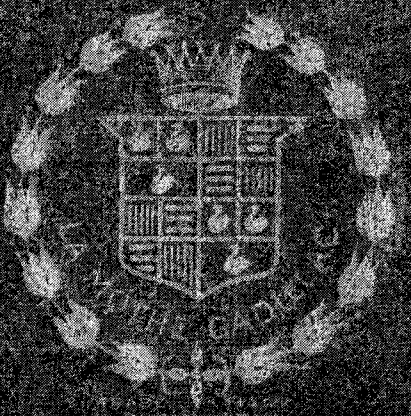
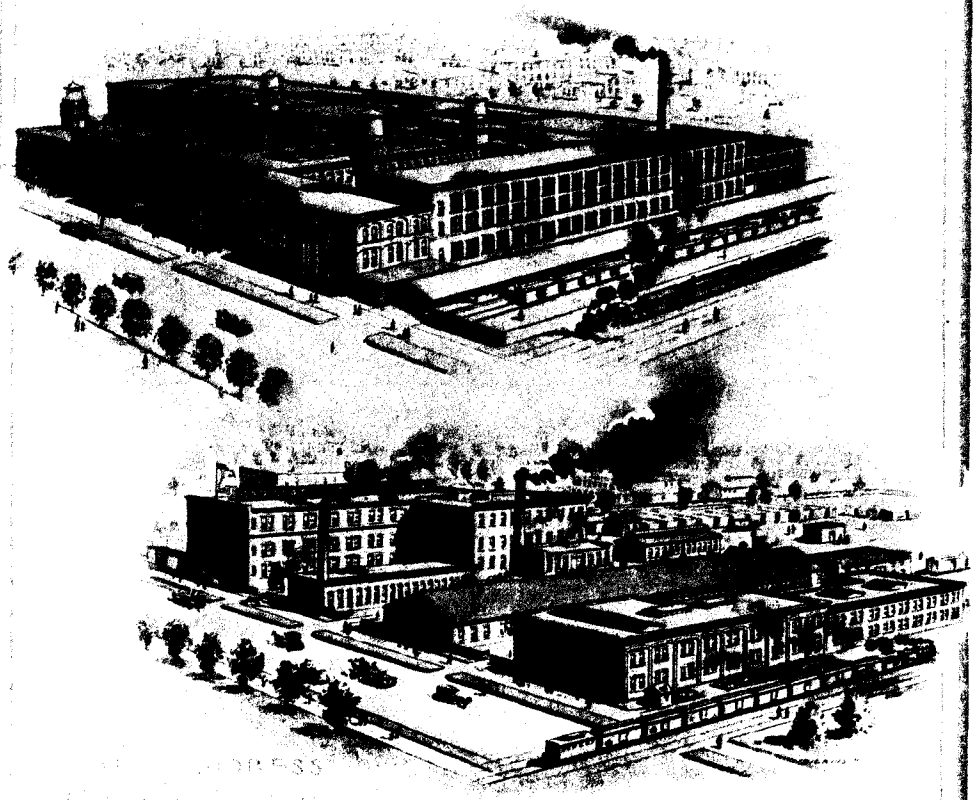
1910

CADILLAC



1910

CADILLAC MOTOR CAR CO.



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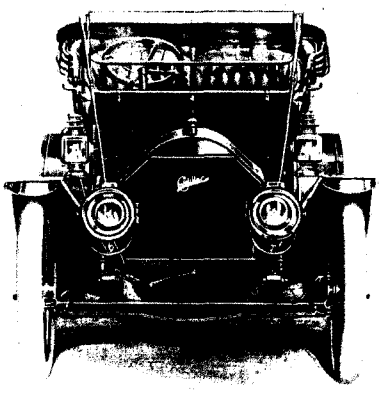


THE STORY of the Cadillac is the story of successful motor car building in America.

As the Cadillac Company was the first to offer the world a thoroughly practical and dependable motor car, so was the Cadillac Company first to successfully solve the thousand and one problems which made possible the production of the motor car which was destined to revolutionize the industry, to establish a new standard in automobile values and to inaugurate a new criterion by which all motor cars should henceforth be judged.

So pronounced has been this accomplishment that the Cadillac "Thirty" is universally accorded the well merited distinction of not simply equalling in design, mechanical construction, materials and fineness of workmanship the most expensive cars in the world but of surpassing them in numerous essential features.

Furthermore, the Cadillac "Thirty" is to-day the only car selling at less than twice its price, which, by those who are familiar with motor car construction and motor car values, is accorded a position alongside of those few cars which stand at the pinnacle in the world's esteem.

When in 1908 the Cadillac "Thirty" first made its appearance, automobile buyers were loth to concede the full measure of its worth: the car appeared too good to be possible at its price. But with a better understanding of Cadillac organization, Cadillac experience, Cadillac manufacturing methods and Cadillac facilities, there came the realization that the long looked for day had arrived when the highest type of motor car might be obtained at the price which theretofore would purchase only mediocrity.

There does not exist in the world another plant possessing the organization, the experience, the manufacturing methods, the facilities and the equipment of special tools and labor saving machinery which would make possible the production of a car the equal of the Cadillac "Thirty" at an actual factory cost so low as its retail selling price, much less afford to market it at an approximate figure.

The enviable position occupied by the Cadillac "Thirty" is attributable to one thing—the thorough and complete satisfaction and service which it has afforded its users. But back of that there must be something more—the causes for and the conditions which make for that satisfaction and service. The Cadillac organization has for its foundation more than a half century's experience in the manufacture of fine machinery, machine tools and gas engines.

In the manufacture of high grade motor cars, the Cadillac Company has produced a larger number than any other factory in the world. The constant performance of these cars, the first year's output of which numbering some 2000 machines all of which are still running, is the wonder and admiration of the motoring world Each individual car is a monument to the high ideals of the organization which produced it.

In the design of the Cadillac "Thirty" there are no new and untried experiments for the purchaser to try out at his own expense. There is not an ounce of uncertainty in its magnificent makeup. Every essential part has proven its worth by from two to five years' actual service in the nearly thirty thousand Cadillacs which have preceded it.

The selection of materials for the various parts of the car is one of the most vital considerations. To select these intelligently requires a thorough knowledge of the duties they must perform. A grade or quality of material may be ideal for one purpose but totally unfit for another. Cadillac materials are determined upon only after the most careful analysis of the requirements and scientific tests of their capabilities both in our laboratories and on the road. Cost receives no consideration where service is at stake.

Cadillac cars are manufactured almost in their entirety in the great Cadillac plants. These plants include foundries, both iron and brass. They include pattern shops, sheet metal shops, gear cutting shops and machine shops, They include body finishing, painting, enameling and trimming departments. In these plants are manufactured the motors, the carburetors, the transmissions, the radiators, the hoods and the fenders. There are also plants for the manufacture of even the small parts—capscrews, bolts, nuts, etc.

The equipment of the Cadillac plant in the matter of fine machinery, fine tools, jigs and fixtures is not equalled in any other motor car factory in the world—a statement which will be verified by those who have had the opportunity of a personal inspection. This equipment includes more than half a thousand special automatic labor saving machines, some of which are capable of turning out from two to ten times the volume of work produced by the ordinary methods which obtain in most factories—and doing it far better. The equipment includes approximately 100,000 tools, jigs, fixtures and dies of which nearly 20,000 were designed and made by us especially for the manufacture of Cadillac cars. The expense for tool maintenance alone has exceeded $60,000 in a single year.

The Cadillac "Thirty" is a thoroughly standardized car, a distinction to which it alone is entitled. This means that every individual part is exactly like every other part of its kind, without even the one-thousandth of an inch variation where that degree of accuracy is essential. The advantages of standardization are manifold; the disadvantages of its absence can scarcely be calculated.

In the Cadillac, thorough standardization means the absolute interchangeability of parts. It means that when for any reason it becomes necessary to replace a part that the part may be ordered from the factory and that it will fit without the slightest alteration.

In the Cadillac "Thirty" there are 112 parts which are not permitted to deviate to exceed one one-thousandth of an inch,—about one-third to one-half the thickness of a hair—from the prescribed limits of measurement. There are some parts in which the limit of variation permissable is cut down to the half of the one one-thousandth.

So accurately is every piece made that thousands of pieces of a kind with thousands of pieces of other kinds are sent to the various

assembling departments and there they are all "put together" with the use of only wrenches and screw-drivers—not so much as the finest file or emery cloth being necessary.

Standardization means further that the parts will work in perfect harmony. It precludes the possibility of ill fitting joints and bearings. Standardization decreases the great power absorbent—friction. It limits wear. Standardization reduces "automobile troubles," to a minimum. It brings operating and maintenance cost down to the lowest notch.

Standardization produces a quiet and smooth running car. In this respect, the Cadillac "Thirty" has no peer outside of cars selling at two to three times its price—and very few of those.

The system of inspection maintained in the Cadillac plant is so exacting that it practically precludes the possibility of an imperfect part being incorporated in the car so far as can be detected by the most accurate measuring instruments known to engineering science. From the time the raw materials reach the warehouse until they leave the plant they are under the careful scrutiny of a corps of experts trained in accordance with the high standards of the Cadillac organization. This inspection extends to the smallest pieces, even nuts, bolts and screws.

While standardization has reduced wear at friction points to the lowest possible limit, the "Thirty" is provided wherever possible with adjustments for taking up any wear.

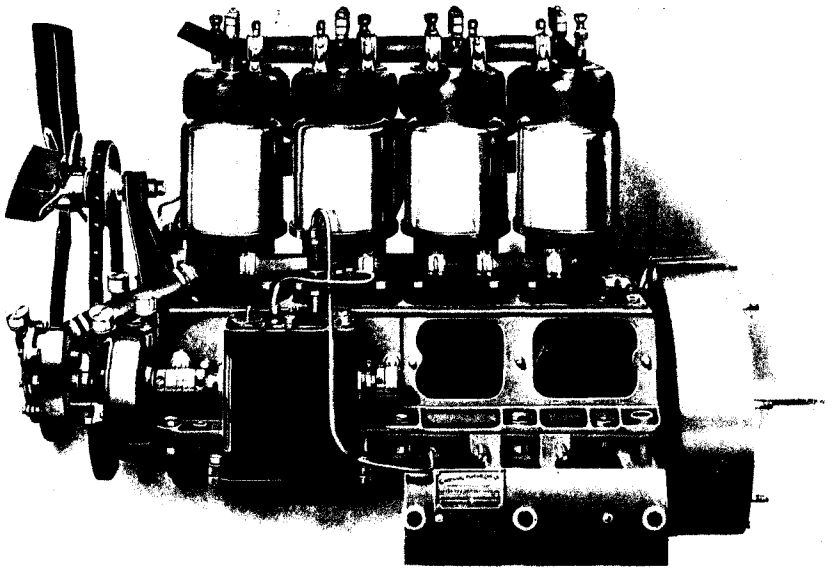
The fact that the Cadillac is a car manufactured practically under one roof instead of merely an assembly of motor, transmission, frame, axles, etc., obtained indiscriminately here, there and everywhere that they may be had at the lowest price, regardless of quality, is a feature which no buyer can afford to overlook.

The Cadillac Company is prepared to furnish an exact duplicate of any part of any car it ever built. No Cadillac user was ever obliged to discard his car because of inability to obtain some needed part. No Cadillac user was ever obliged to pay an exorbitant price to have such part made to special order because the maker had gone out of business, had discontinued making parts for old models or had to depend upon some outside parts maker to supply them.

The Cadillac "Thirty" has repeatedly demonstrated its speed capabilities at from five to fifty miles an hour on high gear and its superior hill climbing abilities are recognized the world over.

It is a sturdy and dependable car. Its motor is the most powerful of its dimensions ever designed. Its strong and substantial construction, the perfect fit and perfect alignment of its working parts enables the maximum of the motor's power to be delivered to the ground—in marked contrast with the flimsily constructed car in which material is skimped to save cost and in which the twisting and binding strains consume much of the power.

The Cadillac "Thirty" has demonstrated its right to the distinction of being the most carefully built car ever produced. It has demonstrated its right to the distinction of being the most economical multiple cylinder car, both in operation and maintenance. It has demonstrated its right to the distinction of being the most reliable and the most serviceable car. It has demonstrated its right to the distinction of being the greatest automobile value the world has ever offered.



CADILLAC "THIRTY" MOTOR (Left Side)
(Note accessibility of inside of crank case)

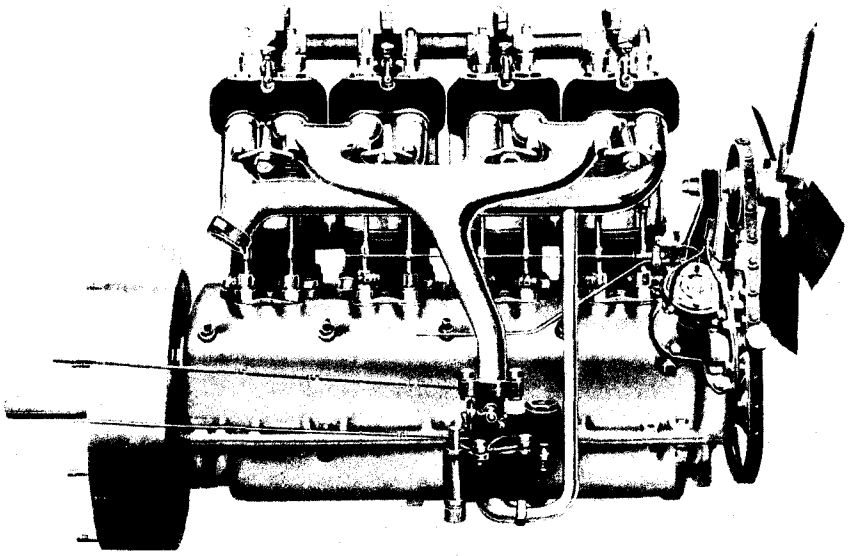
MOTOR

Engineering science has not been able to produce a better motor than that of the Cadillac "Thirty." This motor is truly a marvel for noiselessness and smoothness in action and a wonder of power for its dimensions—4¼-inch bore by 4½-inch piston stroke. While its power according to generally accepted methods of calculation, figures 28.9 H. P. and which method may be fair enough for motors in general, it is totally inadequate for determining the power of the Cadillac "Thirty" motor. Dynamometer tests show it to develop 33 actual H. P., but in accordance with the Cadillac policy of conservatism we accord it the nominal rating of 30 H. P.

It is the product of that division of our plant which during the past ten years has produced more high grade gasoline motors than any other establishment in the world. It is of the same general type and embodies the same general principles as all four cylinder Cadillac motors which have been made for the past six years and which are famous the world over for efficiency and durability.

It is the only type of four cylinder motor which does not present disadvantages of one form or another. Notwithstanding the advanced manufacturing methods employed in the Cadillac plant, this type of motor is the most expensive to produce. While that construction may necessitate a higher selling price for the complete car than would be required were we to build a motor in the ordinary way, the extra cost is compensated for many times over by the greatly increased service and satisfaction it will render and the lessened expense for operation and maintenance.

The cylinders are cast each by itself and the cylinder heads containing the valve chambers are also cast separately. The latter are attached to the former by right



CADILLAC "THIRTY" MOTOR
Right Side

and left threaded nipples. The cylinders are surrounded by water jackets of spun copper clamped into position in such manner that leakage is unknown. The advantages of this form of construction are numerous. By casting the cylinders singly we are enabled to make the walls of uniform thickness and by applying the copper jacket, it leaves a perfectly uniform space for water circulation.

We cast our cylinders, pistons and piston rings in our own foundry from special grades of metal made after our own formulas, the result of years of experience, experimenting and testing in our own laboratories. In addition to the remarkable strength and toughness of this metal, a critical inspection reveals a marked absence of the spongy portions and blow holes characteristic of many castings. It possesses the further and very desirable quality of resisting to the greatest possible degree the influence of heat, consequently it is not so susceptible to contraction and expansion as are all other castings. The superior qualities of Cadillac castings are so widely recognized and appreciated that our foundry has for years made cylinder, piston and piston ring castings for a number of other automobile manufacturers, making the highest priced cars in America.

In finishing the cylinders and pistons, we do not stop at simply machining. Every one of them is ground to a polished surface with the result that practically perfect compression and consequently maximum power is obtained.

The piston rings which are finished with the same precision are made from our own special formula, different from that of which the cylinders and pistons are cast. This metal possesses exceptional spring qualities which are not easily affected by the heat of the motor. In consequence of this, they retain their efficiency long after the ordinary ring has been rendered practically worthless.

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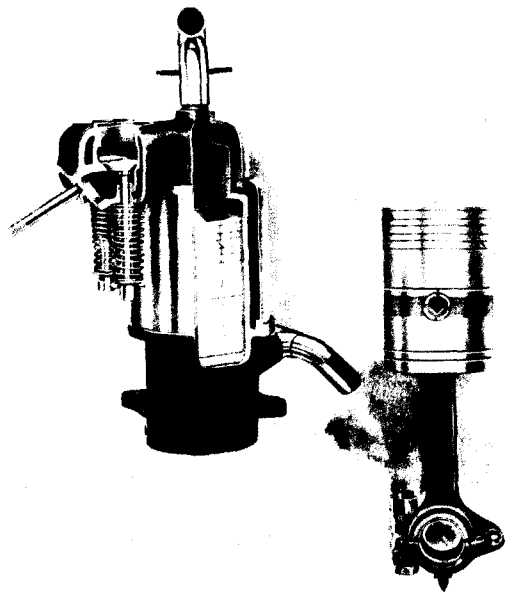


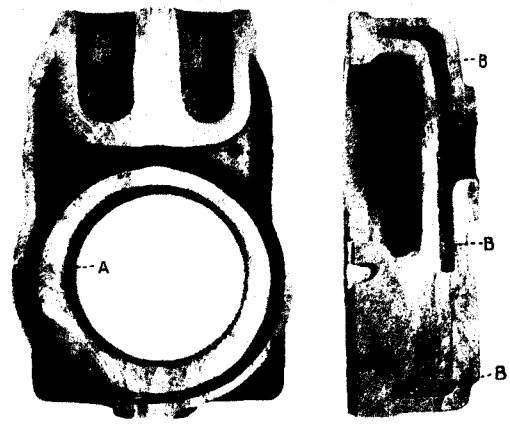
CADILLAC CYLINDER AND PISTON
Note the even thickness of cylinder wall and uniform space for water circulation

We show here some of the advantages of our method of construction as against the ordinary practice of casting cylinders, valve chambers and water jackets together. In the illustration at the bottom of this page, is shown a cylinder with valve chamber and water jacket cast integral. This illustration is made from a photograph taken of a cylinder and water jacket cut in two horizontally. Note the varying thickness of the cylinder wall "A." With this condition existing it will be readily understood that it is impossible for the circulating water to cool the cylinder uniformly. The result is that the contraction and expansion of the metal will be so varying that the bore of the cylinder will not retain perfect roundness. In consequence of this it will bind the piston at certain points of its travel and fit so loosely at others that the lubrication is imperfect, that wear is uneven and disastrous and that there is a great waste of fuel with a corresponding loss of power.

In the smaller figure are shown the webs "B" which are sometimes formed when the two parts of the core, used in casting, are not held firmly together. This web is sure to obstruct the circulation of the water, causing overheating of the cylinder with its undesirable consequences, and is something that is impossible to detect without destroying the cylinder.

We do not wish to be understood as saying that it is impossible to make such castings correctly, but it is a fact that many are not made correctly.

When cylinders, valve chambers and water jackets are made separately, as in the Cadillac, an injury to any one part calls for the replacement of only that particular part at but a moderate cost, while in the case of cylinder, valve chamber and water jacket cast together, and particularly when cast in pairs or all in one, an injury to any one part necessitates taking down the motor, replacing the entire combination casting, and reassembling.



ORDINARY CASTING OF CYLINDER WITH WATER JACKET INTEGRAL
Note varying thickness of cylinder walls and uneven water circulating space. Also webs which interfere with circulation

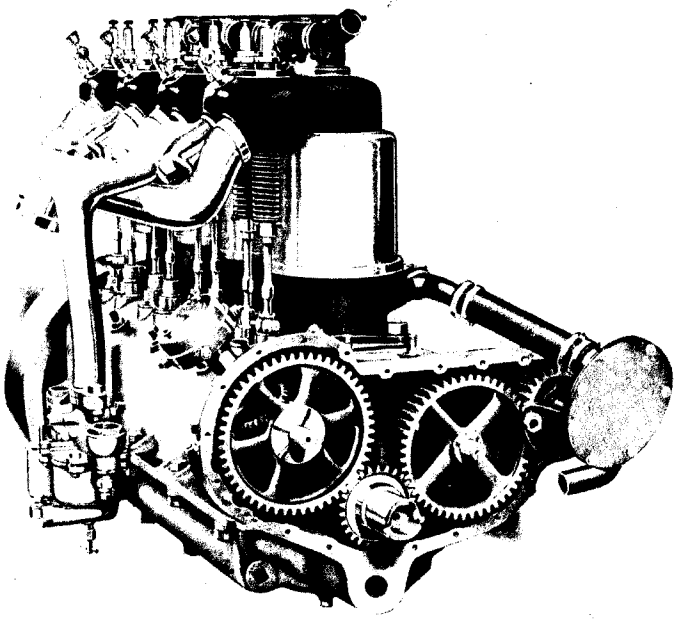
How CADILLAC Cylinders are Tested for Accuracy

The accompanying illustration shows the method of gauging Cadillac cylinders. Every cylinder after being ground must stand this final test. Two gauges are provided. One of them is marked "4.250 Go," meaning that it is exactly four and one-quarter inches in diameter. The cylinder must be large enough to permit this gauge to enter. The other gauge is marked "4.252 Not Go," meaning that its diameter is just two one-thousandths of an inch larger than four and a quarter inches, but the cylinder must not be so large that it will permit this gauge to enter. If a cylinder is too small to permit the "Go" gauge to enter, the inside is ground until it is the correct size. If the cylinder is large enough to permit the "Not Go" gauge to enter, it is discarded.

When you realize that one gauge is less than a hair's breadth larger in diameter than the other; when you realize that one will enter the cylinder and the other will not; when you realize that there are one hundred and twelve parts in the Cadillac car which are not permitted to vary more than the one one-thousandth part of an inch, which is about half the thickness of the average human hair, then can you form some conception of why Cadillacs are what they are, and why they render the constant service that they do.

Cadillac pistons are gauged to similar accuracy, a snap gauge however being used which gauges the outside diameter of the piston.

The result is that neither cylinders nor pistons can possibly vary in diameter even a hair's breadth. Consequently, ANY piston will fit in ANY cylinder. They do not have to be "paired." If it ever becomes necessary to replace a piston, all the owner has to do is replace the piston. He is not necessarily obliged to replace the cylinder also, or possibly a pair of cylinders or the whole four as might be the case where they are cast in pairs or all together.



CADILLAC "THIRTY" MOTOR
(Front view with gear cover plates removed)

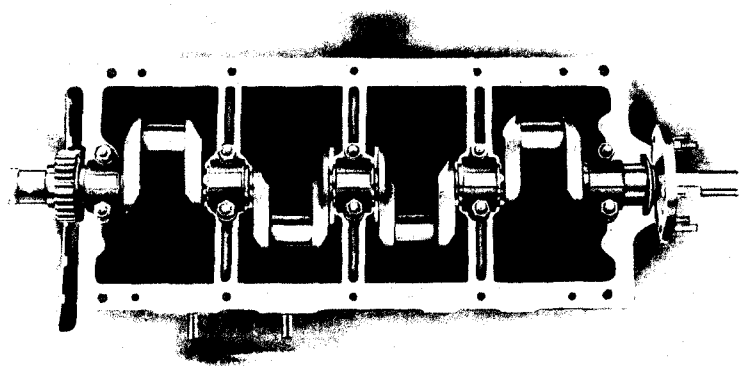
The piston connecting rods are dropped forged steel of "H" section.

The crank shaft, which is a special alloy nickel carbon steel drop forging, undergoes a special tempering process which gives it great strength. Its bearing surfaces are accurately ground. At the time of this writing, we have yet to hear of the first broken "Thirty" crankshaft, although a vast number of the cars have seen more than a year's service.

The crank shaft is substantially supported by no less than five large bearings which insure that firmness and rigidity which is essential to a smooth running, vibrationless and durable motor.

These bearings are of large surface, made of Parsons white brass, die cast. Incidentally, we had occasion to examine the bearings of a car which had traveled 46000 miles, yet the wear proved not to exceed the one one-thousandth of an inch. Each bearing is made in halves and should occasion ever require, they may be removed, replaced or adjusted through the hand holes in the crank case without even disturbing the crank shaft.

The crankshaft is offset: that is, instead of being placed directly in line with the middle of the cylinders it is set to one side. The advantage of this is, that when the piston is at the highest point, which is also the time at which the charge in the cylinder is at its highest compression and the time when the ignition should take place, the crank shaft has passed its dead center. Therefore, the force of the explosion is expended to greater advantage than is possible in motors where the crank shaft is in line with the middle of the cylinders when the explosion occurs.



OIL PAN AND CRANK SHAFT
Note the five large substantial bearings
Also showing oil wells and distributing troughs

This feature is one which some makers have been laying much stress upon during the last year or two, but like many other ideas, the Cadillac Company has been embodying this principle in its motors for years; in fact the offset crank shaft has been used in Cadillacs since their beginning, in 1902.

Upon the accuracy of the cams and cam shaft and the accurate fit of the cam shaft in its bearings depends the correct operation and timing of the valves and the correct timing of the valves is one of the greatest essentials in the development of maximum power. To insure these requisites we grind both the cams and the shaft, the latter within a half-thousandth of an inch limit. These parts are special heat treated high carbon steel. The cam shaft is supported by five substantial bearings which afford it the maximum degree of rigidity which is not obtainable with a lesser number of bearings.

The inlet and exhaust valves are alike and interchangeable. They are all located on the right side of the motor and are operated by the single cam shaft. The valve lifting rods do not bear directly on the cams. The lower end of each rod is provided with a hardened steel roller and consequently the possibility of wear is reduced to an absolute minimum. This is a feature which, outside of the Cadillac, is found only in the highest priced cars.

The motor base or crank case is cast in two parts having four compartments. The ends and dividing walls support the five crank shaft bearings. The hand holes in the crank case provide easy access to all parts within. The entire motor is constructed with a view to accessibility of all parts which may require attention.

The cooling system used on the Cadillac "Thirty" is not equalled in any other motor car at any price. The radiator is our own design, made in our own factory. It is composed of 150 seamless copper tubes passing vertically through 120 horizontal copper plates,—copper because it radiates or throws off heat better than other metals. In the method of manufacturing we have inaugurated a wide departure from the usual practice of dipping the entire radiator in molten solder after assembling, a practice which is followed to cover up poor workmanship and poor material and a

practice which has a decided tendency to reduce the radiating efficiency. The Cadillac method is to confine the solder as closely as possible to the points where the tubes pass through the plates without covering the plates themselves. By this method we obtain the maximum radiating efficiency. All parts and passages with which the water comes in contact are made of either copper or brass—no iron or steel or other metal subject to rust. Before assembling, each individual tube is tested and the finished radiator is also tested by air and water pressure. The water circulation is promoted by a gear driven pump. The air draft through the radiator is augmented by a ball bearing belt driven rotary fan with an adjustment provided for taking up any stretch in the belt. With our radiator construction, the copper jacketed cylinders and uniform water circulating space, we have a system that comes nearest perfection of any that has ever been produced. The radiator is mounted on the chassis by our three point contact method. Therefore it is not liable to distortion resulting from the strains to which the car frame may be subjected.

The clutch is the leather faced cone type. It is made of pressed steel, giving it great strength without needless weight. The ring with which the cone engages is split at eight points of its periphery and part of each section is sprung inward. This causes the clutch to take hold gradually so that in starting the car there is that noticeable absence of shock and jar characteristic of most cars. This clutch is devoid of the usual complications characteristic of other types. It is extremely simple and requires the least attention of any motor car clutch ever designed. In the matter of efficiency, ease of operation, dependability and service, it is not even approached.

The motor entire is mounted in the chassis frame by our three point suspension plan. The rear of the motor base is attached to a frame cross member at two points while the forward end is provided with a rocker joint. By this method, any twisting strains to which the car may be subjected due to uneven road conditions do not materially affect the alignment of the motor and its working parts.

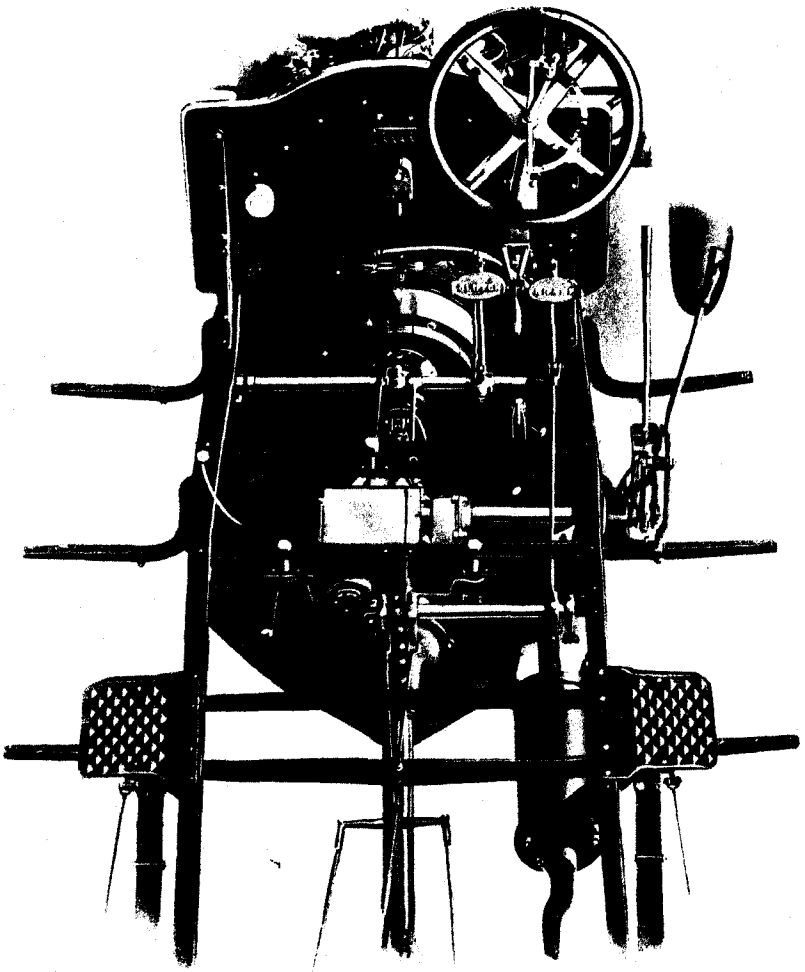
The carburetor is of the float feed type and as we make it ourselves it possesses several distinct advantages not found in the commercial article. The body is cast from bronze in our own foundry. The various other parts, adjusting screws, etc., are made of brass with the exception of the intake valve which is made of nickel-silver alloy. This composition is very hard and durable and not subject to corrosion; it costs us five dollars per pound but it saves the car user much trouble and annoyance. The intake valve is provided with a positive guide which compels it to seat properly, thereby preventing undue wear on the seat. The intake opening is large enough to supply gasoline to the carburetor in sufficient quantities to meet all requirements.

Instead of the usual cork float which is liable to absorb gasoline, necessitating frequent adjustments, we make a finely balanced copper float of such a shape that it is not liable to become wedged and cause flooding.

The spring of the auxiliary intake valve is seated in such a manner that it is not liable to displacement, obviating another frequent cause of annoyance, and is provided with a positive but adjustable high speed stop.

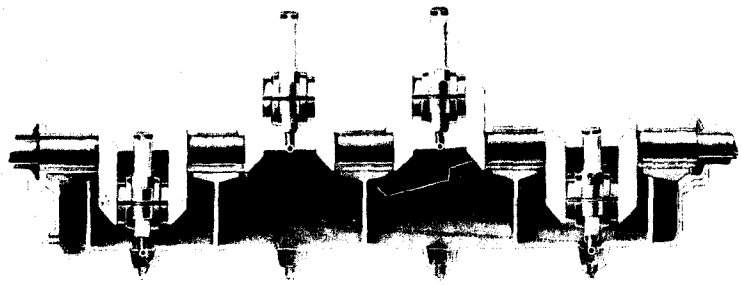
A carburetor to give the best results must be accurately made and its parts perfectly fitted. By doing all the work ourselves and following the high standards of Cadillac workmanship, we obtain the greatest possible efficiency.

This type carburetor was adopted by us after long and severe tests in our own laboratories and on the road, to satisfy ourselves of its superiority in point of speed, power, economy, simplicity, flexibility and general efficiency.



DASH, CLUTCH AND TRANSMISSION

In the important matter of lubrication, the Cadillac "Thirty" is provided with the most efficient, the most positive and the most economical system ever devised, the oil consumption averaging from 500 to 800 miles per gallon. This system in its present perfected form was originated by the Cadillac Company and the fact that it has been used on all four-cylinder Cadillacs since their beginning, in 1905, and the fact that it has successfully met every condition is the strongest possible testimony to its merit.



SECTIONAL VIEW OF CRANK CASE AND CRANK SHAFT
Showing Oil Wells and Distributing Troughs

A quantity of oil is first placed in the oil pan of the crank case, sufficient to fill the wells. An oil reservoir is placed alongside the motor: in this reservoir is located a double acting force pump, the supply from which may be properly regulated to take care of the motor's requirements. The supply is forced from the reservoir up to and drops through the sight feed on the dash. From there it is forced to the crank case, maintaining the supply there. By means of splashers at the end of each connecting rod which dip into the oil at each revolution of the crank, the oil is thrown completely over and upon all the inside working parts of the motor, including main bearings, cylinders, etc.

There are four compartments to the crank case, the end and dividing walls of which support the five main bearings.

With the Cadillac system there is no possibility of the oil collecting in either end of the crank case as the sloping troughs on the sides distribute it from one compartment to the other, maintaining a uniform level in each, regardless of road grades, up or down.

There is another prime advantage. There is not a multiplicity of feed pipes to watch that are liable to become clogged up and result in burned out bearings. On the contrary there is but one and if the oil is shown by the sight feed to be feeding properly and the supply in the crank case adequately maintained, there is positive assurance that all bearings taken care of by this system are being perfectly lubricated.

No one thing is responsible for more "automobile troubles" in a well designed and correctly constructed car than insufficient lubrication. The Cadillac "Thirty" is unusually well provided with lubricating facilities throughout. Besides the perfect motor lubricating system and the constant oil bath of the main universal joint, special attention is directed to the numerous compression grease cups throughout the car, including spring shackles and oscillating spring seats, their prominence acting as constant reminders of their importance. This is a striking contrast to the small oilers and oil holes found in many cars.

IGNITION

In the very essential feature, ignition, the Cadillac "Thirty" marks a long step in advance of the times. It is equipped with two complete and independent systems including two sets of spark plugs. Either system alone is efficient for operating the car.

In the selection of a magneto which should be worthy of the car, we conducted what was undoubtedly the most exhaustive series of practical tests ever attempted and determined upon this important equipment only after thoroughly demonstrating that this magneto afforded the greatest all around advantages possible to obtain. Some of the advantages proven over other magnetos tested were:—Its greater efficiency when running slowly; less attention required to adjustment of spark plug points; life of platinum contact points which was more than twice that of its closest competitor. In the adoption of this magneto over all others as standard equipment, we feel that we are serving the best interests of Cadillac users and giving them the benefits of practical tests, such as they themselves could not possibly conduct.

In addition to a low tension magneto, we have also adopted the Delco system. In this system there are but three units, viz., the Coil Box and the Controlling Relay which are located with the motor, under the hood, and the Switch located on the dash.

We quote the following from the maker's catalog:—

"In the design and construction of the Delco system of automobile ignition, we have had in mind the man who owns the car, who drives for pleasure, and has neither the time nor inclination to be continually 'fixing' any part of the car.

The system as supplied for Cadillac cars was designed and built specially for the Cadillac Motor Car Company and embodies the elements of practicability and reliability far beyond what has ever before been done in automobile ignition.

WHAT DELCO DOES

1. It stops all sparking at the primary contacts. A pair of contacts should last for years without attention or renewal.

2. It will run a car 2,000 miles on six dry cells. No storage batteries are required.

3. It stops all sparking at the commutator and is the only system that does. The usual commutator troubles will not occur where Delco is used.

4. It will not require the constant adjustment necessary with other systems. There is but one moving part and one simple adjustment. It should not be necessary to make this one adjustment more often than once a year. Sets have been run 20,000 miles without a single adjustment.

5. It makes but one spark for each explosion, a good spark, at exactly the right time. The timing is equal to any magneto and the spark is the same at all speeds.

6. It removes everything from the dash but the switch, greatly improving the appearance of the car.

7. It stops switch troubles. The Delco switch is the best ever placed on automobiles. It is equipped with a lock to prevent theft.

The coil box contains four induction coils, one for each cylinder. The coils are embedded in a heat resisting insulating compound, which when combined with the steel armour in which it is incased, makes it possible to place the box out of the way, under the motor hood. The individual vibrators are eliminated, so there is not a single moving part in this unit, and it will require no attention.

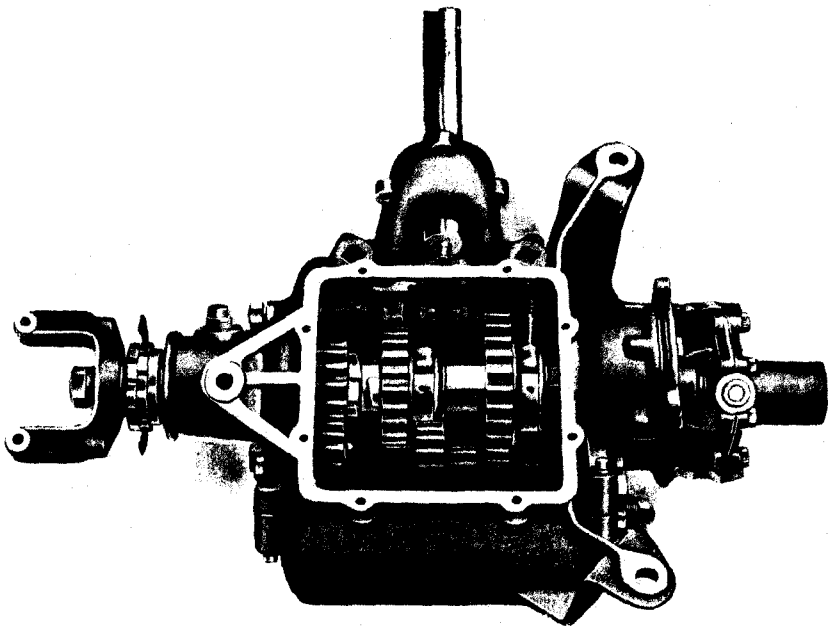
Many minor advantages might be enumerated, but these will become apparent after the user of the car becomes familiar with his new equipment.

We feel that every Cadillac owner may well be congratulated on having his car equipped with this, the very latest and best ignition system yet devised and we bespeak for him perfect satisfaction.

In case of any trouble or misunderstanding, we shall be glad to have you write us fully; your letter will have our immediate attention.

THE DAYTON ENGINEERING LABORATORIES CO.,
Dayton, Ohio, U. S. A.

For many months we have been conducting very exhaustive experiments and practical tests both in our laboratories and on the road. Cadillac users have been more than delighted with their experiences and we have yet to discover any reason why we cannot concur in the representations made by the makers as to the advantages of this system.



TRANSMISSION

The transmission of the Cadillac "Thirty" enjoys a reputation equal to that of the Cadillac motor for the superiority and fineness of its construction. A better transmission has never been made, none more substantial, none more positive, none more dependable, none better in any respect. It is our own design, manufactured in our own factory. It is the selective type of sliding gear in which the gear changes may be made direct from one to the other without "going through" a third. There are three speeds forward and reverse, direct on high. The gears, also the transmission shaft and clutch shaft are made of chrome nickel steel. The construction is Cadillac quality throughout. The utmost skill is exercised in cutting and finishing the gears and other parts according to the Cadillac system of limit gauges which insures hairsbreadth accuracy. These parts are then treated by a special process which gives them extreme strength, toughness and wear resisting qualities.

The gear teeth are "backed off" or beveled by machinery especially designed for the purpose and it is therefore done more accurately than is possible by ordinary methods. This facilitates the shifting of the gears without the crashing and grinding characteristic of some construction.

The main transmission shaft, the jack shaft and the clutch shaft revolve on five annular ball bearings.

The gear box is of such construction that the lubricant is automatically distributed.

The gear shifts are made by a hand lever whose range of action is within an "H" shaped quadrant, located at the driver's right.

DRIVE

The drive is direct by a special heat treated high carbon steel shaft through nickel carbon steel pinion to special carbon steel bevel gear, both accurately cut by our own methods in our own gear cutting plant. The shaft revolves on anti-friction bearings at each end within its steel tube housing which also takes the torsion.

There is but one universal joint between the transmission shaft and rear axle. This is a telescopic joint which revolves in a constant bath of lubricant. It is so constructed that it is self centering, with the result that the friction and binding strains characteristic of ordinary universal joints are practically eliminated.

Special attention is directed to the fact that when the car is carrying its normal load the driving power is transmitted in practically a straight line from the motor to the rear axle, consequently the maximum of the motor's power is delivered at the rear wheels.

BRAKES

Nothing in a motor car is more essential to the safety of the motorist than a thoroughly efficient and dependable brake system.

The Cadillac "Thirty" is equipped with two pairs of powerful, double acting brakes which operate directly on the large hub drums of the rear wheels. The regular service brakes contract upon the outside of the drums and are operated by a foot lever. The emergency brakes expand within the hub drums and are brought into action by a hand lever at the driver's right.

It is well known that it is a difficult matter to adjust a pair of brakes so that the tension or gripping qualities will be uniform on both. To overcome this we have compensating devices on both the service and emergency brakes which automatically take up any inequality in the tension and cause the pressure to be applied equally on both brake drums. This not only adds materially to the efficiency of the brakes but is a large factor in preventing skidding. Freedom of action is further facilitated by the double acting joints with which the pull rods are fitted.

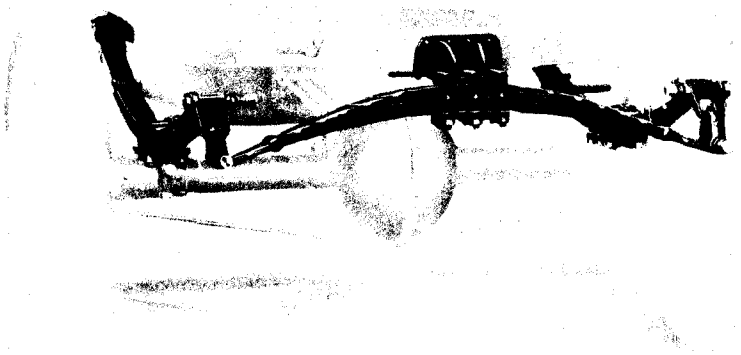
The brake bands are lined with asbestos containing a reinforcement of fine copper wires. Practical tests have proven this to be the most serviceable material obtainable for this purpose.

SPRINGS

The Cadillac 'Thirty" is equipped with the most luxurious spring suspension ever installed on a motor car. One has but to ride in the car to appreciate its superb qualities of comfort. The "Thirty" carries its own good road with it.

The forward suspension consists of two semi-elliptical springs, 36 inches long by 2 inches wide.

The rear suspension is of the three-quarter platform type, a type which is recognized as the most conducive to comfort, but which makers of cheaply constructed cars cannot afford to use and which few have sufficient knowledge to apply correctly. Like most other features, this is one which the Cadillac Company has perfected to a marked degree.



REAR SPRING SUSPENSION

As will be seen by the illustration, the side and rear members of the rear suspension are hung with ball joint shackle connections.

It remained for the designers of the Cadillac "Thirty" to devise means which would obviate the most common cause of spring breakage and at the same time not only conserve but increase the spring efficiency.

It will be seen, first, that the spring leaves themselves do not commence to taper until they have passed from between the clamping blocks. Second, the inside surfaces of the spring perch and clamping blocks are curved to correspond with the normal curvature of the springs. Furthermore, the spring is held in position by three clips instead of the usual two.

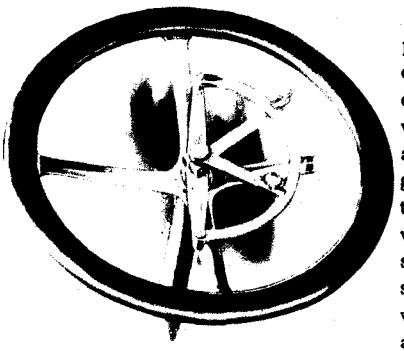
In ordinary construction, spring leaves commence to taper right in the middle and are held together between flat surfaced spring perch and clamping block. The result is that the spring leaves are distorted at the very outset and are therefore much more liable to crystallization and breakage during subsequent action. But in Cadillac construction first outlined, the leaves are always retained in their normal shape excepting when in action. This is also an important factor in preventing loosening of spring clips.

The shackle bearings are provided with compression grease cups to facilitate lubrication.

Like all other Cadillac construction, that of the springs is given more attention than is usual in most cars. The utmost care is exercised in the selection of the material, in the manufacture and in the testing of the springs themselves. All spring eyes are made with hardened steel bushings and all parts are made within close limits to prevent rattling, to minimize wear and to preserve correct alignment.

Attention is further directed to the spring perches. These are not attached rigidly to the rear axle as in ordinary practice but are of the oscillating type, moving upon the axle tube. This not only prevents undue straining and twisting of the springs in going over obstructions or into depressions but in connection with the previously mentioned refinements, it permits the full benefits of spring efficiency to be realized.

STEERING MECHANISM



STEERING WHEEL
With Throttle and Spark Levers

The Cadillac "Thirty" steering mechanism possesses features of merit, superior to any other type ever produced. It is of our own patented design and manufacture, of the worm and worm gear sector type. The parts are all accurately cut and hardened, and the worm gear is fitted with two ball thrust bearings. The teeth in the middle of the sector, being the ones which are in mesh when the car is driven straight ahead, naturally perform the greatest service and are therefore most susceptible to wear. To compensate for this the center teeth are cut on a slightly less pitch radius so that any wear may be taken up without affecting the upper or lower teeth of the sector; consequently they do not bind when turning corners.

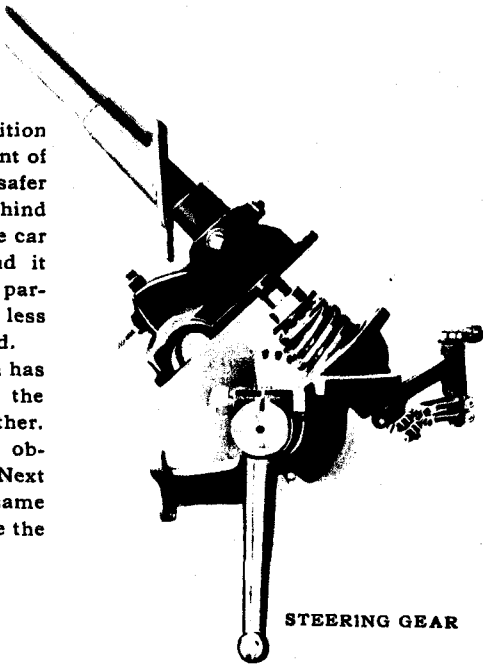
We know of no other car equipped with a steering device capable of adjustment to the degree which characterizes our own.

A steering gear that is not provided with proper adjustments is apt to become worn to such an extent that the resulting back lash will make steering both uncertain and unsafe.

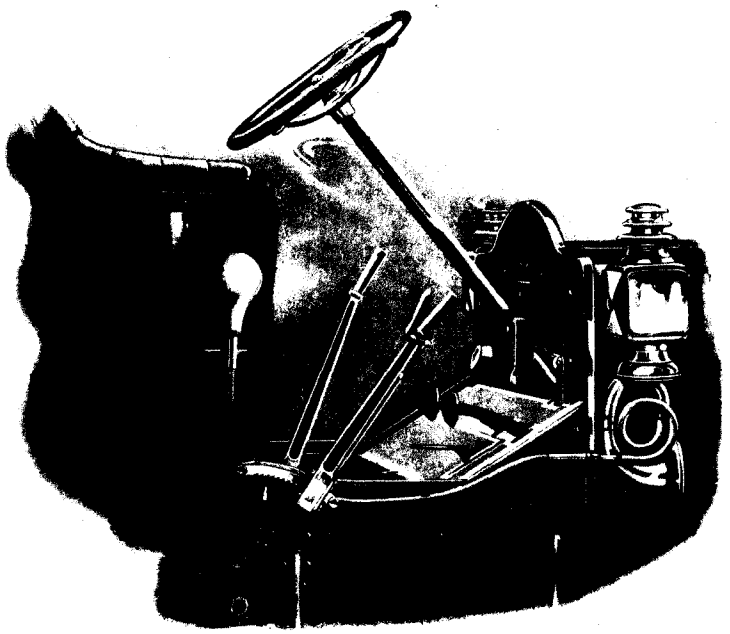
The adjustment provision of most gears is simply for original setting at the factories so that when the parts become worn they must be replaced by new ones. In our mechanism the provision for adjustment is more adequate than will probably ever be required.

The parallel rod which connects the steering knuckles of the front wheels is placed in front of the axle for the reason that this is the only mechanically correct position for it. With the parallel rod in front of the axle, the steering is steadier, safer and more certain than if placed behind the axle. Furthermore, it allows the car to be turned in smaller space and it keeps the front wheels more nearly parallel in turning, with consequently less grinding of the tires on the ground.

To test this, jack up a car which has the rod behind the axle, cramp the wheels to one side and then the other. Then take hold of one wheel and observe how easily it will "wobble." Next test a Cadillac "Thirty" by the same method and you will readily realize the difference



STEERING GEAR



BRAKE AND CONTROL LEVERS

The Cadillac "Thirty" is equipped with the standard form of control. There are no confusing combinations on any one lever; each has its separate and distinct function. There are two hand levers at the driver's right; one applies the internal expanding hub brakes, the other is the speed change lever. There are also two foot levers; one operates the main clutch, the other applies the external contracting hub brakes. The two foot levers are adjustable to accomodate drivers with different lengths of limbs.

The throttle and spark levers are located conveniently at the steering wheel.

A foot throttle control is also provided.

MUFFLER

Our muffler is a most effectual silencer in which back pressure has been reduced to the lowest minimum. It is provided with a special valve which is designed to perform three different functions. First, it acts as a safety valve which is opened automatically in the event of muffler explosions, thereby preventing injury to the muffler and exhaust piping. Second, it may be used as a cut-out. Third, it may direct the exhaust to a horn or a foot-warmer.

FRAME

The frame of the "Thirty" is strong and substantially braced. It is made of pressed steel, channel section, dropped in front so that the weight is carried closer to the ground, yet not interfering with the clearance. Its width is 33 inches in the rear, reduced to 30 inches in front which enables the car to be turned in a 34 foot circle. All cross members are hot riveted with pneumatic hammers, a process which prevents loosening of the rivets and parts.

BODIES

The bodies are all exclusive Cadillac patterns of graceful and handsome designs. All body frames are ash. The body of the Touring Car is wood. The large panel of the tonneau of the Demi-Tonneau car is aluminized sheet steel. The doors of both Touring Car and Demi-Tonneau are aluminized sheet steel. The Touring Car body is large and roomy, has wide doors and seats five passengers comfortably. The Demi-Tonneau has a seating capacity for two persons in the tonneau. This tonneau is detachable and is interchangeable with a plain deck or a rumble seat. The rumble seat on the Roadster is also detachable. There is abundant foot room for passengers in all types.

WHEELS

The wheels are the best obtainable and equal to those used on the highest priced cars. They are of the artillery type made from well seasoned second growth hickory with steel hubs. The spokes are of ample dimensions to insure great strength.

TIRES

The standard equipment for Cadillac cars is Hartford, Morgan & Wright or Goodyear tires of either the Dunlop or Q. D. Clincher types.

All wheels are equipped with Goodyear quick detachable rims.

The standard size of tires used on Cadillac "Thirty" Touring Car, Demi-Tonneau and Roadster is 34x4 inches. On the Limousine, 34x4½ inches.

NOTE—When make and type of tire desired (as previously designated) are not specifically stated in ordering, we shall equip cars with some one of the before mentioned makes or types at our option.

FENDERS

Fenders are special Cadillac pattern, made in our own sheet metal department. They are strongly made, substantially attached and are so designed that they will be found quite effectual in protecting the car and its occupants. They are finished in several coats of black enamel, each coat baked on at a high temperature and rubbed down before the succeeding coat is applied. This gives a finish which for durability has never been excelled.

FINISH

No motor car is better finished than is the "Thirty." Cadillac finish is noted the world over for its excellence and durability. Inasmuch as this work is done in our own shops and not let out on contract, we are able to give it the same careful supervision and inspection which characterizes all Cadillac workmanship.

The standard finish of all styles of the Cadillac "Thirty" is Royal Blue, including body, hood, frame, axles and wheels, with light striping. The fenders and radiator are baked black enamel.

The dash is highly finished mahogany with brass edge. The door trimming strip and hood sills are also mahogany finish.

The seats are luxuriously upholstered in selected full hides of black leather tufted over deep coil springs and fine quality genuine curled hair.

