CADILLAC MOTOR CAR CO.
Miscellaneous

1926-27 The Cadillac line for 1926-1927.

c.1

The Cadillac Line for

1926 - 1927

LIBRARY REFERENCE COPY

NOT TO CIRCULATE

THE purpose of this booklet is to supply the Cadillac distributing organization with information regarding the Cadillac line for 1926-27. It is not intended as a catalogue, but as a means of providing the necessary information pending the publication of the catalogue.

It contains illustrations of the full line of Cadillac Standard and Custom cars, together with prices and information as to standard and optional equipment.

A few of the illustrations do not reveal the cars to the best advantage, but in order to expedite the printing of this booklet we have used photographs available rather than waiting until better ones could be obtained.

The Cadillac Line For 1926-27

THE Cadillac 1926-27 line includes the finest group of fine cars the automobile industry has ever seen—50 body styles and types and 500 color and upholstery combinations.

Included in this line are 21 Standard and Custom Fisher-built bodies. The remaining 29 include Fleetwood and Brunn Custom-built bodies and Cadillac semi-commercial vehicles.

Four new body models have been added. They are: Standard Two-Passenger Sport Coupe; Standard Five-Passenger Sport Sedan, 132-inch wheelbase; Custom Two-Passenger Convertible Coupe, and Sport Phaeton with double cowl.

In addition, the Standard Victoria has been made a five-passenger model by the removal of the parcel compartment back of the driver's seat. And the Standard Imperial Sedan has been lengthened to 138-inch wheelbase. These, in effect, constitute new models.

Furthermore, the Custom Five-Passenger Coupe, Custom Five-Passenger Sedan, Custom Suburban and Custom Seven-Passenger Imperial are also available in Cabriolet style.

Thus the line really numbers ten models that are new this year.

Cadillac's achievement in producing the most extensive line of fine cars in the history of the industry is one that is surpassed only by the introduction of the Cadillac ninety-degree V-type Eight. And in providing the distributing organization with such a splendid line-up for the ensuing twelve months, Cadillac has provided a still greater opportunity for every distributor, dealer and salesman.

The Cadillac now being produced in such a wide range of body styles and types is essentially the same car as the New Cadillac introduced in August, 1925—the car that met with such universal favor as to cause Cadillac to break all production and sales records in the twelve months following its introduction.

Since it is Cadillac's policy to refine and improve continually, incorporated in the car now offered are a number of improvements. Among these are a new radiator casing, radiator emblem, steering wheel with light control,

and a handsome new instrument board panel. In addition, a number of minor chassis changes have been made.

Though these changes effect an improvement in the car's appearance they are not sufficiently radical as to cause the present car to appear to be a new model. As was stated before, the car is essentially the same, but it is now manufactured in a range of body types and styles and color and upholstery combinations so extensive as to enable Cadillac to cater to the ever-growing demand for individuality in the fine car field.

This booklet includes only illustrations of the Fisher-built bodies in the Standard and Custom line.

Prices

Following are the prices that became effective August 1:

Standard Line

Five-Passenger Brougham	$2995
Two-Passenger Coupe	3100
Five-Passenger Victoria	3195
Five-Passenger Sedan	3250
Seven-Passenger Sedan	3350
Seven-Passenger Imperial	3535
Sport Two-Passenger Coupe	3500
Sport Five-Passenger Sedan	3650

Custom Line

Roadster	$3350
Touring Car	3450
Phaeton	3450
Sport Phaeton	3975
Two-Passenger Convertible Coupe	3450
Five-Passenger Coupe	3855
Five-Passenger Sedan	3995
Seven-Passenger Suburban	4125
Seven-Passenger Imperial	4350

F. O. B., Detroit. Tax Extra.

A number of the cars illustrated in this booklet have equipment added for display purposes. The fact that equipment is shown in the illustration does not necessarily mean that it is standard equipment. Therefore, consult the information in this booklet for guidance in the matter of equipment.

Equipment for All Models

FOLLOWING is information regarding equipment for both Custom and Standard line models, together with information as to optional equipment.

Wheelbase Lengths

Open cars: Touring—138″, Phaeton—138″, Roadster—132″.

Standard closed cars are all on 132″ chassis except the Standard Imperial. It is on the 138″ chassis, which makes possible a comfortable chauffeur's compartment and gives ample legroom to passengers in the wide auxiliary seats.

Sport Two-Passenger Coupe and Sport Five-Passenger Sedan are also on 132″ chassis.

All Custom closed models are on the 138″ chassis, with the exception of the Convertible Two-Passenger Coupe which is on 132″ wheelbase.

Gear Ratio

On all models, both Standard and Custom, the gear ratio is 5 to 1.

Tire Equipment

Standard size for all models is 33 x 6.75 Balloon. Makes: Goodyear, Royal, Firestone, and Ajax.

So far as possible distributors' preference for tires will be observed, but the factory reserves the right to supply at its option, any standard make of tire without respect to distributors' specifications.

High-pressure cord tires, size 33 x 5, optional at no extra charge, can be supplied with wood wheel equipment only on Standard or Custom models.

Wheels

Wood wheels, artillery type, standard equipment on all except Sport models.

Budd-Michelin disc wheels optional, no charge, per set of 5.

Budd-Michelin disc wheels, per set of 6—on other than Standard Sport models, additional charge $25.00; two spares mounted on rear tire carrier.

The "Buffalo" type wire wheel, made by the Wire Wheel Corporation of America, is continued as special equipment on all except Sport

Phaeton which takes 6 wire wheels as regular equipment. Additional charge, set of 5—$140.00; set of 6—$175.00.

Fender Wells

Extra tires may be carried forward in fender wells. Special combination prices are quoted which include the tires, since it would be impossible to carry spare wheels or rims unless they were so equipped.

Six wire wheels, fender wells and two spare tires, $350.00, on all models except Sport Phaeton on which this is regular equipment. Six disc wheels, fender wells and two spare tires, $240.00 on all models except Sport Two-Passenger Coupe and Five-Passenger Sport Sedan on which this is regular equipment.

Wood wheels, fender wells, two spare tires and rims, $200.00.

Collapsible Trunk Rack

A practical convenience for touring and the finishing touch for cars equipped with fender wells is a collapsible trunk rack, supplied as standard equipment on Sport Phaeton (Custom), Sport Two-Passenger Coupe (Standard), and Sport Five-Passenger Sedan (Standard) only. Available on other Standard or Custom models at extra charge of $50.00.

Special Trunk to fit folding trunk rack is not supplied as standard equipment on any model, but is available for factory equipment at $100.00. This trunk is designed to Cadillac standards and is of sound, dust-proof construction.

Radiator Casing

The radiator casing on all models is standard finish white nickel; black enamel optional.

It will also be supplied in special Duco color to match fenders at no additional charge on Custom models only. Extra charge for special color on Standard models, $12.50.

Headlamps

Drum type with $10\frac{1}{4}$" lens on all models. Custom headlamps have brass shell finished in white nickel. Black enamel optional at no extra charge. Will also be furnished in Duco to match special color fenders if specified.

Standard headlamps have steel shell, black enamel finish with nickel rims. Custom headlamps or Standard lamps in full nickel finish will not be furnished on Standard body styles except Sport Coupe and Sport Sedan, on which they are regular equipment.

Extra charge for special color lamps on Standard cars with black fenders—$10.00.

When special color fenders are ordered, lamp drums will be finished to match fenders at no additional charge unless otherwise specified.

Drum type sidelamps mounted on a nickel cowl band are standard equipment on Custom open and closed and Standard Sport models. Finish will match headlamps.

Cowl lamps on other Standard models, $75.00 extra.

Running Board Mats

All Standard and Sport models take ribbed rubber matting. Custom cars take molded rubber mats with raised step pads. Standard cars will not be supplied with Custom mats.

Spring Covers, Bumpers and Fender Guards

Front Bumper and Rear Fender Guards of U. S. E. make, and DeLuxe Motometer are supplied as standard equipment on Custom open and closed body styles and Standard Sport models.

Spring Covers of leather are also supplied on Custom models.

These items are available as factory equipment on other body styles at following extra charges:

Front Bumper and Rear Fender Guards—$50.00.

Motometer—$10.00.

Spring Covers—$25.00.

Tire Covers

"Double-wrap Spring type" cover (covers both tire and rim) for cars equipped with wood wheels. Patent finish (Black), $8.25. Satin finish (Black), $8.00.

When ordering cars with special color fender sets, tire cover should be ordered to harmonize. Double-wrap spring covers made of duPont Fabricoid, Ducoed any color—$20.00.

"No. 2 Rim-Type" cover for wire or disc wheels covers the tire only. A spring on the inner edge insures a close fit and neat appearance at all times. Black Patent or Satin finish, $6.25.

"Drum type special" cover for wire wheels covers the tire and outer surface of the wheel and has a spring on the inner edge. Black Patent or Satin finish, $6.25.

Both "No. 2 Rim-Type" and "Drum type special" covers can be furnished in duPont Fabricoid material, Ducoed any color, $17.00.

For open cars a very attractive cover can be furnished in drab duck material to match the top at following charges:

"Double-wrap Spring type," $17.00; "No. 2 Rim-type" and "Drum type special," $14.00.

All covers carry the Cadillac crest in colors.

ALL SPECIFICATIONS AND PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

Standard Closed Body Styles

THE 1927 series of Standard closed body styles has been refined to keep pace with improvements in the Custom line.

The pleated and tufted style of trimming used in Custom closed cars during the 1926 season has been adopted for the Standard bodies. Double-decked Marshall spring construction provides an even greater degree of comfort in cushions.

Trimmings

Optional trimmings for the Standard line include: 34-T-127, Taupe mohair; 36-T-127, Blue-Gray mohair; 35-T-127, Taupe cloth; 37-T-127, Blue-Gray cloth.

The additional charge for special mohair, cloth, and leather trims will be announced in an early bulletin.

Front pillars have been narrowed one inch, giving greater visibility.

A new type sun visor is supported at each side by nickel bars.

Window recesses similar to the Custom closed cars have been adopted, giving a dash of color to the conventional black upper panels, and a lighter appearance to the entire car.

Color Options

Standard color options for August and September are as follows:

August—Adjutant Gray, Norse Blue, Argyle Brown, Normandy Blue.

September—Adjutant Gray, Norse Blue, Brentwood Brown, Normandy Blue.

Four colors will be offered on the Standard line each month. To provide variety, these colors will run four months only, one color being dropped and another substituted each month.

Special colors will be supplied at the following charges:

Center panel (between mouldings), $20.00; Lower panel (below lower mouldings), $20.00.

Upper panels, fenders, and chassis are finished black. Charge for special color:

Upper panel, $20.00; Fenders, Dust-shields, etc., $75.00; Chassis, $20.00.

Roof and sun visor are finished black unless otherwise specified. Charge for special color, $25.00.

Special color orders must reach the factory not later than the 10th of month preceding that in which shipment is to be made.

All above prices refer to Duco colors only.

No orders accepted for Standard body styles in varnish finish.

Wheels

Wheels, unless otherwise specified, are finished the same color as lower panel. Special color wheels on standard job, $10.00. Contrasting color wheels on special color job, no charge. Natural wood wheels on standard or special job, $10.00.

Mouldings

Mouldings are finished in the same color as fenders unless otherwise specified. Charge for special color, $10.00.

Striping

Striping for all standard colors is a double hairline of Antique Ivory on upper and lower mouldings.

Charge for special color stripe in standard location on standard color jobs, $15.00. Stripe color optional on special color jobs.

Charge for standard or special color stripe in other than standard location on standard and special color jobs, $15.00.

Radiator Shutters

Radiator shutters are finished in same color as lower panels. Nickel radiator shutters cannot be supplied.

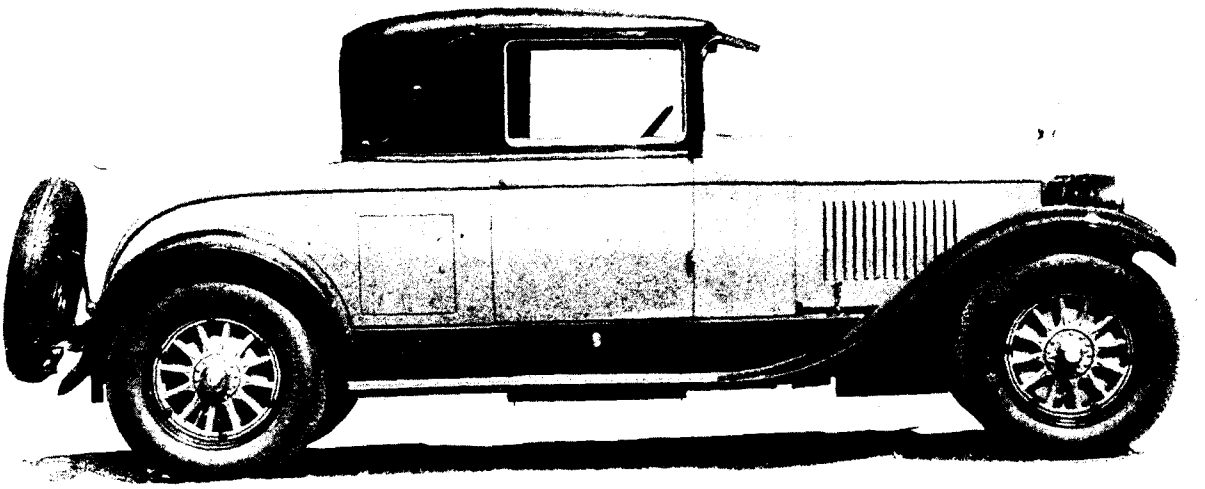
Other Details

Vanity Cases are leather covered to match trimming and are made in two sizes.

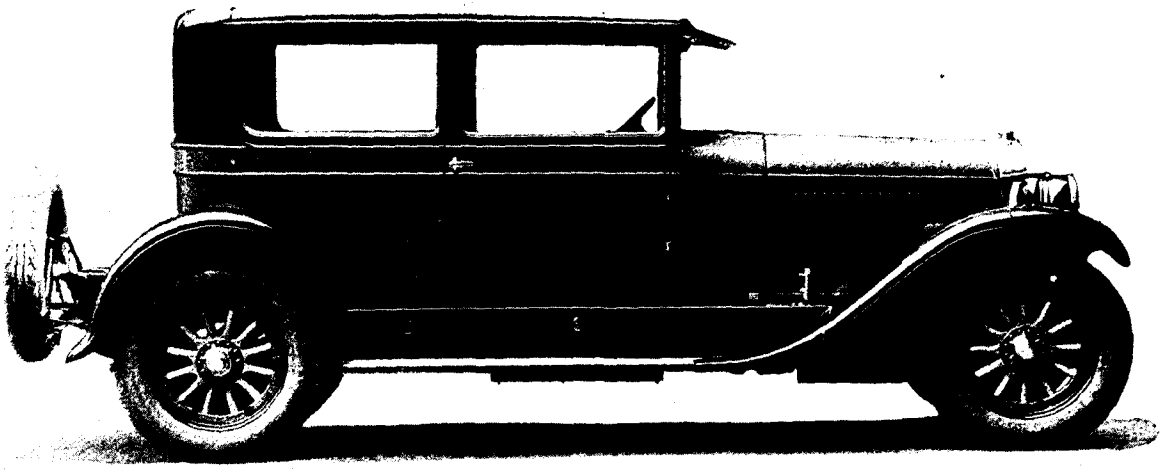
The larger, supplied on Seven-Passenger Sedan, Victoria Coupe and Standard Imperial, have for equipment in the ladies' case, a compact, memo pad and pencil and small ash receiver; in the smoking set, a match box holder and large ash receiver.

The smaller, supplied on Brougham and Five-Passenger Sedan, are equipped with compact and memo pad with pencil in the ladies' case and match box holder and small ash receiver in the smoking set. No cases are furnished with Two-Passenger Coupe.

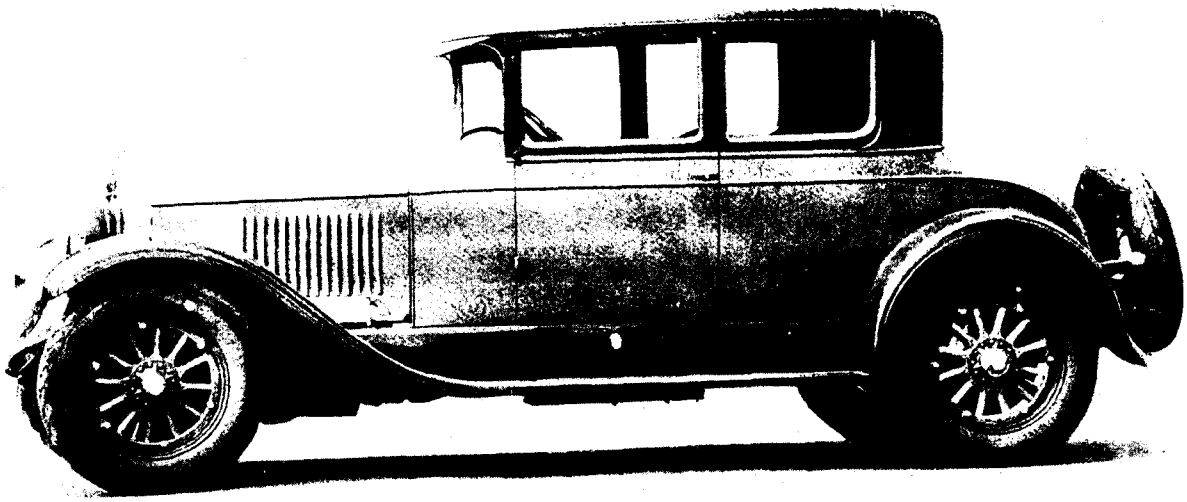
Interior Hardware is die casting, nickel-plated in Butler's silver finish.



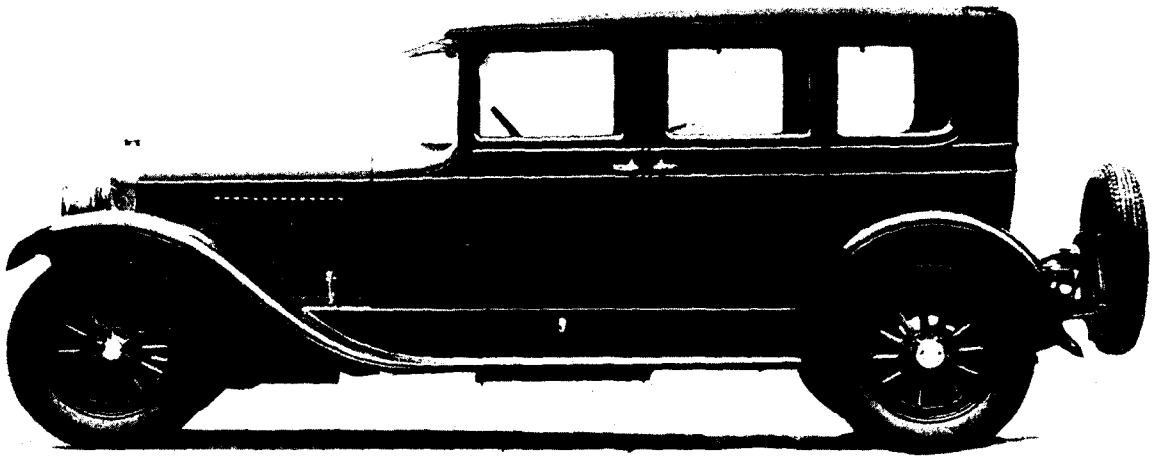
Standard Two-Passenger Coupe



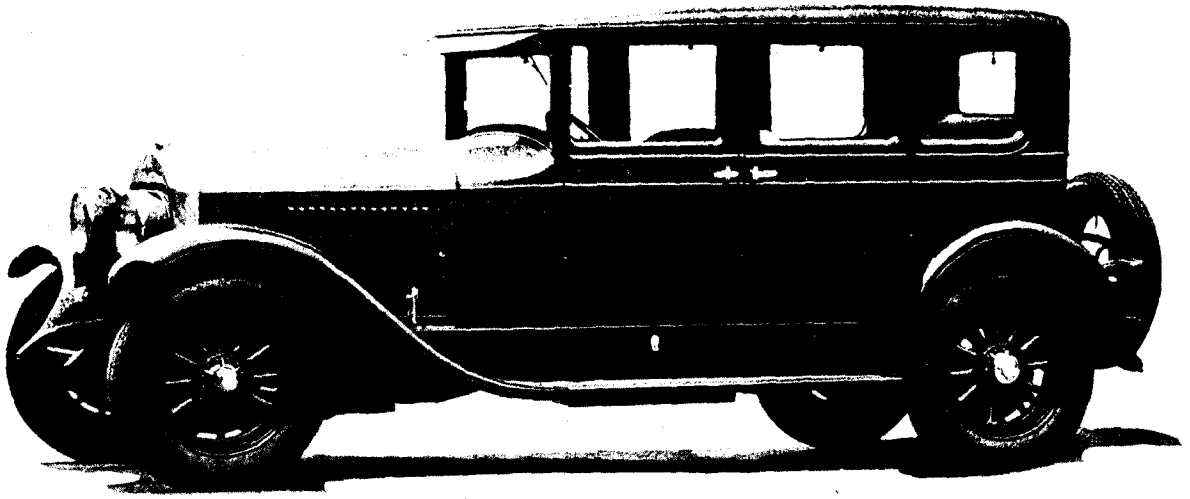
Standard Brougham



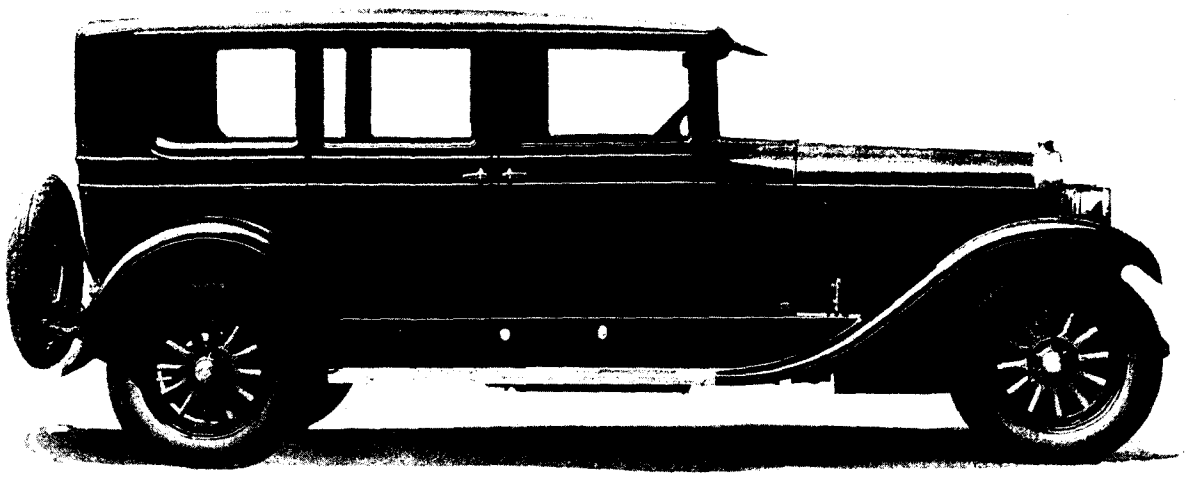
Standard Five-Passenger Victoria



Standard Five-Passenger Sedan



Standard Seven-Passenger Sedan



Standard Imperial

Sport Models—Standard Line

TWO new Standard Sport models are introduced: the Two-Passenger Sport Coupe and the Five-Passenger Sport Sedan. Both are on the 132″ chassis.

The appeal of these models is to the less conservative prospect, as the name implies.

The Coupe top is non-collapsible, but is dressed with a Burbank covering. Landau bows have a graceful sweep.

The Sedan has leather quarter panels and landau bows. Rear quarter windows of a practical as well as novel design give full vision to the occupants of the rear seat, and lower for ventilation.

Tops on both models are cut down slightly at the rear, giving a racy appearance without infringing on head room.

Special mohair of an entirely new design has been selected for trimming.

Standard Equipment

The following standard equipment on both models is included at the quoted prices:

Nickel headlamps. Nickel cowl band with side lamps. Six disc wheels. Fender wells. Collapsible trunk rack. Two spare tires. Bumpers, front and rear. Motometer.

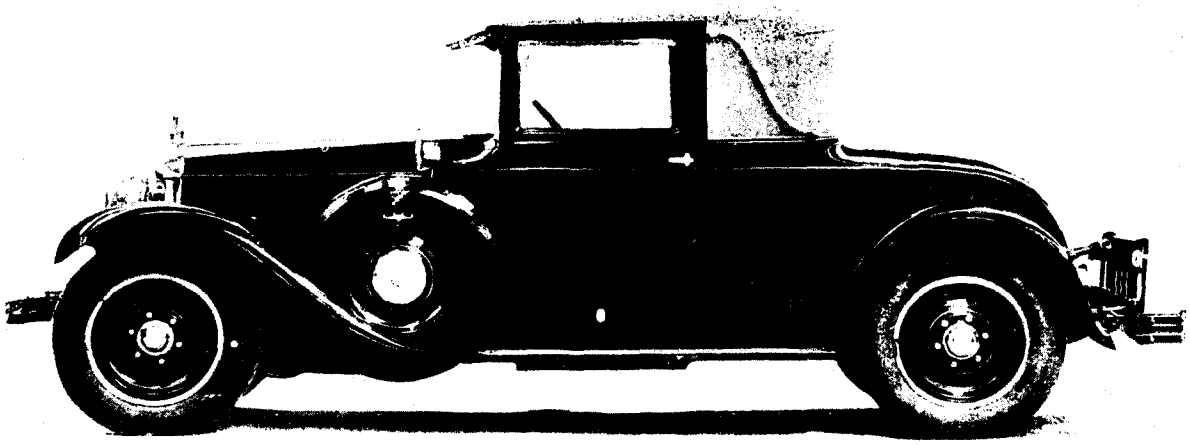
Colors

Distinctive colors have been selected for these models, the Coupe being available in two, and the Sedan in four. Options during August and September are as follows:

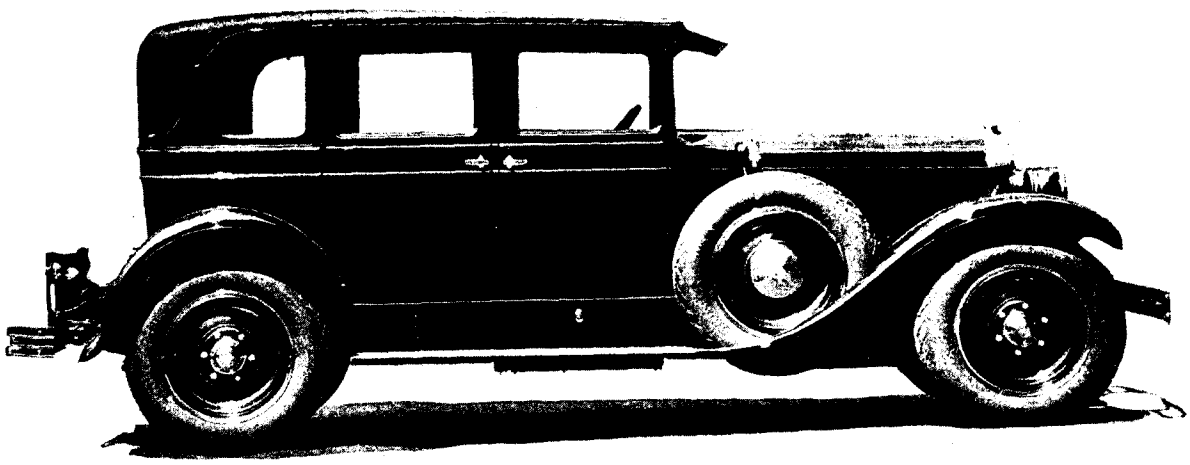
Coupe: 1, R. & M. Maroon with Sumach Red disc wheels; 2, Entire Black with Cream or Vermillion disc wheels.

Sedan: 1, Vineyard Lake with Mountain Ash Scarlet disc wheels; 2, Aulay Gray with disc wheels finished Chasseur Red; 3, Sefari Blue with Linden Cream disc wheels; 4, Upper panels, fenders, chassis—Ardsley Green, Center and lower panels and disc wheels—Canoe Brook Green. (Extra charge for special color roof, fenders and chassis—$120.)

Interior hardware, vanity cases, running board mats, etc., are the same as on Standard closed types.



Two-Passenger Sport Coupe



Five-Passenger Sport Sedan

Custom Closed Body Styles

THE Custom line of closed cars for 1927 far surpasses anything Cadillac has heretofore produced.

The plain style of trimming with the disappearing arm rest in the rear seat will appeal to the most discriminating buyer.

The special spring construction in the cushions is the latest development of Cadillac and Fisher engineers, the effect produced being a comfort which equals, if it does not exceed, down cushions, at the same time retaining a neat appearance.

Standard Equipment

Bumpers, front and rear, DeLuxe motometer, and spring covers are retained as standard equipment. In addition, Custom cars are equipped with sidelamps, attached to a nickel cowl band, to match the headlamps.

Trimmings

Optional trimmings include four highest quality mohair materials and eight cloth patterns.

17-T-127, Blue-Gray mohair
18-T-127, Taupe mohair
19-T-127, Blue mohair
20-T-127, Green mohair
21-T-127, Gray Bedford Cord cloth
22-T-127, Striped Gray broadcloth
23-T-127, Blue-Gray broadcloth—vine pattern
25-T-127, Blue-Gray broadcloth—basketweave pattern
26-T-127, Tan broadcloth—chain pattern
28-T-127, Tan broadcloth—basketweave pattern
30-T-127, Green broadcloth—chain pattern
32-T-127, Tan broadcloth—vine pattern

All of the cloths selected are the most recent developments, and are notable for their beauty and richness. Plain headlining to harmonize is used with the pattern seat material.

Color

Although color is optional on Custom bodies, standard colors carried in stock at the factory

will be listed in monthly schedule letters to assist distributors in ordering attractive cars for stock with the least delay

Upper panels, roof, sun visor, fenders, and chassis are finished black unless otherwise specified.

No charge is made for special color on upper panels, roof, or sun visor.

Fenders and chassis will be finished in special color Duco at an extra charge of $95.00.

Instrument Board is finished in same color as center panels.

Equipment

Vanity Cases surpass in beauty and fittings any heretofore supplied. Imported German Calfskin in colors harmonizing with upholstery, is used for covering the cases.

Equipment in the ladies' case in the Five-Passenger Coupe includes a compact, combination note book and card case with pencil, and a small ash tray. The smoking set contains an electric cigar lighter, attractive cigarette case and two square ash receivers.

Equipment in the Sedan, Suburban and Imperial Suburban includes: Ladies' Case—combination compact and cigarette case, combination note book and card case with pencil; two square ash receivers, and Hunter 30-hour clock of novel design with Radium numerals and hands; Smoking Set—electric cigar lighter and large ash receiver.

Interior Hardware is bronze forging edged in white nickel and enameled in Pyralin in shades to harmonize with upholstery. Inside toggle-action door locks are of new attractive design.

Dome lights and step lights on both sides operate with the opening of rear doors. A separate switch on the right pillar also controls the dome light. Rear quarter lights are controlled by a switch on the left pillar.

Gear shift and hand-brake levers are nickel-plated.

Outside door handles are of offset hand-grip type, rubber covered with nickel ends.

Running Boards are covered with molded rubber matting.

Cabriolet Types

The Custom Five-Passenger Sedan, Custom Five-Passenger Coupe, Custom Suburban and Custom Imperial are now available in leather-back, or Cabriolet style. The extra charge for this type is $100. In addition, there is the regular extra charge for fender wells, spare tires and folding trunk rack.

Convertible Two-Passenger Coupe

A welcome addition to the Custom line is the convertible Two-Passenger Coupe, with a rumble seat in the rear deck.

The door and window construction is a new idea in convertible body design, being exceptionally rigid and rattle-proof. Contrary to usual trend, the pleasing appearance of the car is improved rather than destroyed, by lowering the top.

The windshield is hinged at the top and is easily and rigidly held outward in any position up to 5½ inches, measuring at the bottom from the cowl. A cowl ventilator provides ample air passage to cool the lower part of the body.

When the rumble seat is in use, and the top is up, the back panel of the top folds up against the roof, providing the same easy companionship in this model that prevails in the Phaeton or the Five-Passenger Coupe.

Trimming and Equipment

Special selected glove finish leather has been adopted and trimming is done in plain style. Any of the custom mohair or cloth materials can be supplied if desired, although the leather has been selected for its practicability as well as its neat and durable appearance.

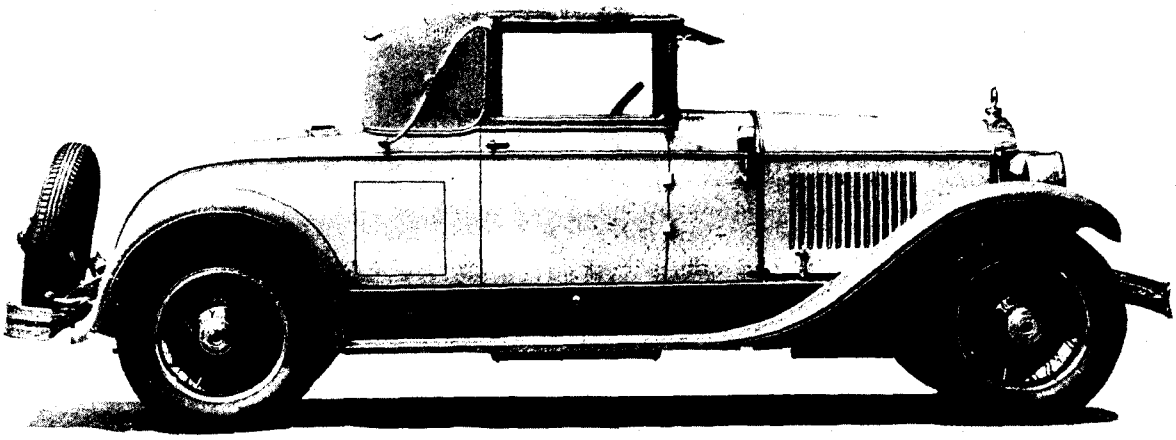
Regular Custom equipment includes bumpers, spring covers, motometer, molded rubber running board mats, and nickel cowl band and side lamps.

The top is covered with neat, waterproof non-cracking and non-fading Burbank.

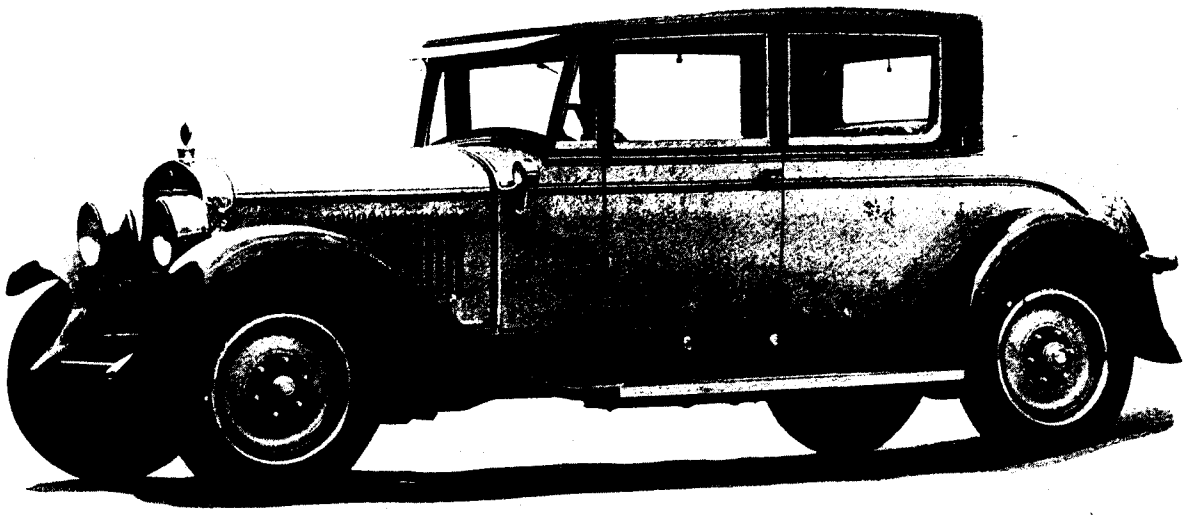
Color

The body color is optional as on other Custom models, and light attractive shades in durable Duco will be recommended each month for stock purposes. Special color fenders and chassis available at the regular charge of $95.00, probably add more to the appearance of this model than any other in the entire line.

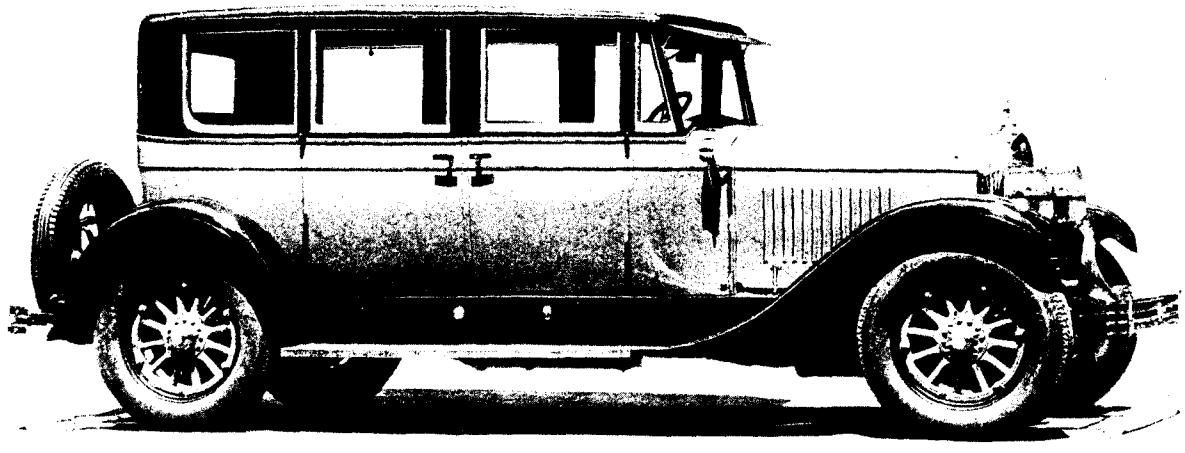
Six wire wheels, fender wells, and two spare tires are offered at a combination price of $350.00, and a collapsible trunk rack at $50.00.



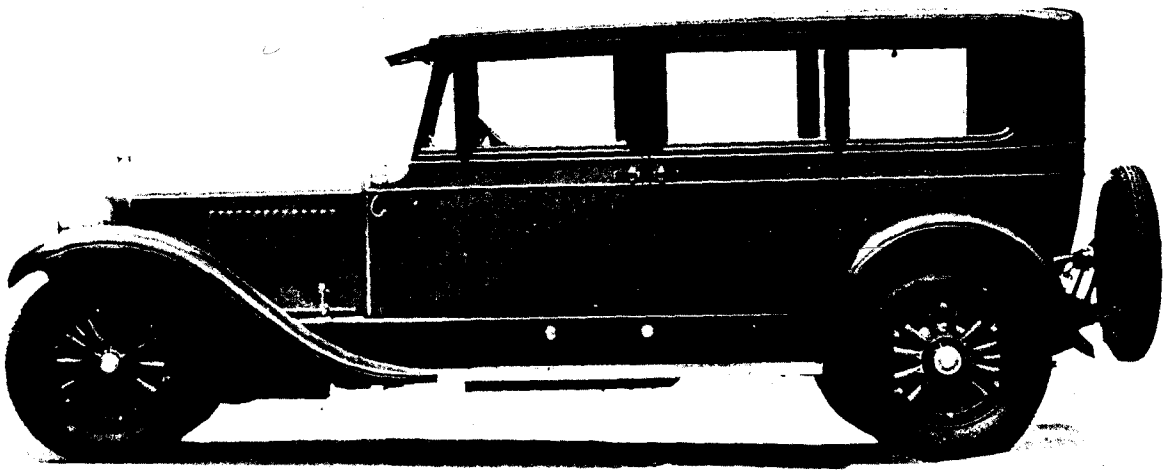
Convertible Coupe



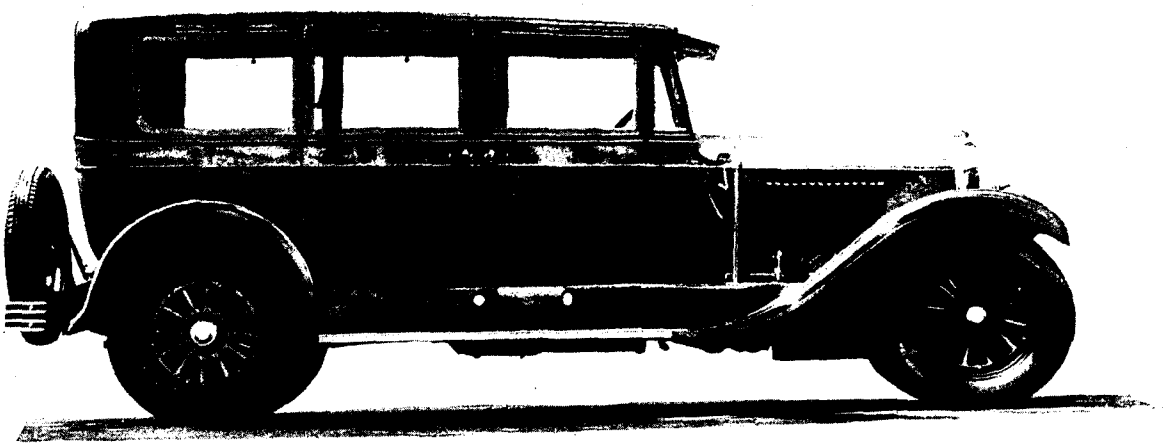
Five-Passenger Custom Coupe



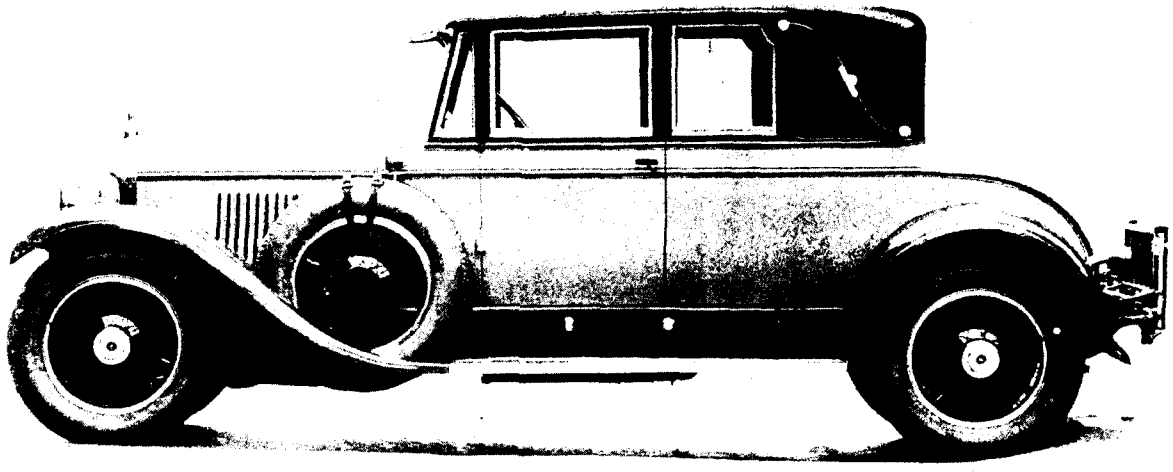
Five-Passenger Custom Sedan



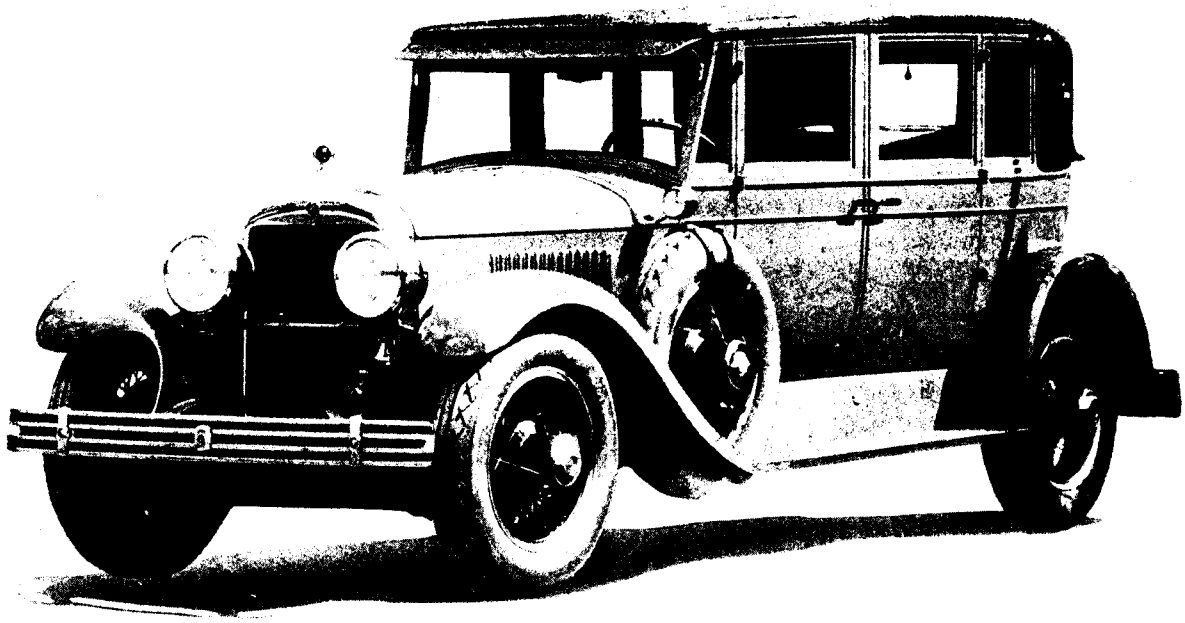
Custom Suburban



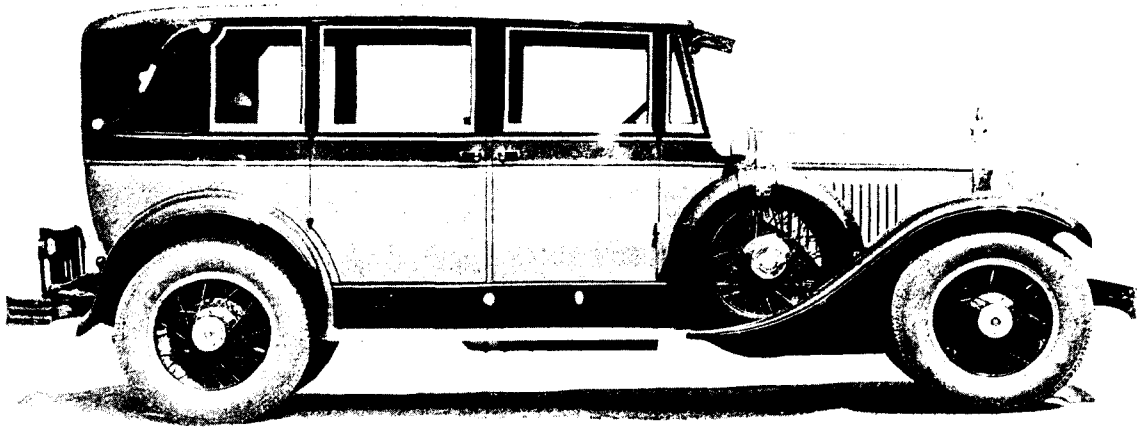
Custom Imperial



Cabriolet Coupe



Cabriolet Five-Passenger Sedan



Cabriolet Imperial

Custom Open Body Styles

THE 1927 series of Custom open cars has been refined to a point never before approached.

The most noticeable feature is the plain style of trimming, with the disappearing arm rest as standard equipment in both the front and rear seats of the Touring car and Phaeton.

Sidelamps to match the headlamps are mounted on a nickel band which goes across the front of the cowl on all open bodies.

Monogram Panel

A change in the monogram panel on the Touring car and Phaeton to take effect about October 1st, is incorporated in the cars illustrated here.

This panel, heretofore placed only on the rear doors, has been extended across the center panel and the front doors and the vertical moulding in front of the rear door has been moved back of the door.

The effect of this change is to give a much longer and lower appearance to the car, which may be emphasized by the use of contrasting colors in this panel. Cane wicker monogram panels will be supplied at extra charge of $50.00 on Touring and Phaeton, and $20.00 on Roadster.

Seat Construction

The seat construction of the Roadster is a departure from ordinary practice and a convenience which will be greatly appreciated by the trade, the movable seat being easily adapted to suit the requirements of either the tall or the short passenger.

The driver of average height will also find a welcome convenience in this easily adjustable seat as he can move closer to the steering wheel and controls in heavy traffic and find perfect relaxation in the far position for country driving.

Windshields and Tops

Phaetons and Roadsters are equipped with a specially designed windshield which can be folded forward when the top is lowered. Windshield wings have been omitted.

Tops are newly designed to fold compactly, carrying out the straight line of the lowered windshield.

Trimming

Trimming options remain unchanged. Four colors of leather are offered:

36-GX, Green
36-JX, Blue
36-CX, Brown
36-N, Gray

Charge for special trim materials will be announced in an early bulletin.

Equipment

Standard equipment includes front bumper and rear fender guards, spring covers and motometer. Trunk is supplied with the Phaeton.

The Roadster is continued on the 132″ chassis, the Touring and Phaeton remaining 138″ wheelbase.

The addition of special color fenders and chassis adds greatly to the appearance of the open models. Extra charges of $75.00 for special colored fender sets and $20.00 for special colored chassis are made.

Six wire wheels with extras mounted forward in fender wells and two spare tires are offered at a special combination price of $350.00. A full rear bumper is substituted for the rear fender guards when fender wells are supplied.

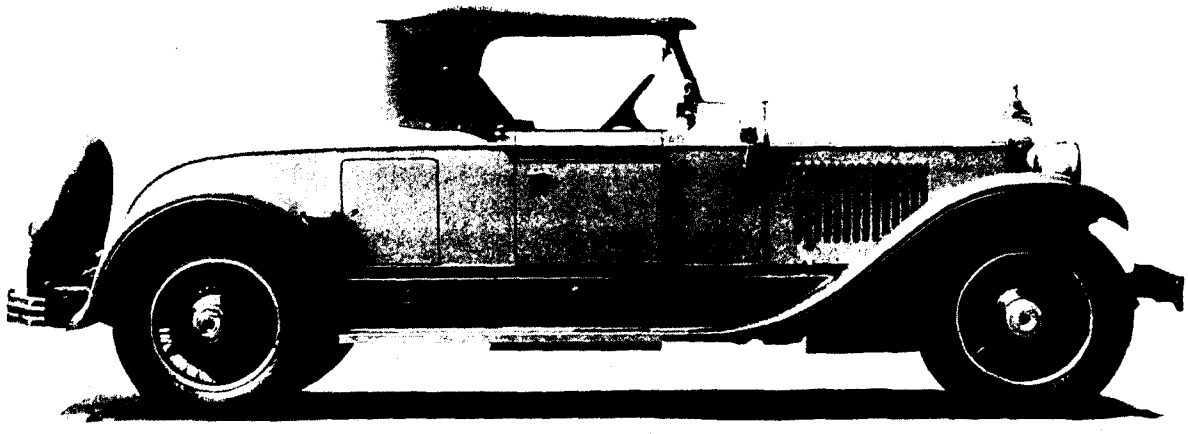
Fender wells, wood wheels, including two spare tires — $200.00. Fender wells, six disc wheels, including two spare tires—$240.00.

A practical, collapsible trunk rack on the rear adds the finishing touch to cars so equipped, at a nominal extra charge of $50.00.

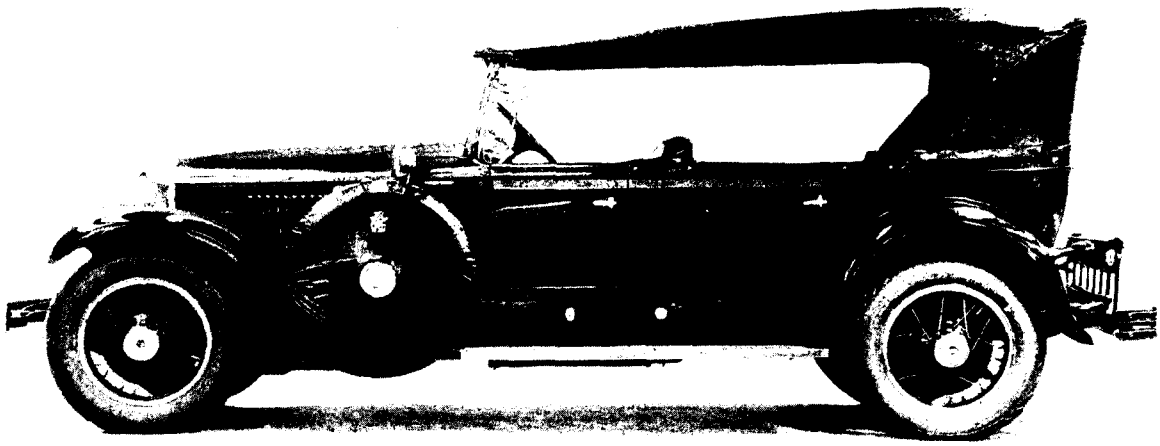
Sport Phaeton

This model, in production this fall, is an adaptation of the Custom Phaeton, with the addition of double cowl and tonneau windshield.

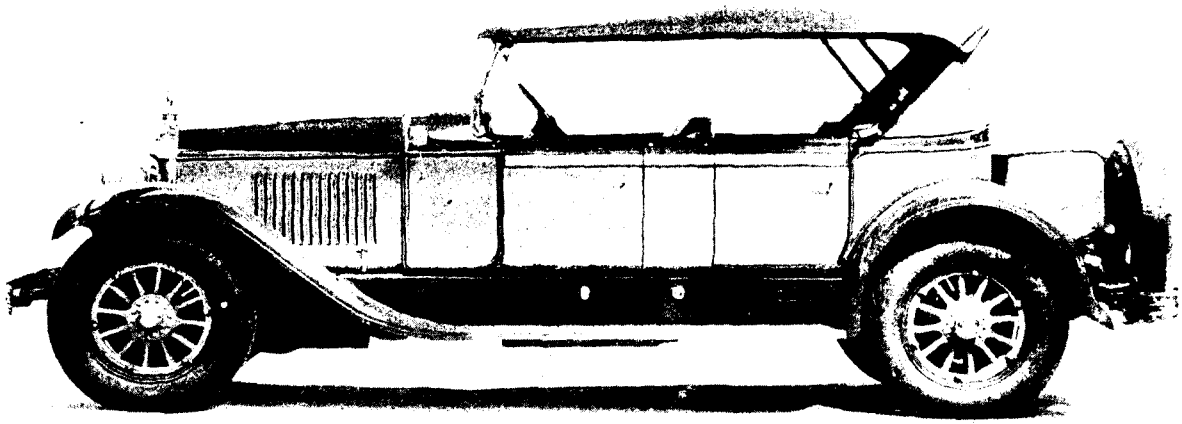
Six wire wheels, two spare tires, fender wells and collapsible trunk rack are added to the regular Custom equipment and included in the quoted price.



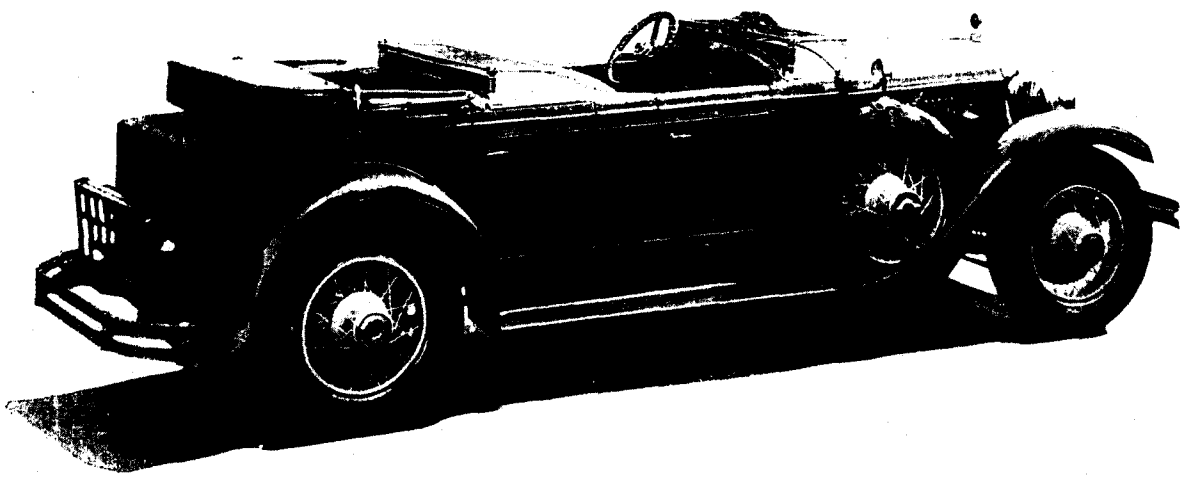
Roadster



Touring Car



Phaeton



Sport Phaeton

CADILLAC

Operator's Manual



1926

Price Thirty-Five Cents

CADILLAC MOTOR CAR COMPANY
DETROIT

Copyright 1925 by
Cadillac Motor Car Company

EDITION NO. 314-100
In ordering a duplicate of this Manual specify the above number or the engine number of the car

Foreword

THE experienced motorist whose new Cadillac succeeds other cars, some of which may also have been Cadillacs, requires less elementary operating instructions than the beginner, learning for the first time to drive. Likewise, the owner who takes advantage of the facilities offered by the maintenance station has less need for detailed information in regard to care of the car than the owner who provides for all necessary attention in his private garage.

In preparing this Manual, it has been taken for granted that the typical Cadillac purchaser is no longer a novice in motor car operation and that the greatest number of Cadillac owners will be best served by omitting that which is extremely elementary in character. It has also been assumed that, although he should at least know what care his car must regularly receive in order to render the best possible performance with the fewest possible interruptions, the typical Cadillac owner prefers to depend upon the maintenance station for occasional adjustments and repairs.

By thus omitting both that which is very elementary and that which is too technical, the first two divisions of the Manual have been made to include only information that is vital to every Cadillac owner regardless of his previous motoring experience. Part I, "Operation," is important because, no matter what car the owner may have driven before, his new car will differ in some feature, even from an earlier Cadillac. Part II, "Lubrication and Care," contains information that every owner should have regardless of the extent to which he expects to delegate the care of the car to others. Especially should he be familiar with lubrication, for correct lubrication is an essential without which it is impossible for the car to render unfaltering performance.

Part III, "General Information," may be considered as a supplement to the Manual. It contains information that may never be required by some owners, but that is included for use should occasion arise. In other words, it is a reference section.

All written instructions are subject to limitations. The owner is asked to remember that the Manual is only one means by which the Cadillac organization desires to assist the Cadillac owner to realize the most from his car. Cadillac distributors and dealers everywhere invite the Cadillac owner to consult them on any matters pertaining to the operation and care of his car. If preferred, a request for information may be made direct to the factory, where it will receive the attention of the Technical Department.

Contents

Part I—Operation

PAGE

CHAPTER I—*Controls and Instruments* 9

Locks—Gasoline gauges and air compressor—Throttle control—Ignition control lever—Carburetor enriching button—Ignition and lighting switch—Starter pedal—Oil pressure gauge—Clutch pedal—Transmission control—Brakes—Speedometer—Ammeter.

CHAPTER II—*Driving* 18

Driving speed when car is new—Danger of running engine in closed garage—Coasting—General driving suggestions—Don'ts.

CHAPTER III—*Equipment* 22

Windshield and ventilation—Windshield cleaner—Rear vision mirror—Cigar lighter and inspection lamp—Clock—Side curtains—Curtain fasteners—Tools. TIRES—Tire valve caps—Inflation pressure—Tire air compressor—Tire holder—Changing tires—Truing up rim.

CHAPTER IV—*Cold Weather Operation* 31

STARTING THE ENGINE—Carburetor enriching button—Priming the carburetor—Position of throttle hand lever—Position of ignition control lever—Use of starter—Use of accelerator pedal before engine is warm. ADDITIONAL COLD WEATHER SUGGESTIONS—Engine oil for cold weather—Strainers in gasoline system. ANTI-FREEZING SOLUTIONS—Alcohol and water—Glycerin and water—Capacity of cooling system—Effect of alcohol on finish.

Part II—Lubrication and Care

CHAPTER I—*Systematic Lubrication* 37

Necessity for lubrication. Lubrication schedule. LUBRICANTS—Engine oil—Rear axle and transmission lubricant—Roller bearing and cup grease—Universal joint grease—Steering gear lubricant.

CHAPTER II—*Engine Lubrication* 40

Oil circulating system—Oil level—Oil pressure—Crankcase ventilating system—Oil filter—Replacing engine oil—Generator oil cups—Timer-distributor oil cup—Engine rear supports.

CHAPTER III—*General Lubrication* 45

Grease gun connections—Clutch thrust bearing—Transmission—Universal joints—Rear axle—Wheels—Front brake trunnions—Steering gear—Oil holes in steering column—Speedometer flexible drive shaft—Horn—Springs—Door hardware.

CHAPTER IV—*Care of Body* 49

Care of finish when new—Washing varnished cars—Washing Duco—Cleaning windows—Cleaning upholstery.

CHAPTER V—*Care of Tires* 51

Result of under-inflation—Result of improperly aligned front wheels—Neglect of small cuts—Result of improperly adjusted tire chains—Result of sudden application of brakes—Additional suggestions.

CHAPTER VI—*Storing Car* 53

Engine—Storage battery—Tires—Body and top—Taking car out of storage.

Part III—General Information

CHAPTER I—*Engine* 56

Important features of construction—General principle of gasoline engine—Suction stroke—Compression stroke—Power stroke—Exhaust stroke—Firing order.

CHAPTER II—*Gasoline System* 58

Settling chambers and strainers—Carburetor.

CHAPTER III—*Cooling System* 60

Water circulation—Radiator and shutters—Filling and draining—Cleaning the cooling system.

CHAPTER IV—*Electrical System* 61

Generator—Ammeter. STORAGE BATTERY—Adding water to storage battery—Specific gravity of battery solution—Disconnecting battery—Exide depots and sales offices. STARTING MOTOR—Operation of starter. IGNITION—General description—Timer-distributor—Spark plugs. LIGHTING SYSTEM—Lamp bulbs—Cleaning headlamp reflectors—Official approval of headlamps—Adjustment of headlamps.

CHAPTER V—*Clutch and Transmission* 71

Clutch—Adjustment of clutch release rod—Transmission.

CHAPTER VI—*Brakes* 74

General description—Adjustment.

CHAPTER VII—*Wheels* 80

Tires and rims—Caution in adjusting wheel bearings—Removing front wheel—Installing front wheel and adjusting bearings—Removing rear wheel—Installing rear wheel and adjusting bearings.

CHAPTER VIII—*Repair Parts* 82

Genuine Cadillac parts—Uniform parts prices—Ordering new parts—Returning parts—Tires, speedometer and clock.

CHAPTER IX—*Specifications and License Data* 84

PART I

OPERATION

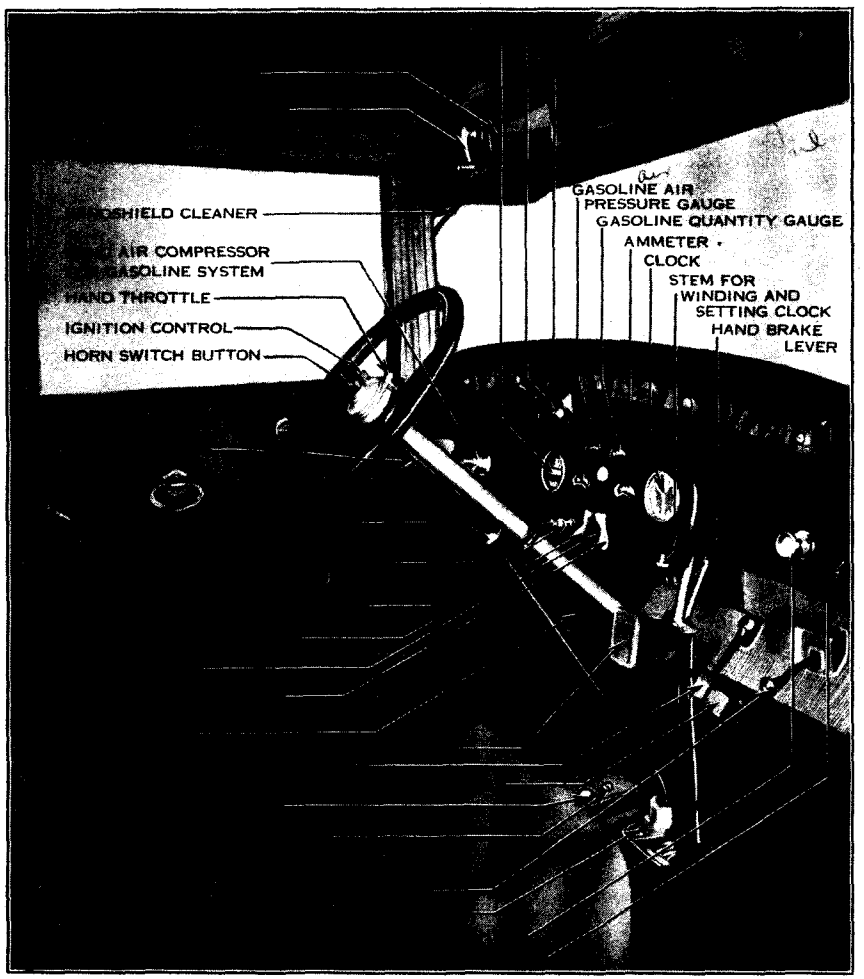


FIGURE 1. ***Instruments and controls***

CHAPTER I

Controls and Instruments

ONE of the first things the driver of a new car has to do is to familiarize himself with the various controls. In the following chapter are described the levers, pedals, instruments, and other devices used in the operation of the car. The experienced motorist, as well as the beginner, should read this chapter to avoid overlooking any detail of operation in which the car may differ from cars he has previously driven.

Locks

The Cadillac car is provided with the following cylinder locks, all of which on any one car are operated by the same key: ignition switch, transmission control lever, tool compartment, battery compartment, tire holder, and, on closed cars, the doors and various package compartments.

The lock on the switch acts only on the ignition or left-hand lever, which must be *down* in order to be locked. The transmission control lever can be locked in neutral or in any one of the four other positions of the lever.

Gasoline Gauges and Air Compressor

The two upper dials on the instrument panel (Fig. 1) are gauges for the gasoline system. The gauge at the right marked "Gas" indicates in gallons the quantity of fuel in the tank at the rear of the car, and is operated electrically.

The gauge at the left marked "Air" is a pressure gauge and indicates in pounds per square inch the air pressure in the gasoline system. This pressure is necessary to force the fuel from the tank to the carburetor.

Initial pressure is secured by operating the hand air compressor at the left-hand end of the instrument board. While the engine is running, pressure is automatically maintained by a compressor driven by the engine camshaft.

The normal pressure maintained by the automatic compressor is from one to two pounds. There is sufficient pressure for starting the engine when the car is on level ground, if the gauge pointer is even one division away from the pin at zero. On a steep upgrade an initial pressure of one pound may be necessary.

In order to prevent leakage of the air pressure in the gasoline system it is important that the gasoline tank filler cap be air-tight. After screwing on the filler cap be sure to tighten the thumb screw in the center of the cap.

Before operating the hand compressor, the plunger must be released by turning the handle counter-clockwise. When the necessary pressure has been

obtained, push the compressor handle all the way in and lock it, turning it clockwise as far as it will go.

Throttle Control

The power and speed of the engine are controlled by opening and closing a throttle valve in the carburetor. This throttle is operated both by a hand lever and a foot pedal.

The foot pedal, or accelerator, is at the right of the brake pedal (Fig. 1). The hand control is the right-hand lever of the two levers above the steering wheel. Both controls operate the same throttle; the hand lever, however, remains in the position to which it is moved, whereas the accelerator must be held down to keep the throttle open.

The normal position of the throttle hand lever for driving the car is all the way up. In this position the throttle of the carburetor is open just enough to permit the engine to run at idling speed after it is warm. For starting, however, the lever should be moved approximately one-fourth the way down, and should be left in this position until the engine is warm enough to permit the lever to be returned to the idling position without stalling the engine.

The throttle should normally be controlled by the accelerator. In starting the car on a hill, however, the hand lever should be used rather than the accelerator. This permits the brake pedal to be released with the right foot at the same time that the clutch is engaged with the left.

In cold weather, the accelerator should not be pushed down suddenly before the engine is warm. Sudden opening of the throttle before the engine is warm causes "popping-back" in the carburetor. This should be avoided as much as possible by judicious opening of the throttle during the warming-up period. (See page 32 under "Use of Accelerator Before Engine is Warm.")

The accelerator can be used in cold weather to prime the carburetor by pushing the accelerator to the floor once or twice. This is not necessary except in very cold weather and should never be done more than twice; otherwise gasoline may overflow from the carburetor. (See page 31 under "Priming the Carburetor.")

Ignition Control Lever

Correct timing of the ignition in relation to the positions of the pistons is accomplished automatically by a governor which is a part of the timer-distributor and which provides for all ordinary advancing and retarding of the spark. (See page 66 under "Timer-Distributor.") A hand control is also provided for still farther advancing or retarding the spark on certain occasions as hereafter described.

The hand control is the left-hand lever of the two levers above the steering wheel. For average driving, the correct position of this lever is about one-third down from the extreme top or advanced position. The lever should be left in this position except on the following occasions:

1. If the engine is being cranked by hand, the lever should be moved all the way down. If this is not done, a "kick-back" may occur resulting in personal injury.
2. In pulling at low speeds with the throttle well open, the lever should be moved farther down.
3. In driving at high speeds, the lever should be moved all the way up.
4. In starting the engine in extremely cold weather, the lever should be moved all the way up unless the engine is being cranked by hand.

Carburetor Enriching Button

The button at the left of the ignition switch lever (Fig. 1) controls a device on the carburetor for temporarily enriching the fuel mixture supplied to the engine. In starting the engine it is necessary to have the proportion of liquid gasoline in the fuel mixture greater than at other times because in a cold mixture only a part of the gasoline is vaporized. Pulling out the enriching button increases the proportion of liquid gasoline to air, the normal proportions being restored when the button is released and permitted to return to its original position.

Correct use of the enriching control not only is essential to quick starting of the engine, but also has an important bearing on the life of the engine. The enriching button must be pulled out far enough in starting to provide an explosive mixture quickly so that the battery is not unnecessarily discharged by useless cranking. The button must also be held out far enough during the warming-up period so that the engine will run without missing and "popping back." On the other hand, it should not be pulled out any farther or held out any longer than is necessary to accomplish these results, because some of the excess liquid gasoline in the enriched mixture does not burn.

If the engine still retains heat from previous running, the enriching control should not be used without first attempting to start the engine on the normal mixture. If the enriching button is pulled out for starting a hot engine the mixture may be made so rich that starting will be impossible.

The enriching button is not a priming device. It has no effect whatever on the fuel or the fuel mixture unless the engine is being cranked or is running under its own power. The button must be pulled out and held partly out during the cranking operation.

Ignition and Lighting Switch

The ignition and lighting switch (Fig. 1) controls the current for the ignition and for the following lamps: headlamps, instrument lamp, and rear

lamp. The ignition lever is the left-hand lever and has two positions: "off," when down, and "on," when up. The lighting lever is the right-hand lever and has four positions. Starting with the lowest position, these are:

First Position—All lights off.

Second Position—Parking lights, instrument lamp and rear lamp.

Third Position—Headlamp lower beams, instrument lamp and rear lamp.

Fourth Position—Headlamp upper beams, instrument lamp and rear lamp.

Cadillac headlamp bulbs have two filaments, one above the other, instead of the customary single filament. Both filaments are of the same candlepower (21), but because they are located in different positions with respect to the focus of the parabolic reflector, the beam of light from one filament is projected at a different angle from the other. When the switch lever is in the fourth position, the lower filaments are lighted and the beams are projected straight ahead, illuminating the road at a distance. When the lever is in the third position, the upper filaments are lighted and the beams are projected down at an angle, illuminating more brightly the road directly in front of the car.

The practice to be followed by the driver in using this double-beam feature of the headlamps will depend upon the regulations imposed by local authorities. In general, it is expected that the upper beams will be used except on the following occasions: when passing a vehicle approaching from the opposite direction, when rounding a sharp curve and when topping the crest of a hill. On these occasions and at other times when illumination is desired directly in front of the car, the lower beams should be used. For a further description of the headlamps, see page 68.

Starter Pedal

The starter pedal is at the right of the accelerator (Fig. 1). Pushing this pedal forward brings into action the electric motor that cranks the engine for starting. *Do not push the starter pedal when the engine is running.*

The starter pedal is only one of the controls that must be manipulated to start the engine. Unless there is an explosive mixture in the cylinders and a spark to ignite it, it is useless to crank the engine. The starter pedal should not be operated, therefore, until the necessary preliminary steps have been taken. The following, in their proper order, are the various steps that must be performed to start the engine. As each control is mentioned, reference is made to the page on which that control is explained in detail.

1. Unlock the transmission. (Page 9.)
2. Unlock the ignition switch. (Page 11.)
3. Make sure that the transmission control lever is in neutral. (Page 15.)

4. Note whether pressure is indicated on the gasoline pressure gauge; if not, operate the hand compressor. (Page 9.)
5. Place the ignition control lever at the steering wheel about one-third* the way down. (Page 10.)
6. Place the throttle lever about one-fourth the way down from the idling position. (Page 10.)
7. *Cold Weather Only*—In extremely cold weather, prime the carburetor by pushing the accelerator to the floor once or twice, but not more than twice. (Page 10.)
8. Pull back the carburetor enriching button unless the engine is still warm. If the engine is still warm, do not pull back the enriching button unless the engine fails to start on the normal mixture. (Page 11.)
9. Switch on the ignition. (Page 11.)
10. Push the starter pedal forward and hold it until the engine starts under its own power. Release it immediately as soon as the engine starts. (See below for probable causes for the engine failing to start.)
11. Let the carburetor enriching button partly in as soon as the engine starts, and all the way in as soon as the engine is warm enough to permit it. (Page 11.)
12. Note whether pressure is indicated on the oil pressure gauge and stop the engine at once if no pressure is indicated. (Page 11.)
13. Move the throttle lever up to the idling position as soon as the engine is warm enough to permit it.

In cold weather, disengage the clutch before pressing down the starter pedal, and hold it down during the cranking operation. This relieves the starter of the necessity of turning the transmission gears, which are immersed in lubricant. The additional load is small in warm weather when the lubricant is thin, but in cold weather the power required to turn the gears through the thickened lubricant adds unnecessarily to the demand upon the battery.

If the Engine Fails to Start—If the engine fails to start after being cranked for a few seconds, do not continue to operate the starter. To do so is a useless expenditure of battery energy. Release the starter pedal and investigate the cause, which may be one of the following:

No fuel in the tank.

No air pressure in the gasoline system.

Ignition not switched on.

Carburetor flooded by unnecessary use of enriching device when engine is warm.

*In extremely cold weather move the ignition control lever all the way up unless the engine should be cranked by hand. If the engine is cranked by hand, be sure to move the ignition control lever all the way down.

Oil Pressure Gauge

The lower left-hand dial on the instrument panel (Fig. 1) is the oil pressure gauge. This gauge indicates, not the *quantity* of oil in the engine, but the *pressure* under which the oil is forced to the engine bearings.

When the engine is not running, the pointer on the oil pressure gauge should remain at zero, but as soon as the engine is started and as long as it runs the gauge should show pressure. If the gauge does not show pressure when the engine is running, stop the engine at once and determine the cause. Serious damage may be done if the engine is run without oil pressure. (See page 41 under "Oil Pressure.")

The amount of the pressure indicated by the gauge depends upon the speed of the engine, the viscosity of the oil, and the adjustment of the oil pressure regulator. At idling speed with fresh oil of the correct viscosity, the pressure after the engine is warm should be 5 to 7 lbs. Before the engine is warm, higher pressures than those specified will be indicated. After the oil has become thin from use, lower pressures than those specified will be indicated. These are normal variations from the standard and do not indicate need for readjustment of the oil pressure regulator.

Clutch Pedal

The clutch pedal is the left-hand pedal. When this pedal is in its normal or released position, the clutch is engaged. The flywheel of the engine is then coupled to the transmission by a series of discs, every other one of which is faced on both sides with friction material, and which are pressed together by a powerful spring. When the clutch pedal is pushed down, the spring is compressed and the clutch discs are allowed to separate. The clutch is then disengaged and the flywheel, if the engine is running, revolves independently of the transmission.

The clutch has two uses: First, to enable the car to be started gradually and without jerk or jar; second, to permit shifting of the transmission gears. The operation of the clutch pedal is discussed in connection with the transmission control on page 15. Further comment is unnecessary at this point except the following suggestions to the driver:

Do not drive with the foot resting on the clutch pedal. The Cadillac clutch operates so easily that even the weight of the driver's foot may unintentionally cause the clutch to slip.

Do not form the practice of disengaging the clutch whenever the brakes are applied. Most occasions for use of the brakes require only slowing down without stopping or even shifting of gears. A skilled driver will not touch the clutch pedal until the car is just about to stop or until he is about to shift to a lower gear. It is a mistaken idea that applying the brakes with the clutch engaged is more severe on the brake lining. The opposite is actually

the case, proof of which is in the fact that in coasting down grades the resistance of the engine is used to assist the brakes in controlling the car speed.

It will be observed in operating the clutch pedal that the pedal offers almost no resistance until it has been moved about one inch. It is at this point that it actually begins to disengage the clutch. It is important that the pedal have this "lost motion." If the full pressure of the clutch spring is felt just as soon as the pedal is moved from its released position, necessity for readjustment of the pedal connections is indicated. Failure to make this adjustment will result in the clutch slipping. (See page 72.)

Transmission Control

The Cadillac transmission has three forward speeds and reverse. It is controlled by a lever, the handle of which describes the letter "H" as it is moved from one position to another. It should be observed by those who have driven other makes of cars that, although most cars have this conventional H-type of transmission control, all these cars do not have the same positions of the lever. The driver should study Fig. 2 carefully, and if the various positions of the lever are different from those to which he has been accustomed, he should master the new arrangement before attempting to drive.

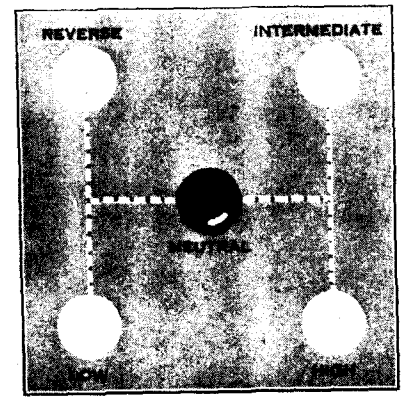


FIGURE 2. ***Positions of transmission control lever***

No attempt can be made here to teach the beginner the technique of gear shifting. It is recommended that the beginner secure individual instruction from the Cadillac distributor or dealer from whom the car was purchased and who will be glad to give this instruction. There are, however, certain rules and suggestions for the operation of the transmission control that it will be to the advantage of every driver to learn or to recall if he already knows them.

Always disengage the clutch before moving the control lever and hold the pedal down until the shift is completed.

Do not attempt to start the car with the transmission control in high gear.

Do not start with the transmission control in intermediate except when the car is on a smooth level road or on a down grade; even under these conditions do not start the car in intermediate unless the engine is thoroughly warm.

Do not make any of the following shifts when the car is moving:

From reverse to any forward gear.
From any forward gear to reverse.
From high gear to low gear.
From intermediate to low gear (except when the car is moving very slowly.)

In shifting from high to intermediate, the car should not be traveling faster than fifteen miles per hour and the control lever should be moved very quickly and with no hesitation in neutral.

There are times when it is desirable to be able to shift from high to intermediate at higher car speeds. It is possible to do this by the following method, which is called "double de-clutching":

Disengage the clutch and shift the transmission control lever at once to neutral. Re-engage the clutch at the same time accelerating the engine; then disengage the clutch again and instantly shift to intermediate, after which re-engage the clutch. The speed to which the engine should be accelerated while the transmission control is in neutral depends upon the speed at which the car is traveling when the shift is made.

It is not recommended that the driver attempt the double de-clutching method until he has become expert in shifting from high to intermediate in the usual manner at lower speeds.

Make a practice of shifting the transmission control to intermediate or even to low before commencing the descent of steep grades. The reason for this is explained on page 19, where will also be found further suggestions for coasting.

Brakes

The foot brakes, which consist of external brake bands on the rear wheels and internal bands on the front wheels, are operated by the right-hand pedal. This pedal differs from the conventional brake pedal in a construction that provides automatically for notifying the driver when re-adjustment of the brakes is necessary. Every driver is familiar with the fact that, as the brake lining wears, the brake pedal must be pushed farther toward the floorboard to apply the brakes. On most cars this proceeds until an occasion arises for an emergency stop and then it is found that the pedal goes all the way to the floorboard before the brakes are fully applied.

The Cadillac brake pedal has two stages in its travel. The first stage, which consists of the first four or five inches of the pedal travel, is sufficient for all ordinary stops when the brake band clearance is properly adjusted. When, as the result of wear on the lining, the pedal must be pushed farther toward the floorboard, an inch or inch and a half from the floorboard the second stage of pedal travel is reached. In the second stage, the pedal has somewhat less leverage than in the first stage and the point of division is marked by increased resistance to movement of the pedal. This serves as a notice to the driver that the brakes require readjustment. If it is not convenient to have the adjustment made at once, the brakes can still be operated for some time. The adjustment should be made, however, as soon thereafter as possible.

The hand brakes, which are internal brakes on the rear wheels, are operated by the hand lever at the right of the transmission control lever.

Speedometer

The speedometer has three dials. The upper dial indicates the speed of the car. The center dial indicates the total mileage traveled. The lower dial also indicates mileage, but it can be reset to zero by pushing up and turning the knurled stem back of the instrument board. The right-hand figure on the lower dial indicates tenths of a mile.

An automobile repairman should never be permitted to attempt to adjust or repair the speedometer head or to replace the glass. 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 as carefully as a fine watch. The speedometer head may easily be damaged by rough handling.

Ammeter

The lower right-hand dial on the instrument panel (Fig. 1) is the ammeter, which measures the electric current flowing to the battery and the current flowing from the battery at all times except when the starter is cranking the engine. When current is flowing from the battery, the ammeter shows a reading on the side marked "Discharge"; when current is flowing to the battery, the ammeter reading is on the "Charge" side.

The ammeter should indicate on the "Charge" side most of the time. Otherwise, more current will be taken out of the battery than is put into it and the battery will eventually become fully discharged. The exact amount of current that should be indicated by the ammeter at any time depends upon various conditions, which are explained on page 62.

Ordinarily, when no lights are in use, the ammeter should show "Charge" as soon as the car is running ten or twelve miles per hour in high gear. If the ammeter indicates "Discharge" with all lights off, either when the engine is not running or when the car is running more than twelve miles per hour in high gear, need for readjustment of the generator is indicated.

CHAPTER II

Driving

THE preceding chapter of the Manual has aimed to familiarize the driver with the controls and instruments used in operating the car. Actual skill in driving is, of course, more than knowledge of and familiarity with these individual devices. It is not the purpose of this Manual to discuss all phases of driving, but there are a few matters of sufficient importance to Cadillac owners to warrant devoting a chapter to them.

Driving Speed When Car is New

The parts of the Cadillac car are machined and ground to secure the most accurate fit and the finest finish. Proper functioning of the assembled mechanism is further assured by testing the engine and chassis both on shop dynamometers and on the road. Nevertheless, it is not possible by manufacturing processes and tests to give to bearing surfaces the fine polish that results from continued operation at moderate speeds and loads.

Until a new car has been driven far enough to produce this effect on the bearing surfaces, the car should not be driven at high speeds. It is recommended that the 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. Moderate driving during the first five hundred miles will increase the life of the car more than enough to repay any inconvenience. Manufacturers of locomotives and stationary steam engines have always recognized the necessity for an initial "running-in" period.

Danger of Running Engine in Closed Garage

Every person having to do with the operation or care of a motor car should be warned of the danger that attends running the engine while the car is in a small closed garage.

Carbon monoxide, a deadly poisonous gas, is present in the exhaust of all internal combustion engines. Most people are already familiar with carbon monoxide in the form of illuminating gas, or in the gas produced by furnaces and stoves when insufficient air is supplied to give complete combustion. But illuminating gas and coal gas have an unpleasant odor, which serves as a warning, whereas carbon monoxide, as produced in the internal-combustion engine, is colorless, tasteless, and almost odorless, so that the victim may be overcome before he is aware of the danger.

When the engine exhausts into the open air, the carbon monoxide is so

diluted that it has no effect. It is when the engine is run for a time in a closed room that the proportion of carbon monoxide in the air may increase to the point at which continued breathing of it would be fatal. The United States Public Health Service advises that the average automobile engine warming up in a single-car garage will give off enough carbon monoxide in three minutes to endanger life.

Unusual precaution must be taken in cold weather when the natural tendency is to keep the garage doors and windows closed. The practice of letting the engine warm up before running the car out of the garage is unsafe. The risk is made greater by the fact that the enriching of the mixture by manipulation of the carburetor enriching device increases the amount of carbon monoxide formed.

Coasting

To coast *on the level*, simply release the accelerator pedal and disengage the clutch. If coasting to a stop, the transmission control may also be shifted to neutral and the clutch re-engaged.

In coasting *down grades*, however, it is recommended that the transmission be left in gear and the clutch engaged. With the throttle in the idling position, the car is thus made to drive the engine, the resistance of which assists the brakes and saves wear on the brake lining. It must be remembered that the brakes are subjected to much more severe use on grades than on the level because gravity acts continuously, whereas on the level the brakes need absorb only the momentum of the car. Even on slight grades, coasting with the transmission in neutral or the clutch disengaged is not advisable. On any grade steep enough to warrant coasting, it is worth while to save the brakes as much as possible by utilizing the braking effect of the engine.

Ordinarily, the resistance offered by the engine when the transmission is in high is sufficient to control the speed of the car, supplemented by moderate use of the brakes. On steep grades, however, the transmission control should be shifted to intermediate or even to low if the grade is very steep. Shifting should always be done before commencing the descent of the grade, because, after the car has once gained speed, considerable braking may be necessary to slow down to the speed at which the shift can be made easily.

Do not switch off the ignition when coasting with the car driving the engine. Contrary to a common impression, this does not appreciably increase the resistance and is likely to cause damage to the engine. Even with the throttle closed, some fuel is admitted to the cylinders and if this is not burned it condenses on the cylinder walls and washes off the oil by which the pistons are lubricated.

General Driving Suggestions

Road and traffic laws vary greatly in different localities. It is unfortunately impossible to set down a complete list of rules that may be followed in all parts of the country. The following are some of the rules that are universal in practically all parts of the United States:

In meeting a vehicle going in the opposite direction pass to the right.

In overtaking 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 the car around to do this, it should be done.

Never turn around or turn off on another road without making absolutely certain that there is no other vehicle directly behind.

Never start to cross street car tracks without making sure that there is no car directly behind. 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. At any railroad crossing that is on an up grade or which for any reason must be approached very slowly, it is a wise precaution to shift to intermediate gear before crossing because the car can thereby be accelerated more quickly, if necessary.

In crowded traffic do not apply the brakes suddenly unless it is absolutely necessary. A vehicle following may not have brakes as efficient as Cadillac four-wheel brakes.

On wet asphalt streets or slippery roads do not apply the brakes suddenly unless it is absolutely necessary. Cadillac four-wheel brakes minimize the possibility of skidding under these conditions, but their effectiveness should not induce anyone to drive less carefully.

Slow down in passing vehicles going in the opposite direction.

Never take a chance.

Don'ts for General Operation

Don't fail to change the engine oil as frequently as recommended.

Don't fail to release the carburetor enriching button as soon after starting as possible.

Don't fill the lubricating system of the engine alone and neglect to lubricate all other parts of the car.

Don't neglect the lubrication of any part of the car.

Don't run the car at sustained high speed when it is new.

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 disengaging 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 switch off the ignition when coasting with the car driving the engine.

Don't push the starter pedal 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. The front wheels pivot more easily if they are rotating.

Don't fail to investigate any unusual sound which may develop in the car. The car should be inspected at a Cadillac maintenance station.

Don't neglect to inspect the level of the acid in the storage battery every 500 miles and add distilled water if necessary.

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 air pressure or without gasoline in the tank.

Don't neglect to keep the tires inflated properly.

Don't race the engine when it is not driving the car. There is no worse abuse.

CHAPTER III

Equipment

THE controls and instruments used in driving have already been described. In addition to these the car is equipped with various devices which are for the convenience and comfort of the occupants, and are used only as occasion demands. It is suggested that the driver anticipate his use of such equipment by becoming familiar at once with the directions contained in this chapter.

Windshield and Ventilation

Closed Cars—Cadillac closed cars are equipped with a one-piece windshield, which can be moved up and down. Movement of the glass is controlled by a handle above the windshield. To raise the glass, the handle should be turned clockwise, and to lower the glass the handle should be turned counter-clockwise.

For moderate ventilation, the windshield should be raised not more than one inch so that the lower edge of the glass is still below the ledge over the instrument board. With the windshield in this position, air is deflected into the driving compartment through an opening in the cowl just forward of the instrument board. For additional ventilation, the windshield can be raised above the level of the ledge over the instrument board, and air then enters directly into the car.

Open Cars—Cadillac open cars are equipped with a cowl ventilator which is operated by a lever just in front of the instrument board and at the right of the steering column. Additional ventilation for warmer weather can be secured by manipulating the windshield.

The open-car windshield is in one section, which is pivoted at the upper corners. To secure more ventilation than can be obtained through the cowl ventilator, ~~the windshield should be tilted in toward the driver. A fixed stop prevents the windshield from striking the steering wheel. If still greater ventilation is desired,~~ the windshield can be tilted out.

The thumb screws on the windshield supports must be loosened before adjusting the position of the windshield and must be tightened to hold it in the desired position.

Windshield Cleaner

The windshield cleaner is attached to the car outside and above the windshield. It is operated by the suction or vacuum in the passages between the

carburetor and the engine, and is controlled by a lever on the instrument board. (Fig. 1.) The lever has three positions: in the extreme right-hand position, the cleaner is shut off; in the center position, the cleaner operates slowly; and in the left-hand position, the cleaner operates at its full speed.

Rear Vision Mirror

The rear vision mirror may be adjusted by the driver to suit his preference, after loosening the clamp screws that hold the mirror to its supporting bracket.

Cigar Lighter and Inspection Lamp

The car is equipped with a combination cigar lighter and inspection lamp that makes use of a single reel with twelve feet of flexible cord attached to the back of the instrument board. The flexible cord ends in a bayonet type socket to which may be attached either the inspection lamp or the heating element of the cigar lighter. The method of attachment is identical with that of an ordinary lamp bulb. Ordinarily the cigar lighter is carried in place in the socket on the cord and the inspection lamp in a stationary socket provided on the front of the dash, where it is useful to illuminate the engine.

To use the cigar lighter pull it out from the instrument board at least a foot, wait a few seconds for the heating element to heat and apply it to the cigar or cigarette. The current is automatically switched on as soon as ten or twelve inches of the cord has been unreeled. To light a pipe, remove the nickel plated shield by turning it slightly counter-clockwise and pulling it straight off.

To lock the cord in any desired position, pull out the button on the instrument board at the right of the cigar lighter (Fig. 1). This engages a ratchet which prevents the reel from rewinding. To rewind the cord, press the button back to its original position.

The inspection lamp socket on the dash has a double bayonet lock with two sets of slots. Normally, the pins on the lamp engage the first or outer set of slots and in this position the current is not switched on. To switch the current on, turn the lamp slightly counter-clockwise, press in, and turn it clockwise again, engaging the pins in the second or inner set of slots. To switch off the light, turn the lamp counter-clockwise and pull it out of the socket far enough to engage the first set of slots.

Clock

The clock has an eight-day movement and is wound in the same manner as a watch. The stem is under the clock back of the instrument board.

Side Curtains

The side curtains, with which the open cars are equipped, are carried in an envelope provided with cloth partitions to prevent rubbing and chafing. The Touring car curtains are stowed under the front seat; the Phaeton curtains in a compartment back of the front seat, with a door opening in the tonneau; the Roadster curtains in the package compartment just back of the seat.

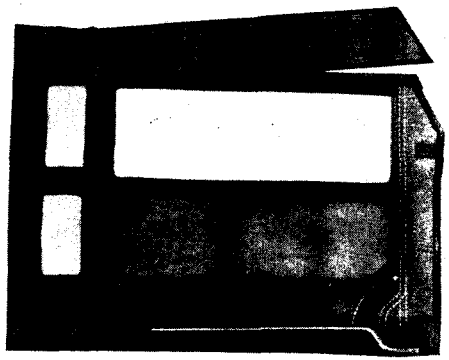


FIGURE 3. ***Side curtains***

The Touring car and Phaeton curtains are in six sections, each of which is marked to indicate its position, as "Left Front," "Right Center." The front and center sections on both sides are each provided with a rod, the lower end of which fits a socket in the top of the door. When a curtain is folded for stowing, this rod is parallel with the bottom of the curtain as shown in Fig. 3. Before the curtain can be attached to the door, the rod must be moved to the position shown by the dotted lines. The upper end of the rod is slotted to engage with the stiffener that runs along the upper edge of the curtain.

The rear sections should be applied first, followed by the center and front sections. The rear sections should be fastened to the rear bows *under* the side flaps of the permanent rear curtains.

Before stowing the curtains, they should be dry and clean.

Curtain Fasteners

Most of the curtain fasteners used on the top and side curtains are of the type illustrated in Fig. 4. When this type of fastener is snapped on its stud, it becomes locked on three sides. To release the fastener it must be lifted on the side that is not locked. This side is indicated by the small projection to which the arrow points in Fig. 4. This type of fastener cannot be released by lifting it at any other side. The remainder of the fasteners used on the top and curtains are of the usual glove type.

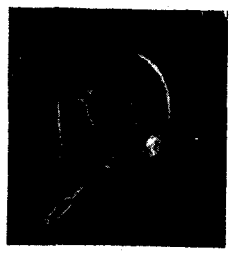


FIGURE 4.
Curtain fastener

Tools

The compartment for carrying the tool equipment is just forward of the right-hand running board. The lock on this compartment is operated by the switch key. The following are the tools comprising the standard equipment. The numbers refer to the numbers by which the tools are designated in Fig. 5.

1. Open end wrenches (two) for adjusting rear foot brakes
2. Small screw driver
3. Socket wrench for oil pan drain plug
4. Large screw driver
5. Center punch
6. Cold chisel
7. Hammer
8. File
9. Pliers
10. Distributor wrench (with gauge for adjusting timer contact points and spark plugs)
11. Distributor wrench (plain)
12. Bicycle wrench
13. Monkey wrench
14. Wrench for rim clamping nuts
15. Rim assembling tool
16. Wrench for spark plugs and compression relief cocks
17. Adapter for grease gun for lubricating clutch thrust bearing
18. Grease gun
19. Hand starting crank
20. Hub cap wrench
21. Oil can
22. Jack handle
23. Jack
24. Hose for tire air compressor
25. Small tool bag
26. Large tool bag
27. Lubrication chart
28. Operator's Manual

Tires

Tire Valve Caps

The valve caps used with some makes of tires are a combination dust and valve cap. This type of cap can be removed and installed without screwing the cap the entire length of the threads on the valve stem.

To remove one of these valve caps, turn it two or three turns counterclockwise. This loosens the sliding nut inside the cap. (Fig. 6). Next, pull the cap up as far as it will go. Then remove the cap by unscrewing it the rest of the way.

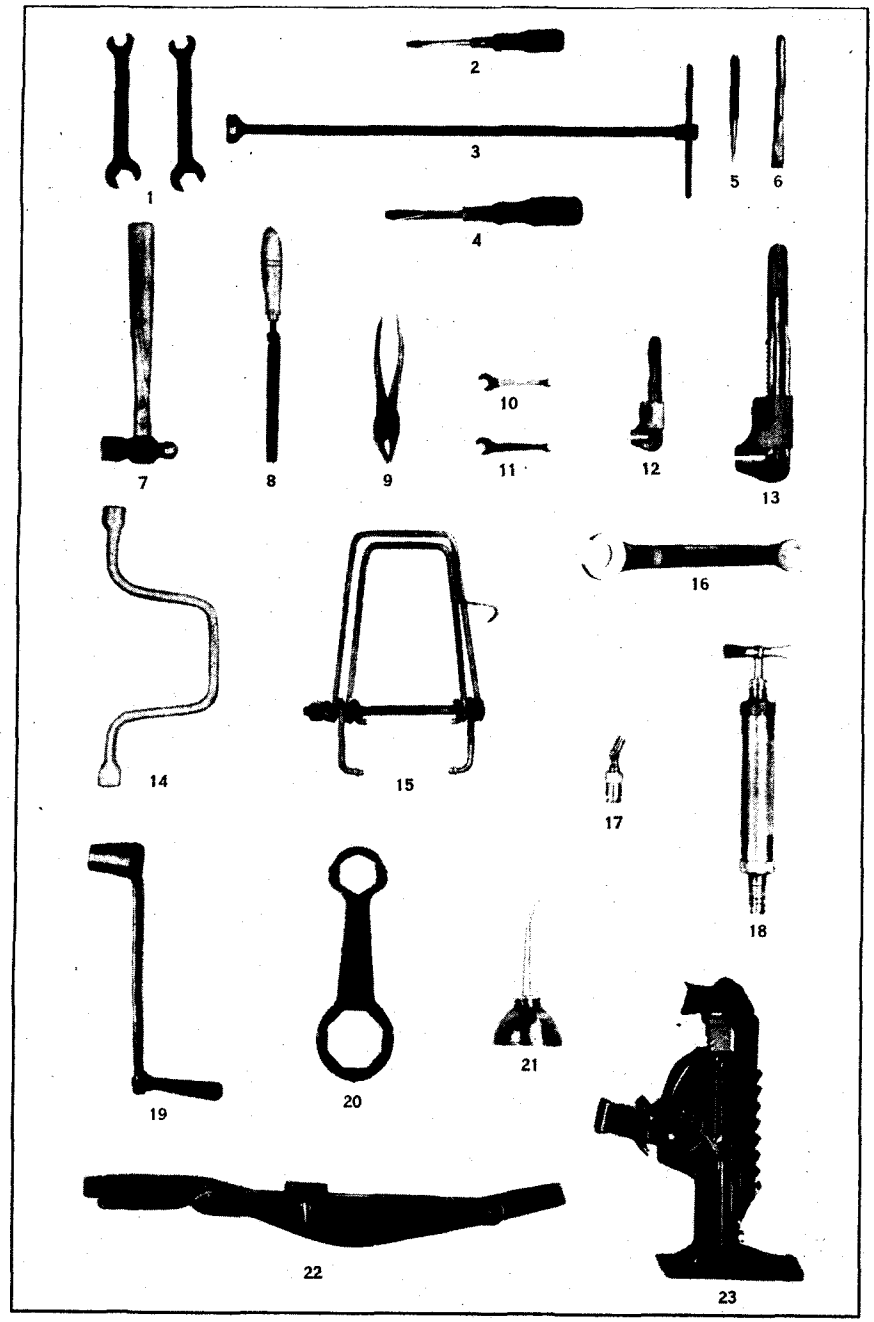


FIGURE 5. ***Standard tool equipment***

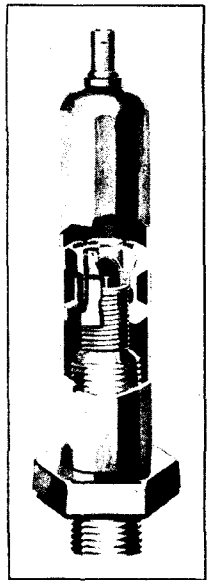


FIGURE 6
Tire valve cap

To install a valve cap, place the cap over the valve stem and turn it a few turns clockwise to engage the threads in the sliding nut. If the sliding nut is too far inside the cap to be reached by the valve stem, shake the nut down by tapping the bottom of the cap on some solid object. When the valve stem has been started in the sliding nut, push the cap down over the stem as far as it will go. Then turn the cap until it locks tightly.

Inflation Pressure

For normal driving, the 33 by 6.75 low pressure tires, which are standard equipment on Cadillac cars, should be inflated to a pressure of 40 lbs. per square inch. The inflation pressure should be checked at least weekly and should not be permitted to drop more than 5 lbs.

On cars driven at high speeds, the front tires should be inflated to 45 lbs. or higher if necessary. *This is important.*

Tire Air Compressor

To use the tire air compressor with which the car is equipped, proceed as follows:

Turn back the left-hand side of the front carpet and lift the small oval-shaped cover which is in the floor just to the left of the transmission control lever. Reach through the hole in the floor and remove the knurled cap from the connection on top of the compressor. Connect one end of the air hose (in the tool equipment) to this connection and the other end of the hose to the valve of the tire to be inflated. *Do not connect the hose to the tire first if there is pressure in the tire.*

The control shaft by which the compressor driving gear is placed in mesh with the transmission gears projects through a small hole in the floor just in front of the large hole over the compressor. To start the compressor, if the engine is running, disengage the clutch and hold the pedal down until the transmission gears have ceased to revolve. Then, with a screw driver, turn the slotted head of the compressor control shaft clockwise. If the engine is not running, simply turn the control shaft clockwise without disengaging the clutch and then start the engine.

The compressor gives best results when the engine runs at a speed of approximately 1,000 r.p.m., which is about three times the normal speed of the engine when idling. Do not race the engine in operating the compressor, or, for that matter, at any other time when it is not driving the car. Racing the engine beyond the recommended speed not only decreases the efficiency

(Continued on page 30)

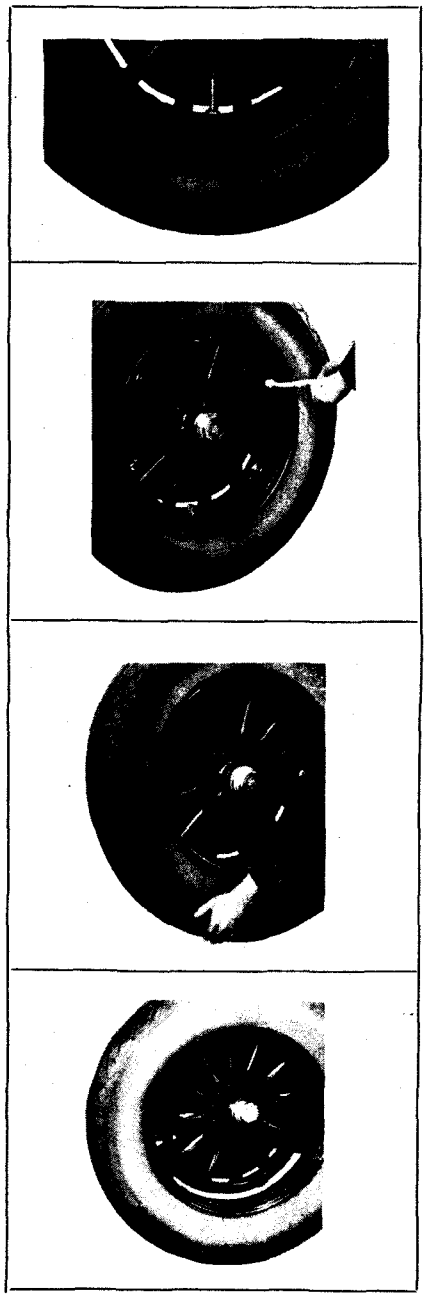


Figure 7a

Jack up the axle until the tire clears the ground. Unscrew the dust cap and the clamping nut from the tire valve stem.

Figure 7b

With the brace wrench, supplied in the tool kit, loosen the six rim clamping nuts. Turn each clamp so that the lug is away from the rim and tighten the nut enough to hold the clamp in this position.

Figure 7c

Rotate the wheel so that the valve stem is at the top, and pull the bottom of the rim away from the wheel.

Figure 7d

Rotate the wheel until the valve stem approaches the bottom. At the point shown in the illustration, the rim and tire will roll free from the wheel and can be removed without lifting.

FIGURE 7. ***Removing rim with tire from wheel***

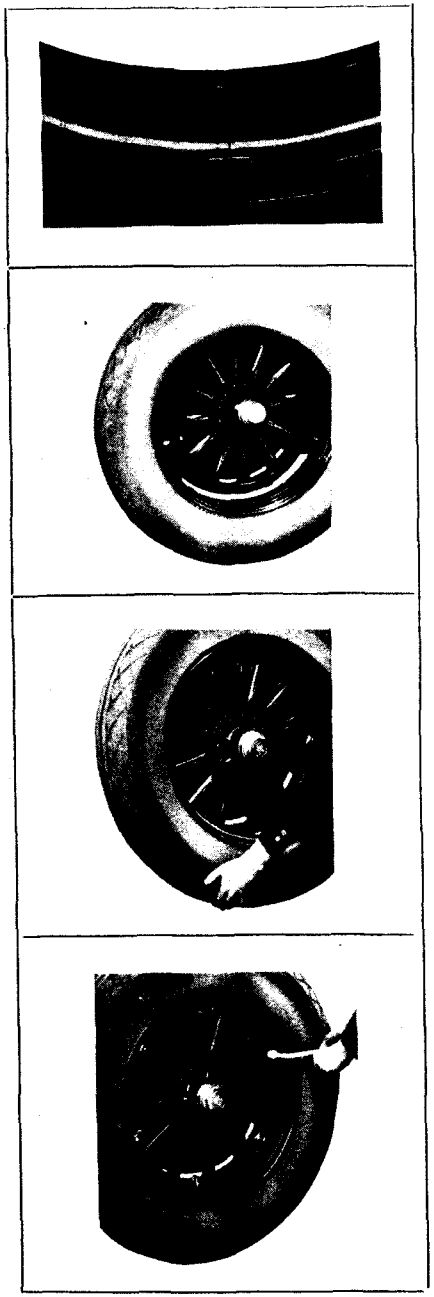


Figure 8a

If the rim has no split clamping ring, take the one from the rim removed. The correct position for the ring is just inside the three lugs and with the split opposite one of the lugs. If the ends of the ring overlap, they can be sprung into place with a screw driver.

Figure 8b

Rotate the wheel so that the hole for the valve stem is in the position shown. Hold the rim so that the three lugs are on the side away from the car and insert the valve stem into the hole in the wheel.

Figure 8c

Rotate the wheel, which will carry the rim with it, until the valve stem is at the top. Then push the lower part of the rim into place.

Figure 8d

Turn each rim clamp so that the lug is over the clamping ring, drawing the nut down until the end of the bolt is flush, or nearly so, with the outer surface of the nut. Then go over the six nuts again, tightening them firmly. (See page 30 in regard to truing up the rim on the wheel.) Install the valve stem clamping nut and the dust cap. It is important that the clamping nut be firmly tightened.

FIGURE 8. ***Installing rim with tire on wheel***

of the compressor, but is one of the worst forms of abuse. To stop the compressor, turn the control shaft counter-clockwise.

Do not turn the compressor control shaft to start the compressor when the engine is running and the clutch is engaged.

Tire Holder

The tire holder is designed to carry either one or two standard size tires mounted on rims and inflated. Each rim has on it three lugs which are located so as to engage with notches on the support arms and on the adjustable clamp. There are two sets of these notches.

When two rims are carried, the rim nearest the car should be placed so that the side with the lugs is away from the car and the lugs should be inserted in the inner set of notches. The outer rim should then be placed so that the side with the lugs faces toward the car and the lugs of this rim should be inserted in the outer set of notches.

When only one rim is carried, the side of the rim with the lugs should face away from the car and the lugs should be inserted in the outer set of notches.

The tire holder lock is in the upper end of the clamp screw and is protected by a dust cap which must be unscrewed to insert the key. Turning the key clockwise disengages the lock, permitting the clamp screw to be turned.

To lock the tire holder, screw the clamp down firmly against the rim or rims. Adjust the clamp screw handle so that it points squarely across the car. Then turn the key counter-clockwise. Care should be exercised in removing or replacing a spare tire not to strike the body of the car.

Changing Tires

If a spare rim with inflated tire is always carried on the tire holder, the driver will seldom or never have occasion to disassemble a tire from the rim. In case of tire trouble it is then merely necessary to remove the rim with tire from the wheel and to install on the wheel the spare rim and tire. Illustrated directions for making this change are on pages 28 and 29. Disassembly of the tire from the rim is necessary only if the tire is to be repaired or a new one installed. Directions for this work, which is usually left to the repair shop, will be found on pages 78 and 79. Never attempt to remove a tire from its rim without first deflating the tire.

Truing Up Rim

If a rim does not run true, it may be trued up in the following manner: Rotate the wheel slowly and mark the part that runs farthest out from the face of the wheel. Loosen slightly the nuts diametrically opposite the mark and then tighten the nuts on the marked side. Test the wheel again and if it still does not run true repeat the operation.

CHAPTER IV

Cold Weather Operation

THE Cadillac car is an all-season car and no owner need hesitate to make full use of his car in severe winter weather as well as at other times. It is necessary in freezing weather, however, to observe certain precautions and to follow a somewhat different procedure, particularly in starting the engine. In this chapter has been grouped all the information relating to operation of the car during cold weather. It should be reviewed just prior to the beginning of the winter season.

Starting the Engine

Carburetor Enriching Button

The first difference between starting the engine in cold weather and starting the engine in warm weather is in the greater use of the carburetor enriching device necessary in cold weather. Gasoline does not vaporize as readily at low temperatures, and in order to supply the cylinders with a gaseous mixture rich enough to be ignited, the proportion of liquid gasoline to air must be increased.

At the same time it is important not to apply the enriching device more than is necessary. The unvaporized gasoline collects on the cylinder walls and works down past the pistons, washing off the lubricant as it goes. Although dilution of the oil supply with this unburned gasoline is minimized in the Cadillac engine by an exclusive system for ventilating the crankcase (see page 42), it is best to avoid an excess of liquid gasoline in the combustion chambers by careful and judicious use of the enriching device.

The following rule should govern the use of the enriching button in winter weather: Pull the enriching button back just as far as it is necessary to start the engine, but as soon as the engine starts, let the button return as far as possible without causing the engine to stop or slow down. Then release the button entirely as soon as the engine is warm enough to permit doing so.

Priming the Carburetor

In extremely cold weather, if the engine does not start after cranking for a few seconds with the enriching device fully applied, release the starter pedal. Then prime the carburetor by opening and closing the throttle once or twice rather rapidly with the accelerator. Opening and closing the throttle operates

a throttle pump on the carburetor and raises the level of gasoline in the carburetor bowl. Do not open and close the throttle more than twice or gasoline will overflow from the carburetor.

Position of Throttle Hand Lever

The correct position of the throttle hand lever for starting in cold weather is the same as for starting under other conditions, that is, about one-fourth the way down from the idling position. In warm weather, however, the lever may be returned to the idling position almost as soon as the engine is started. In cold weather, the throttle must be left slightly open until the engine becomes warm.

