27429 | 1 |
| 27429 | Contact Lever for Operating Contact Assembly 10766 | 1 |
| 20810 | Plain Washer under Contact Lever 27429 (Not shown in Illustration) | 1 |
| 27438 | Screw for mounting Dial 27319 | 3 |
| 27439 | Screw for Train Plate Assembly 12503 (Round Head) | 3 |
| 27442 | Screw for Hopper Plate Assembly 12505 (Short Round Head) | 3 |
| 27443 | Screw for Hopper Plate Assembly 12505 (Long Round Head) | 1 |
| 27444 | Screw for mounting Armature Box Assembly 12460 and for Meter Terminal No. 1 (Short Fillister Head) | 3 |
| 27445 | Screw for Meter Terminal No. 2 | 1 |
| 27449 | Screw for retaining Meter Base 27312 | 2 |
| 27450 | Long Screw for Armature Box Assembly 12460 on Driving Pole 27318 | 1 |
| 27451 | Screw for mounting Compensating Pole 27315 | 1 |
| 27452 | Screw for mounting Hopper Plate Assembly 12505 (Round Head, milled down) | 1 |
| 27454 | Plain Washer for Screws 27450 and 27444 | 6 |
| 27459 | Insulating Tube for Case Stud 27347 (Not shown in Illustration) | 2 |
| 27482 | Gasket around Meter Base 27312 for Case Assembly 12555 (Not shown in Illustration) | 1 |
| 10306 | **Lead Assembly from Side Terminal on Cut-Out Relay to the Third Terminal from Bottom on Left Side of Controller Switch** (Incudes the next Item) | 1 |
| 21737.. | Ferrule for Lead Assembly 10306 (Not shown in Illustration) | 1 |
| 10307 | **Lead Assembly from (C) on Meter Contact Assembly 10766 to the First Terminal from the Top on Left Side of Controller Switch** (Includes the next Item) | 1 |
| 21737 | Ferrule for Lead Assembly 10307 (Not shown in Illustration) | 1 |
| 27432 | Lead from Terminal No. 3 on Controller Bracket to Compensating Coil Assembly 12506 (Not shown in Illustration) | 1 |
| 20116 | Clip for Lead 27432 (Not shown in Illustration) | 1 |
| 12510 | **Lead Assembly from Terminal No. 1 on Ampere Hour Meter to the First Terminal from Bottom on Left Side of Controller Switch** (Includes the next Item) | 1 |
| 27422 | Clip for Lead Assembly 12510 | 1 |
| 10561 | **Lead Assembly** (Includes the next Item) | 1 |
| 20116 | Clip for Lead Assembly 10561 | 1 |
| 5668 | **Cut-Out Relay Assembly Complete** (Includes the next 27 Items) | 1 |
| 11127 | **Coil Assembly for Relay 5668** | 1 |
| 21939 | Bracket for mounting Cut-Out Relay 5668 | 1 |
| 11047 | **Bracket for mounting Contact Assembly 11046 and Armature Assembly 11050** (Includes the next 3 Items) | 1 |
| 24144 | Bushing for Frame Assembly 11047 (Not shown in Illustration) | 1 |
| 24149 | Insulator for Frame Assembly 11047 (Not shown in Illustration) | 1 |
| 24169 | Stud for retaining Insulator 24149 (Not shown in Illustration) | 1 |
| 11050 | **Armature Assembly for Cut-Out Relay 5668** | 1 |
| 11046 | **Contact Assembly (Upper)** | 1 |
| 24151 | Nut for Armature Assembly 11050 | 1 |
| 24154 | Terminal Plate (Small Screw Holes for mounting Screws) | 2 |
| 24155 | Terminal Plate (Large Screw Holes for mounting Screws) | 1 |
| 24168 | Screw for mounting Terminal Plate 24154 | 2 |
| 24167 | Screw for mounting Terminal Plate 24155 and Contact Assembly 11046 | 4 |
| 24969 | Lock Washer for Screws 24167 and 24168 | 6 |
| 23941 | Insulating Washer for Screw 24167 | 4 |
| 21495 | Insulating Bushing for Screw 24167 for Contact Assembly 11046 | 2 |
| 11067 | **Lead Assembly for connecting Armature Assembly 11050** | 1 |
| 24138 | Terminal Clamp (on Top of Terminal Plates 24154 and 24155) | 2 |
| 20373 | Terminal Clamp (under Terminal Plate 24155 and for Terminal on Side of Coil) | 2 |
| 21491 | Nut for Coil Assembly 11127 | 2 |
| 26586 | Lock Washer for Nut 21491 | 1 |
| 24242 | Insulating Bushing for Screw 24167 for mounting Terminal Plate 24155 | 2 |
| 24145 | Insulating Bushing for Coil Studs (Long) | 2 |

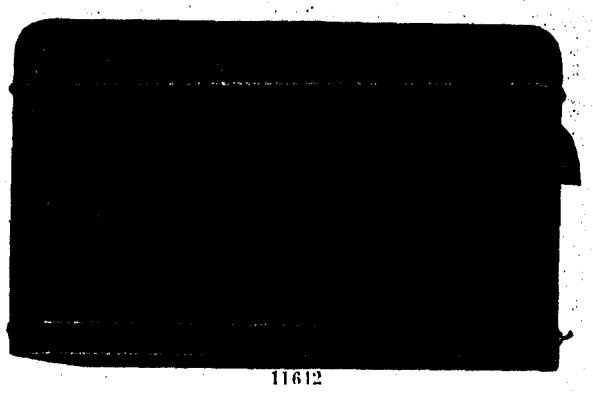
# No. 5401 BATTERY BOX (Continued)

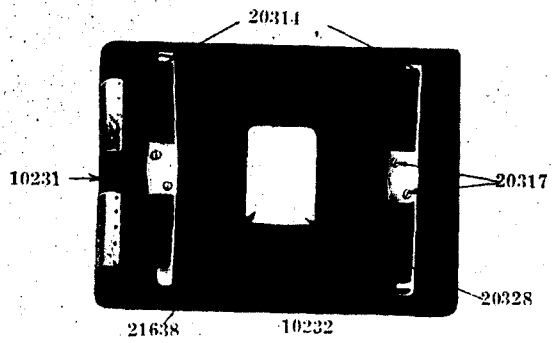
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 24144 | Insulating Bushing for Coil Studs (Short) | 1 |
| 24157 | Plate for grounding Terminal Lead Assembly 11067 | 1 |
| 24182 | Screw for retaining Terminal Clamps on Terminal Plate 24155 | 1 |
| 24165 | Screw for retaining Terminal Clamp on Terminal Plate 24154 and Terminal on Side of Coil Assembly 11127 | 2 |
| 24969 | Lock Washer for Nut 23452 | 3 |
| 23452 | Nut for Screws 24182 and 24165 | 3 |
| 24172 | Spring for operating Armature Assembly 11050 | 1 |
| 21937 | Insulator for Cut-Out Relay 5668 (Not shown in Illustration) | 1 |
| 20107 | Screw for retaining Cut-Out Relay Assembly 5668 | 2 |
| 20251 | Insulating Bushing for Screw 20107 | 2 |
| 20252 | Insulating Washer for Screw 20107 | 2 |
| 20165 | Plain Washer for Screw 20107 | 2 |
| 20142 | Lock Washer for Screw 20107 | 2 |
| 10532 | **Controller Switch Assembly Complete** (Includes the next 78 Items) | 1 |
| 10076 | **Controller Latch Arm for Controller Switch Assembly 1029 (Not shown in Illustration)** | 1 |
| 10335 | **Shunt Wire for Switch Assembly 1029 (To be used when charging rate is low) (Not shown in Illustration) (Double Shunt Service)** | 1 |
| 10118 | **Shunt Wire Assembly (Single Shunt) (Not shown in Illustration)** | 1 |
| 20098 | Spring for Latch Arm Assembly 10076 | 1 |
| 20178 | Screw for Latch Arm 10076 | 1 |
| 20350 | Lock Washer for Screw 20178 | 1 |
| 20109 | Plain Washer for Screw 20178 | 1 |
| 1029 | **Controller Switch Complete** (Includes the next 63 Items) | 1 |
| 24569 | Frame (Upper) for Controller Switch Assembly 1029 | 1 |
| 11247 | **Frame Assembly Complete (Lower) for Controller Switch Assembly 1029** | 1 |
| 20358 | Connector across Back of Switch connecting Top Terminal on Right Side of Switch to Fourth Terminal from Top on Left Side of Switch | 1 |
| 20359 | Connector for Blades on Left Side of Switch | 4 |
| 11244 | **Controller Blade Assembly (Blades Assembled Complete for Left Side of Switch)** (Includes the next 13 Items) | 1 |
| 20361 | Blade (Blades on Left Side of Switch with Extension for Connectors) | 3 |
| 20366 | Blade on Left Side of Switch with Extension for Two Binding Posts | 1 |
| 20363 | Blade on Left Side of Switch with Extension for Binding Posts and Connectors | 3 |
| 20364 | Blade on Left Side of Switch with Extension for One Binding Post | 1 |
| 20367 | Connector on Left Side of Switch Connecting with Brush | 3 |
| 20362 | Rod for supporting Blades | 2 |
| 20365 | Insulating Sleeve for Blades | 2 |
| 24574 | Brass Collar between Blades and Lower End Frame (On Left Side of Switch) | 1 |
| 24564 | Insulating Washer for Blade on Left Side of Switch | 9 |
| 24566 | Brass Collar between Blades on Left Side of Switch | 4 |
| 24565 | Brass Collar between Blades and Upper End Frame | 1 |
| 24567 | Insulating Collar between Blades on Left Side of Switch (Hard Rubber) | 6 |
| 27963 | Lock Washer between Blades and Upper End Frame | 1 |
| 11243 | **Blade Assembly (Blades Assembled Complete for Right Side of Switch)** (Includes the next 10 Items) | 1 |
| 20363 | Blade on Right Side of Switch with Extension for Connector and Bind Post | 1 |
| 20360 | Blade on Right Side of Switch with Extensions | 7 |
| 20368 | Connector on Right Side connecting with Brush | 5 |
| 20362 | Rod for supporting Blades on Right Side of Switch | 2 |
| 20365 | Insulating Sleeve for Blades on Right Side of Switch | 2 |
| 24564 | Insulating Washer between Blades and End Frame on Right Side of Switch | 1 |
| 24570 | Brass Collar with Shoulder between Blades on Right Side of Switch | 3 |
| 24567 | Insulating Collar between Blades on Right Side of Switch (Hard Rubber) | 9 |
| 24565 | Brass Collar between Blades and Upper End Frame | 1 |
| 27963 | Lock Washer between Blades and Upper End Frame (Not shown in Illustration) | 1 |
| 11245 | **Brush Assembly Complete (Blades Assembled Complete for Center of Switch)** (Includes the next 18 Items) | 1 |
| 24572 | Lock Washer on Ends of Rod 24579 for Pivoting Brush Blades | 2 |
| 24582 | Arm for Binding Brush Parts together | 2 |
| 24581 | Compression Spring for Brush Blades | 7 |
| 24578 | Insulating Washer on Pivoting Rod 24579 for Brush Blades | 16 |
| 24573 | Brass Collar on Ends of Pivoting Rod 24579 | 2 |
| 24580 | Rod for locating Brush Blades on Brush Assembly 11245 | 1 |
| 20351 | Insulating Sleeve for locating Rod 24580 (Hard Rubber) | 1 |
| 24579 | Rod for locating Brush Blades on Brush Assembly 11245 (Not shown in Illustration) | 1 |
| 20352 | Insulating Sleeve for Pivoting Rod 24579 (Hard Rubber) | 1 |
| 24576 | Brass Collar on Lower End of locating Rod 24580 | 1 |
| 24562 | Blades for Brush Assembly 11245 | 16 |
| 24563 | Brass Collar on locating Rod 24580 between Blades | 7 |
| 24540 | Dowel Pin for Pivoting Rod 24579 | 2 |
| 24541 | Dowel Pin for locating Rod 24580 | 2 |
| 24564 | Insulating Washer on Rod 24580 for Brush Blades | 16 |

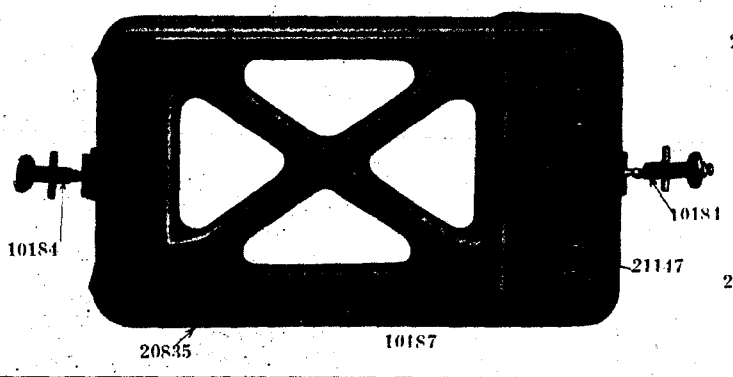
# No. 5401 BATTERY BOX (Continued)

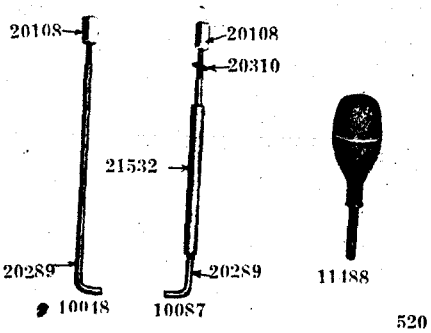
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 27963 | Lock Washer on Upper End of Rod 24580 (Not shown in Illustration) | 1 |
| 24575 | Brass Collar on Upper End of Rod 24580 | 1 |
| 24577 | Spacing Washer between Blades 24562 | 8 |
| 23452 | Nut for Screws 24165 and 24542 | 22 |
| 24969 | Lock Washer for Nut 23452 | 22 |
| 20373 | Terminal Clamp for Binding Posts | 15 |
| 11246 | **Arm Assembly for Operating Brush Assembly 11246** | 1 |
| 24079 | Dowel Pin for retaining Arm Assembly 11246 | 1 |
| 24538 | Screw for End Frame 24569 and End Frame Assembly 11247 | 7 |
| 24165 | Screw for Terminal Clamps on Binding Posts, and Long Screws for Connectors on Back of Switch | 18 |
| 24542 | Screws (Short Screw for Connectors on Back of Switch) | 4 |
| 24568 | Stud in End Frame Assembly 11247 for Spring 20098 | 1 |
| 20463 | Insulator (Back of Controller Switch) | 1 |
| 20035 | Screw for mounting Controller Switch | 4 |
| 20495 | Lock Washer for Screw 20035 | 4 |
| 20104 | Nut for mounting Ampere Hour Meter Assembly 10101 | 3 |
| 20070 | Screw for mounting Ampere Hour Meter Assembly 10101 | 3 |
| 20791 | Lock Washer for Screw 20070 | 3 |
| 20114 | Plain Washer for Screw 20070 | 3 |
| 20125 | Insulating Washer for Screw 20070 (Large) | 3 |
| 20075 | Nut for Spring Terminal | 1 |
| 20137 | Lock Washer for Nut 20075 | 1 |
| 22237 | Ferrule Placed over Ends of Lead Assemblies 10579 and 11262, and Leads 10304 and 10582 and soldered (Not shown in Illustration) | 2 |
| 22238 | Insulator Placed over Ferrule 22237 after soldering (Not shown in Illustration) | 2 |
| 10108 | **Cover Assembly Complete for Controller Switch** (Includes the next 4 Items) | 1 |
| 20168 | Clamp Nut for Cover Assembly 10108 | 1 |
| 20310 | Plain Washer for Clamp Nut 20168 | 1 |
| 21923 | Name Plate for Cover Assembly 10108 (Not shown in Illustration) | 1 |
| 20687 | Rivets for Name Plate 21923 (Not shown in Illustration) | 2 |
| 20128 | Screw for attaching Controller Bracket Assembly 10099 (Not shown in Illusration) | 5 |
| 20129 | Nut for Screw 20128 (Not shown in Illustration) | 5 |
| 20137 | Lock Washer for Nut 20129 | 5 |
| 12135 | **Base Assembly for Battery Box Base Assembly 12135 (Not shown in Illustration)** (Includes the next 13 Items) | 1 |
| 10113 | **Battery Box Latch Assembly for mounting Battery Box Cover Assembly** (Includes he next 5 Items) | 1 |
| 20584 | Latch for Battery Box Latch Assembly 10113 (Not shown in Illustration) | 1 |
| 20587 | Bolt for Battery Box Latch Assembly 10113 (Not shown in Illustration) | 1 |
| 20586 | Nut for Battery Box Latch Assembly 10113 (Not shown in Illustration) | 1 |
| 20588 | Spring for Battery Box Latch Assembly 10113 (Not shown in Illustration) | 1 |
| 20585 | Nut for Battery Box Latch Assembly 10113 (Round) (Not shown in Illustration) | 1 |
| 12002 | **Base Assembly for Battery Box Base Assembly 12135** (Includes the next 4 Items) | 1 |
| 20091 | Guide for Controller Rod Assembly 10107 | 1 |
| 21001 | Rivet for Guide 20091 and Plate | 9 |
| 20596 | Plate for retaining Latch Assembly 10113 | 2 |
| 21001 | Rivets for Plate 20596 | 6 |
| 10122 | **Battery Cover Assembly Complete for Battery** (Includes the next 4 Items) | 1 |
| 20314 | Spring for Battery Cover Assembly 10122 | 2 |
| 20317 | Screw for Spring 20314 | 4 |
| 21267 | Date Card for Battery Cover Assembly 10122 (Not shown in Illustration) | 2 |
| 20328 | Pin for Date Card 21267 on Battery Cover Assembly 10122 | 2 |
| 21565 | Base Support for Battery Box (Not shown in Illustration) | 4 |
| 20080 | Terminal Clip for connecting Battery Box (Not shown in Illustration) | 6 |
| 20289 | Bolt for Battery | 1 |
| 20108 | Nut for Bolt 20289 | 1 |
| 20310 | Plain Washer for Nut 20108 | 1 |
| 11536 | **Battery Box Cover Assembly** | 1 |
| 20223 | Wrench for Controller Switch 1029 | 2 |
| 10534 | **Controller Operating Rod Assembly Complete** (Includes the next 6 Items) | 1 |
| 10535 | **Controller Operating Rod Assembly** (Includes the next Item) | 1 |
| 21162 | Dowel Pin for retaining Collar 20236 | 2 |
| 20048 | Spring for Controller Operating Rod Assembly 10534 | 1 |
| 20389 | Sleeve for Rod 20123 | 1 |
| 20176 | Guide for Sleeve 20389 | 1 |
| 20096 | Cup for Spring 20048 | 2 |