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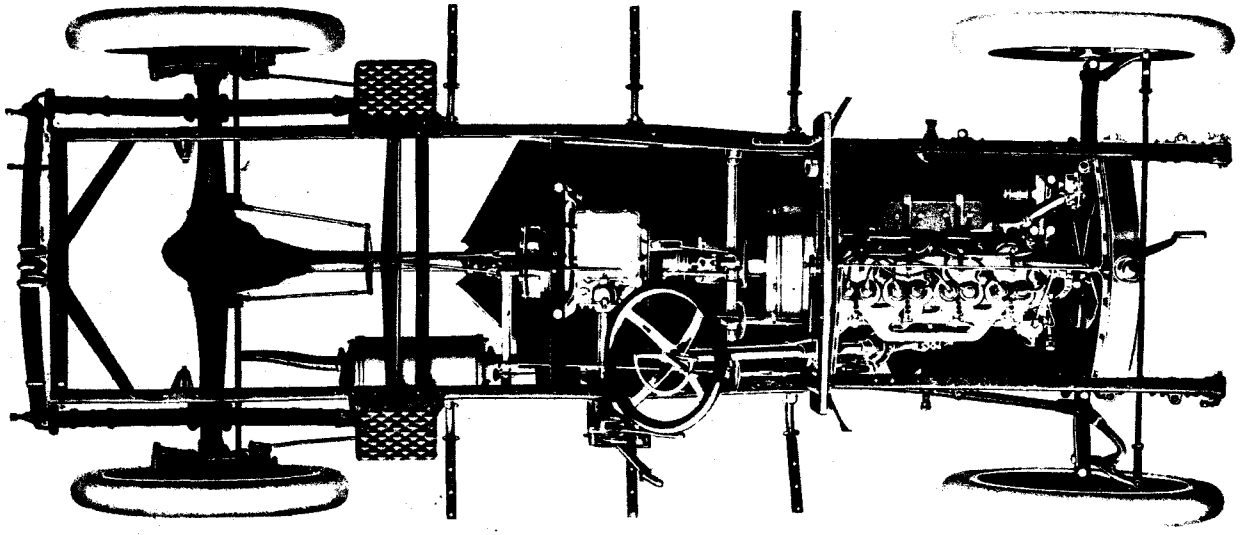


CADILLAC "THIRTY" CHASSIS
PLAN VIEW

CAD. Copy # 26081

SPECIFICATIONS IN BRIEF

CADILLAC "THIRTY"

MOTOR—Four-cylinder, four-cycle; cylinders cast singly. 4¼-inch bore by 4½-inch stroke. Five-bearing crank shaft.

HORSEPOWER—A. L. A. M. rating 28.9. Actual, dynamometer tests, 33.

COOLING—Water. Copper jacketed cylinders, gear driven pump. Radiator of ample efficiency. Fan attached to motor and running on two-point ball bearings. Center distances of fan pulleys adjustable to take up stretch in belt.

IGNITION—Jump spark. Two complete and independent systems, including two sets of spark plugs Low tension magneto. Also Delco four unit coil with controlling relay: dry cell current.

LUBRICATION—Automatic splash system. Oil uniformly distributed. Supply maintained by mechanical force feed lubricator with positive sight feed on dash.

CARBURETOR—Float feed type, our own make. Copper float.

CLUTCH—Cone type, leather faced with special spring ring in fly wheel.

TRANSMISSION—Sliding gear, selective type, three speeds forward and reverse. Chrome nickel steel gears. Chrome nickel steel transmission shaft and clutch shaft running on five annular ball-bearings.

DRIVE—Direct shaft in housing to bevel gears of special cut teeth to afford maximum strength. All gears cut by us. Telescopic universal joint enclosed in housing and running in oil bath.

AXLES—Rear, special alloy steel live axle shafts running on special roller bearings. Front, with drop forged yokes, spring perches, tie rod ends and steering spindles.

BRAKES—One internal and one external brake direct on wheels, large drums.

STEERING GEAR—Our own patented worm and worm gear sector type, adjustable, with ball thrust bearings.

FRAME—Dropped, pressed steel, channel section. Width, 30 inches in front, 33 inches in rear.

GEAR RATIO—Standard on Touring Car, Demi-Tonneau and Roadster 3½ to 1. On Limousine 4 to 1. Option on Touring Car and Demi-Tonneau 4 to 1. Option on Roadster 3 to 1 or 4 to 1.

WHEELS—Wood, artillery type, fitted with quick detachable rims. Special large hub flanges and special strength wide spokes.

WHEEL BASE—On Touring Car, Demi-Tonneau and Roadster, 110 inches.

TIRES—On Touring Car, Demi-Tonneau and Roadster, 34 x 4 inches.

TREAD—56 inches. Option 61 inches.

SPRINGS—Front, semi-elliptical 36 inches long by 2 inches wide. Rear, three-quarter platform; sides, 42 inches long by 2 inches wide; rear, 38 inches long by 2 inches wide.

CONTROL—Spark and throttle levers at steering wheel. Steering wheel 17 inches in diameter. Clutch operated by foot pedal. Service brake (external) operated by foot lever. Emergency brake (internal) operated by hand lever. Speed changes by hand lever operating in "H" plate. Throttle accelerator by foot lever.

SPEED—5 to 50 miles per hour on high gear.

GASOLINE CAPACITY—About 13 gallons.

OIL CAPACITY—6 pints, sufficient for 400 to 600 miles.

UPHOLSTERING—Black leather over genuine curled hair and deep coil steel springs.

FINISH—Royal blue body and chassis, striped.

EQUIPMENT—Low tension Magneto. Delco four unit coil with dry cells. One pair gas lamps and generator. One pair side oil lamps and tail lamp, one horn and set of tools, pump and repair kit for tires. Robe rail and tire holders.

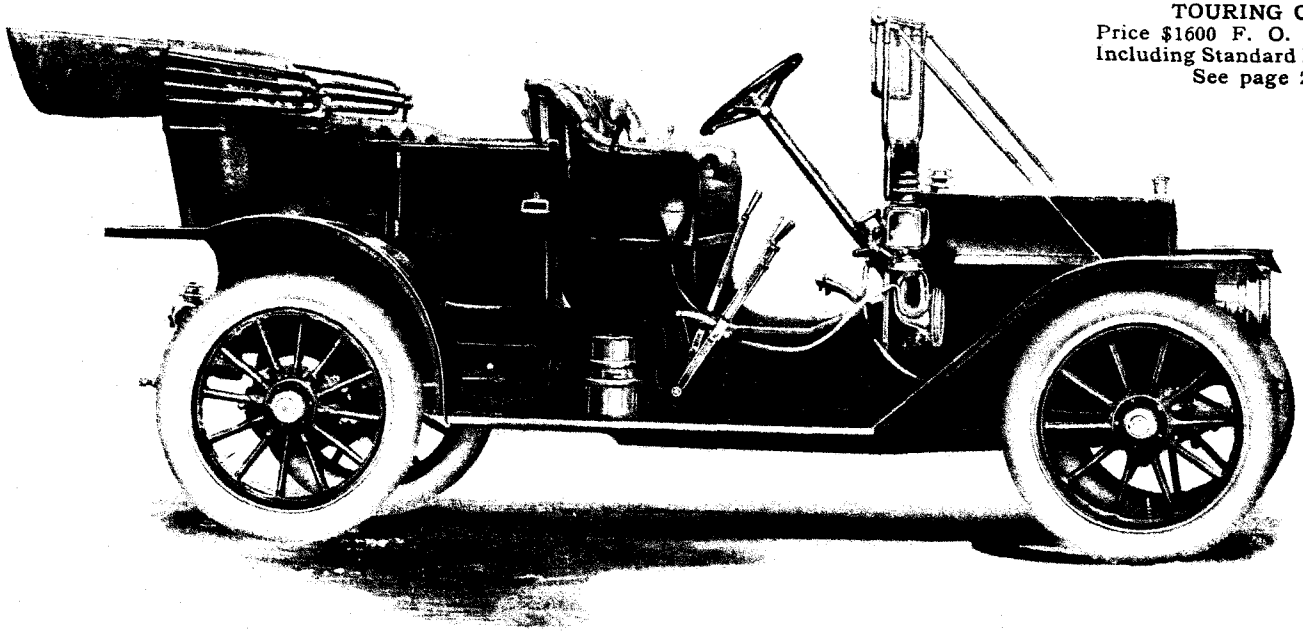
No allowance will be made for any part of standard equipment if ordered omitted.

NOTE—The Cadillac Motor Car Company reserves the right to make changes or improvements at any time without incurring any obligation to install same on cars previously purchased.

CAD. COPY # 26082

Cadillac
"Thirty"

TOURING CAR
Price $1600 F. O. B. Detroit
Including Standard Equipment
See page 23



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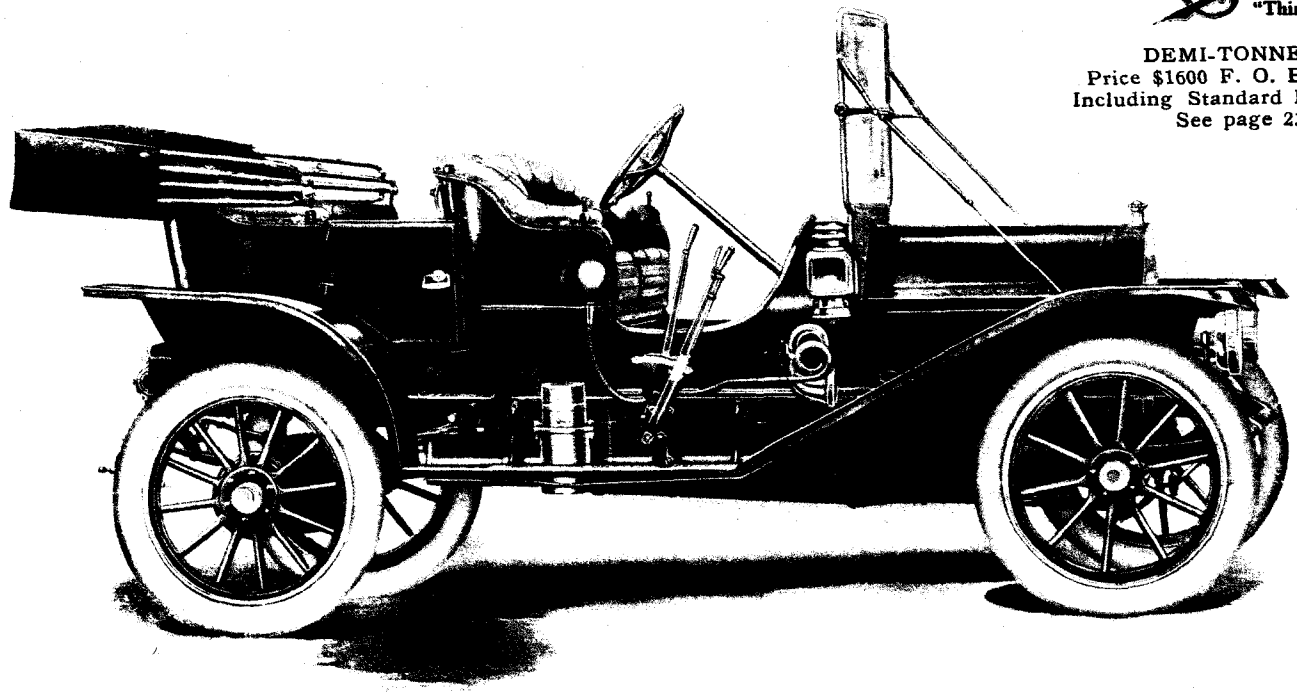


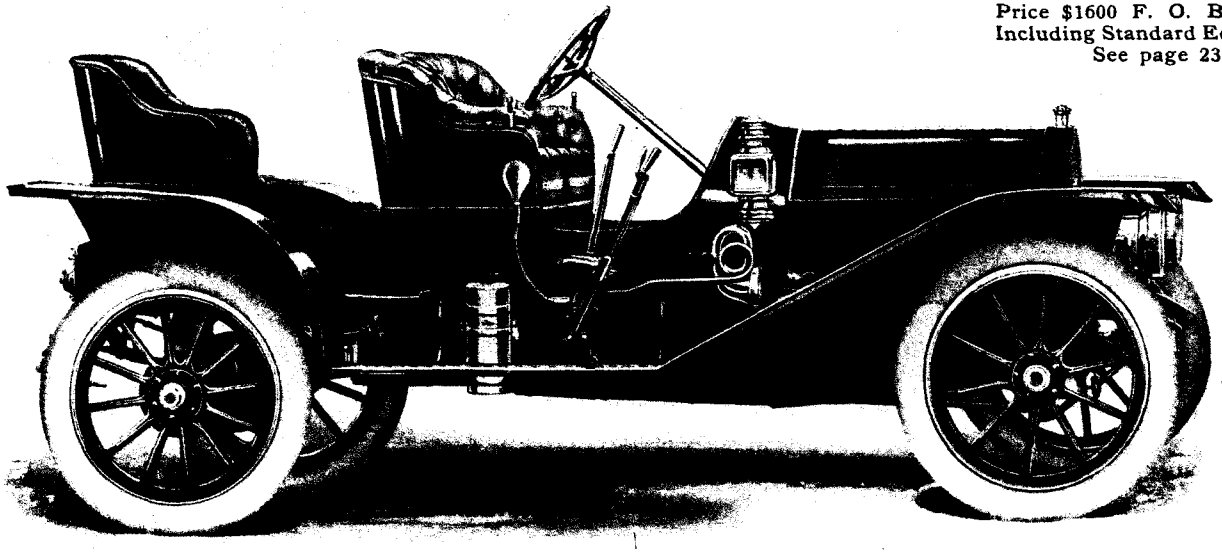
Cadillac "Thirty"

DEMI-TONNEAU
Price $1600 F. O. B. Detroit
Including Standard Equipment
See page 23

CDD. COPY # 26083

Cadillac
"Thirty"

GENTLEMAN'S ROADSTER
With Rumble Seat
Price $1600 F. O. B. Detroit
Including Standard Equipment
See page 23



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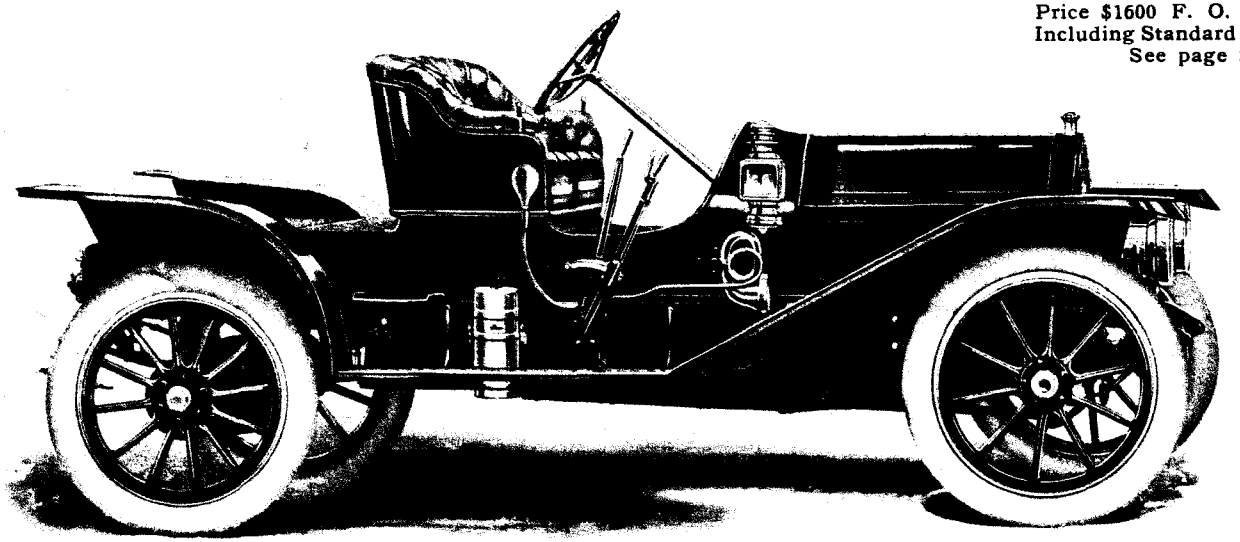
Cadillac
"Thirty"

GENTLEMAN'S ROADSTER
With Deck
Price $1600 F. O. B. Detroit
Including Standard Equipment
See page 23



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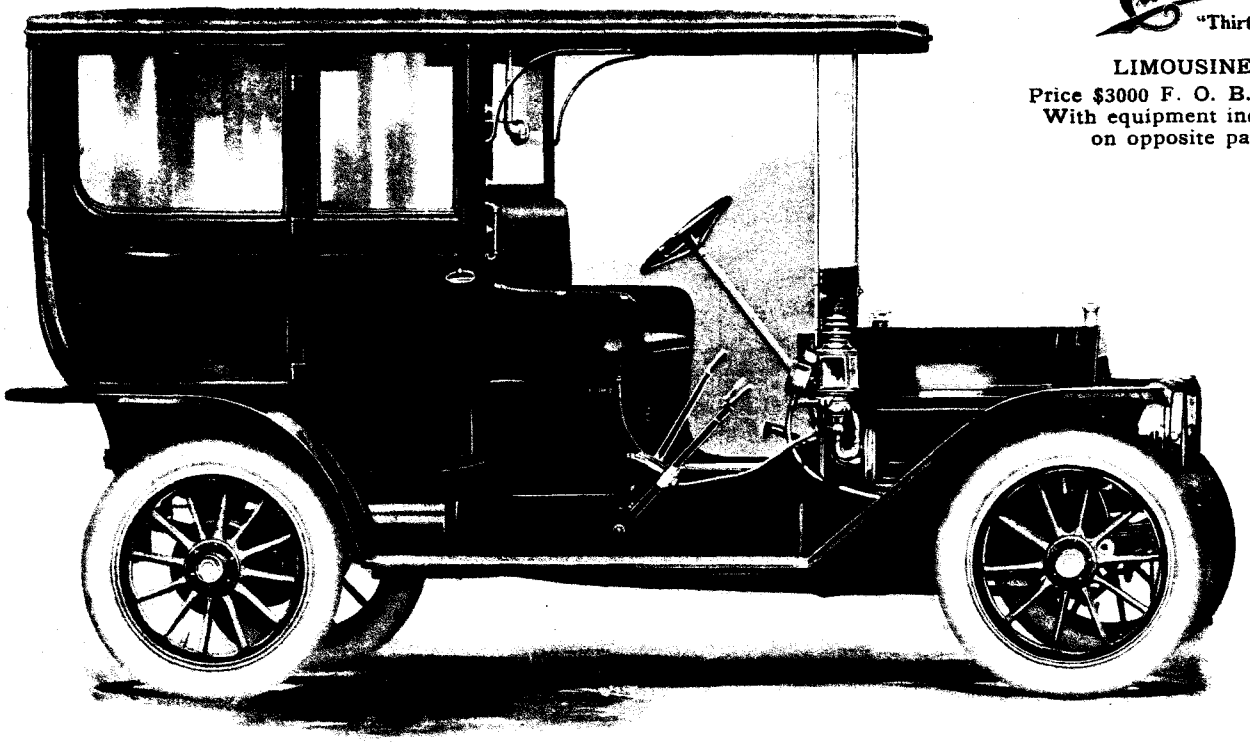


Cadillac
"Thirty"

LIMOUSINE
Price $3000 F. O. B. Detroit
With equipment indicated
on opposite page

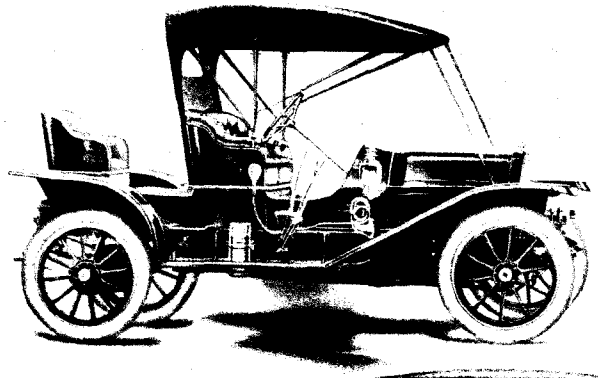
AD. copy # 19249

CADILLAC "THIRTY" LIMOUSINE

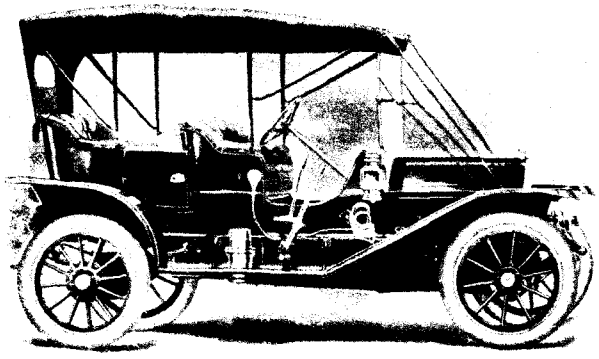
The Cadillac "Thirty" Limousine embodies the same principles and mechanical construction and equipment as other types of the "Thirty" excepting that the chassis is longer, it has a longer wheel base and the tire size is increased to 34 inches by 4½ inches.

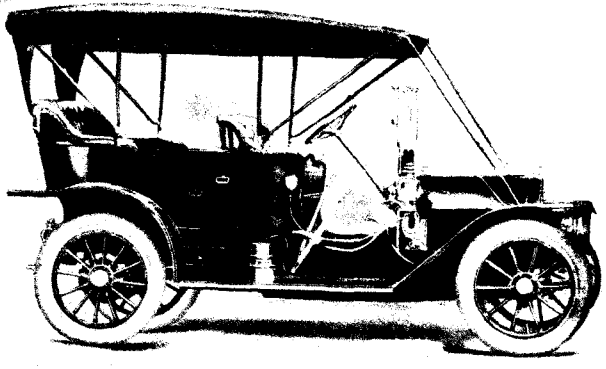
Its design is the latest conception of the body builders' art Its handsome proportions and graceful lines appeal to the tastes of dignity, elegance and refinement. In the finish and luxuriousness of its appointments, it leaves nothing to be desired. It is richly upholstered and trimmed. The upholstering is of genuine morocco and the trimming of broadcloth. The ceiling above the driver's seat is mahogany finish. The enclosed portion affords accommodations for five passengers. The equipment includes electric dome lights, toilet case, card case and speaking tube. The headlights are large and a Prest-o-lite gas tank is furnished. The windshield, which is fitted with Circassian walnut frame, is constructed to permit swinging it up under the roof.

The finish is royal blue chassis and body panels, with black trimming. The frame, wheels and hood are striped.



Cadillac
Tops





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CADILLAC TOPS AND SLIP COVERS

A Cadillac Car is worthy of a Cadillac top. The Cadillac user who equips his car with a cheap top is not doing either himself or his car justice. We manufacture our own tops because we want Cadillac users to have the best there is—something that is going to look well and wear well, something that is going to be in keeping and stay in keeping with the high quality of the car itself. The ordinary cheap commercial top is expensive because it soon gets out of shape and takes on a shabby appearance.

We design and make Cadillac tops especially for Cadillac cars. They are given the same care that characterizes all Cadillac products.

While we cannot make and sell these tops in price competition with the ordinary commercial article, our prices are below those asked for the same quality by high grade makers.

They are so designed that they will give a well balanced and well proportioned outline, and the lines are in harmony with and give a rich finishing touch to the car.

The bows are of the best selected ash with double steel bow sockets. The front and rear bows which sustain the greatest strain are substantially reinforced. Leather straps in front hold the top securely in position. The covering used on the "rubber" top is a high grade three-ply rubber covered cloth with heavy jeans back. Experience has proven this to be one of the best and most durable coverings known. The tops are well reinforced with webbing and padded with cotton wadding which aids materially in holding their shape.

The black mohair mackintosh is the material "de luxe" for automobile tops. It is the finest cloth we can buy for this purpose, durability, beauty and serviceability considered. It has a silky lustre that gives it a richness of appearance which no other material has.

With all tops for the "Thirty" we include side curtains and a storm front except when car is ordered with windshield. In such cases the storm front is omitted but special curtains are fitted and a visor is provided to cover the opening between the windshield and top, held securely in position by Swan clip fasteners. With all tops we furnish also a dust hood of same material to cover the top when laid back. When slip covers are ordered, however, we supply the dust hood of same material as slip covers. The under side of all dust hoods is made of rubber cloth to facilitate cleaning.

Storm fronts and side curtains are lighted with transparent material.

The Cadillac trade mark is sewed in the lining of all genuine Cadillac tops.

PRICES

RUBBER CAPE CART TOP FOR "THIRTY" TOURING CAR AND DEMI-TONNEAU	$75 00
MOHAIR CAPE CART TOP FOR "THIRTY" TOURING CAR AND DEMI-TONNEAU	95 00
RUBBER TOP FOR "THIRTY" ROADSTER	55 00
MOHAIR TOP FOR "THIRTY" ROADSTER	70 00

SLIP COVERS

We make on order, slip covers for covering the seats of Cadillac "Thirties." The material in these slip covers is the best we can obtain for the purpose. They are made of mouse colored jeans with heavy twill backing and rubber interlining. The color corresponds with the top lining. The prices are:

For Touring Car	$60 00
For Demi-Tonneau	57 50
For Roadster	40 00

All prices subject to change without notice.

EXTRAS

The following optional and additional equipment will be furnished with the Cadillac "Thirty" at prices hereinafter quoted. These prices include fitting to car unless otherwise stated.

Where equipment is ordered separate from car, no allowance will be made for fitting.

PREST-O-LITE TANK, style "B" each	$ 25 00
FOLDING AUTOMATIC WIND SHIELD	30 00

JONES SPEEDOMETERS

No. 34, 60-mile	25 00
No. 29, 60-mile	30 00
No. 33, 80-mile	35 00
FOOT RAIL	3 50

INCOMPLETE CARS

CHASSIS

Cadillac "Thirty" Chassis only, 34 x 4-inch tires	1525 00

Chassis includes hood, dash, fenders, lamps and horn.

BODIES

Cadillac "Thirty" touring car body only, standard finish and upholstering	250 00
Detachable tonneau only, for demi-tonneau, standard finish and upholstering	115 00
Single rumble seat with tool-box base only, standard finish and upholstering	50 00
Deck, to replace rumble seat or demi-tonneau	30 00

NOTE—These extras are subject to withdrawal and prices subject to change without notice.

TIRE GUARANTY

All tires and rims used on Cadillac cars are guaranteed by their respective makers. In case of claims they should be sent to the factory or any of the branches of said makers (not to us), transportation charges prepaid.

TIRES, SPARK COILS, BATTERIES, MAGNETOS AND OTHER ACCESSORIES. When repairing is required which neccesitates shipping these to the factory, do not send them to us, but forward prepaid to their respective makers or to any of their branches which are established in most large cities.

CRATING. When automobiles are to be shipped long distances, singly, it is sometimes advisable to have them crated. The cost of crating four-cylinder cars is $15.00, boxing $20.00 extra, NET.

PRICES on Automobiles and parts are positively net, F. O. B. Detroit.

DISCOUNTS. We do not allow discounts excepting to bona fide automobile dealers with whom we make annual contracts for quantities of cars and who are properly equipped to conduct their business successfully and serve the best interests of Cadillac owners.

DICKINSON BROS GRAND RAPIDS

Cadillac

STANDARD OF THE WORLD

1909-1910

Instructions

for Operation and Care

PRICE 25 CENTS

CADILLAC MOTOR CAR CO.
DETROIT, MICHIGAN

IMPORTANT
Read this page carefully

The information, advice and instruction contained in this book are published because the user of a motor car needs them. But if the user fails to heed the advice given the loss is not wholly his but partly ours as well.

The Cadillac car in the hands of an operator who will give it the reasonable consideration to which it is entitled, and which every car requires, will run as smoothly and as quietly as is possible for any motor car to run. No car will give more satisfaction nor will any car stand more abuse. But no car can be expected to stand continual abuse without resenting it sooner or later.

We want Cadillac cars to render unfailing service and satisfaction. They are built for that purpose but the user must do his part after the car comes into his possession. We furnish a car that is capable of rendering the best of service and we furnish the instructions which will guide the user toward obtaining that service. But if he persists in ignoring the instructions and in substituting his own ideas there is no one but himself upon whom he can rightfully place the responsibility for any difficulties which may result.

There is a wealth of information, advice and instruction contained in this book. There is much that the owner may never have to use, but it is here to be used in the event that it is needed. There is other information which a user cannot get along without, no matter how much he may **think** he knows, nor how much previous automobile experience he may have had.

We will merely draw attention here briefly to the importance of a few points which are treated at greater length in the body of the book and which should be studied carefully.

See that the car is always thoroughly lubricated and supplied with gasoline and water.

See that all nuts, bolts and screws are tight.

If ever some unusual sound develops, investigate and find out what causess it and have it remedied.

See that spark plug points are the correct distance apart.

Do not tamper with the carburetor unless you **know** that it needs adjusting and don't touch it even then unless you **know how** to adjust it.

Do not tinker with your car unless you know how to do what you wish to accomplish.

Keep the tires well inflated. Four inch tires should be kept inflated to 70 pounds pressure.

Do not attempt to drive your car in crowded thoroughfares or "tight" places until you have thoroughly mastered its operation. Always keep your car under full control.

Study carefully the directions covering the starting of the motor and the car, the driving, the shifting of gears and the stopping of the car.

Study particularly the instructions concerning the correct handling of the throttle and spark levers for upon the correct handling of these depends whether you will obtain the maximum efficiency of the motor and the smooth, noiseless operation of the car and whether you will avoid the troubles which may arise from their incorrect handling.

The Care of a Motor Car

In the care and operation of an automobile, much must be left to the judgment of the operator, who should study the construction of his car and thoroughly acquaint himself with its mechanism, the functions of its various parts and the "why" of everything connected with it. Remember that the difference between a comprehensive understanding of your automobile and the superficial knowledge possessed by most owners and drivers is the difference between having troubles and not having them.

The old adage "A stitch in time saves nine" applies with special significance to the motor car. Intelligent care and proper attention will often correct a needed adjustment or lubricate a bearing that is becoming dry, but which if neglected, may cause serious and possibly expensive damage.

On the other hand is frequently found the user who is constantly tinkering with his car when there is no necessity for it. Avoid both extremes. If after seeing that all bolts, nuts and screws are tight, your car is running well, leave it alone. Many users drive their Cadillacs for months without touching a wrench to them. If something goes wrong and you are not sufficiently acquainted with the construction to know what the trouble is, don't experiment but take your car to someone who does know.

The care of an automobile may be boiled down to two important instructions—"Lubricate" and "Adjust." It will be readily understood that where one part moves or works upon another, there is always more or less friction and these parts must be oiled more or less frequently, including springs, shackle joints, connecting rod bearings, etc.

But do not stop with oiling only at the points mentioned. Look the car over carefully and you will find numerous oil holes, oil cups and grease cups. Remember that these are placed there for a purpose. THAT PURPOSE IS OIL. Oil holes frequently become stopped up. When they do, be careful not to overlook them.

Part two of this book gives detailed instructions regarding lubricating. Be sure to read and observe them carefully.

Great care is also necessary to see that all nuts, bolts and screws about the car are kept properly tightened. Most important parts subject to wear are, wherever possible, provided with adjustments for taking up such wear and these should be inspected occasionally and receive attention whenever required.

By far the greater portion of "automobile troubles" is the result of negligence and carelessness, while the reasonable care to which any piece of machinery is entitled, will insure long life and satisfactory service.

TO PLACE MOTOR AND CAR IN RUNNING CONDITION.

When a car is shipped from the factory, the gasoline and water are drained off, therefore before placing the car in use, the supply of gasoline and water should be replenished **The car should also be thoroughly lubricated in accordance with the instructions contained in this book.**

TO FILL THE WATER CIRCULATING SYSTEM.

Remove the cap from the top of the radiator and fill it with clean water. If the radiator has previously been drained, it is advisable after the first refilling to run the motor two or three minutes so that the pump will cause the water to force all the air out of the entire system. It may then be found that additional water will be required to fill the radiator.

Make sure that the radiator is full or nearly so at all times. Otherwise, the water circulation may stop and cause the motor to heat and pound.

In cold weather a good anti-freezing mixture should be used. A 25 to 30 per cent solution of glycerine and water is very good for this purpose.

It is well to put in the anti-freezing mixture early in the fall or a cold snap may catch you suddenly and cause expensive damage.

TO DRAIN THE WATER CIRCULATING SYSTEM.

To drain the water, open the cock in the bottom of the radiator. On later cars the outlet is provided with a cap which should be removed for draining. Also on cars after the first thousand there is a drain cock from the fourth cylinder. This also should be opened.

CLEAN THE WATER STRAINER.

In the bottom of the radiator at the point where the rubber hose connection is attached, there is a conical gauze strainer to stop the passage of dirt, lint, etc. When this strainer becomes clogged, it naturally retards the passage of water, and may cause overheating of the motor. When this occurs, the strainer should be removed and thoroughly cleaned and replaced.

In the earlier 1909 cars this strainer was situated inside the rubber hose connection between the radiator and pump. To clean this strainer it will be necessary to remove the hose.

The strainer in the top of the radiator just below the filler hole cap should always be in place when the radiator is being filled. No amount of clogging in this strainer can affect the heating.

FAN DRIVING BELT.

The belt which drives the fan should be observed frequently to see that it is performing its duty. If the belt should become loose, it should be tightened by raising the fan by means of the adjustment provided. It may possibly be necessary to tighten it once or twice while the car is new. If the belt stretches sufficiently to permit the fan to strike the hose connection above it, a few links should be removed from the belt.

GASOLINE SYSTEM.

There are two gasoline tanks, the large main tank for regular use and the auxiliary for emergency. The auxiliary is inside the main tank which is located under the front seat. To fill these tanks, take out the left seat cushion, raise the seat board and remove the plugs from the tanks. Clean gasoline, strained through a chamois skin, should be used, as water, grit or lint will prevent the proper working of the carburetor.

Each of the gasoline tanks, the main and the auxiliary, is provided with a cock which opens the flow of gasoline to the pipe which carries it to the carburetor. Under ordinary conditions gasoline should be used from the main tank, holding that in the auxiliary tank for emergencies.

When the gasoline from the main tank has been exhausted and it becomes necessary to use that in the auxiliary or reserve tank, first close the main

tank valve so as to prevent all the gasoline in the reserve from running down into the main tank, then open the auxiliary tank valve.

In case the gasoline in the main tank is quite low and a very steep hill is to be surmounted it may sometimes be necessary to turn on the supply from the reserve tank. When the top of the hill is reached, close the valve of the auxiliary tank.

The gasoline tank is provided with a settling chamber on its under side to catch any particles of dirt or other foreign matter. The plug should be removed from the bottom of this chamber occasionally and the settlings drawn off.

GASOLINE FEED PIPE.

In the feed pipe which leads from the gasoline tank to the carburetor, there is a small settling chamber with a gauze strainer in it. This is to catch any particles of dirt or water that may be in the gasoline. It should be taken out about every thousand miles or oftener and cleaned. If it should become filled with dirt or water, any excess will then flow to the carbureor and prevent its working properly.

TO START THE MOTOR.

CAUTION.

Before starting the motor, always be sure that the control lever is in neutral position, and that the emergency (hand) brake is set.

If this precaution is not observed and the motor is started with some transmission gears engaged, the car is likely to start off without a driver.

On about one thousand of the first Cadillac "Thirties," the application of the emergency (hand) brakes also disengaged the main engine clutch. On later cars, this connection was abolished so that the clutch could be disengaged only by the use of the left foot lever and the use of the hand brake lever applied only the emergency (internal expanding) brakes.

The instructions in this chapter apply to cars in which the emergency brakes and clutch act independently and should also be followed by users in whose cars these two act in conjunction.

Place the throttle lever (the long one) about half way between centre (marked "C" on the sector) and its closed position just about where it is shown in the accompanying illustration, and place the spark lever directly over the throttle lever.

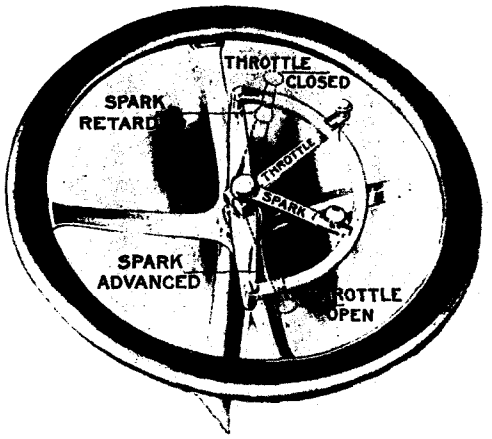


Fig. 1—Steering Wheel with Spark Lever and Throttle Lever.

Next prime the carburetor by means of the priming lever. This holds the needle valve off its seat and allows the gasoline to flow down into the carburetor. Then turn on the switch at the dash coil. The motor is now ready to start. This is done by means of the starting crank (in front, below the radiator). First push the crank in, then pull up on it, turning the crank to the right (in the direction of the movements of the hands of a clock). Do not push down on the crank as it makes it harder to turn, and should you have advanced your spark, a back kick would occur, which would endanger the operator. If you were pulling up with the spark advanced, the crank would be pulled out of your hands.

In cold weather, if the motor shows a tendency to slow down after starting, hold the primer open while the motor is running, for perhaps a half minute or until the motor gets warm.

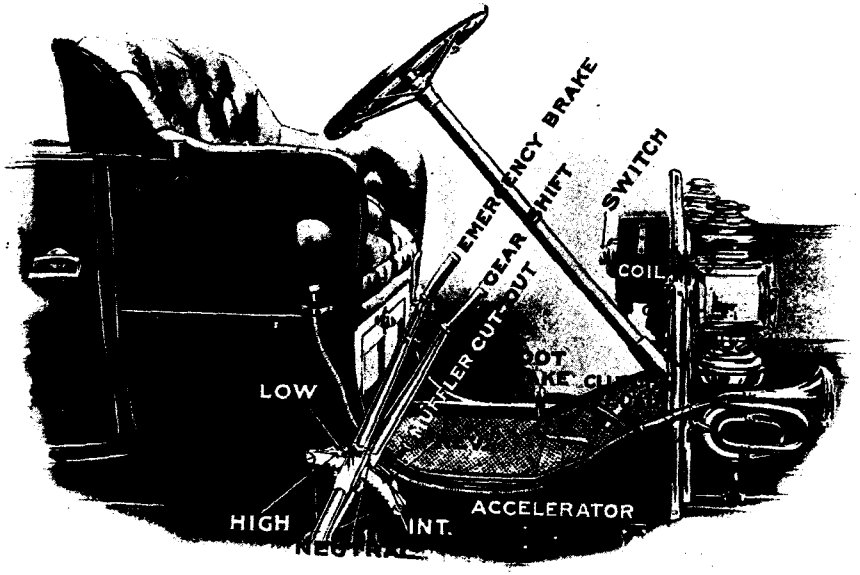


Fig. 2. Control Levers.

Note: The coil shown above is on 1909 models only. On 1910 models, only the switch is on the dash.)

Be sure to oil all moving parts occasionally.

TO START THE CAR.

See Fig. 2.

After having started the motor, take your seat in the car. First place your foot against the left pedal and hold the main engine clutch out. Then disengage the emergency brake by means of the hand lever, still keeping the clutch held out with the foot.

The slot in the quadrant within which the control lever travels resembles the letter "H" in shape. The four parts of this opening are marked, "Low," "High," "Rev" (reverse) and "Int" (intermediate).

Next, place the control or speed change lever in the section of the "H" plate which is marked "Low." Then let in the main clutch carefully by allowing your foot to come slowly toward you. After the car has gotten under way on low gear, then shift the lever into the section marked "Int" (Intermediate). After the car has gotten under way on intermediate gear then shift into "High" position.

If it is desired to start the car backward, the lever should be set in the section of the "H" plate marked "Rev" (reverse) and the clutch engaged slowly as before directed.

When it becomes necessary to shift down from high to intermediate gear a little care in the operation will avoid the grinding noise caused by the teeth in their effort to mesh when one gear is traveling at greater speed than the other.

In making the shift, disengage the main clutch by the left foot lever, then bring the control lever to neutral position and allow the main clutch to re-engage. Then disengage the main clutch again and **at the same instant** shift the control lever into intermediate position. Then allow the clutch to again engage. This whole operation can be performed in about five seconds,—in less time than it takes to read it. A little practice will enable the driver to make the shift so quietly that other occupants of the car would not know of it.

CAUTION—While it is mechanically possible to shift direct from low to high gear it is bad practice because it throws excessive strain on the gears and the motor. It is also bad practice to allow the main clutch to engage suddenly for the same reason as just explained. **The clutch should always be allowed to engage gradually.**

After the car has gotten under way, its speed should be controlled by the throttle and spark.

It will be noticed that there is an opening through which the control lever passes in being moved from one side of the "H" slot to the other. When the lever is in this opening, it is in the "neutral" position. In other words, the main engine clutch might be engaged and some of the transmission gears be running idle but would not be in mesh with any of the gears which connect with the rear axle.

As this is the selective type of transmission, the operator may shift from any gear to any other gear without "going through" another. It must be borne in mind, however, that the clutch must be disengaged by the left pedal before the gears can be shifted from one to another.

TO STOP THE CAR.

To stop the car—First disengage the main engine clutch by pushing forward on the left foot lever. Then apply the brake by the right foot lever. Next shift the control lever to the neutral position. THIS MUST BE DONE. Then apply the emergency brake by means of the hand lever. Now place the throttle lever (at the steering wheel) on the center "C" and the spark lever about half way between center "C" and the extreme position from you. Turn off the switch. By following these directions, the car is in the correct position to be started again.

TO START BY THE SPARK.

The motor may also often be started by the spark, that is without the necessity of cranking, frequently for some time after it has been stopped. To do this, place the spark lever about half way between centre ("C" on the sector) and the extreme position from you, and place the throttle lever on centre "C" on the sector. Then close the switch on the dash. If the vibrator works but the motor does not start, it will be necessary to crank it in the usual manner, for with the spark lever in the above position, the revolving contact point should be in contact with one of the contacting plates in the commutator.

ADJUSTMENT OF CARBURETOR.

See Fig. 3.

Carburetors are adjusted on cars before leaving our factory and ordinarily should not require re-adjusting very soon unless, perhaps, to meet different atmospheric conditions, such as change of altitude or temperature. These may usually be accomplished by slightly changing the amount of opening of the needle valve (22).

The carburetor should not be tampered with unless you know that it needs adjusting. Before changing the adjustments be sure that there is no dirt under the gasoline inlet needle valve (35) which would prevent its seating properly, and that there is no dirt around the needle valve (22). Also see that the float and the gasoline level in the float chamber is not too high. (Directions regarding this will be found further along in this chapter.) Also before changing any carburetor adjustments, be careful to see that the electrical system is in perfect order. See that the spark plug points are the proper distance apart (information regarding which is given under "Spark Plugs"). Also see that the spark plug porcelains are clean. See that the commutator is properly set, that it is clean, and in good working order. Be sure that your batteries are not run down. See also that all connections are tight and that the entire electrical system is in proper working order.

When it is certain that the carburetor requires adjusting, proceed as follows:—

First, close needle valve (22) and then open it three-quarters of a turn. Place the spark and throttle levers on steering wheel in the correct position for starting, and start the motor. Allow the motor to run several minutes until air intake pipe between the exhaust pipe and carburetor is warm its entire length. Then close the throttle and place the spark lever in the extreme retarded position. Set the adjusting screw (19) so that the motor will run about 250 revolutions per minute with spark and throttle levers in this position.

Next, close needle valve (22) a little at a time until motor begins to miss, due to a "lean" mixture. Then open the needle valve a little at a time until the motor again fires regularly. After this adjustment has been correctly made, needle valve (22) **should not again be moved during the carburetor adjustment.**

Next, with the throttle still closed, pull the spark lever on the sector to "C" and speed the motor up to about 500 or 600 r. p. m. by pulling the throttle lever down a little. Now with a pencil slightly depress the leather air valve (7). If the motor speeds up, it indicates that the spring (8) is too stiff. This should be weakened by loosening the lock nut (11) and slightly unscrewing the nut (10), being sure to again lock the lock nut (11), after the adjustment has been properly made.

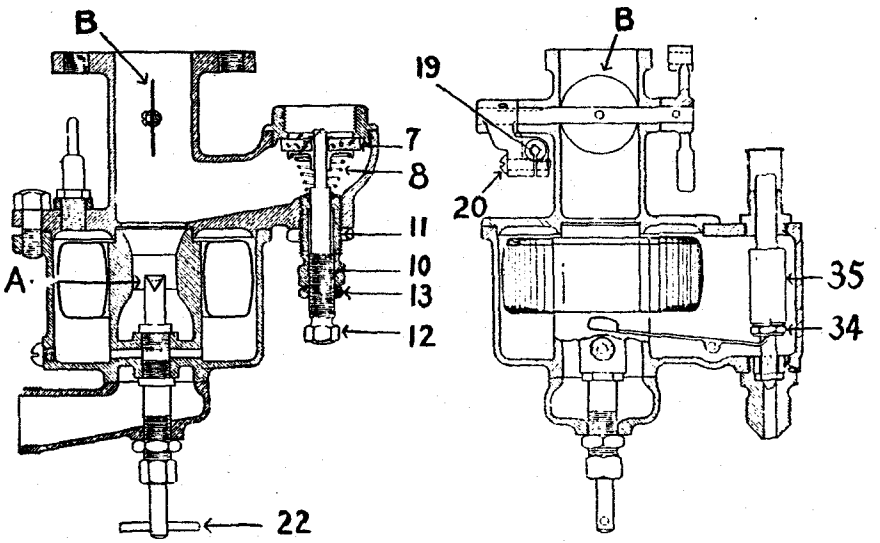


Fig. 3.

Carburetor.

If, on the other hand, the motor slows down immediately upon holding the leather air valve down slightly, it indicates that the spring (8) is too light. This may be made stiffer by loosening the lock nut (11) and screwing up on the nut (10), being sure as before to lock the lock nut (11).

When the tension of the leather air valve spring (8) is correct and the leather air valve (7) is slightly depressed, no change will be noticed in the speed of the motor for a few seconds and then it will begin to run slower.

With the adjustments made for low and intermediate speeds, next consider high speed. With the spark lever still on center, open the throttle wide, having previously loosened the lock nut (13). Screw the nut (12) first down until the motor slows up because of too much air. Then up until the motor speeds up and beyond until motor slows up very slightly. Then lock the nut (13). By cutting the air down to a point a little less than seems to give the highest speed when motor is running idle, it will be found that the motor will pull and "pick up" better, although the car may not run quite so fast as it would if the carburetor were given a little more air.

CAUTION: The motor should never be allowed to run idle with spark at or near center and the throttle open longer than absolutely necessary to make this adjustment.

In very cold weather it may be found necessary to slightly increase the opening of the needle valve (22) if the adjustment has been made in a warm place.

After very long service, there may be a slight amount of wear at the point of the needle valve and its seat. When such wear does occur to any extent it may cause the gasoline level to rise. If worn sufficiently it will cause the gasoline to overflow out of the spraying nozzle and then out of the bottom of the carburetor. When this occurs the gasoline level should be adjusted as directed in this chapter.

An adjustment has been provided for the needle valve, which admits the gasoline to the float chamber. The weight (35) on this valve should be so adjusted that the gasoline level will be maintained in the float chamber at a point so that the gasoline will not run out of the spraying nozzle. The best action will be obtained when the chamfered portion in the top of the spraying nozzle is about half filled with gasoline as shown by dotted lines at (A), or it may be as much as 1-32 inch below that point. The adjustment will not have to be altered excepting when the needle point or needle seat becomes badly worn.

If gasoline runs out of the carburetor after the motor has been standing, it indicates one of two things. Either there is dirt under the gasoline inlet needle or the float is not properly adjusted. In the latter case the gasoline level should be lowered by adjusting the float as above directed.

A warm air pipe is provided, running from the exhaust pipe of the motor down to the air inlet of the carburetor. This is for the purpose of assisting the vaporization of the gasoline at extreme low speeds and is beneficial at all speeds in cold weather.

For extreme high speed work such as track racing, it is well to remove the warm air pipe entirely. When the pipe is removed, the auxiliary air valve "7" should be adjusted so that it will leave its seat about 5-32 to 3-16 of an inch and the gasoline inlet valve "22" should be opened to give a correspondingly increased amount of gasoline for high speed work. This can best be determined and regulated by actual fast driving.

Gasoline

The gasoline obtainable in different parts of the country varies to a greater or less degree, hence it is manifestly impossible to adjust a carburetor at the factory with one grade and have it equally efficient with another. Some gasoline tests as low as 60 and other tests as high as 82 to 86. The adjusting at the factory is usually done with an intermediate grade. When the higher grades are used, the carburetor efficiency will be **increased** by slightly **decreasing** the supply furnished to the carburetor. When a lower grade is used, the carburetor efficiency is **increased** by **increasing** the supply. In other words, the higher the grade or test of the gasoline, the less the quantity required. The supply to the carburetor is, as before explained, regulated by the adjusting screw, 22.

Again. Upon the grade of gasoline used depends the amount of spark advance the motor will stand. The lower the grade of the gasoline the greater is the spark advance required. The higher the grade of the gasoline the less the spark advance permissible. This is because the higher grades of gasoline gnite more quickly than the lower.

COMMUTATOR AND SPARK COILS.

(For Delco and Magneto Instructions, see makers special Instruction Book.)

In case of trouble with spark coils, Delco apparatus or magnetos, which you are unable to correct, or when repairing is required, do not send them to us, but correspond with the manufacturer, whose name and address will be found on the part.

When batteries require recharging, do not send them to us but send them to some station near you which is equipped for that work.

Each unit of the spark coil is adjusted by means of a knurled headed adjusting screw. The contact points, one of which is on the vibrator spring and the other on the under side of the bridge, are made of platinum. The contact point on the bridge should be directly above and in line with the one on the vibrator spring. Neither of them should extend out past the edge of the other.

These points may sometimes become pitted and rough, causing poor ignition. In such cases the points should be smoothed down with a fine file or oil stone. They should then be re-adjusted.

Each coil unit should be adjusted so that it will give an even vibration and secure the proper working of the motor. The best way to determine this is by the use of an ammeter which should be connected in the primary circuit wiring. To do this, disconnect the battery wire from the coil, then connect the end of the wire with the positive pole of the ammeter and with an extra piece of copper wire, connect the negative pole of the ammeter with the binding post on the coil. Then by turning the motor, and as the four circuits are closed in rotation by the commutator, the ammeter will show the volume of current flowing to each unit. The volume of current is regulated by the adjusting screw. This screw should be turned down until the ammeter registers from .5 to .6 (five-tenths to six-tenths) of an ampere through each unit.

If the pointer in the ammeter swings backward instead of forward when the current is flowing, it indicates that the terminals of the battery wires—one of which wires runs from the battery to the coil and the other of which is grounded—have been transposed at the binding posts on the battery. They should be connected up correctly by attaching the ground wire to the negative pole of the battery and connecting the positive pole of the battery with the battery binding post of the coil.

How to Drive a Cadillac

Driving an automobile does not mean simply starting, steering, applying the brakes and stopping any more than playing a violin means simply drawing the bow across the strings. Pushing a wheel-barrow is one thing. Driving a more or less intricate piece of mechanism, like an automobile necessarily is to some extent, and doing it right is quite another. To properly drive an automobile requires an understanding of the principles involved and the exercise of some intelligence and judgment.

We believe we are safe in saying that with properly designed and correctly built automobiles, 95 per cent. of so called troubles are directly traceable to abuse, carelessness, a lack of understanding of the principles involved and improper handling generally.

Some drivers seem to think that so long as the car "goes" that that is all there is to it. It is not.

Our object now is to endeavor to make clear a few points which some owners and drivers do not appear to fully comprehend, or which if they do, they seem to totally ignore.

Taking it for granted that you have properly started the car as previously directed in this book, we will here deal more particularly with the handling of the throttle and spark.

To begin with, the driver should thoroughly understand what is going on inside the motor, and how, and why. If he understands these he is better able to realize why certain things must be done and why certain other things must not be done if he is to obtain the most satisfactory results, the greatest efficiency and the greatest economy, together with durability and long life of the motor and of the car. Not only these, but if proper care in operating is not exercised, serious damage is almost sure to occur, for which the car itself is in no way to blame.

A few words of explanation here will prove of advantage to those who may not be familiar with the principles of a gasoline engine and what makes it "go."

The Cadillac motors are of the four-cycle type, that is, there are four movements or strokes of the pistons and two revolutions of the fly-wheel to complete each power-producing cycle.

The gasoline flows from the tank down to the carburetor. The carburetor is the instrument, by the action of which the gasoline is mixed with air and transformed into vapor or gas. This gas is then drawn through the intake pipes and through the inlet valves into the cylinders of the motor, where it is ignited by the electric spark and is exploded.

The quantity of gas supplied to the motor is regulated by the throttle lever at the steering wheel (the throttle lever is the longer of the two).

Drawing the throttle lever toward you increases the supply of gas supplied to the motor and consequently increases the power and speed of the car. Pushing this lever from you, toward the front of the car, decreases the supply and consequently reduces the power and speed of the car.

The action of the motor is as follows:

Starting, we will say, with the piston up, that is at its highest point in the cylinder, it first goes down. As it does so, the inlet valve opens and through this valve a charge consisting of a volume of gas is drawn into the cylinder. This movement of the piston is called the suction stroke. Then the inlet valve closes and the piston goes up and compresses the charge. This is called the compression stroke. At the completion of this compression stroke, the electric spark is made at the spark plug. This spark ignites the compressed charge of gas and explodes it, driving the piston downward. This is what produces the force or power and is called the working stroke. Just before the piston gets to its lowest point the exhaust valve opens, then when the piston goes up again it forces the burned gas out through the exhaust valve. By the time the piston has reached its highest point it has forced out practically all of the burned gas and having completed the four operations, it is now ready to commence all over again by going downward and drawing in a new charge.

All four of the cylinders work in the same way but they do not all do the same thing at the same time. Counting from the front of the motor, while the first cylinder is on the working stroke, the second is compressing a charge, the third is exhausting and the fourth is drawing in a charge. The order in which the cylinders fire is 1, 2, 4, 3, etc.

On each of the 1909 and 1910 models of the Cadillac "Thirty" there are two complete and independent ignition systems. The car may be operated on either system, the change from one to the other being accomplished by means of the switch on the dash.

On the 1909 model the ignition was by storage battery and dry cells with induction coil on the dash. Magneto was furnished as an extra. Bosch and Splitdorf were the ones principally used.

On the 1910 model the ignition was by the Delco system with four unit coil attached to the motor, current supplied by dry cells. On the 1910 model a Splitdorf magneto was also supplied.

It will be seen that at the steering wheel there is a sector on which the outer ends of the throttle and spark levers rest. About midway on the sector is stamped the letter "C." This "C" means center—that is, when the motor is running slowly on the battery system and the spark lever (the shorter one of the two) is set at "C," the charges of gas in the cylinders are igniting just as the pistons reach their highest points. When the piston is at its highest position in the cylinder is, of course, the time when the charge is at its greatest compression, or, in other words, when the gas is "jammed in the tightest." The spark occurring exactly at this instant produces a much more forceful explosion than if it occurred at a time when the charge was not so tightly compressed. It is just the same as a gun. If the powder is rammed in tightly, the explosive force will be greater than if loaded loosely.