Position of Ignition Control Lever

Unless the weather is extremely cold, the correct position of the ignition control lever for starting is the same as that recommended on page 10, that is, about one-third the way down. In extremely cold weather, however, the lever should be moved all the way up for starting, unless the engine should be cranked by hand, in which case the lever should be moved all the way down.

It is the practice of some drivers to move the ignition control lever all the way down whenever starting the engine. This is the correct position if the engine is to be cranked by hand, but if the engine is to be cranked with the starter, there is no reason for retarding the spark, and in extremely cold weather "popping back" in the carburetor is less likely to occur if the spark is fully advanced.

Use of Starter

In extremely cold weather, when the car has been standing long enough to become thoroughly chilled, it is a good plan to disengage the clutch during the cranking operation. If this is not done, the starter is called upon to turn the jackshaft gears in the transmission in addition to cranking the engine. At ordinary temperatures, the additional energy required is negligible, but in extremely cold weather, the lubricant in the transmission offers sufficient resistance to rotation of the transmission gears to increase considerably the demand upon the battery and to retard the cranking speed.

Use of Accelerator Before Engine is Warm

In cold weather, after the engine has been started and before it has run long enough to become warm, the engine cannot deliver its normal power and it should not be called upon to do so. In accelerating the engine to start the car and in accelerating the car after the transmission is in gear, do not open the throttle suddenly or too far. To do so is not only to invite "popping back" in the carburetor, but to increase the amount of excess unvaporized gasoline in the combustion chambers, both of which results are undesirable. For this reason also, starting in intermediate should never be attempted in cold weather.

Additional Cold Weather Suggestions

Engine Oil for Cold Weather

All engine lubricating oil is more viscous at lower temperatures than at higher temperatures. An engine oil of the proper viscosity for summer weather will not flow freely at freezing temperatures, and will not lubricate the cylinders and bearings properly until the engine is warm. If the oil congeals it also offers considerable resistance to cranking of the engine, causing a severe drain on the battery, and retarding the cranking speed.

In cold weather, therefore, it is essential that an oil be used that has a sufficiently low cold test. The light grade of the Cadillac Motor Oil is recommended generally for winter use. If in doubt as to a suitable oil for cold weather, consult an authorized Cadillac maintenance station.

Strainers in Gasoline System

During cold weather, it may be found necessary to remove and clean the strainers in the gasoline line (see page 58) more frequently. An accumulation of water at these points that would have no bad effect in warm weather might freeze in cold weather and prevent the gasoline from flowing to the carburetor.

Anti-Freezing Solutions

In freezing weather, the water in the cooling system must be replaced with some solution that has a lower freezing temperature than that of water. A solution of alcohol and water or of glycerin and water is recommended. Solutions containing calcium chloride or other ingredients injurious to the metal parts of the cooling system should never be used.

Alcohol and Water

The following table gives the freezing temperatures of solutions of denatured alcohol and water:

Denatured Alcohol (Parts by volume)	Water (Parts by volume)	Freezing Temperature (Degrees Fahr.)
1	4	10°
1	3	0°
1	2	−10°
1	1	−25°

Alcohol is more volatile than water and an alcohol solution tends to decrease in strength. It is a good plan, if an alcohol anti-freezing solution is used, to test a sample occasionally with a hydrometer. Hydrometers graduated to indicate the freezing temperature of the solution can be obtained.

Glycerin and Water

The following table gives the freezing temperatures of solutions of commercial glycerin and water:

Glycerin (Parts by volume)	Water (Parts by volume)	Freezing Temperature (Degrees Fahr.)
1	3	20°
1	2	12°
1	1	0°
3	2	−4°

Capacity of Cooling System

The capacity of the cooling system is five and one-half gallons.

Effect of Alcohol on Finish

Strong solutions of alcohol have a harmful effect on the finish. In adding pure alcohol or solutions containing 50 per cent or more alcohol, extreme care must be used not to let the liquid spatter or spill. A funnel and a pouring vessel with a suitable spout are necessary. Especially avoid pouring cold alcohol into very hot water. The effect of this is to make the mixture foam up and possibly bubble over on the finish.

PART II

LUBRICATION AND CARE

Cadillac 4000-Mile Lubrication Schedule

Note: Engine oil must be added whenever the oil level indicator ball drops to "Fill," regardless of the changing of oil specified every 2000 miles on the schedule. The oil level should be checked every 100 to 150 miles.

Explanation: The figures and letters following the items in this column refer to the chassis lubrication diagram, Fig. 11	Refer to page	Lubrication No. and Mileage at which due							
		1	2	3	4	5	6	7	8
		500	1000	1500	2000	2500	3000	3500	4000
LUBRICATION NUMBER 8 — LUBRICATION NUMBER 4 — LUBRICATION Nos. 2 and 6 — 1, 3, 5, and 7 — Grease gun connections: G	45	O	O	O	O	O	O	O	O
Spring leaves: 2, 10, 13, 23	48	O	O	O	O	O	O	O	O
Add water to storage battery	63	O	O	O	O	O	O	O	O
Universal joints: 16, 17	46		O		O		O		O
Generator and distributor oil cups: 20, 21, 22	45		O		O		O		O
Engine rear supports: 7, 19	45		O		O		O		O
Steering column oil holes: 4	47		O		O		O		O
Brake pins and connections	77		O		O		O		O
Door hardware	48		O		O		O		O
*Gasoline strainers and settling chambers**: 1, 5, 9	58		O		O		O		O
Drain and replace engine oil: 24	43				O				O
Transmission‡—add lubricant: 18	46				O				O
Rear axle‡—add lubricant: 14	46				O				O
Steering gear—add lubricant: 8	47				O				O
Speedometer drive shaft	47				O				O
Clutch thrust bearing: 6	45								O
Transmission‡—drain and replace lubricant: 18	46								O
Rear axle‡—drain and replace lubricant: 14	46								O
Wheel bearings—clean and repack: 3, 11, 15, 25	46								O
Front brake trunnions: 12, 26	47								O
Clean horn commutator	48								O
RECORD — Speedometer Reading									
Date									

*More frequently in cold weather.
‡Change to light grade of lubricant at beginning of cold weather and to heavy grade of lubricant at beginning of warm weather, regardless of mileage.

FIGURE 9
Lubrication schedule

CHAPTER I

Systematic Lubrication

Necessity for Lubrication

Lubrication has made machinery possible. Without it the destructive effects of friction would render the most ingeniously designed mechanism useless. Especially is this so of the gasoline engine, in which heat of combustion is added to that of friction. Absence of lubrication for even a brief instant while the engine is running would heat the surfaces in contact to the melting point.

But it is not enough to know that friction, unrestrained by lubrication, is capable of ruining an engine in less time than it takes to tell it. No motorist expects to run out of oil. What is frequently not fully appreciated is that, if improper lubricants are used and are infrequently applied, friction is still a powerful destructive agent capable of shortening the useful life of the car from years to months.

The quiet, dependable operation of a new car is primarily the result of the accurate finishing of surfaces separated from each other by a few thousandths of an inch. In the Cadillac, there are hundreds of such surfaces. If the clearances between these surfaces are to be maintained, so that the car will continue to operate quietly and dependably, friction must be prevented from taking its toll in wear.

Cadillac engineers have provided for the lubrication of all surfaces where friction is a factor. The most that a manufacturer can do, however, is to provide a place for the lubricant and means for it to reach the surfaces to be lubricated. The car cannot be equipped with an inexhaustible supply of lubricant. Upon the car owner devolves the responsibility of replenishing the supply at the proper time with lubricant of the prescribed specifications.

Because of the importance to the car owner of proper lubrication of his car, every effort has been made in this Manual to give explicit information for his guidance. Lubricants are prescribed for each point requiring lubrication, directions are given for applying the lubricant, and recommendations are made as to the frequency with which the lubricant should be applied. All this information is based upon actual operation of Cadillac cars over hundreds of thousands of miles.

Lubrication Schedule

Lubrication is effective only insofar as it is regular and systematic. To be systematic, lubrication must be performed at regular mileage intervals. The

Cadillac technical staff has accordingly developed for the Cadillac car a complete lubrication schedule which, if faithfully followed, will insure for each bearing surface ample, but not superfluous, lubrication. This schedule is shown in Fig. 9.

The unit of the Cadillac lubrication schedule is 4,000 miles, which is divided into eight 500-mile intervals. Corresponding to these is a series of eight consecutive groups of lubricating operations. When the car has traveled 500 miles, the points enumerated under Lubrication No. 1 should receive attention. At 1,000 miles, Lubrication No. 2 is due, and so on until at 4,000 miles Lubrication No. 8 should be performed. At 4,500 miles the schedule begins again with Lubrication No. 1.

In order that the driver may be continually reminded of the mileage at which the next lubrication is due, it is recommended that a lubrication notice be used. Cadillac distributors and dealers can supply a gummed notice to be affixed to the speedometer just below the total mileage dial. This notice has two blank spaces upon which are to be written the number of the lubrication next due and the mileage at which it is due. If this notice is used, the driver need only glance occasionally at the speedometer and compare the mileage on the dial with the figures on the notice in order to plan for the necessary attention.

Cadillac distributors and dealers are prepared to sell lubrication based on this schedule. A car that is being lubricated on the schedule can be taken to any authorized Cadillac maintenance station, and without further ordering than to specify "Schedule Lubrication," the car will receive the necessary attention.

The schedule in Fig. 9 is in outline form. Detailed information as to the location of the points to which lubricant is to be applied, the method of lubricating, and the kind and amount of lubricant will be found in Chapters VI and VII. For each point on the schedule, two reference numbers are given: the number of the page on which detailed directions will be found and the number designating the point on the chassis lubrication diagram, Fig. 11.

The schedule is the most effective aid to systematic lubrication that has been devised. Used in conjunction with a notice on the speedometer cover glass, it reduces lubrication to the simplest possible terms. Whether the car is lubricated in the owner's private garage or in a Cadillac authorized maintenance station, it is strongly urged that this schedule be followed from the first mile of operation.

Lubricants

The selection of proper lubricants for the Cadillac car is one of the first concerns of the owner in his attention to the lubrication of his car.

The lubricants must not only be of high quality, but their viscosity and other characteristics must be suited to the Cadillac car. The difficulty of securing suitable lubricants on the open market has induced us to provide lubricants under the Cadillac trade mark. These lubricants are prepared according to specifications prescribed by the Cadillac technical staff and are based upon hundreds of actual tests. Cadillac lubricants include the following and can be obtained from Cadillac distributors or dealers:

Cadillac Engine Oil—Light, Medium and Heavy
Cadillac Rear Axle and Transmission Lubricant—Light and Heavy
Cadillac Roller Bearing and Cup Grease
Cadillac Universal Joint Grease
Cadillac Steering Gear Lubricant

Engine Oil

Except in extremely hot or extremely cold weather, the medium grade of Cadillac Engine Oil is recommended. In extremely hot weather, the heavy grade should be used and in freezing weather, the light grade.

The names of other engine oils approved for use in the Cadillac engine will be supplied by our Technical Department on request.

Rear Axle and Transmission Lubricant

The heavy grade of Cadillac Rear Axle and Transmission Lubricant should be used except in cold weather. The light grade should then be used. If the heavy grade is used in cold weather the transmission gears will be difficult to shift.

The names of other lubricants suitable for use in the Cadillac rear axle and transmission will be supplied upon request.

Roller Bearing and Cup Grease

Cadillac Roller Bearing and Cup Grease is recommended for the wheel bearings and for all points for which grease gun connections are provided, with the exception of the steering gear and the universal joints. In the absence of Cadillac Roller Bearing and Cup Grease, No. 3 cup grease may be used for the grease gun connections and No. 1½ cup grease for the wheel bearings.

Universal Joint Grease

Cadillac Universal Joint Grease is recommended for the universal joints on the drive shaft. In its absence a No. 3 fibre grease may be used.

Steering Gear Lubricant

Cadillac Steering Gear Lubricant is recommended for lubricating the steering gear worm and sector. In its absence, use a mixture consisting of 75 per cent rear axle and transmission lubricant and 25 per cent cup grease.

CHAPTER II

Engine Lubrication

Oil Circulating System

The supply of engine oil is carried in the pressed steel reservoir that covers the bottom of the crankcase. The oil is forced to the bearings by a gear pump attached to the right-hand side of the engine toward the front and driven by a spiral gear on the crankshaft.

The pump draws the oil from the bottom of the oil pan and delivers it under pressure to a supply pipe running the length of the engine parallel with the crankshaft. From this supply pipe, three leads branch off to feed the three main bearings. A fourth lead connects the supply pipe to the oil pressure regulator which is attached to the crankcase just back of the right-hand cylinder block. A fifth lead at the front end of the supply pipe directs a stream of oil upon the spiral gears. A separate passage drilled through the crankcase conducts oil direct from the pump to the camshaft front bearing from which the oil enters the hollow camshaft and is carried to the other camshaft bearings and to the distributor driving gear.

At the oil pressure regulator there are four paths for the oil to follow:

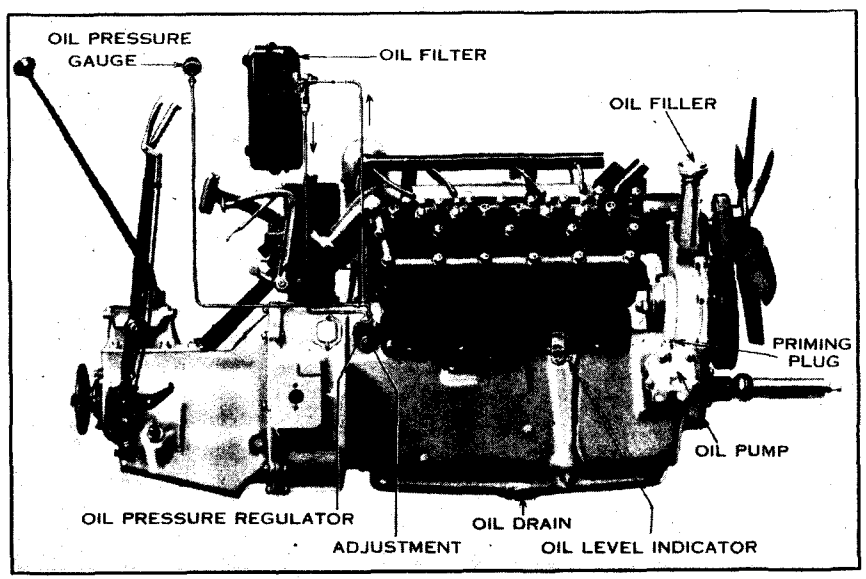


FIGURE 10. ***Engine lubrication features***

two through passages within the regulator and two through outside connections. The first passage is a small by-pass which leads back to the crankcase and which has an adjustable metering screw. Oil flows through this by-pass whenever the engine is running. The second passage leads to a valve which is under spring tension and which does not open until the pressure in the supply pipe reaches approximately 30 lbs. Oil passing this valve also flows back to the crankcase.

The T-connection on the outside of the oil pressure regulator leads to the pressure gauge on the instrument panel and to the oil filter on the dash. Oil flows through the filter whenever the engine is running, the filtered oil being returned to the oil pressure regulator and thence to the crankcase.

The crankpin bearings are fed from the main bearings through ducts in the crankshaft. Oil thrown from the crankpins as the crankshaft revolves becomes a fine mist or spray which pervades the interior of the crankcase and cylinders and lubricates the pistons, piston pins, cams, camslides, and rollers.

The valve stems are automatically lubricated by oil sprayed from two small holes drilled in the wall of each cylinder at such a distance from the bottom of the cylinder that, when the piston is at the bottom of its stroke, these holes register with a groove in the piston between the second and third piston rings. As the piston descends on the power stroke, oil collects in this groove and as soon as the groove registers with the holes, the pressure of the gases above the piston forces oil out upon the valve stems. Surplus oil collecting in the valve compartments is returned to the crankcase through drain passages.

All oil returns to the oil pan through a fine mesh screen placed above the oil pan and separating it from the crankcase.

Oil Level

The normal capacity of the oil pan is two gallons which fills it to the level of the screen above the pan. When the oil pan contains this amount, the oil level indicator on the right-hand side of the engine (Fig. 10) indicates "Full." As the oil level descends, the indicator indicates "Fill" and then "Empty." Oil should be added as soon as the indicator ball has dropped to "Fill." If the indicator indicates "Empty," under no circumstances should the engine be run until oil has been added.

The mileage interval at which oil must be added depends upon individual circumstances. It is recommended that the oil level indicator be checked every one hundred to one hundred and fifty miles, although it is improbable that oil will be required as frequently as this.

Oil Pressure

The pressure of the oil in the supply pipe is indicated by the oil pressure gauge on the instrument panel (Fig. 1). The purpose of the oil pressure gauge

is, first, to enable the driver to make sure that there is pressure whenever the engine is running, and second, to verify the adjustment of the oil pressure regulator.

It is absolutely necessary that there should be oil pressure just as soon as the engine starts and as long as the engine is running. If the oil pressure gauge does not indicate pressure as soon as the engine starts, stop the engine at once and investigate the cause. First, check the level of oil in the oil pan. If the level is above "Fill," prime the oil pump by removing the plug shown in Fig. 10 and pouring oil in through a funnel. Be sure to replace the plug before starting the engine. If, after priming the oil pump and starting the engine, the oil pressure gauge does not indicate pressure, stop the engine immediately and consult the nearest Cadillac maintenance station.

Before the adjustment of the oil pressure regulator can be verified, the factors affecting the viscosity of the oil must be standardized. The oil pressure changes with the viscosity, which in turn depends upon the kind of oil, the extent to which it has been thinned by use, and the temperature. It is therefore necessary that the oil be fresh and of the viscosity specified for the Cadillac engine. The engine must also be run long enough to become thoroughly warm. Under these conditions the pressure at idling speed (300 r.p.m.) should be from 5 to 7 lbs.

Adjustment of the pressure at idling speeds is made by the screw shown in Fig. 10. To increase the pressure, turn the screw clockwise; to decrease the pressure turn the screw counter-clockwise. This adjustment should be made while the engine is running.

Crankcase Ventilating System

In every internal combustion engine, seepage of vapors by the pistons takes place to some extent, permitting water vapor and other products resulting from combustion, as well as unburned gasoline, to enter the crankcase. Contamination of the lubricating oil from this source makes it necessary in most engines to replace the oil supply at frequent intervals.

Cadillac engines are equipped with an exclusive system to prevent the seepage vapors from entering the crankcase. To bring about this result, advantage is taken of the fact that the Cadillac crankshaft with its compensating weights acts naturally to draw air through an inlet in the left-hand side of the engine, building up within the crankcase a pressure slightly above atmospheric pressure. No outlet is provided in the crankcase itself but in the wall of each cylinder is a port connecting the space below the piston with the valve compartment. This port is open except when the piston is at the extreme bottom of its stroke.

The effect of this arrangement is as follows: The seepage vapors that pass the two upper piston rings are forced through slots milled in the circumference of the lower piston ring and through corresponding holes in the piston into the space inside the piston, where they are carried down as the piston descends. The vapors cannot enter the crankcase, however, because they are prevented from doing so by the pressure built up in the crankcase by the revolving crankshaft. Instead, the vapors are expelled through the port into the valve compartment. From the valve compartments the expelled vapors are conducted through flexible pipes underneath the car where they are discharged.

Oil Filter

Another source of contamination of the oil supply is dirt. In the Cadillac engine all solid matter in the oil is removed by means of a filter (Fig. 10) which is attached to the dash and which is connected to the oil circulating system.

The filter consists of a metal container in which is a series of eight envelopes made of special fabric. As the oil is forced through these fabric envelopes, the total area of which is over five square feet, it leaves all solid matter behind, returning to the engine as clean oil.

The filter is connected to the oil pressure regulator at the same point as the oil pressure gauge. Oil is thus forced to the filter whenever the engine is running and there is pressure in the oil lines. The normal flow when the filter is new is approximately one quart per minute so that an amount of oil equal to the entire capacity of the lubricating system passes through the filter every eight to ten minutes.

The filtered oil, which is returned to the oil pressure regulator and thence to the crankcase, leaves the filter through a sight-feed glass. When the filter is new, the stream of filtered oil visible through the glass should be about $\frac{1}{8}$ inch in diameter. As dirt accumulates in the filter, the flow of oil gradually decreases. When the stream has diminished to the size of a pencil lead, the filter unit should be replaced. When checking the flow of oil through the sight-feed the engine should be warm and the throttle should be opened until the oil pressure gauge indicates approximately 15 lbs.

Under average driving conditions the filter unit should not require replacement for 12,000 to 15,000 miles. Filter units for replacement can be obtained from Cadillac distributors and dealers.

Replacing Engine Oil

Although the crankcase ventilating system and the oil filter described in the preceding sections greatly prolong the useful life of the oil, it is recommended that the oil be drained and replaced with fresh oil every 2,000 miles.

To drain the oil, simply remove the drain plug (Fig. 10). A special socket wrench for the oil pan drain plug is supplied as part of the tool equipment.

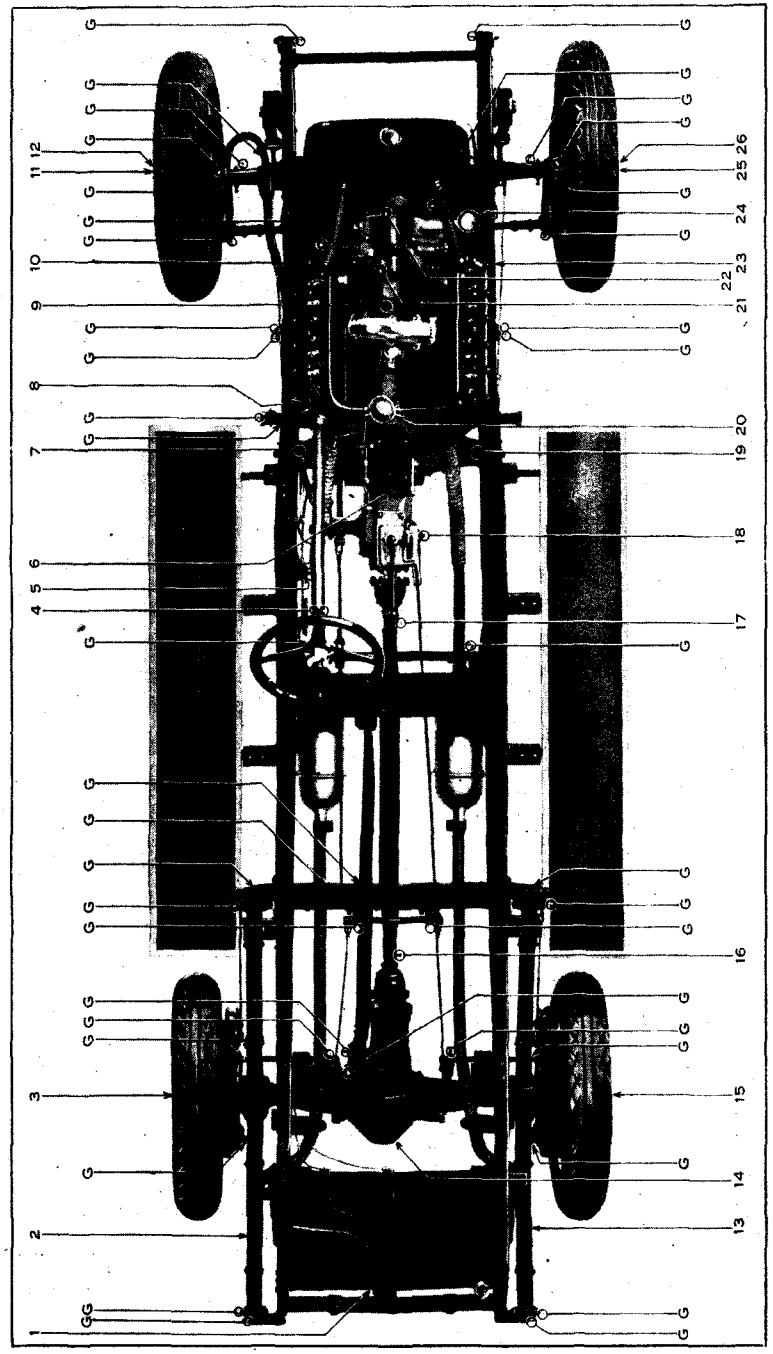


FIGURE 11. ***Chassis lubrication diagram***
Each "G" indicates a grease gun connection. Each number indicates a lubricating point for which instructions are given in Chapters II and III. Lubricating points that are visible in the diagram are surrounded by circles, others are indicated by arrows.

Be sure to reinstall the drain plug before adding the fresh oil. Two gallons of fresh oil should be added, or enough to bring the oil level indicator ball to "Full."

At the end of the first 1,000 miles, it is recommended that the car be taken to a Cadillac maintenance station to have the oil pan and screen removed and cleaned with gasoline or kerosene. This should be repeated once a year or whenever the filter unit is replaced.

Generator Oil Cups: 21, 22*

Two oil cups on the generator conduct lubricant to the forward and rear bearings on the armature shaft. A few drops of engine oil should be applied to each cup every 1,000 miles.

Timer-Distributor Oil Cup: 20

The oil cup at "20" is for lubricating the ball bearing at the upper end of the timer-distributor shaft. A few drops of engine oil should be applied every 1,000 miles.

Engine Rear Supports: 7, 19

The brackets on the frame to which the engine rear supports are bolted are provided with felt wicks. Engine oil should be applied at these points every 1,000 miles.

CHAPTER III

General Lubrication

Grease Gun Connections: G

Spring bolts, steering connections, brake rocker shafts and other points are provided with connections to fit the grease gun supplied with the tool equipment. These points are indicated by "G" in Fig. 11. Cadillac Roller Bearing and Cup Grease should be applied to these points with the grease gun every 500 miles.

Clutch Thrust Bearing: 6

The clutch thrust bearing is provided with a grease gun connection, which is accessible after removing the floor boards and the cover plate shown at

*The numbers following the headings in this chapter and in Chapter III refer to Fig.11.

"6." Before the grease gun can be applied to the connection, it is necessary to attach to the connection the adapter furnished with the tool equipment.

If the connection does not point upward so that the adapter can be applied, turn the bearing until it does. This must be done with the engine not running.

The clutch thrust bearing should be lubricated every 4,000 miles with Cadillac Roller Bearing and Cup Grease.

Caution: Do not inject too much grease into the clutch thrust bearing. One or two turns of the grease gun handle are sufficient.

Transmission: 18

The transmission case should contain sufficient lubricant to bring the level up to the filling hole at the right-hand side. The level should be inspected every 2,000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended. The heavy grade should be used except in cold weather. The light grade should then be used. If the heavy grade is used in cold weather, the transmission gears will be difficult to shift.

Every 4,000 miles the drain plug should be removed from the bottom of the transmission case and the lubricant should be drained and replaced with fresh lubricant. Three quarts of lubricant are required to fill the transmission case to the proper level.

Universal Joints: 16, 17

The forward and rear universal joints on the drive shaft are provided with grease gun connections as indicated at "16" and "17." It may be necessary to roll the car forward or backward a few inches to bring the connections underneath where they can be reached with the grease gun. Cadillac Universal Joint Grease should be applied every 1,000 miles.

Rear Axle: 14

The rear axle housing should contain enough lubricant to bring the level up to the filling hole in the rear cover plate. The level should be inspected every 2,000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended. The heavy grade should be used except in cold weather. The light grade should then be used.

Every 4,000 miles the drain plug should be removed from the bottom of the axle housing and the lubricant should be drained and replaced with fresh lubricant. Three and one-half quarts of lubricant are necessary to fill the rear axle housing to the proper level.

Wheels: 3, 11, 15, 25

The front and rear wheel bearings are packed in grease when the car is assembled. Every 4,000 miles all the wheels should be removed and the bearings should be thoroughly cleaned in gasoline or kerosene. They should then be repacked and the bearings adjusted in accordance with the directions on pages 80, 81 and 82.

Cadillac Roller Bearing and Cup Grease is recommended for the wheel bearings. Do not use heavy grease as it will roll away from the path of the rollers and will not return.

Front Brake Trunnions: 12, 26

Every 4,000 miles, at the same time that the wheels are removed for lubrication of the wheel bearings, the brake operating trunnions inside the front wheel brake drums should be lubricated by applying the grease gun to the connection at "A" (Fig. 12). Cadillac Roller Bearing and Cup Grease should be used. It should be injected only until it begins to appear around the trunnion bearings. Do not inject too much grease. Before replacing the wheels, wipe off any grease appearing around the trunnion bearings. Do not inject any grease at "A" except when the wheel is off and the application of too much grease can be definitely avoided.

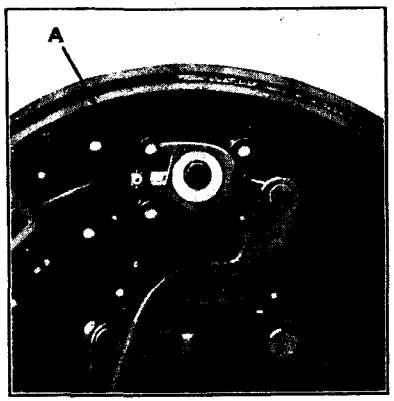


FIGURE 12
Lubrication of front brake trunnions

Steering Gear: 8

A grease gun connection is provided on the steering gear housing for injecting lubricant for the steering gear worm and sector. Cadillac Steering Gear Lubricant is recommended for the steering gear and it should be applied every 2,000 miles.

Oil Holes in Steering Column: 4

There are two oil holes in the steering column just below the steering wheel. A few drops of engine oil should be applied to these every 1,000 miles. The holes are closed by screw plugs which must be removed before the oil can be applied.

Speedometer Flexible Drive Shaft

The flexible shaft by which the speedometer is driven is housed in a flexible casing. To lubricate the speedometer drive shaft, the shaft should be removed from its casing and lubricant applied to it for its entire length. Cadillac Roller Bearing and Cup Grease is recommended for this lubrication, which should be performed every 2,000 miles.

Do not under any circumstances attempt to lubricate the speedometer itself. Any parts in the speedometer requiring lubrication are amply supplied when it is assembled.

Horn

The horn is lubricated when assembled and does not require further lubrication, but the commutator of the horn motor should be inspected every 4,000 miles and cleaned, if necessary. To do this, remove the motor shell from the horn. If the commutator appears to be dirty, clean it with a dry cloth. This should be done with the horn motor running so that the commutator will be cleaned on all sides. Do not attempt to polish the commutator or brushes with oil or vaseline. These parts are designed to run without lubricant.

Springs: 2, 10, 13, 23

To lubricate the spring leaves, it is recommended that the edges and ends of the leaves be painted with engine oil every 500 miles. A small stiff brush should be used. After applying the oil, the car should not be washed until it has been driven far enough to allow the lubricant to work in between the leaves. Do not separate the leaves and insert lubricant. A certain amount of friction between the spring leaves is necessary in order to give the springs the desired characteristics.

If spring covers are used, it is not necessary to lubricate the spring leaves as directed in the preceding paragraph.

Stabilators

The stabilators, with which the car is equipped and which are for the purpose of controlling the recoil of the springs, not only need no lubrication—they *must not* be lubricated. To lubricate the stabilators would defeat their purpose just as oil or grease on the brakes would prevent them from holding.

Door Hardware

Whenever the chassis is being lubricated, the door locks and other door hardware should also be lubricated as follows:

Place a few drops of oil on each door lock plunger or striker, turning the handle back and forth so that the oil will work into the lock. Also place a drop of oil on each of the striker plates against which the strikers engage when the doors are closed. The hinge pins should also be oiled sparingly so as not to get oil on the finish.

Each door has a wedge-shaped tongue that dovetails into a receptacle on the body when the door is closed. These tongues should receive a small amount of grease or oil.

Each closed car door is also fitted with a check at the top which limits the outward movement of the door. A small amount of grease should be applied to the pin that slides in the slot at the top of the door.

CHAPTER IV

Care of Body

Care of Finish When New

On cars finished with varnish, more careful and more frequent attention is necessary when the car is new than after the varnish has hardened. Particular care should be taken to keep mud from the body and hood for the first few weeks. Even after the varnish has hardened, mud should not be permitted 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 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.

The same degree of caution, although commendable, is not as necessary on cars finished with Duco, because Duco hardens much more quickly than paint or varnish.

Washing Varnished Cars

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, because 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 pressure greater than will carry the water six inches 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.

Wash the chassis first, going over the under sides of the fenders, the wheels, and the running gear 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 under side of the fenders, or machine oil or grease from the chassis, use a 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 soft carriage sponge.

After washing the chassis, begin at the front of the car, and flow water from the hose upon the body, hood, and upper surfaces of the fenders. This will soften the accumulation of road dirt, removing most of it. Then go over the car again and remove all dirt by rubbing lightly with a soft wool sponge, at the same time applying an abundance of water from the hose. The sponge, which should be kept exclusively for the body, hood, and upper surfaces of the fenders, should be rinsed 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. Be sure and use a chamois that has not been used on the chassis. Rinse the chamois and wring it out frequently. Do not rub the finish or apply more pressure than is necessary to dry off the surplus water. The remaining water will evaporate quickly, leaving the finish in good condition.

If it is desired to chamois the wheels and chassis, and they have become dry, wet these parts with clean water and then wipe them. Be sure to use a separate chamois for the chassis. The chamois that has been used on the body should be saved for the body exclusively.

Do not use soap, gasoline, kerosene, or anything of similar nature on the finish. Such materials attack the finish.

Washing Duco

Although it is not necessary in washing cars finished in Duco to use the same degree of care as in washing varnished cars, nevertheless the same general directions should be followed.

Cleaning Windows

Do not clean the window glass with preparations that may contain harmful ingredients. Use only cleaning compounds that are known to have no destructive effects on highly polished glass.

Cleaning Upholstery

To keep the upholstery in closed cars in the best condition, it should be cleaned thoroughly at least once a month with a whisk broom and vacuum cleaner. Dirt and grit accumulating in the fabric wear it out faster than use.

Spots on the upholstery may be cleaned with any good dry cleaner. When the cleaner has thoroughly evaporated, apply a hot flat iron wrapped in a wet cloth. Steaming the fabric and rubbing lightly against the nap will raise the nap to its normal position.

CHAPTER V

Care of Tires

EACH tire maker publishes a booklet with instructions for care and repair of tires. Every motorist should provide himself with one of these and thoroughly familiarize himself with the contents. The suggestions here apply to pneumatic tires in general.

Three-fourths of so-called "tire trouble" is the result of misuse. We give here some suggestions regarding the more important points of the care of tires.

Result of Under-Inflation

Under-inflation causes a tire to flatten out under load. This causes the side walls to bend sharply as the tire revolves. The result is the breaking of the side walls. An under-inflated tire is susceptible to bruise, broken cords and blow-out.

Result of Improperly Aligned Front Wheels

Running a car with the front wheels out of alignment causes rapid tread wear. This usually affects both tires similarly, although sometimes only one tire is affected. An incorrect adjustment of the front axle parallel rod or a bent steering arm is responsible for the condition. Unless the wheels are in proper alignment the treads of the front tires will wear away in a remarkably short time.

Neglect of Small Cuts

If cuts extending to the cords are neglected deterioration and blistering of the tire tread is the result. It is unnecessary to remove a tire to treat small cuts of this nature. Tire companies furnish a plastic compound for filling cuts. This prevents moisture and dirt from getting in. If a cut is large, it should be vulcanized at once.

Result of Improperly Adjusted Tire Chains

Tires are sometimes badly damaged through the use of tire chains which are incorrectly adjusted or which are fastened to the spokes of the wheel holding the chains tightly in place.

The least injury results when chains are applied loosely leaving play enough to permit them to work around. The wear on the tire is thus distributed evenly. Probably the greatest amount of injury comes from using chains unnecessarily on paved streets.

Result of Sudden Application of the Brakes

The sudden application of the brakes resulting in sliding the wheels causes the treads to wear away in spots. A tire will give away very rapidly under this severe treatment.

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 cords, 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 layers of cords to dirt and moisture, which soon starts to rot the cords.

In turning in a narrow street, avoid striking the curb.

If a tire goes flat without any indication of injury to the tire, see that the valve is not leaking. A little moisture on the tip will show bubbles if the air is escaping.

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 carcass 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 rubber 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.

CHAPTER VI

Storing Car

IF THE car is not to be used for a period of several months, it should be protected from deterioration during the period when it is not in use by carefully preparing it for storage.

Engine

To prepare the engine for storage, proceed as follows: Run the engine until opening of the radiator shutters indicates that the engine is warm. This may be done by driving on the road or by running the engine idle. In the latter case, care should be taken that there is sufficient ventilation to avoid injury from carbon monoxide poisoning. (See page 18.)

After the engine is warm, place the car where it is to be stored and stop the flow of gasoline to the carburetor by removing the gasoline tank filler cap, thus relieving the air pressure. As soon as the engine starts to slow down, raise the polished aluminum cap on top of the carburetor and inject three or four tablespoonfuls of clean fresh engine oil into the carburetor. Injection of the oil will stop the engine.

Open the compression relief cocks by turning them counter-clockwise. Inject two or three tablespoonfuls of engine oil into each compression relief cock, 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. The engine should not be started again after injecting the oil. If it is started, it will be necessary to repeat the treatment.

Drain the cooling system by opening the drain valve in the water pump.

Storage Battery

If the car is to be stored during the winter, the storage battery should have special treatment in order to protect it against freezing.

Shortly before the car is used for the last time, distilled water should be added to bring the level of the solution up to the bottom of the fillers. (See page 63.) After the water added has had an opportunity to mix thoroughly with the acid solution, the specific gravity should be taken with a hydrometer. If the specific gravity of the solution is above 1.270 there will be no danger of the acid solution freezing. If, however, the specific gravity is below 1.270, the battery should be removed and charged. *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.*

It is important that one of the battery leads should in all cases be disconnected during storage as a slight leak in the wiring will discharge the battery

and lower the specific gravity to the point where the solution may freeze.

If possible, the storage battery should be removed and charged from an outside source every two months during the storage period.

Tires

During storage of the car, it is best to remove the tires *from the rims* and to keep the casings and tubes in a fairly warm atmosphere away from the light. The tubes should be inflated slightly after the tires have been removed.

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

The weight of the car should not be allowed to rest on the tires during the storage period. If tires are not removed, the car should be blocked up so that no weight is borne by the tires. The tires should also be partly deflated.

Body and Top

A cover should be placed over the entire car to protect it from dust. In storing an open car, the top should be up.

Taking Car Out of Storage

In putting into service again a car that has been stored, it is advisable, unless the storage battery has been removed and charged at periodic intervals, to remove the battery from the car and give it a fifty-hour charge at a four-ampere rate. If the battery has received periodic charges, or if the specific gravity is above 1.200, simply add distilled water to the proper level and connect the leads. If there is a greenish deposit on the terminals of the battery, remove this with a solution of bicarbonate of soda (common cooking soda) and water. Do not allow any of this solution to get into the battery.

Before starting the engine, drain the oil from the oil pan and remove and clean the oil pan and screen. After reinstalling the oil pan, add eight quarts of fresh engine oil. Fill the cooling system, being sure to use anti-freezing solution in freezing weather. Open the compression release cocks and inject two or three tablespoonfuls of engine oil into each cylinder. Close the compression release cocks, and, with the ignition switched off, crank the engine a few seconds with the starter to distribute the oil over the cylinder walls.

Start the engine in the usual manner. As soon as the engine starts, immediately let the carburetor enriching button go as far forward as possible without causing the engine to stop or slow down materially and then open the throttle until the ammeter reads approximately 10 with all lights switched off. While the engine is running lift the aluminum cap on top of the carburetor and inject from two to three tablespoonfuls of engine oil into the carburetor. It is a good plan to run the car outdoors as soon as this has been done. Release the carburetor enriching button entirely as soon as the engine is warm enough to permit it.

PART III

GENERAL INFORMATION

CHAPTER I

Engine

Important Features of Construction

The Cadillac engine is of the water-cooled, four-cycle type with two L-head cylinder blocks of four cylinders each, placed at an angle of ninety degrees between the blocks. The cylinders of one block are directly opposite those of the other block, the lower end of each connecting rod on the left-hand side working in the forked end of the connecting rod opposite. This construction makes the engine shorter and more compact than any other type, the smooth running being largely the result of the short, rigid crankshaft.

The crankshaft has four throws or cranks, three main bearings, and carries on its front end the sprocket by which the camshaft is driven. The camshaft has six bearings, and is driven by the crankshaft through a silent chain in which the proper tension is maintained by an automatically adjusted idler gear. The camshaft has sixteen cams, each operating one valve through a camslide in which is carried a roller.

The fan is mounted on the front end of the generator shaft, which is driven by the camshaft through a special V-shaped belt.

The water pump and oil pump are driven by a cross shaft, which in turn is driven by a spiral gear on the crankshaft. The water pump is at the left-hand end of the cross shaft and the oil pump at the right-hand end.

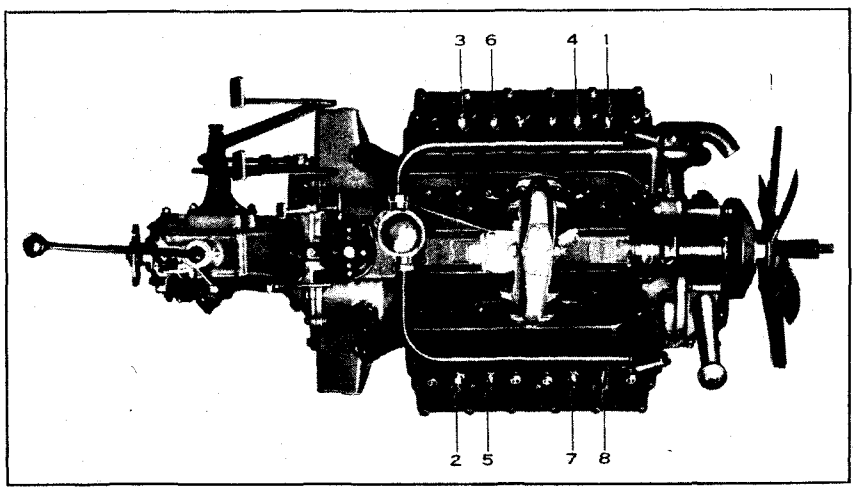


FIGURE 13. ***Firing order***

The engine base is the aluminum crankcase that supports the cylinder blocks and carries the crankshaft and camshaft bearings. The crankcase is supported at the rear end by two arms which are cast integrally with the crankcase and which are bolted to brackets on the frame. The front end of the engine is supported on a cross member of the frame below the radiator.

General Principle of Gasoline Engine

The production of power by the engine may be described briefly as follows:

Gasoline is fed by air pressure from the tank to the carburetor where it is mixed with air in the proper proportions to form an explosive vapor or gas. This gas is then drawn through the intake manifold and inlet valves into the cylinders of the engine where it is compressed by the pistons and then ignited by electric sparks. The pressure of the resulting explosions acting on the pistons produces the power.

The series of operations through which the pistons and valves of each cylinder must go to produce one power stroke is called a "cycle" and for such a cycle four strokes of each piston and two revolutions of the flywheel are required. The four strokes, each of which has a different function, take place in the following order:

Suction Stroke—The suction stroke commences with the piston at its highest point in the cylinder and with the inlet and exhaust valves closed. As soon as the piston starts to descend, the inlet valve immediately opens and a charge of gas is drawn from the carburetor through the valve opening into the space above the piston.

Compression Stroke—When the piston starts upward again after completing the suction stroke, the inlet valve closes. The gas, which has no means of escape, 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, a spark, timed to occur at exactly the right instant, jumps between the electrodes of the spark plug and ignites the compressed charge of gas. The heat that results 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 the piston down and produces the impulse which is transmitted by the connecting rod to the crankshaft, causing the crankshaft to revolve.

Exhaust Stroke—Just before the piston reaches the end of the power stroke, the exhaust valve opens. It remains open while the piston travels upward on the fourth, or exhaust stroke, driving the burned gas 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. This completes the four strokes of the cycle and the piston is ready to draw in a new charge and to repeat the cycle.

Firing Order

Such a cycle as has been described takes place in each of the eight 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 of the eight pistons are so timed that a power stroke is begun every quarter-turn of the crankshaft. The crankshaft thus receives four overlapping power impulses every revolution.

The order in which the eight cylinders fire is indicated by the numbers in Fig. 13. These numbers are the numbers used in marking the flywheel for valve and ignition adjustments.

CHAPTER II

Gasoline System

THE general arrangement of the gasoline system is illustrated in Fig. 14. There are two sets of tubes, one for air and one for gasoline.

The air tubes connect the automatic compressor at the left-hand front end of the engine, the hand compressor on the instrument board, and the air pressure relief valve, to the top of the gasoline tank. As described on page 9, the automatic and hand compressors are for the purpose of furnishing the necessary pressure to force the gasoline to the carburetor. The air pressure relief valve, which is fastened to the left-hand side of the frame under the front floor boards, prevents excessive pressure that might accompany the use of high-test or casing-head gasoline.

The gasoline line starts at the bottom of the gasoline tank and runs to a combination settling chamber and strainer from which tubes lead to the pressure gauge on the instrument panel and to the carburetor.

Settling Chambers and Strainers

The combination settling chamber and strainer in the gasoline line is attached to the left-hand side of the frame under the front floor boards. There is also a settling chamber at the bottom of the gasoline tank and a strainer at the point where the gasoline pipe enters the carburetor.

It is recommended that both settling chambers be drained and both strainers be cleaned regularly every one thousand miles. In freezing

weather it is advisable to do this more frequently as an accumulation of water at these points might freeze and prevent gasoline from flowing to the carburetor.

Before removing either settling chamber drain plug, or the strainer at the carburetor, first relieve the air pressure by removing the gasoline tank filler cap. Be sure there is no fire near.

To drain the settling chamber at the gasoline tank, remove the drain plug at the rear of the chamber as shown in Fig. 14. It is necessary to drain out only enough gasoline to flush the chamber.

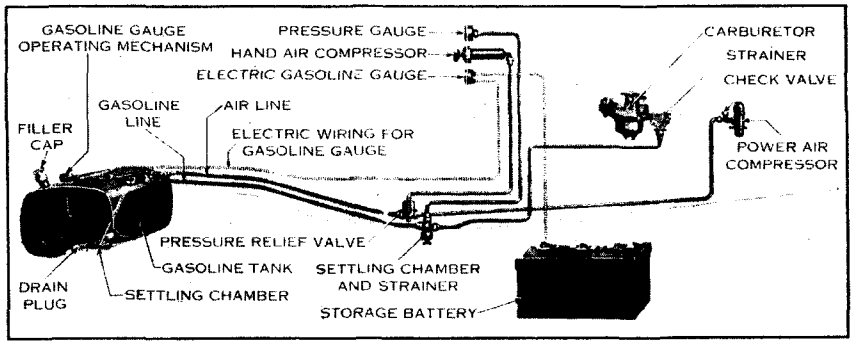


FIGURE 14. *Gasoline system*

To drain the settling chamber in the gasoline line, remove the drain plug in the bottom of the chamber. While the plug is removed, the strainer, which is attached to the plug, should be carefully cleaned of any accumulated matter.

To clean the strainer at the carburetor, remove the six screws that fasten the cap on the strainer. Remove and clean the three gauze discs. In reinstalling the discs, be sure to place them in their original positions. The two discs with fine mesh gauze should be installed first.

Carburetor

The carburetor is correctly adjusted when the engine is assembled and, unless tampered with, should not require readjustment. It is unnecessary to change the adjustment for changes in season, weather or altitude.

Good carburetor action cannot be expected until the engine is thoroughly warmed. 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, it should, if possible, be made by an authorized Cadillac maintenance station. The adjustment should not be attempted by one unfamiliar with it.

CHAPTER III

Cooling System

Water Circulation

The Cadillac engine is cooled with water circulated through the jackets of the cylinder blocks by a centrifugal pump. This pump is mounted on the left-hand side of the engine near the front and is driven by a cross-shaft, which in turn is driven by a spiral gear on the crankshaft. The pump draws cold water from the bottom of the radiator and delivers it to a connection on the left-hand side of the engine where the stream divides, half going to the left-hand cylinder block and half through a passage in the crankcase to the right-hand cylinder block. From the front end of each cylinder head an outlet pipe with hose connection carries the heated water to the top of the radiator.

Radiator and Shutters

The radiator consists of an upper tank and a lower tank connected by water passages around the outside of which air is circulated by the fan. The water passages are so constructed that they expose a large amount of surface to the air, which cools the water as it passes from the upper to the lower tank.

Until the water in the cylinder blocks and radiator is warm, the cooling effect of the radiator is not only unnecessary, but is undesirable. The radiator is accordingly provided with shutters that prevent air from circulating around the water passages until the engine becomes warm. The shutters are pivoted vertically and are controlled automatically by a powerful thermostat contained in the upper tank of the radiator.

When the engine is cold, the shutters are held tightly closed and circulation of air is prevented. The water from the cylinders consequently undergoes little change in temperature as it flows through the radiator and the engine quickly becomes warm. As soon as the water entering the upper tank of the radiator reaches the temperature at which the engine operates best, the shutters are forced open by the thermostat and air begins to circulate. The resulting cooling effect checks the rising temperature of the water, which is thereafter maintained uniformly at the temperature of most efficient operation as long as the engine is running.

Filling and Draining the Cooling System

Except during freezing weather, water should be used in the cooling system. In freezing weather, a suitable anti-freezing solution such as those described on page 34 must be used.

To add liquid to the cooling system or to refill the cooling system after it has been drained, remove the radiator filler cap and pour the liquid in through the filler.

To drain the cooling system, open the drain valve at the bottom of the water pump by turning the hexagonal end of the valve counter-clockwise.

Cleaning the Cooling System

The cooling system should be drained and flushed every two or three months. This can be done in the following manner:

Run the engine until the opening of the radiator shutters indicates that the engine is warm. Stop the engine and immediately open the water pump drain valve.

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

After the liquid has drained off, refill the cooling system with hot water and repeat the operation described above. If in draining the second time the water is very dirty it may be advisable to repeat the flushing operation a third time, placing one or two handfuls of sal-soda in through the radiator filler. The sal-soda must not be permitted to get on the finish of the hood or radiator. If sal-soda is used, the cooling system must be drained and flushed again before refilling for use.

CHAPTER IV

Electrical System

THE electrical system comprises the following units: The generator or source of electrical energy; the storage battery, which stores the current generated; the starting motor, which cranks the engine for starting; the ignition system; the lamps and other devices using electrical current; the ammeter; the ignition and lighting switch; and the circuit breakers, which protect the system. The wiring system connecting these units is the single wire or grounded type, the engine and frame forming one side of the electrical circuit.

Generation of Current

Generator

The generator is attached to the crankcase at the front of the engine and is driven by a specially made V-shaped belt from a pulley on the front end of the camshaft.

At very low engine speeds the voltage of the current generated is not sufficient to provide current for lighting or ignition and the battery is then the source of current. To prevent the battery at such times from discharging through the generator, a cut-out relay on the generator automatically opens the circuit whenever the generated voltage drops below the battery voltage. At approximately eight miles per hour the generated voltage is sufficient to operate the cut-out, which then closes the circuit between the generator and the battery and lighting circuits. If no lights are switched on, the entire output of the generator, less the current required for ignition, flows to the battery for recharging it. If all the lights are on, the generator will not generate sufficient current to start charging the battery until a speed of twelve to fifteen miles per hour is reached.

The amount of current generated by the generator at any instant is the ammeter reading (with all lights off) plus the current for ignition, which is two to three amperes. The generator output reaches its maximum at speeds between twenty and twenty-five miles per hour. This maximum should not exceed eighteen amperes, which is equivalent to an ammeter reading of sixteen when all lights are off.

Do not put oil on the commutator of either the generator or the starting motor.

Ammeter

The ammeter on the instrument board indicates the amount of current flowing to or from the battery except when the starter pedal is down and the starting motor is cranking the engine. When the engine is not running, the ammeter will indicate a current on the discharge side depending in amount upon the number of lights in use. The rate of charge or discharge when the engine is running depends upon the speed of the engine and the number of lights in use, and is equal in amount to the difference between the current generated and the current used by the lights, horn, ignition, and other electrical devices. The ammeter does not indicate the current used in cranking the engine.

If the ammeter should indicate "discharge" with the engine running at normal driving speed and with no lights in use, it is an indication of abnormal conditions and the electrical system should then be checked by a Cadillac maintenance station.

Storage Battery

The storage battery is a three-cell, six-volt Exide battery made especially for the Cadillac electrical system by the Electric Storage Battery Company, of Philadelphia, Pennsylvania. The battery compartment is just forward

of the left-hand running board. The hinged cover of the compartment is provided with a lock that is operated by the switch key.

Adding Water to Storage Battery

The battery is filled with a solution from which the water slowly evaporates and fresh distilled water must be added at intervals to maintain the correct level. The level should be inspected every 500 miles and distilled water should be added to bring the level up to the bottom of the fillers.

The battery compartment has been purposely made convenient of access to facilitate the adding of water. It is important in touring that nothing be placed on top of the compartment that would interfere with this regular attention.

Each cell is provided with a filler and filler plug. To remove a filler plug, turn it as far as possible counter-clockwise and then lift it straight up. To install it, set the plug in place and turn it clockwise until tight. If a plug is lost or broken, obtain a new one and install it as soon as possible.

Nothing but pure distilled water should be added to the battery solution. In the absence of distilled water, melted artificial ice or rain water caught in

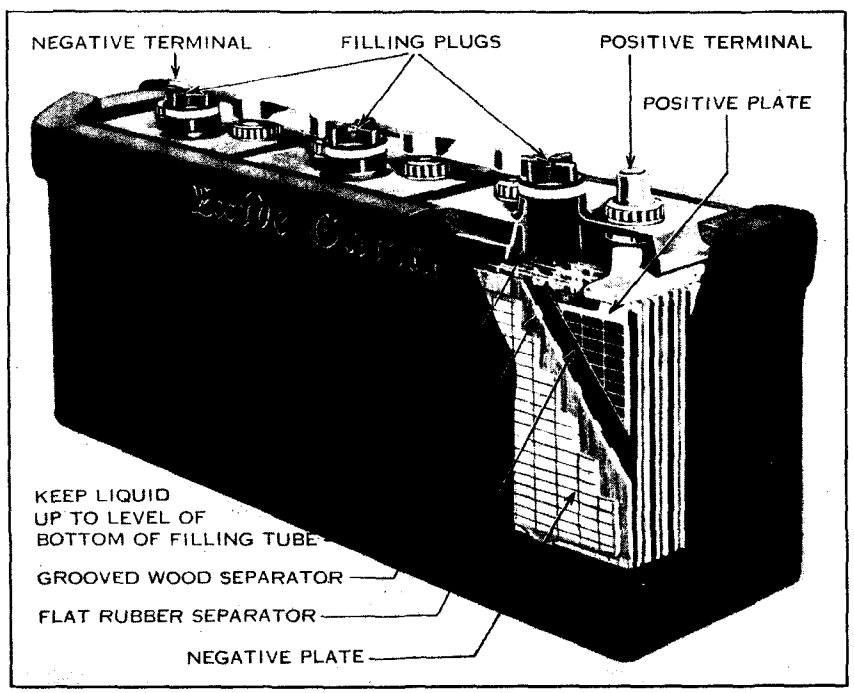


FIGURE 15. ***Storage battery***

an earthenware receptacle may be used. Hydrant water or water that has been in contact with metallic surfaces will cause trouble if used. *Acid must never be added to the battery.*

After adding water to the storage battery in freezing weather, the car should immediately be run far enough to mix the water and acid solution thoroughly. If the car is parked immediately after adding water, the water is likely to stay on top of the acid solution and may freeze, causing extensive damage.

If one cell regularly requires more water than the other, a leaky jar is indicated. A leaky jar should be replaced immediately by a new one as even a very slow leak will in time result in the loss of all the solution in the cell.

Specific Gravity of Battery Solution

As the storage battery is charged and discharged, the solution reacts chemically with the plates of the battery, the specific gravity of the solution changing as the reaction proceeds. The state of charge of the battery is thus indicated by the specific gravity of the solution. As the battery is charged, the specific gravity of the solution increases, reaching 1.270 to 1.290 when the battery is fully charged. The specific gravity of the solution decreases as the battery is discharged. A fully discharged battery has a specific gravity of 1.150 to 1.170.

A hydrometer is the instrument used to measure the specific gravity of a solution. A hydrometer syringe is a hydrometer especially designed for convenience in testing the specific gravity of the acid solution in the storage battery. A hydrometer syringe can be obtained at any battery service station.

The specific gravity of the acid solution should never be tested immediately after adding distilled water. If the solution is below the plates so that it cannot be reached with the syringe, add the necessary amount of distilled water and then drive the car for a few hours before taking the hydrometer reading.

Disconnecting Battery

Do not remove the 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.

Never run the engine with the storage battery disconnected. Serious damage to the generator may result.

Exide Depots and Sales Offices

The Electric Storage Battery Company, whose general offices and works are at Alleghany Avenue and Nineteenth Street, Philadelphia, Pennsylvania, has representative stations in towns of any considerable size as well as sales offices and Exide battery depots in a number of the larger cities. If a storage battery is in need of attention other than recharging, it is advisable to communicate either with a Cadillac maintenance station or with the nearest Exide station or depot. Do not ship a storage battery without receiving instructions.

Starting Motor

Operation of Starter

The starting motor is a series-wound motor mounted vertically at the rear end of the crankcase directly over the flywheel. When cranking the engine, the starting motor drives the flywheel through a pinion which meshes with teeth machined on the rear face of the flywheel. The pinion is normally held out of engagement with the teeth on the flywheel. It is moved down into mesh with the teeth on the flywheel by pushing forward on the starter pedal. Further movement of the pedal operates a switch that closes the battery circuit and starts the armature revolving.

If, in pushing down the starter pedal, the ends of the teeth on the pinion strike against the ends of the teeth on the flywheel preventing further movement of the pinion, continued movement of the pedal compresses a spring. As soon as the pedal has been pushed down far enough to close the starting switch, the armature starts to revolve. The pressure of the spring then forces the pinion the rest of the way, completing the meshing operation.

An over-running clutch on the armature shaft prevents the flywheel from driving the starting motor after the engine is running under its own power and before the starter pedal is released.

Ignition

General Description

The function of the ignition system is, first, to multiply the low voltage (six to eight volts) of the storage battery and generator into voltage of sufficient intensity to cause a spark to jump between the electrodes of the spark plugs; and second, to time this spark so that ignition will take place in the proper cylinder at the proper instant.

The Delco single-spark system is used, consisting of a combination timer-distributor unit in connection with a transformer or induction coil. The primary circuit, through which flows the current from the storage battery or generator, includes the primary winding of the ignition coil; the resistance unit, which is attached to the ignition coil; the timer contact arms and points; and the condenser, which is enclosed in the timer. The secondary or

high-voltage circuit includes the secondary winding on the ignition coil, the distributor and the spark plugs.

Current flows through the primary circuit whenever and as long as either of the two sets of timer contact points is closed. Current flows through the secondary circuit for an instant only when either set of contact points is opened; but the voltage of this current is several thousand times that of the primary circuit and is sufficient to cause a spark at the spark plug.

Timer-Distributor

The timer-distributor is mounted on the top of the crankcase at the rear end and is driven by a spiral gear on the rear end of the camshaft. The shaft of the timer-distributor, which revolves at one-half crankshaft speed, carries a four-lobed cam. As this cam revolves, it actuates the two contact arms alternately, opening and closing first one set of contact points and then the the other. The circuit is thus made and broken eight times during each revolution of the cam and eight corresponding sparks are produced at the spark plugs.

In order to procure the maximum power from each explosion, ignition must occur at the right instant in relation to the position of the piston. But the ignition process, although apparently a matter of an instant, consumes a measurable amount of time. It is therefore necessary to break the circuit at the contact points far enough in advance so that actual ignition will take place in the cylinder at the correct time. The lapse of time is always the same, regardless of the speed of the engine, but because the pistons move faster when the engine is running at higher speeds than when it is running at lower speeds, the degree of advance in relation to the positions of the pistons must be increased as the engine speed increases.

This advancing of the relative timing of the spark for higher engine speeds is automatically accomplished by a centrifugal ring governor on the timer shaft below the cam. As the speed of the engine increases, the governor ring assumes a position more nearly horizontal, forcing the cam ahead of the shaft by which it is driven. This causes the contact points to open earlier, starting the ignition process earlier in relation to the positions of the pistons in the cylinders.

In addition to the automatic advance, the timer has a manual control by which the opening of the contact points may be still further advanced or still further delayed. This is operated by the left-hand lever at the steering wheel, as described on page 10.

The distributor is the mechanism that insures that the high voltage current in the secondary circuit is switched to the proper spark plug at the proper time. It consists of a rotor which is carried on the upper end of the timer shaft and which has a metal contact button electrically connected at

all times with the secondary current from the coil. As the rotor revolves, the button makes contact successively with eight metal contacts which are set in the distributor head, and which are connected to the spark plugs. The relation between the rotor and the timer shaft is such that when the cam causes one set of timer contact points to open, the rotor will be in correct position for conducting the resulting high voltage in the secondary circuit to the proper spark plug.

Spark Plugs

For best results the electrodes of the spark plugs should be .023 inch apart. If the spark plugs should be removed, it is recommended that the electrodes be inspected and adjusted to this clearance if necessary.

Lighting System

Lamp Bulbs

It is recommended that bulbs for the lamps, particularly the two-filament bulbs for the headlamps, be purchased from a Cadillac distributor or dealer. In any event bulbs should have the correct voltage and candle-power ratings. Only three different types of lamp bulbs are used in the entire lighting system. The bulbs and the lamps in which they are used are as follows:

Lamp	Voltage	Candle-power
Headlamp	8	21 (two-filament) (Mazda No. 1110)
Back-up light	8	21 (single filament)
Stop light	8	
Inspection lamp	8	
Parking lights	8	3
Instrument lamp	8	
Rear lamp	8	
Closed car dome and quarter lamps	8	

Cadillac two-filament bulbs are equipped with fog caps or metal screens placed over the upper part of the bulb for the purpose of stopping direct unreflected light from the filament. It is this direct unreflected light from the filament that causes the dazzling reflection from fog or smoke. Headlamps equipped with fog caps have the appearance of being dimmed when seen from the front, but they do not perceptibly affect the useful light from the headlamps.

In replacing a headlamp bulb, transfer the fog cap from the old bulb to the new, adjusting the cap to the position shown in Fig. 18. Then adjust the lamp as directed on page 69.

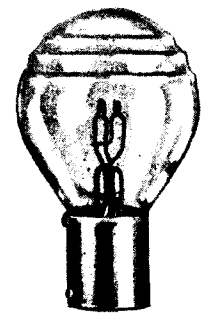


FIGURE 16. ***Double-filament headlamp bulb***

Cleaning Headlamp Reflectors

The headlamp reflectors are plated with pure silver. Although the reflectors ordinarily require no attention, if they should require polishing extreme care must be exercised to select materials that will not scratch the silver.

Powdered dry rouge and a chamois skin are recommended. If the reflectors are tarnished, the rouge may be moistened with alcohol. Afterward, polish with a dry chamois and rouge.

The chamois used for the headlamp reflectors must not be used for any other purpose. It must be soft and free from dust.

Official Approval of Headlamps

Cadillac headlamps have been approved by practically every state in the country. For purposes of official identification, the following description of the headlamps is given:

A complete headlamp containing a parabolic reflector with axis inclined two and one-half degrees; screw adjustment on shell of headlamp to adjust the bulb filament with relation to the reflector in both axial and vertical planes to compensate for filament variation in bulbs; a cover glass containing cylindrical flutes vertically grouped in three distinct zones, the outer zone having greater refractory power and the flutes being more pronounced than

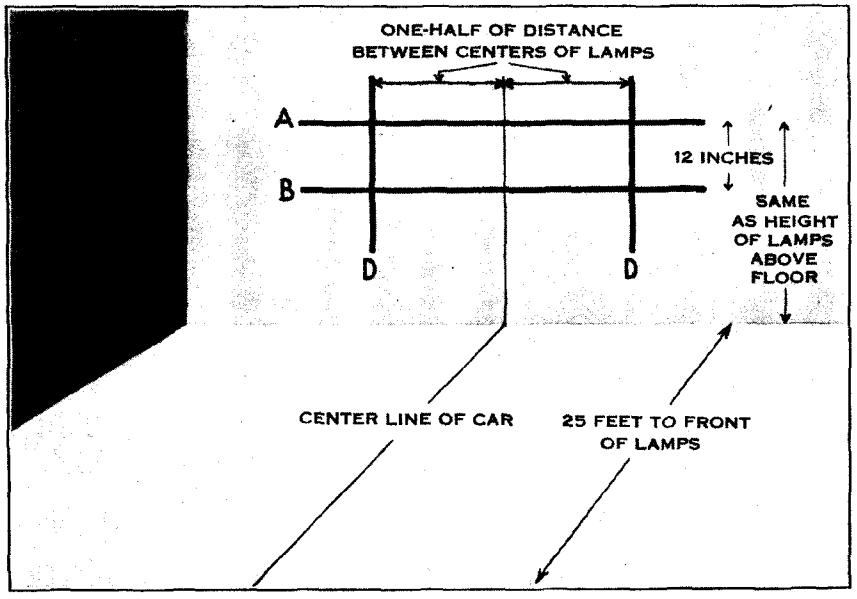


FIGURE 17. ***Marks for adjustment of headlamps***

in the center; and a cap over the upper front portion of the bulb to intercept the direct unreflected light above the horizontal.

Approval by the state authorities is conditioned upon the headlamps being adjusted to a definite standard. The directions which follow are for this standard adjustment.

Adjustment of Headlamps

Select a level spot where the car with an average load can be placed facing toward and twenty-five feet distant from a wall upon which the lines shown in Fig. 17 can be drawn. The adjustment should be made when it is dark enough so that the outlines of the projected beams are plainly visible.

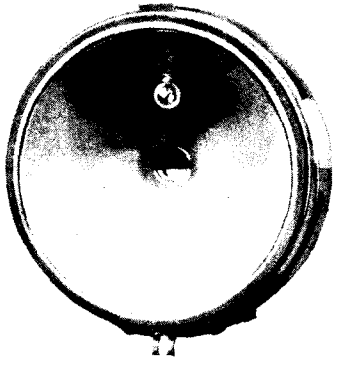


FIGURE 18. ***Headlamp fog cap***

Locate a point on the wall directly opposite the front of the car by sighting through the center of the rear curtain toward the radiator cap. Draw a vertical line on the wall through this point: Measure the distance between the centers of the headlamps, and draw two vertical lines "D" parallel to the center line and distant from it by an amount equal to one-half of the distance between the headlamps. Measure the distance of the headlamp centers above the ground or floor and draw the horizontal line "A" at the same elevation. Draw the line "B" twelve inches below the line "A."

Upper Adjusting Screw—The first adjustment should be made with the lower beam on, that is, with the lighting switch lever in the third position. Cover the headlamp that is not being adjusted, or disconnect the plug connector that supplies current to the lamp. Remove the headlamp door. Make sure that the fog cap is properly placed on the bulb as shown in Fig. 18.

The adjusting screws, of which there are two, are in the back of the headlamp shell. Turn the upper or large adjusting screw until the light spot on the screen is the smallest that can be obtained.

Loosen the nut on the headlamp support and aim the headlamp so that the top center of the spot of light is at the intersection of lines "B" and "D" as shown in Fig. 20a. When the lamp has been properly aimed, tighten the nut securely.

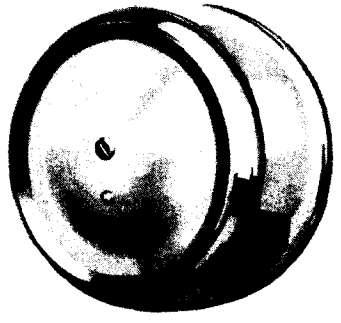


FIGURE 19
Headlamp adjusting screws

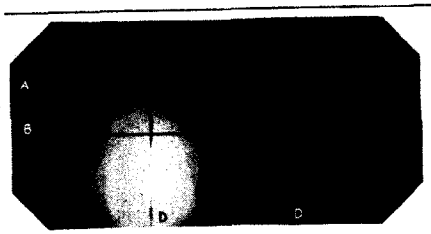


Figure 20a
Left-hand lower beam without lens.

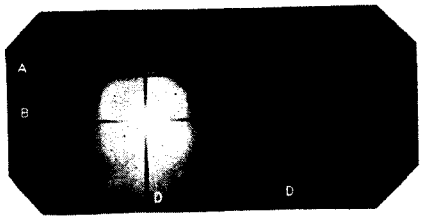


Figure 20b
Left-hand upper beam without lens.

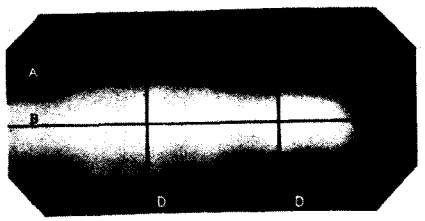


Figure 20c
Left-hand upper beam with lens.

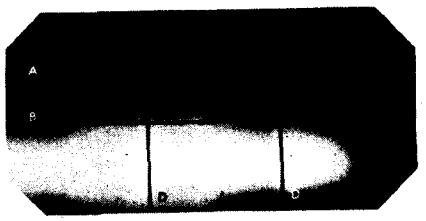


Figure 20d
Left-hand lower beam with lens.



Figure 20e
Both upper beams with lenses.



Figure 20f
Both lower beams with lenses.

FIGURE 20. ***Beams from headlamps***

Lower Adjusting Screw—Turn the lighting switch to the fourth position so that the upper beam is on. Adjust the lower or small screw until the top of the beam is at the intersection of lines "A" and "D" as shown in Fig. 20b. The beam should be of approximately the same proportionate size as shown, and the greatest intensity of the beam should be near the top of the spot and at its center. If the lower beam is now switched on, it should appear as in Fig. 20a and should be of the same proportionate size with the greatest intensity near the bottom, rather than at the center of the spot.

Install the door with the lens. If the lens is for any reason removed from the headlamp door, it should be replaced with the cylindrical flutes vertical and the smooth side facing out.

With the lens in place, the upper beam from the left-hand headlamp should appear as in Fig. 20c. The pattern of the lower beam from the left-hand headlamp should appear as in Fig. 20d.

After adjusting the one headlamp, repeat the adjustment on the other. When both headlamps have been adjusted and both headlamp doors are in place, the combined light from both headlamps should appear as in Fig. 20e when the upper beams are on, and as in Fig.20f when the lower beams are on.

CHAPTER V

Clutch and Transmission

Clutch

The Cadillac clutch is a dry multiple-disc clutch with eight smooth driven discs and seven driving discs faced with friction material composed largely of asbestos. The driving discs have gear teeth machined on their outer circumference to engage with teeth machined internally in the flywheel. The driven discs have gear teeth machined on their inner circumference to mesh with teeth machined on the outside of the clutch hub, which in turn drives the transmission. Except when the clutch pedal is pushed down, the clutch discs are pressed together by a spring having a pressure of 300 lbs. The driven discs then revolve with the driving discs and the engine, if running, drives the transmission.

When the clutch pedal is pushed down to disengage the clutch a forked lever presses against the clutch spring through a ball thrust bearing, releasing the discs from the pressure of the spring. The discs then separate and the driven discs rotate independently of the driving discs.

The clutch itself requires no adjustment or attention other than lubrication of the clutch thrust bearing as directed on page 45. Adjustment of the clutch release rod, however, may be necessary after the car has been driven some distance.

Adjustment of Clutch Release Rod

As described on page 15, the clutch pedal is purposely given about one inch of "lost motion." That is, the clutch does not begin to disengage until the pedal has been moved down about an inch from its released position. This lost motion is necessary in order to allow the clutch discs to come closer together as the facings are reduced in thickness. The lost motion gradually decreases as the clutch is used and eventually will be all taken up. Before this happens, the clutch release rod must be readjusted to restore the lost motion; otherwise, the clutch discs will slip and the engine will not drive the car.

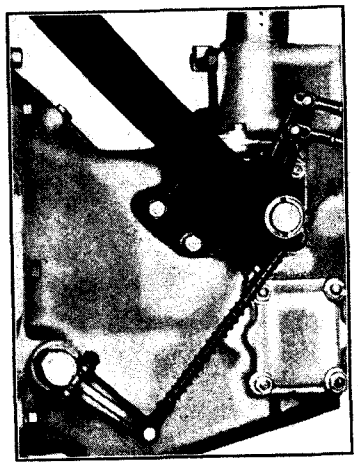


FIGURE 21
Adjustment of clutch release rod

To make the adjustment unscrew the nut "A" (Fig. 21) until the clutch pedal has a movement of one inch without starting to disengage the clutch.

The nut "A" must be turned a half-turn at a time.

Transmission

The purpose of the transmission is to provide a means for varying the ratio and direction of the rear axle speed in relation to the engine speed. Three things are accomplished by doing this: First, the engine is enabled to drive the car backwards. Second, the engine is permitted to revolve fast enough to develop the power necessary for starting and for driving the car at extremely low speeds. Third, the turning effort of the engine is multiplied so that it may be sufficient for climbing steep hills and pulling through deep sand and mud.

The Cadillac transmission is known as the selective, sliding gear type. It has three speeds forward, of which one is direct drive, and one speed in reverse. Selection of the various speeds is accomplished by movement of two shifter gears, "A" and "D," (Fig. 22) which are controlled by the transmission control lever. The positions of the gears corresponding to the five positions of the control lever as illustrated in Fig. 2 are as follows:

Neutral—When the control lever is in neutral position, the shifter gears "A" and "D" are in the positions shown in Fig. 22; that is, they are not in mesh with any of the other gears.

Low—When the control lever is moved from neutral to low, the gear "A" is moved forward into mesh with gear "R." Power is then transmitted from

the clutch shaft "Z" to the transmission main shaft "C" through gears "E," "U," "R" and "A." The ratio of engine speed to propeller shaft speed in low is approximately 3 to 1.

Intermediate—When the control lever is moved from low to intermediate the gear "A" is first returned to its neutral position and gear "D" is then moved back into mesh with gear "S." Power is then transmitted through gears "E," "U," "S" and "D." The ratio of engine speed to propeller shaft speed in intermediate is approximately 1.7 to 1.

High—When the control lever is moved from intermediate to high, the gear "D" is first moved forward out of mesh with gear "S" and then farther forward until teeth cut internally in a recess in gear "D" engage teeth on the

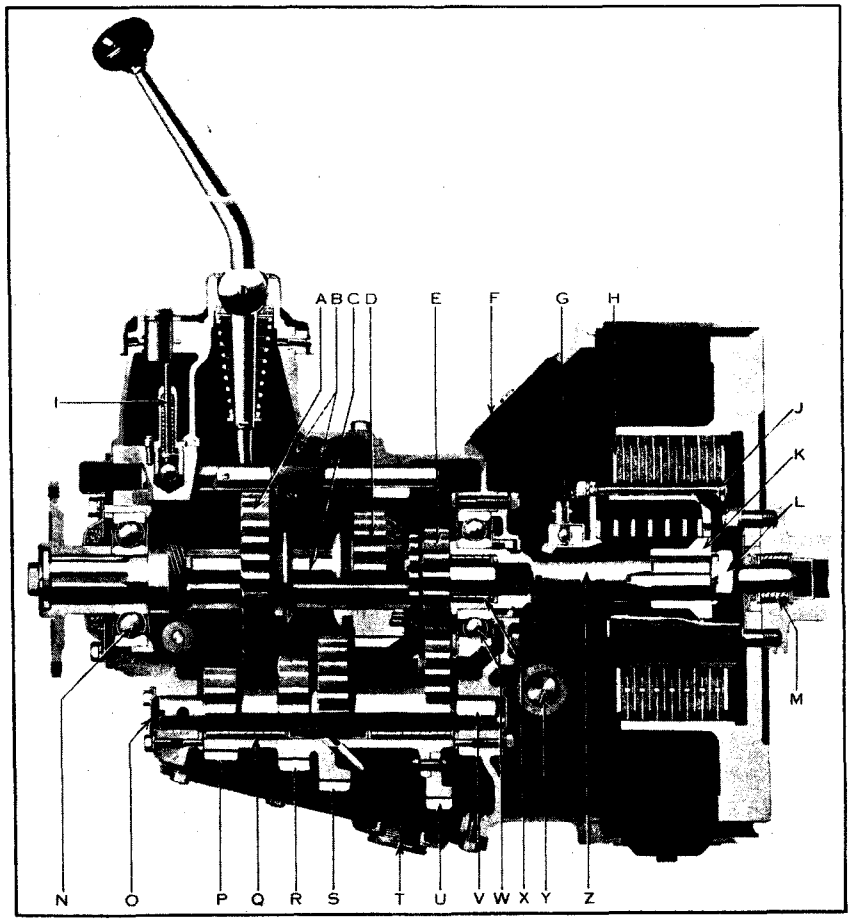


FIGURE 22. ***Sectional view of transmission***

extreme end of gear "E." The drive is then direct from the clutch shaft to the transmission main shaft without reduction.

Reverse—When the control lever is moved from neutral to low, the gear "A" is moved back into mesh with an idler gear, not shown in Fig. 22, which is at all times in mesh with gear "P." Power is then transmitted through gears "E," "U," "P," the reverse idler gear, and gear "A." The interposition of the idler gear reverses the direction of rotation. The ratio of engine speed to propeller shaft speed in reverse is approximately 3.8 to 1.

CHAPTER VI

Brakes

General Description

There are three pairs of brakes: the rear wheel external brakes, the rear wheel internal brakes, and the front wheel brakes, which are also internal. The rear wheel external brakes and the front wheel brakes are operated by the brake pedal and comprise the foot brakes. The rear wheel internal brakes are operated by the hand lever and are used principally for locking the rear wheels when the car is standing.

The purpose of the front wheel brakes is to add to the braking ability as much as is consistent with safety. It is not desirable to attempt to secure the maximum possible braking effect on the front wheels for the reason that, when a front wheel slides without rotating, it has no power to change the direction of the car.

Cadillac front wheel brakes are accordingly designed so that when the foot brakes are applied while the steering wheel is turned to the right or left, only the brake on the inside wheel is effective and the brake on the outer wheel is released, leaving the outer wheel free to rotate. It is thus impossible to lock both front wheels even on slippery pavement unless the car is moving straight ahead. If, while the car is moving straight ahead on slippery pavement, the brakes should be applied with sufficient pressure to lock both front wheels and it then becomes necessary to make a turn, the car will instantly respond because the brake on the outer wheel is automatically released as soon as the steering wheel is turned.

Adjustment

Each foot brake has provision to compensate for wear on the brake lining. The adjustment by which this compensation is effected is at the brake itself

rather than in the connections. Cadillac brakes must *not* be adjusted to compensate for wear by adjusting the pull rods or stop screws.

As described on page 16, the Cadillac two-stage brake pedal automatically notifies the driver when the foot brakes require adjustment. It is recommended that the car be taken to a Cadillac maintenance station for attention when necessity for adjustment is thus indicated.

If, however, the adjustment is neglected and as a result the pedal touches the floor boards before the brakes are fully applied, an emergency adjustment can be made by screwing down the adjusting nuts "F" (Fig. 23) one or more half-turns. The nuts "F" lock every half-turn and must be turned a half-turn at a time. The nuts "F" must not be turned down far enough to cause the brakes to heat and they must be turned down the same amount on both sides.

If adjustment of the nuts "F" is not sufficient, or if the occasion gives opportunity for a complete adjustment, this adjustment should be made as follows:

Loosen the three locking nuts "B," "D" and "N" (Fig. 23) and screw the three stop screws "A", "C" and "M" away from the brake band. Observe the clearance between those parts of the brake lining nearest the hexagonal

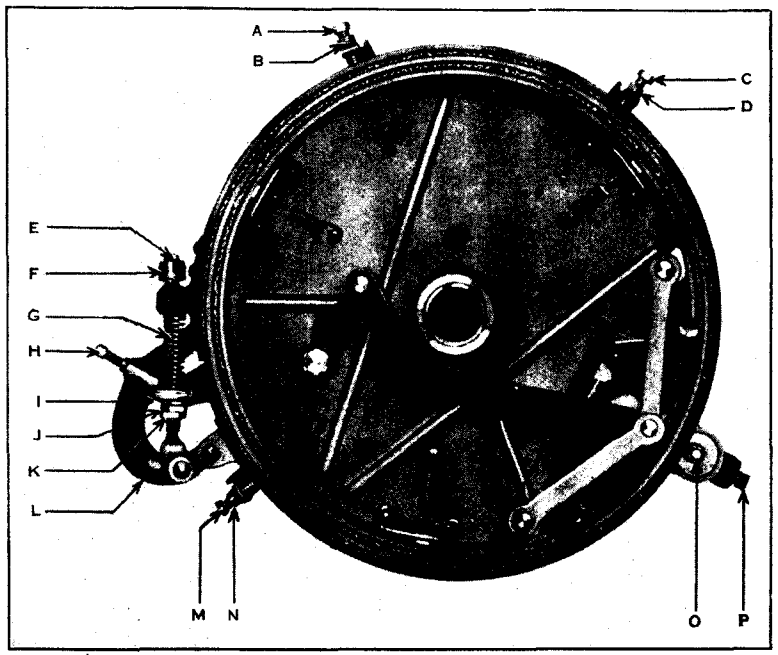


FIGURE 23. ***Rear wheel brakes***

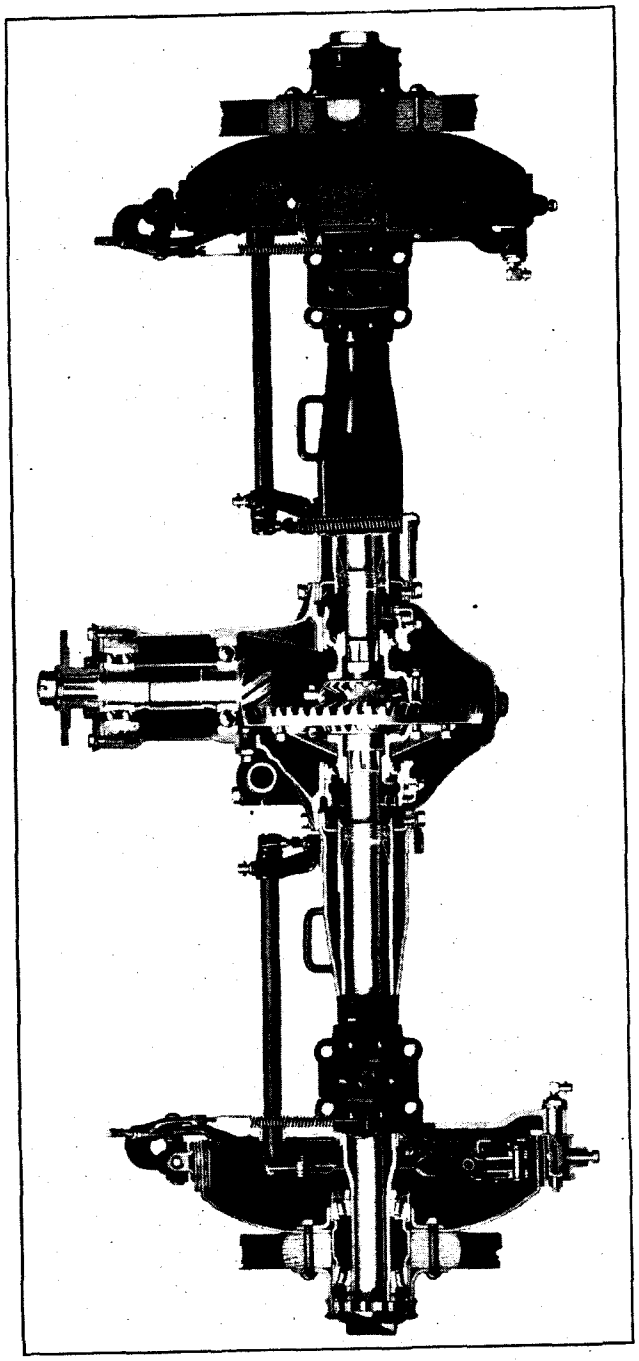


FIGURE 24. *Sectional view of rear axle*

head screw "P" and the brake drum. This clearance should be .030 to .035 inch. If the clearance is not correct, adjust the screw "P" until it is. The screw "P" is kept from turning of its own accord by a lock washer which turns with the screw and locks every half-turn. It must accordingly be turned a half-turn at a time.

Loosen the locking nuts "K" and adjust the nuts "J" and the screws "M" so that there is a uniform clearance of .030 to .035 inch between the *lower* part of the brake lining and the brake drum. To decrease the clearance between the brake lining and the drum, screw the nut "J" farther down on the yoke bolt "E."

Adjust the nuts "F" and the two stop screws "A" and "C" so that there is a uniform clearance of .030 to .035 inch between the *upper* part of the brake lining and the drum.

After making the foregoing adjustments so that there is a uniform clearance of .030 to .035 inch between the drum and the lining, check the results by applying the brakes, and measuring the travel of the upper end of the lever "L." This travel should not be less than $\frac{7}{8}$ inch. If the end of the lever "L" travels less than $\frac{7}{8}$ inch in moving from the released position to the applied position, readjust one or all of the nuts "F" and "J" and the screws "P," "A," "C" and "M" to increase the clearance slightly, keeping the clearance uniform at all points around the drum. Do not fail to tighten the locking nuts "B," "D," "N" and "K" when the adjustment has been made.

Do not change the adjustment of the screw "H." This screw is properly set when the car is assembled and does not require readjustment in taking up wear on the lining.

Inasmuch as the brakes are designed so that the greater proportion of the braking load is taken by the rear wheel brakes, adjustment of the front wheel brakes is usually not necessary until the rear wheel foot brakes have been adjusted several times. Before the limit of adjustment for the rear wheel foot brakes has been reached, the car should be taken to a Cadillac maintenance station for adjustment of the front wheel brakes.

Adjustment of the hand brakes is unnecessary. The hand brakes retain their effectiveness without adjustment throughout the life of the lining.

All joints in the brake connections should be oiled at regular intervals. The brakes should also be tested occasionally to be sure that they are in serviceable condition. When the brake band linings have worn so that further adjustment is impossible, they can be renewed.

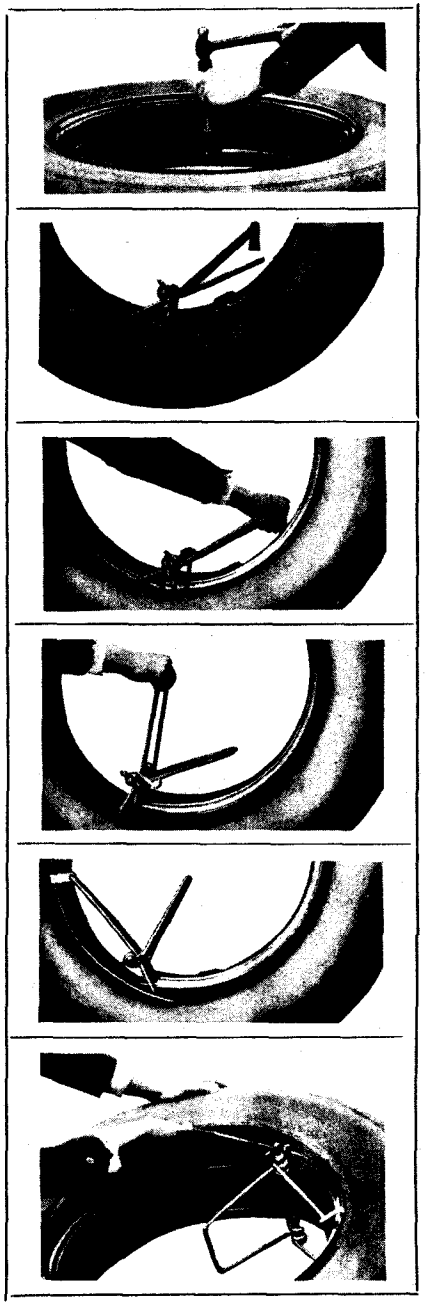


Figure 25a

Lay the tire and rim flat on the ground and drive out the locking pin, using the hammer and punch in the tool kit.

Figure 25b

Apply the rim tool, which is furnished in the tool kit, as shown in the illustration. Note that there are two pairs of holes in the rim near the split and that one pair is nearer the split than the other. The short end of the tool must be inserted in the holes nearer the split and the long end in the holes farther from the split. Clamp the tool firmly in position by tightening the wing nut.

Figure 25c

Grasp the two handles and bring them together, spreading the ends of the rim farther apart at the split. Then pull both handles together toward the other side of the rim until one end of the rim is forced up and over the other end.

Figure 25d

Release the short handle of the tool but continue pulling the long handle until it is against the rim.

Figure 25e

Engage the hook that is attached to the long handle over the edge of the rim to hold the rim in the collapsed position.

Figure 25f

Lay the rim and tire on the ground and remove the tire from the rim by working it off first on the side where the rim is split. The handle of the large wrench is flat to serve as a prying tool.

FIGURE 25. ***Removing tire from rim***

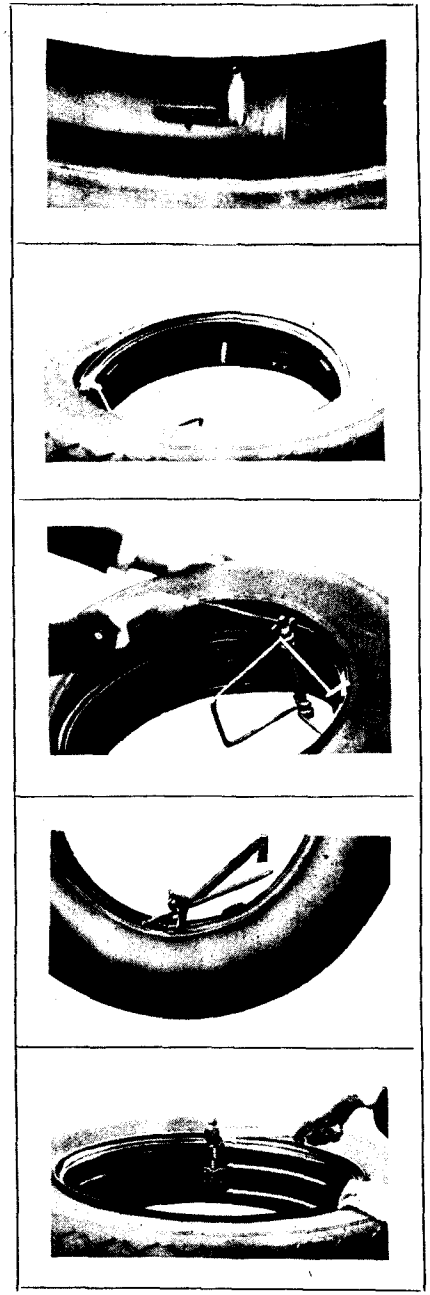


Figure 26a

Make sure that the tube flap is in place and that the valve stem passes through the holes in both ends of the flap.

Figure 26b

Insert the valve stem in the hole in the rim and work the tire well into place on each side of the valve stem.

Figure 26c

Pry the tire over the projecting end of the rim where it is split. The rest of the tire can then be pushed down into place.

Figure 26d

Release the hook on the tool and push the handles of the tool back to their original position. Then remove the tool.

Figure 26e

Replace the pin which locks the two ends of the rim together. This is important.

FIGURE 26. ***Installing tire on rim***

CHAPTER VII

Wheels

Tires and Rims

Illustrated directions for removing a rim with tire from a wheel and installing a rim with tire on a wheel are given in Figs. 7 and 8. Directions for removing a tire from a rim and installing a tire on a rim are given in Figs. 25 and 26.

Do not under any circumstances attempt to remove a tire from a rim without deflating the tire.

Caution in Adjusting Wheel Bearings

The adjustment of wheel bearings or the removal of the wheels should not be attempted by one unfamiliar with work of this nature. It is recommended that the car be taken to a Cadillac maintenance station if possible. In any event great care must be exercised in adjusting wheel bearings 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.

Removing Front Wheel

To remove a front wheel, first jack up the axle until the wheel is free from the ground and then proceed as follows:

Remove the hub cap by unscrewing it. Remove the cotter pin "E" (Fig. 27). Remove the lock nut "A." Remove the serrated washer "B." Remove the adjusting nut "C." The wheel may then be removed by pulling it straight off.

Installing Front Wheel and Adjusting Bearings

Before installing the wheel, make sure the bearings are clean and that they are packed in a light grease that is free from dirt and grit.

Set the wheel in place on the spindle and adjust the nut "C" (Fig. 27) very carefully, following the caution above. Install the serrated washer "B," making sure that one of the notches in the washer fits over the stud "D" on

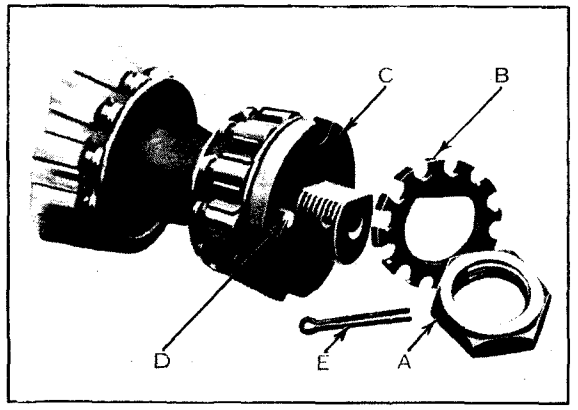


FIGURE 27. *Front wheel bearings*

the adjusting nut. Replace the lock nut "A" and tighten it firmly, locking it with the cotter pin "E."

It is always better to adjust wheel bearings too loosely than too tightly. If after the adjustment is apparently correct, the notch in the washer "B" is not directly over the stud "D," loosen the adjustment rather than tighten it.

Removing Rear Wheel

To remove a rear wheel, first jack up the axle until the wheel is free from the ground and then proceed as follows:

Remove the hub cap "D" (Fig. 28) by unscrewing it. Remove the spring locking ring "F." Withdraw the axle shaft "E." With a screw driver or blunt

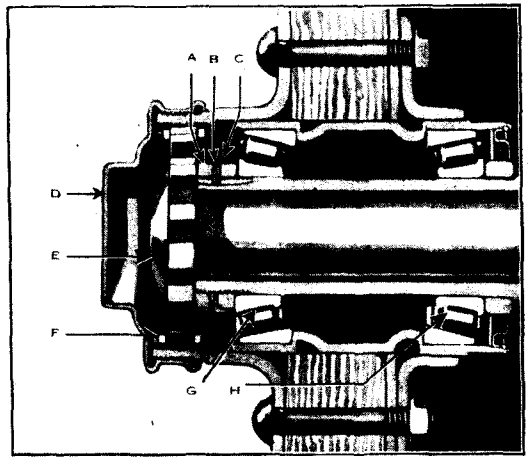


FIGURE 28. *Sectional view of rear wheel hub, showing bearings*

tool straighten the lug of the outer lock washer "B" where it has been bent over the lock nut "A." Unscrew the lock nut "A." Remove the washers "B" and the adjusting nut "C." The wheel can then be removed by pulling it straight off.

Installing Rear Wheel and Adjusting Bearings

Before installing the wheel, make sure that the bearings are clean and packed in a light grease that is free from dirt and grit.

Set the wheel in place upon the axle and adjust the nut "C" (Fig. 28) very carefully. Install the lock washers "B," using new washers or straightening the ones removed if new ones are not available. In placing the washers in position, reverse the outer one with respect to the inner so that the lugs on one washer are opposite the spaces between the lugs on the other washer; that is, so that the lugs on the two washers are staggered. Install and tighten the lock nut "A." Next, select that lug on the inner washer that falls nearest to the center of one of the flat sides of the adjusting or inner nut, and with a screw driver or other suitable tool bend this lug over the nut. In the same way bend one of the lugs of the outer washer over one of the flat sides of the locking or outer nut. In bending the lugs of the locking washers, take care not to alter the adjustment of the inner nut or loosen the outer nut.

CHAPTER VIII

Repair Parts

Genuine Cadillac Parts

Cadillac owners are cautioned against permitting the use of other than genuine Cadillac parts in the repair of their cars. The quality of the Cadillac car is identical with the quality of its component parts, the production of which is based upon more than twenty years of experience in designing, manufacturing, and inspecting. No other individual or organization has access to the data resulting from this experience nor could they possibly have the same interest in protecting the owners of Cadillac cars.

Uniform Parts Prices

Cadillac parts are sold at uniform prices throughout the United States, and are not subject to the addition of transportation, excise or other supplementary charges. Printed price lists published by the Cadillac Motor Car Company are open to inspection by owners at any authorized Cadillac distributor's or dealer's establishment.

Ordering New Parts

With many thousands of Cadillac automobiles in use, it is obviously impractical to deal directly with each Cadillac owner. We cannot open accounts with any except regular distributors with whom annual contracts are made.

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 Cadillac distributor or dealer, who carries a large stock and is generally in a position to supply a part immediately. If he cannot do so, he can order it.

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 tagged properly and with transportation charges prepaid. (See below under "Returning Parts.") Otherwise, we cannot promise prompt service or to fill the order intelligently.

Our responsibility ceases in all cases, with delivery to the transportation company.

Returning Parts

In the event parts are returned, transportation charges must be prepaid or the parts cannot be accepted. They should be tagged properly with the name of the owner and the engine number of the car. A letter should be sent, giving complete instructions regarding the disposition of the parts.

Tires, Speedometer and Clock

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

CHAPTER IX

Specifications and License Data

Type of engine	8 cyl. V-type
Diameter of cylinder bore	3⅛ in.
Length of stroke	5⅛ in.
Piston displacement	314 cu. in.
Horsepower (N. A. C. C. rating)	31.25
Engine number: stamped on crankcase at base of oil filler; also on name plate on front face of dash	
Diameter of crankshaft main bearings	2⅜ in.
Length of crankshaft between inner ends of front and rear bearings	18⅝ in.
Exhaust valves	1 9/16 in.
Inlet valves	1 11/16 in.
Capacity of gasoline tank	20 gals.
Capacity of engine lubricating system	2 gals.
Capacity of cooling system	5½ gals.
Capacity of transmission	3 qts.
Capacity of rear axle	3½ qts.
Tires	33x6.75 (low pressure)
Wheelbase	132 in. and 138 in.
Tread	56 in.

CADILLAC

Operator's Manual



Price Thirty-Five Cents

CADILLAC MOTOR CAR COMPANY
DETROIT

Copyright 1926 by
Cadillac Motor Car Company

EDITION NO. 314-140

In ordering a duplicate of this Manual specify the above number or the engine number of the car

Foreword

THE experienced motorist whose new Cadillac succeeds other cars, some of which may also have been Cadillacs, requires less elementary operating instructions than the beginner, learning for the first time to drive. Likewise, the owner who takes advantage of the facilities offered by the maintenance station has less need for detailed information in regard to care of the car than the owner who provides for all necessary attention in his private garage.

In preparing this Manual, it has been taken for granted that the typical Cadillac purchaser is no longer a novice in motor car operation and that the greatest number of Cadillac owners will be best served by omitting that which is extremely elementary in character. It has also been assumed that, although he should at least know what care his car must regularly receive in order to render the best possible performance with the fewest possible interruptions, the typical Cadillac owner prefers to depend upon the maintenance station for occasional adjustments and repairs.

By thus omitting both that which is very elementary and that which is too technical, the first two divisions of the Manual have been made to include only information that is vital to every Cadillac owner regardless of his previous motoring experience. Part I, "Operation," is important because, no matter what car the owner may have driven before, his new car will differ in some feature, even from an earlier Cadillac. Part II, "Lubrication and Care," contains information that every owner should have regardless of the extent to which he expects to delegate the care of the car to others. Especially should he be familiar with lubrication, for correct lubrication is an essential without which it is impossible for the car to render unfaltering performance.

Part III, "General Information," may be considered as a supplement to the Manual. It contains information that may never be required by some owners, but that is included for use should occasion arise. In other words, it is a reference section to which the index on page 85 is a sufficient guide.

All written instructions are subject to limitations. The owner is asked to remember that the Manual is only one means by which the Cadillac organization desires to assist the Cadillac owner to realize the most from his car. Cadillac distributors and dealers everywhere invite the Cadillac owner to consult them on any matters pertaining to the operation and care of his car. If preferred, a request for information may be made direct to the factory, where it will receive the attention of the Technical Department.

Contents

Part I—Operation

PAGE

CHAPTER I—*Controls and Instruments* 9

Locks—Gasoline gauges and air compressor—Throttle control—Ignition control lever—Carburetor enriching button—Ignition and lighting switch—Starter pedal—Oil pressure gauge—Clutch pedal—Transmis ion control—Brakes—Speedometer—Ammeter.

CHAPTER II—*Driving* 18

Driving speed when car is new—Danger of running engine in closed garage—Coasting—General driving suggestions—Don'ts.

CHAPTER III—*Equipment* 22

Windshield and ventilation—Windshield cleaner—Rear vision mirror—Cigar lighter and inspection lamp—Clock—Side curtains—Curtain fasteners—Tools. TIRES—Tire valve caps—Inflation pressure—Tire air compressor—Tire holder—Changing tires—Truing up rim.

CHAPTER IV—*Cold Weather Operation* 31

STARTING THE ENGINE—Carburetor enriching button—Priming the carburetor—Position of throttle hand lever—Position of ignition control lever—Use of starter—Use of accelerator pedal before engine is warm. ADDITIONAL COLD WEATHER SUGGESTIONS—Engine oil for cold weather—Strainers in gasoline system. ANTI-FREEZING SOLUTIONS—Alcohol and water—Glycerin and water—Capacity of cooling system—Effect of alcohol on finish.

Part II—Lubrication and Care

CHAPTER I—*Systematic Lubrication* 37

Necessity for lubrication. Lubrication schedule. LUBRICANTS—Engine oil—Rear axle and transmission lubricant—Roller bearing and cup grease—Universal joint grease—Steering gear lubricant.

CHAPTER II—*Engine Lubrication* 40

Oil circulating system—Oil level—Oil pressure—Crankcase ventilating system—Oil filter—Replacing engine oil—Generator oil cups—Timer-distributor oil cup—Engine rear supports.

CHAPTER III—*General Lubrication* 45

Grease gun connections—Clutch thrust bearing—Transmission—Universal joints—Rear axle—Wheels—Front brake trunnions—Steering gear—Oil holes in steering column—Speedometer flexible drive shaft—Horn—Springs—Door hardware.

CHAPTER IV—*Care of Body* 49

Care of finish when new—Washing varnished cars—Washing Duco—Cleaning windows—Cleaning upholstery.

CHAPTER V—*Care of Tires* 51

Result of under-inflation—Result of improperly aligned front wheels—Neglect of small cuts—Result of improperly adjusted tire chains—Result of sudden application of brakes—Additional suggestions.

CHAPTER VI—*Storing Car* 53

Engine—Storage battery—Tires—Body and top—Taking car out of storage.

Part III—General Information

CHAPTER I—*Engine* 56

Important features of construction—General principle of gasoline engine—Suction stroke—Compression stroke—Power stroke—Exhaust stroke—Firing order.

CHAPTER II—*Gasoline System* 58

Settling chambers and strainers—Carburetor.

CHAPTER III—*Cooling System* 60

Water circulation—Radiator and shutters—Filling and draining—Cleaning the cooling system.

CHAPTER IV—*Electrical System* 61

Generator—Ammeter. STORAGE BATTERY—Adding water to storage battery—Specific gravity of battery solution—Disconnecting battery—Exide depots and sales offices. STARTING MOTOR—Operation of starter. IGNITION—General description—Timer-distributor—Spark plugs. LIGHTING SYSTEM—Lamp bulbs—Cleaning headlamp reflectors—Official approval of headlamps—Adjustment of headlamps.

CHAPTER V—*Clutch and Transmission* 71

Clutch—Adjustment of clutch release rod—Transmission.

CHAPTER VI—*Brakes* 74

General description—Adjustment.

CHAPTER VII—*Wheels* 80

Tires and rims—Caution in adjusting wheel bearings—Removing front wheel—Installing front wheel and adjusting bearings—Removing rear wheel—Installing rear wheel and adjusting bearings.

CHAPTER VIII—*Repair Parts* 82

Genuine Cadillac parts—Uniform parts prices—Ordering new parts—Returning parts—Tires, speedometer and clock.

CHAPTER IX—*Specifications and License Data* 84

INDEX 85

PART I

OPERATION

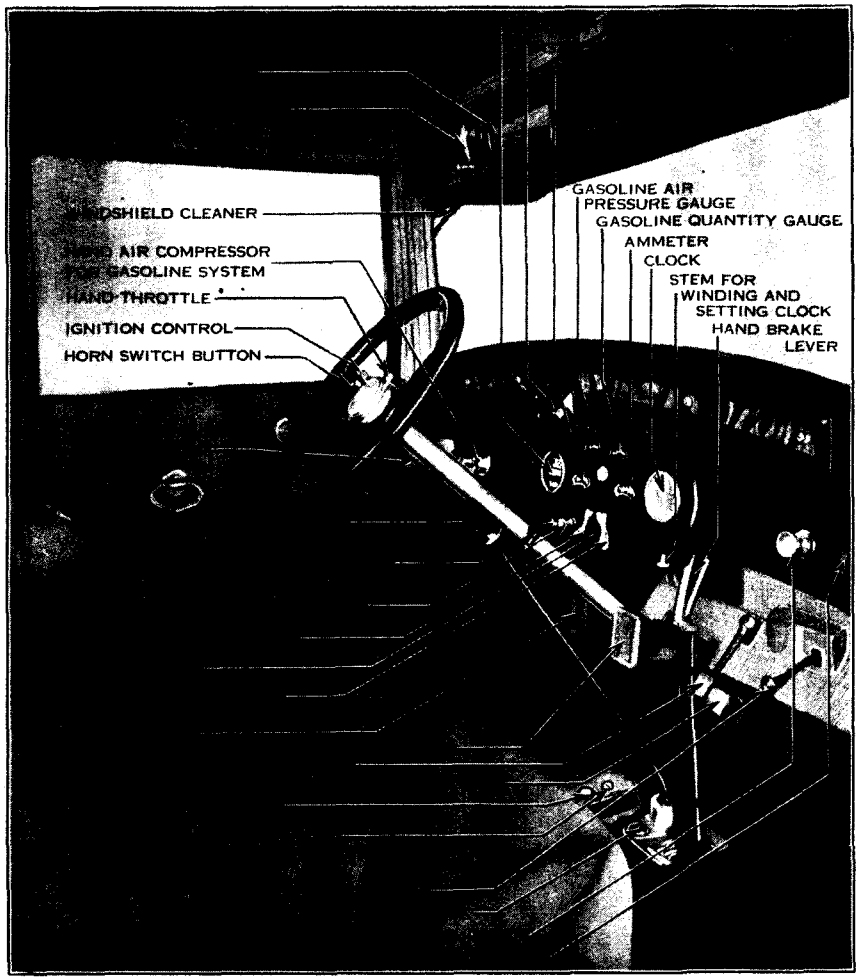


FIGURE 1. ***Instruments and controls***

*See page 23 regarding use of inspection lamp in cigar lighter socket.

CHAPTER I

Controls and Instruments

ONE of the first things the driver of a new car has to do is to familiarize himself with the various controls. In the following chapter are described the levers, pedals, instruments, and other devices used in the operation of the car. The experienced motorist, as well as the beginner, should read this chapter to avoid overlooking any detail of operation in which the car may differ from cars he has previously driven.

Locks

The Cadillac car is provided with the following cylinder locks, all of which on any one car are operated by the same key: ignition switch, transmission control lever, tool compartment, battery compartment, tire holder, and, on closed cars, the doors and various package compartments.

The lock on the switch acts only on the ignition or left-hand lever, which must be *down* in order to be locked. The transmission control lever can be locked in neutral, intermediate and high.

The lock number is stamped on each key, but not upon the face of the lock. It is urged that the owner make a record of the key number as soon as he takes delivery of his car, so that in the event both keys are lost, a duplicate key can be easily ordered.

Gasoline Gauges and Air Compressor

The two upper dials on the instrument panel (Fig. 1) are gauges for the gasoline system. The gauge at the right marked "Gas" indicates in gallons the quantity of fuel in the tank at the rear of the car, and is operated electrically.

The gauge at the left marked "Air" is a pressure gauge and indicates in pounds per square inch the air pressure in the gasoline system. This pressure is necessary to force the fuel from the tank to the carburetor.

Initial pressure is secured by operating the hand air compressor at the left-hand end of the instrument board. While the engine is running, pressure is automatically maintained by a compressor driven by the engine camshaft.

The normal pressure maintained by the automatic compressor is from one to two pounds. There is sufficient pressure for starting the engine when the car is on level ground, if the gauge pointer is even one division away from the pin at zero. On a steep upgrade an initial pressure of one pound may be necessary.

In order to prevent leakage of the air pressure in the gasoline system it is important that the gasoline tank filler cap be air-tight. After screwing on the filler cap be sure to tighten the thumb screw in the center of the cap.

Before operating the hand compressor, the plunger must be released by turning the handle counter-clockwise. When the necessary pressure has been

obtained, push the compressor handle all the way in and lock it, turning it clockwise as far as it will go.

Throttle Control

The power and speed of the engine are controlled by opening and closing a throttle valve in the carburetor. This throttle is operated both by a hand lever and a foot pedal.

The foot pedal, or accelerator, is at the right of the brake pedal (Fig. 1). The hand control is the right-hand lever of the two levers above the steering wheel. Both controls operate the same throttle; the hand lever, however, remains in the position to which it is moved, whereas the accelerator must be held down to keep the throttle open.

The normal position of the throttle hand lever for driving the car is all the way up (at "Close"). In this position the throttle of the carburetor is open just enough to permit the engine to run at idling speed after it is warm. For starting, however, the lever should be moved approximately one-fourth the way down, and should be left in this position until the engine is warm enough to permit the lever to be returned to the idling position without stalling the engine.

The throttle should normally be controlled by the accelerator. In starting the car on a hill, however, the hand lever should be used rather than the accelerator. This permits the brake pedal to be released with the right foot at the same time that the clutch is engaged with the left.

In cold weather, the accelerator should not be pushed down suddenly before the engine is warm. Sudden opening of the throttle before the engine is warm causes "popping-back" in the carburetor. This should be avoided as much as possible by judicious opening of the throttle during the warming-up period. (See page 32 under "Use of Accelerator Before Engine Is Warm.")

The accelerator can be used in cold weather to prime the carburetor by pushing the accelerator to the floor once or twice. This is not necessary except in very cold weather and should never be done unnecessarily. Excessive priming is likely to prevent the engine from starting. (See page 31 under "Priming the Carburetor.")

Ignition Control Lever

Correct timing of the ignition in relation to the positions of the pistons is accomplished automatically by a governor which is a part of the timer-distributor and which provides for all ordinary advancing and retarding of the spark. (See page 66 under "Timer-Distributor.") A hand control is also provided for still farther advancing or retarding the spark on certain occasions as hereafter described.

The hand control is the left-hand lever of the two levers above the steering wheel. For average driving, the correct position of this lever is about one-third down from the extreme top or "Advance" position. The lever should be left in this position except on the following occasions:

1. If the engine is being cranked by hand, the lever should be moved all the way down. If this is not done, a "kick-back" may occur resulting in personal injury.
2. In pulling at low speeds with the throttle well open, the lever should be moved farther down.
3. In driving at high speeds, the lever should be moved all the way up.
4. In starting the engine in extremely cold weather, the lever should be moved all the way up unless the engine is being cranked by hand.