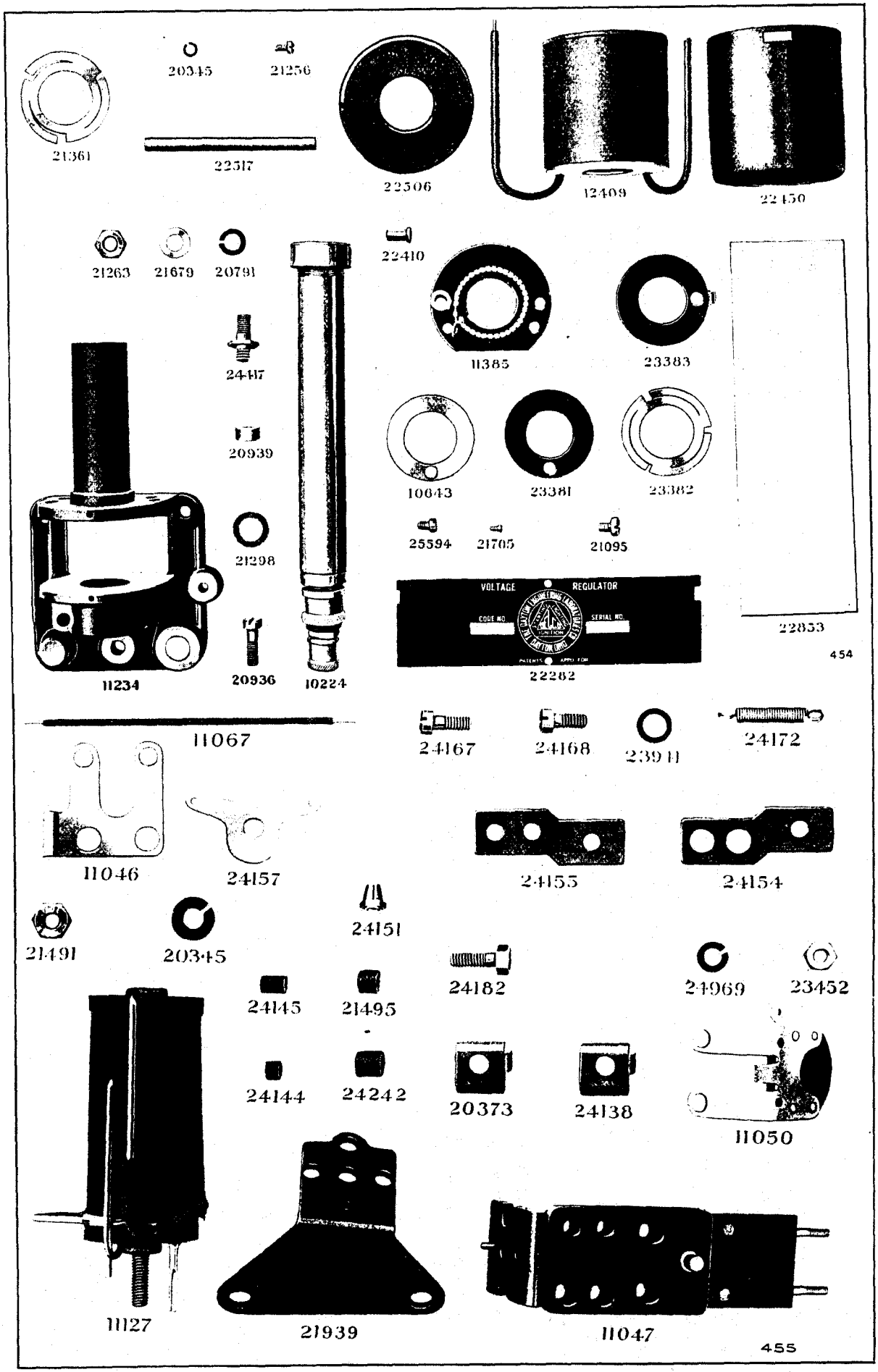




# No. 5404 BATTERY BOX



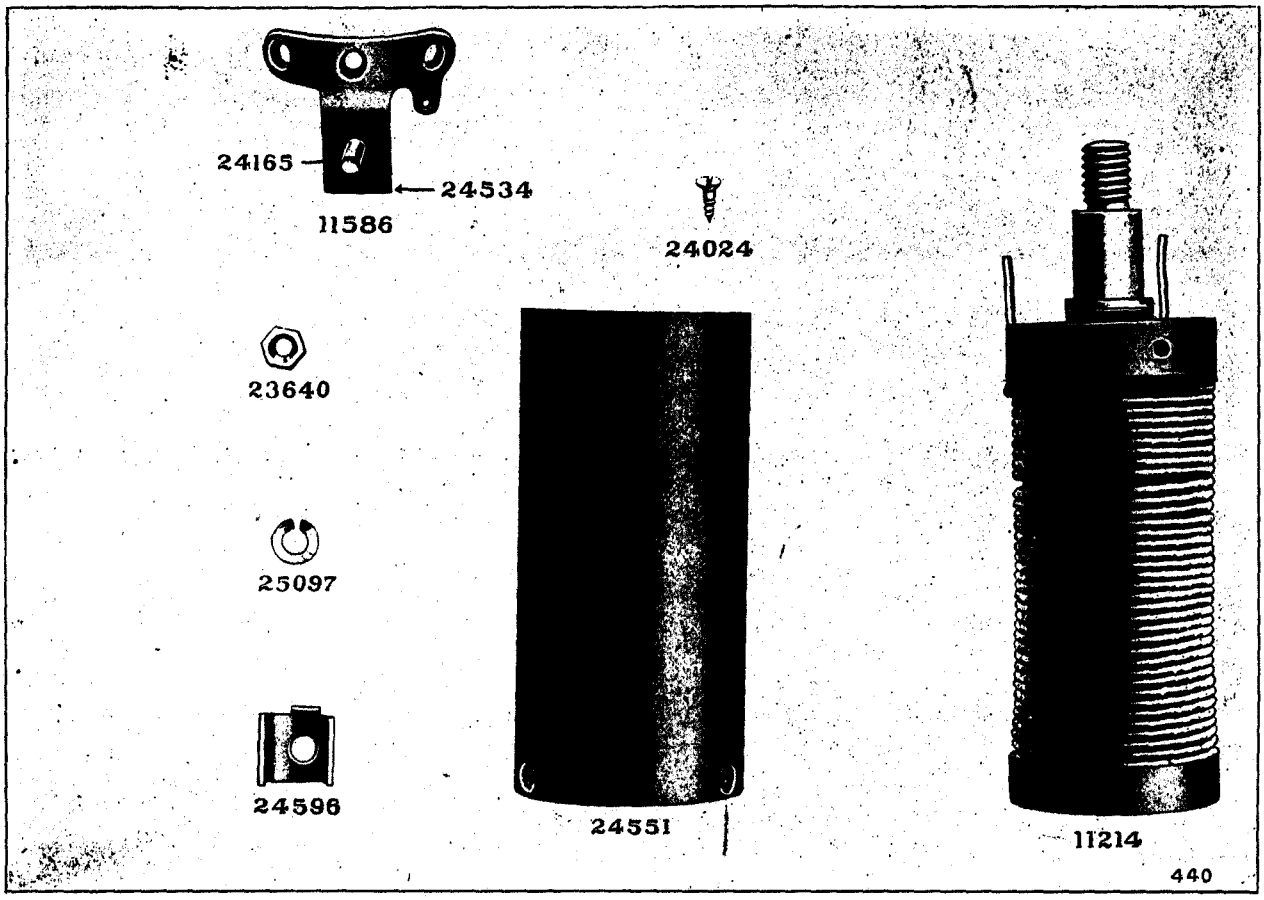

# No. 5404 BATTERY BOX

# No. 5404 BATTERY BOX

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5404 | **BATTERY BOX COMPLETE** | 1 |
| 11642 | **Cover Assembly** | 1 |
| 20316 | Terminal Clip for Voltage Regulator 5602 | 1 |
| 11488 | **Syringe for Filling Storage Battery** | 1 |
| 10232 | **Cover Assembly Complete for Storage Battery (Wood)** (Includes the next 4 Items) | 1 |
| 20314 | Spring for Cover Assembly 10231 | 2 |
| 20317 | Screw for retaining Spring 20314 | 4 |
| 21638 | Date Card for Cover Assembly 10232 | 1 |
| 20328 | Pin for retaining Date Card | 4 |
| 20289 | Bolt for Battery Bolt Assembly | 1 |
| 20108 | Nut for Bolt 20289 | 1 |
| 20310 | Plain Washer for Nut 20108 | 1 |
| 10087 | **Battery Bolt Assembly Complete** (Includes the next 4 Items) | 1 |
| 20289 | Bolt for Battery Bolt Assembly 10087 | 1 |
| 20108 | Nut for Bolt 20289 | 1 |
| 20310 | Plain Washer for Nut 20108 | 1 |
| 21532 | Sleeve for Bolt 20289 | 1 |
| 20835 | Base for Battery Box | 1 |
| 21600 | Screw for retaining Clamp Plate 21597 (Not shown in Illustration) | 4 |
| 21601 | Nut for Screw 21600 (Not shown in Illustration) | 4 |
| 20393 | Lock Washer for Nut 21601 (Not shown in Illustration) | 4 |
| 10184 | **Latch Assembly Complete** (Includes the next 8 Items) | 2 |
| 20588 | Spring for Latch Assembly 10184 (Not shown in Illustration) | 1 |
| 20585 | Clamp Nut for Latch Assembly 10184 (Not shown in Illustration) | 1 |
| 20586 | Cap Nut for Latch Assembly 10184 (Not shown in Illustration) | 1 |
| 20584 | Latch for Latch Assembly 10184 (Not shown in Illustration) | 1 |
| 20310 | Plain Washer for Spring 20588 (Not shown in Illustration) | 1 |
| 10183 | **Latch Assembly (Not shown in Illustration)** (Includes the next 2 Items) | 1 |
| 20587 | Bolt for Latch Assembly 10183 (Not shown in Illustration) | 1 |
| 21597 | Clamp Plate for Bolt 20587 (Not shown in Illustration) | 1 |
| 20129 | Nut for Screw 21147 (Not shown in Illustration) | 3 |
| 21147 | Screw for retaining Apparatus Box 5502 (Not shown in Illustration) | 1 |
| 20137 | Lock Washer for Nut 20129 (Not shown in Illustration) | 3 |
| 5502 | **Apparatus Box Complete** (Includes the next 96 Items) | 1 |
| 20939 | Insulating Bushing for Screw 20128 (Long) (Not shown in Illustration) | 2 |
| 21078 | Insulating Bushing for Screw 20128 (Short) (Not shown in Illustration) | 1 |
| 20117 | Insulating Bushing for Box 21639 (Rubber) (Not shown in Illustration) | 3 |
| 21193 | Cover Plate for Box 21639 (Not shown in Illustration) | 1 |
| 20553 | Screw for attaching Cover Plate 21193 (Not shown in Illustration) | 2 |
| 20484 | Lock Washer for Screw 20553 (Not shown in Illustration) | 2 |
| 21291 | Nut for retaining Screw 20553 (Not shown in Illustration) | 2 |
| 21684 | Clip for retaining Lead (Outside of Box) (Long Clip) (Not shown in Illustration) | 1 |
| 21208 | Clip for retaining Lead (Outside of Box) (Short Clip) (Not shown in Illustration) | 1 |
| 21217 | Insulator for Voltage Regulator 5502 | 1 |
| 20068 | Nut for retaining Screws 21746 and 20107 (Not shown in Illustration) | 2 |
| 20347 | Nut for retaining Screw 20349 (Not shown in Illustration) | 1 |
| 20393 | Lock Washer for Nut 20347 (Not shown in Illustration) | 1 |
| 20128 | Screw for retaining Voltage Regulator 5502 (Not shown in Illustration) | 3 |
| 20349 | Screw for Side Terminal on Relay 5678 (Not shown in Illustration) | 1 |
| 20114 | Plain Washer for Screw 20128 (Not shown in Illustration) | 3 |
| 20137 | Lock Washer for Screw 20128 (Not shown in Illustration) | 3 |
| 20076 | Insulating Washer for Screw 20128 (Not shown in Illustration) | 3 |
| 20107 | Screw for attaching Relay 5678 (Inner) (Not shown in Illustration) | 1 |
| 20251 | Insulating Bushing for Screw 21746 (Not shown in Illustration) | 1 |
| 20252 | Insulating Washer for Screw 21746 | 1 |
| 20165 | Plain Washer for Screw 21746 | 1 |
| 20142 | Lock Washer for Screw 21746 | 1 |
| 21746 | Screw for attaching Relay 5678 (Outer) | 1 |
| 10126 | **Box Assembly Complete** (Includes the next 4 Items) | 1 |
| 21264 | Insulator for Box Assembly 10126 | 2 |
| 21673 | Rivet for retaining Insulator 21264 | 6 |
| 21923 | Number Plate for Box Assembly 10125 (Not shown in Illustration) | 1 |
| 22216 | Rivet for retaining Number Plate 21923 (Not shown in Illustration) | 2 |
| 11108 | **Lead Assembly (Long Single)** (Includes the next 2 Items) | 1 |
| 21107 | Clip for Lead Assembly 11108 | 1 |
| 21737 | Ferrule for Clip 21107 (Not shown in Illustration) | 1 |
| 11109 | **Lead Assembly (Double) (Not shown in Illustration)** (Includes the next 5 Items) | 1 |
| 21736 | Connector for Lead Assembly 11109 | 1 |
| 20316 | Clip for Voltage Regulator End of Lead Assembly 11109 | 1 |
| 21107 | Clip for Lead Assembly 11109 | 1 |
| 21251 | Clip for Cut-out Relay End of Lead Assembly 11109 | 1 |
| 20117 | Insulating Bushing for Lead Assembly 11109 | 1 |

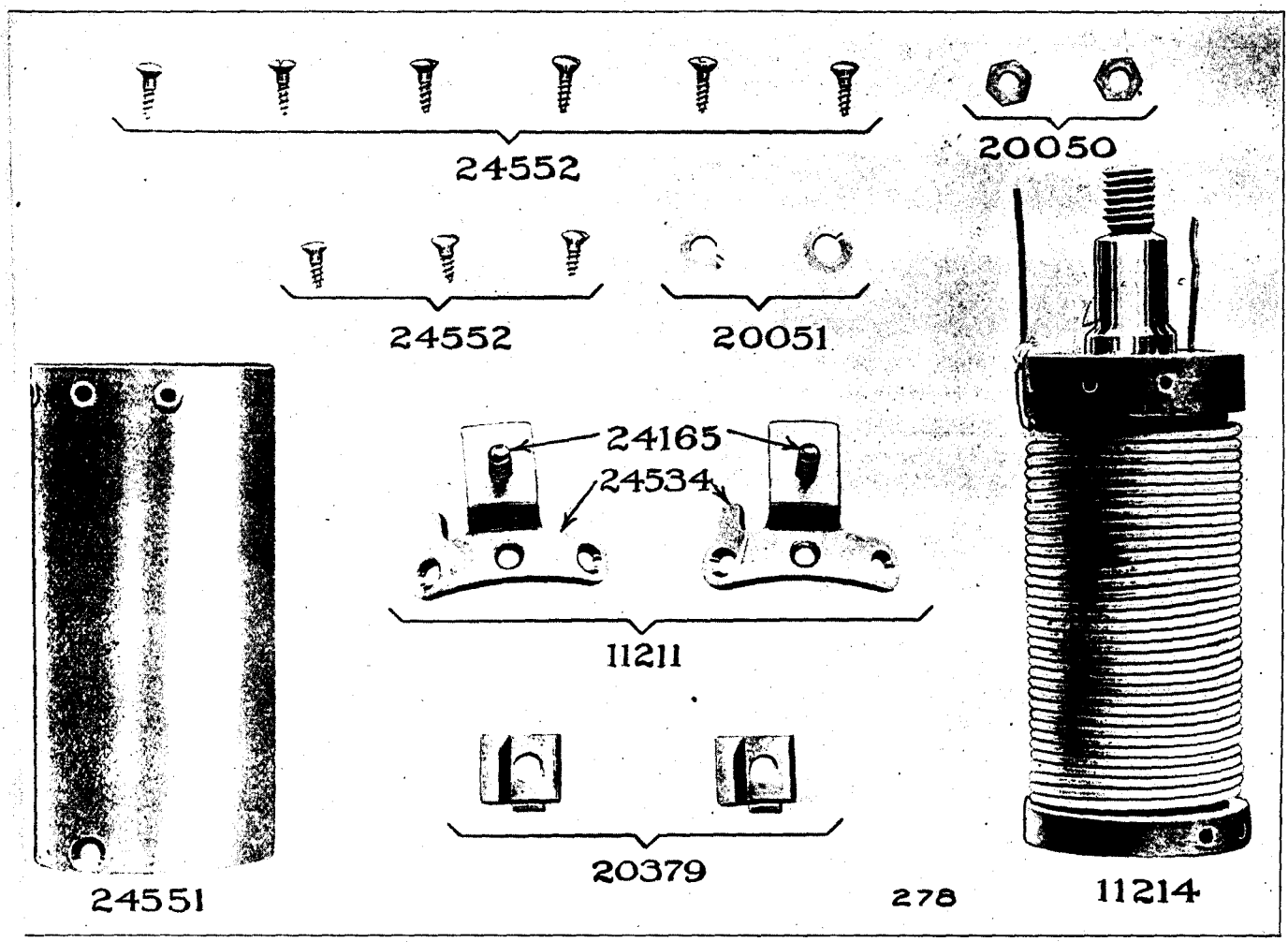
# No. 5404 BATTERY BOX (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 11110 | **Lead Assembly (Short Single) (Not shown in Illustration)** | 1 |
| | (Includes the next 2 Items) | |
| 20316 | Clip for Lead Assembly 11110 | 1 |
| 21737 | Ferrule for Clip 20316 | 1 |
| 5678 | **Cut-Out Relay Complete** | 1 |
| | (Includes the next 27 Items) | |
| 11127 | **Coil Assembly** | 1 |
| 11067 | **Lead Assembly for connecting Contact Spring Assembly 11050** | 1 |
| 11050 | **Contact Spring Assembly (Lower Contact)** | 1 |
| 11046 | **Contact Spring Assembly (Upper Contact)** | 2 |
| 24151 | Nut for retaining Contact Spring Assembly 11050 (Split Nut) | 4 |
| 24167 | Screw for attaching Contact Spring Assembly 11046 and Terminal Plate 24155 | 4 |
| 23941 | Insulating Washer for Screws 24167, 24182 and 24168 | 2 |
| 21495 | Insulating Bushing on Screw 24167 for Contact Spring Assembly 11046 | 1 |
| 24242 | Insulating Bushing on Screw 24167 for Terminal Plate 24155 | 2 |
| 24168 | Screw for retaining Contact Plate 24154 | 1 |
| 24154 | Terminal Plate (Small Hole) | 1 |
| 24155 | Terminal Plate (Large Hole) | 2 |
| 24138 | Terminal Clip for Terminal Plates 24154 and 24155 (Upper) | 2 |
| 20373 | Terminal Clip for Terminal Plates 24154 and 24155 (Lower) | 2 |
| 24182 | Screw for retaining Terminal Clips 20373 and 24138 | 2 |
| 23452 | Nut for Screw 24182 | 2 |
| 24969 | Lock Washer for Nut 23452 | 1 |
| 11047 | **Bracket Assembly for retaining Contact Spring Assemblies 11050 and 11046** | 1 |
| | (Includes the next 3 Items) | |
| 24169 | Stud for Insulator (Not shown in Illustration) | 1 |
| 24149 | Insulator for Bracket Assembly 11047 (Not shown in Illustration) | 1 |
| 24144 | Bushing for Stud 24169 | 1 |
| 21939 | Bracket for attaching Relay 5678 | 1 |
| 24172 | Spring for operating Contact Spring Assembly 11050 | 2 |
| 21491 | Nut for retaining Coil Assembly 11127 | 1 |
| 24345 | Lock Washer for Nut 21491 | 1 |
| 24145 | Insulating Bushing for Coil Assembly 11127 (Long) | 2 |
| 24144 | Insulating Bushing for Coil Assembly 11127 (Short) | 1 |
| 24157 | Plate under Nut 21491 for Grounding Lead Assembly 11067 | 1 |
| 21937 | Insulator for Bracket 21939 (Not shown in Illustration) | 8 |
| 24969 | Lock Washer for Screws 24167, 24182 and 24168 | 1 |
| 5602 | **Voltage Regulator Complete** | |
| | (Includes the next 30 Items) | |
| 10884 | **Voltage Regulator Assembly (Service) (Complete 5602 Assembly less Mercury Tube 10224) (Not shown in Illustration)** | 1 |
| 11234 | **Bracket Assembly for Voltage Regulator 5602** | 1 |
| 10224 | **Mercury Tube Assembly** | 1 |
| 22450 | Shell for Coil Assembly 15279 | 1 |
| 15279 | **Coil Assembly** | 1 |
| 22512 | Terminal Clip for Coil Assembly 15279 (Not shown in Illustration) | 1 |
| 22853 | Insulator for Coil Assembly 15279 | 1 |
| 22517 | Insulator for Lead on Coil Assembly 15279 | 1 |
| 11385 | **Rheostat Coil Assembly** | 1 |
| 22506 | Cover for Shell 22450 | 2 |
| 22410 | Insulating Bushing for Lead on Coil Assembly 15279 | 2 |
| 21256 | Screw for retaining Shell 22450 | 2 |
| 20345 | Washer for Screw 21256 | 1 |
| 22282 | Name Plate for Voltage Regulator 5602 | 2 |
| 21705 | Screw for retaining Name Plate 22282 | 1 |
| 20936 | Screw in Bracket Assembly 11234 for Clamping Mercury Assembly 10224 | 1 |
| 21095 | Screw for retaining Rheostat Coil Assembly 11385 (Large Head) | 1 |
| 25594 | Screw for Rheostat Coil Assembly 11385 (Small Head) | 1 |
| 22417 | Terminal Stud for retaining Terminal Stud Assembly 10591 | 1 |
| 21263 | Nut for Terminal Stud 22417 | 1 |
| 21679 | Plain Washer for Nut 21263 | 1 |
| 20791 | Lock Washer for Nut 21263 | 1 |
| 20939 | Insulating Bushing for Terminal Stud 22417 | 2 |
| 21298 | Insulating Washer for Terminal Stud 22417 | 2 |
| 10643 | **Contact Plate Assembly for Rheostat Coil Assembly 11385** | 1 |
| 23381 | Insulating Plate for Contact Plate Assembly 10643 | 1 |
| 23382 | Tension Spring for Contact Plate Assembly 10643 | 1 |
| 23383 | Adjusting Plate for Contact Plate Assembly 10643 | 1 |
| 21361 | Tension Spring for Coil Assembly 15279 | 1 |
| 22526 | Screw for Voltage Regulator 5602 (Not shown in Illustration) | |
| 10591 | **Terminal Stud Assembly for connecting Voltage Regulator 5602 (Not shown in Illustration)** | 1 |
| | (Includes the next 4 Items) | |
| 22894 | Stud for Terminal Stud Assembly 10591 (Not shown in Illustration) | 1 |
| 24281 | Clamp for Terminal Stud Assembly 10591 (Not shown in Illustration) | 1 |
| 20347 | Nut for Stud 22894 (Not shown in Illustration) | 1 |
| 20393 | Lock Washer for Nut 20347 (Not shown in Illustration) | 1 |
| 10128 | **Cover Assembly for Apparatus Box 5502** | |
| | (Includes the next 4 Items) | 2 |
| 21146 | Nut for Cover 21009 | 2 |
| 20114 | Washer for Nut 21146 | |



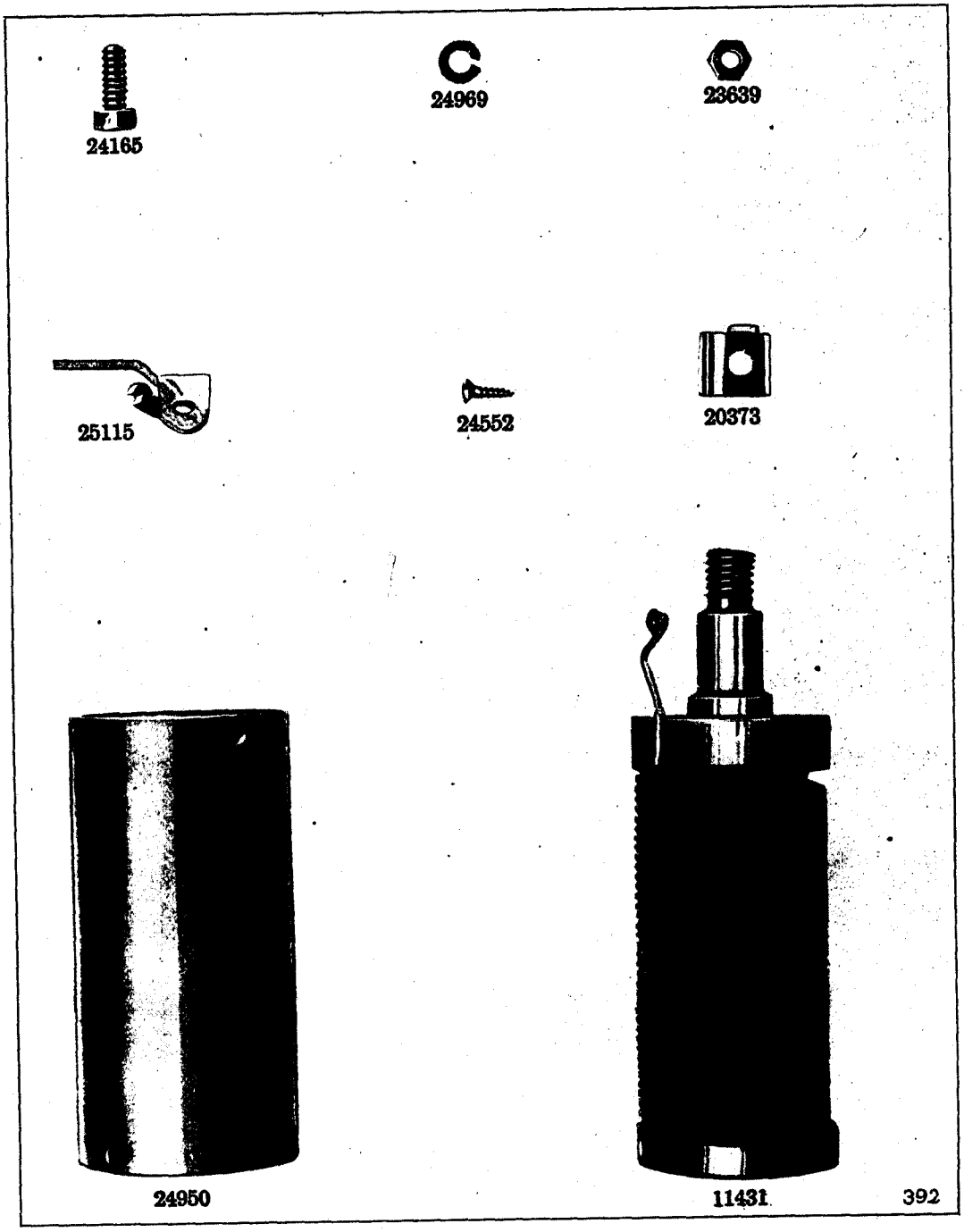

# No. 5440 CLUTCH MAGNET

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **5440** | **CLUTCH MAGNET COMPLETE** | 1 |
| **11214** | **Latch Magnet Coil Assembly** | 1 |
| **24551** | Shell for Clutch Magnet Coil Assembly 11214 | 1 |
| **24024** | Screw for retaining Shell 24551 and Terminal Assembly 12126 | 9 |
| **12126** | **Terminal Assembly Complete (Not shown in Illustration)** (Includes the next 5 Items) | 2 |
| **11586** | **Terminal Assembly** (Includes the next Item) | 1 |
| **24165** | Screw for connecting Clutch Magnet | 1 |
| **24596** | Clip for Screw 24165 | 1 |
| **23640** | Nut for Screw 24165 | 1 |
| **25097** | Lock Washer for Nut 23640 | 1 |




# No. 5442 CLUTCH MAGNET

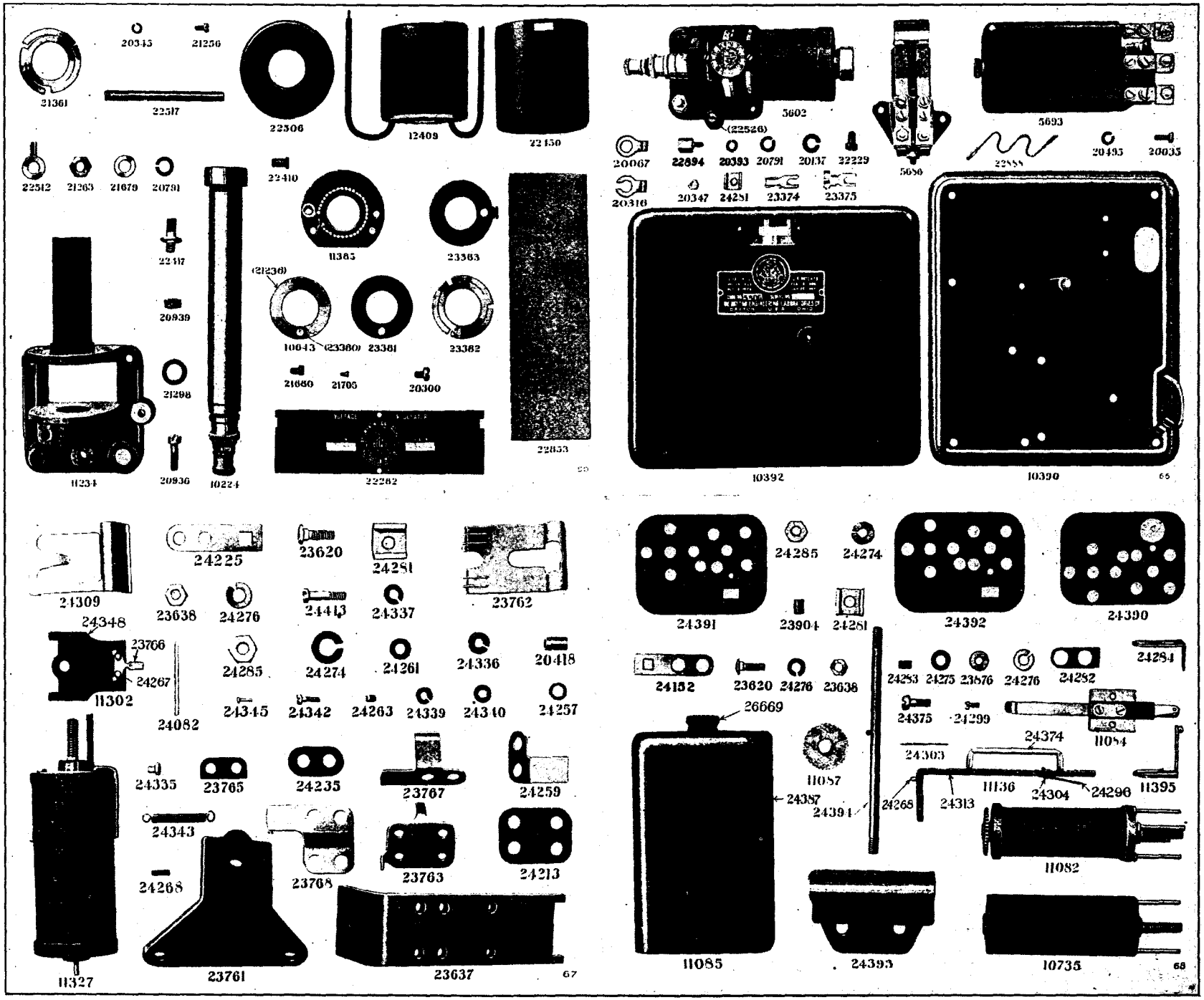
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5442 | **CLUTCH MAGNET COMPLETE** | 1 |
| 11214 | **Coil Assembly** | 1 |
| 24551 | **Shell for Coil Assembly 11214** | 1 |
| 24552 | Screw for retaining Shell 24551 and Terminal Assembly 11508 | 9 |
| 11508 | **Terminal Assembly Complete (Not shown in Illustration)** (Includes the next 5 Items) | 2 |
| 11211 | **Terminal Assembly** (Includes the next Item) | 1 |
| 24165 | Screw for connecting Clutch Magnet | 1 |
| 20373 | Clip for Screw 24165 (Not shown in Illustration) | 1 |
| 23639 | Nut for Screw 24165 | 1 |
| 24539 | Lock Washer for Nut 23639 | 1 |




# No. 5447 CLUTCH MAGNET

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5447 | **CLUTCH MAGNET COMPLETE** | 1 |
| 11431 | **Coil Assembly** | 1 |
| 24950 | Shell for Coil Assembly 11413 | 1 |
| 24552 | Screw for retaining Shell 24950 and Terminal Assembly 13492 | 8 |
| 13492 | **Terminal Assembly Complete** (Includes the next 5 Items) | 2 |
| 11432 | **Terminal Assembly** (Includes the next Item) | 1 |
| 24165 | Screw for connecting Clutch Magnet | 1 |
| 20373 | Clip for Screw 24165 | 1 |
| 23639 | Nut for Screw 24165 | 1 |
| 20393 | Lock Washer for Nut 23639 | 1 |

# No. 5506 APPARATUS BOX



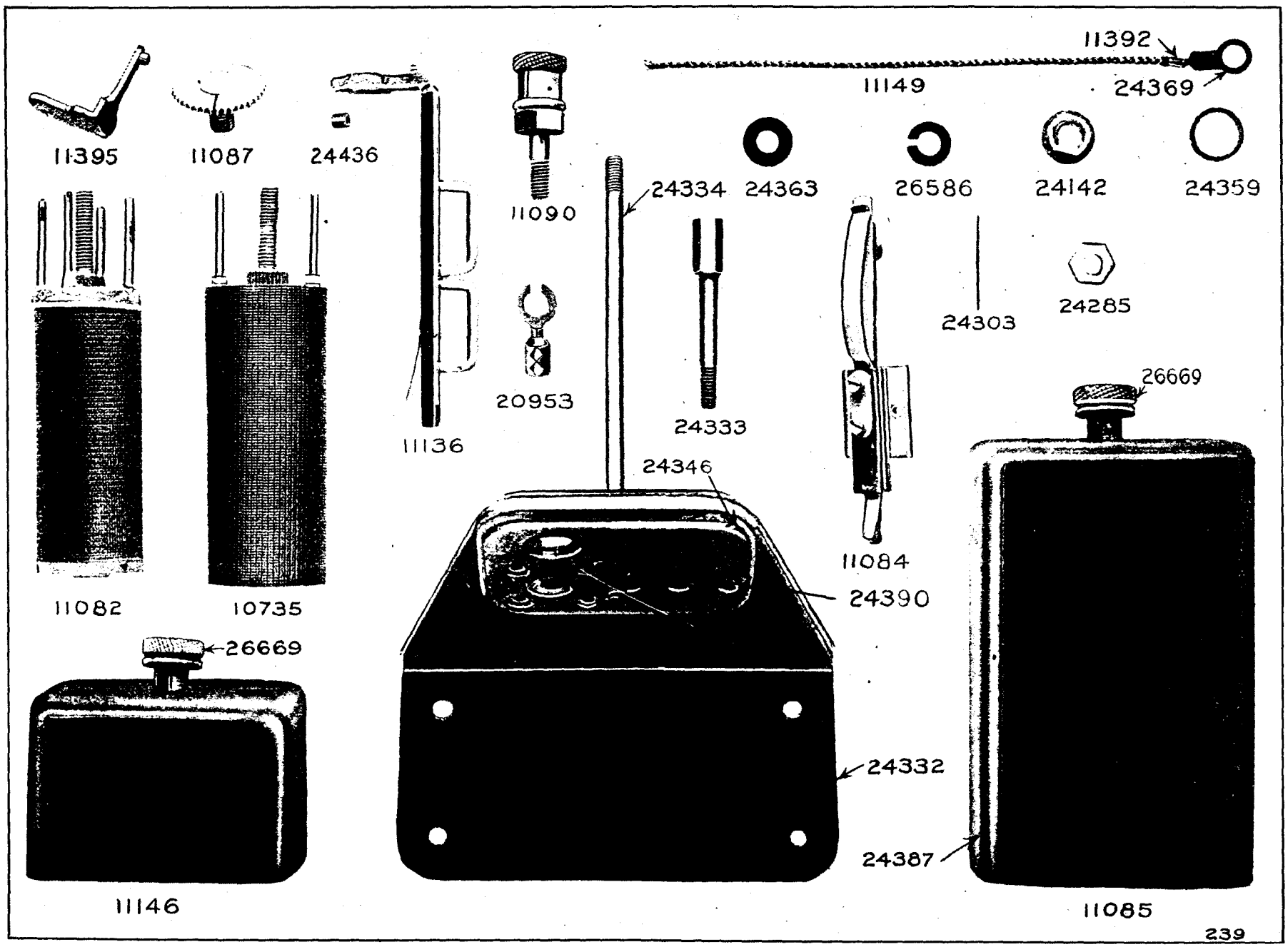
# No. 5506 APPARATUS BOX

(No. 5510 Apparatus Box is the same as No. 5506 Apparatus Box with the Voltage Regulator taken out. No. 5510 Apparatus Box is used with No. 28B Motor Generator. No. 5506 Apparatus Box is used with No. 28 Motor Generator.