When the motor is running on magneto ignition, the spark lever is on "center" when it is at the extreme forward or upward position on the sector.

But now there is another consideration.

If the electric spark were produced the very instant the contact in the commutator is made, so that the charge of gas in the cylinder always exploded exactly at the moment the piston was at its highest point, regardless of the speed of the motor, then the spark could be set permanently in the one position and would not require changing. But such is not the case.

The current of the electricity which produces the spark is generated by either the storage batteries, by the dry cells for the Delco system or by the Magneto, depending of course upon which system is in operation.

This electric current does not flow continuously. There is a separate and distinct "spark" for each explosion, the current being "off" and "on" for each igniting process. This current circuit is closed and opened alternately by the commutator or distributor in whichever system the motor is running on.

A certain space of time is consumed from the instant the circuit is closed until the spark is produced at the spark plug in the cylinder. While this space of time is but the merest fraction of a second, in fact, almost infinitesimal, yet it is time just the same and must be taken into account when dealing with such a rapidly acting mechanism as an automobile motor.

The lapse of time required to produce the ignition is always the same, no matter whether the motor is running ten revolutions or a thousand revolutions per minute. The rate at which the piston travels, varies from the speed it travels when cranking the car, which is at the rate of 20 feet per minute, up to as high as a rate of 1200 feet per minute, or sixty times as fast.

You will now realize that when the motor is running at, say, 1000 revolutions per minute, the piston is naturally traveling many times as fast as it does when it is running only 50 or 100 revolutions per minute. Therefore this must be compensated for by arranging to start the igniting process long enough ahead of time so that the climax will be reached just at the instant when the charge of gas in the cylinder is most tightly compressed, which is when the piston is at its highest point. This is accomplished by what is called "advancing the spark" by means of the spark lever at the steering wheel. (The spark lever is the shorter one.) Drawing this lever toward you advances the spark and pushing it from you, toward the front of the car, retards the spark. The way this is accomplished is as follows: If you will examine the connections from the spark lever down through the steering post, you will find that they lead to the commutator. Drawing the spark lever toward you turns the commutator slightly so that the metal contact plates in the commutator meet the rotating point sooner, causing the primary circuit to connect enough earlier so that the coil mechanism will have time to act and produce the secondary current and spark so that the igniting process will reach the climax exactly at the instant the piston reaches its highest position or economical firing point. The explosion occurring at this particular instant gives the maximum amount of force or power for reasons which have been previously explained and consequently is desirable from a standpoint of economy in gasoline.

Just how much the spark should be advanced, or rather how much spark advance the motor will stand, depends largely on how fast it is running. The faster the motor is running, the more the spark should be advanced. Bear in mind constantly, however, that there is such a thing as overdoing it and advancing the spark too far. When this is done, the ignition takes place before the charge has been fully compressed and consequently the piston is obliged to overcome the expanded gases of the exploded charge before it can commence on its power delivering stroke. In such a case, if it were not for the momentum already gained by the car, the car would be driven backward.

Furthermore, when the spark is advanced too far, a slight pounding noise in the motor is the result. This pounding is sometimes not noticed by the beginner, as it is usually but slight, owing to the substantial construction of the crank shaft and its five bearings, and by the uninitiated it is often accepted as permissible.

Advancing the spark too far is very injurious because by it the bearings, crank shaft and connecting rods are required to withstand strains which are greatly in excess of those produced when the ignition occurs at the proper moment. It also causes overheating of the motor. This latter point will be taken up in detail further on.

Always retard the spark a few notches when suddenly opening the throttle, otherwise the motor will pound. As the speed of the car increases the spark may be gradually advanced to its correct position.

We have now covered the subject of advancing the spark and the results of advancing it too far. Next comes the subject of not advancing it far enough and the results.

When the spark is not advanced as far as it should be, it is called a "retarded spark." With a retarded spark the charge is not exploded until after the piston has reached its highest point and compressed the charge and has started again on its downward movement. Therefore, the gas will, to some extent, have expanded again, consequently, when ignited in this condition, the force of the explosion is materially reduced and therefore a great deal more fuel is required to produce a given amount of power than when the charge is exploded just at the right instant.

IMPORTANT—When starting the motor always be very careful to see that the spark lever is at "C" or preferably slightly retarded, that is, a little farther up on the sector. If this precaution is not observed and the spark should be advanced, that is, below the letter "C" on the sector, it would cause the charge in the cylinder to be ignited too early. This would result in the motor's starting in the reverse direction, carrying the starting crank with it. This is usually a painful experience to the operator. To avoid it, be sure to observe the foregoing directions.

A retarded spark and an open throttle will usually produce a slight rumbling of the gears on the crank shaft and cam shaft. This rumbling is caused by the uneven velocity of the gears and the uneven

velocity is due to the fact that a late ignition or explosion is so weak that the motor has a tendency to hesitate slightly before fully compressing the charge.

Again, with a retarded spark and a late explosion the combustion or burning of the charge of gas is not complete. This causes a great amount of carbon to be deposited on the walls of the cylinders, combustion chambers, piston heads, spark plugs, etc. It also causes the motor to heat to a much higher temperature, which causes a very severe action on the valves and valve seats. When the charge is ignited at just the right instant the combustion is practically complete, so that when the valves open a thoroughly burned charge passes out. On the other hand, when the charge is ignited late, the charge is still burning when it passes through the valve opening and tends to heat, burn, scale and causes pits on the valves and valve seats. In time, this creates a condition which prevents the valves from seating properly or fitting tightly and therefore a loss of compression, and a corresponding loss of power is the result.

There is still another most undesirable and detrimental condition which arises from the lack of proper spark regulation. For example:—

We have received two or three complaints in times past to the effect that the radiators boiled the water away and that it therefore becomes necessary to replenish the water supply every twenty or thirty miles.

In the three cases which we had occasion to particularly investigate the following was observed:

One was caused on account of the operator driving with his spark lever advanced altogether too far, consequently igniting the charge too early. This caused a slight knock in the motor, resulting in its heating much more than if the charge had been ignited to the proper time.

The second and more common cause of overheating is driving with a late spark, that is, not igniting the charge until after it had gone over the compression and started to expand again.

The third complaint was made because, as the complainant expressed it, "soon after the car was started the water run out of the overflow pipe and some water and vapor came out around the filler cap." This caused the user to conclude that the radiator was not adequate, because when he removed the filler cap and "looked into the top of the radiator the water was down quite a ways."

The facts are these, when the radiator is filled to the limit, usually from city water pipes or a well, the temperature of the water is much lower than that of the atmosphere and perhaps from 125° to 150° lower than it afterwards becomes when the motor is running normally. It is one of nature's laws that if a receptacle is filled to the limit of its capacity with liquid at a low temperature, and the temperature of the liquid be then raised up to or nearly the boiling point, some of the liquid is bound to overflow and that when the liquid is allowed to cool again to the same low temperature that it was at first, the receptacle will not be full. In other words when the temperature of liquid is changed, its volume or bulk also changes. When heated it expands, and when cooled it contracts.

In the top of the radiator there is a baffle-plate or distributing plate, which has many small holes in it. The function of this plate is to prevent the liquid from passing through only a few of the center tubes, which would allow that in the side tubes of the radiator to become stagnant and consequently would not carry off their portion of the heat. The baffle-plate distributes the

liquid evenly through all of the tubes of the radiator so that the latter will be utilized to the limit of its efficiency. The baffle-plate is exposed when the radiator lacks from a pint to a quart of being full. When the baffle-plate can be seen from the filler hole, some operators get frightened and think that the radiator is nearly empty. The fact is, however, that the amount of liquid that is thrown out because of the expansion and slopping has about ceased and that the only liquid which is lost afterward is that which evaporates. If the motor is properly controlled, the car can still be run quite a distance on the supply of water in the circulating system. The length of time that this water will serve will vary according to the conditions of the road and weather. When using only water for cooling, the radiator is usually completely filled and when the expansion, owing to the heat, takes place, about a pint or a little more is thrown out. However, when using a more expensive cooling medium, such as some anti-freeze compound, in cold weather, it is desirable to fill the radiator only to within a pint or a pint and a half from the limit of its capacity.

Now the question which no doubt presents itself to you is:

In what positions should the spark and throttle levers be carried to obtain the best results? No set rules can be laid down because there are so many different conditions which must be taken into account. The correct relative positions of the spark and throttle levers depend, first, upon the condition of the car itself in general and whether or not it is in good running order. They depend also upon whether the carburetor is correctly adjusted, and they depend on whether or not the commutator itself is timed correctly. The condition of the road, whether smooth, rough, muddy or sandy; whether up hill, down hill or on a level; the weight of the load; whether going with or against the wind, especially if the car is equipped with a top, all have more or less influence.

Where the roads are rough or heavy, or when climbing a hill or with a greater load, or against the wind (if the car has a top), it would be found necessary, in order to obtain the same speed, to increase the charge of gas by opening the throttle somewhat more, the exact amount depending on the increased labor the motor is obliged to perform.

To sum it all up, in order to obtain the greatest efficiency and at the same time the greatest economy of fuel, the car should be driven with no more throttle opening than is necessary, but with the greatest spark advance which the speed of the motor will permit, always being careful, however, to avoid advancing the spark too far.

TO COAST.

To coast on the level, simply disengage the main engine clutch by means of the left foot pedal.

When descending a grade, a good method is to close the throttle and retard the spark and allow the engine to do the "holding back" as much as possible. This saves much wear on the brake band linings.

When descending grades up to four or five per cent., the resistance offered by allowing the car to drive the engine when "high speed" or "direct drive" is engaged is usually sufficient to control the speed. When the engine does not offer sufficient resistance the speed may be further checked by applying the foot brake.

When it is necessary to descend a very steep grade it is best to engage the intermediate or possibly the low speed gears **before commencing the descent,** and if the resistance of the motor thus obtained is not sufficient, supplement it by the foot brake.

On the first thousand 1909 Cadillac "Thirties," when the engine is used for resistance in coasting, only the foot brake can be used to supplement because applying the hand brake would disengage the clutch. On later cars, however, either brake may be used. Bear in mind that the more the resistance of the motor is used in coasting the longer the brake band linings will wear and the brakes retain their adjustment.

The principle of this method will be understood when you realize that the same combination of gearing which changes the ratio between the engine shaft and the rear axle, which makes it easier for the engine to drive the car, will when the car is compelled to drive the engine, have exactly the opposite effect, which is the case when the above method is used in descending a hill.

ADJUSTMENT OF ENGINE BEARINGS.

Do not neglect the crank shaft and piston connecting rod bearings. A slight knock or pound in the engine may sometimes be caused by a looseness in these bearings and they should always be kept properly adjusted. They are accessible by removing the hand hole covers from the crank case.

To adjust the connecting rod bearings, first loosen the Columbia lock nut and turn up the connecting rod bolt until it is quite tight. Then retighten the Columbia lock nut. The bearing will now probably be so tight that the crank shaft will not turn freely and should therefore be loosened. To do this, simply back off on the bolt and at the same time turn the Columbia lock nut in the same direction you are turning the bolt. The bolt should be backed off just sufficient to permit the crank shaft to revolve freely.

There are five main crank bearings, one at each end and three intermediate bearings between. It will be observed that the five main bearings are provided with liners. These are small pieces of metal which are placed between the two halves of the bearings. To tighten the main bearings, new liners of less thickness should be substituted. Each liner is stamped, showing its thickness in thousands of an inch, thus .180. We make these liners in a number of sizes with a difference of .001 of an inch between each size, therefore when new liners are necessary, they should be replaced with those which are sufficiently

smaller than those taken out to make the correct adjustment, yet should be thick enough so that the bearings may be brought up against the liners without pinching the crank-shaft. Liners in the bearings are not all the same size, so when you have occasion to take them out, be sure not to mix them and be sure to keep track of where each one was taken from.

The thickness of a liner may be reduced with a fine file, but this should never be attempted excepting by someone who thoroughly understands how to do it, as any inaccuracy in the work may prove disastrous to the bearings.

To adjust a main bearing remove the cap and replace the liners with thinner ones indicated by the figures stamped thereon. Replace the cap and tighten with the nuts.

Frequently a very slight adjustment may be made on the first occasion after changing the liners by simply tightening the nuts without again putting in new liners.

The bearings should be adjusted one at a time being careful to see that each is just right before proceeding to the next. While the adjustment should be close, at the same time it should be just free enough to permit the crank to turn without any bind. A bearing that is too tight will probably be burned out.

There are three ways of testing to see that a bearing is not too tight and it is well to apply all three tests.

First, after making an adjustment, pull up on the starting crank just enough to compress the air in one cylinder but do not turn it clear over. Then relax on the crank and the compression should throw it back.

Second, the bearing should be sufficiently loose so that with the point of a screw driver inserted between the end of the top half of the bearing and the cheek of the crank you can move the top half of the bearing back and forth with only slight pressure.

Third, the bearing should be sufficiently loose so that you can take hold of the fly-wheel and turn it back and forth without there being any perceptible bind.

BRAKES, (A. B. B. AXLE).

There are two sets of brakes. One set expands inside the drums on rear wheels and is applied by a hand lever at the side of the car. The other set contracts upon the rear wheel drums and is applied by the right foot lever. On the first thousand Cadillac "Thirties" application of hand brakes automatically releases the main clutch, disconnecting the motor from the transmission. On later cars the main clutch and hand brakes are operated independently.

When the brake band linings have become worn to some extent, it may be necessary to tighten the bands.

To adjust the external brakes, simply take up on the pull rods which connect the brake band lever arm with the equalizing bar.

To adjust the internal brakes, take up on the pull rods which connect the lever arms on the rocker shafts with the small equalizing bar.

To make these adjustments it is necessary to take out the cotter pins and pins which hold the yokes on the ends of the pull rods in position, then loosen the lock nuts and turn up the yokes. Then replace and tighten with the lock nuts.

If the brake bands become dry and grip the brake drums too severely, it is a good plan to put a little graphite mixed with oil on them once in a while.

In taking up on the pull rods be sure to take up on both approximately alike.

Be sure to oil all the working joints of the brake parts occasionally.

Do not forget to apply some lubricant occasionally to the ends of the large equalizing bar where they move in the frame.

When brake bands and brake drums are wet or muddy they are less effective than when in proper condition. Therefore when necessary to make a sudden stop under such conditions it is well to apply both the service and emergency brakes.

WIRING.

The accompanying diagram shows the plan of wiring on the Cadillac "Thirty" when equipped with only the storage battery and dry cells. When magneto is used, additional wires are also used as shown in separate illustrations.

It should be understood that the illustration is distorted to some extent in order to enable the reader to more closely trace the wires without confusion.

To facilitate this explanation, the cylinders are numbered 1, 2, 3, 4, commencing at the front of the motor.

The contacting points in the commutator are numbered 1, 2, 3, 4, commencing with the one at your lower left.

The units of the spark coil on the dash are numbered 1, 2, 3, 4, commencing at your left AS YOU SIT IN THE CAR.

The primary wires which connect the contact plates of the commutator with the coil units are lettered A, B, C, D.

The secondary wires which connect the coil units with the spark plugs in the cylinders are lettered E, F, G, H.

To facilitate identification, the four primary wires are different colors, viz.:

A Red	C Black
B Brown or White	D Green

As will be seen by the diagram, these primary wire connections are as follows:

Primary wire A connects commutator contact plate No. 1 with coil unit No. 1.
Primary wire B connects commutator contact plate No. 2 with coil unit No. 2.
Primary wire C connects commutator contact plate No. 4 with coil unit No. 3.
Primary wire D connects commutator contact plate No. 3 with coil unit No. 4.

The connections of secondary wires which are lettered E, F, G, H, are as follows:

Secondary wire E connects coil unit No. 1 with cylinder No. 1
Secondary wire F connects coil unit No. 2 with cylinder No. 2.
Secondary wire G connects coil unit No. 3 with cylinder No. 3.
Secondary wire H connects coil unit No. 4 with cylinder No. 4.

The order in which the revolving contacting point in the commutator closes the circuit at the contact plates is 1, 2, 3, 4, but the wiring is such that the order in which they fire the cylinders is 1, 2, 4, 3, etc.

Current through commutator contact plate No. 1 passes through primary wire A, to coil unit No. 1, inducing a current through secondary wire E and fires cylinder No. 1.

Current through commutator contact plate No. 2 passes through primary wire B to coil unit No. 2, inducing a current through secondary wire F and fires cylinder No. 2.

Current through commutator contact plate No. 3 passes through primary wire D to coil unit No. 4, inducing a current through secondary wire H and fires cylinder No. 4.

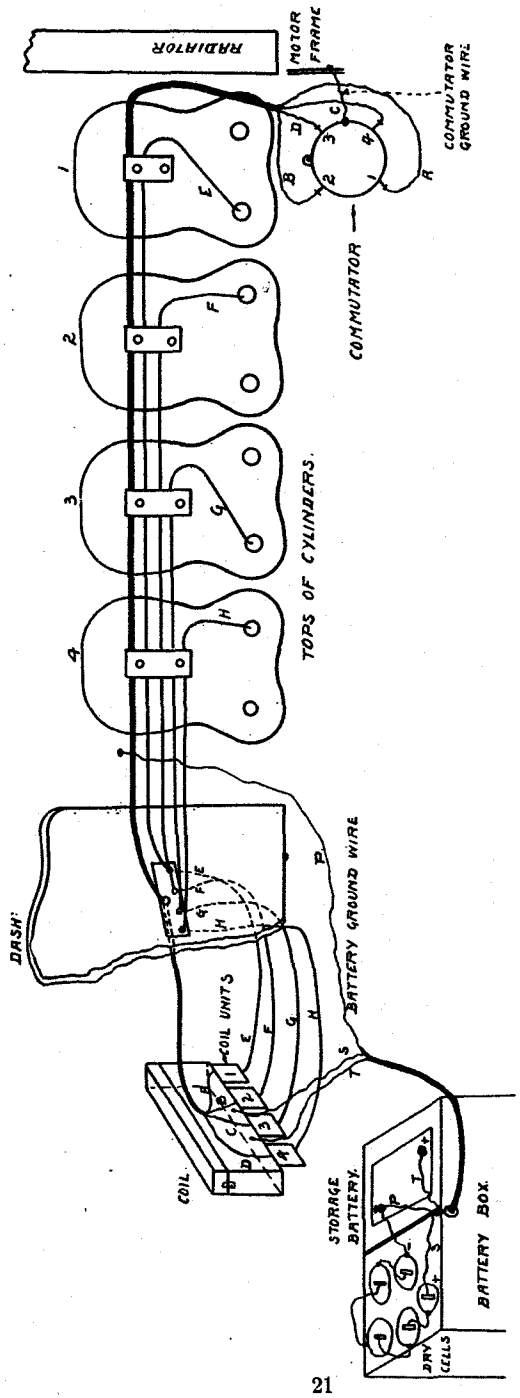


Fig. 4
WIRING FOR STORAGE BATTERY AND DRY CELLS.
1909 Touring Car.
(For Roadster and Demi-Tonneau wiring see pages 26-27.)

Current through commutator contact plate No. 4 passes through primary wire C to coil unit No. 3, inducing a current through wire G and fires cylinder No. 3.

The additional wiring necessary when car is equipped with magneto is shown on the following pages.

If from any cause the primary wires A, B, C, D, become so dirty that it is impossible to distinguish their colors and it should become necessary to disconnect them it will be advisable to attach a tag to the end of each, marking it so you will know to what coil unit or commutator contact plate it should be reattached.

If this precaution is overlooked, it will then be necessary to proceed as follows:—

First, disconnect the primary wires from the four coil units, also from the four contacts of the commutator.

Place the spark lever at the steering wheel about midway on the sector and remove the spark plugs, allowing them to rest on the tops of the cylinders, but leaving them connected with the secondary wires which connect them with the coil, and then turn on the switch.

Remove the forward cover from the side of the crank case so as to be able to see the position of the crank. Next crank the motor, bringing the piston in the forward cylinder (designated "No. 1") to the completion of the compression stroke. This position is in dead center—nearly one-half of a revolution of the fly-wheel after the inlet valve has closed.

Now having the wires disconnected from both commutator and coils first connect one primary wire with each coil unit. Next observe the position of the rotating point in the commutator, noting the contact plate with which said rotating point comes in contact. Now attach the primary wire from the first coil (the coil at the left as you sit in the car) to the terminal which connects with the contact plate with which the rotating commutator plate is contacting. To determine which one of the four primary wires is attached to the first coil, it will be necessary to test them in the following manner: Hold the metal terminal at the ends of the wires in contact with any part of the motor and the wire which causes the vibrator of the first coil to act and which causes a spark at the plug at the first cylinder, is of course the wire which is connected with the first coil, and is the wire which should be attached to commutator contact plate No. 1. The second, third and fourth wires are identified in the same manner. As the rotating plate in the commutator turns to the right (in the direction of the movements of the hands of a clock), the primary wire from the second coil should now be attached to the terminal following the one just connected. The wire from the fourth coil should be attached to the third terminal, and the wire from the third coil should be attached to the fourth terminal.

These directions may also be followed when putting in new wires.

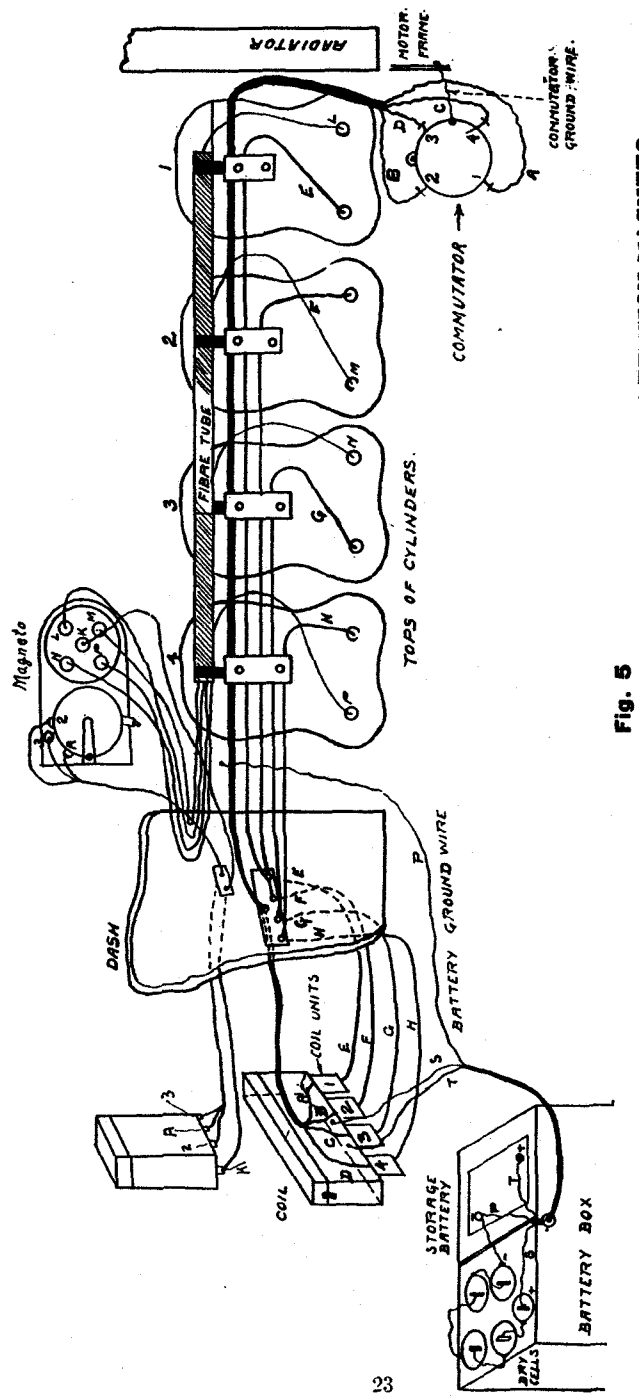


Fig. 5
WIRING FOR STORAGE BATTERY, DRY CELLS AND SPLITDORF LOW TENSION MAGNETO.
1909 Touring Car.
(For Roadster and Demi-Tonneau wiring see pages 26-27.)

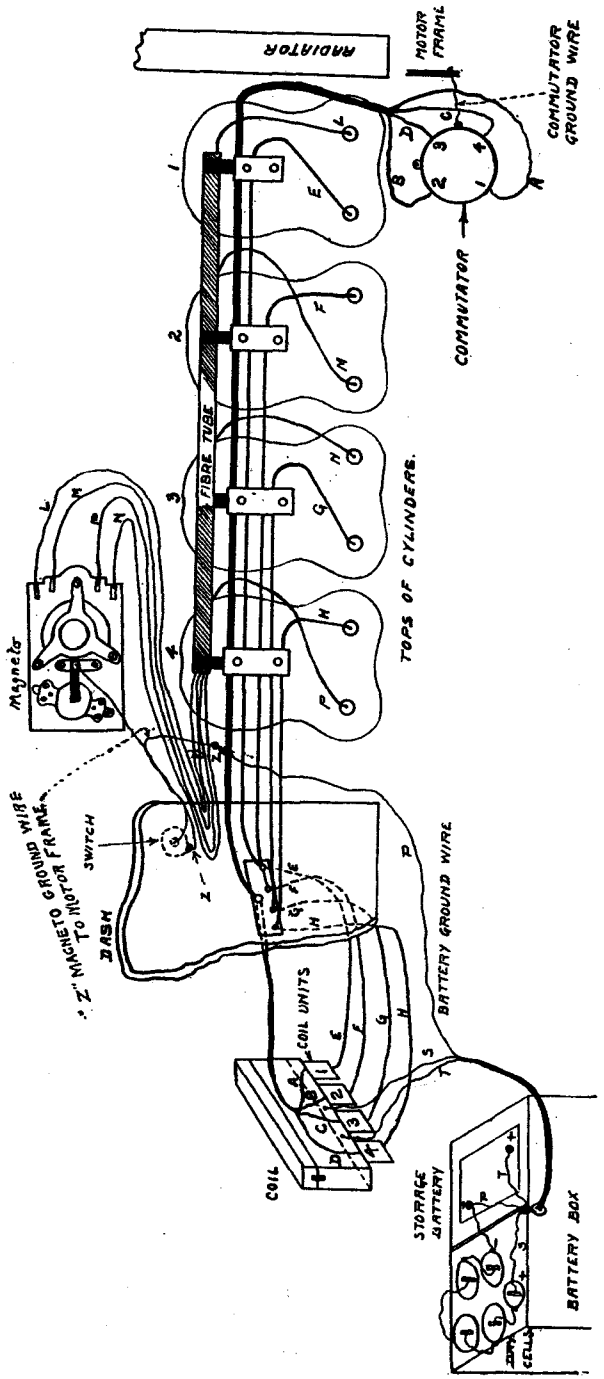


Fig. 6
WIRING FOR STORAGE BATTERY, DRY CELLS AND BOSCH HIGH TENSION MAGNETO.
1909 Touring Car.
(For Roadster and Demi-Tonneau Wiring see pages 26-27)

MAGNETOS.

Each magneto maker furnishes a special Instruction Book covering his particular type. Users should provide themselves with these books if they have not already done so, by obtaining them from said makers.

The following few suggestions will apply to magnetos in general but for detailed information you are referred to the maker's special Instruction Book.

In case of trouble with magnetos which you are unable to correct and about which you want special information, also in case of claims for defective parts or for the purchase of new parts, you are requested to write direct to the magneto maker.

When it is desired to install a low tension magneto on a Cadillac car after it has left the factory, it will be necessary to move the regular induction coil to the right. Holes in the dash have been provided for moving the coil about 2¾" to the right of its original position. These holes are plugged with brass screws which can be removed. By setting the coil to the right as just explained, it will leave room at the left for attaching the induction coil which goes with the magneto.

In equipping a car with a magneto, the armature should be so set that it is possible to get all of the spark advance that is required for fast driving and yet be set so that in its extreme retarded position it will fire either on center or possibly slightly in advance of center.

The connecting rods which control the magneto should be connected with the holes in the levers on the rocker shaft so that the full movement of the breaker box on the magneto will correspond with the full movement of the spark lever on the steering wheel.

All magneto bearings require oil occasionally but judiciously. They should have sufficient lubrication but too much is detrimental. The universal joints which form the connection on the driving shaft should also receive one or two drops of oil at the same time.

HOW TO DETERMINE WHETHER THE COMMUTATOR AND COMMUTATOR CONTACT POINT ARE SET CORRECTLY IN RELATION TO THE "C" ON THE SECTOR.

1st.—Open the cylinder relief or priming cocks.

2nd.—Turn the motor one-half turn after the inlet valve on number one cylinder has closed. (This is the second valve, counting from the front of the motor.) The letter "C" on the face of the fly-wheel should then stand at the top and in line with the centers of the cylinders. The piston will have reached its highest point of travel, the proper time for ignition to take place.

3rd.—Remove the cover from the commutator.

4th.—Retard the spark as far as possible.

5th.—Turn on the switch.

6th.—Advance the spark lever slowly. The unit No. 1 in the coil box should start vibrating just as the spark lever is opposite "C" on the sector and the contact point should now commence to contact on the plate in the lower left hand part of the commutator (as you are looking into it).

Commutators are set correctly when cars leave the factory and should not require adjusting unless some of the connections have been altered or bent. In case the action should be found not to be as above mentioned, the commutator should be adjusted by the means provided for same.

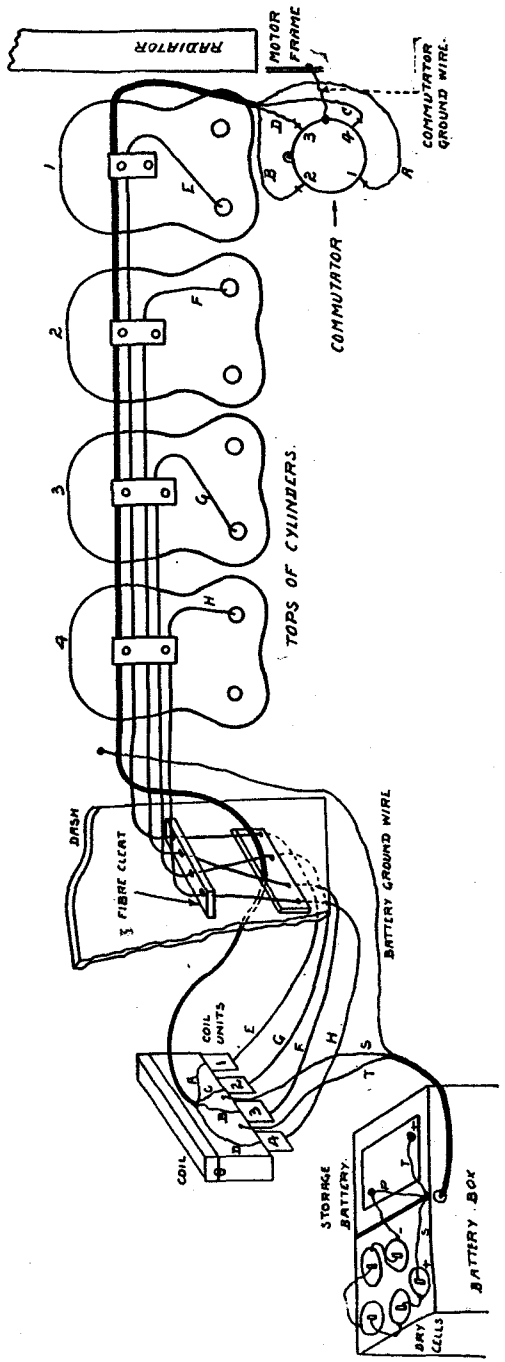


Fig. 7.
Wiring for Storage Battery and Dry Cells as used on 1909 Roadster and Demi-Tonneau.

WIRING FOR ROADSTER AND DEMI TONNEAU.

The diagrams on the preceding pages show the plans of wiring on the first 1500 Cadillac Thirties of all styles. After these, however, a slight change was made in wiring the battery and dry cell ignition system on the Demi Tonneau and Roadster types but not on the Touring Cars. No change in wiring was made in magneto ignition.

The change is shown in the diagram on the opposite page and is as follows:
Primary wire A connects commutator contact plate No. 1 with coil unit No. 1
Primary wire B connects commutator contact plate No. 2 with coil unit No. 3
Primary wire C connects commutator contact plate No. 4 with coil unit No. 2
Primary wire D connects commutator contact plate No. 3 with coil unit No. 4

The connections of secondary wires which are lettered E, F, G, H, are as follows:

Secondary wire E connects coil unit No. 1 with cylinder No. 1
Secondary wire F connects coil unit No. 3 with cylinder No. 2
Secondary wire G connects coil unit No. 2 with cylinder No. 3
Secondary wire H connects coil unit No. 4 with cylinder No. 4

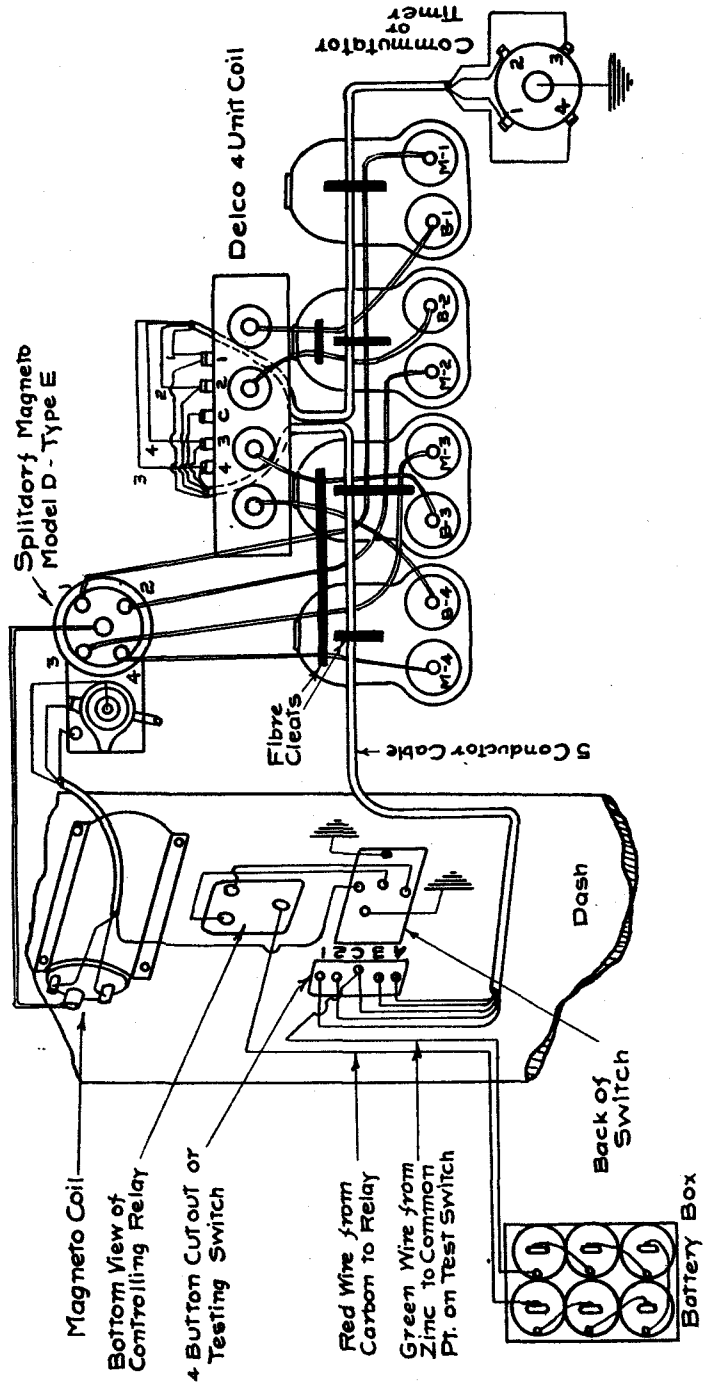
The order in which the revolving contacting point in the commutator closes the circuit at the contact plates is 1, 2, 3, 4, but the wiring is such that the order in which they fire the cylinders is 1, 2, 4, 3, etc.

Current through commutator contact plate No. 1 passes through primary wire A, to coil unit No. 1, inducing a current through secondary wire E and fires cylinder No. 1.

Current through commutator contact plate No. 2 passes through primary wire B to coil unit No. 3, inducing a current through secondary wire F and fires cylinder No. 2.

Current through commutator contact plate No. 3 passes through primary wire D to coil unit No. 4, inducing a current through secondary wire H and fires cylinder No. 4.

Current through commutator contact plate No. 4 passes through primary wire C to coil unit No. 2, inducing a current through wire G and fires cylinder No. 3.



WIRING DIAGRAM FOR DELCO SYSTEM AND SPLITDORF LOW TENSION MAGNETO AS USED ON THE 1910 CADILLAC.

SPARK PLUGS.

Spark plugs should be kept clean. When carbon or soot is permitted to collect on them, it causes a short circuiting of the current and prevents the proper ignition of the charge in the cylinder. A good method of keeping plugs clean is to wash them occasionally in gasoline.

In order to get the best results, the space between the spark plug points across which the spark jumps should be correct.

For the ignition systems used on the Cadillac "Thirty," these spark plug gaps should be as follows:—

J. & B. system, 1/32 to 3/64 of an inch.
Delco system, 1/32 to 3/64 of an inch.
Bosch Magneto, 1/64 of an inch.
Splitdorf Magneto, not to exceed 1/32 of an inch, preferably a little bit less.

TIMING THE VALVES.

The fly-wheel is marked as follows:

C meaning Center
I O meaning Inlet Opens
I C meaning Inlet Closed
E O meaning Exhaust Opens
E C meaning Exhaust Closed

Each of the above appears twice on the face of the fly-wheel. When a "C" is exactly at the top of the fly-wheel, it indicates that the crank shaft and piston are on "centre," that is, that two of the pistons are at their highest points and the other two at their lowest points.

The positions of the above mentioned letters on the fly-wheel are clearly indicative of the correct timing of the valves. There being four cylinders, the inlet and exhaust valves must be timed on each separately. As valves are all timed before the car leaves the factory, these instructions will be found adequate for such slight adjustments as may possibly from time to time be advisable.

For example: Take the forward cylinder. Turn the fly-wheel until the inlet valve begins to open. If it is correctly timed, the letters "I O" stamped on the fly-wheel will be exactly at the top under the pointer. If not, the valve should be timed so that it **will begin** to open when the letters are at the point mentioned. Now turn the fly-wheel in the direction that motor regularly runs, a little more than half a revolution, when the letters "I C" will appear at or close to the top. The inlet valve should be so timed that it will have **entirely closed** when the letters "I C" are at the top. Now take the Exhaust Valve. This should be so timed that it will **begin** to open just as an "E O" has reached the top of the fly-wheel and should be entirely closed just as "E C" on the opposite side has reached the top.

The adjustments of the inlet and exhaust valves are made by lengthening or shortening the valve lifting rods by means of the adjusting collars on the lower ends of same.

When the cam shaft gear and crank shaft gear have been disengaged for any purpose, it will be necessary, when reassembling them, to see that the tooth which is stamped "O" on one gear enters the space (between the teeth) which is stamped "O" on the other gear.

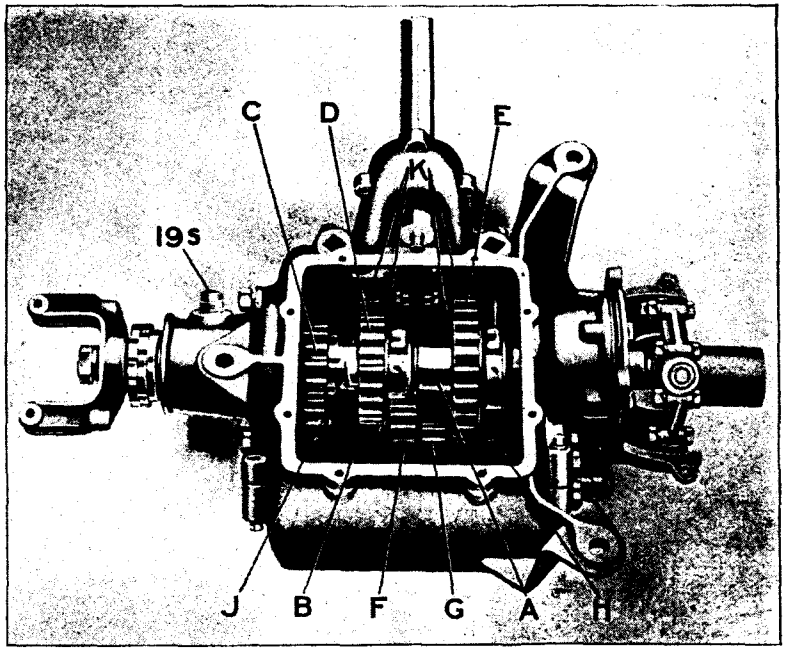


Fig. 8. Sliding Gear Transmission.

Keep sufficient liquid oil in transmission gear case so that the under teeth of the largest gear will enter into it their full depth. The best lubricant for this part is Cadillac Rear Axle and Transmission Lubricant, or, in its absence a mixture of cup grease and oil, mixed to such a consistency that it will not be so thick that the gears will simply cut a path in it but be just liquid enough to flow.

The transmission on the Cadillac is our selective type of sliding gear. The main transmission driving shaft "A," also the jack shaft "B," revolve on annular ball bearings.

There are three speeds forward and reverse. The speed changes are accomplished by means of a hand lever at the side of the car, the range of action being within an "H" shaped quadrant. The construction is such that a shift may be made from any gear to any other gear without "going through" a third.

The illustration shows the transmission in neutral position: that is, even with the motor running and with the main engine clutch engaged, it would not drive the car because the transmission shaft "A" and the driving shaft to the rear axle are not connected by the high speed clutch "J."

High speed is obtained by shifting the control lever so that the lugs at "J" interlock, thereby connecting the transmission shaft with the shaft which transmits the power to the rear axle.

Intermediate speed is obtained by shifting gear "D" into mesh with gear "F."

Low speed is obtained by shifting gear "E" into mesh with gear "G."

In reversing, gear "E" is shifted into mesh with the gear which is directly underneath gear "H."

When stopping the car, always be sure to shift the control lever to the neutral position.

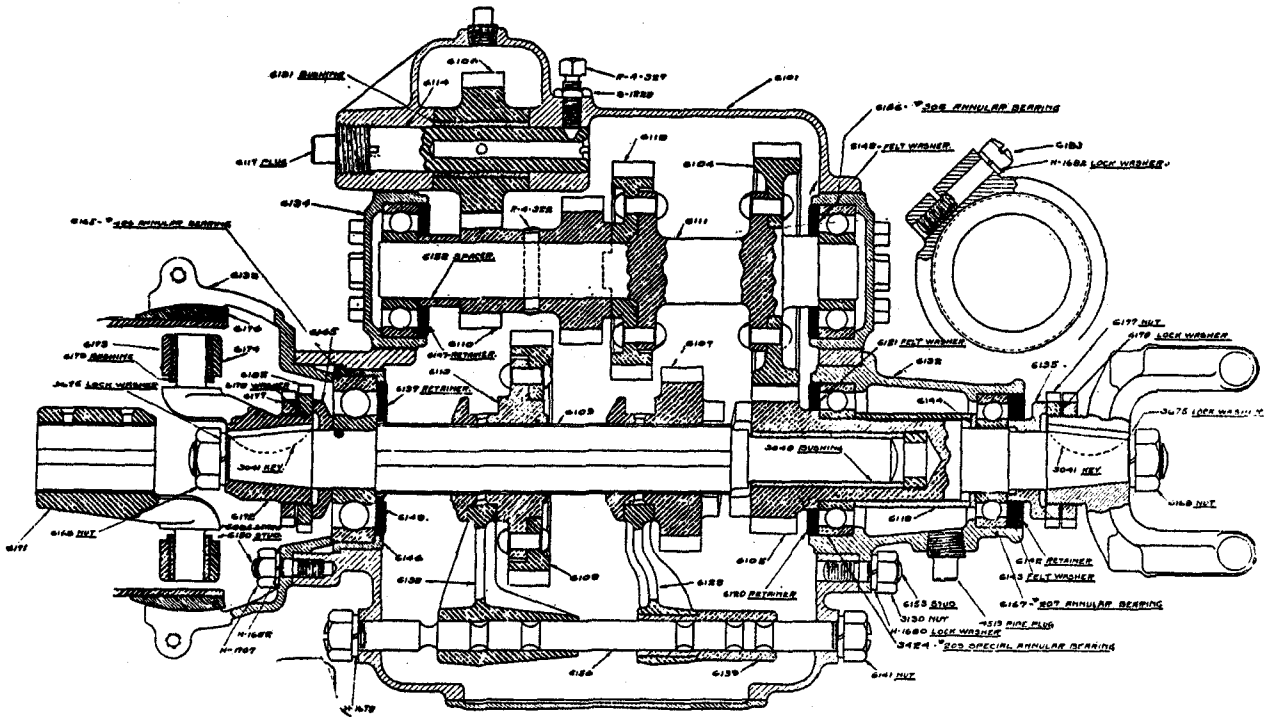
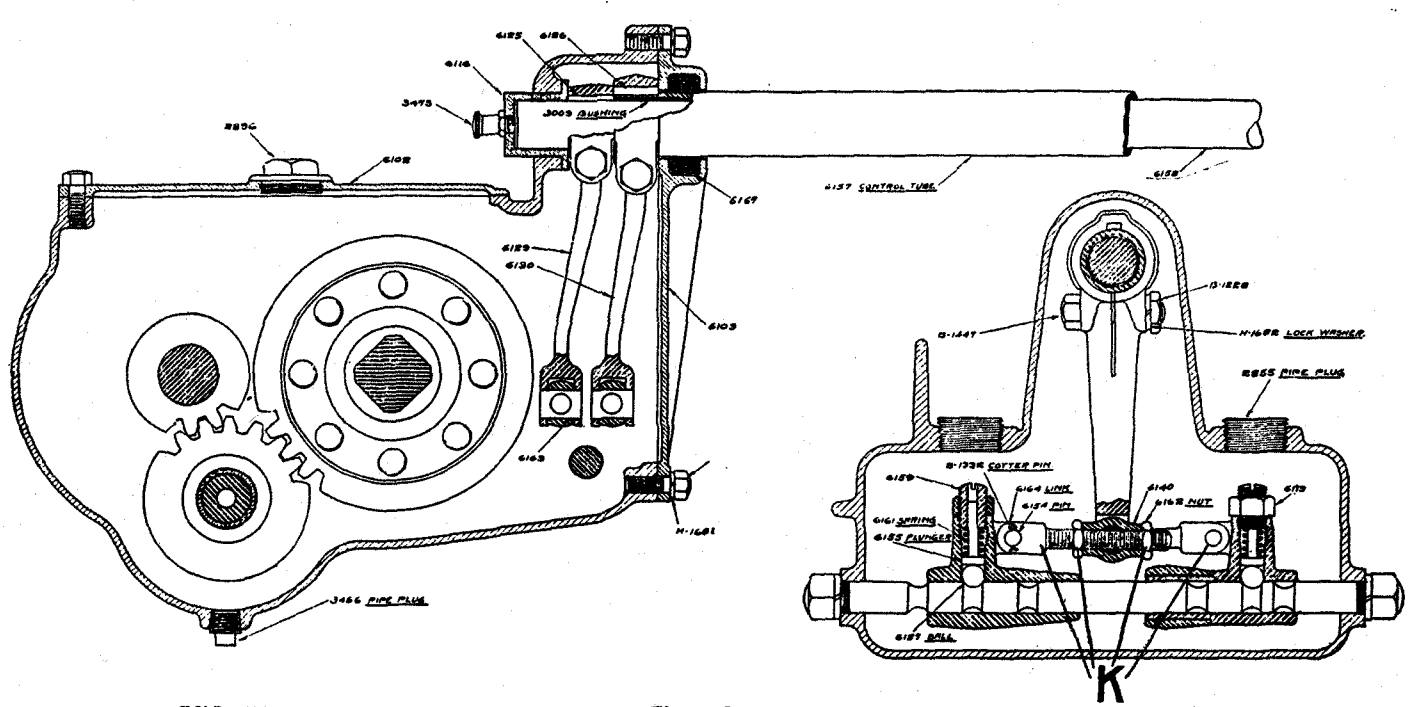


Fig. 9
SECTIONAL VIEW OF TRANSMISSION ASSEMBLY.



END VIEW

SIDE VIEW

Fig. 10
TRANSMISSION CONTROLLING MECHANISM.

ADJUSTMENT OF TRANSMISSION GEARS.

The teeth of the transmission gears should mesh so that the sides of the two gears in mesh will be flush or at least within 1/32" of being flush.

These gears are not liable to require adjustment unless some of the connections become bent or distorted by the operator's trying to shift gears without having the gear teeth in the correct position to mesh, or by some other improper handling.

If for any reason it becomes necessary to alter the position of the gears in order to make them mesh properly, first place the controller lever in the neutral position in the "H" plate. The gears should be so positioned that one does not rub against or interfere with another. Their position can be regulated by properly adjusting the shifting arms which are inside the transmission case. The adjustment for this is shown at "K."

CAUTION.—After making the adjustment just mentioned, be sure to see that the locking nuts are properly tightened.

ADJUSTMENT OF MAIN MOTOR CLUTCH.

See Fig. 11.

On the first thousand 1909 Cadillacs there was a connecting rod which disengaged the main motor clutch when the emergency (hand) brake was set. On later cars this connecting rod was omitted so that the clutch and brake are operated independent of each other.

After a car has been run for some time it may be found that the leather facing on the clutch has become compressed to some extent and consequently either permits the clutch to slip or to seat sufficiently far in the ring so that it allows the clutch pedal to come closer toward the driver.

To determine whether the main clutch (A) seats properly take hold of the left foot pedal and if you can move it back and forth an inch or more with only moderate pressure and without starting to release the clutch, the probabilities are that it is all right.

In case it is found necessary to adjust the clutch to seat more firmly, it is necessary to simply lengthen the stay rod which will be found beneath the universal joint that is just in front of the transmission. This rod may be lengthened by the adjustment provided for the purpose.

The clutch is held in its seat by means of the spiral spring (B) which is inside the hub of the clutch and encircles the shaft (C) on which the clutch revolves. If it ever becomes necessary to increase the tension of the spring in order to make the clutch seat more firmly, proceed as follows:

On the rear end of the shaft on which the clutch revolves, just in front of the forward universal joint, there are two hexagon head screws, one large and one small. The large one (D) is the adjusting screw which is hollow and is split at its inner end. The small one (E) is a locking screw which runs through the large one and has an expander (F) on its inner end (similar to the front wheel adjustment on single cylinder Cadillacs for the last two years).

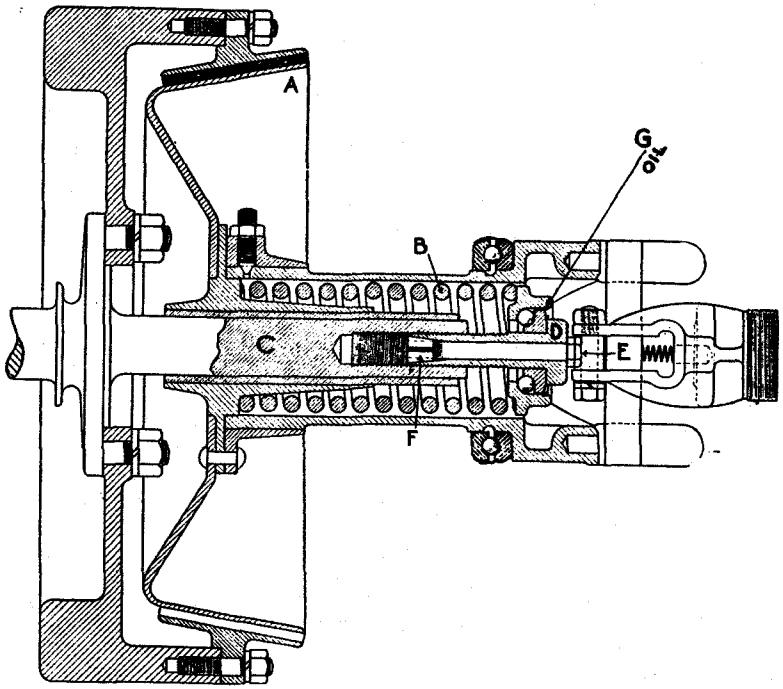


Fig. 11.

MAIN CLUTCH.

To tighten or increase the tension on the clutch spring, proceed as follows: First loosen the small hex head screw (E) three or four turns, then drive it in to loosen the expander (F). Now turn up the large hex head adjusting screw (D) four to eight turns and lock it again securely with the locking screw.

Both the left foot pedal which disengages the clutch and the right foot pedal which applies the service brakes may be adjusted to a certain extent to accommodate persons with different lengths of limbs.

To alter the position of the foot brake pedal, take up or let out on the pull rod which runs back from said pedal.

To alter the position of the clutch foot pedal, take up or let out on the hold back rod that will be found directly underneath the universal joint which is between the clutch and the transmission.

In altering the positions of either of these pedals, be sure not to alter them so much as to interfere with their proper action.

If after a car has been in use for some time it is found that the leather facing of the clutch has become dry and hard so that it does not "take hold" properly, it may be made more pliable by applying a little Neatsfoot oil. This, however, must be applied very sparingly as too much will cause it to slip and possibly burn out. Under no circumstances should any but Neatsfoot oil be used. An application only once or twice a season is usually sufficient to keep clutch leather in good condition. To apply the oil, disengage the clutch and revolve the cone with the hand, at the same time applying the oil through the slots in the clutch ring. Another method is to disengage the clutch and jack up one rear wheel of the car. Then with some of the transmission gears engaged and by turning the rear wheel, the cone will revolve. While it is revolving, apply the oil through the slots in the clutch rings.