Carburetor Enriching Button

The button at the left of the ignition switch lever (Fig. 1) controls a device on the carburetor for temporarily enriching the fuel mixture supplied to the engine. In starting the engine it is necessary to have the proportion of liquid gasoline in the fuel mixture greater than at other times because in a cold mixture only a part of the gasoline is vaporized. Pulling out the enriching button increases the proportion of liquid gasoline to air, the normal proportions being restored when the button is released and permitted to return to its original position.

Correct use of the enriching control not only is essential to quick starting of the engine, but also has an important bearing on the life of the engine. The enriching button must be pulled out far enough in starting to provide an explosive mixture quickly so that the battery is not unnecessarily discharged by useless cranking. The button must also be held out far enough during the warming-up period so that the engine will run without missing and "popping back." On the other hand, it should not be pulled out any farther or held out any longer than is necessary to accomplish these results, because some of the excess liquid gasoline in the enriched mixture does not burn.

If the engine still retains heat from previous running, the enriching control should not be used without first attempting to start the engine on the normal mixture. If the enriching button is pulled out for starting a hot engine the mixture may be made so rich that starting will be impossible.

The enriching button is not a priming device. It has no effect whatever on the fuel or the fuel mixture unless the engine is being cranked or is running under its own power. The button must be pulled out and held partly out during the cranking operation.

Ignition and Lighting Switch

The ignition and lighting switch (Fig. 1) controls the current for the ignition and for the following lamps: headlamps, instrument lamp, and rear

lamp. The ignition lever is the left-hand lever and has two positions: "off," when down, and "on," when up. The lighting lever is the right-hand lever and has four positions besides the "off" position. Starting with the lowest position, these are:

First Position—Instrument lamp and rear lamp.
Second Position—Parking lights, instrument lamp and rear lamp.
Third Position—Headlamp lower beams, instrument lamp and rear lamp.
Fourth Position—Headlamp upper beams, instrument lamp and rear lamp.

Cadillac headlamp bulbs have two filaments, one above the other, instead of the customary single filament. Both filaments are of the same candlepower (21), but because they are located in different positions with respect to the focus of the parabolic reflector, the beam of light from one filament is projected at a different angle from the other. When the switch lever is in the fourth position, one set of filaments is lighted and the beams are projected straight ahead, illuminating the road at a distance. When the lever is in the third position, the other filaments are lighted and the beams are projected down at an angle, illuminating more brightly the road directly in front of the car.

The practice to be followed by the driver in using this double-beam feature of the headlamps will depend upon the regulations imposed by local authorities. In general, it is expected that the upper beams will be used except on the following occasions: when passing a vehicle approaching from the opposite direction, when rounding a sharp curve and when topping the crest of a hill. On these occasions and at other times when illumination is desired directly in front of the car, the lower beams should be used. For a further description of the headlamps, see page 68.

Starter Pedal

The starter pedal is at the right of the accelerator (Fig. 1). Pushing this pedal forward brings into action the electric motor that cranks the engine for starting. *Do not push the starter pedal when the engine is running.*

The starter pedal is only one of the controls that must be manipulated to start the engine. Unless there is an explosive mixture in the cylinders and a spark to ignite it, it is useless to crank the engine. The starter pedal should not be operated, therefore, until the necessary preliminary steps have been taken. The following, in their proper order, are the various steps that must be performed to start the engine. As each control is mentioned, reference is made to the page on which that control is explained in detail.

1. Unlock the transmission. (Page 9.)
2. Make sure that the transmission control lever is in neutral. (Page 15.)
3. Unlock the ignition switch. (Page 11.)

4. Note whether pressure is indicated on the gasoline pressure gauge; if not, operate the hand compressor. (Page 9.)
5. Place the ignition control lever at the steering wheel about one-third* the way down. (Page 10.)
6. Place the throttle lever about one-fourth the way down from the idling position. (Page 10.)
7. *Cold Weather Only*—In extremely cold weather, prime the carburetor by pushing the accelerator to the floor once or twice. Do not prime the carburetor in warm weather or unnecessarily in cold weather. Excessive priming is likely to prevent the engine from starting. (Page 10.)
8. Pull back the carburetor enriching button unless the engine is still warm. If the engine is still warm, do not pull back the enriching button unless the engine fails to start on the normal mixture. (Page 11.)
9. Switch on the ignition. (Page 11.)
10. Push the starter pedal forward and hold it until the engine starts under its own power. Release it immediately as soon as the engine starts. (See below for probable causes for the engine failing to start.)
11. Let the carburetor enriching button partly in as soon as the engine starts, and all the way in as soon as the engine is warm enough to permit it. (Page 11.)
12. Note whether pressure is indicated on the oil pressure gauge and stop the engine at once if no pressure is indicated. (Page 14.)
13. Move the throttle lever up to the idling position as soon as the engine is warm enough to permit it.

In cold weather, disengage the clutch before pressing down the starter pedal, and hold it down during the cranking operation. This relieves the starter of the necessity of turning the transmission gears, which are immersed in lubricant. The additional load is small in warm weather when the lubricant is thin, but in cold weather the power required to turn the gears through the thickened lubricant adds unnecessarily to the demand upon the battery.

If the Engine Fails to Start—If the engine fails to start after being cranked for a few seconds, do not continue to operate the starter. To do so is a useless expenditure of battery energy. Release the starter pedal and investigate the cause, which may be one of the following:

No fuel in the tank.

No air pressure in the gasoline system.

Ignition not switched on.

Carburetor flooded by unnecessary use of the enriching device or by unnecessary priming of the carburetor when the engine is warm.

*In extremely cold weather move the ignition control lever all the way up unless the engine should be cranked by hand. If the engine is cranked by hand, be sure to move the ignition control lever all the way down.

Oil Pressure Gauge

The lower left-hand dial on the instrument panel (Fig. 1) is the oil pressure gauge. This gauge indicates, not the *quantity* of oil in the engine, but the *pressure* under which the oil is forced to the engine bearings.

When the engine is not running, the pointer on the oil pressure gauge should remain at zero, but as soon as the engine is started and as long as it runs the gauge should show pressure. If the gauge does not show pressure when the engine is running, stop the engine at once and determine the cause. Serious damage may be done if the engine is run without oil pressure. (See page 41 under "Oil Pressure.")

The amount of the pressure indicated by the gauge depends upon the speed of the engine, the viscosity of the oil, and the adjustment of the oil pressure regulator. At idling speed with fresh oil of the correct viscosity, the pressure after the engine is warm should be 1 to 4 lbs. Before the engine is warm, higher pressures than those specified will be indicated. After the oil has become thin from use, lower pressures than those specified will be indicated. These are normal variations from the standard and do not indicate need for readjustment of the oil pressure regulator.

Clutch Pedal

The clutch pedal is the left-hand pedal. When this pedal is in its normal or released position, the clutch is engaged. The flywheel of the engine is then coupled to the transmission by a series of discs, every other one of which is faced on both sides with friction material, and which are pressed together by a powerful spring. When the clutch pedal is pushed down, the spring is compressed and the clutch discs are allowed to separate. The clutch is then disengaged and the flywheel, if the engine is running, revolves independently of the transmission.

The clutch has two uses: First, to enable the car to be started gradually and without jerk or jar; second, to permit shifting of the transmission gears. The operation of the clutch pedal is discussed in connection with the transmission control on page 15. Further comment is unnecessary at this point except the following suggestions to the driver:

Do not drive with the foot resting on the clutch pedal. The Cadillac clutch operates so easily that even the weight of the driver's foot may unintentionally cause the clutch to slip.

Do not form the practice of disengaging the clutch whenever the brakes are applied. Most occasions for use of the brakes require only slowing down without stopping or even shifting of gears. A skilled driver will not touch the clutch pedal until the car is just about to stop or until he is about to shift to a lower gear. It is a mistaken idea that applying the brakes with the clutch engaged is more severe on the brake lining. The opposite is actually

the case, proof of which is in the fact that in coasting down grades the resistance of the engine is used to assist the brakes in controlling the car speed.

It will be observed in operating the clutch pedal that the pedal offers almost no resistance until it has been moved about one inch. It is at this point that it actually begins to disengage the clutch. It is important that the pedal have this "lost motion." If the full pressure of the clutch spring is felt just as soon as the pedal is moved from its released position, necessity for readjustment of the pedal connections is indicated. Failure to make this adjustment will result in the clutch slipping. (See page 72.)

Transmission Control

The Cadillac transmission has three forward speeds and reverse. It is controlled by a lever, the handle of which describes the letter "H" as it is moved from one position to another. It should be observed by those who have driven other makes of cars that, although most cars have this conventional H-type of transmission control, all these cars do not have the same positions of the lever. The driver should study Fig. 2 carefully, and if the various positions of the lever are different from those to which he has been accustomed, he should master this arrangement before attempting to drive.

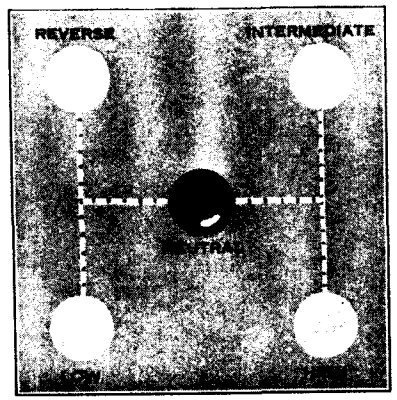


FIGURE 2. ***Positions of transmission control lever***

No attempt can be made here to teach the beginner the technique of gear shifting. It is recommended that the beginner secure individual instruction from the Cadillac distributor or dealer from whom the car was purchased and who will be glad to give this instruction. There are, however, certain rules and suggestions for the operation of the transmission control that it will be to the advantage of every driver to learn or to recall if he already knows them.

Always disengage the clutch before moving the control lever and hold the pedal down until the shift is completed.

Do not attempt to start the car with the transmission control in high gear.

Do not start with the transmission control in intermediate except when the car is on a smooth level road or on a down grade; even under these conditions do not start the car in intermediate unless the engine is thoroughly warm.

Do not make any of the following shifts when the car is moving:

From reverse to any forward gear.
From any forward gear to reverse.
From high gear to low gear.
From intermediate to low gear (except when the car is moving very slowly).

In shifting from high to intermediate, the car should not be traveling faster than fifteen miles per hour and the control lever should be moved very quickly and with no hesitation in neutral.

There are times when it is desirable to be able to shift from high to intermediate at higher car speeds. It is possible to do this by the following method, which is called "double de-clutching":

Disengage the clutch and shift the transmission control lever at once to neutral. Re-engage the clutch at the same time accelerating the engine; then disengage the clutch again and instantly shift to intermediate, after which re-engage the clutch. The speed to which the engine should be accelerated while the transmission control is in neutral depends upon the speed at which the car is traveling when the shift is made.

It is not recommended that the driver attempt the double de-clutching method until he has become expert in shifting from high to intermediate in the usual manner at lower speeds.

Make a practice of shifting the transmission control to intermediate or even to low before commencing the descent of steep grades. The reason for this is explained on page 19, where will also be found further suggestions for coasting.

Brakes

The foot brakes, which consist of external brake bands on the rear wheels and internal bands on the front wheels, are operated by the right-hand pedal. This pedal differs from the conventional brake pedal in a construction that provides automatically for notifying the driver when re-adjustment of the brakes is necessary. Every driver is familiar with the fact that, as the brake lining wears, the brake pedal must be pushed farther toward the floorboard to apply the brakes. On most cars this proceeds until an occasion arises for an emergency stop and then it is found that the pedal goes all the way to the floorboard before the brakes are fully applied.

The Cadillac brake pedal has two stages in its travel. The first stage, which consists of the first four or five inches of the pedal travel, is sufficient for all ordinary stops when the brake band clearance is properly adjusted. When, as the result of wear on the lining, the pedal must be pushed farther toward the floorboard, an inch or inch and a half from the floorboard the second stage of pedal travel is reached. In the second stage, the pedal has somewhat less leverage than in the first stage and the point of division is marked by increased resistance to movement of the pedal. This serves as a notice to the driver that the brakes require readjustment. If it is not convenient to have the adjustment made at once, the brakes can still be operated for some time. The adjustment should be made, however, as soon thereafter as possible.

The hand brakes, which are internal brakes on the rear wheels, are operated by the hand lever at the right of the transmission control lever.

Speedometer

The speedometer has three dials. The upper dial indicates the speed of the car. The center dial indicates the total mileage traveled. The lower dial also indicates mileage, but it can be reset to zero by pushing up and turning the knurled stem back of the instrument board. The right-hand figure on the lower dial indicates tenths of a mile.

Across the speedometer cover glass and below the total mileage dial is a strip of black celluloid on which are two white spaces. These spaces are for the lubrication notice described on page 38 in connection with the lubrication schedule.

An automobile repairman should never be permitted to attempt to adjust or repair the speedometer head or to replace the glass. 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 as carefully as a fine watch. The speedometer head may easily be damaged by rough handling.

Ammeter

The lower right-hand dial on the instrument panel (Fig. 1) is the ammeter, which measures the electric current flowing to the battery and the current flowing from the battery at all times except when the starter is cranking the engine. When current is flowing from the battery, the ammeter shows a reading on the side marked "Discharge"; when current is flowing to the battery, the ammeter reading is on the "Charge" side.

The ammeter should indicate on the "Charge" side most of the time. Otherwise, more current will be taken out of the battery than is put into it and the battery will eventually become fully discharged. The exact amount of current that should be indicated by the ammeter at any time depends upon various conditions, which are explained on page 62.

Ordinarily, when no lights are in use, the ammeter should show "Charge" as soon as the car is running ten or twelve miles per hour in high gear. If the ammeter shows "Discharge" with all lights off, when the car is running more than twelve miles per hour in high gear, it indicates either that the fan belt is slipping or that the generator charging rate should be readjusted. The fan belt should be inspected first, and tightened if necessary, before any attempt is made to change the generator charging rate.

CHAPTER II

Driving

THE preceding chapter of the Manual has aimed to familiarize the driver with the controls and instruments used in operating the car. Actual skill in driving is, of course, more than knowledge of and familiarity with these individual devices. It is not the purpose of this Manual to discuss all phases of driving, but there are a few matters of sufficient importance to Cadillac owners to warrant devoting a chapter to them.

Driving Speed When Car Is New

The parts of the Cadillac car are machined and ground to secure the most accurate fit and the finest finish. Proper functioning of the assembled mechanism is further assured by testing the engine and chassis both on shop dynamometers and on the road. Nevertheless, it is not possible by manufacturing processes and tests to give to bearing surfaces the fine polish that results from continued operation at moderate speeds and loads.

Until a new car has been driven far enough to produce this effect on the bearing surfaces, the car should not be driven at high speeds. It is recommended that the 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. Moderate driving during the first five hundred miles will increase the life of the car more than enough to repay any inconvenience. Manufacturers of locomotives and stationary steam engines have always recognized the necessity for an initial "running-in" period.

Danger of Running Engine in Closed Garage

Every person having to do with the operation or care of a motor car should be warned of the danger that attends running the engine while the car is in a small closed garage.

Carbon monoxide, a deadly poisonous gas, is present in the exhaust of all internal combustion engines. Most people are already familiar with carbon monoxide in the form of illuminating gas, or in the gas produced by furnaces and stoves when insufficient air is supplied to give complete combustion. But illuminating gas and coal gas have an unpleasant odor, which serves as a warning, whereas carbon monoxide, as produced in the internal-combustion engine, is colorless, tasteless, and almost odorless, so that the victim may be overcome before he is aware of the danger.

When the engine exhausts into the open air, the carbon monoxide is so

diluted that it has no effect. It is when the engine is run for a time in a closed room that the proportion of carbon monoxide in the air may increase to the point at which continued breathing of it would be fatal. The United States Public Health Service advises that the average automobile engine warming up in a single-car garage will give off enough carbon monoxide in three minutes to endanger life.

Unusual precaution must be taken in cold weather when the natural tendency is to keep the garage doors and windows closed. The practice of letting the engine warm up before running the car out of the garage is unsafe. The risk is made greater by the fact that the enriching of the mixture by manipulation of the carburetor enriching device increases the amount of carbon monoxide formed.

Coasting

To coast *on the level*, simply release the accelerator pedal and disengage the clutch. If coasting to a stop, the transmission control may also be shifted to neutral and the clutch re-engaged.

In coasting *down grades*, however, it is recommended that the transmission be left in gear and the clutch engaged. With the throttle in the idling position, the car is thus made to drive the engine, the resistance of which assists the brakes and saves wear on the brake lining. It must be remembered that the brakes are subjected to much more severe use on grades than on the level because gravity acts continuously, whereas on the level the brakes need absorb only the momentum of the car. Even on slight grades, coasting with the transmission in neutral or the clutch disengaged is not advisable. On any grade steep enough to warrant coasting, it is worth while to save the brakes as much as possible by utilizing the braking effect of the engine.

Ordinarily, the resistance offered by the engine when the transmission is in high is sufficient to control the speed of the car, supplemented by moderate use of the brakes. On steep grades, however, the transmission control should be shifted to intermediate or even to low if the grade is very steep. Shifting should always be done before commencing the descent of the grade, because, after the car has once gained speed, considerable braking may be necessary to slow down to the speed at which the shift can be made easily.

Do not switch off the ignition when coasting with the car driving the engine. Contrary to a common impression, this does not appreciably increase the resistance and is likely to cause damage to the engine. Even with the throttle closed, some fuel is admitted to the cylinders and if this is not burned it condenses on the cylinder walls and washes off the oil by which the pistons are lubricated.

General Driving Suggestions

Road and traffic laws vary greatly in different localities. It is unfortunately impossible to set down a complete list of rules that may be followed in all parts of the country. The following are some of the rules that are universal in practically all parts of the United States:

In meeting a vehicle going in the opposite direction pass to the right.

In overtaking 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 the car around to do this, it should be done.

Never turn around or turn off on another road without making absolutely certain that there is no other vehicle directly behind.

Never start to cross street car tracks without making sure that there is no car directly behind. 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. At any railroad crossing that is on an up grade or which for any reason must be approached very slowly, it is a wise precaution to shift to intermediate gear before crossing because the car can thereby be accelerated more quickly, if necessary.

In crowded traffic do not apply the brakes suddenly unless it is absolutely necessary. A vehicle following may not have brakes as efficient as Cadillac four-wheel brakes.

On wet asphalt streets or slippery roads do not apply the brakes suddenly unless it is absolutely necessary. Cadillac four-wheel brakes minimize the possibility of skidding under these conditions, but their effectiveness should not induce anyone to drive less carefully.

Slow down in passing vehicles going in the opposite direction.

Never take a chance.

Don'ts for General Operation

Don't fail to change the engine oil as frequently as recommended.

Don't fail to release the carburetor enriching button as soon after starting as possible.

Don't fill the lubricating system of the engine alone and neglect to lubricate all other parts of the car.

Don't neglect the lubrication of any part of the car.

Don't run the car at sustained high speed when it is new.

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 disengaging 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 switch off the ignition when coasting with the car driving the engine.

Don't push the starter pedal 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. The front wheels pivot more easily if they are rotating.

Don't fail to investigate any unusual sound which may develop in the car. The car should be inspected at a Cadillac maintenance station.

Don't neglect to inspect the level of the acid solution in the storage battery every 500 miles and add distilled water if necessary.

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 air pressure or without gasoline in the tank.

Don't neglect to keep the tires inflated properly.

Don't race the engine when it is not driving the car. There is no worse abuse.

CHAPTER III

Equipment

THE controls and instruments used in driving have already been described. In addition to these the car is equipped with various devices which are for the convenience and comfort of the occupants, and are used only as occasion demands. It is suggested that the driver anticipate his use of such equipment by becoming familiar at once with the directions contained in this chapter.

Windshield and Ventilation

Closed Cars—Cadillac closed cars are equipped with a one-piece windshield, which can be moved up and down. Movement of the glass is controlled by a handle above the windshield. To raise the glass, the handle should be turned clockwise, and to lower the glass the handle should be turned counter-clockwise.

For moderate ventilation, the windshield should be raised not more than one inch so that the lower edge of the glass is still below the ledge over the instrument board. With the windshield in this position, air is deflected into the driving compartment through an opening in the cowl just forward of the instrument board. For additional ventilation, the windshield can be raised above the level of the ledge over the instrument board, and air then enters directly into the car.

Open Cars—Cadillac open cars are equipped with a cowl ventilator which is operated by a lever just in front of the instrument board and at the right of the steering column. Additional ventilation for warmer weather can be secured by manipulating the windshield.

The open-car windshield is in one section, which is pivoted at the upper corners. To secure more ventilation than can be obtained through the cowl ventilator, the windshield can be tilted out.

The thumb screws on the windshield supports must be loosened before adjusting the position of the windshield and must be tightened to hold it in the desired position.

Windshield Cleaner

The windshield cleaner is operated by the suction or vacuum in the passages between the carburetor and the engine. On open cars the cleaner is controlled by a lever at the cleaner. When the lever is as far toward the right as it will go, the cleaner is shut off. To start the cleaner, move the lever toward the left.

On closed cars the cleaner is controlled by a knurled button on the left-hand end of the instrument board. When the button is turned clockwise as far as it will go, the cleaner is shut off. To start the cleaner, turn the button counter-clockwise. (On some closed cars the cleaner is controlled by a lever on the instrument board similar to that on the open car cleaner.)

Rear Vision Mirror

The rear vision mirror may be adjusted by the driver to suit his preference, after loosening the clamp screws that hold the mirror to its supporting bracket.

Cigar Lighter and Inspection Lamp

The car is equipped with a combination cigar lighter and inspection lamp that makes use of a single reel with twelve feet of flexible cord attached to the back of the instrument board. The flexible cord ends in a bayonet type socket to which may be attached either the inspection lamp or the heating element of the cigar lighter. The method of attachment is identical with that of an ordinary lamp bulb. Ordinarily the cigar lighter will be carried in place in the socket on the cord and the inspection lamp in a stationary socket provided on the front of the dash, where it is useful to illuminate the engine. (The inspection lamp is packed with the tool equipment when the car is shipped.)

To use the cigar lighter pull it out from the instrument board at least a foot, wait a few seconds for the heating element to heat and apply it to the cigar or cigarette. The current is automatically switched on as soon as ten or twelve inches of the cord has been unreeled. To light a pipe, remove the nickel plated shield by turning it slightly counter-clockwise and pulling it straight off.

To lock the cord in any desired position, pull out the button on the instrument board at the right of the cigar lighter (Fig. 1). This engages a ratchet which prevents the reel from rewinding. To rewind the cord, press the button back to its original position.

The inspection lamp socket on the dash has a double bayonet lock with two sets of slots. To install the lamp, simply insert it in the socket, press in, and turn it clockwise as soon as the pins on the lamp engage the first or outer set of slots. In this position the current is not switched on. To switch the current on, turn the lamp slightly counter-clockwise, press in, and turn it clockwise again, engaging the pins in the second or inner set of slots. To switch off the light, turn the lamp counter-clockwise and pull it out of the socket far enough to engage the first set of slots.

Clock

The clock has an eight-day movement and is wound in the same manner as a watch. The stem is under the clock back of the instrument board.

Side Curtains on Open Cars

The side curtains, with which the open cars are equipped, are carried in an envelope provided with cloth partitions to prevent rubbing and chafing. The Touring car curtains are stowed under the front seat; the Phaeton curtains in a compartment back of the front seat, with a door opening in the tonneau; the Roadster curtains in the package compartment just back of the seat.

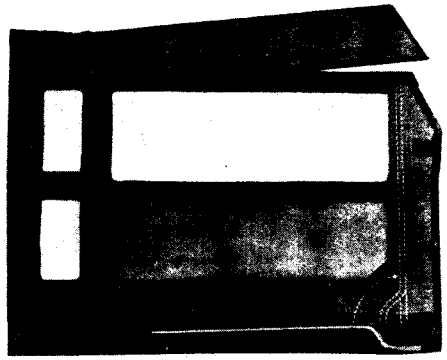


FIGURE 3. ***Side curtains***

The Touring car and Phaeton curtains are in six sections, each of which is marked to indicate its position, as "Left Front," "Right Center." The front and center sections on both sides are each provided with a rod, the lower end of which fits a socket in the top of the door. When a curtain is folded for stowing, this rod is parallel with the bottom of the curtain as shown in Fig. 3. Before the curtain can be attached to the door, the rod must be moved to the position shown by the dotted lines. The upper end of the rod is slotted to engage with the stiffener that runs along the upper edge of the curtain.

The rear sections should be applied first, followed by the center and front sections. The rear sections should be fastened to the rear bows *under* the side flaps of the permanent rear curtains.

Before stowing the curtains, they should be dry and clean.

Curtain Fasteners

Most of the curtain fasteners used on the top and side curtains are of the type illustrated in Fig. 4. When this type of fastener is snapped on its stud, it becomes locked on three sides. To release the fastener it must be lifted on the side that is not locked. This side is indicated by the small projection to which the arrow points in Fig. 4. This type of fastener cannot be released by lifting it at any other side. The remainder of the fasteners used on the top and curtains are of the usual glove type.



FIGURE 4
Curtain fastener

Tools

The compartment for carrying the tool equipment is just forward of the right-hand running board. The lock on this compartment is operated by the switch key. The following are the tools comprising the standard equipment. The numbers refer to the numbers by which the tools are designated in Fig. 5. Items listed opposite Nos. 25, 26, 27, 28 and 29 are not illustrated.

1. Open end wrenches (two) for adjusting rear foot brakes
2. Small screw driver
3. Socket wrench for oil pan drain plug
4. Large screw driver
5. Center punch
6. Cold chisel
7. Hammer
8. File
9. Pliers
10. Wrench for spark plugs and compression relief cocks
11. Distributor wrench (with gauge for adjusting timer contact points and spark plugs)
12. Distributor wrench (plain)
13. Bicycle wrench
14. Monkey wrench
15. Wrench for rim clamping nuts
16. Rim assembling tool
17. Hose for tire air compressor
18. Adapter for grease gun for lubricating clutch thrust bearing (for cars with grease gun connection on thrust bearing)

18A. Extension fitting for lubricating clutch thrust bearing (for cars using screw plug on thrust bearing)

19. Grease gun
20. Hand starting crank
21. Hub cap wrench
22. Oil can
23. Jack handle
24. Jack
25. Inspection lamp. Note: The inspection lamp is packed with the tool equipment when the car is shipped but is ordinarily carried in the socket provided for it on the dash
26. Small tool bag
27. Large tool bag
28. Lubrication chart
29. Operator's Manual

Tires

Tire Valve Caps

The valve caps used with some makes of tires are a combination dust and valve cap. This type of cap can be removed and installed without screwing the cap the entire length of the threads on the valve stem.

To remove one of these valve caps, turn it two or three turns counter-clockwise. This loosens the sliding nut inside the cap (Fig. 6). Next, pull the cap up as far as it will go. Then remove the cap by unscrewing it the rest of the way.

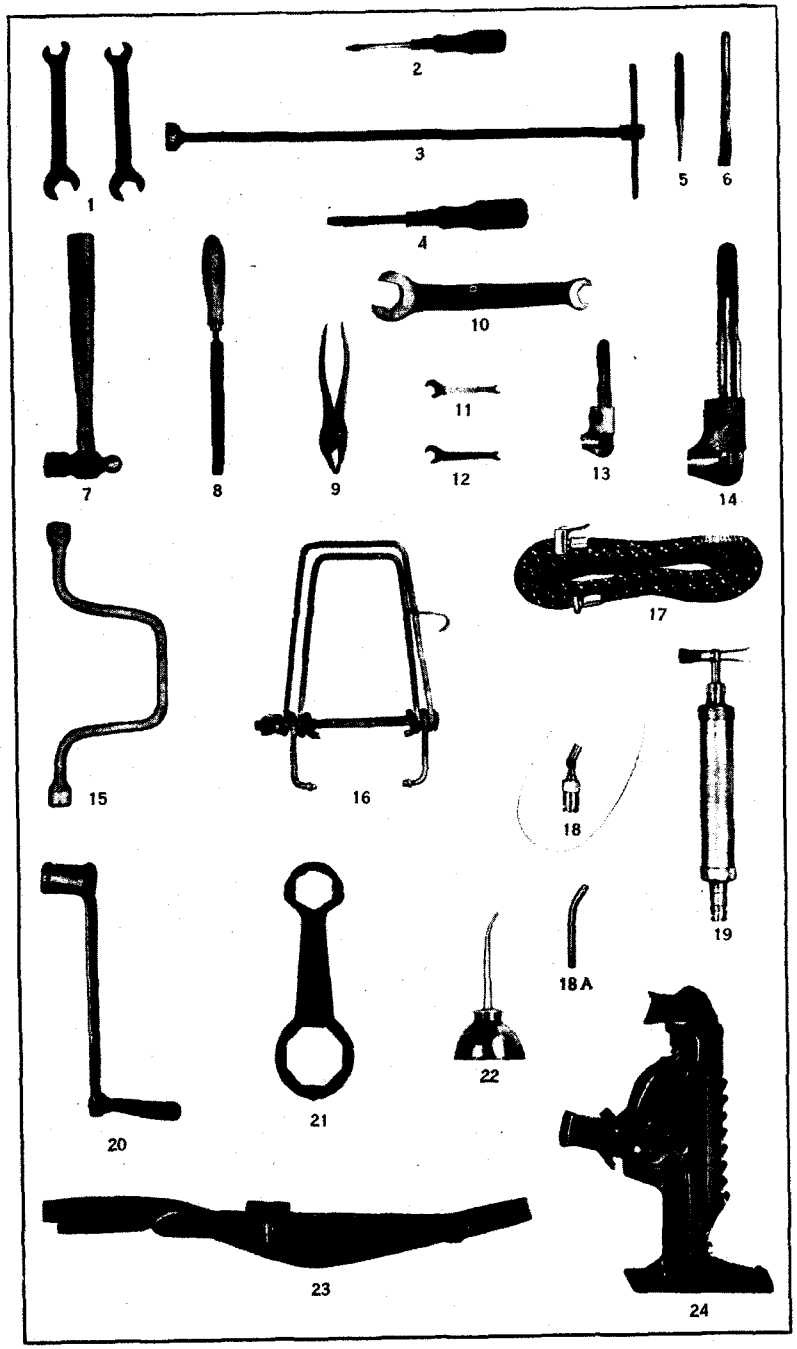


FIGURE 5. ***Standard tool equipment***

(The numbers refer to the list on page 25)

To install a valve cap, place the cap over the valve stem and turn it a few turns clockwise to engage the threads in the sliding nut. If the sliding nut is too far inside the cap to be reached by the valve stem, shake the nut down by tapping the bottom of the cap on some solid object. When the valve stem has been started in the sliding nut, push the cap down over the stem as far as it will go. Then turn the cap until it locks tightly.

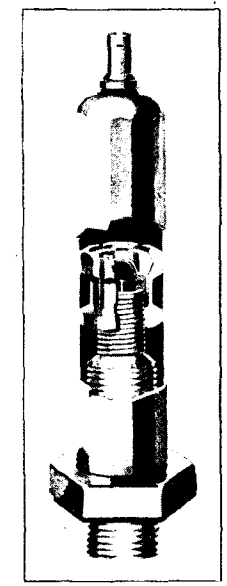


FIGURE 6
Tire valve cap

Inflation Pressure

For normal driving, the 33 by 6.75 low pressure tires, which are standard equipment on Cadillac cars, should be inflated to a pressure of 40 lbs. per square inch. The inflation pressure should be checked at least weekly and should not be permitted to drop more than 5 lbs.

On cars driven at high speeds, the front tires should be inflated to 50 lbs. or higher if necessary. *This is important.*

Tire Air Compressor

To use the tire air compressor with which the car is equipped, proceed as follows:

Turn back the left-hand side of the front carpet and lift the small oval-shaped cover which is in the floor just to the left of the transmission control lever. Reach through the hole in the floor and remove the knurled cap from the connection on top of the compressor. Connect one end of the air hose (in the tool equipment) to this connection and the other end of the hose to the valve of the tire to be inflated. *Do not connect the hose to the tire first if there is pressure in the tire.*

The control shaft by which the compressor driving gear is placed in mesh with the transmission gears projects through a small hole in the floor just in front of the large hole over the compressor. To start the compressor, if the engine is running, disengage the clutch and hold the pedal down until the transmission gears have ceased to revolve. Then, with a screw driver, turn the slotted head of the compressor control shaft clockwise. If the engine is not running, simply turn the control shaft clockwise without disengaging the clutch and then start the engine.

The compressor gives best results when the engine runs at a speed of approximately 1,000 r.p.m., which is about three times the normal speed of the engine when idling. Do not race the engine in operating the compressor, or, for that matter, at any other time when it is not driving the car. Racing the engine beyond the recommended speed not only decreases the efficiency

(Continued on page 30)

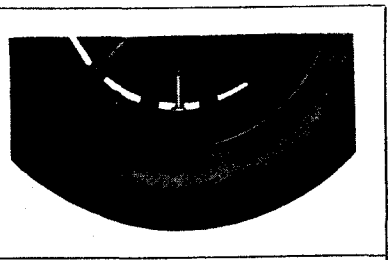


Figure 7a

Jack up the axle until the tire clears the ground. Unscrew the dust cap and the clamping nut from the tire valve stem.

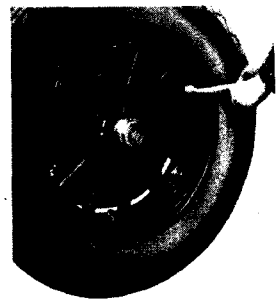


Figure 7b

With the brace wrench, supplied in the tool kit, loosen the six rim clamping nuts. Turn each clamp so that the lug is away from the rim and tighten the nut enough to hold the clamp in this position.



Figure 7c

Rotate the wheel so that the valve stem is at the top, and pull the bottom of the rim away from the wheel. If the rim does not come off easily, pull the top of the rim as far out as the valve stem will permit and then pull the bottom part of the rim away from the wheel.

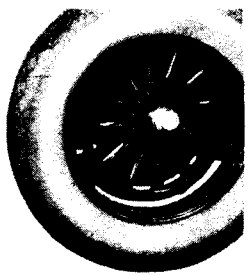


Figure 7d

Rotate the wheel until the valve stem approaches the bottom. At the point shown in the illustration, the rim and tire will roll free from the wheel and can be removed without lifting

FIGURE 7. ***Removing rim with tire from wheel***

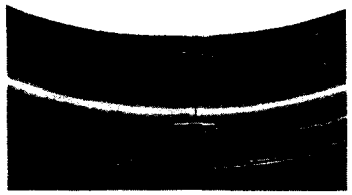


Figure 8a

If the rim has no split clamping ring, take the one from the rim removed. The correct position for the ring is just inside the three lugs and with the split opposite one of the lugs. If the ends of the ring overlap, they can be sprung into place with a screw driver.

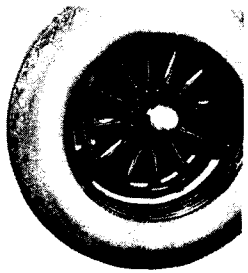


Figure 8b

Rotate the wheel so that the hole for the valve stem is in the position shown. Hold the rim so that the three lugs are on the side away from the car and insert the valve stem into the hole in the wheel.

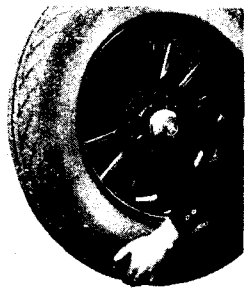


Figure 8c

Rotate the wheel, which will carry the rim with it, until the valve stem is at the top. Then push the lower part of the rim into place, guiding the hinge on the rim through the notch provided for it in the edge of the wheel.

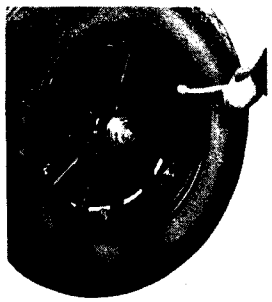


Figure 8d

Turn each rim clamp so that the lug is over the clamping ring, drawing the nut down until the end of the bolt is flush, or nearly so, with the outer surface of the nut. Then go over the six nuts again, tightening them firmly. (See page 30 in regard to truing up the rim on the wheel.) Install the valve stem clamping nut and the dust cap. It is important that the clamping nut be firmly tightened.

FIGURE 8. ***Installing rim with tire on wheel***

of the compressor, but is one of the worst forms of abuse. To stop the compressor, turn the control shaft counter-clockwise.

Do not turn the compressor control shaft to start the compressor when the engine is running and the clutch is engaged.

Tire Holder

The tire holder is designed to carry either one or two standard size tires mounted on rims and inflated. Each rim has on it three lugs which are located so as to engage with notches on the support arms and on the adjustable clamp. There are two sets of these notches.

When two rims are carried, the rim nearest the car should be placed so that the side with the lugs is away from the car and the lugs should be inserted in the inner set of notches. The outer rim should then be placed so that the side with the lugs faces toward the car and the lugs of this rim should be inserted in the outer set of notches.

When only one rim is carried, the side of the rim with the lugs should face toward the car and the lugs should be inserted in the inner set of notches.

The tire holder lock is in the upper end of the clamp screw and is protected by a dust cap which must be unscrewed to insert the key. Turning the key clockwise disengages the lock, permitting the clamp screw to be turned.

To lock the tire holder, screw the clamp down firmly against the rim or rims. Adjust the clamp screw handle so that it points squarely across the car. Then turn the key counter-clockwise. Care should be exercised in removing or replacing a spare tire not to strike the body of the car.

Note: If a tire cover is used, it should have slots cut in it opposite the two upper lugs on the rim so as to permit these lugs to seat in the notches in the support arms.

Changing Tires

If a spare rim with inflated tire is always carried on the tire holder, the driver will seldom or never have occasion to disassemble a tire from the rim. In case of tire trouble it is then merely necessary to remove the rim with tire from the wheel and to install on the wheel the spare rim and tire. Illustrated directions for making this change are on pages 28 and 29. Disassembly of the tire from the rim is necessary only if the tire is to be repaired or a new one installed. Directions for this work, which is usually left to the repair shop, will be found on pages 78 and 79. Never attempt to remove a tire from its rim without first deflating the tire.

Truing Up Rim

If a rim does not run true, it may be trued up in the following manner: Rotate the wheel slowly and mark the part that runs farthest out from the face of the wheel. Loosen slightly the nuts diametrically opposite the mark and then tighten the nuts on the marked side. Test the wheel again and if it still does not run true repeat the operation.

CHAPTER IV

Cold Weather Operation

THE Cadillac car is an all-season car and no owner need hesitate to make full use of his car in severe winter weather as well as at other times. It is necessary in freezing weather, however, to observe certain precautions and to follow a somewhat different procedure, particularly in starting the engine. In this chapter has been grouped all the information relating to operation of the car during cold weather. It should be reviewed just prior to the beginning of the winter season.

Starting the Engine

Carburetor Enriching Button

The first difference between starting the engine in cold weather and starting the engine in warm weather is in the greater use of the carburetor enriching device necessary in cold weather. Gasoline does not vaporize as readily at low temperatures, and in order to supply the cylinders with a gaseous mixture rich enough to be ignited, the proportion of liquid gasoline to air must be increased.

At the same time it is important not to apply the enriching device more than is necessary. The unvaporized gasoline collects on the cylinder walls and works down past the pistons, washing off the lubricant as it goes. Although dilution of the oil supply with this unburned gasoline is minimized in the Cadillac engine by an exclusive system for ventilating the crankcase (see page 42), it is best to avoid an excess of liquid gasoline in the combustion chambers by careful and judicious use of the enriching device.

The following rule should govern the use of the enriching button in winter weather: Pull the enriching button back just as far as it is necessary to start the engine, but as soon as the engine starts, let the button return as far as possible without causing the engine to stop or slow down. Then release the button entirely as soon as the engine is warm enough to permit doing so.

Priming the Carburetor

In extremely cold weather, if the engine does not start after cranking for a few seconds with the enriching device fully applied, release the starter pedal. Then prime the carburetor by opening and closing the throttle once or twice rather rapidly with the accelerator. Opening and closing the throttle operates

a throttle pump on the carburetor and raises the level of gasoline in the carburetor bowl. The carburetor should never be primed in warm weather and should not be primed unnecessarily in cold weather. Excessive priming is likely to prevent the engine from starting.

Position of Throttle Hand Lever

The correct position of the throttle hand lever for starting in cold weather is the same as for starting under other conditions, that is, about one-fourth the way down from the idling position. In warm weather, however, the lever may be returned to the idling position almost as soon as the engine is started. In cold weather, the throttle must be left slightly open until the engine becomes warm.

Position of Ignition Control Lever

Unless the weather is extremely cold, the correct position of the ignition control lever for starting is the same as that recommended on page 10, that is, about one-third the way down. In extremely cold weather, however, the lever should be moved all the way up for starting, unless the engine should be cranked by hand, in which case the lever should be moved all the way down.

It is the practice of some drivers to move the ignition control lever all the way down whenever starting the engine. This is the correct position if the engine is to be cranked by hand, but if the engine is to be cranked with the starter, there is no reason for retarding the spark, and in extremely cold weather "popping back" in the carburetor is less likely to occur if the spark is fully advanced.

Use of Starter

In extremely cold weather, when the car has been standing long enough to become thoroughly chilled, it is a good plan to disengage the clutch during the cranking operation. If this is not done, the starter is called upon to turn the jackshaft gears in the transmission in addition to cranking the engine. At ordinary temperatures, the additional energy required is negligible, but in extremely cold weather, the lubricant in the transmission offers sufficient resistance to rotation of the transmission gears to increase considerably the demand upon the battery and to retard the cranking speed.

Use of Accelerator Before Engine Is Warm

In cold weather, after the engine has been started and before it has run long enough to become warm, the engine cannot deliver its normal power and it should not be called upon to do so. In accelerating the engine to start the car and in accelerating the car after the transmission is in gear, do not open the throttle suddenly or too far. To do so is not only to invite "popping back" in the carburetor, but to increase the amount of excess unvaporized gasoline in the combustion chambers, both of which results are undesirable. For this reason also, starting in intermediate should never be attempted in cold weather.

Additional Cold Weather Suggestions

Engine Oil for Cold Weather

All engine lubricating oil is more viscous at lower temperatures than at higher temperatures. An engine oil of the proper viscosity for summer weather will not flow freely at freezing temperatures, and will not lubricate the cylinders and bearings properly until the engine is warm. If the oil congeals it also offers considerable resistance to cranking of the engine, causing a severe drain on the battery, and retarding the cranking speed.

In cold weather, therefore, it is essential that an oil be used that has a sufficiently low cold test. The medium grade of Cadillac Engine Oil is recommended generally for winter use. If in doubt as to a suitable oil for cold weather, consult an authorized Cadillac maintenance station.

Strainers in Gasoline System

During cold weather, it is especially important to remove and clean the strainers in the gasoline line (see page 58). An accumulation of water at these points that would have no bad effect in warm weather might freeze in cold weather and prevent the gasoline from flowing to the carburetor.

Anti-Freezing Solutions

In freezing weather, the water in the cooling system must be replaced with some solution that has a lower freezing temperature than that of water. A solution of glycerin and water is recommended. There is practically no loss of glycerin by evaporation and a solution of suitable strength placed in the cooling system at the beginning of freezing weather will ordinarily last the entire season.

Some of the patented substitutes for glycerin may be safely used. Such preparations should not be used unless tested and approved. Cadillac distributors and dealers should be consulted as to the suitability of an anti-freeze other than glycerin, or inquiry may be made to the factory Technical Department. Solutions containing calcium chloride or other ingredients injurious to the metal parts of the cooling system must never be used.

A solution of denatured alcohol may be used if its strength is periodically inspected by testing it with a hydrometer, and if care is taken not to let the solution get on the finish of the hood or radiator. Alcohol vaporizes more

readily than water and the loss by evaporation must be replaced at frequent intervals or the weakened solution will afford little protection against freezing.

Glycerin and Water

The following table* gives the freezing temperature and specific gravity of solutions of glycerin† and water:

Percentage of Glycerin (by Volume)	Parts by Volume		Freezing Temperature (° Fahr.)	Specific Gravity
	Glycerin	Water		
20	1	4	21°	1.057
25	1	3	17°	1.070
33⅓	1	2	8½°	1.092
50	1	1	−15°	1.132

Alcohol and Water

The following table* gives the freezing temperature and specific gravity of solutions of denatured alcohol and water:

Percentage of Alcohol (by Volume)	Parts by Volume		Freezing Temperature (° Fahr.)	Specific Gravity
	Alcohol	Water		
20	1	4	19°	.980
25	1	3	15°	.975
33⅓	1	2	6°	.965
50	1	1	−18°	.941

Capacity of Cooling System

The capacity of the cooling system is four and one-half gallons when filled to the proper level. It is not necessary to add liquid to the radiator whenever the level falls below the filler. There is sufficient liquid in the cooling system if the bottom of the upper tank is covered, and any liquid in excess of this is usually forced out through the overflow pipe as soon as the engine becomes warm. When water is used, any loss from this cause is of little consequence, but in winter to conserve anti-freeze it is important to avoid adding more liquid than is necessary.

Effect of Alcohol on Finish

Strong solutions of alcohol have a harmful effect on the finish. In adding pure alcohol or solutions containing 50 per cent or more alcohol, extreme care must be used not to let the liquid spatter or spill. A funnel and a pouring vessel with a suitable spout are necessary. Especially avoid pouring cold alcohol into very hot water. The effect of this is to make the mixture foam up and possibly bubble over on the finish.

*The freezing temperatures and specific gravities in these tables are according to the U. S. Bureau of Standards. The temperature given is in each case the temperature at which the first crystals form and not the temperature at which the solution freezes solid.

†Undiluted commercial glycerin having a specific gravity of 1.250.

PART II

LUBRICATION AND CARE

Cadillac 4000-Mile Lubrication Schedule

Note: Do not wait for schedule lubrications before adding engine oil. The oil level should be checked every 100 to 150 miles and oil added if the indicator ball is below "Full." This is especially important on cars driven at high speeds.

				Explanation: The figures and letters following the items in this column refer to the chassis lubrication diagram, Fig. 11	Refer to page	Lubrication No. and Mileage at which due							
						1	2	3	4	5	6	7	8
						500	1000	1500	2000	2500	3000	3500	4000
LUBRICATION NUMBER 8	LUBRICATION NUMBER 4	LUBRICATION Nos. 2 and 6	1, 3, 5, and 7	Add engine oil as necessary*: 21	41	O	O	O	O	O	O	O	O
				Grease gun connections: G	45	O	O	O	O	O	O	O	O
				Spring leaves: 1, 7, 10, 20	48	O	O	O	O	O	O	O	O
				Add water to storage battery	63	O	O	O	O	O	O	O	O
				Universal joints: 13, 14	46		O		O		O		O
				Generator and distributor oil cups: 17, 18, 19	45		O		O		O		O
				Engine rear supports: 5, 16	45		O		O		O		O
				Steering column oil holes: 3	47		O		O		O		O
				Brake pins and connections	77		O		O		O		O
				Door hardware	48		O		O		O		O
				Drain and replace engine oil*: 21	43				O				O
				Transmission‡—add lubricant: 15	46				O				O
				Rear axle‡—add lubricant: 11	46				O				O
				Clutch thrust bearing: 4	45				O				O
				Steering gear—add lubricant: 6	47				O				O
				Transmission‡—drain and replace lubricant: 15	46								O
				Rear axle‡—drain and replace lubricant: 11	46								O
				Wheel bearings—clean and repack: 2, 8, 12, 22	46								O
				Front brake trunnions: 9, 23	47								O
				Speedometer drive shaft	47								O
RECORD				Speedometer Reading									
				Date									

*Change to medium grade of engine oil at beginning of cold weather and to heavy grade of engine oil at beginning of warm weather, regardless of mileage.
‡Change to light grade of lubricant at beginning of cold weather and to heavy grade of lubricant at beginning of warm weather, regardless of mileage.

CHAPTER I

Systematic Lubrication

Necessity for Lubrication

Lubrication has made machinery possible. Without it the destructive effects of friction would render the most ingeniously designed mechanism useless. Especially is this so of the gasoline engine, in which heat of combustion is added to that of friction. Absence of lubrication for even a brief instant while the engine is running would heat the surfaces in contact to the melting point.

But it is not enough to know that friction, unrestrained by lubrication, is capable of ruining an engine in less time than it takes to tell it. No motorist expects to run out of oil. What is frequently not fully appreciated is that, if improper lubricants are used and are infrequently applied, friction is still a powerful destructive agent capable of shortening the useful life of the car from years to months.

The quiet, dependable operation of a new car is primarily the result of the accurate finishing of surfaces separated from each other by a few thousandths of an inch. In the Cadillac, there are hundreds of such surfaces. If the clearances between these surfaces are to be maintained, so that the car will continue to operate quietly and dependably, friction must be prevented from taking its toll in wear.

Cadillac engineers have provided for the lubrication of all surfaces where friction is a factor. The most that a manufacturer can do, however, is to provide a place for the lubricant and means for it to reach the surfaces to be lubricated. The car cannot be equipped with an inexhaustible supply of lubricant. Upon the car owner devolves the responsibility of replenishing the supply at the proper time with lubricant of the prescribed specifications.

Because of the importance to the car owner of proper lubrication of his car, every effort has been made in this Manual to give explicit information for his guidance. Lubricants are prescribed for each point requiring lubrication, directions are given for applying the lubricant, and recommendations are made as to the frequency with which the lubricant should be applied. All this information is based upon actual operation of Cadillac cars over hundreds of thousands of miles.

Lubrication Schedule

Lubrication is effective only insofar as it is regular and systematic. To be systematic, lubrication must be performed at regular mileage intervals. The

Cadillac technical staff has accordingly developed for the Cadillac car a complete lubrication schedule which, if faithfully followed, will insure for each bearing surface ample, but not superfluous, lubrication. This schedule is shown on page 36.

The unit of the Cadillac lubrication schedule is 4,000 miles, which is divided into eight 500-mile intervals. Corresponding to these is a series of eight consecutive groups of lubricating operations. When the car has traveled 500 miles, the points enumerated under Lubrication No. 1 should receive attention. At 1,000 miles, Lubrication No. 2 is due, and so on until at 4,000 miles Lubrication No. 8 should be performed. At 4,500 miles the schedule begins again with Lubrication No. 1.

In order that the driver may be continually reminded of the mileage at which the next lubrication is due, provision is made on the speedometer for a lubrication notice. This consists of a strip of black celluloid (Fig. 9) which is placed across the speedometer cover glass below the total mileage dial and which has two white spaces, one for the lubrication number and one for the mileage at which it is due. Whenever the car is lubricated on the schedule, the figures then on the celluloid should be erased and the next lubrication number and the mileage at which it is due should be written or stamped in their places. If this notice is used, the driver need only glance occasionally at the speedometer and compare the mileage on the dial with the figures on the notice in order to plan for the necessary attention.



FIGURE 9.
Lubrication notice

Note: Do not wait for the mileage indicated on the notice before adding engine oil. The oil level should be checked every 100 to 150 miles and oil added, if the indicator ball is below "Full"

Cadillac distributors and dealers are prepared to sell lubrication based on this schedule. A car that is being lubricated on the schedule can be taken to any authorized Cadillac maintenance station, and without further ordering than to specify "Schedule Lubrication," the car will receive the necessary attention.

The schedule on page 36 is in outline form. Detailed information as to the location of the points to which lubricant is to be applied, the method of lubricating, and the kind and amount of lubricant will be found in Chapters VI and VII. For each point on the schedule, two reference numbers are given: the number of the page on which detailed directions will be found and the number designating the point on the chassis lubrication diagram (Fig. 11).

Lubricants

The selection of proper lubricants for the Cadillac car is one of the first concerns of the owner in his attention to the lubrication of his car.

The lubricants must not only be of high quality, but their viscosity and other characteristics must be suited to the Cadillac car. The difficulty of securing suitable lubricants on the open market has induced us to provide lubricants under the Cadillac trade mark. These lubricants are prepared according to specifications prescribed by the Cadillac technical staff and are based upon hundreds of actual tests. Cadillac lubricants include the following and can be obtained from Cadillac distributors or dealers: Cadillac Engine Oil—Heavy, Medium and Light (special). Cadillac Rear Axle and Transmission Lubricant—Light and Heavy. Cadillac Roller Bearing and Cup Grease. Cadillac Fiber Grease—Light and Heavy. Cadillac Steering Gear Lubricant.

Engine Oil

The heavy grade of Cadillac Engine Oil is recommended for summer use and for winter use if the temperature is not much below freezing. For average winter use (temperatures down to zero) the medium grade is recommended. For extremely low temperatures (below zero) the light grade should be used, but should be replaced with the medium grade as soon as more moderate temperatures return.

The names of other engine oils approved for use in the Cadillac engine will be supplied by our Technical Department on request.

Rear Axle and Transmission Lubricant

The heavy grade of Cadillac Rear Axle and Transmission Lubricant should be used except in cold weather. The light grade should then be used. If the heavy grade is used in cold weather the transmission gears will be difficult to shift. The names of other lubricants suitable for use in the Cadillac rear axle and transmission will be supplied upon request.

Roller Bearing and Cup Grease

Cadillac Roller Bearing and Cup Grease is recommended for the wheel bearings and for all points for which grease gun connections are provided, with the exception of the steering gear and the universal joints. In the absence of Cadillac Roller Bearing and Cup Grease, No. 3 cup grease may be used for the grease gun connections and No. 1½ cup grease for the wheel bearings.

Fiber Grease

Cadillac Fiber Grease is supplied in two grades, light and heavy. The light grade is recommended for the clutch thrust bearing and the heavy grade for the universal joints on the drive shaft.

Steering Gear Lubricant

Cadillac Steering Gear Lubricant is recommended for lubricating the steering gear worm and sector. In its absence, use a mixture consisting of 75 per cent rear axle and transmission lubricant and 25 per cent cup grease.

CHAPTER II

Engine Lubrication

Oil Circulating System

The supply of engine oil is carried in the pressed steel reservoir that covers the bottom of the crankcase. The oil is forced to the bearings by a gear pump attached to the right-hand side of the engine toward the front and driven by a spiral gear on the crankshaft.

The pump draws the oil from the bottom of the oil pan and delivers it under pressure to a supply pipe running the length of the engine parallel with the crankshaft. From this supply pipe, three leads branch off to feed the three main bearings. The crankpin bearings are fed from the main bearings through ducts in the crankshaft. Oil thrown from the crankpins as the crankshaft revolves becomes a fine mist or spray which pervades the interior of the crankcase and cylinders and lubricates the pistons, piston pins, cams, camslides, and rollers.

A separate passage drilled through the crankcase conducts oil direct from the pump to the camshaft front bearing from which the oil enters the hollow camshaft and is carried to the other camshaft bearings and to the distributor driving gear.

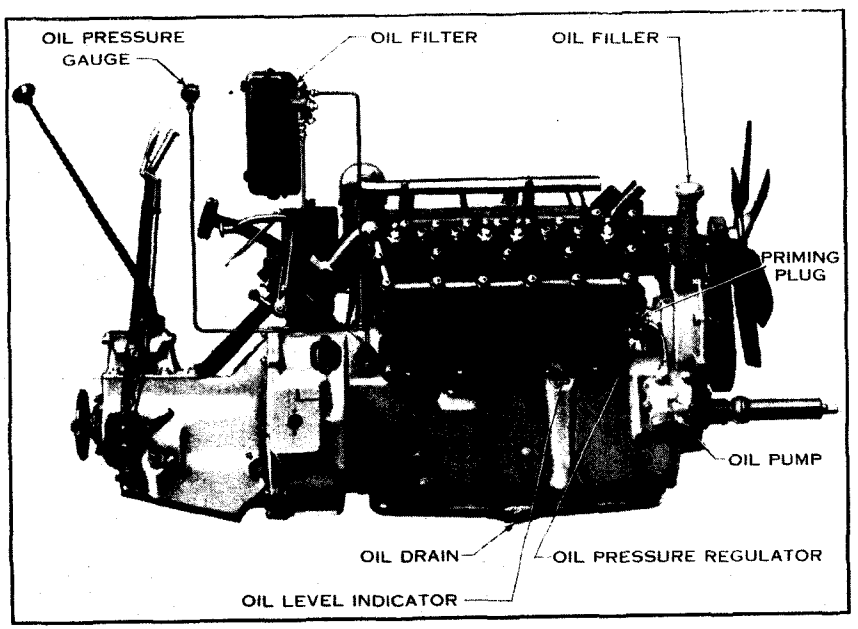


FIGURE 10. ***Engine lubrication features***

The pressure in the lines supplying the main bearings and the camshaft bearings is controlled by an oil pressure regulator* attached to the crankcase almost directly above the pump and connected to the pump by an external pipe. The pressure regulator contains a by-pass with metering screw for adjustment of the oil pressure at idling speeds and a spring-controlled valve that opens to prevent excessive pressure at high speeds. The oil that passes the regulator, either through the by-pass or around the valve, is led to the spiral gears, chain and chain adjusting mechanism.

The valve stems are automatically lubricated by oil sprayed from two small holes drilled in the wall of each cylinder at such a distance from the bottom of the cylinder that, when the piston is at the bottom of its stroke, these holes register with a groove in the piston between the second and third piston rings. As the piston descends on the power stroke, oil collects in this groove and as soon as the groove registers with the holes, the pressure of the gases above the piston forces oil out upon the valve stems. Surplus oil collecting in the valve compartments is returned to the crankcase through drain passages.

All oil returns to the oil pan through a fine mesh screen placed above the oil pan and separating it from the crankcase.

Oil Level

The normal capacity of the oil pan is two gallons which fills it to the level of the screen above the pan. When the oil pan contains this amount, the oil level indicator on the right-hand side of the engine (Fig. 10) indicates "Full." As the oil level descends, the indicator indicates "Fill" and then "Empty." Oil should be added as soon as the indicator ball has dropped to "Fill." If the indicator indicates "Empty," under no circumstances should the engine be run until oil has been added.

The mileage interval at which oil must be added depends upon individual circumstances. *It is recommended that the oil level indicator be checked every one hundred to one hundred and fifty miles, although it is improbable that oil will be required as frequently as this.*

Oil Pressure

The pressure of the oil in the supply pipe is indicated by the oil pressure gauge on the instrument panel (Fig. 1). The purpose of the oil pressure gauge is, first, to enable the driver to make sure that there is pressure whenever the engine is running, and second, to verify the adjustment of the oil pressure regulator.

It is absolutely necessary that there should be oil pressure just as soon as the engine starts and as long as the engine is running. If the oil pressure

*On some cars the pressure regulator is located just to the rear of the right-hand cylinder block and takes the place of the fitting to which the filter and pressure gauge are connected. On these cars the priming plug is a hexagonal plug directly on top of the oil pump.

gauge does not indicate pressure as soon as the engine starts, stop the engine at once and investigate the cause. First, check the level of oil in the oil pan. If the level is above "Fill," prime the oil pump by removing the screw plug shown in Fig. 10 and pouring oil in through a funnel. Be sure to replace the plug before starting the engine. If, after priming the oil pump and starting the engine, the oil pressure gauge does not indicate pressure, stop the engine immediately and consult the nearest Cadillac maintenance station.

Before the adjustment of the oil pressure regulator can be verified, the factors affecting the viscosity of the oil must be standardized. The oil pressure changes with the viscosity, which in turn depends upon the kind of oil, the extent to which it has been thinned by use, and the temperature. It is therefore necessary that the oil be fresh and of the viscosity specified for the Cadillac engine. The engine must also be run long enough to become thoroughly warm. Under these conditions the pressure at idling speed (300 r.p.m.) should be from 1 to 4 lbs.

Adjustment of the pressure at idling speeds is made by the screw at the oil pressure regulator shown in Fig. 10. To increase the pressure, turn the screw clockwise; to decrease the pressure, turn the screw counter-clockwise. This adjustment should be made while the engine is running.

Crankcase Ventilating System

In every internal combustion engine, seepage of vapors by the pistons takes place to some extent, permitting water vapor and other products resulting from combustion, as well as unburned gasoline, to enter the crankcase. Contamination of the lubricating oil from this source makes it necessary in most engines to replace the oil supply at frequent intervals.

Cadillac engines are equipped with an exclusive system to prevent the seepage vapors from entering the crankcase. To bring about this result, advantage is taken of the fact that the Cadillac crankshaft with its compensating weights acts naturally to draw air through an inlet in the left-hand side of the engine, building up within the crankcase a pressure slightly above atmospheric pressure. No outlet is provided in the crankcase itself but in the wall of each cylinder is a port connecting the space below the piston with the valve compartment. This port is open except when the piston is at the extreme bottom of its stroke.

The effect of this arrangement is as follows: The seepage vapors that pass the two upper piston rings are forced through slots milled in the circumference of the lower piston ring and through corresponding holes in the piston into the space inside the piston, where they are carried down as the piston descends. The vapors cannot enter the crankcase, however, because they are prevented from doing so by the pressure built up in the crankcase by the revolving crankshaft. Instead, the vapors are expelled through the port into the valve compartment. From the valve compartments the expelled vapors are conducted through flexible pipes underneath the car where they are discharged.

Oil Filter

Another source of contamination of the oil supply is dirt. In the Cadillac engine all solid matter in the oil is removed by means of a filter (Fig. 10) which is attached to the dash and which is connected to the oil circulating system.

The filter consists of a metal container in which is a series of eight envelopes made of special fabric. As the oil is forced through these fabric envelopes, the total area of which is over five square feet, it leaves all solid matter behind, returning to the engine as clean oil.

The filter is connected to the oil line by a pipe that leads from a tee on the crankcase at the rear of the right-hand cylinder block. The oil pressure gauge on the instrument board is also connected to this tee. Oil is thus forced to the filter whenever the engine is running and there is pressure in the oil lines. The normal flow when the filter is new is approximately one quart per minute under a gauge pressure of 15 pounds, so that an amount of oil equal to the entire capacity of the lubricating system passes through the filter every eight to ten minutes.

As dirt accumulates in the filter, the flow of oil through the filter decreases, and eventually the filter unit must be replaced. When it takes longer than seven minutes for a quart of oil to flow through the filter under a gauge pressure of 15 pounds, the filter unit should be replaced.

As an approximate check on the condition of the filter, remove the screw plug in the fitting at the filter and note the size of the stream of oil that flows from the opening. In making this test, the engine should be warm and the throttle should be opened until the pressure gauge indicates 15 pounds. Under these conditions a stream of oil as large as a pencil lead, or larger, should flow from the filter. (On some cars the filter has a sight feed glass through which the stream of oil flowing from the filter may be seen.)

Under average driving conditions replacement of the filter unit should not be necessary for 12,000 to 15,000 miles. Filter units for replacement can be obtained from Cadillac distributors and dealers.

Replacing Engine Oil

Although the crankcase ventilating system and the oil filter described in the preceding sections greatly prolong the useful life of the oil, it is recommended that the oil be drained and replaced with fresh oil every 2,000 miles.

To drain the oil, simply remove the drain plug (Fig. 10). A special socket wrench for the oil pan drain plug is supplied as part of the tool equipment.

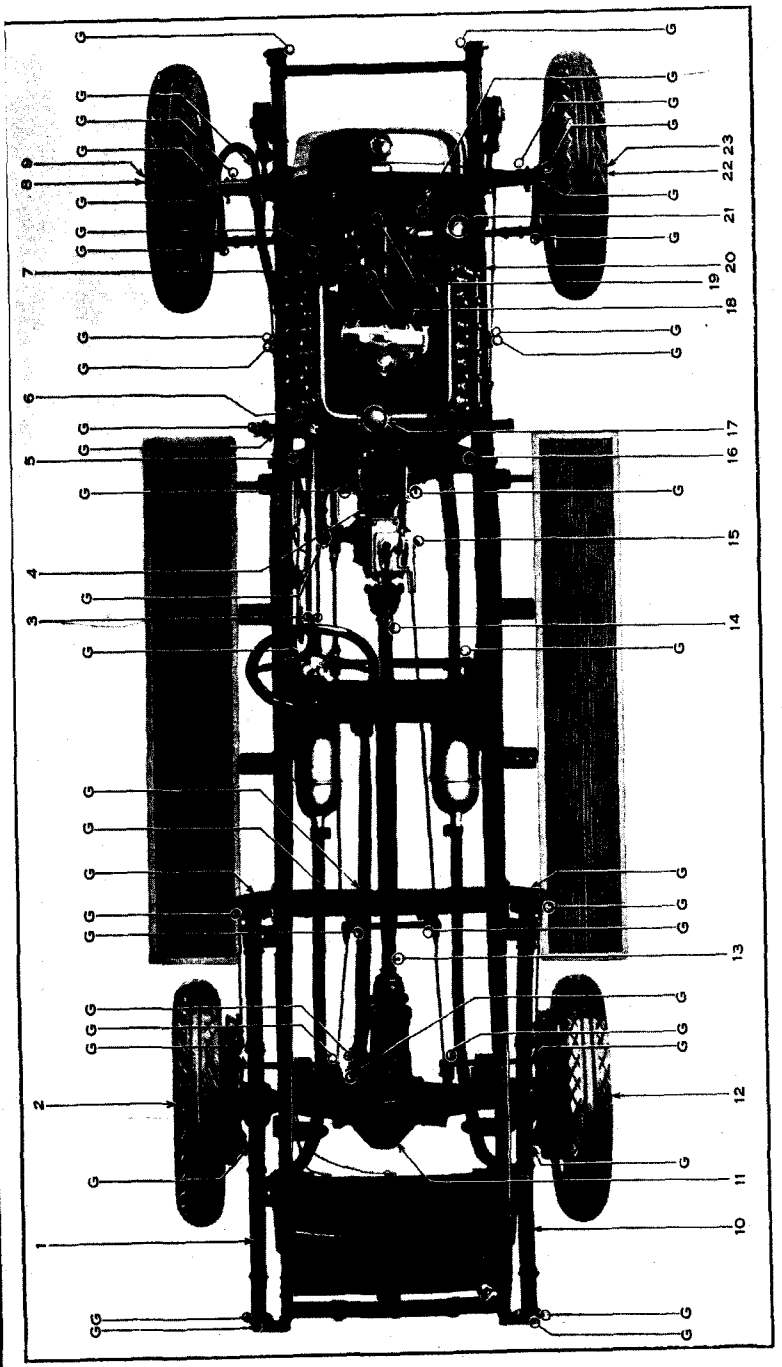


FIGURE 11. *Chassis lubrication diagram*
Each "G" indicates a grease gun connection. Each number indicates a lubricating point for which instructions are given in Chapters II and III. Lubricating points that are visible in the diagram are surrounded by circles, others are indicated by arrows.

Be sure to reinstall the drain plug before adding the fresh oil. Two gallons of fresh oil should be added, or enough to bring the oil level indicator ball to "Full."

At the end of the first 1,000 miles, it is recommended that the car be taken to a Cadillac maintenance station to have the oil pan and screen removed and cleaned with gasoline or kerosene. This should be repeated once a year or whenever the filter unit is replaced.

Generator Oil Cups: 18, 19*

Two oil cups on the generator conduct lubricant to the forward and rear bearings on the armature shaft. A few drops of engine oil should be applied to each cup every 1,000 miles.

Timer-Distributor Oil Cup: 17

The oil cup at "17" is for lubricating the ball bearing at the upper end of the timer-distributor shaft. A few drops of engine oil should be applied every 1,000 miles.

Engine Rear Supports: 5, 16

The brackets on the frame to which the engine rear supports are bolted are provided with felt wicks. Engine oil should be applied at these points every 1,000 miles.

CHAPTER III

General Lubrication

Grease Gun Connections: G

Spring bolts, steering connections, brake rocker shafts and other points are provided with connections to fit the grease gun supplied with the tool equipment. These points are indicated by "G" in Fig. 11. Cadillac Roller Bearing and Cup Grease should be applied to these points with the grease gun every 500 miles.

Clutch Thrust Bearing: 4

The lubricating joint on the clutch thrust bearing is fitted with a screw plug shown at "G" (Fig. 22). To reach this plug, remove the floor boards and the cover plate shown at "F" (Fig. 11) and turn the thrust bearing until the plug is uppermost. Remove the plug with a screw driver, taking care not to drop the plug into the clutch housing. Screw the extension fitting shown at 18A (Fig. 5) into the threaded hole from which the plug was removed. Attach the grease gun to this fitting.

*The numbers following the headings in this chapter and in Chapter III refer to Fig.11

Note: On some cars a grease gun connection is permanently fitted to the thrust bearing in place of the screw plug. On these cars the adapter 18 (Fig. 5) should be used instead of the extension pipe 18A. This must be done with the engine not running.

The clutch thrust bearing should be lubricated every 2,000 miles with the light grade of Cadillac Fiber Grease.

Caution: Do not inject too much grease into the clutch thrust bearing. One or two turns of the grease gun handle are sufficient.

Transmission: 15

The transmission case should contain sufficient lubricant to bring the level up to the filling hole at the right-hand side. The level should be inspected every 2,000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended. The heavy grade should be used except in cold weather. The light grade should then be used. If the heavy grade is used in cold weather, the transmission gears will be difficult to shift.

Every 4,000 miles the drain plug should be removed from the bottom of the transmission case and the lubricant should be drained and replaced with fresh lubricant. Three quarts of lubricant are required to fill the transmission case to the proper level.

Universal Joints: 13, 14

The forward and rear universal joints on the drive shaft are provided with grease gun connections as indicated at "13" and "14." It may be necessary to roll the car forward or backward a few inches to bring the connections underneath where they can be reached with the grease gun. The heavy grade of Cadillac Fiber Grease should be applied every 1,000 miles.

Rear Axle: 11

The rear axle housing should contain enough lubricant to bring the level up to the filling hole in the rear cover plate. The level should be inspected every 2,000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended. The heavy grade should be used except in cold weather. The light grade should then be used.

Every 4,000 miles the drain plug should be removed from the bottom of the axle housing and the lubricant should be drained and replaced with fresh lubricant. Three and one-half quarts of lubricant are necessary to fill the rear axle housing to the proper level.

Wheels: 2, 8, 12, 22

The front and rear wheel bearings are packed in grease when the car is assembled. Every 4,000 miles all the wheels should be removed and the bearings should be thoroughly cleaned in gasoline or kerosene. They should then be repacked and the bearings adjusted in accordance with the directions on pages 80, 81 and 82.

Cadillac Roller Bearing and Cup Grease is recommended for the wheel bearings. Do not use heavy grease as it will roll away from the path of the rollers and will not return.

Front Brake Trunnions: 9, 23

Every 4,000 miles, at the same time that the wheels are removed for lubrication of the wheel bearings, the brake operating trunnions inside the front wheel brake drums should be lubricated by applying the grease gun to the connection at "A" (Fig. 12). Cadillac Roller Bearing and Cup Grease should be used. It should be injected only until it begins to appear around the trunnion bearings. Do not inject too much grease. Before replacing the wheels, wipe off any grease appearing around the trunnion bearings. Do not inject any grease at "A" except when the wheel is off and the application of too much grease can be definitely avoided.

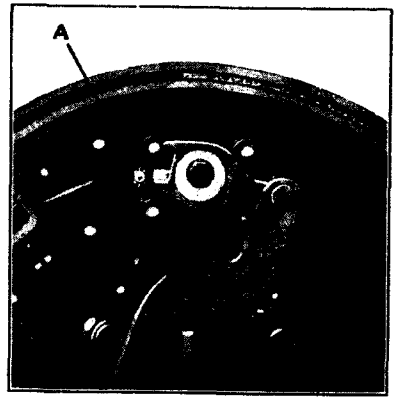


FIGURE 12
Lubrication of front brake trunnions

Steering Gear: 6

A grease gun connection is provided on the steering gear housing for injecting lubricant for the steering gear worm and sector. Cadillac Steering Gear Lubricant is recommended for the steering gear and it should be applied every 2,000 miles.

Oil Holes in Steering Column: 3

There are two oil holes in the steering column just below the steering wheel. A few drops of engine oil should be applied to these every 1,000 miles. The holes are closed by screw plugs which must be removed before the oil can be applied.

Speedometer Flexible Drive Shaft

The flexible shaft by which the speedometer is driven is housed in a flexible casing. To lubricate the speedometer drive shaft, the shaft should be removed from its casing and lubricant applied to it for its entire length. Cadillac Roller Bearing and Cup Grease is recommended for this lubrication, which should be performed every 4,000 miles.

Do not under any circumstances attempt to lubricate the speedometer itself. Any parts in the speedometer requiring lubrication are amply supplied when it is assembled.

Horn

The horn is lubricated when assembled and does not require further lubrication, but it is a good plan to inspect the commutator of the horn motor occasionally and clean it, if necessary. To do this, remove the horn from its bracket and the motor shell from the horn. If the commutator appears to be dirty, clean it with a dry cloth. This should be done with the horn motor running so that the commutator will be cleaned on all sides. Do not attempt to polish the commutator or brushes with oil or vaseline. These parts are designed to run without lubricant.

Springs: 1, 7, 10, 20

To lubricate the spring leaves, it is recommended that the edges and ends of the leaves be painted with engine oil every 500 miles. A small stiff brush should be used. After applying the oil, the car should not be washed until it has been driven far enough to allow the lubricant to work in between the leaves. Do not separate the leaves and insert lubricant. A certain amount of friction between the spring leaves is necessary in order to give the springs the desired characteristics.

If spring covers are used, it is not necessary to lubricate the spring leaves as directed in the preceding paragraph.

Stabilators

The stabilators, with which the car is equipped and which are for the purpose of controlling the recoil of the springs, not only need no lubrication—they *must not* be lubricated. To lubricate the stabilators would defeat their purpose just as oil or grease on the brakes would prevent them from holding.

Door Hardware

Whenever the chassis is being lubricated, the door locks and other door hardware should also be lubricated as follows:

Place a few drops of oil on each door lock plunger or striker, turning the handle back and forth so that the oil will work into the lock. Also place a drop of oil on each of the striker plates against which the strikers engage when the doors are closed. The hinge pins should also be oiled sparingly so as not to get oil on the finish.

Each door has a wedge-shaped tongue that dovetails into a receptacle on the body when the door is closed. These tongues should receive a small amount of grease or oil.

Each closed car door is also fitted with a check at the top which limits the outward movement of the door. A small amount of grease should be applied to the pin that slides in the slot at the top of the door.

CHAPTER IV

Care of Body

Care of Finish When New

On cars finished with varnish, more careful and more frequent attention is necessary when the car is new than after the varnish has hardened. Particular care should be taken to keep mud from the body and hood for the first few weeks. Even after the varnish has hardened, mud should not be permitted 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 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.

The same degree of caution, although commendable, is not as necessary on cars finished with Duco, because Duco hardens much more quickly than paint or varnish.

Washing Varnished Cars

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, because 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 pressure greater than will carry the water six inches 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.

Wash the chassis first, going over the under sides of the fenders, the wheels, and the running gear 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 under side of the fenders, or machine oil or grease from the chassis, use a 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 soft carriage sponge.

After washing the chassis, begin at the front of the car and flow water from the hose upon the body, hood and upper surfaces of the fenders. This will soften the accumulation of road dirt, removing most of it. Then go over the car again and remove all dirt by rubbing lightly with a soft wool sponge, at the same time applying an abundance of water from the hose. The sponge, which should be kept exclusively for the body, hood and upper surfaces of the fenders, should be rinsed 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. Be sure and use a chamois that has not been used on the chassis. Rinse the chamois and wring it out frequently. Do not rub the finish or apply more pressure than is necessary to dry off the surplus water. The remaining water will evaporate quickly, leaving the finish in good condition.

If it is desired to chamois the wheels and chassis, and they have become dry, wet these parts with clean water and then wipe them. Be sure to use a separate chamois for the chassis. The chamois that has been used on the body should be saved for the body exclusively.

Do not use soap, gasoline, kerosene, or anything of similar nature on the finish. Such materials attack the finish.

Washing Duco

Although it is not necessary in washing cars finished in Duco to use the same degree of care as in washing varnished cars, nevertheless the same general directions should be followed.

Cleaning Windows

Do not clean the window glass with preparations that may contain harmful ingredients. Use only cleaning compounds that are known to have no destructive effects on highly polished glass.

Cleaning Upholstery

To keep the upholstery in closed cars in the best condition, it should be cleaned thoroughly at least once a month with a whisk broom and vacuum cleaner. Dirt and grit accumulating in the fabric wear it out faster than use.

Spots on the upholstery may be cleaned with any good dry cleaner. When the cleaner has thoroughly evaporated, apply a hot flatiron wrapped in a wet cloth. Steaming the fabric and rubbing lightly against the nap will raise the nap to its normal position.

CHAPTER V

Care of Tires

EACH tire maker publishes a booklet with instructions for care and repair of tires. Every motorist should provide himself with one of these and thoroughly familiarize himself with the contents. The suggestions here apply to pneumatic tires in general.

Three-fourths of so-called "tire trouble" is the result of misuse. We give here some suggestions regarding the more important points of the care of tires.

Result of Under-Inflation

Under-inflation causes a tire to flatten out under load. This causes the side walls to bend sharply as the tire revolves. The result is the breaking of the side walls. An under-inflated tire is susceptible to bruise, broken cords and blow-out.

Result of Improperly Aligned Front Wheels

Running a car with the front wheels out of alignment causes rapid tread wear. This usually affects both tires similarly, although sometimes only one tire is affected. An incorrect adjustment of the front axle parallel rod or a bent steering arm is responsible for the condition. Unless the wheels are in proper alignment the treads of the front tires will wear away in a remarkably short time.

Neglect of Small Cuts

If cuts extending to the cords are neglected deterioration and blistering of the tire tread is the result. It is unnecessary to remove a tire to treat small cuts of this nature. Tire companies furnish a plastic compound for filling cuts. This prevents moisture and dirt from getting in. If a cut is large, it should be vulcanized at once.

Result of Improperly Adjusted Tire Chains

Tires are sometimes badly damaged through the use of tire chains which are incorrectly adjusted or which are fastened to the spokes of the wheel holding the chains tightly in place.

The least injury results when chains are applied loosely leaving play enough to permit them to work around. The wear on the tire is thus distributed evenly. Probably the greatest amount of injury comes from using chains unnecessarily on paved streets.

Result of Sudden Application of the Brakes

The sudden application of the brakes resulting in sliding the wheels causes the treads to wear away in spots. A tire will give away very rapidly under this severe treatment.

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 cords, 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 layers of cords to dirt and moisture, which soon starts to rot the cords.

In turning in a narrow street, avoid striking the curb.

If a tire goes flat without any indication of injury to the tire, see that the valve is not leaking. A little moisture on the tip will show bubbles if the air is escaping.

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 carcass 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 rubber 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.

CHAPTER VI

Storing Car

IF THE car is not to be used for a period of several months, it should be protected from deterioration during the period when it is not in use by carefully preparing it for storage.

Engine

To prepare the engine for storage, proceed as follows: Run the engine until opening of the radiator shutters indicates that the engine is warm. This may be done by driving on the road or by running the engine idle. In the latter case, care should be taken that there is sufficient ventilation to avoid injury from carbon monoxide poisoning. (See page 18.)

After the engine is warm, place the car where it is to be stored and stop the flow of gasoline to the carburetor by removing the gasoline tank filler cap, thus relieving the air pressure. As soon as the engine starts to slow down, raise the polished aluminum cap on top of the carburetor and inject three or four tablespoonfuls of clean fresh engine oil into the carburetor. Injection of the oil will stop the engine.

Open the compression relief cocks by turning them counter-clockwise. Inject two or three tablespoonfuls of engine oil into each compression relief cock, 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. The engine should not be started again after injecting the oil. If it is started, it will be necessary to repeat the treatment.

Drain the cooling system by opening the drain valve in the water pump.

Storage Battery

If the car is to be stored during the winter, the storage battery should have special treatment in order to protect it against freezing.

Shortly before the car is used for the last time, distilled water should be added to bring the level of the solution up to the bottom of the fillers. (See page 63.) After the water added has had an opportunity to mix thoroughly with the acid solution, the specific gravity should be taken with a hydrometer. If the specific gravity of the solution is above 1.270 there will be no danger of the acid solution freezing. If, however, the specific gravity is below 1.270, the battery should be removed and charged. *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.*

It is important that one of the battery leads should in all cases be disconnected during storage as a slight leak in the wiring will discharge the battery

and lower the specific gravity to the point where the solution may freeze.

If possible, the storage battery should be removed and charged from an outside source every two months during the storage period.

Tires

During storage of the car, it is best to remove the tires *from the rims* and to keep the casings and tubes in a fairly warm atmosphere away from the light. The tubes should be inflated slightly after the tires have been removed.

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

The weight of the car should not be allowed to rest on the tires during the storage period. If tires are not removed, the car should be blocked up so that no weight is borne by the tires. The tires should also be partly deflated.

Body and Top

A cover should be placed over the entire car to protect it from dust. In storing an open car, the top should be up.

Taking Car Out of Storage

In putting into use again a car that has been stored, it is advisable, unless the storage battery has been removed and charged at periodic intervals, to remove the battery from the car and give it a fifty-hour charge at a four-ampere rate. If the battery has received periodic charges, or if the specific gravity is above 1.200, simply add distilled water to the proper level and connect the leads. If there is a greenish deposit on the terminals of the battery, remove this with a solution of bicarbonate of soda (common cooking soda) and water. Do not allow any of this solution to get into the battery.

Before starting the engine, drain the oil from the oil pan and remove and clean the oil pan and screen. After reinstalling the oil pan, add eight quarts of fresh engine oil. Fill the cooling system, being sure to use anti-freezing solution in freezing weather. Open the compression release cocks and inject two or three tablespoonfuls of engine oil into each cylinder. Close the compression release cocks, and, with the ignition switched off, crank the engine a few seconds with the starter to distribute the oil over the cylinder walls.

Start the engine in the usual manner. As soon as the engine starts, immediately let the carburetor enriching button go as far forward as possible without causing the engine to stop or slow down materially and then open the throttle until the ammeter reads approximately 10 with all lights switched off. While the engine is running lift the aluminum cap on top of the carburetor and inject from two to three tablespoonfuls of engine oil into the carburetor. It is a good plan to run the car outdoors as soon as this has been done. Release the carburetor enriching button entirely as soon as the engine is warm enough to permit it.

PART III

GENERAL INFORMATION

CHAPTER I

Engine

Important Features of Construction

The Cadillac engine is of the water-cooled, four-cycle type with two L-head cylinder blocks of four cylinders each, placed at an angle of ninety degrees between the blocks. The cylinders of one block are directly opposite those of the other block, the lower end of each connecting rod on the left-hand side working in the forked end of the connecting rod opposite. This construction makes the engine shorter and more compact than any other type, the smooth running being largely the result of the short, rigid crankshaft.

The crankshaft has four throws or cranks, three main bearings, and carries on its front end the sprocket by which the camshaft is driven. The camshaft has six bearings, and is driven by the crankshaft through a silent chain in which the proper tension is maintained by an automatically adjusted idler gear. The camshaft has sixteen cams, each operating one valve through a camslide in which is carried a roller.

The fan is mounted on the front end of the generator shaft, which is driven by the camshaft through a special V-shaped belt.

The water pump and oil pump are driven by a cross shaft, which in turn is driven by a spiral gear on the crankshaft. The water pump is at the left-hand end of the cross shaft and the oil pump at the right-hand end.

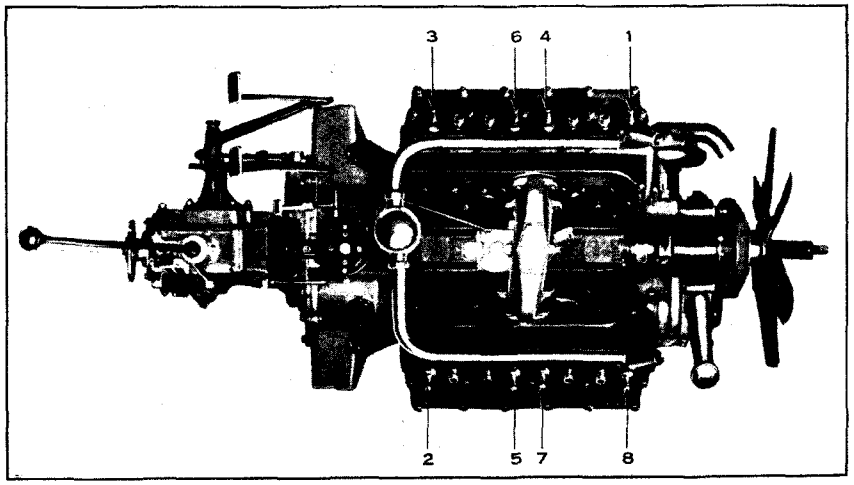


FIGURE 13. ***Firing order***

The engine base is the aluminum crankcase that supports the cylinder blocks and carries the crankshaft and camshaft bearings. The crankcase is supported at the rear end by two arms which are cast integrally with the crankcase and which are bolted to brackets on the frame. The front end of the engine is supported on a cross member of the frame below the radiator.

General Principle of Gasoline Engine

The production of power by the engine may be described briefly as follows:

Gasoline is fed by air pressure from the tank to the carburetor where it is mixed with air in the proper proportions to form an explosive vapor or gas. This gas is then drawn through the intake manifold and inlet valves into the cylinders of the engine where it is compressed by the pistons and then ignited by electric sparks. The pressure of the resulting explosions acting on the pistons produces the power.

The series of operations through which the pistons and valves of each cylinder must go to produce one power stroke is called a "cycle" and for such a cycle four strokes of each piston and two revolutions of the flywheel are required. The four strokes, each of which has a different function, take place in the following order:

Suction Stroke—The suction stroke commences with the piston at its highest point in the cylinder and with the inlet and exhaust valves closed. As soon as the piston starts to descend, the inlet valve immediately opens and a charge of gas is drawn from the carburetor through the valve opening into the space above the piston.

Compression Stroke—When the piston starts upward again after completing the suction stroke, the inlet valve closes. The gas, which has no means of escape, 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, a spark, timed to occur at exactly the right instant, jumps between the electrodes of the spark plug and ignites the compressed charge of gas. The heat that results 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 the piston down and produces the impulse which is transmitted by the connecting rod to the crankshaft, causing the crankshaft to revolve.

Exhaust Stroke—Just before the piston reaches the end of the power stroke, the exhaust valve opens. It remains open while the piston travels upward on the fourth, or exhaust stroke, driving the burned gas 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. This completes the four strokes of the cycle and the piston is ready to draw in a new charge and to repeat the cycle.

Firing Order

Such a cycle as has been described takes place in each of the eight 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 of the eight pistons are so timed that a power stroke is begun every quarter-turn of the crankshaft. The crankshaft thus receives four overlapping power impulses every revolution.

The order in which the eight cylinders fire is indicated by the numbers in Fig. 13. These numbers are the numbers used in marking the flywheel for valve and ignition adjustments.

CHAPTER II

Gasoline System

THE general arrangement of the gasoline system is illustrated in Fig. 14. There are two sets of tubes, one for air and one for gasoline.

The air tubes connect the automatic compressor at the left-hand front end of the engine, the hand compressor on the instrument board, and the air pressure relief valve, to the top of the gasoline tank. As described on page 9, the automatic and hand compressors are for the purpose of furnishing the necessary pressure to force the gasoline to the carburetor. The air pressure relief valve, which is fastened to the left-hand side of the frame under the front floor boards, prevents excessive pressure that might accompany the use of high-test or casing-head gasoline.

The gasoline line starts at the bottom of the gasoline tank and runs to a combination settling chamber and strainer from which tubes lead to the pressure gauge on the instrument panel and to the carburetor.

Settling Chambers and Strainers

The combination settling chamber and strainer in the gasoline line is attached to the left-hand side of the frame under the front floor boards. There is also a settling chamber at the bottom of the gasoline tank and a strainer at the point where the gasoline pipe enters the carburetor.

It is recommended that both settling chambers be drained and both strainers be cleaned at the beginning of freezing weather and at least

every 4,000 miles during the winter season. An accumulation of water at these points might freeze and prevent gasoline from flowing to the carburetor.

Before removing either settling chamber drain plug, or the strainer at the carburetor, first relieve the air pressure by removing the gasoline tank filler cap. Be sure there is no fire near.

To drain the settling chamber at the gasoline tank, remove the drain plug at the rear of the chamber as shown in Fig. 14. It is necessary to drain out only enough gasoline to flush the chamber.

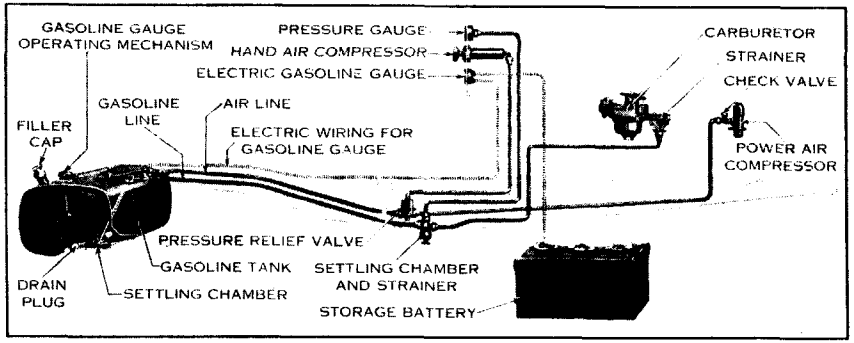


FIGURE 14. *Gasoline system*

To drain the settling chamber in the gasoline line, remove the drain plug in the bottom of the chamber. While the plug is removed, the strainer, which is attached to the plug, should be carefully cleaned of any accumulated matter.

To clean the strainer at the carburetor, remove the six screws that fasten the cap on the strainer. Remove and clean the three gauze discs. In reinstalling the discs, be sure to place them in their original positions. The two discs with fine mesh gauze should be installed first.

Carburetor

The carburetor is correctly adjusted when the engine is assembled and, unless tampered with, should not require readjustment. It is unnecessary to change the adjustment for changes in season, weather or altitude.

Good carburetor action cannot be expected until the engine is thoroughly warmed. 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, it should, if possible, be made by an authorized Cadillac maintenance station. The adjustment should not be attempted by one unfamiliar with it.

CHAPTER III

Cooling System

Water Circulation

The Cadillac engine is cooled with water circulated through the jackets of the cylinder blocks by a centrifugal pump. This pump is mounted on the left-hand side of the engine near the front and is driven by a cross-shaft, which in turn is driven by a spiral gear on the crankshaft. The pump draws cold water from the bottom of the radiator and delivers it to a connection on the left-hand side of the engine where the stream divides, half going to the left-hand cylinder block and half through a passage in the crankcase to the right-hand cylinder block. From the front end of each cylinder head an outlet pipe with hose connection carries the heated water to the top of the radiator.

Radiator and Shutters

The radiator consists of an upper tank and a lower tank connected by water passages around the outside of which air is circulated by the fan. The water passages are so constructed that they expose a large amount of surface to the air, which cools the water as it passes from the upper to the lower tank.

Until the water in the cylinder blocks and radiator is warm, the cooling effect of the radiator is not only unnecessary, but is undesirable. The radiator is accordingly provided with shutters that prevent air from circulating around the water passages until the engine becomes warm. The shutters are pivoted vertically and are controlled automatically by a powerful thermostat contained in the upper tank of the radiator.

When the engine is cold, the shutters are held tightly closed and circulation of air is prevented. The water from the cylinders consequently undergoes little change in temperature as it flows through the radiator and the engine quickly becomes warm. As soon as the water entering the upper tank of the radiator reaches the temperature at which the engine operates best, the shutters are forced open by the thermostat and air begins to circulate. The resulting cooling effect checks the rising temperature of the water, which is thereafter maintained uniformly at the temperature of most efficient operation as long as the engine is running.

Filling and Draining the Cooling System

Except during freezing weather, water should be used in the cooling system. In freezing weather, a suitable anti-freezing solution such as those described on page 34 must be used.

To add liquid to the cooling system or to refill the cooling system after it has been drained, remove the radiator filler cap and pour the liquid in through the filler.

It is not necessary to add liquid to the radiator whenever the level falls below the filler. There is sufficient liquid in the cooling system if the core of the radiator is covered, and any liquid in excess of this is usually forced out through the overflow pipe as soon as the engine becomes warm. When water is used, any loss from this cause is of little consequence, but in winter to conserve anti-freeze it is important to avoid adding more liquid than is necessary.

To drain the cooling system, open the drain valve at the bottom of the water pump by turning the hexagonal end of the valve counter-clockwise.

Cleaning the Cooling System

The cooling system should be drained and flushed every two or three months. This can be done in the following manner:

Run the engine until the opening of the radiator shutters indicates that the engine is warm. Stop the engine and immediately open the water pump drain valve.

After the liquid has drained off, refill the cooling system with hot water and repeat the operation described above. If in draining the second time the water is very dirty it may be advisable to repeat the flushing operation a third time, placing one or two handfuls of sal-soda in through the radiator filler. The sal-soda must not be permitted to get on the finish of the hood or radiator. If sal-soda is used, the cooling system must be drained and flushed again before refilling for use.

CHAPTER IV

Electrical System

THE electrical system comprises the following units: The generator or source of electrical energy; the storage battery, which stores the current generated; the starting motor, which cranks the engine for starting; the ignition system; the lamps and other devices using electrical current; the ammeter; the ignition and lighting switch; and the circuit breakers, which protect the system. The wiring system connecting these units is the single wire or grounded type, the engine and frame forming one side of the electrical circuit.

Generation of Current

Generator

The generator is attached to the crankcase at the front of the engine and is driven by a specially made V-shaped belt from a pulley on the front end of the camshaft.

At very low engine speeds the voltage of the current generated is not sufficient to provide current for lighting or ignition and the battery is then the source of current. To prevent the battery at such times from discharging through the generator, a cut-out relay on the generator automatically opens the circuit whenever the generated voltage drops below the battery voltage. At approximately eight miles per hour the generated voltage is sufficient to operate the cut-out, which then closes the circuit between the generator and the battery and lighting circuits. If no lights are switched on, the entire output of the generator, less the current required for ignition, flows to the battery for recharging it. If all the lights are on, the generator will not generate sufficient current to start charging the battery until a speed of twelve to fifteen miles per hour is reached.

The amount of current generated by the generator at any instant is the ammeter reading (with all lights off) plus the current for ignition, which is two to three amperes. The generator output reaches its maximum at speeds between twenty and twenty-five miles per hour. This maximum should not exceed eighteen amperes, which is equivalent to an ammeter reading of sixteen when all lights are off.

Do not put oil on the commutator of either the generator or the starting motor.

Ammeter

The ammeter on the instrument board indicates the amount of current flowing to or from the battery except when the starter pedal is down and the starting motor is cranking the engine. When the engine is not running, the ammeter will indicate a current on the discharge side depending in amount upon the number of lights in use. The rate of charge or discharge when the engine is running depends upon the speed of the engine and the number of lights in use, and is equal in amount to the difference between the current generated and the current used by the lights, horn, ignition, and other electrical devices. The ammeter does not indicate the current used in cranking the engine.

If the ammeter should show "Discharge" with the car running twelve miles an hour or more and with no lights in use, it is an indication either that the fan belt is slipping or that the generator charging rate should be readjusted. The fan belt should be inspected first, and tightened if necessary, before any attempt is made to change the generator charging rate.

Storage Battery

The storage battery is a three-cell, six-volt Exide battery made especially for the Cadillac electrical system by the Electric Storage Battery Company, of Philadelphia, Pennsylvania. The battery compartment is just forward

of the left-hand running board. The hinged cover of the compartment is provided with a lock that is operated by the switch key.

Adding Water to Storage Battery

The battery is filled with a solution from which the water slowly evaporates and fresh distilled water must be added at intervals to maintain the correct level. The level should be inspected every 500 miles and distilled water should be added to bring the level up to the bottom of the fillers.

The battery compartment has been purposely made convenient of access to facilitate the adding of water. It is important in touring that nothing be placed on top of the compartment that would interfere with this regular attention.

Each cell is provided with a filler and filler plug. To remove a filler plug, turn it as far as possible counter-clockwise and then lift it straight up. To install it, set the plug in place and turn it clockwise until tight. If a plug is lost or broken, obtain a new one and install it as soon as possible.

Nothing but pure distilled water should be added to the battery solution. In the absence of distilled water, melted artificial ice or rain water caught in

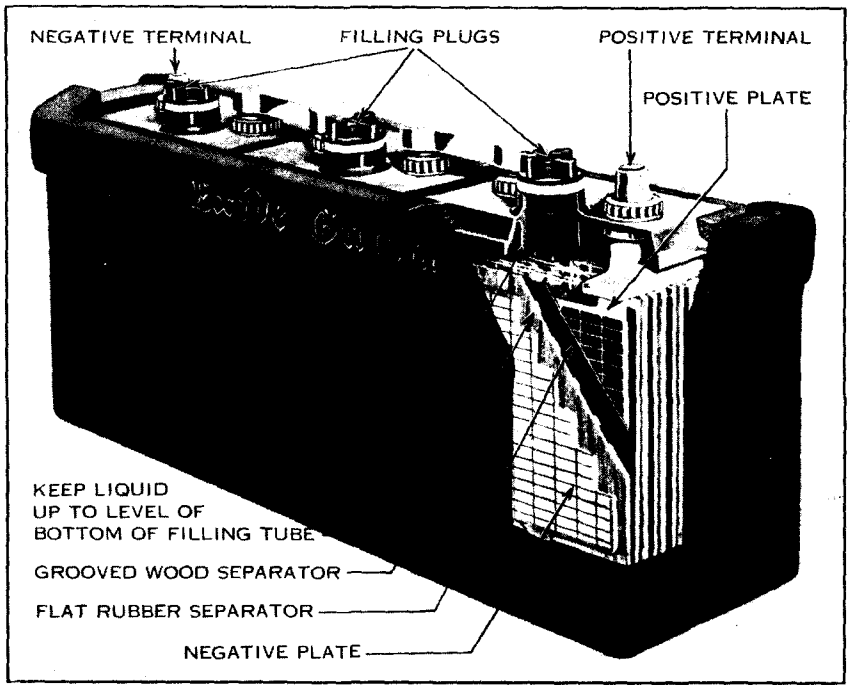


FIGURE 15. ***Storage battery***

an earthenware receptacle may be used. Hydrant water or water that has been in contact with metallic surfaces will cause trouble if used. *Acid must never be added to the battery.*

After adding water to the storage battery in freezing weather, the car should immediately be run far enough to mix the water and acid solution thoroughly. If the car is parked immediately after adding water, the water is likely to stay on top of the acid solution and may freeze, causing extensive damage.

If one cell regularly requires more water than the other, a leaky jar is indicated. A leaky jar should be replaced immediately by a new one as even a very slow leak will in time result in the loss of all the solution in the cell.

Specific Gravity of Battery Solution

As the storage battery is charged and discharged, the solution reacts chemically with the plates of the battery, the specific gravity of the solution changing as the reaction proceeds. The state of charge of the battery is thus indicated by the specific gravity of the solution. As the battery is charged, the specific gravity of the solution increases, reaching 1.270 to 1.290 when the battery is fully charged. The specific gravity of the solution decreases as the battery is discharged. A fully discharged battery has a specific gravity of 1.150 to 1.170.

A hydrometer is the instrument used to measure the specific gravity of a solution. A hydrometer syringe is a hydrometer especially designed for convenience in testing the specific gravity of the acid solution in the storage battery. A hydrometer syringe can be obtained at any battery service station.

The specific gravity of the acid solution should never be tested immediately after adding distilled water. If the solution is below the plates so that it cannot be reached with the syringe, add the necessary amount of distilled water and then drive the car for a few hours before taking the hydrometer reading.

Disconnecting Battery

Do not remove the 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.

Never run the engine with the storage battery disconnected. Serious damage to the generator may result.

Exide Depots and Sales Offices

The Electric Storage Battery Company, whose general offices and works are at Alleghany Avenue and Nineteenth Street, Philadelphia, Pennsylvania, has representative stations in towns of any considerable size as well as sales offices and Exide battery depots in a number of the larger cities. If a storage battery is in need of attention other than recharging, it is advisable to communicate either with a Cadillac maintenance station or with the nearest Exide station or depot. Do not ship a storage battery without receiving instructions.

Starting Motor

Operation of Starter

The starting motor is a series-wound motor mounted vertically at the rear end of the crankcase directly over the flywheel. When cranking the engine, the starting motor drives the flywheel through a pinion which meshes with teeth machined on the rear face of the flywheel. The pinion is normally held out of engagement with the teeth on the flywheel. It is moved down into mesh with the teeth on the flywheel by pushing forward on the starter pedal. Further movement of the pedal operates a switch that closes the battery circuit and starts the armature revolving.

If, in pushing down the starter pedal, the ends of the teeth on the pinion strike against the ends of the teeth on the flywheel preventing further movement of the pinion, continued movement of the pedal compresses a spring. As soon as the pedal has been pushed down far enough to close the starting switch, the armature starts to revolve. The pressure of the spring then forces the pinion the rest of the way, completing the meshing operation.

An over-running clutch on the armature shaft prevents the flywheel from driving the starting motor after the engine is running under its own power and before the starter pedal is released.

Ignition

General Description

The function of the ignition system is, first, to multiply the low voltage (six to eight volts) of the storage battery and generator into voltage of sufficient intensity to cause a spark to jump between the electrodes of the spark plugs; and second, to time this spark so that ignition will take place in the proper cylinder at the proper instant.

The Delco single-spark system is used, consisting of a combination timer-distributor unit in connection with a transformer or induction coil. The primary circuit, through which flows the current from the storage battery or generator, includes the primary winding of the ignition coil; the timer contact arms and points; and the condenser, which is enclosed in the timer. The

secondary or high-voltage circuit includes the secondary winding on the ignition coil, the distributor and the spark plugs.

Current flows through the primary circuit whenever and as long as either of the two sets of timer contact points is closed. Current flows through the secondary circuit for an instant only when either set of contact points is opened; but the voltage of this current is several thousand times that of the primary circuit and is sufficient to cause a spark at the spark plug.

Timer-Distributor

The timer-distributor is mounted on the top of the crankcase at the rear end and is driven by a spiral gear on the rear end of the camshaft. The shaft of the timer-distributor, which revolves at one-half crankshaft speed, carries a four-lobed cam. As this cam revolves, it actuates the two contact arms alternately, closing and opening first one set of contact points and then the other. The circuit is thus made and broken eight times during each revolution of the cam and eight corresponding sparks are produced at the spark plugs.

In order to procure the maximum power from each explosion, ignition must occur at the right instant in relation to the position of the piston. But the ignition process, although apparently a matter of an instant, consumes a measurable amount of time. It is therefore necessary to break the circuit at the contact points far enough in advance so that actual ignition will take place in the cylinder at the correct time. The lapse of time is always the same, regardless of the speed of the engine, but because the pistons move faster when the engine is running at higher speeds than when it is running at lower speeds, the degree of advance in relation to the positions of the pistons must be increased as the engine speed increases.

This advancing of the relative timing of the spark for higher engine speeds is automatically accomplished by a centrifugal ring governor on the timer shaft below the cam. As the speed of the engine increases, the governor ring assumes a position more nearly horizontal, forcing the cam ahead of the shaft by which it is driven. This causes the contact points to open earlier, starting the ignition process earlier in relation to the positions of the pistons in the cylinders.

In addition to the automatic advance, the timer has a manual control by which the opening of the contact points may be still further advanced or still further delayed. This is operated by the left-hand lever at the steering wheel, as described on page 10.

The distributor is the mechanism that insures that the high voltage current in the secondary circuit is switched to the proper spark plug at the proper time. It consists of a rotor which is carried on the upper end of the timer shaft and which has a metal contact button electrically connected at

all times with the secondary current from the coil. As the rotor revolves, the button makes contact successively with eight metal contacts which are set in the distributor head, and which are connected to the spark plugs. The relation between the rotor and the timer shaft is such that when the cam causes one set of timer contact points to open, the rotor will be in correct position for conducting the resulting high voltage in the secondary circuit to the proper spark plug.

Spark Plugs

For best results the electrodes of the spark plugs should be .032 to .035 inch apart. If the spark plugs should be removed, it is recommended that the electrodes be inspected and adjusted to this clearance if necessary.

Lighting System

Lamp Bulbs

It is recommended that bulbs for the lamps, particularly the two-filament bulbs for the headlamps, be purchased from a Cadillac distributor or dealer. In any event bulbs should have the correct voltage and candle-power ratings. Only three different types of lamp bulbs are used in the entire lighting system. The bulbs and the lamps in which they are used are as follows:

Lamp	Voltage	Candle-power
Headlamp	6–8	21 (two-filament) (Mazda No. 1110)
Back-up light	6–8	21 (single filament)
Stop light	6–8	
Inspection lamp	6–8	
Parking lights	6–8	3
*Instrument lamp	6–8	
*Rear lamp	6–8	
Closed car dome and quarter lamps	6–8	

Cadillac two-filament bulbs are equipped with fog caps or metal screens placed over the upper part of the bulb for the purpose of stopping direct unreflected light from the filament. It is this direct unreflected light from the filament that causes the dazzling reflection from fog or smoke. Headlamps equipped with fog caps have the appearance of being dimmed when seen from the front, but they do not perceptibly affect the useful light from the headlamps.

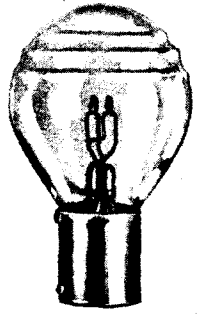


FIGURE 16
Double-filament headlamp bulb

In replacing a headlamp bulb, transfer the fog cap from the old bulb to the new, adjusting the cap to the position shown in Fig. 18. Then adjust the lamp as directed on page 69.

*Bulbs rated at 3–4 volts, such as are used in the rear lamps of some cars, must not be used in these lamps. If installed, they will burn out almost immediately.

Cleaning Headlamp Reflectors

The headlamp reflectors are plated with pure silver. Although the reflectors ordinarily require no attention, if they should require polishing extreme care must be exercised to select materials that will not scratch the silver.

Powdered dry rouge and a chamois skin are recommended. If the reflectors are tarnished, the rouge may be moistened with alcohol. Afterward, polish with a dry chamois and rouge.

The chamois used for the headlamp reflectors must not be used for any other purpose. It must be soft and free from dust.

Official Approval of Headlamps

Cadillac headlamps have been approved by practically every state in the country. For purposes of official identification, the following description of the headlamps is given:

A complete headlamp containing a parabolic reflector with axis inclined two and one-half degrees; screw adjustment on shell of headlamp to adjust the bulb filament with relation to the reflector in both axial and vertical planes to compensate for filament variation in bulbs; a cover glass containing cylindrical flutes vertically grouped in three distinct zones, the outer zone having greater refractory power and the flutes being more pronounced than

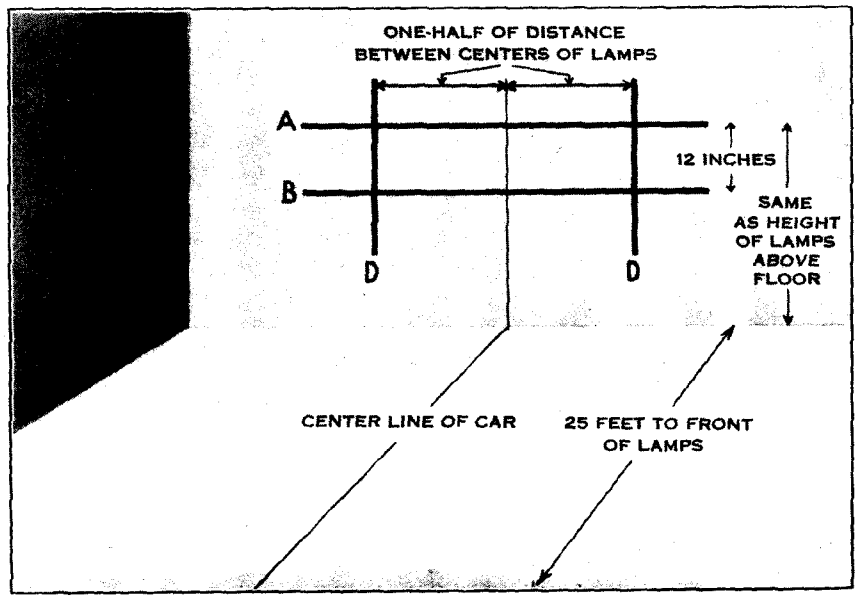


FIGURE 17. ***Marks for adjustment of headlamps***

in the center; and a cap over the upper front portion of the bulb to intercept the direct unreflected light above the horizontal.

Approval by the state authorities is conditioned upon the headlamps being adjusted to a definite standard. The directions which follow are for this standard adjustment.

Adjustment of Headlamps

Select a level spot where the car with an average load can be placed facing toward and twenty-five feet distant from a wall upon which the lines shown in Fig. 17 can be drawn. The adjustment should be made when it is dark enough so that the outlines of the projected beams are plainly visible.

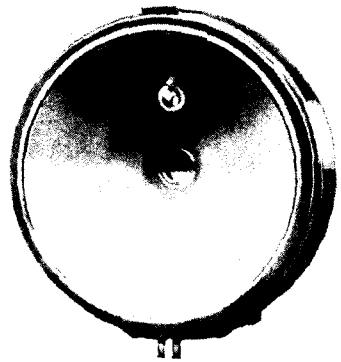


FIGURE 18. ***Headlamp fog cap***

Locate a point on the wall directly opposite the front of the car by sighting through the center of the rear curtain toward the radiator cap. Draw a vertical line on the wall through this point: Measure the distance between the centers of the headlamps, and draw two vertical lines "D" parallel to the center line and distant from it by an amount equal to one-half of the distance between the headlamps. Measure the distance of the headlamp centers above the ground or floor and draw the horizontal line "A" at the same elevation. Draw the line "B" twelve inches below the line "A."

Upper Adjusting Screw—The first adjustment should be made with the lower beam on, that is, with the lighting switch lever in the third position. Cover the headlamp that is not being adjusted, or disconnect the plug connector that supplies current to the lamp. Remove the headlamp door. Make sure that the fog cap is properly placed on the bulb as shown in Fig. 18.

The adjusting screws, of which there are two, are in the back of the headlamp shell. Turn the upper or large adjusting screw until the light spot on the screen is the smallest that can be obtained.

Loosen the nut on the headlamp support and aim the headlamp so that the top center of the spot of light is at the intersection of lines "B" and "D" as shown in Fig. 20a. When the lamp has been properly aimed, tighten the nut securely. *(Continued on page 71)*

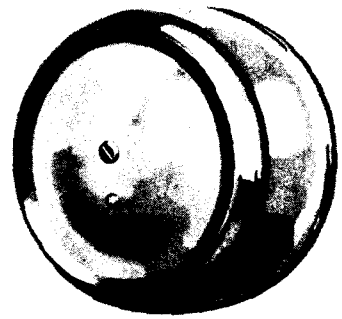


FIGURE 19
Headlamp adjusting screws

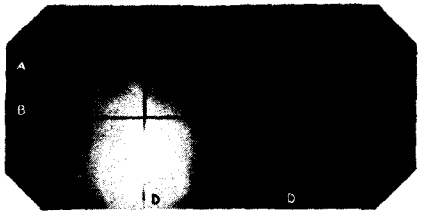


Figure 20a
Left-hand lower beam without lens.