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5506 | APPARATUS BOX COMPLETE | 1 |
| 10392 | **Cover Assembly Complete** (Includes the next 8 Items) | 1 |
| 22907 | Clamp Nut for Cover Assembly 10392 (Not shown in Illustration) | 1 |
| 20114 | Plain Washer for Clamp Nut 22907 (Not shown in Illustration) | 1 |
| 22439 | Indicator Guard for Cover 22423 (Not shown in Illustration) | 1 |
| 22440 | Indicator Cover for Indicator Guard 22439 (Not shown in Illustration) | 1 |
| 20810 | Plain Washer for Rivet 22731 (Not shown in Illustration) | 2 |
| 22731 | Rivet for Indicator Guard 22439 (Not shown in Illustration) | 2 |
| 22408 | Name Plate for Cover 22423 (Not shown in Illustration) | 1 |
| 22216 | Rivet for Name Plate 22408 (Not shown in Illustration) | 2 |
| 10390 | **Base Assembly** | 1 |
| 20035 | Screw for Mounting Relays 5693 and 5686 | 4 |
| 20495 | Lock Washer for Screw 20035 | 4 |
| 22229 | Screw for mounting Regulator 5602 | 2 |
| 20137 | Lock Washer for Screw 22229 | 3 |
| 22881 | Protector Strip for Cover Assembly 10592 (Not shown in Illustration) | 1 |
| 22962 | Rubber Bushing for Leads | 1 |
| 22888 | Battery Charging Resistance for connecting Regulator 5602 and Relay 5686 | 1 |
| 10591 | **Terminal Stud Assembly for Battery Charging Resistance 22888 (Service)** (Includes the next 4 Items) | 1 |
| 22894 | Connector Stud for Terminal Stud Assembly 10591 | 1 |
| 24281 | Clip for Connector Stud 22894 | 1 |
| 20347 | Nut for Connector Stud 22894 | 1 |
| 20393 | Lock Washer for Nut 20347 | 1 |
| 22526 | Ground Screw Regulator 5602 | 1 |
| 20791 | Lock Washer under Terminal Stud Assembly 10591 | 1 |
| 5686 | **Cut-Out Relay Complete** (Includes the next 37 Items) | 1 |
| 11327 | **Coil Assembly for Relay** | 1 |
| 23761 | Mounting Bracket for Mounting Relay | 1 |
| 23637 | Bracket for Mounting Contact | 1 |
| 11302 | **Armature Assembly for operating Double Contact Arm 23762** | 1 |
| 24309 | Indicator Mounted on Armature Assembly 11302 | 1 |
| 24343 | Spring for operating Armature Assembly 11302 | 1 |
| 24345 | Pin for mounting Indicator Shutter 24309 | 2 |
| 24268 | Pin for locating mounting Bracket 23761 and Bracket 23637 | 1 |
| 24335 | Stud for Double Contact Arm 23762 | 2 |
| 24082 | Pin for mounting Armature Assembly 11302 | 1 |
| 24285 | Nut for mounting Coil Assembly 11327 | 1 |
| 24274 | Lock Washer for Nut 24285 | 1 |
| 23763 | Terminal Plate for Grounding Coil Assembly 11327 | 1 |
| 24259 | Connector for connecting Coil and Terminal Plate 24225 | 1 |
| 23762 | Double Contact Arm for Armature Assembly 11302 | 1 |
| 23767 | Single Contact Arm for Cut-Out Relay (Two Holes) | 1 |
| 23768 | Single Contact Arm for Cut-Out Relay (Four Holes) | 1 |
| 24266 | Screw for mounting Double Contact Arm 23762 | 2 |
| 24263 | Insulating Bushing for Screw 24266 | 2 |
| 24339 | Lock Washer for Screw 24266 | 2 |
| 24340 | Plain Washer for Screw 24266 | 2 |
| 24257 | Insulating Washer for Screw 24266 | 2 |
| 23765 | Insulator for Double Contact Arm 23762 | 1 |
| 24225 | Terminal Plate for Connecting Relay | 2 |
| 23620 | Screw for Terminal Plate 24225 | 2 |
| 24281 | Clip for Terminal Plate 24225 | 2 |
| 23638 | Nut for Screw 23620 | 2 |
| 24276 | Lock Washer for Nut 23638 | 2 |
| 24413 | Screw for mounting Terminal Plate 24225 | 4 |
| 20418 | Insulating Bushing for Screw 24413 | 4 |
| 24336 | Plain Washer for Screw 24413 | 4 |
| 24337 | Lock Washer for Screw 24413 | 4 |
| 24261 | Insulating Washer for Screw 24413 | 1 |
| 24235 | Insulator for Contact Arms 23767 and 23768 | 2 |
| 24213 | Insulator under Contact Arms 23767 and 23768 | 1 |
| 5602 | **Voltage Regulator Complete** (Includes the next 28 Items) | 1 |
| 10844 | **Voltage Regulator Assembly (Service) (Voltage Regulator complete less Mercury Tube Assembly)** | 1 |
| 11234 | **Bracket Assembly for Regulator 5602** | 1 |
| 10224 | **Mercury Tube Assembly** | 1 |
| 22450 | Coil Shell for Coil Assembly 15279 | 1 |
| 15279 | **Coil Assembly for Regulator** | 1 |

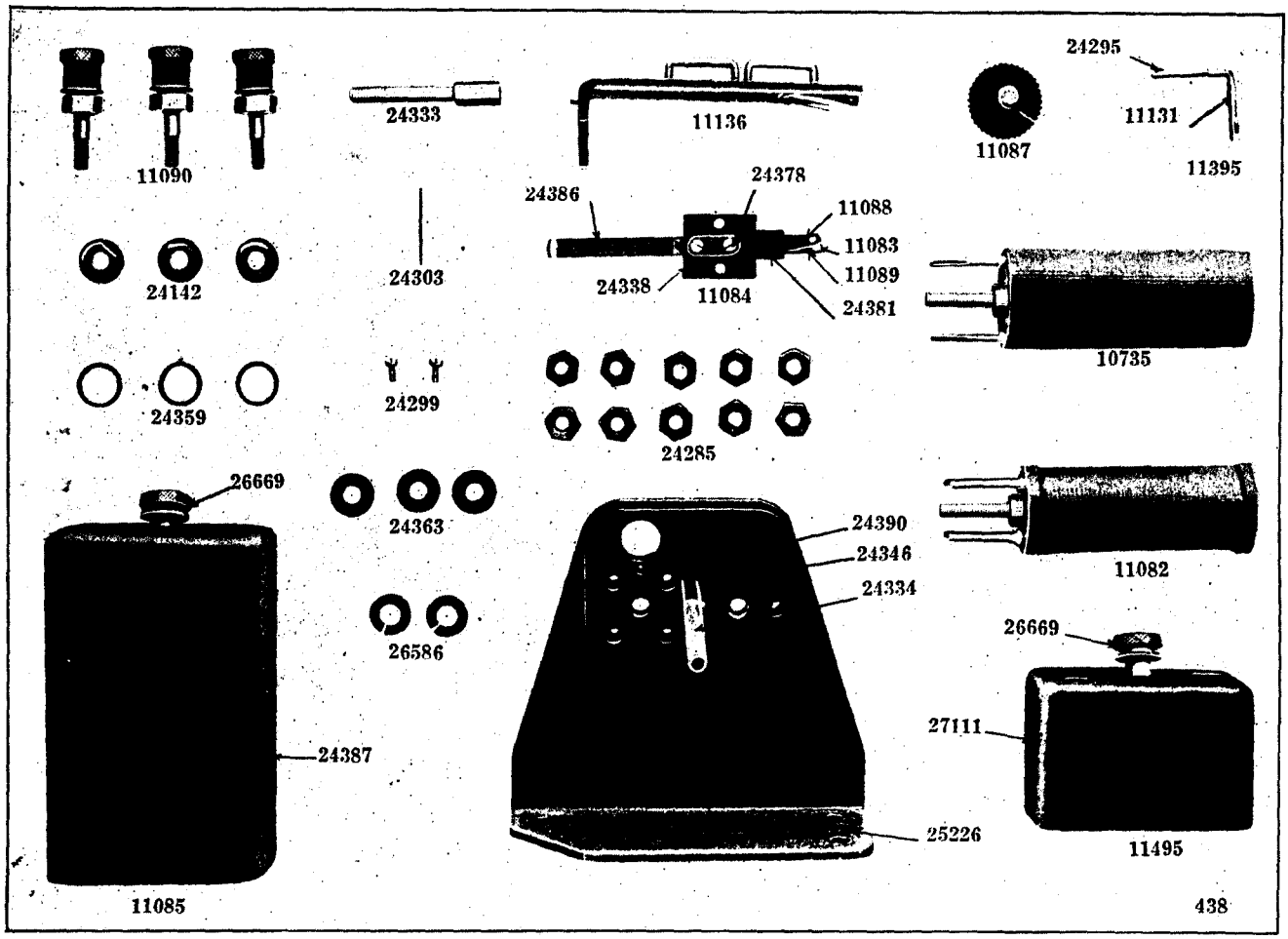
# No. 5506 APPARATUS BOX (Continued)

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 22512 | Terminal Clip for Coil Assembly | 1 |
| 22853 | Insulator for Coil Assembly 15279 | 1 |
| 22517 | Insulator for Lead on Coil Assembly 15279 | 1 |
| 11385 | **Rheostat Coil Assembly** | 1 |
| 22506 | Cover for Coil Shell 22450 | 1 |
| 22410 | Insulating Bushing for Lead on Coil Assembly 12409 | 1 |
| 21256 | Screw for retaining Coil Shell 22450 | 2 |
| 20345 | Lock Washer for Screw 21256 | 2 |
| 22282 | Name Plate for Regulator | 2 |
| 21705 | Screw for Name Plate 22282 | 1 |
| 20936 | Screw in Bracket Assembly 11234 for Clamping Mercury Tube Assembly 10224 | 2 |
| 25594 | Screw for mounting Rheostat Coil Assembly 11385 (Small) (Not shown in Illustration) | 1 |
| 21095 | Screw for mounting Rheostat Coil Assembly 11385 (Large) (Not shown in Illustration) | 1 |
| 22417 | Terminal Stud for mounting Terminal Stud Assembly 10591 | 1 |
| 21263 | Nut for Terminal Stud 22417 | 1 |
| 21679 | Plain Washer for Nut 21263 | 1 |
| 20791 | Lock Washer for Nut 21263 | 1 |
| 20939 | Insulating Bushing for Terminal Stud 22417 | 1 |
| 21298 | Insulating Washer for Terminal Stud 22417 | 1 |
| 10643 | **Contact Plate Assembly Complete for Rheostat Coil Assembly 11385** | 2 |
| 23381 | Insulator Plate for Contact Plate Assembly 10643 | 1 |
| 23382 | Tension Spring for Contact Plate Assembly 10643 | 1 |
| 23383 | Adjusting Plate for Contact Plate Assembly 10643 | 1 |
| 21361 | Tension Spring for Coil Assembly 12409 | 1 |
| 5693 | **Ignition Relay Complete** | 1 |
| | (Includes the next 45 Items) | 1 |
| 24393 | Mounting Bracket for Mounting Relay | |
| 24394 | Stud for mounting Shell Assembly 11085 | 1 |
| 10735 | **Condenser Assembly for Relay** | 1 |
| 11082 | **Coil Assembly for Relay** | 1 |
| | (Includes the next Item) | 1 |
| 11087 | **Adjustment Screw for Coil Assembly 11082** | |
| 11085 | **Shell Assembly Complete Relay** | 1 |
| | (Includes the next Item) | 1 |
| 26669 | Clamp Nut for Shell 24387 | |
| 24389 | Plain Washer for retaining Nut 26669 | 1 |
| 11136 | **Mounting Bracket Assembly Complete for mounting Contact Assembly 11084** | 1 |
| | (Includes the next 2 Items) | 1 |
| 24296 | Spring for Bracket Assembly 11136 | |
| 24304 | Rivet for attaching Spring 24296 | 1 |
| 11395 | **Armature Assembly for operating Contact Assembly 11084** | 2 |
| 24303 | Pin for mounting Armature Assembly 11395 | 1 |
| 11084 | **Contact Assembly Complete for Relay** | 1 |
| 24285 | Nut for mounting Coil Assembly 11082 and Condenser Assembly 10735 | 1 |
| 26586 | Lock Washer for Nut 24285 (Not shown in Illustration) | 4 |
| 24299 | Screw for mounting Contact Assembly 11084 | 2 |
| 24391 | Dust Pad for mounting Bracket 24393 | 2 |
| 24392 | Mounting Plate (Outside) for mounting Coil Assembly 11082 and Condenser Assembly 10735 | 1 |
| 24390 | Mounting Plate (Inside of Mounting Coil Assembly 11082 and Condenser Assembly 10735) | 1 |
| 23904 | Insulating Bushing for Coil Assembly 11082 and Condenser Assembly 10735 | 1 |
| 24152 | Base Plate for mounting Relay | 6 |
| 24375 | Screw for mounting Base 24152 | 3 |
| 24283 | Insulating Bushing for Screw 24375 | 6 |
| 24275 | Insulating Washer for Screw 24375 | 6 |
| 23876 | Plain Washer for Screw 24375 | 6 |
| 24276 | Lock Washer for Screw 24375 | 6 |
| 24282 | Insulator for Connector 24284 | 6 |
| 24284 | Connector for connecting Coil Assembly 11082 and Condenser Assembly 10735 to Terminal Plate 24225 | 3 |
| 24281 | Clip for retaining Terminal Clips | 3 |
| 23620 | Screw for retaining Clip 24281 | 3 |
| 23638 | Nut for Screw 23620 | 3 |
| 24276 | Lock Washer for Nut 23638 | 3 |
| 20316 | Terminal Clip for Voltage Regulator | 3 |
| 23375 | Terminal Clip for Cut-Out Relay | 1 |
| 23374 | Terminal Clip for Ignition Relay | 2 |
| 20067 | Terminal Clip (Ground) | 3 |
| | | 1 |


11395
11087
24436
11136
11090
20953
11392
11149
24369
24334
24363
26586
24142
24359
24333
24303
24285
11084
26669
11082
10735
24346
24390
24332
24387
11085
26669
11146
239

# No. 5661 IGNITION RELAY

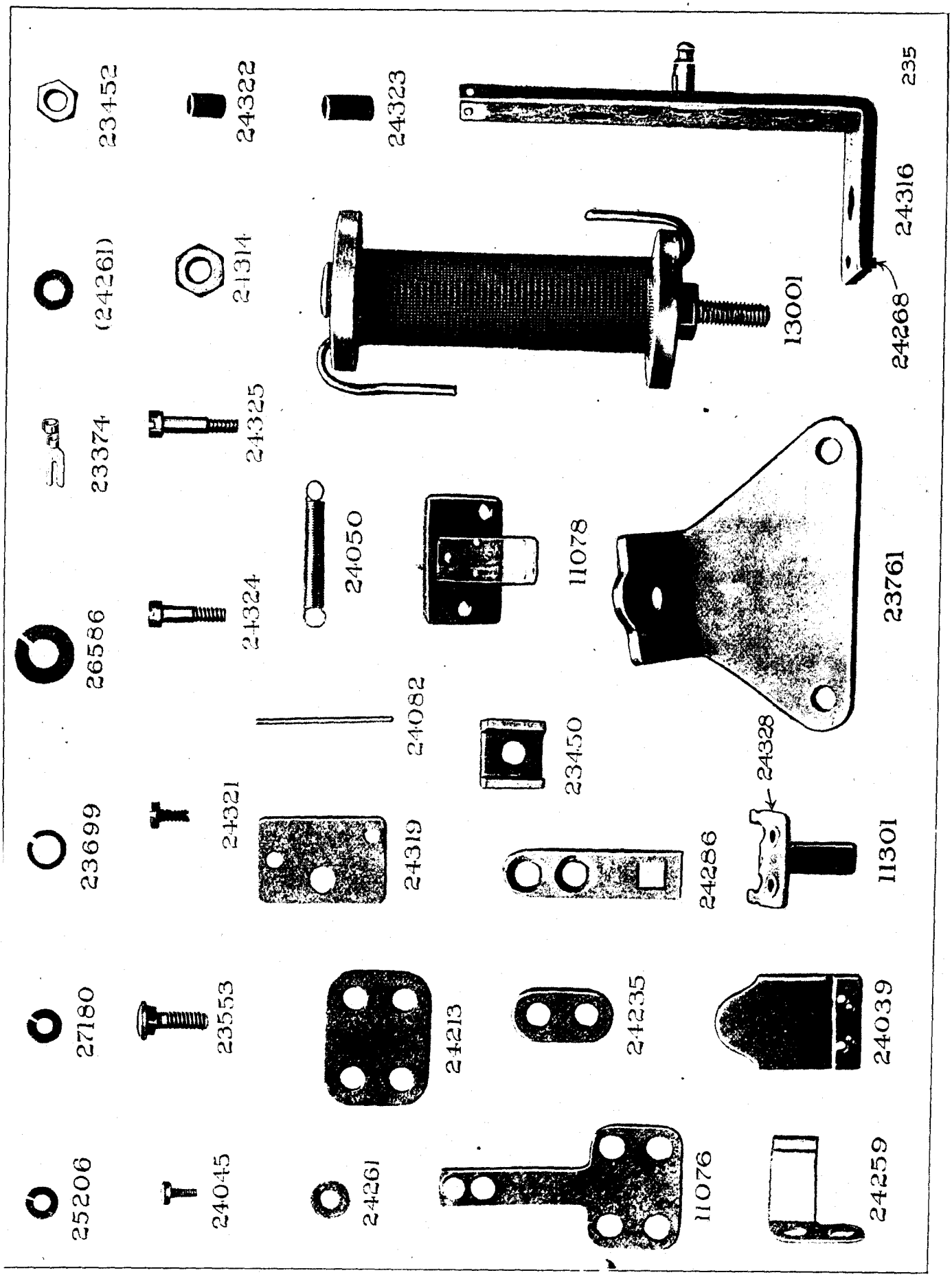
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **5661** | **IGNITION RELAY** | 1 |
| **24332** | Mounting Bracket for Mounting Ignition Relay 5661 | 1 |
| **24436** | Insulating Bushing for Coil Assembly 11082 and Condenser Assembly 10735 | 6 |
| **24333** | Stud for Mounting Shell Assembly 11146 | 1 |
| **24334** | Rod for Mounting Shell Assembly 11085 | 1 |
| **11085** | **Shell Assembly Complete for Governing Coil Assembly 11082 and Condenser Assembly 10735** (Includes the next Item) | 1 |
| **26669** | Nut for Shell Assembly 11085 | 1 |
| **24285** | Nut for Mounting Coil Assembly 11085 and Condenser Assembly 10735 and Spring Terminal Assembly 11090 | 10 |
| **26586** | Lock Washer for Nut 24285 | 2 |
| **10735** | **Condenser Assembly for Relay** | 1 |
| **11149** | **Lead Assembly Complete for connecting Terminal Assembly 11090 to Coil Assembly** 11082 (Includes the next 3 Items) | 3 |
| **24369** | Clip for connecting Lead Assembly 11149 to Terminal Assembly 11090 | 1 |
| **11392** | **Copper Wire Assembly for Lead Assembly 11149** | 1 |
| **24461** | Sleeve for Lead Assembly 11149 (Not shown in Illustration) | 1 |
| **11146** | **Shell Assembly Complete for Mounting Spring Terminal Assembly 11090** (Includes the next Item) | 1 |
| **26669** | Nut for Shell Assembly 11146 | 1 |
| **24346** | Gasket for Mounting Plate 24390 | 2 |
| **24390** | Mounting Plate for Shell Assemblies 11085 and 11146 | 2 |
| **11090** | **Spring Terminal Assembly for connecting Relay** | 3 |
| **24142** | Insulating Bushing for Spring Terminal Assembly 11090 | 3 |
| **24359** | Insulating Washer for Spring Terminal Assembly 11090 | 3 |
| **24363** | Plain Washer for Spring Terminal Assembly 11090 | 3 |
| **24285** | Nut for Spring Terminal Assembly 11090 | 6 |
| **11084** | **Contact Spring Assembly for Relay** | 1 |
| **11395** | **Armature Assembly Complete for Operating Contact Spring Assembly 11084** | 1 |
| **24303** | Pin for Mounting Armature Assembly 11395 | 1 |
| **11136** | **Bracket Assembly for Mounting Spring Assembly 11084** | 1 |
| **11082** | **Coil Assembly for Relay** | 1 |
| **11087** | **Adjusting Screw Assembly for Coil Assembly 11082** | 1 |
| **20953** | Terminal Clip for Ignition Relay 5661 | 1 |




# No. 5677 IGNITION RELAY

# No. 5677 IGNITION RELAY

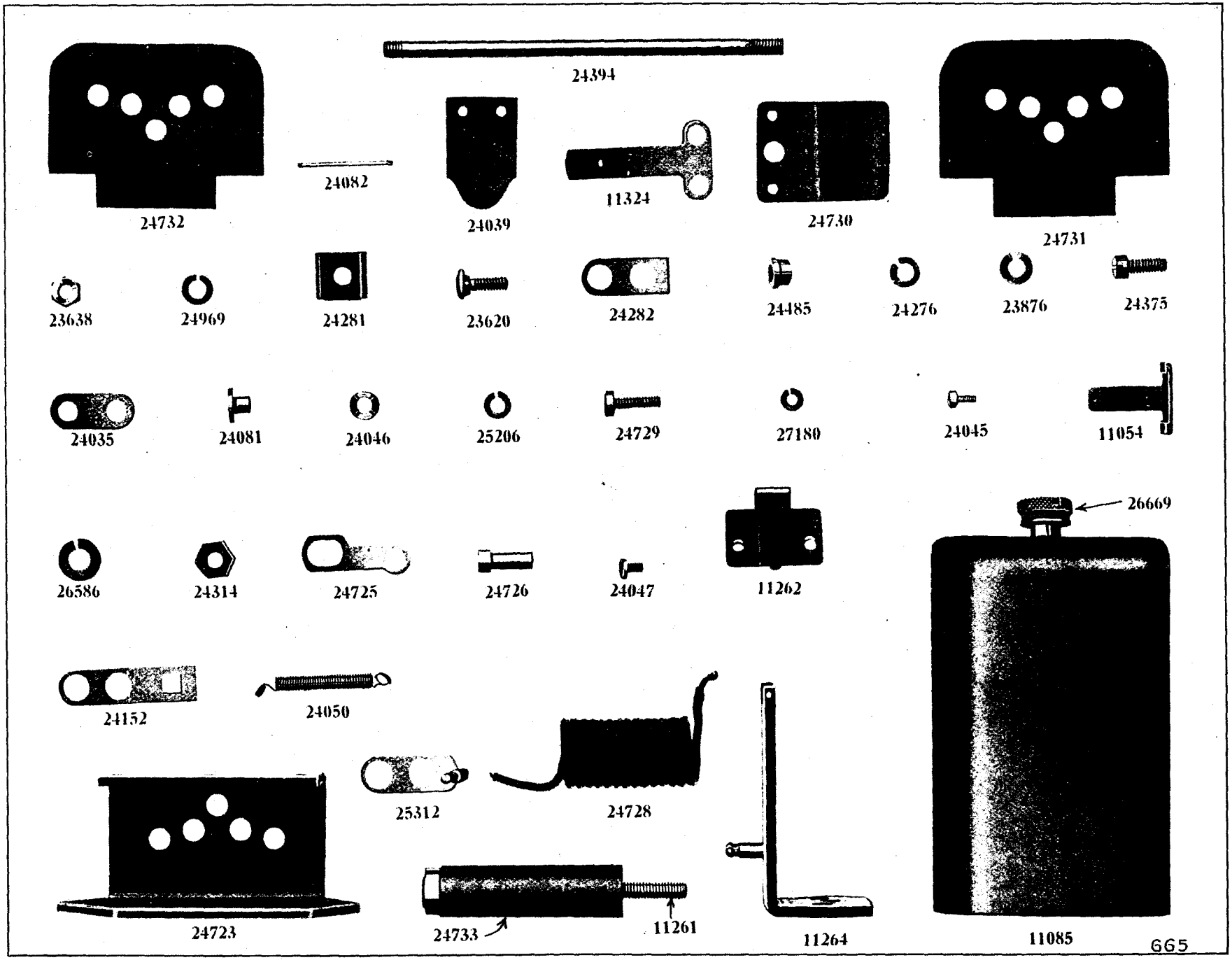
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5677 | **IGNITION RELAY COMPLETE** | 1 |
| 11084 | **Contact Spring Assembly** | 1 |
| 24299 | Screw for attaching Contact Spring Assembly 11084 | 2 |
| 11395 | **Armature Assembly** | 1 |
| 24303 | Pin for attaching Armature Assembly 11395 | 1 |
| 11136 | **Bracket Assembly for Contact Spring Assembly 11084** | 1 |
| 11082 | **Coil Assembly** (Includes the next Item) | 1 |
| 11087 | **Adjusting Screw Assembly for Coil Assembly 11082** | 1 |
| 11085 | **Shell Assembly Complete (Long)** (Includes the next Item) | 1 |
| 26669 | Nut for Shell Assembly 11085 | 1 |
| 24389 | Plain Washer for retaining Nut 26669 | 1 |
| 24285 | Nut for retaining Spring Terminal Assembly 11090 | 6 |
| 24363 | Plain Washer for Nut 24285 | 3 |
| 11090 | **Spring Terminal Assembly for Shell Assembly 11446** | 3 |
| 24142 | Insulating Bushing for Spring Terminal Assembly 11090 | 3 |
| 24359 | Insulating Washer for Spring Terminal Assembly 11090 | 3 |
| 11149 | **Lead Assembly for Connecting Spring Terminal Assembly 11090 to Coil Assembly 11082 and Condenser Assembly 10735 (Not shown in Illustration)** | 3 |
| 11495 | **Shell Assembly** (Includes the next Item) | 1 |
| 26669 | Nut for Shell Assembly 11495 | 1 |
| 24333 | Stud for retaining Shell Assembly 11446 | 1 |
| 24334 | Rod for retaining Shell Assembly 11085 | 1 |
| 24390 | Mounting Disc for Shell Assemblies 11446 and 11085 | 2 |
| 24346 | Gasket for Mounting Disc 24390 | 2 |
| 24436 | Insulating Bushing for Coil Assembly 11082 and Condenser Assembly 10735 (Not shown in Illustration) | 6 |
| 24285 | Nut for retaining Coil Assembly 11082 and Condenser Assembly 10735 | 4 |
| 26586 | Lock Washer for Nut 24285 | 2 |
| 25226 | Bracket for attaching Relay Assembly 5677 | 1 |
| 10735 | **Condenser Assembly** | 1 |
| 24270 | Wire for connecting Terminals on Coil Assembly 11082 and Terminals on Condenser Assembly 10735 (19-32″ long) (Not shown in Illustration) | 1 |
| 24964 | Wire for connecting Terminals on Coil Assembly 11082 and Terminals on Condenser Assembly 10735 (.759″ long) (Not shown in Illustration) | 1 |
| 24962 | Wire for connecting Terminals on Coil Assembly 11082 and Terminals on Condenser Assembly 10735 (2 $^{9}/_{32}$″ long) (Not shown in Illustration) | 1 |
| 24271 | Wire for connecting Terminals on Coil Assembly 11082 and Terminals on Condenser Assembly 10735 (1 $^{29}/_{32}$″ long) (Not shown in Illustration) | 1 |
| 24278 | Sleeving for Wire 24962 (Not shown in Illustration) | 1 |