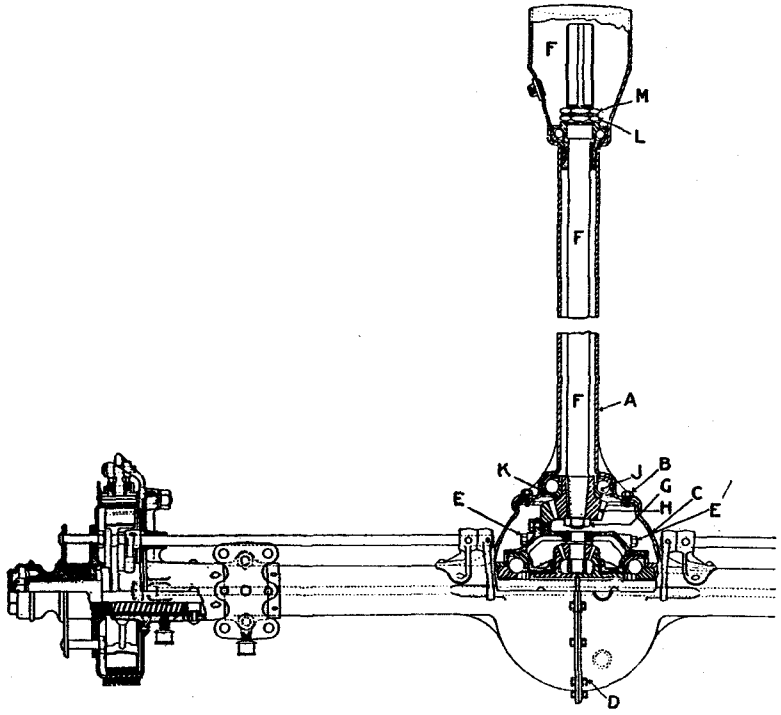


Fig. 12.

A. B. B. REAR AXLE AND DRIVE SHAFT.

The rear axle housing should always contain enough oil so that the large bevel gear will dip into it. To place the oil therein, remove the plug from the upper part of the housing. The first filling will require about one pint of oil. It is also advisable not to use too much. On all except the first few hundred cars another plug is provided on the underside of the sphere. When placing the oil in the housing, remove the plug from the underside of the sphere so that any excess will run out. The quantity of oil should be maintained on a level with the under plug. The best lubricant for this part is a mixture of cup grease and oil, mixed to such a consistency that it will not be so thick that the gears will simply cut a path in it but be just liquid enough to flow. The roller bearings in the rear axle out near the wheels should be kept properly lubricated through the oil cups.

BRAKES.

For directions for adjusting brakes on A. B. B. Axle See Page 19.

TO REMOVE AND REPLACE REAR AXLE.

1. Jack up rear end of car by placing jacks under the rear springs just forward of the rear axle. Or, where the facilities are at hand, it is a good plan to suspend the rear of the car.
2. Block up rear end of frame so that it will not sway.
3. Disconnect all brake pull rods at rear axle.
4. Remove the nuts which clamp the spring perches to the axle.
5. Roll rear axle with drive shaft and housing from under the car.

To install new axle, reverse the order of the above operations.

Care must be taken in installing the axle, also to get the brakes correctly adjusted.

(See Special Instructions for Adjusting Brakes.)

TO TAKE DOWN THE A. B. B. REAR AXLE.

See Fig. 12.

Remove rear wheels with wheel puller furnished with car and remove the keys which hold the wheels to the axle shaft. Remove the nuts (B) from the studs which hold the pinion drive shaft housing (A) to the axle housing (C). The pinion drive shaft, with its housing, may then be taken off. Next remove the bolts (D) which hold the two halves of the axle housing together and disconnect the strut rods under the axle. The housings may then be removed.

To take the two halves of the live axle apart, remove the three long bolts (E) which run through the gear mounts.

ADJUSTMENT OF BEVEL DRIVING GEAR AND BEVEL DRIVING PINION. (A. B. B. AXLE).

See Fig. 12.

The bevel driving gear and bevel driving pinion are placed in the correct relative positions when the car is assembled at the factory.

Provision is made for altering the position of both the bevel driving gear and bevel pinion. After long use, perhaps a season or so, it may be found advisable to readjust them. These directions will also apply when putting in new gears.

In all cases where our bevel gears are mounted together, the teeth of the two gears should mesh perfectly, that is, they should be practically flush so that they will run smoothly. The ends of the teeth of neither gear should set out beyond the ends of the teeth of the other gear, to exceed the one-hundredth part of an inch.

It is necessary that bevel gears be adjusted very carefully in order to have them run quietly. This is necessary regardless of how perfectly they may have been made. Bevel gears must be placed in such a relation to each other that the circular pitch of both gear and pinion are exactly alike.

CAUTION.—When it is found necessary to adjust the driving gear and driving pinion into closer mesh, it must be carefully determined whether the driving gear should be moved toward the driving pinion or whether the driving pinion should be moved toward the rear axle shaft, or both.

If it becomes necessary to move the large bevel driving gear either in closer mesh with or away from the bevel pinion, proceed as follows:

You will see that the large bevel driving gear is attached to the differential gear mount. On each side of the differential gear mount there is a ball bearing. Back of each of the cones of these bearings there are thin metal washers. Now to move the gear mount to the right and into closer mesh with the pinion, take off one or more (as the case may require) of the metal washers from behind the cone of the ball bearing on the right side of the gear mount and place said washers behind the cone on the other side.

To move the gear mount to the left, just reverse the operation.

If it becomes necessary to alter the position of the driving pinion either by moving it toward or away from the rear axle shafts, it may be done as follows:—

Assuming that the axle has been removed from the car, then disconnect the drive shaft housing (A) containing the shaft (F) from the axle housing as before directed.

Next, with a wrench, hold the squared end of the pinion shaft (F) to keep it from turning and remove the nut (G) which holds the pinion (H) on the end of the shaft. Then either with a lead hammer or by placing a piece of lead or copper against the lower end of the shaft and striking it with a heavy hammer, the shaft may be loosened from the pinion (H) and the latter removed The ball bearing cone (J) will come off with the pinion. Then in order to move the driving pinion closer to the rear axle shaft, metal washers may be put in between the cone and the shoulder of the pinion at (K). Next before replacing the pinion on the end of the shaft, be sure to back off on the adjusting nut (L) and lock nut (M) a turn or two, sufficient to compensate for the space taken up by the washers which were put in. Now replace the pinion and replace the nut (G).

After the pinion has been put on the taper end of the shaft and properly drawn up with the nut, the ball bearing adjusting nut near the squared end of the shaft should be tightened up until all of the backlash is taken out of the ball bearings on the pinion shaft. Great care should be taken not to get these bearings adjusted too tightly. Ball bearings can easily be injured by being adjusted too tightly, as one not thoroughly experienced in adjusting such bearings keeps tightening them even after the lost motion has all disappeared, because the bearing does not seem to run hard. It is a fact that destructive strains can be put through ball bearings even notwithstanding that they seem to turn quite freely. Bear in mind that in adjusting ball bearings the best possible condition is to adjust them so that the lost motion has just disappeared but that there is no strain between the bearings; nor should they be adjusted so that you can take hold of the shaft and feel lost motion, or at least, not more than one or two thousandths of an inch.

IMPORTANT NOTICE.—Bear in mind that if for any reason either of the bevel gears are replaced by another with a different number of teeth, it will be necessary to replace the other gear also with one having teeth of the proper angle to correctly mesh with the new gear.

INSTRUCTIONS FOR ASSEMBLING COMPENSATING GEARS ON INNER ENDS OF LIVE AXLE SHAFTS (A. B. B. AXLE.)

The utmost precaution must be exercised in every detail in assembling these gears and shafts to insure perfect fits. It is merely necessary to realize that the shearing strain on the key amounts to several tons to apprceiate the absolute necessity for extreme precaution.

The key-way in both shafts and gears are made parallel and to close limits. The steel keys must be a tight fit sideways in both the shaft and gear and should be sufficiently free on the top side under the gear to prevent any tendency toward the bursting of the gear.

On the inner end of each of the live axle shafts there is a bevel gear which meshes with the beveled differential pinions. Back of each of these bevel gears is a fibre washer which holds said gears in mesh with the pinions. If these washers should become worn to such an extent that they allow too much play of the bevel gears and pinions they should be replaced by washers of sufficient thickness to take up the play.

TO REMOVE THE REAR WHEEL, (A. B. B. AXLE).

First remove the hub cap, then remove the cotter pin from the slotted hex nut and take off the hex nut. Also remove the key which holds the wheel to the axle. A wheel puller should always be used to remove rear wheels from axle.

In replacing the rear wheel, first oil the end of axle shaft to prevent rusting, then start the key and wheel on the shaft. Put on the slotted hex nut, forcing the key and wheel on, and turn the nut up tight and be sure to lock it with a cotter pin as provided. Then put on the hub cap with spanner wrench.

IMPORTANT—When replacing rear wheels always be sure to secure the slotted nuts with cotter pins.

TO REMOVE FRONT WHEEL AND ADJUST BEARINGS.

To remove front wheel first take off the hub cap. Then unscrew the locking cap screw which enters the end of the spindle, just a few turns. Drive this cap screw in lightly, then unscrew and remove the knurled headed adjusting screw and the wheel can be drawn off bringing the adjusting cone with it.

When replacing the wheel, see that the stationary cone is in position against the shoulder of the spindle. Then slip on the wheel, then the adjusting cone. Screw in the knurled headed adjusting screw with the locking cap screw in it, turning up said knurled headed adjusting screw with the fingers until it can be felt that the adjusting cone touches the balls. Then tighten the adjusting cap screw firmly with a wrench. Be careful, however, not to strip the threads or it may come loose.

In adjusting the front wheel bearings, they should be loose enough to allow the wheel to be turned easily yet not loose enough to permit more than a mere trifle of side play.

Front wheel bearings should be lubricated two to four times a year by packing them with heavy cup grease. It is necessary to remove the wheels to do this.

Timken

REAR AXLE AND DRIVE SHAFT.

See illustration, Page 43.

The driving gear housing should always contain enough oil so that the large bevel driving gear will dip into it. To place the oil in the housing, remove the two plugs and insert the oil through the upper hole. The lower hole is to allow any excess to run out. The oil supply should be maintained on a level with the under plug. It is advisable not to use too much.

The best lubricant for this is Cadillac Rear Axle and Transmission Lubricant, or, in its absence a mixture of cup grease and oil, mixed to such a consistency that it will be just liquid enough to flow. If it is too thick the gear will simply cut a path in it and the lubricant will not flow into the bearings properly.

The bearings in the axle out near the wheels should be lubricated every two or three weeks by a few drops of oil through the oil cups.

CAUTION IN ADJUSTING TIMKIN BEARINGS.

When adjusting any Timken bearing, great care must be exercised not to get them too 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 and the slots in the locking nut do not match up with the cotter pin holes or if the slots in the adjusting collar do not match with the locking plates, it is best to back off on the adjustment (loosen it) to the next cotter pin hole or slot rather than adjust the bearing a little tighter. It is far better to have a bearing a trifle too loose than too tight.

All Timken bearing adjustments have right hand threads.

TO REMOVE AND REPLACE REAR AXLE.

1. Jack up rear end of car by placing jacks under the rear springs just forward of the rear axle. Or, where the facilities are at hand, it is a good plan to suspend the rear of the car.
2. Block up rear end of frame so that it will not sway.
3. Disconnect all brake pull rods at rear axle.
4. Remove the nuts which clamp the spring perches to the axle.
5. Roll rear axle with drive shaft and housing from under the car.

To install new axle, reverse the order of the above operations.

Care must be taken in installing the axle, also to get the brakes correctly adjusted.

(See Special Instructions for Adjusting Brakes.)

TO REMOVE AND REPLACE THE REAR WHEEL

(Timken Axle)

First remove the hub cap, then remove the cotter pin from the slotted hex nut and take off the hex nut. Then remove the wheel with the wheel puller provided. A wheel puller should always be used to remove rear wheels from axle.

In replacing the rear wheel, first oil the end of axle shaft to prevent rusting. Be sure that the key is in its proper position, then put on the wheel, being careful not to damage the key or keyway. Then put on the slotted hex nut forcing the wheel on, then turn the nut up tightly and BE SURE TO LOCK IT WITH A COTTER PIN as provided. Then put on the hub cap with a spanner wrench.

TO TAKE DOWN AND REASSEMBLE REAR AXLE

(Timken)

After removing rear wheels as before directed, then remove the following parts in the order named:—cotter pin and nut (J), bolt (K), locking plate (L). Then unscrew (turn to left) the bearing adjusting collar (M) from each end. The live axles (N and N) may then be drawn out.

As the live axle consists of two separate parts, the parts must be removed separately, each from its own side of the housing.

When replacing axle shafts in positon, care must be exercised to get them placed and adjusted correctly. They should be so adjusted that there will be the same amount of clearance at each end of the axle between the stationary parts of the brake band supports and the brake drums which are attached to the wheels.

The outer bearings, one at the extreme end of each of the live axle shafts, constitute one pair acting in conjunction and must be adjusted in unison. That is, when one is adjusted or moved in either direction, it is necessary to adjust the one on the extreme end of the other shaft also in order to compensate for the amount adjusted on the first one.

The gear mount bearings, on either side of the gear mount near the center of the axle, have nothing to do with the positioning of the axle shafts themselves.

TO REMOVE LARGE BEVEL GEAR MOUNT

(Timken)

Before the large bevel gear mount can be removed it is necessary to remove the live axle shafts. Then proceed as follows:—

Remove hand hole cover from back of axle after first removing the bolts (or nuts) (O). Remove the four screws (P) after which the two caps (R.R.) may be taken off. The entire gear mount may then be taken out bringing both of its bearings with it.

To remove the large bevel driving gear from its mount, it will be necessary to cut the heads from rivets which hold it in position.

When new gears are sent from the factory, new soft rivets are sent also.

ADJUSTMENT OF BEVEL DRIVING GEAR AND BEVEL DRIVING PINION

(Timken Axle)

The bevel driving gear (A) and bevel driving pinion (B) are placed in the correct relative positions when the car is assembled at the factory. After long use, perhaps a season or so, it may be found advisable to re-adjust them. These directions will also apply when putting in new gears.

Provision is made for altering the position of both the bevel driving gear and bevel pinion.

CAUTION.—If it becomes necessary to adjust the driving gear and driving pinion into closer mesh, it must be carefully determined whether the driving gear should be moved toward the driving pinion or whether the driving pinion should be moved toward the rear axle shaft, or both.

In all cases where our bevel gears are mounted together, the teeth of the two gears should mesh correctly, that is, they should be practically flush in order to run smoothly. It is possible however that sometimes the best results will be obtained if the teeth of the pinion are permitted to extend forward of the teeth of the large driving gear up to an amount not exceeding the one-hundredth of an inch. It is very seldom that the teeth of the driving gear should be permitted to extend out forward of the teeth of the pinion.

It is necessary that bevel gears be adjusted very carefully in order to have them run quietly, regardless of how perfectly they may have been made. Bevel gears must be placed in such a relation to each other that the circular pitch of both gear and pinion are exactly alike.

IMPORTANT NOTICE.—Bear in mind that if for any reason the bevel pinion is replaced by another with a different number of teeth, it will be necessary to replace the large gear also with one having teeth of the proper angle to correctly mesh with the new gear.

To move the large bevel driving gear into closer mesh with the bevel pinion, proceed as follows:—

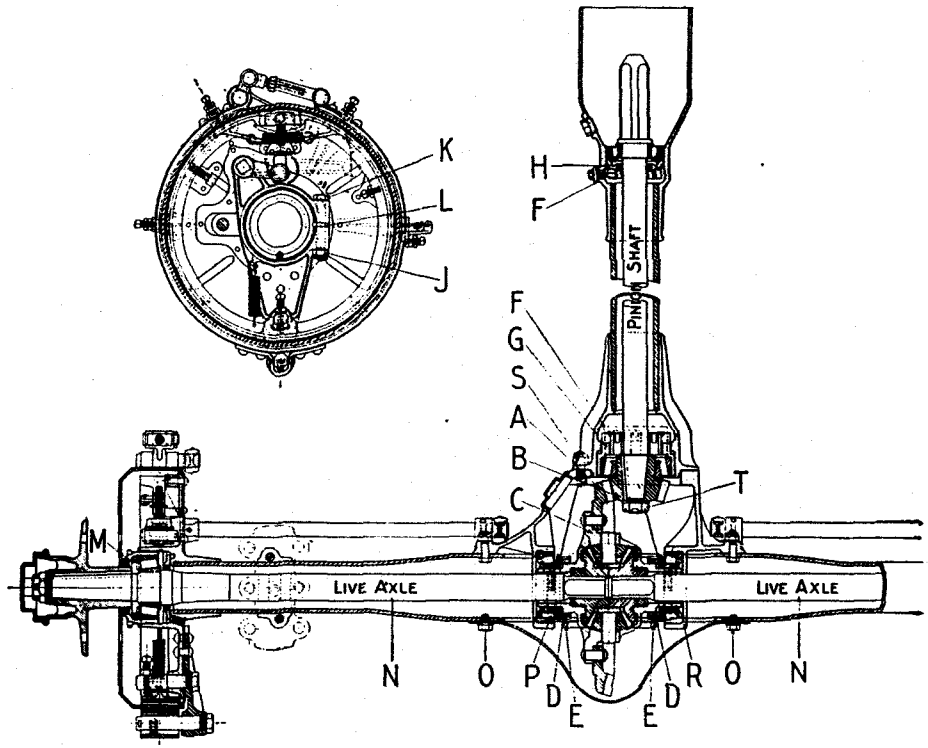
Before making adjustments, if the axle has been detached from the car, be sure to have it right side up so that the references "right" and "left" mentioned hereinafter will not become confused.

It will be seen that the large bevel gear (A) is attached to the gear mount (C). On each side of this gear mount there is a Timken bearing. The mount may be moved either to the right or to the left by turning the notched adjusting collars (D.D.) on their threaded seats. These notched collars are held in position by the locking plates (E.E.)

To move the gear mount to the right so as to bring the driving gear into closer mesh with the bevel driving pinion, first remove the locking plate (E) which enters the notch in the right hand collar (D) and screw this collar to the right so that it will make room to allow the left hand collar to also be moved toward the right. Then screw the left hand collar toward the right in the same manner and exactly the same number of notches. After making the adjustments be sure to lock the bearings in position with the locking plates (E.E).

To move the gear mount to the left, simply reverse the operation.

See CAUTION in regard to adjusting Timken bearings.



REAR AXLE AND DRIVE SHAFT.

TO ADJUST POSITION OF DRIVING PINION

(Timken Axle)

If it becomes necessary to adjust the position of the driving pinion in its relation to the large bevel driving gear, proceed as follows:—

Remove the four cap screws which hold the two locking plates (F.F.) in position and take off the plates. This gives access through the holes to the notches of the bearing adjusting collars, (G and H).

To move the pinion into closer mesh with the large bevel driving gear, insert a screw driver or other suitable instrument through the locking plate hole and then turn the adjusting collar (G) so that it moves toward the rear axle the required distance. Then turn the other adjusting collar (H) the same number of notches so that it also moves toward the rear axle the same distance as the first adjustment.

If after the pinion has been adjusted to the correct position it is found necessary to take up any wear that may have taken place in the bearings, they should be adjusted.

If necessary to move pinion away from driving gear, simply move the bearings in the opposite direction but bearing (H) should be moved first.

See CAUTION in regard to adjustment of Timken bearings.

TO REMOVE PINION AND PINION SHAFT

(Timken Axle)

Assuming that the axle and pinion shaft with their housings have been removed from the car, if it becomes necessary to remove the pinion shaft, first disconnect the pinion shaft housing from the axle housing by taking off the six nuts (S). Next remove the pinion from the end of the shaft by first removing the nut (T) which holds it on and then loosen the shaft by striking on the pinion end with a soft hammer or piece of brass so as not to injure the threads. When the shaft is loosened from the pinion it may be drawn out through the forward end of its housing.

TO REMOVE FRONT WHEEL AND ADJUST BEARINGS.

(Timken Axle)

Take off hub cap, remove cotter pin and unscrew slotted nut. Wheel will then slip off easily.

In replacing wheel, be sure to secure the nut with cotter pin.

The bearings should be adjusted as closely as possible and yet allow the wheel to turn freely. There must be just a very slight amount of play. This can be readily felt by taking hold of the wheel and moving it sideways. It is better that the bearing be a trifle too loose rather than too tight.

See CAUTION in regard to adjusting bearings.

Front wheels should be taken off two to four times a year and the bearings packed with heavy cup grease. A few drops of lubricating oil should also be applied occasionally through the oil cups.

BRAKES.

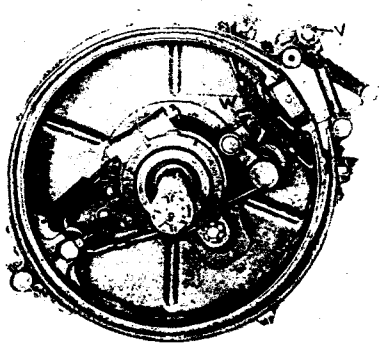
(Timken Axle)

There are two sets of brakes. One set expands inside the drums on rear wheels and is applied by a hand lever at the side of the car. The other set contracts upon the rear wheel drums and is applied by the right foot lever.

When the brake band linings have become worn so that they do not hold the car properly it will be necessary to tighten the bands.

The external contracting brakes being the ones which perform the greatest service are more likely to require adjustment than the internal or emergency brakes which are used less frequently.

To adjust the external contracting brakes, remove the cotter pin and bolt (V). Then screw the threaded part of the yoke further into its seat and re-attach the yoke in position with the pin and cotter pin.



To adjust the internal expanding brakes it will be necessary to remove the rear wheels to get access to the internal mechanism. It will be seen that the internal brake is brought into action by causing the expanding wedge (W) to force the brake band outward and into contact with the inner surface of the brake drum. To adjust this brake band, take an end wrench or pliers and turn the wedge (W) so that it screws out from its threaded seat and so that when the brake is applied it will cause the wedge to force the ends of the brake band further apart and into closer contact with the inside of the drum.

While it is possible to adjust brake bands by taking up on the pull rods, such practice is not advised except in case of emergency when the user has not time to remove the rear wheels. In that case the internal brakes may be adjusted by taking up on the pull rods. At the first opportunity, however, the pull rods should be let out again to their original position and the brake bands adjusted in the correct manner. As the external brakes may be adjusted without removing the wheels, they should never be adjusted excepting by the correct method as previously explained.

If the brake bands become dry and grip the brake drums too severely, it is a good plan to put a little graphite mixed with oil on them once in a while.

Be sure to oil all of the working joints of the brake parts occasionally.

Do not forget to apply some lubricant occasionally to the ends of the large equalizing bar where they move in the frame.

When brake bands and brake drums are wet or muddy they are less effective than when in proper condition. Therefore drivers should drive more cautiously under such conditions and when necessary to make a sudden stop it is well to apply both the service and emergency brakes.

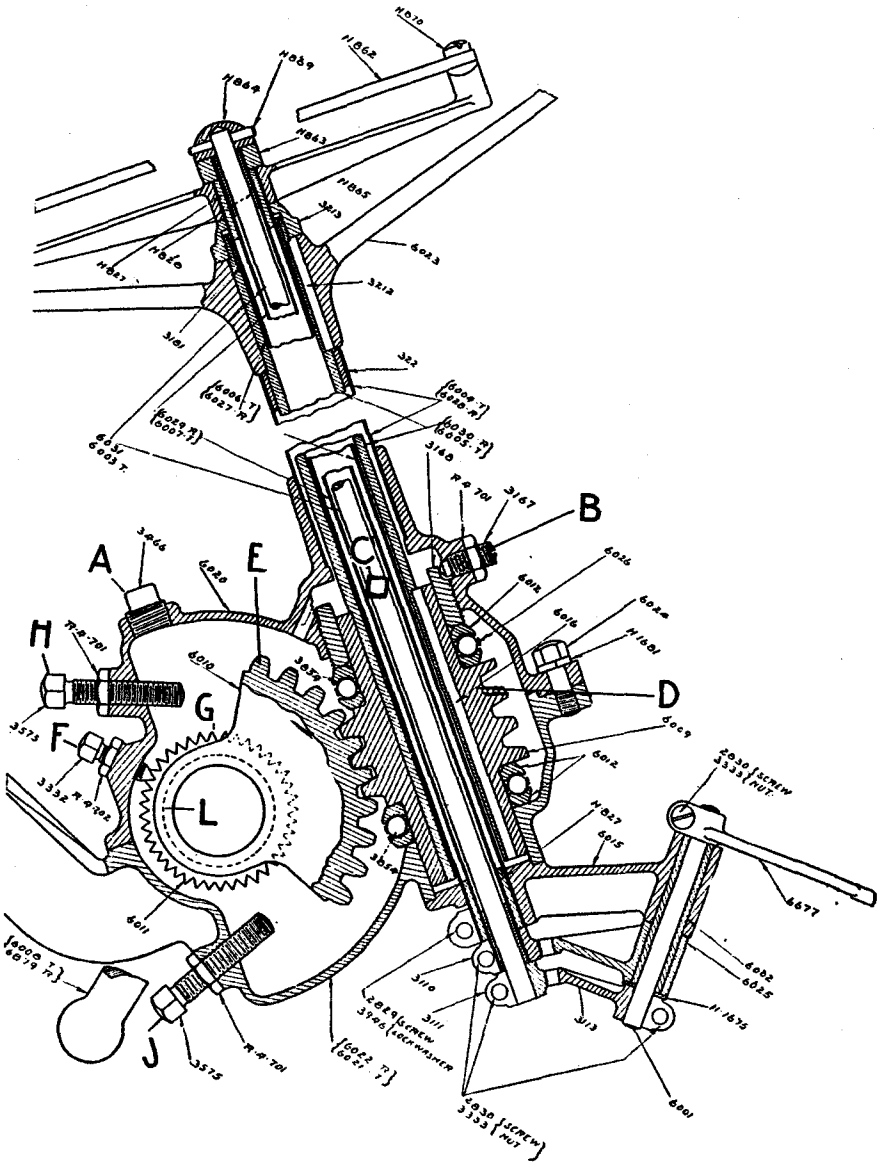


Fig. 13.

STEERING GEAR.

STEERING GEAR.

See Fig. 13.

The internal mechanism of the steering gear is oiled at A and C, Figure 13, after taking out the plugs. Cylinder oil and flake graphite is a good lubricant for this part. The steering gear arm K is encased in leather and packed in grease and runs a season without refilling.

Two adjustments are provided. The first is to take up end play in the steering staff. When this occurs, loosen the jamb nut and the set screw "B" and remove the plug "C." Then with a screw driver or something suitable turn up the adjusting collar, which can be seen through the hole from which plug "C" was removed. Then lock the collar with the set screw and jamb nut "B" and replace plug.

The other adjustment provides for taking up wear on the worm "D" and sector "E." The sector has its bearings in a pair of eccentric steel bushings and should wear occur it is taken up by turning these bushings so that they throw the sector closer toward the worm. To do this proceed as follows: First remove the two set screws "F," which are on each side of the sector (but only one shows in the illustration). Through the holes from which the set screws were taken, the two notched adjusting eccentric bushings "G" may be seen. Next, with a wrench, turn the hex heads on the bearing bushing forward, moving the sector toward the worm, just one notch of the bushings, or more if necessary, but one will usually be sufficient. In any event be very sure to **turn both sides exactly alike,** otherwise the gear will be thrown out of alignment. Then replace the set screws.

"H" and "J" are stop screws which limit the range of movement of the steering gear and front wheels.

SPRINGS.

It is quite important that the nuts on the spring clips be kept properly tightened. If this is not done it allows the springs to work loose and in time may be the cause of their breaking.

TIRES.

TIRE GUARANTY. All tires and rims used on Cadillac automobiles are guaranteed by their respective makers and in case of claims, should be sent to the factory or any of the branches of said makers (not to us), transportation charges prepaid.

Each tire maker publishes a booklet with instructions for care and repair of tires and every motorist should provide himself with one of these and thoroughly familiarize himself with its contents.

We give here a few general suggestions that will apply to pneumatic tires in general.

The various size tires are constructed for the purpose of carrying up to certain maximum loads and no more. For example: tires on a two passenger car are not calculated to carry three or four passengers and owners should realize therefore that overloading a car beyond the intended carrying capacity of the tires is sure to materially shorten their life.

Do not turn corners or run over sharp obstructions, like car tracks, at a high rate of speed. Such practice is sure to strain or possibly break the fabric, with the result that the further life of the tires will be limited. Remember that most tire troubles are the result of abuse more than use.

In case of puncture the car should be stopped at once and the tube repaired or replaced. 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 wheel, examine the inside of the casing to see that the cause of the puncture is not still protruding because it would, if allowed to remain, continue to cut the inner tube. It is also advisable to look over the outside of your tires frequently and take out any pieces of glass or other particles which may have become imbedded in the casing, as they are liable to work themselves in and finally puncture the inner tube.

A puncture, gash or cut in a casing sufficiently deep to expose the fabric should have a vulcanized repair made without delay. Otherwise, water and dirt will soon ruin the whole tire, the threads acting as a conductor for the moisture, the fabric thus becoming mildewed.

Experience has taught the careful driver to carry one or more spare tubes, as a cemented roadside repair will not always hold, especially in warm weather, as the heat generated in the tire may loosen the patch. When touring, a spare casing should always be carried.

The garage floor should be kept free from oil or gasoline. The tires on a car left standing on a grease-covered floor deteriorate quickly, the natural enemies of tires being oil and gasoline. These destroy the nature of the rubber, rendering it soft so that it cuts and wears away quickly.

Tires that show wear on one side from use on rutty roads or from other causes should be turned around, thereby lengthening the life of the tire. It is also a good plan to place the rear tires on the front wheels when they begin to show age, as the power being transmitted through the rear tires they necessarily wear out sooner than the front tires, which are simply submitted to a rolling action and sustain less weight.

A sprung axle will often cause the quick wearing of a tire for the reason that the tire is running on an angle, which sets up a grinding action. Tires run under these conditions will wear out in a very few miles. When a car is not to be used for an indefinite period all four wheels should be jacked up; this prevents the fabric from becoming set in one position.

Spare air tubes should be kept slightly inflated. This keeps them in good condition and prolongs their life. They should not be stored in a greasy toolbox under any circumstances. If a spare casing and tube be carried, the latter should be slightly inflated and placed in the cover.

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. Before the tires are put back, the rim should be thoroughly cleaned, and any rust carefully removed; a coat of paint or shellac is also advised.

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

The greatest injury that can be done to tires on a car stored for the winter is to allow the weight of the car to rest on the tires. The car should be blocked up, so that no weight is borne by the tires, and the tires should then be deflated partially. This will relieve the tires of all strain, so that in the spring they should be no worse for the winter's storage.

Occasionally a tire will puncture without apparent good reason. In such cases examine the rim and it may be found that a bolt head protrudes above the rim surface and has finally worn through the tube. The obstruction should be buffed or filed off until the bolt lies flush with the rim bed.

If the trouble is caused by a bolt being too far into the rim, leaving a depression sufficiently sharp and deep to damage the tube, this should be filled in. A compound of pumice stone and coach varnish mixed to the consistency of putty will do the work nicely. Just fill the hole and leave it to dry for an hour or so, and it will become hard.

AIR PRESSURE IN TIRES.

This is a much disputed point. Some tire makers advise the use of an air pressure gauge and specify certain pressures for various size tires. Other makers claim a gauge is not of much value on account of a large percentage of pressure being lost in the piping and opening the valve check. About the surest method seems to be to inflate the tires until they show very little or no depression under the load they are obliged to carry.

The minimum air pressure recommended by one maker for the various sizes of tires is as follows:

2½	inch	tires	45 lbs.
3	"	"	50 "
3½	"	"	60 "
4	"	"	70 "
4½	"	"	80 "
5	"	"	90 "

DIRECTIONS FOR USING THE

WITHERBEE STORAGE BATTERY IGNITER NO. 66.

IMPORTANT:—Keep the acid solution above the tops of the plates. (See No. 3, under acid.)

DIRECTIONS.

The + terminal denotes Positive, and the — terminal Negative. Connect the Positive wire with the + terminal, and the Negative wire with the — terminal, for either charging or discharging.

ACID.

1. Always examine the acid before charging, and see that it covers the tops of the plates.
2. To examine the acid and refill cells, remove the rubber vent-caps and use an acid syringe and hydrometer.
3. If upon examination you find the acid below the tops of the plates, and the Igniter is in a discharged condition, bring the acid up to the required height by adding distilled or pure water.
4. Never add acid except when the Igniter is fully charged.
5. The acid should be 29° Baumé, or 1250° specific gravity, after the Igniter is fully charged.
6. Use chemically pure acid.

CHARGING: Charge from a direct current circuit.

1.—Connect wires properly (see instructions above.)

2.—See that the acid is above the tops of the plates (see "acid").

3.—Charge 1st at 5 amperes until each individual cell shows 2.5 volts, then charge at 2 amperes until each individual cell shows 2.5 volts.

Then the Igniter will be fully charged and ready for use.

Voltage readings should always be taken while the cells are still charging.

Batteries are guaranteed by their makers, provided same are cared for according to said makers' instructions, which are sent with each battery, and should be carefully followed.

In case of trouble, correspond with the maker of the battery, not with the maker of the car.

POINTS TO BE REMEMBERED.

If by accident the shell should be broken, remove the plates from the battery jar and wash same thoroughly in distilled or rain water. Never allow plates that have been in acid to stand dry, since this will cause sulphation which will destroy the usefulness of the plates.

Information Regarding Storage Batteries in General

FITTING THE BATTERY IN THE CAR.

A storage battery should not be allowed to bounce around in the car, but should be placed in a box in which it fits snugly; pack it with excelsior or some spongy material.

In connecting up the battery, it is advisable to connect the positive wire to the coil, and the negative to the ground.

Connections to be kept clean at all times.

CARE OF THE METAL PARTS.

Keep the metal parts of the battery covered with vaseline or ordinary cup grease. This will insure a good contact at all times.

TO CARE FOR A BATTERY WHEN NOT IN USE.

Have the battery recharged and placed where it will not be subjected to extreme cold. It will have a tendency to discharge of its own accord, then after say, six weeks or two months, have the battery recharged again and allow it to discharge as before. The most important thing is to see that the plates are kept covered with acid at all times, and would suggest that the battery be examined from time to time to determine this.

WHEN THE ELECTROLYTE IS SPILLED.

When a battery is received, no matter whether same comes from the manufacturer or jobber, it is advisable to remove the vent caps and see whether or not any acid has been allowed to spill while in transit, and should the plates be exposed it is then necessary to cover same with acid. Often, the addition of a little distilled water is all that is required.

The acid to be used is known as "Electrolyte," and same is made up by using one part chemically pure sulphuric acid to four parts of distilled water. It is absolutely necessary to use a water free from any mineral substance, and if distilled water is not convenient, then use rain water collected from a shingle roof.

The acid in the battery should read 1.250 degrees specific gravity, or 29 degrees Baumé, when the battery is fully charged .

Please understand that the acid will fall in gravity as the battery becomes discharged. This is why the battery should be fully charged when acid readings are taken or new acid added.

In handling acid and water used for the batteries use either glass or earthern receptacles.

RE-CHARGING.

Never allow the voltage to fall below 1.7 volts per cell. This is easily determined since at this point the battery will fail to spark the engine satisfactorily. Readings to be taken under compression or when engine is running.

The plus terminal denotes positive and the minus terminal negative. Connect the positive wire with the plus terminal, and the negative wire with the negative terminal, for either charging or discharging.

It is absolutely necessary that you determine the polarity of the wires before attempting to recharge a battery, for should the negative wire be connected with the plus terminal of the battery, it would mean that you would reverse the plates and render the battery useless for the time being.

If you have no polarity indicator convenient then determine the polarity of the wires by the following method:

Into a half pint solution of salt and water put the ends of the two wires leading from the charging circuit: around the wire of one of the wires small bubbles will gather—this is the negative wire.

Before connecting the battery for recharging, it is necessary to remove the rubber vent caps, also cover the metal parts of the battery with vaseline (this is done to prevent sulphation from the acid spray) then refer to the directions as appear on the side of the battery for charging rate.

GENERAL INFORMATION.

Batteries of 40 ampere hour capacity charge at 3 amperes.
Batteries of 50 ampere hour capacity charge at 4 amperes.
Batteries of 60 ampere hour capacity charge at 5 amperes.
Batteries of 80 ampere hour capacity charge at 6 amperes.

To reduce the charging rate, simply unscrew the required number of lamps.

In every instance, both at the high and low rate of charging, the battery is charged until each individual cell reads 2.5 volts. All volt readings to be taken while the cells are charging and still connected.

In a few minutes after the charging of a battery has been stopped, you will notice that the voltage will drop from 2.5 per cell to say 2.2. This is all right, and when each cell reads 2.2 volts or over on an open circuit, the battery is then fully charged and ready to use.

Be careful not to allow the battery to get hot; when charging it will get warm, but when the shell feels hot to the hand then reduce the rate at which the battery is being charged and you will notice that the heat will diminish, but should the extreme heat continue, then no doubt the acid is too strong. In this case lower the gravity of the acid two or three degrees by adding a sufficient amount of distilled water.

LAMPS.

In arriving at the number of lamps necessary to give the desired resistance for recharging, the following can be relied upon:

When the current is 108 to 115 volts each 16 C. P. lamp gives ½ ampere of current, each 33 C. P. lamp gives 1 ampere of current, and each 50 C. P. lamp gives 1½ ampere of current when connected in multiple with each other and in series with the battery.

When the current is 220 volts, then ½ of the above rate applies; that is a 16 C. P. lamp will give ¼, a 33 C. P. lamp ½, and a 50 C. P. lamp ¾ ampere of current when connected in multiple with each other and in series with the battery.

The battery can be charged direct only from the direct current, and if the current is alternating then a transformer must be used which changes the current from alternating to direct.

Battery makers will gladly give such additional information as you may desire.

PART TWO
Instructions for Lubricating

LUBRICATION AND ITS IMPORTANCE.

There is no one thing which is the primary source of more trouble and the cause of more expense in maintenance to the mechanism of an automobile than insufficient lubrication.

The special object of this chapter is to point out the places in the Cadillac "Thirty" which require oiling. While it is manifestly impossible to give exact instructions in every instance as to just how frequently each individual point should be oiled or exactly how much lubricant should be applied we give this approximately, based on average use.

It should be borne in mind constantly that where one part moves upon or in contact with another that friction is created. Friction means wear, and the wear will be of the metal itself unless there is oil, and oil is much cheaper than metal. The use of too much oil is better than too little, but just enough is best.

Proper lubrication not only largely prevents the wearing of the parts but it makes the car run more easily, consequently with less expense for fuel and makes its operation easier in every way.

The oiling diagram shown in this chapter indicates the more important points which require attention. But do not stop at these. Notice the numerous little places where there are moving parts such as the yokes on the ends of various connecting rods, and pull rods, etc. A few drops of oil on these occasionally will make them work more smoothly.

Oil holes sometimes become stopped up with dirt and grease. When they do, be careful not to overlook them.

Judicious lubrication is one of the greatest essentials to the satisfactory running and the long life of a motor car. Therefore lubricate and lubricate judiciously.

Lubricating Oils

There are many grades of oils. There are none too good. Naturally, we have experimented a great deal with numerous lubricants to determine which is best adapted for the various parts of the Cadillac car. It is not always an easy matter for users to obtain good lubricants and the constant demand made upon us by Cadillac dealers and Cadillac users has induced us to provide suitable lubricants which may be obtained from Cadillac dealers.

CADILLAC MOTOR OIL.

(For engine and other light oiling)

CADILLAC REAR AXLE AND TRANSMISSION LUBRICANT

(For rear axle and transmission.)

CADILLAC CUP GREASE.

(For grease cups and other parts designated.)

OIL FOR THE ENGINE.

In the absence of Cadillac motor oil, we recommend lubricant of the following specifications as suitable for use in the crank case and for other light oiling about the car. It is understood that the properties mentioned are of about equal importance.

For use in winter oil should have a specific gravity of 30° Baume or higher, that is between 30° and 32°; flash test should be 415° F. or higher; fire test should be 470° F. or higher; viscosity should be 90 or higher at 212° F. (Tagliabue viscosimeter); cold test 20° F.

For summer, the oil should have a specific gravity of 29° Baume or higher; flash test should be 435° or higher; fire test should be 480° or higher; viscosity should be 100 or higher at 212° F.; cold test should be 30° or higher.

Light, well filtered oil is preferable. Dark oils usually contain more carbon than light oils.

Oil should be strained through cheese cloth or fine mesh wire cloth before using.

FOR GREASE CUPS.

In the absence of Cadillac cup grease, we recommend the best other grade obtainable.

FOR THE TRANSMISSION.

In the absence of "Cadillac rear axle and transmission lubricant" we recommend a compound of cup grease and motor oil mixed to such a consistency that it will flow very easily

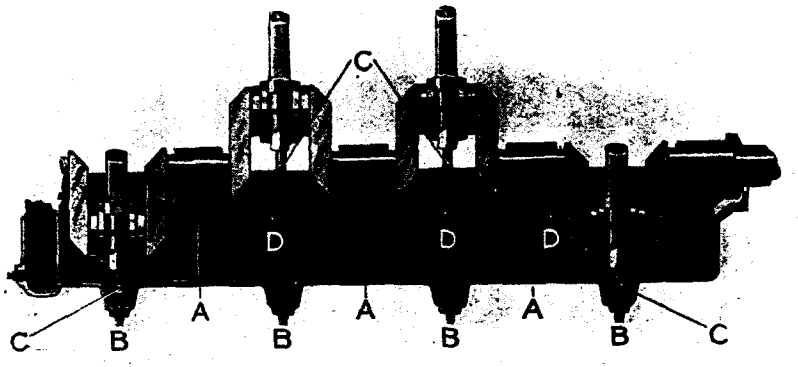
FOR THE REAR AXLE.

In the absence of "Cadillac rear axle and transmission lubricant" we recommend the use of vegetable castor oil. (Do not use mineral castor oil.)

MOTOR LUBRICATION.

The lubricating of the Cadillac motor is by our automatic splash system. This system takes care of the five crank shaft bearings, the connecting rod and cam shaft bearings, cylinders, pistons, etc.

The crank case is divided by walls "A" into four compartments. In the bottom of each compartment there is a depression or well "B." The crank case should always contain sufficient oil so that each of these four wells will be from three-fourths to entirely full and so that the splashers "C," which are attached to the connecting rods, will dip into the supply and throw the oil over the parts to be lubricated.



Sectional View of Crank Case Showing Oil Wells and Oil Distributing Troughs.

On the left side of the motor there is a lubricator tank or reservoir. See that this is filled as often as required. In this lubricator there is a double acting force pump. One movement of the pump plunger forces the oil through the feed pipe up to the sight feed on the dash. The oil drops to the bottom of this sight feed and from there it is drawn by the other movement of the pump plunger and forced to the third compartment of the crank case to maintain the supply there.

As before stated, the splashers at the lower ends of the connecting rods throw the oil all over the inside of the motor and that which is not utilized in lubricating drains down the inside walls and into the sloping troughs "D" at the side. These troughs carry the oil from one compartment to the other so that the supply is maintained uniformly in each.

The adjustment for the oil supplied to the crank case should be so regulated that the quantity in the wells will be maintained as before mentioned. The supply is governed by the length of the stroke of the plunger of the lubricator pump. The longer the stroke of the pump plunger, the more oil is forced through the feed pipe.

On the top of the lubricator, on the plunger, there are two notched collars. The upper one is the adjusting collar attached rigidly to the plunger. The lower one is the locking collar. To adjust the stroke of the plunger, first loosen the locking collar. Then to increase the supply of oil, turn the adjusting collar to the right (screw it down). Doing this gives a longer stroke to the plunger. To decrease the supply of oil, turn the adjusting collar to the left (screw it upward). Doing this shortens the stroke of the plunger. After making an adjustment, be sure to lock it with the locking collar.

Commencing with the later 1909 cars, the method of adjusting is slightly different although the principle is the same. On these latter, instead of there being the collar, there is a hole through the plunger. With a piece of wire or anything suitable the plunger may be turned and its stroke lengthened or shortened as before directed.

The quantity of oil which should be supplied to the crank case through the sight feed depends, of course, upon the amount the motor is consuming. It will therefore be realized that it is impossible for us to give any set rules as to just how much should be fed. As a fair basis for calculation we suggest that the pump plunger be adjusted so that it will deliver about one drop of oil into the sight feed at each movement. This is for ordinary driving. For specially fast work or for long, hard pulling it will be well to increase it to about two drops for each movement of the pump plunger.

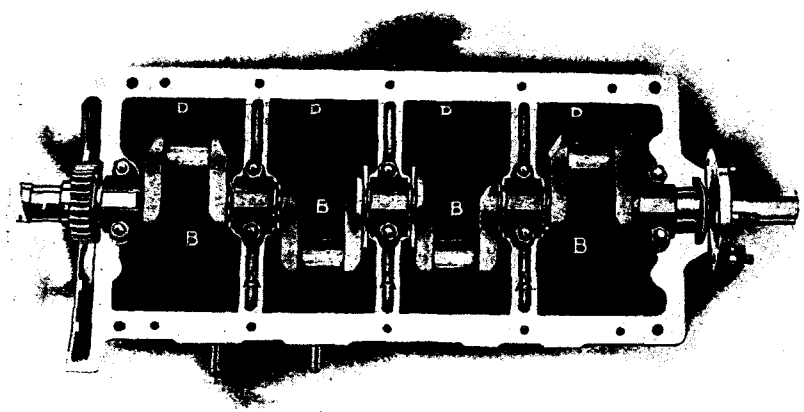


Fig. 16.

OIL PAN OF MOTOR BASE.

There is still another consideration. The Cadillac lubricating system is the most economical we know of and we sometimes find persons who have driven other cars inclined to lubricate too freely. This also must be avoided as too much oil will cause carbon deposits in the cylinders and combustion chambers, on the piston heads and on the spark plugs.

See special information under head of "Carbon Deposits."

When examining the crank case to see the amount of oil contained in the bottom, it should be remembered that if the wells contained the correct amount when the car had been standing still, that a few hundred revolutions of the crank shaft would splash a considerable part of it over the inside walls of the motor. Therefore the time to examine it is after the car has stood a while and the oil has had time to run down and settle in the wells.

The sight feed glass may be cleaned by unscrewing it from its seat.

CARBON DEPOSIT.

This is one of the greatest enemies to the motor and electrical apparatus. Too much oil is one cause of carbon deposits. The high temperature will evaporate this oil, which will be partially condensed on the walls of the combustion chamber, piston heads and spark plugs and form a sticky film. This film is ready to adhere to any lamp black or carbon which might be in the explosion should the mixture be set too rich. This film will cake up and also form carbon. In time the carbon will start to scale and a thin flake will adhere to the combustion chamber and piston heads. The intense heat of the explosions of the motor will cause this carbon to become red hot, which will ignite the charge instead of allowing the spark to do so. This produces a pound in the engine and decreases its power. Ofttimes these scales become lodged in the exhaust valve seat and the compression is lost.

Carbon which is formed on the spark plugs forms a circuit for a high tension current to travel over, it meeting with less resistance than jumping between the points. Sometimes part of the current will travel over the carbon and the rest of it jump between the spark plug points. The operator looks at his spark plug and considers it is in perfect condition. The spark that will jump in the neighborhood of ⅜ inch in the open air will not jump more than 1/16 inch under seventy pounds pressure. Therefore a spark plug that is sending part of its current through the carbon deposit and the other part between the spark plug points will send all of the current over the carbon deposit when the compression is on. Great care must be taken to make sure that the combustion chamber and spark plugs are free from carbon.

Spark plugs should be kept clean. A good method of keeping plugs clean is to wash them occasionally in gasoline.

GENERAL LUBRICATION.

See Fig. 15.

The illustration on the following page indicates the most important points requiring lubrication.

It will be noted that after the indicating figures, there are the letters A, B, C, D, or S, thus 5A, 3B, 4C, 2D, 11S, etc. The figures point to the places to be lubricated and the letters A, B, C, and D, indicate the kind of lubricant to use and the probable frequency with which it should be applied, as follows:—

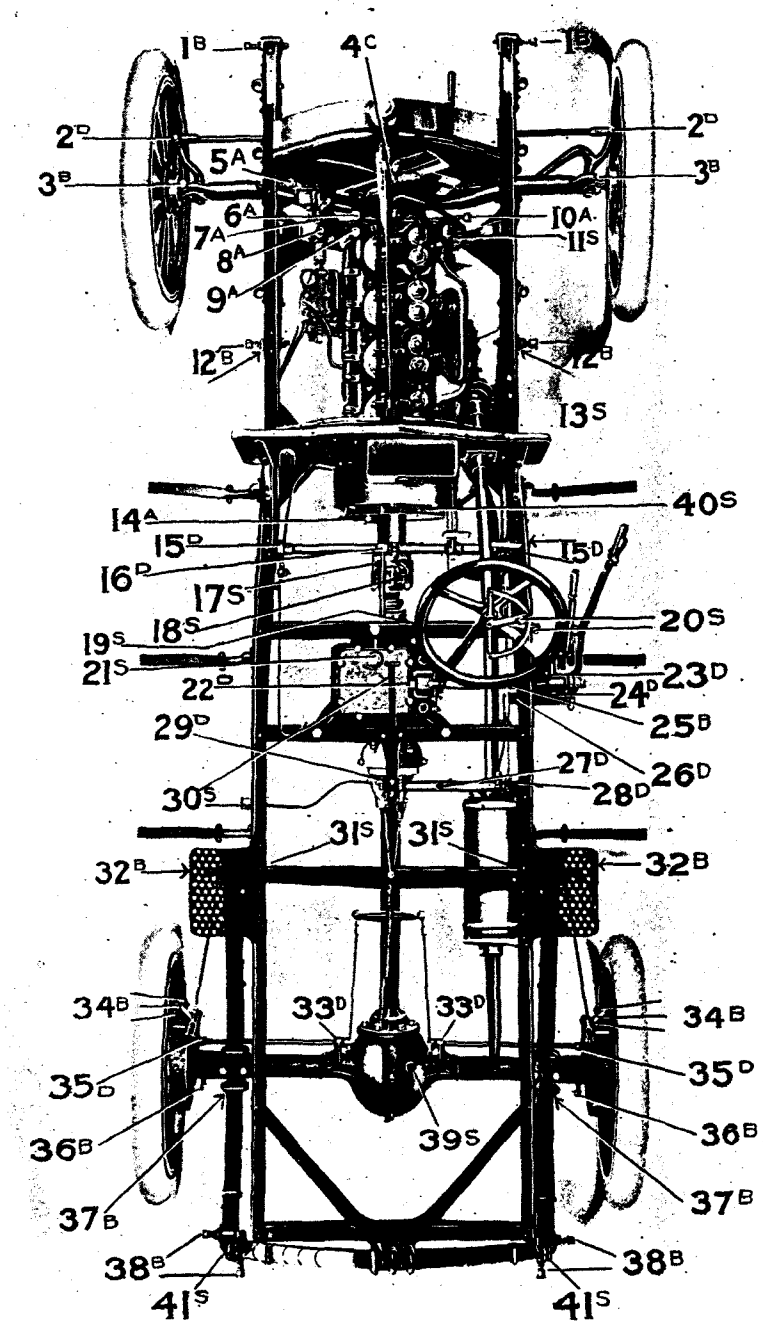
"A" after a number indicates grease cups which should be turned down two full turns about every 150 miles of travel.

"B" after a number indicates grease cups which should be turned down about every 300 miles of travel and about half the contents of the cup should be injected each time.

"C" after a number indicates a grease cup which should be turned down about every 500 miles and the full contents of the cup injected.

"D" after a number indicates oil holes where machine oil or gas engine oil should be applied about every 300 miles.

"S" after a number indicates "Special" and should be lubricated according to the following directions:—



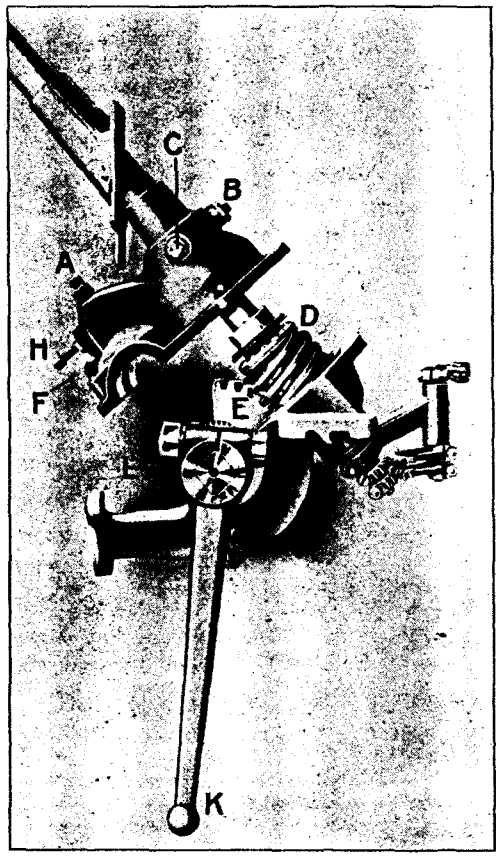
Plan View of Chassis Showing Places to be Lubricated.

COMMUTATOR.

"11s." The inside of the commutator should be oiled sparingly with good lean cylinder oil about every 100 or 200 miles.

The commutator should be washed out occasionally with kerosene oil.

STEERING GEAR.



"13s" The internal mechanism of the steering gear should be lubricated bout every three months. This can be done by removing the plugs "A" and C." Cylinder oil with some flake graphite mixed in it is a good lubricant for his part.

The steering gear arm "K" is encased in leather and packed in grease. 'his packing should be renewed about once a year.

CLUTCH.

"40's"

If after a car has been in use for some time it is found that the leather facing of the clutch has become dry and hard so that it does not "take hold" properly, it may be made more pliable by applying a little Neatsfoot oil. This, however, must be applied very sparingly as too much will cause it to slip and possibly burn out. Under no circumstances should any but Neatsfoot oil be used. An application only once or twice a season is usually sufficient to keep clutch leather in good condition. To apply the oil, disengage the clutch and revolve the cone with the hand, at the same time applying the oil through the slots in the clutch ring. Another method is to disengage the clutch and jack up one rear wheel of the car. Then with some of the transmission gears engaged and by turning the rear wheel, the cone will revolve. While it is revolving, apply the oil through the slots in the clutch rings.

Do not use ordinary oil on this part.

CLUTCH THRUST BEARING.

"17s" is the clutch ball thrust bearing. Remove the screw and lubricate this bearing by injecting cup grease about every 300 miles. A good way to do this is to screw in a grease cup and inject the contents. Remove the grease cup after lubricating.

There is also a ball thrust bearing at the backward end of spiral clutch spring. This is shown more clearly in Fig. 11, page 35 at "G." This bearing should be oiled every week or two by injecting a liquid oil so that it will reach the balls.