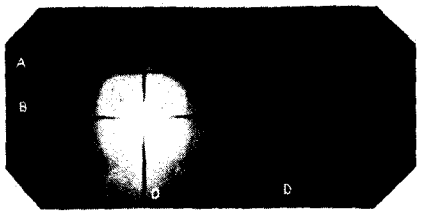


Figure 20b
Left-hand upper beam without lens.

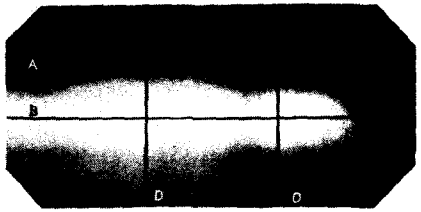


Figure 20c
Left-hand upper beam with lens.

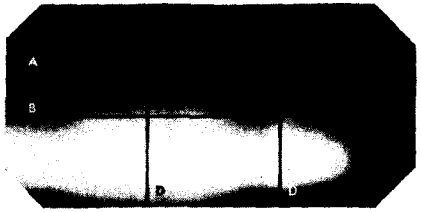


Figure 20d
Left-hand lower beam with lens.



Figure 20e
Both upper beams with lenses.

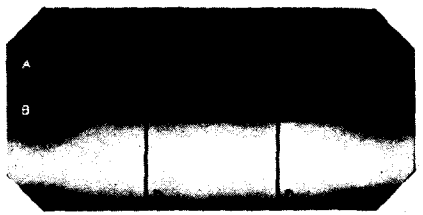


Figure 20f
Both lower beams with lenses.

FIGURE 20. ***Beams from headlamps***

Lower Adjusting Screw—Turn the lighting switch to the fourth position so that the upper beam is on. Adjust the lower or small screw until the top of the beam is at the intersection of lines "A" and "D" as shown in Fig. 20b. The beam should be of approximately the same proportionate size as shown, and the greatest intensity of the beam should be near the top of the spot and at its center. If the lower beam is now switched on, it should appear as in Fig. 20a and should be of the same proportionate size with the greatest intensity near the bottom, rather than at the center of the spot.

Install the door with the lens. If the lens is for any reason removed from the headlamp door, it should be replaced with the cylindrical flutes vertical and the smooth side facing out.

With the lens in place, the upper beam from the left-hand headlamp should appear as in Fig. 20c. The pattern of the lower beam from the left-hand headlamp should appear as in Fig. 20d.

After adjusting the one headlamp, repeat the adjustment on the other. When both headlamps have been adjusted and both headlamp doors are in place, the combined light from both headlamps should appear as in Fig. 20e when the upper beams are on, and as in Fig.20f when the lower beams are on.

CHAPTER V

Clutch and Transmission

Clutch

The Cadillac clutch is a dry multiple-disc clutch with eight smooth driven discs and seven driving discs faced with friction material composed largely of asbestos. The driving discs have gear teeth machined on their outer circumference to engage with teeth machined internally in the flywheel. The driven discs have gear teeth machined on their inner circumference to mesh with teeth machined on the outside of the clutch hub, which in turn drives the transmission. Except when the clutch pedal is pushed down, the clutch discs are pressed together by a spring having a pressure of 300 lbs. The driven discs then revolve with the driving discs and the engine, if running, drives the transmission.

When the clutch pedal is pushed down to disengage the clutch a forked lever presses against the clutch spring through a ball thrust bearing, releasing the discs from the pressure of the spring. The discs then separate and the driven discs rotate independently of the driving discs.

The clutch itself requires no adjustment or attention other than lubrication of the clutch thrust bearing as directed on page 45. Adjustment of the clutch release rod, however, may be necessary after the car has been driven some distance.

Adjustment of Clutch Release Rod

As described on page 15, the clutch pedal is purposely given about one inch of "lost motion." That is, the clutch does not begin to disengage until the pedal has been moved down about an inch from its released position. This lost motion is necessary in order to allow the clutch discs to come closer together as the facings are reduced in thickness. The lost motion gradually decreases as the clutch is used and eventually will be all taken up. Before this happens, the clutch release rod must be readjusted to restore the lost motion; otherwise, the clutch discs will slip and the engine will not drive the car.

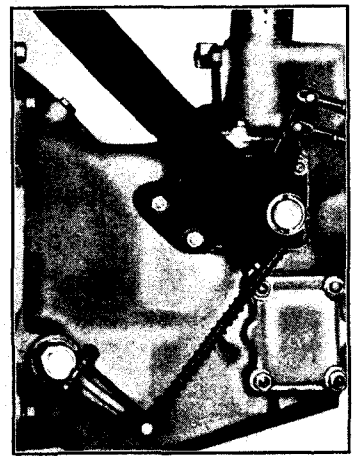


FIGURE 21
Adjustment of clutch release rod

To make the adjustment unscrew the nut "A" (Fig. 21) until the clutch pedal has a movement of one inch without starting to disengage the clutch.

The nut "A" must be turned a half-turn at a time.

Transmission

The purpose of the transmission is to provide a means for varying the ratio and direction of the rear axle speed in relation to the engine speed. Three things are accomplished by doing this: First, the engine is enabled to drive the car backwards. Second, the engine is permitted to revolve fast enough to develop the power necessary for starting and for driving the car at extremely low speeds. Third, the turning effort of the engine is multiplied so that it may be sufficient for climbing steep hills and pulling through deep sand and mud.

The Cadillac transmission is known as the selective, sliding gear type. It has three speeds forward, of which one is direct drive, and one speed in reverse. Selection of the various speeds is accomplished by movement of two shifter gears, "A" and "D," (Fig. 22) which are controlled by the transmission control lever. The positions of the gears corresponding to the five positions of the control lever as illustrated in Fig. 2 are as follows:

Neutral—When the control lever is in neutral position, the shifter gears "A" and "D" are in the positions shown in Fig. 22; that is, they are not in mesh with any of the other gears.

Low—When the control lever is moved from neutral to low, the gear "A" is moved forward into mesh with gear "R." Power is then transmitted from the clutch shaft "Z" to the transmission main shaft "C" through gears "E," "U," "R" and "A." The ratio of engine speed to propeller shaft speed in low is approximately 3 to 1.

Intermediate—When the control lever is moved from low to intermediate the gear "A" is first returned to its neutral position and gear "D" is then moved back into mesh with gear "S." Power is then transmitted through gears "E," "U," "S" and "D." The ratio of engine speed to propeller shaft speed in intermediate is approximately 1.7 to 1.

High—When the control lever is moved from intermediate to high, the gear "D" is first moved forward out of mesh with gear "S" and then farther forward until teeth cut internally in a recess in gear "D" engage teeth on the

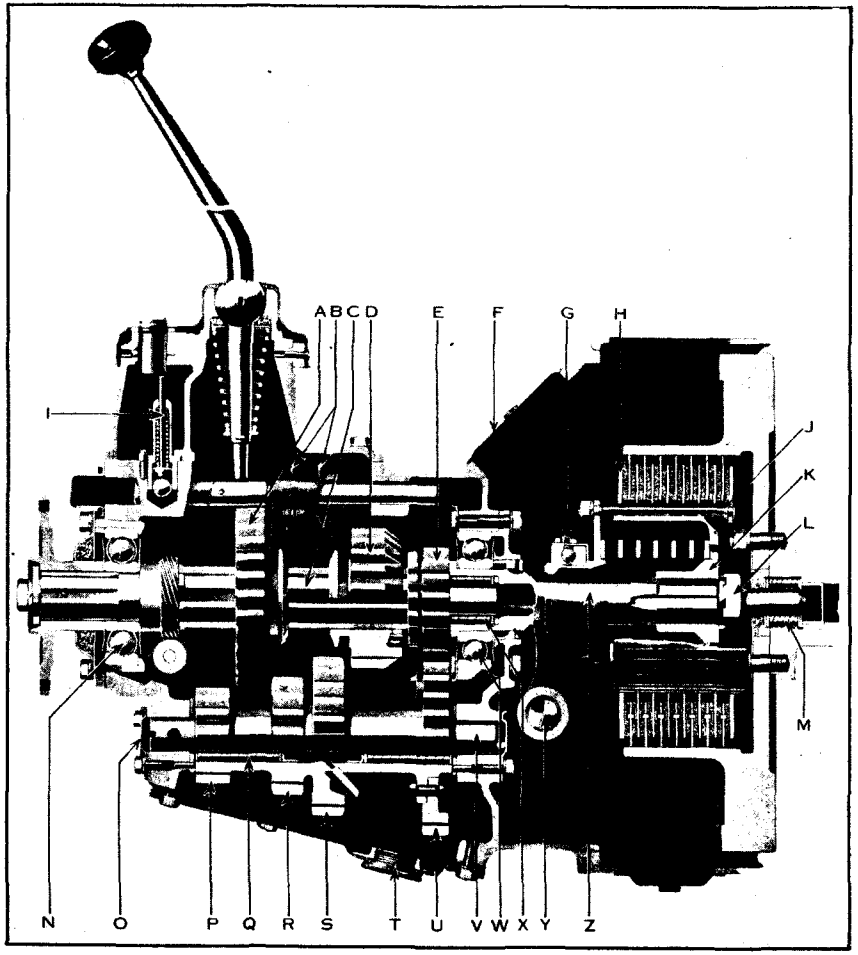


FIGURE 22. ***Sectional view of transmission***

extreme end of gear "E." The drive is then direct from the clutch shaft to the transmission main shaft without reduction.

Reverse—When the control lever is moved from neutral to low, the gear "A" is moved back into mesh with an idler gear, not shown in Fig. 22, which is at all times in mesh with gear "P." Power is then transmitted through gears "E," "U," "P," the reverse idler gear, and gear "A." The interposition of the idler gear reverses the direction of rotation. The ratio of engine speed to propeller shaft speed in reverse is approximately 3.8 to 1.

CHAPTER VI

Brakes

General Description

There are three pairs of brakes: the rear wheel external brakes, the rear wheel internal brakes, and the front wheel brakes, which are also internal. The rear wheel external brakes and the front wheel brakes are operated by the brake pedal and comprise the foot brakes. The rear wheel internal brakes are operated by the hand lever and are used principally for locking the rear wheels when the car is standing.

The purpose of the front wheel brakes is to add to the braking ability as much as is consistent with safety. It is not desirable to attempt to secure the maximum possible braking effect on the front wheels for the reason that, when a front wheel slides without rotating, it has no power to change the direction of the car.

Cadillac front wheel brakes are accordingly designed so that when the foot brakes are applied while the steering wheel is turned to the right or left, only the brake on the inside wheel is effective and the brake on the outer wheel is released, leaving the outer wheel free to rotate. It is thus impossible to lock both front wheels even on slippery pavement unless the car is moving straight ahead. If, while the car is moving straight ahead on slippery pavement, the brakes should be applied with sufficient pressure to lock both front wheels and it then becomes necessary to make a turn, the car will instantly respond because the brake on the outer wheel is automatically released as soon as the steering wheel is turned.

Adjustment

Each foot brake has provision to compensate for wear on the brake lining. The adjustment by which this compensation is effected is at the brake itself

rather than in the connections. Cadillac brakes must *not* be adjusted to compensate for wear by adjusting the pull rods or stop screws.

As described on page 16, the Cadillac two-stage brake pedal automatically notifies the driver when the foot brakes require adjustment. It is recommended that the car be taken to a Cadillac maintenance station for attention when necessity for adjustment is thus indicated.

If, however, the adjustment is neglected and as a result the pedal touches the floor boards before the brakes are fully applied, an emergency adjustment can be made by screwing down the adjusting nuts "F" (Fig. 23) one or more half-turns. The nuts "F" lock every half-turn and must be turned a half-turn at a time. The nuts "F" must not be turned down far enough to cause the brakes to heat and they must be turned down the same amount on both sides.

If adjustment of the nuts "F" is not sufficient, or if the occasion gives opportunity for a complete adjustment, this adjustment should be made as follows:

Loosen the three locking nuts "B," "D" and "N" (Fig. 23) and screw the three stop screws "A", "C" and "M" away from the brake band. Observe the clearance between those parts of the brake lining nearest the hexagonal

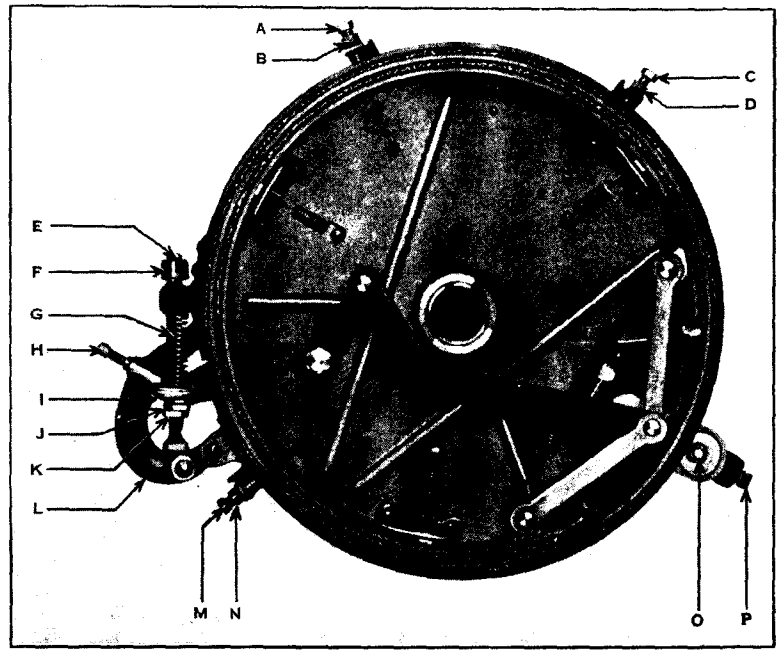


FIGURE 23. ***Rear wheel brakes***

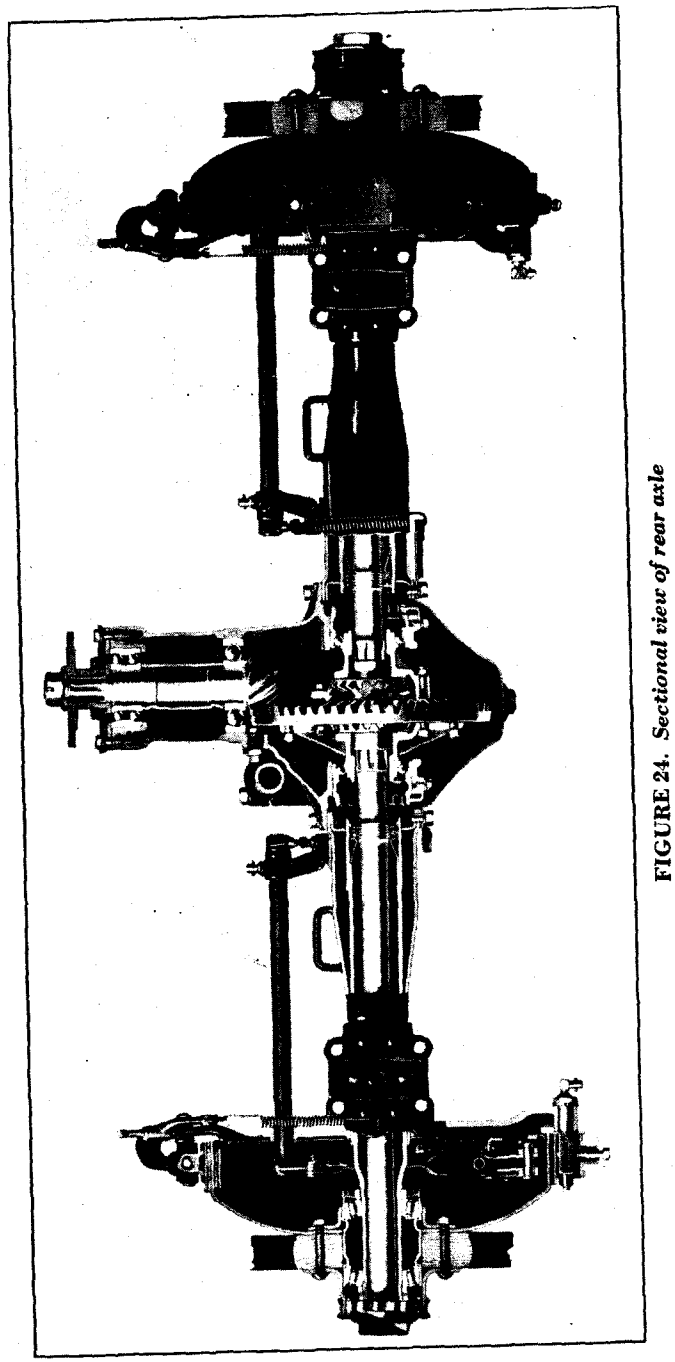


FIGURE 24. *Sectional view of rear axle*

head screw "P" and the brake drum. This clearance should be .030 to .035 inch. If the clearance is not correct, adjust the screw "P" until it is. The screw "P" is kept from turning of its own accord by a lock washer which turns with the screw and locks every half-turn. It must accordingly be turned a half-turn at a time.

Loosen the locking nuts "K" and adjust the nuts "J" and the screws "M" so that there is a uniform clearance of .030 to .035 inch between the *lower* part of the brake lining and the brake drum. To decrease the clearance between the brake lining and the drum, screw the nut "J" farther down on the yoke bolt "E."

Adjust the nuts "F" and the two stop screws "A" and "C" so that there is a uniform clearance of .030 to .035 inch between the *upper* part of the brake lining and the drum.

After making the foregoing adjustments so that there is a uniform clearance of .030 to .035 inch between the drum and the lining, check the results by applying the brakes, and measuring the travel of the upper end of the lever "L." This travel should not be less than 7/8 inch. If the end of the lever "L" travels less than 7/8 inch in moving from the released position to the applied position, readjust one or all of the nuts "F" and "J" and the screws "P," "A," "C" and "M" to increase the clearance slightly, keeping the clearance uniform at all points around the drum. Do not fail to tighten the locking nuts "B," "D," "N" and "K" when the adjustment has been made.

Do not change the adjustment of the screw "H." This screw is properly set when the car is assembled and does not require readjustment in taking up wear on the lining.

Inasmuch as the brakes are designed so that the greater proportion of the braking load is taken by the rear wheel brakes, adjustment of the front wheel brakes is usually not necessary until the rear wheel foot brakes have been adjusted several times. Before the limit of adjustment for the rear wheel foot brakes has been reached, the car should be taken to a Cadillac maintenance station for adjustment of the front wheel brakes.

Adjustment of the hand brakes is unnecessary. The hand brakes retain their effectiveness without adjustment throughout the life of the lining.

All joints in the brake connections should be oiled at regular intervals. The brakes should also be tested occasionally to be sure that they are in serviceable condition. When the brake band linings have worn so that further adjustment is impossible, they can be renewed.

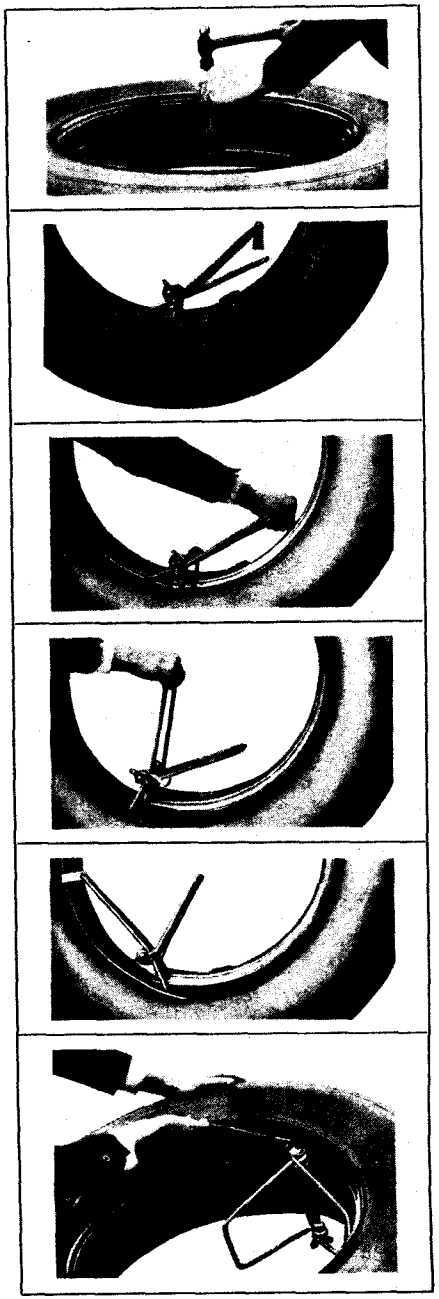


Figure 25a

Lay the tire and rim flat on the ground and drive out the locking pin, using the hammer and punch in the tool kit. *Be sure there is no air in the tire.*

Figure 25b

Apply the rim tool, which is furnished in the tool kit, as shown in the illustration. Note that there are two pairs of holes in the rim near the split and that one pair is nearer the split than the other. The short end of the tool must be inserted in the holes nearer the split and the long end in the holes farther from the split. Clamp the tool firmly in position by tightening the wing nut.

Figure 25c

Grasp the two handles and squeeze them together, spreading the ends of the rim farther apart at the split. Then pull both handles together toward the other side of the rim until one end of the rim is forced up and over the other end. If the rim does not pull over evenly on both sides a screw driver can be used to advantage to pry up the end of the rim.

Figure 25d

Release the short handle of the tool but continue pulling the long handle until it is against the rim.

Figure 25e

Engage the hook that is attached to the long handle over the edge of the rim to hold the rim in the collapsed position.

Figure 25f

Lay the rim and tire on the ground with the hook and wing nut *face down* and remove the tire from the rim by working it off first on the side where the rim is split. The handle of the large wrench is flat to serve as a prying tool.

FIGURE 25. ***Removing tire from rim***

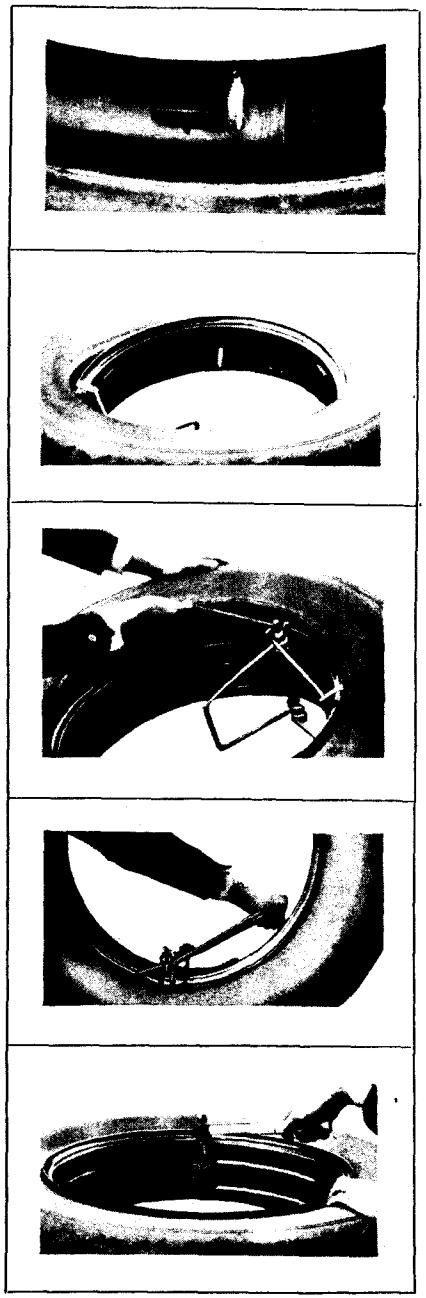


Figure 26a

Make sure that the tube flap is in place and that the valve stem passes through the holes in both ends of the flap.

Figure 26b

Lay the rim on the floor with the hook and wing nut of the tool *face up*. Insert the valve stem in the hole in the rim and work the tire well into place on each side of the valve stem.

Figure 26c

Pry the tire over the projecting end of the rim where it is split. The rest of the tire can then be pushed down into place.

Figure 26d

Release the hook from the rim and let the long handle go back until it stops. Then squeeze the two handles together until the end of the rim drops into its original position. *Do not attempt to force the long handle alone as this will only bend the tool.* If the end of the rim does not go easily into place, remove the tool and pry the end of the rim with a screw driver.

Figure 26e

Replace the pin which locks the two ends of the rim together. This is important.

FIGURE 26. ***Installing tire on rim***

CHAPTER VII

Wheels

Tires and Rims

Illustrated directions for removing a rim with tire from a wheel and installing a rim with tire on a wheel are given in Figs. 7 and 8. Directions for removing a tire from a rim and installing a tire on a rim are given in Figs. 25 and 26.

Do not under any circumstances attempt to remove a tire from a rim *without deflating the tire.*

Caution in Adjusting Wheel Bearings

The adjustment of wheel bearings or the removal of the wheels should not be attempted by one unfamiliar with work of this nature. It is recommended that the car be taken to a Cadillac maintenance station if possible. In any event great care must be exercised in adjusting wheel bearings 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.

Removing Front Wheel

To remove a front wheel, first jack up the axle until the wheel is free from the ground and then proceed as follows:

Remove the hub cap by unscrewing it. Remove the cotter pin "E" (Fig. 27). Remove the lock nut "A." Remove the serrated washer "B." Remove the adjusting nut "C." The wheel may then be removed by pulling it straight off.

Installing Front Wheel and Adjusting Bearings

Before installing the wheel, make sure the bearings are clean and that they are packed in a light grease that is free from dirt and grit.

Set the wheel in place on the spindle and adjust the nut "C" (Fig. 27) very carefully, following the caution above. Install the serrated washer "B," making sure that one of the notches in the washer fits over the stud "D" on

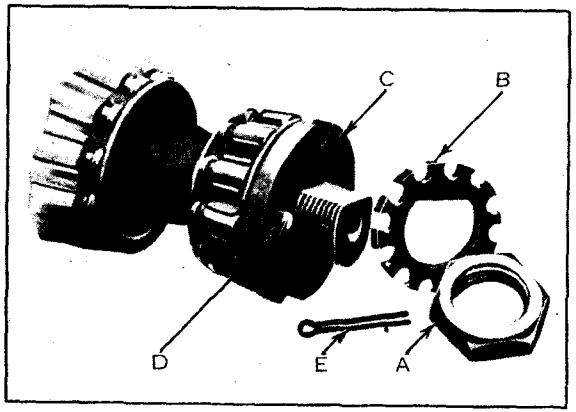


FIGURE 27. ***Front wheel bearings***

the adjusting nut. Replace the lock nut "A" and tighten it firmly, locking it with the cotter pin "E."

It is always better to adjust wheel bearings too loosely than too tightly. If after the adjustment is apparently correct, the notch in the washer "B" is not directly over the stud "D," loosen the adjustment rather than tighten it.

Removing Rear Wheel

To remove a rear wheel, first jack up the axle until the wheel is free from the ground and then proceed as follows:

Remove the hub cap "D" (Fig. 28) by unscrewing it. Remove the spring locking ring "F." Withdraw the axle shaft "E." With a screw driver or blunt

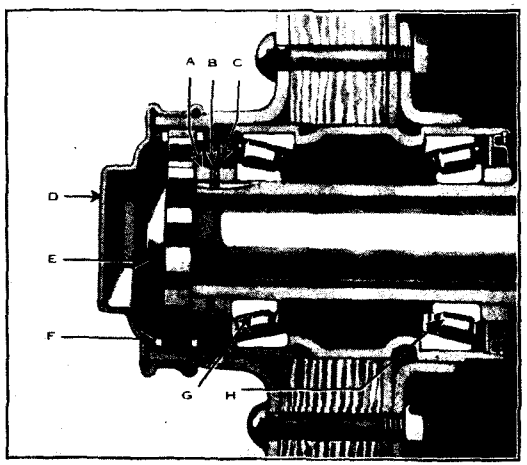


FIGURE 28. ***Sectional view of rear wheel hub, showing bearings***

tool straighten the lug of the outer lock washer "B" where it has been bent over the lock nut "A." Unscrew the lock nut "A." Remove the washers "B" and the adjusting nut "C." The wheel can then be removed by pulling it straight off.

Installing Rear Wheel and Adjusting Bearings

Before installing the wheel, make sure that the bearings are clean and packed in a light grease that is free from dirt and grit.

Set the wheel in place upon the axle and adjust the nut "C" (Fig. 28) very carefully. Install the lock washers "B," using new washers or straightening the ones removed if new ones are not available. In placing the washers in position, reverse the outer one with respect to the inner so that the lugs on one washer are opposite the spaces between the lugs on the other washer; that is, so that the lugs on the two washers are staggered. Install and tighten the lock nut "A." Next, select that lug on the inner washer that falls nearest to the center of one of the flat sides of the adjusting or inner nut, and with a screw driver or other suitable tool bend this lug over the nut. In the same way bend one of the lugs of the outer washer over one of the flat sides of the locking or outer nut. In bending the lugs of the locking washers, take care not to alter the adjustment of the inner nut or loosen the outer nut.

CHAPTER VIII

Repair Parts

Genuine Cadillac Parts

Cadillac owners are cautioned against permitting the use of other than genuine Cadillac parts in the repair of their cars. The quality of the Cadillac car is identical with the quality of its component parts, the production of which is based upon more than twenty years of experience in designing, manufacturing, and inspecting. No other individual or organization has access to the data resulting from this experience nor could they possibly have the same interest in protecting the owners of Cadillac cars.

Uniform Parts Prices

Cadillac parts are sold at uniform prices throughout the United States, and are not subject to the addition of transportation, excise or other supplementary charges. Printed price lists published by the Cadillac Motor Car Company are open to inspection by owners at any authorized Cadillac distributor's or dealer's establishment.

Ordering New Parts

With many thousands of Cadillac automobiles in use, it is obviously impractical to deal directly with each Cadillac owner. We cannot open accounts with any except regular distributors with whom annual contracts are made.

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 Cadillac distributor or dealer, who carries a large stock and is generally in a position to supply a part immediately. If he cannot do so, he can order it. 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 parts either from a Cadillac distributor or from the factory, send the engine number and the unit assembly number (see page 84) with an accurate description of the part desired, preferably accompanied by a sketch with dimensions. If this cannot be done, send the part itself properly tagged and with transportation charges prepaid. (See below under "Returning Parts.") Otherwise prompt and intelligent filling of the order will be impossible.

Our responsibility ceases in all cases, with delivery to the transportation company.

Returning Parts

In the event parts are returned, transportation charges must be prepaid or the parts cannot be accepted. They should be tagged properly with the name of the owner and the engine number of the car. A letter should be sent, giving complete instructions regarding the disposition of the parts.

Tires, Speedometer and Clock

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

CHAPTER IX

Specifications and License Data

Type of engine	8 cyl. V-type
Diameter of cylinder bore	3 1/8 in.
Length of stroke	5 1/8 in.
Piston displacement	314 cu. in.
Horsepower (N. A. C. C. rating)	31.25
Engine number	See below
Diameter of crankshaft main bearings	2 3/8 in.
Length of crankshaft between inner ends of front and rear bearings	18 5/8 in.
Exhaust valves	1 1/16 in.
Inlet valves	1 11/16 in.
Capacity of gasoline tank	20 gals.
Capacity of engine lubricating system	2 gals.
Capacity of cooling system*	4 1/2 gals.
Capacity of transmission	3 qts.
Capacity of rear axle	3 1/2 qts.
Tires	33x6.75 (low pressure)
Wheelbase	132 in. and 138 in.
Tread	56 in.

*When the radiator contains only enough liquid to cover the bottom of the upper tank.

Engine and Unit Assembly Numbers

Each Cadillac car when shipped carries an engine number which is also a serial number. This is the number to be used in filling out license and insurance applications and in general reference to the car. The engine number is stamped on the car in two places: On the name plate on the front face of the dash and on the crankcase at the base of the oil filler.

The various units such as the transmission, steering gear, etc., also carry unit assembly numbers. These are located as described below. It is important in ordering parts to give, not only the engine number of the car, but also the unit assembly number of the unit to which the part belongs.

Transmission number—on the upper surface of the boss to which the clutch and brake pedal bracket is attached.

Steering gear number—on the steering gear housing just above the grease gun connection.

Carburetor number—on the left-hand rear face of the flange by which the carburetor is attached to the intake header.

Generator number—on the left-hand side of the generator.

Starting motor number—on the left-hand side of the starter almost opposite the distributor.

Front axle number—on the upper surface of the axle I-beam at the right-hand end just above the steering stop screw.

Rear axle number—on the rear surface of the axle housing just to the right of the cover plate.

Frame number—on the upper surface of the left-hand side bar opposite the steering gear.

Index

A

Accelerator (see throttle control) 10
Accelerator, use of, when engine is cold 32
Adding water to storage battery 63
Additional cold weather suggestions 33
Adjustment of brakes 74
Adjustment of clutch release rod 72
Adjustment of headlamps 69
Adjustment of oil pressure regulator 42
Air compressor for tires 27
Air compressor, gasoline system 9
Air pump for tires (tire air compressor) 27
Alcohol as anti-freeze 34
Alcohol, effect of, on finish 34
Alignment of front wheels, incorrect, result of 51
Ammeter 17
Ammeter, its use 62
Anti-freezing solutions 33
Axle, rear, add lubricant to 46

B

Battery, storage of, when car not in use 53
Bearing, clutch thrust, to grease 45
Bearings for wheels, adjustment of 80
Bearings for wheels, pack with grease 46
Body and top, care of, when stored 54
Body, care of finish when new 49
Brakes 16
Brake adjustment 74
Brakes, general description of 74
Brakes suddenly applied, effect on tires 52
Bulbs for lamps, voltage 67
Button, carburetor enriching 11

C

Carburetor 59
Carburetor enriching button 11
Carburetor enriching button, use of, in cold weather 31
Carburetor, to prime 31
Capacity of cooling system 34
Caps, tire valve 25
CARE OF BODY 49
Care of finish on body when new 49
CARE OF TIRES '51
Chains for tires, when improperly adjusted 51
Changing tire on rim 78–9
Changing tires 30
Chassis lubrication diagram 44
Choke rod 11
Choke rod button (carburetor enriching button) use of, in cold weather 31
Cigar lighter and inspection lamp 23
Circulating system for oil 40
Circulation of water 60
Cleaner for windshield 22
Cleaning headlamp reflectors 68
Cleaning the cooling system 61
Cleaning upholstery 50
Cleaning windows, closed cars 50
Clock 23
Clock, repairs to 83
CLUTCH AND TRANSMISSION 71
Clutch, construction of 71
Clutch pedal 14
Clutch release rod, adjustment of 72
Clutch thrust bearing, to grease 45
Coasting 19
COLD WEATHER OPERATION 31
Contents 5
CONTROLS AND INSTRUMENTS 9
Control, ignition lever 10
Control, throttle lever 10
Control, transmission 15
Commutator, horn, to clean 48
Compressor, air, gasoline system 9
Compressor for air in tires 27
COOLING SYSTEM 60
Cooling system, capacity 34
Cooling system, drain and refill 60
Cooling system, to clean 61
Cowl ventilator, open cars 22
Crankcase ventilating system 42
Cup grease 39
Curtain fasteners, open cars 24
Curtains, side, open cars 24

D

Danger of running engine in closed garage 18
Data for license purposes 84
Diagram, chassis lubrication 44
Distributor oil cups, fill with oil 45
Don'ts for general operation 20
Door hardware, to oil 48
Draining cooling system 60
DRIVING 18
Driving on steep grades 19
Driving speed when car is new 18
Driving suggestions 20
Duco finished cars, to wash 50

E

Effect of alcohol on finish of body 34
ELECTRICAL SYSTEM 61
Engine, fails to start 13
Engine, gasoline, general principles of 57
Engine, important features of 56
ENGINE LUBRICATION 40

Engine number, location of 84
Engine oil 39
Engine oil for cold weather 33
Engine oil, to replace 45
Engine, prepare for storage 53
Engine rear supports, to oil 45
Engine, starting of 12
Engine, starting in cold weather 31
EQUIPMENT, general 22
Equipment, tools 24
Exide Depots for battery maintenance .. 64

F

Fasteners, curtain, open cars 24
Filling and draining cooling system 60
Filter for oil 43
Finish of body, care of, when new 49
Foot brakes 16
Foreword 3
Front brake trunnions, lubrication of 47
Front wheels improperly aligned, result of 51

G

Garage floor, grease covered, effect on tires 52
Gas in closed garage, when engine is running 18
Gasoline gauges and air compressor 9
Gasoline settling chambers and strainers, where located 58
Gasoline strainers, cleaning in cold weather 33
Gasoline system 59
Gauge, oil pressure 14
Gauges, gasoline quantity and pressure 9
General driving suggestions 20
GENERAL INFORMATION 56
GENERAL LUBRICATION 45
General operation, don'ts 20
General principles of gasoline engine 57
Generator 61
Generator oil cups, fill with oil 45
Genuine Cadillac parts 82
Glycerine as anti-freeze 34
Grease for roller bearings 39
Grease for universal joints 39
Grease gun connections, to grease 45

H

Hand brakes 17
Hardware on doors, to oil 48
Headlamp reflectors, to clean 68
Headlamps, adjustment of 69
Headlamps, official approval of 68
Headlamps, operation, use of beams 12
Holder for rim and tire 30
Horn, clean commutator of 48
Ignition and lighting switch 11
Ignition control lever 10
Ignition control lever position in cold weather 32
Ignition, general description of 65
Ignition switch lock 9, 11
Inflation pressure, tires 27
Inflation of tires, under-inflation 51
Inspection lamp 23
Installing rim with tire on wheel 29
Installing wheels 80
INSTRUMENTS AND CONTROLS .. 9

L

Lamp bulbs 67
Lamp, inspection 23
Level for oil, engine 41
Lever, ignition control 10
Lever, throttle control 10
Lever, transmission control 15
License data 84
Lighter, cigar 23
Lighting switch 11
Lighting system 67
Locks 9
Lubricant for rear axle and transmission 39
Lubricant for steering gear 39
Lubricants 39
Lubricants, selection of 39
Lubrication and care 35
Lubrication chart 36
LUBRICATION, ENGINE 40
Lubrication schedule 36
LUBRICATION, SYSTEMATIC METHOD 37

M

Mirror, rear vision 23
Mounting tire on rim 79

N

New car, driving speed 18
New car, washing 49

O

Official approval of headlamps 68
Oil circulating system 40
Oil cups on generator, to fill 45
Oil cups on timer-distributor 45
Oil filter 43
Oil for engine 39
Oil for engine in cold weather 33
Oil holes in steering column, to lubricate 47
Oil level 41
Oil pressure regulator 42
Oil pressure 41
Oil pressure gauge 14
Oil, replacing of, in engine 45

OPERATION, IN COLD WEATHER 31
Operation, don'ts 20
Operation of starter 65
Ordering new parts 83

P

Parts, genuine Cadillac 82
Parts, ordering new 83
Parts, returning of 83
Pedal, clutch 14
Pedal, foot brake 16
Pedal, starter 12
Position of ignition control lever 32
Position of throttle hand lever in cold weather 32
Plugs, spark 67
Pressure for tires 27
Pressure gauge, gasoline air line 9
Pressure of oil 41
Pressure, oil gauge 14
Prices of parts, uniform 82
Priming the carburetor in cold weather 31
Pump, air for tires (tire air compressor) 27

R

Radiator and shutters 60
Rear axle and transmission lubricant 39
Rear axle, sectional view 76
Rear axle, to add lubricant 46
Rear vision mirror 23
Removal of wheels 80–1
Removing rim with tire from wheel 28
REPAIR PARTS 82
Repairs to speedometer head 17
Replacing engine oil 45
Result of under-inflation of tires 51
Returning parts 83
Rim, installing on wheel 29
Rim, removal of tire from 78
Rim, removing from wheel 28
Rim, true up 30
Roller bearing and cup grease 39

S

Schedule of lubrication 37
Settling chambers and strainer in gasoline line, to clean 59
Shaft, flexible for speedometer drive, to lubricate 47
Shifting transmission gears 16
Shutters on radiator 60
Side curtains, open cars 24
Small cuts in tires, neglect of 51
Solutions for anti-freeze 33
Spark control lever 10
Spark plugs 67
Specific gravity of battery solutions 64
SPECIFICATIONS AND LICENSE DATA 84
Speed of new car 18
Speedometer 17
Speedometer head, lubrication indicator 17
Speedometer flexible drive shaft, to lubricate 47
Speedometer, repairs to 83
Springs, to lubricate leaves 48
Stabilators, do not lubricate 48
Starter pedal 12
Starter, use of in cold weather 32
Starting engine 12
Starting engine, fails to start 13
Starting engine in cold weather 31
Starting motor 65
Steering gear, add lubricant 47
Steering gear lubricant 39
Strainers in gasoline system, cleaning in cold weather 33
Storage battery, adding water 63
Storage battery, location on car 63
Storage battery, when car is stored 53
STORING CAR 53
Storage of car, placing car in service (use) 54
Storage of tires 54
Suggestions for driving 20
Supports for rear of engine, to oil 45
Switch, ignition and lighting 11
SYSTEMATIC LUBRICATION 37

T

Taking car out of storage 54
Throttle control 10
Throttle hand lever position, cold weather 32
Timer-distributor, how operated 66
Timer-distributor oil cups, fill with oil .. 45
Tire air compressor 27
Tire and rim, installing on wheel 29
Tire and rim, removing from wheel 28
Tire carrier (tire holder) 30
Tire chains, improperly adjusted 51
Tire holder 30
Tire holder lock 9
Tire, to install on rim 79
Tire pressure 27
Tires 25
Tires, care of, when car is stored 54
Tires, removal from rim 78
Tires, repairs to 83
Tires, to change 30
Tools 24
Tools (illustration) 26
Top, care of when car is stored 54
Transmission control 15
Transmission, description of 72
Transmission lock 9
Transmission lubricant 39
Transmission, to add lubricant 46
Truing up rim 30
Trunnions, front brake, to lubricate 47

U

Uniform parts prices 82
Universal joint grease 39
Universal joints, to lubricate 46
Upholstery, to clean 50
Use of accelerator before engine is warm 32
Use of starter in cold weather 32

V

Valve caps, tire 25
Valve stems, how lubricated 41
Varnished cars, washing, when new 49
Ventilating system for crankcase 42
Ventilator in cowl, open cars 22

W

Washing Duco-finished cars 50
Washing varnished cars 49
Water circulation 60
Watson stabilators, do not lubricate 48
Windows, to clean 50
Windshield and ventilator 22
Windshield cleaner 22
Wiper, windshield 22
WHEELS 80
Wheels, installation of 80–2
Wheels, pack bearings with grease 46
Wheels, removal of 80–1
Wheels, to adjust bearings of 80

The Cadillac Motor Car Company reserves the right without notice to make changes in design, construction and specifications

1-26-5000
PRINTED IN U.S.A.

CADILLAC

Operator's Manual



Price Thirty-Five Cents

CADILLAC MOTOR CAR COMPANY
DETROIT

CADILLAC

Operator's Manual



Price Thirty-Five Cents

CADILLAC MOTOR CAR COMPANY
DETROIT

1926

CADILLAC

Operator's Manual



Price Thirty-Five Cents

CADILLAC MOTOR CAR COMPANY
DETROIT

Copyright 1926 by
Cadillac Motor Car Company

EDITION NO. 314-150

In ordering a duplicate of this Manual specify the above number or the engine number of the car

Foreword

THE experienced motorist whose new Cadillac succeeds other cars, some of which may also have been Cadillacs, requires less elementary operating instructions than the beginner, learning for the first time to drive. Likewise, the owner who takes advantage of the facilities offered by the maintenance station has less need for detailed information in regard to care of the car than the owner who provides for all necessary attention in his private garage.

In preparing this Manual, it has been taken for granted that the typical Cadillac purchaser is no longer a novice in motor car operation and that the greatest number of Cadillac owners will be best served by omitting that which is extremely elementary in character. It has also been assumed that, although he should at least know what care his car must regularly receive in order to render the best possible performance with the fewest possible interruptions, the typical Cadillac owner prefers to depend upon the maintenance station for occasional adjustments and repairs.

By thus omitting both that which is very elementary and that which is too technical, the first two divisions of the Manual have been made to include only information that is vital to every Cadillac owner regardless of his previous motoring experience. Part I, "Operation," is important because, no matter what car the owner may have driven before, his new car will differ in some feature, even from an earlier Cadillac. Part II, "Lubrication and Care," contains information that every owner should have regardless of the extent to which he expects to delegate the care of the car to others. Especially should he be familiar with lubrication, for correct lubrication is an essential without which it is impossible for the car to render unfaltering performance.

Part III, "General Information," may be considered as a supplement to the Manual. It contains information that may never be required by some owners, but that is included for use should occasion arise. In other words, it is a reference section to which the index on page 85 is a sufficient guide.

All written instructions are subject to limitations. The owner is asked to remember that the Manual is only one means by which the Cadillac organization desires to assist the Cadillac owner to realize the most from his car. Cadillac distributors and dealers everywhere invite the Cadillac owner to consult them on any matters pertaining to the operation and care of his car. If preferred, a request for information may be made direct to the factory, where it will receive the attention of the Technical Department.

Contents

Part I—Operation

PAGE

CHAPTER I—*Controls and Instruments* 9

Locks—Gasoline gauges and air compressor—Throttle control—Ignition control lever—Carburetor enriching button—Ignition and lighting switch—Starter pedal—Oil pressure gauge—Clutch pedal—Transmission control—Brakes—Speedometer—Ammeter.

CHAPTER II—*Driving* 18

Driving speed when car is new—Danger of running engine in closed garage—Coasting—General driving suggestions—Don'ts.

CHAPTER III—*Equipment* 22

Windshield and ventilation—Windshield cleaner—Rear vision mirror—Cigar lighter and inspection lamp—Clock—Side curtains—Curtain fasteners—Tools. TIRES—Tire valve caps—Inflation pressure—Tire air compressor—Tire holder—Changing tires—Truing up rim.

CHAPTER IV—*Cold Weather Operation* 31

STARTING THE ENGINE—Carburetor enriching button—Priming the carburetor—Position of throttle hand lever—Position of ignition control lever—Use of starter—Use of accelerator pedal before engine is warm. ADDITIONAL COLD WEATHER SUGGESTIONS—*Engine oil for cold weather*—Strainers in gasoline system. ANTI-FREEZING SOLUTIONS—Alcohol and water—Glycerin and water—Capacity of cooling system—Effect of alcohol on finish.

Part II—Lubrication and Care

CHAPTER I—*Systematic Lubrication* 37

Necessity for lubrication. Lubrication schedule. LUBRICANTS—Engine oil—Rear axle and transmission lubricant—Roller bearing and cup grease—Universal joint grease—Steering gear lubricant.

CHAPTER II—*Engine Lubrication* 40

Oil circulating system—Oil level—Oil pressure—Crankcase ventilating system—Oil filter—Replacing engine oil—Generator oil cups—Timer-distributor oil cup—Engine supports.

CHAPTER III—*General Lubrication* 45

Grease gun connections—Clutch thrust bearing—Transmission—Universal joints—Rear axle—Wheels—Front brake trunnions—Steering gear—Oil holes in steering column—Speedometer flexible drive shaft—Horn—Springs—Door hardware.

CHAPTER IV—*Care of Body* 49

Care of finish when new—Washing varnished cars—Washing Duco—Cleaning windows—Cleaning upholstery.

CHAPTER V—*Care of Tires* 51

Result of under-inflation—Result of improperly aligned front wheels—Neglect of small cuts—Result of improperly adjusted tire chains—Result of sudden application of brakes—Additional suggestions.

CHAPTER VI—*Storing Car* 53

Engine—Storage battery—Tires—Body and top—Taking car out of storage.

Part III—General Information

CHAPTER I—*Engine* 56

Important features of construction—General principle of gasoline engine—Suction stroke—Compression stroke—Power stroke—Exhaust stroke—Firing order.

CHAPTER II—*Gasoline System* 58

Settling chambers—Gasoline filter—Carburetor.

CHAPTER III—*Cooling System* 60

Water circulation—Radiator and shutters—Filling and draining—Cleaning the cooling system.

CHAPTER IV—*Electrical System* 61

Generator—Ammeter. STORAGE BATTERY—Adding water to storage battery—Specific gravity of battery solution—Disconnecting battery—Exide depots and sales offices. STARTING MOTOR—Operation of starter. IGNITION—General description—Timer-distributor—Spark plugs. LIGHTING SYSTEM—Lamp bulbs—Cleaning headlamp reflectors—Official approval of headlamps—Adjustment of headlamps.

CHAPTER V—*Clutch and Transmission* 71

Clutch—Adjustment of clutch release rod—Transmission.

CHAPTER VI—*Brakes* 74

General description—Adjustment.

CHAPTER VII—*Wheels* 80

Tires and rims—Caution in adjusting wheel bearings—Removing front wheel—Installing front wheel and adjusting bearings—Removing rear wheel—Installing rear wheel and adjusting bearings.

CHAPTER VIII—*Repair Parts* 82

Genuine Cadillac parts—Uniform parts prices—Ordering new parts—Returning parts—Tires, speedometer and clock.

CHAPTER IX—*Specifications and License Data* 84

INDEX 85

PART I

OPERATION

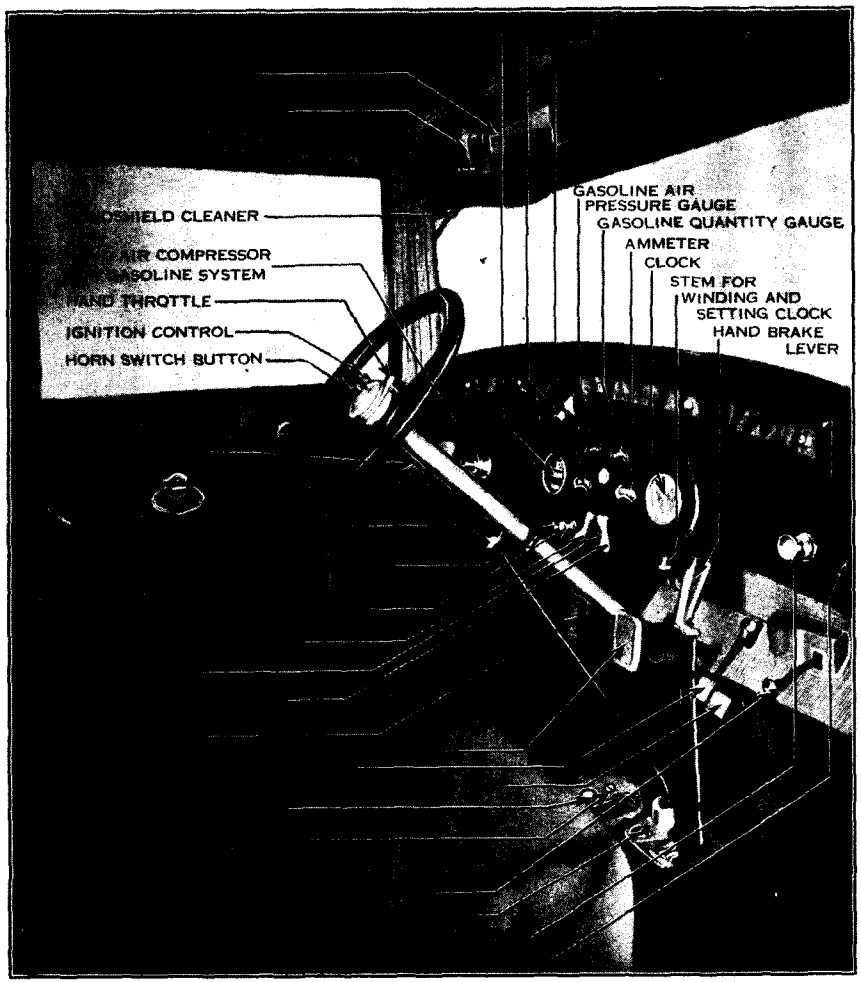


FIGURE 1. ***Instruments and controls***

*See page 23 regarding use of inspection lamp in cigar lighter socket.

CHAPTER I

Controls and Instruments

ONE of the first things the driver of a new car has to do is to familiarize himself with the various controls. In the following chapter are described the levers, pedals, instruments, and other devices used in the operation of the car. The experienced motorist, as well as the beginner, should read this chapter to avoid overlooking any detail of operation in which the car may differ from cars he has previously driven.

Locks

The Cadillac car is provided with the following cylinder locks, all of which on any one car are operated by the same key: ignition switch, transmission control lever, tool compartment, battery compartment, tire holder, and, on closed cars, the doors and various package compartments.

The lock on the switch acts only on the ignition or left-hand lever, which must be *down* in order to be locked. The transmission control lever can be locked in neutral, intermediate and high.

The lock number is stamped on each key, but not upon the face of the lock. It is urged that the owner make a record of the key number as soon as he takes delivery of his car, so that in the event both keys are lost, a duplicate key can be easily ordered.

Gasoline Gauges and Air Compressor

The two upper dials on the instrument panel (Fig. 1) are gauges for the gasoline system.

The gauge at the right marked "Gas" indicates in gallons the quantity of fuel in the tank at the rear of the car, and is operated electrically. To read from the gauge the quantity of fuel in the tank, *the ignition must be switched on.* When the ignition is switched off the gauge does not indicate correctly.

As filling station rules forbid running the engine while the gasoline tank is being filled, in order to know how much fuel to call for, it is necessary to read the gauge before stopping the engine. If the tank is to be completely filled and it is necessary to check the level as it nears the top of the tank, the ignition should be switched on again after stopping the engine.

The gauge at the left marked "Air" is a pressure gauge and indicates in pounds per square inch the air pressure in the gasoline system. This pressure is necessary to force the fuel from the tank to the carburetor.

Initial pressure is secured by operating the hand air compressor at the left-hand end of the instrument board. While the engine is running, pressure is automatically maintained by a compressor driven by the engine camshaft.

The normal pressure maintained by the automatic compressor is from one

to two pounds. There is sufficient pressure for starting the engine when the car is on level ground, if the gauge pointer is even one division away from the pin at zero. On a steep upgrade an initial pressure of one pound may be necessary.

In order to prevent leakage of the air pressure in the gasoline system it is important that the gasoline tank filler cap be air-tight. After screwing on the filler cap be sure to tighten the thumb screw in the center of the cap.

Before operating the hand compressor, the plunger must be released by turning the handle counter-clockwise. When the necessary pressure has been obtained, push the compressor handle all the way in and lock it, turning it clockwise as far as it will go.

Throttle Control

The power and speed of the engine are controlled by opening and closing a throttle valve in the carburetor. This throttle is operated both by a hand lever and a foot pedal.

The foot pedal, or accelerator, is at the right of the brake pedal (Fig. 1). The hand control is the right-hand lever of the two levers above the steering wheel. Both controls operate the same throttle; the hand lever, however, remains in the position to which it is moved, whereas the accelerator must be held down to keep the throttle open.

The normal position of the throttle hand lever for driving the car is all the way up (at "Close"). In this position the throttle of the carburetor is open just enough to permit the engine to run at idling speed after it is warm. For starting, however, the lever should be moved approximately one-fourth the way down, and should be left in this position until the engine is warm enough to permit the lever to be returned to the idling position without stalling the engine.

The throttle should normally be controlled by the accelerator. In starting the car on a hill, however, the hand lever should be used rather than the accelerator. This permits the brake pedal to be released with the right foot at the same time that the clutch is engaged with the left.

In cold weather, the accelerator should not be pushed down suddenly before the engine is warm. Sudden opening of the throttle before the engine is warm causes "popping-back" in the carburetor. This should be avoided as much as possible by judicious opening of the throttle during the warming-up period. (See page 32 under "Use of Accelerator Before Engine Is Warm.")

The accelerator can be used in cold weather to prime the carburetor by pushing the accelerator to the floor once or twice. This is not necessary except in very cold weather and should never be done unnecessarily. Excessive priming is likely to prevent the engine from starting. (See page 31 under "Priming the Carburetor.")

Ignition Control Lever

Correct timing of the ignition in relation to the positions of the pistons is accomplished automatically by a governor which is a part of the timer-distributor and which provides for all ordinary advancing and retarding of the spark. (See page 66 under "Timer-Distributor.") A hand control is also provided for still farther advancing or retarding the spark on certain occasions as hereafter described.

The hand control is the left-hand lever of the two levers above the steering wheel. For average driving, the correct position of this lever is about one-third down from the extreme top or "Advance" position. The lever should be left in this position except on the following occasions:

1. If the engine is being cranked by hand, the lever should be moved all the way down. If this is not done, a "kick-back" may occur, resulting in personal injury.
2. In pulling at low speeds with the throttle well open, the lever should be moved farther down.
3. In driving at high speeds, the lever should be moved all the way up.
4. In starting the engine in extremely cold weather, the lever should be moved all the way up unless the engine is being cranked by hand.

Carburetor Enriching Button

The button at the left of the ignition switch lever (Fig. 1) controls a device on the carburetor for temporarily enriching the fuel mixture supplied to the engine. In starting the engine it is necessary to have the proportion of liquid gasoline in the fuel mixture greater than at other times, because in a cold mixture only a part of the gasoline is vaporized. Pulling out the enriching button increases the proportion of liquid gasoline to air, the normal proportions being restored when the button is released and permitted to return to its original position.

Correct use of the enriching control not only is essential to quick starting of the engine, but also has an important bearing on the life of the engine. The enriching button must be pulled out far enough in starting to provide an explosive mixture quickly so that the battery is not unnecessarily discharged by useless cranking. The button must also be held out far enough during the warming-up period so that the engine will run without missing and "popping back." On the other hand, it should not be pulled out any farther or held out any longer than is necessary to accomplish these results, because some of the excess liquid gasoline in the enriched mixture does not burn.

If the engine still retains heat from previous running, the enriching control should not be used without first attempting to start the engine on the normal mixture. If the enriching button is pulled out for starting a hot engine the mixture may be made so rich that starting will be impossible.

The enriching button is not a priming device. It has no effect whatever on

the fuel or the fuel mixture unless the engine is being cranked or is running under its own power. The button must be pulled out and held partly out during the cranking operation.

Ignition and Lighting Switch

The ignition and lighting switch (Fig. 1) controls the current for the ignition and for the following lamps: headlamps, instrument lamp, and rear lamp. The ignition lever is the left-hand lever and has two positions: "off," when down, and "on," when up. The lighting lever is the right-hand lever and has four positions besides the "off" position. Starting with the lowest position, these are:

First Position—Instrument lamp and rear lamp.
Second Position—Parking lights, instrument lamp and rear lamp.
Third Position—Headlamp lower beams, instrument lamp and rear lamp.
Fourth Position—Headlamp upper beams, instrument lamp and rear lamp.

Cadillac headlamp bulbs have two filaments, one above the other, instead of the customary single filament. Both filaments are of the same candlepower (21), but because they are located in different positions with respect to the focus of the parabolic reflector, the beam of light from one filament is projected at a different angle from the other. When the switch lever is in the fourth position, one set of filaments is lighted and the beams are projected straight ahead, illuminating the road at a distance. When the lever is in the third position, the other filaments are lighted and the beams are projected down at an angle, illuminating more brightly the road directly in front of the car.

The practice to be followed by the driver in using this double-beam feature of the headlamps will depend upon the regulations imposed by local authorities. In general, it is expected that the upper beams will be used except on the following occasions: when passing a vehicle approaching from the opposite direction, when rounding a sharp curve and when topping the crest of a hill. On these occasions and at other times when illumination is desired directly in front of the car, the lower beams should be used. For a further description of the headlamps, see page 68.

Starter Pedal

The starter pedal is at the right of the accelerator (Fig. 1). Pushing this pedal forward brings into action the electric motor that cranks the engine for starting. *Do not push the starter pedal when the engine is running.*

The starter pedal is only one of the controls that must be manipulated to start the engine. Unless there is an explosive mixture in the cylinders and a spark to ignite it, it is useless to crank the engine. The starter pedal should not be operated, therefore, until the necessary preliminary steps have been taken. The following, in their proper order, are the various steps that must

be performed to start the engine. As each control is mentioned, reference is made to the page on which that control is explained in detail.

1. Unlock the transmission. (Page 9.)
2. Make sure that the transmission control lever is in neutral. (Page 15.)
3. Unlock the ignition switch. (Page 11.)
4. Note whether pressure is indicated on the gasoline pressure gauge; if not, operate the hand compressor. (Page 9.)
5. Place the ignition control lever at the steering wheel about one-third* the way down. (Page 10.)
6. Place the throttle lever about one-fourth the way down from the idling position. (Page 10.)
7. *Cold Weather Only*—In extremely cold weather, prime the carburetor by pushing the accelerator to the floor once or twice. Do not prime the carburetor in warm weather or unnecessarily in cold weather. Excessive priming is likely to prevent the engine from starting. (Page 10.)
8. Pull back the carburetor enriching button unless the engine is still warm. If the engine is still warm, do not pull back the enriching button unless the engine fails to start on the normal mixture. (Page 11.)
9. Switch on the ignition. (Page 11.)
10. Push the starter pedal forward and hold it until the engine starts under its own power. Release it immediately as soon as the engine starts. (See below for probable causes for the engine failing to start.)
11. Let the carburetor enriching button partly in as soon as the engine starts, and all the way in as soon as the engine is warm enough to permit it. (Page 11.)
12. Note whether pressure is indicated on the oil pressure gauge and stop the engine at once if no pressure is indicated. (Page 14.)
13. Move the throttle lever up to the idling position as soon as the engine is warm enough to permit it.

In cold weather, disengage the clutch before pressing down the starter pedal, and hold it down during the cranking operation. This relieves the starter of the necessity of turning the transmission gears, which are immersed in lubricant. The additional load is small in warm weather when the lubricant is thin, but in cold weather the power required to turn the gears through the thickened lubricant adds unnecessarily to the demand upon the battery.

If the Engine Fails to Start—If the engine fails to start after being cranked for a few seconds, do not continue to operate the starter. To do so is a useless expenditure of battery energy. Release the starter pedal and investigate the cause, which may be one of the following:

No fuel in the tank.

No air pressure in the gasoline system.

*In extremely cold weather move the ignition control lever all the way up unless the engine should be cranked by hand. If the engine is cranked by hand, be sure to move the ignition control lever all the way down.

Ignition not switched on.

Carburetor flooded by unnecessary use of the enriching device or by unnecessary priming of the carburetor when the engine is warm.

Oil Pressure Gauge

The lower left-hand dial on the instrument panel (Fig. 1) is the oil pressure gauge. This gauge indicates, not the *quantity* of oil in the engine, but the *pressure* under which the oil is forced to the engine bearings.

When the engine is not running, the pointer on the oil pressure gauge should remain at zero, but as soon as the engine is started and as long as it runs the gauge should show pressure. If the gauge does not show pressure when the engine is running, stop the engine at once and determine the cause. Serious damage may be done if the engine is run without oil pressure. (See page 41 under "Oil Pressure.")

The amount of the pressure indicated by the gauge depends upon the speed of the engine, the viscosity of the oil, and the adjustment of the oil pressure regulator. At idling speed with fresh oil of the correct viscosity, the pressure after the engine is warm should be 1 to 4 lbs. Before the engine is warm, higher pressures than those specified will be indicated. After the oil has become thin from use, lower pressures than those specified will be indicated. These are normal variations from the standard and do not indicate need for readjustment of the oil pressure regulator.

Clutch Pedal

The clutch pedal is the left-hand pedal. When this pedal is in its normal or released position, the clutch is engaged. The flywheel of the engine is then coupled to the transmission by a series of discs, every other one of which is faced on both sides with friction material, and which are pressed together by a powerful spring. When the clutch pedal is pushed down, the spring is compressed and the clutch discs are allowed to separate. The clutch is then disengaged and the flywheel, if the engine is running, revolves independently of the transmission.

The clutch has two uses: First, to enable the car to be started gradually and without jerk or jar; second, to permit shifting of the transmission gears. The operation of the clutch pedal is discussed in connection with the transmission control on page 15. Further comment is unnecessary at this point except the following suggestions to the driver:

Do not drive with the foot resting on the clutch pedal. The Cadillac clutch operates so easily that even the weight of the driver's foot may unintentionally cause the clutch to slip.

Do not form the practice of disengaging the clutch whenever the brakes are applied. Most occasions for use of the brakes require only slowing down without stopping or even shifting of gears. A skilled driver will not touch the clutch pedal until the car is just about to stop or until he is about to shift to a lower gear. It is a mistaken idea that applying the brakes with the clutch engaged is more severe on the brake lining. The opposite is actually the case, proof of which is in the fact that in coasting down grades the resistance of the engine is used to assist the brakes in controlling the car speed.

It will be observed in operating the clutch pedal that the pedal offers almost no resistance until it has been moved about one inch. It is at this point that it actually begins to disengage the clutch. It is important that the pedal have this "lost motion." If the full pressure of the clutch spring is felt just as soon as the pedal is moved from its released position, necessity for readjustment of the pedal connections is indicated. Failure to make this adjustment will result in the clutch slipping. (See page 72.)

Transmission Control

The Cadillac transmission has three forward speeds and reverse. It is controlled by a lever, the handle of which describes the letter "H" as it is moved from one position to another. It should be observed by those who have driven other makes of cars that, although most cars have this conventional H-type of transmission control, all these cars do not have the same positions of the lever. The driver should study Fig. 2 carefully, and if the various positions of the lever are different from those to which he has been accustomed, he should master this arrangement before attempting to drive.

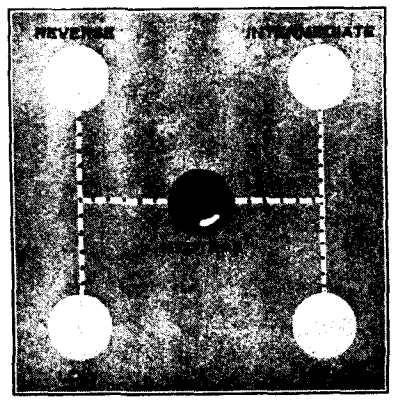


FIGURE 2. ***Positions of transmission control lever***

No attempt can be made here to teach the beginner the technique of gear shifting. It is recommended that the beginner secure individual instruction from the Cadillac distributor or dealer from whom the car was purchased and who will be glad to give this instruction. There are, however, certain rules and suggestions for the operation of the transmission control that it will be to the advantage of every driver to learn or to recall if he already knows them.

Always disengage the clutch before moving the control lever and hold the pedal down until the shift is completed.

Do not attempt to start the car with the transmission control in high gear.

Do not start with the transmission control in intermediate except when

the car is on a smooth level road or on a down grade; even under these conditions do not start the car in intermediate unless the engine is thoroughly warm.

Do not make any of the following shifts when the car is moving:

From reverse to any forward gear.
From any forward gear to reverse.
From high gear to low gear.
From intermediate to low gear (except when the car is moving very slowly).

In shifting from high to intermediate, the car should not be traveling faster than fifteen miles per hour and the control lever should be moved very quickly and with no hesitation in neutral.

There are times when it is desirable to be able to shift from high to intermediate at higher car speeds. It is possible to do this by the following method, which is called "double de-clutching":

Disengage the clutch and shift the transmission control lever at once to neutral. Re-engage the clutch, at the same time accelerating the engine; then disengage the clutch again and instantly shift to intermediate, after which re-engage the clutch. The speed to which the engine should be accelerated while the transmission control is in neutral, depends upon the speed at which the car is traveling when the shift is made.

It is not recommended that the driver attempt the double de-clutching method until he has become expert in shifting from high to intermediate in the usual manner at lower speeds.

Make a practice of shifting the transmission control to intermediate or even to low before commencing the descent of steep grades. The reason for this is explained on page 19, where will also be found further suggestions for coasting.

Brakes

The foot brakes, which consist of external brake bands on the rear wheels and internal bands on the front wheels, are operated by the right-hand pedal. This pedal differs from the conventional brake pedal in a construction that provides automatically for notifying the driver when readjustment of the brakes is necessary. Every driver is familiar with the fact that, as the brake lining wears, the brake pedal must be pushed farther toward the floorboard to apply the brakes. On most cars this proceeds until an occasion arises for an emergency stop and then it is found that the pedal goes all the way to the floorboard before the brakes are fully applied.

The Cadillac brake pedal has two stages in its travel. The first stage, which consists of the first four or five inches of the pedal travel, is sufficient for all ordinary stops when the brake band clearance is properly adjusted. When, as the result of wear on the lining, the pedal must be pushed farther toward the floorboard, an inch or inch and a half from the floorboard, the second stage of pedal travel is reached. In the second stage, the pedal has somewhat less leverage than in the first stage and the point of division is marked by increased resistance to movement of the pedal. This serves as a notice to the driver that the brakes require readjustment. If it is not convenient to have the adjustment made at once, the brakes can still be operated for some time. The adjustment should be made, however, as soon thereafter as possible.

The hand brakes, which are internal brakes on the rear wheels, are operated by the hand lever at the right of the transmission control lever.

Speedometer

The speedometer has three dials. The upper dial indicates the speed of the car. The center dial indicates the total mileage traveled. The lower dial also indicates mileage, but it can be reset to zero by pushing up and turning the knurled stem back of the instrument board. The right-hand figure on the lower dial indicates tenths of a mile.

Across the speedometer cover glass and below the total mileage dial is a strip of black celluloid on which are two white spaces. These spaces are for the lubrication notice described on page 38 in connection with the lubrication schedule.

An automobile repairman should never be permitted to attempt to adjust or repair the speedometer head or to replace the glass. 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 as carefully as a fine watch. The speedometer head may easily be damaged by rough handling.

Ammeter

The lower right-hand dial on the instrument panel (Fig. 1) is the ammeter, which measures the electric current flowing to the battery and the current flowing from the battery at all times except when the starter is cranking the engine. When current is flowing from the battery, the ammeter shows a reading on the side marked "Discharge"; when current is flowing to the battery, the ammeter reading is on the "Charge" side.

The ammeter should indicate on the "Charge" side most of the time. Otherwise, more current will be taken out of the battery than is put into it and the battery will eventually become fully discharged. The exact amount of current that should be indicated by the ammeter at any time depends upon various conditions, which are explained on page 62.

Ordinarily, when no lights are in use, the ammeter should show "Charge" as soon as the car is running ten or twelve miles per hour in high gear. If the ammeter shows "Discharge" with all lights off, when the car is running

more than twelve miles per hour in high gear, it indicates either that the fan belt is slipping or that the generator charging rate should be readjusted. The fan belt should be inspected first, and tightened if necessary, before any attempt is made to change the generator charging rate.

CHAPTER II

Driving

THE preceding chapter of the Manual has aimed to familiarize the driver with the controls and instruments used in operating the car. Actual skill in driving is, of course, more than knowledge of and familiarity with these individual devices. It is not the purpose of this Manual to discuss all phases of driving, but there are a few matters of sufficient importance to Cadillac owners to warrant devoting a chapter to them.

Driving Speed When Car Is New

The parts of the Cadillac car are machined and ground to secure the most accurate fit and the finest finish. Proper functioning of the assembled mechanism is further assured by testing the engine and chassis, both on shop dynamometers and on the road. Nevertheless, it is not possible by manufacturing processes and tests to give to bearing surfaces the fine polish that results from continued operations at moderate speeds and loads.

Until a new car has been driven far enough to produce this effect on the bearing surface, the car should not be driven at high speeds. It is recommended that the 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. Moderate driving during the first five hundred miles will increase the life of the car more than enough to repay any inconvenience. Manufacturers of locomotives and stationary steam engines have always recognized the necessity for an initial "running-in" period.

Danger of Running Engine in Closed Garage

Every person having to do with the operation or care of a motor car should be warned of the danger that attends running the engine while the car is in a small closed garage.

Carbon monoxide, a deadly poisonous gas, is present in the exhaust of all internal combustion engines. Most people are already familiar with carbon monoxide in the form of illuminating gas, or in the gas produced by furnaces and stoves when insufficient air is supplied to give complete combustion. But illuminating gas and coal gas have an unpleasant odor, which serves as a warning, whereas carbon monoxide, as produced in the internal combustion engine, is colorless, tasteless, and almost odorless, so that the victim may be overcome before he is aware of the danger.

When the engine exhausts into the open air, the carbon monoxide is so diluted that it has no effect. It is when the engine is run for a time in a closed room that the proportion of carbon monoxide in the air may increase to the point at which continued breathing of it would be fatal. The United States Public Health Service advises that the average automobile engine warming up in a single-car garage will give off enough carbon monoxide in three minutes to endanger life.

Unusual precaution must be taken in cold weather when the natural tendency is to keep the garage doors and windows closed. The practice of letting the engine warm up before running the car out of the garage is unsafe. The risk is made greater by the fact that the enriching of the mixture by manipulation of the carburetor enriching device increases the amount of carbon monoxide formed.

Coasting

To coast *on the level*, simply release the accelerator pedal and disengage the clutch. If coasting to a stop, the transmission control may also be shifted to neutral and the clutch re-engaged.

In coasting *down grades*, however, it is recommended that the transmission be left in gear and the clutch engaged. With the throttle in the idling position, the car is thus made to drive the engine, the resistance of which assists the brakes and saves wear on the brake lining. It must be remembered that the brakes are subjected to much more severe use on grades than on the level because gravity acts continuously, whereas on the level the brakes need absorb only the momentum of the car. Even on slight grades, coasting with the transmission in neutral or the clutch disengaged is not advisable. On any grade steep enough to warrant coasting, it is worth while to save the brakes as much as possible by utilizing the braking effect of the engine.

Ordinarily, the resistance offered by the engine when the transmission is in high is sufficient to control the speed of the car, supplemented by moderate use of the brakes. On steep grades, however, the transmission control should be shifted to intermediate or even to low if the grade is very steep. Shifting should always be done before commencing the descent of the grade, because, after the car has once gained speed, considerable braking may be necessary to slow down to the speed at which the shift can be made easily.

Do not switch off the ignition when coasting with the car driving the engine. Contrary to a common impression, this does not appreciably increase

the resistance and is likely to cause damage to the engine. Even with the throttle closed, some fuel is admitted to the cylinders, and if this is not burned it condenses on the cylinder walls and washes off the oil by which the pistons are lubricated.

General Driving Suggestions

Road and traffic laws vary greatly in different localities. It is unfortunately impossible to set down a complete list of rules that may be followed in all parts of the country. The following are some of the rules that are universal in practically all parts of the United States:

In meeting a vehicle going in the opposite direction pass to the right.

In overtaking 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 the car around to do this, it should be done.

Never turn around or turn off on another road without making absolutely certain that there is no other vehicle directly behind.

Never start to cross streetcar tracks without making sure that there is no car directly behind. No matter how sure you feel, look and see.

Do not cross streetcar or steam railroad tracks without making certain that is is absolutely safe to do so. At any railroad crossing that is on an up grade or which for any reason must be approached very slowly, it is a wise precaution to shift to intermediate gear before crossing because the car can thereby be accelerated more quickly, if necessary.

In crowded traffic do not apply the brakes suddenly unless it is absolutely necessary. A vehicle following may not have brakes as efficient as Cadillac four-wheel brakes.

On wet asphalt streets or slippery roads do not apply the brakes suddenly unless it is absolutely necessary. Cadillac four-wheel brakes minimize the possibility of skidding under these conditions, but their effectiveness should not induce anyone to drive less carefully.

Slow down in passing vehicles going in the opposite direction.

Never take a chance.

Don'ts for General Operation

Don't fail to change the engine oil as frequently as recommended.

Don't fail to release the carburetor enriching button as soon after starting as possible.

Don't fill the lubricating system of the engine alone and neglect to lubricate all other parts of the car.

Don't neglect the lubrication of any part of the car.

Don't run the car at sustained high speed when it is new.

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 disengaging 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 switch off the ignition when coasting with the car driving the engine.

Don't push the starter pedal 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. The front wheels pivot more easily if they are rotating.

Don't fail to investigate any unusual sound which may develop in the car. The car should be inspected at a Cadillac maintenance station.

Don't neglect to inspect the level of the acid solution in the storage battery every 500 miles and add distilled water if necessary.

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 air pressure or without gasoline in the tank.

Don't neglect to keep the tires inflated properly.

Don't race the engine when it is not driving the car. There is no worse abuse.

CHAPTER III

Equipment

THE controls and instruments used in driving have already been described. In addition to these the car is equipped with various devices which are for the convenience and comfort of the occupants, and are used only as occasion demands. It is suggested that the driver anticipate his use of such equipment by becoming familiar at once with the directions contained in this chapter.

Windshield and Ventilation

Closed Cars—Cadillac closed cars are equipped with a one-piece windshield, which can be moved up and down. Movement of the glass is controlled by a handle above the windshield. To raise the glass, the handle should be turned clockwise, and to lower the glass the handle should be turned counter-clockwise.

For moderate ventilation, the windshield should be raised not more than one inch so that the lower edge of the glass is still below the ledge over the instrument board. With the windshield in this position, air is deflected into the driving compartment through an opening in the cowl just forward of the instrument board. For additional ventilation the windshield can be raised above the level of the ledge over the instrument board, and air then enters directly into the car.

Open Cars—Cadillac open cars are equipped with a cowl ventilator which is operated by a lever just in front of the instrument board and at the right of the steering column. Additional ventilation for warmer weather can be secured by manipulating the windshield.

The open car windshield is in one section, which is pivoted at the upper corners. To secure more ventilation than can be obtained through the cowl ventilator, the windshield can be tilted out.

The thumb screws on the windshield supports must be loosened before adjusting the position of the windshield and must be tightened to hold it in the desired position.

Windshield Cleaner

The windshield cleaner is operated by the suction or vacuum in the passages between the carburetor and the engine. On open cars the cleaner is controlled by a lever at the cleaner. When the lever is as far toward the right as it will go, the cleaner is shut off. To start the cleaner, move the lever toward the left.

On closed cars the cleaner is controlled by a knurled button on the left-hand end of the instrument board. When the button is turned clockwise as far as it will go, the cleaner is shut off. To start the cleaner, turn the button counter-clockwise. (On some closed cars the cleaner is controlled by a lever on the instrument board similar to that on the open car cleaner.)

Rear Vision Mirror

The rear vision mirror may be adjusted by the driver to suit his preference after loosening the clamp screws that hold the mirror to its supporting bracket.

Cigar Lighter and Inspection Lamp

The car is equipped with a combination cigar lighter and inspection lamp that makes use of a single reel with twelve feet of flexible cord attached to the back of the instrument board. The flexible cord ends in a bayonet type socket to which may be attached either the inspection lamp or the heating element of the cigar lighter. The method of attachment is identical with that of an ordinary lamp bulb. Ordinarily the cigar lighter will be carried in place in the socket on the cord and the inspection lamp in a stationary socket provided on the front of the dash, where it is useful to illuminate the engine. (The inspection lamp is packed with the tool equipment when the car is shipped.)

To use the cigar lighter, pull it out from the instrument board at least a foot, wait a few seconds for the heating element to heat and apply it to the cigar or cigarette. The current is automatically switched on as soon as ten or twelve inches of the cord has been unreeled. To light a pipe, remove the nickel-plated shield by turning it slightly counter-clockwise and pulling it straight off.

To lock the cord in any desired position, pull out the button on the instrument board at the right of the cigar lighter (Fig. 1). This engages a ratchet which prevents the reel from rewinding. To rewind the cord, press the button back to its original position.

The inspection lamp socket on the dash has a double bayonet lock with two sets of slots. To install the lamp, simply insert it in the socket, press in, and turn it clockwise as soon as the pins on the lamp engage the first or outer set of slots. In this position the current is not switched on. To switch the current on, turn the lamp slightly counter-clockwise, press in, and turn it clockwise again, engaging the pins in the second or inner set of slots. To switch off the light, turn the lamp counter-clockwise and pull it out of the socket far enough to engage the first set of slots.

Clock

The clock has an eight-day movement and is wound in the same manner as a watch. The stem is under the clock back of the instrument board.

Side Curtains on Open Cars

The side curtains, with which the open cars are equipped, are carried in an envelope provided with cloth partitions to prevent rubbing and chafing. The Touring car curtains are stowed under the front seat; the Phaeton curtains in a compartment back of the front seat, with a door opening in the tonneau; the Roadster curtains in the package compartment just back of the seat.

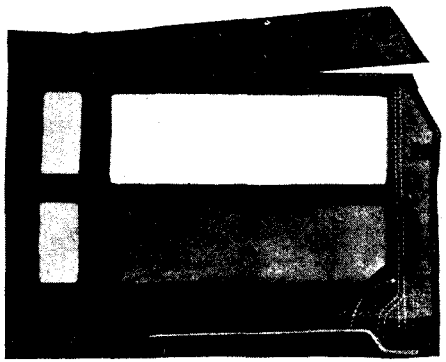


FIGURE 3. ***Side curtains***

The Touring car and Phaeton curtains are in six sections, each of which is marked to indicate its position, as "Left Front," "Right Center." The front and center sections on both sides are each provided with a rod, the lower end of which fits a socket in the top of the door. When a curtain is folded for stowing, this rod is parallel with the bottom of the curtain as shown in Fig. 3. Before the curtain can be attached to the door, the rod must be moved to the position shown by the dotted lines. The upper end of the rod is slotted to engage with the stiffener that runs along the upper edge of the curtain.

The rear sections should be applied first, followed by the center and front sections. The rear sections should be fastened to the rear bows *under* the side flaps of the permanent rear curtains.

Before stowing the curtains, they should be dry and clean.

Curtain Fasteners

Most of the curtain fasteners used on the top and side curtains are of the type illustrated in Fig. 4. When this type of fastener is snapped on its stud, it becomes locked on three sides. To release the fastener it must be lifted on the side that is not locked. This side is indicated by the small projection to which the arrow points in Fig. 4. This type of fastener cannot be released by lifting it at any other side. The remainder of the fasteners used on the top and curtains are of the usual glove type.

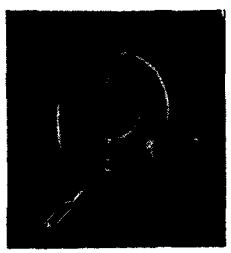


FIGURE 4.
Curtain fastener

Tools

The compartment for carrying the tool equipment is just forward of the right-hand running board. The lock on this compartment is operated by the switch key. The following are the tools comprising the standard equipment. The numbers refer to the numbers by which the tools are designated in Fig. 5. Items listed opposite Nos. 25, 26, 27, 28 and 29 are not illustrated.

1. Open end wrenches (two) for adjusting rear foot brakes
2. Small screw driver
3. Socket wrench for oil pan drain plug
4. Large screw driver
5. Center punch
6. Cold chisel
7. Hammer
8. File
9. Pliers
10. Wrench for spark plugs and compression relief cocks
11. Distributor wrench (with gauge for adjusting timer contact points and spark plugs)
12. Distributor wrench (plain)
13. Bicycle wrench
14. Monkey wrench
15. Wrench for rim clamping nuts
16. Rim assembling tool
17. Hose for tire air compressor
18. Adapter for grease gun for lubricating clutch thrust bearing (for cars with grease gun connection on thrust bearing)

18A. Extension fitting for lubricating clutch thrust bearing (for cars using screw plug on thrust bearing)

19. Grease gun
20. Hand starting crank
21. Hub cap wrench
22. Oil can
23. Jack handle
24. Jack
25. Inspection lamp. Note: The inspection lamp is packed with the tool equipment when the car is shipped but is ordinarily carried in the socket provided for it on the dash
26. Small tool bag
27. Large tool bag
28. Lubrication chart
29. Operator's Manual

Tires

Tire Valve Caps

The valve caps used with some makes of tires are a combination dust and valve cap. This type of cap can be removed and installed without screwing the cap the entire length of the threads on the valve stem.

To remove one of these valve caps, turn it two or three turns counter-clockwise. This loosens the sliding nut inside the cap (Fig. 6). Next, pull the cap up as far as it will go. Then remove the cap by unscrewing it the rest of the way.

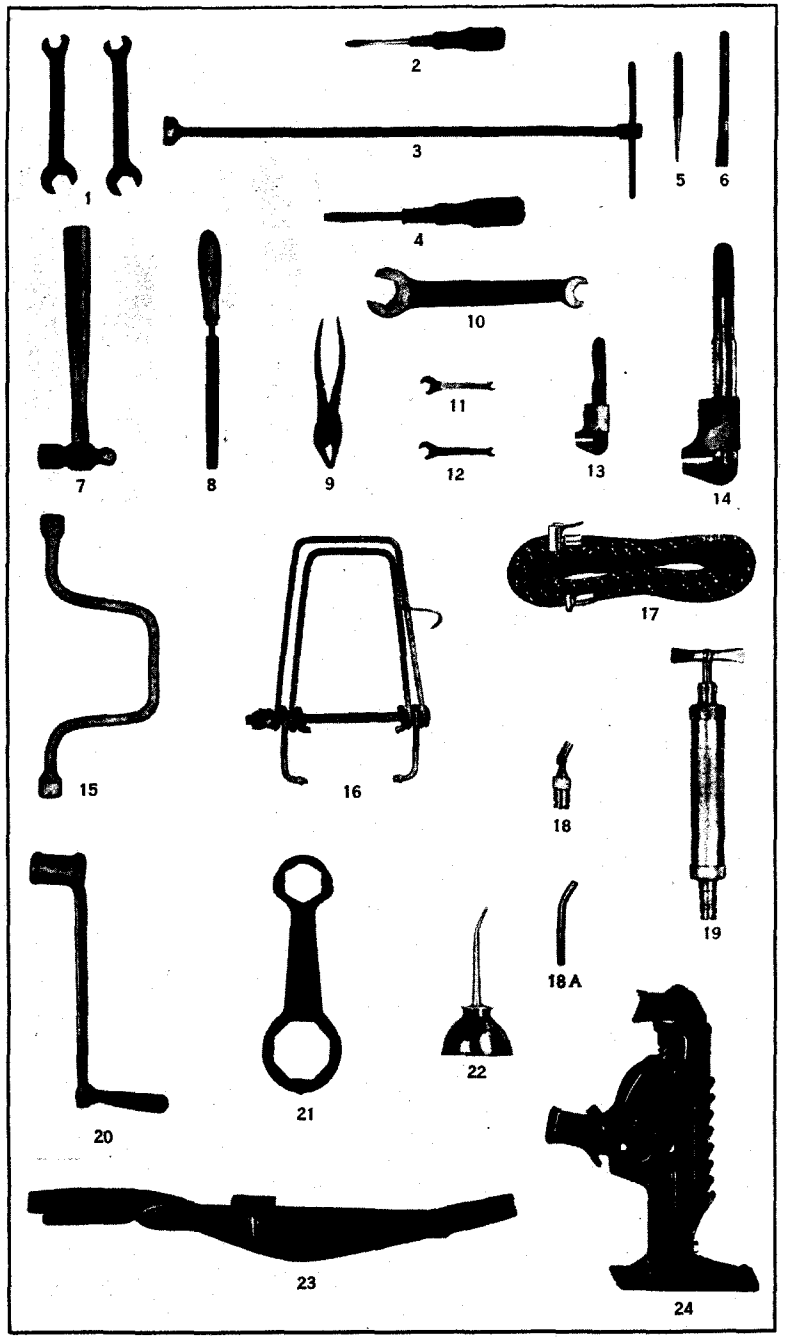


FIGURE 5. ***Standard tool equipment***
(The numbers refer to the list on page 25)

To install a valve cap, place the cap over the valve stem and turn it a few turns clockwise to engage the threads in the sliding nut. If the sliding nut is too far inside the cap to be reached by the valve stem, shake the nut down by tapping the bottom of the cap on some solid object. When the valve stem has been started in the sliding nut, push the cap down over the stem as far as it will go. Then turn the cap until it locks tightly.

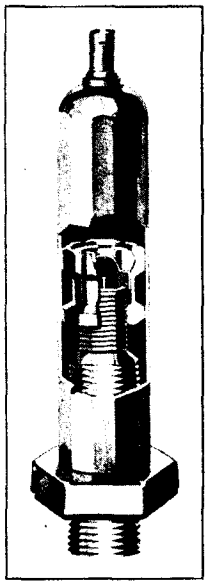


FIGURE 6.
Tire valve cap

Inflation Pressure

For normal driving, the 33 by 6.75 low pressure tires, which are standard equipment on Cadillac cars, should be inflated to a pressure of 40 lbs. per square inch. The inflation pressure should be checked at least weekly and should not be permitted to drop more than 5 lbs.

On cars driven at high speeds, the front tires should be inflated to 50 lbs. or higher if necessary. *This is important.*

Tire Air Compressor

To use the tire air compressor with which the car is equipped, proceed as follows:

Turn back the left-hand side of the front carpet and lift the small oval-shaped cover which is in the floor just to the left of the transmission control lever. Reach through the hole in the floor and remove the knurled cap from the connection on top of the compressor. Connect one end of the air hose (in the tool equipment) to this connection and the other end of the hose to the valve of the tire to be inflated. *Do not connect the hose to the tire first if there is pressure in the tire.*

The control shaft by which the compressor driving gear is placed in mesh with the transmission gears projects through a small hole in the floor just in front of the large hole over the compressor. To start the compressor, if the engine is running, disengage the clutch and hold the pedal down until the transmission gears have ceased to revolve. Then, with a screw-driver, turn the slotted head of the compressor control shaft clockwise. If the engine is not running, simply turn the control shaft clockwise without disengaging the clutch and then start the engine.

The compressor gives best results when the engine runs at a speed of approximately 1,000 r. p. m., which is about three times the normal speed of the engine when idling. Do not race the engine in operating the compressor, or, for that matter, at any other time when it is not driving the car. Racing the engine beyond the recommended speed not only decreases the efficiency

(Continued on page 30)

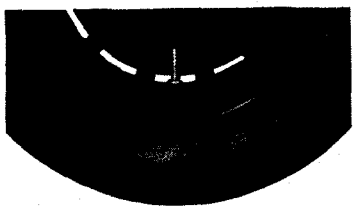


Figure 7a

Jack up the axle until the tire clears the ground. Unscrew the dust cap and the clamping nut from the tire valve stem.

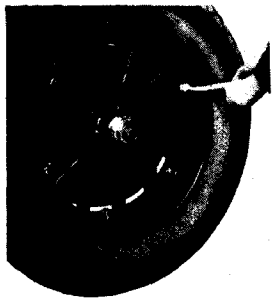


Figure 7b

With the brace wrench, supplied in the tool kit, loosen the six rim clamping nuts. Turn each clamp so that the lug is away from the rim and tighten the nut enough to hold the clamp in this position.



Figure 7c

Rotate the wheel so that the valve stem is at the top, and pull the bottom of the rim away from the wheel. If the rim does not come off easily, pull the top of the rim as far out as the valve stem will permit and then pull the bottom part of the rim away from the wheel.

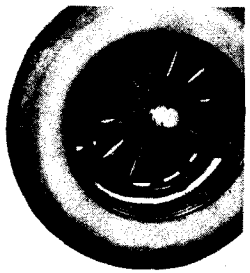


Figure 7d

Rotate the wheel until the valve stem approaches the bottom. At the point shown in the illustration, the rim and tire will roll free from the wheel and can be removed without lifting.

FIGURE 7. ***Removing rim with tire from wheel***

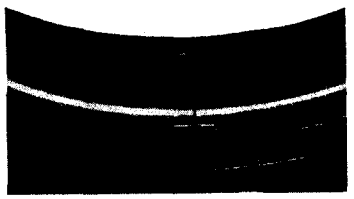


Figure 8a

If the rim has no split clamping ring, take the one from the rim removed. The correct position for the ring is just inside the three lugs and with the split opposite one of the lugs. If the ends of the ring overlap, they can be sprung into place with a screw-driver.

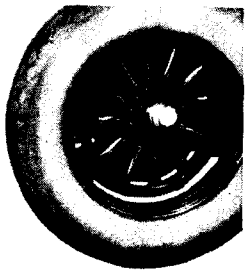


Figure 8b

Rotate the wheel so that the hole for the valve stem is in the position shown. Hold the rim so that the three lugs are on the side away from the car and insert the valve stem into the hole in the wheel.

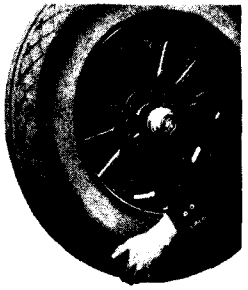


Figure 8c

Rotate the wheel, which will carry the rim with it, until the valve stem is at the top. Then push the lower part of the rim into place, guiding the hinge on the rim through the notch provided for it in the edge of the wheel.

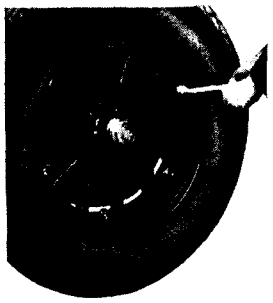


Figure 8d

Turn each rim clamp so that the lug is over the clamping ring, drawing the nut down until the end of the bolt is flush, or nearly so, with the outer surface of the nut. Then go over the six nuts again, tightening them firmly. (See page 30 in regard to truing up the rim on the wheel.) Install the valve stem clamping nut and the dust cap. It is important that the clamping nut be firmly tightened.

FIGURE 8. ***Installing rim with tire on wheel***

of the compressor, but is one of the worst forms of abuse. To stop the compressor, turn the control shaft counter-clockwise.

Do not turn the compressor control shaft to start the compressor when the engine is running and the clutch is engaged.

Tire Holder

The tire holder is designed to carry either one or two standard size tires mounted on rims and inflated. Each rim has on it three lugs which are located so as to engage with notches on the support arms and on the adjustable clamp. There are two sets of these notches.

When two rims are carried, the rim nearest the car should be placed so that the side with the lugs is away from the car and the lugs should be inserted in the inner set of notches. The outer rim should then be placed so that the side with the lugs faces toward the car and the lugs of this rim should be inserted in the outer set of notches.

When only one rim is carried, the side of the rim with the lugs should face toward the car and the lugs should be inserted in the inner set of notches.

The tire holder lock is in the upper end of the clamp screw and is protected by a dust cap which must be unscrewed to insert the key. Turning the key clockwise disengages the lock, permitting the clamp screw to be turned.

To lock the tire holder, screw the clamp down firmly against the rim or rims. Adjust the clamp screw handle so that it points squarely across the car Then turn the key counter-clockwise. Care should be exercised in removing or replacing a spare tire not to strike the body of the car.

Note: If a tire cover is used, it should have slots cut in it opposite the two upper lugs on the rim so as to permit these lugs to seat in the notches in the support arms.

Changing Tires

If a spare rim with inflated tire is always carried on the tire holder, the driver will seldom or never have occasion to disassemble a tire from the rim. In case of tire trouble it is then merely necessary to remove the rim with tire from the wheel and to install on the wheel the spare rim and tire. Illustrated directions for making this change are on pages 28 and 29. Disassembly of the tire from the rim is necessary only if the tire is to be repaired or a new one installed. Directions for this work, which is usually left to the repair shop, will be found on pages 78 and 79. Never attempt to remove a tire from its rim without first deflating the tire.

Truing Up Rim

If a rim does not run true, it may be trued up in the following manner: Rotate the wheel slowly and mark the part that runs farthest out from the face of the wheel. Loosen slightly the nuts diametrically opposite the mark and then tighten the nuts on the marked side. Test the wheel again and if it still does not run true repeat the operation.

CHAPTER IV

Cold Weather Operation

THE Cadillac car is an all-season car and no owner need hesitate to make full use of his car in severe winter weather as well as at other times. It is necessary in freezing weather, however, to observe certain precautions and to follow a somewhat different procedure, particularly in starting the engine. In this chapter has been grouped all the information relating to operation of the car during cold weather. It should be reviewed just prior to the beginning of the winter season.

Starting the Engine

Carburetor Enriching Button

The first difference between starting the engine in cold weather and starting the engine in warm weather is in the greater use of the carburetor enriching device necessary in cold weather. Gasoline does not vaporize as readily at low temperatures, and in order to supply the cylinders with a gaseous mixture rich enough to be ignited, the proportion of liquid gasoline to air must be increased.

At the same time it is important not to apply the enriching device more than is necessary. The unvaporized gasoline collects on the cylinder walls and works down past the pistons, washing off the lubricant as it goes. Although dilution of the oil supply with this unburned gasoline is minimized in the Cadillac engine by an exclusive system for ventilating the crankcase (see page 42), it is best to avoid an excess of liquid gasoline in the combustion chambers by careful and judicious use of the enriching device.

The following rule should govern the use of the enriching button in winter weather: Pull the enriching button back just as far as it is necessary to start the engine, but as soon as the engine starts, let the button return as far as possible without causing the engine to stop or slow down. Then release the button entirely as soon as the engine is warm enough to permit doing so.

Priming the Carburetor

In extremely cold weather, if the engine does not start after cranking for a few seconds with the enriching device fully applied, release the starter pedal. Then prime the carburetor by opening and closing the throttle once or twice rather rapidly with the accelerator. Opening and closing the throttle operates

a throttle pump on the carburetor and raises the level of gasoline in the carburetor bowl. The carburetor should never be primed in warm weather and should not be primed unnecessarily in cold weather. Excessive priming is likely to prevent the engine from starting.

Position of Throttle Hand Lever

The correct position of the throttle hand lever for starting in cold weather is the same as for starting under other conditions, that is, about one-fourth the way down from the idling position. In warm weather, however, the lever may be returned to the idling position almost as soon as the engine is started. In cold weather, the throttle must be left slightly open until the engine becomes warm.

Position of Ignition Control Lever

Unless the weather is extremely cold, the correct position of the ignition control lever for starting is the same as that recommended on page 10, that is, about one-third the way down. In extremely cold weather, however, the lever should be moved all the way up for starting, unless the engine should be cranked by hand, in which case the lever should be moved all the way down.

It is the practice of some drivers to move the ignition control lever all the way down whenever starting the engine. This is the correct position if the engine is to be cranked by hand, but if the engine is to be cranked with the starter, there is no reason for retarding the spark, and in extremely cold weather "popping back" in the carburetor is less likely to occur if the spark is fully advanced.

Use of Starter

In extremely cold weather, when the car has been standing long enough to become thoroughly chilled, it is a good plan to disengage the clutch during the cranking operation. If this is not done, the starter is called upon to turn the jackshaft gears in the transmission in addition to cranking the engine. At ordinary temperatures, the additional energy required is negligible, but in extremely cold weather, the lubricant in the transmission offers sufficient resistance to rotation of the transmission gears to increase considerably the demand upon the battery and to retard the cranking speed.

Use of Accelerator Before Engine Is Warm

In cold weather, after the engine has been started and before it has run long enough to become warm, the engine cannot deliver its normal power and it should not be called upon to do so. In accelerating the engine to start the car and in accelerating the car after the transmission is in gear, do not open the throttle suddenly or too far. To do so is not only to invite "popping back" in the carburetor, but to increase the amount of excess unvaporized gasoline in the combustion chambers, both of which results are undesirable. For this reason, also, starting in intermediate should never be attempted in cold weather.

Additional Cold Weather Suggestions

Engine Oil for Cold Weather

All engine lubricating oil is more viscous at lower temperatures than at higher temperatures. An engine oil of the proper viscosity for summer weather will not flow freely at freezing temperatures, and will not lubricate the cylinders and bearings properly until the engine is warm. If the oil congeals it also offers considerable resistance to cranking of the engine, causing a severe drain on the battery, and retarding the cranking speed.

In cold weather, therefore, it is essential that an oil be used that has a sufficiently low cold test. The medium grade of Cadillac Engine Oil is recommended generally for winter use. If in doubt as to a suitable oil for cold weather, consult an authorized Cadillac maintenance station.

Strainers in Gasoline System

During cold weather, it is especially important to remove and clean the strainers in the gasoline line (see page 58). An accumulation of water at these points that would have no bad effect in warm weather might freeze in cold weather and prevent the gasoline from flowing to the carburetor.

Anti-Freezing Solutions

In freezing weather, the water in the cooling system must be replaced with some solution that has a lower freezing temperature than that of water. A solution of glycerin and water is recommended. There is practically no loss of glycerin by evaporation and a solution of suitable strength placed in the cooling system at the beginning of freezing weather will ordinarily last the entire season.

Some of the patented substitutes for glycerin may be safely used. Such preparations should not be used unless tested and approved. Cadillac distributors and dealers should be consulted as to the suitability of an anti-freeze other than glycerin, or inquiry may be made to the factory Technical Department. Solutions containing calcium chloride or other ingredients injurious to the metal parts of the cooling system must never be used.

A solution of denatured alcohol may be used if its strength is periodically inspected by testing it with a hydrometer, and if care is taken not to let the solution get on the finish of the hood or radiator. Alcohol vaporizes more

readily than water and the loss by evaporation must be replaced at frequent intervals or the weakened solution will afford little protection against freezing.

Glycerin and Water

The following table* gives the freezing temperature and specific gravity of solutions of glycerin† and water:

Percentage of Glycerin (by Volume)	Parts by Volume		Freezing Temperature (° Fahr.)	Specific Gravity
	Glycerin	Water		
20	1	4	21°	1.057
25	1	3	17°	1.070
33⅓	1	2	8½°	1.092
50	1	1	−15°	1.132

Alcohol and Water

The following table* gives the freezing temperature and specific gravity of solutions of denatured alcohol and water:

Percentage of Alcohol (by Volume)	Parts by Volume		Freezing Temperature (° Fahr.)	Specific Gravity
	Alcohol	Water		
20	1	4	19°	.980
25	1	3	15°	.975
33⅓	1	2	6°	.965
50	1	1	−18°	.941

Capacity of Cooling System

The capacity of the cooling system is four and one-half gallons when filled to the proper level. It is not necessary to add liquid to the radiator whenever the level falls below the filler. There is sufficient liquid in the cooling system if the bottom of the upper tank is covered, and any liquid in excess of this is usually forced out through the overflow pipe as soon as the engine becomes warm. When water is used, any loss from this cause is of little consequence, but in winter to conserve anti-freeze it is important to avoid adding more liquid than is necessary.

Effect of Alcohol on Finish

Strong solutions of alcohol have a harmful effect on the finish. In adding pure alcohol or solutions containing 50 per cent or more alcohol, extreme care must be used not to let the liquid spatter or spill. A funnel and a pouring vessel with a suitable spout are necessary. Especially avoid pouring cold alcohol into very hot water. The effect of this is to make the mixture foam up and possibly bubble over on the finish.

*The freezing temperatures and specific gravities in these tables are according to the U. S. Bureau of Standards. The temperature given is in each case the temperature at which the first crystals form and not the temperature at which the solution freezes solid.

†*Undiluted commercial glycerin having a specific gravity of 1.250.*

PART II

LUBRICATION AND CARE

Cadillac 4000-Mile Lubrication Schedule

Note: Do not wait for schedule lubrications before adding engine oil. The oil level should be checked every 100 to 150 miles and oil added if the indicator ball is below "Full." This is especially important on cars driven at high speeds.

Explanation: The figures and letters following the items in this column refer to the chassis lubrication diagram, Fig. 11				Refer to page	Lubrication No. and Mileage at which due							
					1	2	3	4	5	6	7	8
					500	1000	1500	2000	2500	3000	3500	4000
LUBRICATION NUMBER 8	LUBRICATION NUMBER 4	LUBRICATION Nos. 2 and 6	1, 3, 5, and 7	Add engine oil as necessary*: 21	41	O	O	O		O	O	O	
				Grease gun connections: G	45	O	O	O	O	O	O	O	O
				Spring leaves: 1, 7, 10, 20	48	O	O	O	O	O	O	O	O
				Add water to storage battery	63	O	O	O	O	O	O	O	O
			Universal joints: 13, 14		46		O		O		O		O
			Generator and distributor oil cups: 17, 18, 19		45		O		O		O		O
			Engine supports: 5, 16, 24		45		O		O		O		O
			Steering column oil holes: 3		47		O		O		O		O
			Brake pins and connections		77		O		O		O		O
			Door hardware		48		O		O		O		O
		Drain and replace engine oil*: 21			43				O				O
		Transmission‡—add lubricant: 15			46				O				
		Rear axle‡—add lubricant: 11			46				O				
		Clutch thrust bearing: 4			45				O				O
		Steering gear—add lubricant: 6			47				O				O
	Transmission‡—drain and replace lubricant: 15				46								O
	Rear axle‡—drain and replace lubricant: 11				46								O
	Wheel bearings—clean and repack: 2, 8, 12, 22				46								O
	Front brake trunnions: 9, 23				47								O
	Speedometer drive shaft				47								O
RECORD	Speedometer Reading												
	Date												

CHAPTER I

Systematic Lubrication

Necessity for Lubrication

LUBRICATION has made machinery possible. Without it the destructive effects of friction would render the most ingeniously designed mechanism useless. Especially is this so of the gasoline engine, in which heat of combustion is added to that of friction. Absence of lubrication for even a brief instant while the engine is running would heat the surfaces in contact to the melting point.

But it is not enough to know that friction, unrestrained by lubrication, is capable of ruining an engine in less time than it takes to tell it. No motorist expects to run out of oil. What is frequently not fully appreciated is that, if improper lubricants are used and are infrequently applied, friction is still a powerful destructive agent capable of shortening the useful life of the car from years to months.

The quiet, dependable operation of a new car is primarily the result of the accurate finishing of surfaces separated from each other by a few thousandths of an inch. In the Cadillac, there are hundreds of such surfaces. If the clearances between these surfaces are to be maintained, so that the car will continue to operate quietly and dependably, friction must be prevented from taking its toll in wear.

Cadillac engineers have provided for the lubrication of all surfaces where friction is a factor. The most that a manufacturer can do, however, is to provide a place for the lubricant and means for it to reach the surfaces to be lubricated. The car cannot be equipped with an inexhaustible supply of lubricant. Upon the car owner devolves the responsibility of replenishing the supply at the proper time with lubricant of the prescribed specifications.

Because of the importance to the car owner of proper lubrication of his car, every effort has been made in this Manual to give explicit information for his guidance. Lubricants are prescribed for each point requiring lubrication, directions are given for applying the lubricant, and recommendations are made as to the frequency with which the lubricant should be applied. All this information is based upon actual operation of Cadillac cars over hundreds of thousands of miles.

Lubrication Schedule

Lubrication is effective only insofar as it is regular and systematic. To be systematic, lubrication must be performed at regular mileage intervals. The

Cadillac technical staff has accordingly developed for the Cadillac car a complete lubrication schedule which, if faithfully followed, will insure for each bearing surface ample, but not superfluous, lubrication. This schedule is shown on page 36.

The unit of the Cadillac lubrication schedule is 4,000 miles, which is divided into eight 500-mile intervals. Corresponding to these is a series of eight consecutive groups of lubricating operations. When the car has traveled 500 miles, the points enumerated under Lubrication No. 1 should receive attention. At 1,000 miles, Lubrication No. 2 is due, and so on until at 4,000 miles Lubrication No. 8 should be performed. At 4,500 miles the schedule begins again with Lubrication No. 1.

In order that the driver may be continually reminded of the mileage at which the next lubrication is due, provision is made on the speedometer for a lubrication notice. This consists of a strip of black celluloid (Fig. 9) which is placed across the speedometer cover glass below the total mileage dial and which has two white spaces, one for the lubrication number and one for the mileage at which it is due. Whenever the car is lubricated on the schedule, the figures then on the celluloid should be erased and the next lubrication number and the mileage at which it is due should be written or stamped in their places. If this notice is used, the driver need only glance occasionally at the speedometer and compare the mileage on the dial with the figures on the notice in order to plan for the necessary attention.

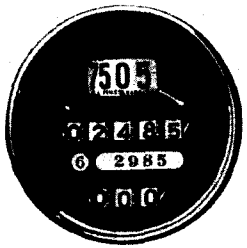


FIGURE 9.
Lubrication notice

Note: Do not wait for the mileage indicated on the notice before adding engine oil. The oil level should be checked every 100 to 150 miles and oil added, if the indicator ball is below "Full"

Cadillac distributors and dealers are prepared to sell lubrication based on this schedule. A car that is being lubricated on the schedule can be taken to any authorized Cadillac maintenance station, and without further ordering than to specify "Schedule Lubrication," the car will receive the necessary attention.

The schedule on page 36 is in outline form. Detailed information as to the location of the points to which lubricant is to be applied, the method of lubricating, and the kind and amount of lubricant will be found in Chapters VI and VII. For each point on the schedule, two reference numbers are given: the number of the page on which detailed directions will be found and the number designating the point on the chassis lubrication diagram (Fig. 11).

Lubricants

The selection of proper lubricants for the Cadillac car is one of the first concerns of the owner in his attention to the lubrication of his car.

The lubricants must not only be of high quality, but their viscosity and other characteristics must be suited to the Cadillac car. The difficulty of securing suitable lubricants on the open market has induced us to provide lubricants under the Cadillac trade mark. These lubricants are prepared according to specifications prescribed by the Cadillac technical staff and are based upon hundreds of actual tests. Cadillac lubricants include the following and can be obtained from Cadillac distributors or dealers: Cadillac Engine Oil—Heavy, Medium and Light (special). Cadillac Rear Axle and Transmission Lubricant—Light and Heavy. Cadillac Roller Bearing and Cup Grease. Cadillac Fiber Grease—Light and Heavy. Cadillac Steering Gear Lubricant.

Engine Oil

The heavy grade of Cadillac Engine Oil is recommended for summer use and for winter use if the temperature is not much below freezing. For average winter use (temperatures down to zero) the medium grade is recommended. For extremely low temperatures (below zero) the light grade should be used, but should be replaced with the medium grade as soon as more moderate temperatures return.

The names of other engine oils approved for use in the Cadillac engine will be supplied by our Technical Department on request.

Rear Axle and Transmission Lubricant

The heavy grade of Cadillac Rear Axle and Transmission Lubricant should be used except in cold weather. The light grade should then be used. If the heavy grade is used in cold weather the transmission gears will be difficult to shift. The names of other lubricants suitable for use in the Cadillac rear axle and transmission will be supplied upon request.

Roller Bearing and Cup Grease

Cadillac Roller Bearing and Cup Grease is recommended for the wheel bearings and for all points for which grease gun connections are provided, with the exception of the steering gear and the universal joints. In the absence of Cadillac Roller Bearing and Cup Grease, No. 3 cup grease may be used for the grease gun connections and No. 1½ cup grease for the wheel bearings.

Fiber Grease

Cadillac Fiber Grease is supplied in two grades, light and heavy. The light grade is recommended for the clutch thrust bearing and the heavy grade for the universal joints on the drive shaft.

Steering Gear Lubricant

Cadillac Steering Gear Lubricant is recommended for lubricating the steering gear worm and sector. In its absence, use a mixture consisting of 75 per cent rear axle and transmission lubricant and 25 per cent cup grease.

Spring Lubricant

Cadillac Spring Lubricant is recommended for lubricating springs equipped with spring covers. This lubricant is a petroleum jelly that does not harden and cake and that has no destructive effect on the leather of the spring covers.

CHAPTER II

Engine Lubrication

Oil Circulating System

THE supply of engine oil is carried in the pressed steel reservoir that covers the bottom of the crankcase. The oil is forced to the bearings by a gear pump attached to the right-hand side of the engine toward the front and driven by a spiral gear on the crankshaft.

The pump draws the oil from the bottom of the oil pan and delivers it under pressure to a supply pipe running the length of the engine parallel with the crankshaft. From this supply pipe, three leads branch off to feed the three main bearings. The crankpin bearings are fed from the main bearings through ducts in the crankshaft. Oil thrown from the crankpins as the crankshaft revolves becomes a fine mist or spray which pervades the interior of the crankcase and cylinders and lubricates the pistons, piston pins, cams, camslides, and rollers.

A separate passage drilled through the crankcase conducts oil direct from the pump to the camshaft front bearing from which the oil enters the hollow camshaft and is carried to the other camshaft bearings and to the distributor driving gear.