No. 5692 CIRCUIT BREAKER

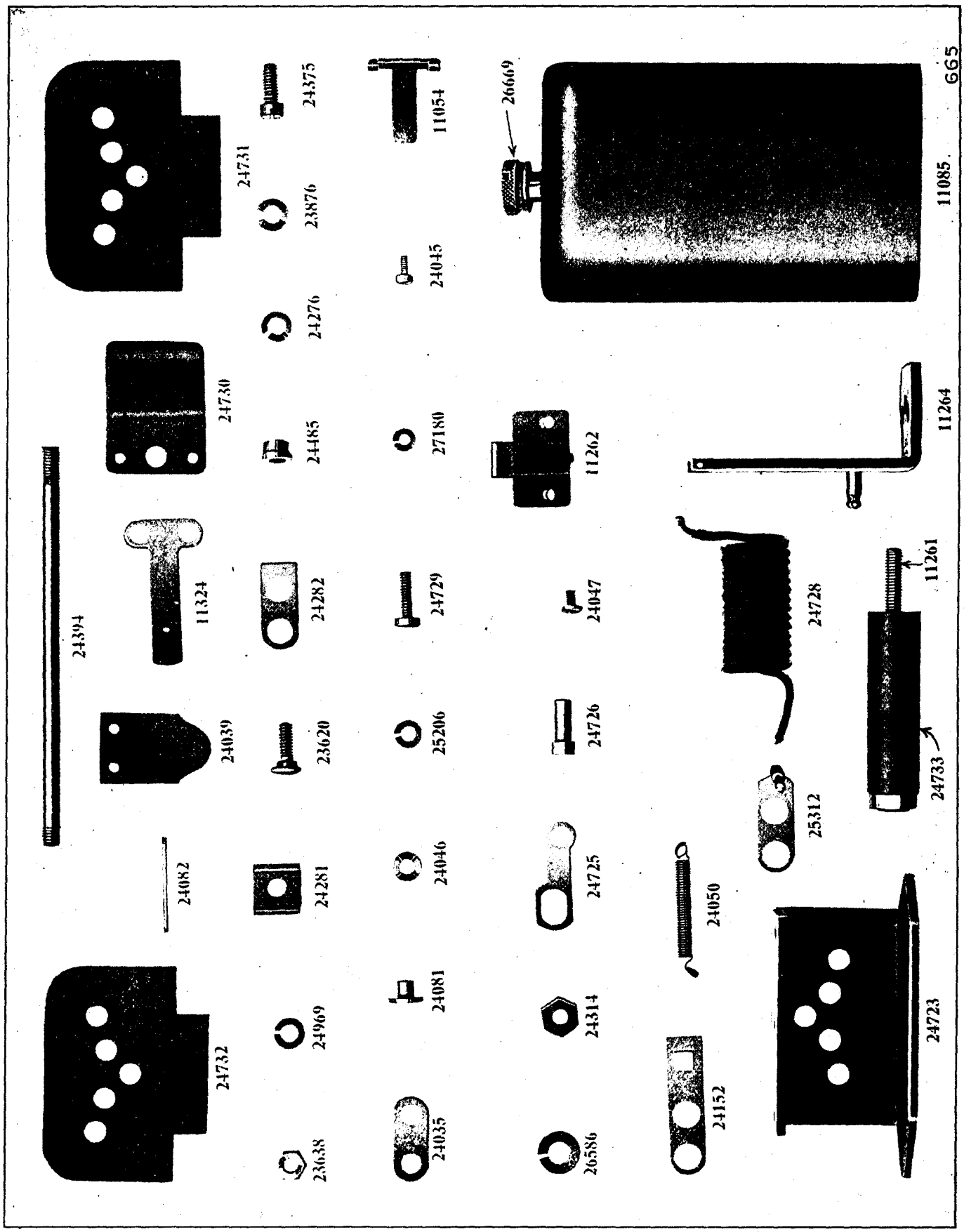
# No. 5692 CIRCUIT BREAKER

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5692 | **CIRCUIT BREAKER COMPLETE** | 1 |
| 23761 | Mounting Bracket for mounting Circuit Breaker | 1 |
| 24316 | Bracket for mounting Terminal Clip Assembly 11078 | 1 |
| 11078 | **Terminal Clip Assembly for connecting Coil Assembly 13001** | 1 |
| 24319 | Insulator for Terminal Clip Assembly 11078 | 1 |
| 24321 | Screw for mounting Terminal Clip Assembly 11078 | 2 |
| 13001 | **Coil Assembly for Circuit Breaker** | 1 |
| 24314 | Nut for mounting Coil Assembly 13001 | 1 |
| 26586 | Washer for Nut 24314 | 1 |
| 24039 | Armature for operating Stop Assembly 11301 | 1 |
| 11301 | **Stop Assembly for operating Contact Arm Assembly 11076** | 1 |
| 24328 | Stop for operating Contact with Fibre Bumper (Not shown in Illustration) | 1 |
| 24330 | Stud for Stop 24328 (Not shown in Illustration) | 1 |
| 24050 | Spring for operating Armature 24039 | 2 |
| 24045 | Screw for mounting Stop Assembly 11301 | 2 |
| 27180 | Washer for Screw 24045 | 2 |
| 24082 | Pin for mounting Armature 24039 | 1 |
| 11076 | **Contact Assembly** | 1 |
| 11438 | **Contact Assembly (Old Style) With Fibre Bumper (Not shown in Illustration)** | 1 |
| 24213 | Insulator under Contact Assembly 11076 | 2 |
| 24325 | Screw for mounting Contact Assembly 11076 (Long) | 2 |
| 24324 | Screw for mounting Contact Assembly 11076 (Short) | 2 |
| 24322 | Insulating Bushing for Screw 24324 | 2 |
| 24323 | Insulating Bushing for Screw 24325 | 2 |
| 25206 | Lock Washer for Screws 24324 and 24325 | 4 |
| 24046 | Plain Washer for Screws 24324 and 24325 (Not shown in Illustration) | 4 |
| 24261 | Insulating Washer for Screws 24324 and 24325 | 4 |
| 24259 | Connector for connecting Oil Assembly 13001 to Terminal Plate 24286 | 1 |
| 24286 | Terminal Plate for connecting Circuit Breaker | 2 |
| 23553 | Screw for retaining Clip 23450 | 2 |
| 23450 | Clip for retaining Terminal Clips | 2 |
| 23452 | Nut for Screw 23553 | 2 |
| 23699 | Lock Washer for Nut 23452 | 2 |
| 24235 | Insulator for Connector 24259 | 1 |
| 24268 | Pin for locating Mounting Bracket 23761 and Bracket 24316 | 1 |
| 23374 | Terminal Clip for Circuit Breaker 5692 | 2 |


24394
24732
24082
24039
11324
24730
24731
23638
24969
24281
23620
24282
24485
24276
23876
24375
24035
24081
24046
25206
24729
27180
24045
11054
26586
24314
24725
24726
24047
11262
26669
24152
24050
25312
24728
24723
24733
11261
11264
11085
665

# No. 5695 CIRCUIT BREAKER

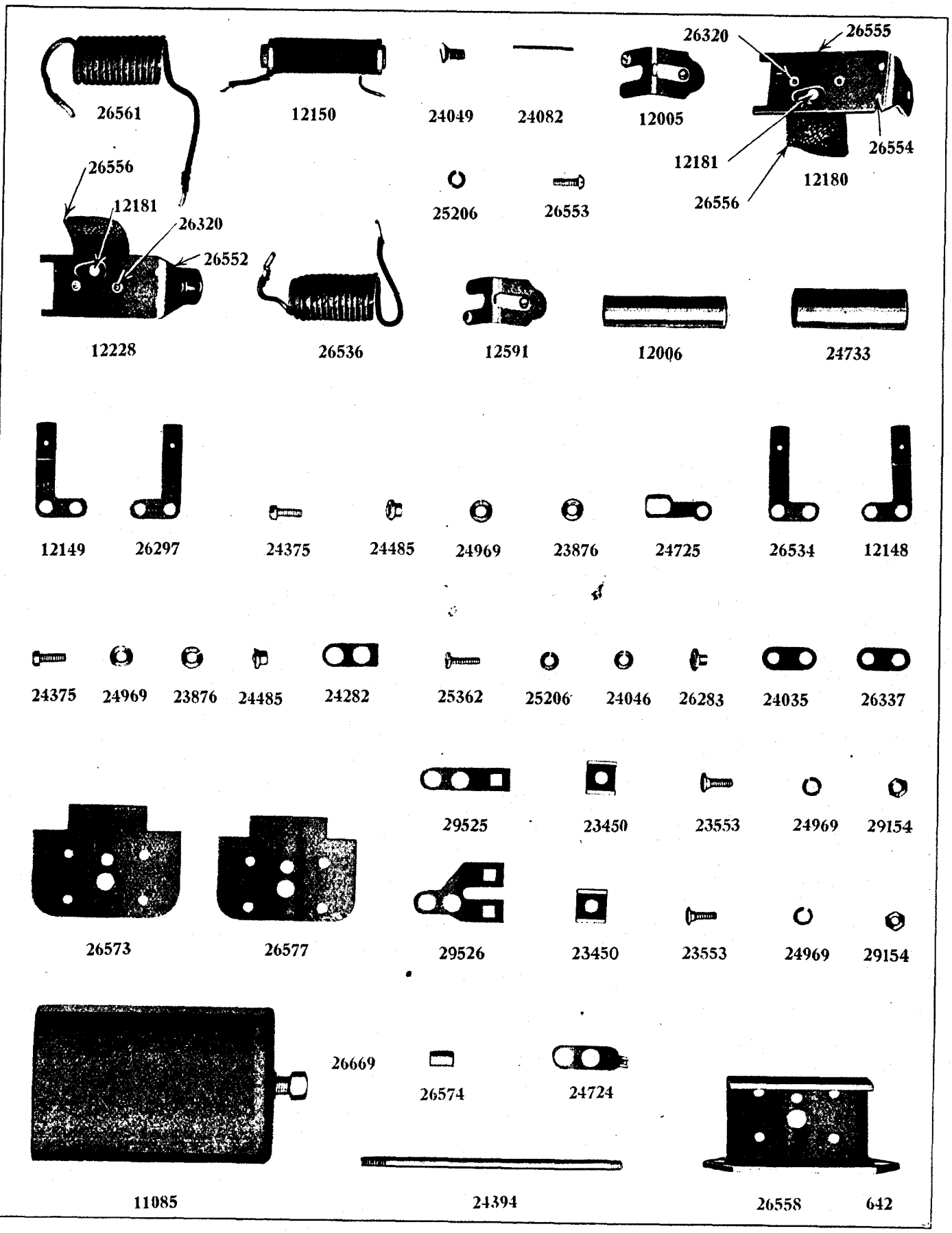
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5695 | **CIRCUIT BREAKER COMPLETE** | 1 |
| 11085 | **Shell Assembly Complete** (Includes the next 2 Items) | 1 |
| 26669 | Nut for Shell Assembly 11085 | 1 |
| 24389 | Plain Washer for Nut 26669 (Not shown in Illustration) | 1 |
| 11324 | **Contact Spring Assembly (Upper Contact)** | 2 |
| 11054 | **Stop Assembly for Operating Contact Spring Assembly 11324** | 2 |
| 11262 | **Terminal Assembly (Lower Contact)** | 1 |
| 24039 | Armature for Operating Stop Assembly 11054 | 2 |
| 11261 | **Core Assembly for Coils 24728 and 25580** | 2 |
| 24733 | Insulating Sleeve for Coils 24728 and 25580 | 2 |
| 11264 | **Bracket Assembly for Coil Assembly 11261 and Contact Spring Assembly 11324** | 2 |
| 24723 | Bracket for Bracket Assembly 11264 | 1 |
| 25312 | Terminal Clip under Center Terminal for connecting Coils 24728 and 25580 | 1 |
| 23876 | Plain Washer for Screw 24375 | 6 |
| 20393 | Lock Washer for Screw 24375 | 6 |
| 24485 | Insulating Bushing for Screw 24375 | 6 |
| 24282 | Insulator for Terminal Post Assembly 11135 | 3 |
| 24375 | Screw for attaching Terminal Post Assembly 11135 | 6 |
| 24276 | Lock Washer for Screw 24375 | 6 |
| 24152 | Base Plate for connecting Circuit Breaker | 1 |
| 23620 | Screw for retaining Terminal Clamp 24281 | 1 |
| 23638 | Nut for Screw 23620 | 1 |
| 20393 | Lock Washer for Nut 23638 | 1 |
| 24281 | Terminal Clamp for retaining Terminal Clip 23375 | 1 |
| 24314 | Nut for retaining Core Assembly 11261 | 4 |
| 26586 | Lock Washer for Nut 24314 | 2 |
| 24729 | Screw for retaining Contact Spring Assembly 11324 | 4 |
| 25206 | Lock Washer for Screw 24729 | 4 |
| 24046 | Plain Washer for Screw 24729 | 4 |
| 24081 | Insulating Bushing for Screw 24729 | 4 |
| 24725 | Terminal Plate for connecting Terminal Assembly 11135 and Contact Spring Assembly 11324 | 2 |
| 24732 | Mounting Plate for Shell Assembly 11085 (Large) | 1 |
| 24731 | Mounting Plate for Shell Assembly 11085 (Small) | 1 |
| 24726 | Insulating Bushing for Coils 24728 and 25580 | 2 |
| 24035 | Insulating Plate for Contact Spring Assembly 11324 | 4 |
| 24730 | Insulator for Terminal Assembly 11262 | 2 |
| 25580 | Coil for Right Hand Relay (Not shown in Illustration) | 1 |
| 24728 | Coil for Left Hand Relay | 1 |
| 24050 | Spring for Operating Armature 24039 | 4 |
| 24082 | Pin for retaining Armature 24039 | 2 |
| 24394 | Pin for retaining Shell Assembly 11085 | 1 |
| 24047 | Screw for attaching Terminal Assembly 11262 | 1 |
| 24045 | Screw for attaching Stop Assembly 11054 | 2 |
| 27180 | Lock Washer for Screw 24045 | 4 |
| 23375 | Terminal Clip for connecting Circuit Breaker (Not shown in Illustration) | 3 |




No. 5696 CIRCUIT BREAKER

# No. 5696 CIRCUIT BREAKER

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **5696** | **CIRCUIT BREAKER COMPLETE** | 1 |
| **11085** | **Shell Assembly Complete** (Includes the next 2 Items) | 1 |
| **26669** | Nut for retaining Shell Assembly 11085 | 1 |
| **24389** | Plain Washer for Nut 26669 (Not shown in Illustration) | 1 |
| **11324** | **Contact Spring Assembly (Upper Contact)** | 1 |
| **11264** | **Bracket Assembly for Armature 24039 and Contact Spring Assembly 11324** | 1 |
| **11054** | **Stop Assembly Complete for Operating Contact Spring Assembly 11324** | 1 |
| **11262** | **Terminal Assembly (Lower Contact)** | 1 |
| **11261** | **Core Assembly for Coil 24728** | 1 |
| **24723** | Bracket for Circuit Breaker | 1 |
| **24724** | Terminal for connecting Coil 24728 and Terminal Post Assembly 11135 (Not shown in Illustration) | 1 |
| **24375** | Screw for retaining Terminal Post Assembly 11135 | 3 |
| **20393** | Lock Washer for Screw 24375 | 3 |
| **23876** | Plain Washer for Screw 24375 | 3 |
| **24485** | Insulating Bushing for Screw 24375 | 3 |
| **24282** | Insulator for Terminal Post Assembly 11135 | 2 |
| **24152** | Base Plate for connecting Circuit Breaker | 1 |
| **23620** | Screw for retainnig Terminal Clip 24281 | 1 |
| **23638** | Nut for Screw 23620 | 1 |
| **24276** | Lock Washer for Nut 23638 | 1 |
| **24281** | Terminal Clamp for retaining Terminal Clip 23375 | 1 |
| **24394** | Pin for retaining Shell Assembly 11085 | 1 |
| **24728** | Coil for Circuit Breaker 5696 | 1 |
| **24314** | Nut for retaining Core Assembly 11261 | 2 |
| **26586** | Lock Washer for Nut 24314 | 1 |
| **24050** | Spring for Operating Contact Spring Assembly 11324 | 2 |
| **24039** | Armature for Operating Stop Assembly 11324 | 1 |
| **24082** | Pin for attaching Armature 24039 | 1 |
| **24045** | Screw for retaining Stop Assembly 11054 | 2 |
| **27180** | Lock Washer for Screw 24045 | 2 |
| **24729** | Screw for retaining Contact Spring Assembly 11324 | 2 |
| **25206** | Lock Washr for Screw 24729 | 2 |
| **24046** | Plain Washer for Screw 24729 | 2 |
| **24081** | Insulating Bushing for Screw 24729 | 2 |
| **24726** | Insulating Bushing for Coil 24728 | 2 |
| **24732** | Mounting Plate for Shell Assembly 11085 (Large) | 1 |
| **24731** | Mounting Plate for Shell Assembly 11085 (Small) | 1 |
| **24733** | Insulating Sleeve for Coil 24728 | 1 |
| **24035** | Insulating Plate for Contact Spring Assembly 11324 | 2 |
| **24730** | Insulator for Terminal Assembly 11262 | 1 |
| **24047** | Screw for retaining Terminal Assembly 11262 | 2 |
| **24375** | Screw for retaining Terminal Plate 24725 | 1 |
| **24725** | Terminal Plate for connecting Contact Spring Assembly 11324 and Terminal Post Assembly 11135 | 1 |
| **20393** | Plain Washer for Screw 24375 | 1 |
| **24485** | Insulating Bushing for Screw 24375 | 1 |
| **23876** | Plain Washer for Screw 24375 | 1 |
| **23375** | Terminal Clip for connecting Circuit Breaker 5696 (Not shown in Illustration) | 2 |

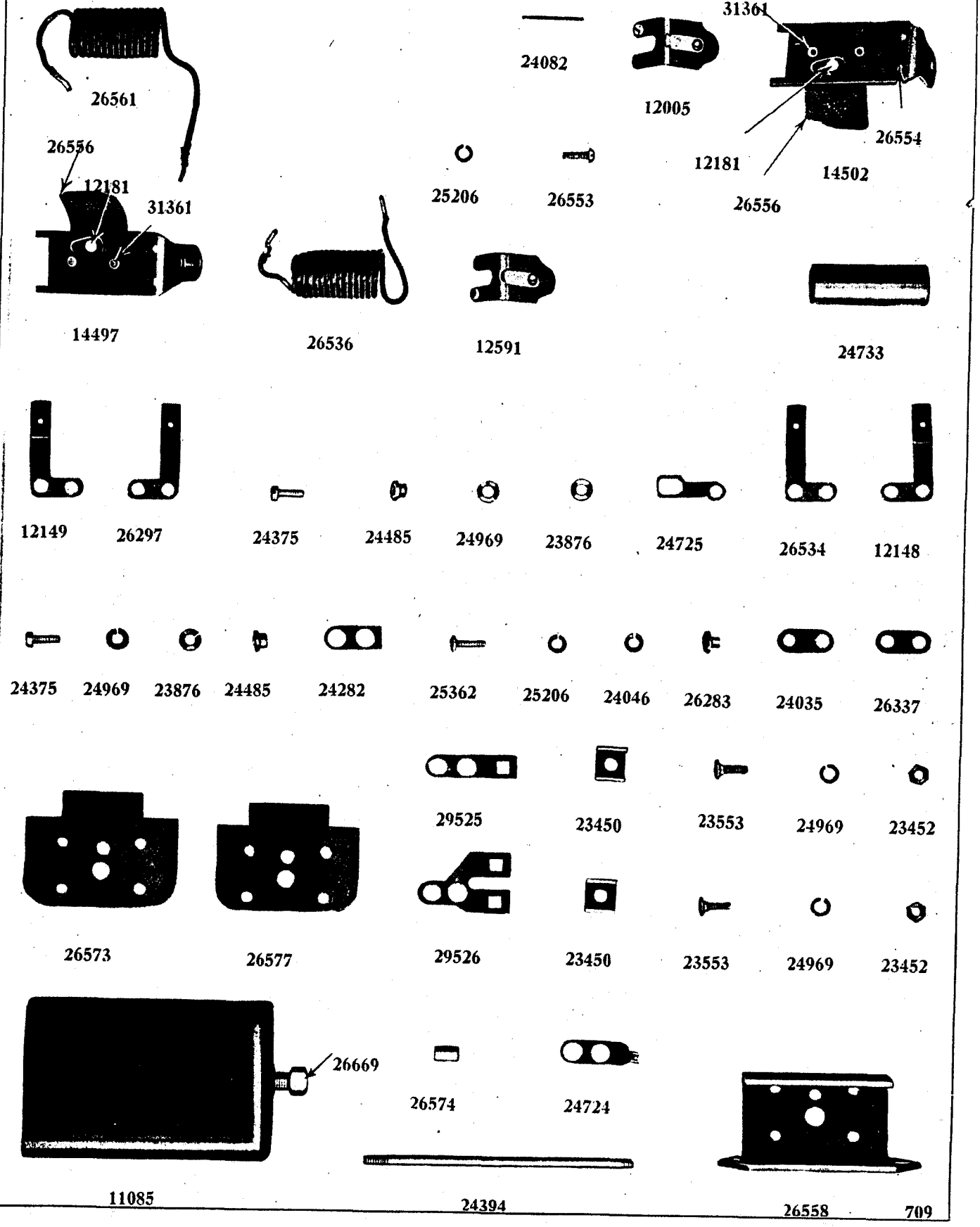



No. 5705 CIRCUIT BREAKER

# 5705 CIRCUIT BREAKER

Note: No. 5705 Circuit Breaker superseded by No. 5742 Circuit Breaker. When ordering a complete new unit, order No. 5742.

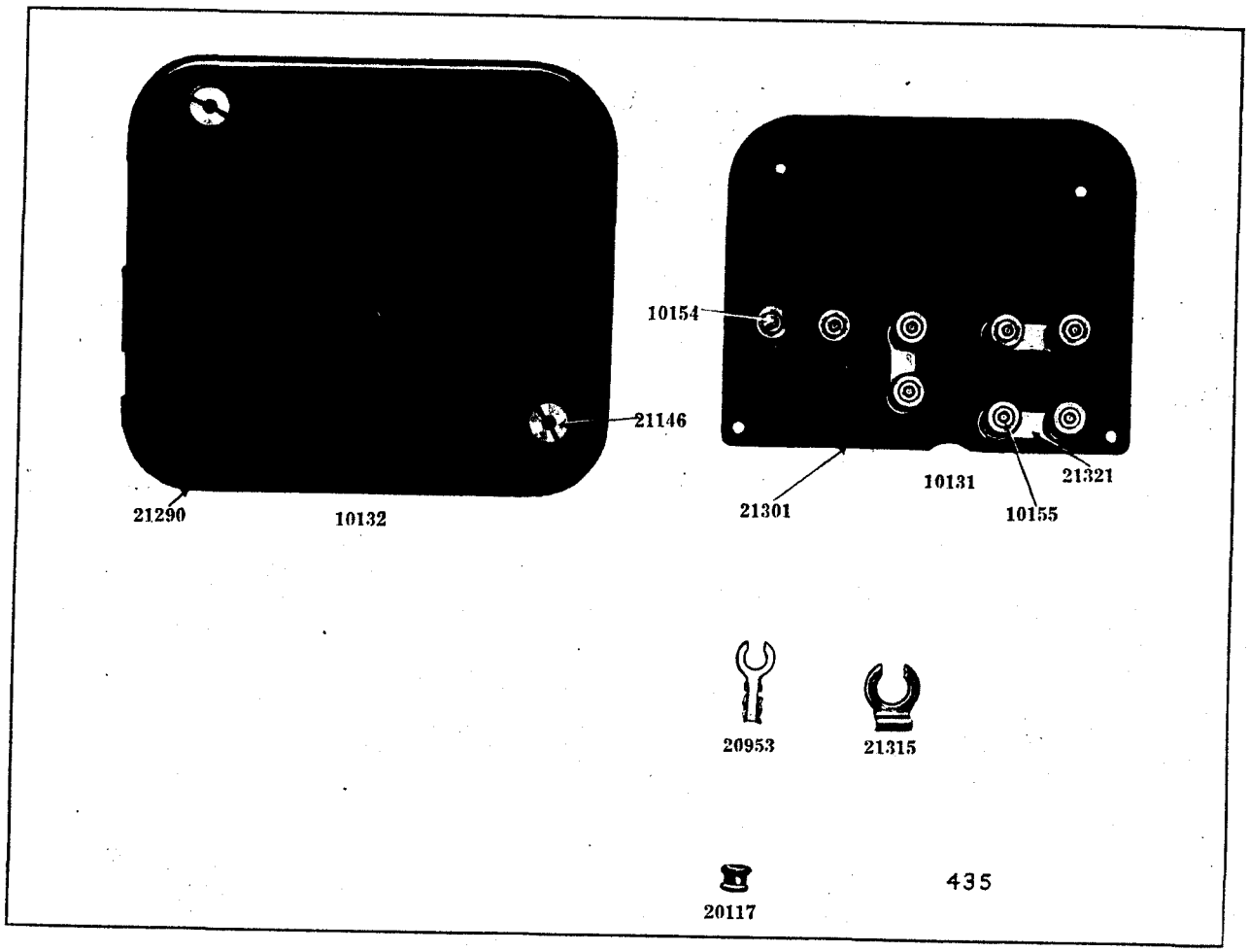
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5705 | **CIRCUIT BREAKER COMPLETE** | 1 |
| 26558 | Bracket for Mounting Assembly | 1 |
| 24394 | Pin for retaining Shell Assembly 11085 | 1 |
| 29526 | Terminal Post for Switch (Double) | 1 |
| 23553 | Screw for retaining Clamp 23450 | 3 |
| 23452 | Nut for Screw 23553 | 3 |
| 20393 | Lock Washer for Nut 23452 | 3 |
| 23450 | Clip for retaining Terminal Clip | 3 |
| 29525 | Terminal Post for Switch (Single) | 2 |
| 24375 | Screw for retaining Terminal Post Assemblies | 4 |
| 20393 | Lock Washer for Screw 24375 | 4 |
| 23876 | Plain Washer for Screw 24375 | 4 |
| 24485 | Insulating Bushing for Screw 24375 | 4 |
| 26574 | Insulating Bushing in Bracket 26558 for Coils 26561 and 26536 | 1 |
| 26573 | Mounting Plate for Shell Assembly 11085 (Large) | 1 |
| 26577 | Mounting Plate for Shell Assembly 11085 (Small) | 1 |
| 24724 | Terminal Plate for connecting Coils 26536 and 26561 | 1 |
| 24282 | Insulator for Terminal Post Assemblies 12186 and 12187 | 3 |
| 11085 | **Shell Assembly Complete** (Includes the next 2 Items) | 1 |
| 26669 | Nut for Shell 24387 | 1 |
| 24389 | Plain Washer for Nut 26669 | 1 |
| 26536 | Coil for Vibrating Relay | 1 |
| 26561 | Coil for Lock Out Relay (Outer) | 1 |
| 12150 | **Coil Assembly for Lock Out Relay (Inner)** | 1 |
| 12006 | **Core Assembly for Vibrating Relay** | 1 |
| 24733 | Insulating Sleeve for Core Assembly 12006 | 1 |
| 12591 | **Armature Assembly for Vibrating Relay** | 1 |
| 12005 | **Armature Assembly for Lock Out Relay** | 1 |
| 24082 | Pin for attaching Armature Assemblies 12005 and 12591 | 2 |
| 24049 | Screw for retaining Core Assembly 12006 and Coil Assembly 12150 | 2 |
| 26297 | Spring for operating Armature Assembly 12005 | 1 |
| 26534 | Spring for operating Armature Assembly 12591 | 1 |
| 12148 | **Contact Spring Assembly for Vibrating Relay (Upper Contact)** | 1 |
| 12149 | **Contact Spring Assembly for Lock Out Relay (Upper Contact)** | 1 |
| 24035 | Insulating Plate for Contact Spring Assemblies 12148 and 12149 (Thick) | 2 |
| 26337 | Insulating Plate for Contact Spring Assemblies 12148 and 12149 (Thin) | 2 |
| 24725 | Terminal Plate for connecting Terminal Post Assemblies 12186 and 12187 to Contact Spring Assemblies 12148 and 12149 | 2 |
| 24375 | Screw for retaining Terminal Plate 24725 | 2 |
| 20393 | Lock Washer for Screw 24375 | 2 |
| 23876 | Plain Washer for Screw 24375 | 2 |
| 24485 | Insulating Bushing for Screw 24375 | 2 |
| 25362 | Screw for retaining Contact Spring Assemblies 12148 and 12149 | 4 |
| 25206 | Lock Washer for Screws 26553 and 25362 | 8 |
| 24046 | Plain Washer for Screw 25362 | 4 |
| 24081 | Insulating Bushing for Screw 25362 | 1 |
| 26553 | Screw for retaining Bracket Assemblies 12180 and 12228 | 4 |
| 12180 | **Bracket Assembly for Lock Out Relay** (Includes the next 5 Items | 1 |
| 26555 | Bracket for Bracket Assembly 12180 | 1 |
| 12181 | **Terminal Assembly (Lower Contact)** | 1 |
| 26320 | Rivet for retaining Terminal Assembly 12181 | 2 |
| 26556 | Insulator for Terminal Assembly 12181 | 1 |
| 26554 | Bushing for Bracket 26555 | 1 |
| 12228 | **Bracket Assembly for Vibrating Relay** (Includes the next 4 Items) | 1 |
| 26552 | Bracket for Bracket Assembly 12228 | 1 |
| 12181 | **Terminal Assembly (Lower Contact)** | 1 |
| 26556 | Insulator for Terminal Assembly 12181 | 1 |
| 26320 | Rivet for retaining Terminal Assembly 12181 | 2 |
| 23374 | Terminal Clip for connecting Circuit Breaker (Small) (Not shown in Illustration) | 2 |
| 23375 | Terminal Clip for connecting Circuit Breaker (Large) (Not shown in Illustration) | 2 |