UNIVERSAL CROSS.

"18s" is the universal cross: Lubricant should be applied to the bearing surfaces every 200 or 300 miles

TRANSMISSION BEARINGS.

"19s." The transmission bearings should be oiled with lubricating oil or cup grease or preferably a mixture of the two about every two or three months. The plug must be removed to lubricate this part.

SPARK AND THROTTLE LEVERS.

"20s" are the spark and throttle levers. Move the spark lever to the top and the throttle lever to the lower position on the sector and put in a drop of oil occasionally so it will run in and lubricate the dog which engages in the notches of the sector

TRANSMISSION.

"21s." The transmission gear case should always contain sufficient lubricant so that the under teeth of the larger gear will enter into their full depth. The best lubricant for this part is a mixture of cup grease and oil, mixed to such a consistency that it will not be so thick that the gears will simply cut a path in it, but be just liquid enough to flow.

UNIVERSAL JOINT.

"30s" is a flexible tube which runs to the universal joint. To lubricate this joint, remove the thumb screw from the end of the tube and with an oil gun inject a mixture of oil and cup grease about every 300 miles.

Be careful not to twist the flexible tube or it may be damaged.

On some cars, the oil tube leading to this joint extends forward and above the transmission case.

EQUALIZING BAR.

"31s." The ends of the brake equalizing bar should have lubricant applied about once a week.

REAR AXLE AND DRIVE SHAFT.

"39s." The rear axle housing should always contain enough lubricant that the large bevel gear will dip into it. To place the oil therein, remove the plug from the upper part of the housing. The first filling will require about one pint of oil. It is also advisable not to use too much. On all except the first few hundred cars another plug is provided on the underside of the sphere so that any excess will run out. The quantity of oil should be maintained on a level with the under plug.

The best lubricant for this part is Cadillac Rear Axle and Transmission Lubricant, or, in its absence, a mixture of cup grease and oil, mixed to such a consistency that it will not be so thick that the gears will simply cut a path in it, but be just liquid enough to flow.

SHACKLES.

"41s." The ball joints of the spring shackles should be lubricated occasionally.

VALVE STEMS.

In the 1910 models it will be seen that on each of the eight valve lifting rods of the motor just about midway inside of the spring which closes the valve, there is a small brass cup through which the valve rod slides. Inside the cup and around the rod there is a felt washer. This washer should be kept well saturated with lubricating oil which may be applied with an oil can by introducing the nozzle between the coils of the spring.

FRONT WHEELS.

About every month or every thousand miles of travel, a few drops of motor oil should be introduced through the spring hole. About every three months the wheels should be removed and the bearings packed with cup grease.

SPRINGS.

It is a good plan to jack up the frame of the car occasionally and insert oil mixed with graphite between the leaves of the springs. This will prevent their squeaking and keep them from rusting.

ADDITIONAL.

In addition to all the points specifically mentioned, note carefully all small connections and joints throughout the car, such as connecting rod yokes, etc., and apply a drop or two of oil as occasion requires.

COMMON SOURCES OF TROUBLE.

Inadequate lubrication.

Imperfect vibrator action.

Dirty spark plugs.

Exhausted batteries.

Loose or broken wires.

Tight bands or any imperfect adjustment.

Dirty gasoline.

Water in the gasoline.

Frozen circulating water.

Lack of circulation of water.

Charred or sticky valve stems.

Common sources of troubles do not include accidents, and such things as may be occasional or accidental troubles.

Of these, the first, inadequate lubrication, is by far the most detrimental, as it may ruin all of the most important wearing surfaces of the motor, as well as cause serious damage to other parts of the car.

" A FEW DON'TS."

Don't try to start without the switch turned on.

Don't try to start without seeing that the spark lever is in correct position.

Don't try to run without oil, water or gasoline.

Don't crank a motor, that is, don't turn it over the compression more than three or four times after priming. If it does not start at once there is something wrong.

Don't drive fast nor attempt to stop quickly on a wet, slippery road or pavement.

Don't drive fast around corners, it is dangerous and destructive, especially to tires.

Don't allow an automobile to stand in cold weather with pure water in the circulating system. It will freeze and burst something. In cold weather use some good, anti-freezing solution.

Don't run a motor fast when the automobile is standing still; there is no worse abuse.

Don't advance spark lever too fast or too far (crank shafts can be sprung by injudicious use of spark advance).

To Cadillac Owners

NEW PARTS FOR REPAIRS.

To avoid unnecessary delay and useless correspondence PARTS FOR REPAIRS should, where possible, be ordered from the dealer from whom the machine was purchased or from nearest local Cadillac dealer, who is generally in a position to know what is desired and how to order it. (If he is not we should like to know it.)

With more than seventy thousand Cadillac automobiles in use it is obviously impractical for us to deal direct with all Cadillac owners. We cannot open accounts with or sell at a discount to any except regular dealers with whom we make annual contracts. Where conditions are such as to, in our judgment, warrant it, we will fill orders for parts at prices listed in our parts catalogue f. o. b. factory providing Cash accompanies the Order.

In case orders are sent under above conditions we must have motor number, and model of machine with correct description, also sketch and exact dimensions of the part wanted. If these are not procurable, return the part properly tagged, charges prepaid (or it will not be accepted), with a special letter of instructions and instructions for returning. Otherwise we cannot promise prompt service or an intelligent fulfillment of the order.

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

REPAIRS TO PARTS.

In the event of claims or the necessity for repairing parts, the same course should be followed as outlined above for ordering new parts. The only exception is tires.

TIRES.

In cases of tire claims or repairs to tires, correspondence should be opened direct with the tire makers; and if necessary, the tires should be sent direct to said makers or their branches, transportation charges prepaid.

CADILLAC MOTOR CAR COMPANY,
DETROIT, MICH.

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Miscellaneous
Police system
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1922

Index of all Cadillac Models using Delco Equipment

1910 CADILLAC MODEL

Delco System No. 142

No. 2004	COIL BOX
No. 1018	IGNITION SWITCH
No. 5661	IGNITION RELAY

1911 CADILLAC MODEL

Delco System No. 4411

No. 5001	DRY CELL DISTRIBUTOR
No. 5661	IGNITION RELAY
No. 2022	IGNITION COIL
No. 1007	IGNITION SWITCH
No. 1009	IGNITION SWITCH

1912 CADILLAC MODEL

Delco System No. 1

No. 1	MOTOR GENERATOR
No. 5401	BATTERY BOX
No. 5001	DRY CELL DISTRIBUTOR
No. 2022	IGNITION COIL
No. 1018	IGNITION SWITCH
No. 5661	IGNITION RELAY
No. 5049	GENERATOR DISTRIBUTOR
No. 2045	IGNITION COIL
No. 10678	RESISTANCE UNIT
No. 1991	STARTING SWITCH
No. 5442	CLUTCH MAGNET

1913 CADILLAC MODEL

Delco System No. 4

No. 4	MOTOR GENERATOR
No. 5404	BATTERY BOX
No. 5440	CLUTC HMAGNET
No. 10686	RESISTANCE UNIT
No. 1978	IGNITION SWITCH
No. 5055	GENERATOR DISTRIBUTOR
No. 2093	IGNITION COIL
No. 5059	DRY CELL DISTRIBUTOR
No. 2092	IGNITION COIL
No. 6051	AMMETER
No. 5677	IGNITION RELAY
No. 1979	IGNITION SWITCH
No. 10131	TERMINAL BOARD

Index of all Cadillac Models using Delco Equipment

1910 CADILLAC MODEL

Delco System No. 142

No. 2004	COIL BOX
No. 1018	IGNITION SWITCH
No. 5661	IGNITION RELAY

1911 CADILLAC MODEL

Delco System No. 4411

No. 5001	DRY CELL DISTRIBUTOR
No. 5661	IGNITION RELAY
No. 2022	IGNITION COIL
No. 1007	IGNITION SWITCH
No. 1009	IGNITION SWITCH

1912 CADILLAC MODEL

Delco System No. 1

No. 1	MOTOR GENERATOR
No. 5401	BATTERY BOX
No. 5001	DRY CELL DISTRIBUTOR
No. 2022	IGNITION COIL
No. 1018	IGNITION SWITCH
No. 5661	IGNITION RELAY
No. 5049	GENERATOR DISTRIBUTOR
No. 2045	IGNITION COIL
No. 10678	RESISTANCE UNIT
No. 1991	STARTING SWITCH
No. 5442	CLUTCH MAGNET

1913 CADILLAC MODEL

Delco System No. 4

No. 4	MOTOR GENERATOR
No. 5404	BATTERY BOX
No. 5440	CLUTC HMAGNET
No. 10686	RESISTANCE UNIT
No. 1978	IGNITION SWITCH
No. 5055	GENERATOR DISTRIBUTOR
No. 2093	IGNITION COIL
No. 5059	DRY CELL DISTRIBUTOR
No. 2092	IGNITION COIL
No. 6051	AMMETER
No. 5677	IGNITION RELAY
No. 1979	IGNITION SWITCH
No. 10131	TERMINAL BOARD

1914 CADILLAC MODEL

Delco System No. 27

No. 24	MOTOR GENERATOR
No. 5506	APPARATUS BOX
No. 5105	DISTRIBUTOR
No. 2104	IGNITION COIL
No. 1035	COMBINATION SWITCH
No. 1042	COMBINATION SWITCH
No. 5447	CLUTCH MAGNET
No. 5692	CIRCUIT BREAKER

51 MODEL—1915 CADILLAC

Delco System No. 69

No. 44	MOTOR GENERATOR
No. 10726	MOTOR CLUTCH
No. 2115	IGNITION COIL
No. 1045	COMBINATION SWITCH
No. 5696	CIRCUIT BREAKER
No. 5308	AUTO HORN
No. 5695	CIRCUIT BREAKER

53 MODEL—1916 CADILLAC

Delco System No. 98

No. 78	MOTOR GENERATOR
No. 5150	AUTOMATIC DISTRIBUTOR
No. 11973	MOTOR CLUTCH
No. 2115	IGNITION COIL
No. 1062	COMBINATION SWITCH
No. 1069	COMBINATION SWITCH
No. 5705	CIRCUIT BREAKER
No. 5310	AUTO HORN
No. 1061	AUTO HORN SWITCH

55 MODEL—1917 CADILLAC

Delco System No. 130

No. 98	MOTOR GENERATOR
No. 12677	MOTOR CLUTCH
No. 5150	DISTRIBUTOR
No. 2115	IGNITION COIL
No. 1077	COMBINATION SWITCH
No. 5705	CIRCUIT BREAKER
No. 5311	AUTO HORN
No. 1061	AUTO HORN SWITCH

57 MODEL—1918 CADILLAC

Delco System No. 177

No. 98	MOTOR GENERATOR
No. 12677	MOTOR CLUTCH
No. 5166	DISTRIBUTOR
No. 2115	IGNITION COIL
No. 1099	COMBINATION SWITCH
No. 5705	CIRCUIT BREAKER
No. 5312	AUTO HORN

57 MODEL—1919 CADILLAC

Delco System No. 177

No. 98	MOTOR GENERATOR
No. 12677	MOTOR CLUTCH
No. 5166	DISTRIBUTOR
No. 2115	IGNITION COIL
No. 1099	COMBINATION SWITCH
No. 5742	CIRCUIT BREAKER
No. 5312	HORN (EXTRA)

59 MODEL—1920 AND 1921 CADILLAC

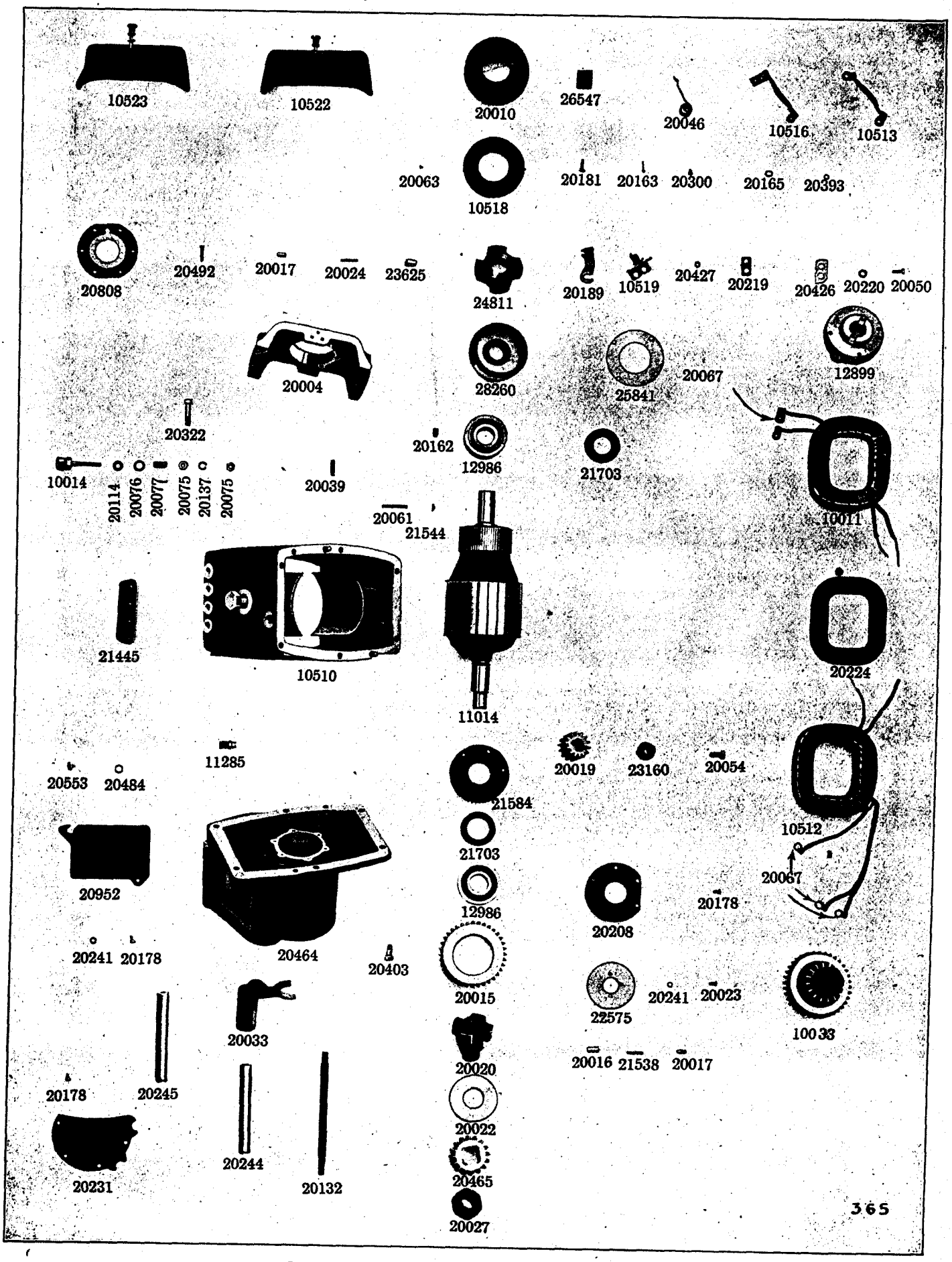
Delco System No. 291

No. 162	MOTOR GENERATOR
No. 1150	COMBINATION SWITCH
No. 2115	IGNITION COIL
No. 5206	DISTRIBUTOR
No. 5742	CIRCUIT BREAKER
No. 12677	MOTOR CLUTCH

Chart Showing Cadillac Models and the Delco Apparatus Used on Each Model

Cadillac Models	Year Used	Delco System	Motor Generator	Ignition Switch	Combination Switch	Ignition Coils and Boxes	Distributor	Apparatus Boxes	Ignition Relays	Circuit Breakers	Motor Clutch	Resistance Units	Clutch Magnet	Battery Box	Starting Switch	Auto Horns	Horn Switch	Terminal Boards
1910	1910	IGN 142		1018		2004			5661									
1911	1911	IGN 4411		1007* 1009		2022	5001		5661									
1912	1912	1	1	1018		2022 2045	5001 5049		5661			10678*	5442	5401	1991			
1913	1913	4	4	1978 1979		2093 2092	5055 5059		5677			10686	5440	5404				10131
1914	1914	27	24		1035* 1042*	2104	5105	5506		5692			5447					
51	1915	69	44		1045	2115				5696 5695	10724					5308		
53	1916	98	78*		1062* 1069	2115	5150*			5705*	11973					5310	1061	
55	1917	130	98		1077	2115	5150*			5705*	12677					5311	1061	
57	1918	177	98		1099*	2115	5166			5705*	12677					5312		
57	1919	177	98		1099*	2115	5166			5742	12677					5312		
59	1920 1921	291	162		1150	2115	5206			5742	12677							

*Refer to the note under the piece of apparatus in the catalog to determine the correct part to order.



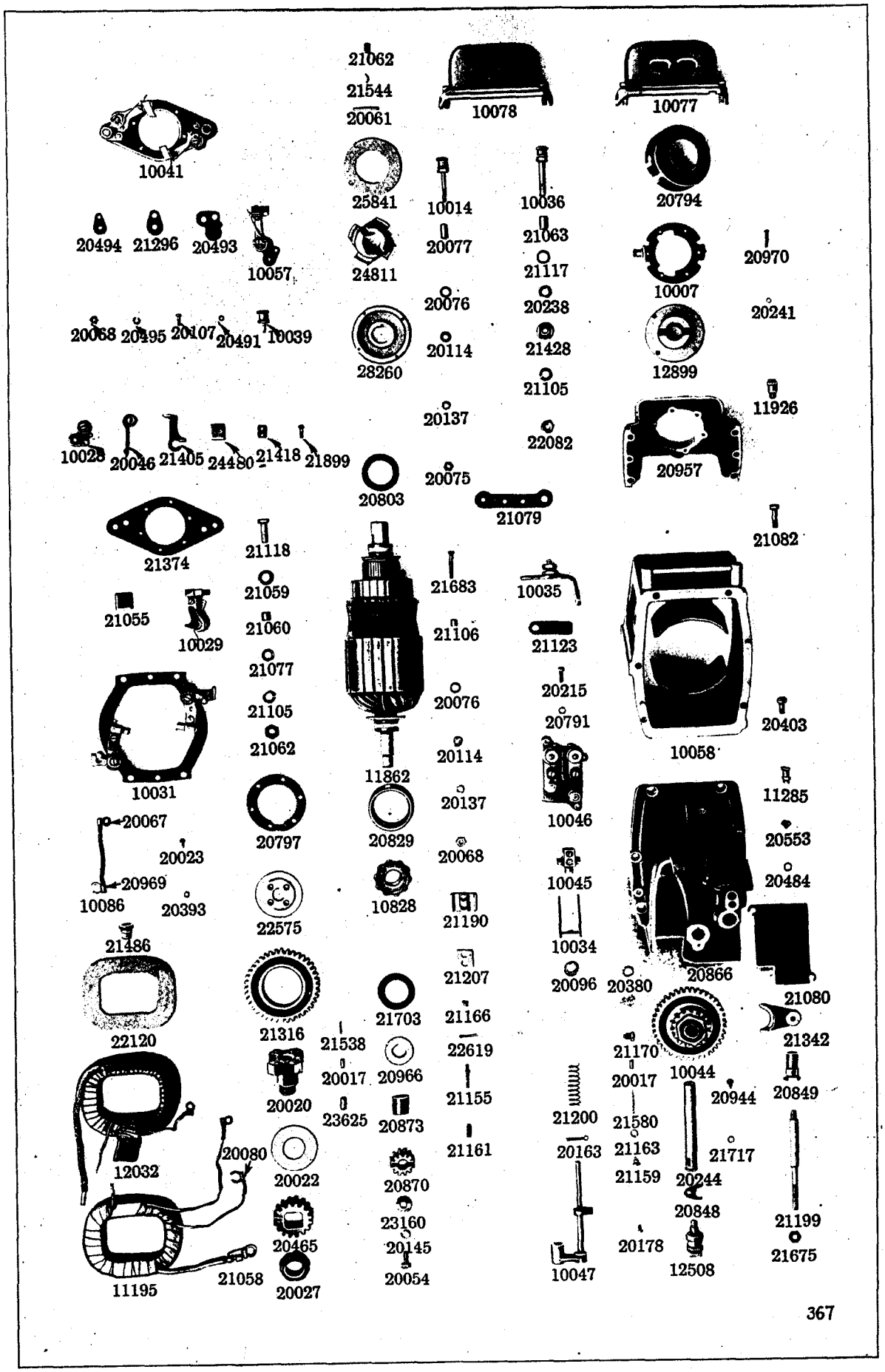
No. 1 MOTOR GENERATOR

No. 1 MOTOR GENERATOR

Piece Number	NAME OF PART	Quantity Required
1	**MOTOR GENERATOR COMPLETE**	1
10510	**Generator Frame Assembly**	1
	(Includes the next 2 Items)	
20041	Pole Piece Screw (Not shown in Illustration)	2
20039	Dowel Pin for Pole Piece	4
10011	**Upper Field Coil Assembly Complete**	1
	(Includes the next Item)	
20067	Terminal Clip for Spring Terminal Assembly 10014	2
10512	**Lower Field Coil Assembly Complete**	1
	(Includes the next Item)	
20067	Terminal Clip for Spring Terminal Assembly 10014	3
10513	**Brush Connector Lead Assembly Complete**	1
	(Includes the next 2 Items)	
22517	Sleeving for Lead Assembly 10513 (Not shown in Illustration)	1
20067	Clip for Lead Assembly 10513 (Not shown in Illustration)	2
10014	**Spring Terminal Assembly for connecting Generator**	4
21445	Insulator for Spring Terminal Assembly 10014 (Outer)	1
20077	Insulating Bushing for Spring Terminal Assembly 10014	4
20076	Insulating Washer for Spring Terminal Assembly 10014 (Inner)	4
20114	Plain Washer for Spring Terminal Assembly 10014	4
20075	Nut for retaining Spring Terminal Assembly 10014	8
20137	Lock Washer for Nut 20075	4
20224	Shield for Field Coil Assemblies 10011 and 10512	2
20004	Frame for Driving Clutch End of Generator	1
12986	**Ball Bearing Assembly for Frame 20004**	1
21703	Oil Retainer (Felt) (For Ball Bearing Assembly 12986 (Inner)	1
20208	Retainer for Ball Bearing Assembly 12986 (Inner)	1
20492	Screw for retaining Retainer 20208 and Bearing Retainer Assembly 10518	6
10518	**Bearing Retainer Assembly for Ball Bearing Assembly 12986 (Outer)**	1
20062	Stud for Retainer Assembly 10518 (Not shown in Illustration)	1
10519	**Generator Brush Bracket Assembly Complete**	2
	(Includes the next 2 Items)	
20187	Stud for holding Generator Brush Arm Assembly 13516 (Not shown in Illustration)	1
20188	Stop Stud for Generator Brush Arm Assembly 13516 (Not shown in Illustration)	1
20050	Screw for attaching Generator Brush Bracket Assembly 10519	4
20220	Plain Washer for Screw 20054	4
20219	Insulator for Generator Brush Bracket Assembly 10519 (Upper)	2
20426	Insulator for Generator Brush Bracket Assembly 10519 (Lower)	2
20427	Insulating Bushing for Screw 20050	4
20189	Generator Brush Arm	2
26547	Brush for Brush Arm 20189	1
20181	Screw for attaching Brush 26547	2
21418	Lock Plate for Screw 20181 (Not shown in Illustration)	1
10516	**Generator Brush Lead Assembly Complete**	2
	(Includes the next 3 Items)	
22517	Sleeving for Lead Assembly 10516 (Not shown in Illustration)	1
20067	Clip for Spring Terminal End of Lead Assembly 10516 (Not shown in Illustration)	1
20180	Clip for Brush Arm End of Lead Assembly 10516 (Not shown in Illustration)	1
11014	**Armature Assembly for Motor Generator**	1
20046	Spring for Generator Brush Arm 20189	2
20163	Cotter Pin for retaining Generator Brush Arm 20189	2
20065	Screw for retaining Cover 20010 (Not shown in Illustration)	1
20010	Cover for Generator Clutch Assembly 12899	1
20162	Clamp Screw for retaining Clutch Assembly 12899 (Not shown in Illustration)	1
21544	Key for Generator Clutch Assembly 12899	1
13671	**Generator Clutch Assembly Complete (Not shown in Illustrated)**	1
	(Includes the next 8 Items)	
22262	Cam for Generator Clutch Assembly 13671 (Not shown in Illustration)	1
28260	Shell for Generator Clutch Assembly 13671	1
23625	Roll for Cam 22262	4
20024	Spring for Plunger 20017	4
20017	Plunger for Roll 24625	4
25841	Retainer for Roll 23625	1
20063	Screw for retaining Retainer 25841	4
20061	Pin for retaining Clutch	1
20464	Housing for Pinion End for Generator	1
21584	Retainer for Ball Bearing Assembly 12986 (Outer) (Pinion End)	1
20178	Screw for retaining Retainer 21584	6
20241	Lock Washer for Screw 20178	6
11285	**Oiler Assembly for Housing 20464**	1
10522	**Cover Assembly Complete (Upper)**	1
	(Includes the next 4 Items)	
10521	**Screw Assembly (Not shown in Illustration)**	1
20056	Nut for Screw Assembly 10521 Not shown in Illustration)	1

No. 1 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
20211	Lock Washer for Nut 20056 (Not shown in Illustration)	1
20059	Pin for Nut 20056 (Not shown in Illustration)	1
10523	**Cover Assembly Complete (Lower)** (Includes the next 4 Items)	1
10521	**Screw Assembly (Not shown in Illustration)**	1
20056	Nut for Screw Assembly 10521 (Not shown in Illustration)	1
20211	Lock Washer for Nut 20056 (Not shownin Illustration)	1
20059	Pin for Nut 20056 (Not shown in Illustration)	1
20484	Spring Washer for Screw 20553	2
20553	Screw for attaching Cover 20952	2
20952	Cover for End Housing Assembly 10520 (Top	1
20178	Screw for attaching Cover 20231	4
20241	Lock Washer for Screw 20178	4
20231	Cover for End Housing Assembly 10520 (End)	1
20245	Shaft for Shifting Yoke 20033	1
20244	Shaft for Motor Clutch	1
20132	**Shifting Rod for Motor Clutch**	1
20033	Shifting Yoke for Shifting Rod 20132	1
23160	Clamp Washer for Motor Pinion 20019	1
20054	Clamp Screw for retaining Motor Pinion 20019	1
20145	Lock Washer for Clamp Screw 20054 (Not shown in Illustration)	1
20019	Motor Pinion for Armature Shaft	1
20403	Screw for attaching End Housing 20464	6
20775	Sleeve for Armature Shaft (Pinion Shaft) (Not shown in Illustration)	1
12986	**Ball Bearing Assembly for Pinion End of Armature Shaft**	1
21703	Oil Retainer (Felt) for Ball Bearing Assembly 12986	2
21584	Retainer for Ball Bearing Assembly (Outer) (Pinion End)	1
20322	Screw for attaching End Frame 20004	4
20042	Dowel Pin for End Frame 20004 (Not shown in Illustration)	2
20039	Dowel Pin for End Housing 20464	2
20178	Screw for attaching Retainer 21584	6
20241	Lock Washer for Screw 20178	6
20300	Screw for attaching Generator Brush Lead Assembly 10516 to Generator Brush Bracket	4
20165	Plain Washer for Screw 20300	4
20393	Lock Washer for Screw 20300	4
12809	**Motor Clutch Assembly Complete (Old Style before Cadillac No. 65800)** (Includes the next 11 Items)	1
20232	Pinion for Motor Clutch Assembly 12809 (Not shown in Illustration)	1
20020	Cam for Motor Clutch Assembly 12809	1
20027	Clamp Nut for Motor Clutch Assembly 12809	1
20015	Gear for Motor Clutch Assembly 12809	1
20022	Retainer for Roll 23625 (Inner)	1
22575	Retainer for Roll 23625 (Outer)	1
20017	Plunger for Roll 23625	4
21538	Spring for Plunger 20017	4
23625	Roll for Cam 20020	4
20023	Screw for Retainer 20022 and 22575	4
20393	Lock Washer for Screw 20023	4
10033	**Motor Clutch Assembly Complete (After Cadillac Motor No. 65800)** (Includes the next 11 Items)	1
20465	Pinion for Motor CLlutch Assembly 10033	1
20020	Cam for Motor Clutch Assembly 10033	1
20027	Clamp Nut for Motor Clutch Assembly 10033	1
20015	Gear for Motor Clutch Assembly 10033	1
20022	Retainer for Roll 23625 (Inner)	1
22575	Retainer for Roll 23625 (Outer)	1
21538	Spring for Plunger 20017	4
20017	Plunger for Roll 23625	4
23625	Roll for Cam 20020	4
20023	Screw for Retainers 20022 and 22575	4
20241	Lock Washer for Screw 20023	4



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No. 4 MOTOR GENERATOR

No. 4 MOTOR GENERATOR

Piece Number	NAME OF PART	Quantity Required
4	**MOTOR GENERATOR**	1
10058	**Generator Frame Assembly** (Includes the next 2 Items)	1
20041	Screw for Pole Piece (Not shown in Illustration)	2
20039	Dowel Pin for Pole Piece (Not shown in Illustration)	4
10079	**Field Coil Assembly Complete** (Includes the next 10 Items)	1
21486	Insulating Bushing for Series Lead	1
20080	Terminal Clip for Spring Terminal Assembly 10036	1
20067	Terminal Clip for Spring Terminal Assembles 10014 and 10037	2
21058	Terminal Clip for Spring Terminal Assembly 10080	1
21681	Terminal Clip for attaching Series Lead to Switch Cover Assembly 10046	1
22285	Binding Strip for Field Coil Assembly 10079 (Not shown in Illustration)	2
22284	Insulating Binding Strip for Field Coil Assembly 10079 (Outer) (Not shown in Illustration)	2
22283	Insulating Binding Strip for Field Coil Assembly 10079 (Inner) (Not shown in Illustration)	2
10029	**Motor Brush Arm Assembly Complete** (Includes the next 9 Items)	2
21051	Arm for Motor Brush Arm Assembly 10029 (Right Hand) (Not shown in Illustration)	1
21052	Arm for Motor Brush Arm Assembly 10029 (Left Hand) (Not shown in Illustration)	1
20970	Bolt for connecting Arm 21051 and 21052 (Not shown in Illustration)	1
21055	Brush for Motor Brush Arm Assembly 10029	1
21068	Hub for Arms 21051 and 21052 (Not shown in Illustration)	1
20495	Lock Washer for Nut 20068	1
20068	Nut for Bolt 20970	1
21124	Spring for Motor Brush Arm Assembly 10029 (Outer) (Not shown in Illustration)	1
21258	Stud for Arms 21051 and 21052 (Not shown in Illustration)	1
10028	**Motor Brush Connector Assembly Complete**	2
21413	Spring for Motor Brush Arm Assembly 10029 (Inner)	2
21077	Plain Washer for Screw 21118	2
20791	Lock Washer for Screw 21118	2
21118	Screw for retaining Motor Brush Arm Assembly 10029	2
21057	Plate for mounting Motor Brush Arm Assembly 10029 (Not shown in Illustration)	1
21407	Stud for Plate 21057 for holding Motor Brush Arm Assembly 10029 (Not shown in Illustration)	2
20125	Insulating Washer for Stud 21407 (Outer) (Not shown in Illustration)	2
20076	Insulating Washer for Stud 21407 (Inner) (Not shown in Illustration)	2
20114	Plain Washer for Nut 20075 (Not shown in Illustration)	2
20137	Lock Washer for Nut 20075 (Not shown in Illustration)	2
20075	Nut for retaining Stud 21407 (Not shown in Illustration)	2
21078	Insulating Bushing for Stud 21407 (Not shown in Illustration)	2
21428	Plain Washer for retaining Spring 21413 (Not shown in Illustration)	2
10014	**Spring Terminal Assembly for connecting Generator (No. 1-2-3 Terminal from Left Side of Generator**	3
10036	**Spring Terminal Assembly for connecting Generator (No. 4 Terminal from Left Side of Generator)**	1
10035	**Motor Terminal Assembly Complete** (Includes the next 2 Items)	1
21087	Strap for connecting Motor Terminal to Spring Terminal Assembly 10036 (Not shown in Illustration)	1
21372	Stud for Strap 21987 (Not shown in Illustration)	1
20079	Washer for Stud 21062	1
21062	Nut for Stud 21372	1
21105	Lock Washer for Nut 21062	1
21106	Insulating Bushing for Screw 21683	1
20077	Insulating Bushing for Spring Terminal Assembly 10014	3
21063	Insulating Bushing for Spring Terminal Assembly 10036	1
21059	Insulating Collar for Screw 21073	1
21079	Insulator for Spring Terminal Assemblies 10014 and 10036	1
21073	Screw for retaining Brush Terminal (Not shown in Illustration)	1
21123	Insulator for Strap 21087	1
20075	Nut for Spring Terminal Assemblies 10014 and 10036 and Screw 21683	7
20039	Dowel Pin for locating Pole Piece (Not shown in Illustration)	2
21683	Screw for retaining Strap 21087	1
21060	Insulating Washer for Screw 21073 (Not shown in Illustration)	1
22120	Shield for Field Coil Assembly 10079	2
20114	Plain Washer for Screw 21683 and Spring Terminal Assembly 10014	4
20137	Lock Washer for Screw 21683 and Spring Terminal Assembly 10014	4
20076	Insulating Washer for Screw 21683 and Spring Terminal Assembly 10014	4
21117	Insulating Washer for Spring Terminal Assembly 10036	2
20238	Plain Washer for Spring Terminal Assembly 10036	2

No. 4 MOTOR GENERATOR (Continued)

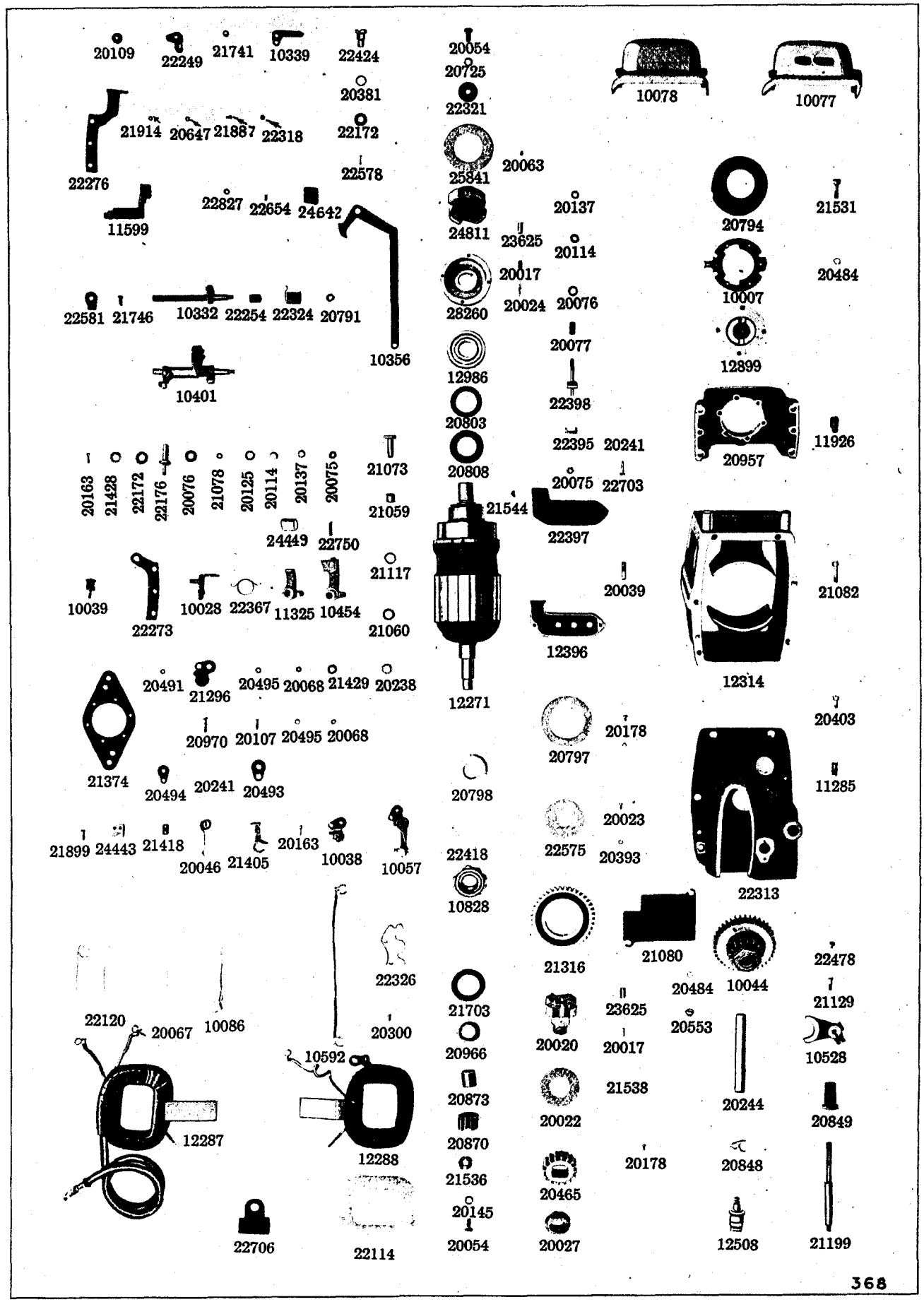
Piece Number	NAME OF PART	Quantity Required
22082	Clamp Nut for Spring Terminal Assembly 10036	1
11862	**Armature Assembly for Motor Generator**	1
21405	Generator Brush Arm	1
24480	Brush for Arm 21405	1
21418	Plate for Arm 21405	2
21899	Screw for attaching Brush 24480	2
22826	Lock Plate for Screw 21899 (Not shown in Illustration)	1
10038	**Generator Brush Holder Plate Assembly Complete (Not shown in Illustration)** (Includes the next Item)	2
12422	Stud for Plate Assembly 10038 (Not shown in Illustration)	1
10039	**Spring Terminal Assembly for Generator Brush Holder Assembly 10041**	2
21374	Holder for Generator Brush Holder Plate Assembly 10038	2
21296	Insulator for Plate 21209	2
23623	Insulator for Holder 21374 (Not shown in Illustration)	2
20494	Plate for Generator Brush Holder Assembly 10041 (Outer)	2
20495	Lock Washer for Nut 20068	4
20068	Nut for retaining Generator Brush Spring Terminal Assembly 10039 and Screw 20107	4
20107	Screw for retaining Plate 20494	2
20491	Insulating Bushing for Generator Brush Spring Terminal Assembly 10039 and Screw 20107	4
10007	**Bearing Retainer Assembly Complete** (Includes the next 5 Items)	1
10201	**Bearing Retainer Assembly (Not shown in Illustration)** (Includes the next Item)	1
20062	Stud for Retainer Assembly 10201 (Not shown in Illustration)	1
20802	Spring Nut for Bearing Retainer Assembly 10007 (Not shown in Illustration)	1
20801	Screw for Spring Nut 20802 (Not shown in Illustration)	1
20307	Spring for Screw 20801 (Not shown in Illustration)	1
20957	End Frame for Generator	1
12989	**Ball Bearing Assembly for Armature Shaft (Not shown in Illustration)**	1
22736	Shim for Ball Bearing Assembly 12989 (Not shown in Illustration)	2
20970	Screw for retaining Bearing Retainer Assembly 10007	6
20241	Lock Washer for Screw 20970	6
21704	Pipe Plug for Oil Hole in End Frame 20957 (Not shown in Illustration)	1
12899	**Generator Clutch Assembly Complete** (Includes the next 8 Items)	1
24811	Cam for Generator Clutch Assembly 12899	1
28260	Shell for Generator Clutch Assembly 12899	1
23625	Roll for Cam 24811	4
20024	Spring for Plunger 20017 (Not shown in Illustration)	4
20017	Plunger for Roll 23625	4
25841	Retainer for Roll 23625	1
20063	Screw for retaining Retainer 25841 (Not shown in Illustration)	4
20061	Pin for Shell 28260	1
20794	Cover for Generator Clutch Assembly 12899	1
20966	Collar for retaining Ball Bearing Assembly 12989 (Pinion End of Armature Shaft)	1
21544	Key for Generator Clutch Assembly 12899	1
20163	Cotter Pin for Motor Brush Arm Assembly 10029	2
20061	Pin for Set Screw 20162	1
20870	Motor Pinion for Armature Shaft	1
20808	Retainer for Ball Bearing Assembly 12989 (Commutator End) (Inner) (Not shown in Illustration)	1
21703	Oil Retainer (Felt) for Ball Bearing Assembly 12989 (Outer, Both Ends of Armature Shaft)	2
20803	Oil Retainer (Felt) for Ball Bearing Assembly 12989 (Inner, Both Ends of Armature Shaft)	2
20054	Screw for retaining Motor Pinion 20870	1
20162	Set Screw for Commutator End of Armature Shaft (Not shown in Illustration)	1
20873	Sleeve for retaining Collar 20966 (Pinion End of Armature Shaft)	1
20046	Spring for Motor Brush Arm Assembly 10029	2
23160	Clamp Washer for Screw 20054 (Pinion End of Armature Shaft)	1
20725	Lock Washer for Screw 20054	1
20798	Washer for retaining Ball Bearing Assembly 12989 (Pinion End of Armature Shaft, Inner) (Not shown in Illustration)	1
22735	Washer (Shim) for Armature Shaft (Not shown in Illustration)	1
10034	**Switch Latch Arm Assembly for Switch Contact Block Assembly 10045**	1
22620	Block for Operating Switch Cover Assembly 10046 (Not shown in Illustration)	1
21173	Roll for Block 22620 (Not shown in Illustration)	2
21174	Screw for retaining Roll 21173 (Not shown in Illustration)	2
10044	**Motor Clutch Assembly Complete** (Includes the next 11 Items)	1
20465	Pinion for Motor Clutch Assembly 10044	1
20020	Cam for Motor Clutch Assembly 10044	1
20027	Clamp Nut for Motor Clutch Assembly 10044	1
21316	Gear for Motor Clutch Assembly 10044	1
20022	Retainer for Roll 23625 (Inner)	1
22575	Retainer for Roll 23625 (Outer)	1
21538	Spring for Plunger 20017	4

No. 4 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
20017	Plunger for Roll 23625	4
23625	Roll for Cam 20020	4
20023	Screw for Retainers 22575 and 20022	4
20393	Lock Washer for Screw 20023	4
10046	**Switch Cover Assembly Complete** (Includes the next 29 Items)	1
10049	**Generator Switch Common Conductor Assembly (Large)**	1
10050	**Switch Conductor Assembly (Generator) (Small)**	1
10051	**Switch Conductor Assembly (Motor) (Medium)**	1
10040	**Insulator Assembly for Terminal Plate Assembly 10052 and Plate 21188** (Includes the next 3 Items)	1
21368	Insulator for Insulator Assembly 10040	1
21176	Separator for Insulator 21368	1
22009	Screw for Insulator Assembly 10040	2
10158	**Spring Terminal Assembly for connecting Switch Cover Assembly 10046**	1
10052	**Switch Terminal Plate Assembly for Top Cover 21151** (Includes the next 3 Items)	1
10162	**Spacing Terminal Assembly for Switch Terminal Plate Assembly 10052**	1
21189	Plate for Switch Terminal Plate Assembly	1
20137	Lock Washer for Spring Terminal Assembly 10162	1
21106	Insulating Bushing for Screw 21530	1
21158	Insulating Bushing for Spring Terminal Assembly 10158 and Switch Conductor Assemblies 10040 and 10051	3
21156	Insulating Bushing for Screw 21169	1
21150	Cover for Switch Cover Assembly 10046	1
20347	Nut for Rod 21183	1
21456	Nut for Switch Conductor Assembly 10051 (Thin)	1
21062	Nut for Switch Conductor Assemblies 10051 and 10049	2
21455	Insulating Plate for Switch Conductor Assemblies 10051 and 10049 (Inner)	1
21188	Clamp Plate for Conductor Assembly 10051 and Screw 21169	2
21183	Rod for Switch Conductor Assemblies 10050 and 10051 and Generator Switch Common Conductor Assembly 10049	2
20076	Insulating Washer for Screw 21530 and 21169	2
20114	Plain Washer for Screws 21530 and 21169	2
20791	Lock Washer for Screws 21530 and 21169	2
21165	Insulating Washer for Spring Terminal Assembly 10158 (Outer)	1
20146	Lock Washer for Spring Terminal Assembly 10158 and Nut 21062	3
20393	Lock Washer for Nut 20347	2
21454	Insulating Washer for Spring Terminal Assembly 10158 (Inner)	1
21168	Plain Washer for Spring Terminal Assembly 10158	1
21169	Screw for retaining Clamp Plate 21188	1
21530	Screw for retaining Switch Terminal Plate Assembly 10052	1
21895	Insulating Bushing for Switch Conductor Assemblies 10050 and 10051 and Generator Switch Common Conductor Assembly 10049	4
21896	Insulating Bushing between Switch Conductor Assemblies 10051 and 10050	1
21190	Switch Contact Plate for Switch Conductor Assemblies 10050 and 10051 and Generator Switch Common Conductor Assembly 10049	1
20866	End Housing for Generator	1
20849	Bushing in End Housing 20866 for Shift Rod 21199	1
20944	Screw for connecting Shift Rod 21199	1
21717	Lock Washer for Screw 20944	1
12989	**Ball Bearing Assembly for Armature Shaft (Not shown in Illustration)**	1
22736	Shim for Ball Bearing Assembly 12989 (Not shown in Illustration)	2
20178	Screw for retaining Retainer 20797	6
20797	Retainer for Ball Bearing Assembly 12989	1
20241	Lock Washer for Screw 20178	6
21704	Pipe Plug for Oil Hole in End Housing 20866 (Not shown in Illustration)	1
10047	**Switch Rod Operating Assembly Complete** (Includes the next Items)	1
21162	Pin for retaining Arms to Rod (Not shown in Illustration)	2
20244	Shaft for Motor Clutch Assembly 10044	1
21544	Key for Shaft 20244	1
21704	Pipe Plug for Shaft 20244 (Not shown in Illustration)	1
21166	Insulating Bushing for Switch Contact Plate 21190	2
20848	Clip for Shaft 20244	1
21080	Cover for End Housing Rod Assembly 10054 (Bottom)	1
20096	Cup for Spring 21200	1
21207	Insulator for Switch Contact Plate 21190	1
21675	Nut for Shift Rod 21199	1
21162	Pin for Arm 21178 (Not shown in Illustration)	1
21201	Pin for locating Switch Cover Assembly 10046 (Not shown in Illustration)	2
20163	Cotter Pin for retaining Cup 20096	1
20017	Plunger for Switch Latch Arm Assembly 10034	1
21199	Shift Rod for Motor Clutch Assembly 10044	1

No. 4 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
21147	Screw for attaching Switch Cover Assembly 10046 (Outer) (Not shown in Illustration)	1
20215	Screw for attaching Switch Cover Assembly 10046 (Inner)	1
22618	Screw for Switch Contact Plate 21190 (Not shown in Illustration)	2
22619	Cotter Pin for Screw	1
21159	Screw for retaining Plunger 20017	1
21170	Screw for attaching Switch Latch Arm Assembly 10034	2
20178	Screw for attaching Clip 20848	1
20553	Screw for attaching Cover 21080	2
21161	Spring for Switch Contact Plate 21190	2
21200	Spring for Switch Operating Rod Assembly 10047	1
21580	Spring for Plunger 20017	1
20791	Lock Washer for Screws 21147 and 20215	2
20380	Lock Washer for Screw 21170	2
21105	Lock Washer for Nut 21675	1
20484	Spring Washer for Screw 20553	2
20142	Lock Washer for Screw 20178 (Not shown in Illustration)	1
21163	Lock Washer for Screw 21159 (Not shown in Illustration)	1
21342	Yoke for Shift Rod 21199	1
10077	**Lower Generator End Cover Assembly Complete** (Includes the next 5 Items)	1
20737	Plate for Screen 20736 (Not shown in Illustration)	1
20736	Screen for Cover Assembly (Not shown in Illustration)	1
21673	Rivet retaining Plate 20737 and Screen 20736 (Not shown in Illustration)	1
21531	Screw for attaching Lower Generator End Cover Assembly 10077 (Not shown in Illustration)	2
20484	Spring Washer for Screw 21531 (Not shown in Illustration)	2
10078	**Upper Generator End Cover Assembly Complete** (Includes the next 2 Items)	1
21531	Screw for attaching Upper Generator Cover Assembly 10078 (Not shown in Illustration)	2
20484	Spring Washer for Screw 21531 (Not shown in Illustration)	2
20403	Screw for attaching Generator End Housing	5
10086	**Brush Connector Lead Assembly** (Includes the next 3 Items)	1
22386	Clip for Brush End of Lead Assembly 10086 (Not shown in Illustration)	1
20067	Clip for Field Coil End of Lead Assembly 10086	1
22451	Insulator for Lead Assembly 10086 (Not shown in Illustration)	1
21082	Screw for attaching Generator End Frame	4
11285	**Oiler Assembly for Ball Bearing Assembly 12989 (Commutator End)**	1
11926	**Oiler Assembly for Ball Bearing Assembly 12989 (Pinion End)**	1
12508	**Grease Cup Assembly in End Housing 20866 for Motor Clutch 10044**	1
21370	Terminal Clip for connecting Series Lead to Switch Cover Assembly 10046 (Not shown in Illustration)	1
21699	Terminal Clip for Motor Terminal (Not shown in Illustration)	1
20969	Terminal Clip for Spring Terminal Assembly 10014, 10080, 10037, 10036 and 10158 (Not shown in Illustration)	5
21315	Terminal Clip for connecting Switch Conductor Assembly 10051 and Generator Switch Common Conductor Assembly 10049 (Not shown in Illustration)	2



No. 24 MOTOR GENERATOR

No. 24 MOTOR GENERATOR

Piece Number	NAME OF PART	Quantity Required
24	**MOTOR GENERATOR COMPLETE**	1
12314	**Generator Frame Assembly** (Includes the next 2 Items)	1
20041	Screw for Pole Piece (Not shown in Illustration)	2
20039	Dowel Pin for Pole Piece (Not shown in Illustration)	4
10384	**Field Coil Assembly Complete (Not shown in Illustration)** (Includes the next 6 Items)	1
22289	Terminal Clip for Series Lead (Not shown in Illustration)	1
20300	Screw for Terminal Clip 22289 (Not shown in Illustration)	2
22283	Insulating Strip for Field Coil Assembly 10384 (Inner) (Not shown in Illustration)	2
22284	Insulating Strip for Field Coil Assembly 10384 (Outer) (Not shown in Illustration)	2
22285	Binding Strip for Field Coil Assembly	2
20067	Terminal Clip for Terminal Stud 22398	3
10356	**Brush Switch Link and Lever Assembly Complete** (Includes the next 3 Items)	1
22240	Link for connecting Shift Rod 21199 (Not shown in Illustration)	1
14253	**Lever Assembly (Not shown in Illustration)**	1
12396	**Terminal Block Assembly for Motor Generator**	1
22273	Motor Brush Stud Plate	1
22176	Stud for holding Lower Motor Brush Arm	1
10028	**Motor Brush Connector Assembly Complete**	1
20114	Plain Washer for Stud 22176	1
21078	Insulating Washer for Stud 22176	1
20076	Insulting Wsher for Stud 22176 (Inner)	1
20125	Insulating Washer for Stud 22176 (Outer)	1
20137	Lock Washer for Nut 20075	1
20075	Nut for attaching Stud 22176	1
10332	**Brush Arm Shaft Assembly** (Includes the next 2 Items)	1
22256	Spring Stud for Arm Shaft Assembly 10332 (Not shown in Illustration)	1
21162	Taper Pin for attaching Arm to Shaft (Not shown in Illustration)	1
11599	**Motor Brush Switch Arm Assembly** (Includes the next 4 Items)	1
22256	Spring Stud for Arm Assembly 11599 (Not shown in Illustration)	1
21173	Roll for Stud 22243	1
22243	Stud for attaching Roll 21173 to Arm Assembly 11599 (Not shown in Illustration)	1
22247	Contact for Motor Brush Switch Arm Assembly 11599 (Not shown in Illustration)	1
24642	Brush for Motor Brush Switch Arm Assembly 11599	2
22654	Screw for attaching Brush 24642	1
22827	Lock Plate for Screw 22654	1
22581	Collar for Shaft 22250	1
21746	Screw for retaining Collar 22581	1
22254	Sleeve for Shaft 22250	1
22324	Spring for Brush Arm Shaft Assembly 10332	1
22424	Screw for attaching Brush Switch Link and Lever Assembly 10356	1
20381	Lock Washer for Screw 22424	1
22578	Cotter Pin for Screw 22424	1
22398	Terminal Stud for connecting Motor Generator	3
20075	Nut for Terminal Stud 22398	9
20077	Insulating Bushing for Terminal Stud 22398	3
22395	Clip for Terminal Stud 22398	3
20076	Insulating Washer for Nut 20075	3
20114	Plain Washer for Nut 20075	3
20137	Lock Washer for Nut 20075	6
21073	Screw for attaching Field Coil Assembly 10384 (Lower)	1
21059	Collar for Screw 21073	1
21060	Insulating Bushing for Screw 21073	1
21117	Insulating Washer for Screw 21073	1
20238	Plain Washer for Screw 21073	1
22114	Insulator for Field Coil Assembly 10384 (Lower)	1
22120	Insulator for Field Coil Assembly 10384 (Upper)	1
20065	Screw for Shaft 22250 (Not shown in Illustration)	1
20345	Lock Washer for Screw 20065	1
22172	Plain Washer for under Cotter Pin 22578	1
10086	**Brush Connector Lead Assembly Complete** (Includes the next 3 Items)	1
22386	Clip for Brush End for Lead Assembly 10086 (Not shown in Illustration)	1
20067	Clip for Brush Plate End of Lead Assembly 10086 (Not shown in Illustration)	1
22451	Insulator for Lead Assembly 10086 (Not shown in Illustration)	1
11325	**Lower Motor Brush Arm Assembly** (Includes the next Item)	1
22084	Spring Stud for Brush Arm Assembly 11325 (Not shown in Illustration)	1
24449	Brush for Lower Motor Brush Arm Assembly 11325	2
22750	Screw for attaching Brush 24449	1
22827	Lock Plate for Screw 22750	1