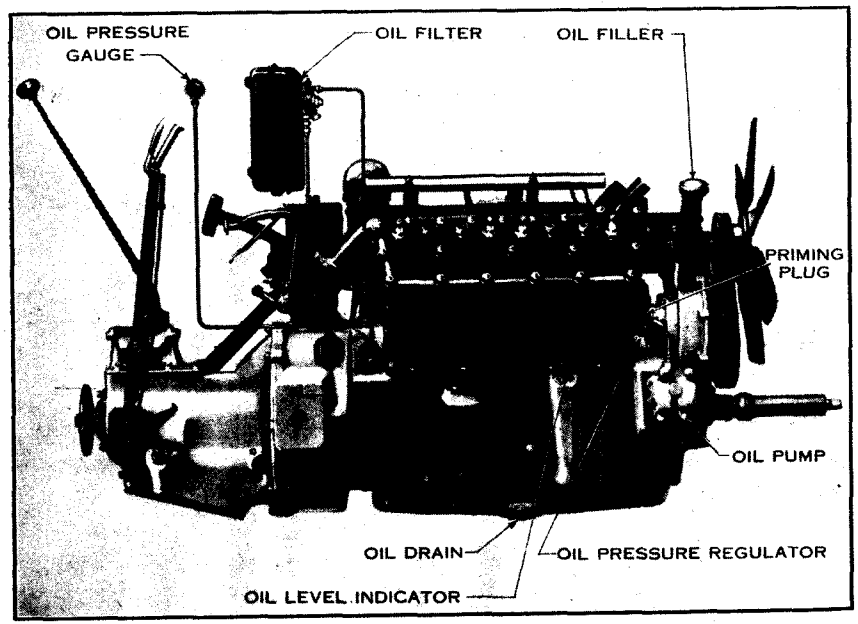


FIGURE 10. ***Engine lubrication features***

The pressure in the lines supplying the main bearings and the camshaft bearings is controlled by an oil pressure regulator* attached to the crankcase almost directly above the pump and connected to the pump by an external pipe. The pressure regulator contains a by-pass with metering screw for adjustment of the oil pressure at idling speeds and a spring-controlled valve that opens to prevent excessive pressure at high speeds. The oil that passes the regulator, either through the by-pass or around the valve, is led to the spiral gears, chain and chain adjusting mechanism.

The valve stems are automatically lubricated by oil sprayed from two small holes drilled in the wall of each cylinder at such a distance from the bottom of the cylinder that, when the piston is at the bottom of its stroke, these holes register with a groove in the piston between the second and third piston rings. As the piston descends on the power stroke, oil collects in this groove and as soon as the groove registers with the holes, the pressure of the gases above the piston forces oil out upon the valve stems. Surplus oil collecting in the valve compartments is returned to the crankcase through drain passages.

All oil returns to the oil pan through a fine mesh screen placed above the oil pan and separating it from the crankcase.

Oil Level

The normal capacity of the oil pan is two gallons which fills it to the level of the screen above the pan. When the oil pan contains this amount, the oil level indicator on the right-hand side of the engine (Fig. 10) indicates "Full." As the oil level descends, the indicator indicates "Fill" and then "Empty." Oil should be added as soon as the indicator ball has dropped to "Fill." If the indicator indicates "Empty," under no circumstances should the engine be run until oil has been added.

The mileage interval at which oil must be added depends upon individual circumstances. *It is recommended that the oil level indicator be checked every one hundred to one hundred and fifty miles, although it is improbable that oil will be required as frequently as this.*

Oil Pressure

The pressure of the oil in the supply pipe is indicated by the oil pressure gauge on the instrument panel (Fig. 1). The purpose of the oil pressure gauge is, first, to enable the driver to make sure that there is pressure whenever the engine is running, and second, to verify the adjustment of the oil pressure regulator.

It is absolutely necessary that there should be oil pressure just as soon as the engine starts and as long as the engine is running. If the oil pressure

*On some cars the pressure regulator is located just to the rear of the right-hand cylinder block and takes the place of the fitting to which the filter and pressure gauge are connected. On these cars the priming plug is a hexagonal plug directly on top of the oil pump.

gauge does not indicate pressure as soon as the engine starts, stop the engine at once and investigate the cause. First, check the level of oil in the oil pan. If the level is above "Fill," prime the oil pump by removing the screw plug shown in Fig. 10 and pouring oil in through a funnel. Be sure to replace the plug before starting the engine. If, after priming the oil pump and starting the engine, the oil pressure gauge does not indicate pressure, stop the engine immediately and consult the nearest Cadillac maintenance station.

Before the adjustment of the oil pressure regulator can be verified, the factors affecting the viscosity of the oil must be standardized. The oil pressure changes with the viscosity, which in turn depends upon the kind of oil, the extent to which it has been thinned by use, and the temperature. It is therefore necessary that the oil be fresh and of the viscosity specified for the Cadillac engine. The engine must also be run long enough to become thoroughly warm. Under these conditions the pressure at idling speed (300 r.p.m.) should be from 1 to 4 lbs.

Adjustment of the pressure at idling speeds is made by the screw at the oil pressure regulator shown in Fig. 10. To increase the pressure, turn the screw clockwise; to decrease the pressure, turn the screw counter-clockwise. This adjustment should be made while the engine is running.

Crankcase Ventilating System

In every internal combustion engine, seepage of vapors by the pistons takes place to some extent, permitting water vapor and other products resulting from combustion, as well as unburned gasoline, to enter the crankcase. Contamination of the lubrication oil from this source makes it necessary in most engines to replace the oil supply at frequent intervals.

Cadillac engines are equipped with an exclusive system to prevent the seepage vapors from entering the crankcase. To bring about this result, advantage is taken of the fact that the Cadillac crankshaft with its compensating weights acts naturally to draw air through an inlet in the left-hand side of the engine, building up within the crankcase a pressure slightly above atmospheric pressure. No outlet is provided in the crankcase itself, but in the wall of each cylinder is a port connecting the space below the piston with the valve compartment. This port is open except when the piston is at the extreme bottom of its stroke.

The effect of this arrangement is as follows: The seepage vapors that pass the two upper piston rings are forced through slots milled in the circumference of the lower piston ring and through corresponding holes in the piston into the space inside the piston, where they are carried down as the piston descends. The vapors cannot enter the crankcase, however, because they are prevented from doing so by the pressure built up in the crankcase by the revolving crankshaft. Instead, the vapors are expelled through the port into

the valve compartment. From the valve compartments the expelled vapors are conducted through flexible pipes underneath the car where they are discharged.

Oil Filter

Another source of contamination of the oil supply is dirt. In the Cadillac engine all solid matter in the oil is removed by means of a filter (Fig. 10) which is attached to the dash and which is connected to the oil circulating system.

The filter consists of a metal container in which is a series of eight envelopes made of special fabric. As the oil is forced through these fabric envelopes, the total area of which is over five square feet, it leaves all solid matter behind, returning to the engine as clean oil.

The filter is connected to the oil line by a pipe that leads from a tee on the crankcase at the rear of the right-hand cylinder block. The oil pressure gauge on the instrument board is also connected to this tee. Oil is thus forced to the filter whenever the engine is running and there is pressure in the oil lines. The normal flow when the filter is new is approximately one quart per minute under a gauge pressure of 15 pounds, so that an amount of oil equal to the entire capacity of the lubricating system passes through the filter every eight to ten minutes.

As dirt accumulates in the filter, the flow of oil through the filter decreases, and eventually the filter unit must be replaced. When it takes longer than seven minutes for a quart of oil to flow through the filter under a gauge pressure of 15 pounds, the filter unit should be replaced.

As an approximate check on the condition of the filter, remove the screw plug in the fitting at the filter and note the size of the stream of oil that flows from the opening. In making this test, the engine should be warm and the throttle should be opened until the pressure gauge indicates 15 pounds. Under these conditions a stream of oil as large as a pencil lead, or larger, should flow from the filter. (On some cars the filter has a sight feed glass through which the stream of oil flowing from the filter may be seen.)

Under average driving conditions replacement of the filter unit should not be necessary for 12,000 to 15,000 miles. Filter units for replacement can be obtained from Cadillac distributors and dealers.

Replacing Engine Oil

Although the crankcase ventilating system and the oil filter described in the preceding sections greatly prolong the useful life of the oil, it is recommended that the oil be drained and replaced with fresh oil every 2,000 miles.

To drain the oil, simply remove the drain plug (Fig. 10). A special socket wrench for the oil pan drain plug is supplied as part of the tool equipment.

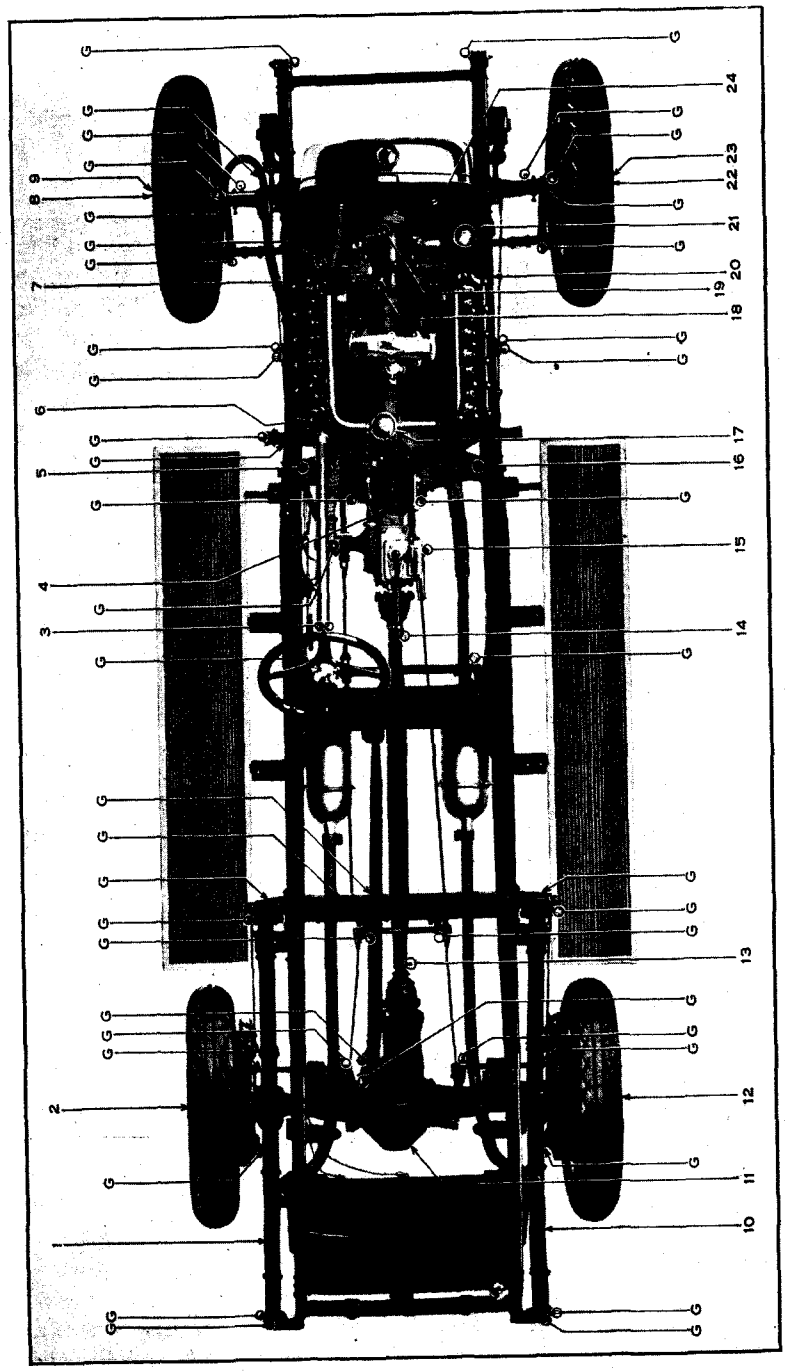


FIGURE 11. ***Chassis lubrication diagram***
Each "G" indicates a grease gun connection. Each number indicates a lubricating point for which instructions are given in Chapters II and III. Lubricating points that are visible in the diagram are surrounded by circles, others are indicated by arrows.

Be sure to reinstall the drain plug before adding the fresh oil. Two gallons of fresh oil should be added, or enough to bring the oil level indicator ball to "Full."

At the end of the first 1,000 miles, it is recommended that the car be taken to a Cadillac maintenance station to have the oil pan and screen removed and cleaned with gasoline or kerosene. This should be repeated once a year or whenever the filter unit is replaced.

Generator Oil Cups: 18, 19*

Two oil cups on the generator conduct lubricant to the forward and rear bearings on the armature shaft. A few drops of engine oil should be applied to each cup every 1,000 miles.

Timer-Distributor Oil Cup: 17

The oil cup at "17" is for lubricating the ball bearing at the upper end of the timer-distributor shaft. A few drops of engine oil should be applied every 1,000 miles.

Engine Supports: 5, 16, 24

The brackets on the frame to which the engine rear supports are bolted are provided with felt wicks (5 and 16). Every 1,000 miles engine oil should be applied to these points and to the oil hole at the front engine support (24).

CHAPTER III

General Lubrication

Grease Gun Connections: G

SPRING bolts, steering connections, brake rocker shafts and other points are provided with connections to fit the grease gun supplied with the tool equipment. These points are indicated by "G" in Fig. 11. Cadillac Roller Bearing and Cup Grease should be applied to these points with the grease gun every 500 miles.

Clutch Thrust Bearing: 4

The lubricating joint on the clutch thrust bearing is fitted with a screw plug shown at "G" (Fig. 22). To reach this plug, remove the floor boards and the cover plate shown at "F" (Fig. 11) and turn the thrust bearing until the plug is uppermost. Remove the plug with a screw-driver, taking care not to drop the plug into the clutch housing. Screw the extension fitting shown at "18A" (Fig. 5) into the threaded hole from which the plug was removed. Attach the grease gun to this fitting.

*The numbers following the headings in this chapter and in Chapter III refer to Fig. 11.

Note: On some cars a grease gun connection is permanently fitted to the thrust bearing in place of the screw plug. On these cars the adapter "18" (Fig. 5) should be used instead of the extension pipe "18A." This must be done with the engine not running.

The clutch thrust bearing should be lubricated every 2,000 miles with the light grade of Cadillac Fiber Grease.

Caution: Do not inject too much grease into the clutch thrust bearing. One or two turns of the grease gun handle are sufficient.

Transmission: 15

The transmission case should contain sufficient lubricant to bring the level up to the filling hole at the right-hand side. The level should be inspected every 2,000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended. The heavy grade should be used except in cold weather. The light grade should then be used. If the heavy grade is used in cold weather, the transmission gears will be difficult to shift.

Every 4,000 miles the drain plug should be removed from the bottom of the transmission case and the lubricant should be drained and replaced with fresh lubricant. Three quarts of lubricant are required to fill the transmission case to the proper level.

Universal Joints: 13, 14

The forward and rear universal joints on the drive shaft are provided with grease gun connections as indicated at "13" and "14." It may be necessary to roll the car forward or backward a few inches to bring the connections underneath where they can be reached with the grease gun. The heavy grade of Cadillac Fiber Grease should be applied every 1,000 miles.

Rear Axle: 11

The rear axle housing should contain enough lubricant to bring the level up to the filling hole in the rear cover plate. The level should be inspected every 2,000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended. The heavy grade should be used except in cold weather. The light grade should then be used.

Every 4,000 miles the drain plug should be removed from the bottom of the axle housing and the lubricant shoud be drained and replaced with fresh lubricant. Three and one-half quarts of lubricant are necessary to fill the rear axle housing to the proper level.

Wheels: 2, 8, 12, 22

The front and rear wheel bearings are packed in grease when the car is assembled. Every 4,000 miles all the wheels should be removed and the bear

ings should be thoroughly cleaned in gasoline or kerosene. They should then be repacked and the bearings adjusted in accordance with the directions on pages 80, 81 and 82.

Cadillac Roller Bearing and Cup Grease is recommended for the wheel bearings. Do not use heavy grease as it will roll away from the path of the rollers and will not return.

Front Brake Trunnions: 9, 23

Every 4,000 miles, at the same time that the wheels are removed for lubrication of the wheel bearings, the brake operating trunnions inside the front wheel brake drums should be lubricated by applying the grease gun to the connection at "A" (Fig. 12). Cadillac Roller Bearing and Cup Grease should be used. It should be injected only until it begins to appear around the trunnion bearings. Do not inject too much grease. Before replacing the wheels, wipe off any grease appearing around the trunnion bearings. Do not inject any grease at "A" except when the wheel is off and the application of too much grease can be definitely avoided.

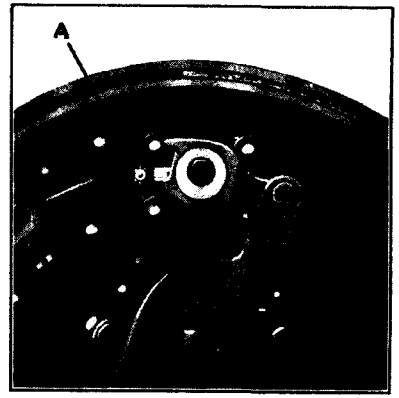


FIGURE 12.
Lubrication of front brake trunnions

Steering Gear: 6

A grease gun connection is provided on the steering gear housing for injecting lubricant for the steering gear worm and sector. Cadillac Steering Gear Lubricant is recommended for the steering gear and it should be applied every 2,000 miles.

There are two holes at "3" in the steering column just below the steering wheel. Remove the screw plug from the uppermost hole and when grease begins to flow stop injecting grease at "6."

Speedometer Flexible Drive Shaft

The flexible shaft by which the speedometer is driven is housed in a flexible casing. To lubricate the speedometer drive shaft, the shaft should be removed from its casing and lubricant applied to it for its entire length. Cadillac Roller Bearing and Cup Grease is recommended for this lubrication, which should be performed every 4,000 miles.

Do not under any circumstances attempt to lubricate the speedometer itself. Any parts in the speedometer requiring lubrication are amply supplied when it is assembled.

Horn

The horn is lubricated when assembled and does not require further lubrication, but it is a good plan to inspect the commutator of the horn motor occasionally and clean it, if necessary. To do this, remove the horn from its bracket and the motor shell from the horn. If the commutator appears to be dirty, clean it with a dry cloth. This should be done with the horn motor running so that the commutator will be cleaned on all sides. Do not attempt to polish the commutator or brushes with oil or vaseline. These parts are designed to run without lubricant.

Springs: 1, 7, 10, 20

To lubricate the spring leaves, it is recommended that the edges and ends of the leaves be painted with engine oil every 500 miles. A small stiff brush should be used. After applying the oil, the car should not be washed until it has been driven far enough to allow the lubricant to work in between the leaves. Do not separate the leaves and insert lubricant. A certain amount of friction between the spring leaves is necessary in order to give the springs the desired characteristics.

If spring covers are used, it is not necessary to lubricate the spring leaves as directed in the preceding paragraph. It is sufficient to repack the springs once a season with Cadillac Spring Lubricant.

Stabilators

The stabilators, with which the car is equipped and which are for the purpose of controlling the recoil of the springs, not only need no lubrication—they *must not* be lubricated. To lubricate the stabilators would defeat their purpose just as oil or grease on the brakes would prevent them from holding.

Door Hardware

Whenever the chassis is being lubricated, the door locks and other door hardware should also be lubricated as follows:

Place a few drops of oil on each door lock plunger or striker, turning the handle back and forth so that the oil will work into the lock. Also place a drop of oil on each of the striker plates against which the strikers engage when the doors are closed. The hinge pins should also be oiled sparingly so as not to get oil on the finish.

Each door has a wedge-shaped tongue that dovetails into a receptacle on the body when the door is closed. These tongues should receive a small amount of grease or oil.

Each closed car door is also fitted with a check at the top which limits the outward movement of the door. A small amount of grease should be applied to the pin that slides in the slot at the top of the door.

CHAPTER IV

Care of Body

Care of Finish When New

On cars finished with varnish, more careful and more frequent attention is necessary when the car is new than after the varnish has hardened. Particular care should be taken to keep mud from the body and hood for the first few weeks. Even after the varnish has hardened, mud should not be permitted 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 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.

The same degree of caution, although commendable, is not as necessary on cars finished with Duco, because Duco hardens much more quickly than paint or varnish.

Washing Varnished Cars

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, because 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 pressure greater than will carry the water six inches 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.

Wash the chassis first, going over the under sides of the fenders, the wheels, and the running gear 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 under side of the fenders, or machine oil or grease from the chassis, use a 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 soft carriage sponge.

After washing the chassis, begin at the front of the car and flow water from the hose upon the body, hood and upper surfaces of the fenders. This will soften the accumulation of road dirt, removing most of it. Then go over the car again and remove all dirt by rubbing lightly with a soft wool sponge, at the same time applying an abundance of water from the hose. The sponge, which should be kept exclusively for the body, hood and upper surfaces of the fenders, should be rinsed 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. Be sure and use a chamois that has not been used on the chassis. Rinse the chamois and wring it out frequently. Do not rub the finish or apply more pressure than is necessary to dry off the surplus water. The remaining water will evaporate quickly, leaving the finish in good condition.

If it is desired to chamois the wheels and chassis, and they have become dry, wet these parts with clean water and then wipe them. Be sure to use a separate chamois for the chassis. The chamois that has been used on the body should be saved for the body exclusively.

Do not use soap, gasoline, kerosene, or anything of similar nature on the finish. Such materials attack the finish.

Washing Duco

Although it is not necessary in washing cars finished in Duco to use the same degree of care as in washing varnished cars, nevertheless the same general directions should be followed.

Cleaning Windows

Do not clean the window glass with preparations that may contain harmful ingredients. Use only cleaning compounds that are known to have no destructive effects on highly polished glass.

Cleaning Upholstery

To keep the upholstery in closed cars in the best condition, it should be cleaned thoroughly at least once a month with a whisk broom and vacuum cleaner. Dirt and grit accumulating in the fabric wear it out faster than use.

Spots on the upholstery may be cleaned with any good dry cleaner. When the cleaner has thoroughly evaporated, apply a hot flatiron wrapped in a wet cloth. Steaming the fabric and rubbing lightly against the nap will raise the nap to its normal position.

CHAPTER V

Care of Tires

EACH tire maker publishes a booklet with instructions for care and repair of tires. Every motorist should provide himself with one of these and thoroughly familiarize himself with the contents. The suggestions here apply to pneumatic tires in general.

Three-fourths of so-called "tire trouble" is the result of misuse. We give here some suggestions regarding the more important points of the care of tires.

Result of Under-Inflation

Under-inflation causes a tire to flatten out under load. This causes the side walls to bend sharply as the tire revolves. The result is the breaking of the side walls. An under-inflated tire is susceptible to bruise, broken cords and blow-out.

Result of Improperly Aligned Front Wheels

Running a car with the front wheels out of alignment causes rapid tread wear. This usually affects both tires similarly, although sometimes only one tire is affected. An incorrect adjustment of the front axle parallel rod or a bent steering arm is responsible for the condition. Unless the wheels are in proper alignment the treads of the front tires will wear away in a remarkably short time.

Neglect of Small Cuts

If cuts extending to the cords are neglected deterioration and blistering of the tire tread is the result. It is unnecessary to remove a tire to treat small cuts of this nature. Tire companies furnish a plastic compound for filling cuts. This prevents moisture and dirt from getting in. If a cut is large, it should be vulcanized at once.

Result of Improperly Adjusted Tire Chains

Tires are sometimes badly damaged through the use of tire chains which are incorrectly adjusted or which are fastened to the spokes of the wheel holding the chains tightly in place.

The least injury results when chains are applied loosely, leaving play enough to permit them to work around. The wear on the tire is thus distributed evenly. Probably the greatest amount of injury comes from using chains unnecessarily on paved streets.

Result of Sudden Application of the Brakes

The sudden application of the brakes resulting in sliding the wheels causes the treads to wear away in spots. A tire will give away very rapidly under this severe treatment.

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 cords, 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 layers of cords to dirt and moisture, which soon starts to rot the cords.

In turning in a narrow street, avoid striking the curb.

If a tire goes flat without any indication of injury to the tire, see that the valve is not leaking. A little moisture on the tip will show bubbles if the air is escaping.

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 carcass 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 rubber 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.

CHAPTER VI

Storing Car

If the car is not to be used for a period of several months, it should be protected from deterioration during the period when it is not in use by carefully preparing it for storage.

Engine

To prepare the engine for storage, proceed as follows: Run the engine until opening of the radiator shutters indicates that the engine is warm. This may be done by driving on the road or by running the engine idle. In the latter case, care should be taken that there is sufficient ventilation to avoid injury from carbon monoxide poisoning. (See page 18.)

After the engine is warm, place the car where it is to be stored and stop the flow of gasoline to the carburetor by removing the gasoline tank filler cap, thus relieving the air pressure. As soon as the engine starts to slow down, raise the polished aluminum cap on top of the carburetor and inject three or four tablespoonfuls of clean fresh engine oil into the carburetor. Injection of the oil will stop the engine.

Open the compression relief cocks by turning them counter-clockwise. Inject two or three tablespoonfuls of engine oil into each compression relief cock, 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. The engine should not be started again after injecting the oil. If it is started, it will be necessary to repeat the treatment.

Drain the cooling system by opening the drain valve in the water pump.

Storage Battery

If the car is to be stored during the winter, the storage battery should have special treatment in order to protect it against freezing.

Shortly before the car is used for the last time, distilled water should be added to bring the level of the solution up to the bottom of the fillers. (See page 63.) After the water added has had an opportunity to mix thoroughly with the acid solution, the specific gravity should be taken with a hydrometer. If the specific gravity of the solution is above 1.270 there will be no danger of the acid solution freezing. If, however, the specific gravity is below 1.270, the battery should be removed and charged. *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.*

It is important that one of the battery leads should in all cases be disconnected during storage as a slight leak in the wiring will discharge the battery

and lower the specific gravity to the point where the solution may freeze.

If possible, the storage battery should be removed and charged from an outside source every two months during the storage period.

Tires

During storage of the car, it is best to remove the tires *from the rims* and to keep the casings and tubes in a fairly warm atmosphere away from the light. The tubes should be inflated slightly after the tires have been removed.

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

The weight of the car should not be allowed to rest on the tires during the storage period. If tires are not removed, the car should be blocked up so that no weight is borne by the tires. The tires should also be partly deflated.

Body and Top

A cover should be placed over the entire car to protect it from dust. In storing an open car, the top should be up.

Taking Car Out of Storage

In putting into use again a car that has been stored, it is advisable, unless the storage battery has been removed and charged at periodic intervals, to remove the battery from the car and give it a fifty-hour charge at a four-ampere rate. If the battery has received periodic charges, or if the specific gravity is above 1.200, simply add distilled water to the proper level and connect the leads. If there is a greenish deposit on the terminals of the battery, remove this with a solution of bicarbonate of soda (common cooking soda) and water. Do not allow any of this solution to get into the battery.

Before starting the engine, drain the oil from the oil pan and remove and clean the oil pan and screen. After reinstalling the oil pan, add eight quarts of fresh engine oil. Fill the cooling system, being sure to use anti-freezing solution in freezing weather. Open the compression release cocks and inject two or three tablespoonfuls of engine oil into each cylinder. Close the compression release cocks, and, with the ignition switched off, crank the engine a few seconds with the starter to distribute the oil over the cylinder walls.

Start the engine in the usual manner. As soon as the engine starts, immediately let the carburetor enriching button go as far forward as possible without causing the engine to stop or slow down materially and then open the throttle until the ammeter reads approximately 10 with all lights switched off. While the engine is running lift the aluminum cap on top of the carburetor and inject from two to three tablespoonfuls of engine oil into the carburetor. It is a good plan to run the car outdoors as soon as this has been done. Release the carburetor enriching button entirely as soon as the engine is warm enough to permit it.

PART III

GENERAL INFORMATION

CHAPTER I

Engine

Important Features of Construction

THE Cadillac engine is of the water-cooled, four-cycle type with two L-head cylinder blocks of four cylinders each, placed at an angle of ninety degrees between the blocks. The cylinders of one block are directly opposite those of the other block, the lower end of each connecting rod on the left-hand side working in the forked end of the connecting rod opposite. This construction makes the engine shorter and more compact than any other type, the smooth running being largely the result of the short, rigid crankshaft.

The crankshaft has four throws or cranks, three main bearings, and carries on its front end the sprocket by which the camshaft is driven. The camshaft has six bearings, and is driven by the crankshaft through a silent chain in which the proper tension is maintained by an automatically adjusted idler gear. The camshaft has sixteen cams, each operating one valve through a camslide in which is carried a roller.

The fan is mounted on the front end of the generator shaft, which is driven by the camshaft through a special V-shaped belt.

The water pump and oil pump are driven by a cross shaft, which in turn is driven by a spiral gear on the crankshaft. The water pump is at the left-hand end of the cross shaft and the oil pump at the right-hand end.

The engine base is the aluminum crankcase that supports the cylinder blocks and carries the crankshaft and camshaft bearings. The crankcase is supported at the rear end by two arms which are cast integrally with the

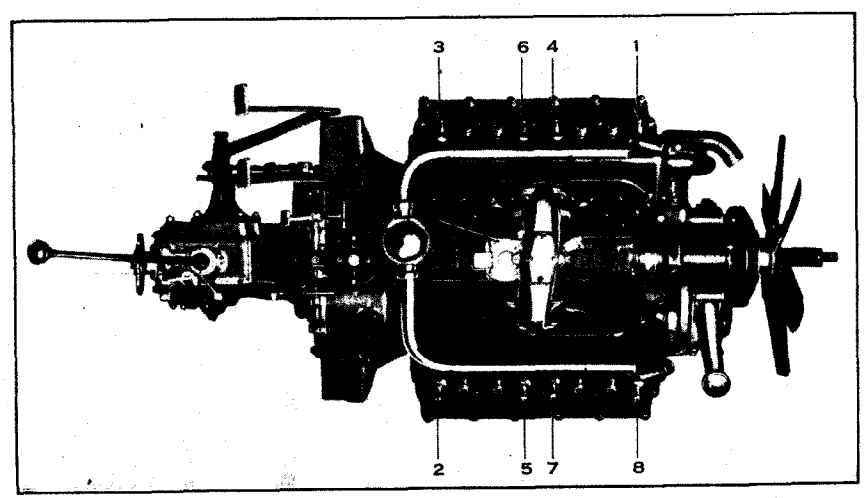


FIGURE 13. ***Firing order***

crankcase and which are bolted to brackets on the frame. The front end of the engine is supported on a cross member of the frame below the radiator.

General Principle of Gasoline Engine

The production of power by the engine may be described briefly as follows:

Gasoline is fed by air pressure from the tank to the carburetor where it is mixed with air in the proper proportions to form an explosive vapor or gas. This gas is then drawn through the intake manifold and inlet valves into the cylinders of the engine where it is compressed by the pistons and then ignited by electric sparks. The pressure of the resulting explosions acting on the pistons produces the power.

The series of operations through which the pistons and valves of each cylinder must go to produce one power stroke is called a "cycle" and for such a cycle four strokes of each piston and two revolutions of the flywheel are required. The four strokes, each of which has a different function, take place in the following order:

Suction Stroke—The suction stroke commences with the piston at its highest point in the cylinder and with the inlet and exhaust valves closed. As soon as the piston starts to descend, the inlet valve immediately opens and a charge of gas is drawn from the carburetor through the valve opening into the space above the piston.

Compression Stroke—When the piston starts upward again after completing the suction stroke, the inlet valve closes. The gas, which has no means of escape, 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, a spark, timed to occur at exactly the right instant, jumps between the electrodes of the spark plug and ignites the compressed charge of gas. The heat that results 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 the piston down and produces the impulse which is transmitted by the connecting rod to the crankshaft, causing the crankshaft to revolve.

Exhaust Stroke—Just before the piston reaches the end of the power stroke, the exhaust valve opens. It remains open while the piston travels upward on the fourth, or exhaust stroke, driving the burned gas 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. This completes the four strokes of the cycle and the piston is ready to draw in a new charge and to repeat the cycle.

Firing Order

Such a cycle as has been described takes place in each of the eight 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 of the eight pis-

tons are so timed that a power stroke is begun every quarter-turn of the crankshaft. The crankshaft thus receives four overlapping power impulses every revolution.

The order in which the eight cylinders fire is indicated by the numbers in Fig. 13. These numbers are the numbers used in marking the flywheel for valve and ignition adjustments.

CHAPTER II

Gasoline System

THE general arrangement of the gasoline system is illustrated in Fig. 14. There are two sets of tubes, one for air and one for gasoline.

The air tubes connect the automatic compressor at the left-hand front end of the engine, the hand compressor on the instrument board, and the air pressure relief valve, to the top of the gasoline tank. As described on page 9, the automatic and hand compressors are for the purpose of furnishing the necessary pressure to force the gasoline to the carburetor. The air pressure relief valve, which is fastened to the left-hand side of the frame under the front floor boards, prevents excessive pressure that might accompany the use of high-test or casing-head gasoline.

The gasoline line starts at the bottom of the gasoline tank and runs to the gasoline filter on the front face of the dash. From the filter one tube leads to the pressure gauge on the instrument board and another tube to the carburetor.

Settling Chambers

It is recommended that the settling chamber at the gasoline tank (Fig. 14) be drained at the beginning of freezing weather and at least every 4,000 miles during the winter season. An accumulation of water at this point might freeze and prevent gasoline from flowing to the carburetor.

To drain the settling chamber at the gasoline tank, first relieve the air-pressure by removing the filler cap and then remove the drain plug at the rear of the chamber as shown in Fig. 14. It is necessary to drain out only enough gasoline to flush the chamber. Be sure there is no fire near.

Gasoline Filter

Any solid matter in the gasoline that is not deposited in the settling chamber at the tank is removed when the gasoline passes through the filter on the dash.

This filter has a glass bowl through which the filter screen is visible, and which can be easily removed for cleaning. This should be done whenever any amount of dirt or water has been accumulated in the bowl.

To remove the filter bowl and screen for cleaning, first shut off the gasoline by turning clockwise the small T-handle valve at the side of the filter. Then unscrew the thumb screw under the bowl, after which the yoke supporting the bowl can be swung to one side and the bowl can be removed. If the screen does not come off with the bowl, it can be removed by pulling it straight down.

In putting back the bowl make sure that it seats properly against the cork gasket in the top of the filter before tightening the thumb screw. Do not forget to turn the gasoline on by turning the valve clockwise as far as it will go.

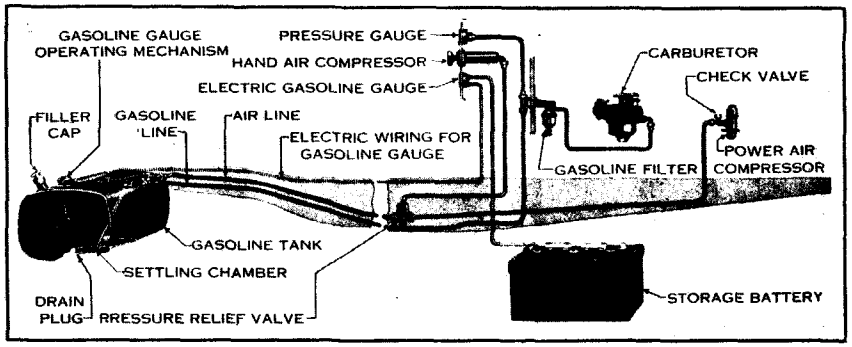


FIGURE 14. ***Gasoline System***

On some Cadillac cars a strainer at the carburetor takes the place of the filter on the dash. On these cars there is also a strainer in the settling chamber on the frame. These strainers should be cleaned whenever the settling chambers are drained.

To clean the strainer at the carburetor remove the six screws that fasten the cap on the strainer. Remove and clean the three gauze discs. In reinstalling the discs, be sure to place them in their original positions. The two discs with the fine mesh gauze should be installed first.

Carburetor

The carburetor is correctly adjusted when the engine is assembled and, unless tampered with, should not require readjustment. It is unnecessary to change the adjustment for changes in season, weather or altitude.

Good carburetor action cannot be expected until the engine is thoroughly warmed. 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, it should, if possible, be made by an authorized Cadillac maintenance station. The adjustment should not be attempted by one unfamiliar with it.

CHAPTER III

Cooling System

Water Circulation

THE Cadillac engine is cooled with water circulated through the jackets of the cylinder blocks by a centrifugal pump. This pump is mounted on the left-hand side of the engine near the front and is driven by a cross shaft, which in turn is driven by a spiral gear on the crankshaft. The pump draws cold water from the bottom of the radiator and delivers it to a connection on the left-hand side of the engine where the stream divides, half going to the left-hand cylinder block and half through a passage in the crankcase to the right-hand cylinder block. From the front end of each cylinder head an outlet pipe with hose connection carries the heated water to the top of the radiator.

Radiator and Shutters

The radiator consists of an upper tank and a lower tank connected by water passages around the outside of which air is circulated by the fan. The water passages are so constructed that they expose a large amount of surface to the air, which cools the water as it passes from the upper to the lower tank.

Until the water in the cylinder blocks and radiator is warm, the cooling effect of the radiator is not only unnecessary, but is undesirable. The radiator is accordingly provided with shutters that prevent air from circulating around the water passages until the engine becomes warm. The shutters are pivoted vertically and are controlled automatically by a powerful thermostat contained in the upper tank of the radiator.

When the engine is cold, the shutters are held tightly closed and circulation of air is prevented. The water from the cylinders consequently undergoes little change in temperature as it flows through the radiator and the engine quickly becomes warm. As soon as the water entering the upper tank of the radiator reaches the temperature at which the engine operates best, the shutters are forced open by the thermostat and air begins to circulate. The resulting cooling effect checks the rising temperature of the water, which is thereafter maintained uniformly at the temperature of most efficient operation as long as the engine is running.

Filling and Draining the Cooling System

Except during freezing weather, water should be used in the cooling system. In freezing weather, a suitable anti-freezing solution such as those described on page 34 must be used.

To add liquid to the cooling system or to refill the cooling system after it has been drained, remove the radiator filler cap and pour the liquid in through the filler.

It is not necessary to add liquid to the radiator whenever the level falls below the filler. There is sufficient liquid in the cooling system if the core of the radiator is covered, and any liquid in excess of this is usually forced out through the overflow pipe as soon as the engine becomes warm. When water is used, any loss from this cause is of little consequence, but in winter to conserve anti-freeze it is important to avoid adding more liquid than is necessary.

To drain the cooling system, open the drain valve at the bottom of the water pump by turning the hexagonal end of the valve counter-clockwise.

Cleaning the Cooling System

The cooling system should be drained and flushed every two or three months. This can be done in the following manner:

Run the engine until the opening of the radiator shutters indicates that the engine is warm. Stop the engine and immediately open the water pump drain valve.

After the liquid has drained off, refill the cooling system with hot water and repeat the operation described above. If in draining the second time the water is very dirty it may be advisable to repeat the flushing operation a third time, placing one or two handfuls of sal-soda in through the radiator filler. The sal-soda must not be permitted to get on the finish of the hood or radiator. If sal-soda is used, the cooling system must be drained and flushed again before refilling for use.

CHAPTER IV

Electrical System

THE electrical system comprises the following units: The generator or source of electrical energy; the storage battery, which stores the current generated; the starting motor, which cranks the engine for starting; the ignition system; the lamps and other devices using electrical current; the ammeter; the ignition and lighting switch; and the circuit breakers, which protect the system. The wiring system connecting these units is the single wire or grounded type, the engine and frame forming one side of the electrical circuit.

Generation of Current

Generator

The generator is attached to the crankcase at the front of the engine and is driven by a specially made V-shaped belt from a pulley on the front end of the camshaft.

At very low engine speeds the voltage of the current generated is not sufficient to provide current for lighting or ignition and the battery is then the source of current. To prevent the battery at such times from discharging through the generator, a cut-out relay on the generator automatically opens the circuit whenever the generated voltage drops below the battery voltage. At approximately eight miles per hour the generated voltage is sufficient to operate the cut-out, which then closes the circuit between the generator and the battery and lighting circuits. If no lights are switched on, the entire output of the generator, less the current required for ignition, flows to the battery for recharging it. If all the lights are on, the generator will not generate sufficient current to start charging the battery until a speed of twelve to fifteen miles per hour is reached.

The amount of current generated by the generator at any instant is the ammeter reading (with all lights off) plus the current for ignition, which is two to three amperes. The generator output reaches its maximum at speeds between twenty and twenty-five miles per hour. This maximum should not exceed eighteen amperes, which is equivalent to an ammeter reading of sixteen when all lights are off.

Do not put oil on the commutator of either the generator or the starting motor.

Ammeter

The ammeter on the instrument board indicates the amount of current flowing to or from the battery except when the starter pedal is down and the starting motor is cranking the engine. When the engine is not running, the ammeter will indicate a current on the discharge side depending in amount upon the number of lights in use. The rate of charge or discharge when the engine is running depends upon the speed of the engine and the number of lights in use, and is equal in amount to the difference between the current generated and the current used by the lights, horn, ignition, and other electrical devices. The ammeter does not indicate the current used in cranking the engine.

If the ammeter should show "Discharge" with the car running twelve miles an hour or more and with no lights in use, it is an indication either that the fan belt is slipping or that the generator charging rate should be readjusted. The fan belt should be inspected first, and tightened if necessary, before any attempt is made to change the generator charging rate.

Storage Battery

The storage battery is a three-cell, six-volt Exide battery made especially for the Cadillac electrical system by the Electric Storage Battery Company, of Philadelphia, Pennsylvania. The battery compartment is just forward

of the left-hand running board. The hinged cover of the compartment is provided with a lock that is operated by the switch key.

Adding Water to Storage Battery

The battery is filled with a solution from which the water slowly evaporates and fresh distilled water must be added at intervals to maintain the correct level. The level should be inspected every 500 miles and distilled water should be added to bring the level up to the bottom of the fillers.

The battery compartment has been purposely made convenient of access to facilitate the adding of water. It is important in touring that nothing be placed on top of the compartment that would interfere with this regular attention.

Each cell is provided with a filler and filler plug. To remove a filler plug, turn it as far as possible counter-clockwise and then lift it straight up. To install it, set the plug in place and turn it clockwise until tight. If a plug is lost or broken, obtain a new one and install it as soon as possible.

Nothing but pure distilled water should be added to the battery solution. In the absence of distilled water, melted artificial ice or rain water caught in

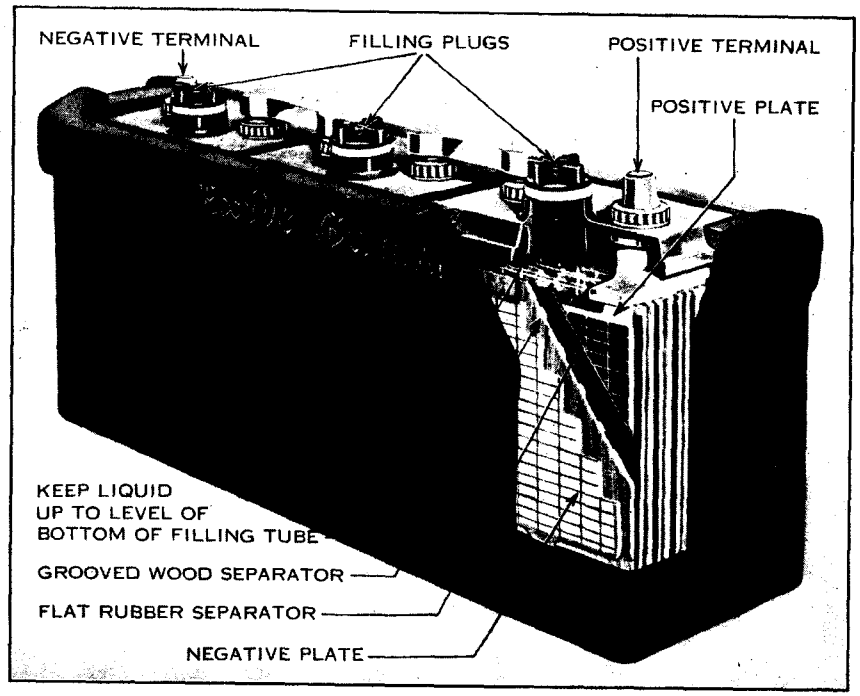


FIGURE 15. ***Storage battery***

an earthenware receptacle may be used. Hydrant water or water that has been in contact with metallic surfaces will cause trouble if used. *Acid must never be added to the battery.*

After adding water to the storage battery in freezing weather, the car should immediately be run far enough to mix the water and acid solution thoroughly. If the car is parked immediately after adding water, the water is likely to stay on top of the acid solution and may freeze, causing extensive damage.

If one cell regularly requires more water than the other, a leaky jar is indicated. A leaky jar should be replaced immediately by a new one as even a very slow leak will in time result in the loss of all the solution in the cell.

Specific Gravity of Battery Solution

As the storage battery is charged and discharged, the solution reacts chemically with the plates of the battery, the specific gravity of the solution changing as the reaction proceeds. The state of charge of the battery is thus indicated by the specific gravity of the solution. As the battery is charged, the specific gravity of the solution increases, reaching 1.270 to 1.290 when the battery is fully charged. The specific gravity of the solution decreases as the battery is discharged. A fully discharged battery has a specific gravity of 1.150 to 1.170.

A hydrometer is the instrument used to measure the specific gravity of a solution. A hydrometer syringe is a hydrometer especially designed for convenience in testing the specific gravity of the acid solution in the storage battery. A hydrometer syringe can be obtained at any battery service station.

The specific gravity of the acid solution should never be tested immediately after adding distilled water. If the solution is below the plates so that it cannot be reached with the syringe, add the necessary amount of distilled water and then drive the car for a few hours before taking the hydrometer reading.

Disconnecting Battery

Do not remove the 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.

Never run the engine with the storage battery disconnected. Serious damage to the generator may result.

Exide Depots and Sales Offices

The Electric Storage Battery Company, whose general offices and works are at Alleghany Avenue and Nineteenth Street, Philadelphia, Pennsylvania, has representative stations in towns of any considerable size as well as sales offices and Exide battery depots in a number of the larger cities. If a storage battery is in need of attention other than recharging, it is advisable to communicate either with a Cadillac maintenance station or with the nearest Exide station or depot. Do not ship a storage battery without receiving instructions.

Starting Motor

Operation of Starter

The starting motor is a series-wound motor, mounted vertically at the rear end of the crankcase directly over the flywheel. When cranking the engine, the starting motor drives the flywheel through a pinion which meshes with teeth machined on the rear face of the flywheel. The pinion is normally held out of engagement with the teeth on the flywheel. It is moved down into mesh with the teeth on the flywheel by pushing forward on the starter pedal. Further movement of the pedal operates a switch that closes the battery circuit and starts the armature revolving.

If, in pushing down the starter pedal, the ends of the teeth on the pinion strike against the ends of the teeth on the flywheel, preventing further movement of the pinion, continued movement of the pedal compresses a spring. As soon as the pedal has been pushed down far enough to close the starting switch, the armature starts to revolve. The pressure of the spring then forces the pinion the rest of the way, completing the meshing operation.

An over-running clutch on the armature shaft prevents the flywheel from driving the starting motor after the engine is running under its own power and before the starter pedal is released.

Ignition

General Description

The function of the ignition system is, first, to multiply the low voltage (six to eight volts) of the storage battery and generator into voltage of sufficient intensity to cause a spark to jump between the electrodes of the spark plugs; and second, to time this spark so that igntion will take place in the proper cylinder at the proper instant.

The Delco single-spark system is used, consisting of a combination timer-distributor unit in connection with a transformer or induction coil. The primary circuit, through which flows the current from the storage battery or generator, includes the primary winding of the ignition coil; the timer contact arms and points; and the condenser, which is enclosed in the timer. The

secondary or high-voltage circuit includes the secondary winding on the ignition coil, the distributor and the spark plugs.

Current flows through the primary circuit whenever and as long as either of the two sets of timer contact points is closed. Current flows through the secondary circuit for an instant only when either set of contact points is opened; but the voltage of this current is several thousand times that of the primary circuit and is sufficient to cause a spark at the spark plug

Timer-Distributor

The timer-distributor is mounted on the top of the crankcase at the rear end and is driven by a spiral gear on the rear end of the camshaft. The shaft of the timer-distributor, which revolves at one-half crankshaft speed, carries a four-lobed cam. As this cam revolves, it actuates the two contact arms alternately, closing and opening first one set of contact points and then the other. The circuit is thus made and broken eight times during each revolution of the cam and eight corresponding sparks are produced at the spark plugs.

In order to procure the maximum power from each explosion, ignition must occur at the right instant in relation to the position of the piston. But the ignition process, although apparently a matter of an instant, consumes a measurable amount of time. It is therefore necessary to break the circuit at the contact points far enough in advance so that actual ignition will take place in the cylinder at the correct time. The lapse of time is always the same, regardless of the speed of the engine, but because the pistons move faster when the engine is running at higher speeds than when it is running at lower speeds, the degree of advance in relation to the positions of the pistons must be increased as the engine speed increases.

This advancing of the relative timing of the spark for higher engine speeds is automatically accomplished by a centrifugal ring governor on the timer shaft below the cam. As the speed of the engine increases, the governor ring assumes a position more nearly horizontal, forcing the cam ahead of the shaft by which it is driven. This causes the contact points to open earlier, starting the ignition process earlier in relation to the positions of the pistons in the cylinders.

In addition to the automatic advance, the timer has a manual control by which the opening of the contact points may be still further advanced or still further delayed. This is operated by the left-hand lever at the steering wheel, as described on page 10.

The distributor is the mechanism that insures that the high voltage current in the secondary circuit is switched to the proper spark plug at the proper time. It consists of a rotor which is carried on the upper end of the timer shaft and which has a metal contact button electrically connected at

all times with the secondary current from the coil. As the rotor revolves, the button makes contact successively with eight metal contacts which are set in the distributor head, and which are connected to the spark plugs. The relation between the rotor and the timer shaft is such that when the cam causes one set of timer contact points to open, the rotor will be in correct position for conducting the resulting high voltage in the secondary circuit to the proper spark plug.

Spark Plugs

For best results the electrodes of the spark plugs should be .032 to .035 inch apart. If the spark plugs should be removed, it is recommended that the electrodes be inspected and adjusted to this clearance if necessary.

Lighting System

Lamp Bulbs

It is recommended that bulbs for the lamps, particularly the two-filament bulbs for the headlamps, be purchased from a Cadillac distributor or dealer. In any event bulbs should have the correct voltage and candle-power ratings. Only three different types of lamp bulbs are used in the entire lighting system. The bulbs and the lamps in which they are used are as follows:

Lamp	Voltage	Candle-power
Headlamps	6–8	21 (two-filament) (Mazda No. 1110)
Back-up light	6–8	21 (single filament)
Stop light	6–8	
Inspection lamp	6–8	
Parking lights	6–8	3
*Instrument lamp	6–8	
*Rear lamp	6–8	
Closed car dome and quarter lamps	6–8	

Cadillac two-filament bulbs are equipped with fog caps or metal screens placed over the upper part of the bulb for the purpose of stopping direct unreflected light from the filament. It is this direct unreflected light from the filament that causes the dazzling reflection from fog or smoke. Headlamps equipped with fog caps have the appearance of being dimmed when seen from the front, but they do not perceptibly affect the useful light from the headlamps.

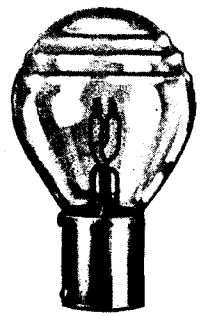


FIGURE 16. ***Double-filament headlamp bulb***

In replacing a headlamp bulb, transfer the fog cap from the old bulb to the new, adjusting the cap to the position shown in Fig. 18. Then adjust the lamp as directed on page 69.

*Bulbs rated at 3-4 volts, such as are used in the rear lamps of some cars, must not be used in these lamps. If installed, they will burn out almost immediately.

Cleaning Headlamp Reflectors

The headlamp reflectors are plated with pure silver. Although the reflectors ordinarily require no attention, if they should require polishing extreme care must be exercised to select materials that will not scratch the silver.

Powdered dry rouge and a chamois skin are recommended. If the reflectors are tarnished, the rouge may be moistened with alcohol. Afterward, polish with a dry chamois and rouge.

The chamois used for the headlamp reflectors must not be used for any other purpose. It must be soft and free from dust.

Do not touch the reflectors with the bare hands.

Official Approval of Headlamps

Cadillac headlamps have been approved by practically every state in the country. For purposes of official identification, the following description of the headlamps is given:

A complete headlamp containing a parabolic reflector with axis inclined two and one-half degrees; screw adjustment on shell of headlamp to adjust the bulb filament with relation to the reflector in both axial and vertical planes to compensate for filament variation in bulbs; a cover glass containing cylindrical flutes vertically grouped in three distinct zones, the outer zone having greater refractory power and the flutes being more pronounced than

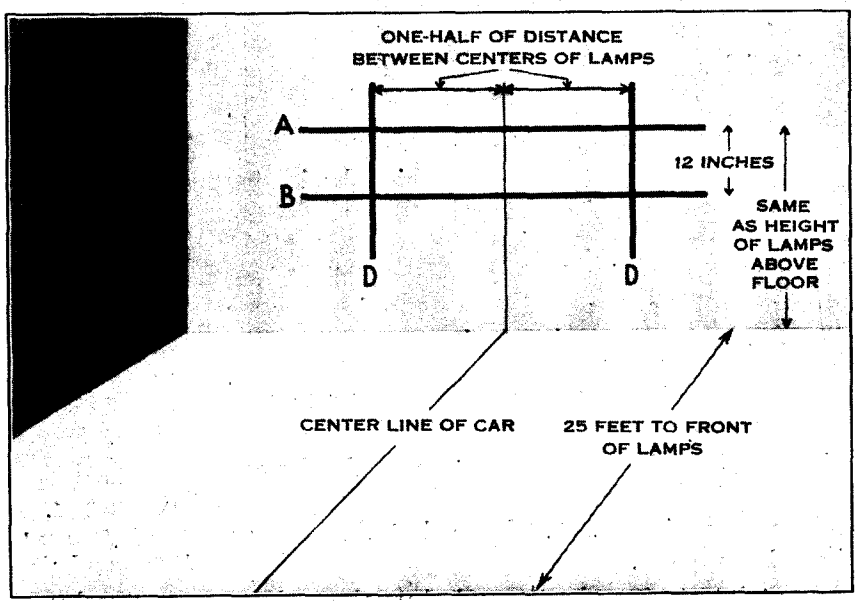


FIGURE 17. ***Marks for adjustment of headlamps***

in the center; and a cap over the upper front portion of the bulb to intercept the direct unreflected light above the horizontal.

Approval by the state authorities is conditional upon the headlamps being adjusted to a definite standard. The directions which follow are for this standard adjustment.

Adjustment of Headlamps

Select a level spot where the car with an average load can be placed facing toward and twenty-five feet distant from a wall upon which the lines shown in Fig. 17 can be drawn. The adjustment should be made when it is dark enough so that the outlines of the projected beams are plainly visible.

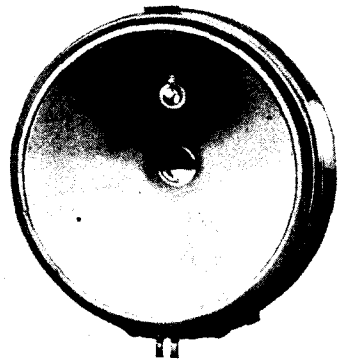


FIGURE 18. ***Headlamp fog cap***

Locate a point on the wall directly opposite the front of the car by sighting through the center of the rear curtain toward the radiator cap. Draw a vertical line on the wall through this point: Measure the distance between the centers of the headlamps, and draw two vertical lines "D" parallel to the center line and distant from it by an amount equal to one-half of the distance between the headlamps. Measure the distance of the headlamp centers above the ground or floor and draw the horizontal line "A" at the same elevation. Draw the line "B" twelve inches below the line "A."

Upper Adjusting Screw—The first adjustment should be made with the lower beam on, that is, with the lighting switch lever in the third position. Cover the headlamp that is not being adjusted, or disconnect the plug connector that supplies current to the lamp. Remove the headlamp door. Make sure that the fog cap is properly placed on the bulb as shown in Fig. 18.

The adjusting screws, of which there are two, are in the back of the headlamp shell. Turn the upper or large adjusting screw until the light spot on the screen is the smallest that can be obtained.

Loosen the nut on the headlamp support and aim the headlamp so that the top center of the spot of light is at the intersection of lines "B" and "D" as shown in Fig. 20a. When the lamp has been properly aimed, tighten the nut securely.

(*Continued on page 71*)

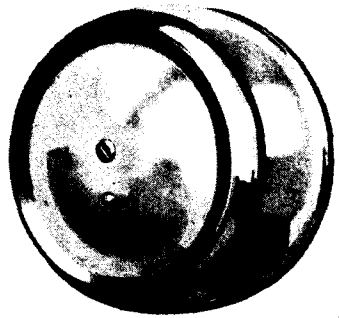


FIGURE 19.
Headlamp adjusting screws

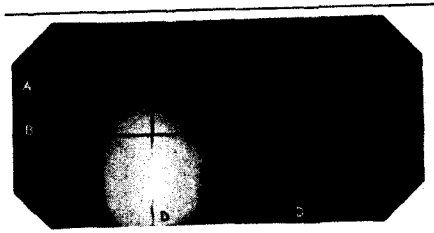


Figure 20a
Left-hand lower beam without lens.

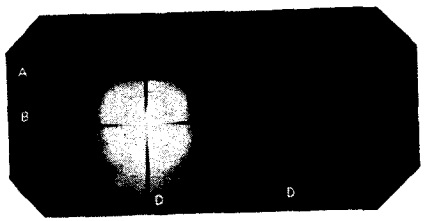


Figure 20b
Left-hand upper beam without lens.

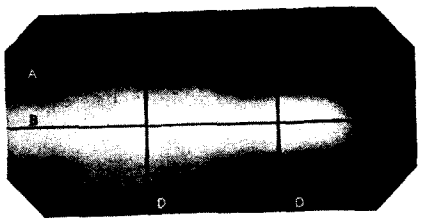


Figure 20c
Left-hand upper beam with lens.

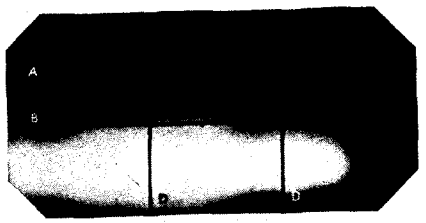


Figure 20d
Left-hand lower beam with lens.



Figure 20e
Both upper beams with lenses.

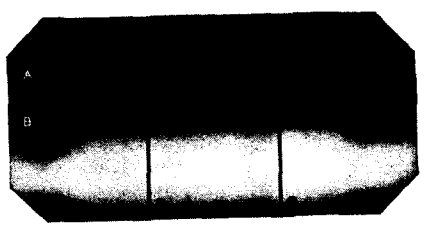


Figure 20f
Both lower beams with lenses.

FIGURE 20, *Beams from headlamps*

Lower Adjusting Screw—Turn the lighting switch to the fourth position so that the upper beam is on. Adjust the lower or small screw until the top of the beam is at the intersection of lines "A" and "D" as shown in Fig. 20b. The beam should be of approximately the same proportionate size as shown, and the greatest intensity of the beam should be near the top of the spot and not at its center. If the lower beam is now switched on, it should appear as in Fig. 20a and should be of the same proportionate size with the greatest intensity near the bottom, rather than at the center of the spot.

Install the door with the lens. If the lens is for any reason removed from the headlamp door, it should be replaced with the cylindrical flutes vertical and the smooth side facing out.

With the lens in place, the upper beam from the left-hand headlamp should appear as in Fig. 20c. The pattern of the lower beam from the left-hand headlamp should appear as in Fig. 20d.

After adjusting the one headlamp, repeat the adjustment on the other. When both headlamps have been adjusted and both headlamp doors are in place, the combined light from both headlamps should appear as in Fig. 20e when the upper beams are on, and as in Fig. 20f when the lower beams are on.

CHAPTER V

Clutch and Transmission

Clutch

THE Cadillac clutch is a dry multiple-disc clutch with eight smooth driven discs and seven driving discs faced with friction material composed largely of asbestos. The driving discs have gear teeth machined on their outer circumference to engage with teeth machined internally in the flywheel. The driven discs have gear teeth machined on their inner circumference to mesh with teeth machined on the outside of the clutch hub, which in turn drives the transmission. Except when the clutch pedal is pushed down, the clutch discs are pressed together by a spring having a pressure of 300 lbs. The driven discs then revolve with the driving discs and the engine, if running, drives the transmission.

When the clutch pedal is pushed down to disengage the clutch a forked lever presses against the clutch spring through a ball thrust bearing, releasing the discs from the pressure of the spring. The discs then separate and the driven discs rotate independently of the driving discs.

The clutch itself requires no adjustment or attention other than lubrication of the clutch thrust bearing as directed on page 45. Adjustment of the clutch release rod, however, may be necessary after the car has been driven some distance.

Adjustment of Clutch Release Rod

As described on page 15, the clutch pedal is purposely given about one inch of "lost motion." That is, the clutch does not begin to disengage until the pedal has been moved down about an inch from its released position. This lost motion is necessary in order to allow the clutch discs to come closer together as the facings are reduced in thickness. The lost motion gradually decreases as the clutch is used and eventually will be all taken up. Before this happens, the clutch release rod must be readjusted to restore the lost motion; otherwise the clutch discs will slip and the engine will not drive the car.

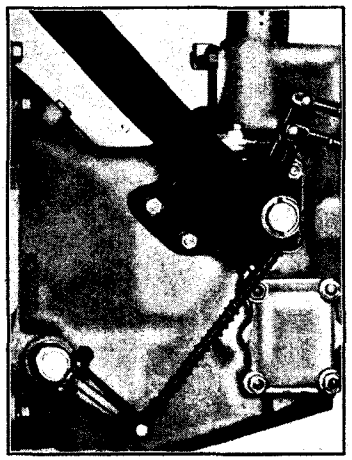


FIGURE 21.
Adjustment of clutch release rod

To make the adjustment, unscrew the nut "A" (Fig. 21) until the clutch pedal has a movement of one inch without starting to disengage the clutch.

The nut "A" must be turned a half-turn at a time.

Transmission

The purpose of the transmission is to provide a means for varying the ratio and direction of the rear axle speed in relation to the engine speed. Three things are accomplished by doing this: First, the engine is enabled to drive the car backwards. Second, the engine is permitted to revolve fast enough to develop the power necessary for starting and for driving the car at extremely low speeds. Third, the turning effort of the engine is multiplied so that it may be sufficient for climbing steep hills and pulling through deep sand and mud.

The Cadillac transmission is known as the selective, sliding gear type. It has three speeds forward, of which one is direct drive, and one speed in reverse. Selection of the various speeds is accomplished by movement of two shifter gears, "A" and "D," (Fig. 22) which are controlled by the transmission control lever. The positions of the gears corresponding to the five positions of the control lever, as illustrated in Fig. 2, are as follows:

Neutral—When the control lever is in neutral position, the shifter gears "A" and "D" are in the positions shown in Fig. 22; that is, they are not in mesh with any of the other gears.

Low—When the control lever is moved from neutral to low, the gear "A" is moved forward into mesh with gear "R." Power is then transmitted from the clutch shaft "Z" to the transmission main shaft "C" through gears "E," "U," "R" and "A." The ratio of engine speed to propeller shaft speed in low is approximately 3 to 1.

Intermediate—When the control lever is moved from low to intermediate the gear "A" is first returned to its neutral position and gear "D" is then moved back into mesh with gear "S." Power is then transmitted through gears "E," "U," "S" and "D." The ratio of engine speed to propeller shaft speed in intermediate is approximately 1.7 to 1.

High—When the control lever is moved from intermediate to high, the gear "D" is first moved forward out of mesh with gear "S" and then farther forward until teeth cut internally in a recess in gear "D" engage teeth on the

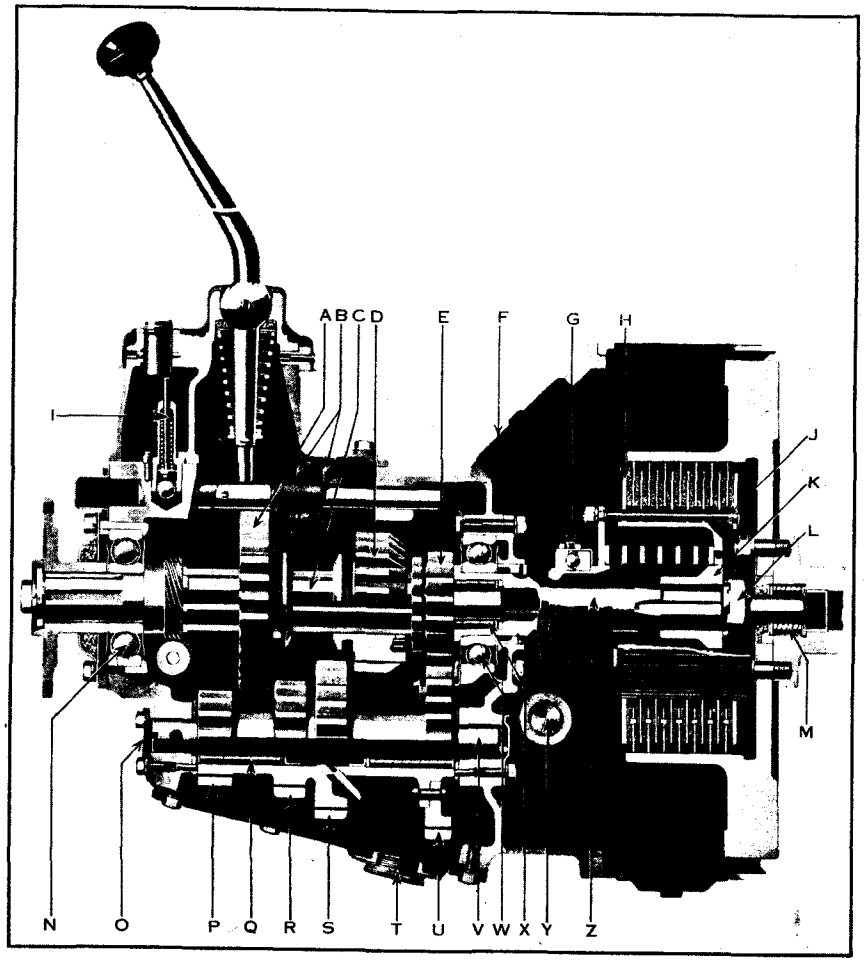


FIGURE 22. ***Sectional view of transmission***

extreme end of gear "E." The drive is then direct from the clutch shaft to the transmission main shaft without reduction.

Reverse—When the control lever is moved from neutral to low, the gear "A" is moved back into mesh with an idler gear, not shown in Fig. 22, which is at all times in mesh with gear "P." Power is then transmitted through gears "E," "U," "P," the reverse idler gear, and gear "A." The interposition of the idler gear reverses the direction of rotation. The ratio of engine speed to propeller shaft speed in reverse is approximately 3.8 to 1.

CHAPTER VI

Brakes

General Description

THERE are three pairs of brakes: the rear wheel external brakes, the rear wheel internal brakes, and the front wheel brakes, which are also internal. The rear wheel external brakes and the front wheel brakes are operated by the brake pedal and comprise the foot brakes. The rear wheel internal brakes are operated by the hand lever and are used principally for locking the rear wheels when the car is standing.

The purpose of the front wheel brakes is to add to the braking ability as much as is consistent with safety. It is not desirable to attempt to secure the maximum possible braking effect on the front wheels for the reason that, when a front wheel slides without rotating, it has no power to change the direction of the car.

Cadillac front wheel brakes are accordingly designed so that when the foot brakes are applied while the steering wheel is turned to the right or left, only the brake on the inside wheel is effective and the brake on the outer wheel is released, leaving the outer wheel free to rotate. It is thus impossible to lock both front wheels even on slippery pavement unless the car is moving straight ahead. If, while the car is moving straight ahead on slippery pavement, the brakes should be applied with sufficient pressure to lock both front wheels and it then becomes necessary to make a turn, the car will instantly respond because the brake on the outer wheel is automatically released as soon as the steering wheel is turned.

Adjustment

Each foot brake has provision to compensate for wear on the brake lining. The adjustment by which this compensation is effected is at the brake itself

rather than in the connections. Cadillac brakes must *not* be adjusted to compensate for wear by adjusting the pull rods or stop screws.

As described on page 16, the Cadillac two-stage brake pedal automatically notifies the driver when the foot brakes require adjustment. It is recommended that the car be taken to a Cadillac maintenance station for attention when necessity for adjustment is thus indicated.

If, however, the adjustment is neglected and as a result the pedal touches the floor boards before the brakes are fully applied, an emergency adjustment can be made by screwing down the adjusting nuts "F" (Fig. 23) one or more half-turns. The nuts "F" lock every half-turn and must be turned a half-turn at a time. The nuts "F" must not be turned down far enough to cause the brakes to heat and they must be turned down the same amount on both sides.

If adjustment of the nuts "F" is not sufficient, or if the occasion gives opportunity for a complete adjustment, this adjustment should be made as follows:

Loosen the three locking nuts "B," "D" and "N" (Fig. 23) and screw the three stop screws "A," "C" and "M" away from the brake band. Observe the clearance between those parts of the brake lining nearest the hexagonal

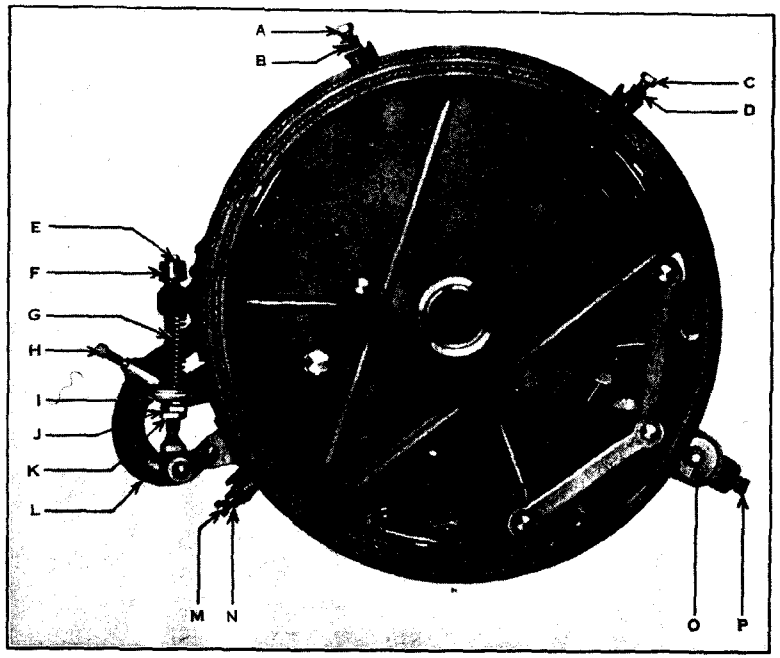


FIGURE. 23 ***Rear wheel brakes***

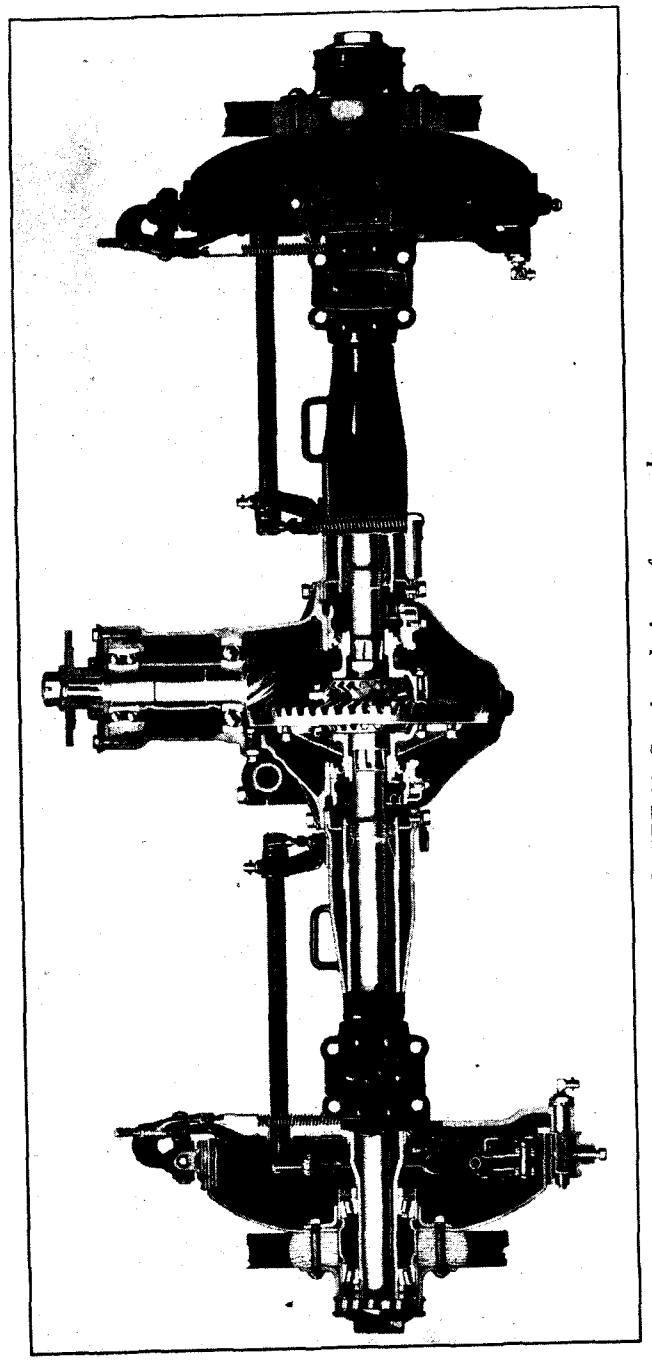


FIGURE 24. *Sectional view of rear axle*

head screw "P" and the brake drum. This clearance should be .030 to .035 inch. If the clearance is not correct, adjust the screw "P" until it is. The screw "P" is kept from turning of its own accord by a lock washer which turns with the screw and locks every half-turn. It must accordingly be turned a half-turn at a time.

Loosen the locking nuts "K" and adjust the nuts "J" and the screws "M" so that there is a uniform clearance of .030 to .035 inch between the *lower* part of the brake lining and the brake drum. To decrease the clearance between the brake lining and the drum, screw the nut "J" farther down on the yoke bolt "E."

Adjust the nuts "F" and the two stop screws "A" and "C" so that there is a uniform clearance of .030 to .035 inch between the *upper* part of the brake lining and the drum.

After making the foregoing adjustments so that there is a uniform clearance of .030 to .035 inch betwen the drum and the lining, check the results by applying the brakes, and measuring the travel of the upper end of the lever "L." This travel should not be less than $\frac{7}{8}$ inch. If the end of the lever "L" travels less than $\frac{7}{8}$ inch in moving from the released position to the applied position, readjust one or all of the nuts "F" and "J" and the screws "P," "A," "C" and "M" to increase the clearance slightly, keeping the clearance uniform at all points around the drum. Do not fail to tighten the locking nuts "B," "D," "N" and "K" when the adjustment has been made.

Do not change the adjustment of the screw "H." This screw is properly set when the car is assembled and does not require readjustment in taking up wear on the lining.

Inasmuch as the brakes are designed so that the greater proportion of the braking load is taken by the rear wheel brakes, adjustment of the front wheel brakes is usually not necessary until the rear wheel foot brakes have been adjusted several times. Before the limit of adjustment for the rear wheel foot brakes has been reached, the car should be taken to a Cadillac maintenance station for adjustment of the front wheel brakes.

Adjustment of the hand brakes is unnecessary. The hand brakes retain their effectiveness without adjustment throughout the life of the lining.

All joints in the brake connections should be oiled at regular intervals. The brakes should also be tested occasionally to be sure that they are in serviceable condition. When the brake band linings have worn so that further adjustment is impossible they can be renewed.

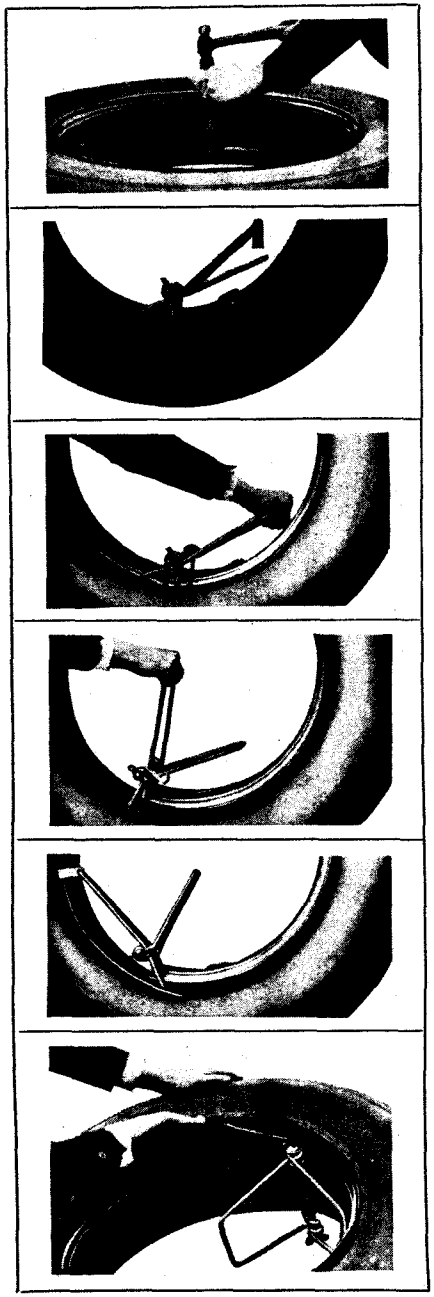


FIGURE 25. ***Removing tire from rim***

Figure 25a

Lay the tire and rim flat on the ground and drive out the locking pin, using the hammer and punch in the tool kit. *Be sure there is no air in the tire.*

Figure 25b

Apply the rim tool, which is furnished in the tool kit, as shown in the illustration. Note that there are two pairs of holes in the rim near the split and that one pair is nearer the split than the other. The short end of the tool must be inserted in the holes nearer the split and the long end in the holes farther from the split. Clamp the tool firmly in position by tightening the wing nut.

Figure 25c

Grasp the two handles and squeeze them together, spreading the ends of the rim farther apart at the split. Then pull both handles together toward the other side of the rim until one end of the rim is forced up and over the other end. If the rim does not pull over evenly on both sides a screw-driver can be used to advantage to pry up the end of the rim.

Figure 25d

Release the short handle of the tool but continue pulling the long handle until it is against the rim.

Figure 25e

Engage the hook that is attached to the long handle over the edge of the rim to hold the rim in the collapsed position.

Figure 25f

Lay the rim and tire on the ground with the hook and wing nut *face down,* and remove the tire from the rim by working it off first on the side where the rim is split. The handle of the large wrench is flat to serve as a prying tool.

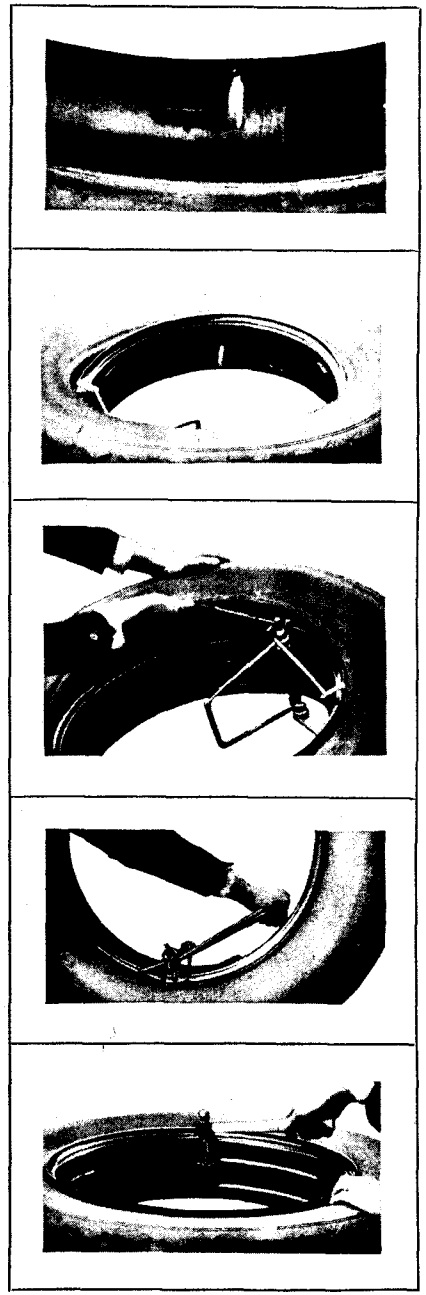


FIGURE 26. ***Installing tire on rim***

Figure 26a

Make sure that the tube flap is in place and that the valve stem passes through the holes in both ends of the flap.

Figure 26b

Lay the rim on the floor with the hook and wing nut of the tool *face up.* Insert the valve stem in the hole in the rim and work the tire well into place on each side of the valve stem.

Figure 26c

Pry the tire over the projecting end of the rim where it is split. The rest of the tire can then be pushed down into place.

Figure 26d

Release the hook from the rim and let the long handle go back until it stops. Then squeeze the two handles together until the end of the rim drops into its original position. *Do not attempt to force the long handle alone as this will only bend the tool.* If the end of the rim does not go easily into place, remove the tool and pry the end of the rim with a screw-driver.

Figure 26e

Replace the pin which locks the two ends of the rim together. This is important.

CHAPTER VII

Wheels

Tires and Rims

ILLUSTRATED directions for removing a rim with tire from a wheel and installing a rim with tire on a wheel are given in Figs. 7 and 8. Directions for removing a tire from a rim and installing a tire on a rim are given in Figs. 25 and 26.

Do not under any circumstances attempt to remove a tire from a rim without deflating the tire.

Caution in Adjusting Wheel Bearings

The adjustment of wheel bearings or the removal of the wheels should not be attempted by one unfamiliar with work of this nature. It is recommended that the car be taken to a Cadillac maintenance station if possible. In any event great care must be exercised in adjusting wheel bearings 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.

Removing Front Wheel

To remove a front wheel, first jack up the axle until the wheel is free from the ground and then proceed as follows:

Remove the hub cap by unscrewing it. Remove the cotter pin "E" (Fig. 27). Remove the lock nut "A." Remove the serrated washer "B." Remove the adjusting nut "C." The wheel may then be removed by pulling it straight off.

Installing Front Wheel and Adjusting Bearings

Before installing the wheel, make sure the bearings are clean and that they are packed in a light grease that is free from dirt and grit.

Set the wheel in place on the spindle and adjust the nut "C" (Fig. 27) very carefully, following the caution above. Install the serrated washer "B," making sure that one of the notches in the washer fits over the stud "D" on

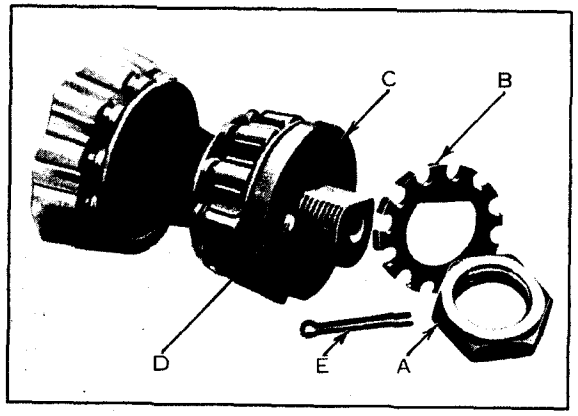


FIGURE 27. *Front wheel bearings*

the adjusting nut. Replace the lock nut "A" and tighten it firmly, locking it with the cotter pin "E."

It is always better to adjust wheel bearings too loosely than too tightly. If, after the adjustment is apparently correct, the notch in the washer "B" is not directly over the stud "D," loosen the adjustment rather than tighten it.

Removing Rear Wheel

To remove a rear wheel, first jack up the axle until the wheel is free from the ground and then proceed as follows:

Remove the hub cap "D" (Fig. 28) by unscrewing it. Remove the spring locking ring "F." Withdraw the axle shaft "E." With a screw-driver or blunt

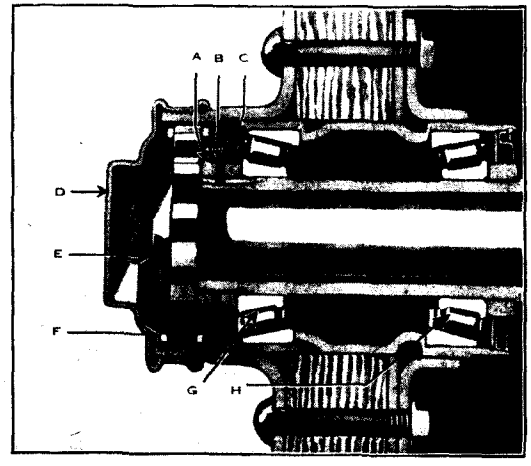


FIGURE 28. *Sectional view of rear wheel hub, showing bearings*

tool straighten the lug of the outer lock washer "B" where it has been bent over the lock nut "A." Unscrew the lock nut "A." Remove the washers "B" and the adjusting nut "C." The wheel can then be removed by pulling it straight off.

Installing Rear Wheel and Adjusting Bearings

Before installing the wheel, make sure that the bearings are clean and packed in a light grease that is free from dirt and grit.

Set the wheel in place upon the axle and adjust the nut "C" (Fig. 28) very carefully. Install the lock washer "B," using new washers or straightening the ones removed if new ones are not available. In placing the washers in position, reverse the outer one with respect to the inner so that the lugs on one washer are opposite the spaces between the lugs on the other washer; that is, so that the lugs on the two washers are staggered. Install and tighten the lock nut "A." Next, select that lug on the inner washer that falls nearest to the center of one of the flat sides of the adjusting or inner nut, and with a screw-driver or other suitable tool bend this lug over the nut. In the same way bend one of the lugs of the outer washer over one of the flat sides of the locking or outer nut. In bending the lugs of the locking washers, take care not to alter the adjustment of the inner nut or loosen the outer nut.

CHAPTER VIII

Repair Parts

Genuine Cadillac Parts

CADILLAC owners are cautioned against permitting the use of other than genuine Cadillac parts in the repair of their cars. The quality of the Cadillac car is identical with the quality of its component parts, the production of which is based upon more than twenty years of experience in designing, manufacturing, and inspecting. No other individual or organization has access to the data resulting from this experience nor could they possibly have the same interest in protecting the owners of Cadillac cars.

Uniform Parts Prices

Cadillac parts are sold at uniform prices throughout the United States, and are not subject to the addition of transportation, excise or other supplementary charges. Printed price lists published by the Cadillac Motor Car Company are open to inspection by owners at any authorized Cadillac distributor's or dealer's establishment.

Ordering New Parts

With many thousands of Cadillac automobiles in use, it is obviously impractical to deal directly with each Cadillac owner. We cannot open accounts with any except regular distributors with whom annual contracts are made.

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 Cadillac distributor or dealer, who carries a large stock and is generally in a position to supply a part immediately. If he cannot do so, he can order it. 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 parts, either from a Cadillac distributor or from the factory, send the engine number and the unit assembly number (see page 84) with an accurate description of the part desired, preferably accompanied by a sketch with dimensions. If this cannot be done, send the part itself properly tagged and with transportation charges prepaid. (See below under "Returning Parts.") Otherwise prompt and intelligent filling of the order will be impossible.

Our responsibility ceases in all cases with delivery to the transportation company.

Returning Parts

In the event parts are returned, transportation charges must be prepaid or the parts cannot be accepted. They should be tagged properly with the name of the owner and the engine number of the car. A letter should be sent, giving complete instructions regarding the disposition of the parts.

Tires, Speedometer and Clock

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

CHAPTER IX

Specifications and License Data

Type of engine	8 cyl. V-type
Diameter of cylinder bore	3⅛ in.
Length of stroke	5⅛ in.
Piston displacement	314 cu. in.
Horsepower (N. A. C. C. rating)	31.25
Engine number	See below
Diameter of crankshaft main bearings	2⅜ in.
Length of crankshaft between inner ends of front and rear bearings	18⅝ in.
Exhaust valves	1 9/16 in.
Inlet valves	1 11/16 in.
Capacity of gasoline tank	20 gals.
Capacity of engine lubricating system	2 gals.
Capacity of cooling system*	4½ gals.
Capacity of transmission	3 qts.
Capacity of rear axle	3½ qts.
Tires	33x6.75 (low pressure)
Wheelbase	132 in. and 138 in.
Tread	56 in.

*When the radiator contains only enough liquid to cover the bottom of the upper tank.

Engine and Unit Assembly Numbers

EACH Cadillac car when shipped carries an engine number which is also a serial number. This is the number to be used in filling out license and insurance applications and in general reference to the car. The engine number is stamped on the car in two places: On the name plate on the front face of the dash and on the crankcase at the base of the oil filler.

The various units such as the transmission, steering gear, etc., also carry unit assembly numbers. These are located as described below. It is important in ordering parts to give, not only the engine number of the car, but also the unit assembly number of the unit to which the part belongs.

Transmission number—on the upper surface of the boss to which the clutch and brake pedal bracket is attached.

Steering gear number—on the steering gear housing just above the grease gun connection.

Carburetor number—on the left-hand rear face of the flange by which the carburetor is attached to the intake header.

Generator number—on the left-hand side of the generator.

Starting motor number—on the left-hand side of the starter almost opposite the distributor.

Front axle number—on the upper surface of the axle I-beam at the right-hand end just above the steering stop screw.

Rear axle number—on the rear surface of the axle housing just to the right of the cover plate.

Frame number—on the upper surface of the left-hand side bar opposite the steering gear.

Index

A

Accelerator (see throttle control) 10
Accelerator, use of, when engine is cold 32
Adding water to storage battery 63
Additional cold weather suggestions 33
Adjusting of brakes 74
Adjustment of clutch release rod 72
Adjustment of headlamps 69
Adjustment of oil pressure regulator 42
Air compressor for tires 27
Air compressor, gasoline system 9
Air pump for tires (tire air compressor) 27
Alcohol as anti-freeze 34
Alcohol, effect of, on finish 34
Alignment of front wheels, incorrect, result of 51
Ammeter 17
Ammeter, its use 62
Anti-freezing solutions 33
Axle, rear, add lubricant to 46

B

Battery, storage of, when car not in use 53
Bearing, clutch thrust, to grease 45
Bearings for wheels, adjustment of 80
Bearings for wheels, pack with grease 46
Body and top, care of, when stored 54
Body, care of finish when new 49
Brakes 16
Brake adjustment 74
Brakes, general description of 74
Brakes suddenly applied, effect on tires 52
Bulbs for lamps, voltage 67
Button, carburetor enriching 11

C

Carburetor 59
Carburetor enriching button 11
Carburetor enriching button, use of, in cold weather 31
Carburetor, to prime 31
Capacity of cooling system 34
Caps, tire valve 25
CARE OF BODY 49
Care of finish on body when new 49
CARE OF TIRES 51
Chains for tires, when improperly adjusted 51
Changing tire on rim 78–9
Changing tires 30
Chassis lubrication diagram 44
Choke rod 11
Choke rod button (carburetor enriching button) use of, in cold weather 31
Cigar lighter and inspection lamp 23
Circulating system for oil 40
Circulation of water 60
Cleaner for windshield 22
Cleaning headlamp reflectors 68
Cleaning the cooling system 61
Cleaning upholstery 50
Cleaning windows, closed cars 50
Clock 23
Clock, repairs to 83
CLUTCH AND TRANSMISSION 71
Clutch, construction of 71
Clutch pedal 14
Clutch release rod, adjustment of 72
Clutch thrust bearing, to grease 45
Coasting 19
COLD WEATHER OPERATION 31
Contents 5
CONTROLS AND INSTRUMENTS 9
Control, ignition lever 11
Control, throttle lever 10
Control, transmission 15
Commutator, horn, to clean 48
Compressor, air, gasoline system 9
Compressor for air in tires 27
COOLING SYSTEM 60
Cooling system, capacity 34
Cooling system, drain and refill 60
Cooling system, to clean 61
Cowl ventilator, open cars 22
Crankcase ventilating system 42
Cup grease 39
Curtain fasteners, open cars 24
Curtains, side, open cars 24

D

Danger of running engine in closed garage 81
Data for license purposes 84
Diagram, chassis lubrication 44
Distributor oil cups, fill with oil 45
Don'ts for general operation 20
Door hardware, to oil 48
Draining cooling system 60
DRIVING 18
Driving on steep grades 19
Driving speed when car is new 18
Driving suggestions 20
Duco finished cars, to wash 50

E

Effect of alcohol on finish of body 34
ELECTRICAL SYSTEM 61
Engine, fails to start 13
Engine, gasoline, general principles of 57
Engine, important features of 56
ENGINE LUBRICATION 40

Engine number, location of ... 84
Engine oil ... 39
Engine oil for cold weather ... 33
Engine oil, to replace ... 45
Engine, prepare for storage ... 53
Engine supports, to oil ... 45
Engine, starting of ... 12
Engine, starting in cold weather ... 31
EQUIPMENT, general ... 22
Equipment, tools ... 24
Exide depots for battery maintenance ... 64

F

Fasteners, curtain, open cars ... 24
Filling and draining cooling system ... 60
Filter for oil ... 43
Filter for gasoline ... 58
Finish of body, care of, when new ... 49
Foot brakes ... 16
Foreword ... 3
Front brake trunnions, lubrication of ... 47
Front wheels improperly aligned, result of ... 51

G

Garage floor, grease covered, effect on tires ... 52
Gas in closed garage, when engine is running ... 18
Gasoline filter ... 58
Gasoline gauges and air compressor ... 9
Gasoline settling chambers and strainers, where located ... 58
Gasoline strainers, cleaning in cold weather ... 33
Gasoline system ... 59
Gauge, oil pressure ... 14
Gauges, gasoline quantity and pressure ... 9
General driving suggestions ... 20
GENERAL INFORMATION ... 56
GENERAL LUBRICATION ... 45
General operation, don'ts ... 20
General principles of gasoline engine ... 57
Generator ... 61
Generator oil cups, fill with oil ... 45
Genuine Cadillac parts ... 82
Glycerin as anti-freeze ... 34
Grease for roller bearings ... 39
Grease for universal joints ... 39
Grease gun connections, to grease ... 45

H

Hand brakes ... 17
Hardware on doors, to oil ... 48
Headlamp reflectors, to clean ... 68
Headlamps, adjustment of ... 69
Headlamps, official approval of ... 68
Headlamps, operation, use of beams ... 12
Holder for rim and tire ... 30
Horn, clean commutator of ... 48

I

Ignition and lighting switch ... 12
Ignition control lever ... 10
Ignition control lever position in cold weather ... 32
Ignition, general description of ... 65
Ignition switch lock ... 9, 11
Inflation pressure, tires ... 27
Inflation of tires, under-inflation ... 51
Inspection lamp ... 23
Installing rim with tire on wheel ... 29
Installing wheels ... 80
INSTRUMENTS AND CONTROLS ... 9

L

Lamp bulbs ... 67
Lamp, inspection ... 23
Level for oil, engine ... 41
Lever, ignition control ... 10
Lever, throttle control ... 10
Lever, transmission control ... 15
License data ... 84
Lighter, cigar ... 23
Lighting switch ... 12
Lighting system ... 67
Locks ... 9
Lubricant for rear axle and transmission ... 39
Lubricant for steering gear ... 39
Lubricants ... 39
Lubricants, selection of ... 39
Lubrication and care ... 35
Lubrication chart ... 36
LUBRICATION, ENGINE ... 40
Lubrication schedule ... 36
LUBRICATION, SYSTEMATIC METHOD ... 37

M

Mirror, rear vision ... 23
Mounting tire on rim ... 79

N

New car, driving speed ... 18
New car, washing ... 49

O

Official approval of headlamps ... 68
Oil circulating system ... 40
Oil cups on generator, to fill ... 45
Oil cups on timer-distributor ... 45
Oil filter ... 43
Oil for engine ... 39
Oil for engine in cold weather ... 33
Oil holes in steering column, to lubricate ... 47
Oil level ... 41
Oil pressure regulator ... 42
Oil pressure ... 41
Oil pressure gauge ... 14
Oil, replacing of, in engine ... 45

OPERATION, IN COLD WEATHER ... 31
Operation, don'ts ... 20
Operation of starter ... 65
Ordering new parts ... 83

P

Parts, genuine Cadillac ... 82
Parts, ordering new ... 83
Parts, returning of ... 83
Pedal, clutch ... 14
Pedal, foot brake ... 16
Pedal, starter ... 12
Position of ignition control lever ... 32
Position of throttle hand lever in cold weather ... 32
Plugs, spark ... 67
Pressure for tires ... 27
Pressure gauge, gasoline air line ... 9
Pressure of oil ... 41
Pressure, oil gauge ... 14
Prices of parts, uniform ... 82
Priming the carburetor in cold weather ... 31
Pump, air for tires (tire air compressor) ... 27

R

Radiator and shutters ... 60
Rear axle and transmission lubricant ... 39
Rear axle, sectional view ... 76
Rear axle, to add lubricant ... 46
Rear vision mirror ... 23
Removal of wheels ... 80-1
Removing rim with tire from wheel ... 28
REPAIR PARTS ... 82
Repairs to speedometer head ... 17
Replacing engine oil ... 45
Result of under-inflation of tires ... 51
Returning parts ... 83
Rim, installing on wheel ... 29
Rim, removal of tire from ... 78
Rim, removing from wheel ... 28
Rim, true up ... 30
Roller bearing and cup grease ... 39

S

Schedule of lubrication ... 37
Settling chambers and strainer in gasoline line, to clean ... 59
Shaft, flexible for speedometer drive, to lubricate ... 47
Shifting transmission gears ... 16
Shutters on radiator ... 60
Side curtains, open cars ... 24
Small cuts in tires, neglect of ... 51
Solutions for anti-freeze ... 33
Spark control lever ... 10
Spark plugs ... 67
Specific gravity of battery solution ... 64
SPECIFICATIONS AND LICENSE DATA ... 84
Speed of new car ... 18
Speedometer ... 17
Speedometer head, lubrication indicator ... 17
Speedometer flexible drive shaft, to lubricate ... 47
Speedometer, repairs to ... 83
Springs, to lubricate leaves ... 48
Stabilators, do not lubricate ... 48
Starter pedal ... 12
Starter, use of in cold weather ... 32
Starting engine ... 12
Starting engine, fails to start ... 13
Starting engine in cold weather ... 31
Starting motor ... 65
Steering gear, add lubricant ... 47
Steering gear lubricant ... 39
Strainers in gasoline system, cleaning in cold weather ... 33
Storage battery, adding water ... 63
Storage battery, location on car ... 63
Storage battery, when car is stored ... 53
STORING CAR ... 53
Storage of car, placing car in service (use) ... 54
Storage of tires ... 54
Suggestions for driving ... 20
Supports for rear of engine, to oil ... 45
Switch, ignition and lighting ... 11
SYSTEMATIC LUBRICATION ... 37

T

Taking car out of storage ... 54
Throttle control ... 10
Throttle hand lever position, cold weather ... 32
Timer-distributor, how operated ... 66
Timer-distributor oil cups, fill with oil ... 45
Tire air compressor ... 27
Tire and rim, installing on wheel ... 29
Tire and rim, removing from wheel ... 28
Tire carrier (tire holder) ... 30
Tire chains, improperly adjusted ... 51
Tire holder ... 30
Tire holder lock ... 9
Tire, to install on rim ... 79
Tire pressure ... 27
Tires ... 25
Tires, care of, when car is stored ... 54
Tires, removal from rim ... 78
Tires, repairs to ... 83
Tires, to change ... 30
Tools ... 21
Tools (illustration) ... 26
Top, care of when car is stored ... 54
Transmission control ... 15
Transmission, description of ... 72
Transmission lock ... 9
Transmission lubricant ... 39
Transmission, to add lubricant ... 46
Truing up rim ... 30
Trunnions, front brake, to lubricate ... 47

U

Uniform parts prices 82
Universal joint grease 39
Universal joints, to lubricate 46
Upholstery, to clean 50
Use of accelerator before engine is warm 32
Use of starter in cold weather 32

V

Valve caps, tire 25
Valve stems, how lubricated 41
Varnished cars, washing, when new 49
Ventilating system for crankcase 42
Ventilator in cowl, open cars 22

W

Washing Duco finished cars 50
Washing varnished cars 49
Water circulation 60
Watson Stabilators, do not lubricate 48
Windows, to clean 50
Windshield and ventilator 22
Windshield cleaner 22
Wiper, windshield 22
WHEELS 80
Wheels, installation of 80–2
Wheels, pack bearings with grease 46
Wheels, removal of 80–1
Wheels, to adjust bearings of 80

The Cadillac Motor Car Company reserves the right without notice to make changes in design, construction and specifications

CADILLAC

Operator's Manual



Price Thirty-Five Cents

CADILLAC MOTOR CAR COMPANY
DETROIT

Copyright 1926 by
Cadillac Motor Car Company

EDITION NO. 314-160

In ordering a duplicate of this Manual specify the above number or the engine number of the car

Foreword

THE experienced motorist whose new Cadillac succeeds other cars, some of which may also have been Cadillacs, requires less elementary operating instructions than the beginner, learning for the first time to drive. Likewise, the owner who takes advantage of the facilities offered by the maintenance station has less need for detailed information in regard to care of the car than the owner who provides for all necessary attention in his private garage.

In preparing this Manual, it has been taken for granted that the typical Cadillac purchaser is no longer a novice in motor car operation and that the greatest number of Cadillac owners will be best served by *omitting* that which is extremely elementary in character. It has also been assumed that, although he should at least know what care his car must regularly receive in order to render the best possible performance with the fewest possible interruptions, the typical Cadillac owner prefers to depend upon the maintenance station for occasional adjustments and repairs.

By thus omitting both that which is very elementary and that which is too technical, the first two divisions of the Manual have been made to include only information that is vital to every Cadillac owner regardless of his previous *motoring* experience. Part I, "Operation," is important because, no matter what car the owner may have driven before, his new car will differ in some feature, even from an earlier Cadillac. Part II, "Lubrication and Care," contains information that every owner should have regardless of the extent to which he expects to delegate the care of the car to others. Especially should he be familiar with lubrication, for correct lubrication is an essential without which it is impossible for the car to render unfaltering performance.

Part III, "General Information," may be considered as a supplement to the Manual. It contains information that may never be required by some owners, but that is included for use should occasion arise. In other words, it is a reference section to which the index on page 85 is a sufficient guide.

All written instructions are subject to limitations. The owner is asked to remember that the Manual is only one means by which the Cadillac organization desires to assist the Cadillac owner to realize the most from his car. Cadillac distributors and dealers everywhere invite the Cadillac owner to consult them on any matters pertaining to the operation and care of his car. If preferred, a request for information may be made direct to the factory, where it will receive the attention of the Technical Department.

Contents

Part I—Operation

PAGE

CHAPTER I—*Controls and Instruments* 9

Locks—Gasoline gauges and air compressor—Throttle control—Ignition control lever—Carburetor enriching button—Ignition and lighting switch—Starter pedal—Oil pressure gauge—Clutch pedal—Transmission control—Brakes—Speedometer—Ammeter.

CHAPTER II—*Driving* 18

Driving speed when car is new—Danger of running engine in closed garage—Coasting—General driving suggestions—Don'ts.

CHAPTER III—*Equipment* 22

Windshield and ventilation—Windshield cleaner—Rear vision mirror—Cigar lighter and inspection lamp—Clock—Side curtains—Curtain fasteners—Tools. TIRES—Tire valve caps—Inflation pressure—Tire air compressor—Tire holder—Changing tires—Truing up rim.

CHAPTER IV—*Cold Weather Operation* 31

STARTING THE ENGINE—Carburetor enriching button—Priming the carburetor—Position of throttle hand lever—Position of ignition control lever—Use of starter—Use of accelerator pedal before engine is warm. ADDITIONAL COLD WEATHER SUGGESTIONS—Engine oil for cold weather—Strainers in gasoline system. ANTI-FREEZING SOLUTIONS—Alcohol and water—Glycerin and water—Capacity of cooling system—Effect of alcohol on finish.

Part II—Lubrication and Care

CHAPTER I—*Systematic Lubrication* 37

Necessity for lubrication. Lubrication schedule. LUBRICANTS—Engine oil—Rear axle and transmission lubricant—Roller bearing and cup grease—Universal joint grease—Steering gear lubricant.

CHAPTER II—*Engine Lubrication* 40

Oil circulating system—Oil level—Oil pressure—Crankcase ventilating system—Oil filter—Replacing engine oil—Generator oil cups—Timer-distributor oil cup—Engine supports.

CHAPTER III—*General Lubrication* 45

Grease gun connections—Clutch thrust bearing—Transmission—Universal joints—Rear axle—Wheels—Front brake trunnions—Steering gear—Oil holes in steering column—Speedometer flexible drive shaft—Horn—Springs—Door hardware.

CHAPTER IV—*Care of Body* 49

Care of finish when new—Washing varnished cars—Washing Duco—Cleaning windows—Cleaning upholstery.

CHAPTER V—*Care of Tires* 51

Result of under-inflation—Result of improperly aligned front wheels—Neglect of small cuts—Result of improperly adjusted tire chains—Result of sudden application of brakes—Additional suggestions.

CHAPTER VI—*Storing Car* 53

Engine—Storage battery—Tires—Body and top—Taking car out of storage.

Part III—General Information

CHAPTER I—*Engine* 56

Important features of construction—General principle of gasoline engine—Suction stroke—Compression stroke—Power stroke—Exhaust stroke—Firing order.

CHAPTER II—*Gasoline System* 58

Settling chamber—Strainer—Carburetor.

CHAPTER III—*Cooling System* 60

Water circulation—Radiator and shutters—Filling and draining—Cleaning the cooling system.

CHAPTER IV—*Electrical System* 61

Generator—Ammeter. STORAGE BATTERY—Adding water to storage battery—Specific gravity of battery solution—Disconnecting battery—Exide depots and sales offices. STARTING MOTOR—Operation of starter. IGNITION—General description—Timer-distributor—Spark plugs. LIGHTING SYSTEM—Lamp bulbs—Cleaning headlamp reflectors—Official approval of headlamps—Adjustment of headlamps.

CHAPTER V—*Clutch and Transmission* 71

Clutch—Adjustment of clutch release rod—Transmission.

CHAPTER VI—*Brakes* 74

General description—Adjustment.

CHAPTER VII—*Wheels* 80

Tires and rims—Caution in adjusting wheel bearings—Removing front wheel—Installing front wheel and adjusting bearings—Removing rear wheel—Installing rear wheel and adjusting bearings.

CHAPTER VIII—*Repair Parts* 82

Genuine Cadillac parts—Uniform parts prices—Ordering new parts—Returning parts—Tires, speedometer and clock.

CHAPTER IX—*Specifications and License Data* 84

INDEX 85

PART I

OPERATION

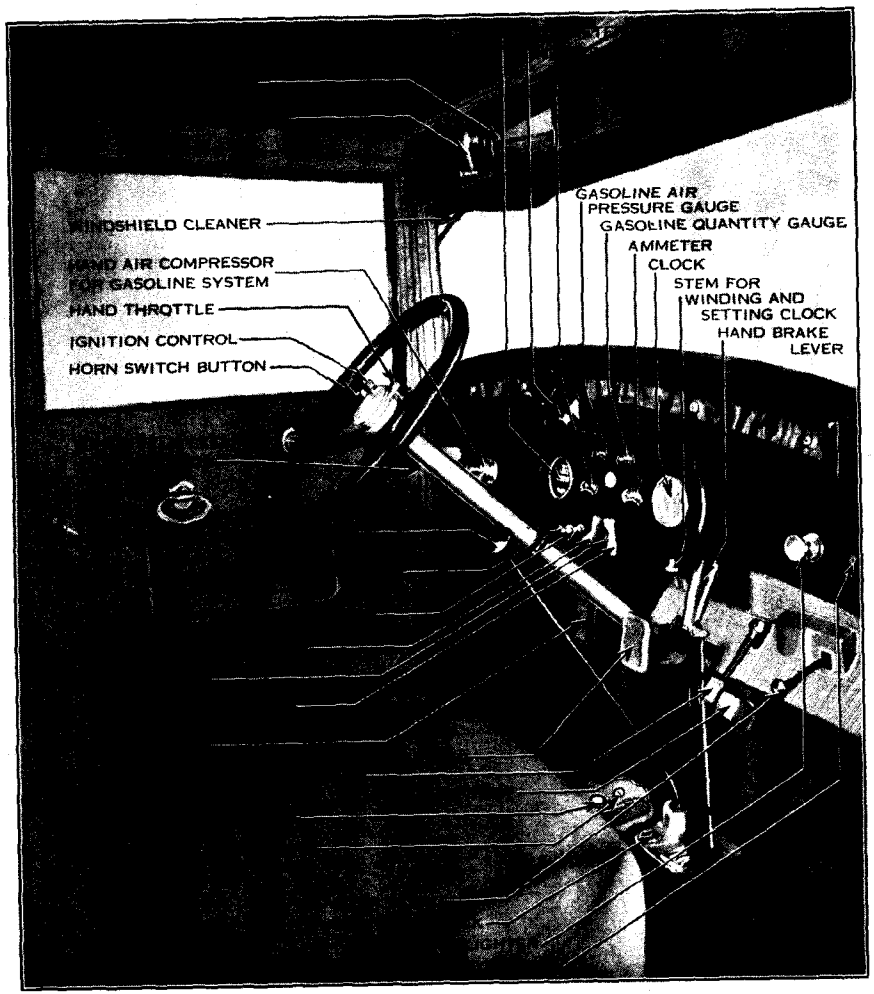


FIGURE 1. ***Instruments and controls***

*See page 23 regarding use of inspection lamp in cigar lighter socket.

CHAPTER 1

Controls and Instruments

ONE of the first things the driver of a new car has to do is to familiarize himself with the various controls. In the following chapter are described the levers, pedals, instruments, and other devices used in the operation of the car. The experienced motorist, as well as the beginner, should read this chapter to avoid overlooking any detail of operation in which the car may differ from cars he has previously driven.

Locks

The Cadillac car is provided with the following cylinder locks, all of which on any one car are operated by the same key: ignition switch, transmission control lever, tool compartment, battery compartment, tire holder, and, on closed cars, the doors and various package compartments.

The lock on the switch acts only on the ignition or left-hand lever, which must be *down* in order to be locked. The transmission control lever can be locked in neutral, intermediate and high.

The lock number is stamped on each key, but not upon the face of the lock. It is urged that the owner make a record of the key number as soon as he takes delivery of his car, so that in the event both keys are lost, a duplicate key can be easily ordered.

Gasoline Gauges and Air Compressor

The two upper dials on the instrument panel (Fig. 1) are gauges for the gasoline system.

The gauge at the right marked "Gas" indicates in gallons the quantity of fuel in the tank at the rear of the car, and is operated electrically. To read from the gauge the quantity of fuel in the tank, *the ignition must be switched on.* When the ignition is switched off the gauge does not indicate correctly.

As filling station rules forbid running the engine while the gasoline tank is being filled, in order to know how much fuel to call for, it is necessary to read the gauge before stopping the engine. If the tank is to be completely filled and it is necessary to check the level as it nears the top of the tank, the ignition should be switched on again after stopping the engine.