No. 5742 CIRCUIT BREAKER

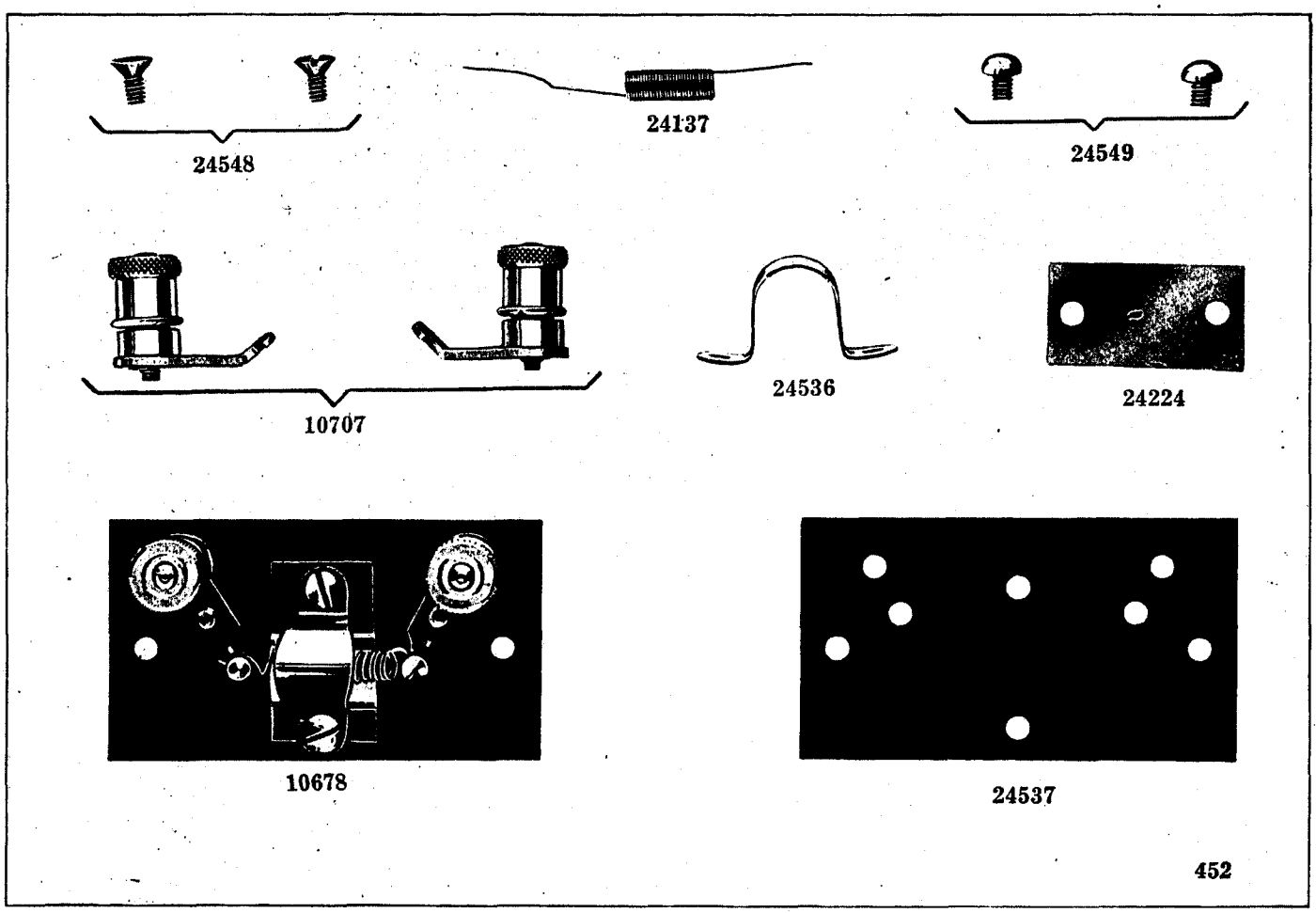
# No. 5742 CIRCUIT BREAKER

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| 5742 | **CIRCUIT BREAKER CMPLETE** | 1 |
| 26558 | Bracket for mounting Circuit Breaker | 1 |
| 24294 | Pin for retaining Shell Assembly 11085 | 1 |
| 29525 | Terminal Post (Single) | 1 |
| 29526 | Terminal Post (Double) | 1 |
| 23553 | Screw for retaining Clamp 23450 | 4 |
| 23452 | Nut for Screw 23553 | 4 |
| 20393 | Lock Washer for Nut 23452 | 4 |
| 23450 | Clamp for retaining Terminal Post | 4 |
| 24375 | Screw for retaining Terminal Posts 29525 and 29526 | 4 |
| 20393 | Lock Washer for Screw 24375 | 4 |
| 23876 | Plain Washer for Screw 24375 | 4 |
| 24485 | Insulating Bushing for Screw 24375 | 4 |
| 26574 | Insulating Bushing in Bracket 26558 for Coils 26561 and 26536 | 1 |
| 26573 | Mounting Plate for Shell Assembly 11085 (Large) | 1 |
| 26577 | Mounting Plate for Shell Assembly 11085 (Small) | 1 |
| 24724 | Terminal Plate for connecting Coils 26536 and 26561 | 1 |
| 24282 | Insulator for Terminal Posts 29525 and 29526 | 3 |
| 11085 | **Shell Assembly Complete** | 1 |
| | (Includes the next 2 Items) | |
| 26669 | Nut for Shell | 1 |
| 24389 | Plain Washer for Nut 26669 | 1 |
| 26536 | Coil for Vibrating Relay | 1 |
| 26561 | Coil for Lock Out Relay (Outer) | 1 |
| 24733 | Insulating Sleeve for Coil 26536 | 1 |
| 12591 | **Armature Assembly for Vibrating Relay** | 1 |
| 12005 | **Armature Assembly for Lock Out Relay** | 1 |
| 24082 | Pin for attaching Armature Assemblies 12005 and 12591 | 2 |
| 26297 | Spring for operating Armature Assembly 12005 | 1 |
| 26534 | Spring for operating Armature Assembly 12591 | 1 |
| 12148 | **Contact Spring Assembly for Vibrating Relay (Upper Contact)** | 1 |
| 12149 | **Contact Spring Assembly for Lock Out Relay (Upper Contact)** | 1 |
| 24035 | Insulating Plate for Contact Spring Assemblies 12148 and 12149 (Thick) | 2 |
| 26337 | Insulating Plate for Contact Spring Assemblies 12148 and 12149 (Thin) | 2 |
| 24725 | Terminal Plate for connecting Terminal Posts 29525 and 29526 to Contact Spring Assemblies 12148 and 12149 | 2 |
| 24375 | Screw for retaining Terminal Plate 24725 | 2 |
| 20393 | Lock Washer for Screw 24375 | 2 |
| 23876 | Plain Washer for Screw 24375 | 2 |
| 24485 | Insulating Bushing for Screw 24375 | 2 |
| 25362 | Screw for retaining Contact Spring Assemblies 12148 and 12149 | 4 |
| 25206 | Lock Washer for Screws 26553 and 25362 | 8 |
| 24046 | Plain Washer for Screw 25362 | 4 |
| 24081 | Insulating Bushing for Screw 25362 | 1 |
| 26553 | Screw for retaining Bracket Assemblies | 4 |
| 14502 | **Bracket Coil and Contact Assembly** | 1 |
| | (Includes the next 3 Items) | |
| 12181 | **Terminal Assembly (Lower Contact)** | 1 |
| 26320 | Rivet for retaining Terminal Assembly 12181 | 2 |
| 26556 | Insulator for Terminal Assembly 12181 | 1 |
| 26554 | Bushing for Bracket Assembly | 1 |
| 14497 | **Bracket Core and Contact Assembly** | 1 |
| | (Includes the next 3 Items) | |
| 12181 | **Terminal Assembly (Lower Contact)** | 1 |
| 26556 | Insulator for Terminal Assembly 12181 | 1 |
| 26320 | Rivet for retaining Terminal Assembly 12181 | 2 |
| 23374 | Terminal Clip for connecting Circuit Breaker (Small) (Not shown in illustration) | 2 |
| 23375 | Terminal Clip for connecting Circuit Breaker (Large) (Not shown in illustration) | 2 |




# No. 10131 TERMINAL BOARD

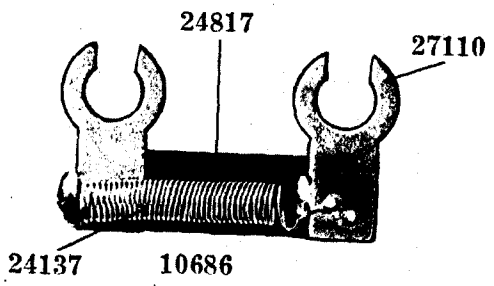
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **10131** | **TERMINAL BOARD ASSEMBLY COMPLETE** ..... (Includes the next 6 Items) | 1 |
| **10154** | **Spring Terminal Assembly (Short)** ..... | 8 |
| **21301** | Plate for Terminal Board Assembly 10131 ..... | 1 |
| **21321** | Connector for Spring Terminal Assembly 10154 ..... | 3 |
| **21314** | Screw for retaining Spring Terminal Assembly 10154 (Not shown in Illustration) .. | 8 |
| **21333** | Lock Washer for Screw 21314 (Not shown in Illustration) ..... | 8 |
| **10132** | **Terminal Board Cover Assembly Complete** ..... (Includes the next 2 Items) | 1 |
| **21146** | Nut for Cover 21290 ..... | 2 |
| **20114** | Lock Washer for Nut 21146 (Not shown in Illustration) ..... | 2 |
| **20953** | Terminal Clip (Long) ..... | 1 |
| **21315** | Terminal Clip (Short) ..... | 1 |
| **20117** | Insulating Bushing for Plate 21301 ..... | 2 |

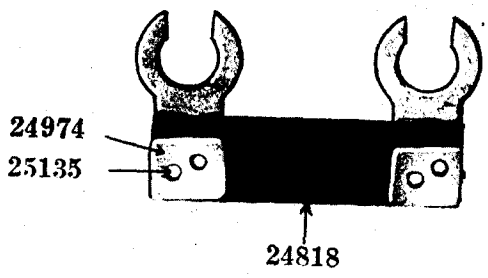



# No. 10678 RESISTANCE UNIT

Note: No. 10678 Resistance Unit superseded by No. 10680 Resistance Unit. When ordering a complete new unit, order No. 10680.

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **10678** | **RESISTANCE UNIT ASSEMBLY COMPLETE** ..... (Includes the next 7 Items) | 1 |
| **24537** | Plate for holding Spring Terminal Assembly 10707 ..... | 1 |
| **10707** | **Spring Terminal Assembly** ..... | 2 |
| **24548** | Screw for attaching Spring Terminal Assembly 10707 ..... | 2 |
| **24536** | Protector for Coil 24137 ..... | 1 |
| **24549** | Screw for retaining Protector 24536 ..... | 2 |
| **24137** | Coil for Resistance Unit Assembly 10678 ..... | 1 |
| **24224** | Insulator for Coil 24137 ..... | 1 |

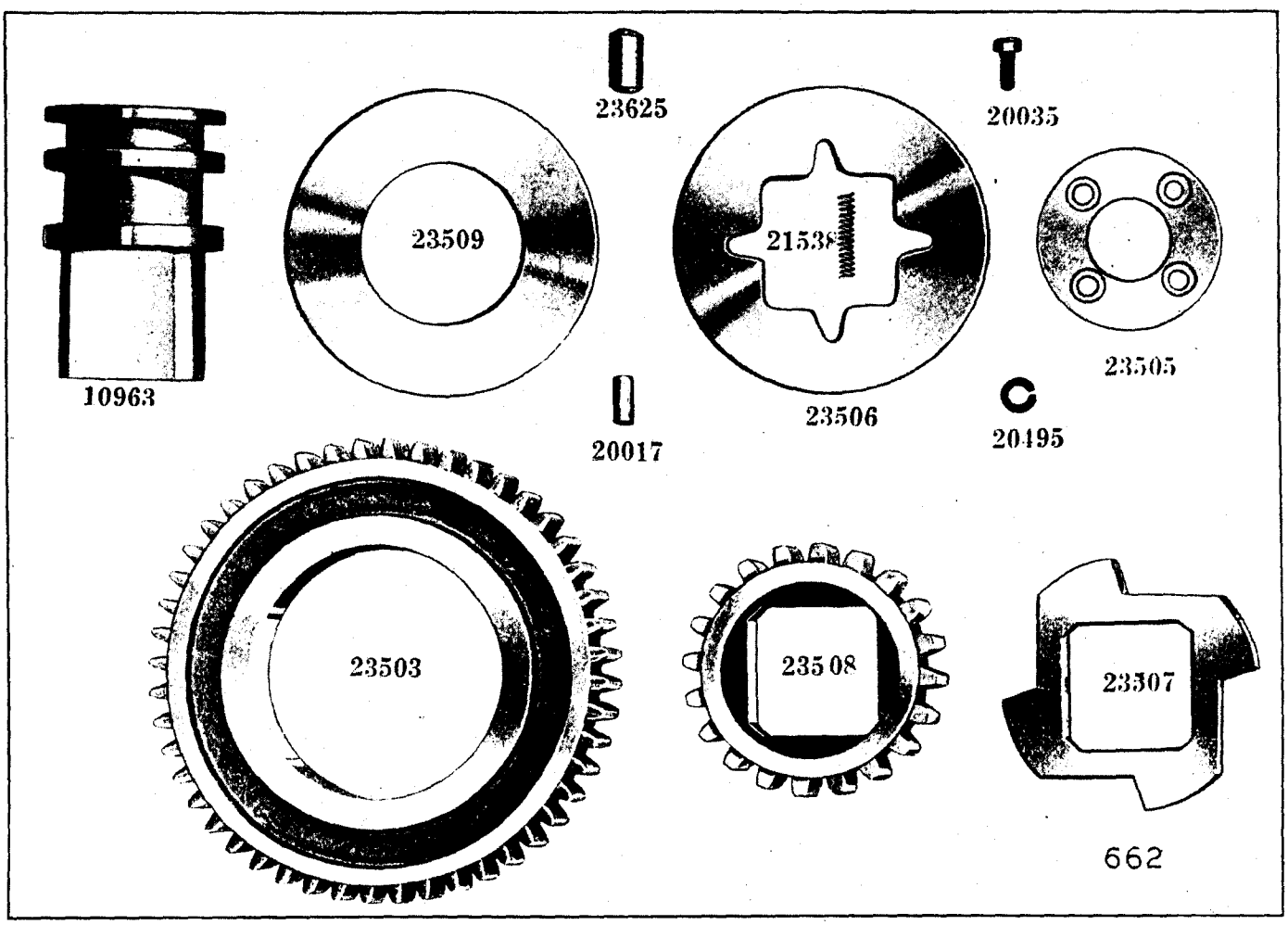



437

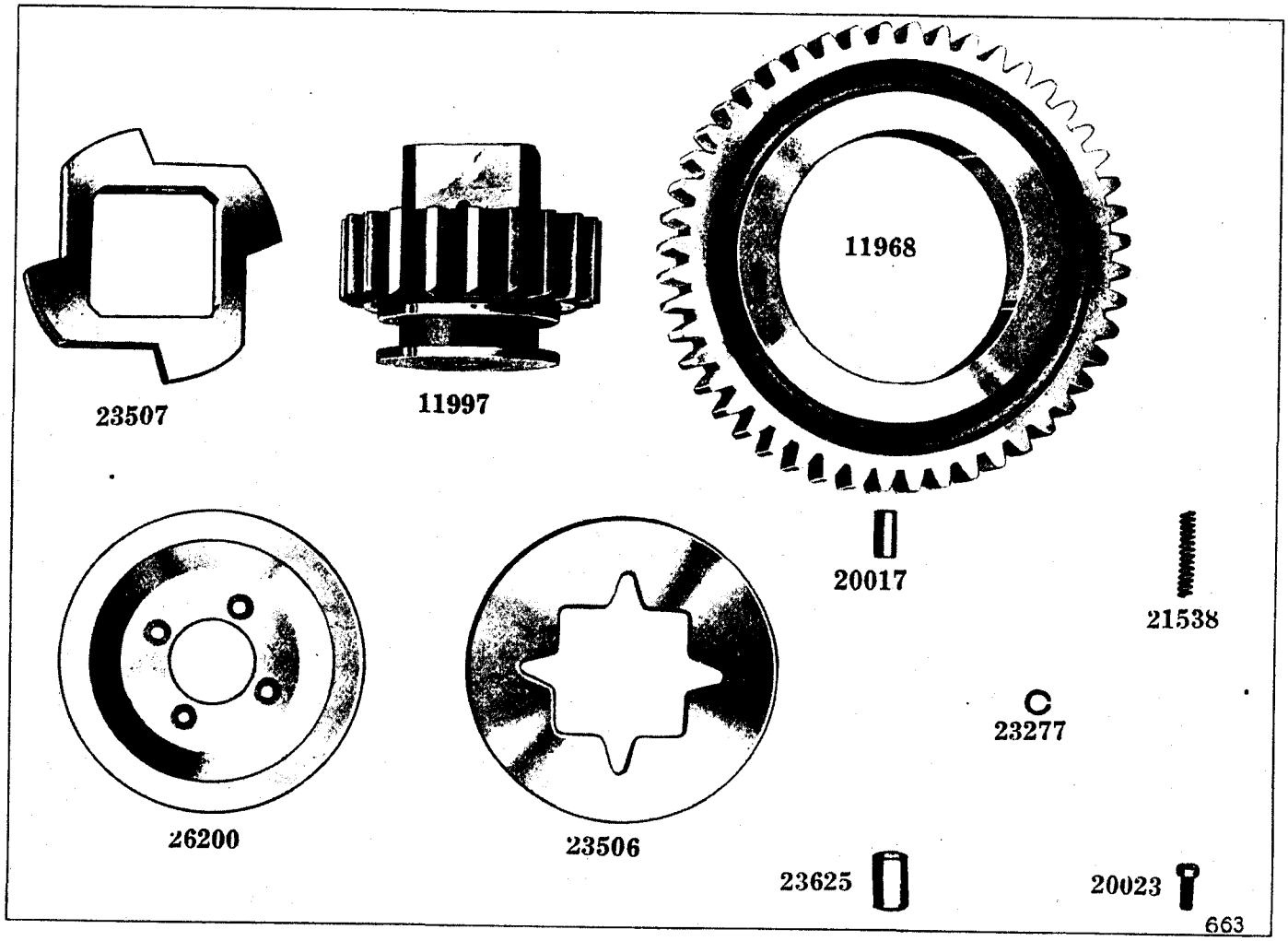
# No. 10686 RESISTANCE UNIT

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **10686** | **RESISTANCE UNIT ASSSEMBLY COMPLETE** ..... (Includes the next 6 Items) | 1 |
| **24974** | Plate for mounting Terminal 27110 ..... | 1 |
| **27110** | Terminal for Resistance Unit Assembly 10686 ..... | 2 |
| **25135** | Rivet for retaining Terminal 27110 ..... | 4 |
| **24137** | Coil for Resistance Unit Assembly 10686 ..... | 1 |
| **24817** | Insulator for Coil 24137 (Mica) ..... | 1 |
| **24818** | Insulator for Coil 24137 (Black Fibre) ..... | 1 |




# No. 10726 MOTOR CLUTCH

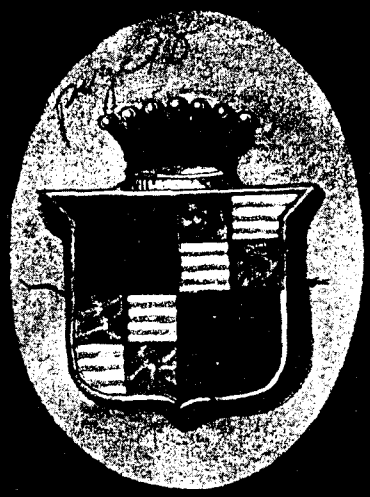
| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **10726** | **MOTOR CLUTCH ASSEMBLY COMPLETE** ..... (Includes the next 12 Items) | 1 |
| **10963** | **Sleeve Assembly** ..... | 1 |
| **23508** | Pinion for Motor Clutch Assembly 10726 ..... | 1 |
| **23503** | Gear for Motor Clutch Assembly 10726 ..... | 1 |
| **23507** | Cam for Gear 23503 ..... | 1 |
| **23625** | Roll for Cam 23507 ..... | 4 |
| **23509** | Retainer for Roll 23625 (Large Hole) (Inner) ..... | 1 |
| **23506** | Retainer for Roll 23625 (Small Hole) (Outer) ..... | 1 |
| **20035** | Screw for Retainers 23506 and 23509 ..... | 4 |
| **20495** | Lock Washer for Screw 20035 ..... | 4 |
| **23505** | Clamp Washer for Pinion 23508 ..... | 1 |
| **20017** | Plunger for Roll 23625 ..... | 4 |
| **21538** | Spring for Plunger 20017 ..... | 4 |




# No. 11973 MOTOR CLUTCH

| Piece Number | NAME OF PART | Quantity Required |
|---|---|---|
| **11973** | **MOTOR CLUTCH ASSEMBLY COMPLETE** (Includes the next 10 Items) | 1 |
| **11997** | **Pinion Assembly** | 1 |
| **11968** | **Gear Assembly** | 1 |
| **23506** | Retainer for Roll 23625 (Inner) | 1 |
| **26200** | Retainer for Roll 23625 (Outer) | 1 |
| **20023** | Screw for Retainers 26200 and 23506 | 4 |
| **23277** | Lock Washer for Screw 20023 | 4 |
| **23507** | Cam for Gear Assembly 11968 | 1 |
| **23625** | Roll for Cam 23507 | 4 |
| **20017** | Plunger for Roll 23625 | 4 |
| **21538** | Spring for Plunger 20017 | 4 |

CADILLAC
Miscellaneous
General
1919- The Cadillac mot
car



LIBRARY REFERENCE COPY
NOT TO CIRCULATE

# The CADILLAC Motor Car

*An Illustrated Description of the Latest Open and Closed Models*



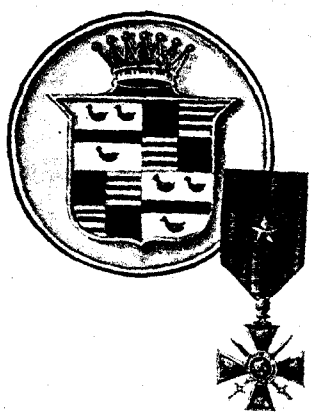
CADILLAC MOTOR CAR COMPANY

DETROIT. MICHIGAN

*Copyrighted 1919, Cadillac Motor Car Company*



*Peace brought the joy of playtime back to millions of children in France*



# *Cadillac's Eighteenth Year*

THE times invite a continuation of good things. They have weeded out the inefficient and uncertain. As it stands, the Cadillac car is a matured development of principles of automobile design and construction already proved sound. With this foundation the efforts of Cadillac designers have been in the direction of finishing touches and refinements.

For eighteen years Cadillac craftsmen have built an automobile which has been second only to an improved type of their own making. Each new year has brought a better understanding of what should be sought for in a good automobile. And each succeeding year has found Cadillac a more complete expression of motor car refinement, a more effective embodiment of motoring dependability and a more practical conception of motor car economy.

As the Standard Seven-Passenger Car of the United States Army, the present Cadillac has been subject to usage and put to tests which no automobile was ever meant to endure. The Army chose Cadillac on its reputation for dependable service with minimum care. Great things were expected of it. The manner in which the car lived up to these expectations has proved a great source of satisfaction to its makers and to Cadillac owners.

# DETAILS AND APPOINTMENTS

THE effort of Cadillac engineers to create a permanent, dependable mechanism in the Cadillac chassis is supplemented by the desire of Cadillac body builders to provide maximum motoring comfort and convenience. The earnest ambition of factory designers to incorporate every possible motoring convenience as a Cadillac feature has created rather than catered to the tastes of discriminating motorists.

It has been the thought of body engineers not only to include these comforts as standard Cadillac equipment; but so to incorporate them in the general design that, built-in rather than added on, they contribute character and dignity to the bearing of the whole car.