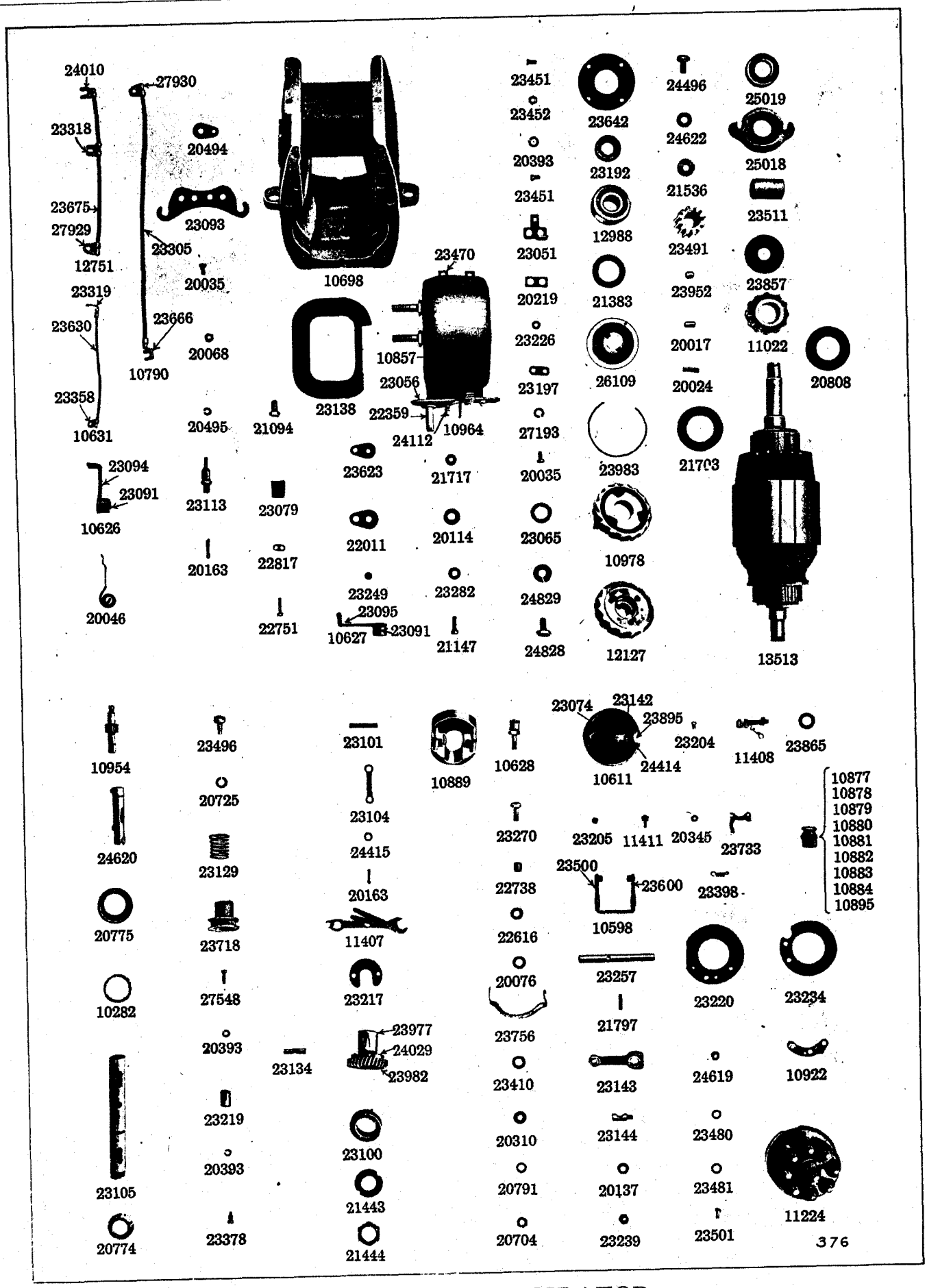
No. 24 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
22542	Stud for End of Shaft 22250 (Not shown in Illustration)	1
20791	Lock Washer for Stud 22542	1
21428	Plain Washer for retaining Lower Motor Brush Arm Assembly 11325	1
22570	Wedge for Field Coil Assembly 10384 (Not shown in Illustration)	2
22367	Spring for Lower Motor Brush Arm Assembly 11325	1
22172	Spring Washer under Cotter Pin 20163	1
20163	Cotter Pin retaining Plain Washer 21428	1
20039	Dowel Pin for locating Pole Piece	1
12271	**Armature Assembly for Motor Generator**	1
10038	**Generator Brush Holder Plate Assembly Complete** (Includes the next Item)	2
21422	Stud for Plate Assembly 10038 (Not shown in Illustration)	1
10039	**Generator Brush Spring Terminal Assembly for Generator Brush Holder Assembly 10038**	2
21374	Holder for Generator Brush Holder Plate Assembly 10038	1
21296	Insulator for Plate 21209	2
23623	Insulator for Holder 21374 (Not shown in Illustration)	2
20494	Plate for Generator Brush Holder Assembly 10038 (Outer)	2
20495	Lock Washer for Nut 20068	4
20068	Nut for retaining Generator Brush Spring Terminal Assembly 10039 and Screw 20107	4
20107	Screw for retaining Plate 20494	2
20491	Insulating Bushing for Generator Brush Spring Terminal Assembly 10039 Screw 20107	4
10007	**Bearing Retainer Assembly Complete for Ball Bearing Assembly 12986** (Includes the next 5 Items)	1
10201	**Bearing Retainer Assembly (Not shown in Illustration)**	1
20062	Stud for Retainer Assembly 10201 (Not shown in Illustration)	1
20802	Spring Nut for Bearing Retainer Assembly 10007 (Not shown in Illustration)	1
20801	Screw for Spring Nut 20802 (Not shown in Illustration)	1
20307	Spring for Screw 20801 (Not shown in Illustration)	1
20957	End Frame for Generator	1
12986	**Ball Bearing Assembly for Commutator End of Armature Shaft**	6
20970	Screw for retaining Bearing Retainer Assembly 10007	6
20241	Lock Washer for Screw 20970	1
21704	Pipe Plug for Oil Hole in End Frame 20957 (Not shown in Illustration)	1
10592	**Generator Brush Connector Lead Assembly Complete** (Includes the next 2 Items)	2
22386	Clip for Lead Assembly 10592 (Not shown in Illustration)	1
23089	Sleeving for Lead Assembly 10592 (Not shown in Illustration)	1
22326	Insulating Guard Plate for Lead Assembly 10592	1
10382	**Generator Clutch Assembly Complete (Smooth Type) (Not shown in Illustration)** (Includes the next 8 Items) (When ordering a Complete Clutch always order the New Style "Ratchet Type" No. 11348)	1
24811	Cam for Generator Clutch Assembly 10382 (Not shown in Illustration)	1
22286	Shell for Generator Clutch Assembly 10382 (Not shown in Illustration)	1
20878	Retainer for Roll 23625 (Not shown in Illustration)	1
23625	Roll for Cam 24811	1
20024	Spring for Plunger 20017	1
20017	Plunger for Roll 23625	1
21477	Screw for retaining Retainer 20878 (Not shown in Illustration)	1
22321	Plain Washer for Generator Clutch Assembly (Not shown in Illustration)	1
11348	**Generator Clutch Assembly Complete (Ratchet Type)** (Includes the next 8 Items)	1
24811	Cam for Generator Clutch Assembly 11348	1
24812	Shell for Generator Clutch Assembly 11348 (Not shown in Illustration)	4
23625	Roll for Cam 24811	4
20024	Spring for Plunger 20017	4
20017	Plunger for Roll 23625	1
25841	Retainer for Roll 23625	4
20063	Screw for retaining Retainer 25841	1
22321	Clamp Washer for Clutch Assembly	1
20054	Clamp Screw for Generator Clutch Assembly 11348	1
20725	Lock Washer for Clamp Screw 20054	1
21544	Key for Generator Clutch Assembly 12899	2
21703	Oil Retainer (Felt) for Ball Bearing Assembly 12986	1
20808	Retainer for Ball Bearing Assembly 12986 (Inner)	1
20798	Washer for retaining Ball Bearing Assembly 12986 (Outer)	1
10828	**Inner Race and Balls Assembly for Pinion End of Armature Shaft**	2
20803	Oil Retainer (Felt) for Inner Race and Balls Assembly 10828	1
20966	Washer for retaining Inner Race and Balls Assembly 10828 (Outer)	1
20873	Sleeve on Armature Shaft for retaining Washer 20966	1
20870	Motor Pinion for Armature Shaft	1
21536	Clamp Washer for Motor Pinion 20870	1
20054	Clamp Screw for Motor Pinion 20870	1
20725	Lock Washer for Clamp Screw 20054	1
21405	Generator Brush Arm	1

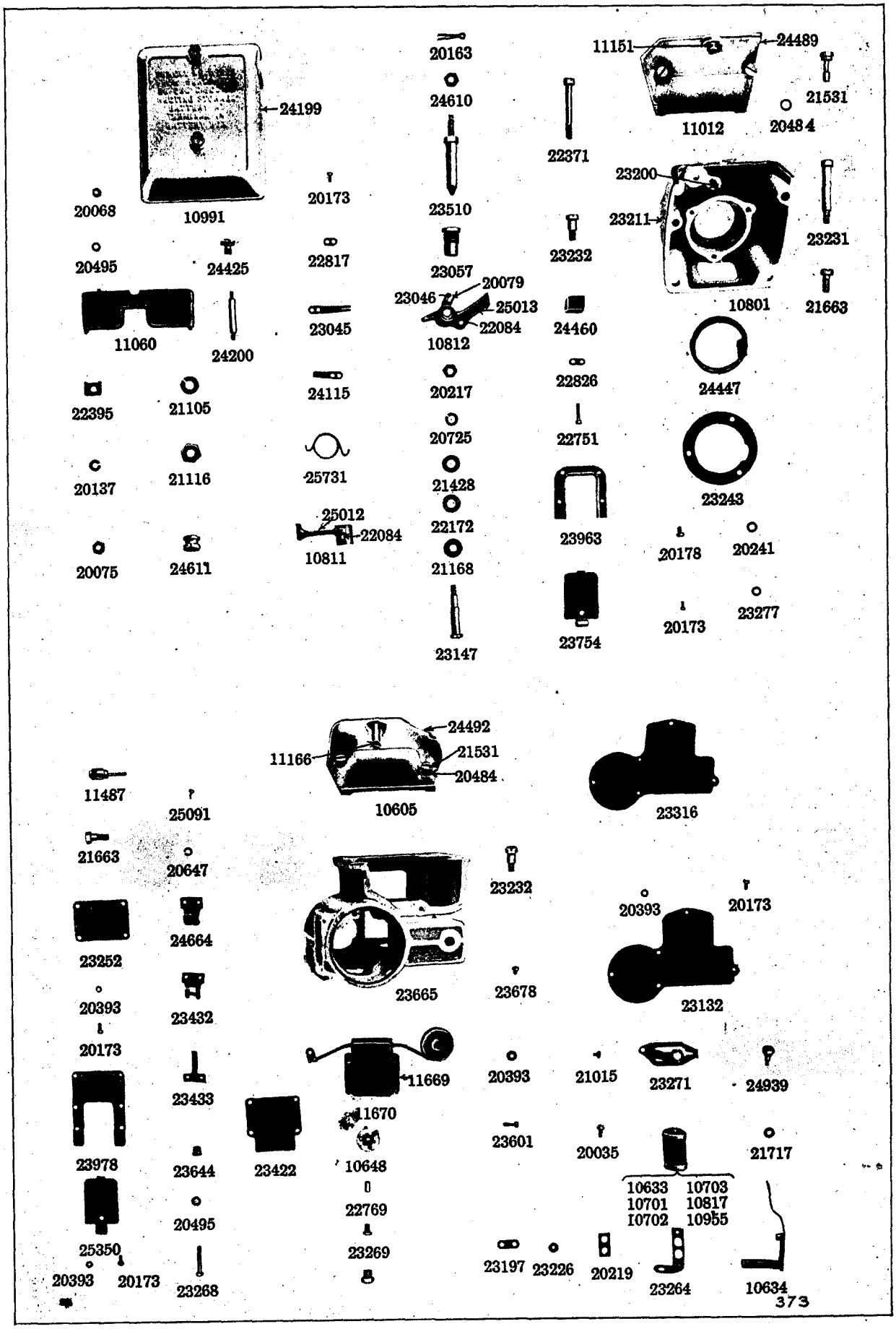
No. 24 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
24443	Brush for Arm 21405	1
21418	Plate for Arm 21405	1
21899	Screw for attaching Brush24443	2
22826	Lock Plate for Screw 21899 (Not shown in Illustration)	1
20163	Cotter Pin for retaining Generator Brush Arm 21405	2
20794	Cover for Generator Clutch Assembly 11348	1
20046	**Spring for Generator Brush Arm 21405**	1
22313	End Housing for Generator	1
22418	Outer Race for Inner Race and Balls Assembly 10828	1
20797	Retainer for Outer Race 22418 (Inner)	1
20178	Screw for retaining Retainer 20797	6
20241	Lock Washer for Screw 20178	6
20849	Bushing in End Housing 22313 for Shift Rod 21199	1
21704	Pipe Plug for Oil Hole in End Housing 22313 (Not shown in Illustration)	2
10339	**Contact Spring Assembly for Generator**	1
10039	**Spring Terminal Assembly for attaching Contact Spring Assembly 10339**	1
22276	Bracket for mounting Contact Assembly 10339	1
22249	Insulator under Contact Spring Assembly 10339	1
21741	Insulating Bushing for Spring Terminal Assembly 10039	1
21429	Insulating Washer for Spring Terminal Assembly 10039	1
20109	Plain Washer for Spring Terminal Assembly 10039	1
20495	Lock Washer for Nut 20068	1
20068	Nut for attaching Spring Terminal Assembly 10039	1
21887	Screw for retaining Bracket 22276	1
20647	Lock Washer for Screw 21887	1
21914	Plain Washer for Screw 21887	1
22318	Insulating Bushing for Screw 21887	1
20244	Shaft for Motor Clutch	1
21544	Key for Shaft 20244	1
21704	Pipe Plug for Shaft 20244 (Not shown in Illustration)	1
10528	**Generator Shifting Yoke Assembly Complete** (Includes the next 2 Items)	1
22883	Stud for attaching Link to Shift Rod (Not shown in Illustration)	1
20390	Pin for retaining Stud 22883 (Not shown in Illustration)	1
10078	**Upper Generator End Cover Assembly Complete** (Includes the next 2 Items)	1
21531	Screw for attaching Upper Generator End Cover Assembly 10078	2
20484	Spring Washer for Screw 21531	2
10077	**Lower Generator End Cover Assembly Complete** (Includes the next 5 Items)	1
20737	Plate for retaining Screen 20736 (Not shown in Illustration)	1
20736	Screen for Cover Assembly 10077 (Not shown in Illustration)	1
21673	Rivet for retaining Plate 20737 and Screen 20736 (Not shown in Illustration)	1
21531	Screw for attaching Lower Generator End Cover Assembly 10077	2
20484	Spring Washer for Screw 21531	2
20039	Dowel Pin for Generator End Frame 20957 and End Housing 22313	4
21082	Screw for attaching Generator End Frame 20957	4
20403	Screw for attaching End Housing 22313	5
20848	Clip for Shaft 20244	1
20178	Screw for retaining Clip 20848	1
20142	Lock Washer for Screw 20178	1
21199	Shift Rod for Generator Shifting Yoke and Motor Brush Switch Arm	1
20722	Plain Washer for Stud 22883	1
20163	Cotter Pin for Stud 22883	1
21080	Cover for nd Housing 22313	1
20553	Screw for attaching Cover 21080	2
20484	Spring Washer for Screw 20553	2
21129	Clamp Screw for Yoke 22307	1
22706	Terminal Clip for Battery Lead	1
22622	Ferrule for Terminal Clip 22706 (Not shown in Illustration)	1
22397	Conduit Cover (On Top of Generator)	1
22703	Screw for attaching Conduit Cover 22397	1
12508	**Grease Cup Assembly in End Housing 22313 for Motor Clutch**	1
11285	**Oil Cup Assembly for Ball Bearing Assembly 12986**	1
11926	**Oil Cup Assembly for Inner Race and Balls Assembly 10828**	1
22452	Terminal Clip for Terminal 22398 (Not shown in Illustration)	3
10044	**Motor Clutch Assembly Complete** (Includes the next 11 Items)	1
20465	Pinion for Motor Clutch Assembly 10044	1
20020	Cam for Motor Clutch Assembly 10044	1
20027	Clamp Nut for Motor Clutch Assembly 10044	1
21316	Gear for Motor Clutch Assembly 10044	1
20022	Retainer for Roll 23625 (Inner)	1
22575	Retainer for Roll 23625 (Outer)	1
21538	Spring for Plunger 20017	4
20017	Plunger for Roll 23625	4
23625	Roll for Cam 20020	4
20023	Screw for retainers 22575 and 20022	4
20393	Lock Washer for Screw 20023	4

PIECE PARTS CATALOG



No. 44 MOTOR GENERATOR



No. 44 MOTOR GENERATOR

No. 44 MOTOR GENERATOR

Piece Number	NAME OF PART	Quantity Required
44	**MOTOR GENERATOR**	1
10698	**Generator Frame Assembly**	1
	(Includes the next 5 Items)	
24228	Screw for Binding Generator Frame (Upper) (Not shown in Illustration)	1
24126	Screw for Binding Generator (Lower) (Not shown in Illustration)	4
24494	Lock Washer for Screw 24126 (Not shown in Illustration)	4
21147	Dowel Screw for Pole Piece (Not shown in Illustration)	1
21717	Lock Washer for Screw 21147 (Not shown in Illustration)	1
10964	**Field Coil Assembly Complete**	1
	(Includes the next 17 Items)	
14279	**Field Coil Assembly (Not shown in Illustration)**	1
	(Includes the next Item)	
10660	**Motor Brush Plate Assembly (Not shown in Illustration)**	1
	(Includes the next 3 Items)	
24112	Spring Stud for Brush Plate Assembly 10660	1
22359	Stud for holding Series Motor Brush Arm Assembly 11189	1
22007	Plain Washer for Stud 22359 (Not shown in Illustration)	1
22520	Rivet for retaining Motor Brush Plate Assembly 10660 (Not shown in Illustration)	3
23051	Clip for Spring 23045	1
23197	Lock Plate for Screw 20035	1
20219	Insulator for Clip 23051	2
23226	Insulating Bushing for Screw 20035	2
20035	Screw for retaining Clip 23051	2
23451	Screw for retaining Lead Assembly 12790	1
23452	Nut for Screw 23451	1
20393	Lock Washer for Nut 23452	1
23451	Screw for retaining Terminal Clip on Field Coil Assembly 10964	2
23452	Nut for Screw 23451	2
20393	Lock Washer for Nut 23452	2
10811	**Series Motor Brush Arm Assembly**	1
	(Includes the next 3 Items)	
22084	Spring Stud for Brush Arm Assembly 10811	1
25017	Insulating Bushing for Stud 25016 (Not shown in Illustration)	1
25016	Stud for Screw 24621 (Not shown in Illustration)	1
24460	Brush for Brush Arm Assembly 10811	1
22751	Screw for attaching Brush 24012	2
22826	Lock Plate for Screw 22751	1
11060	**Terminal Block Assembly**	1
20137	Lock Washer for Nut 20075	1
20068	Nut for attaching Stud 23655	1
23655	Stud for attaching Clip 22395	1
20495	Lock Washer for Nut 20068	1
22395	Clip for Stud 23655	1
20075	Nut for attaching Clip 22395	1
21428	Plain Washer for Series Motor Brush Arm Assembly 10811	2
22172	Spring Washer for retaining Series Motor Brush Arm Assembly 10811	1
20163	Cotter Pin for retaining Spring Washer 22172	1
25731	Spring for Series Motor Brush Arm Assembly 10811	1
23138	Insulator for Field Coil Assembly 10964	2
27193	Insulating Washer for Screw 21147 (Not shown in Illustration)	8
20114	Plain Washer for Screw 21147	2
21717	Lock Washer for Screw 21147	2
21147	Screw for attaching Motor Brush Plate Assembly 10660	2
23282.	Insulating Bushing for Screw 21147 (Not shown in Illustration)	2
21116	Nut for Terminal Stud under Terminal Block Assembly 11060 (Small)	2
21105	Lock Washer for Nut 24611	2
24611	Nut for Terminal Stud under Terminal Block Assembly 11060 (Large)	2
22570	Wedge for Field Coil Assembly 10964 (Not shown in Illustration)	7
10889	**Governor Ring Assembly for Distributor Shaft**	1
	(Includes the next 2 Items)	
23448	Clip for Governor Ring Assembly 10889 (Not shown in Illustration)	1
24198	Screw for attaching Clip 23448 (Not shown in Illustration)	2
10954	**Distributor Cam Adjustment Assembly Complete**	1
	(Includes the next 3 Items)	
23874	Cam for Cam Adjustment Assembly 10954 (Not shown in Illustration)	1
23468	Pin for Cam 23874 (Not shown in Illustration)	1
23117	Screw for Distributor Cam Adjustment Assembly 10954 (Not shown in Illustration)	1
10922	**Distributor Segment Assembly for mounting Contact Arm Assembly 11408**	1
	(Includes the next 3 Items)	
24070	Stud for mounting Stop 23733 (Not shown in Illustration)	1
24071	Stud for mounting Contact Arm Assembly 11408 (Not shown in Illustration)	1
24073	Stud for connecting Current Regulator Bracket	1
11408	**Contact Arm Assembly for Distributor**	1
	(Includes the next 3 Items. Do not count Old Style Parts)	

No. 44 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
11379	**Connector Assembly for Contact Arm Assembly 11408 (Not shown in Illustration)**	1
21801	Hub for Contact Arm Assembly 11408 (Not shown in Illustration)	1
24069	Terminal Wire (Old Style) (Not shown in Illustration	1
24947	Screw for attaching Hub 24069 (Not shown in Illustration)	2
10282	**Retainer and Balls Assembly for Distributor Shaft Assembly 10699**	2
11061	**Pinion and Hub Assembly for Distributor Shaft (Not shown in Illustration)** (Includes the next 3 Items)	1
27548	Screw for attaching Pinion to Hub	2
20393	Lock Washer for Screw 27548	2
24029	Dowel Pin for Pinion and Hub Assembly 11061	1
23217	Retainer Plate for Pinion and Hub Assembly 11061	1
21836	Screw for retaining Stop 23733 (Not shown in Illustration)	1
23733	Stop for Contact Arm Assembly 11408	1
23480	Plain Washer for Screw 23501	2
23481	Insulating Bushing for Screw 23501	2
20035	Screw for attaching Distributor Segment Assembly 10922	2
20345	Lock Washer for Screw 21836	1
23100	Advance Ring on Shaft 23105 for Hand Advance	1
23220	Mounting Plate for Shaft 23105	1
23134	Pin for Advance Ring 23100	1
21443	Clamp Nut for Shaft 23105	1
21444	Lock Nut for Clamp Nut 21443	1
23218	Clamp for Pin 23134	1
23378	Screw for retaining Clamp 23218	1
20393	Lock Washer for Screw 23378	1
11094	**Distributor Shaft and Cone Assembly (Not shown in Illustration)** (Includes the next 2 Items)	1
23105	Shaft for Distributor	1
27222	Cone for Shaft 23105 (Not shown in Illustration)	2
23234	Insulating Washer for Distributor Segment Assembly 10922	1
23129	Spring for Collar 23718 on Shaft 23105	1
23718	Collar for Automatic Advance on Shaft 23105	1
23101	Pin for retaining Collar 23718 and Governor Ring Assembly 10889	2
24415	Plain Washer for Pin 23101	4
20163	Cotter Pin for retaining Pin 23101	4
23104	Advance Arm for connecting Collar 23718 to Governor Ring Assembly 10889	2
23496	Screw for retaining Governor Ring Assembly 10889	2
24493	Lock Washer for Screw 23496	2
23098	Shaft for Distributor Cam Adjustment Assembly 10954	1
20775	Cup for Retainer and Balls Assembly 10282	2
23398	Spring for Contact Arm Assembly 11408	1
12988	**Ball Bearing Assembly for Distributor End of Armature Shaft**	1
10634	**Current Regulator Contact Arm Assembly** (Includes the next 3 Items)	1
23262	Roll for Contact Arm Assembly 10634 (Not shown in Illustration)	1
23263	Stud for Contact Arm Assembly 10634 (Not shown in Illustration)	1
24247	Rivet for Contact Arm Assembly 10634 (Not shown in Illustration)	2
10631	**Resistance Unit Connector Lead Assembly Complete** (Includes the next 2 Items)	1
23319	Clip for Resistance Unit End of Lead Assembly 10631	1
23358	Clip for Field Coil End of Lead Assembly 10631	1
10611	**Distributor Rotor Assembly Complete** (Includes the next 4 Items)	1
23074	Connector for Distributor Rotor Assembly 10611	1
23142	Screw for connecting Connector 23074	1
23895	Brush for Distributor Rotor Assembly 10611	1
24414	Spring for Brush 23895	1
10633, 10701, 10702, 10703, 10817, 10955	**Current Regulator Resistance Unit Assembly (One to be used. Order by number stamped on Current Regulator Resistance Unit Assembly)**	1
10648	**Resistance Unit Assembly for Distributor**	1
10598	**Advance Yoke Assembly**	1
23257	Shaft for Advance	1
23144	Clamp Screw for Advance Lever 23143	1
23239	Nut for Clamp Screw 23144	1
20137	Lock Washer for Nut 23239	1
23143	Advance Lever for Advance Lever Shaft 23257	1
11868	**Spring Terminal Assembly for connecting Distributor**	1
12411	**Contact Screw Assembly for Contact Arm Assembly 11408 (Not shown in Illustration)**	1
23665	End Frame for Generator	1
21383	Washer (Felt) for Ball Bearing Assembly 12988	2

No. 44 MOTOR GENERATOR (Continued)

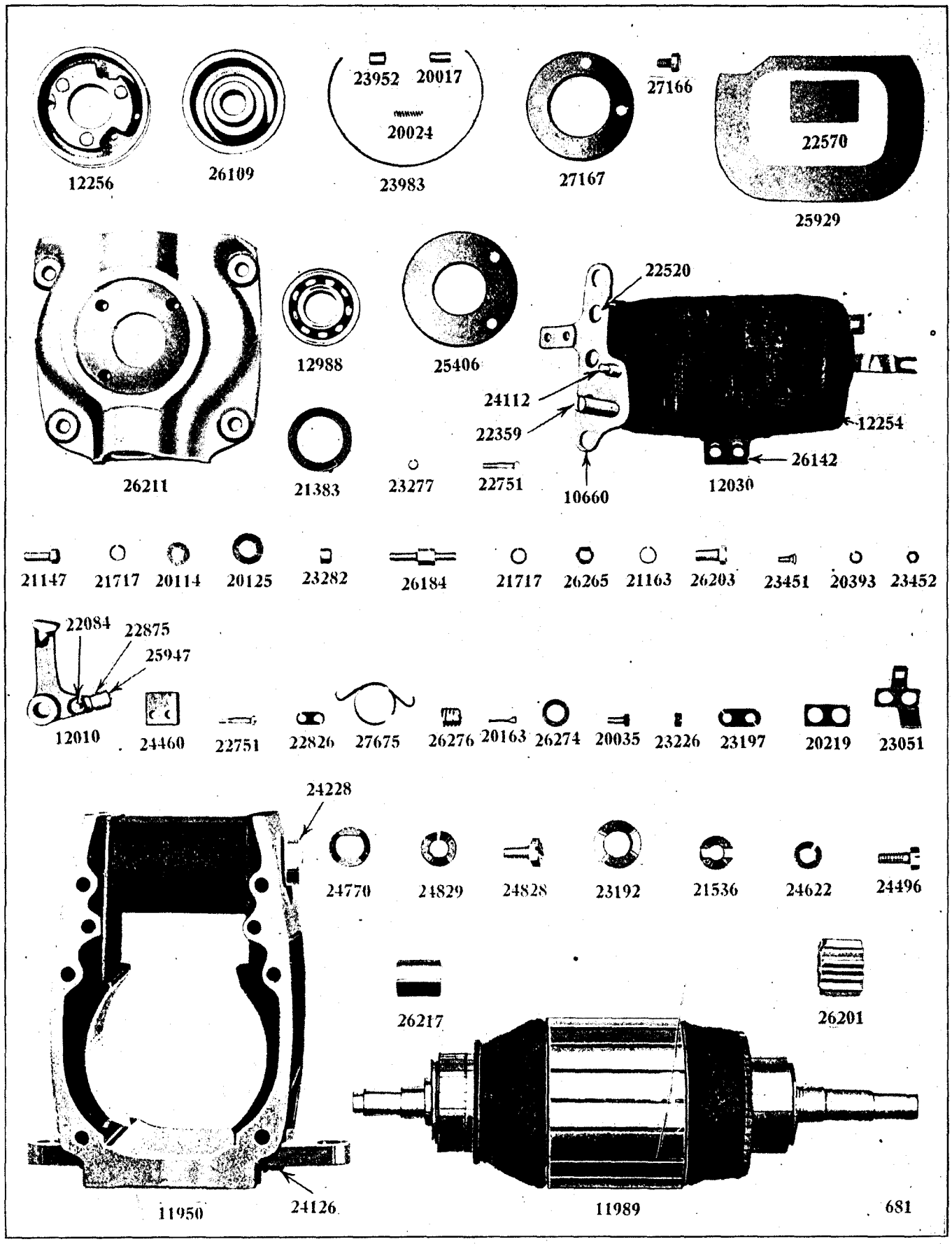
Piece Number	NAME OF PART	Quantity Required
23642	Retainer for Ball Bearing Assembly 12988 (Inner)	1
21094	Screw for retaining Retainer 23642	4
23271	Bracket for Current Regulator Resistance Unit Assembly 10703 ,etc. (Upper)	1
23678	Screw for attaching Bracket 23271	1
20373	Lock Washer for Screw 23678	3
23268	Screw for retaining Stud 23270	1
23269	Insulating Bushing for Stud 23270	1
22769	Insulating Bushing for Resistance Unit Assembly 10648	1
20495	Lock Washer for Nut 23644	1
23644	Nut for retaining Resistance Unit Assembly 10648	1
23270	Bushing for Resistance Unit Assembly 10648	1
24664	Clip for attaching Distributor Head Assembly 12568 (Single)	1
20647	Lock Washer for Screws 21015 and 21531	5
25091	Screw for attaching Clips 24664, 23433 and 23432	4
23433	Clip for attaching Distributor Head Assembly 12568 (Long Tongue Clip)	1
23432	Clip for attaching Distributor Head Assembly 12568 (With Clip 23433)	1
21797	Screw for attaching Advance Yoke Assembly 10598	1
21015	Screw for retaining Bracket 23271	1
23978	Guide Plate for Cover Plate 25350	1
25350	Cover Plate for End Frame 23665	1
23264	Bracket for Current Regulator Resistance Unit Assembly 10703, etc. (Lower)	1
20219	Insulator for Bracket 23264	2
23197	Lock Plate for Screw 20035	1
23226	Insulating Bushing for Screw 20035	2
24939	Screw for attaching Current Regulator Resistance Unit Assembly 10703, etc.	2
21717	Lock Washer for Screw 24939	2
20173	Screw for attaching Guide Plate 23978	6
20393	Lock Washer for Screw 20173	6
20035	Screw for attaching Distributor Segment Assembly 10922	1
20495	Lock Washer for Screw 20035	1
22616	Plain Washer for Screw 23205 and Spring Terminal Assembly 10628	2
20076	Insulating Washer for Screw 23205 and Spring Terminal Assembly 10628 (Outer)	2
22738	Insulating Bushing for Screw 23205 and Spring Terminal Assembly 10628	2
23410	Insulating Washer for Screw 23205 and Spring Terminal Assembly 10628 (Inner)	2
23756	Connector for connecting Spring Terminal Assembly 10628 and Screw 23205	1
20704	Nut for Screw 23205 and Spring Terminal Assembly 10628	2
20791	Lock Washer for Nut 20704	2
20310	Plain Washer for Nut 20704	2
23205	Screw for Contact Screw Assembly 12411	1
12127	**Generator Clutch Assembly Complete** (Includes the next 6 Items)	1
10978	**Spiral Gear and Cam Assembly for Generator Clutch Assembly 12127**	1
26109	Shell for Generator Clutch Assembly 12127	1
23952	Roll for Spiral Gear and Cam Assembly 10978	3
20017	Plunger for Roll 23952	3
20024	Spring for Plunger 20017	3
23983	Binding Spring for Generator Clutch Assembly 12127	1
14898	**Ball Bearing Assembly for Pinion End of Armature Shaft**	1
13513	**Armature Assembly for Motor Generator**	1
21703	Oil Retainer (Felt) for Inner Race and Balls Assembly 14898	2
20808	Retainer for Oil Retainer 21703 (Inner)	1
24622	Lock Washer for Clamp Screw 24496	1
24496	Clamp Screw for Motor Pinion 23491	1
21536	Clamp Washer for Motor Pinion 23491	1
24829	Lock Washer for Clamp Screw 24828 (Clutch End)	1
23065	Clamp Washer for Generator Clutch Assembly 12127	1
24828	Clamp Screw for retaining Generator Clutch Assembly 12127	1
23192	Spacing Collar on Armature Shaft next to Generator Clutch Assembly 12127	1
23511	Spacing Sleeve on Armature Shaft for retaining Washer 23857	1
23491	Motor Pinion for Armature Shaft	1
23857	Washer for retaining Inner Race and Balls Assembly 14898	1
10801	**Motor End Frame Assembly** (Includes the next Item)	1
23200	Spring Stud for End Frame Assembly 10801	1
10812	**Grounded Motor Brush Arm Assembly** (Includes the next 3 Items)	1
22084	Spring Stud for Brush Arm Assembly 10812	1
23046	Roll for Brush Arm Assembly 10812	1
20079	Plain Washer for Roll 23046	1
24460	Brush for Grounded Motor Brush Arm Assembly 10812	1
22751	Screw for attaching Brush 24460	2
22826	Lock Plate for Screw 22751	1
23045	Spring for Generator Switch on Grounded Motor Brush Arm Assembly 10812	1
20173	Screw for attaching Spring 23045	2

No. 44 MOTOR GENERATOR (Continued)

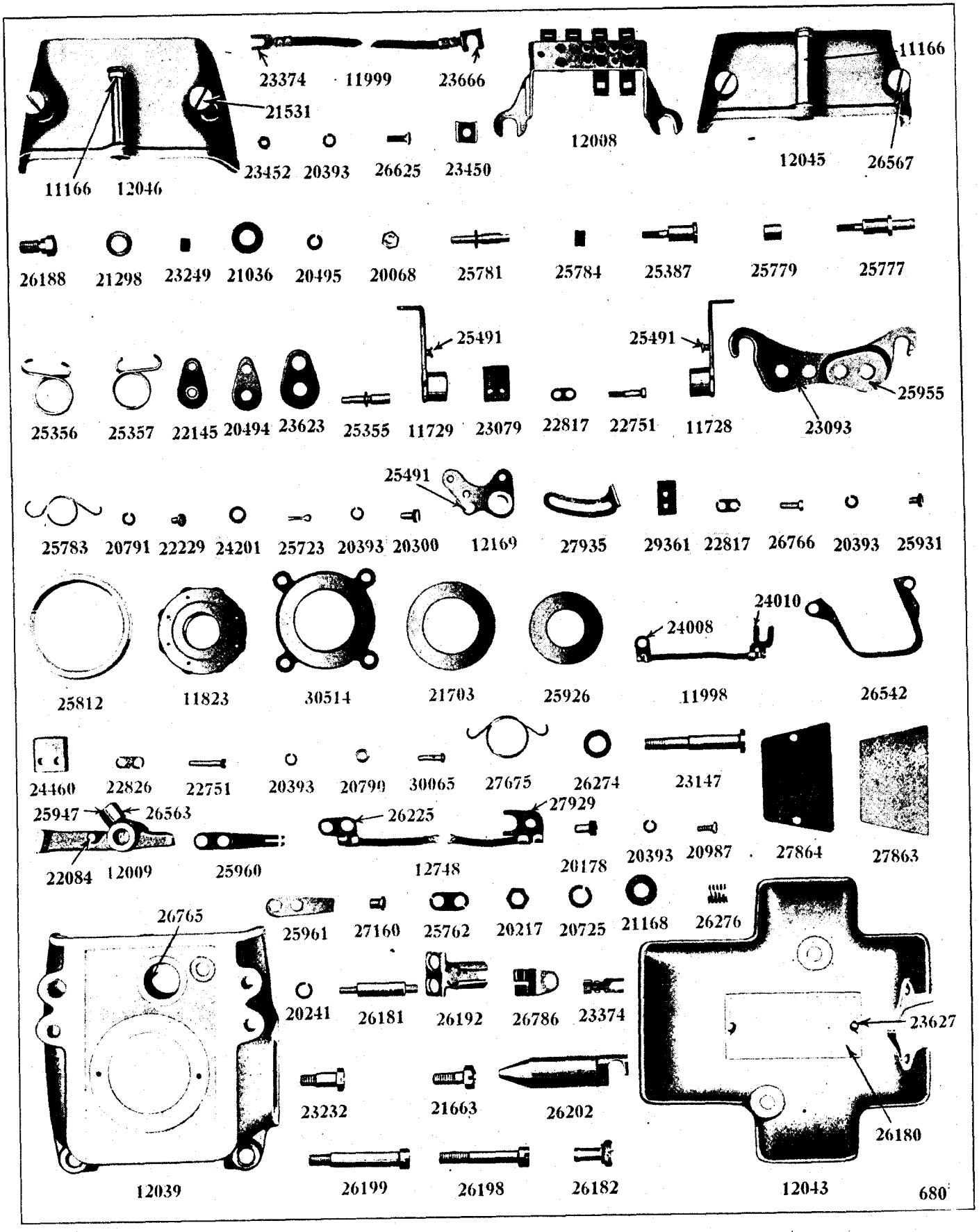
Piece Number	NAME OF PART	Quantity Required
22817	Lock Plate for Screw 20173	1
24115	Plate for Spring 23045	1
24621	Screw for Adjusting Grounded Motor Brush Arm Assembly 10812	1
24619	Nut for Screw 24621	1
21717	Lock Washer for Nut 24619	1
23147	Stud for Holding Grounded Motor Brush Arm Assembly 10812	1
20217	Nut for Stud 23147	1
20725	Lock Washer for Nut 20217	1
21168	Plain Washer for retaining Grounded Motor Brush Arm Assembly 10812 (Outer)	1
21428	Plain Washer for retaining Grounded Brush Arm Assembly 10812 (Inner)	1
22172	Spring Washer for retaining Grounded Motor Brush Arm Assembly 10812	1
25731	Spring for Grounded Motor Brush Arm Assembly 10812	1
23243	Retainer for Ball Bearing Assembly 14898	3
20241	Lock Washer for Screw 20178	3
20178	Screw for retaining Retainer 23243	1
23057	Bushing for Rod 23510	1
23754	Cover Slide for Motor End Frame Assembly 10801	1
23963	Guide for Cover Slide 23754 (Outer)	1
23964	Guide for Cover Slide 23754 (Inner) (Not shown in Illustration)	1
20173	Screw for Guides 23963 and 23964	4
23277	Lock Washer for Screw 20173	4
24111	Felt Plug for Oil Hole (Not shown in Illustration)	1
10626	**Generator Brush Arm Assembly (Left)**	1
23079	Brush for Generator Brush Arm Assembly 10626	2
22751	Screw for attaching Brush 23709	1
22817	Lock Plate for Screw 22751	1
10627	**Generator Brush Arm Assembly (Right)** (Include sthe next Item)	1
23079	Brush for Generator Brush Arm Assembly 10627	3
22751	Screw for attaching Brush 23079	1
22817	Lock Plate for Screw 22751	1
12790	**Ground Connector Lead Assembly Complete** (Includes the next 2 Items)	1
23666	Clip for Generator Switch End of Lead Assembly 12790	1
27930	Clip for Brush Plate End of Lead Assembly 12790	1
12751	**Outside Terminal Connector Lead Assembly Complete** (Includes the next 3 Items)	1
27929	Clip for Brush Plate End of Lead Assembly 12751	1
23318	Clip for Field Coil (Center of Lead Assembly 12751)	1
24010	Clip for Spring Terminal End of LeadAssembly 12751	2
20046	Spring for Generator Brush Arm Assemblies 10626 and 10627	2
20163	Cotter Pin for retaining Spring 20046	1
23093	Generator Brush Holder Bracket	2
20494	Plate for Stud 23113 (Inner)	4
23623	Insulator for Stud 23113	2
23113	Stud for Holding Generator Brush Arm Assemblies 10626 and 10627	4
23249	Insulating Bushing for Stud 23113 and Screw 20035	2
20068	Nut for Stud 23113	2
20495	Lock Washer for Nut 20068	2
22011	Plate for Stud 23113 (Outer)	2
20035	Screw for retaining Plates 22011 and 20494	1
10991	**Generator Top Cover Assembly Complete** (Includes the next Item)	2
24425	Clamp Nut for Top Cover Assembly 10991	1
11012	**Motor End Top Cover Assembly Complete** (Includes the next 3 Items)	2
20484	Spring Washer for Screw 21531	2
21531	Screw for attaching Top Cover Assembly 11012	1
11151	**Oiler Assembly for Motor End Top Cover Assembly 11012**	1
10605	**Generator End Top Cover Assembly Complete** (Includes the next 3 Items)	2
21531	Screw for attaching Top Cover Assembly 10605	2
20484	Spring Washer for Screw 21531	1
14043	**Oiler Assembly for Generator End Top Cover Assembly 10605**	1
11383	**Flange and Washer Assembly Complete (Not shown in Illustration)** (Includes the next Item)	1
25019	Felt Washer for Flange Assembly 11383	1
23510	Brush Lifting Rod	2
24610	Nut for Rod 23510	1
25307	Cotter Pin for retaining Nut 24610	1
11487	**Distributor Bearing Oiler Assembly**	1
23108	Screw for attaching Generator Brush Holder Bracket 23093	1
21663	Screw for attaching Motor End Frame Assembly 10801 (Short) (Plain)	1
23232	Screw for attaching Motor End Frame Assembly 10801 (Short) (Dowel)	1
23231	Screw for attaching Motor End Frame Assembly 10801 (Long) (Dowel)	1
22371	Screw for attaching Motor End Frame Assembly 10801 (Long) (Plain)	1

No. 44 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
21663	Screw for attaching Generator End Frame 23665 (Plain)	2
23232	Screw for attaching Generator End Frame 23665 (Dowel)	2
23132	Bottom Plate for Generator End Frame 23665	1
23316	Gasket for Bottom Plate 23132	1
20393	Lock Washer for Screw 20173	5
20173	Screw for attaching Bottom Plate 23132 and Name Plate 23252	9
23252	Name Plate for Generator End Frame 23665	1
20393	Lock Washer for Screw 20173	4
24200	Stud for attaching Nut 24425 (On Generator Top Cover Assembly 10991)	2
23204	Screw for attaching Condenser Assembly 11670 to Screw 23205	1
20345	Lock Washer for Screw 23204	1
23422	Gasket for Condenser Assembly 10861	1
24527	Insulator for Resistance Unit Guard (Not shown in Illustration)	1
10861	**Condenser Assembly Complete** (Includes the next Item)	1
23601	Screw for attaching Condenser Assembly 10861	4
12568	**Distributor Head Assembly Complete (Not shown in Illustration)** (Includes the next 2 Items. Do not count Old Style Parts)	1
21425	Plunger (Old Style) for Distributor Head Assembly 12568 (Approximately ⅛/ Diameter) (Not shown in Illustration)	1
27608	Plunger for Distributor Head Assembly 12568 (Approximately ¼" Diameter) (Not shown in Illustration)	1
21424	Spring (Old Style) for Plunger 21425 (Approximately ⅛" Diameter) (Not shown in Illustration)	1
27607	Spring for Plunger 27608 (Approximately ¼" Diameter) (Not shown in Illustration)	1
10697	**Motor Terminal Clip Assembly Complete (Not shown in Illustration)** (Includes the next 5 Items)	1
23654	Terminal Clip for Motor Terminal Assembly 10697 (Not shown in Illustration)	1
22395	Clip for Terminal Clip 23654 (Not shown in Illustration)	1
23656	Stud for attaching Clip 22395 to Terminal Clip 23654 (Not shown in Illustration)	1
20137	Lock Washer for Nut 20075	1
20075	Nut for Stud 23656	1
24453	Terminal Clip for connecting Generator Brush Arm Assemblies 10626 and 10627 (Not shown in Illustration)	2
23365	Fibre Ferrule for Terminal Clip 24453 (Not shown in Illustration)	2
23360	Terminal Clip for Spring Terminal Assembly 10628 (Not shown in Illustration)	1
23365	Fibre Ferrule for Terminal Clip 23360 (Not shown in Illustration)	1
25092	Insulator for Series Lead on Generator Top Cover Assembly 10991 (Not shown in Illustration)	1
23865	Rubber Washer for High Tension Terminal Assemblies	9
11407	**Wrench for Distributor**	1
10877	**High Tension Terminal Assembly for Distributor Head Assembly 12568 (Blank)**	1
10878	**High Tension Terminal Assembly for Distributor Head Assembly 12568 (1)**	1
10879	**High Tension Terminal Assembly for Distributor Head Assembly 12568 (2)**	1
10880	**High Tension Terminal Assembly for Distributor Head Assembly 12568 (3)**	1
10881	**High Tension Terminal Assembly for Distributor Head Assembly 12568 (4)**	1
10882	**High Tension Terminal Assembly for Distributor Head Assembly 12568 (5)**	1
10883	**High Tension Terminal Assembly for Distributor Head Assembly 12568 (6)**	1
10884	**High Tension Terminal Assembly for Distributor Head Assembly 12568 (7)**	1
10885	**High Tension Terminal Assembly for Distributor Head Assembly 12568 (8)**	1



No. 78 MOTOR GENERATOR



No. 78 MOTOR GENERATOR

No. 78 MOTOR GENERATOR

Note: No. 78 Motor Generator superseded by No. 98 Motor Generator, when ordering a complete new unit, order No. 98.