The gauge at the left marked "Air" is a pressure gauge and indicates in pounds per square inch the air pressure in the gasoline system. This pressure is necessary to force the fuel from the tank to the carburetor.

Initial pressure is secured by operating the hand air compressor at the left-hand end of the instrument board. While the engine is running, pressure is automatically maintained by a compressor driven by the engine camshaft.

The normal pressure maintained by the automatic compressor is from one

to two pounds. There is sufficient pressure for starting the engine when the car is on level ground, if the gauge pointer is even one division away from the pin at zero. On a steep upgrade an initial pressure of one pound may be necessary.

In order to prevent leakage of the air pressure in the gasoline system it is important that the gasoline tank filler cap be air-tight. After screwing on the filler cap be sure to tighten the thumb screw in the center of the cap.

Before operating the hand compressor, the plunger must be released by turning the handle counter-clockwise. When the necessary pressure has been obtained, push the compressor handle all the way in and lock it, turning it clockwise as far as it will go.

Throttle Control

The power and speed of the engine are controlled by opening and closing a throttle valve in the carburetor. This throttle is operated both by a hand lever and a foot pedal.

The foot pedal, or accelerator, is at the right of the brake pedal (Fig. 1). The hand control is the right-hand lever of the two levers above the steering wheel. Both controls operate the same throttle; the hand lever, however, remains in the position to which it is moved, whereas the accelerator must be held down to keep the throttle open.

The normal position of the throttle hand lever for driving the car is all the way up (at "Close"). In this position the throttle of the carburetor is open just enough to permit the engine to run at idling speed after it is warm. For starting, however, the lever should be moved approximately one-fourth the way down, and should be left in this position until the engine is warm enough to permit the lever to be returned to the idling position without stalling the engine.

The throttle should normally be controlled by the accelerator. In starting the car on a hill, however, the hand lever should be used rather than the accelerator. This permits the brake pedal to be released with the right foot at the same time that the clutch is engaged with the left.

In cold weather, the accelerator should not be pushed down suddenly before the engine is warm. Sudden opening of the throttle before the engine is warm causes "popping-back" in the carburetor. This should be avoided as much as possible by judicious opening of the throttle during the warming-up period. (See page 32 under "Use of Accelerator Before Engine Is Warm.")

The accelerator can be used in cold weather to prime the carburetor by pushing the accelerator to the floor once or twice. This is not necessary except in very cold weather and should never be done unnecessarily. Excessive priming is likely to prevent the engine from starting. (See page 31 under "Priming the Carburetor.")

Ignition Control Lever

Correct timing of the ignition in relation to the positions of the pistons is accomplished automatically by a governor which is a part of the timer-distributor and which provides for all ordinary advancing and retarding of the spark. (See page 66 under "Timer-Distributor.") A hand control is also provided for still farther advancing or retarding the spark on certain occasions as hereafter described.

The hand control is the left-hand lever of the two levers above the steering wheel. For average driving, the correct position of this lever is about one-third down from the extreme top or "Advance" position. The lever should be left in this position except on the following occasions:

1. If the engine is being cranked by hand, the lever should be moved all the way down. If this is not done, a "kick-back" may occur, resulting in personal injury.
2. In pulling at low speeds with the throttle well open, the lever should be moved farther down.
3. In driving at high speeds, the lever should be moved all the way up.
4. In starting the engine in extremely cold weather, the lever should be moved all the way up unless the engine is being cranked by hand.

Carburetor Enriching Button

The button at the left of the ignition switch lever (Fig. 1) controls a device on the carburetor for temporarily enriching the fuel mixture supplied to the engine. In starting the engine it is necessary to have the proportion of liquid gasoline in the fuel mixture greater than at other times, because in a cold mixture only a part of the gasoline is vaporized. Pulling out the enriching button increases the proportion of liquid gasoline to air, the normal proportions being restored when the button is released and permitted to return to its original position.

Correct use of the enriching control not only is essential to quick starting of the engine, but also has an important bearing on the life of the engine. The enriching button must be pulled out far enough in starting to provide an explosive mixture quickly so that the battery is not unnecessarily discharged by useless cranking. The button must also be held out far enough during the warming-up period so that the engine will run without missing and "popping back." On the other hand, it should not be pulled out any farther or held out any longer than is necessary to accomplish these results, because some of the excess liquid gasoline in the enriched mixture does not burn.

If the engine still retains heat from previous running, the enriching control should not be used without first attempting to start the engine on the normal mixture. If the enriching button is pulled out for starting a hot engine the mixture may be made so rich that starting will be impossible.

The enriching button is not a priming device. It has no effect whatever on

the fuel or the fuel mixture unless the engine is being cranked or is running under its own power. The button must be pulled out and held partly out during the cranking operation.

Ignition and Lighting Switch

The ignition and lighting switch (Fig. 1) controls the current for the ignition and for the following lamps: headlamps, instrument lamp, and rear lamp. The ignition lever is the left-hand lever and has two positions: "off," when down, and "on," when up. The lighting lever is the right-hand lever and has four positions besides the "off" position. Starting with the lowest position, these are:

First Position—Instrument lamp and rear lamp.

Second Position—Parking lights (in headlamps), instrument lamp and rear lamp.

Third Position—Headlamp lower beams, instrument lamp and rear lamp.

Fourth Position—Headlamp upper beams, instrument lamp and rear lamp.

Cadillac headlamps have two bulbs each, an upper bulb of 3 c. p. for use when parking and a lower bulb of 21 c. p. for driving. The lower bulbs, furthermore, have two filaments, one above the other, instead of the customary single filament. Both filaments are of the same candle-power (21), but because they are located in different positions with respect to the focus of the parabolic reflector, the beam of light from one filament is projected at a different angle from the other. When the switch lever is in the fourth position, one set of filaments is lighted and the beams are projected straight ahead, illuminating the road at a distance. When the lever is in the third position, the other filaments are lighted and the beams are projected down at an angle, illuminating more brightly the road directly in front of the car.

The practice to be followed by the driver in using this double-beam feature of the headlamps will depend upon the regulations imposed by local authorities. In general, it is expected that the upper beams will be used except on the following occasions: when passing a vehicle approaching from the opposite direction, when rounding a sharp curve and when topping the crest of a hill. On these occasions and at other times when illumination is desired directly in front of the car, the lower beams should be used. For a further description of the headlamps, see page 68.

Starter Pedal

The starter pedal is at the right of the accelerator (Fig. 1). Pushing this pedal forward brings into action the electric motor that cranks the engine for starting. *Do not push the starter pedal when the engine is running.*

The starter pedal is only one of the controls that must be manipulated to start the engine. Unless there is an explosive mixture in the cylinders and a spark to ignite it, it is useless to crank the engine. The starter pedal should not be operated, therefore, until the necessary preliminary steps have been taken. The following, in their proper order, are the various steps that must

be performed to start the engine. As each control is mentioned, reference is made to the page on which that control is explained in detail.

1. Unlock the transmission. (Page 9.)
2. Make sure that the transmission control lever is in neutral. (Page 15.)
3. Unlock the ignition switch. (Page 11.)
4. Note whether pressure is indicated on the gasoline pressure gauge; if not, operate the hand compressor. (Page 9.)
5. Place the ignition control lever at the steering wheel about one-third* the way down. (Page 10.)
6. Place the throttle lever about one-fourth the way down from the idling position. (Page 10.)
7. *Cold Weather Only*—In extremely cold weather, prime the carburetor by pushing the accelerator to the floor once or twice. Do not prime the carburetor in warm weather or unnecessarily in cold weather. Excessive priming is likely to prevent the engine from starting. (Page 10.)
8. Pull back the carburetor enriching button unless the engine is still warm. If the engine is still warm, do not pull back the enriching button unless the engine fails to start on the normal mixture. (Page 11.)
9. Switch on the ignition. (Page 11.)
10. Push the starter pedal forward and hold it until the engine starts under its own power. Release it immediately as soon as the engine starts. (See below for probable causes for the engine failing to start.)
11. Let the carburetor enriching button partly in as soon as the engine starts, and all the way in as soon as the engine is warm enough to permit it. (Page 11.)
12. Note whether pressure is indicated on the oil pressure gauge and stop the engine at once if no pressure is indicated. (Page 14.)
13. Move the throttle lever up to the idling position as soon as the engine is warm enough to permit it.

In cold weather, disengage the clutch before pressing down the starter pedal, and hold it down during the cranking operation. This relieves the starter of the necessity of turning the transmission gears, which are immersed in lubricant. The additional load is small in warm weather when the lubricant is thin, but in cold weather the power required to turn the gears through the thickened lubricant adds unnecessarily to the demand upon the battery.

If the Engine Fails to Start—If the engine fails to start after being cranked for a few seconds, do not continue to operate the starter. To do so is a useless expenditure of battery energy. Release the starter pedal and investigate the cause, which may be one of the following:

No fuel in the tank.

No air pressure in the gasoline system.

*In extremely cold weather move the ignition control lever all the way up unless the engine should be cranked by hand. If the engine is cranked by hand, be sure to move the ignition control lever all the way down.

Ignition not switched on.

Carburetor flooded by unnecessary use of the enriching device or by unnecessary priming of the carburetor when the engine is warm.

Oil Pressure Gauge

The lower left-hand dial on the instrument panel (Fig. 1) is the oil pressure gauge. This gauge indicates, not the *quantity* of oil in the engine, but the *pressure* under which the oil is forced to the engine bearings.

When the engine is not running, the pointer on the oil pressure gauge should remain at zero, but as soon as the engine is started and as long as it runs the gauge should show pressure. If the gauge does not show pressure when the engine is running, stop the engine at once and determine the cause. Serious damage may be done if the engine is run without oil pressure. (See page 41 under "Oil Pressure.")

The amount of the pressure indicated by the gauge depends upon the speed of the engine, the viscosity of the oil, and the adjustment of the oil pressure regulator. At idling speed with fresh oil of the correct viscosity, the pressure after the engine is warm should be 1 to 4 lbs. Before the engine is warm, higher pressures than those specified will be indicated. After the oil has become thin from use, lower pressures than those specified will be indicated. These are normal variations from the standard and do not indicate need for readjustment of the oil pressure regulator.

Clutch Pedal

The clutch pedal is the left-hand pedal. When this pedal is in its normal or released position, the clutch is engaged. The flywheel of the engine is then coupled to the transmission by a series of discs, every other one of which is faced on both sides with friction material, and which are pressed together by a powerful spring. When the clutch pedal is pushed down, the spring is compressed and the clutch discs are allowed to separate. The clutch is then disengaged and the flywheel, if the engine is running, revolves independently of the transmission.

The clutch has two uses: First, to enable the car to be started gradually and without jerk or jar; second, to permit shifting of the transmission gears. The operation of the clutch pedal is discussed in connection with the transmission control on page 15. Further comment is unnecessary at this point except the following suggestions to the driver:

Do not drive with the foot resting on the clutch pedal. The Cadillac clutch operates so easily that even the weight of the driver's foot may unintentionally cause the clutch to slip.

Do not form the practice of disengaging the clutch whenever the brakes are applied. Most occasions for use of the brakes require only slowing down without stopping or even shifting of gears. A skilled driver will not touch the clutch pedal until the car is just about to stop or until he is about to shift to a lower gear. It is a mistaken idea that applying the brakes with the clutch engaged is more severe on the brake lining. The opposite is actually the case, proof of which is in the fact that in coasting down grades the resistance of the engine is used to assist the brakes in controlling the car speed.

It will be observed in operating the clutch pedal that the pedal offers almost no resistance until it has been moved about one inch. It is at this point that it actually begins to disengage the clutch. It is important that the pedal have this "lost motion." If the full pressure of the clutch spring is felt just as soon as the pedal is moved from its released position, necessity for readjustment of the pedal connections is indicated. Failure to make this adjustment will result in the clutch slipping. (See page 72.)

Transmission Control

The Cadillac transmission has three forward speeds and reverse. It is controlled by a lever, the handle of which describes the letter "H" as it is moved from one position to another. It should be observed by those who have driven other makes of cars that, although most cars have this conventional H-type of transmission control, all these cars do not have the same positions of the lever. The driver should study Fig. 2 carefully, and if the various positions of the lever are different from those to which he has been accustomed, he should master this arrangement before attempting to drive.

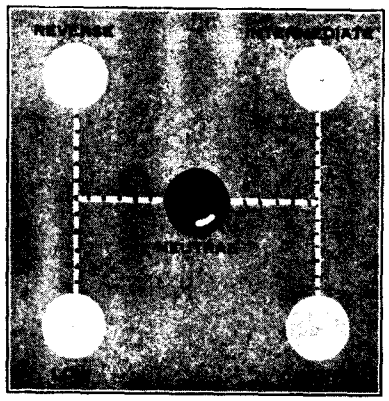


FIGURE 2. ***Positions of transmission control lever***

No attempt can be made here to teach the beginner the technique of gear shifting. It is recommended that the beginner secure individual instruction from the Cadillac distributor or dealer from whom the car was purchased and who will be glad to give this instruction. There are, however, certain rules and suggestions for the operation of the transmission control that it will be to the advantage of every driver to learn or to recall if he already knows them.

Always disengage the clutch before moving the control lever and hold the pedal down until the shift is completed.

Do not attempt to start the car with the transmission control in high gear.

Do not start with the transmission control in intermediate except when

the car is on a smooth level road or on a down grade; even under these conditions do not start the car in intermediate unless the engine is thoroughly warm.

Do not make any of the following shifts when the car is moving:

From reverse to any forward gear.
From any forward gear to reverse.
From high gear to low gear.
From intermediate to low gear (except when the car is moving very slowly).

In shifting from high to intermediate, the car should not be traveling faster than fifteen miles per hour and the control lever should be moved very quickly and with no hesitation in neutral.

There are times when it is desirable to be able to shift from high to intermediate at higher car speeds. It is possible to do this by the following method, which is called "double de-clutching":

Disengage the clutch and shift the transmission control lever at once to neutral. Re-engage the clutch, at the same time accelerating the engine; then disengage the clutch again and instantly shift to intermediate, after which re-engage the clutch. The speed to which the engine should be accelerated while the transmission control is in neutral, depends upon the speed at which the car is traveling when the shift is made.

It is not recommended that the driver attempt the double de-clutching method until he has become expert in shifting from high to intermediate in the usual manner at lower speeds.

Make a practice of shifting the transmission control to intermediate or even to low before commencing the descent of steep grades. The reason for this is explained on page 19, where will also be found further suggestions for coasting.

Brakes

The foot brakes, which consist of external brake bands on the rear wheels and internal bands on the front wheels, are operated by the right-hand pedal. This pedal differs from the conventional brake pedal in a construction that provides automatically for notifying the driver when readjustment of the brakes is necessary. Every driver is familiar with the fact that, as the brake lining wears, the brake pedal must be pushed farther toward the floorboard to apply the brakes. On most cars this proceeds until an occasion arises for an emergency stop and then it is found that the pedal goes all the way to the floorboard before the brakes are fully applied.

The Cadillac brake pedal has two stages in its travel. The first stage, which consists of the first four or five inches of the pedal travel, is sufficient for all ordinary stops when the brake band clearance is properly adjusted. When, as the result of wear on the lining, the pedal must be pushed farther toward the floorboard, an inch or inch and a half from the floorboard, the second stage of pedal travel is reached. In the second stage, the pedal has somewhat less leverage than in the first stage and the point of division is marked by increased resistance to movement of the pedal. This serves as a notice to the driver that the brakes require readjustment. If it is not convenient to have the adjustment made at once, the brakes can still be operated for some time. The adjustment should be made, however, as soon thereafter as possible.

The hand brakes, which are internal brakes on the rear wheels, are operated by the hand lever at the right of the transmission control lever.

Speedometer

The speedometer has three dials. The upper dial indicates the speed of the car. The center dial indicates the total mileage traveled. The lower dial also indicates mileage, but it can be reset to zero by pushing up and turning the knurled stem back of the instrument board. The right-hand figure on the lower dial indicates tenths of a mile.

Across the speedometer cover glass and below the total mileage dial is a strip of black celluloid on which are two white spaces. These spaces are for the lubrication notice described on page 38 in connection with the lubrication schedule.

An automobile repairman should never be permitted to attempt to adjust or repair the speedometer head or to replace the glass. 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 as carefully as a fine watch. The speedometer head may easily be damaged by rough handling.

Ammeter

The lower right-hand dial on the instrument panel (Fig. 1) is the ammeter, which measures the electric current flowing to the battery and the current flowing from the battery at all times except when the starter is cranking the engine. When current is flowing from the battery, the ammeter shows a reading on the side marked "Discharge"; when current is flowing to the battery, the ammeter reading is on the "Charge" side.

The ammeter should indicate on the "Charge" side most of the time. Otherwise, more current will be taken out of the battery than is put into it and the battery will eventually become fully discharged. The exact amount of current that should be indicated by the ammeter at any time depends upon various conditions, which are explained on page 62.

Ordinarily, when no lights are in use, the ammeter should show "Charge" as soon as the car is running ten or twelve miles per hour in high gear. If the ammeter shows "Discharge" with all lights off, when the car is running

more than twelve miles per hour in high gear, it indicates either that the fan belt is slipping or that the generator charging rate should be readjusted. The fan belt should be inspected first, and tightened if necessary, before any attempt is made to change the generator charging rate.

CHAPTER II

Driving

THE preceding chapter of the Manual has aimed to familiarize the driver with the controls and instruments used in operating the car. Actual skill in driving is, of course, more than knowledge of and familiarity with these individual devices. It is not the purpose of this Manual to discuss all phases of driving, but there are a few matters of sufficient importance to Cadillac owners to warrant devoting a chapter to them.

Driving Speed When Car Is New

The parts of the Cadillac car are machined and ground to secure the most accurate fit and the finest finish. Proper functioning of the assembled mechanism is further assured by testing the engine and chassis, both on shop dynamometers and on the road. Nevertheless, it is not possible by manufacturing processes and tests to give to bearing surfaces the fine polish that results from continued operations at moderate speeds and loads.

Until a new car has been driven far enough to produce this effect on the bearing surface, the car should not be driven at high speeds. It is recommended that the 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. Moderate driving during the first five hundred miles will increase the life of the car more than enough to repay any inconvenience. Manufacturers of locomotives and stationary steam engines have always recognized the necessity for an initial "running-in" period.

Danger of Running Engine in Closed Garage

Every person having to do with the operation or care of a motor car should be warned of the danger that attends running the engine while the car is in a small closed garage.

Carbon monoxide, a deadly poisonous gas, is present in the exhaust of all internal combustion engines. Most people are already familiar with carbon monoxide in the form of illuminating gas, or in the gas produced by furnaces and stoves when insufficient air is supplied to give complete combustion. But illuminating gas and coal gas have an unpleasant odor, which serves as a warning, whereas carbon monoxide, as produced in the internal combustion engine, is colorless, tasteless, and almost odorless, so that the victim may be overcome before he is aware of the danger.

When the engine exhausts into the open air, the carbon monoxide is so diluted that it has no effect. It is when the engine is run for a time in a closed room that the proportion of carbon monoxide in the air may increase to the point at which continued breathing of it would be fatal. The United States Public Health Service advises that the average automobile engine warming up in a single-car garage will give off enough carbon monoxide in three minutes to endanger life.

Unusual precaution must be taken in cold weather when the natural tendency is to keep the garage doors and windows closed. The practice of letting the engine warm up before running the car out of the garage is unsafe. The risk is made greater by the fact that the enriching of the mixture by manipulation of the carburetor enriching device increases the amount of carbon monoxide formed.

Coasting

To coast *on the level*, simply release the accelerator pedal and disengage the clutch. If coasting to a stop, the transmission control may also be shifted to neutral and the clutch re-engaged.

In coasting *down grades*, however, it is recommended that the transmission be left in gear and the clutch engaged. With the throttle in the idling position, the car is thus made to drive the engine, the resistance of which assists the brakes and saves wear on the brake lining. It must be remembered that the brakes are subjected to much more severe use on grades than on the level because gravity acts continuously, whereas on the level the brakes need absorb only the momentum of the car. Even on slight grades, coasting with the transmission in neutral or the clutch disengaged is not advisable. On any grade steep enough to warrant coasting, it is worth while to save the brakes as much as possible by utilizing the braking effect of the engine.

Ordinarily, the resistance offered by the engine when the transmission is in high is sufficient to control the speed of the car, supplemented by moderate use of the brakes. On steep grades, however, the transmission control should be shifted to intermediate or even to low if the grade is very steep. Shifting should always be done before commencing the descent of the grade, because, after the car has once gained speed, considerable braking may be necessary to slow down to the speed at which the shift can be made easily.

Do not switch off the ignition when coasting with the car driving the engine. Contrary to a common impression, this does not appreciably increase

the resistance and is likely to cause damage to the engine. Even with the throttle closed, some fuel is admitted to the cylinders, and if this is not burned it condenses on the cylinder walls and washes off the oil by which the pistons are lubricated.

General Driving Suggestions

Road and traffic laws vary greatly in different localities. It is unfortunately impossible to set down a complete list of rules that may be followed in all parts of the country. The following are some of the rules that are universal in practically all parts of the United States:

In meeting a vehicle going in the opposite direction pass to the right.

In overtaking 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 the car around to do this, it should be done.

Never turn around or turn off on another road without making absolutely certain that there is no other vehicle directly behind.

Never start to cross streetcar tracks without making sure that there is no car directly behind. No matter how sure you feel, look and see.

Do not cross streetcar or steam railroad tracks without making certain that is is absolutely safe to do so. At any railroad crossing that is on an up grade or which for any reason must be approached very slowly, it is a wise precaution to shift to intermediate gear before crossing because the car can thereby be accelerated more quickly, if necessary.

In crowded traffic do not apply the brakes suddenly unless it is absolutely necessary. A vehicle following may not have brakes as efficient as Cadillac four-wheel brakes.

On wet asphalt streets or slippery roads do not apply the brakes suddenly unless it is absolutely necessary. Cadillac four-wheel brakes minimize the possibility of skidding under these conditions, but their effectiveness should not induce anyone to drive less carefully.

Slow down in passing vehicles going in the opposite direction.

Never take a chance.

Don'ts for General Operation

Don't fail to change the engine oil as frequently as recommended.

Don't fail to release the carburetor enriching button as soon after starting as possible.

Don't fill the lubricating system of the engine alone and neglect to lubricate all other parts of the car.

Don't neglect the lubrication of any part of the car.

Don't run the car at sustained high speed when it is new.

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 disengaging 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 switch off the ignition when coasting with the car driving the engine.

Don't push the starter pedal 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. The front wheels pivot more easily if they are rotating.

Don't fail to investigate any unusual sound which may develop in the car. The car should be inspected at a Cadillac maintenance station.

Don't neglect to inspect the level of the acid solution in the storage battery every 500 miles and add distilled water if necessary.

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 air pressure or without gasoline in the tank.

Don't neglect to keep the tires inflated properly.

Don't race the engine when it is not driving the car. There is no worse abuse.

CHAPTER III

Equipment

THE controls and instruments used in driving have already been described. In addition to these the car is equipped with various devices which are for the convenience and comfort of the occupants, and are used only as occasion demands. It is suggested that the driver anticipate his use of such equipment by becoming familiar at once with the directions contained in this chapter.

Windshield and Ventilation

Closed Cars—Cadillac closed cars are equipped with a one-piece windshield, which can be moved up and down. Movement of the glass is controlled by a handle above the windshield. To raise the glass, the handle should be turned clockwise, and to lower the glass the handle should be turned counter-clockwise.

For moderate ventilation, the windshield should be raised not more than one inch so that the lower edge of the glass is still below the ledge over the instrument board. With the windshield in this position, air is deflected into the driving compartment through an opening in the cowl just forward of the instrument board. For additional ventilation the windshield can be raised above the level of the ledge over the instrument board, and air then enters directly into the car.

Open Cars—Cadillac open cars are equipped with a cowl ventilator which is operated by a lever just in front of the instrument board and at the right of the steering column. Additional ventilation for warmer weather can be secured by manipulating the windshield.

The open car windshield is in one section, which is pivoted at the upper corners. To secure more ventilation than can be obtained through the cowl ventilator, the windshield can be tilted out.

The thumb screws on the windshield supports must be loosened before adjusting the position of the windshield and must be tightened to hold it in the desired position.

Windshield Cleaner

The windshield cleaner is operated by the suction or vacuum in the passages between the carburetor and the engine. On open cars the cleaner is controlled by a lever at the cleaner. When the lever is as far toward the right as it will go, the cleaner is shut off. To start the cleaner, move the lever toward the left.

On closed cars the cleaner is controlled by a knurled button on the left-hand end of the instrument board. When the button is turned clockwise as far as it will go, the cleaner is shut off. To start the cleaner, turn the button counter-clockwise. (On some closed cars the cleaner is controlled by a lever on the instrument board similar to that on the open car cleaner.)

Rear Vision Mirror

The rear vision mirror may be adjusted by the driver to suit his preference after loosening the clamp screws that hold the mirror to its supporting bracket.

Cigar Lighter and Inspection Lamp

The car is equipped with a combination cigar lighter and inspection lamp that makes use of a single reel with twelve feet of flexible cord attached to the back of the instrument board. The flexible cord ends in a bayonet type socket to which may be attached either the inspection lamp or the heating element of the cigar lighter. The method of attachment is identical with that of an ordinary lamp bulb. Ordinarily the cigar lighter will be carried in place in the socket on the cord and the inspection lamp in a stationary socket provided on the front of the dash, where it is useful to illuminate the engine. (The inspection lamp is packed with the tool equipment when the car is shipped.)

To use the cigar lighter, pull it out from the instrument board at least a foot, wait a few seconds for the heating element to heat and apply it to the cigar or cigarette. The current is automatically switched on as soon as ten or twelve inches of the cord has been unreeled. To light a pipe, remove the nickel-plated shield by turning it slightly counter-clockwise and pulling it straight off.

To lock the cord in any desired position, pull out the button on the instrument board at the right of the cigar lighter (Fig. 1). This engages a ratchet which prevents the reel from rewinding. To rewind the cord, press the button back to its original position.

The inspection lamp socket on the dash has a double bayonet lock with two sets of slots. To install the lamp, simply insert it in the socket, press in, and turn it clockwise as soon as the pins on the lamp engage the first or outer set of slots. In this position the current is not switched on. To switch the current on, turn the lamp slightly counter-clockwise, press in, and turn it clockwise again, engaging the pins in the second or inner set of slots. To switch off the light, turn the lamp counter-clockwise and pull it out of the socket far enough to engage the first set of slots.

Clock

The clock has an eight-day movement and is wound in the same manner as a watch. The stem is under the clock back of the instrument board.

Side Curtains on Open Cars

The side curtains, with which the open cars are equipped, are carried in an envelope provided with cloth partitions to prevent rubbing and chafing. The side curtains are stowed under the front seat.

The Touring car and Phaeton curtains are in six sections, each of which is marked to indicate its position, as "Left Front," "Right Center." The

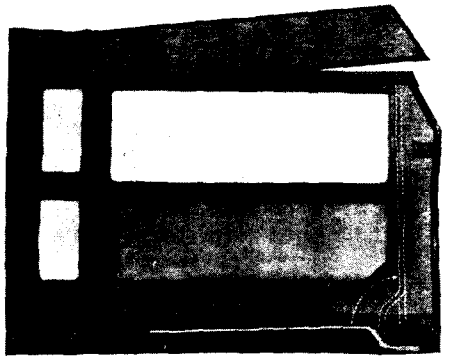


FIGURE 3. ***Side curtains***

front and center sections on both sides are each provided with a rod, the lower end of which fits a socket in the top of the door. When a curtain is folded for stowing, this rod is parallel with the bottom of the curtain as shown in Fig. 3. Before the curtain can be attached to the door, the rod must be moved to the position shown by the dotted lines. The upper end of the rod is slotted to engage with the stiffener that runs along the upper edge of the curtain.

The rear sections should be applied first, followed by the center and front sections. The rear sections should be fastened to the rear bows *under* the side flaps of the permanent rear curtains.

Before stowing the curtains, they should be dry and clean.

Curtain Fasteners

Most of the curtain fasteners used on the top and side curtains are of the type illustrated in Fig. 4. When this type of fastener is snapped on its stud, it becomes locked on three sides. To release the fastener it must be lifted on the side that is not locked. This side is indicated by the small projection to which the arrow points in Fig. 4. This type of fastener cannot be released by lifting it at any other side. The remainder of the fasteners used on the top and curtains are of the usual glove type.

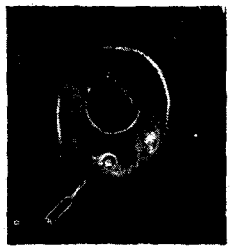


FIGURE 4.
Curtain fastener

Tools

The compartment* for the tool equipment is between the right-hand running board and the frame, and is accessible upon opening a door in the right-hand dust shield. The lock on this door is operated by the switch key.

To reach the tools proceed as follows: Insert the key and turn it counterclockwise, at the same time pressing in on the lock. As soon as the lock is released it will spring out as shown in Fig. 5.

Pull the lock back as far as it will go. This will release the catches and permit the door to be tilted out at the top. As soon as the catches are clear of the top edge of the opening in dust shield, remove the door by lifting it up.

The tools are contained in an inner box which is held in place by the rod shown in Fig. 6. Force this rod out of the depressions in the handles on the cover of the box, and let the rod drop to the position shown in Fig. 7. The cover of the box may then be removed by means of the two handles.

The door of the battery compartment operates in the same manner as the tool compartment.

*On some cars the tool and battery compartments are just forward of the running boards.

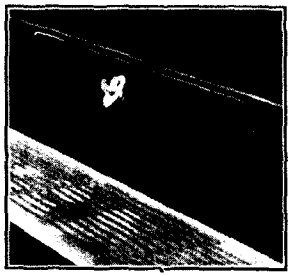


FIGURE 5.
Tool box door unlocked

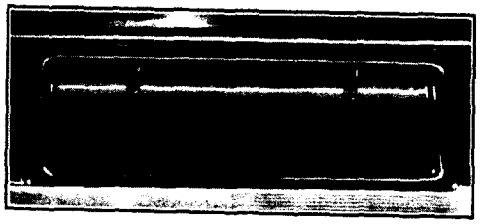


FIGURE 6.
Inner tool box with retaining rod in place

The following are the tools comprising the standard equipment. The numbers refer to the numbers by which the tools are designated in Fig. 8. Items listed opposite Nos. 25, 26, 27, 28 and 29 are not illustrated.

1. Open end wrenches (two) for adjusting rear foot brakes
2. Small screw driver
3. Socket wrench for oil pan drain plug
4. Large screw-driver
5. Center punch
6. Cold chisel
7. Hammer
8. File
9. Pliers
10. Wrench for spark plugs and compression relief cocks
11. Distributor wrench (with gauge for adjusting timer contact points and spark plugs)
12. Distributor wrench (plain)
13. Bicycle wrench
14. Monkey wrench
15. Wrench for rim clamping nuts
16. Rim assembling tool
17. Hose for tire air compressor
18. Adapter for grease gun for lubricating clutch thrust bearing (for cars with grease gun connection on thrust bearing)

18A. Extension fitting for lubricating clutch thrust bearing (for cars using screw plug on thrust bearing)

19. Grease gun
20. Hand starting crank
21. Hub cap wrench
22. Oil can
23. Jack handle
24. Jack
25. Inspection lamp. Note: The inspection lamp is packed with the tool equipment when the car is shipped but is ordinarily carried in the socket provided for it on the dash
26. Small tool bag
27. Large tool bag
28. Lubrication chart
29. Operator's Manual



FIGURE 7.
Retaining rod dropped down to permit removal of cover

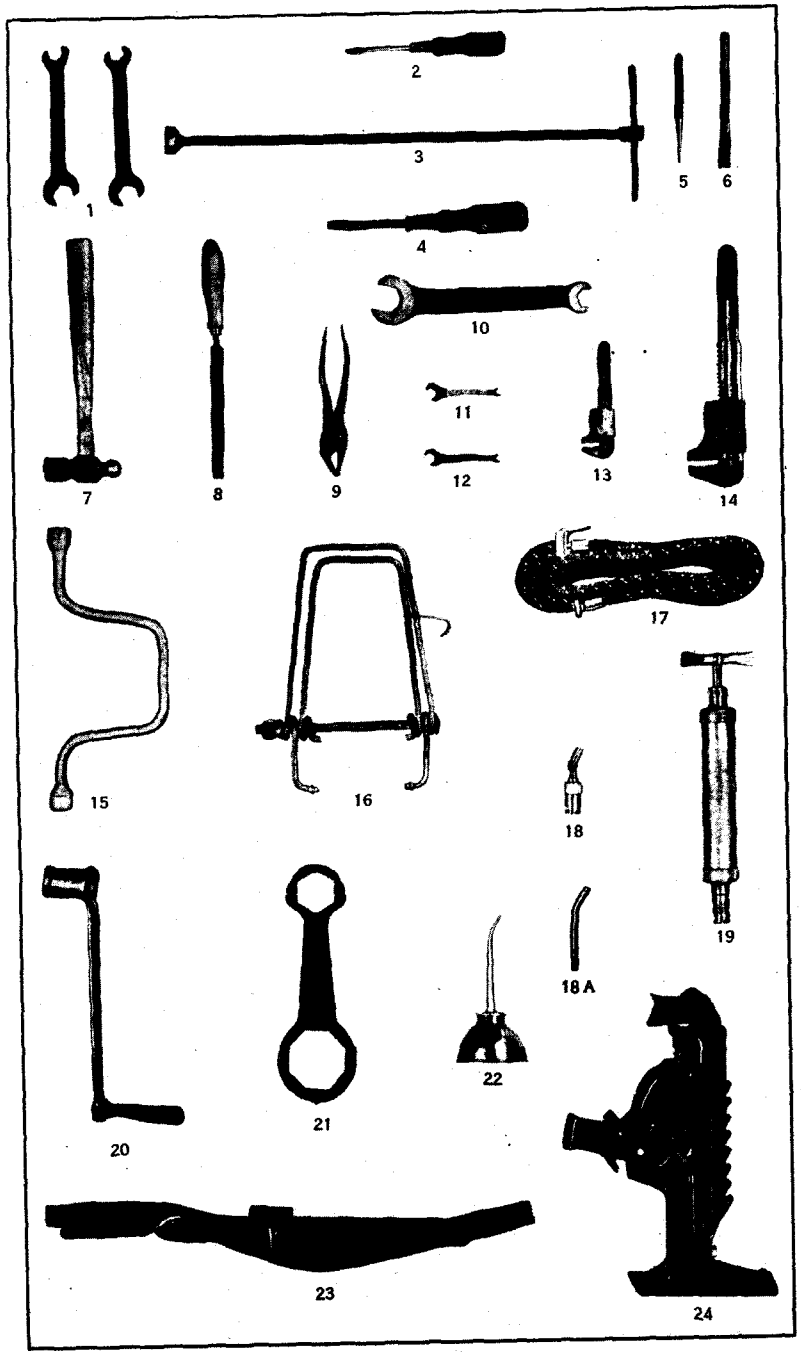


FIGURE 8. ***Standard tool equipment***

(The numbers refer to the list on page 25)

Tires

Tire Valve Caps

The valve caps used with some makes of tires are a combination dust and valve cap. This type of cap can be removed and installed without screwing the cap the entire length of the threads on the valve stem.

To remove one of these valve caps, turn it two or three turns counter-clockwise. This loosens the sliding nut inside the cap (Fig. 9). Next, pull the cap up as far as it will go. Then remove the cap by unscrewing it the rest of the way.

To install a valve cap, place the cap over the valve stem and turn it a few turns clockwise to engage the threads in the sliding nut. If the sliding nut is too far inside the cap to be reached by the valve stem, shake the nut down by tapping the bottom of the cap on some solid object. When the valve stem has been started in the sliding nut, push the cap down over the stem as far as it will go. Then turn the cap until it locks tightly.

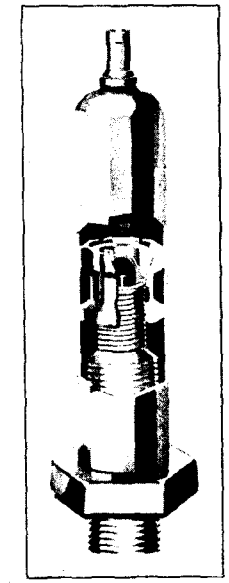


FIGURE 9.
Tire valve cap

Inflation Pressure

For normal driving, the 33 by 6.75 low pressure tires, which are standard equipment on Cadillac cars, should be inflated to a pressure of 40 lbs. per square inch. The inflation pressure should be checked at least weekly and should not be permitted to drop more than 5 lbs.

On cars driven at high speeds, the front tires should be inflated to 50 lbs. or higher if necessary. *This is important.*

Tire Air Compressor

To use the tire air compressor with which the car is equipped, proceed as follows:

Turn back the left-hand side of the front carpet and lift the small oval-shaped cover which is in the floor just to the left of the transmission control lever. Reach through the hole in the floor and remove the knurled cap from the connection on top of the compressor. Connect one end of the air hose (in the tool equipment) to this connection and the other end of the hose to the valve of the tire to be inflated. *Do not connect the hose to the tire first if there is pressure in the tire.*

The control shaft by which the compressor driving gear is placed in mesh with the transmission gears projects through a small hole in the floor just in front of the large hole over the compressor. To start the compressor, if the engine is running, disengage the clutch and hold the pedal down until the transmission gears have ceased to revolve. Then, with a screw-driver, turn the slotted head of the compressor control shaft clockwise. If the engine is not running, simply turn the control shaft clockwise without disengaging the clutch and then start the engine.

The compressor gives best results when the engine runs at a speed of approximately 1,000 r. p. m., which is about three times the normal speed of the engine when idling. Do not race the engine in operating the compressor,

(Continued on page 30)

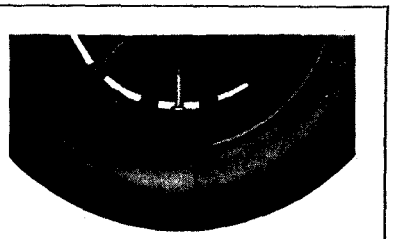


Figure 10a

Jack up the axle until the tire clears the ground. Unscrew the dust cap and the clamping nut from the tire valve stem.

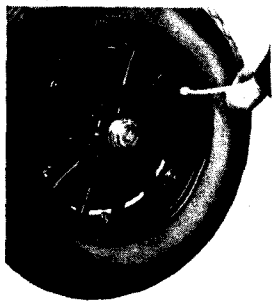


Figure 10b

With the brace wrench, supplied in the tool kit, loosen the six rim clamping nuts. Turn each clamp so that the lug is away from the rim and tighten the nut enough to hold the clamp in this position.

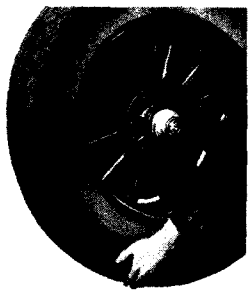


Figure 10c

Rotate the wheel so that the valve stem is at the top, and pull the bottom of the rim away from the wheel. If the rim does not come off easily, pull the top of the rim as far out as the valve stem will permit and then pull the bottom part of the rim away from the wheel.

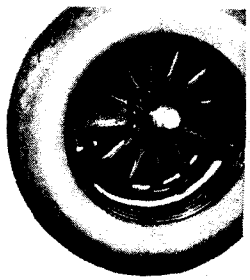


Figure 10d

Rotate the wheel until the valve stem approaches the bottom. At the point shown in the illustration, the rim and tire will roll free from the wheel and can be removed without lifting.

FIGURE 10. ***Removing rim with tire from wheel***

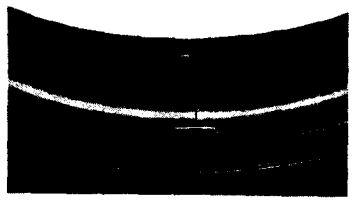


Figure 11a

If the rim has no split clamping ring, take the one from the rim removed. The correct position for the ring is just inside the three lugs and with the split opposite one of the lugs. If the ends of the ring overlap, they can be sprung into place with a screw-driver.

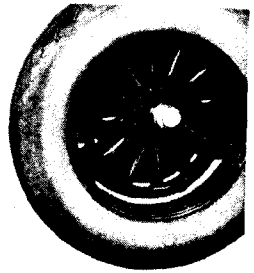


Figure 11b

Rotate the wheel so that the hole for the valve stem is in the position shown. Hold the rim so that the three lugs are on the side away from the car and insert the valve stem into the hole in the wheel.

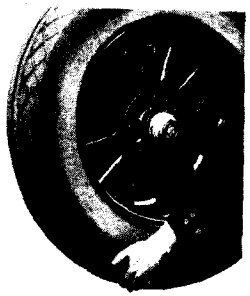


Figure 11c

Rotate the wheel, which will carry the rim with it, until the valve stem is at the top. Then push the lower part of the rim into place, guiding the hinge on the rim through the notch provided for it in the edge of the wheel.

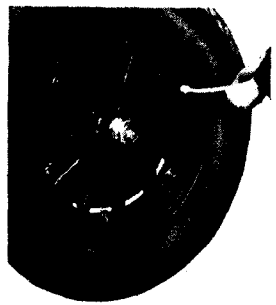


Figure 11d

Turn each rim clamp so that the lug is over the clamping ring, drawing the nut down until the end of the bolt is flush, or nearly so, with the outer surface of the nut. Then go over the six nuts again, tightening them firmly. (See page 30 in regard to truing up the rim on the wheel.) Install the valve stem clamping nut and the dust cap. It is important that the clamping nut be firmly tightened.

FIGURE 11. ***Installing rim with tire on wheel***

or, for that matter, at any other time when it is not driving the car. Racing the engine beyond the recommended speed not only decreases the efficiency of the compressor, but is one of the worst forms of abuse. To stop the compressor, turn the control shaft counter-clockwise.

Do not turn the compressor control shaft to start the compressor when the engine is running and the clutch is engaged.

Tire Holder

The tire holder is designed to carry either one or two standard size tires mounted on rims and inflated. Each rim has on it three lugs which are located so as to engage with notches on the support arms and on the adjustable clamp. There are two sets of these notches.

When two rims are carried, the rim nearest the car should be placed so that the side with the lugs is away from the car and the lugs should be inserted in the inner set of notches. The outer rim should then be placed so that the side with the lugs faces toward the car and the lugs of this rim should be inserted in the outer set of notches.

When only one rim is carried, the side of the rim with the lugs should face toward the car and the lugs should be inserted in the inner set of notches.

The tire holder lock is in the upper end of the clamp screw and is protected by a dust cap which must be unscrewed to insert the key. Turning the key clockwise disengages the lock, permitting the clamp screw to be turned.

To lock the tire holder, screw the clamp down firmly against the rim or rims. Adjust the clamp screw handle so that it points squarely across the car Then turn the key counter-clockwise. Care should be exercised in removing or replacing a spare tire not to strike the body of the car.

Note: If a tire cover is used, it should have slots cut in it opposite the two upper lugs on the rim so as to permit these lugs to seat in the notches in the support arms.

Changing Tires

If a spare rim with inflated tire is always carried on the tire holder, the driver will seldom or never have occasion to disassemble a tire from the rim. In case of tire trouble it is then merely necessary to remove the rim with tire from the wheel and to install on the wheel the spare rim and tire. Illustrated directions for making this change are on pages 28 and 29. Disassembly of the tire from the rim is necessary only if the tire is to be repaired or a new one installed. Directions for this work, which is usually left to the repair shop, will be found on pages 78 and 79. Never attempt to remove a tire from its rim without first deflating the tire.

Truing Up Rim

If a rim does not run true, it may be trued up in the following manner: Rotate the wheel slowly and mark the part that runs farthest out from the face of the wheel. Loosen slightly the nuts diametrically opposite the mark and then tighten the nuts on the marked side. Test the wheel again and if it still does not run true repeat the operation.

CHAPTER IV

Cold Weather Operation

THE Cadillac car is an all-season car and no owner need hesitate to make full use of his car in severe winter weather as well as at other times. It is necessary in freezing weather, however, to observe certain precautions and to follow a somewhat different procedure, particularly in starting the engine. In this chapter has been grouped all the information relating to operation of the car during cold weather. It should be reviewed just prior to the beginning of the winter season.

Starting the Engine

Carburetor Enriching Button

The first difference between starting the engine in cold weather and starting the engine in warm weather is in the greater use of the carburetor enriching device necessary in cold weather. Gasoline does not vaporize as readily at low temperatures, and in order to supply the cylinders with a gaseous mixture rich enough to be ignited, the proportion of liquid gasoline to air must be increased.

At the same time it is important not to apply the enriching device more than is necessary. The unvaporized gasoline collects on the cylinder walls and works down past the pistons, washing off the lubricant as it goes. Although dilution of the oil supply with this unburned gasoline is minimized in the Cadillac engine by an exclusive system for ventilating the crankcase (see page 42), it is best to avoid an excess of liquid gasoline in the combustion chambers by careful and judicious use of the enriching device.

The following rule should govern the use of the enriching button in winter weather: Pull the enriching button back just as far as it is necessary to start the engine, but as soon as the engine starts, let the button return as far as possible without causing the engine to stop or slow down. Then release the button entirely as soon as the engine is warm enough to permit doing so.

Priming the Carburetor

In extremely cold weather, if the engine does not start after cranking for a few seconds with the enriching device fully applied, release the starter pedal. Then prime the carburetor by opening and closing the throttle once or twice rather rapidly with the accelerator. Opening and closing the throttle operates

a throttle pump on the carburetor and raises the level of gasoline in the carburetor bowl. The carburetor should never be primed in warm weather and should not be primed unnecessarily in cold weather. Excessive priming is likely to prevent the engine from starting.

Position of Throttle Hand Lever

The correct position of the throttle hand lever for starting in cold weather is the same as for starting under other conditions, that is, about one-fourth the way down from the idling position. In warm weather, however, the lever may be returned to the idling position almost as soon as the engine is started. In cold weather, the throttle must be left slightly open until the engine becomes warm.

Position of Ignition Control Lever

Unless the weather is extremely cold, the correct position of the ignition control lever for starting is the same as that recommended on page 10, that is, about one-third the way down. In extremely cold weather, however, the lever should be moved all the way up for starting, unless the engine should be cranked by hand, in which case the lever should be moved all the way down.

It is the practice of some drivers to move the ignition control lever all the way down whenever starting the engine. This is the correct position if the engine is to be cranked by hand, but if the engine is to be cranked with the starter, there is no reason for retarding the spark, and in extremely cold weather "popping back" in the carburetor is less likely to occur if the spark is fully advanced.

Use of Starter

In extremely cold weather, when the car has been standing long enough to become thoroughly chilled, it is a good plan to disengage the clutch during the cranking operation. If this is not done, the starter is called upon to turn the jackshaft gears in the transmission in addition to cranking the engine. At ordinary temperatures, the additional energy required is negligible, but in extremely cold weather, the lubricant in the transmission offers sufficient resistance to rotation of the transmission gears to increase considerably the demand upon the battery and to retard the cranking speed.

Use of Accelerator Before Engine Is Warm

In cold weather, after the engine has been started and before it has run long enough to become warm, the engine cannot deliver its normal power and it should not be called upon to do so. In accelerating the engine to start the car and in accelerating the car after the transmission is in gear, do not open the throttle suddenly or too far. To do so is not only to invite "popping back" in the carburetor, but to increase the amount of excess unvaporized gasoline in the combustion chambers, both of which results are undesirable. For this reason, also, starting in intermediate should never be attempted in cold weather.

Additional Cold Weather Suggestions

Engine Oil for Cold Weather

All engine lubricating oil is more viscous at lower temperatures than at higher temperatures. An engine oil of the proper viscosity for summer weather will not flow freely at freezing temperatures, and will not lubricate the cylinders and bearings properly until the engine is warm. If the oil congeals it also offers considerable resistance to cranking of the engine, causing a severe drain on the battery, and retarding the cranking speed.

In cold weather, therefore, it is essential that an oil be used that has a sufficiently low cold test. The medium grade of Cadillac Engine Oil is recommended generally for winter use. If in doubt as to a suitable oil for cold weather, consult an authorized Cadillac maintenance station.

Strainers in Gasoline System

During cold weather, it is especially important to remove and clean the strainers in the gasoline line (see page 58). An accumulation of water at these points that would have no bad effect in warm weather might freeze in cold weather and prevent the gasoline from flowing to the carburetor.

Anti-Freezing Solutions

In freezing weather, the water in the cooling system must be replaced with some solution that has a lower freezing temperature than that of water. A solution of glycerin and water is recommended. There is practically no loss of glycerin by evaporation and a solution of suitable strength placed in the cooling system at the beginning of freezing weather will ordinarily last the entire season.

Some of the patented substitutes for glycerin may be safely used. Such preparations should not be used unless tested and approved. Cadillac distributors and dealers should be consulted as to the suitability of an anti-freeze other than glycerin, or inquiry may be made to the factory Technical Department. Solutions containing calcium chloride or other ingredients injurious to the metal parts of the cooling system must never be used.

A solution of denatured alcohol may be used if its strength is periodically inspected by testing it with a hydrometer, and if care is taken not to let the solution get on the finish of the hood or radiator. Alcohol vaporizes more

readily than water and the loss by evaporation must be replaced at frequent intervals or the weakened solution will afford little protection against freezing.

Glycerin and Water

The following table* gives the freezing temperature and specific gravity of solutions of glycerin† and water:

Percentage of Glycerin (by Volume)	Parts by Volume		Freezing Temperature (° Fahr.)	Specific Gravity
	Glycerin	Water		
20	1	4	21°	1.057
25	1	3	17°	1.070
33⅓	1	2	8½°	1.092
50	1	1	−15°	1.132

Alcohol and Water

The following table* gives the freezing temperature and specific gravity of solutions of denatured alcohol and water:

Percentage of Alcohol (by Volume)	Parts by Volume		Freezing Temperature (° Fahr.)	Specific Gravity
	Alcohol	Water		
20	1	4	19°	.980
25	1	3	15°	.975
33⅓	1	2	6°	.965
50	1	1	−18°	.941

Capacity of Cooling System

The capacity of the cooling system is four and one-half gallons when filled to the proper level. It is not necessary to add liquid to the radiator whenever the level falls below the filler. There is sufficient liquid in the cooling system if the bottom of the upper tank is covered, and any liquid in excess of this is usually forced out through the overflow pipe as soon as the engine becomes warm. When water is used, any loss from this cause is of little consequence, but in winter to conserve anti-freeze it is important to avoid adding more liquid than is necessary.

Effect of Alcohol on Finish

Strong solutions of alcohol have a harmful effect on the finish. In adding pure alcohol or solutions containing 50 per cent or more alcohol, extreme care must be used not to let the liquid spatter or spill. A funnel and a pouring vessel with a suitable spout are necessary. Especially avoid pouring cold alcohol into very hot water. The effect of this is to make the mixture foam up and possibly bubble over on the finish.

*The freezing temperatures and specific gravities in these tables are according to the U. S. Bureau of Standards. The temperature given is in each case the temperature at which the first crystals form and not the temperature at which the solution freezes solid.

†Undiluted commercial glycerin having a specific gravity of 1.250.

PART II

LUBRICATION AND CARE

Cadillac 4000-Mile Lubrication Schedule

Note: Do not wait for schedule lubrications before adding engine oil. The oil level should be checked every 100 to 150 miles and oil added if the indicator ball is below "Full." This is especially important on cars driven at high speeds.

Explanation: The figures and letters following the items in this column refer to the chassis lubrication diagram, Fig. 11	Refer to page	Lubrication No. and Mileage at which due							
		1	2	3	4	5	6	7	8
		500	1000	1500	2000	2500	3000	3500	4000
LUBRICATION NUMBER 8 — LUBRICATION NUMBER 4 — LUBRICATION Nos. 2 and 6 — 1, 3, 5, and 7 — Add engine oil as necessary*: 21	41	O	O	O		O	O	O	
Grease gun connections: G	45	O	O	O	O	O	O	O	O
Spring leaves: 1, 7, 10, 20	48	O	O	O	O	O	O	O	O
Add water to storage battery	63	O	O	O	O	O	O	O	O
Universal joints: 13, 14	46		O		O		O		O
Generator and distributor oil cups: 17, 18, 19	45		O		O		O		O
Engine supports: 5, 16, 24	45		O		O		O		O
Brake pins and connections	77		O		O		O		O
Door hardware	48		O		O		O		O
Drain and replace engine oil*: 21	43				O				O
Transmission‡—add lubricant: 15	46				O				
Rear axle‡—add lubricant: 11	46				O				
Clutch thrust bearing: 4	45				O				O
Steering gear—add lubricant: 6	47				O				O
Transmission‡—drain and replace lubricant: 15	46								O
Rear axle‡—drain and replace lubricant: 11	46								O
Wheel bearings—clean and repack: 2, 8, 12, 22	46								O
Front brake trunnions: 9, 23	47								O
Speedometer drive shaft	47								O
RECORD — Speedometer Reading									
Date									

CHAPTER I

Systematic Lubrication

Necessity for Lubrication

LUBRICATION has made machinery possible. Without it the destructive effects of friction would render the most ingeniously designed mechanism useless. Especially is this so of the gasoline engine, in which heat of combustion is added to that of friction. Absence of lubrication for even a brief instant while the engine is running would heat the surfaces in contact to the melting point.

But it is not enough to know that friction, unrestrained by lubrication, is capable of ruining an engine in less time than it takes to tell it. No motorist expects to run out of oil. What is frequently not fully appreciated is that, if improper lubricants are used and are infrequently applied, friction is still a powerful destructive agent capable of shortening the useful life of the car from years to months.

The quiet, dependable operation of a new car is primarily the result of the accurate finishing of surfaces separated from each other by a few thousandths of an inch. In the Cadillac, there are hundreds of such surfaces. If the clearances between these surfaces are to be maintained, so that the car will continue to operate quietly and dependably, friction must be prevented from taking its toll in wear.

Cadillac engineers have provided for the lubrication of all surfaces where friction is a factor. The most that a manufacturer can do, however, is to provide a place for the lubricant and means for it to reach the surfaces to be lubricated. The car cannot be equipped with an inexhaustible supply of lubricant. Upon the car owner devolves the responsibility of replenishing the supply at the proper time with lubricant of the prescribed specifications.

Because of the importance to the car owner of proper lubrication of his car, every effort has been made in this Manual to give explicit information for his guidance. Lubricants are prescribed for each point requiring lubrication, directions are given for applying the lubricant, and recommendations are made as to the frequency with which the lubricant should be applied. All this information is based upon actual operation of Cadillac cars over hundreds of thousands of miles.

Lubrication Schedule

Lubrication is effective only insofar as it is regular and systematic. To be systematic, lubrication must be performed at regular mileage intervals. The

Cadillac technical staff has accordingly developed for the Cadillac car a complete lubrication schedule which, if faithfully followed, will insure for each bearing surface ample, but not superfluous, lubrication. This schedule is shown on page 36.

The unit of the Cadillac lubrication schedule is 4,000 miles, which is divided into eight 500-mile intervals. Corresponding to these is a series of eight consecutive groups of lubricating operations. When the car has traveled 500 miles, the points enumerated under Lubrication No. 1 should receive attention. At 1,000 miles, Lubrication No. 2 is due, and so on until at 4,000 miles Lubrication No. 8 should be performed. At 4,500 miles the schedule begins again with Lubrication No. 1.

In order that the driver may be continually reminded of the mileage at which the next lubrication is due, provision is made on the speedometer for a lubrication notice. This consists of a strip of black celluloid (Fig. 12) which is placed across the speedometer cover glass below the total mileage dial and which has two white spaces, one for the lubrication number and one for the mileage at which it is due. Whenever the car is lubricated on the schedule, the figures then on the celluloid should be erased and the next lubrication number and the mileage at which it is due should be written or stamped in their places. If this notice is used, the driver need only glance occasionally at the speedometer and compare the mileage on the dial with the figures on the notice in order to plan for the necessary attention.

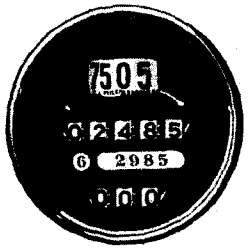


FIGURE 12.
Lubrication notice

Note: Do not wait for the mileage indicated on the notice before adding engine oil. The oil level should be checked every 100 to 150 miles and oil added, if the indicator ball is below "Full"

Cadillac distributors and dealers are prepared to sell lubrication based on this schedule. A car that is being lubricated on the schedule can be taken to any authorized Cadillac maintenance station, and without further ordering than to specify "Schedule Lubrication," the car will receive the necessary attention.

The schedule on page 36 is in outline form. Detailed information as to the location of the points to which lubricant is to be applied, the method of lubricating, and the kind and amount of lubricant will be found in Chapters VI and VII. For each point on the schedule, two reference numbers are given: the number of the page on which detailed directions will be found and the number designating the point on the chassis lubrication diagram (Fig. 14).

Lubricants

The selection of proper lubricants for the Cadillac car is one of the first concerns of the owner in his attention to the lubrication of his car.

The lubricants must not only be of high quality, but their viscosity and other characteristics must be suited to the Cadillac car. The difficulty of securing suitable lubricants on the open market has induced us to provide lubricants under the Cadillac trade-mark. These lubricants are prepared according to specifications prescribed by the Cadillac technical staff and are based upon hundreds of actual tests. Cadillac lubricants include the following and can be obtained from Cadillac distributors or dealers: Cadillac Engine Oil—Heavy, Medium and Light (special). Cadillac Rear Axle and Transmission Lubricant—Light and Heavy. Cadillac Roller Bearing and Cup Grease. Cadillac Fiber Grease—Light and Heavy. Cadillac Steering Gear Lubricant.

Engine Oil

The heavy grade of Cadillac Engine Oil is recommended for summer use and for winter use if the temperature is not much below freezing. For average winter use (temperatures down to zero) the medium grade is recommended. For extremely low temperatures (below zero) the light grade should be used, but should be replaced with the medium grade as soon as more moderate temperatures return.

The names of other engine oils approved for use in the Cadillac engine will be supplied by our Technical Department on request.

Rear Axle and Transmission Lubricant

The heavy grade of Cadillac Rear Axle and Transmission Lubricant should be used except in cold weather. The light grade should then be used. If the heavy grade is used in cold weather the transmission gears will be difficult to shift. The names of other lubricants suitable for use in the Cadillac rear axle and transmission will be supplied upon request.

Roller Bearing and Cup Grease

Cadillac Roller Bearing and Cup Grease is recommended for the wheel bearings and for all points for which grease gun connections are provided, with the exception of the steering gear and the universal joints. In the absence of Cadillac Roller Bearing and Cup Grease, No. 3 cup grease may be used for the grease gun connections and No. 1½ cup grease for the wheel bearings.

Fiber Grease

Cadillac Fiber Grease is supplied in two grades, light and heavy. The light grade is recommended for the clutch thrust bearing and the heavy grade for the universal joints on the drive shaft.

Spring Lubricant

Cadillac Spring Lubricant is recommended for lubricating springs equipped with spring covers. This lubricant is a petroleum jelly that does not harden and cake and that has no destructive effect on the leather of the spring covers.

CHAPTER II

Engine Lubrication

Oil Circulating System

THE supply of engine oil is carried in the pressed steel reservoir that covers the bottom of the crankcase. The oil is forced to the bearings by a gear pump attached to the right-hand side of the engine toward the front and driven by a spiral gear on the crankshaft.

The pump draws the oil from the bottom of the oil pan and delivers it under pressure to a supply pipe running the length of the engine parallel with the crankshaft. From this supply pipe, three leads branch off to feed the three main bearings. The crankpin bearings are fed from the main bearings through ducts in the crankshaft. Oil thrown from the crankpins as the crankshaft revolves becomes a fine mist or spray which pervades the interior of the crankcase and cylinders and lubricates the pistons, piston pins, cams, camslides, and rollers.

A separate passage drilled through the crankcase conducts oil direct from the pump to the camshaft front bearing from which the oil enters the hollow camshaft and is carried to the other camshaft bearings and to the distributor driving gear.

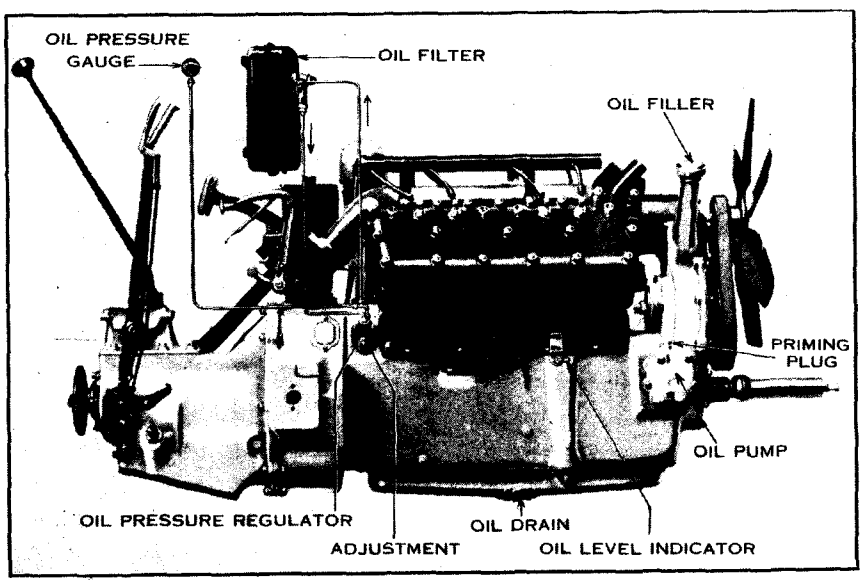


FIGURE 13. ***Engine lubrication features***

The pressure in the lines supplying the main bearings and the camshaft bearings is controlled by an oil pressure regulator* attached to the crankcase almost directly above the pump and connected to the pump by an external pipe. The pressure regulator contains a by-pass with metering screw for adjustment of the oil pressure at idling speeds and a spring-controlled valve that opens to prevent excessive pressure at high speeds. The oil that passes the regulator, either through the by-pass or around the valve, is led to the spiral gears, chain and chain adjusting mechanism.

The valve stems are automatically lubricated by oil sprayed from two small holes drilled in the wall of each cylinder at such a distance from the bottom of the cylinder that, when the piston is at the bottom of its stroke, these holes register with a groove in the piston between the second and third piston rings. As the piston descends on the power stroke, oil collects in this groove and as soon as the groove registers with the holes, the pressure of the gases above the piston forces oil out upon the valve stems. Surplus oil collecting in the valve compartments is returned to the crankcase through drain passages.

All oil returns to the oil pan through a fine mesh screen placed above the oil pan and separating it from the crankcase.

Oil Level

The normal capacity of the oil pan is two gallons which fills it to the level of the screen above the pan. When the oil pan contains this amount, the oil level indicator on the right-hand side of the engine (Fig. 13) indicates "Full." As the oil level descends, the indicator indicates "Fill" and then "Empty." Oil should be added as soon as the indicator ball has dropped to "Fill." If the indicator indicates "Empty," under no circumstances should the engine be run until oil has been added.

The mileage interval at which oil must be added depends upon individual circumstances. *It is recommended that the oil level indicator be checked every one hundred to one hundred and fifty miles, although it is improbable that oil will be required as frequently as this.*

Oil Pressure

The pressure of the oil in the supply pipe is indicated by the oil pressure gauge on the instrument panel (Fig. 1). The purpose of the oil pressure gauge is, first, to enable the driver to make sure that there is pressure whenever the engine is running, and second, to verify the adjustment of the oil pressure regulator.

It is absolutely necessary that there should be oil pressure just as soon as the engine starts and as long as the engine is running. If the oil pressure

*On some cars the pressure regulator is located just to the rear of the right-hand cylinder block and takes the place of the fitting to which the filter and pressure gauge are connected. On these cars the priming plug is a hexagonal plug directly on top of the oil pump.

gauge does not indicate pressure as soon as the engine starts, stop the engine at once and investigate the cause. First, check the level of oil in the oil pan. If the level is above "Fill," prime the oil pump by removing the screw plug shown in Fig. 13 and pouring oil in through a funnel. Be sure to replace the plug before starting the engine. If, after priming the oil pump and starting the engine, the oil pressure gauge does not indicate pressure, stop the engine immediately and consult the nearest Cadillac maintenance station.

Before the adjustment of the oil pressure regulator can be verified, the factors affecting the viscosity of the oil must be standardized. The oil pressure changes with the viscosity, which in turn depends upon the kind of oil, the extent to which it has been thinned by use, and the temperature. It is therefore necessary that the oil be fresh and of the viscosity specified for the Cadillac engine. The engine must also be run long enough to become thoroughly warm. Under these conditions the pressure at idling speed (300 r.p.m.) should be from 1 to 4 lbs.

Adjustment of the pressure at idling speeds is made by the screw at the oil pressure regulator shown in Fig. 13. To increase the pressure, turn the screw clockwise; to decrease the pressure, turn the screw counter-clockwise. This adjustment should be made while the engine is running.

Crankcase Ventilating System

In every internal combustion engine, seepage of vapors by the pistons takes place to some extent, permitting water vapor and other products resulting from combustion, as well as unburned gasoline, to enter the crankcase. Contamination of the lubrication oil from this source makes it necessary in most engines to replace the oil supply at frequent intervals.

Cadillac engines are equipped with an exclusive system to prevent the seepage vapors from entering the crankcase. To bring about this result, advantage is taken of the fact that the Cadillac crankshaft with its compensating weights acts naturally to draw air through an inlet in the left-hand side of the engine, building up within the crankcase a pressure slightly above atmospheric pressure. No outlet is provided in the crankcase itself, but in the wall of each cylinder is a port connecting the space below the piston with the valve compartment. This port is open except when the piston is at the extreme bottom of its stroke.

The effect of this arrangement is as follows: The seepage vapors that pass the two upper piston rings are forced through slots milled in the circumference of the lower piston ring and through corresponding holes in the piston into the space inside the piston, where they are carried down as the piston descends. The vapors cannot enter the crankcase, however, because they are prevented from doing so by the pressure built up in the crankcase by the revolving crankshaft. Instead, the vapors are expelled through the port into the valve compartment. From the valve compartments the expelled vapors are conducted through flexible pipes underneath the car where they are discharged.

Oil Filter

Another source of contamination of the oil supply is dirt. In the Cadillac engine all solid matter in the oil is removed by means of a filter (Fig. 13) which is attached to the dash and which is connected to the oil circulating system.

The filter consists of a metal container in which is a series of eight envelopes made of special fabric. As the oil is forced through these fabric envelopes, the total area of which is over five square feet, it leaves all solid matter behind, returning to the engine as clean oil.

The filter is connected to the oil line by a pipe that leads from a tee on the crankcase at the rear of the right-hand cylinder block. The oil pressure gauge on the instrument board is also connected to this tee. Oil is thus forced to the filter whenever the engine is running and there is pressure in the oil lines. The normal flow when the filter is new is approximately one quart per minute under a gauge pressure of 15 pounds, so that an amount of oil equal to the entire capacity of the lubricating system passes through the filter every eight to ten minutes.

As dirt accumulates in the filter, the flow of oil through the filter decreases, and eventually the filter unit must be replaced. When it takes longer than seven minutes for a quart of oil to flow through the filter under a gauge pressure of 15 pounds, the filter unit should be replaced.

As an approximate check on the condition of the filter, remove the screw plug in the fitting at the filter and note the size of the stream of oil that flows from the opening. In making this test, the engine should be warm and the throttle should be opened until the pressure gauge indicates 15 pounds. Under these conditions a stream of oil as large as a pencil lead, or larger, should flow from the filter. (On some cars the filter has a sight feed glass through which the stream of oil flowing from the filter may be seen.)

Under average driving conditions replacement of the filter unit should not be necessary for 12,000 to 15,000 miles. Filter units for replacement can be obtained from Cadillac distributors and dealers.

Replacing Engine Oil

Although the crankcase ventilating system and the oil filter described in the preceding sections greatly prolong the useful life of the oil, it is recommended that the oil be drained and replaced with fresh oil every 2,000 miles.

To drain the oil, simply remove the drain plug (Fig. 13). A special socket wrench for the oil pan drain plug is supplied as part of the tool equipment.

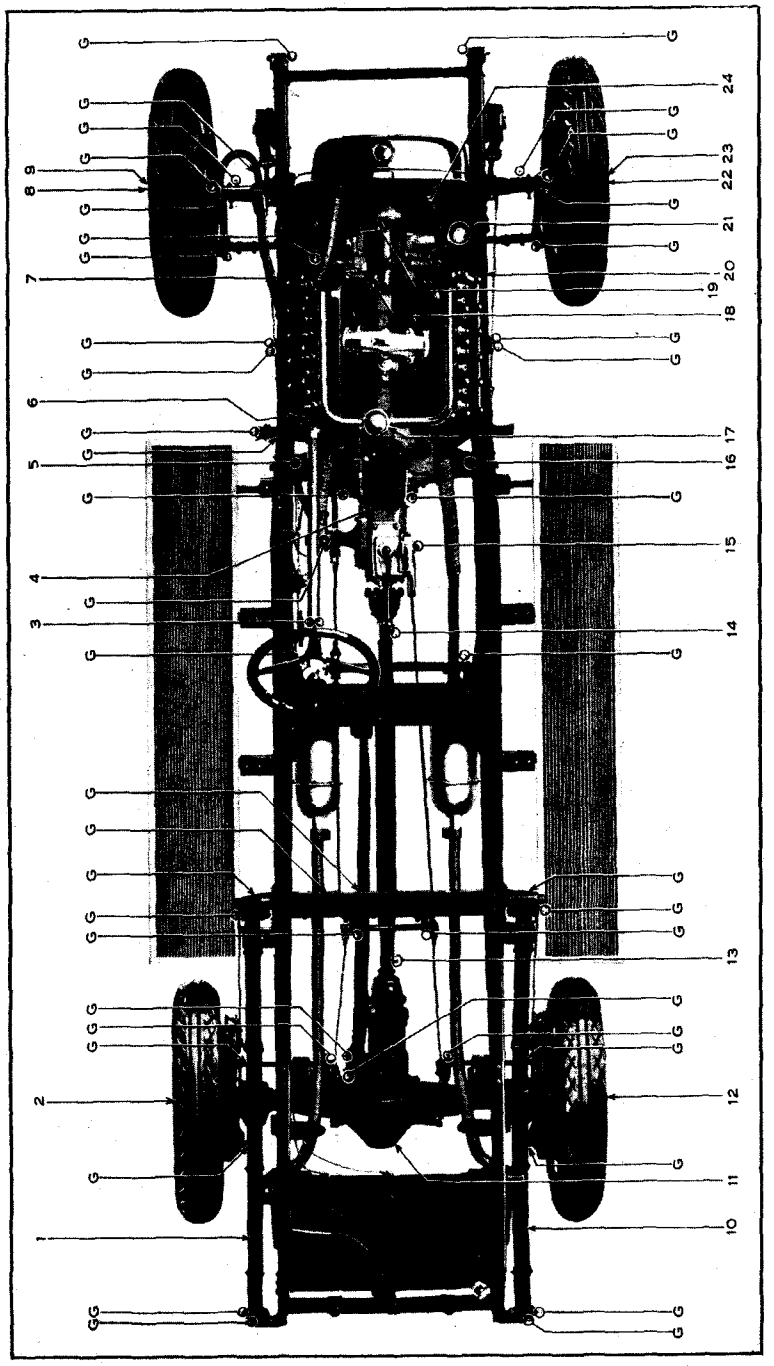


FIGURE 14. *Chassis lubrication diagram*

Each "G" indicates a grease gun connection. Each number indicates a lubricating point for which instructions are given in Chapters II and III. Lubricating points that are visible in the diagram are surrounded by circles, others are indicated by arrows.

Be sure to reinstall the drain plug before adding the fresh oil. Two gallons of fresh oil should be added, or enough to bring the oil level indicator ball to "Full."

At the end of the first 1,000 miles, it is recommended that the car be taken to a Cadillac maintenance station to have the oil pan and screen removed and cleaned with gasoline or kerosene. This should be repeated once a year or whenever the filter unit is replaced.

Generator Oil Cups: 18, 19*

Two oil cups on the generator conduct lubricant to the forward and rear bearings on the armature shaft. A few drops of engine oil should be applied to each cup every 1,000 miles.

Timer-Distributor Oil Cup: 17

The oil cup at "17" is for lubricating the ball bearing at the upper end of the timer-distributor shaft. A few drops of engine oil should be applied every 1,000 miles.

Engine Supports: 5, 16, 24

The brackets on the frame to which the engine rear supports are bolted are provided with felt wicks (5 and 16). Every 1,000 miles engine oil should be applied to these points and to the oil hole at the front engine support (24).

CHAPTER III

General Lubrication

Grease Gun Connections: G

SPRING bolts, steering connections, brake rocker shafts and other points are provided with connections to fit the grease gun supplied with the tool equipment. These points are indicated by "G" in Fig. 14. Cadillac Roller Bearing and Cup Grease should be applied to these points with the grease gun every 500 miles.

Clutch Thrust Bearing: 4

The lubricating joint on the clutch thrust bearing is fitted with a screw plug shown at "G" (Fig. 25). To reach this plug, remove the floor boards and the cover plate shown at "F" (Fig. 14) and turn the thrust bearing until the plug is uppermost. Remove the plug with a screw-driver, taking care not to drop the plug into the clutch housing. Screw the extension fitting shown at "18A" (Fig. 8) into the threaded hole from which the plug was removed. Attach the grease gun to this fitting.

*The numbers following the headings in this chapter and in Chapter III refer to Fig. 14.

Note: On some cars a grease gun connection is permanently fitted to the thrust bearing in place of the screw plug. On these cars the adapter "18" (Fig. 8) should be used instead of the extension pipe "18A." This must be done with the engine not running.

The clutch thrust bearing should be lubricated every 2,000 miles with the light grade of Cadillac Fiber Grease.

Caution: Do not inject too much grease into the clutch thrust bearing. One or two turns of the grease gun handle are sufficient.

Transmission: 15

The transmission case should contain sufficient lubricant to bring the level up to the filling hole at the right-hand side. The level should be inspected every 2,000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended. The heavy grade should be used except in cold weather. The light grade should then be used. If the heavy grade is used in cold weather, the transmission gears will be difficult to shift.

Every 4,000 miles the drain plug should be removed from the bottom of the transmission case and the lubricant should be drained and replaced with fresh lubricant. Three quarts of lubricant are required to fill the transmission case to the proper level.

Universal Joints: 13, 14

The forward and rear universal joints on the drive shaft are provided with grease gun connections as indicated at "13" and "14." It may be necessary to roll the car forward or backward a few inches to bring the connections underneath where they can be reached with the grease gun. The heavy grade of Cadillac Fiber Grease should be applied every 1,000 miles.

Rear Axle: 11

The rear axle housing should contain enough lubricant to bring the level up to the filling hole in the rear cover plate. The level should be inspected every 2,000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended. The heavy grade should be used except in cold weather. The light grade should then be used.

Every 4,000 miles the drain plug should be removed from the bottom of the axle housing and the lubricant should be drained and replaced with fresh lubricant. Three and one-half quarts of lubricant are necessary to fill the rear axle housing to the proper level.

Wheels: 2, 8, 12, 22

The front and rear wheel bearings are packed in grease when the car is assembled. Every 4,000 miles all the wheels should be removed and the bearings should be thoroughly cleaned in gasoline or kerosene. They should then be repacked and the bearings adjusted in accordance with the directions on pages 80, 81 and 82.

Cadillac Roller Bearing and Cup Grease is recommended for the wheel bearings. Do not use heavy grease as it will roll away from the path of the rollers and will not return.

Front Brake Trunnions: 9, 23

Every 4,000 miles, at the same time that the wheels are removed for lubrication of the wheel bearings, the brake operating trunnions inside the front wheel brake drums should be lubricated by applying the grease gun to the connection at "A" (Fig. 15). Cadillac Roller Bearing and Cup Grease should be used. It should be injected only until it begins to appear around the trunnion bearings. Do not inject too much grease. Before replacing the wheels, wipe off any grease appearing around the trunnion bearings. Do not inject any grease at "A" except when the wheel is off and the application of too much grease can be definitely avoided.

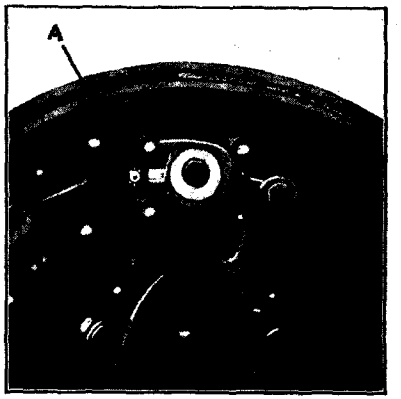


FIGURE 15.
Lubrication of front brake trunnions

Steering Gear: 6

The hole for adding lubricant to the steering gear is on top of the housing just at the base of the steering column, and is fitted with a square plug. Every 2,000 miles this plug should be removed and rear axle and transmission lubricant or 600-W should be added until it flows from the hole.

On some cars there is a grease gun connection for the injection of lubricant. On these cars there are also two holes at (3), at the upper end of the steering column. In lubricating this type of steering gear the lower of these two plugs should be removed, and when the grease begins to flow from the hole stop injecting grease at (6).

Speedometer Flexible Drive Shaft

The flexible shaft by which the speedometer is driven is housed in a flexible casing. To lubricate the speedometer drive shaft, the shaft should be removed from its casing and lubricant applied to it for its entire length. Cadillac Roller Bearing and Cup Grease is recommended for this lubrication, which should be performed every 4,000 miles.

Do not under any circumstances attempt to lubricate the speedometer itself. Any parts in the speedometer requiring lubrication are amply supplied when it is assembled.

Horn

The horn is lubricated when assembled and does not require further lubrication, but it is a good plan to inspect the commutator of the horn motor occasionally and clean it, if necessary. To do this, remove the horn from its bracket and the motor shell from the horn. If the commutator appears to be dirty, clean it with a dry cloth. This should be done with the horn motor running so that the commutator will be cleaned on all sides. Do not attempt to polish the commutator or brushes with oil or vaseline. These parts are designed to run without lubricant.

Springs: 1, 7, 10, 20

To lubricate the spring leaves, it is recommended that the edges and ends of the leaves be painted with engine oil every 500 miles. A small stiff brush should be used. After applying the oil, the car should not be washed until it has been driven far enough to allow the lubricant to work in between the leaves. Do not separate the leaves and insert lubricant. A certain amount of friction between the spring leaves is necessary in order to give the springs the desired characteristics.

If spring covers are used, it is not necessary to lubricate the spring leaves as directed in the preceding paragraph. It is sufficient to repack the springs once a season with Cadillac Spring Lubricant.

Stabilators

The stabilators, with which the car is equipped and which are for the purpose of controlling the recoil of the springs, not only need no lubrication—they *must not* be lubricated. To lubricate the stabilators would defeat their purpose just as oil or grease on the brakes would prevent them from holding.

Door Hardware

Whenever the chassis is being lubricated, the door locks and other door hardware should also be lubricated as follows:

Place a few drops of oil on each door lock plunger or striker, turning the handle back and forth so that the oil will work into the lock. Also place a drop of oil on each of the striker plates against which the strikers engage when the doors are closed. The hinge pins should also be oiled sparingly so as not to get oil on the finish.

Each door has a wedge-shaped tongue that dovetails into a receptacle on the body when the door is closed. These tongues should receive a small amount of grease or oil.

Each closed car door is also fitted with a check at the top which limits the outward movement of the door. A small amount of grease should be applied to the pin that slides in the slot at the top of the door.

CHAPTER IV

Care of Body

Care of Finish When New

On cars finished with varnish, more careful and more frequent attention is necessary when the car is new than after the varnish has hardened. Particular care should be taken to keep mud from the body and hood for the first few weeks. Even after the varnish has hardened, mud should not be permitted 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 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.

The same degree of caution, although commendable, is not as necessary on cars finished with Duco, because Duco hardens much more quickly than paint or varnish.

Washing Varnished Cars

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, because 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 pressure greater than will carry the water six inches 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.

Wash the chassis first, going over the under sides of the fenders, the wheels, and the running gear 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 under side of the fenders, or machine oil or grease from the chassis, use a 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 soft carriage sponge.

After washing the chassis, begin at the front of the car and flow water from the hose upon the body, hood and upper surfaces of the fenders. This will soften the accumulation of road dirt, removing most of it. Then go over the car again and remove all dirt by rubbing lightly with a soft wool sponge, at the same time applying an abundance of water from the hose. The sponge, which should be kept exclusively for the body, hood and upper surfaces of the fenders, should be rinsed 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. Be sure and use a chamois that has not been used on the chassis. Rinse the chamois and wring it out frequently. Do not rub the finish or apply more pressure than is necessary to dry off the surplus water. The remaining water will evaporate quickly, leaving the finish in good condition.

If it is desired to chamois the wheels and chassis, and they have become dry, wet these parts with clean water and then wipe them. Be sure to use a separate chamois for the chassis. The chamois that has been used on the body should be saved for the body exclusively.

Do not use soap, gasoline, kerosene, or anything of similar nature on the finish. Such materials attack the finish.

Washing Duco

Although it is not necessary in washing cars finished in Duco to use the same degree of care as in washing varnished cars, nevertheless the same general directions should be followed.

Cleaning Windows

Do not clean the window glass with preparations that may contain harmful ingredients. Use only cleaning compounds that are known to have no destructive effects on highly polished glass.

Cleaning Upholstery

To keep the upholstery in closed cars in the best condition, it should be cleaned thoroughly at least once a month with a whisk broom and vacuum cleaner. Dirt and grit accumulating in the fabric wear it out faster than use.

Spots on the upholstery may be cleaned with any good dry cleaner. When the cleaner has thoroughly evaporated, apply a hot flatiron wrapped in a wet cloth. Steaming the fabric and rubbing lightly against the nap will raise the nap to its normal position.

CHAPTER V

Care of Tires

EACH tire maker publishes a booklet with instructions for care and repair of tires. Every motorist should provide himself with one of these and thoroughly familiarize himself with the contents. The suggestions here apply to pneumatic tires in general.

Three-fourths of so-called "tire trouble" is the result of misuse. We give here some suggestions regarding the more important points of the care of tires.

Result of Under-Inflation

Under-inflation causes a tire to flatten out under load. This causes the side walls to bend sharply as the tire revolves. The result is the breaking of the side walls. An under-inflated tire is susceptible to bruise, broken cords and blow-out.

Result of Improperly Aligned Front Wheels

Running a car with the front wheels out of alignment causes rapid tread wear. This usually affects both tires similarly, although sometimes only one tire is affected. An incorrect adjustment of the front axle parallel rod or a bent steering arm is responsible for the condition. Unless the wheels are in proper alignment the treads of the front tires will wear away in a remarkably short time.

Neglect of Small Cuts

If cuts extending to the cords are neglected deterioration and blistering of the tire tread is the result. It is unnecessary to remove a tire to treat small cuts of this nature. Tire companies furnish a plastic compound for filling cuts. This prevents moisture and dirt from getting in. If a cut is large, it should be vulcanized at once.

Result of Improperly Adjusted Tire Chains

Tires are sometimes badly damaged through the use of tire chains which are incorrectly adjusted or which are fastened to the spokes of the wheel holding the chains tightly in place.

The least injury results when chains are applied loosely, leaving play enough to permit them to work around. The wear on the tire is thus distributed evenly. Probably the greatest amount of injury comes from using chains unnecessarily on paved streets.

Result of Sudden Application of the Brakes

The sudden application of the brakes resulting in sliding the wheels causes the treads to wear away in spots. A tire will give away very rapidly under this severe treatment.

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 cords, 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 layers of cords to dirt and moisture, which soon starts to rot the cords.

In turning in a narrow street, avoid striking the curb.

If a tire goes flat without any indication of injury to the tire, see that the valve is not leaking. A little moisture on the tip will show bubbles if the air is escaping.

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 carcass 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 rubber 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.

CHAPTER VI

Storing Car

If the car is not to be used for a period of several months, it should be protected from deterioration during the period when it is not in use by carefully preparing it for storage.

Engine

To prepare the engine for storage, proceed as follows: Run the engine until opening of the radiator shutters indicates that the engine is warm. This may be done by driving on the road or by running the engine idle. In the latter case, care should be taken that there is sufficient ventilation to avoid injury from carbon monoxide poisoning. (See page 18.)

After the engine is warm, place the car where it is to be stored and stop the flow of gasoline to the carburetor by removing the gasoline tank filler cap, thus relieving the air pressure. As soon as the engine starts to slow down raise the polished aluminum cap on top of the carburetor and inject three or four tablespoonfuls of clean fresh engine oil into the carburetor. Injection of the oil will stop the engine.

Open the compression relief cocks by turning them counter-clockwise. Inject two or three tablespoonfuls of engine oil into each compression relief cock, 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. The engine should not be started again after injecting the oil. If it is started, it will be necessary to repeat the treatment.

Drain the cooling system by opening the drain valve in the water pump.

Storage Battery

If the car is to be stored during the winter, the storage battery should have special treatment in order to protect it against freezing.

Shortly before the car is used for the last time, distilled water should be added to bring the level of the solution up to the bottom of the fillers. (See page 63.) After the water added has had an opportunity to mix thoroughly with the acid solution, the specific gravity should be taken with a hydrometer. If the specific gravity of the solution is above 1.270 there will be no danger of the acid solution freezing. If, however, the specific gravity is below 1.270, the battery should be removed and charged. *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.*

It is important that one of the battery leads should in all cases be disconnected during storage as a slight leak in the wiring will discharge the battery

and lower the specific gravity to the point where the solution may freeze.

If possible, the storage battery should be removed and charged from an outside source every two months during the storage period.

Tires

During storage of the car, it is best to remove the tires *from the rims* and to keep the casings and tubes in a fairly warm atmosphere away from the light. The tubes should be inflated slightly after the tires have been removed.

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

The weight of the car should not be allowed to rest on the tires during the storage period. If tires are not removed, the car should be blocked up so that no weight is borne by the tires. The tires should also be partly deflated.

Body and Top

A cover should be placed over the entire car to protect it from dust. In storing an open car, the top should be up.

Taking Car Out of Storage

In putting into use again a car that has been stored, it is advisable, unless the storage battery has been removed and charged at periodic intervals, to remove the battery from the car and give it a fifty-hour charge at a four-ampere rate. If the battery has received periodic charges, or if the specific gravity is above 1.200, simply add distilled water to the proper level and connect the leads. If there is a greenish deposit on the terminals of the battery, remove this with a solution of bicarbonate of soda (common cooking soda) and water. Do not allow any of this solution to get into the battery.

Before starting the engine, drain the oil from the oil pan and remove and clean the oil pan and screen. After reinstalling the oil pan, add eight quarts of fresh engine oil. Fill the cooling system, being sure to use anti-freezing solution in freezing weather. Open the compression release cocks and inject two or three tablespoonfuls of engine oil into each cylinder. Close the compression release cocks, and, with the ignition switched off, crank the engine a few seconds with the starter to distribute the oil over the cylinder walls.

Start the engine in the usual manner. As soon as the engine starts, immediately let the carburetor enriching button go as far forward as possible without causing the engine to stop or slow down materially and then open the throttle until the ammeter reads approximately 10 with all lights switched off. While the engine is running lift the aluminum cap on top of the carburetor and inject from two to three tablespoonfuls of engine oil into the carburetor. It is a good plan to run the car outdoors as soon as this has been done. Release the carburetor enriching button entirely as soon as the engine is warm enough to permit it.

PART III

GENERAL INFORMATION

CHAPTER I

Engine

Important Features of Construction

THE Cadillac engine is of the water-cooled, four-cycle type with two L-head cylinder blocks of four cylinders each, placed at an angle of ninety degrees between the blocks. The cylinders of one block are directly opposite those of the other block, the lower end of each connecting rod on the left-hand side working in the forked end of the connecting rod opposite. This construction makes the engine shorter and more compact than any other type, the smooth running being largely the result of the short, rigid crankshaft.

The crankshaft has four throws or cranks, three main bearings, and carries on its front end the sprocket by which the camshaft is driven. The camshaft has six bearings, and is driven by the crankshaft through a silent chain in which the proper tension is maintained by an automatically adjusted idler gear. The camshaft has sixteen cams, each operating one valve through a camslide in which is carried a roller.

The fan is mounted on the front end of the generator shaft, which is driven by the camshaft through a special V-shaped belt.

The water pump and oil pump are driven by a cross shaft, which in turn is driven by a spiral gear on the crankshaft. The water pump is at the left-hand end of the cross shaft and the oil pump at the right-hand end.

The engine base is the aluminum crankcase that supports the cylinder blocks and carries the crankshaft and camshaft bearings. The crankcase is supported at the rear end by two arms which are cast integrally with the

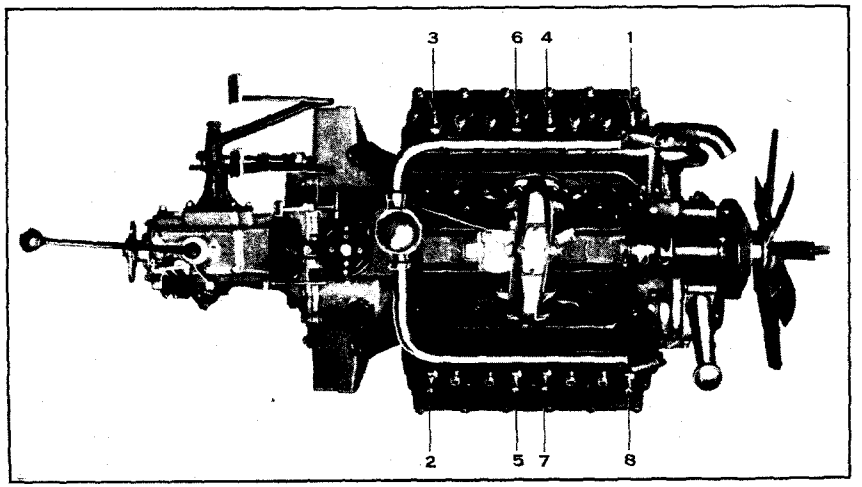


FIGURE 16. ***Firing order***

crankcase and which are bolted to brackets on the frame. The front end of the engine is supported on a cross member of the frame below the radiator.

General Principle of Gasoline Engine

The production of power by the engine may be described briefly as follows:

Gasoline is fed by air pressure from the tank to the carburetor where it is mixed with air in the proper proportions to form an explosive vapor or gas. This gas is then drawn through the intake manifold and inlet valves into the cylinders of the engine where it is compressed by the pistons and then ignited by electric sparks. The pressure of the resulting explosions acting on the pistons produces the power.

The series of operations through which the pistons and valves of each cylinder must go to produce one power stroke is called a "cycle" and for such a cycle four strokes of each piston and two revolutions of the flywheel are required. The four strokes, each of which has a different function, take place in the following order:

Suction Stroke—The suction stroke commences with the piston at its highest point in the cylinder and with the inlet and exhaust valves closed. As soon as the piston starts to descend, the inlet valve immediately opens and a charge of gas is drawn from the carburetor through the valve opening into the space above the piston.

Compression Stroke—When the piston starts upward again after completing the suction stroke, the inlet valve closes. The gas, which has no means of escape, 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, a spark, timed to occur at exactly the right instant, jumps between the electrodes of the spark plug and ignites the compressed charge of gas. The heat that results 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 the piston down and produces the impulse which is transmitted by the connecting rod to the crankshaft, causing the crankshaft to revolve.

Exhaust Stroke—Just before the piston reaches the end of the power stroke, the exhaust valve opens. It remains open while the piston travels upward on the fourth, or exhaust stroke, driving the burned gas 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. This completes the four strokes of the cycle and the piston is ready to draw in a new charge and to repeat the cycle.

Firing Order

Such a cycle as has been described takes place in each of the eight 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 of the eight pis-

tons are so timed that a power stroke is begun every quarter-turn of the crankshaft. The crankshaft thus receives four overlapping power impulses every revolution.

The order in which the eight cylinders fire is indicated by the numbers in Fig. 16. These numbers are the numbers used in marking the flywheel for valve and ignition adjustments.

CHAPTER II

Gasoline System

THE general arrangement of the gasoline system is illustrated in Fig. 17. There are two sets of tubes, one for air and one for gasoline.

The air tubes connect the automatic compressor at the left-hand front end of the engine, the hand compressor on the instrument board, and the air pressure relief valve, to the top of the gasoline tank. As described on page 9, the automatic and hand compressors are for the purpose of furnishing the necessary pressure to force the gasoline to the carburetor. The air pressure relief valve, which is fastened to the left-hand side of the frame under the front floor boards, prevents excessive pressure that might accompany the use of high-test or casing-head gasoline.

The gasoline line starts at the bottom of the gasoline tank and runs to a tee on the frame. From the tee one tube leads to the pressure gauge on the instrument board and another tube to the carburetor.

Settling Chamber

It is recommended that the settling chamber at the gasoline tank (Fig.17) be drained at the beginning of freezing weather and at least every 4,000 miles during the winter season. An accumulation of water at this point might freeze and prevent gasoline from flowing to the carburetor.

To drain the settling chamber at the gasoline tank, first relieve the air-pressure by removing the filler cap and then remove the drain plug at the rear of the chamber as shown in Fig. 17. It is necessary to drain out only enough gasoline to flush the chamber. Be sure there is no fire near.

Strainer

There is a strainer in the gasoline system at the point where the gasoline enters the carburetor. This strainer should be cleaned occasionally.

To do this, first relieve the air pressure by removing the gasoline tank filler cap. Then remove the six screws that hold the strainer cap and remove the cap and the three gauze discs. The discs should be rinsed in clean gasoline.

In re-installing the discs, be sure to place them in their original positions. The two discs with the fine mesh gauze should be installed first.

Carburetor

The carburetor is correctly adjusted when the engine is assembled and, unless tampered with, should not require readjustment. It is unnecessary to change the adjustment for changes in season, weather or altitude.

Good carburetor action cannot be expected until the engine is thoroughly warmed. 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, it should, if possible, be made by an authorized Cadillac maintenance station. The adjustment should not be attempted by one unfamiliar with it.

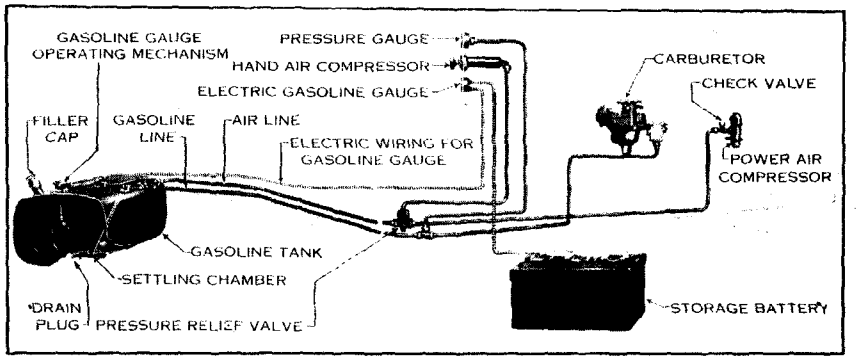


FIGURE 17. ***Gasoline System***

CHAPTER III

Cooling System

Water Circulation

THE Cadillac engine is cooled with water circulated through the jackets of the cylinder blocks by a centrifugal pump. This pump is mounted on the left-hand side of the engine near the front and is driven by a cross shaft, which in turn is driven by a spiral gear on the crankshaft. The pump draws cold water from the bottom of the radiator and delivers it to a connection on the left-hand side of the engine where the stream divides, half going to the left-hand cylinder block and half through a passage in the crankcase to the right-hand cylinder block. From the front end of each cylinder head an outlet pipe with hose connection carries the heated water to the top of the radiator.

Radiator and Shutters

The radiator consists of an upper tank and a lower tank connected by water passages around the outside of which air is circulated by the fan. The water passages are so constructed that they expose a large amount of surface to the air, which cools the water as it passes from the upper to the lower tank.

Until the water in the cylinder blocks and radiator is warm, the cooling effect of the radiator is not only unnecessary, but is undesirable. The radiator is accordingly provided with shutters that prevent air from circulating around the water passages until the engine becomes warm. The shutters are pivoted vertically and are controlled automatically by a powerful thermostat contained in the upper tank of the radiator.

When the engine is cold, the shutters are held tightly closed and circulation of air is prevented. The water from the cylinders consequently undergoes little change in temperature as it flows through the radiator and the engine quickly becomes warm. As soon as the water entering the upper tank of the radiator reaches the temperature at which the engine operates best, the shutters are forced open by the thermostat and air begins to circulate. The resulting cooling effect checks the rising temperature of the water, which is thereafter maintained uniformly at the temperature of most efficient operation as long as the engine is running.

Filling and Draining the Cooling System

Except during freezing weather, water should be used in the cooling system. In freezing weather, a suitable anti-freezing solution such as those described on page 34 must be used.

To add liquid to the cooling system or to refill the cooling system after it has been drained, remove the radiator filler cap and pour the liquid in through the filler.

It is not necessary to add liquid to the radiator whenever the level falls below the filler. There is sufficient liquid in the cooling system if the core of the radiator is covered, and any liquid in excess of this is usually forced out through the overflow pipe as soon as the engine becomes warm. When water is used, any loss from this cause is of little consequence, but in winter to conserve anti-freeze it is important to avoid adding more liquid than is necessary.

To drain the cooling system, open the drain valve at the bottom of the water pump by turning the hexagonal end of the valve counter-clockwise.

Cleaning the Cooling System

The cooling system should be drained and flushed every two or three months. This can be done in the following manner:

Run the engine until the opening of the radiator shutters indicates that the engine is warm. Stop the engine and immediately open the water pump drain valve.

After the liquid has drained off, refill the cooling system with hot water and repeat the operation described above. If in draining the second time the water is very dirty it may be advisable to repeat the flushing operation a third time, placing one or two handfuls of sal-soda in through the radiator filler. The sal-soda must not be permitted to get on the finish of the hood or radiator. If sal-soda is used, the cooling system must be drained and flushed again before refilling for use.

CHAPTER IV

Electrical System

THE electrical system comprises the following units: The generator or source of electrical energy; the storage battery, which stores the current generated; the starting motor, which cranks the engine for starting; the ignition system; the lamps and other devices using electrical current; the ammeter; the ignition and lighting switch; and the circuit breakers, which protect the system. The wiring system connecting these units is the single wire or grounded type, the engine and frame forming one side of the electrical circuit.

Generation of Current

Generator

The generator is attached to the crankcase at the front of the engine and is driven by a specially made V-shaped belt from a pulley on the front end of the camshaft.

At very low engine speeds the voltage of the current generated is not sufficient to provide current for lighting or ignition and the battery is then the source of current. To prevent the battery at such times from discharging through the generator, a cut-out relay on the generator automatically opens the circuit whenever the generated voltage drops below the battery voltage. At approximately eight miles per hour the generated voltage is sufficient to operate the cut-out, which then closes the circuit between the generator and the battery and lighting circuits. If no lights are switched on, the entire output of the generator, less the current required for ignition, flows to the battery for recharging it. If all the lights are on, the generator will not generate sufficient current to start charging the battery until a speed of twelve to fifteen miles per hour is reached.

The amount of current generated by the generator at any instant is the ammeter reading (with all lights off) plus the current for ignition, which is two to three amperes. The generator output reaches its maximum at speeds between twenty and twenty-five miles per hour. This maximum should not exceed eighteen amperes, which is equivalent to an ammeter reading of sixteen when all lights are off.

Do not put oil on the commutator of either the generator or the starting motor.

Ammeter

The ammeter on the instrument board indicates the amount of current flowing to or from the battery except when the starter pedal is down and the starting motor is cranking the engine. When the engine is not running, the ammeter will indicate a current on the discharge side depending in amount upon the number of lights in use. The rate of charge or discharge when the engine is running depends upon the speed of the engine and the number of lights in use, and is equal in amount to the difference between the current generated and the current used by the lights, horn, ignition, and other electrical devices. The ammeter does not indicate the current used in cranking the engine.

If the ammeter should show "Discharge" with the car running twelve miles an hour or more and with no lights in use, it is an indication either that the fan belt is slipping or that the generator charging rate should be readjusted. The fan belt should be inspected first, and tightened if necessary, before any attempt is made to change the generator charging rate.

Storage Battery

The storage battery is a three-cell, six-volt Exide battery made especially for the Cadillac electrical system by the Electric Storage Battery Company of Philadelphia, Pennsylvania. The battery compartment is between the left-hand running board and the frame. The door of the compartment operates the same as the door of the the tool compartment, described on page 24. On some cars the battery compartment is just forward of the running board.

Adding Water to Storage Battery

The battery is filled with a solution from which the water slowly evaporates and fresh distilled water must be added at intervals to maintain the correct level. The level should be inspected every 500 miles and distilled water should be added to bring the level up to the bottom of the fillers.

The battery compartment has been purposely made convenient of access to facilitate the adding of water. It is important in touring that nothing be placed on top of the compartment that would interfere with this regular attention.

Each cell is provided with a filler and filler plug. To remove a filler plug, turn it as far as possible counter-clockwise and then lift it straight up. To install it, set the plug in place and turn it clockwise until tight. If a plug is lost or broken, obtain a new one and install it as soon as possible.

Nothing but pure distilled water should be added to the battery solution. In the absence of distilled water, melted artificial ice or rain water caught in

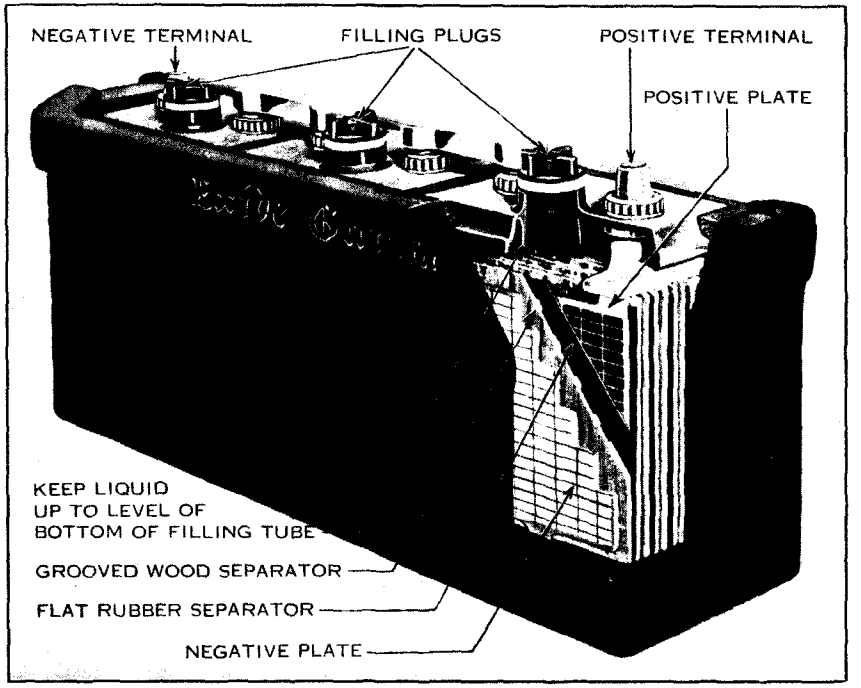


FIGURE 18. ***Storage battery***

an earthenware receptacle may be used. Hydrant water or water that has been in contact with metallic surfaces will cause trouble if used. *Acid must never be added to the battery.*

After adding water to the storage battery in freezing weather, the car should immediately be run far enough to mix the water and acid solution thoroughly. If the car is parked immediately after adding water, the water is likely to stay on top of the acid solution and may freeze, causing extensive damage.

If one cell regularly requires more water than the other, a leaky jar is indicated. A leaky jar should be replaced immediately by a new one as even a very slow leak will in time result in the loss of all the solution in the cell.

Specific Gravity of Battery Solution

As the storage battery is charged and discharged, the solution reacts chemically with the plates of the battery, the specific gravity of the solution changing as the reaction proceeds. The state of charge of the battery is thus indicated by the specific gravity of the solution. As the battery is charged, the specific gravity of the solution increases, reaching 1.270 to 1.290 when the battery is fully charged. The specific gravity of the solution decreases as the battery is discharged. A fully discharged battery has a specific gravity of 1.150 to 1.170.

A hydrometer is the instrument used to measure the specific gravity of a solution. A hydrometer syringe is a hydrometer especially designed for convenience in testing the specific gravity of the acid solution in the storage battery. A hydrometer syringe can be obtained at any battery service station.

The specific gravity of the acid solution should never be tested immediately after adding distilled water. If the solution is below the plates so that it cannot be reached with the syringe, add the necessary amount of distilled water and then drive the car for a few hours before taking the hydrometer reading.

Disconnecting Battery

Do not remove the 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.

Never run the engine with the storage battery disconnected. Serious damage to the generator may result.

Exide Depots and Sales Offices

The Electric Storage Battery Company, whose general offices and works are at Alleghany Avenue and Nineteenth Street, Philadelphia, Pennsylvania, has representative stations in towns of any considerable size as well as sales offices and Exide battery depots in a number of the larger cities. If a storage battery is in need of attention other than recharging, it is advisable to communicate either with a Cadillac maintenance station or with the nearest Exide station or depot. Do not ship a storage battery without receiving instructions.

Starting Motor

Operation of Starter

The starting motor is a series-wound motor, mounted vertically at the rear end of the crankcase directly over the flywheel. When cranking the engine, the starting motor drives the flywheel through a pinion which meshes with teeth machined on the rear face of the flywheel. The pinion is normally held out of engagement with the teeth on the flywheel. It is moved down into mesh with the teeth on the flywheel by pushing forward on the starter pedal. Further movement of the pedal operates a switch that closes the battery circuit and starts the armature revolving.

If, in pushing down the starter pedal, the ends of the teeth on the pinion strike against the ends of the teeth on the flywheel, preventing further movement of the pinion, continued movement of the pedal compresses a spring. As soon as the pedal has been pushed down far enough to close the starting switch, the armature starts to revolve. The pressure of the spring then forces the pinion the rest of the way, completing the meshing operation.

An over-running clutch on the armature shaft prevents the flywheel from driving the starting motor after the engine is running under its own power and before the starter pedal is released.

Ignition

General Description

The function of the ignition system is, first, to multiply the low voltage (six to eight volts) of the storage battery and generator into voltage of sufficient intensity to cause a spark to jump between the electrodes of the spark plugs; and second, to time this spark so that igntion will take place in the proper cylinder at the proper instant.

The Delco single-spark system is used, consisting of a combination timer-distributor unit in connection with a transformer or induction coil. The primary circuit, through which flows the current from the storage battery or generator, includes the primary winding of the ignition coil; the timer contact arms and points; and the condenser, which is enclosed in the timer. The

secondary or high-voltage circuit includes the secondary winding on the ignition coil, the distributor and the spark plugs.

Current flows through the primary circuit whenever and as long as either of the two sets of timer contact points is closed. Current flows through the secondary circuit for an instant only when either set of contact points is opened; but the voltage of this current is several thousand times that of the primary circuit and is sufficient to cause a spark at the spark plug

Timer-Distributor

The timer-distributor is mounted on the top of the crankcase at the rear end and is driven by a spiral gear on the rear end of the camshaft. The shaft of the timer-distributor, which revolves at one-half crankshaft speed, carries a four-lobed cam. As this cam revolves, it actuates the two contact arms alternately, closing and opening first one set of contact points and then the other. The circuit is thus made and broken eight times during each revolution of the cam and eight corresponding sparks are produced at the spark plugs.

In order to procure the maximum power from each explosion, ignition must occur at the right instant in relation to the position of the piston. But the ignition process, although apparently a matter of an instant, consumes a measurable amount of time. It is therefore necessary to break the circuit at the contact points far enough in advance so that actual ignition will take place in the cylinder at the correct time. The lapse of time is always the same, regardless of the speed of the engine, but because the pistons move faster when the engine is running at higher speeds than when it is running at lower speeds, the degree of advance in relation to the positions of the pistons must be increased as the engine speed increases.

This advancing of the relative timing of the spark for higher engine speeds is automatically accomplished by a centrifugal ring governor on the timer shaft below the cam. As the speed of the engine increases, the governor ring assumes a position more nearly horizontal, forcing the cam ahead of the shaft by which it is driven. This causes the contact points to open earlier, starting the ignition process earlier in relation to the positions of the pistons in the cylinders.

In addition to the automatic advance, the timer has a manual control by which the opening of the contact points may be still further advanced or still further delayed. This is operated by the left-hand lever at the steering wheel, as described on page 10.

The distributor is the mechanism that insures that the high voltage current in the secondary circuit is switched to the proper spark plug at the proper time. It consists of a rotor which is carried on the upper end of the timer shaft and which has a metal contact button electrically connected at

all times with the secondary current from the coil. As the rotor revolves, the button makes contact successively with eight metal contacts which are set in the distributor head, and which are connected to the spark plugs. The relation between the rotor and the timer shaft is such that when the cam causes one set of timer contact points to open, the rotor will be in correct position for conducting the resulting high voltage in the secondary circuit to the proper spark plug.

Spark Plugs

For best results the electrodes of the spark plugs should be .032 to .035 inch apart. If the spark plugs should be removed, it is recommended that the electrodes be inspected and adjusted to this clearance if necessary.

Lighting System

Lamp Bulbs

It is recommended that bulbs for the lamps, particularly the two-filament bulbs for the headlamps, be purchased from a Cadillac distributor or dealer. In any event bulbs should have the correct voltage and candle-power ratings. Only three different types of lamp bulbs are used in the entire lighting system. The bulbs and the lamps in which they are used are as follows:

Lamp	Voltage	Candle-power
Headlamps	6 8	21 (two-filament) (Mazda No. 1110)
Back-up light	6 8	21 (single filament)
Stop light	6-8	
Inspection lamp	6-8	
Parking lights	6-8	3
*Instrument lamp	6-8	
*Rear lamp	6-8	
Closed car dome and quarter lamps	6-8	

Cadillac two-filament bulbs are equipped with fog caps or metal screens placed over the upper part of the bulb for the purpose of stopping direct unreflected light from the filament. It is this direct unreflected light from the filament that causes the dazzling reflection from fog or smoke. Headlamps equipped with fog caps have the appearance of being dimmed when seen from the front but they do not perceptibly affect the useful light from the headlamps.

In replacing a headlamp bulb, transfer the fog cap from the old bulb to the new, adjusting the cap to the position shown in Fig. 21. Then adjust the lamp as directed on page 69.

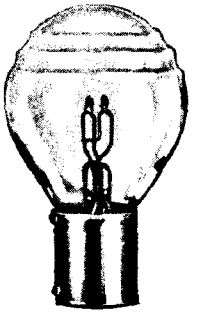


FIGURE 19. ***Double-filament headlamp bulb***

*Bulbs rated at 3-4 volts, such as are used in the rear lamps of some cars, must not be used in these lamps. If installed, they will burn out almost immediately.

Cleaning Headlamp Reflectors

The headlamp reflectors are plated with pure silver. Although the reflectors ordinarily require no attention, if they should require polishing extreme care must be exercised to select materials that will not scratch the silver.

Powdered dry rouge and a chamois skin are recommended. If the reflectors are tarnished, the rouge may be moistened with alcohol. Afterward, polish with a dry chamois and rouge.

The chamois used for the headlamp reflectors must not be used for any other purpose. It must be soft and free from dust.

Do not touch the reflectors with the bare hands.