*Controls*

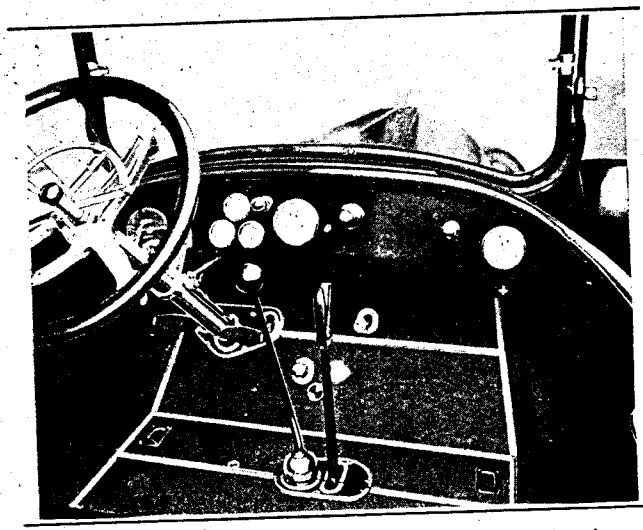
Convenience and comfort are amply prescribed in the arrangement of the driver's compartment. Everything is within easy reach. Steering wheel, gear shift lever, hand and foot brakes, clutch pedal and foot throttle are all designed and placed so that their manipulation easily becomes instinctive. There is thus an added certainty to every driving operation.

The large steering wheel fits conveniently into the driver's lap, though easily pushed out of the way for getting in or out. The ease with which the car is guided is one reason so many women are driving Cadillacs. Turning effort at the steering wheel, due very largely to anti-friction bearings and close workmanship in the steering system, requires little strength. Straightening up after a curve, the caster effect in the front spindles gives the front wheels a strong tendency to come back to center.

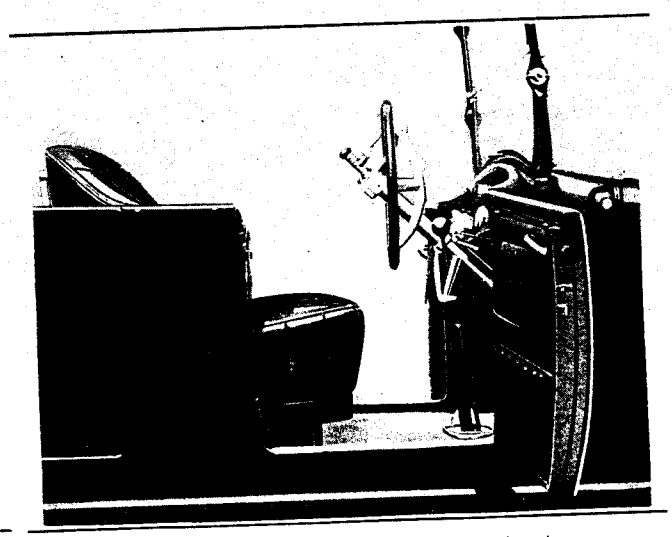
The electric horn button is at the top of the steering column in the center of the wheel. A touch from any angle brings instant response from the familiar Cadillac horn.

The gear change lever is long and close up, so that the hand falls naturally to grasp it. When occasionally it is necessary to shift gears, a minimum of effort is required and only a small movement of the lever. The smoothness of the clutch action is a surprise. It disengages with slight resistance. The braking effort is equalized between the wheels, reducing the chance of skidding, and the light pressure which brings the car to a stop is possible without the driver altering his position. The car decelerates smoothly, but with a satisfying firmness.

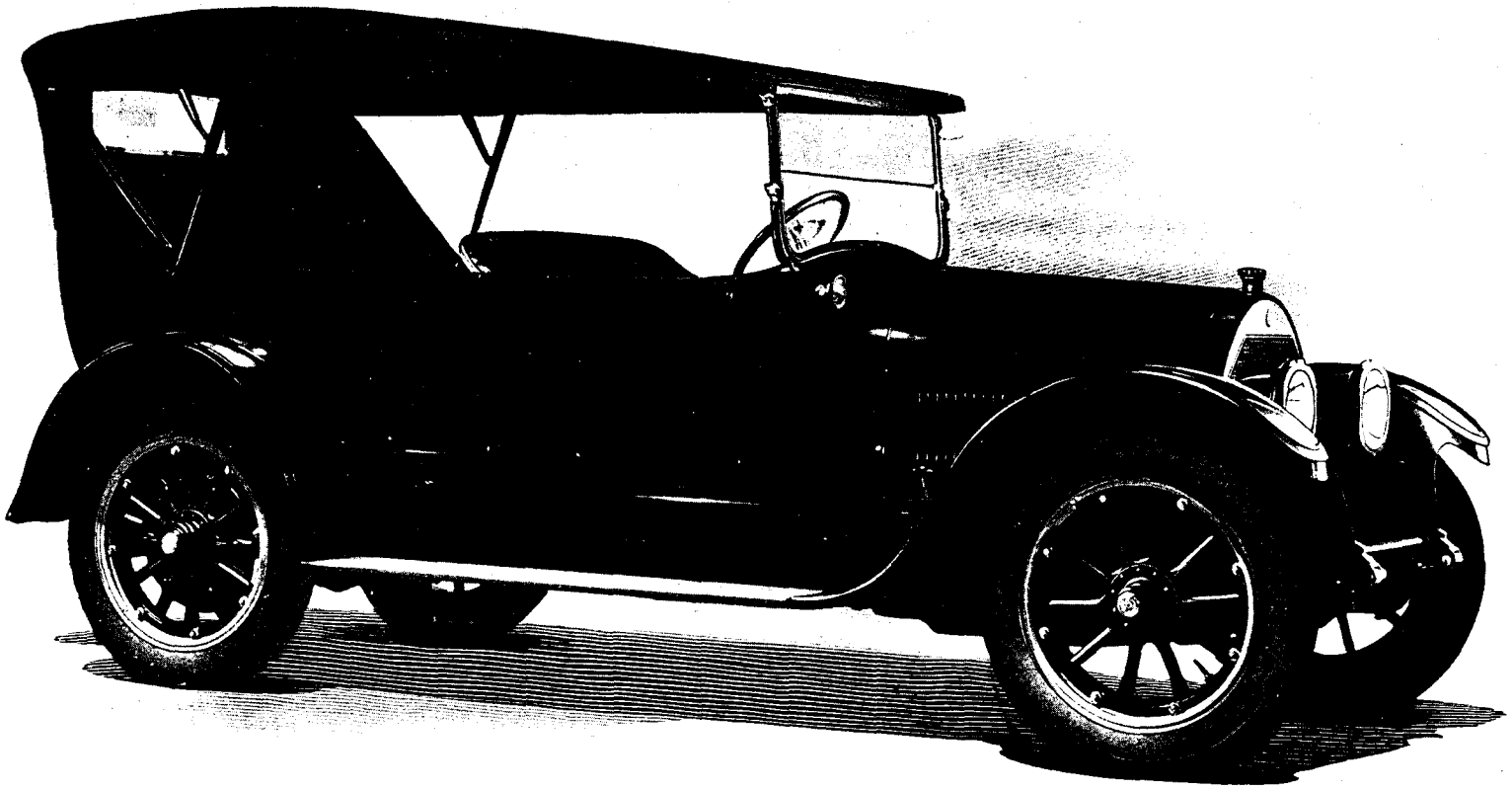
(Continued on page eight)



*Dash and driving controls are convenient to driver's hand and eye. Two dash lamps illuminate instruments on the cowl*



*Wide front doors and tilting steering wheel make even the driver's seat very accessible*



## THE CADILLAC SEVEN-PASSENGER TOURING CAR

THREE considerations are uppermost when the prosperous American family chooses an automobile. They must have a dependable car ready for any contingency. Both very young and very old must find it comfortable. Its appearance, withal, must completely satisfy the vanity of the most particular members of the household.

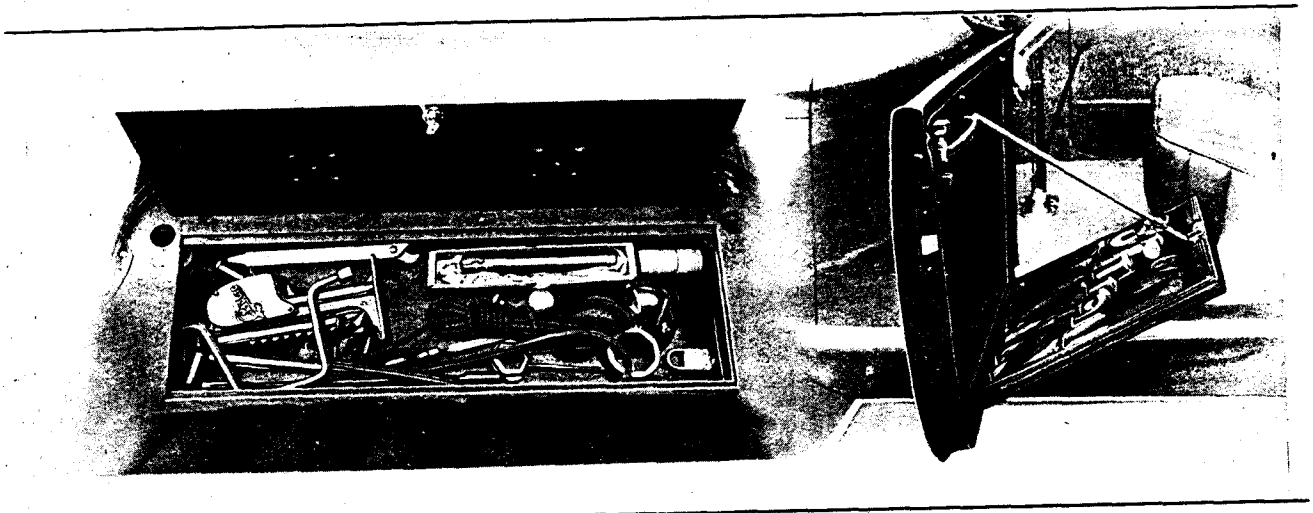
Infinite care in the close inspection of even minor operations is responsible for the reputation for reliability which the Cadillac chassis has earned everywhere.

Bodily comfort in the Seven-Passenger is wisely provided for in design and detail. The 125-inch wheelbase is long enough to include an amply roomy tonneau (knee room being sufficient for five in the rear, with extra seats in use.) Further, this length of wheelbase makes for added road comfort. Still, the turning radius is not so long as to be awkward in congested traffic or at crowded city corners.

The smooth and easy operation of gear shift, clutch and brake pedals, is another kind of comfort which especially appeals to women drivers.

The Seven-Passenger satisfies good taste in cleanness of lines and smooth lustre of finish. But Cadillac beauty lies deeper than this; it is everywhere—in the fineness of material in the full-lined top, the excellence of quality in the plaited leather upholstery, in fact in a fine discretion in the choice of materials throughout.

One feels that this Seven-Passenger is the physical embodiment of that old adage by which the quality ideal has long been expressed — "Whatever is worth doing is worth doing well."



*Full tool and tire change equipment is under lock and key*

[Continued from page six]

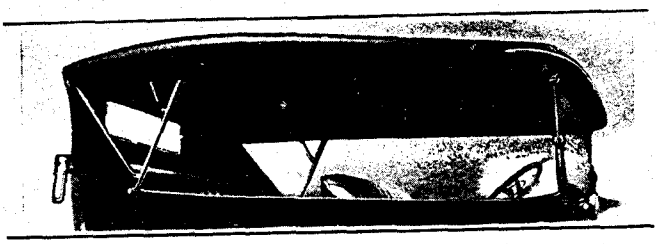
Travel is almost entirely in high gear under throttle control. The foot throttle is well under the right foot, and a rubber-topped foot rest beside it makes the control steady without muscular strain. Step on it, no matter how hard or quickly, and there is an immediate, unfaltering response, which the Cadillac owner has learned to expect.

The starting pedal is up and a little to the right of the accelerator on the sloping foot board. There is a readiness about the Cadillac engine which makes even starting in cold weather quick and quiet.

The instrument board is complete, though not confusing. To the left of the steering column is the switch, controlling all lights and ignition. Oil pressure, ammeter and gasoline pressure gauges are grouped with the speedometer under a lamp in the center of the dash. The eight-day Waltham clock with a red tell-tale spot for winding, is farther to the right, under a light of its own. The speedometer has a trip re-set. Both speedometer and clock are easily readable from the tonneau. The ignition switch key is universal, fitting tool compartments and tire padlock. An auxiliary air valve lever on the steering column below the wheel provides a rich mixture for difficult starting conditions.

A lever on the steering column controls the patent tilting headlamp reflectors which prevent glare, not by dimming the headlights, but by throwing their rays directly in front of the car, where they are most needed. This is a distinct advantage when rounding a curve or topping a hill.

Wide doors on all cars give unrestricted entrance to any seat. A tilting steering wheel makes even the driver's place very accessible from either side. A tonneau light in the rear curb doorway illuminates at night the threshold and running board of the touring car.

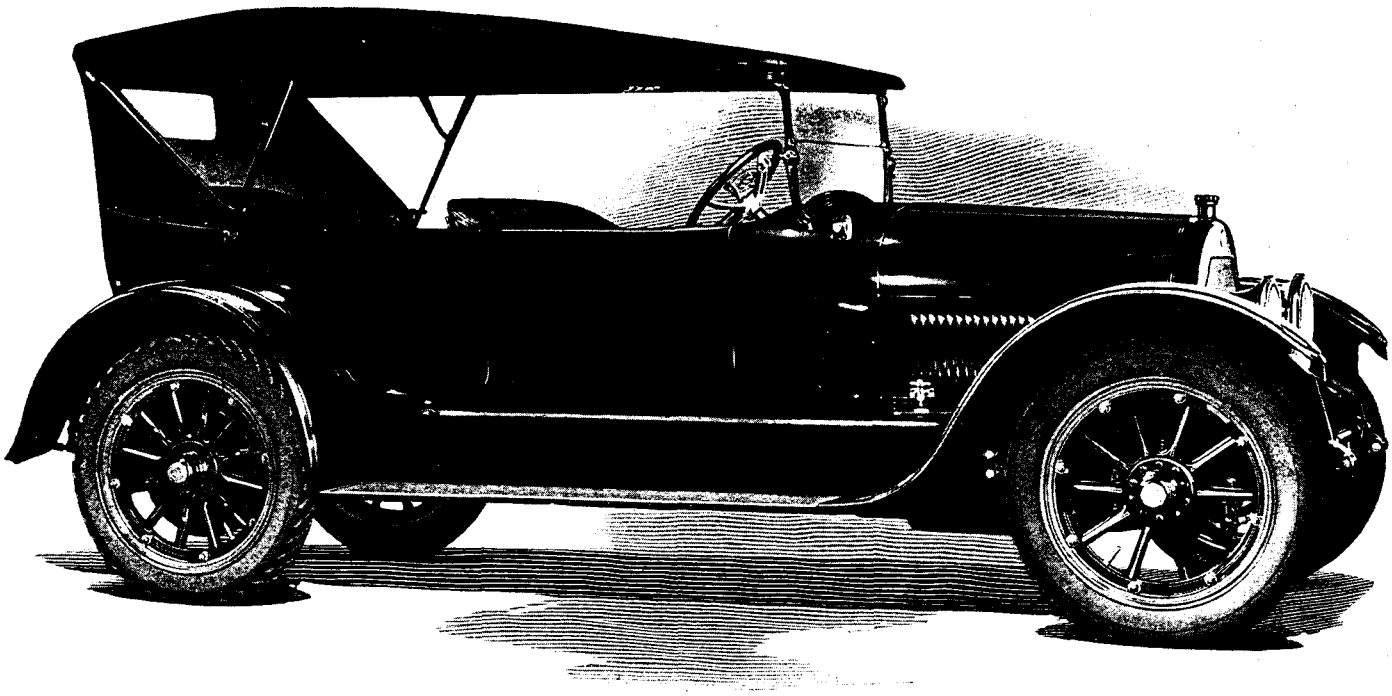


*Tan top lining conceals bows and head straps, finishing the top off smoothly*

*Upholstering*

There is solid comfort in Cadillac motoring, regardless of road conditions. Both chassis and seat springs contribute to this ease

[Continued on page ten]

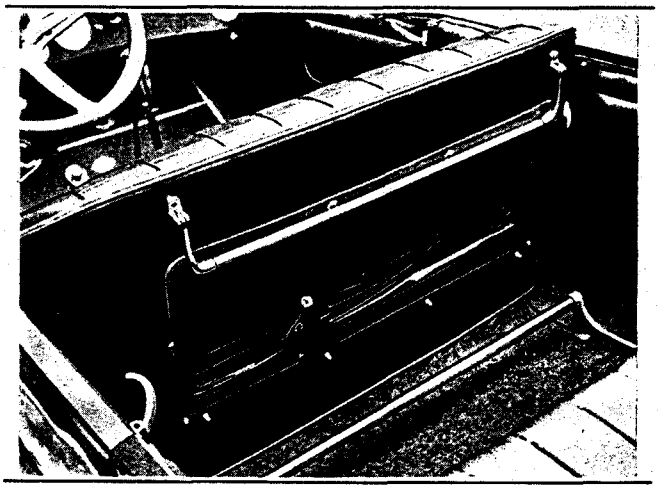


## THE CADILLAC PHAETON

THE Four-Passenger Phaeton is a smaller, lighter body on the same wheelbase as the Seven-Passenger model. With a capacity for four or five persons it is capable of very fast road work. It is an excellent car for the man who makes of his motoring a sport and a hobby.

The design is very smooth and trim, with a low, snug-fitting top and side curtains. The curtains when not in use stow away in a compartment in the back of the front seat. Seats for two are provided in front, with places for two more in the tonneau. A third may be accommodated in the rear when necessary.

Seating arrangements and the flexibility and ease of Cadillac chassis control suits the Phaeton to the use of the small family. There is nothing freakish about the Cadillac Four-Passenger, but it is a car which one finds exceptionally good-looking among those that pass. It adapts itself especially well to individual effects, with wire wheels and a special color.



*Curtain compartment open, showing curtains stowed neatly in back of front seat*

[Continued from page eight]

of mind and body. Three-quarter platform rear springs and long semi-elliptics in front cradle Cadillac bodies against road shocks. The seat cushions are made up of many small spiral springs, nested together in place of the usual stiff hour-glass construction. So formed, one sinks into rather than sits on the car cushions, the gentle action of the springs absorbing rather than reacting to the unevenness of the road.

All open cars are snugly protected against unfavorable weather by a set of close-fitting side curtains. Three quarters of the curtain area is transparent. Curtains swing with the doors on brackets which go on and come off easily without tools. They are fitted with double flaps at top and bottom, and fastened with special "lift the dot" fasteners.

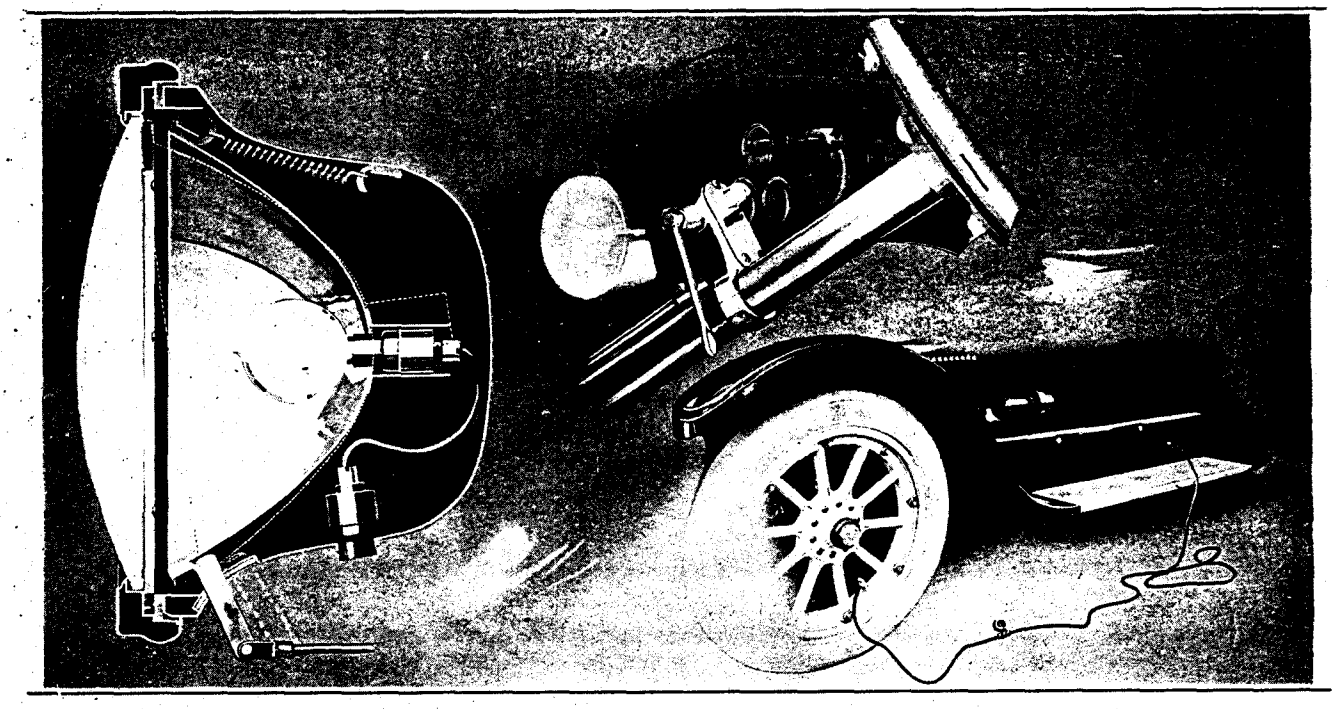
Top lines have been a consideration in the design of the open cars. Heavy black waterproof, leatherized material has a permanent smoothness. The rear curtain protects the sides and back of the tonneau seat. A beveled plate glass window is set in concealed mouldings in the center of the back curtain. A tan lining covers the bows, and conceals the framing on the underside of the top, presenting a well-tailored finish.

A very complete set of tools accompanies each Cadillac car. Tire jack and larger tools are under the front seat, in a locked compartment. The smaller tools—wrench, screw drivers, pliers and so forth—are in a case in the door next to the driver's seat. Both tool compartments are locked by the ignition switch key.

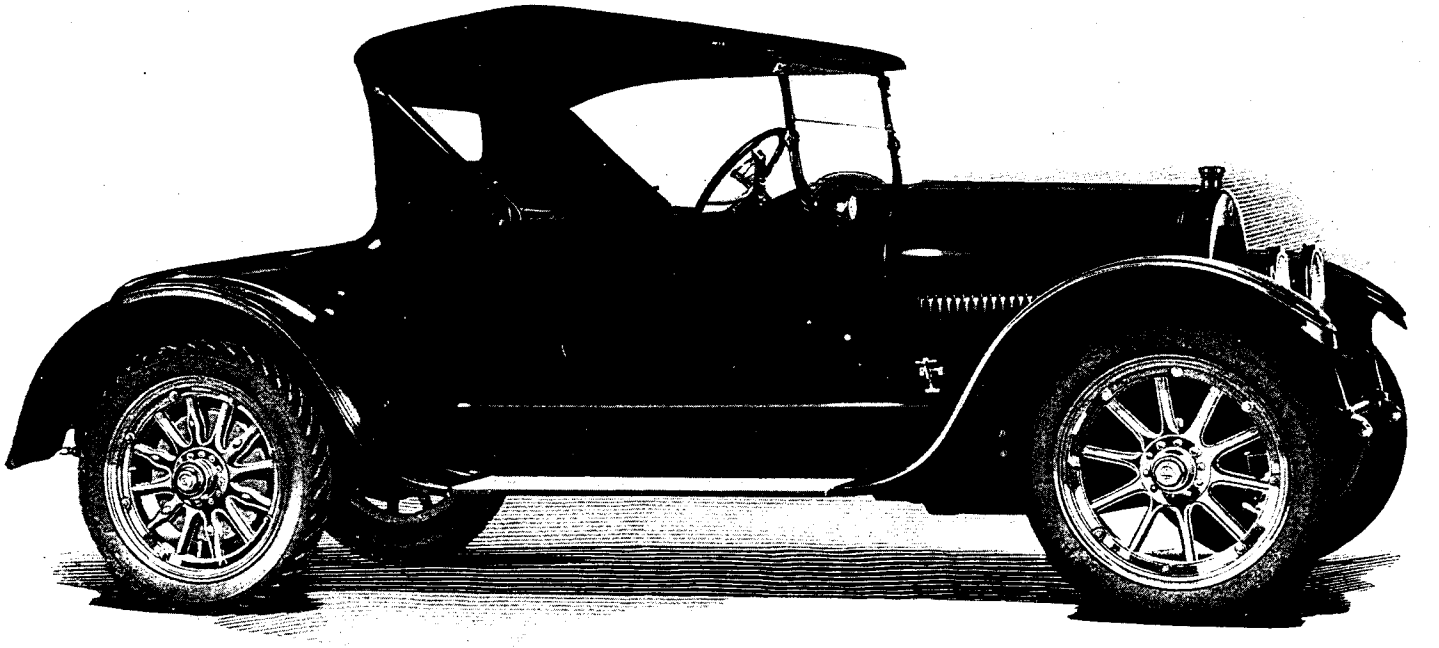
The windshield on the open cars is double ventilating, and waterproofed with a rubber dam between the sections, and at the bottom, next to the cowl.

A power tire pump is connected with the motor drive. Tubing to reach all wheels is furnished, with a gauge, so that tires may at any time be inflated to their proper pressure. The pump saves energy and tires by making it easy to have them properly inflated. The

[Continued on page twelve]



*A lever on the steering column throws rays from headlight close in front for passing. Connection for power tire pump is through left-hand dust shield*



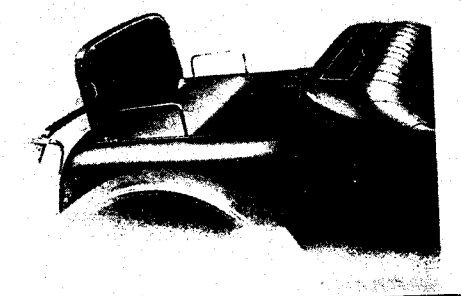
## THE CADILLAC ROADSTER

THE Two-Passenger Roadster, except for seating capacity, is a counterpart of the Four-Passenger Phaeton. It is modelled on the same low, clean lines and mounted on the 125-inch wheelbase. The Roadster top is very smooth, bows being invisible and a Grecian curve joining the top with the rear curtain. Curtains make a close, weather-tight fit.

The driver's seat is low, and particularly comfortable for long, rough rides. Immediately back of it is storage space for a bag or moderate sized suitcase.

The rumble, entered through a waterproof lid in the top, has concealed in it comfortable auxiliary accommodations for two, as well as an ample storage space for luggage.

Extra tires, as on other models, are mounted at the rear and secured with a universal key padlock.



*Storage compartment and emergency seat in Roadster*

The Two-Passenger is capable of any amount of rough, hard work. Like the Phaeton, it is very fast, the kind of a car which a professional man most appreciates. For long daily journeys it is dependable and comfortable enough to make relaxation possible while on the road.

[Continued from page ten]

hose connection is through an opening in the left dust shield.

A sturdy tire carrier with a capacity for two extra rims with tires, special rim lock operated by the switch key, and one extra tire rim, as well as a license holder, are standard equipment on all Cadillac cars.