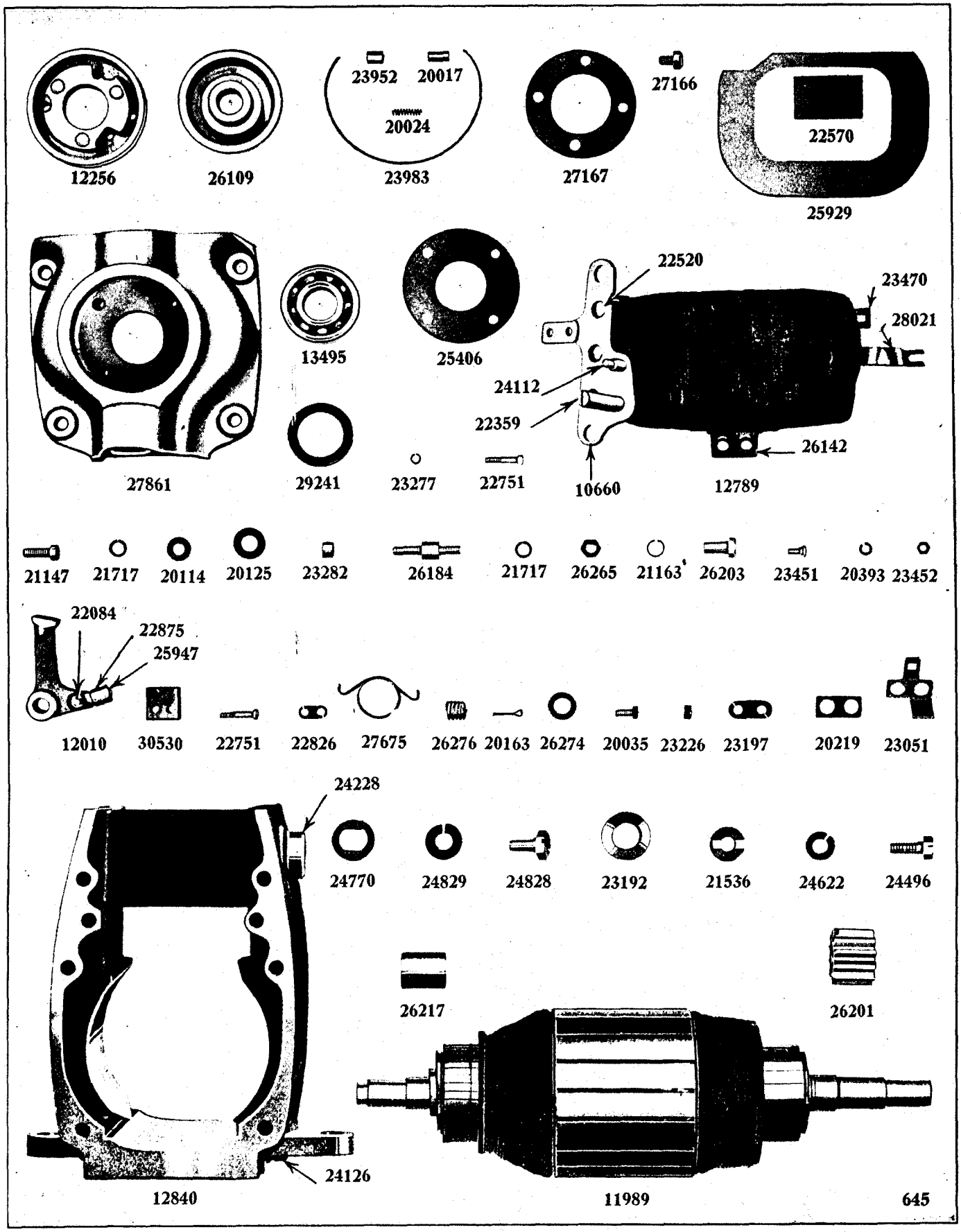
Piece Number	NAME OF PART	Quantity Required
78	**MOTOR GENERATOR COMPLETE**	1
11950	**Generator Frame Assembly** (Includes the next 3 Items)	1
24228	Screw for binding Generator Frame (Upper)	1
24126	Screw for binding Generator Frame (Lower)	2
24494	Lock Washer for Screw 24126 (Not shown in Illustration)	2
12254	**Field Coil and Motor Brush Plate Assembly** (Includes the next 7 Items)	1
10660	**Motor Brush Plate Assembly** (Includes the next 3 Items)	1
24112	Spring Stud for Brush Plate Assembly 10660	1
22359	Stud for holding Series Motor Brush Arm Assembly 12010	1
22007	Washer for Stud 22359 (Not shown in Illustration)	1
22520	Rivet for retaining Motor Brush Plate Assembly 10660	3
26185	Clip on Field Coil Assembly for Terminal Plate (Not shown in Illustration)	1
26142	Strap for Motor Terminal Clip 26192	1
23051	Clip on Motor Brush Plate Assembly 10660 for Generator Switch	1
23197	Lock Plate for Screw 20035	1
20219	Insulator for Clip 23051	2
23226	Insulating Bushing for Screw 20035	2
20035	Screw for retaining Clip 23051	2
23451	Screw on Clip 23051 for retaining Lead Assembly 11999	1
23452	Nut for Screw 23451	1
20393	Lock Washer for Nut 23452	1
23451	Screw for retaining Terminal Clip on Field Coil Assembly 12254	1
23452	Nut for Screw 23451	1
20393	Lock Washer for Nut 23452	1
26203	Screw for attaching Motor Terminal Clip 26192	2
21163	Lock Washer for Screw 26203	2
12010	**Series Motor Brush Arm Assembly** (Includes the next 3 Items)	1
22084	Spring Stud for Brush Arm Assembly 12010	1
22875	Roll for Brush Arm Assembly 12010	1
25947	Plain Washer for retaining Roll 22875	1
24460	Brush for Series Motor Brush Arm Assembly 12010	1
22751	Screw for attaching Brush 24460	2
22826	Lock Plate for Screw 22751	1
26276	Spring for Series Motor Brush Arm Assembly 12010 (Inner)	1
26274	Plain Washer for retaining Series Motor Brush Arm Assembly 12010	1
20163	Cotter Pin for retaining Series Motor Brush Arm Assembly 12010	1
27675	Spring for Series Motor Brush Arm Assembly 12010 (Outer)	1
25929	Insulator for Field Coil Assembly 12254	2
20125	Insulating Washer for Screw 21147	4
20114	Plain Washer for Screw 21147	2
21717	Lock Washer for Screw 21147	2
21147	Screw for attaching Motor Brush Plate Assembly 10660	2
23282	Insulating Bushing for Screw 21147	2
22570	Wedge for Field Coil Assembly 12254	7
26184	Dowel Stud for connecting Ground Lead (On Side of Frame)	1
21717	Lock Washer for Nut 26285	2
26265	Nut for Dowel Stud 26184	1
26211	End Frame for Generator	1
12988	**Ball Bearing Assembly for Generator Clutch End of Armature Shaft**	1
25406	Retainer for Ball Bearing Assembly 12988 (Inner)	1
22751	Screw for attaching Retainer 25406	4
23277	Lock Washer for Screw 22751	4
24111	Felt Plug for Oil Hole in End Frame 26211	1
21383	Oil Retainer (Felt) for Ball Bearing Assembly 12988	2
12035	**Generator Clutch Assembly Complete (Old Style before Serial No. 352610)** (Includes the next 6 Items)	1
12034	**Generator Clutch Shell and Cam Assembly**	1
26109	**Shell for Generator Clutch Assembly 12035** (Inner)	1
23952	Roll for Generator Clutch Shell and Cam Assembly 12034	3
20024	Spring for Plunger 20017	3
20017	Plunger for Roll 23952	3
23983	Binding Spring for Generator Clutch Assembly 12035	1
12257	**Generator Clutch Assembly Complete** (Includes the next 8 Items)	1
12256	**Generator Clutch Shell and Cam Assembly**	1
26109	Shell for Generator Clutch Shell and Cam Assembly 12256 (Inner)	1
23952	Roll for Generator Clutch Shell and Cam Assembly 12256	3
20017	Plunger for Roll 23952	3
20024	Spring for Plunger 20017	3

No. 78 MOTOR GENERATOR (Continued)

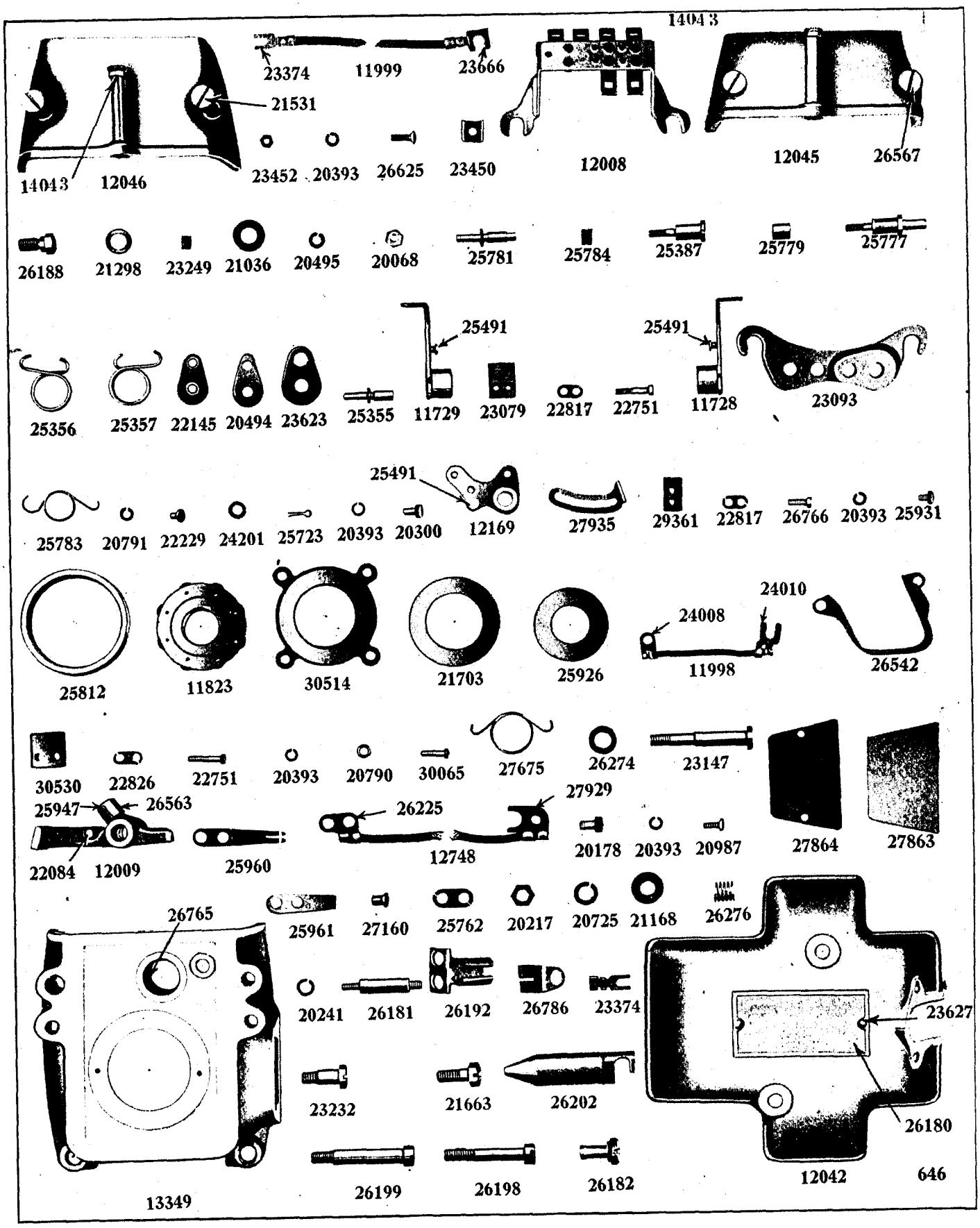
Piece Number	NAME OF PART	Quantity Required
23983	Binding Spring for Generator Clutch Assemby 12257	1
27167	Coupling for Generator Clutch Assembly 12257	1
27166	Screw for attaching Coupling 27167	1
11823	**Inner Race and Balls Assembly for Pinion End of Armature Shaft**	1
11989	**Armature Assembly for Motor Generator**	1
21703	Oil Retainer (Felt) for Inner Race and Balls Assembly 11823	2
20808	Retainer for Oil Retainer 21703 (Inner) (Not shown in Illustration)	1
24622	Lock Washer for Clamp Screw 24496	1
24496	Clamp Screw for Motor Pinion 26201	1
21536	Clamp Washer for Motor Pinion 26201	1
24829	Lock Washer for Clamp Screw 24828	1
24770	Clamp Washer for Generator Clutch Assembly 12257	1
24828	Clamp Screw for Generator	1
23192	Spacing Collar for Generator Clutch Assembly 12257	1
26217	Spacing Sleeve on Armature Shaft next to Washer 25926 (Pinion End)	1
26201	Motor Pinion for Armature Shaft	1
25926	Washer for retaining Inner Race and Balls Assembly 11823 (Outer)	1
12039	**Motor End Frame Assembly** (Includes the next 2 Items)	1
23200	Spring Stud for End Frame Assembly 12039 (Not shown in Illustration)	1
26765	Bushing for Rod 26202	1
12009	**Grounded Motor Brush Arm Assembly** (Includes the next 3 Items)	1
22084	Spring Stud for Brush Arm Assembly 12009	1
26563	Roll for Brush Arm Assembly 12009	1
25947	Plain Washer for retaining Roll 26563	1
24460	Brush for Grounded Motor Brush Arm Assembly 12009	2
22751	Screw for attaching Brush 24460	1
22826	Lock Plate for Screw 22751	1
25960	Spring on Grounded Motor Brush Arm Assembly 12009 for Generator Switch	1
25961	Plate for Spring 25960	3
25762	Insulating Plate for Spring 25960	2
27160	Insulating Bushing for Screw 22654	2
21899	Screw for attaching Spring 25960	1
12748	**Generator Brush Bracket to Switch Arm Lead Assembly Complete** (Includes the next 2 Items)	1
27929	Clip for Brush Bracket End of Lead Assembly 12748	1
26225	Clip for Switch Arm End of Lead Assembly 12748	2
20790	Plain Washer for Screw 22654	2
20393	Lock Washer for Screw 22654	1
23147	Stud for holding Grounded Motor Brush Arm Assembly 12009	1
20217	Nut for Stud 23147	1
20725	Lock Washer for Nut 20217	1
21168	Plain Washer for Grounded Motor Brush Arm Assembly 12009 (Outer)	1
26276	Spring for Grounded Motor Brush Arm Assembly 12009 (Inner)	1
26274	Plain Washer for Grounded Motor Brush Arm Assembly 12009 (Inner)	1
27675	Spring for Grounded Motor Brush Arm Assembly 12009 (Outer)	1
30514	Retainer for Outer Race 25812	1
26193	Retainer for Outer Race 25812 (Old Style) before Serial No. 386208	4
20241	Lock Washer for Screw 20178	4
20178	Screw for attaching Retainer 30514	1
25812	Outer Race for Inner Race and Balls Assembly 11823	1
24111	Felt Plug for Oil Hole in End Frame Assembly 12039	1
11728	**Generator Brush Arm Assembly (Right)** (Includes the next Item)	1
25491	Spring Stud for Brush Arm Assembly 11728	1
23079	Brush for Generator Brush Arm Assembly 11728	2
22751	Screw for attaching Brush 23079	1
22817	Lock Plate for Screw 22751	1
11729	**Generator Brush Arm Assembly (Left)** (Includes the next Item)	1
25491	Spring Stud for Brush Arm Assembly 11729	1
23079	Brush for Generator Brush Arm Assembly 11729	2
22751	Screw for attaching Brush 23079	1
22817	Lock Plate for Screw 22751	1
11815	**Third Generator Brush Arm Assembly (Old Style) (Straight)**	1
12169	**Third Generator Brush Arm Assembly (Radial)** (Includes the next Item)	1
25491	Spring Stud for Brush Arm Assembly 12169	1
25782	Extension Brush Arm for Third Generator Brush Arm Assembly 11815 (Old Style) (Straight)	1
27935	Extension Brush Arm for Third Generator Brush Arm Assembly 12169	1
29361	Third Brush for Extension Brush Arm 27935	1
22817	Lock Plate for Screw 26766	2
26766	Screw for attaching Third Brush 29361	2
25931	Screw for attaching Extension Brush Arm Assembly 12169	2

No. 78 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
20393	Lock Washer for Screw 25931	2
20810	Plain Washer for Screw 25931	2
11998	**Third Generator Brush to Field Coil Lead Assembly Complete** (Includes the next 2 Items)	1
24010	Clip for Field Coil End of Lead Assembly 11998	1
24008	Clip for Third Brush End of Lead Assembly 11998	1
25356	Spring for Generator Brush Arm Assembly 11729	1
25357	Spring for Generator Brush Arm Assembly 11728	1
25783	Spring for Third Generator Brush Arm Assembly 12169	1
23093	Generator Brush Holder Bracket	1
20494	Plate for Studs 14547, 25777, 25355 and 25387 (Inner)	2
22145	Plate for Studs 14547, 25777, and 25387 (Outer)	2
25955	Plate for Studs 25355 and 25387 next to Bracket 23093	2
23623	Insulator for Studs 14547 and 25777	2
25355	Stop Stud for Generator Brush Arm Assembly 11728	1
25387	Stud for holding Generator Brush Arm Assembly 11728	1
23249	Insulating Bushing for Studs 25777 and 14547	2
20068	Nut for Studs 14547, 25777, 25355 and 25387	4
20495	Lock Washer for Nut 20068	4
25777	Stud for holding Third Generator Brush Arm Assembly 12169 and Generator Brush Arm Assembly 11729	1
14547	**Stop Assembly Stud for Generator Brush Arm Assembly 11729**	1
25784	Insulating Sleeve for Stop Stud 14547	1
25779	Insulating Bushing for Third Generator Brush Arm Assembly 12169	1
21036	Insulating Washer for Third Generator Brush Arm Assembly 12169 (Inner)	1
21298	Insulating Washer for Third Generator Brush Arm Assembly 12169 (Outer)	1
25723	Cotter Pin for retaining Third Generator Brush Arm Assembly 12169	1
24201	Plain Washer under Cotter Pin 25723	1
20300	Screw for attaching Third Generator Brush to Field Coil Lead Assembly 11998	1
20393	Lock Washer for Screw 20300	1
12008	**Terminal Bracket Assembly**	1
11999	**Motor Brush Plate to Terminal Bracket Lead Assembly Complete** (Includes the next 2 Items)	1
23666	Clip for Motor Brush Plate End of Lead Assembly 11999	1
23374	Clip for Terminal Bracket End of Lead Assembly 11999	1
26625	Screw for attaching Clip 23450	6
20393	Lock Washer for Nut 23452	6
23452	Nut for Screw 26625	6
23450	Clip for Terminal Bracket Assembly 12008	6
12043	**Generator Top Cover Assembly Complete** (Includes the next 3 Items)	1
26180	Name Plate for Generator Top Cover Assembly 12043	1
23627	Rivet for attaching Name Plate 26180	2
26182	Screw for attaching Generator Top Cover Assembly 12043	2
12045	**Motor End Top Cover Assembly Complete** (Includes the next 3 Items)	1
20484	Spring Washer for Screw 26567	2
26567	Screw for attaching Cover Assembly 12045	2
14043	**Bearing Oiler Assembly for Motor End Top Cover Assembly 12045**	1
12046	**Generator End Top Cover Assembly Complete** (Includes the next 3 Items)	1
21531	Screw for attaching Cover Assembly 12046	2
20484	Spring Washer for Screw 21531	2
14043	**Bearing Oiler Assembly for Generator End Top Cover Assembly 12046**	1
26202	Rod for Lifting Motor Brush Arms	1
26188	Screw for attaching Generator Brush Holder Bracket 23093	2
21663	Screw for attaching Motor End Frame Assembly 12039 (Short, Plain)	1
23232	Screw for attaching Motor End Frame Assembly 12039 (Short, Dowel)	1
26199	Screw, for attaching Motor End Frame Assembly 12039 (Long, Dowel)	1
26198	Screw for attaching Motor End Frame Assembly 12039 (Long, Plain)	1
21663	Screw for attaching Generator End Frame 26211 (Plain)	2
23232	Screw for attaching Generator End Frame 26211 (Dowel)	2
26181	Stud for Screw 26182	2
26542	Guard for Motor Terminal Clip 26192	1
20791	Lock Washer for Screw 22229	1
22229	Screw for attaching Guard 26542	1
26826	Insulating Plate for Terminal Clip 26192	1
23374	Terminal Clip for connecting Terminal Bracket Assembly 12044	4
26786	Terminal Clip used with Motor Terminal Clip 26192	1
26192	Motor Terminal Clip	1



No. 98 MOTOR GENERATOR



No. 98 MOTOR GENERATOR

No. 98 MOTOR GENERATOR

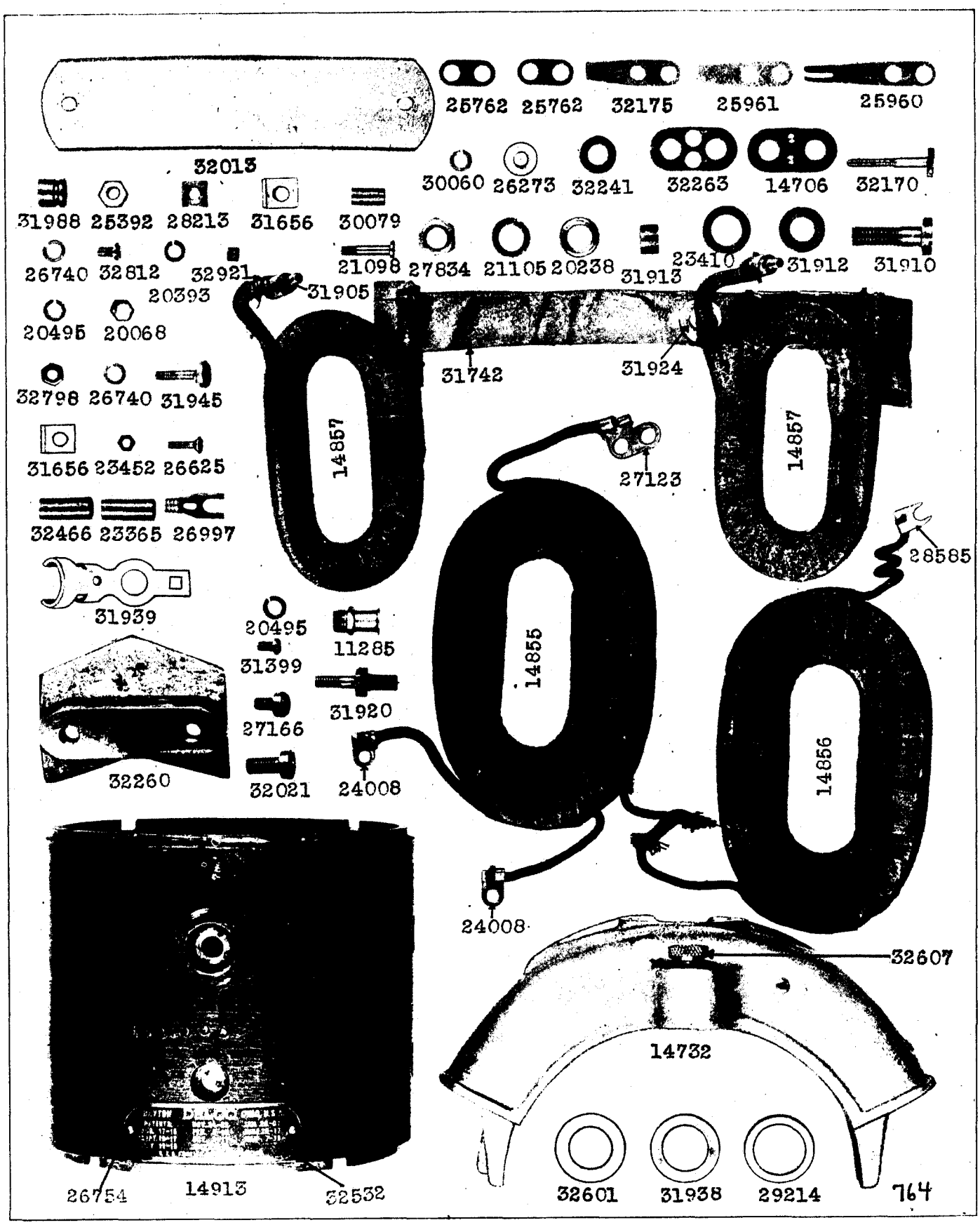
Piece Number	NAME OF PART	Quantity Required
98	**MOTOR GENERATOR COMPLETE**	1
12840	**Generator Frame Assembly**	1
	(Includes the next 3 Items)	
24228	Screw for Binding Generator Frame (Upper)	1
24126	Screw for Binding Generator Frame (Lower)	2
24494	Lock Washer for Screw 24126	2
13076	**Field Coil Assembly**	1
	(Includes the next 7 Items)	
26142	Strap for Motor Terminal Clip 26192	1
23470	Clip on Field Coil Assembly for Third Brush	1
28021	Clip on Field Coil Assembly for Terminal Plate	1
10660	**Motor Brush Plate Assembly**	1
	(Includes the next 2 Items)	
24112	Spring Stud for Motor Brush Plate Assembly 10660	1
22359	Stud for Holding Series Motor Brush Arm Assembly	1
22520	Rivet for retaining Motor Brush Plate Assembly	3
23051	Clip on Motor Brush Plate Assembly 10660 for Generator Switch	1
23197	Lock Plate for Screw 20035	1
20219	Insulator for Clip 23051	2
23226	Insulating Bushing for Screw 20035	2
20035	Screw for retaining Clip 23051	2
23451	Screw for Clip 23051 for retaining Lead Assembly 11999	1
23452	Nut for Screw 23451	1
20393	Lock Washer for Nut 23452	1
26203	Screw for retaining Motor Terminal Clip 26192	2
21163	Lock Washer for Screw 26203	2
12010	**Series Motor Brush Arm Assembly**	1
	(Includes the next 3 Items)	
22084	Spring Stud for Brush Arm Assembly 12010	1
22875	Roll for Brush Arm Assembly 12010	1
25947	Plain Washer for retaining Roll 22875	1
30530	Brush for Series Motor Brush Arm Assembly 12010	1
22751	Screw for attaching Brush 24460	2
22826	Lock Plate for Screw 22751	1
26276	Spring for Series Motor Brush Arm Assembly 12010 (Inner)	1
26274	Plain Washer for retaining Series Motor Brush Arm Assembly 12010	1
20163	Cotter Pin for retaining Series Motor Brush Arm Assembly 12010	1
27675	Spring for Series Motor Brush Arm Assembly 12010 (Outer)	1
25929	Insulator for Field Coil Assembly 12849	2
20125	Insulating Washer for Screw 21147	4
20114	Plain Washer for Screw 21147	2
21717	Lock Washer for Screw 21147	2
21147	Screw for attaching Motor Brush Plate Assembly 10660	2
23282	Insulating Bushing for Screw 21147	2
22570	Wedge for Field Coil Assembly 12849	7
26184	Dowel Stud for connecting Ground Lead (On Side of Frame)	1
21717	Lock Washer for Nut 26265	2
26265	Nut for Dowel 26184	1
27861	End Frame for Generator	1
12988	**Ball Bearing Assembly for Clutch End of Armature Shaft**	1
25406	Retainer for Ball Bearing Assembly 12988 (Inner)	1
22751	Screw for Retainer 25406	4
23277	Lock Washer for Screw 22751	4
24111	Felt Plug for Oil Hole in End Frame 27861 (Not shown in Illustration)	1
21383	Oil Retainer (Felt) for Ball Bearing Assembly 13495	2
12257	**Generator Clutch Assembly Complete**	1
	(Includes the next 8 Items)	
12256	**Generator Clutch Shell and Cam Assembly**	1
26109	Shell for Generator Clutch Shell and Cam Assembly 12256 (Inner)	1
23952	Roll for Generator Clutch Shell and Cam Assembly 12256	3
20017	Plunger for Roll 23952	3
20024	Spring for Plunger 20017	3
23983	Binding Spring for Generator Clutch Assembly 12257	1
27167	Coupling for Generator Clutch Assembly 12257	1
27166	Screw for attaching Coupling 27167	2
11989	**Armature Assembly for Motor Generator**	1
24829	Lock Washer for Clamp Screw 24828	1
24770	Clamp Washer for Generator Clutch Assembly 12257	1
24828	Clamp Screw for Generator Clutch Assembly 12257	1
23192	Spacing Collar on Armature Shaft next to Generator Clutch Assembly 12257	1
13349	**Motor End Frame Assembly**	1
	(Includes the next 2 Items)	
23200	Spring Stud for Motor End Frame Assembly 13349 (Not shown in Illustration)	1
26765	Bushing for Rod 26202	1

No. 98 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
27147	Retainer for Outer Race 25812 (Old Style before Serial No. 9809528) (Not shown in Illustration)	1
30514	Retainer for Outer Race 25812	1
20241	Lock Washer for Screw 20178	1
20178	Screw for retaining Retainer 30514	4
24111	Felt Plug Oil Hole in Motor End Frame Assembly 13349 (Not shown in Illustration)	4
15499	**Ball Bearing Assembly (Pinion End of Armature Shaft)**	1
	Note: When it is necessary to replace either an Old Style Outer Race or Inner Race and Rolls on the Old Style **Roller** Bearing on this Generator an entire new **Ball** Bearing Assembly must be ordered.	
	(Includes the next 2 Items)	
15526	**Inner Race and Balls Assembly for Ball Bearing Assembly 15499**	1
24447	Outer Race for Inner Race and Balls Assembly 15526	1
21703	Oil Retainer (Felt) for Inner Race Balls Assembly 15526	2
12009	**Grounded Motor Brush Arm Assembly**	1
	(Includes the next 3 Items)	
22084	Spring Stud for Grounded Motor Brush Arm Assembly 12009	1
26563	Roll for Brush Arm Assembly 12009	1
25947	Plain Washer for retaining Roll 26563	1
30530	Brush for Grounded Motor Brush Arm Assembly 12009	1
22751	Screw for attaching Brush 30530	1
22826	Lock Plate for Screw 22751	2
25960	Spring on Grounded Motor Brush Arm Assembly 12009 for Generator Switch	1
25961	Plate for Spring 25960	1
25762	Insulating Plate for Spring 25960	3
27160	Insulating Bushing for Screw 21899	2
21899	Screw for attaching Spring 25960	2
12748	**Generator Brush Brackets to Switch Arm Lead Assembly Complete**	1
	(Includes the next 2 Items)	
27929	Clip for Brush Bracket End of Lead Assembly 12748	1
26225	Clip for Switch Arm End of Lead Assembly 12748	1
20790	Plain Washer for Screw 30065	2
20393	Lock Washer for Screw 30065	2
23147	Stud for Holding Grounded Motor Brush Arm Assembly 12009	1
20217	Nut for Stud 23147	1
20725	Lock Washer for Nut 20217	1
21168	Plain Washer for Grounded Motor Brush Arm Assembly 12009 (Outer)	1
26276	Spring for Grounded Motor Brush Arm Assembly 12009 (Inner)	1
26274	Plain Washer Grounded Motor Brush Arm Assembly 12009 (Inner)	1
27675	Spring for Grounded Motor Brush Arm Assembly 12009 (Outer)	1
11728	**Generator Brush Arm Assembly (Right)**	1
	(Includes the next Item)	
25491	Spring Stud for Brush Arm Assembly 11728	1
23079	Brush for Generator Brush Arm Assembly 11728	1
22751	Screw for attaching Brush 23079	2
22817	Lock Plate for Screw 22751	1
11729	**Generator Brush Arm Assembly (Left)**	1
	(Includes the next Item)	
25491	Spring Stud for Brush Arm Assembly 11729	1
23079	Brush for Generator Brush Arm Assembly 11729	1
22751	Screw for attaching Brush 23079	2
22817	Lock Plate for Screw 22751	1
12169	**Third Generator Brush Arm Assembly (Radial)**	1
	(Includes the next Item)	
25491	Spring Stud for Brush Arm Assembly 12169	1
27935	Extension Brush Arm for Third Generator Brush Arm Assembly 12169	1
29361	Third Brush for Third Generator Brush Arm Assembly 12169	1
22817	Lock Plate for Screw 26766	1
26766	Screw for attaching Third Brush 29361	2
25931	Screw for attaching Extension Brush Arm 27935	2
20393	Lock Washer for Screw 25931	2
20810	Plain Washer for Screw 25931 (Not shown in Illustration)	2
11998	**Third Generator Brush to Field Coil Lead Assembly Complete**	2
	(Includes the next 2 Items)	
24010	Clip for Field Coil End of Lead Assembly 11998	1
24008	Clip for Third Brush End of Lead Assembly 11998	1
25356	Spring for Generator Brush Arm Assembly 11729	1
25357	Spring for Generator Brush Arm Assembly 11728	1
25783	Spring for Third Generator Brush Arm Assembly 12169	1
23093	Bracket for Brush Arms	1
20494	Plate for Studs 14547, 25777, 25355 and 25387 (Inner)	2
22145	Plate for Studs 14547, 25777, 25355 and 25387 (Outer)	2
25955	Plate for Studs 25355 and 25387 next to Bracket 23093 (Not shown in Illustration)	2
23623	Insulator for Studs 14547 and 25777	2
25355	Stop Stud for Generator Brush Arm Assembly 11728	1
25387	Stud for holding Generator Brush Arm Assembly 11728	1

No. 98 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
23249	Insulating Bushing for Studs 25777 and 14547	2
20068	Nut for Studs 14547, 25777, 25355 and 25387	4
20495	Lock Washer for Nut 20068	4
25777	Stud for holding Third Generator Brush Arm Assembly 12169 and Generator Brush Arm Assembly 11729	1
14547	**Stop Stud Assembly for Third Brush Arm Assembly 12169**	1
25784	Insulating Sleeve for Stop Stud 14547	1
25779	Insulating Bushing for Third Generator Brush Arm Assembly 12169	1
21036	Insulating Washer for Third Generator Brush Arm Assembly 12169 (Inner	1
21298	Insulating Washer for Third Generator Brush Arm Assembly 12169 (Outer)	1
25723	Cotter Pin for retaining Third Generator Brush Arm Assembly 12169	1
24201	Plain Washer under Cotter Pin 25723	1
20300	Screw for attaching Third Generator Brush to Field Coil Lead Assembly 11998	1
20393	Lock Washer for Screw 20300	1
12008	**Terminal Bracket Assembly**	1
11999	**Motor Brush Plate to Terminal Bracket Lead Assembly Complete** (Includes the next 2 Items)	1
23666	Clip for Motor Brush Plate End of Lead Assembly 11999	1
23374	Clip for Terminal Bracket End of Lead Assembly 11999	1
26625	Screw for attaching Clip 23450	6
20393	Lock Washer for Nut 23452	6
23452	Nut for Screw 26625	6
23450	Clip for Terminal Bracket Assembly 12008	6
12043	**Generator Top Cover Assembly Complete** (Includes the next 3 Items)	1
26180	Name Plate for Top Cover Assembly 12043	1
23627	Rivet for attaching Name Plate 26180	2
26182	Screw for attaching Generator Top Cover Assembly 12043	2
12045	**Motor End Top Cover Assembly Complete** (Includes the next 4 Items)	1
20484	Spring Washer for Screw 26567 (Not shown in Illustration)	2
26567	Screw for attaching Cover Assembly 12045	2
14043	**Bearing Oiler Assembly for Motor End Top Cover Assembly 12045**	1
30639	Wick for Oiler Assembly 14043 (Not shown in Illustration)	1
12046	**Generator End Top Cover Assembly Complete** (Includes the next 4 Items)	1
21531	Screw for attaching Cover Assembly 12046	2
20484	Spring Washer for Screw 21531 (Not shown in Illustration)	2
14043	**Oiler Assembly for Generator End Top Cover Assembly 12046**	1
30639	Wick for Oiler Assembly 14043 (Not shown in Illustration)	1
26202	Rod for Grounded and Series Motor Brush Arm Assembly 12009 and 12010	1
26188	Screw for attaching Generator Brush Holder Bracket Assembly 12845	2
21663	Screw for attaching Motor End Frame Assembly 13349 (Short) (Plain)	1
33529	Screw for attaching Motor End Frame Asembly 13349 (Short) (Dowel)	1
26199	Screw for attaching Motor End Frame Assembly 13349 (Long) (Dowel)	1
26198	Screw for attaching Motor End Fram Assembly 13349 (Long) (Plain)	1
21663	Screw for attaching Generator End Frame 27861 (Plain)	2
33529	Screw for attaching Generator End Frame 27861 (Dowel)	2
26181	Stud for Screw 26182	2
26542	Guard for Motor Terminal Clip 26192	1
20791	Lock Washer for Screw 22229	1
22229	Screw for attaching Guard 26542	1
33530	Cover for Motor End Frame (Side)	1
27864	Gasket for Cover 33530	1
27863	Cover End Frame Assemblies (Bottom)	2
27864	Gasket for Cover 33530	2
20987	Screw for attaching Cover 33530	4
33215	Screw for attaching Cover 33530	2
32817	Lock Washer for Screws 20987 and 33215	6
20808	Retainer for Oil Retainer 21703 (Inner) (Not shown in Illustration)	1
25926	Washer for retaining Inner Race and Rolls Assembly 11823 (Outer)	1
26217	Spacing Sleeve on Armature Shaft for retaining Washer 25926 (Pinion End)	1
26201	Motor Pinion for Armature Shaft	1
21536	Clamp Washer for Motor Pinion 26201	1
24622	Lock Washer for Clamp Screw 24496	1
24496	Clamp Screw for Motor Pinion 26201	1
26826	Insulating Plate for Motor Terminal Clip 26192 (Not shown in Illustration)	1
23374	Terminal Clip for connecting Terminal Bracket Assembly 12008	4
26786	Terminal Clip used with Motor Terminal Clip 26192	1
26192	Motor Terminal Clip	1



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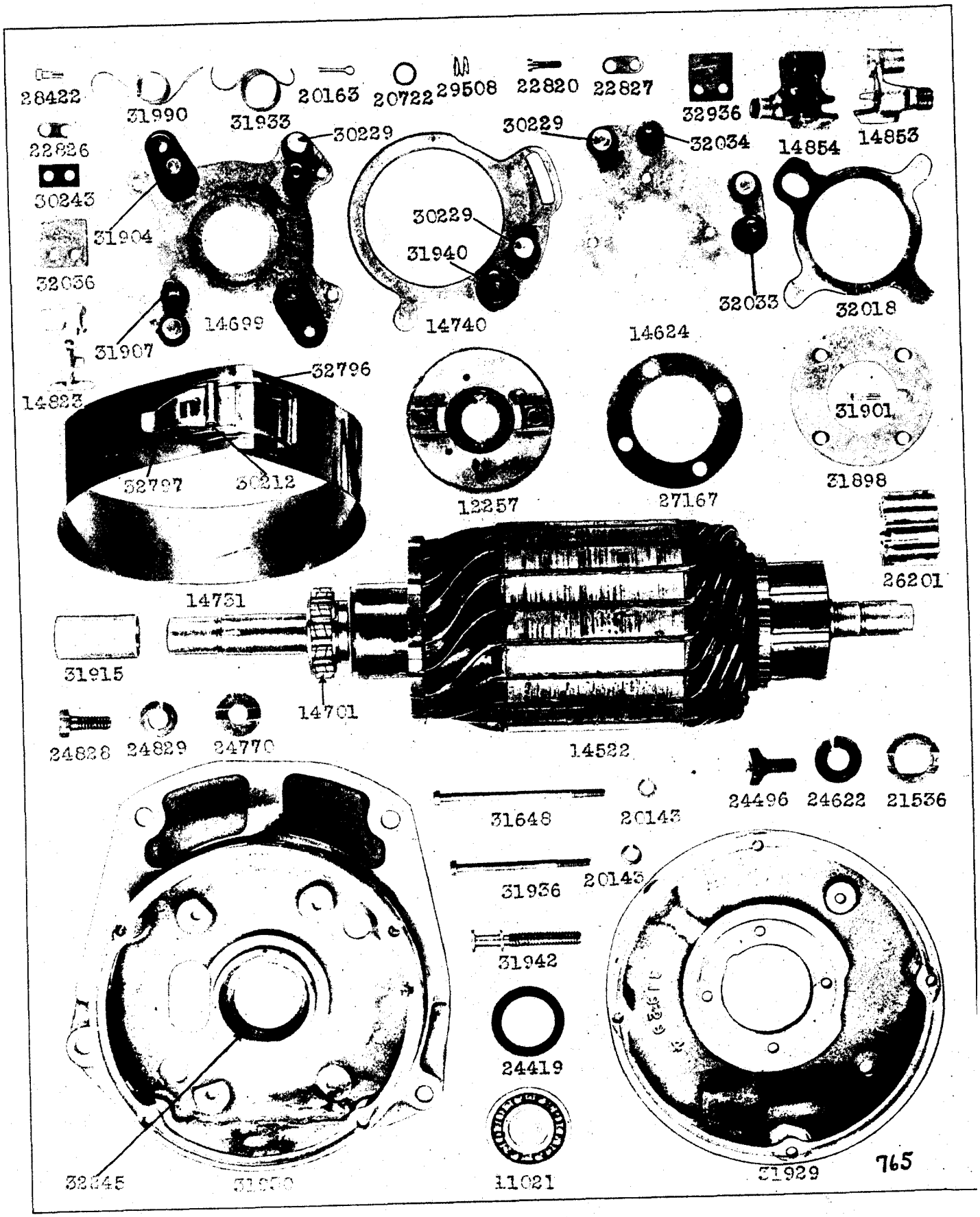


No. 162 MOTOR GENERATOR

No. 162 MOTOR GENERATOR

Piece Number	NAME OF PART	Quantity Required
162	**MOTOR GENERATOR COMPLETE**	1
31932	**Frame for Motor Generator**	1
32532	Name Plate for Motor Generator	1
32821	Pin for attaching Name Plate	2
32260	Pole Piece for Frame	4
32021	Screw for attaching Pole Piece	7
31920	Stud Screw for attaching Pole Piece	1
14857	**Motor Field Coil Assembly** (Includes next Item)	2
31905	Stud for connecting Motor Field Coil	1
31924	Connector for Connecting Motor Field Coil	1
31742	Insulator for Connector 31924	1
32445	Insulator between Motor Field Coil and Pole Piece	4
14856	**Generator Field Coil Assembly (On same side as Generator Switch** (Includes the next 3 Items)	1
27123	Clip for connecting Coils to Generator Switch	1
24008	Clip for connecting Field Coil to Brush Plate	1
28585	Clip for connecting Field Coil to Brush Plate	1
14855	**Generator Field Coil Assembly (Opposite Field Coil Assembly 14856** (Includes the next Item)	1
24008	Clip for connecting Field Coil to Brush Plate	1
31910	Motor Terminal Stud	1
31912	Insulating Washer for Terminal Stud 31910 (Outside)	1
23410	Insulating Washer for Terminal Stud 31910 (Inside)	1
20238	Plain Washer for Terminal Stud 31910	1
31913	Insulating Bushing for Terminal Stud 31910	1
21105	Lock Washer for Nut 27834	2
27834	Nut for Terminal Stud	2
31929	End Frame for Generator end of Armature Shaft	1
11021	**Ball Bearing Assembly**	1
15386	**Third Brush Arm Plate Assembly** (Includes the next 7 Items)	1
31940	Stud for Third Brush Arm	1
32147	Insulating Bushing for Stud 31940	1
29240	Insulating Washer for Stud 31940	2
20238	Plain Washer for Stud 31940	1
33526	Stud for Third Brush Arm Spring 30241	1
30241	Bushing for Stud 33526	1
30227	Insulating Washer for Stud 33526	3
14624	**Generator Brush Arm Plate Assembly** (Includes the next 8 Items)	1
32033	Stud for Generator Brush Arm (Grounded)	1
32034	Stud for Generator Brush Arm (Insulated)	1
32147	Insulating Bushing for Stud 32034	1
29240	Insulating Washer for Stud 32034	2
30238	Plain Washer for Stud 32034	1
30229	Stud for Generator Brush Arm Spring	2
30241	Insulating Bushing for Stud 30229	2
30227	Insulating Washer for Stud 30229	2
24419	Felt Washer for Ball Bearing Assembly 11021	1
33294	Retainer for Ball Bearing	1
31898	Retainer for Ball Bearing Assembly 11021	1
31901	Screw for attaching Retainer 31898	4
31945	Screw for locking Third Brush Plate	1
20165	Plain Washer for Screw 31945	1
26740	Lock Washer for Screw 31945	1
32798	Nut for Screw 31945	1
31942	Screw for adjusting Brushes (Old Style)	1
14823	**Generator and Third Brush Arm Assembly (Old Style used before Serial No. 162-21351)**	3
33220	Stop for Brush Arm (Old Style)	3
22826	Lock Plate for Screw 22820	3
22820	Screw for attaching Brush (Before Serial No. 162-21351)	6
29508	Tension Spring for Generator Brush Arm (Small)	3
20722	Plain Washer for retaining Springs 29508	3
20163	Cotter Pin for retaining Springs 29508	3
15319	**Generator Brush Arm Assembly** (Includes next 2 Items)	2
33353	Hub for Generator Brush Arm Assembly	1
31990	Spring for Generator Brush Arm Assembly	1

No. 162 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
15411	**Thermostat and Third Brush Arm Assembly** (Includes next 5 Items)	1
33353	Hub for Third Brush Arm Assembly	1
31990	Spring for Third Brush Assembly	1
15166	**Thermostat Resistance Assembly**	1
25091	Screw for attaching Resistance Assembly	2
20647	Lock Washer for Screw 25091	2
33362	Brush for Generator and Third Brush Arm Assembly	3
33355	Screw for attaching Brush 33362	6
33354	Stop Plate for Brush 33362	3
33357	Plate for Brush 33362	3
25091	Screw for attaching Lead to Thermostat and Third Brush Arm Assembly	1
20647	Lock Washer for Screw 25091	1
31930	Motor End Frame	1
14701	**Inner Race and Rolls Assembly for Drive End of Armature Shaft**	1
32245	Outer Race for Inner Race and Rolls Assembly 14701	1
32170	Generator Switch Terminal Stud	2
32920	Lock Plate for Switch Terminal Stud	1
32263	Insulator for Stud 32170 (Next to end Frame)	1
30079	Insulating Bushing for Stud 32170	2
32241	Insulating Washer for Stud 32170	2
26273	Plain Washer for Stud 32170	2
28213	Nut for Stud 32170	2
31656	Clip for Stud 32170	2
30060	Lock Washer for Stud 32170	2
25392	Nut for connecting Generator Lead to Stud 32170	2
14706	**Insulator Assembly for separating Studs 32170**	1
14699	**Motor Brush Plate Assembly** (Includes the next 9 Items)	1
31907	Stud for Motor Brush Arms (Grounded)	2
31904	Stud for Motor Brush Arm (Insulated)	2
30229	Spring Stud for Grounded Motor Brush Arm Spring	2
30241	Insulating Bushing for Stud 30229	2
30227	Insulating Washer for Stud 30229	2
30140	Insulating Bushing for Stud 31904	2
32017	Insulator for Stud 31904	4
31991	Plate for retaining Insulated Brush Arm Studs 31904	2
29499	Plate for retaining Insulated Brush Arm Studs 31904	2
14852	**Motor Brush Arm Assembly (Insulated)**	2
15209	**Motor Brush Arm Assembly (Grounded)**	1
14854	**Motor Brush Arm Assembly (For Generator Switch)**	1
32936	Brush for Motor Brush Arms	4
22820	Screw for attaching Brushes 32936	8
22827	Lock Plate for Screw 22820	4
31933	Brush Arm Springs (For Grounded Motor Brush Arm)	2
32255	Brush Arm Springs for Insulated Brush Arms	2
29508	Tension Spring for Motor Brush Arm	4
20722	Plain Washer for Spring 29508	4
20163	Cotter Pin retaining Tension Springs 29508	4
14522	**Armature Assembly**	1
32601	Spacing Washer for Armature Shaft (Drive end)	1
32528	Washer for Armature Shaft	1
32529	Washer for Armature Shaft	1
32530	Fibre Plug for End Housing	1
31938	Spacing Washer for Armature Shaft (For Roller Bearing (Inner)	1
29214	Washer for Armature Shaft (Next to Generator Clutch)	1
29886	Washer for Armature Shaft (For Roller Bearing Outer)	1
31915	Sleeve for Armature Shaft (Next to Pinion)	1
26201	Pinion for Armature Shaft	1
21536	Clamp Washer for Pinion	1
24496	Screw for retaining Pinion	1
24622	Lock Washer for Screw 24496	1
20068	Nut for attaching Field Coil Stud	2
20495	Lock Washer for Nut 20068	2
31988	Bushing for Insulating Field Coil Stud on Motor Brush Plate	2
32018	Lifting Plate for Motor Brushes	1
20492	Screw for attaching Plate 32018	4
20495	Lock Washer for Screws 20492	4
31648	Screw for attaching Motor End Frame	4
20143	Lock Washer for Screws 31648 and 31946	8
31936	Screw for attaching Generator End Frame	4
26740	Lock Washer for Screw 31936	4
12257	**Generator Clutch Assembly** (Includes the next 8 Items)	1
12256	**Generator Clutch Shell and Cam Assembly**	1
26109	Shell for Clutch Shell and Cam Assembly 12256	1
23952	Roll for Clutch Shell and Cam Assembly	3

No. 162 MOTOR GENERATOR (Continued)

Piece Number	NAME OF PART	Quantity Required
20017	Plunger for Roll	3
20024	Spring for Plunger	3
23983	Binding Spring for Generator Clutch Assembly	1
27167	Coupling for Generator Clutch Assembly	1
27166	Screw for attaching Coupling 27167	3
11285	**Oiler Assembly for Drive end of Generator**	1
24770	Clamp Washer for Generator Clutch	1
24828	Screw for retaining Generator Clutch	1
24829	Lock Washer for Screw 24828	1
31399	Screw for attaching Brush connecting Lead	1
20495	Lock Washer for Screw 31399	1
25762	Insulated Plate for Generator Switch Arm (Short)	2
32175	Insulator for Switch Arm (Long) (Old Style)	1
25960	Contact for Generator Switch	1
25961	Support Plate for Switch Contact	1
32257	Bushing for Screw 26068 (Old Style)	2
32169	Locking Plate for Screw 26068 (Old Style)	1
26068	Screw for attaching Switch Contacts (Old Style)	2
32921	Bushing for Screw 21098	2
21098	Screw for attaching Switch Contacts	2
20790	Plain Washer for Screw 21098	2
20393	Lock Washer for Screw 21098	2
14732	**Top Cover Assembly**	1
	(Includes the next 2 Items)	
32289	Insulator for Top Cover	1
24315	Rivet for attaching Insulator 32289	2
32051	Nut for attaching Top Cover Assembly (Old Style) (Used with Cover without Non-loseable Screw)	1
20137	Lock Washer for Nut 32051	1
27041	Plain Washer for Nut 32051	1
32607	Nut for attaching Top Cover Assembly (Used with Cover with Non-losable Screws)	1
32608	Plain Washer for Nut 32607	1
14731	Cover Band Assembly	1
	(Includes next 3 Items)	
32796	Clamp Spring for Cover Band	1
32797	Latch for Cover Band	1
30212	Pin for attaching Latch	1
32013	Cover Strap for Generator (Lower)	2
32812	Screw for attaching Strap 32013	2
26740	Lock Washer for Screw 32812	1
31939	Motor Terminal Clip	3
26997	Generator Terminal Clip (Open)	3
23365	Fibre Ferrule for Clip 26997	1
21656	Clamp Clip for connecting Motor Generator	1
23553	Screw for Clamp Clip 31656	1
23277	Lock Washer for Nut 23452	1
23452	Nut for Screw 23553	1

No. 1007 IGNITION SWITCH

Note: No. 1007 Ignition Switch superseded by No. 1009 Ignition Switch. When ordering a Complete new unit, order No. 1009)

(Not Illustrated)

Piece Number	NAME OF PART	Quantity Required
1007	**IGNITION SWITCH COMPLETE**	1
12094	**Cover Assembly Complete**	1
	(Includes the next 6 Items)	
26477	Cover for Cover Assembly 12094	1
26478	Push Button for Cover 26477	1
24916	Stud for Push Button 26478	1
24593	Spring for Stud 24916	1
23578	Name Plate for Cover 26477	1
25197	Rivet for Name Plate 23578	2
14106	**Frame Assembly (Service)**	1
	(Includes the next 7 Items)	
25251	Stud for mounting, Switch (Short)	1
24657	Stud for mounting Switch (Long)	1
25187	Spring Stud for Frame Assembly 14106	1
25277	Stud for Retaining Cam 25276	1
25276	Cam for Locking Switch	1
24956	Nut for retaining Screw 25370	4
25193	Dowel Pin for retaining Stud 24657	1
24285	Nut for Frame Assembly 14106	4
24809	Plain Washer for Nut 24285	3
11529	**Locking Plate Assembly**	1
	(Includes the next Item)	
25349	Spring Stud for Locking Plate Assembly 11529	1
24590	Spring for Locking Plate Assembly 11529	1
11405	**Key for locking Ignition Switch 1007**	1
24808	Screw for retaining Cover Assembly 12094	4
11253	**Spring Terminal Assembly (Battery and Magneto)**	2
	(Includes the next 3 Items)	
11437	**Spring Terminal Assembly for Spring Terminal Assembly 11253**	1
24833	Terminal Post for Spring Terminal Assembly 11253	1
25191	Dowel Pin for Spring Terminal Assembly 11253	1
11359	**Spring Terminal Assembly (Center)**	1
	(Includes the next 3 Items)	
11437	**Spring Terminal Assembly for Spring Terminal Assembly 11359**	1
14004	**Terminal Post for Spring Terminal Assembly 11359**	1
24614	Dowel Pin for Spring Terminal Assembly 11359	1
11614	**Contact Assembly for Push Button (Long)**	1
11314	**Contact Assembly (Long Contact for Battery)**	1
11315	**Contact Assembly (Short Contact for Battery)**	1
11375	**Contact Assembly (Outer Contact for Magneto)**	1
11357	**Contact Assembly (Inner Contact for Magneto)**	1
25370	Screw for retaining Contact Assemblies 11314, 11315, 11357 and 11375	4
25375	Screw for retaining Contact Assembly 11614	2
24803	Insulating Bushing for Screw 25375	2
24804	Insulating Bushing for Screw 25370	4
24656	Insulating Bushing for Lever Assembly 11155	2
11155	**Lever Assembly**	1
25162	Plate for retaining Lever Assembly 11155	1
24867	Screw for retaining Plate 25162 (Large)	1
24957	Screw for retaining Plate 25162 (Small)	1
25255	Plain Washer for Screw 24957	1
24598	Connector for Contact Assemblies 11614 and 11315	1
24592	Separator between Contact Assemblies 11314 and 11357 and Frame Assembly 11534 (Short)	2
24837	Insulator for Contact Assembly 11614	3
24658	Insulator for Contact Assemblies 11314 and 11315	5
24838	Insulator between Contact Assemblies 11357 and 11375 (Long)	1
24897	Insulating Washer for Screws 25370 and 25375	6
24954	Insulating Plate for Ignition Switch Assembly 1007	1
24971	Bushing for retaining Screw 25375	2
24591	Separator between Contact Assemblies 11314 and 11357 and Frame Assembly 14106	2
24959	Stop Screw for Locking Plate Assembly 11529	1

No. 1009 IGNITION SWITCH

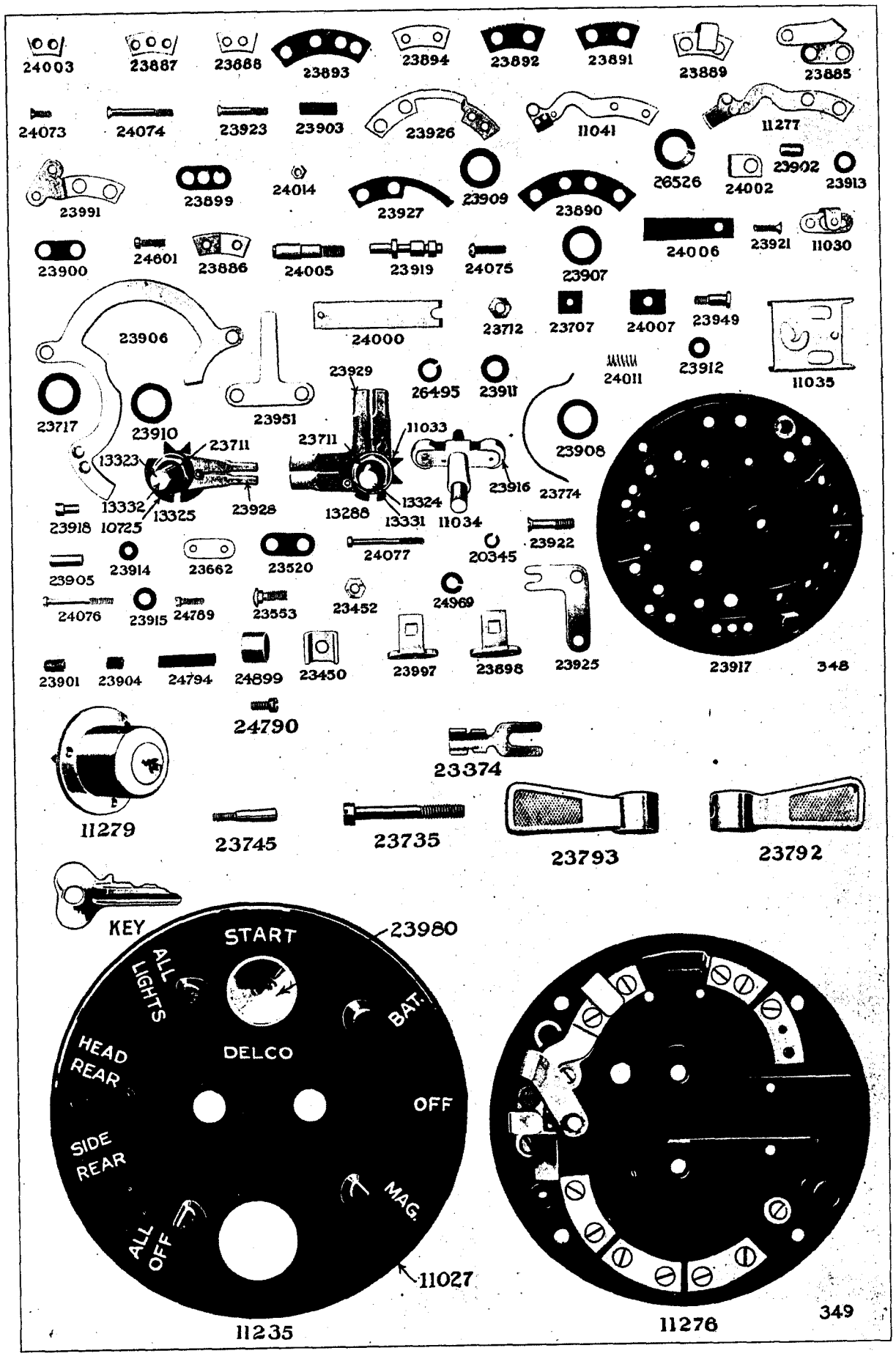
(Not Illustrated)

Piece Number	NAME OF PART	Quantity Required
1009	**IGNITION SWITCH COMPLETE**	1
11506	**Cover Assembly Complete**	1
	(Includes the next 6 Items)	
26477	Cover for Cover Assembly 11506	1
28166	Push Button for Cover 26477	1
25200	Stud for Push Button 28166	1
24593	Spring for Stud 25200	1
23576	Name Plate for Cover 26477	2
14107	**Frame Assembly (Service)**	1
	(Includes the next 7 Items)	
24786	Stud for mounting Switch (Short)	1
24759	Stud for mounting Switch (Long)	1
25193	Pin for retaining Stud 24759	1
25187	Spring Stud for Frame Assembly 14107	1
25277	Stud for retaining Cam 25276	1
25276	Cam for Locking Switch	1
24956	Nut for retaining Screw 25370	4
24285	Nut for Frame Assembly 14107	3
24809	Plain Washer for Nut 24285	2
11529	**Locking Plate Assembly**	1
	(Includes the next Item)	
25349	Spring Stud for Locking Plate Assembly 11529	1
24590	Spring for Locking Plate Assembly 11529	1
11405	**Key for locking Ignition Switch 1009**	1
24808	Screw for retaining Cover Assembly 11506	4
11394	**Terminal Assembly (Center)**	1
11437	**Spring Terminal Assembly for Spring Terminal Assembly 11394**	1
	(Includes the next 3 Items)	
25120	Terminal Post for Spring Terminal Assembly 11394	1
24614	Dowel Pin for Spring Terminal Assembly 11394	1
11253	**Terminal Assembly (Magneto and Battery)**	2
	(Includes the next 3 Items)	
11437	**Spring Terminal Assembly for Spring Terminal Assembly 11253**	1
24833	Terminal Post for Spring Terminal Assembly 11253	1
25191	Dowel Pin for Spring Terminal Assembly 11253	1
11504	**Contact Assembly (Short Contact for Push Button)**	1
11614	**Contact Assembly (Long Contact for Push Button)**	1
11592	**Contact Assembly (Center Contact for Battery)**	1
11315	**Contact Assembly (Outer Contact for Battery)**	1
11314	**Contact Assembly (Inner Contact for Battery)**	1
11357	**Contact Assembly (Inner Contact for Magneto)**	1
11375	**Contact Assembly (Outer Contact for Magneto)**	4
25370	Screw for retaining Contact Assemblies 11357, 11375, 11314, 11315 and 11592	2
24968	Insulating Bushing on Screw 25370 for Contact Assemblies 11375 and 11357	2
24805	Insulating Bushing on Screw 25370 for Contact Assemblies 11314, 11315 and 11592	2
24971	Bushing for retaining Screw 24810	2
24605	Insulating Bushing for Screw 24810	2
24810	Screw for retaining Contact Assemblies 11504 and 11614	1
11307	**Spring Terminal Assembly for Frame Assembly 14107**	1
24954	Insulating Plate for Ignition Switch 1009	1
25162	Plate for retaining Lever Assembly 11305	1
24867	Screw for retaining Plate 25162 (Large)	1
24957	Screw for retaining Plate 25162 (Small)	1
25255	Plain Washer for Screw 24957	1
24959	Stop Screw for Locking Plate Assembly 11529	2
24656	Insulating Bushing for Lever Assembly 11305	1
24598	Connector (Wide)	1
24807	Connector (Narrow)	3
24837	Insulator (Thick)	6
24658	Insulator (Thin)	1
24838	Insulator for Contact Assembly 11375 (Long)	1
24603	Insulator for Contact Assembly 11504 (Long)	2
24591	Separator for Contact Assemblies 11314 and 11357	6
24897	Insulating Washer for Screws 25370 and 24810	1
11305	**Lever Assembly**	