Official Approval of Headlamps

Cadillac headlamps have been approved by practically every state in the country. For purposes of official identification, the following description of the headlamps is given:

A complete headlamp containing a parabolic reflector with axis inclined two and one-half degrees; screw adjustment on shell of headlamp to adjust the bulb filament with relation to the reflector in both axial and vertical planes to compensate for filament variation in bulbs; a cover glass containing cylindrical flutes vertically grouped in three distinct zones, the outer zone having greater refractory power and the flutes being more pronounced than

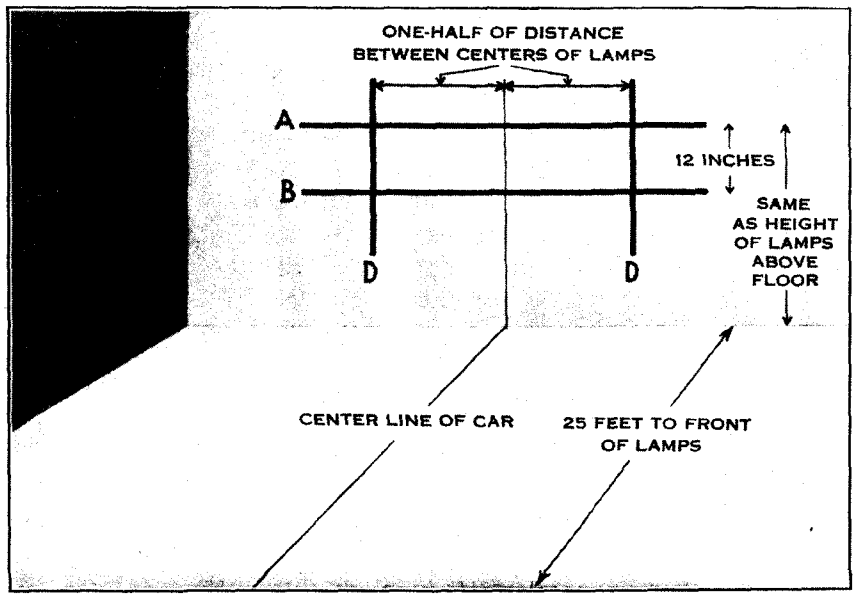


FIGURE 20. ***Marks for adjustment of headlamps***

in the center; and a cap over the upper front portion of the bulb to intercept the direct unreflected light above the horizontal.

Approval by the state authorities is conditional upon the headlamps being adjusted to a definite standard. The directions which follow are for this standard adjustment.

Adjustment of Headlamps

Select a level spot where the car with an average load can be placed facing toward and twenty-five feet distant from a wall upon which the lines shown in Fig. 20 can be drawn. The adjustment should be made when it is dark enough so that the outlines of the projected beams are plainly visible.

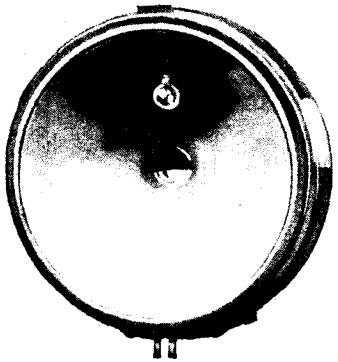


FIGURE 21. ***Headlamp fog cap***

Locate a point on the wall directly opposite the front of the car by sighting through the center of the rear curtain toward the radiator cap. Draw a vertical line on the wall through this point: Measure the distance between the centers of the headlamps, and draw two vertical lines "D" parallel to the center line and distant from it by an amount equal to one-half of the distance between the headlamps. Measure the distance of the headlamp centers above the ground or floor and draw the horizontal line "A" at the same elevation. Draw the line "B" twelve inches below the line "A."

Upper Adjusting Screw—The first adjustment should be made with the lower beam on, that is, with the lighting switch lever in the third position. Cover the headlamp that is not being adjusted, or disconnect the plug connector that supplies current to the lamp. Remove the headlamp door. Make sure that the fog cap is properly placed on the bulb as shown in Fig. 21.

The adjusting screws, of which there are two, are in the back of the headlamp shell. Turn the upper or large adjusting screw until the light spot on the screen is the smallest that can be obtained.

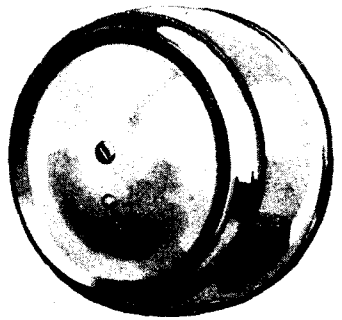


FIGURE 22.
Headlamp adjusting screws

Loosen the nut on the headlamp support and aim the headlamp so that the top center of the spot of light is at the intersection of lines "B" and "D" as shown in Fig. 23a. When the lamp has been properly aimed, tighten the nut securely.

(Continued on page 71)

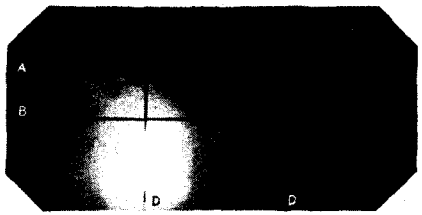


Figure 23a
Left-hand lower beam without lens.

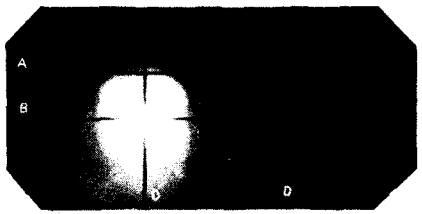


Figure 23b
Left-hand upper beam without lens.

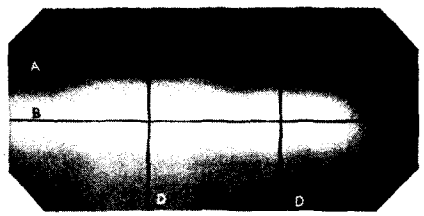


Figure 23c
Left-hand upper beam with lens.

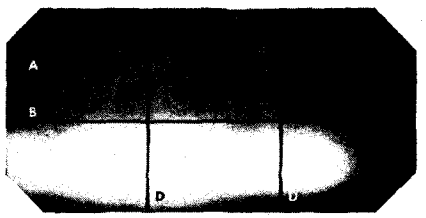


Figure 23d
Left-hand lower beam with lens.



Figure 23e
Both upper beams with lenses.

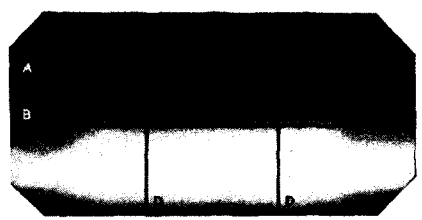


Figure 23f
Both lower beams with lenses.

FIGURE 23. *Beams from headlamps*

Lower Adjusting Screw—Turn the lighting switch to the fourth position so that the upper beam is on. Adjust the lower or small screw until the top of the beam is at the intersection of lines "A" and "D" as shown in Fig. 23b. The beam should be of approximately the same proportionate size as shown, and the greatest intensity of the beam should be near the top of the spot and not at its center. If the lower beam is now switched on, it should appear as in Fig. 23a and should be of the same proportionate size with the greatest intensity near the bottom, rather than at the center of the spot.

Install the door with the lens. If the lens is for any reason removed from the headlamp door, it should be replaced with the cylindrical flutes vertical and the smooth side facing out.

With the lens in place, the upper beam from the left-hand headlamp should appear as in Fig. 23c. The pattern of the lower beam from the left-hand headlamp should appear as in Fig. 23d.

After adjusting the one headlamp, repeat the adjustment on the other. When both headlamps have been adjusted and both headlamp doors are in place, the combined light from both headlamps should appear as in Fig. 23e when the upper beams are on, and as in Fig. 23f when the lower beams are on.

CHAPTER V

Clutch and Transmission

Clutch

THE Cadillac clutch is a dry multiple-disc clutch with eight smooth driven discs and seven driving discs faced with friction material composed largely of asbestos. The driving discs have gear teeth machined on their outer circumference to engage with teeth machined internally in the flywheel. The driven discs have gear teeth machined on their inner circumference to mesh with teeth machined on the outside of the clutch hub, which in turn drives the transmission. Except when the clutch pedal is pushed down, the clutch discs are pressed together by a spring having a pressure of 350 lbs. The driven discs then revolve with the driving discs and the engine, if running, drives the transmission.

When the clutch pedal is pushed down to disengage the clutch a forked lever presses against the clutch spring through a ball thrust bearing, releasing the discs from the pressure of the spring. The discs then separate and the driven discs rotate independently of the driving discs.

The clutch itself requires no adjustment or attention other than lubrication of the clutch thrust bearing as directed on page 45. Adjustment of the clutch release rod, however, may be necessary after the car has been driven some distance.

Adjustment of Clutch Release Rod

As described on page 15, the clutch pedal is purposely given about one inch of "lost motion." That is, the clutch does not begin to disengage until the pedal has been moved down about an inch from its released position. This lost motion is necessary in order to allow the clutch discs to come closer together as the facings are reduced in thickness. The lost motion gradually decreases as the clutch is used and eventually will be all taken up. Before this happens, the clutch release rod must be readjusted to restore the lost motion; otherwise the clutch discs will slip and the engine will not drive the car.

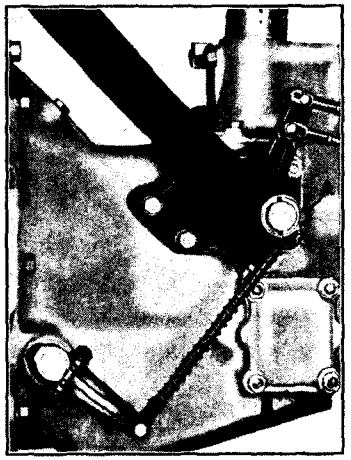


FIGURE 24.
Adjustment of clutch release rod

To make the adjustment, unscrew the nut "A" (Fig. 24) until the clutch pedal has a movement of one inch without starting to disengage the clutch.

The nut "A" must be turned a half-turn at a time.

Transmission

The purpose of the transmission is to provide a means for varying the ratio and direction of the rear axle speed in relation to the engine speed. Three things are accomplished by doing this: First, the engine is enabled to drive the car backwards. Second, the engine is permitted to revolve fast enough to develop the power necessary for starting and for driving the car at extremely low speeds. Third, the turning effort of the engine is multiplied so that it may be sufficient for climbing steep hills and pulling through deep sand and mud.

The Cadillac transmission is known as the selective, sliding gear type. It has three speeds forward, of which one is direct drive, and one speed in reverse. Selection of the various speeds is accomplished by movement of two shifter gears, "A" and "D," (Fig. 25) which are controlled by the transmission control lever. The positions of the gears corresponding to the five positions of the control lever, as illustrated in Fig. 2, are as follows:

Neutral—When the control lever is in neutral position, the shifter gears "A" and "D" are in the positions shown in Fig. 25; that is, they are not in mesh with any of the other gears.

Low—When the control lever is moved from neutral to low, the gear "A" is moved forward into mesh with gear "R." Power is then transmitted from the clutch shaft "Z" to the transmission main shaft "C" through gears "E," "U," "R" and "A." The ratio of engine speed to propeller shaft speed in low is approximately 3 to 1.

Intermediate—When the control lever is moved from low to intermediate the gear "A" is first returned to its neutral position and gear "D" is then moved back into mesh with gear "S." Power is then transmitted through gears "E," "U," "S" and "D." The ratio of engine speed to propeller shaft speed in intermediate is approximately 1.7 to 1.

High—When the control lever is moved from intermediate to high, the gear "D" is first moved forward out of mesh with gear "S" and then farther forward until teeth cut internally in a recess in gear "D" engage teeth on the

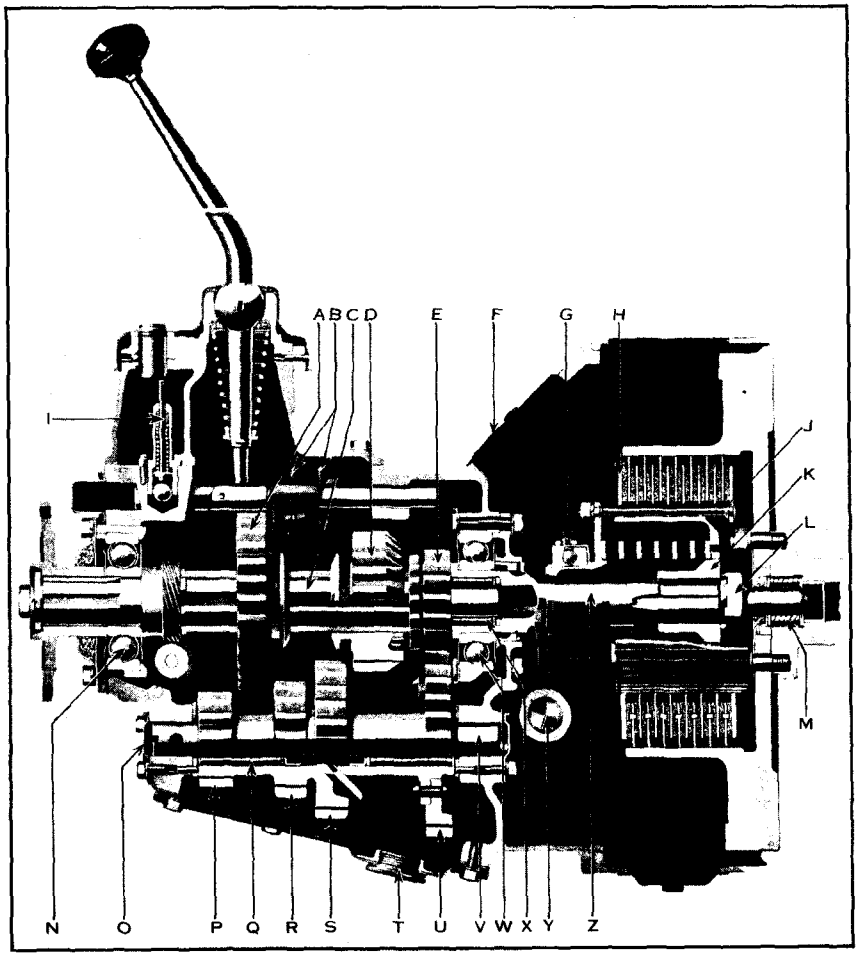


FIGURE 25. ***Sectional view of transmission***

extreme end of gear "E." The drive is then direct from the clutch shaft to the transmission main shaft without reduction.

Reverse—When the control lever is moved from neutral to low, the gear "A" is moved back into mesh with an idler gear, not shown in Fig. 25, which is at all times in mesh with gear "P." Power is then transmitted through gears "E," "U," "P," the reverse idler gear, and gear "A." The interposition of the idler gear reverses the direction of rotation. The ratio of engine speed to propeller shaft speed in reverse is approximately 3.8 to 1. .

CHAPTER VI

Brakes

General Description

THERE are three pairs of brakes: the rear wheel external brakes, the rear wheel internal brakes, and the front wheel brakes, which are also internal. The rear wheel external brakes and the front wheel brakes are operated by the brake pedal and comprise the foot brakes. The rear wheel internal brakes are operated by the hand lever and are used principally for locking the rear wheels when the car is standing.

The purpose of the front wheel brakes is to add to the braking ability as much as is consistent with safety. It is not desirable to attempt to secure the maximum possible braking effect on the front wheels for the reason that, when a front wheel slides without rotating, it has no power to change the direction of the car.

Cadillac front wheel brakes are accordingly designed so that when the foot brakes are applied while the steering wheel is turned to the right or left, only the brake on the inside wheel is effective and the brake on the outer wheel is released, leaving the outer wheel free to rotate. It is thus impossible to lock both front wheels even on slippery pavement unless the car is moving straight ahead. If, while the car is moving straight ahead on slippery pavement, the brakes should be applied with sufficient pressure to lock both front wheels and it then becomes necessary to make a turn, the car will instantly respond because the brake on the outer wheel is automatically released as soon as the steering wheel is turned.

Adjustment

Each foot brake has provision to compensate for wear on the brake lining. The adjustment by which this compensation is effected is at the brake itself

rather than in the connections. Cadillac brakes must *not* be adjusted to compensate for wear by adjusting the pull rods or stop screws.

As described on page 16, the Cadillac two-stage brake pedal automatically notifies the driver when the foot brakes require adjustment. It is recommended that the car be taken to a Cadillac maintenance station for attention when necessity for adjustment is thus indicated.

If, however, the adjustment is neglected and as a result the pedal touches the floor boards before the brakes are fully applied, an emergency adjustment can be made by screwing down the adjusting nuts "F" (Fig. 26) one or more half-turns. The nuts "F" lock every half-turn and must be turned a half-turn at a time. The nuts "F" must not be turned down far enough to cause the brakes to heat and they must be turned down the same amount on both sides.

If adjustment of the nuts "F" is not sufficient, or if the occasion gives opportunity for a complete adjustment, this adjustment should be made as follows:

Loosen the three locking nuts "B," "D" and "N" (Fig. 26) and screw the three stop screws "A," "C" and "M" away from the brake band. Observe the clearance between those parts of the brake lining nearest the hexagonal

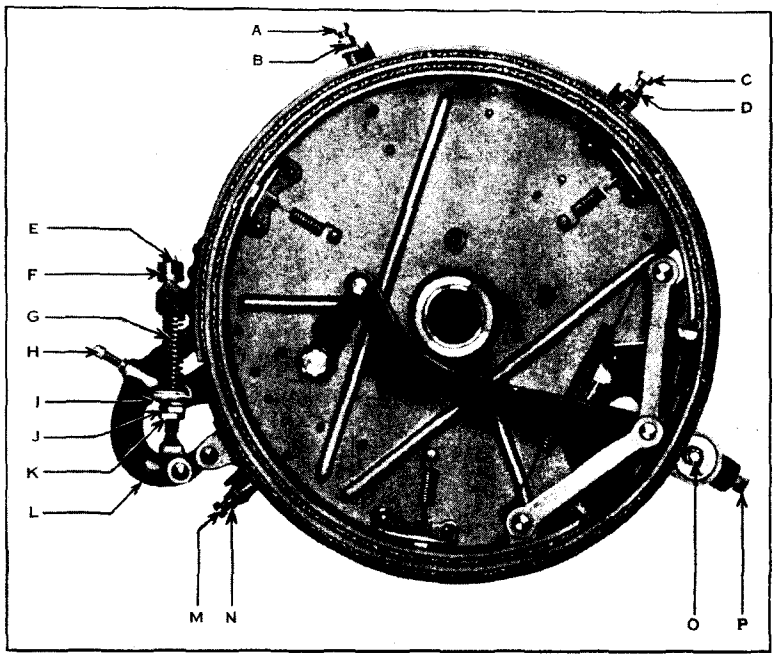


FIGURE 26. ***Rear wheel brakes***

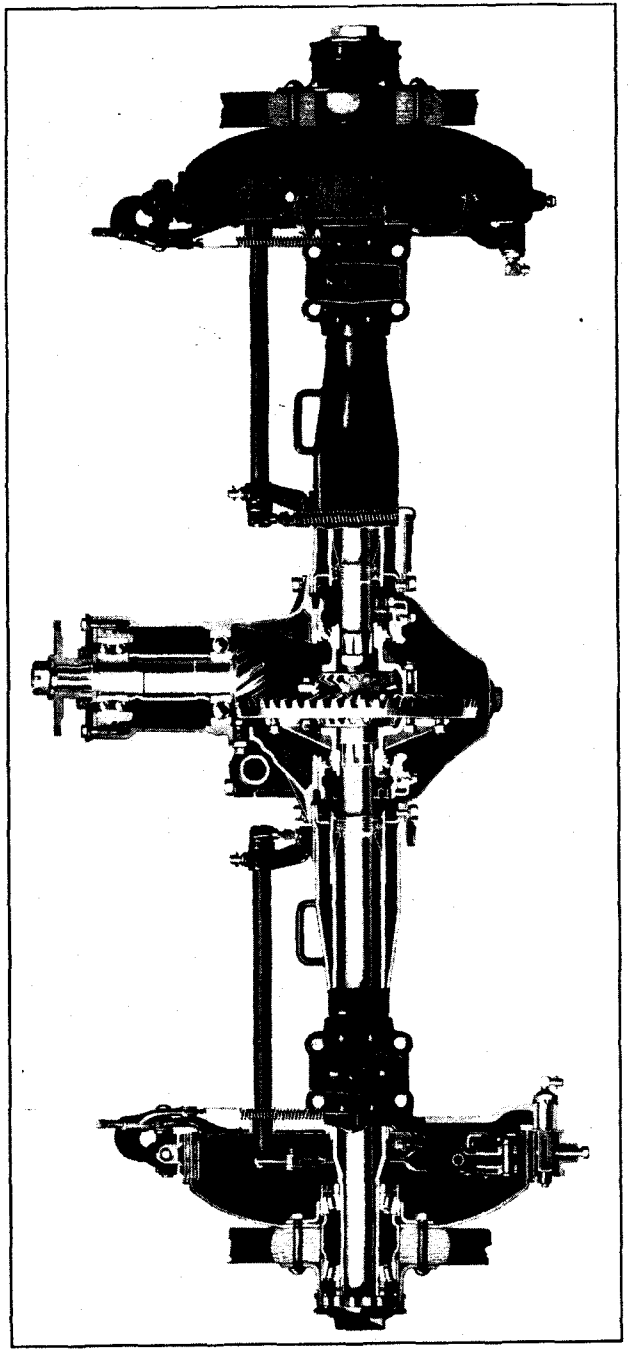


FIGURE 27. *Sectional view of rear axle*

head screw "P" and the brake drum. This clearance should be .030 to .035 inch. If the clearance is not correct, adjust the screw "P" until it is. The screw "P" is kept from turning of its own accord by a lock washer which turns with the screw and locks every half-turn. It must accordingly be turned a half-turn at a time.

Loosen the locking nuts "K" and adjust the nuts "J" and the screws "M" so that there is a uniform clearance of .030 to .035 inch between the *lower* part of the brake lining and the brake drum. To decrease the clearance between the brake lining and the drum, screw the nut "J" farther down on the yoke bolt "E."

Adjust the nuts "F" and the two stop screws "A" and "C" so that there is a uniform clearance of .030 to .035 inch between the *upper* part of the brake lining and the drum.

After making the foregoing adjustments so that there is a uniform clearance of .030 to .035 inch betwen the drum and the lining, check the results by applying the brakes, and measuring the travel of the upper end of the lever "L." This travel should not be less than $\frac{7}{8}$ inch. If the end of the lever "L" travels less than $\frac{7}{8}$ inch in moving from the released position to the applied position, readjust one or all of the nuts "F" and "J" and the screws "P," "A," "C" and "M" to increase the clearance slightly, keeping the clearance uniform at all points around the drum. Do not fail to tighten the locking nuts "B," "D," "N" and "K" when the adjustment has been made.

Do not change the adjustment of the screw "H." This screw is properly set when the car is assembled and does not require readjustment in taking up wear on the lining.

Inasmuch as the brakes are designed so that the greater proportion of the braking load is taken by the rear wheel brakes, adjustment of the front wheel brakes is usually not necessary until the rear wheel foot brakes have been adjusted several times. Before the limit of adjustment for the rear wheel foot brakes has been reached, the car should be taken to a Cadillac maintenance station for adjustment of the front wheel brakes.

Adjustment of the hand brakes is unnecessary. The hand brakes retain their effectiveness without adjustment throughout the life of the lining.

All joints in the brake connections should be oiled at regular intervals. The brakes should also be tested occasionally to be sure that they are in serviceable condition. When the brake band linings have worn so that further adjustment is impossible they can be renewed.

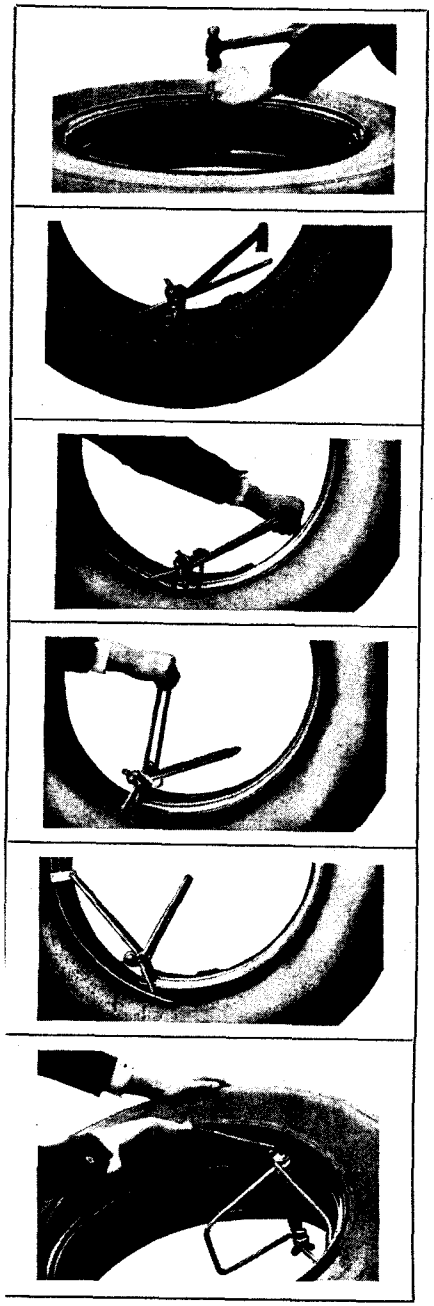


Figure 28a

Lay the tire and rim flat on the ground and drive out the locking pin, using the hammer and punch in the tool kit. *Be sure there is no air in the tire.*

Figure 28b

Apply the rim tool, which is furnished in the tool kit, as shown in the illustration. Note that there are two pairs of holes in the rim near the split and that one pair is nearer the split than the other. The short end of the tool must be inserted in the holes nearer the split and the long end in the holes farther from the split. Clamp the tool firmly in position by tightening the wing nut.

Figure 28c

Grasp the two handles and squeeze them together, spreading the ends of the rim farther apart at the split. Then pull both handles together toward the other side of the rim until one end of the rim is forced up and over the other end. If the rim does not pull over evenly on both sides a screw-driver can be used to advantage to pry up the end of the rim.

Figure 28d

Release the short handle of the tool but continue pulling the long handle until it is against the rim.

Figure 28e

Engage the hook that is attached to the long handle over the edge of the rim to hold the rim in the collapsed position.

Figure 28f

Lay the rim and tire on the ground with the hook and wing nut *face down*, and remove the tire from the rim by working it off first on the side where the rim is split. The handle of the large wrench is flat to serve as a prying tool.

FIGURE 28. ***Removing tire from rim***

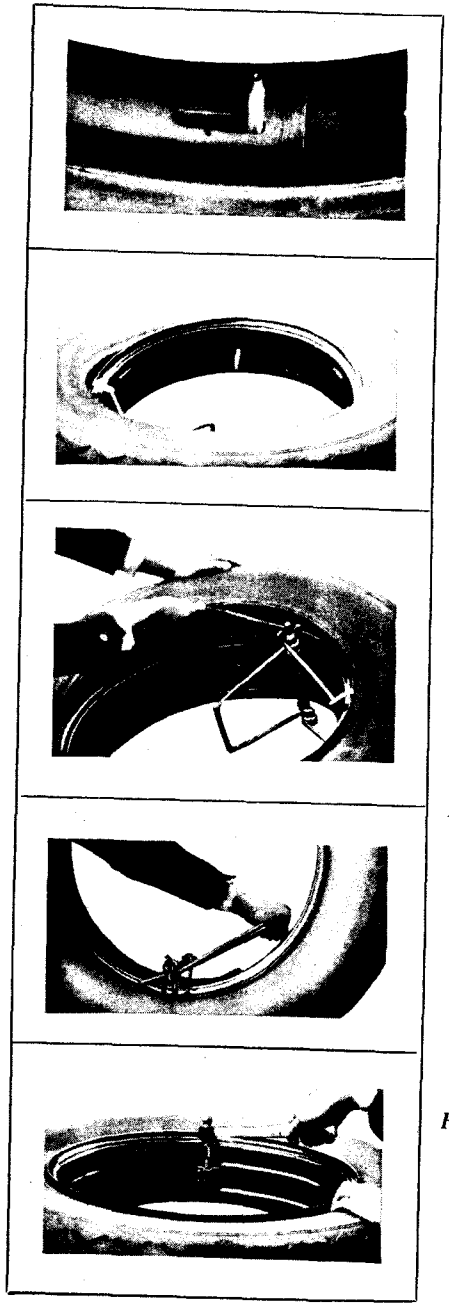


Figure 29a

Make sure that the tube flap is in place and that the valve stem passes through the holes in both ends of the flap.

Figure 29b

Lay the rim on the floor with the hook and wing nut of the tool *face up*. Insert the valve stem in the hole in the rim and work the tire well into place on each side of the valve stem.

Figure 29c

Pry the tire over the projecting end of the rim where it is split. The rest of the tire can then be pushed down into place.

Figure 29d

Release the hook from the rim and let the long handle go back until it stops. Then squeeze the two handles together until the end of the rim drops into its original position. *Do not attempt to force the long handle alone as this will only bend the tool.* If the end of the rim does not go easily into place, remove the tool and pry the end of the rim with a screw-driver.

Figure 29e

Replace the pin which locks the two ends of the rim together. This is important.

FIGURE 29. ***Installing tire on rim***

CHAPTER VII

Wheels

Tires and Rims

ILLUSTRATED directions for removing a rim with tire from a wheel and installing a rim with tire on a wheel are given in Figs. 10 and 11. Directions for removing a tire from a rim and installing a tire on a rim are given in Figs. 28 and 29.

Do not under any circumstances attempt to remove a tire from a rim without deflating the tire.

Caution in Adjusting Wheel Bearings

The adjustment of wheel bearings or the removal of the wheels should not be attempted by one unfamiliar with work of this nature. It is recommended that the car be taken to a Cadillac maintenance station if possible. In any event great care must be exercised in adjusting wheel bearings 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.

Removing Front Wheel

To remove a front wheel, first jack up the axle until the wheel is free from the ground and then proceed as follows:

Remove the hub cap by unscrewing it. Remove the cotter pin "E" (Fig. 30). Remove the lock nut "A." Remove the serrated washer "B." Remove the adjusting nut "C." The wheel may then be removed by pulling it straight off.

Installing Front Wheel and Adjusting Bearings

Before installing the wheel, make sure the bearings are clean and that they are packed in a light grease that is free from dirt and grit.

Set the wheel in place on the spindle and adjust the nut "C" (Fig. 30) very carefully, following the caution above. Install the serrated washer "B," making sure that one of the notches in the washer fits over the stud "D" on

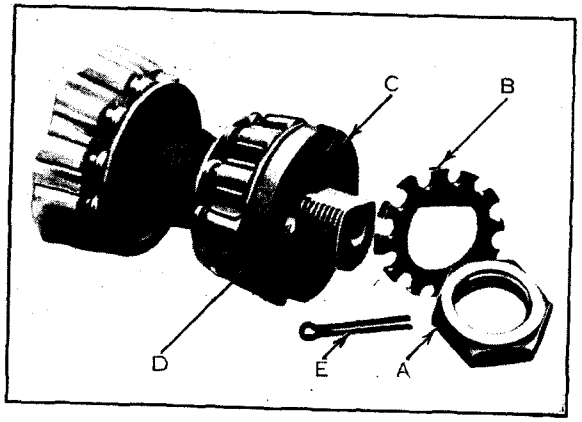


FIGURE 30. *Front wheel bearings*

the adjusting nut. Replace the lock nut "A" and tighten it firmly, locking it with the cotter pin "E."

It is always better to adjust wheel bearings too loosely than too tightly. If, after the adjustment is apparently correct, the notch in the washer "B" is not directly over the stud "D," loosen the adjustment rather than tighten it.

Removing Rear Wheel

To remove a rear wheel, first jack up the axle until the wheel is free from the ground and then proceed as follows:

Remove the hub cap "D" (Fig. 31) by unscrewing it. Remove the spring locking ring "F." Withdraw the axle shaft "E." With a screw-driver or blunt

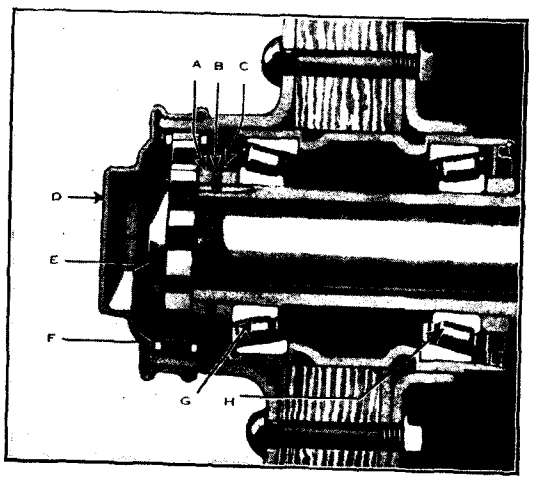


FIGURE 31. *Sectional view of rear wheel hub, showing bearings*

tool straighten the lug of the outer lock washer "B" where it has been bent over the lock nut "A." Unscrew the lock nut "A." Remove the washers "B" and the adjusting nut "C." The wheel can then be removed by pulling it straight off.

Installing Rear Wheel and Adjusting Bearings

Before installing the wheel, make sure that the bearings are clean and packed in a light grease that is free from dirt and grit.

Set the wheel in place upon the axle and adjust the nut "C" (Fig. 31) very carefully. Install the lock washer "B," using new washers or straightening the ones removed if new ones are not available. In placing the washers in position, reverse the outer one with respect to the inner so that the lugs on one washer are opposite the spaces between the lugs on the other washer; that is, so that the lugs on the two washers are staggered. Install and tighten the lock nut "A." Next, select that lug on the inner washer that falls nearest to the center of one of the flat sides of the adjusting or inner nut, and with a screw-driver or other suitable tool bend this lug over the nut. In the same way bend one of the lugs of the outer washer over one of the flat sides of the locking or outer nut. In bending the lugs of the locking washers, take care not to alter the adjustment of the inner nut or loosen the outer nut.

CHAPTER VIII

Repair Parts

Genuine Cadillac Parts

CADILLAC owners are cautioned against permitting the use of other than genuine Cadillac parts in the repair of their cars. The quality of the Cadillac car is identical with the quality of its component parts, the production of which is based upon more than twenty years of experience in designing, manufacturing, and inspecting. No other individual or organization has access to the data resulting from this experience nor could they possibly have the same interest in protecting the owners of Cadillac cars.

Uniform Parts Prices

Cadillac parts are sold at uniform prices throughout the United States, and are not subject to the addition of transportation, excise or other supplementary charges. Printed price lists published by the Cadillac Motor Car Company are open to inspection by owners at any authorized Cadillac distributor's or dealer's establishment.

Ordering New Parts

With many thousands of Cadillac automobiles in use, it is obviously impractical to deal directly with each Cadillac owner. We cannot open accounts with any except regular distributors with whom annual contracts are made.

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 Cadillac distributor or dealer, who carries a large stock and is generally in a position to supply a part immediately. If he cannot do so, he can order it. 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 parts, either from a Cadillac distributor or from the factory, send the engine number and the unit assembly number (see page 84) with an accurate description of the part desired, preferably accompanied by a sketch with dimensions. If this cannot be done, send the part itself properly tagged and with transportation charges prepaid. (See below under "Returning Parts.") Otherwise prompt and intelligent filling of the order will be impossible.

Our responsibility ceases in all cases with delivery to the transportation company.

Returning Parts

In the event parts are returned, transportation charges must be prepaid or the parts cannot be accepted. They should be tagged properly with the name of the owner and the engine number of the car. A letter should be sent, giving complete instructions regarding the disposition of the parts.

Tires, Speedometer and Clock

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

CHAPTER IX

Specifications and License Data

Type of engine	8 cyl. V-type
Diameter of cylinder bore	3⅛ in.
Length of stroke	5⅛ in.
Piston displacement	314 cu. in.
Horsepower (N. A. C. C. rating)	31.25
Engine number	See below
Diameter of crankshaft *main* bearings	2⅜ in.
Length of crankshaft between inner ends of front and rear bearings	18⅝ in.
Exhaust valves	1 9/16 in.
Inlet valves	1 11/16 in.
Capacity of gasoline tank	20 gals.
Capacity of engine lubricating system	2 gals.
Capacity of cooling system*	4½ gals.
Capacity of transmission	3 qts.
Capacity of rear axle	3½ qts.
Tires	33x6.75 (low pressure)
Wheelbase	132 *in. and* 138 *in.*
Tread	56 in.

*When the radiator contains only enough liquid to cover the bottom of the upper tank.

Engine and Unit Assembly Numbers

EACH Cadillac car when shipped carries an engine number which is also a serial number. This is the number to be used in filling out license and insurance applications and in general reference to the car. The engine number is stamped on the car in two places: On the name plate on the front face of the dash and on the crankcase at the base of the oil filler.

The various units such as the transmission, steering gear, etc., also carry unit assembly numbers. These are located as described below. It is important in ordering parts to give, not only the engine number of the car, but also the unit assembly number of the unit to which the part belongs.

Transmission number—on the upper surface of the boss to which the clutch and brake pedal bracket is attached.

Steering gear number—on the steering gear housing just below the oil filler plug.

Carburetor number—on the left-hand rear face of the flange by which the carburetor is attached to the intake header.

Generator number—on the left-hand side of the generator.

Starting motor number—on the left-hand side of the starter almost opposite the distributor.

Front axle number—on the upper surface of the axle I-beam at the right-hand end just above the steering stop screw.

Rear axle number—on the rear surface of the axle housing just to the right of the cover plate.

Frame number—on the upper surface of the left-hand side bar opposite the steering gear.

Index

A

Accelerator (see throttle control) 10
Accelerator, use of, when engine is cold 32
Adding water to storage battery 63
Additional cold weather suggestions 33
Adjusting of brakes 74
Adjustment of clutch release rod 72
Adjustment of headlamps 69
Adjustment of oil pressure regulator 42
Air compressor for tires 27
Air compressor, gasoline system 9
Air pump for tires (tire air compressor) 27
Alcohol as anti-freeze 34
Alcohol, effect of, on finish 34
Alignment of front wheels, incorrect, result of 51
Ammeter 17
Ammeter, its use 62
Anti-freezing solutions 33
Axle, rear, add lubricant to 46

B

Battery, storage of, when car not in use 53
Bearing, clutch thrust, to grease 45
Bearings for wheels, adjustment of 80
Bearings for wheels, pack with grease 46
Body and top, care of, when stored 54
Body, care of finish when new 49
Brakes 16
Brake adjustment 74
Brakes, general description of 74
Brakes suddenly applied, effect on tires 52
Bulbs for lamps, voltage 67
Button, carburetor enriching 11

C

Carburetor 59
Carburetor enriching button 11
Carburetor enriching button, use of, in cold weather 31
Carburetor, to prime 31
Capacity of cooling system 34
Caps, tire valve 25
CARE OF BODY 49
Care of finish on body when new 49
CARE OF TIRES 51
Chains for tires, when improperly adjusted 51
Changing tire on rim 78–9
Changing tires 30
Chassis lubrication diagram 44
Choke rod 11
Choke rod button (carburetor enriching button) use of, in cold weather 31
Cigar lighter and inspection lamp 23
Circulating system for oil 40
Circulation of water 60
Cleaner for windshield 22
Cleaning headlamp reflectors 68
Cleaning the cooling system 61
Cleaning upholstery 50
Cleaning windows, closed cars 50
Clock 23
Clock, repairs to 83
CLUTCH AND TRANSMISSION 71
Clutch, construction of 71
Clutch pedal 14
Clutch release rod, adjustment of 72
Clutch thrust bearing, to grease 45
Coasting 19
COLD WEATHER OPERATION 31
Contents 5
CONTROLS AND INSTRUMENTS 9
Control, ignition lever 11
Control, throttle lever 10
Control, transmission 15
Commutator, horn, to clean 48
Compressor, air, gasoline system 9
Compressor for air in tires 27
COOLING SYSTEM 60
Cooling system, capacity 34
Cooling system, drain and refill 60
Cooling system, to clean 61
Cowl ventilator, open cars 22
Crankcase ventilating system 42
Cup grease 39
Curtain fasteners, open cars 24
Curtains, side, open cars 23

D

Danger of running engine in closed garage 81
Data for license purposes 84
Diagram, chassis lubrication 44
Distributor oil cups, fill with oil 45
Don'ts for general operation 20
Door hardware, to oil 48
Draining cooling system 60
DRIVING 18
Driving on steep grades 19
Driving speed when car is new 18
Driving suggestions 20
Duco finished cars, to wash 50

E

Effect of alcohol on finish of body 34
ELECTRICAL SYSTEM 61
Engine, fails to start 13
Engine, gasoline, general principles of 57
Engine, important features of 56
ENGINE LUBRICATION 40

Engine number, location of ... 84
Engine oil ... 39
Engine oil for cold weather ... 33
Engine oil, to replace ... 45
Engine, prepare for storage ... 53
Engine supports, to oil ... 45
Engine, starting of ... 12
Engine, starting in cold weather ... 31
EQUIPMENT, general ... 22
Equipment, tools ... 24
Exide depots for battery maintenance ... 64

F

Fasteners, curtain, open cars ... 24
Filling and draining cooling system ... 60
Filter for oil ... 43
Finish of body, care of, when new ... 49
Foot brakes ... 16
Foreword ... 3
Front brake trunnions, lubrication of ... 47
Front wheels improperly aligned, result of ... 51

G

Garage floor, grease covered, effect on tires ... 52
Gas in closed garage, when engine is running ... 18
Gasoline filter ... 58
Gasoline gauges and air compressor ... 9
Gasoline settling chambers and strainers, where located ... 58
Gasoline strainers, cleaning in cold weather ... 33
Gasoline system ... 59
Gauge, oil pressure ... 14
Gauges, gasoline quantity and pressure ... 9
General driving suggestions ... 20
GENERAL INFORMATION ... 56
GENERAL LUBRICATION ... 45
General operation, don'ts ... 20
General principles of gasoline engine ... 57
Generator ... 61
Generator oil cups, fill with oil ... 45
Genuine Cadillac parts ... 82
Glycerin as anti-freeze ... 34
Grease for roller bearings ... 39
Grease for universal joints ... 39
Grease gun connections, to grease ... 45

H

Hand brakes ... 17
Hardware on doors, to oil ... 48
Headlamp reflectors, to clean ... 68
Headlamps, adjustment of ... 69
Headlamps, official approval of ... 68
Headlamps, operation, use of beams ... 12
Holder for rim and tire ... 30
Horn, clean commutator of ... 48

I

Ignition and lighting switch ... 12
Ignition control lever ... 10
Ignition control lever position in cold weather ... 32
Ignition, general description of ... 65
Ignition switch lock ... 9, 11
Inflation pressure, tires ... 27
Inflation of tires, under-inflation ... 51
Inspection lamp ... 23
Installing rim with tire on wheel ... 29
Installing wheels ... 80
INSTRUMENTS AND CONTROLS ... 9

L

Lamp bulbs ... 67
Lamp, inspection ... 23
Level for oil, engine ... 41
Lever, ignition control ... 10
Lever, throttle control ... 10
Lever, transmission control ... 15
License data ... 84
Lighter, cigar ... 23
Lighting switch ... 12
Lighting system ... 67
Locks ... 9
Lubricant for rear axle and transmission ... 39
Lubricant for steering gear ... 39
Lubricants ... 39
Lubricants, selection of ... 39
Lubrication and care ... 35
Lubrication chart ... 36
LUBRICATION, ENGINE ... 40
Lubrication schedule ... 36
LUBRICATION, SYSTEMATIC METHOD ... 37

M

Mirror, rear vision ... 23
Mounting tire on rim ... 79

N

New car, driving speed ... 18
New car, washing ... 49

O

Official approval of headlamps ... 68
Oil circulating system ... 40
Oil cups on generator, to fill ... 45
Oil cups on timer-distributor ... 45
Oil filter ... 43
Oil for engine ... 39
Oil for engine in cold weather ... 33
Oil holes in steering column, to lubricate ... 47
Oil level ... 41
Oil pressure regulator ... 42
Oil pressure ... 41
Oil pressure gauge ... 14
Oil, replacing of, in engine ... 45

OPERATION, IN COLD WEATHER ... 31
Operation, don'ts ... 20
Operation of starter ... 65
Ordering new parts ... 83

P

Parts, genuine Cadillac ... 82
Parts, ordering new ... 83
Parts, returning of ... 83
Pedal, clutch ... 14
Pedal, foot brake ... 16
Pedal, starter ... 12
Position of ignition control lever ... 32
Position of throttle hand lever in cold weather ... 32
Plugs, spark ... 67
Pressure for tires ... 27
Pressure gauge, gasoline air line ... 9
Pressure of oil ... 41
Pressure, oil gauge ... 14
Prices of parts, uniform ... 82
Priming the carburetor in cold weather ... 31
Pump, air for tires (tire air compressor) ... 27

R

Radiator and shutters ... 60
Rear axle and transmission lubricant ... 39
Rear axle, sectional view ... 76
Rear axle, to add lubricant ... 46
Rear vision mirror ... 23
Removal of wheels ... 80-1
Removing rim with tire from wheel ... 28
REPAIR PARTS ... 82
Repairs to speedometer head ... 17
Replacing engine oil ... 45
Result of under-inflation of tires ... 51
Returning parts ... 83
Rim, installing on wheel ... 29
Rim, removal of tire from ... 78
Rim, removing from wheel ... 28
Rim, true up ... 30
Roller bearing and cup grease ... 39

S

Schedule of lubrication ... 37
Settling chambers and strainer in gasoline line, to clean ... 59
Shaft, flexible for speedometer drive, to lubricate ... 47
Shifting transmission gears ... 16
Shutters on radiator ... 60
Side curtains, open cars ... 24
Small cuts in tires, neglect of ... 51
Solutions for anti-freeze ... 33
Spark control lever ... 10
Spark plugs ... 67
Specific gravity of battery solution ... 64
SPECIFICATIONS AND LICENSE DATA ... 84
Speed of new car ... 18
Speedometer ... 17
Speedometer head, lubrication indicator ... 17
Speedometer flexible drive shaft, to lubricate ... 17
Speedometer, repairs to ... 83
Springs, to lubricate leaves ... 48
Stabilators, do not lubricate ... 48
Starter pedal ... 12
Starter, use of in cold weather ... 32
Starting engine ... 12
Starting engine, fails to start ... 13
Starting engine in cold weather ... 31
Starting motor ... 65
Steering gear, add lubricant ... 47
Steering gear lubricant ... 39
Strainers in gasoline system, cleaning in cold weather ... 33
Storage battery, adding water ... 63
Storage battery, location on car ... 63
Storage battery, when car is stored ... 53
STORING CAR ... 53
Storage of car, placing car in service (use) ... 54
Storage of tires ... 54
Suggestions for driving ... 20
Supports for rear of engine, to oil ... 45
Switch, ignition and lighting ... 11
SYSTEMATIC LUBRICATION ... 37

T

Taking car out of storage ... 54
Throttle control ... 10
Throttle hand lever position, cold weather ... 32
Timer-distributor, how operated ... 66
Timer-distributor oil cups, fill with oil ... 45
Tire air compressor ... 27
Tire and rim, installing on wheel ... 29
Tire and rim, removing from wheel ... 28
Tire carrier (tire holder) ... 30
Tire chains, improperly adjusted ... 51
Tire holder ... 30
Tire holder lock ... 9
Tire, to install on rim ... 79
Tire pressure ... 27
Tires ... 27
Tires, care of, when car is stored ... 54
Tires, removal from rim ... 78
Tires, repairs to ... 83
Tires, to change ... 30
Tools ... 24
Tools (illustration) ... 26
Top, care of when car is stored ... 54
Transmission control ... 15
Transmission, description of ... 72
Transmission lock ... 9
Transmission lubricant ... 39
Transmission, to add lubricant ... 46
Truing up rim ... 30
Trunnions, front brake, to lubricate ... 47

U

Uniform parts prices 82
Universal joint grease 39
Universal joints, to lubricate 46
Upholstery, to clean 50
Use of accelerator before engine is warm 32
Use of starter in cold weather 32

V

Valve caps, tire 25
Valve stems, how lubricated 41
Varnished cars, washing, when new 49
Ventilating system for crankcase 42
Ventilator in cowl, open cars 22

W

Washing Duco finished cars 50
Washing varnished cars 49
Water circulation 60
Watson Stabilators, do not lubricate 48
Windows, to clean 50
Windshield and ventilator 22
Windshield cleaner 22
Wiper, windshield 22
WHEELS 80
Wheels, installation of 80-2
Wheels, pack bearings with grease 46
Wheels, removal of 80-1
Wheels, to adjust bearings of 80

The Cadillac Motor Car Company reserves the right without notice to make changes in design, construction and specifications

5000-1-26

CADILLAC

Operator's Manual



Price Thirty-Five Cents

CADILLAC MOTOR CAR COMPANY
DETROIT

314-161

Copyright 1926 by
Cadillac Motor Car Company

EDITION NO. 314-161

In ordering a duplicate of this Manual specify the above number or the engine number of the car

Foreword

THE experienced motorist whose new Cadillac succeeds other cars, some of which may also have been Cadillacs, requires less elementary operating instructions than the beginner, learning for the first time to drive. Likewise, the owner who takes advantage of the facilities offered by the maintenance station has less need for detailed information in regard to care of the car than the owner who provides for all necessary attention in his private garage.

In preparing this Manual, it has been taken for granted that the typical Cadillac purchaser is no longer a novice in motor car operation and that the greatest number of Cadillac owners will be best served by omitting that which is extremely elementary in character. It has also been assumed that, although he should at least know what care his car must regularly receive in order to render the best possible performance with the fewest possible interruptions, the typical Cadillac owner prefers to depend upon the maintenance station for occasional adjustments and repairs.

By thus omitting both that which is very elementary and that which is too technical, the first two divisions of the Manual have been made to include only information that is vital to every Cadillac owner regardless of his previous motoring experience. Part I, "Operation," is important because, no matter what car the owner may have driven before, his new car will differ in some feature, even from an earlier Cadillac. Part II, "Lubrication and Care," contains information that every owner should have regardless of the extent to which he expects to delegate the care of the car to others. Especially should he be familiar with lubrication, for correct lubrication is an essential without which it is impossible for the car to render unfaltering performance.

Part III, "General Information," may be considered as a supplement to the Manual. It contains information that may never be required by some owners, but that is included for use should occasion arise. In other words, it is a reference section to which the index on page 85 is a sufficient guide.

All written instructions are subject to limitations. The owner is asked to remember that the Manual is only one means by which the Cadillac organization desires to assist the Cadillac owner to realize the most from his car. Cadillac distributors and dealers everywhere invite the Cadillac owner to consult them on any matters pertaining to the operation and care of his car. If preferred, a request for information may be made direct to the factory, where it will receive the attention of the Technical Department.

Contents

Part I—Operation

PAGE

CHAPTER I—*Controls and Instruments* 9

Locks—Gasoline gauges and air compressor—Throttle control—Ignition control lever—Carburetor enriching button—Ignition and lighting switch—Starter pedal—Oil pressure gauge—Clutch pedal—Transmission control—Brakes—Speedometer—Ammeter.

CHAPTER II—*Driving* 18

Driving speed when car is new—Danger of running engine in closed garage—Coasting—General driving suggestions—Don'ts.

CHAPTER III—*Equipment* 22

Windshield and ventilation—Windshield cleaner—Rear vision mirror—Cigar lighter and inspection lamp—Clock—Side curtains—Curtain fasteners—Tools. TIRES—Tire valve caps—Inflation pressure—Tire air compressor—Tire holder—Changing tires—Truing up rim.

CHAPTER IV—*Cold Weather Operation* 31

STARTING THE ENGINE—Carburetor enriching button—Priming the carburetor—Position of throttle hand lever—Position of ignition control lever—Use of starter—Use of accelerator pedal before engine is warm. ADDITIONAL COLD WEATHER SUGGESTIONS—Engine oil for cold weather—Strainers in gasoline system. ANTI-FREEZING SOLUTIONS—Alcohol and water—Glycerin and water—Capacity of cooling system—Effect of alcohol on finish.

Part II—Lubrication and Care

CHAPTER I—*Systematic Lubrication* 37

Necessity for lubrication—Lubrication schedule—LUBRICANTS—Engine oil—Rear axle and transmission lubricant—Roller bearing and cup grease—Fibre grease—Spring lubricant.

CHAPTER II—*Engine Lubrication* 40

Oil circulating system—Oil level—Oil pressure—Crankcase ventilating system—Oil filter—Replacing engine oil—Generator oil cups—Timer-distributor oil cup—Engine supports.

CHAPTER III—*General Lubrication* 45

Grease gun connections—Clutch thrust bearing—Transmission—Universal joints—Rear axle—Wheels—Front brake trunnions—Steering gear—Speedometer flexible drive shaft—Horn—Springs—Stabilators—Door hardware.

CHAPTER IV—*Care of Body* 49

Care of finish when new—Washing varnished cars—Washing Duco—Cleaning windows—Cleaning upholstery.

CHAPTER V—*Care of Tires* 51

Result of under-inflation—Result of improperly aligned front wheels—Neglect of small cuts—Result of improperly adjusted tire chains—Result of sudden application of brakes—Additional suggestions.

CHAPTER VI—*Storing Car* 53

Engine—Storage battery—Tires—Body and top—Taking car out of storage.

Part III—General Information

CHAPTER I—*Engine* 56

Important features of construction—General principle of gasoline engine—Suction stroke—Compression stroke—Power stroke—Exhaust stroke—Firing order.

CHAPTER II—*Gasoline System* 58

Settling chamber—Strainer—Carburetor.

CHAPTER III—*Cooling System* 60

Water circulation—Radiator and shutters—Filling and draining—Cleaning the cooling system.

CHAPTER IV—*Electrical System* 61

Generator—Ammeter. STORAGE BATTERY—Adding water to storage battery—Specific gravity of battery solution—Disconnecting battery—Exide depots and sales offices. STARTING MOTOR—Operation of starter. IGNITION—General description—Timer-distributor—Spark plugs. LIGHTING SYSTEM—Lamp bulbs—Cleaning headlamp reflectors—Official approval of headlamps—Adjustment of headlamps.

CHAPTER V—*Clutch and Transmission* 71

Clutch—Adjustment of clutch release rod—Transmission.

CHAPTER VI—*Brakes* 74

General description—Adjustment.

CHAPTER VII—*Wheels* 80

Tires and rims—Caution in adjusting wheel bearings—Removing front wheel—Installing front wheel and adjusting bearings—Removing rear wheel—Installing rear wheel and adjusting bearings.

CHAPTER VIII—*Repair Parts* 82

Genuine Cadillac parts—Uniform parts prices—Ordering new parts—Returning parts—Tires, speedometer and clock.

CHAPTER IX—*Specifications and License Data* 84

INDEX 85

PART I

OPERATION

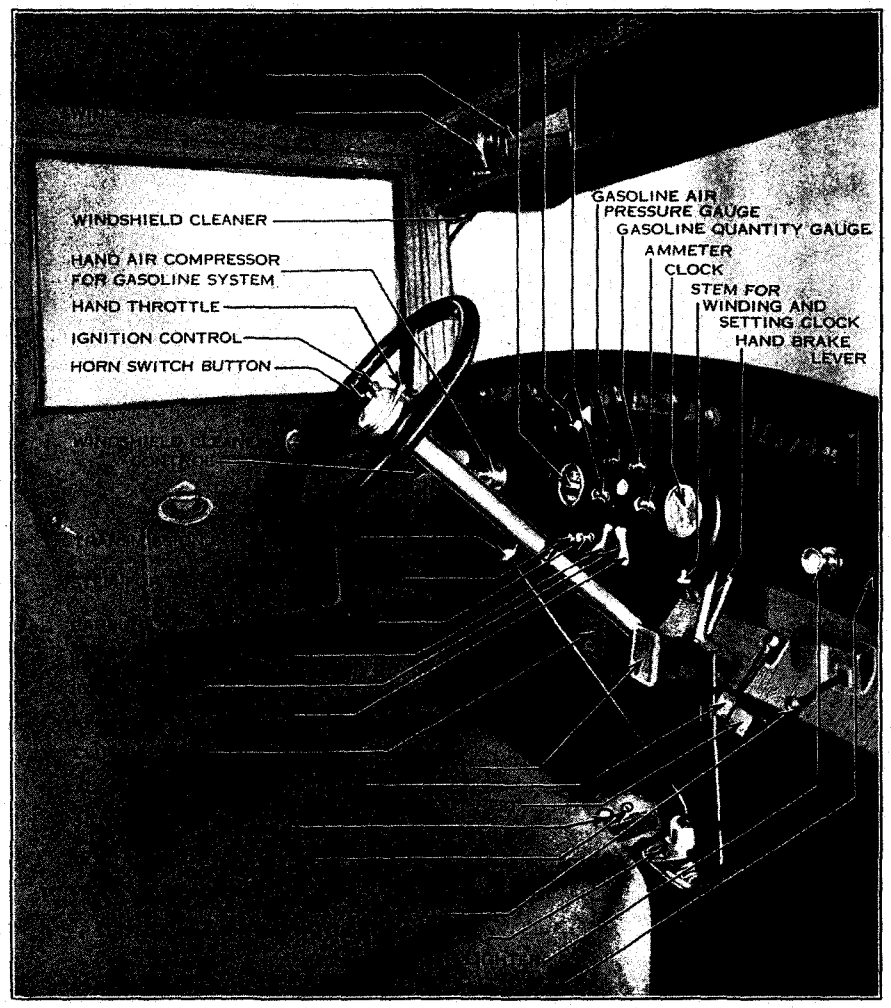


FIGURE 1. ***Instruments and controls***

*See page 23 regarding use of inspection lamp in cigar lighter socket.

CHAPTER I

Controls and Instruments

ONE of the first things the driver of a new car has to do is to familiarize himself with the various controls. In the following chapter are described the levers, pedals, instruments, and other devices used in the operation of the car. The experienced motorist, as well as the beginner, should read this chapter to avoid overlooking any detail of operation in which the car may differ from cars he has previously driven.

Locks

The Cadillac car is provided with the following cylinder locks, all of which on any one car are operated by the same key: ignition switch, transmission control lever, tool compartment, battery compartment, tire holder, and, on closed cars, the doors and various package compartments.

The lock on the switch acts only on the ignition or left-hand lever, which must be *down* in order to be locked. The transmission control lever can be locked in neutral, intermediate and high.

The lock number is stamped on each key, but not upon the face of the lock. It is urged that the owner make a record of the key number as soon as he takes delivery of his car, so that in the event both keys are lost, a duplicate key can be easily ordered.

Gasoline Gauges and Air Compressor

The two upper dials on the instrument panel (Fig. 1) are gauges for the gasoline system.

The gauge at the right marked "Gas" indicates in gallons the quantity of fuel in the tank at the rear of the car, and is operated electrically. To read from the gauge the quantity of fuel in the tank, *the ignition must be switched on*. When the ignition is switched off the gauge does not indicate correctly.

As filling station rules forbid running the engine while the gasoline tank is being filled, in order to know how much fuel to call for, it is necessary to read the gauge before stopping the engine. If the tank is to be completely filled and it is necessary to check the level as it nears the top of the tank, the ignition should be switched on again after stopping the engine.

The gauge at the left marked "Air" is a pressure gauge and indicates in pounds per square inch the air pressure in the gasoline system. This pressure is necessary to force the fuel from the tank to the carburetor.

Initial pressure is secured by operating the hand air compressor at the left-hand end of the instrument board. While the engine is running, pressure is automatically maintained by a compressor driven by the engine camshaft.

The normal pressure maintained by the automatic compressor is from one

to two pounds. There is sufficient pressure for starting the engine when the car is on level ground, if the gauge pointer is even one division away from the pin at zero. On a steep upgrade an initial pressure of one pound may be necessary.

In order to prevent leakage of the air pressure in the gasoline system it is important that the gasoline tank filler cap be air-tight. After screwing on the filler cap be sure to tighten the thumb screw in the center of the cap.

Before operating the hand compressor, the plunger must be released by turning the handle counter-clockwise. When the necessary pressure has been obtained, push the compressor handle all the way in and lock it, turning it clockwise as far as it will go.

Throttle Control

The power and speed of the engine are controlled by opening and closing a throttle valve in the carburetor. This throttle is operated both by a hand lever and a foot pedal.

The foot pedal, or accelerator, is at the right of the brake pedal (Fig. 1). The hand control is the right-hand lever of the two levers above the steering wheel. Both controls operate the same throttle; the hand lever, however, remains in the position to which it is moved, whereas the accelerator must be held down to keep the throttle open.

The normal position of the throttle hand lever for driving the car is all the way up (at "Close"). In this position the throttle of the carburetor is open just enough to permit the engine to run at idling speed after it is warm. For starting, however, the lever should be moved approximately one-fourth the way down, and should be left in this position until the engine is warm enough to permit the lever to be returned to the idling position without stalling the engine.

The throttle should normally be controlled by the accelerator. In starting the car on a hill, however, the hand lever should be used rather than the accelerator. This permits the brake pedal to be released with the right foot at the same time that the clutch is engaged with the left.

In cold weather, the accelerator should not be pushed down suddenly before the engine is warm. Sudden opening of the throttle before the engine is warm causes "popping-back" in the carburetor. This should be avoided as much as possible by judicious opening of the throttle during the warming-up period. (See page 32 under "Use of Accelerator Before Engine Is Warm.")

The accelerator can be used in cold weather to prime the carburetor by pushing the accelerator to the floor once or twice. This is not necessary except in very cold weather and should never be done unnecessarily. Excessive priming is likely to prevent the engine from starting. (See page 31 under "Priming the Carburetor.")

Ignition Control Lever

Correct timing of the ignition in relation to the positions of the pistons is accomplished automatically by a governor which is a part of the timer-distributor and which provides for all ordinary advancing and retarding of the spark. (See page 66 under "Timer-Distributor.") A hand control is also provided for still farther advancing or retarding the spark on certain occasions as hereafter described.

The hand control is the left-hand lever of the two levers above the steering wheel. For average driving, the correct position of this lever is about one-third down from the extreme top or "Advance" position. The lever should be left in this position except on the following occasions:

1. If the engine is being cranked by hand, the lever should be moved all the way down. If this is not done, a "kick-back" may occur, resulting in personal injury.
2. In pulling at low speeds with the throttle well open, the lever should be moved farther down.
3. In driving at high speeds, the lever should be moved all the way up.
4. In starting the engine in extremely cold weather, the lever should be moved all the way up unless the engine is being cranked by hand.

Carburetor Enriching Button

The button at the left of the ignition switch lever (Fig. 1) controls a device on the carburetor for temporarily enriching the fuel mixture supplied to the engine. In starting the engine it is necessary to have the proportion of liquid gasoline in the fuel mixture greater than at other times, because in a cold mixture only a part of the gasoline is vaporized. Pulling out the enriching button increases the proportion of liquid gasoline to air, the normal proportions being restored when the button is released and permitted to return to its original position.

Correct use of the enriching control not only is essential to quick starting of the engine, but also has an important bearing on the life of the engine. The enriching button must be pulled out far enough in starting to provide an explosive mixture quickly so that the battery is not unnecessarily discharged by useless cranking. The button must also be held out far enough during the warming-up period so that the engine will run without missing and "popping back." On the other hand, it should not be pulled out any farther or held out any longer than is necessary to accomplish these results, because some of the excess liquid gasoline in the enriched mixture does not burn.

If the engine still retains heat from previous running, the enriching control should not be used without first attempting to start the engine on the normal mixture. If the enriching button is pulled out for starting a hot engine the mixture may be made so rich that starting will be impossible.

The enriching button is not a priming device. It has no effect whatever on

the fuel or the fuel mixture unless the engine is being cranked or is running under its own power. The button must be pulled out and held partly out during the cranking operation.

Ignition and Lighting Switch

The ignition and lighting switch (Fig. 1) controls the current for the ignition and for the following lamps: headlamps, instrument lamp, and rear lamp. The ignition lever is the left-hand lever and has two positions: "off," when down, and "on," when up. The lighting lever is the right-hand lever and has four positions besides the "off" position. Starting with the lowest position, these are:

First Position—Instrument lamp and rear lamp.

Second Position—Parking lights (in headlamps), instrument lamp and rear lamp.

Third Position—Headlamp lower beams, instrument lamp and rear lamp.

Fourth Position—Headlamp upper beams, instrument lamp and rear lamp.

Cadillac headlamps have two bulbs each, an upper bulb of 3 c. p. for use when parking and a lower bulb of 21 c.p. for driving. The lower bulbs, furthermore, have two filaments, one above the other, instead of the customary single filament. Both filaments are of the same candle-power (21), but because they are located in different positions with respect to the focus of the parabolic reflector, the beam of light from one filament is projected at a different angle from the other. When the switch lever is in the fourth position, one set of filaments is lighted and the beams are projected straight ahead, illuminating the road at a distance. When the lever is in the third position, the other filaments are lighted and the beams are projected down at an angle, illuminating more brightly the road directly in front of the car.

The practice to be followed by the driver in using this double-beam feature of the headlamps will depend upon the regulations imposed by local authorities. In general, it is expected that the upper beams will be used except on the following occasions: when passing a vehicle approaching from the opposite direction, when rounding a sharp curve and when topping the crest of a hill. On these occasions and at other times when illumination is desired directly in front of the car, the lower beams should be used. For a further description of the headlamps, see page 68.

Starter Pedal

The starter pedal is at the right of the accelerator (Fig. 1). Pushing this pedal forward brings into action the electric motor that cranks the engine for starting. *Do not push the starter pedal when the engine is running.*

The starter pedal is only one of the controls that must be manipulated to start the engine. Unless there is an explosive mixture in the cylinders and a spark to ignite it, it is useless to crank the engine. The starter pedal should not be operated, therefore, until the necessary preliminary steps have been taken. The following, in their proper order, are the various steps that must

be performed to start the engine. As each control is mentioned, reference is made to the page on which that control is explained in detail.

1. Unlock the transmission. (Page 9.)
2. Make sure that the transmission control lever is in neutral. (Page 15.)
3. Unlock the ignition switch. (Page 11.)
4. Note whether pressure is indicated on the gasoline pressure gauge; if not, operate the hand compressor. (Page 9.)
5. Place the ignition control lever at the steering wheel about one-third* the way down. (Page 11.)
6. Place the throttle lever about one-fourth the way down from the idling position. (Page 10.)
7. *Cold Weather Only*—In extremely cold weather, prime the carburetor by pushing the accelerator to the floor once or twice. Do not prime the carburetor in warm weather or unnecessarily in cold weather. Excessive priming is likely to prevent the engine from starting. (Page 31.)
8. Pull back the carburetor enriching button unless the engine is still warm. If the engine is still warm, do not pull back the enriching button unless the engine fails to start on the normal mixture. (Page 11.)
9. Switch on the ignition. (Page 11.)
10. Push the starter pedal forward and hold it until the engine starts under its own power. Release it immediately as soon as the engine starts. (See below for probable causes for the engine failing to start.)
11. Let the carburetor enriching button partly in as soon as the engine starts, and all the way in as soon as the engine is warm enough to permit it. (Page 11.)
12. Note whether pressure is indicated on the oil pressure gauge and stop the engine at once if no pressure is indicated. (Page 14.)
13. Move the throttle lever up to the idling position as soon as the engine is warm enough to permit it.

In cold weather, disengage the clutch before pressing down the starter pedal, and hold it down during the cranking operation. This relieves the starter of the necessity of turning the transmission gears, which are immersed in lubricant. The additional load is small in warm weather when the lubricant is thin, but in cold weather the power required to turn the gears through the thickened lubricant adds unnecessarily to the demand upon the battery.

If the Engine Fails to Start—If the engine fails to start after being cranked for a few seconds, do not continue to operate the starter. To do so is a useless expenditure of battery energy. Release the starter pedal and investigate the cause, which may be one of the following:

No fuel in the tank.

No air pressure in the gasoline system.

*In extremely cold weather move the ignition control lever all the way up unless the engine should be cranked by hand. If the engine is cranked by hand, be sure to move the ignition control lever all the way down.

Ignition not switched on.

Carburetor flooded by unnecessary use of the enriching device or by unnecessary priming of the carburetor when the engine is warm. (See page 31.)

Oil Pressure Gauge

The lower left-hand dial on the instrument panel (Fig. 1) is the oil pressure gauge. This gauge indicates, not the *quantity* of oil in the engine, but the *pressure* under which the oil is forced to the engine bearings.

When the engine is not running, the pointer on the oil pressure gauge should remain at zero, but as soon as the engine is started and as long as it runs the gauge should show pressure. If the gauge does not show pressure when the engine is running, stop the engine at once and determine the cause. Serious damage may be done if the engine is run without oil pressure. (See page 41 under "Oil Pressure.")

The amount of the pressure indicated by the gauge depends upon the speed of the engine, the viscosity of the oil, and the adjustment of the oil pressure regulator. At idling speed with fresh oil of the correct viscosity, the pressure after the engine is warm should be 1 to 4 lbs. Before the engine is warm, higher pressures than those specified will be indicated. After the oil has become thin from use, lower pressures than those specified will be indicated. These are normal variations from the standard and do not indicate need for readjustment of the oil pressure regulator.

Clutch Pedal

The clutch pedal is the left-hand pedal. When this pedal is in its normal or released position, the clutch is engaged. The flywheel of the engine is then coupled to the transmission by a series of discs, every other one of which is faced on both sides with friction material, and which are pressed together by a powerful spring. When the clutch pedal is pushed down, the spring is compressed and the clutch discs are allowed to separate. The clutch is then disengaged and the flywheel, if the engine is running, revolves independently of the transmission.

The clutch has two uses: First, to enable the car to be started gradually and without jerk or jar; second, to permit shifting of the transmission gears. The operation of the clutch pedal is discussed in connection with the transmission control on page 15. Further comment is unnecessary at this point except the following suggestions to the driver:

Do not drive with the foot resting on the clutch pedal. The Cadillac clutch operates so easily that even the weight of the driver's foot may unintentionally cause the clutch to slip.

Do not form the practice of disengaging the clutch whenever the brakes are applied. Most occasions for use of the brakes require only slowing down without stopping or even shifting of gears. A skilled driver will not touch the clutch pedal until the car is just about to stop or until he is about to shift to a lower gear. It is a mistaken idea that applying the brakes with the clutch engaged is more severe on the brake lining. The opposite is actually the case, proof of which is in the fact that in coasting down grades the resistance of the engine is used to assist the brakes in controlling the car speed.

It will be observed in operating the clutch pedal that the pedal offers almost no resistance until it has been moved about one inch. It is at this point that it actually begins to disengage the clutch. It is important that the pedal have this "lost motion." If the full pressure of the clutch spring is felt just as soon as the pedal is moved from its released position, necessity for readjustment of the pedal connections is indicated. Failure to make this adjustment will result in the clutch slipping. (See page 72.)

Transmission Control

The Cadillac transmission has three forward speeds and reverse. It is controlled by a lever, the handle of which describes the letter "H" as it is moved from one position to another. It should be observed by those who have driven other makes of cars that, although most cars have this conventional H-type of transmission control, all these cars do not have the same positions of the lever. The driver should study Fig. 2 carefully, and if the various positions of the lever are different from those to which he has been accustomed, he should master this arrangement before attempting to drive.

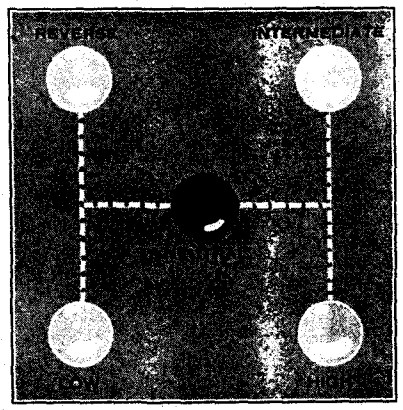


FIGURE 2. ***Positions of transmission control lever***

No attempt can be made here to teach the beginner the technique of gear shifting. It is recommended that the beginner secure individual instruction from the Cadillac distributor or dealer from whom the car was purchased and who will be glad to give this instruction. There are, however, certain rules and suggestions for the operation of the transmission control that it will be to the advantage of every driver to learn or to recall if he already knows them.

Always disengage the clutch before moving the control lever and hold the pedal down until the shift is completed.

Do not attempt to start the car with the transmission control in high gear.

Do not start with the transmission control in intermediate except when

the car is on a smooth level road or on a down grade; even under these conditions do not start the car in intermediate unless the engine is thoroughly warm.

Do not make any of the following shifts when the car is moving:

From reverse to any forward gear.
From any forward gear to reverse.
From high gear to low gear.
From intermediate to low gear (except when the car is moving very slowly).

In shifting from high to intermediate, the car should not be traveling faster than fifteen miles per hour and the control lever should be moved very quickly and with no hesitation in neutral.

There are times when it is desirable to be able to shift from high to intermediate at higher car speeds. It is possible to do this by the following method, which is called "double de-clutching":

Disengage the clutch and shift the transmission control lever at once to neutral. Re-engage the clutch, at the same time accelerating the engine; then disengage the clutch again and instantly shift to intermediate, after which re-engage the clutch. The speed to which the engine should be accelerated while the transmission control is in neutral, depends upon the speed at which the car is traveling when the shift is made.

It is not recommended that the driver attempt the double de-clutching method until he has become expert in shifting from high to intermediate in the usual manner at lower speeds.

Make a practice of shifting the transmission control to intermediate or even to low before commencing the descent of steep grades. The reason for this is explained on page 19, where will also be found further suggestions for coasting.

Brakes

The foot brakes, which consist of external brake bands on the rear wheels and internal bands on the front wheels, are operated by the right-hand pedal. This pedal differs from the conventional brake pedal in a construction that provides automatically for notifying the driver when readjustment of the brakes is necessary. Every driver is familiar with the fact that, as the brake lining wears, the brake pedal must be pushed farther toward the floorboard to apply the brakes. On most cars this proceeds until an occasion arises for an emergency stop and then it is found that the pedal goes all the way to the floorboard before the brakes are fully applied.

The Cadillac brake pedal has two stages in its travel. The first stage, which consists of the first four or five inches of the pedal travel, is sufficient for all ordinary stops when the brake band clearance is properly adjusted. When, as the result of wear on the lining, the pedal must be pushed farther toward the floorboard, an inch or inch and a half from the floorboard, the second stage of pedal travel is reached. In the second stage, the pedal has somewhat less leverage than in the first stage and the point of division is marked by increased resistance to movement of the pedal. This serves as a notice to the driver that the brakes require readjustment. If it is not convenient to have the adjustment made at once, the brakes can still be operated for some time. The adjustment should be made, however, as soon thereafter as possible.

The hand brakes, which are internal brakes on the rear wheels, are operated by the hand lever at the right of the transmission control lever.

Speedometer

The speedometer has three dials. The upper dial indicates the speed of the car. The center dial indicates the total mileage traveled. The lower dial also indicates mileage, but it can be reset to zero by pushing up and turning the knurled stem back of the instrument board. The right-hand figure on the lower dial indicates tenths of a mile.

Across the speedometer cover glass and below the total mileage dial is a strip of black celluloid on which are two white spaces. These spaces are for the lubrication notice described on page 38 in connection with the lubrication schedule.

An automobile repairman should never be permitted to attempt to adjust or repair the speedometer head or to replace the glass. 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 as carefully as a fine watch. The speedometer head may easily be damaged by rough handling.

Ammeter

The lower right-hand dial on the instrument panel (Fig. 1) is the ammeter, which measures the electric current flowing to the battery and the current flowing from the battery at all times except when the starter is cranking the engine. When current is flowing from the battery, the ammeter shows a reading on the side marked "Discharge"; when current is flowing to the battery, the ammeter reading is on the "Charge" side.

The ammeter should indicate on the "Charge" side most of the time. Otherwise, more current will be taken out of the battery than is put into it and the battery will eventually become fully discharged. The exact amount of current that should be indicated by the ammeter at any time depends upon various conditions, which are explained on page 62.

Ordinarily, when no lights are in use, the ammeter should show "Charge" as soon as the car is running ten or twelve miles per hour in high gear. If the ammeter shows "Discharge" with all lights off, when the car is running

more than twelve miles per hour in high gear, it indicates either that the fan belt is slipping or that the generator charging rate should be readjusted. The fan belt should be inspected first, and tightened if necessary, before any attempt is made to change the generator charging rate.

CHAPTER II

Driving

THE preceding chapter of the Manual has aimed to familiarize the driver with the controls and instruments used in operating the car. Actual skill in driving is, of course, more than knowledge of and familiarity with these individual devices. It is not the purpose of this Manual to discuss all phases of driving, but there are a few matters of sufficient importance to Cadillac owners to warrant devoting a chapter to them.

Driving Speed When Car Is New

The parts of the Cadillac car are machined and ground to secure the most accurate fit and the finest finish. Proper functioning of the assembled mechanism is further assured by testing the engine and chassis, both on shop dynamometers and on the road. Nevertheless, it is not possible by manufacturing processes and tests to give to bearing surfaces the fine polish that results from continued operations at moderate speeds and loads.

Until a new car has been driven far enough to produce this effect on the bearing surface, the car should not be driven at high speeds. It is recommended that the 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. Moderate driving during the first five hundred miles will increase the life of the car more than enough to repay any inconvenience. Manufacturers of locomotives and stationary steam engines have always recognized the necessity for an initial "running-in" period.

Danger of Running Engine in Closed Garage

Every person having to do with the operation or care of a motor car should be warned of the danger that attends running the engine while the car is in a small closed garage.

Carbon monoxide, a deadly poisonous gas, is present in the exhaust of all internal combustion engines. Most people are already familiar with carbon monoxide in the form of illuminating gas, or in the gas produced by furnaces and stoves when insufficient air is supplied to give complete combustion. But illuminating gas and coal gas have an unpleasant odor, which serves as a warning, whereas carbon monoxide, as produced in the internal combustion engine, is colorless, tasteless, and almost odorless, so that the victim may be overcome before he is aware of the danger.

When the engine exhausts into the open air, the carbon monoxide is so diluted that it has no effect. It is when the engine is run for a time in a closed room that the proportion of carbon monoxide in the air may increase to the point at which continued breathing of it would be fatal. The United States Public Health Service advises that the average automobile engine warming up in a single-car garage will give off enough carbon monoxide in three minutes to endanger life.

Unusual precaution must be taken in cold weather when the natural tendency is to keep the garage doors and windows closed. The practice of letting the engine warm up before running the car out of the garage is unsafe. The risk is made greater by the fact that the enriching of the mixture by manipulation of the carburetor enriching device increases the amount of carbon monoxide formed.

Coasting

To coast *on the level*, simply release the accelerator pedal and disengage the clutch. If coasting to a stop, the transmission control may also be shifted to neutral and the clutch re-engaged.

In coasting *down grades*, however, it is recommended that the transmission be left in gear and the clutch engaged. With the throttle in the idling position, the car is thus made to drive the engine, the resistance of which assists the brakes and saves wear on the brake lining. It must be remembered that the brakes are subjected to much more severe use on grades than on the level because gravity acts continuously, whereas on the level the brakes need absorb only the momentum of the car. Even on slight grades, coasting with the transmission in neutral or the clutch disengaged is not advisable. On any grade steep enough to warrant coasting, it is worth while to save the brakes as much as possible by utilizing the braking effect of the engine.

Ordinarily, the resistance offered by the engine when the transmission is in high is sufficient to control the speed of the car, supplemented by moderate use of the brakes. On steep grades, however, the transmission control should be shifted to intermediate or even to low if the grade is very steep. Shifting should always be done before commencing the descent of the grade, because, after the car has once gained speed, considerable braking may be necessary to slow down to the speed at which the shift can be made easily.

Do not switch off the ignition when coasting with the car driving the engine. Contrary to a common impression, this does not appreciably increase

the resistance and is likely to cause damage to the engine. Even with the throttle closed, some fuel is admitted to the cylinders, and if this is not burned it condenses on the cylinder walls and washes off the oil by which the pistons are lubricated.

General Driving Suggestions

Road and traffic laws vary greatly in different localities. It is unfortunately impossible to set down a complete list of rules that may be followed in all parts of the country. The following are some of the rules that are universal in practically all parts of the United States:

In meeting a vehicle going in the opposite direction pass to the right.

In overtaking 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 the car around to do this, it should be done.

Never turn around or turn off on another road without making absolutely certain that there is no other vehicle directly behind.

Never start to cross streetcar tracks without making sure that there is no car directly behind. No matter how sure you feel, look and see.

Do not cross streetcar or steam railroad tracks without making certain that is is absolutely safe to do so. At any railroad crossing that is on an up grade or which for any reason must be approached very slowly, it is a wise precaution to shift to intermediate gear before crossing because the car can thereby be accelerated more quickly, if necessary.

In crowded traffic do not apply the brakes suddenly unless it is absolutely necessary. A vehicle following may not have brakes as efficient as Cadillac four-wheel brakes.

On wet asphalt streets or slippery roads do not apply the brakes suddenly unless it is absolutely necessary. Cadillac four-wheel brakes minimize the possibility of skidding under these conditions, but their effectiveness should not induce anyone to drive less carefully.

Slow down in passing vehicles going in the opposite direction.

Never take a chance.

Don'ts for General Operation

Don't fail to change the engine oil as frequently as recommended.

Don't fail to release the carburetor enriching button as soon after starting as possible.

Don't fill the lubricating system of the engine alone and neglect to lubricate all other parts of the car.

Don't neglect the lubrication of any part of the car.

Don't run the car at sustained high speed when it is new.

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 disengaging 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 switch off the ignition when coasting with the car driving the engine.

Don't push the starter pedal 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. The front wheels pivot more easily if they are rotating.

Don't fail to investigate any unusual sound which may develop in the car. The car should be inspected at a Cadillac maintenance station.

Don't neglect to inspect the level of the acid solution in the storage battery every 500 miles and add distilled water if necessary.

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 air pressure or without gasoline in the tank.

Don't neglect to keep the tires inflated properly.

Don't race the engine when it is not driving the car. There is no worse abuse.

CHAPTER III

Equipment

THE controls and instruments used in driving have already been described. In addition to these the car is equipped with various devices which are for the convenience and comfort of the occupants, and are used only as occasion demands. It is suggested that the driver anticipate his use of such equipment by becoming familiar at once with the directions contained in this chapter.

Windshield and Ventilation

Closed Cars—Cadillac closed cars are equipped with a one-piece windshield, which can be moved up and down. Movement of the glass is controlled by a handle above the windshield. To raise the glass, the handle should be turned clockwise, and to lower the glass the handle should be turned counter-clockwise.

For moderate ventilation, the windshield should be raised not more than one inch so that the lower edge of the glass is still below the ledge over the instrument board. With the windshield in this position, air is deflected into the driving compartment through an opening in the cowl just forward of the instrument board. For additional ventilation the windshield can be raised above the level of the ledge over the instrument board, and air then enters directly into the car.

Open Cars—Cadillac open cars are equipped with a cowl ventilator which is operated by a lever just in front of the instrument board and at the right of the steering column. Additional ventilation for warmer weather can be secured by manipulating the windshield.

The open car windshield is in one section, which is pivoted at the upper corners. To secure more ventilation than can be obtained through the cowl ventilator, the windshield can be tilted out.

The thumb screws on the windshield supports must be loosened before adjusting the position of the windshield and must be tightened to hold it in the desired position.

Windshield Cleaner

The windshield cleaner is operated by the suction or vacuum in the passages between the carburetor and the engine. On open cars the cleaner is controlled by a lever at the cleaner. When the lever is as far toward the right as it will go, the cleaner is shut off. To start the cleaner, move the lever toward the left.

On closed cars the cleaner is controlled by a knurled button on the left-hand end of the instrument board. When the button is turned clockwise as far as it will go, the cleaner is shut off. To start the cleaner, turn the button counter-clockwise. (On some closed cars the cleaner is controlled by a lever on the instrument board similar to that on the open car cleaner.)

Rear Vision Mirror

The rear vision mirror may be adjusted by the driver to suit his preference after loosening the clamp screws that hold the mirror to its supporting bracket.

Cigar Lighter and Inspection Lamp

The car is equipped with a combination cigar lighter and inspection lamp that makes use of a single reel with twelve feet of flexible cord attached to the back of the instrument board. The flexible cord ends in a bayonet type socket to which may be attached either the inspection lamp or the heating element of the cigar lighter. The method of attachment is identical with that of an ordinary lamp bulb. Ordinarily the cigar lighter will be carried in place in the socket on the cord and the inspection lamp in a stationary socket provided on the front of the dash, where it is useful to illuminate the engine. (The inspection lamp is packed with the tool equipment when the car is shipped.)

To use the cigar lighter, pull it out from the instrument board at least a foot, wait a few seconds for the heating element to heat and apply it to the cigar or cigarette. The current is automatically switched on as soon as ten or twelve inches of the cord has been unreeled. To light a pipe, remove the nickel-plated shield by turning it slightly counter-clockwise and pulling it straight off.

To lock the cord in any desired position, pull out the button on the instrument board at the right of the cigar lighter (Fig. 1). This engages a ratchet which prevents the reel from rewinding. To rewind the cord, press the button back to its original position.

The inspection lamp socket on the dash has a double bayonet lock with two sets of slots. To install the lamp, simply insert it in the socket, press in, and turn it clockwise as soon as the pins on the lamp engage the first or outer set of slots In this position the current is not switched on. To switch the current on, turn the lamp slightly counter-clockwise, press in, and turn it clockwise again, engaging the pins in the second or inner set of slots. To switch off the light, turn the lamp counter-clockwise and pull it out of the socket far enough to engage the first set of slots.

Clock

The clock has an eight-day movement and is wound in the same manner as a watch. The stem is under the clock back of the instrument board.

Side Curtains on Open Cars

The side curtains, with which the open cars are equipped, are carried in an envelope provided with cloth partitions to prevent rubbing and chafing. The side curtains are stowed under the front seat.

The Touring car and Phaeton curtains are in six sections, each of which is marked to indicate its position, as "Left Front," "Right Center." The

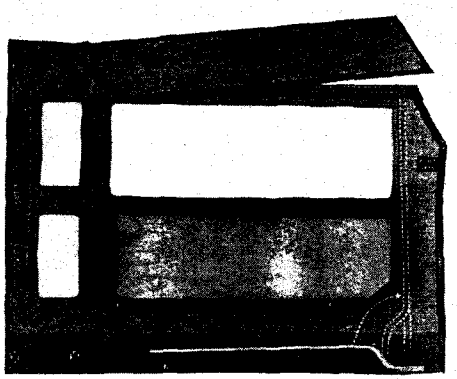


FIGURE 3. *Side curtains*

front and center sections on both sides are each provided with a rod, the lower end of which fits a socket in the top of the door. When a curtain is folded for stowing, this rod is parallel with the bottom of the curtain as shown in Fig. 3. Before the curtain can be attached to the door, the rod must be moved to the position shown by the dotted lines. The upper end of the rod is slotted to engage with the stiffener that runs along the upper edge of the curtain.

The rear sections should be applied first, followed by the center and front sections. The rear sections should be fastened to the rear bows *under* the side flaps of the permanent rear curtains.

Before stowing the curtains, they should be dry and clean.

Curtain Fasteners

Most of the curtain fasteners used on the top and side curtains are of the type illustrated in Fig. 4. When this type of fastener is snapped on its stud, it becomes locked on three sides. To release the fastener it must be lifted on the side that is not locked. This side is indicated by the small projection to which the arrow points in Fig. 4. This type of fastener cannot be released by lifting it at any other side. The remainder of the fasteners used on the top and curtains are of the usual glove type.



FIGURE 4.
Curtain fastener

Tools

The compartment* for the tool equipment is between the right-hand running board and the frame, and is accessible upon opening a door in the right-hand dust shield. The lock on this door is operated by the switch key.

To reach the tools proceed as follows: Insert the key and turn it counterclockwise, at the same time pressing in on the lock. As soon as the lock is released it will spring out as shown in Fig. 5.

Pull the lock back as far as it will go. This will release the catches and permit the door to be tilted out at the top. As soon as the catches are clear of the top edge of the opening in dust shield, remove the door by lifting it up.

The tools are contained in an inner box which is held in place by the rod shown in Fig. 6. Force this rod out of the depressions in the handles on the cover of the box, and let the rod drop to the position shown in Fig. 7. The cover of the box may then be removed by means of the two handles.

The door of the battery compartment operates in the same manner as the tool compartment.

*On some cars the tool and battery compartments are just forward of the running boards.

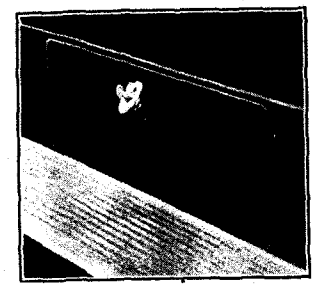


FIGURE 5.
Tool box door unlocked

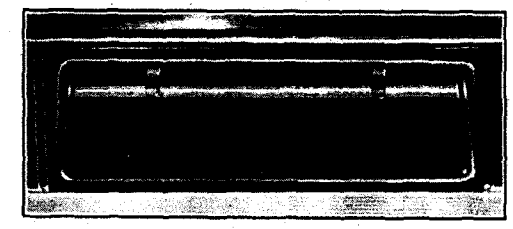


FIGURE 6.
Inner tool box with retaining rod in place

The following are the tools comprising the standard equipment. The numbers refer to the numbers by which the tools are designated in Fig. 8. Items listed opposite Nos. 25, 26, 27, 28 and 29 are not illustrated.

1. Open end wrenches (two) for adjusting rear foot brakes
2. Small screw driver
3. Socket wrench for oil pan drain plug
4. Large screw-driver
5. Center punch
6. Cold chisel
7. Hammer
8. File
9. Pliers
10. Wrench for spark plugs and compression relief cocks
11. Distributor wrench (with gauge for adjusting timer contact points and spark plugs)
12. Distributor wrench (plain)
13. Bicycle wrench
14. Monkey wrench
15. Wrench for rim clamping nuts
16. Rim assembling tool
17. Hose for tire air compressor
18. Adapter for grease gun for lubricating clutch thrust bearing (for cars with grease gun connection on thrust bearing)

18A. Extension fitting for lubricating clutch thrust bearing (for cars using screw plug on thrust bearing)

19. Grease gun
20. Hand starting crank
21. Hub cap wrench
22. Oil can
23. Jack handle
24. Jack
25. Inspection lamp. Note: The inspection lamp is packed with the tool equipment when the car is shipped but is ordinarily carried in the socket provided for it on the dash
26. Small tool bag
27. Large tool bag
28. Lubrication chart
29. Operator's Manual

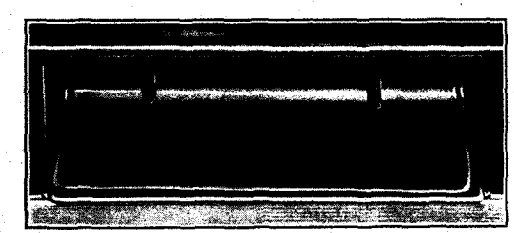


FIGURE 7.
Retaining rod dropped down to permit removal of cover

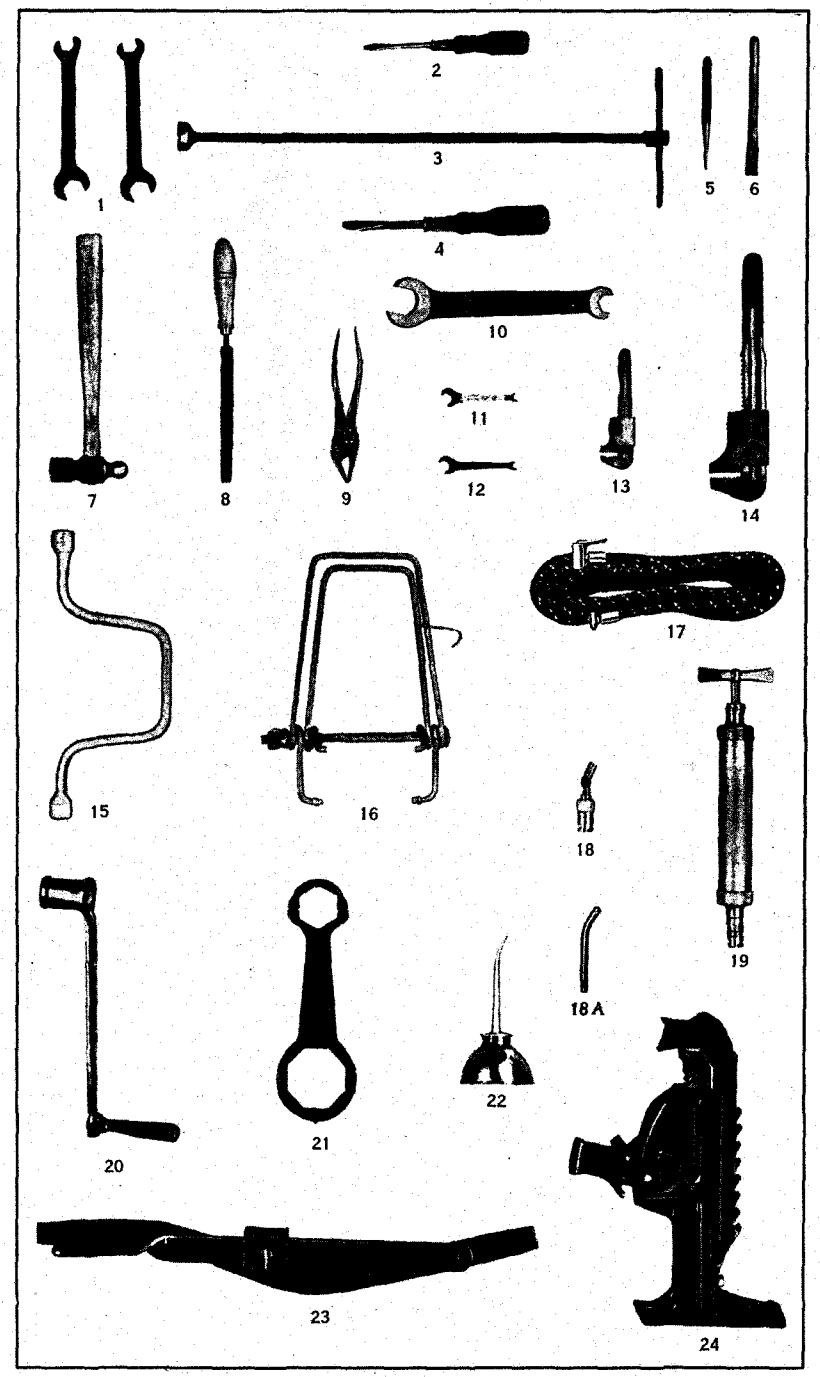


FIGURE 8. *Standard tool equipment*

(The numbers refer to the list on page 25)

Tires

Tire Valve Caps

The valve caps used with some makes of tires are a combination dust and valve cap. This type of cap can be removed and installed without screwing the cap the entire length of the threads on the valve stem.

To remove one of these valve caps, turn it two or three turns counter-clockwise. This loosens the sliding nut inside the cap (Fig. 9). Next, pull the cap up as far as it will go. Then remove the cap by unscrewing it the rest of the way.

To install a valve cap, place the cap over the valve stem and turn it a few turns clockwise to engage the threads in the sliding nut. If the sliding nut is too far inside the cap to be reached by the valve stem, shake the nut down by tapping the bottom of the cap on some solid object. When the valve stem has been started in the sliding nut, push the cap down over the stem as far as it will go. Then turn the cap until it locks tightly.

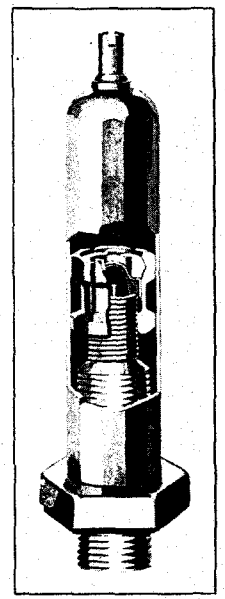


FIGURE 9.
Tire valve cap

Inflation Pressure

For normal driving, the 33 by 6.75 low pressure tires, which are standard equipment on Cadillac cars, should be inflated to a pressure of 40 lbs. per square inch. The inflation pressure should be checked at least weekly and should not be permitted to drop more than 5 lbs.

On cars driven at high speeds, the front tires should be inflated to 50 lbs. or higher if necessary. *This is important.*

Tire Air Compressor

To use the tire air compressor with which the car is equipped, proceed as follows:

Turn back the left-hand side of the front carpet and lift the small oval-shaped cover which is in the floor just to the left of the transmission control lever. Reach through the hole in the floor and remove the knurled cap from the connection on top of the compressor. Connect one end of the air hose (in the tool equipment) to this connection and the other end of the hose to the valve of the tire to be inflated. *Do not connect the hose to the tire first if there is pressure in the tire.*

The control shaft by which the compressor driving gear is placed in mesh with the transmission gears projects through a small hole in the floor just in front of the large hole over the compressor. To start the compressor, if the engine is running, disengage the clutch and hold the pedal down until the transmission gears have ceased to revolve. Then, with a screw-driver, turn the slotted head of the compressor control shaft clockwise. If the engine is not running, simply turn the control shaft clockwise without disengaging the clutch and then start the engine.

The compressor gives best results when the engine runs at a speed of approximately 1,000 r. p. m., which is about three times the normal speed of the engine when idling. Do not race the engine in operating the compressor,

(Continued on page 30)

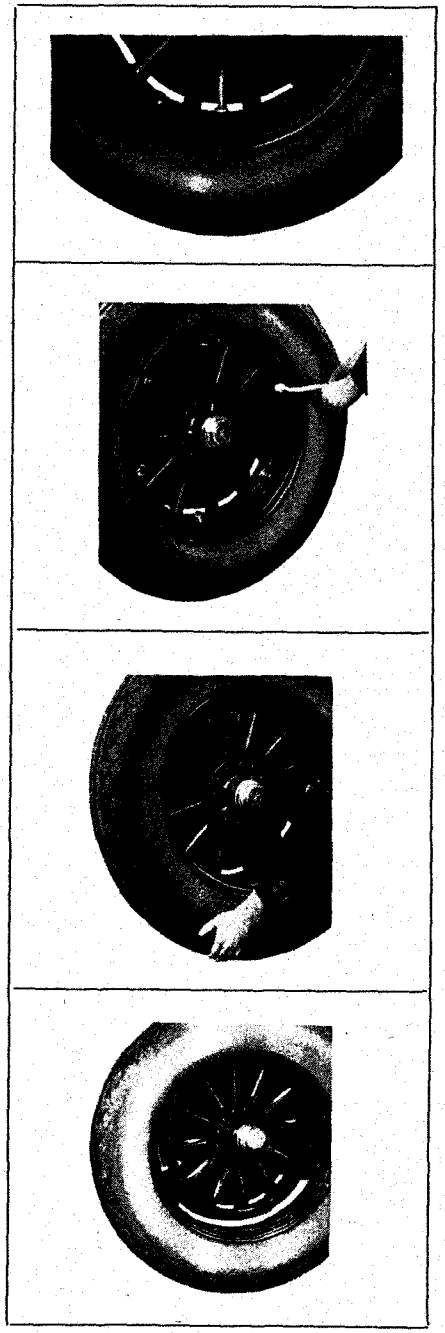


Figure 10a
Jack up the axle until the tire clears the ground. Unscrew the dust cap and the clamping nut from the tire valve stem.

Figure 10b
With the brace wrench, supplied in the tool kit, loosen the six rim clamping nuts. Turn each clamp so that the lug is away from the rim and tighten the nut enough to hold the clamp in this position.

Figure 10c
Rotate the wheel so that the valve stem is at the top, and pull the bottom of the rim away from the wheel. If the rim does not come off easily, pull the top of the rim as far out as the valve stem will permit and then pull the bottom part of the rim away from the wheel.

Figure 10d
Rotate the wheel until the valve stem approaches the bottom. At the point shown in the illustration, the rim and tire will roll free from the wheel and can be removed without lifting.

FIGURE 10. ***Removing rim with tire from wheel***

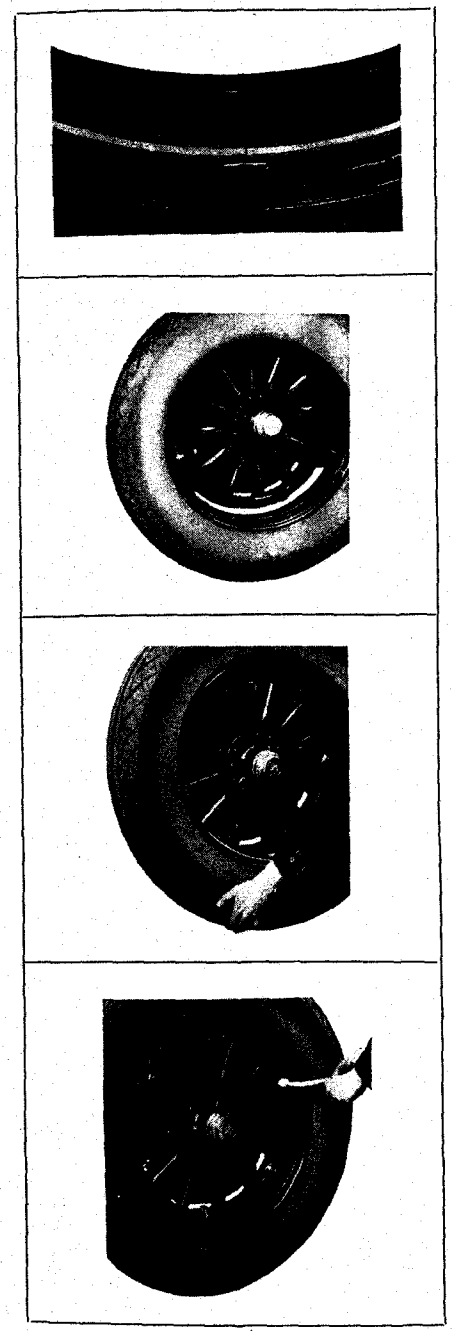


Figure 11a
If the rim has no split clamping ring, take the one from the rim removed. The correct position for the ring is just inside the three lugs and with the split opposite one of the lugs. If the ends of the ring overlap, they can be sprung into place with a screw-driver.

Figure 11b
Rotate the wheel so that the hole for the valve stem is in the position shown. Hold the rim so that the three lugs are on the side away from the car and insert the valve stem into the hole in the wheel.

Figure 11c
Rotate the wheel, which will carry the rim with it, until the valve stem is at the top. Then push the lower part of the rim into place, guiding the hinge on the rim through the notch provided for it in the edge of the wheel.

Figure 11d
Turn each rim clamp so that the lug is over the clamping ring, drawing the nut down until the end of the bolt is flush, or nearly so, with the outer surface of the nut. Then go over the six nuts again, tightening them firmly. (See page 30 in regard to truing up the rim on the wheel.) Install the valve stem clamping nut and the dust cap. It is important that the clamping nut be firmly tightened.

FIGURE 11. ***Installing rim with tire on wheel***

or, for that matter, at any other time when it is not driving the car. Racing the engine beyond the recommended speed not only decreases the efficiency of the compressor, but is one of the worst forms of abuse. To stop the compressor, turn the control shaft counter-clockwise.

Do not turn the compressor control shaft to start the compressor when the engine is running and the clutch is engaged.

Tire Holder

The tire holder is designed to carry either one or two standard size tires mounted on rims and inflated. Each rim has on it three lugs which are located so as to engage with notches on the support arms and on the adjustable clamp. There are two sets of these notches.

When two rims are carried, the rim nearest the car should be placed so that the side with the lugs is away from the car and the lugs should be inserted in the inner set of notches. The outer rim should then be placed so that the side with the lugs faces toward the car and the lugs of this rim should be inserted in the outer set of notches.

When only one rim is carried, the side of the rim with the lugs should face toward the car and the lugs should be inserted in the inner set of notches.

The tire holder lock is in the upper end of the clamp screw and is protected by a dust cap which must be unscrewed to insert the key. Turning the key clockwise disengages the lock, permitting the clamp screw to be turned.

To lock the tire holder, screw the clamp down firmly against the rim or rims. Adjust the clamp screw handle so that it points squarely across the car Then turn the key counter-clockwise. Care should be exercised in removing or replacing a spare tire not to strike the body of the car.

Note: If a tire cover is used, it should have slots cut in it opposite the two upper lugs on the rim so as to permit these lugs to seat in the notches in the support arms.

Changing Tires

If a spare rim with inflated tire is always carried on the tire holder, the driver will seldom or never have occasion to disassemble a tire from the rim. In case of tire trouble it is then merely necessary to remove the rim with tire from the wheel and to install on the wheel the spare rim and tire. Illustrated directions for making this change are on pages 28 and 29. Disassembly of the tire from the rim is necessary only if the tire is to be repaired or a new one installed. Directions for this work, which is usually left to the repair shop, will be found on pages 78 and 79. Never attempt to remove a tire from its rim without first deflating the tire.

Truing Up Rim

If a rim does not run true, it may be trued up in the following manner: Rotate the wheel slowly and mark the part that runs farthest out from the face of the wheel. Loosen slightly the nuts diametrically opposite the mark and then tighten the nuts on the marked side. Test the wheel again and if it still does not run true repeat the operation.

CHAPTER IV

Cold Weather Operation

THE Cadillac car is an all-season car and no owner need hesitate to make full use of his car in severe winter weather as well as at other times. It is necessary in freezing weather, however, to observe certain precautions and to follow a somewhat different procedure, particularly in starting the engine. In this chapter has been grouped all the information relating to operation of the car during cold weather. It should be reviewed just prior to the beginning of the winter season.

Starting the Engine

Carburetor Enriching Button

The first difference between starting the engine in cold weather and starting the engine in warm weather is in the greater use of the carburetor enriching device necessary in cold weather. Gasoline does not vaporize as readily at low temperatures, and in order to supply the cylinders with a gaseous mixture rich enough to be ignited, the proportion of liquid gasoline to air must be increased.

At the same time it is important not to apply the enriching device more than is necessary. The unvaporized gasoline collects on the cylinder walls and works down past the pistons, washing off the lubricant as it goes. Although dilution of the oil supply with this unburned gasoline is minimized in the Cadillac engine by an exclusive system for ventilating the crankcase (see page 42), it is best to avoid an excess of liquid gasoline in the combustion chambers by careful and judicious use of the enriching device.

The following rule should govern the use of the enriching button in winter weather: Pull the enriching button back just as far as it is necessary to start the engine, but as soon as the engine starts, let the button return as far as possible without causing the engine to stop or slow down. Then release the button entirely as soon as the engine is warm enough to permit doing so.

Priming the Carburetor

In extremely cold weather, if the engine does not start after cranking for a few seconds with the enriching device fully applied, release the starter pedal. Then prime the carburetor by opening and closing the throttle once or twice rather rapidly with the accelerator. Opening and closing the throttle operates

a throttle pump on the carburetor and raises the level of gasoline in the carburetor bowl. The carburetor should never be primed in warm weather and should not be primed unnecessarily in cold weather. Excessive priming is likely to prevent the engine from starting.

Position of Throttle Hand Lever

The correct position of the throttle hand lever for starting in cold weather is the same as for starting under other conditions, that is, about one-fourth the way down from the idling position. In warm weather, however, the lever may be returned to the idling position almost as soon as the engine is started. In cold weather, the throttle must be left slightly open until the engine becomes warm.

Position of Ignition Control Lever

Unless the weather is extremely cold, the correct position of the ignition control lever for starting is the same as that recommended on page 10, that is, about one-third the way down. In extremely cold weather, however, the lever should be moved all the way up for starting, unless the engine should be cranked by hand, in which case the lever should be moved all the way down.

It is the practice of some drivers to move the ignition control lever all the way down whenever starting the engine. This is the correct position if the engine is to be cranked by hand, but if the engine is to be cranked with the starter, there is no reason for retarding the spark, and in extremely cold weather "popping back" in the carburetor is less likely to occur if the spark is fully advanced.

Use of Starter

In extremely cold weather, when the car has been standing long enough to become thoroughly chilled, it is a good plan to disengage the clutch during the cranking operation. If this is not done, the starter is called upon to turn the jackshaft gears in the transmission in addition to cranking the engine. At ordinary temperatures, the additional energy required is negligible, but in extremely cold weather, the lubricant in the transmission offers sufficient resistance to rotation of the transmission gears to increase considerably the demand upon the battery and to retard the cranking speed.

Use of Accelerator Before Engine Is Warm

In cold weather, after the engine has been started and before it has run long enough to become warm, the engine cannot deliver its normal power and it should not be called upon to do so. In accelerating the engine to start the car and in accelerating the car after the transmission is in gear, do not open the throttle suddenly or too far. To do so is not only to invite "popping back" in the carburetor, but to increase the amount of excess unvaporized gasoline in the combustion chambers, both of which results are undesirable. For this reason, also, starting in intermediate should never be attempted in cold weather.

Additional Cold Weather Suggestions

Engine Oil for Cold Weather

All engine lubricating oil is more viscous at lower temperatures than at higher temperatures. An engine oil of the proper viscosity for summer weather will not flow freely at freezing temperatures, and will not lubricate the cylinders and bearings properly until the engine is warm. If the oil congeals it also offers considerable resistance to cranking of the engine, causing a severe drain on the battery, and retarding the cranking speed.

In cold weather, therefore, it is essential that an oil be used that has a sufficiently low cold test. If in doubt as to a suitable oil for cold weather, consult an authorized Cadillac maintenance station.

Strainers in Gasoline System

During cold weather, it is especially important to remove and clean the strainer in the gasoline line and to drain the settling chamber at the tank (see page 58). An accumulation of water at these points that would have no bad effect in warm weather might freeze in cold weather and prevent the gasoline from flowing to the carburetor.

Anti-Freezing Solutions

In freezing weather, the water in the cooling system must be replaced with some solution that has a lower freezing temperature than that of water. A solution of glycerin and water is recommended. There is practically no loss of glycerin by evaporation and a solution of suitable strength placed in the cooling system at the beginning of freezing weather will ordinarily last the entire season.

Some of the patented substitutes for glycerin may be safely used. Such preparations should not be used unless tested and approved. Cadillac distributors and dealers should be consulted as to the suitability of an anti-freeze other than glycerin, or inquiry may be made to the factory Technical Department. Solutions containing calcium chloride or other ingredients injurious to the metal parts of the cooling system must never be used.

A solution of denatured alcohol may be used if its strength is periodically inspected by testing it with a hydrometer, and if care is taken not to let the solution get on the finish of the hood or radiator. Alcohol vaporizes more

readily than water and the loss by evaporation must be replaced at frequent intervals or the weakened solution will afford little protection against freezing.

Glycerin and Water

The following table* gives the freezing temperature and specific gravity of solutions of glycerin† and water:

Percentage of Glycerin (by Volume)	Parts by Volume		Freezing Temperature (° Fahr.)	Specific Gravity
	Glycerin	Water		
20	1	4	21°	1.057
25	1	3	17°	1.070
33⅓	1	2	8½°	1.092
50	1	1	−15°	1.132

Alcohol and Water

The following table* gives the freezing temperature and specific gravity of solutions of denatured alcohol and water:

Percentage of Alcohol (by Volume)	Parts by Volume		Freezing Temperature (° Fahr.)	Specific Gravity
	Alcohol	Water		
20	1	4	19°	.980
25	1	3	15°	.975
33⅓	1	2	6°	.965
50	1	1	−18°	.941

Capacity of Cooling System

The capacity of the cooling system is four and one-half gallons when filled to the proper level. It is not necessary to add liquid to the radiator whenever the level falls below the filler. There is sufficient liquid in the cooling system if the bottom of the upper tank is covered, and any liquid in excess of this is usually forced out through the overflow pipe as soon as the engine becomes warm. When water is used, any loss from this cause is of little consequence, but in winter to conserve anti-freeze it is important to avoid adding more liquid than is necessary.