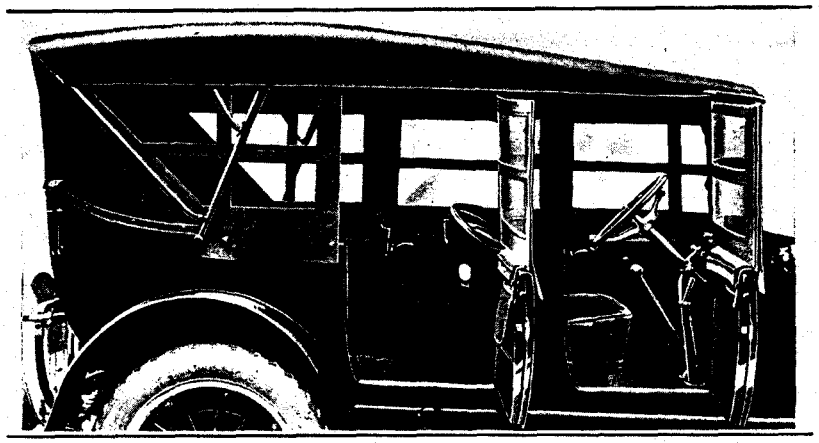


*Concealed moulding holds beveled glass in top curtain. Rim lock tire carrier accommodates two spares*

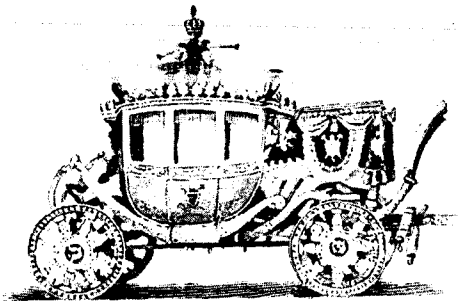
Many separate coats make up the finish of Cadillac open bodies. Before any paint is applied each body is subjected to a sand blast which removes every trace of grease or foreign matter from the surface of the metal. These bodies are not touched by any but gloved hands after sand blasting until the first coat of primer has been applied. Each of the many priming and filling coats is dried and rubbed before applying the next. On this surface several coats of color varnish are then laid and baked, the baking and rubbing greatly hardening the varnish surface. After sufficient drying a final coat of pure coach varnish is applied, and the body allowed to stand and season before being placed on its chassis.

The standard finish for the Touring Car and Phaeton is Cadillac blue, the radiator, lamps, dust shields, hub caps and the chassis being black. The standard finish for the Roadster, except for cream wheels, is the same as for the Touring Car and Phaeton.

No outlay in various motoring accessories is necessary with the delivery of a Cadillac car. The details and appointments, completed before each car leaves the factory, complete the comfort desired by the average motorist.



*Curtains swing with the doors; double flaps on door curtains make tight fit; curtain rods placed without tools*



# CADILLAC COACH WORK

SINCE 1903 Cadillac reputation has rested on the permanence and dependability of its chassis. In the design and construction of bodies the effort of Cadillac coach builders has been directed toward supplying a carriage conservative enough in appearance and so substantially framed as to parallel in utility the mechanical service of the chassis.

*Framing*

As in any sort of structure, the life of a Cadillac closed body depends on a solid foundation. Permanence in Cadillac body construction begins with the chassis frame. The side members are channel sections with a maximum depth of eight inches and of heavier gauge than usual practice. They are joined by five cross members. Two are pressed steel sections, with triangular corner braces. The other three are tubular, splined at the ends to resist twisting strains, and pressed into the side member brackets with ten to fifteen tons pressure.

The frame, thus substantially braced, forms a rigid bed for the body proper, protecting it from the strains of uneven roads, and greatly lengthening body life, as well as reducing to a minimum the possibility of developing body squeaks and rattles.

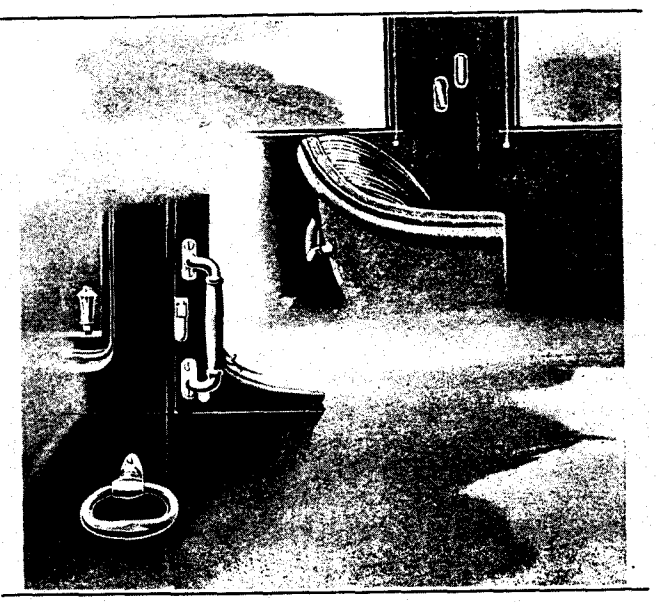
The body sills and side posts are very stout. The material used is first grade oak and ash.

Sills and posts have a substantial cross section. All joints are mortised, screw-fastened and glued, as well as reinforced by steel brackets. Diagonal steel bracing is used on doors and in other places where it is desirable.

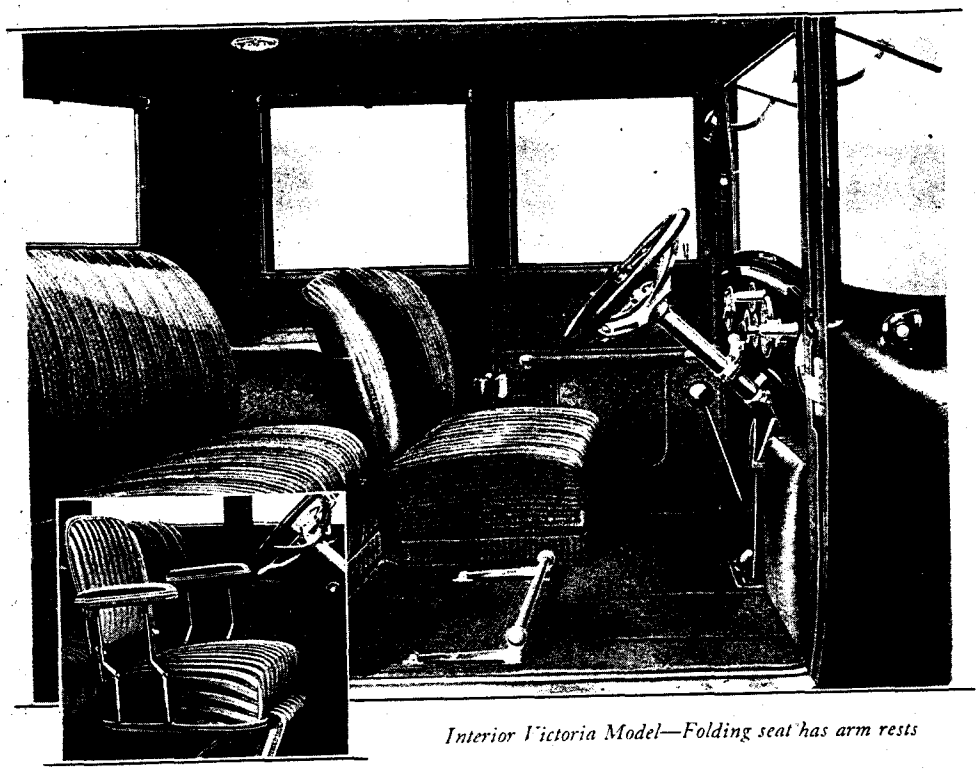
*Panelling*

Exterior body panelling is 14-gauge sheet aluminum throughout.

This is shaped and applied in a few large sheets, the seams afterward being welded so that the body covering when complete is practically one piece. Roofs are one-piece aluminum, provided with a drain channel at the front and sides. [*Continued on page fourteen*]



*Inside thumb locks and curb door key lock protect Cadillac coaches against intrusion*

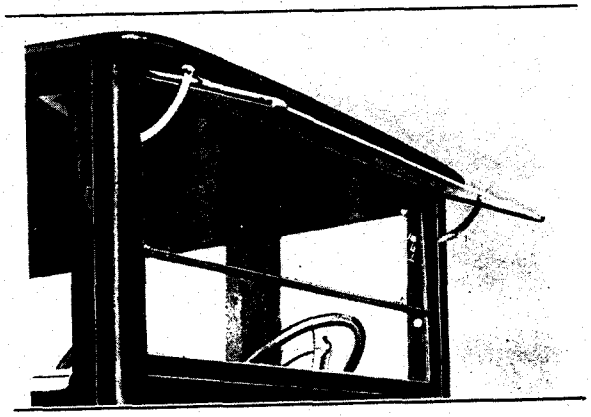


*Interior Victoria Model—Folding seat has arm rests*

### *Fastenings*

Many precautions are taken to insure quiet riding. Felt padding between the roof panel and rafters silences the drumming often noticeable in closed bodies. Hinges on full length doors are mounted against concealed rubber cushions, and the doors close against rubber bumpers. Hinges are adjustable where necessary. Weatherproofing of the closed bodies is very complete. Live rubber rolls, upholstered, bind the door openings and press snugly against the doors when closed.

A rubber weather strip on the bottom of each door meets the aluminum door sill when closed. Window openings are waterproofed and made as effectively weather-tight as the doors. Ventilation is provided by window lifts of the chain and sprocket type in the doors, by the three-piece windshield and strap lifts for the rear quarter windows.



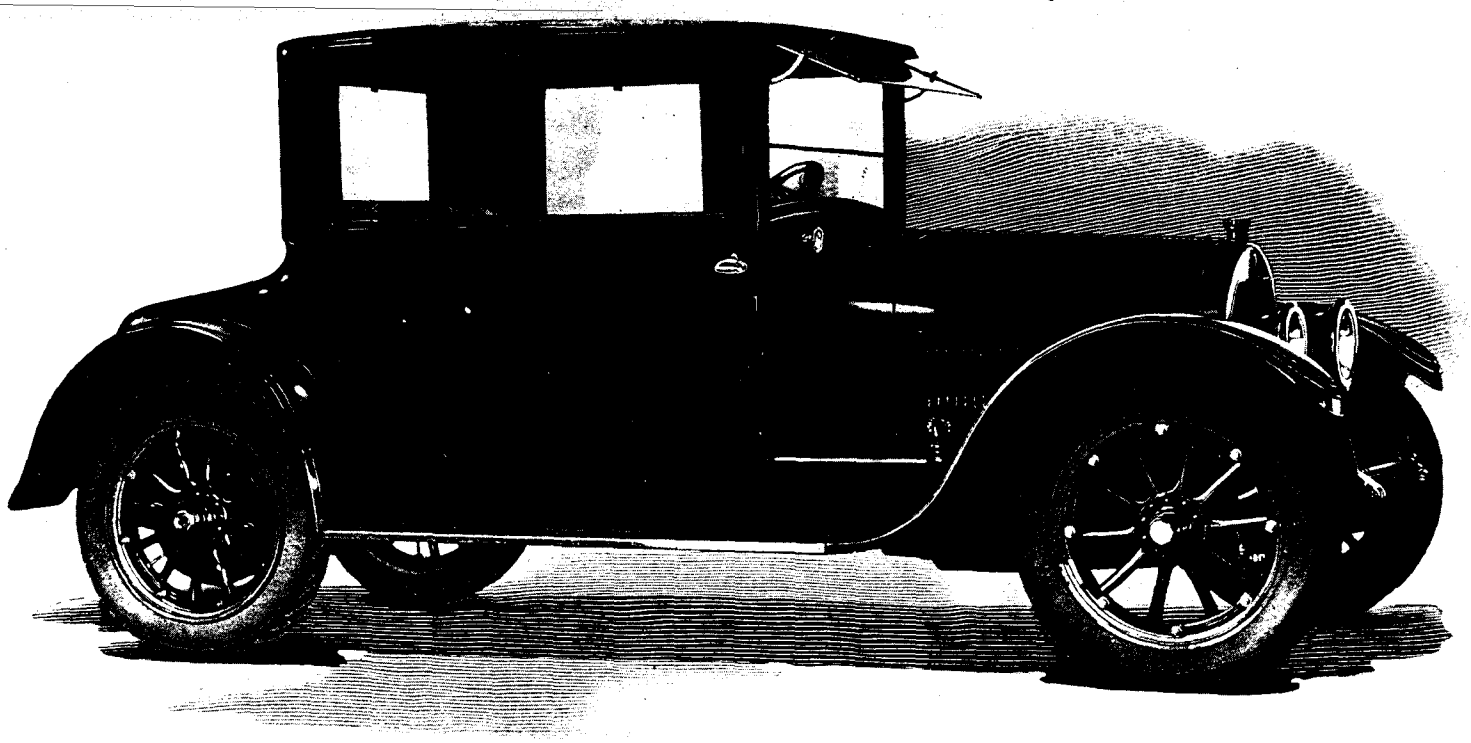
*Third pane keeps the vision glass dry and clean on Cadillac closed cars*

### *Interior Details—Closed Cars*

Just as much care has been taken with Cadillac closed car interiors, that they shall be comfortable and in good taste, as has been given to their substantial construction and outward appearance.

The upholstering material is the first grade mohair velvet. It is made from the fleece of the Angora goat, and possesses more body than silk velvet.

(Continued on page sixteen)



## THE CADILLAC VICTORIA

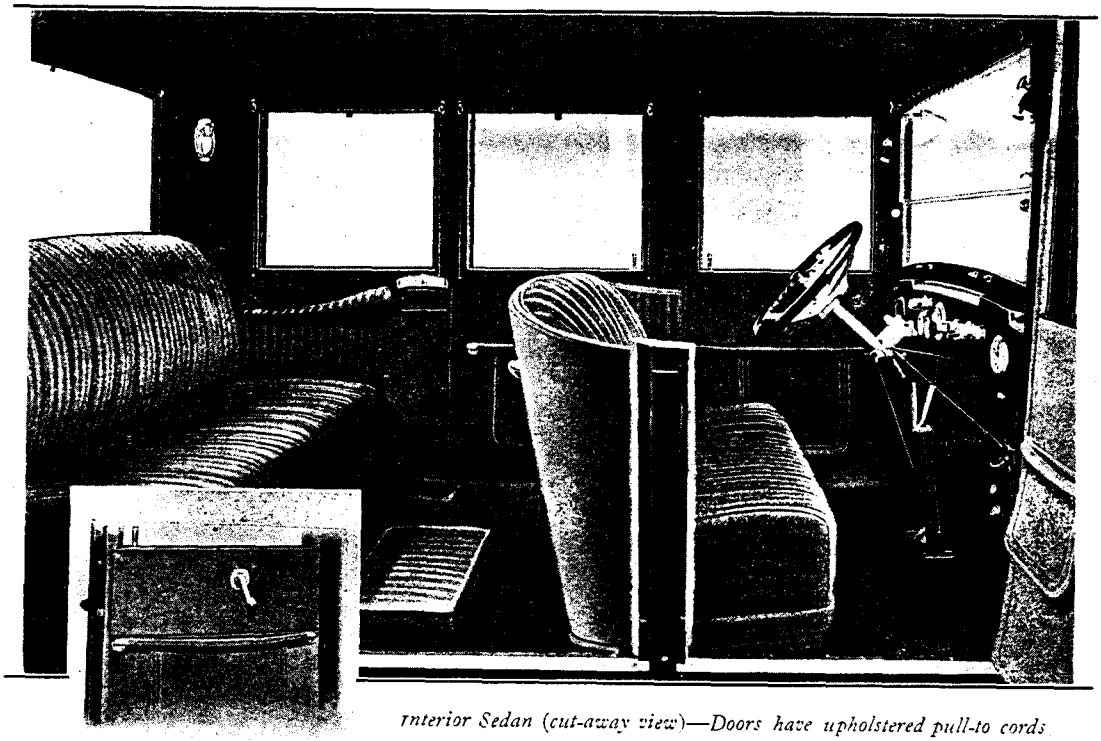
A DISTINGUISHING feature of the Cadillac Victoria is its roominess. The driver's seat is set a few inches ahead of the rear cushions so that he has a clear vision as well as easy entrance through the left hand door. The rear seat for two passengers is 37½ inches wide, and very comfortable. An additional seat folds snugly under the cowl when not in use. It faces forward and is well upholstered and fitted with arm rests. Accommodations are therefore ample for four people.

Storage space behind the driver's seat, as well as door pockets and lockers under all seat cushions, are convenient for stowing motor equipment, and extra parcels. The rumble in the rear, accessible through a waterproof lid in the top, is large enough to accommodate the luggage for a long motoring journey. Tires are carried on a rack at the rear.

The interior upholstering and decoration is in harmonizing patterns of plain and striped mohair velvets. Taffeta silk shades are fitted to side and rear windows. A cut crystal dome lamp is operated by a separate switch. An inside thumb lock is provided for the left hand door. The right hand curb door is secured with an outside key lock.

The exterior of the Victoria is solid aluminum panelling throughout. The standard exterior finish is Calumet green, with upper work, radiator, fenders and dustpans in black. The wheelbase is 125 inches.

In considering the Victoria it is well to have in mind the very wide utility of the car. The model adapts itself without awkwardness to the demands of the business or professional man, to the social duties of the woman or to the touring requirements of a small party.



*rnterior Sedan (cut-away view)—Doors have upholstered pull-to cords*

[Continued from page fourteen]

Striped patterns of this material are laid in French plaits to cover seat cushions, backs and arm rests. The upper works, sides and ceiling, are smoothly laid in plain, unplaited velvet of the same color as the background of the striped material. Bindings also are of this material.

The effect is a pleasing harmony of soft tones, the contrast of dark stripes relieving and decorating. The floor covering harmonizes with the upholstering. A foot hassock is provided in the Limousine, Suburban and Sedan. The shaping and springing of the cushions, topped with curled hair, allows one to rest as comfortably as in a favorite arm chair at home.

### *Appointments*

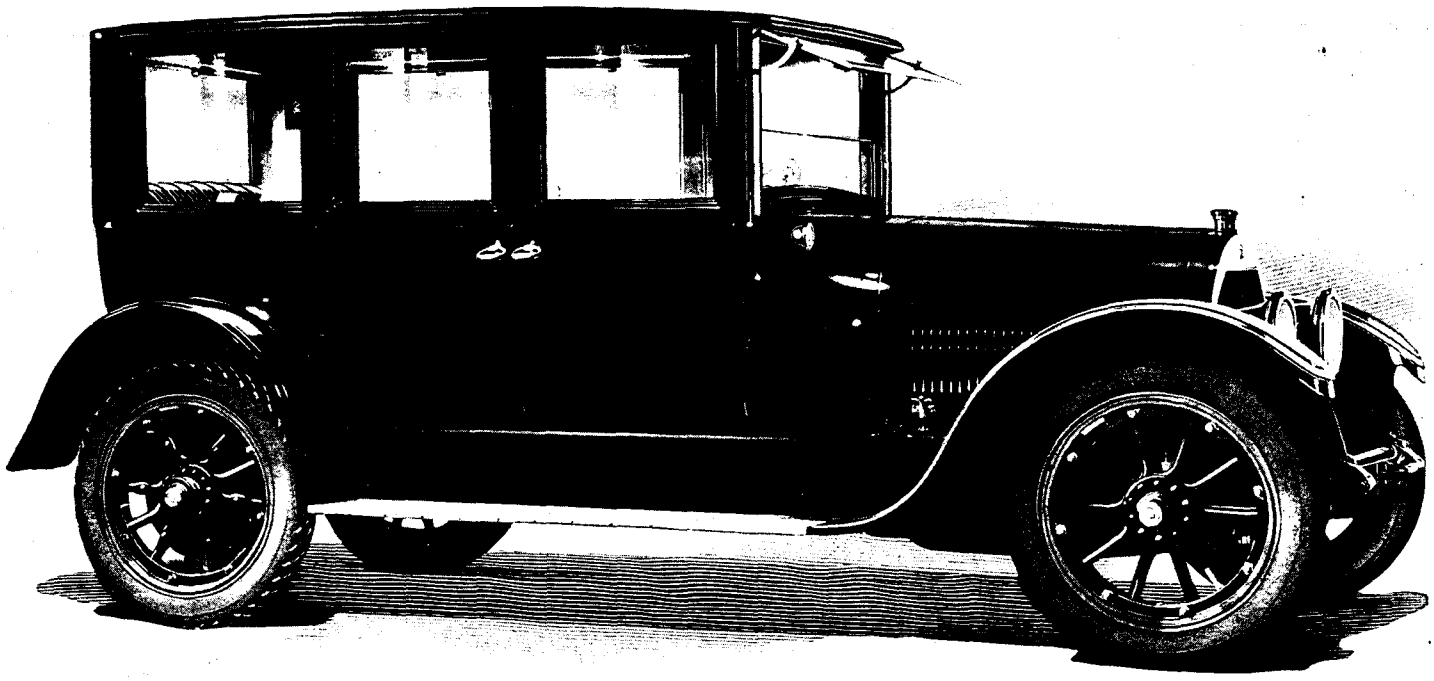
Door pockets with elastic tops and weighted flaps, and a robe rail in the closed bodies are good places to stow the wraps and other accessories of a motoring trip.

Limousine, Sedan and Suburban are provided with a vanity set, containing card case, memorandum pad and pencil, a sizable mirror and two glass vials with inlaid tops. The case itself is mahogany inlaid. On the other side of the car there is a smoking set to match the vanity case. It contains a match safe and ash receiver. An electric cigar lighter on the dash is an added convenience in Victoria, Sedan and Suburban.

The doors on the closed cars are double-latched, eliminating the possibility of their accidentally swinging open. When parking, doors away from the curb are securely fastened from within by thumb locks, outside key locks being provided on the curb doors.

Taffeta silk shades to match the upholstery are provided on the rear windows of the closed models to shut out the sun and provide additional privacy. A cut crystal dome lamp in the ceiling of the Victoria and

[Continued on page eighteen]



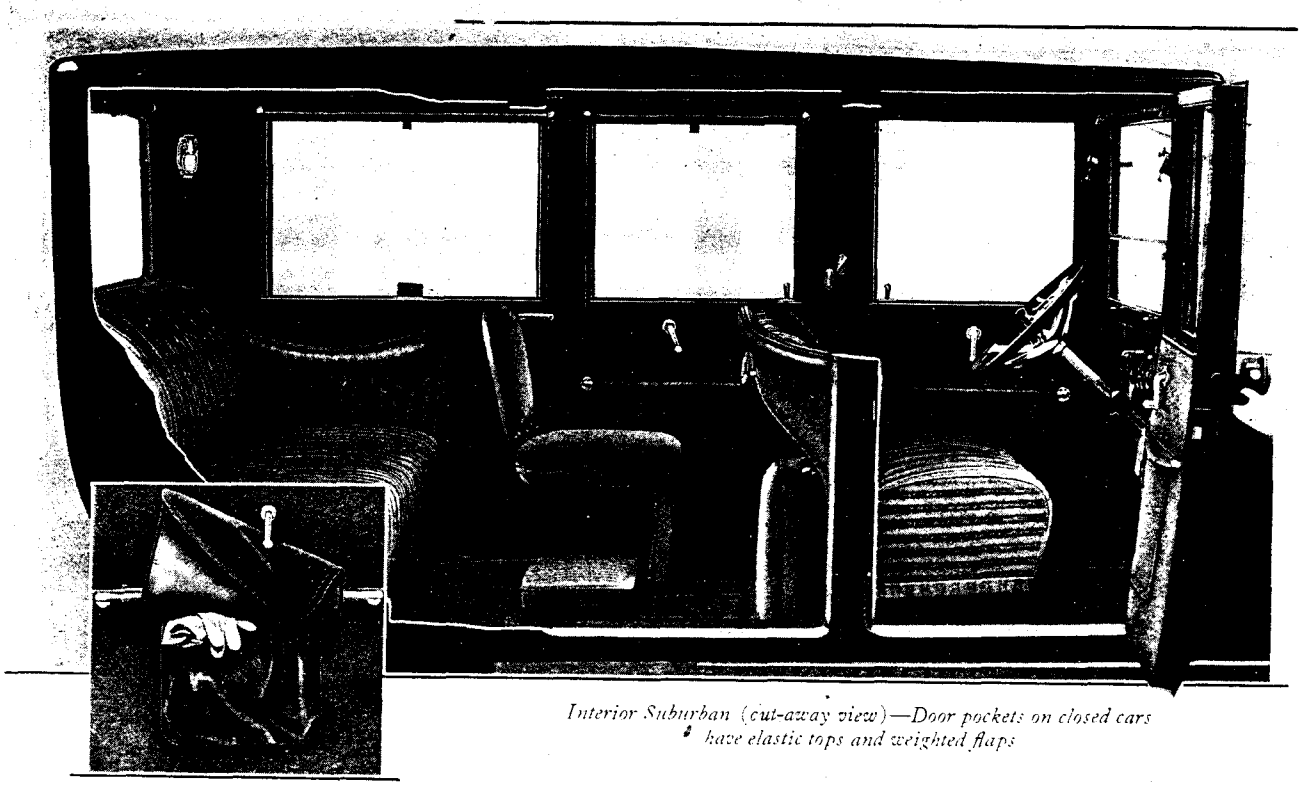
## THE CADILLAC SEDAN

THE Four-Door Sedan is an excellent, moderate-sized, single-compartment closed car for general family use. A door on each side gives entrance to the full front seat. Its width is 43 inches, generous for two, and planned in shape and size to make driving as comfortable as possible. A three-piece windshield, as on the other closed models, includes rain vision and ventilating features. Chain and sprocket lifts under the upholstery operate the windows in all four doors, lowering them flush with the sills. The rear seat, two and one-half inches wider than the front, will accommodate three, and is provided with arm rests. Cut crystal reading lamps in the rear quarters furnish diffused illumination at night, and taffeta silk curtains at the rear and rear quarter windows shut out the glare of sunlight when desired. The rear quarter windows open for two thirds of their length. Upholstery, as on the other closed cars, may be chosen from several quiet patterns of mohair velvet. This material is not only beautifully soft, but as durable as any fabric which you might choose.

Shopping is easy with the Sedan. There are four large plaited door pockets with weighted flaps and corded with elastic at the top, a good place to stow parcels. A vanity case and smoking set are also part of the standard equipment, as well as a foot hassock.

The right hand front door has a key lock, inside thumb locks fastening the other three doors.

The standard color of the Sedan is Calumet green for the lower body, with black for upper works, radiator, dust pans and fenders. Exterior panelling is 14-gauge aluminum. Wheelbase is 125 inches.



*Interior Suburban (cut-away view)—Door pockets on closed cars have elastic tops and weighted flaps*

[Continued from page sixteen]

Limousine provide night illumination. Reading lamps in the rear quarters are equipment for Sedan and Suburban, and additional equipment in the Limousine.

Decorative hardware in the Empire period matches the lighting fixtures and adds a decorative touch to the subdued interiors.

Windows are of crystal polished plateglass, set in seamless metal sash, mouldings on doors and windows being dull ebony finished. The appointments of the enclosed models are all Cadillac designed and built to Cadillac specifications. This precaution is taken that the small things may be in harmony with the body plans and color schemes.