Effect of Alcohol on Finish

Strong solutions of alcohol have a harmful effect on the finish. In adding pure alcohol or solutions containing 50 per cent or more alcohol, extreme care must be used not to let the liquid spatter or spill. A funnel and a pouring vessel with a suitable spout are necessary. Especially avoid pouring cold alcohol into very hot water. The effect of this is to make the mixture foam up and possibly bubble over on the finish.

*The freezing temperatures and specific gravities in these tables are according to the U. S. Bureau of Standards. The temperature given is in each case the temperature at which the first crystals form and not the temperature at which the solution freezes solid.

†Undiluted commercial glycerin having a specific gravity of 1.250.

PART II

LUBRICATION AND CARE

Cadillac 4000-Mile Lubrication Schedule

Note: Do not wait for schedule lubrications before adding engine oil. The oil level should be checked every 100 to 150 miles and oil added if the indicator ball is below "Full." This is especially important on cars driven at high speeds.

Explanation: The figures and letters following the items in this column refer to the chassis lubrication diagram, Fig. 14	Refer to page	Lubrication No. and Mileage at which due							
		1	2	3	4	5	6	7	8
		500	1000	1500	2000	2500	3000	3500	4000
LUBRICATION NUMBER 8 — LUBRICATION NUMBER 4 — LUBRICATION Nos. 2 and 6 — 1, 3, 5, and 7 — Add engine oil as necessary : 21	41	O	O	O		O	O	O	
Grease gun connections: G	45	O	O	O	O	O	O	O	O
Spring leaves: 1, 7, 10, 20	48	O	O	O	O	O	O	O	O
Add water to storage battery	63	O	O	O	O	O	O	O	O
Universal joints: 13, 14	46		O		O		O		O
Generator and distributor oil cups: 17, 18, 19	45		O		O		O		O
Engine supports: 5, 16, 24	45		O		O		O		O
Brake pins and connections	77		O		O		O		O
Door hardware	48		O		O		O		O
LUBRICATION NUMBER 4 — Drain and replace engine oil : 21	43				O				O
Transmission —add lubricant: 15	46				O				
Rear axle —add lubricant: 11	46				O				
Clutch thrust bearing: 4	45				O				O
Steering gear—add lubricant: 6	47				O				O
LUBRICATION NUMBER 8 — Transmission —drain and replace lubricant: 15	46								O
Rear axle —drain and replace lubricant: 11	46								O
Wheel bearings—clean and repack: 2, 8, 12, 22	46								O
Front brake trunnions: 9, 23	47								O
Speedometer drive shaft	47								O
RECORD — Speedometer Reading									
Date									

CHAPTER I

Systematic Lubrication

Necessity for Lubrication

LUBRICATION has made machinery possible. Without it the destructive effects of friction would render the most ingeniously designed mechanism useless. Especially is this so of the gasoline engine, in which heat of combustion is added to that of friction. Absence of lubrication for even a brief instant while the engine is running would heat the surfaces in contact to the melting point.

But it is not enough to know that friction, unrestrained by lubrication, is capable of ruining an engine in less time than it takes to tell it. No motorist expects to run out of oil. What is frequently not fully appreciated is that, if improper lubricants are used and are infrequently applied, friction is still a powerful destructive agent capable of shortening the useful life of the car from years to months.

The quiet, dependable operation of a new car is primarily the result of the accurate finishing of surfaces separated from each other by a few thousandths of an inch. In the Cadillac, there are hundreds of such surfaces. If the clearances between these surfaces are to be maintained, so that the car will continue to operate quietly and dependably, friction must be prevented from taking its toll in wear.

Cadillac engineers have provided for the lubrication of all surfaces where friction is a factor. The most that a manufacturer can do, however, is to provide a place for the lubricant and means for it to reach the surfaces to be lubricated. The car cannot be equipped with an inexhaustible supply of lubricant. Upon the car owner devolves the responsibility of replenishing the supply at the proper time with lubricant of the prescribed specifications.

Because of the importance to the car owner of proper lubrication of his car, every effort has been made in this Manual to give explicit information for his guidance. Lubricants are prescribed for each point requiring lubrication, directions are given for applying the lubricant, and recommendations are made as to the frequency with which the lubricant should be applied. All this information is based upon actual operation of Cadillac cars over hundreds of thousands of miles.

Lubrication Schedule

Lubrication is effective only insofar as it is regular and systematic. To be systematic, lubrication must be performed at regular mileage intervals. The

Cadillac technical staff has accordingly developed for the Cadillac car a complete lubrication schedule which, if faithfully followed, will insure for each bearing surface ample, but not superfluous, lubrication. This schedule is shown on page 36.

The unit of the Cadillac lubrication schedule is 4,000 miles, which is divided into eight 500-mile intervals. Corresponding to these is a series of eight consecutive groups of lubricating operations. When the car has traveled 500 miles, the points enumerated under Lubrication No. 1 should receive attention. At 1,000 miles, Lubrication No. 2 is due, and so on until at 4,000 miles Lubrication No. 8 should be performed. At 4,500 miles the schedule begins again with Lubrication No. 1.

In order that the driver may be continually reminded of the mileage at which the next lubrication is due, provision is made on the speedometer for a lubrication notice. This consists of a strip of black celluloid (Fig. 12) which is placed across the speedometer cover glass below the total mileage dial and which has two white spaces, one for the lubrication number and one for the mileage at which it is due. Whenever the car is lubricated on the schedule, the figures then on the celluloid should be erased and the next lubrication number and the mileage at which it is due should be written or stamped in their places. If this notice is used, the driver need only glance occasionally at the speedometer and compare the mileage on the dial with the figures on the notice in order to plan for the necessary attention.

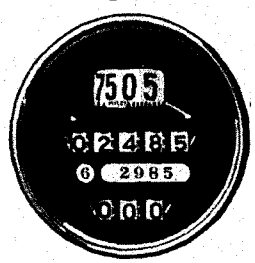


FIGURE 12.
Lubrication notice

Note: Do not wait for the mileage indicated on the notice before adding engine oil. The oil level should be checked every 100 to 150 miles and oil added, if the indicator ball is below "Full"

Cadillac distributors and dealers are prepared to sell lubrication based on this schedule. A car that is being lubricated on the schedule can be taken to any authorized Cadillac maintenance station, and without further ordering than to specify "Schedule Lubrication," the car will receive the necessary attention.

The schedule on page 36 is in outline form. Detailed information as to the location of the points to which lubricant is to be applied, the method of lubricating, and the kind and amount of lubricant will be found in Chapters II and III. For each point on the schedule, two reference numbers are given: the number of the page on which detailed directions will be found and the number designating the point on the chassis lubrication diagram (Fig. 14).

Lubricants

The selection of proper lubricants for the Cadillac car is one of the first concerns of the owner in his attention to the lubrication of his car.

The lubricants must not only be of high quality, but their viscosity and other characteristics must be suited to the Cadillac car. The difficulty of securing suitable lubricants on the open market has induced us to provide lubricants under the Cadillac trade-mark. These lubricants are prepared according to specifications prescribed by the Cadillac technical staff and are based upon hundreds of actual tests. Cadillac lubricants include the following and can be obtained from Cadillac distributors or dealers: Cadillac Engine Oil—Heavy, Medium and Light (special). Cadillac Rear Axle and Transmission Lubricant—Light and Heavy. Cadillac Roller Bearing and Cup Grease. Cadillac Fiber Grease—Light and Heavy. Cadillac Spring Lubricant.

Engine Oil

The heavy grade of Cadillac Engine Oil is recommended for summer use and for winter use if the temperature is not much below freezing. For average winter use (temperatures down to zero) the medium grade is recommended. For extremely low temperatures (below zero) the light grade should be used, but should be replaced with the medium grade as soon as more moderate temperatures return.

The trade names of other engine oils approved for use in the Cadillac engine will be supplied by our Technical Department on request.

Rear Axle and Transmission Lubricant

The heavy grade of Cadillac Rear Axle and Transmission Lubricant should be used except in cold weather. The light grade should then be used. If the heavy grade is used in cold weather the transmission gears will be difficult to shift. The trade names of other lubricants suitable for use in the Cadillac rear axle and transmission will be supplied upon request.

Roller Bearing and Cup Grease

Cadillac Roller Bearing and Cup Grease is recommended for the wheel bearings and for all points for which grease gun connections are provided, with the exception of the steering gear and the universal joints. In the absence of Cadillac Roller Bearing and Cup Grease, No. 3 cup grease may be used for the grease gun connections and No. 1½ cup grease for the wheel bearings.

Fiber Grease

Cadillac Fiber Grease is supplied in two grades, light and heavy. The light grade is recommended for the clutch thrust bearing and the heavy grade for the universal joints on the drive shaft.

Spring Lubricant

Cadillac Spring Lubricant is recommended for lubricating springs equipped with spring covers. This lubricant is a petroleum jelly that does not harden and cake and that has no destructive effect on the leather of the spring covers.

CHAPTER II

Engine Lubrication

Oil Circulating System

THE supply of engine oil is carried in the pressed steel reservoir that covers the bottom of the crankcase. The oil is forced to the bearings by a gear pump attached to the right-hand side of the engine toward the front and driven by a spiral gear on the crankshaft.

The pump draws the oil from the bottom of the oil pan and delivers it under pressure to a supply pipe running the length of the engine parallel with the crankshaft. From this supply pipe, three leads branch off to feed the three main bearings. The crankpin bearings are fed from the main bearings through ducts in the crankshaft. Oil thrown from the crankpins as the crankshaft revolves becomes a fine mist or spray which pervades the interior of the crankcase and cylinders and lubricates the pistons, piston pins, cams, camslides, and rollers.

A separate passage drilled through the crankcase conducts oil direct from the pump to the camshaft front bearing from which the oil enters the hollow camshaft and is carried to the other camshaft bearings and to the distributor driving gear.

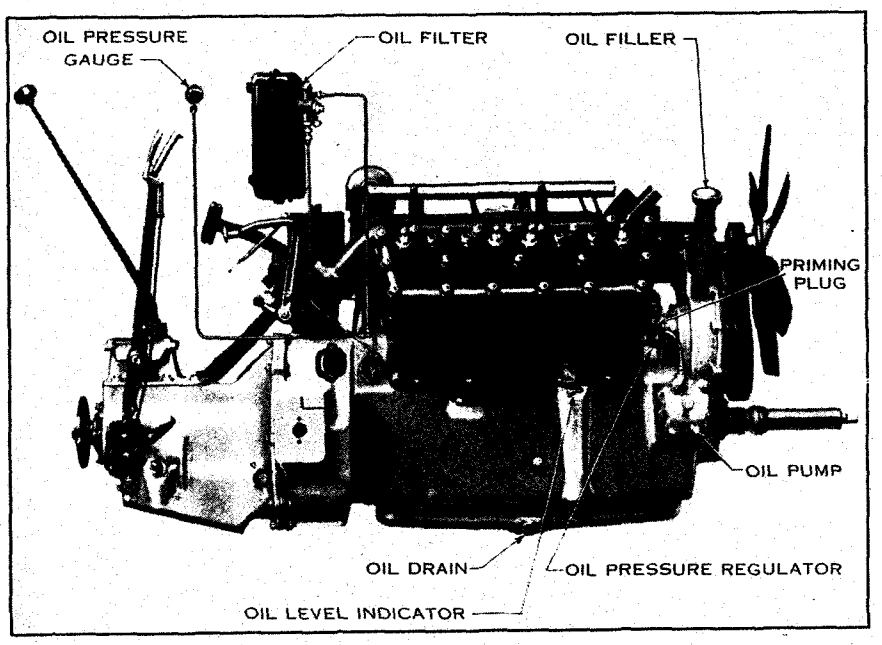


FIGURE 13. *Engine lubrication features*

The pressure in the lines supplying the main bearings and the camshaft bearings is controlled by an oil pressure regulator* attached to the crankcase almost directly above the pump and connected to the pump by an external pipe. The pressure regulator contains a by-pass with metering screw for adjustment of the oil pressure at idling speeds and a spring-controlled valve that opens to prevent excessive pressure at high speeds. The oil that passes the regulator, either through the by-pass or around the valve, is led to the spiral gears, chain and chain adjusting mechanism.

The valve stems are automatically lubricated by oil sprayed from two small holes drilled in the wall of each cylinder at such a distance from the bottom of the cylinder that, when the piston is at the bottom of its stroke, these holes register with a groove in the piston between the second and third piston rings. As the piston descends on the power stroke, oil collects in this groove and as soon as the groove registers with the holes, the pressure of the gases above the piston forces oil out upon the valve stems. Surplus oil collecting in the valve compartments is returned to the crankcase through drain passages.

All oil returns to the oil pan through a fine mesh screen placed above the oil pan and separating it from the crankcase.

Oil Level

The normal capacity of the oil pan is two gallons which fills it to the level of the screen above the pan. When the oil pan contains this amount, the oil level indicator on the right-hand side of the engine (Fig. 13) indicates "Full." As the oil level descends, the indicator indicates "Fill" and then "Empty." Oil should be added as soon as the indicator ball has dropped to "Fill." If the indicator indicates "Empty," under no circumstances should the engine be run until oil has been added.

The mileage interval at which oil must be added depends upon individual circumstances. *It is recommended that the oil level indicator be checked every one hundred to one hundred and fifty miles, although it is improbable that oil will be required as frequently as this.*

Oil Pressure

The pressure of the oil in the supply pipe is indicated by the oil pressure gauge on the instrument panel (Fig. 1). The purpose of the oil pressure gauge is, first, to enable the driver to make sure that there is pressure whenever the engine is running, and second, to verify the adjustment of the oil pressure regulator.

It is absolutely necessary that there should be oil pressure just as soon as the engine starts and as long as the engine is running. If the oil pressure

*On some cars the pressure regulator is located just to the rear of the right-hand cylinder block and takes the place of the fitting to which the filter and pressure gauge are connected. On these cars the priming plug is a hexagonal plug directly on top of the oil pump.

gauge does not indicate pressure as soon as the engine starts, stop the engine at once and investigate the cause. First, check the level of oil in the oil pan. If the level is above "Fill," prime the oil pump by removing the screw plug shown in Fig. 13 and pouring oil in through a funnel. Be sure to replace the plug before starting the engine. If, after priming the oil pump and starting the engine, the oil pressure gauge does not indicate pressure, stop the engine immediately and consult the nearest Cadillac maintenance station.

Before the adjustment of the oil pressure regulator can be verified, the factors affecting the viscosity of the oil must be standardized. The oil pressure changes with the viscosity, which in turn depends upon the kind of oil, the extent to which it has been thinned by use, and the temperature. It is therefore necessary that the oil be fresh and of the viscosity specified for the Cadillac engine. The engine must also be run long enough to become thoroughly warm. Under these conditions the pressure at idling speed (300 r.p.m.) should be from 1 to 4 lbs.

Adjustment of the pressure at idling speeds is made by the screw at the oil pressure regulator shown in Fig. 13. To increase the pressure, turn the screw clockwise; to decrease the pressure, turn the screw counter-clockwise. This adjustment should be made while the engine is running.

Crankcase Ventilating System

In every internal combustion engine, seepage of vapors by the pistons takes place to some extent, permitting water vapor and other products resulting from combustion, as well as unburned gasoline, to enter the crankcase. Contamination of the lubrication oil from this source makes it necessary in most engines to replace the oil supply at frequent intervals.

Cadillac engines are equipped with an exclusive system to prevent the seepage vapors from entering the crankcase. To bring about this result, advantage is taken of the fact that the Cadillac crankshaft with its compensating weights acts naturally to draw air through an inlet in the left-hand side of the engine, building up within the crankcase a pressure slightly above atmospheric pressure. No outlet is provided in the crankcase itself, but in the wall of each cylinder is a port connecting the space below the piston with the valve compartment. This port is open except when the piston is at the extreme bottom of its stroke.

The effect of this arrangement is as follows: The seepage vapors that pass the two upper piston rings are forced through slots milled in the circumference of the lower piston ring and through corresponding holes in the piston into the space inside the piston, where they are carried down as the piston descends. The vapors cannot enter the crankcase, however, because they are prevented from doing so by the pressure built up in the crankcase by the revolving crankshaft. Instead, the vapors are expelled through the port into the valve compartment. From the valve compartments the expelled vapors are conducted through flexible pipes underneath the car where they are discharged.

Oil Filter

Another source of contamination of the oil supply is dirt. In the Cadillac engine all solid matter in the oil is removed by means of a filter (Fig. 13) which is attached to the dash and which is connected to the oil circulating system.

The filter consists of a metal container in which is a series of eight envelopes made of special fabric. As the oil is forced through these fabric envelopes, the total area of which is over five square feet, it leaves all solid matter behind, returning to the engine as clean oil.

The filter is connected to the oil line by a pipe that leads from a tee on the crankcase at the rear of the right-hand cylinder block. The oil pressure gauge on the instrument board is also connected to this tee. Oil is thus forced to the filter whenever the engine is running and there is pressure in the oil lines. The normal flow when the filter is new is approximately one quart per minute under a gauge pressure of 15 pounds, so that an amount of oil equal to the entire capacity of the lubricating system passes through the filter every eight to ten minutes.

As dirt accumulates in the filter, the flow of oil through the filter decreases, and eventually the filter unit must be replaced. When it takes longer than seven minutes for a quart of oil to flow through the filter under a gauge pressure of 15 pounds, the filter unit should be replaced.

As an approximate check on the condition of the filter, remove the screw plug in the fitting at the filter and note the size of the stream of oil that flows from the opening. In making this test, the engine should be warm and the throttle should be opened until the pressure gauge indicates 15 pounds. Under these conditions a stream of oil as large as a pencil lead, or larger, should flow from the filter. (On some cars the filter has a sight feed glass through which the stream of oil flowing from the filter may be seen.)

Under average driving conditions replacement of the filter unit should not be necessary for 12,000 to 15,000 miles. Filter units for replacement can be obtained from Cadillac distributors and dealers.

Replacing Engine Oil

Although the crankcase ventilating system and the oil filter described in the preceding sections greatly prolong the useful life of the oil, it is recommended that the oil be drained and replaced with fresh oil every 2,000 miles.

To drain the oil, simply remove the drain plug (Fig. 13). A special socket wrench for the oil pan drain plug is supplied as part of the tool equipment.

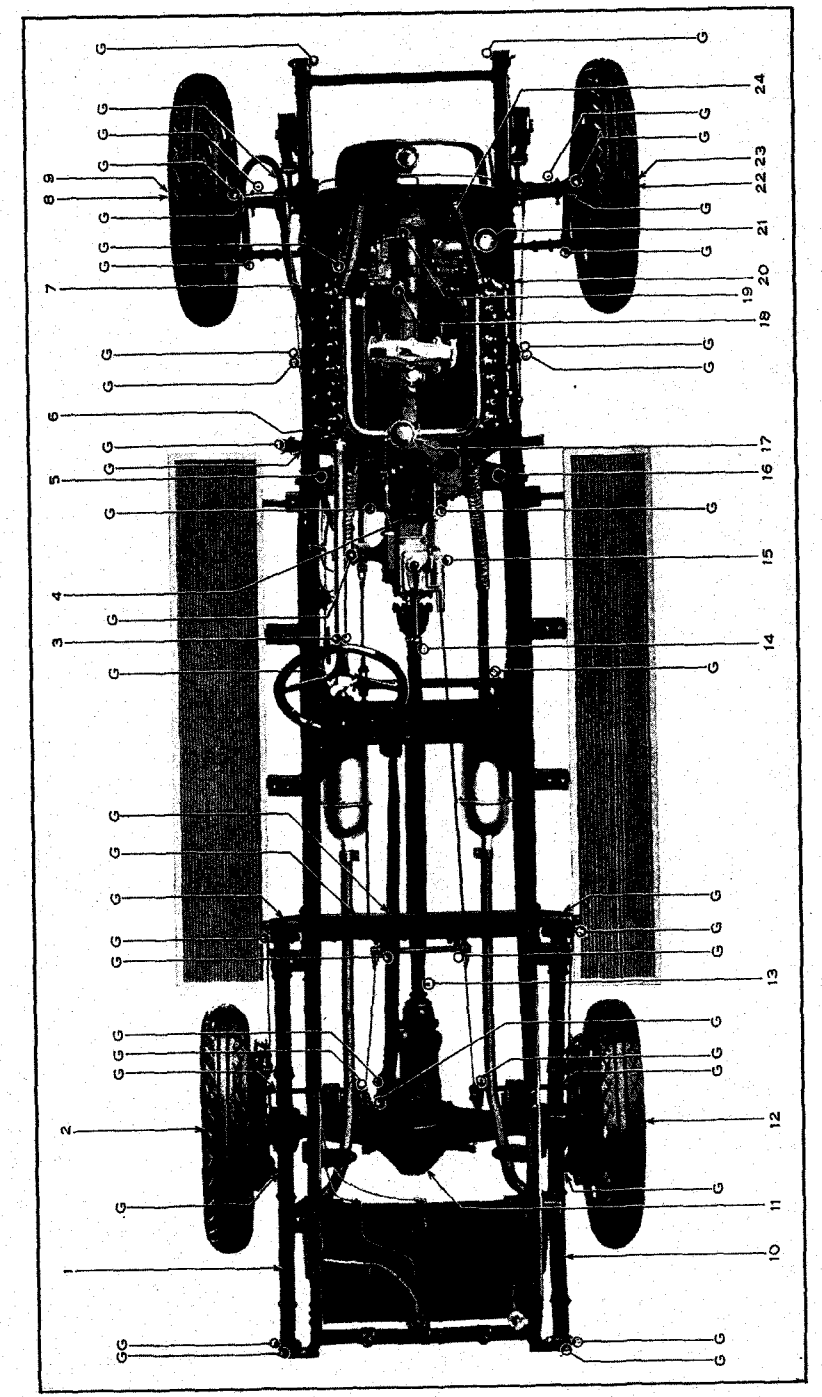


FIGURE 14. *Chassis lubrication diagram*

Each "G" indicates a grease gun connection. Each number indicates a lubricating point for which instructions are given in Chapters II and III. Lubricating points that are visible in the diagram are surrounded by circles, others are indicated by arrows.

Be sure to reinstall the drain plug before adding the fresh oil. Two gallons of fresh oil should be added, or enough to bring the oil level indicator ball to "Full."

At the end of the first 1,000 miles. it is recommended that the car be taken to a Cadillac maintenance station to have the oil pan and screen removed and cleaned with gasoline or kerosene. This should be repeated once a year or whenever the filter unit is replaced.

Generator Oil Cups: 18, 19*

Two oil cups on the generator conduct lubricant to the forward and rear bearings on the armature shaft. A few drops of engine oil should be applied to each cup every 1,000 miles.

Timer-Distributor Oil Cup: 17

The oil cup at "17" is for lubricating the ball bearing at the upper end of the timer-distributor shaft. A few drops of engine oil should be applied every 1,000 miles.

Engine Supports: 5, 16, 24

The brackets on the frame to which the engine rear supports are bolted are provided with felt wicks (5 and 16). Every 1,000 miles engine oil should be applied to these points and to the oil hole at the front engine support (24).

CHAPTER III

General Lubrication

Grease Gun Connections: G

SPRING bolts, steering connections, brake rocker shafts and other points are provided with connections to fit the grease gun supplied with the tool equipment. These points are indicated by "G" in Fig. 14. Cadillac Roller Bearing and Cup Grease should be applied to these points with the grease gun every 500 miles.

Clutch Thrust Bearing: 4

The lubricating joint on the clutch thrust bearing is fitted with a screw plug shown at "G" (Fig. 25). To reach this plug, remove the floor boards and the cover plate shown at "F" (Fig. 14) and turn the thrust bearing until the plug is uppermost. Remove the plug with a screw-driver, taking care not to drop the plug into the clutch housing. Screw the extension fitting shown at "18A" (Fig. 8) into the threaded hole from which the plug was removed. Attach the grease gun to this fitting.

*The numbers following the headings in this chapter and in Chapter III refer to Fig. 14.

Note: On some cars a grease gun connection is permanently fitted to the thrust bearing in place of the screw plug. On these cars the adapter "18" (Fig. 8) should be used instead of the extension pipe "18A." This must be done with the engine not running.

The clutch thrust bearing should be lubricated every 2,000 miles with the light grade of Cadillac Fiber Grease.

Caution: Do not inject too much grease into the clutch thrust bearing. One or two turns of the grease gun handle are sufficient.

Transmission: 15

The transmission case should contain sufficient lubricant to bring the level up to the filling hole at the right-hand side. The level should be inspected every 2,000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended. The heavy grade should be used except in cold weather. The light grade should then be used. If the heavy grade is used in cold weather, the transmission gears will be difficult to shift.

Every 4,000 miles the drain plug should be removed from the bottom of the transmission case and the lubricant should be drained and replaced with fresh lubricant. Three quarts of lubricant are required to fill the transmission case to the proper level.

Universal Joints: 13, 14

The forward and rear universal joints on the drive shaft are provided with grease gun connections as indicated at "13" and "14." It may be necessary to roll the car forward or backward a few inches to bring the connections underneath where they can be reached with the grease gun. The heavy grade of Cadillac Fiber Grease should be applied every 1,000 miles.

Rear Axle: 11

The rear axle housing should contain enough lubricant to bring the level up to the filling hole in the rear cover plate. The level should be inspected every 2,000 miles and lubricant added if necessary. Cadillac Rear Axle and Transmission Lubricant is recommended. The heavy grade should be used except in cold weather. The light grade should then be used.

Every 4,000 miles the drain plug should be removed from the bottom of the axle housing and the lubricant should be drained and replaced with fresh lubricant. Three and one-half quarts of lubricant are necessary to fill the rear axle housing to the proper level.

Wheels: 2, 8, 12, 22

The front and rear wheel bearings are packed in grease when the car is assembled. Every 4,000 miles all the wheels should be removed and the bearings should be thoroughly cleaned in gasoline or kerosene. They should then be repacked and the bearings adjusted in accordance with the directions on pages 80, 81 and 82.

Cadillac Roller Bearing and Cup Grease is recommended for the wheel bearings. Do not use heavy grease as it will roll away from the path of the rollers and will not return.

Front Brake Trunnions: 9, 23

Every 4,000 miles, at the same time that the wheels are removed for lubrication of the wheel bearings, the brake operating trunnions inside the front wheel brake drums should be lubricated by applying the grease gun to the connection at "A" (Fig. 15). Cadillac Roller Bearing and Cup Grease should be used. It should be injected only until it begins to appear around the trunnion bearings. Do not inject too much grease. Before replacing the wheels, wipe off any grease appearing around the trunnion bearings. Do not inject any grease at "A" except when the wheel is off and the application of too much grease can be definitely avoided.

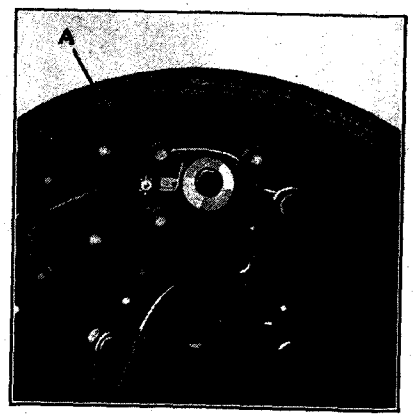


FIGURE 15.
Lubrication of front brake trunnions

Steering Gear: 6

The hole for adding lubricant to the steering gear is on top of the housing just at the base of the steering column, and is fitted with a square plug. Every 2,000 miles this plug should be removed and rear axle and transmission lubricant or 600-W should be added until it flows from the hole.

On some cars there is a grease gun connection for the injection of lubricant. On these cars there are also two holes at (3), at the upper end of the steering column. In lubricating this type of steering gear the lower of these two plugs should be removed, and when the grease begins to flow from the hole stop injecting grease at (6).

Speedometer Flexible Drive Shaft

The flexible shaft by which the speedometer is driven is housed in a flexible casing. To lubricate the speedometer drive shaft, the shaft should be removed from its casing and lubricant applied to it for its entire length. Cadillac Roller Bearing and Cup Grease is recommended for this lubrication, which should be performed every 4,000 miles.

Do not under any circumstances attempt to lubricate the speedometer itself. Any parts in the speedometer requiring lubrication are amply supplied when it is assembled.

Horn

The horn is lubricated when assembled and does not require further lubrication, but it is a good plan to inspect the commutator of the horn motor occasionally and clean it, if necessary. To do this, remove the horn from its bracket and the motor shell from the horn. If the commutator appears to be dirty, clean it with a dry cloth. This should be done with the horn motor running so that the commutator will be cleaned on all sides. Do not attempt to polish the commutator or brushes with oil or vaseline. These parts are designed to run without lubricant.

Springs: 1, 7, 10, 20

To lubricate the spring leaves, it is recommended that the edges and ends of the leaves be painted with engine oil every 500 miles. A small stiff brush should be used. After applying the oil, the car should not be washed until it has been driven far enough to allow the lubricant to work in between the leaves. Do not separate the leaves and insert lubricant. A certain amount of friction between the spring leaves is necessary in order to give the springs the desired characteristics.

If spring covers are used, it is not necessary to lubricate the spring leaves as directed in the preceding paragraph. It is sufficient to repack the springs once a season with Cadillac Spring Lubricant.

Stabilators

The stabilators, with which the car is equipped and which are for the purpose of controlling the recoil of the springs, not only need no lubrication—they *must not* be lubricated. To lubricate the stabilators would defeat their purpose just as oil or grease on the brakes would prevent them from holding.

Door Hardware

Whenever the chassis is being lubricated, the door locks and other door hardware should also be lubricated as follows:

Place a few drops of oil on each door lock plunger or striker, turning the handle back and forth so that the oil will work into the lock. Also place a drop of oil on each of the striker plates against which the strikers engage when the doors are closed. The hinge pins should also be oiled sparingly so as not to get oil on the finish.

Each door has a wedge-shaped tongue that dovetails into a receptacle on the body when the door is closed. These tongues should receive a small amount of grease or oil.

Each closed car door is also fitted with a check at the top which limits the outward movement of the door. A small amount of grease should be applied to the pin that slides in the slot at the top of the door.

CHAPTER IV

Care of Body

Care of Finish When New

On cars finished with varnish, more careful and more frequent attention is necessary when the car is new than after the varnish has hardened. Particular care should be taken to keep mud from the body and hood for the first few weeks. Even after the varnish has hardened, mud should not be permitted 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 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.

The same degree of caution, although commendable, is not as necessary on cars finished with Duco, because Duco hardens much more quickly than paint or varnish.

Washing Varnished Cars

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, because 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 pressure greater than will carry the water six inches 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.

Wash the chassis first, going over the under sides of the fenders, the wheels, and the running gear 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 under side of the fenders, or machine oil or grease from the chassis, use a 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 soft carriage sponge.

After washing the chassis, begin at the front of the car and flow water from the hose upon the body, hood and upper surfaces of the fenders. This will soften the accumulation of road dirt, removing most of it. Then go over the car again and remove all dirt by rubbing lightly with a soft wool sponge, at the same time applying an abundance of water from the hose. The sponge, which should be kept exclusively for the body, hood and upper surfaces of the fenders, should be rinsed 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. Be sure and use a chamois that has not been used on the chassis. Rinse the chamois and wring it out frequently. Do not rub the finish or apply more pressure than is necessary to dry off the surplus water. The remaining water will evaporate quickly, leaving the finish in good condition.

If it is desired to chamois the wheels and chassis, and they have become dry, wet these parts with clean water and then wipe them. Be sure to use a separate chamois for the chassis. The chamois that has been used on the body should be saved for the body exclusively.

Do not use soap, gasoline, kerosene, or anything of similar nature on the finish. Such materials attack the finish.

Washing Duco

Although it is not necessary in washing cars finished in Duco to use the same degree of care as in washing varnished cars, nevertheless the same general directions should be followed.

Cleaning Windows

Do not clean the window glass with preparations that may contain harmful ingredients. Use only cleaning compounds that are known to have no destructive effects on highly polished glass.

Cleaning Upholstery

To keep the upholstery in closed cars in the best condition, it should be cleaned thoroughly at least once a month with a whisk broom and vacuum cleaner. Dirt and grit accumulating in the fabric wear it out faster than use.

Spots on the upholstery may be cleaned with any good dry cleaner. When the cleaner has thoroughly evaporated, apply a hot flatiron wrapped in a wet cloth. Steaming the fabric and rubbing lightly against the nap will raise the nap to its normal position.

CHAPTER V

Care of Tires

EACH tire maker publishes a booklet with instructions for care and repair of tires. Every motorist should provide himself with one of these and thoroughly familiarize himself with the contents. The suggestions here apply to pneumatic tires in general.

Three-fourths of so-called "tire trouble" is the result of misuse. We give here some suggestions regarding the more important points of the care of tires.

Result of Under-Inflation

Under-inflation causes a tire to flatten out under load. This causes the side walls to bend sharply as the tire revolves. The result is the breaking of the side walls. An under-inflated tire is susceptible to bruise, broken cords and blow-out.

Result of Improperly Aligned Front Wheels

Running a car with the front wheels out of alignment causes rapid tread wear. This usually affects both tires similarly, although sometimes only one tire is affected. An incorrect adjustment of the front axle parallel rod or a bent steering arm is responsible for the condition. Unless the wheels are in proper alignment the treads of the front tires will wear away in a remarkably short time.

Neglect of Small Cuts

If cuts extending to the cords are neglected deterioration and blistering of the tire tread is the result. It is unnecessary to remove a tire to treat small cuts of this nature. Tire companies furnish a plastic compound for filling cuts. This prevents moisture and dirt from getting in. If a cut is large, it should be vulcanized at once.

Result of Improperly Adjusted Tire Chains

Tires are sometimes badly damaged through the use of tire chains which are incorrectly adjusted or which are fastened to the spokes of the wheel holding the chains tightly in place.

The least injury results when chains are applied loosely, leaving play enough to permit them to work around. The wear on the tire is thus distributed evenly. Probably the greatest amount of injury comes from using chains unnecessarily on paved streets.

Result of Sudden Application of the Brakes

The sudden application of the brakes resulting in sliding the wheels causes the treads to wear away in spots. A tire will give away very rapidly under this severe treatment.

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 cords, 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 layers of cords to dirt and moisture, which soon starts to rot the cords.

In turning in a narrow street, avoid striking the curb.

If a tire goes flat without any indication of injury to the tire, see that the valve is not leaking. A little moisture on the tip will show bubbles if the air is escaping.

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 carcass 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 rubber 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.

CHAPTER VI

Storing Car

If the car is not to be used for a period of several months, it should be protected from deterioration during the period when it is not in use by carefully preparing it for storage.

Engine

To prepare the engine for storage, proceed as follows: Run the engine until opening of the radiator shutters indicates that the engine is warm. This may be done by driving on the road or by running the engine idle. In the latter case, care should be taken that there is sufficient ventilation to avoid injury from carbon monoxide poisoning. (See page 18.)

After the engine is warm, place the car where it is to be stored and stop the flow of gasoline to the carburetor by removing the gasoline tank filler cap, thus relieving the air pressure. As soon as the engine starts to slow down raise the polished aluminum cap on top of the carburetor and inject three or four tablespoonfuls of clean fresh engine oil into the carburetor. Injection of the oil will stop the engine.

Open the compression relief cocks by turning them counter-clockwise. Inject two or three tablespoonfuls of engine oil into each compression relief cock, 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. The engine should not be started again after injecting the oil. If it is started, it will be necessary to repeat the treatment.

Drain the cooling system by opening the drain valve in the water pump.

Storage Battery

If the car is to be stored during the winter, the storage battery should have special treatment in order to protect it against freezing.

Shortly before the car is used for the last time, distilled water should be added to bring the level of the solution up to the bottom of the fillers. (See page 63.) After the water added has had an opportunity to mix thoroughly with the acid solution, the specific gravity should be taken with a hydrometer. If the specific gravity of the solution is above 1.270 there will be no danger of the acid solution freezing. If, however, the specific gravity is below 1.270, the battery should be removed and charged. *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.*

It is important that one of the battery leads should in all cases be disconnected during storage as a slight leak in the wiring will discharge the battery

and lower the specific gravity to the point where the solution may freeze.

If possible, the storage battery should be removed and charged from an outside source every two months during the storage period.

Tires

During storage of the car, it is best to remove the tires *from the rims* and to keep the casings and tubes in a fairly warm atmosphere away from the light. The tubes should be inflated slightly after the tires have been removed.

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

The weight of the car should not be allowed to rest on the tires during the storage period. If tires are not removed, the car should be blocked up so that no weight is borne by the tires. The tires should also be partly deflated.

Body and Top

A cover should be placed over the entire car to protect it from dust. In storing an open car, the top should be up.

Taking Car Out of Storage

In putting into use again a car that has been stored, it is advisable, unless the storage battery has been removed and charged at periodic intervals, to remove the battery from the car and give it a fifty-hour charge at a four-ampere rate. If the battery has received periodic charges, or if the specific gravity is above 1.200, simply add distilled water to the proper level and connect the leads. If there is a greenish deposit on the terminals of the battery, remove this with a solution of bicarbonate of soda (common cooking soda) and water. Do not allow any of this solution to get into the battery.

Before starting the engine, drain the oil from the oil pan and remove and clean the oil pan and screen. After reinstalling the oil pan, add eight quarts of fresh engine oil. Fill the cooling system, being sure to use anti-freezing solution in freezing weather. Open the compression release cocks and inject two or three tablespoonfuls of engine oil into each cylinder. Close the compression release cocks, and, with the ignition switched off, crank the engine a few seconds with the starter to distribute the oil over the cylinder walls.

Start the engine in the usual manner. As soon as the engine starts, immediately let the carburetor enriching button go as far forward as possible without causing the engine to stop or slow down materially and then open the throttle until the ammeter reads approximately 10 with all lights switched off. While the engine is running lift the aluminum cap on top of the carburetor and inject from two to three tablespoonfuls of engine oil into the carburetor. It is a good plan to run the car outdoors as soon as this has been done. Release the carburetor enriching button entirely as soon as the engine is warm enough to permit it.

PART III

GENERAL INFORMATION

CHAPTER I

Engine

Important Features of Construction

THE Cadillac engine is of the water-cooled, four-cycle type with two L-head cylinder blocks of four cylinders each, placed at an angle of ninety degrees between the blocks. The cylinders of one block are directly opposite those of the other block, the lower end of each connecting rod on the left-hand side working in the forked end of the connecting rod opposite. This construction makes the engine shorter and more compact than any other type, the smooth running being largely the result of the short, rigid crankshaft.

The crankshaft has four throws or cranks, three main bearings, and carries on its front end the sprocket by which the camshaft is driven. The camshaft has six bearings, and is driven by the crankshaft through a silent chain in which the proper tension is maintained by an automatically adjusted idler gear. The camshaft has sixteen cams, each operating one valve through a camslide in which is carried a roller.

The fan is mounted on the front end of the generator shaft, which is driven by the camshaft through a special V-shaped belt.

The water pump and oil pump are driven by a cross shaft, which in turn is driven by a spiral gear on the crankshaft. The water pump is at the left-hand end of the cross shaft and the oil pump at the right-hand end.

The engine base is the aluminum crankcase that supports the cylinder blocks and carries the crankshaft and camshaft bearings. The crankcase is supported at the rear end by two arms which are cast integrally with the

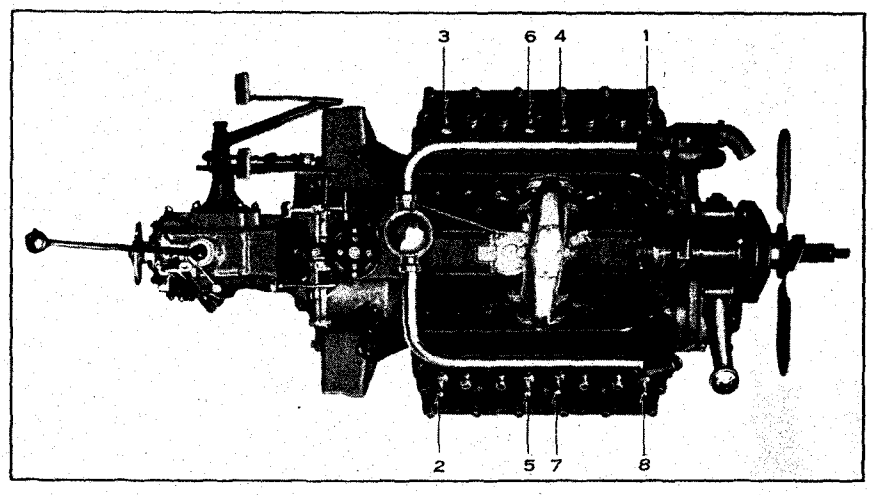


FIGURE 16. ***Firing order***

crankcase and which are bolted to brackets on the frame. The front end of the engine is supported on a cross member of the frame below the radiator.

General Principle of Gasoline Engine

The production of power by the engine may be described briefly as follows:

Gasoline is fed by air pressure from the tank to the carburetor where it is mixed with air in the proper proportions to form an explosive vapor or gas. This gas is then drawn through the intake manifold and inlet valves into the cylinders of the engine where it is compressed by the pistons and then ignited by electric sparks. The pressure of the resulting explosions acting on the pistons produces the power.

The series of operations through which the pistons and valves of each cylinder must go to produce one power stroke is called a "cycle" and for such a cycle four strokes of each piston and two revolutions of the flywheel are required. The four strokes, each of which has a different function, take place in the following order:

Suction Stroke—The suction stroke commences with the piston at its highest point in the cylinder and with the inlet and exhaust valves closed. As soon as the piston starts to descend, the inlet valve immediately opens and a charge of gas is drawn from the carburetor through the valve opening into the space above the piston.

Compression Stroke—When the piston starts upward again after completing the suction stroke, the inlet valve closes. The gas, which has no means of escape, 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, a spark, timed to occur at exactly the right instant, jumps between the electrodes of the spark plug and ignites the compressed charge of gas. The heat that results 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 the piston down and produces the impulse which is transmitted by the connecting rod to the crankshaft, causing the crankshaft to revolve.

Exhaust Stroke—Just before the piston reaches the end of the power stroke, the exhaust valve opens. It remains open while the piston travels upward on the fourth, or exhaust stroke, driving the burned gas 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. This completes the four strokes of the cycle and the piston is ready to draw in a new charge and to repeat the cycle.

Firing Order

Such a cycle as has been described takes place in each of the eight 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 of the eight pis-

tons are so timed that a power stroke is begun every quarter-turn of the crankshaft. The crankshaft thus receives four overlapping power impulses every revolution.

The order in which the eight cylinders fire is indicated by the numbers in Fig. 16. These numbers are the numbers used in marking the flywheel for valve and ignition adjustments.

CHAPTER II

Gasoline System

THE general arrangement of the gasoline system is illustrated in Fig. 17. There are two sets of tubes, one for air and one for gasoline.

The air tubes connect the automatic compressor at the left-hand front end of the engine, the hand compressor on the instrument board, and the air pressure relief valve, to the top of the gasoline tank. As described on page 9, the automatic and hand compressors are for the purpose of furnishing the necessary pressure to force the gasoline to the carburetor. The air pressure relief valve, which is fastened to the left-hand side of the frame under the front floor boards, prevents excessive pressure that might accompany the use of high-test or casing-head gasoline.

The gasoline line starts at the bottom of the gasoline tank and runs to a tee on the frame. From the tee one tube leads to the pressure gauge on the instrument board and another tube to the carburetor.

Settling Chamber

It is recommended that the settling chamber at the gasoline tank (Fig.17) be drained at the beginning of freezing weather and at least every 4,000 miles during the winter season. An accumulation of water at this point might freeze and prevent gasoline from flowing to the carburetor.

To drain the settling chamber at the gasoline tank, first relieve the air-pressure by removing the filler cap and then remove the drain plug at the rear of the chamber as shown in Fig. 17. It is necessary to drain out only enough gasoline to flush the chamber. Be sure there is no fire near.

Strainer

There is a strainer in the gasoline system at the point where the gasoline enters the carburetor. This strainer should be cleaned occasionally.

To do this, first relieve the air pressure by removing the gasoline tank filler cap. Then remove the six screws that hold the strainer cap and remove the cap and the three gauze discs. The discs should be rinsed in clean gasoline.

In re-installing the discs, be sure to place them in their original positions. The two discs with the fine mesh gauze should be installed first.

Carburetor

The carburetor is correctly adjusted when the engine is assembled and, unless tampered with, should not require readjustment. It is unnecessary to change the adjustment for changes in season, weather or altitude.

Good carburetor action cannot be expected until the engine is thoroughly warmed. 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, it should, if possible, be made by an authorized Cadillac maintenance station. The adjustment should not be attempted by one unfamiliar with it.

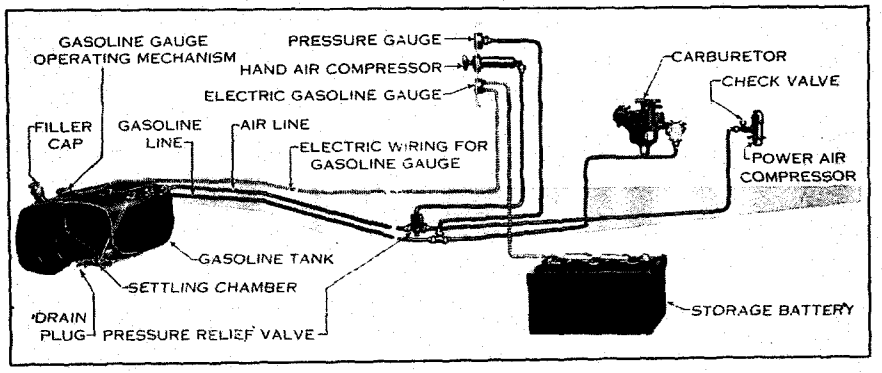


FIGURE 17. ***Gasoline System***

CHAPTER III

Cooling System

Water Circulation

THE Cadillac engine is cooled with water circulated through the jackets of the cylinder blocks by a centrifugal pump. This pump is mounted on the left-hand side of the engine near the front and is driven by a cross shaft, which in turn is driven by a spiral gear on the crankshaft. The pump draws cold water from the bottom of the radiator and delivers it to a connection on the left-hand side of the engine where the stream divides, half going to the left-hand cylinder block and half through a passage in the crankcase to the right-hand cylinder block. From the front end of each cylinder head an outlet pipe with hose connection carries the heated water to the top of the radiator.

Radiator and Shutters

The radiator consists of an upper tank and a lower tank connected by water passages around the outside of which air is circulated by the fan. The water passages are so constructed that they expose a large amount of surface to the air, which cools the water as it passes from the upper to the lower tank.

Until the water in the cylinder blocks and radiator is warm, the cooling effect of the radiator is not only unnecessary, but is undesirable. The radiator is accordingly provided with shutters that prevent air from circulating around the water passages until the engine becomes warm. The shutters are pivoted vertically and are controlled automatically by a powerful thermostat contained in the upper tank of the radiator.

When the engine is cold, the shutters are held tightly closed and circulation of air is prevented. The water from the cylinders consequently undergoes little change in temperature as it flows through the radiator and the engine quickly becomes warm. As soon as the water entering the upper tank of the radiator reaches the temperature at which the engine operates best, the shutters are forced open by the thermostat and air begins to circulate. The resulting cooling effect checks the rising temperature of the water, which is thereafter maintained uniformly at the temperature of most efficient operation as long as the engine is running.

Filling and Draining the Cooling System

Except during freezing weather, water should be used in the cooling system. In freezing weather, a suitable anti-freezing solution such as those described on page 34 must be used.

To add liquid to the cooling system or to refill the cooling system after it has been drained, remove the radiator filler cap and pour the liquid in through the filler.

It is not necessary to add liquid to the radiator whenever the level falls below the filler. There is sufficient liquid in the cooling system if the bottom of the upper tank of the radiator is covered, and any liquid in excess of this is usually forced out through the overflow pipe as soon as the engine becomes warm. When water is used, any loss from this cause is of little consequence, but in winter to conserve anti-freeze it is important to avoid adding more liquid than is necessary.

To drain the cooling system, open the drain valve at the bottom of the water pump by turning the hexagonal end of the valve counter-clockwise.

Cleaning the Cooling System

The cooling system should be drained and flushed every two or three months. This can be done in the following manner:

Run the engine until the opening of the radiator shutters indicates that the engine is warm. Stop the engine and immediately open the water pump drain valve.

After the liquid has drained off, refill the cooling system with hot water and repeat the operation described above. If in draining the second time the water is very dirty it may be advisable to repeat the flushing operation a third time, placing one or two handfuls of sal-soda in through the radiator filler. The sal-soda must not be permitted to get on the finish of the hood or radiator. If sal-soda is used, the cooling system must be drained and flushed again before refilling for use.

CHAPTER IV

Electrical System

THE electrical system comprises the following units: The generator or source of electrical energy; the storage battery, which stores the current generated; the starting motor, which cranks the engine for starting; the ignition system; the lamps and other devices using electrical current; the ammeter; the ignition and lighting switch; and the circuit breakers, which protect the system. The wiring system connecting these units is the single wire or grounded type, the engine and frame forming one side of the electrical circuit.

Generation of Current

Generator

The generator is attached to the crankcase at the front of the engine and is driven by a specially made V-shaped belt from a pulley on the front end of the camshaft.

At very low engine speeds the voltage of the current generated is not sufficient to provide current for lighting or ignition and the battery is then the source of current. To prevent the battery at such times from discharging through the generator, a cut-out relay on the generator automatically opens the circuit whenever the generated voltage drops below the battery voltage. At approximately eight miles per hour the generated voltage is sufficient to operate the cut-out, which then closes the circuit between the generator and the battery and lighting circuits. If no lights are switched on, the entire output of the generator, less the current required for ignition, flows to the battery for recharging it. If all the lights are on, the generator will not generate sufficient current to start charging the battery until a speed of twelve to fifteen miles per hour is reached.

The amount of current generated by the generator at any instant is the ammeter reading (with all lights off) plus the current for ignition, which is two to three amperes. The generator output reaches its maximum at speeds between twenty and twenty-five miles per hour. This maximum should not exceed eighteen amperes, which is equivalent to an ammeter reading of sixteen when all lights are off.

Do not put oil on the commutator of either the generator or the starting motor.

Ammeter

The ammeter on the instrument board indicates the amount of current flowing to or from the battery except when the starter pedal is down and the starting motor is cranking the engine. When the engine is not running, the ammeter will indicate a current on the discharge side depending in amount upon the number of lights in use. The rate of charge or discharge when the engine is running depends upon the speed of the engine and the number of lights in use, and is equal in amount to the difference between the current generated and the current used by the lights, horn, ignition, and other electrical devices. The ammeter does not indicate the current used in cranking the engine.

If the ammeter should show "Discharge" with the car running twelve miles an hour or more and with no lights in use, it is an indication either that the fan belt is slipping or that the generator charging rate should be readjusted. The fan belt should be inspected first, and tightened if necessary, before any attempt is made to change the generator charging rate.

Storage Battery

The storage battery is a three-cell, six-volt Exide battery made especially for the Cadillac electrical system by the Electric Storage Battery Company of Philadelphia, Pennsylvania. The battery compartment is between the left-hand running board and the frame. The door of the compartment operates the same as the door of the the tool compartment, described on page 24. On some cars the battery compartment is just forward of the running board.

Adding Water to Storage Battery

The battery is filled with a solution from which the water slowly evaporates and fresh distilled water must be added at intervals to maintain the correct level. The level should be inspected every 500 miles and distilled water should be added to bring the level up to the bottom of the fillers.

The battery compartment has been purposely made convenient of access to facilitate the adding of water. It is important in touring that nothing be placed on top of the compartment that would interfere with this regular attention.

Each cell is provided with a filler and filler plug. To remove a filler plug, turn it as far as possible counter-clockwise and then lift it straight up. To install it, set the plug in place and turn it clockwise until tight. If a plug is lost or broken, obtain a new one and install it as soon as possible.

Nothing but pure distilled water should be added to the battery solution. In the absence of distilled water, melted artificial ice or rain water caught in

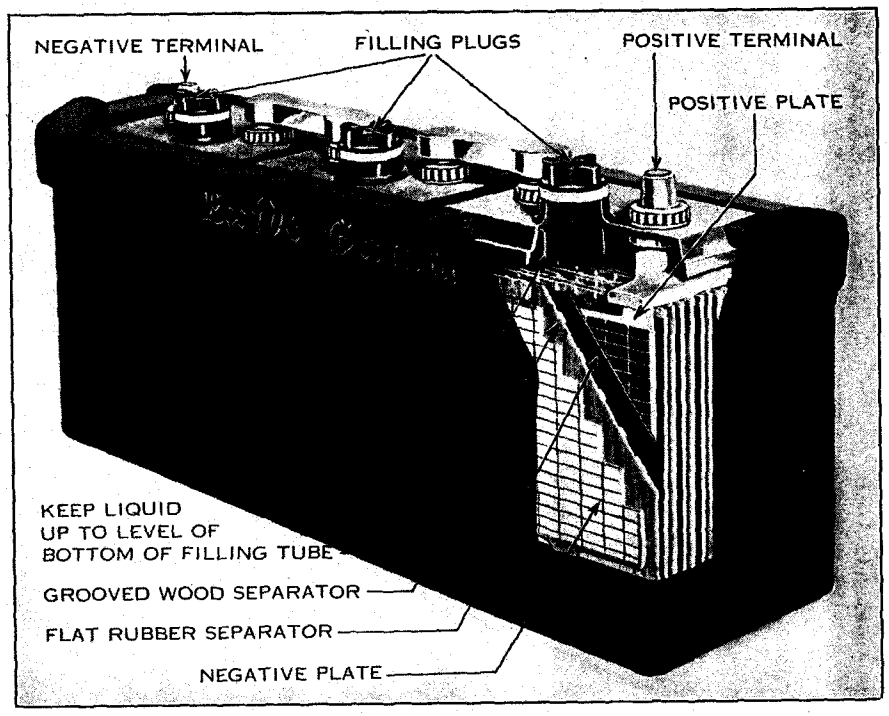


FIGURE 18. ***Storage battery***

an earthenware receptacle may be used. Hydrant water or water that has been in contact with metallic surfaces will cause trouble if used. *Acid must never be added to the battery.*

After adding water to the storage battery in freezing weather, the car should immediately be run far enough to mix the water and acid solution thoroughly. If the car is parked immediately after adding water, the water is likely to stay on top of the acid solution and may freeze, causing extensive damage.

If one cell regularly requires more water than the other, a leaky jar is indicated. A leaky jar should be replaced immediately by a new one as even a very slow leak will in time result in the loss of all the solution in the cell.

Specific Gravity of Battery Solution

As the storage battery is charged and discharged, the solution reacts chemically with the plates of the battery, the specific gravity of the solution changing as the reaction proceeds. The state of charge of the battery is thus indicated by the specific gravity of the solution. As the battery is charged, the specific gravity of the solution increases, reaching 1.270 to 1.290 when the battery is fully charged. The specific gravity of the solution decreases as the battery is discharged. A fully discharged battery has a specific gravity of 1.150 to 1.170.

A hydrometer is the instrument used to measure the specific gravity of a solution. A hydrometer syringe is a hydrometer especially designed for convenience in testing the specific gravity of the acid solution in the storage battery. A hydrometer syringe can be obtained at any battery service station.

The specific gravity of the acid solution should never be tested immediately after adding distilled water. If the solution is below the plates so that it cannot be reached with the syringe, add the necessary amount of distilled water and then drive the car for a few hours before taking the hydrometer reading.

Disconnecting Battery

Do not remove the 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.

Never run the engine with the storage battery disconnected. Serious damage to the generator may result.

Exide Depots and Sales Offices

The Electric Storage Battery Company, whose general offices and works are at Alleghany Avenue and Nineteenth Street, Philadelphia, Pennsylvania, has representative stations in towns of any considerable size as well as sales offices and Exide battery depots in a number of the larger cities. If a storage battery is in need of attention other than recharging, it is advisable to communicate either with a Cadillac maintenance station or with the nearest Exide station or depot. Do not ship a storage battery without receiving instructions.

Starting Motor

Operation of Starter

The starting motor is a series-wound motor, mounted vertically at the rear end of the crankcase directly over the flywheel. When cranking the engine, the starting motor drives the flywheel through a pinion which meshes with teeth machined on the rear face of the flywheel. The pinion is normally held out of engagement with the teeth on the flywheel. It is moved down into mesh with the teeth on the flywheel by pushing forward on the starter pedal. Further movement of the pedal operates a switch that closes the battery circuit and starts the armature revolving.

If, in pushing down the starter pedal, the ends of the teeth on the pinion strike against the ends of the teeth on the flywheel, preventing further movement of the pinion, continued movement of the pedal compresses a spring. As soon as the pedal has been pushed down far enough to close the starting switch, the armature starts to revolve. The pressure of the spring then forces the pinion the rest of the way, completing the meshing operation.

An over-running clutch on the armature shaft prevents the flywheel from driving the starting motor after the engine is running under its own power and before the starter pedal is released.

Ignition

General Description

The function of the ignition system is, first, to multiply the low voltage (six to eight volts) of the storage battery and generator into voltage of sufficient intensity to cause a spark to jump between the electrodes of the spark plugs; and second, to time this spark so that igntion will take place in the proper cylinder at the proper instant.

The Delco single-spark system is used, consisting of a combination timer-distributor unit in connection with a transformer or induction coil. The primary circuit, through which flows the current from the storage battery or generator, includes the primary winding of the ignition coil; the timer contact arms and points; and the condenser, which is enclosed in the timer. The

secondary or high-voltage circuit includes the secondary winding on the ignition coil, the distributor and the spark plugs.

Current flows through the primary circuit whenever and as long as either of the two sets of timer contact points is closed. Current flows through the secondary circuit for an instant only when either set of contact points is opened; but the voltage of this current is several thousand times that of the primary circuit and is sufficient to cause a spark at the spark plug

Timer-Distributor

The timer-distributor is mounted on the top of the crankcase at the rear end and is driven by a spiral gear on the rear end of the camshaft. The shaft of the timer-distributor, which revolves at one-half crankshaft speed, carries a four-lobed cam. As this cam revolves, it actuates the two contact arms alternately, closing and opening first one set of contact points and then the other. The circuit is thus made and broken eight times during each revolution of the cam and eight corresponding sparks are produced at the spark plugs.

In order to procure the maximum power from each explosion, ignition must occur at the right instant in relation to the position of the piston. But the ignition process, although apparently a matter of an instant, consumes a measurable amount of time. It is therefore necessary to break the circuit at the contact points far enough in advance so that actual ignition will take place in the cylinder at the correct time. The lapse of time is always the same, regardless of the speed of the engine, but because the pistons move faster when the engine is running at higher speeds than when it is running at lower speeds, the degree of advance in relation to the positions of the pistons must be increased as the engine speed increases.

This advancing of the relative timing of the spark for higher engine speeds is automatically accomplished by a centrifugal ring governor on the timer shaft below the cam. As the speed of the engine increases, the governor ring assumes a position more nearly horizontal, forcing the cam ahead of the shaft by which it is driven. This causes the contact points to open earlier, starting the ignition process earlier in relation to the positions of the pistons in the cylinders.

In addition to the automatic advance, the timer has a manual control by which the opening of the contact points may be still further advanced or still further delayed. This is operated by the left-hand lever at the steering wheel, as described on page 10.

The distributor is the mechanism that insures that the high voltage current in the secondary circuit is switched to the proper spark plug at the proper time. It consists of a rotor which is carried on the upper end of the timer shaft and which has a metal contact button electrically connected at

all times with the secondary current from the coil. As the rotor revolves, the button makes contact successively with eight metal contacts which are set in the distributor head, and which are connected to the spark plugs. The relation between the rotor and the timer shaft is such that when the cam causes one set of timer contact points to open, the rotor will be in correct position for conducting the resulting high voltage in the secondary circuit to the proper spark plug.

Spark Plugs

For best results the electrodes of the spark plugs should be .032 to .035 inch apart. If the spark plugs should be removed, it is recommended that the electrodes be inspected and adjusted to this clearance if necessary.

Lighting System

Lamp Bulbs

It is recommended that bulbs for the lamps, particularly the two-filament bulbs for the headlamps, be purchased from a Cadillac distributor or dealer. In any event bulbs should have the correct voltage and candle-power ratings. Only three different types of lamp bulbs are used in the entire lighting system. The bulbs and the lamps in which they are used are as follows:

Lamp	Voltage	Candle-power
Headlamps	6–8	21 (two-filament) (Mazda No. 1110)
Back-up light	6–8	21 (single filament)
Stop light	6–8	
Inspection lamp	6–8	
Parking lights	6–8	3
*Instrument lamp	6–8	
*Rear lamp	6–8	
Closed car dome and quarter lamps	6–8	

Cadillac two-filament bulbs are equipped with fog caps or metal screens placed over the upper part of the bulb for the purpose of stopping direct unreflected light from the filament. It is this direct unreflected light from the filament that causes the dazzling reflection from fog or smoke. Headlamps equipped with fog caps have the appearance of being dimmed when seen from the front but they do not perceptibly affect the useful light from the headlamps.

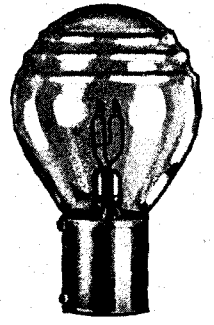


FIGURE 19. ***Double-filament headlamp bulb***

In replacing a headlamp bulb, transfer the fog cap from the old bulb to the new, adjusting the cap to the position shown in Fig. 21. Then adjust the lamp as directed on page 69.

*Bulbs rated at 3-4 volts, such as are used in the rear lamps of some cars, must not be used in these lamps. If installed, they will burn out almost immediately.

Cleaning Headlamp Reflectors

The headlamp reflectors are plated with pure silver. Although the reflectors ordinarily require no attention, if they should require polishing extreme care must be exercised to select materials that will not scratch the silver.

Powdered dry rouge and a chamois skin are recommended. If the reflectors are tarnished, the rouge may be moistened with alcohol. Afterward, polish with a dry chamois and rouge.

The chamois used for the headlamp reflectors must not be used for any other purpose. It must be soft and free from dust.

Do not touch the reflectors with the bare hands.

Official Approval of Headlamps

Cadillac headlamps have been approved by practically every state in the country. For purposes of official identification, the following description of the headlamps is given:

A complete headlamp containing a parabolic reflector with axis inclined two and one-half degrees; screw adjustment on shell of headlamp to adjust the bulb filament with relation to the reflector in both axial and vertical planes to compensate for filament variation in bulbs; a cover glass containing cylindrical flutes vertically grouped in three distinct zones, the outer zone having greater refractory power and the flutes being more pronounced than

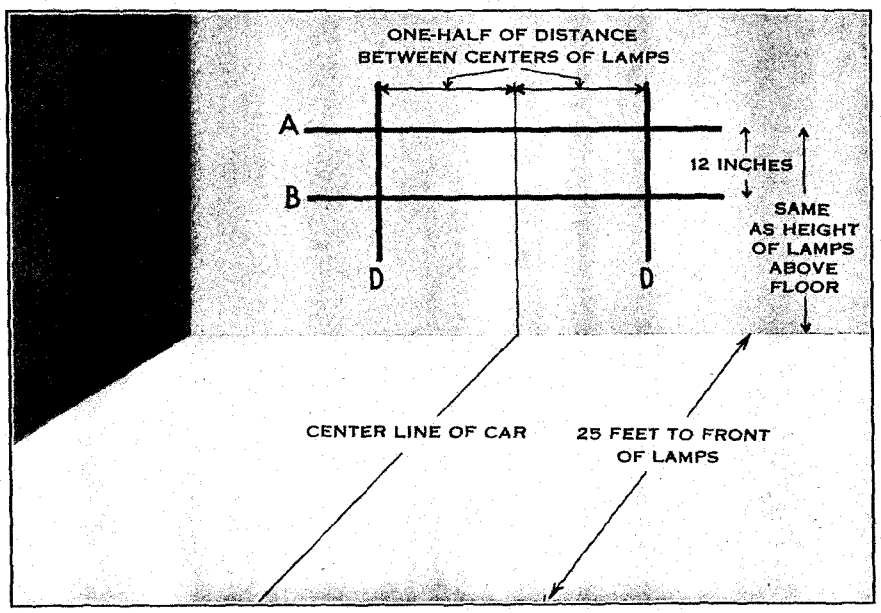


FIGURE 20. *Marks for adjustment of headlamps*

in the center; and a cap over the upper front portion of the bulb to intercept the direct unreflected light above the horizontal.

Approval by the state authorities is conditional upon the headlamps being adjusted to a definite standard. The directions which follow are for this standard adjustment.

Adjustment of Headlamps

Select a level spot where the car with an average load can be placed facing toward and twenty-five feet distant from a wall upon which the lines shown in Fig. 20 can be drawn. The adjustment should be made when it is dark enough so that the outlines of the projected beams are plainly visible.

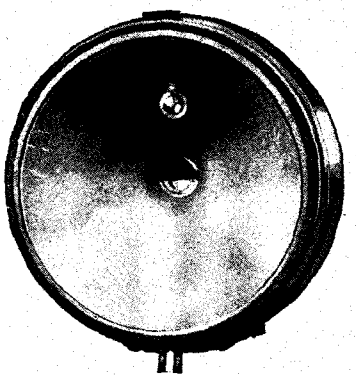


FIGURE 21. *Headlamp fog cap*

Locate a point on the wall directly opposite the front of the car by sighting through the center of the rear curtain toward the radiator cap. Draw a vertical line on the wall through this point: Measure the distance between the centers of the headlamps, and draw two vertical lines "D" parallel to the center line and distant from it by an amount equal to one-half of the distance between the headlamps. Measure the distance of the headlamp centers above the ground or floor and draw the horizontal line "A" at the same elevation. Draw the line "B" twelve inches below the line "A."

Upper Adjusting Screw—The first adjustment should be made with the lower beam on, that is, with the lighting switch lever in the third position. Cover the headlamp that is not being adjusted, or disconnect the plug connector that supplies current to the lamp. Remove the headlamp door. Make sure that the fog cap is properly placed on the bulb as shown in Fig. 21.

The adjusting screws, of which there are two, are in the back of the headlamp shell. Turn the upper or large adjusting screw until the light spot on the screen is the smallest that can be obtained.

Loosen the nut on the headlamp support and aim the headlamp so that the top center of the spot of light is at the intersection of lines "B" and "D" as shown in Fig. 23a. When the lamp has been properly aimed, tighten the nut securely.

(Continued on page 71)

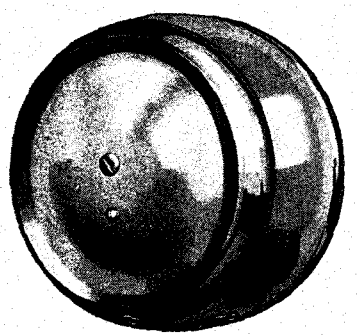


FIGURE 22. *Headlamp adjusting screws*

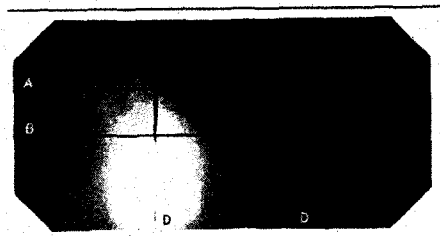


Figure 23a
Left-hand lower beam without lens.

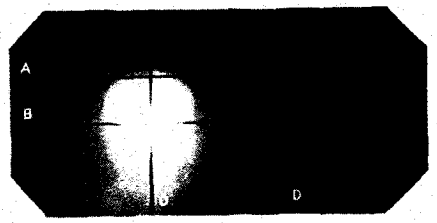


Figure 23b
Left-hand upper beam without lens.



Figure 23c
Left-hand upper beam with lens.

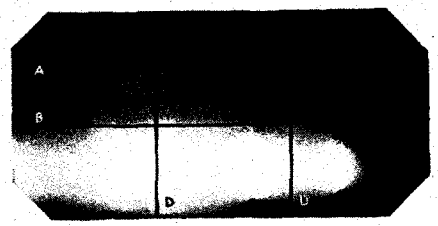


Figure 23d
Left-hand lower beam with lens.



Figure 23e
Both upper beams with lenses.



Figure 23f
Both lower beams with lenses.

FIGURE 23. ***Beams from headlamps***

Lower Adjusting Screw—Turn the lighting switch to the fourth position so that the upper beam is on. Adjust the lower or small screw until the top of the beam is at the intersection of lines "A" and "D" as shown in Fig. 23b. The beam should be of approximately the same proportionate size as shown, and the greatest intensity of the beam should be near the top of the spot and not at its center. If the lower beam is now switched on, it should appear as in Fig. 23a and should be of the same proportionate size with the greatest intensity near the bottom, rather than at the center of the spot.

Install the door with the lens. If the lens is for any reason removed from the headlamp door, it should be replaced with the cylindrical flutes vertical and the smooth side facing out.

With the lens in place, the upper beam from the left-hand headlamp should appear as in Fig. 23c. The pattern of the lower beam from the left-hand headlamp should appear as in Fig. 23d.

After adjusting the one headlamp, repeat the adjustment on the other. When both headlamps have been adjusted and both headlamp doors are in place, the combined light from both headlamps should appear as in Fig. 23e when the upper beams are on, and as in Fig. 23f when the lower beams are on.

CHAPTER V

Clutch and Transmission

Clutch

THE Cadillac clutch is a dry multiple-disc clutch with eight smooth driven discs and seven driving discs faced with friction material composed largely of asbestos. The driving discs have gear teeth machined on their outer circumference to engage with teeth machined internally in the flywheel. The driven discs have gear teeth machined on their inner circumference to mesh with teeth machined on the outside of the clutch hub, which in turn drives the transmission. Except when the clutch pedal is pushed down, the clutch discs are pressed together by a spring having a pressure of 350 lbs. The driven discs then revolve with the driving discs and the engine, if running, drives the transmission.

When the clutch pedal is pushed down to disengage the clutch a forked lever presses against the clutch spring through a ball thrust bearing, releasing the discs from the pressure of the spring. The discs then separate and the driven discs rotate independently of the driving discs.

The clutch itself requires no adjustment or attention other than lubrication of the clutch thrust bearing as directed on page 45. Adjustment of the clutch release rod, however, may be necessary after the car has been driven some distance.

Adjustment of Clutch Release Rod

As described on page 15, the clutch pedal is purposely given about one inch of "lost motion." That is, the clutch does not begin to disengage until the pedal has been moved down about an inch from its released position. This lost motion is necessary in order to allow the clutch discs to come closer together as the facings are reduced in thickness. The lost motion gradually decreases as the clutch is used and eventually will be all taken up. Before this happens, the clutch release rod must be readjusted to restore the lost motion; otherwise the clutch discs will slip and the engine will not drive the car.

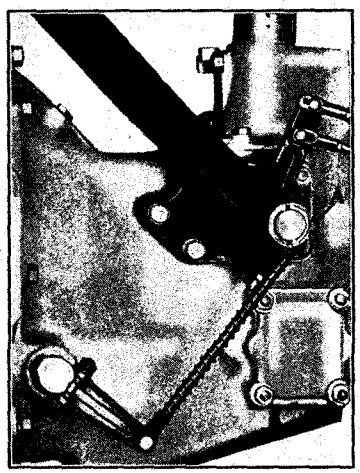


FIGURE 24.
Adjustment of clutch release rod

To make the adjustment, unscrew the nut "A" (Fig. 24) until the clutch pedal has a movement of one inch without starting to disengage the clutch.

The nut "A" must be turned a half-turn at a time.

Transmission

The purpose of the transmission is to provide a means for varying the ratio and direction of the rear axle speed in relation to the engine speed. Three things are accomplished by doing this: First, the engine is enabled to drive the car backwards. Second, the engine is permitted to revolve fast enough to develop the power necessary for starting and for driving the car at extremely low speeds. Third, the turning effort of the engine is multiplied so that it may be sufficient for climbing steep hills and pulling through deep sand and mud.

The Cadillac transmission is known as the selective, sliding gear type. It has three speeds forward, of which one is direct drive, and one speed in reverse. Selection of the various speeds is accomplished by movement of two shifter gears, "A" and "D," (Fig. 25) which are controlled by the transmission control lever. The positions of the gears corresponding to the five positions of the control lever, as illustrated in Fig. 2, are as follows:

Neutral—When the control lever is in neutral position, the shifter gears "A" and "D" are in the positions shown in Fig. 25; that is, they are not in mesh with any of the other gears.

Low—When the control lever is moved from neutral to low, the gear "A" is moved forward into mesh with gear "R." Power is then transmitted from the clutch shaft "Z" to the transmission main shaft "C" through gears "E," "U," "R" and "A." The ratio of engine speed to propeller shaft speed in low is approximately 3 to 1.

Intermediate—When the control lever is moved from low to intermediate the gear "A" is first returned to its neutral position and gear "D" is then moved back into mesh with gear "S." Power is then transmitted through gears "E," "U," "S" and "D." The ratio of engine speed to propeller shaft speed in intermediate is approximately 1.7 to 1.

High—When the control lever is moved from intermediate to high, the gear "D" is first moved forward out of mesh with gear "S" and then farther forward until teeth cut internally in a recess in gear "D" engage teeth on the

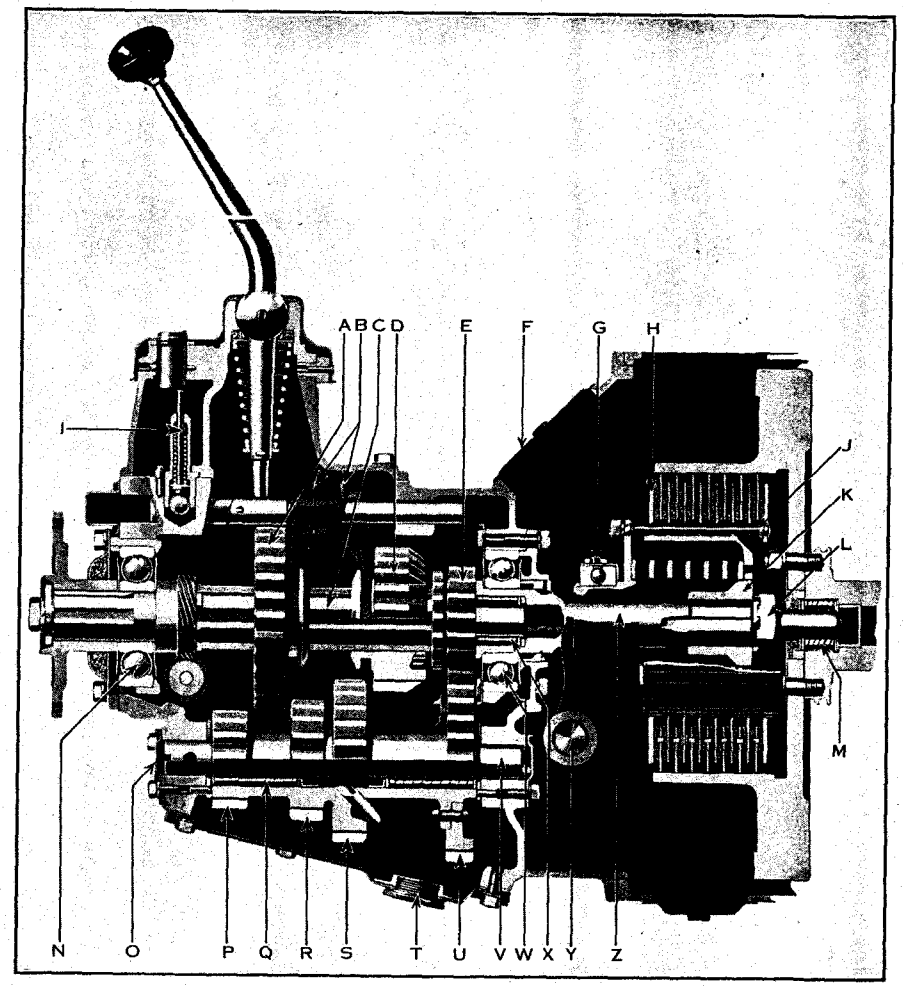


FIGURE 25. ***Sectional view of transmission***

extreme end of gear "E." The drive is then direct from the clutch shaft to the transmission main shaft without reduction.

Reverse—When the control lever is moved from neutral to low, the gear "A" is moved back into mesh with an idler gear, not shown in Fig. 25, which is at all times in mesh with gear "P." Power is then transmitted through gears "E," "U," "P," the reverse idler gear, and gear "A." The interposition of the idler gear reverses the direction of rotation. The ratio of engine speed to propeller shaft speed in reverse is approximately 3.8 to 1.

CHAPTER VI

Brakes

General Description

THERE are three pairs of brakes: the rear wheel external brakes, the rear wheel internal brakes, and the front wheel brakes, which are also internal. The rear wheel external brakes and the front wheel brakes are operated by the brake pedal and comprise the foot brakes. The rear wheel internal brakes are operated by the hand lever and are used principally for locking the rear wheels when the car is standing.

The purpose of the front wheel brakes is to add to the braking ability as much as is consistent with safety. It is not desirable to attempt to secure the maximum possible braking effect on the front wheels for the reason that, when a front wheel slides without rotating, it has no power to change the direction of the car.

Cadillac front wheel brakes are accordingly designed so that when the foot brakes are applied while the steering wheel is turned to the right or left, only the brake on the inside wheel is effective and the brake on the outer wheel is released, leaving the outer wheel free to rotate. It is thus impossible to lock both front wheels even on slippery pavement unless the car is moving straight ahead. If, while the car is moving straight ahead on slippery pavement, the brakes should be applied with sufficient pressure to lock both front wheels and it then becomes necessary to make a turn, the car will instantly respond because the brake on the outer wheel is automatically released as soon as the steering wheel is turned.

Adjustment

Each foot brake has provision to compensate for wear on the brake lining. The adjustment by which this compensation is effected is at the brake itself

rather than in the connections. Cadillac brakes must *not* be adjusted to compensate for wear by adjusting the pull rods or stop screws.

As described on page 16, the Cadillac two-stage brake pedal automatically notifies the driver when the foot brakes require adjustment. It is recommended that the car be taken to a Cadillac maintenance station for attention when necessity for adjustment is thus indicated.

If, however, the adjustment is neglected and as a result the pedal touches the floor boards before the brakes are fully applied, an emergency adjustment can be made by screwing down the adjusting nuts "F" (Fig. 26) one or more half-turns. The nuts "F" lock every half-turn and must be turned a half-turn at a time. The nuts "F" must not be turned down far enough to cause the brakes to heat and they must be turned down the same amount on both sides.

If adjustment of the nuts "F" is not sufficient, or if the occasion gives opportunity for a complete adjustment, this adjustment should be made as follows:

Loosen the three locking nuts "B," "D" and "N" (Fig. 26) and screw the three stop screws "A," "C" and "M" away from the brake band. Observe the clearance between those parts of the brake lining nearest the hexagonal

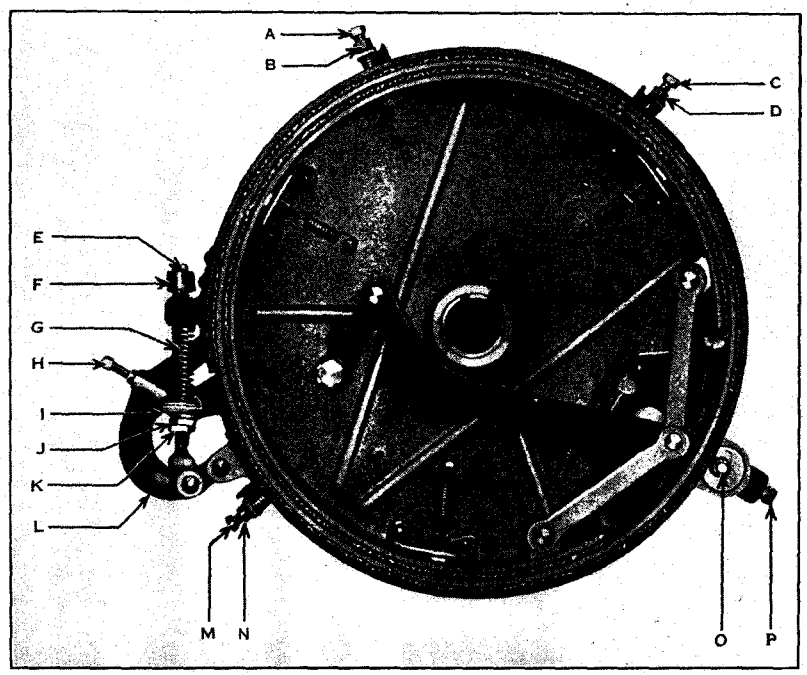


FIGURE 26. ***Rear wheel brakes***

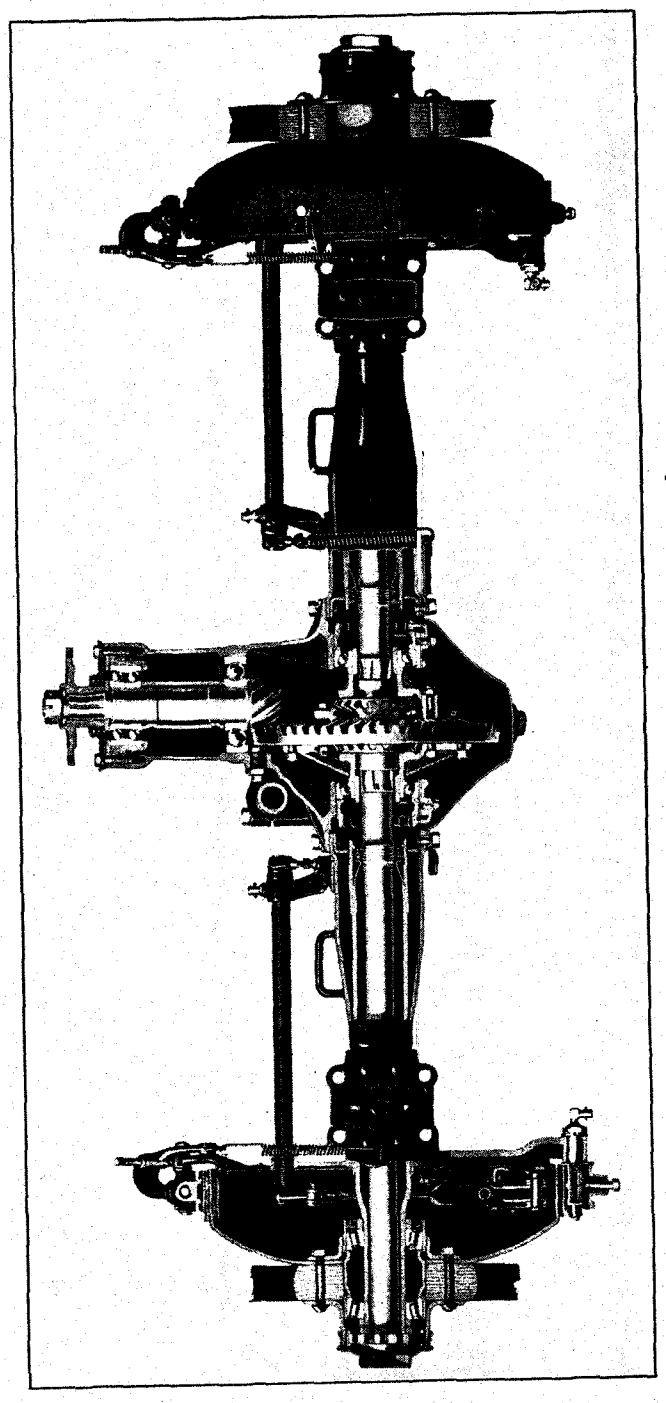


FIGURE 27. *Sectional view of rear axle*

head screw "P" and the brake drum. This clearance should be .030 to .035 inch. If the clearance is not correct, adjust the screw "P" until it is. The screw "P" is kept from turning of its own accord by a lock washer which turns with the screw and locks every half-turn. It must accordingly be turned a half-turn at a time.

Loosen the locking nuts "K" and adjust the nuts "J" and the screws "M" so that there is a uniform clearance of .030 to .035 inch between the *lower* part of the brake lining and the brake drum. To decrease the clearance between the brake lining and the drum, screw the nut "J" farther down on the yoke bolt "E."

Adjust the nuts "F" and the two stop screws "A" and "C" so that there is a uniform clearance of .030 to .035 inch between the *upper* part of the brake lining and the drum.

After making the foregoing adjustments so that there is a uniform clearance of .030 to .035 inch betwen the drum and the lining, check the results by applying the brakes, and measuring the travel of the upper end of the lever "L." This travel should not be less than $\frac{7}{8}$ inch. If the end of the lever "L" travels less than $\frac{7}{8}$ inch in moving from the released position to the applied position, readjust one or all of the nuts "F" and "J" and the screws "P," "A," "C" and "M" to increase the clearance slightly, keeping the clearance uniform at all points around the drum. Do not fail to tighten the locking nuts "B," "D," "N" and "K" when the adjustment has been made.

Do not change the adjustment of the screw "H." This screw is properly set when the car is assembled and does not require readjustment in taking up wear on the lining.

Inasmuch as the brakes are designed so that the greater proportion of the braking load is taken by the rear wheel brakes, adjustment of the front wheel brakes is usually not necessary until the rear wheel foot brakes have been adjusted several times. Before the limit of adjustment for the rear wheel foot brakes has been reached, the car should be taken to a Cadillac maintenance station for adjustment of the front wheel brakes.

Adjustment of the hand brakes is unnecessary. The hand brakes retain their effectiveness without adjustment throughout the life of the lining.

All joints in the brake connections should be oiled at regular intervals. The brakes should also be tested occasionally to be sure that they are in serviceable condition. When the brake band linings have worn so that further adjustment is impossible they can be renewed.

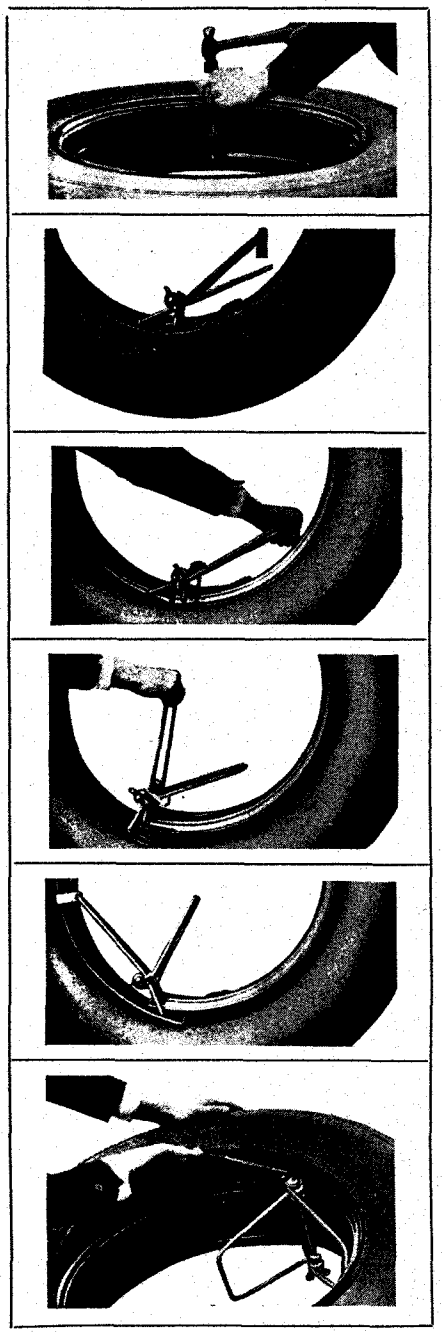


Figure 28a

Lay the tire and rim flat on the ground and drive out the locking pin, using the hammer and punch in the tool kit. *Be sure there is no air in the tire.*

Figure 28b

Apply the rim tool, which is furnished in the tool kit, as shown in the illustration. Note that there are two pairs of holes in the rim near the split and that one pair is nearer the split than the other. The short end of the tool must be inserted in the holes nearer the split and the long end in the holes farther from the split. Clamp the tool firmly in position by tightening the wing nut.

Figure 28c

Grasp the two handles and squeeze them together, spreading the ends of the rim farther apart at the split. Then pull both handles together toward the other side of the rim until one end of the rim is forced up and over the other end. If the rim does not pull over evenly on both sides a screw-driver can be used to advantage to pry up the end of the rim.

Figure 28d

Release the short handle of the tool but continue pulling the long handle until it is against the rim.

Figure 28e

Engage the hook that is attached to the long handle over the edge of the rim to hold the rim in the collapsed position.

Figure 28f

Lay the rim and tire on the ground with the hook and wing nut *face down,* and remove the tire from the rim by working it off first on the side where the rim is split. The handle of the large wrench is flat to serve as a prying tool.

FIGURE 28. ***Removing tire from rim***

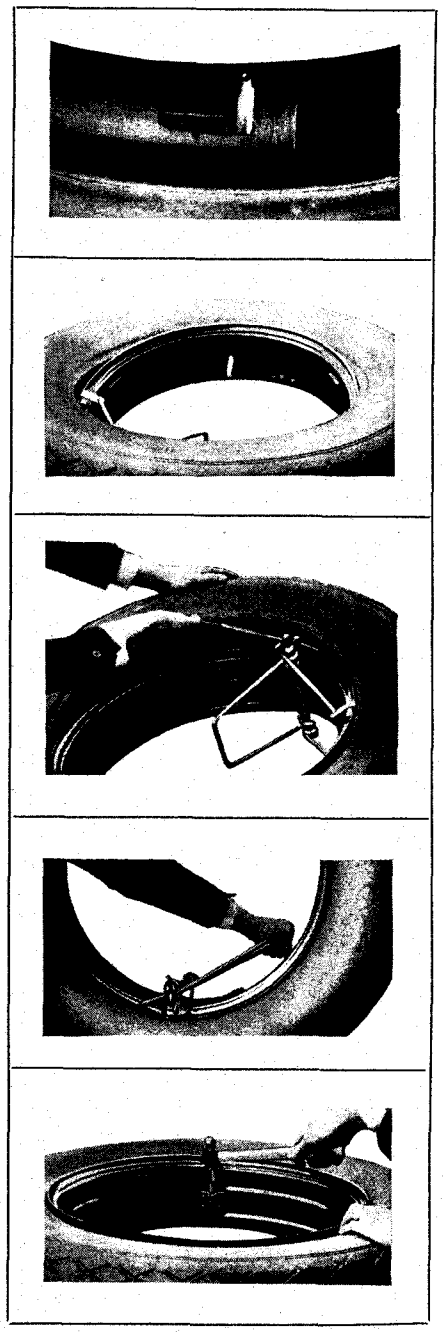


Figure 29a

Make sure that the tube flap is in place and that the valve stem passes through the holes in both ends of the flap.

Figure 29b

Lay the rim on the floor with the hook and wing nut of the tool *face up.* Insert the valve stem in the hole in the rim and work the tire well into place on each side of the valve stem.

Figure 29c

Pry the tire over the projecting end of the rim where it is split. The rest of the tire can then be pushed down into place.

Figure 29d

Release the hook from the rim and let the long handle go back until it stops. Then squeeze the two handles together until the end of the rim drops into its original position. *Do not attempt to force the long handle alone as this will only bend the tool.* If the end of the rim does not go easily into place, remove the tool and pry the end of the rim with a screw-driver.

Figure 29e

Replace the pin which locks the two ends of the rim together. This is important.

FIGURE 29. ***Installing tire on rim***

CHAPTER VII

Wheels

Tires and Rims

ILLUSTRATED directions for removing a rim with tire from a wheel and installing a rim with tire on a wheel are given in Figs. 10 and 11. Directions for removing a tire from a rim and installing a tire on a rim are given in Figs. 28 and 29.

Do not under any circumstances attempt to remove a tire from a rim without deflating the tire.

Caution in Adjusting Wheel Bearings

The adjustment of wheel bearings or the removal of the wheels should not be attempted by one unfamiliar with work of this nature. It is recommended that the car be taken to a Cadillac maintenance station if possible. In any event great care must be exercised in adjusting wheel bearings 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.

Removing Front Wheel

To remove a front wheel, first jack up the axle until the wheel is free from the ground and then proceed as follows:

Remove the hub cap by unscrewing it. Remove the cotter pin "E" (Fig. 30). Remove the lock nut "A." Remove the serrated washer "B." Remove the adjusting nut "C." The wheel may then be removed by pulling it straight off.

Installing Front Wheel and Adjusting Bearings

Before installing the wheel, make sure the bearings are clean and that they are packed in a light grease that is free from dirt and grit.

Set the wheel in place on the spindle and adjust the nut "C" (Fig. 30) very carefully, following the caution above. Install the serrated washer "B," making sure that one of the notches in the washer fits over the stud "D" on

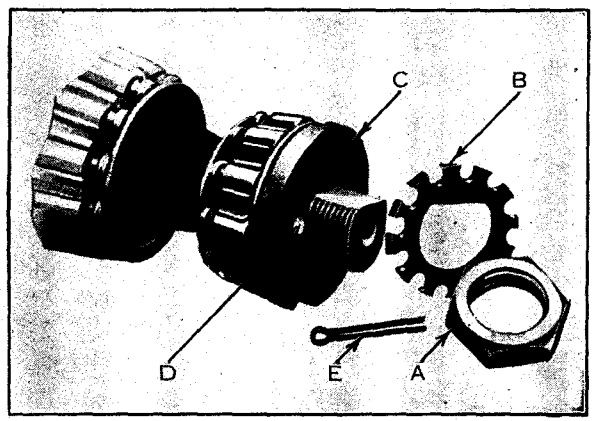


FIGURE 30. *Front wheel bearings*

the adjusting nut. Replace the lock nut "A" and tighten it firmly, locking it with the cotter pin "E."

It is always better to adjust wheel bearings too loosely than too tightly. If, after the adjustment is apparently correct, the notch in the washer "B" is not directly over the stud "D," loosen the adjustment rather than tighten it.

Removing Rear Wheel

To remove a rear wheel, first jack up the axle until the wheel is free from the ground and then proceed as follows:

Remove the hub cap "D" (Fig. 31) by unscrewing it. Remove the spring locking ring "F." Withdraw the axle shaft "E." With a screw-driver or blunt

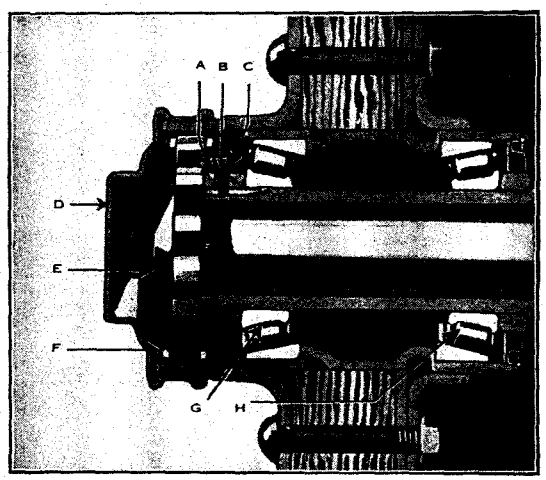


FIGURE 31. *Sectional view of rear wheel hub, showing bearings*

tool straighten the lug of the outer lock washer "B" where it has been bent over the lock nut "A." Unscrew the lock nut "A." Remove the washers "B" and the adjusting nut "C." The wheel can then be removed by pulling it straight off.

Installing Rear Wheel and Adjusting Bearings

Before installing the wheel, make sure that the bearings are clean and packed in a light grease that is free from dirt and grit.

Set the wheel in place upon the axle and adjust the nut "C" (Fig. 31) very carefully. Install the lock washer "B," using new washers or straightening the ones removed if new ones are not available. In placing the washers in position, reverse the outer one with respect to the inner so that the lugs on one washer are opposite the spaces between the lugs on the other washer; that is, so that the lugs on the two washers are staggered. Install and tighten the lock nut "A." Next, select that lug on the inner washer that falls nearest to the center of one of the flat sides of the adjusting or inner nut, and with a screw-driver or other suitable tool bend this lug over the nut. In the same way bend one of the lugs of the outer washer over one of the flat sides of the locking or outer nut. In bending the lugs of the locking washers, take care not to alter the adjustment of the inner nut or loosen the outer nut.

CHAPTER VIII

Repair Parts

Genuine Cadillac Parts

CADILLAC owners are cautioned against permitting the use of other than genuine Cadillac parts in the repair of their cars. The quality of the Cadillac car is identical with the quality of its component parts, the production of which is based upon more than twenty years of experience in designing, manufacturing, and inspecting. No other individual or organization has access to the data resulting from this experience nor could they possibly have the same interest in protecting the owners of Cadillac cars.

Uniform Parts Prices

Cadillac parts are sold at uniform prices throughout the United States, and are not subject to the addition of transportation, excise or other supplementary charges. Printed price lists published by the Cadillac Motor Car Company are open to inspection by owners at any authorized Cadillac distributor's or dealer's establishment.

Ordering New Parts

With many thousands of Cadillac automobiles in use, it is obviously impractical to deal directly with each Cadillac owner. We cannot open accounts with any except regular distributors with whom annual contracts are made.

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 Cadillac distributor or dealer, who carries a large stock and is generally in a position to supply a part immediately. If he cannot do so, he can order it. 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 parts, either from a Cadillac distributor or from the factory, send the engine number and the unit assembly number (see page 84) with an accurate description of the part desired, preferably accompanied by a sketch with dimensions. If this cannot be done, send the part itself properly tagged and with transportation charges prepaid. (See below under "Returning Parts.") Otherwise prompt and intelligent filling of the order will be impossible.

Our responsibility ceases in all cases with delivery to the transportation company.

Returning Parts

In the event parts are returned, transportation charges must be prepaid or the parts cannot be accepted. They should be tagged properly with the name of the owner and the engine number of the car. A letter should be sent, giving complete instructions regarding the disposition of the parts.

Tires, Speedometer and Clock

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

CHAPTER IX

Specifications and License Data

Type of engine	8 cyl. V-type
Diameter of cylinder bore	3⅛ in.
Length of stroke	5⅛ in.
Piston displacement	314 cu. in.
Horsepower (N. A. C. C. rating)	31.25
Engine number	See below
Diameter of crankshaft main bearings	2⅜ in.
Length of crankshaft between inner ends of front and rear bearings	18⅝ in.
Exhaust valves	1 1/16 in.
Inlet valves	1 1/16 in.
Capacity of gasoline tank	20 gals.
Capacity of engine lubricating system	2 gals.
Capacity of cooling system*	4½ gals.
Capacity of transmission	3 qts.
Capacity of rear axle	3½ qts.
Tires	33x6.75 (low pressure)
Wheelbase	132 in. and 138 in.
Tread	56 in.

*When the radiator contains only enough liquid to cover the bottom of the upper tank. This is the recommended level. (See page 61.)

Engine and Unit Assembly Numbers

EACH Cadillac car when shipped carries an engine number which is also a serial number. This is the number to be used in filling out license and insurance applications and in general reference to the car. The engine number is stamped on the car in two places: On the name plate on the front face of the dash and on the crankcase at the base of the oil filler.

The various units such as the transmission, steering gear, etc., also carry unit assembly numbers. These are located as described below. It is important in ordering parts to give, not only the engine number of the car, but also the unit assembly number of the unit to which the part belongs.

Transmission number—on the upper surface of the boss to which the clutch and brake pedal bracket is attached.

Steering gear number—on the steering gear housing just below the oil filler plug.

Carburetor number—on the left-hand rear face of the flange by which the carburetor is attached to the intake header.

Generator number—on the left-hand side of the generator.

Starting motor number—on the left-hand side of the starter almost opposite the distributor.

Front axle number—on the upper surface of the axle I-beam at the right-hand end just above the steering stop screw.

Rear axle number—on the rear surface of the axle housing just to the right of the cover plate.

Frame number—on the upper surface of the left-hand side bar opposite the steering gear.

Index

A

Accelerator (see throttle control) 10
Accelerator, use of, when engine is cold 32
Adding water to storage battery 63
Additional cold weather suggestions 33
Adjusting of brakes 74
Adjustment of clutch release rod 72
Adjustment of headlamps 69
Adjustment of oil pressure regulator 42
Air compressor for tires 27
Air compressor, gasoline system 9
Air pump for tires (tire air compressor) 27
Alcohol as anti-freeze 34
Alcohol, effect of, on finish 34
Alignment of front wheels, incorrect, result of 51
Ammeter 17
Ammeter, its use 62
Anti-freezing solutions 33
Axle, rear, add lubricant to 46

B

Battery, storage of, when car not in use 53
Bearing, clutch thrust, to grease 45
Bearings for wheels, adjustment of 80
Bearings for wheels, pack with grease 46
Body and top, care of, when stored 54
Body, care of finish when new 49
Brakes 16
Brake adjustment 74
Brakes, general description of 74
Brakes suddenly applied, effect on tires 52
Bulbs for lamps, voltage 67
Button, carburetor enriching 11

C

Carburetor 59
Carburetor enriching button 11
Carburetor enriching button, use of, in cold weather 31
Carburetor, to prime 31
Capacity of cooling system 34
Caps, tire valve 25
CARE OF BODY 49
Care of finish on body when new 49
CARE OF TIRES 51
Chains for tires, when improperly adjusted 51
Changing tire on rim 78–9
Changing tires 30
Chassis lubrication diagram 44
Choke rod 11
Choke rod button (carburetor enriching button) use of, in cold weather 31
Cigar lighter and inspection lamp 23
Circulating system for oil 40
Circulation of water 60
Cleaner for windshield 22
Cleaning headlamp reflectors 68
Cleaning the cooling system 61
Cleaning upholstery 50
Cleaning windows, closed cars 50
Clock 23
Clock, repairs to 83
CLUTCH AND TRANSMISSION 71
Clutch, construction of 71
Clutch pedal 14
Clutch release rod, adjustment of 72
Clutch thrust bearing, to grease 45
Coasting 19
COLD WEATHER OPERATION 31
Contents 5
CONTROLS AND INSTRUMENTS 9
Control, ignition lever 11
Control, throttle lever 10
Control, transmission 15
Commutator, horn, to clean 48
Compressor, air, gasoline system 9
Compressor for air in tires 27
COOLING SYSTEM 60
Cooling system, capacity 34
Cooling system, drain and refill 60
Cooling system, to clean 61
Cowl ventilator, open cars 22
Crankcase ventilating system 42
Cup grease 39
Curtain fasteners, open cars 24
Curtains, side, open cars 23

D

Danger of running engine in closed garage 81
Data for license purposes 84
Diagram, chassis lubrication 44
Distributor oil cups, fill with oil 45
Don'ts for general operation 20
Door hardware, to oil 48
Draining cooling system 60
DRIVING 19
Driving on steep grades 18
Driving speed when car is new 18
Driving suggestions 20
Duco finished cars, to wash 50

E

Effect of alcohol on finish of body 34
ELECTRICAL SYSTEM 61
Engine, fails to start 13
Engine, gasoline, general principles of 57
Engine, important features of 56
ENGINE LUBRICATION 40

Engine number, location of ... 84
Engine oil ... 39
Engine oil for cold weather ... 33
Engine oil, to replace ... 45
Engine, prepare for storage ... 53
Engine supports, to oil ... 45
Engine, starting of ... 12
Engine, starting in cold weather ... 31
EQUIPMENT, general ... 22
Equipment, tools ... 24
Exide depots for battery maintenance ... 64

F

Fasteners, curtain, open cars ... 24
Filling and draining cooling system ... 60
Filter for oil ... 43
Finish of body, care of, when new ... 49
Foot brakes ... 16
Foreword ... 3
Front brake trunnions, lubrication of ... 47
Front wheels improperly aligned, result of ... 51

G

Garage floor, grease covered, effect on tires ... 52
Gas in closed garage, when engine is running ... 18
Gasoline filter ... 58
Gasoline gauges and air compressor ... 9
Gasoline settling chambers and strainers, where located ... 58
Gasoline strainers, cleaning in cold weather ... 33
Gasoline system ... 59
Gauge, oil pressure ... 14
Gauges, gasoline quantity and pressure ... 9
General driving suggestions ... 20
GENERAL INFORMATION ... 56
GENERAL LUBRICATION ... 45
General operation, don'ts ... 20
General principles of gasoline engine ... 57
Generator ... 61
Generator oil cups, fill with oil ... 45
Genuine Cadillac parts ... 82
Glycerin as anti-freeze ... 34
Grease for roller bearings ... 39
Grease for universal joints ... 39
Grease gun connections, to grease ... 45

H

Hand brakes ... 17
Hardware on doors, to oil ... 48
Headlamp reflectors, to clean ... 68
Headlamps, adjustment of ... 69
Headlamps, official approval of ... 68
Headlamps, operation, use of beams ... 12
Holder for rim and tire ... 30
Horn, clean commutator of ... 48

I

Ignition and lighting switch ... 12
Ignition control lever ... 10
Ignition control lever position in cold weather ... 32
Ignition, general description of ... 65
Ignition switch lock ... 9, 11
Inflation pressure, tires ... 27
Inflation of tires, under-inflation ... 51
Inspection lamp ... 23
Installing rim with tire on wheel ... 29
Installing wheels ... 80
INSTRUMENTS AND CONTROLS ... 9

L

Lamp bulbs ... 67
Lamp, inspection ... 23
Level for oil, engine ... 41
Lever, ignition control ... 10
Lever, throttle control ... 10
Lever, transmission control ... 15
License data ... 84
Lighter, cigar ... 23
Lighting switch ... 12
Lighting system ... 67
Locks ... 9
Lubricant for rear axle and transmission ... 39
Lubricant for steering gear ... 39
Lubricants ... 39
Lubricants, selection of ... 39
Lubrication and care ... 35
Lubrication chart ... 36
LUBRICATION, ENGINE ... 40
Lubrication schedule ... 36
LUBRICATION, SYSTEMATIC METHOD ... 37

M

Mirror, rear vision ... 23
Mounting tire on rim ... 79

N

New car, driving speed ... 18
New car, washing ... 49

O

Official approval of headlamps ... 68
Oil circulating system ... 40
Oil cups on generator, to fill ... 45
Oil cups on timer-distributor ... 45
Oil filter ... 43
Oil for engine ... 39
Oil for engine in cold weather ... 33
Oil holes in steering column, to lubricate ... 47
Oil level ... 41
Oil pressure regulator ... 42
Oil pressure ... 41
Oil pressure gauge ... 14
Oil, replacing of, in engine ... 45

OPERATION, IN COLD WEATHER ... 31
Operation, don'ts ... 20
Operation of starter ... 65
Ordering new parts ... 83

P

Parts, genuine Cadillac ... 82
Parts, ordering new ... 83
Parts, returning of ... 83
Pedal, clutch ... 14
Pedal, foot brake ... 16
Pedal, starter ... 12
Position of ignition control lever ... 32
Position of throttle hand lever in cold weather ... 32
Plugs, spark ... 67
Pressure for tires ... 27
Pressure gauge, gasoline air line ... 9
Pressure of oil ... 41
Pressure, oil gauge ... 14
Prices of parts, uniform ... 82
Priming the carburetor in cold weather ... 31
Pump, air for tires (tire air compressor) ... 27

R

Radiator and shutters ... 60
Rear axle and transmission lubricant ... 39
Rear axle, sectional view ... 76
Rear axle, to add lubricant ... 46
Rear vision mirror ... 23
Removal of wheels ... 80–1
Removing rim with tire from wheel ... 28
REPAIR PARTS ... 82
Repairs to speedometer head ... 17
Replacing engine oil ... 45
Result of under-inflation of tires ... 51
Returning parts ... 83
Rim, installing on wheel ... 29
Rim, removal of tire from ... 78
Rim, removing from wheel ... 28
Rim, true up ... 30
Roller bearing and cup grease ... 39

S

Schedule of lubrication ... 37
Settling chambers and strainer in gasoline line, to clean ... 59
Shaft, flexible for speedometer drive, to lubricate ... 47
Shifting transmission gears ... 16
Shutters on radiator ... 60
Side curtains, open cars ... 24
Small cuts in tires, neglect of ... 51
Solutions for anti-freeze ... 33
Spark control lever ... 10
Spark plugs ... 67
Specific gravity of battery solution ... 64
SPECIFICATIONS AND LICENSE DATA ... 84
Speed of new car ... 18
Speedometer ... 17
Speedometer head, lubrication indicator ... 17
Speedometer flexible drive shaft, to lubricate ... 47
Speedometer, repairs to ... 83
Springs, to lubricate leaves ... 48
Stabilators, do not lubricate ... 48
Starter pedal ... 12
Starter, use of in cold weather ... 32
Starting engine ... 12
Starting engine, fails to start ... 13
Starting engine in cold weather ... 31
Starting motor ... 65
Steering gear, add lubricant ... 47
Steering gear lubricant ... 39
Strainers in gasoline system, cleaning in cold weather ... 33
Storage battery, adding water ... 63
Storage battery, location on car ... 63
Storage battery, when car is stored ... 53
STORING CAR ... 53
Storage of car, placing car in service (use) ... 54
Storage of tires ... 54
Suggestions for driving ... 20
Supports for rear of engine, to oil ... 45
Switch, ignition and lighting ... 11
SYSTEMATIC LUBRICATION ... 37

T

Taking car out of storage ... 54
Throttle control ... 10
Throttle hand lever position, cold weather ... 32
Timer-distributor, how operated ... 66
Timer-distributor oil cups, fill with oil ... 45
Tire air compressor ... 27
Tire and rim, installing on wheel ... 29
Tire and rim, removing from wheel ... 28
Tire carrier (tire holder) ... 30
Tire chains, improperly adjusted ... 51
Tire holder ... 30
Tire holder lock ... 9
Tire, to install on rim ... 79
Tire pressure ... 27
Tires ... 27
Tires, care of, when car is stored ... 54
Tires, removal from rim ... 78
Tires, repairs to ... 83
Tires, to change ... 30
Tools ... 24
Tools (illustration) ... 26
Top, care of when car is stored ... 54
Transmission control ... 15
Transmission, description of ... 72
Transmission lock ... 9
Transmission lubricant ... 39
Transmission, to add lubricant ... 46
Truing up rim ... 30
Trunnions, front brake, to lubricate ... 47

U

Uniform parts prices 82
Universal joint grease 39
Universal joints, to lubricate 46
Upholstery, to clean 50
Use of accelerator before engine is warm 32
Use of starter in cold weather 32

V

Valve caps, tire 25
Valve stems, how lubricated 41
Varnished cars, washing, when new 49
Ventilating system for crankcase 42
Ventilator in cowl, open cars 22

W

Washing Duco finished cars 50
Washing varnished cars 49
Water circulation 60
Watson Stabilators, do not lubricate 48
Windows, to clean 50
Windshield and ventilator 22
Windshield cleaner 22
Wiper, windshield 22
WHEELS 80
Wheels, installation of 80–2
Wheels, pack bearings with grease 46
Wheels, removal of 80–1
Wheels, to adjust bearings of 80

The Cadillac Motor Car Company reserves the right without notice to make changes in design, construction and specifications

3000-6-26