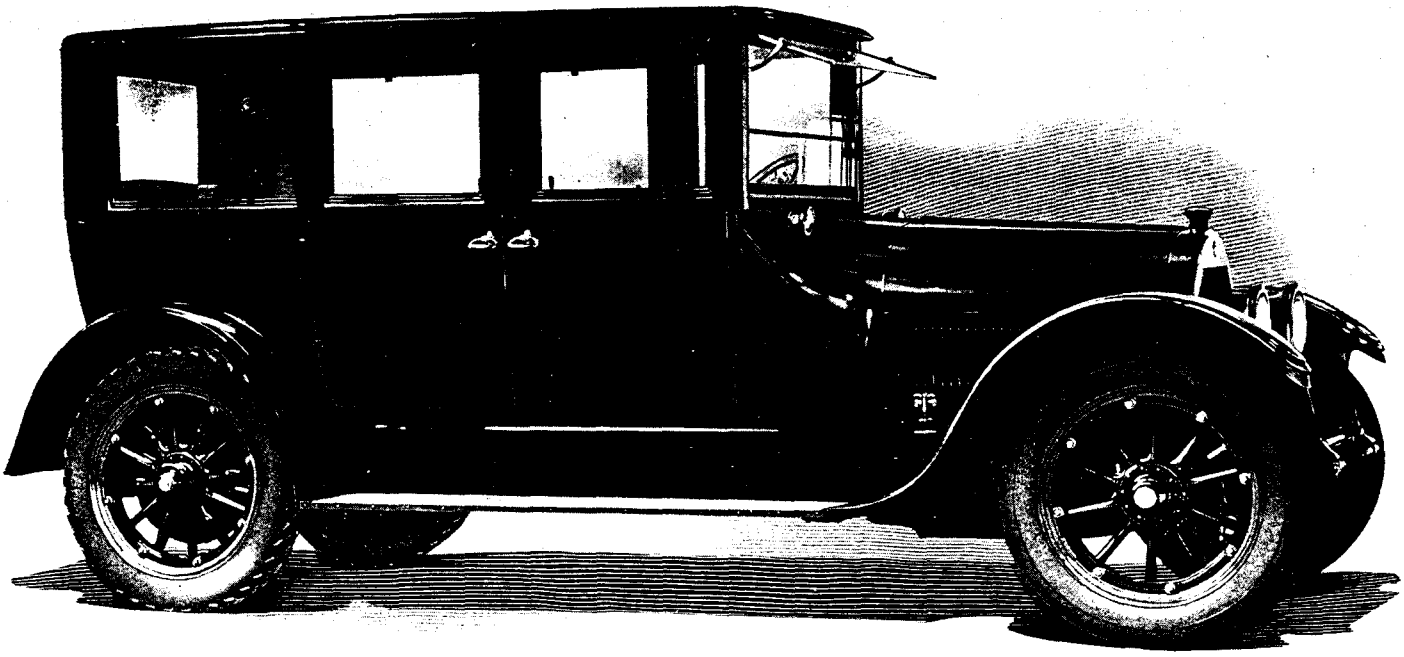
A drop steering wheel, tilting headlamp reflectors, power tire pump, tire carrier and a full set of tools on the closed cars are standard equipment, identical with that provided for the open cars.

## *Design*

There is nothing bizarre or extreme about the appearance of Cadillac closed cars. This year's models reflect in their design the straight lines and square corners so much in favor, but with a Cadillac dignity and restraint which will hold them in the fine car class next year and the year after.

The exterior finish of the closed bodies, applied to the solid aluminum panelling, is something more than a protective surfacing. Cadillac paint processes produce a second flexible body covering so thick and hard as to resist over a long period the scouring effect of mud and dust and sand, and the other elements.

Interior finishing is subdued. The shades of mohair velvet fabrics are neutral in color, forming a soft background for evening clothes.



## THE CADILLAC SUBURBAN

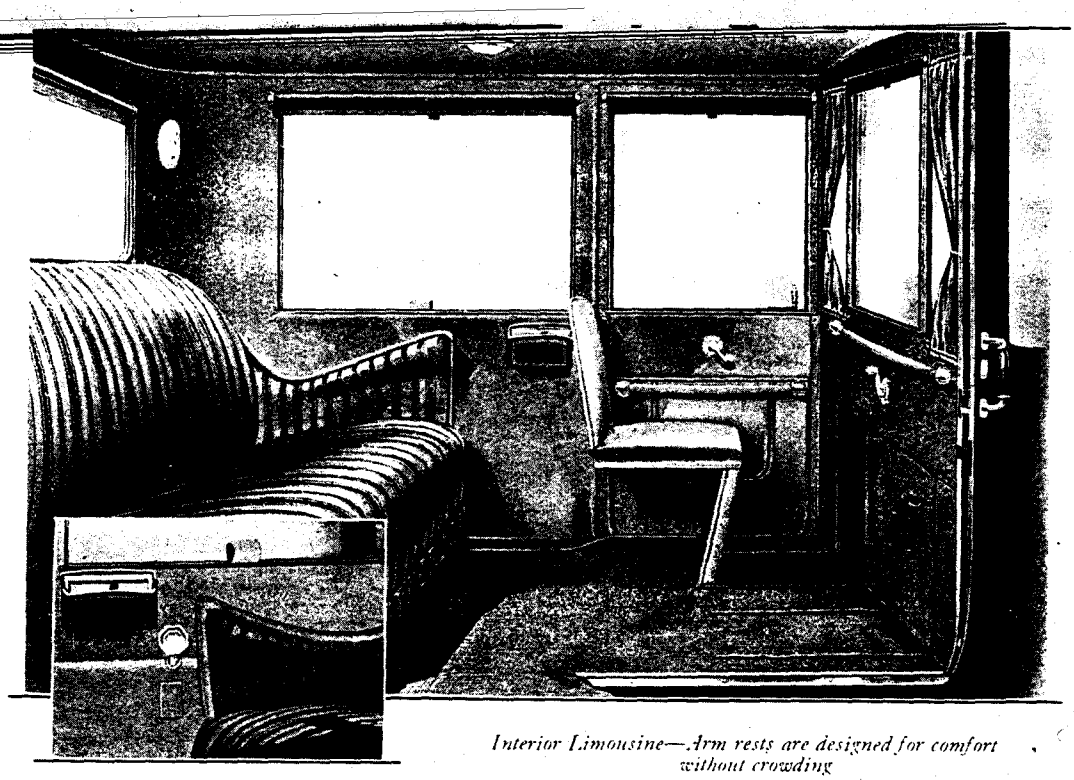
PARALLELING the service of the Seven-Passenger in open cars there is the Cadillac Suburban. It is mounted on the 132-inch wheelbase. The length of the chassis, as well as the three quarter platform rear springs, make for exceptionally easy riding. A long, smooth cowl and flat roof lines give the appearance of low-slung weight and roadability. The length of the car allows an exceptionally roomy rear compartment with comfortable seats for five. The rear seat is 46 inches wide. The front or driver's seat measures forty-four. Auxiliary seats for two, well upholstered, fold into the back of the front seat when out of use. Four wide doors in this single compartment body give double entrance to any seat, front or rear, without disturbing other occupants.

Robe rails, door straps and four door pockets are convenient for the stowage of wraps and other comforts which are needed for long motoring trips. Toilet case and smoking set are standard equipment. Reading lamps in the rear quarters furnish diffused illumination at night, and taffeta sun shades on rollers are provided for the rear windows and doors.

The Cadillac Suburban is a year-round car. A three-piece windshield provides a weather glass to shield the vision glass from rain or snow. Both upper and lower panes are ventilating. The windows in the doors, operated by concealed chain and sprocket fixtures, lower almost out of sight. Those in the rear quarters open two-thirds of the way on straps. Inside thumb locks on the left and outside key locks on the right hand doors secure the interior for parking.

Mohair velvet upholstery in many beautiful patterns offers a wide personal choice in the decoration of the comfortable interior.

The exterior is solid aluminum panelling, finished in Calumet green, with black trimmings.



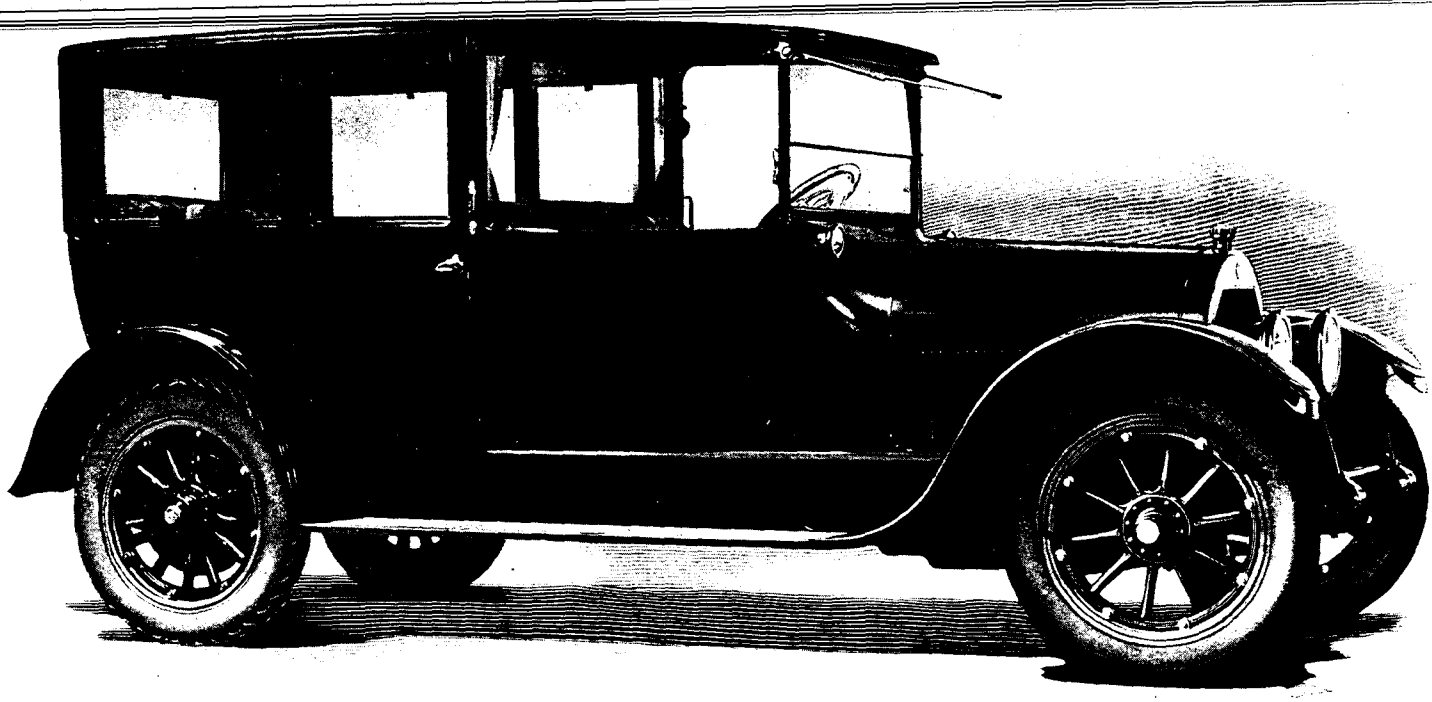
*Interior Limousine—Arm rests are designed for comfort without crowding*

## THE CADILLAC LIMOUSINE

WHEN business or social duties press most heavily, the dependable qualities of a Cadillac chauffeured car are most appreciated. From reading lamps to vanity case it is complete. The interior is tailored in mohair velvet, the material chosen from a large selection of patterns to suit the purchaser's taste. French plaiting, of striped patterns on seat cushions and arm rests, with plain patterns of harmonious fabric for walls and headlining, makes the decorative scheme permanently attractive, without the necessity of lace work for bindings. For the comfort of those in the rear compartment, a foot hassock is provided, in place of a metal rail. The floor covering underlaid with rubber matting harmonizes with the color of the upholstering. The 132-inch wheelbase gives ample room in the rear compartment for five passengers with the folding, comfortably upholstered auxiliary seats in use. The new stentorphone by which communication is held with the driver reproduces normal speech from within in a magnified tone so that directions are clearly transmitted. It is controlled by a button so that sounds are transmitted only when desired by the rider. The instrument is constructed on the same sturdy principles as a desk phone, and will give permanent service for years.

Cut crystal dome and quarter lamps provide diffused illumination at night. Taffeta sun shades on rollers are furnished for all windows, except the curved corner panes, which are draped with silk draw curtains of the same material.

Windows are crystal plate glass fitted in seamless metal sash of weather-tight and rattle-proof construction. The large pane behind the driver's seat, as well as the



THE CADILLAC LIMOUSINE—*Continued*

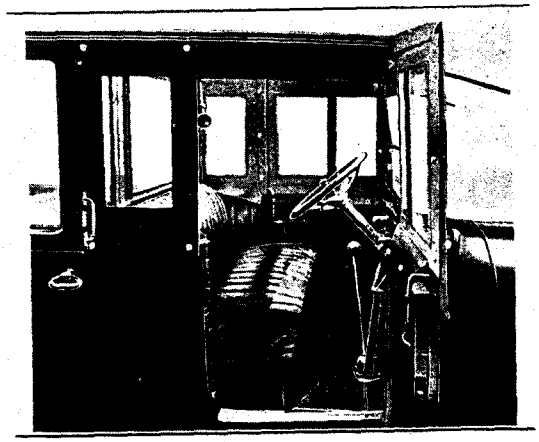
panes in the rear doors and rear side windows, open for more than half their length.

A vanity box contains memorandum pad, card case and pencil, as well as a sizable mirror and two glass vials with inlaid tops. A smoking set consists of match case and ash receiver. They are contained in inlaid mahogany cases on either side of the rear seat.

Key locks are provided on the outside of both doors of the passenger compartment.

*Driver's Compartment*

The driver's compartment is finished in long grain, hand buffed black leather, wood work and ceiling being dull ebony finish. Storm curtains, easily applied and swinging open with the doors, are furnished for the chauffeur's protection in uncertain weather. The windshield is three-piece, rain-vision, ventilating, the extra upper glass keeping the vision glass dry and free from objectionable reflections.



*Curtains on driver's compartment have arm hole for signalling. They swing with doors*

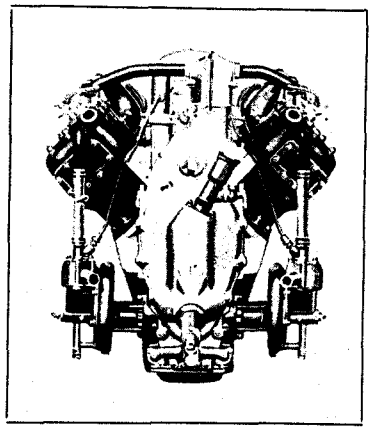
The standard color for the Limousine is Calumet green, with upper works, radiator, fenders and dust shields in black.

A chauffeured Cadillac is a great satisfaction to both owner and driver, ready at any hour to go anywhere, without being "tinkered" with to keep it running smoothly.

# CADILLAC EIGHT CYLINDER CHASSIS

*A full and interesting description of the Cadillac eight cylinder engine and chassis is contained in the Cadillac mechanical catalog, "Details of Construction."*

ENGINE—Eight-cylinder V-type, high speed, high efficiency. Engine and transmission built in unit, three-point suspension. Cylinders cast in two blocks of four cylinders each, with water-jackets and combustion chambers integral; detachable heads. Three and one-eighth inch bore by five and one-eighth inch stroke. Piston displacement, 314 cubic inches. Crankcase, aluminum, copper alloy. Tungsten steel valves. Valve mechanism enclosed. Three-bearing crankshaft, one and seven-eighths inch diameter, of chrome nickel alloy steel, special heat treated. Main and connecting rod bearings of liberal dimensions, Cadillac special bearing metal, with bronze reinforcement. Single camshaft, five bearings. Camshaft and generator shaft driven by silent chains from crankshaft.



HORSEPOWER—N. A. C. C. rating 31.25.

COOLING—Water, forced circulation. Jackets cast integral with cylinders, liberal water circulating space. Two centrifugal pumps, one for each block of cylinders, insuring proper water distribution. Radiator, Cadillac tubular and plate type. Fan driven by silent chain from camshaft. Water temperature governed by Sylphon Thermostats.

IGNITION—Cadillac-Delco, improved system. Current supplied by generator and battery.

LUBRICATION—Automatic pressure feed by gear pump. Oil forced to crankshaft and connecting rod bearings.

CARBURETOR—Cadillac, designed especially for this engine, insuring uniform gas distribution and maximum efficiency. Auxiliary air control to facilitate starting. Intake pipe, hot water jacketed.

CLUTCH—Multiple disc, dry plate type; seventeen high carbon steel plates, 7¾ inches diameter. Driving plates are faced with wire mesh asbestos. Exceptionally soft and velvety in operation.

TRANSMISSION—Aluminum case. Selective type sliding gear, three speeds forward and reverse. Chrome nickel steel gears and shafts.

CRANKING DEVICE—Cadillac-Delco, improved, patented.

STORAGE BATTERY—Exide manufacture, designed especially for Cadillac; heavy plates.

DRIVE—Tubular shaft. Two universal joints, the forward telescopic, each enclosed in housing and running in lubricant.

BRAKES—One internal and one external brake direct on wheels, 17-inch x 2½ inch drums. Exceptionally easy of operation. Both equipped with equalizers.

STEERING GEAR—Cadillac patented worm and worm gear sector type, adjustable, with ball thrust bearings. 18-inch steering wheel with corrugated walnut rim, aluminum spider. Steering wheel hinged to swing downward, facilitating entrance to front seats.

FRAME—Channel section, carbon steel, maximum depth, 8 inches; width 30 inches in front, 33 inches in rear; three tubular and two pressed steel cross members.

WHEELS—Wood, artillery type, rotating on Timken bearings, fitted with demountable rims for straight side tires, special large steel hub flanges and substantial spokes.

CONTROL—Center control. Gear change lever and hand brake in center, set well forward, yet within easy reach. Service brake, foot lever. Clutch, foot lever. Throttle accelerator, pedal button with foot rest. Throttle and spark levers at steering wheel. Throttle auxiliary air control, hand lever on steering column.

FUEL SYSTEM—Twenty-gallon tank with gauge, at rear of chassis. Fuel forced by air pressure to carburetor.

AXLES—Rear, Cadillac Timken full floating type; Timken bearings; special alloy steel live axle shafts. Spiral type bevel driving gears, machined with accuracy. Front axle, drop forged, special alloy steel, I-beam section with integral yokes and spring perches; drop forged tie rod ends and steering spindles, the latter fitted with Timken bearings at the upper ends.

TREAD—56 inches.

SPRINGS—Front semi-elliptic, 42 inches long by 2 inches wide; rear, three-quarter platform; sides, 54 inches long by 2 inches wide. Rear cross 39½ inches long by 2 inches wide.

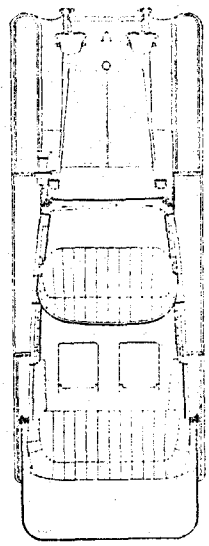
PRICES—On automobiles and parts are net, F. O. B. Detroit. No allowance will be made for any part of standard equipment if ordered omitted.

*NOTE—The Cadillac Motor Car Company reserves the right to make changes or improvements at any time without incurring any obligations to install same on cars previously sold.*

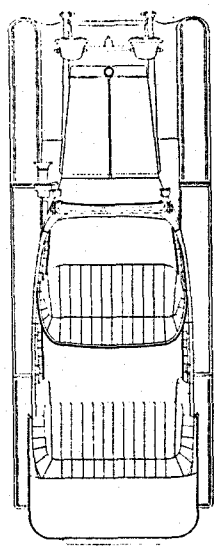
# BODY SPECIFICATIONS AND DETAILS

## *Open Cars*

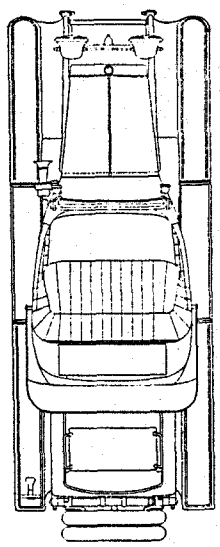
| | TOURING CAR | PHAETON | ROADSTER |
|---|---|---|---|
| *Seating* | 7 Persons—2 in front seats<br>3 in rear seat<br>2 in auxiliary seats | 4 Persons—2 in front seat<br>2 in rear seat (extra wide). | 2 Persons (Folding rumble seat for 2 extra). |
| *Wheelbase* | 125 inches | 125 inches | 125 inches |
| *Tires* | 35 x 5 Goodyear fabric.<br>Plain tread on front wheels.<br>Allweather tread on rear wheels. | 35 x 5 Goodyear fabric.<br>Plain tread on front wheels.<br>Allweather tread on rear wheels. | 34 x 4½ Goodyear fabric.<br>Plain tread on front wheels.<br>Allweather tread on rear wheels |
| *Standard Finish* | Cadillac blue, black trimmings (on radiator, lamps, fenders, dust shields and hub caps). Chassis is black. | Cadillac blue, black trimmings (on radiator, lamps, fenders, dust shields and hub caps). Chassis is black. | Cadillac blue, black trimmings (on radiator, lamps, fenders, dust shields and hub caps) and cream wheels. Chassis is black. |
| *Upholstery* | English long grain, hand buffed, dull finish, black leather, plaited over small spiral springs nested together, and best curled hair. | | |
| *Standard Equipment* | Top of Cadillac design and manufacture. Rear curtain, has quarter wings and bevel plate glass windows; side curtains with more than three-quarters of area transparent, tagged for position, felt lined on lower edge; detachable brackets allow side curtains to swing with doors.<br>Tilting headlamp reflectors; full lamp equipment, special Cadillac design; head and side lamps black enamel, nickel trimmed; tonneau lamps; portable lamp.<br>Dash equipment—Eight day Waltham clock illuminated by special lamp; speedometer with trip reset; ammeter; gasoline and oil pressure gauges with night illumination.<br>Electric horn, power air compressor, foot rail, robe rail, license tag holders, tire carrier for two spare tires and extra rim. | | |
| *Tools* | Tools in locked door pocket, and locker under front seat include following:<br>Pliers<br>Cold Chisel<br>Screw Driver (large)<br>Screw Driver (small)<br>Bicycle wrench<br>Monkey wrench<br>Octagonal punch<br>Spark plug and gasket<br>Hammer<br>Brace and socket wrench for demountable rims<br>Auto jack and handle<br>Set screw wrench generator shaft<br>Handy lamp<br>Starting crank<br>Wrench for spark plug and air cock<br>Wrench, outside brake adjustment<br>Distributor wrench (plain)<br>Distributor wrench (with gauges<br>Hub cap wrench<br>Water pump wrench<br>Oil gun<br>Hose and gauge for tire pump<br>Instruction manual<br>Oiling chart<br>Wrench for crankcase oil plug | | |
| *Special Colors* | Upon sufficient notice cars may be finished in special colors approved by the manufacturer, at additional charge. | | |



*Seven Passenger Touring Car*



*Phaeton*

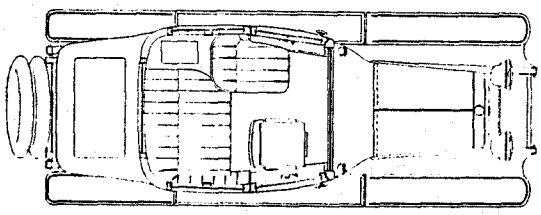


*Roadster*

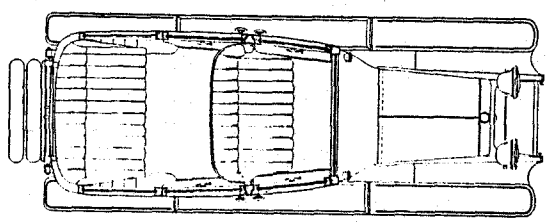
# BODY SPECIFICATIONS AND DETAILS

## *Closed Cars*

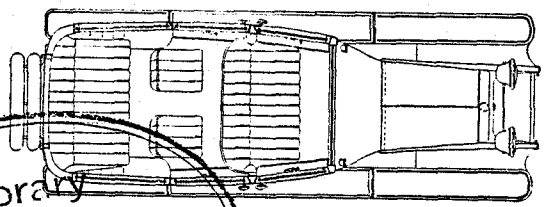
| | VICTORIA | SEDAN | SUBURBAN | LIMOUSINE |
|---|---|---|---|---|
| *Seating* | 4 Persons—<br>1, driver's seat<br>2, rear seat<br>1, extra folding seat | 5 Persons—<br>2, front seat<br>3, rear seat | 7 Persons—<br>2, front seat<br>3, rear seat<br>2, folding tonneau seats | 5 Persons and chauffeur<br>3, rear seat<br>2, folding seats<br>Extra seat beside driver |
| *Wheelbase* | 125 inches | 125 inches | 132 inches | 132 inches |
| *Standard Finish* | Calumet green, trimmed with black on upper work, radiator, fenders, dust shields and hub caps. Chassis is black. | Calumet green, trimmed with black on upper work, radiator, fenders, dust shields and hub caps. Chassis is black. | Calumet green, trimmed with black on upper work, radiator, fenders, dust shields and hub cap. Chassis is black. | Calumet green, trimmed with black on upper work, radiator, fenders, dust shields and hub caps. Chassis is black. |
| *Tires* | 35 x 5 Goodyear fabric tires. Smooth tread on front wheels; Allweather tread on rear wheels. | 35 x 5 Goodyear fabric tires. Smooth tread on front wheels; Allweather tread on rear wheels. | 35 x 5 Goodyear fabric tires. Smooth tread on front wheels; Allweather tread on rear wheels. | 35 x 5 Goodyear fabric tires. Smooth tread on front wheels; Allweather tread on rear wheels. |
| *Upholstery* | Rich mohair velvet in neutral tones to harmonize with other colors. Striped material laid in French plaits over seat cushions, arm rests and sides below arm rests. Doors, ceilings, and all upper works—plain head lining, to match lighter background of striped material. Auxiliary seats upholstered in plain material. Bindings of same material, blind tacked. Window sash and casings, mahogany finished. Decorative hardware in Empire patterns. | | | |
| *Appointments* | Foot rail, arm rests on folding seat. Taffeta roller sunshades on side and rear windows. Inside thumb lock, left hand door; outside key lock, right hand door. Electric cigar lighter. | Taffeta roller sunshades on rear doors, side and rear windows; robe rail; foot hassock; key lock on right hand front door, inside thumb locks on other three doors; smoking and vanity cases. Electric cigar lighter. | Taffeta roller sunshades on rear doors, side and rear windows; robe rail, foot hassock, smoking set and vanity cases. Outside key lock, front curb door; inside thumb locks other three doors. Electric cigar lighter. | Taffeta roller sunshades all windows, draw shades on curved quarter windows; foot hassock, robe rail, chauffeur's telephone. Smoking and vanity cases; key locks both doors, passenger compartment. |
| *Interior Lighting* | Dome lamp in ceiling—two dash lamps. | Two quarter reading lamps —two dash lamps. | Two quarter reading lamps —two dash lamps. | Two quarter reading lamps and dome lamp—two dash lamps. |
| *Storage Space* | Compartment rear of driver's seat, port in top; two door pockets.<br>Rumble in rear, hinged waterproof lid in top. | Under front and rear seats; four door pockets. | Under front and rear seats; four door pockets. | Under rear seat; two door pockets. |
| *Ventilation* | Three piece, upper and lower ventilating windshield; door windows and side windows lower flush with sills. | Three piece, upper and lower ventilating windshield; door windows lower flush with sills; rear side windows lower more than half way. | Three piece, upper and lower ventilating windshield; door windows lower flush with sills; rear side windows lower more than half length. | Front window back of driver's seat lowers half way; door windows lower flush with sill; rear side windows lower more than half way. |
| *Tools* | Same equipment as on open cars, stored under driver's seat. | | | |
| *Special Colors* | Upon sufficient notice cars may be finished in special colors approved by manufacturer, at additional charge. | | | |



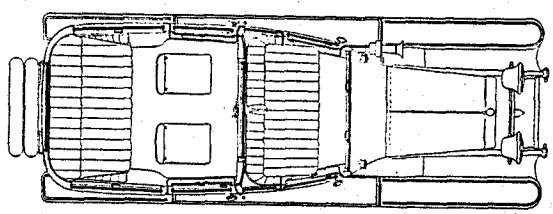
*Victoria*



*Sedan*



*Suburban*



*Limousine*

Library
General Motors Corporation
Research
Laboratories



Evans-Winter-Hebb
complete printing service
Detroit