No. 1018 IGNITION SWITCH

(Not Illustrated)

Piece Number	NAME OF PART	Quantity Required
1018	**IGNITION SWITCH COMPLETE**	1
11542	**Cover Assembly Complete**	1
	(Includes the next 6 Items)	
25231	Cover for Cover Assembly 11542	1
24644	Push Button for Cover Assembly 11542	1
24916	Stud for Push Button 24644	1
24593	Spring for Stud 24916	1
23580	Name Plate for Cover 25231	1
24304	Rivet for Name Plate 23580	2
14107	**Frame Assembly (Service)**	1
	(Includes the next 7 Items)	
24786	Stud for mounting Switch (Short)	1
24759	Stud for mounting Switch (Long)	1
25193	Pin for retaining Stud 24759	1
25187	Spring Stud for Frame Assembly 14107	1
25277	Stud for retaining Cam 25276	1
25276	Cam for locking Switch	1
24956	Nut for retaining Screw 25370	4
24285	Nut for Frame Assembly 14107	3
24809	Plain Washer for Nut 24285	2
11529	**Locking Plate Assembly**	1
	(Includes the next Item)	
25349	Spring Stud for Locking Plate Assembly 11529	1
24590	Spring for Locking Plate Assembly 11529	1
11405	**Key Assembly for locking Ignition Switch 1018**	1
11359	**Terminal Assembly (Short Contact for Push Button)**	1
	(Includes the next 3 Items)	
11437	**Spring Terminal Assembly for Spring Terminal Assembly 11359**	1
14004	**Terminal Post for Spring Terminal Assembly 11359**	1
24614	Dowel Pin for Spring Terminal Assembly 11359	1
11614	**Contact Spring Assembly (Long Contact for Push Button)**	1
24808	Screw for retaining Cover Assembly 11542	4
24837	Insulator between Terminal Assembly 11359 and Contact Spring Assembly 11614	2
24598	Connector for Contact Spring Assembly 11614 and Contact Spring Assembly 11315	1
24897	Plain Washer for Screw 25375	1
24658	Insulating Plate for Screw 25375	1
24971	Bushing for retaining Screw 25375	2
25375	Screw for retaining Contact Spring Assembly 11614	1
11253	**Spring Terminal Assembly (Outer)**	2
	(Includes the next 3 Items)	
11437	**Spring Terminal Assembly for Spring Terminal Assembly 11253**	1
24833	Terminal Post for Spring Terminal Assembly 11253	1
25191	Dowel Pin for Spring Terminal Assembly 11253	1
11252	**Spring Terminal Assembly (Inner)**	1
	(Includes the next 3 Items)	
11437	**Spring Terminal Assembly for Spring Terminal Assembly 11252**	1
25378	Terminal Post for Spring Terminal Assembly 11252	1
25191	Dowel Pin for Spring Terminal Assembly 11252	1
11307	**Spring Terminal Assembly for Frame Assembly 14107**	1
11315	**Contact Spring Assembly for Battery and Magneto (Short)**	2
11314	**Contact Spring Assembly for Battery and Magneto (Long)**	2
25370	Screw for retaining Contact Spring Assemblies 11314 and 11315	4
24805	Insulating Bushing for Screw 25370	4
25162	Plate for retaining Lever Assembly 11260	1
24867	Screw for retaining Plate 25162 (Large)	1
24957	Screw for retaining Plate 25162 (Small)	1
24656	Insulating Bushing for Lever Assembly 11260	2
25255	Plain Washer for Screw 24957	1
24591	Separator for Contact Spring Assembly 11314 (Long)	1
24592	Separator for Contact Spring Assembly 11314 (Short)	1
24959	Stop Screw for Locking Plate Assembly 11529	1
24803	Insulating Bushing for Screw 25375	2
25084	Insulating Plate for Ignition Switch 1018	1
24897	Plain Washer for Screw 25370	4
11260	**Lever Assembly**	1



No. 1035 COMBINATION SWITCH

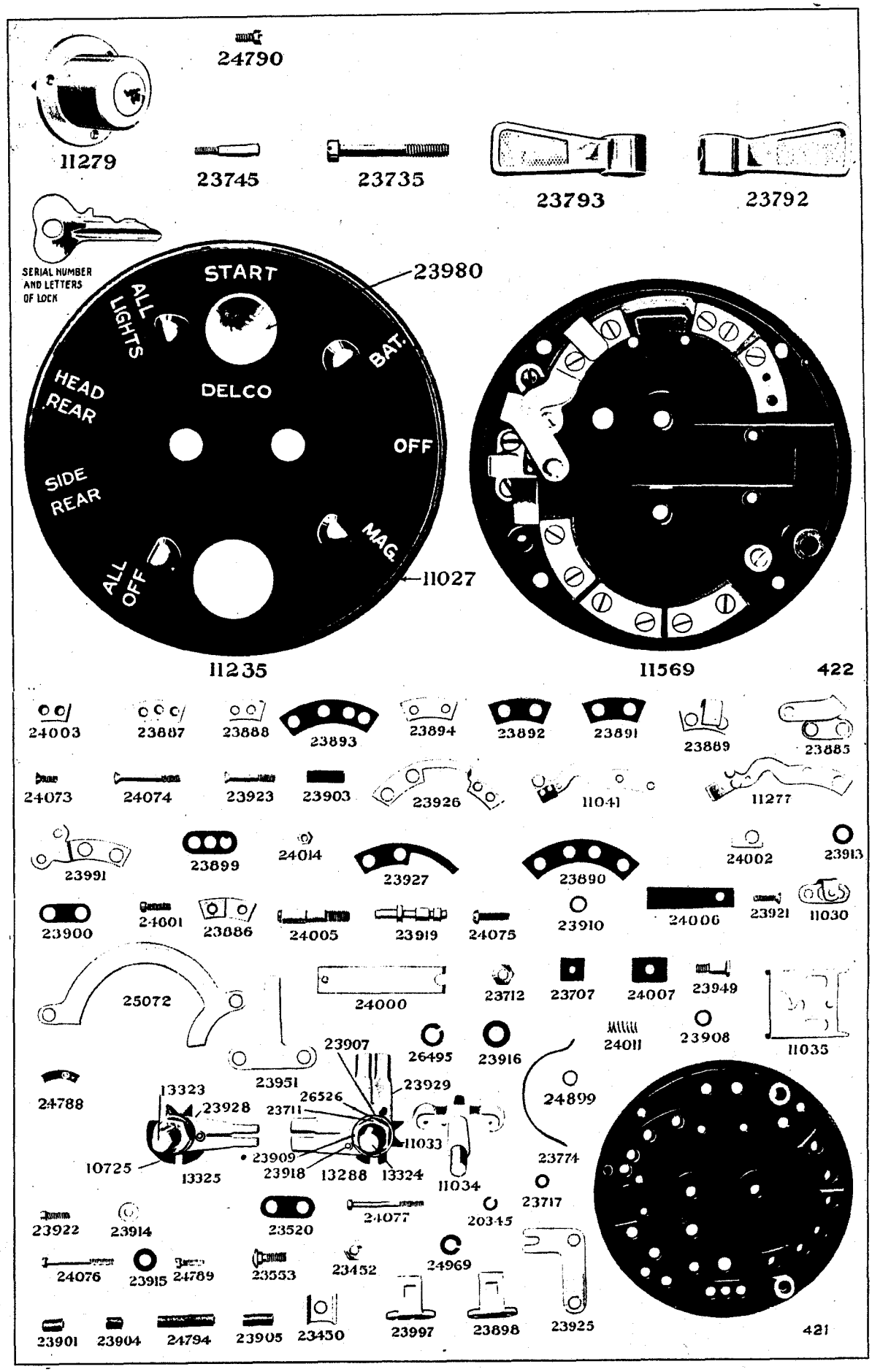
No. 1035 COMBINATION SWITCH

(No. 1035 Combination Switch is superseded by No. 1040 Combination Switch. When ordering a complete new Switch order No. 1040.)

Piece Number	NAME OF PART	Quantity Required
1035	**COMBINATION SWITCH COMPLETE**	1
11235	**Housing Assembly Complete** (Includes the next 3 Items)	1
11027	**Housing Assembly**	1
23980	Push Button for Housing Assembly 11235	1
23979	Screw Stud for Push Button 23980 (Not shown in Illustration)	1
11279	**Lock Assembly for locking Switch** (Includes the next Item)	2
29958	Key for Lock Assembly 11279 (Give Series No. of Lock)	8
23374	Terminal Clip for connecting Switch	1
23917	Mounting Plate for Switch	7
23898	Terminal Post for Terminals 1, 2, 3, 4, 6,7 and 8	8
23553	Screw for retaining Clip 23450	8
23452	Nut for Screw 23553	8
24969	Lock Washer for Nut 23452	8
23450	Clip for retaining Terminal Clip 23374	1
23997	Terminal Post for Terminal Post No. 5	1
23991	Connector for Terminal No. 8 and Contact Spring Assembly 11277	1
23662	Plate for Blank Terminal	1
11041	**Contact Spring Assembly (Upper Contact Arm) for Starting Button**	1
11277	**Contact Spring Assembly (Lower Contact Arm) for Starting Button**	1
23926	Plate for connecting Terminals No. 5 and 6	1
23885	Bracket for supporting Plunger 23919	1
11030	**Contact Bracket Assembly for Starting Button**	1
23919	Plunger Stud for operating Contact Spring Assemblies 11041 and 11277	1
23894	Contact Plate for connecting Terminals No. 2, 3 and 6	1
23886	Plate for connecting Terminal No. 1	1
23887	Plate for connecting Plate 23888 and Plate 23906	1
23888	Plate for connecting Terminal No. 5	1
23889	Plate for connecting Plate 23926 and Terminal No. 6	1
23927	Insulating Plate under Plate 23926	1
23890	Insulating Plate for Contact Plate 23894 for Terminals No. 2 and 3	2
23891	Insulating Plate for Plates 23886 and 23894	2
23892	Insulating Plate for Contact Spring Assembly 11041 (Thin)	1
23893	Insulating Plate for Plates 23887 and 23888	1
23900	Insulator for Connector 23991	10
23520	Insulating Plate for Terminal Post No. 1, 2, 3, 4, 6, 7, 8	1
23899	Insulating Plate for Terminal Post No. 5	1
23901	Insulating Bushing for Screw 24077	2
23902	Insulating Bushing for Screw 23921	10
23903	Insulating Bushing for Screw 23923	1
23904	Insulating Bushing for Screw 23789	2
23905	Insulating Bushing for Screw 23922	1
23912	Plain Washer for Screw 23789	1
23911	Insulating Washer for Screw 23789	10
23923	Screw for retaining Terminals 1, 2, 3, 5, and 6	2
24601	Screw for retaining Terminal No. 8	1
23922	Screw for retaining Terminal No. 1 (Short Screw)	1
24789	Screw for retaining Terminal No. 4 (Short Screw)	2
23921	Screw for retaining Terminal No. 7	1
15454	**Brush Assembly Complete (For Lighting)** (Includes the next 14 Items)	1
13324	**Stud Assembly** (Includes the next Item)	1
23747	Pin for Stud Assembly 13324 (Not shown in Illustration)	2
23929	Contact Arm for Brush Assembly 15454	1
11033	**Stop Disc Assembly** (Includes the next Item)	1
23946	Stud for Stop Disc Assembly 11033 (Not shown in Illustration)	1
23918	Insulating Bushing for Stop Disc Assembly 11033	1
24899	Insulating Bushing for Stud Assembly 13324	1
23717	Plain Washer for Stop Disc Assembly 11033	1
23910	Insulating Washer for Stop Disc Assembly 11033	1
23711	Nut for Clamping Brush Assembly 15454	1
26526	Lock Washer for Nut 23711	1
23909	Plain Washer for Nut 23711	1
23907	Insulating Washer for Nut 23711	2
23908	Plain Washer between Contact Arms 23929	

No. 1035 COMBINATION SWITCH (Continued)

Piece Number	NAME OF PART	Quantity Required
15453	**Brush Assembly Complete (For Ignition)**	1
	(Includes the next 14 Items)	
13323	**Stud Assembly**	1
	(Includes the next Item)	
23747	Pin for Stud Assembly 13323 (Not shown in Illustration)	1
23928	Contact Arm for Brush Assembly 15453	2
10725	**Stop Disc Assembly**	1
	(Includes the next Item)	
23946	Stud for Stop Disc Assembly 10725 (Not shown in Illustration)	1
23918	Insulating Bushing for Stop Disc Assembly 10725	1
24899	Insulating Bushing for Stud Assembly 13332	1
23717	Plain Washer for Stop Disc Assembly 10725	1
23910	Insulating Washer for Stop Disc Assembly 10725	1
23711	Nut for clamping Brush Assembly 13323	1
26526	Lock Washer for Nut 23711	1
23909	Plain Washer for Nut 23711	1
23907	Insulating Washer for Nut 23711	2
23908	Plain Washer for Contact Arms 23928	2
24005	Screw for retaining Brush Assemblies 15454 and 15453	2
23712	Nut for Screw 24005	2
20495	Lock Washer for Nut 23712	1
11034	**Roller Arm Assembly**	1
24002	Contact Plate for Contact Spring Assembly 11277	1
23906	Upper Contact Plate for Brush Assemblies 15453 and 15454	1
23925	Plate for retaining Spring 23951	1
11035	**Tumbler Assembly (Sliding Plate for Locking Switch)**	1
	(Includes the next Item)	
23938	Pin for Tumbler Assembly 11035 (Not shown in Illustration)	1
24000	Slide (For Locking Plunger 23919)	1
23774	Tension Spring for Roller Arm Assembly 11034	2
23951	Spring for operating Plunger 23919	1
24006	Insulator Plate for Spring 23951	1
24007	Insulator Plate for Tension Spring 23774	1
24003	Spacing Plate between Plates 23906 and 23887	1
24011	Spring for Tumbler Assembly 11035	1
24014	Nut for Screw 24077	1
23707	Nut for Screw 24075	1
24794	Insulating Bushing for Screw 24076	1
23901	Insulating Bushing for Screw 24601	1
24969	Lock Washer for Screw 23735	4
20345	Lock Washer for Nut 24014	1
23915	Insulating Washer for Plates 23906 and 24007	2
23916	Insulating Washer for Roller Arm Assembly 11034	1
23913	Insulating Washer for Screw 24077	1
23914	Plain Washer for Screws 24076 and 24077	2
23793	Lever for operating Brush Assembly 15453	2
23745	Screw for retaining Lever 23793	2
24790	Screw for retaining Lock Assembly 11279	3
23949	Screw for retaining Tumbler Assembly 11035	2
24077	Screw for retaining Plates 23906 and 24002	1
24074	Screw for connecting Plate 23906 and Blank Terminal (Long Screw)	1
24076	Screw for retaining Terminal No. 4 (Long Screw)	1
24073	Screw for retaining Plate 23906 (Short)	1
24075	Screw for retaining Tension Spring 23774	1
23735	Screw for retaining Housing Assembly 11235	4



No. 1042 COMBINATION SWITCH

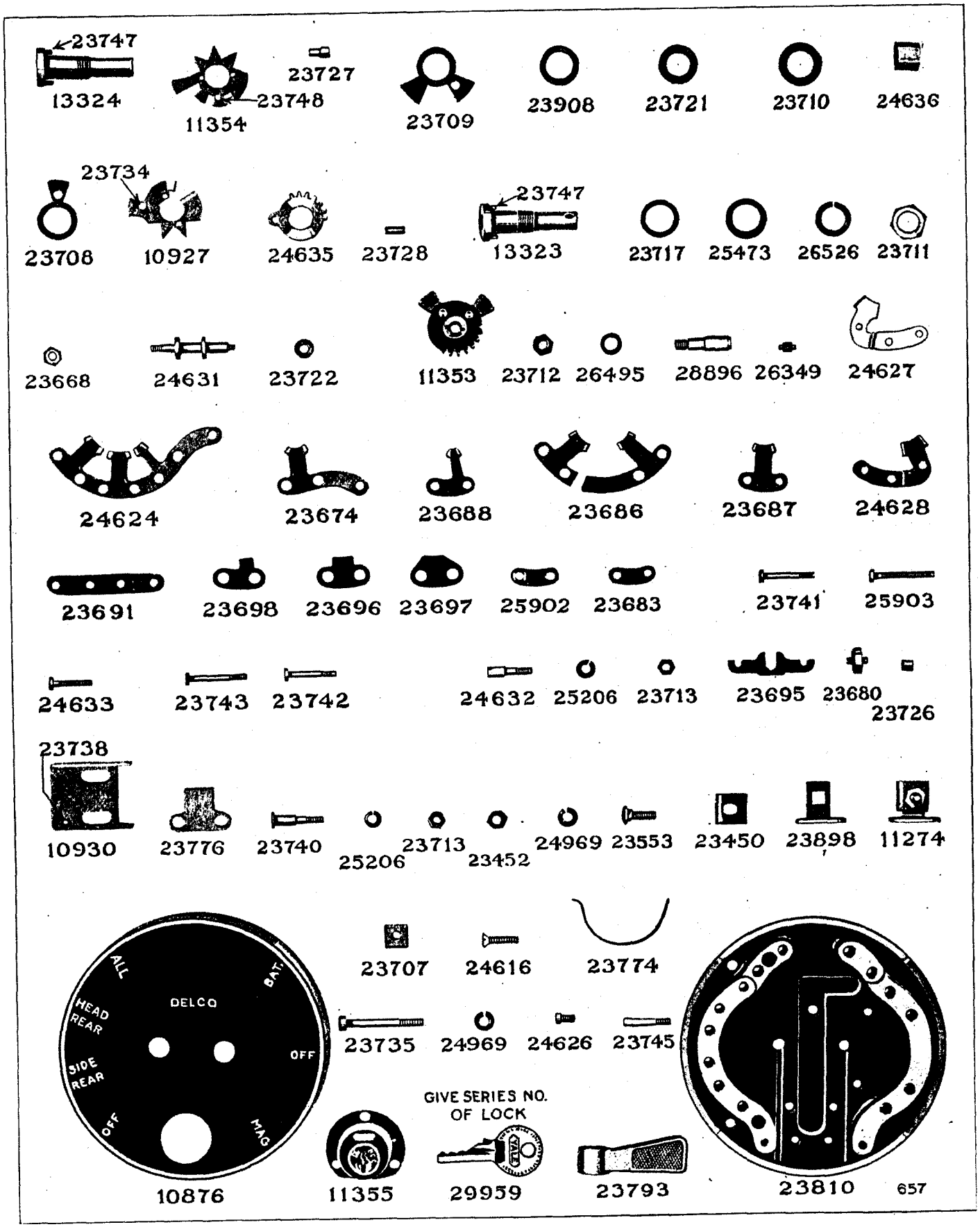
No. 1042 COMBINATION SWITCH

(No. 1042 Combination Switch is superseded by No. 1040 Combination Switch. When ordering a complete new switch order No. 1040.

Piece Number	NAME OF PART	Quantity Required
1042	**COMBINATION SWITCH COMPLETE**	1
11235	**Housing Assembly Complete** (Includes the next 3 Items)	1
11027	**Housing Assembly for Housing Assembly 11235**	1
23980	Push Button for Housing Assembly 11235	1
23979	Screw Stud for Push Button 23980 (Not shown in Illustration)	1
24952	Mounting Plate for Mounting Assembly 11569	8
23898	Terminal Post for Terminals 1, 2, 3, 4, 6, 7, 8 and 9	9
23553	Screw for retaining Clip 23450	9
23452	Nut for Screw 23553	9
20393	Lock Washer for Nut 23452	9
23450	Clip for retaining Terminal Clips to Combination Switch	1
23997	Terminal Post for Terminal Post No. 5	1
23991	Connector for Terminal No. 8 and Contact Spring Assembly 11277	1
11041	**Contact Spring Assembly (Upper Contact Arm for Starting Button)**	1
11277	**Contact Spring Assembly (Lower Contact Arm for Starting Button)**	1
23926	Plate connecting Terminals Nos 5 and 6	1
23885	Bracket for supporting Plunger Stud 23919	1
11030	**Contact Bracket Assembly for Starting Button**	1
23919	Plunger Stud for operating Contact Spring Assemblies 11041 and 11277	3
23894	Plate for connecting Terminals Nos. 2, 3, and 6	1
23886	Plate for connecting Terminal No. 1	1
23887	Plate for connecting Plates 23888 and 23926	1
23888	Plate for connecting Terminal No. 5	1
23889	Plate for connecting Plate 23926 and Terminal No. 6	1
23927	Insulating Plate under Plate 23926	2
23890	Insulating Plate for Plate 23894 and Terminals Nos. 2 and 3	2
23891	Insulating Plate for Plates 23886 and 23894 and Contact Spring Assembly 11041 (Thick)	2
23892	Insulating Plate for Contact Spring Assembly 11041 (Thin)	1
23893	Insulating Plate for Plates 23887 and 23888	1
23900	Insulating Plate for Connector 23991	10
23520	Insulating Plate for Terminal Post No. 1, 2, 3, 4, 6, 7, 8, 9	1
23899	Insulating Plate for Terminal Post No. 5	3
23901	Insulating Bushing for Screws 24077 and 24601	2
23902	Insulating Bushing for Screw 23921 (Not shown in Illustration)	10
23903	Insulating Bushing for Screw 23923	1
23904	Insulating Bushing for Screw 23789	2
23905	Insulating Bushing for Screw 23922	1
23912	Plain Washer for Screw 24789 (Not shown in Illustration)	1
23911	Insulating Washer for Screw 24789 (Not shown in Illustration)	10
23923	Screw for retaining Terminals Nos. 1, 2, 3, 6, and 5	2
24601	Screw for retaining Terminal No. 8	1
23922	Screw for retaining Terminal No. 1 (Short Screw)	1
24789	Screw for retaining Terminal No. 4 (Short Screw)	2
23921	Screw for retaining Terminal No. 7	1
15454	**Brush Assembly Complete (For Lighting)** (Includes the next 14 Items)	1
13324	**Stud Assembly** (Includes the next Item)	1
23747	Pin for Stud Assembly 13324 (Not shown in Illustration)	2
23929	Contact Arm for Brush Assembly 15454 (Includes the next Item)	1
11033	**Stop Disc Assembly** (Includes the next Item)	1
23946	Stud for Stop Disc Assembly 11033 (Not shown in Illustration)	1
23918	Insulating Bushing for Stop Disc Assembly 11033	1
24899	Insulating Bushing for Stud Assembly 13324	1
23717	Plain Washer for Stop Disc Assembly 11033	1
23910	Insulating Washer for Stop Disc Assembly 11033	1
23711	Nut for clamping Brush Assembly 13288	1
26526	Lock Washer for Nut 23711	1
23909	Plain Washer for Nut 23711	1
23907	Insulating Washer for Nut 23711	2
23908	Plain Washer for Contact Arm 23929	1
15453	**Brush Assembly Complete (For Ignition)** (Includes the next 14 Items)	1
13323	**Stud Assembly** (Includes the next Item)	1
23747	Pin for Stud Assembly 13323 (Not shown in Illustration)	2
23928	Contact Arm for Brush Assembly 15453	

No. 1042 COMBINATION SWITCH (Continued)

Piece Number	NAME OF PART	Quantity Required
10725	**Stop Disc Assembly** (Includes the next Item)	1
23946	Stud for Stop Disc Assembly 10725 (Not shown in Illustration)	1
23918	Insulating Bushing for Stop Disc Assembly 10725	1
24899	Insulating Bushnig for Stud Assembly 13323 (Not shown in Illustration)	1
23717	Plain Washer for Stop Disc Assembly 10725	1
23910	Insulating Washer for Stop Disc Assembly 10725	1
23711	Nut for clamping Brush Assembly 15453	1
26526	Lock Washer for Nut 23711	1
23909	Plain Washer for Nut 23711	1
23908	Plain Washer for Contact Arm 13928	2
23907	Insulating Washer for Nut 23711	1
24005	Screw for retaining Brush Assemblies 15453 and 15454	2
23712	Nut for Screw 24005	2
20495	Lock Washer for Nut 23712	2
23913	Insulating Washer for Screw 24077	1
23914	Plain Washer for Screws 24076 and 24077	1
23793	Lever for operating Brush Assembly 15453	2
23745	Screw for retaining Lever 23793	2
24788	Segment for Terminal No. 5 (Upper)	1
11279	**Lock Assembly for connecting Switch** (Includes the next Item)	1
29958	Key for Lock Assembly 11279 (Give Series No. of Lock)	2
24790	Screw for retaining Lock ssembly 11279	3
24077	Screw for retaining Plate 24002 and Segment 24788	1
24074	Screw for retaining Terminal No. 9 (Long Screw)	1
24076	Screw for retaining Terminal No. 4 (Long Screw)	1
24073	Screw for retaining Plate 25072 (Short Screw)	1
24075	Screw for retaining Spring 23774	1
23735	Screw for retaining Housing Assembly 11235	4
11034	**Roller Arm Assembly**	1
24002	Contact Plate for Contact Spring Assembly 11277	1
25072	Upper Contact Plate for Brush Assembly 13288	1
23925	Plate for retaining Spring 23951	1
11035	**Tumbler Assembly for Locking Switch** (Includes the next Item)	1
23938	Pin for Tumbler Assembly 11035 (Not shown in Illustration)	1
24000	Slide (For locking Push Button)	1
23774	Tension Spring for Roller Arm Assembly 11034	2
23951	Spring for operating Plunger Stud 23919	1
24006	Insulating Plate for Spring 23774	1
24007	Insulating Plate for Tension Spring 23774	1
24003	Spacing Plate between Plate 23887 and Segment 24788	1
24011	Spring for Tumbler Assembly 11035	1
24014	Nut for Screw 24077	1
23707	Nut for Screw 24075	1
24794	Insulating Bushing for Screw 24076	1
20393	Lock Washer for Screw 23735	2
20345	Lock Washer for Nut 24014	1
23916	Insulating Washer for Roller Arm Assembly 11034	1
23915	Insulating Washer for Plates 25072 and 24007	2
23949	Screw for retaining Tumbler Assembly 11035	2



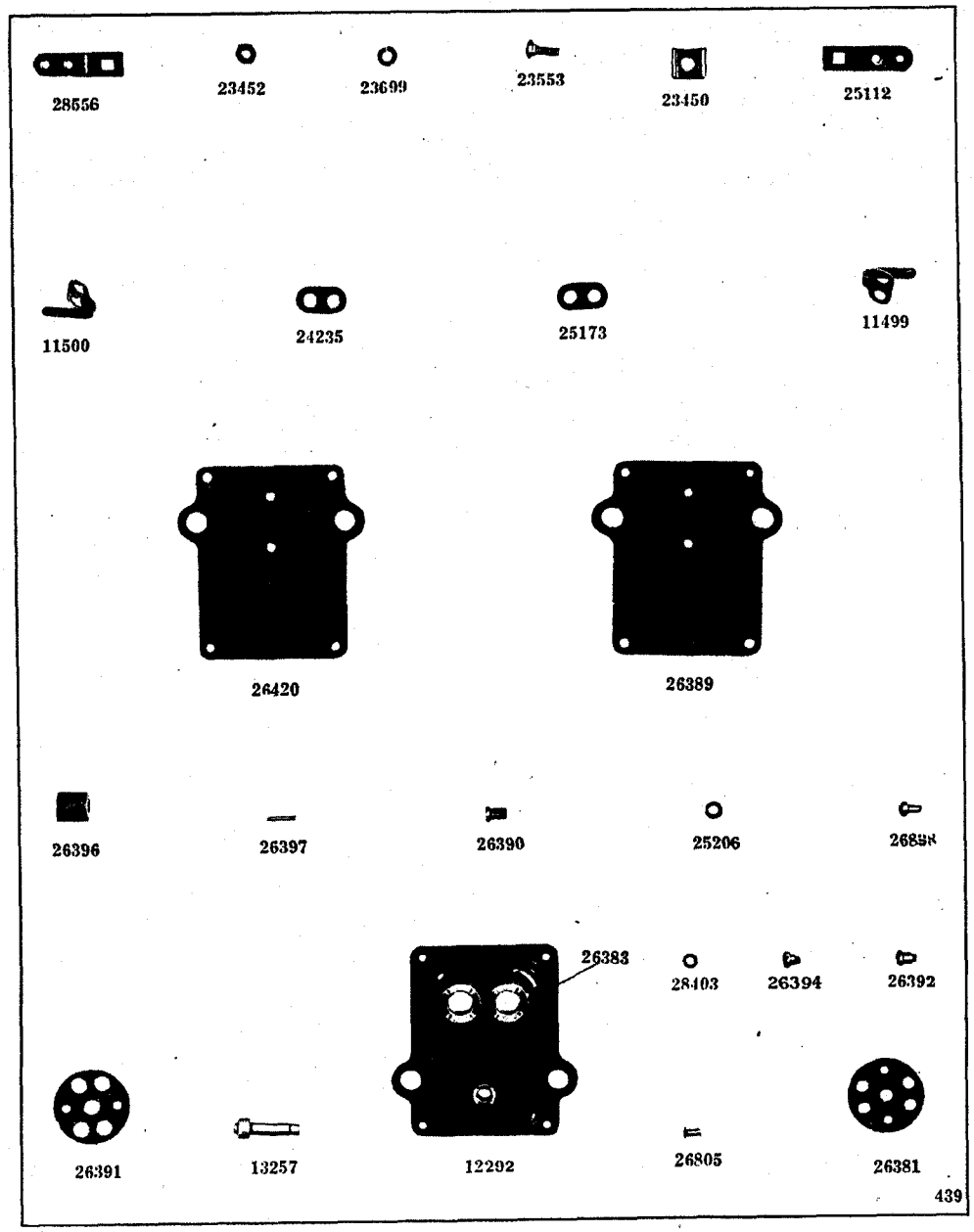
No. 1045 COMBINATION SWITCH

No. 1045 COMBINATION SWITCH

Piece Number	NAME OF PART	Quantity Required
1045	**COMBINATION SWITCH COMPLETE**	1
10876	**Housing Assembly**	1
10930	**Tumbler Assembly for locking Switch** (Includes the next Item)	1
23738	Stud for Tumbler Assembly 10930	2
23740	Screw for retaining Tumbler Assembly 10930	1
23776	Spring for retaining Tumbler Assembly 10930	5
23713	Nut for Screws 23740, 24632 and Stud 24631	5
25206	Lock Washer for Nut 23713	2
24632	Stop Screw for Blade Assemblies 13326 and 13327	1
11353	**Gear Wheel Assembly**	3
23668	Nut for retaining Gear Wheel Assembly 11353 and Screw 23742	1
23722	Plain Washer for Nut 23668	1
23695	Retainer for Roller 23680	2
23680	Roller for Blade Assemblies 13326 and 13327	1
24631	Stud for Retainer 23695	1
11355	**Lock Assembly** (Includes the next Item)	2
29959	Key for Lock Assembly 11355 (Give Series No. of Lock)	3
24626	Screw for retaining Lock Assembly 11355	4
23735	Screw for retaining Housing Assembly 10876	4
20393	Lock Washer for Screw 23735	2
23793	Lever for operating Blade Assemblies 13326 and 13327	2
23745	Screw for retaining Lever 23793	2
28896	Stud for retaining Blade Assemblies 13326 and 13327	2
23712	Nut for Stud 28896	2
20495	Lock Washer for Nut 23712	8
23898	Terminal Post for Terminal Post	8
23553	Screw for retaining Clip 23450	8
23452	Nut for Screw 23553	8
20393	Lock Washer for Nut 23452	8
23450	Clip for retaining Terminal Clip 23774	10
23743	Screw for retaining Terminals Nos. 1, 2, 3, 5 and 6	10
23726	Insulating Bushing for Screw 23743	1
23691	Plate under Terminal No. 4	2
23742	Screw for retaining Plate 23691	1
24616	Screw for retaining Spring 23774	2
23774	Spring for Retainer 23695	1
23707	Nut for Screw 24616	1
23683	Plate for retaining Screw 23741	2
23741	Screw for retaining Terminal No. 4	2
25903	Screw for retaining Brush 24628	1
24628	Brush for Terminal No. 7	1
24627	Brush for Terminal No. 8	1
26349	Insulating Stud for Brushes 24627 and 24628	1
23810	Mounting Plate for Terminal Post	
23686	Brush for Terminals Nos. 5 and 6 (Upper for Terminal No. 5 and Lower for Terminal No. 6)	1
23674	Brush for Terminal No. 5 (Lower)	1
23687	Brush for Terminals Nos. 2, 3 and 6 (Upper)	3
23688	Brush for Terminal No. 1 (Upper)	1
24624	Brush for Terminals Nos. 1, 2 and 3 (Lower)	1
23698	Insulating Plate for Terminal No. 1	1
23697	Insulating Plate for Terminal No. 6 (Lower)	1
23696	Insulating Plate for Terminals Nos. 2, 3 and 5	4
25902	Spacing Plate for Brush 24628	2
24633	Screw for retaining Brush 24627	2
13326	**Blade Assembly Complete (For Ignition)** (Includes the next 13 Items)	1
13323	**Stud Assembly** (Includes the next Item)	1
23747	Pin for Stud Assembly 13323	1
10927	**Stop Disc Assembly** (Includes the next Item)	1
23734	Stud for Stop Disc Assembly 10927	1
24635	Gear for Blade Assembly 13326	1
23711	Nut for Clamping Blade Assembly 13326	1
26526	Lock Washer for Nut 23711	1
23708	Blade for Blade Assembly 13326	2
23710	Insulating Washer for Blade 23708	2
23717	Plain Washer for Stop Disc Assembly 10927 (Thick)	2
25473	Plain Washer for Gear 24635 (Thin)	

No. 1045 COMBINATION SWITCH (Continued)

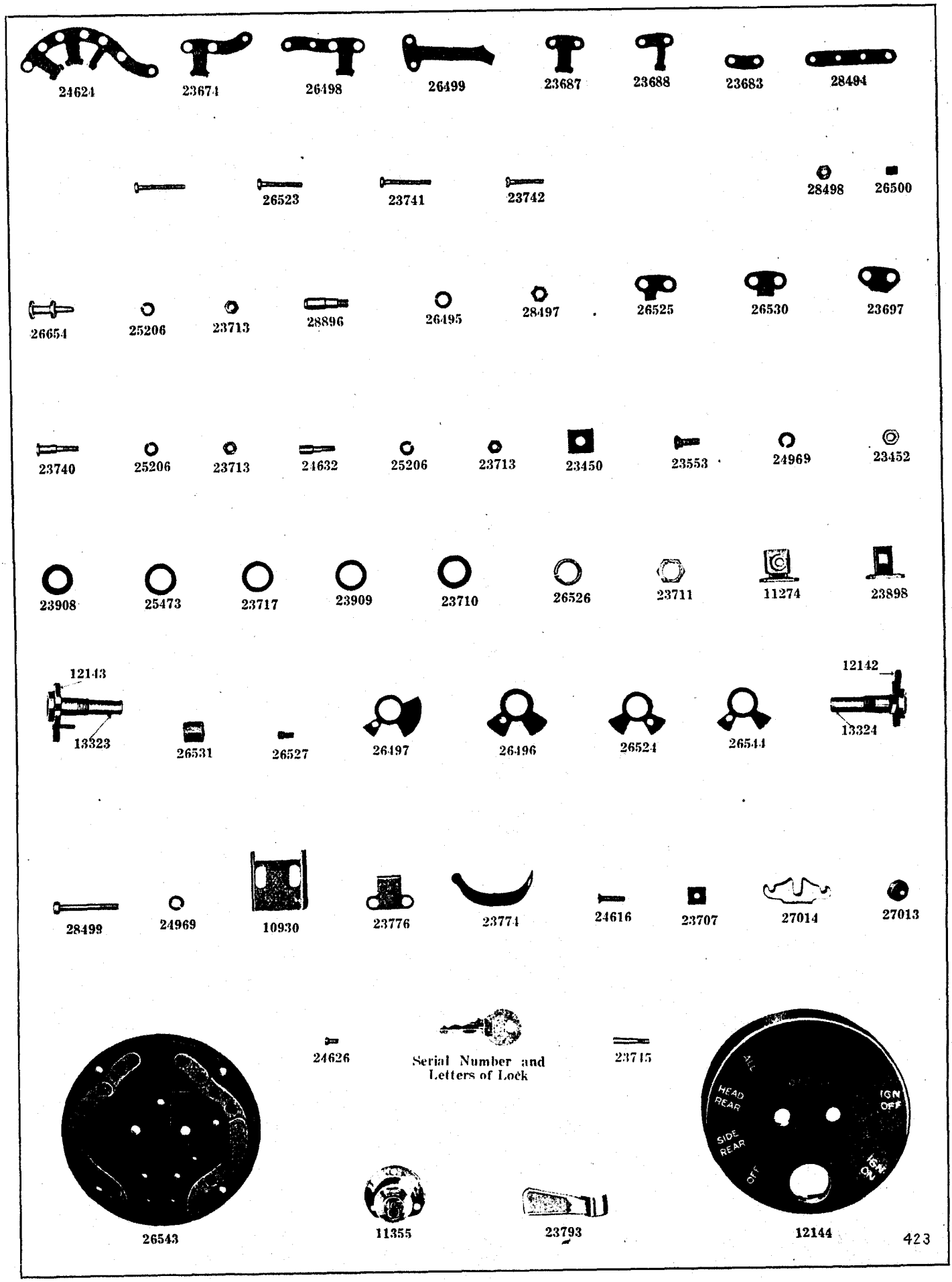
Piece Number	NAME OF PART	Quantity Required
24636	Insulating Bushing for Stud Assembly 13323	1
23728	Insulating Bushing for Stop Disc Assembly 10927	1
13327	**Blade Assembly Complete (For Lighting)** (Includes the next 14 Items)	1
13324	**Stud Assembly** (Includes the next Item)	1
23747	Pin for Stud Assembly 13324	1
11354	**Stop Wheel Assembly** (Includes the next Item)	1
23748	Stud for Stop Wheel Assembly 11354	1
23727	Insulating Bushing for Stop Wheel Assembly 11354	1
23737	Insulating Bushing for Stud Assembly 13324 (Not shown in Illustration)	1
23711	Nut for Clamping Blade Assembly 13327	1
26526	Lock Washer for Nut 23711	1
23721	Plain Washer for Nut 23711 (Thick)	1
23710	Insulating Washer for Blade 23709	2
23717	Plain Washer for Stop Wheel Assembly 11354 (Thick)	2
25473	Plain Washer for Stop Wheel Assembly 11354 (Thin)	2
23709	Blade for Blade Assembly 13327	1
23908	Plain Washer for Nut 23711 (Thin)	1
23375	Terminal Clip for connecting Switch (Large) (Not shown in Illustration)	2
23374	Terminal Clip for connecting Switch (Small) (Not shown in Illustration)	6



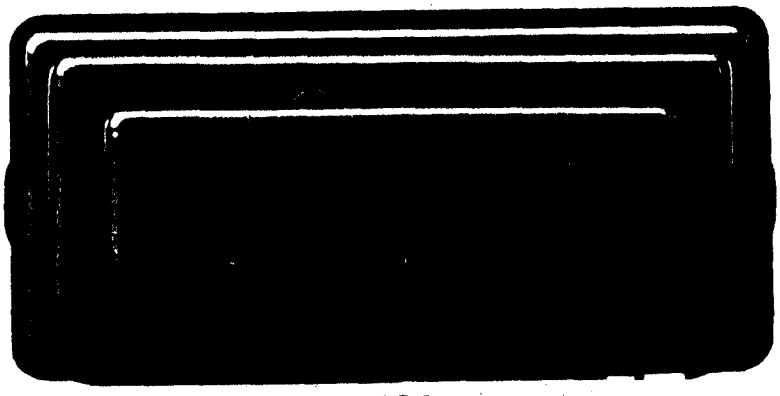
No. 1061 AUTO HORN SWITCH

No. 1061 AUTO HORN SWITCH

Piece Number	NAME OF PART	Quantity Required
1061	**AUTO HORN SWITCH COMPLETE**	1
14110	**Cover Assembly Complete (Service)** (Includes the next 6 Items)	1
12292	**Cover Assembly** (Includes the next 2 Items)	1
26963	Bushing for Plunger Assembly 13257 (Not shown in Illustration)	2
26383	Hub for Cover Assembly 14110	2
13257	**Plunger Assembly**	1
26396	Cap for Plunger Assembly 13257	1
26397	Pin for retaining Cap 26396	1
26898	Screw for retaining Cover Assembly 12292	4
25206	Lock Washer for Screw 26898	4
12077	**Base Assembly Complete** (Includes the next 25 Items)	1
26420	Base for Base Assembly 12077	1
26389	Insulator for Base 26393	1
26391	Insulator (Thick) (Round)	1
26381	Insulator (Thin) (Round)	1
26390	Stud Stop for Contact Spring Assembly 11500	2
26394	Screw for attaching Terminal Assembly 12076	2
26392	Screw for attaching Terminal Assembly 13095	1
12076	**Terminal Assembly Complete (Crooked Terminal)** (Includes the next 5 Items)	1
28556	Terminal for Terminal Assembly 12076	1
23450	Clip for retaining Terminal Clip 23374	1
23553	Screw for retaining Clip 23450	1
23452	Nut for Screw 23553	1
23699	Lock Washer for Nut 23452	1
11507	**Terminal Assembly Complete (Straight Terminal)** (Includes the next 5 Items)	1
25112	Terminal for Terminal Assembly 11507	1
23450	Clip for retaining Terminal Clip 23374	1
23553	Screw for retaining Clip 23450	1
23452	Nut for Screw 23553	1
23699	Lock Washer for Nut 23452	1
24235	Insulator for Contact Spring Assembly 11499 (Lower)	1
25173	Insulator for Contact Spring Assembly 11499 (Upper)	1
11500	**Contact Spring Assembly (Lower Contact)**	1
11499	**Contact Spring Assembly (Upper Contact)**	1
26805	Rivet for retaining Insulators 26391 and 26381	2
28403	Washer for Rivet 26805	2
23374	Terminal Clip for connecting Switch (Not shown in Illustration)	2



No. 1062 COMBINATION SWITCH



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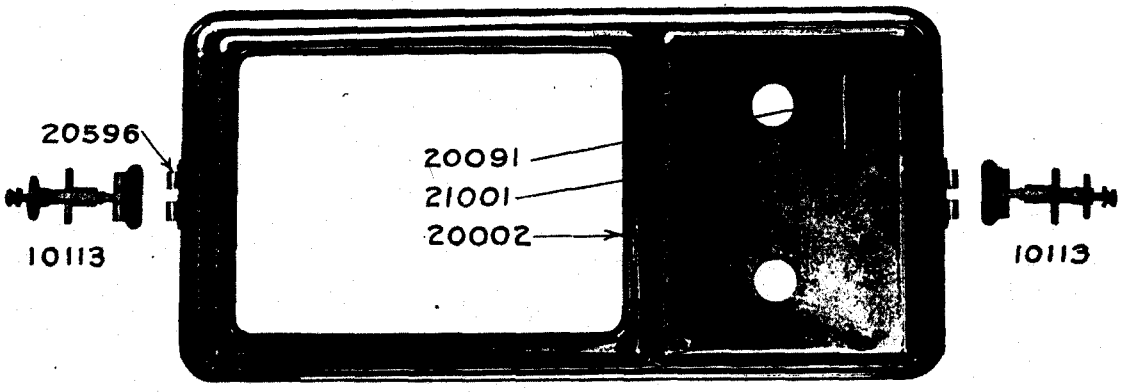

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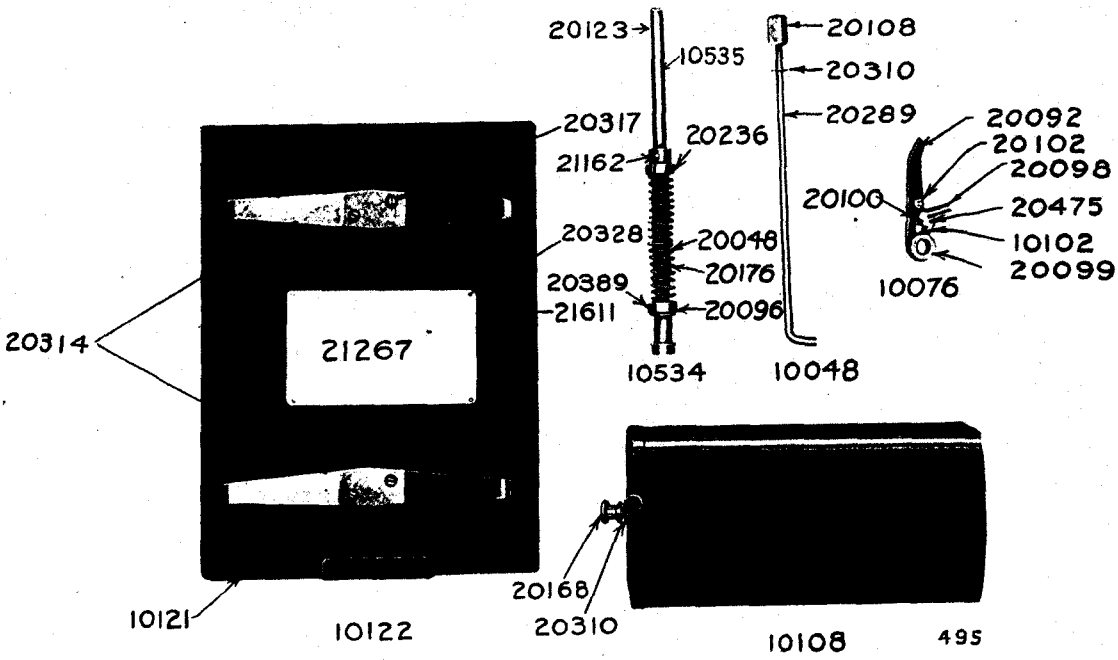
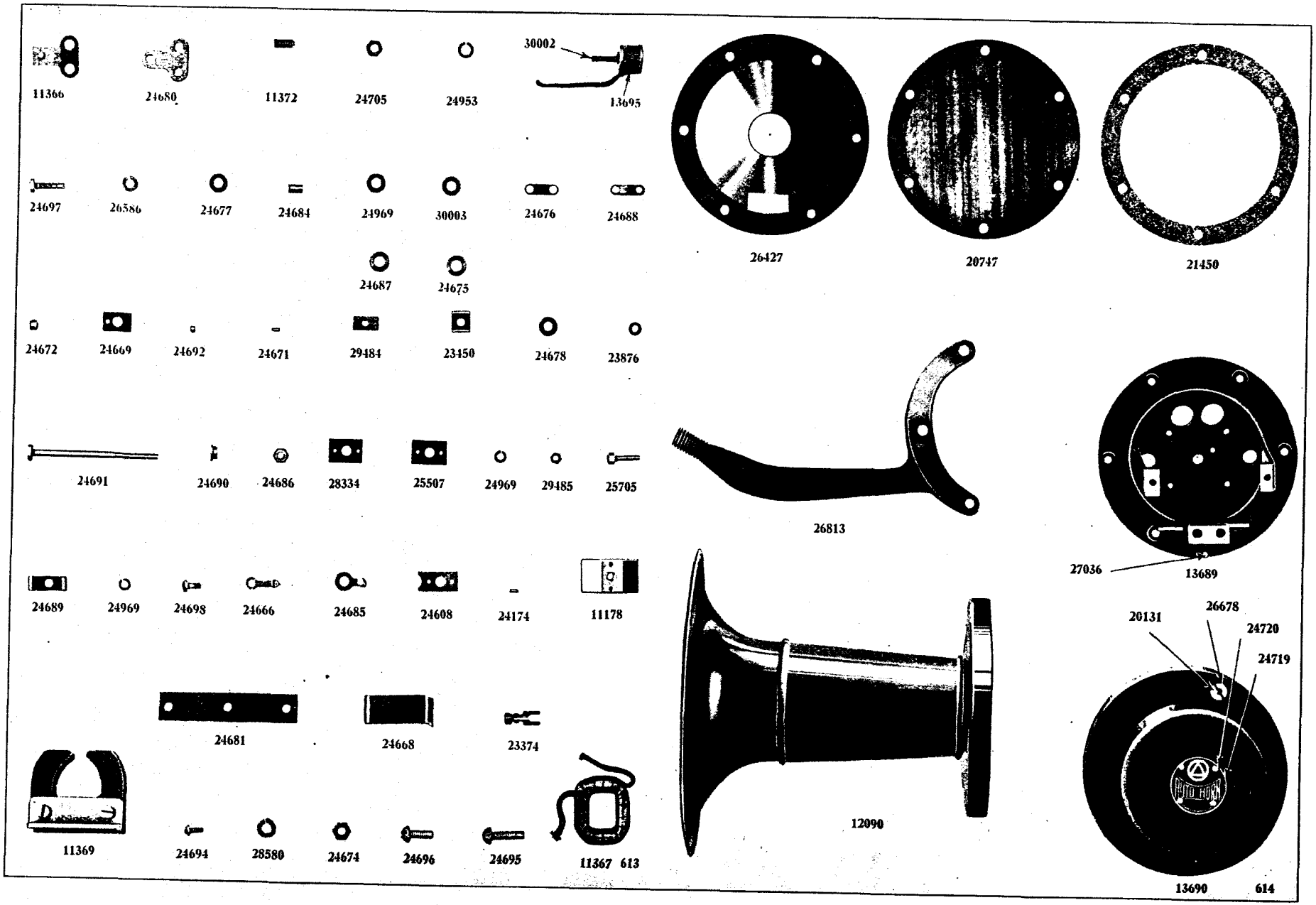


No. 5401 BATTERY BOX

No. 5312 AUTO HORN

Piece Number	NAME OF PART	Quantity Required
5312	**AUTO HORN ASSEMBLY**	1
13690	**Shell Assembly Complete**	1
	(Includes the next 5 Items)	
24719	Name Plate for Shell Assembly 13690	1
26838	Rivet for attaching Name Plate 24719	4
26678	Thumb Nut for retaining Shell Assembly 13690	1
20131	Lock Washer for Thumb Nut 26678	1
24389	Plain Washer for retaining Thumb Nut 26678 (Not shown in Illustration)	1
12090	**Horn Assembly Complete (Front)**	1
28613	Bracket for connecting Auto Horn	1
26427	Protector for Diaphragm	1
11367	**Coil Assembly for Horn**	1
13689	**Housing Assembly for Horn**	1
	(Includes the next Item)	
27036	Stud for retaining Shell Assembly 13690	1
12140	**Contact Spring Assembly (Lower Contact)**	1
11369	**Core Assembly for Coil Assembly 11367**	1
11372	**Contact Screw Assembly**	1
24705	Nut for Contact Screw Assembly 11372	1
24953	Lock Washer for Nut 24705	1
11178	**Armature Assembly Complete**	1
	(Includes the next Item)	
24174	Pin for Armature 24158	2
13695	**Resistance Coil Assembly for Horn**	1
29777	Screw for Resistance Coil Assembly 13695	1
24969	Lock Washer for Screw 29777	1
30003	Plain Washer for Screw 29777	1
26586	Lock Washer for Nuts 24686 and Screw 24697	3
24666	Clip connecting Coil Assembly 11367 to Screw 25705 and Resistance Coil Assembly 13695	4
24668	Retainer for Coil Assembly 11367	1
24669	Insulator for Terminal Base 29484 and Clip 24666	4
29484	Terminal Base for retaining Terminal Clip 23374	2
24671	Pin for Terminal Base 29484	2
24672	Bushing for Screw 25705	1
25705	Screw for retaining Terminal Clamp 24281 and Clip 24666	1
23450	Terminal Clamp for retaining Terminal Clip 23374	2
29485	Nut for retaining Screw 25705 and Resistance Coil 13695	2
24969	Lock Washer for Nut 29485 and Screws 25705 and 24698	6
28580	Lock Washer for Nut 24674	6
24674	Nut for Screws 24695 and 24696	6
24695	Screw for retaining Horn Assembly 12090 (Short)	3
24696	Screw for retaining Horn Assembly 12090 (Long)	3
24675	Plain Washer for Contact Spring Assembly 11366 (Thin)	2
24687	Spacing Washer for Contact Spring Assembly 11365 (Thick)	2
24678	Plain Washer for Contact Spring Assembly 11366 (Thick)	2
24677	Insulating Washer for Contact Spring Assembly 11366	2
24680	Terminal Plate for retaining Contact	1
24697	Screw for retaining Plate 24680 and Contact Spring Assembly 11366	2
24688	Block for retaining Screw 24697	1
24676	Insulating Plate for Block 24688	2
24681	Spring Plate for operating Armature Assembly 11178	6
28334	Insulator for Stop Plate 24608 (Lower)	1
25507	Insulator for Stop Plate 24608 (Upper)	1
24608	Stop Plate for operating Contact Spring Assembly 11366	1
24684	Insulator Bushing for Screw 24697	2
24685	Clip for connecting Coil Assembly 11367 and Contact Spring Assembly 11366	1
24686	Nut for Tapper 24691	1
24691	Tapper for operating Diaphragm 20747	1
20747	Diaphragm for Horn Assembly 12090	1
21450	Insulating Ring for Diaphragm 20747 (Narrow)	1
24264	Insulating Ring for Diaphragm 20747 (Wide) (Not shown in Illustration)	1
24689	Clip for retaining Spring Plate 24681	2
24690	Bushing for Tapper 24691	1
24692	Bushing for Terminal Base 24670	1
23876	Plain Washer for Screw 25705	1
24694	Screw for retaining Core Assembly 11369	4
24698	Screw for retaining Spring Plate 24681	2
23374	Terminal Clip for connecting Auto Horn 5312	1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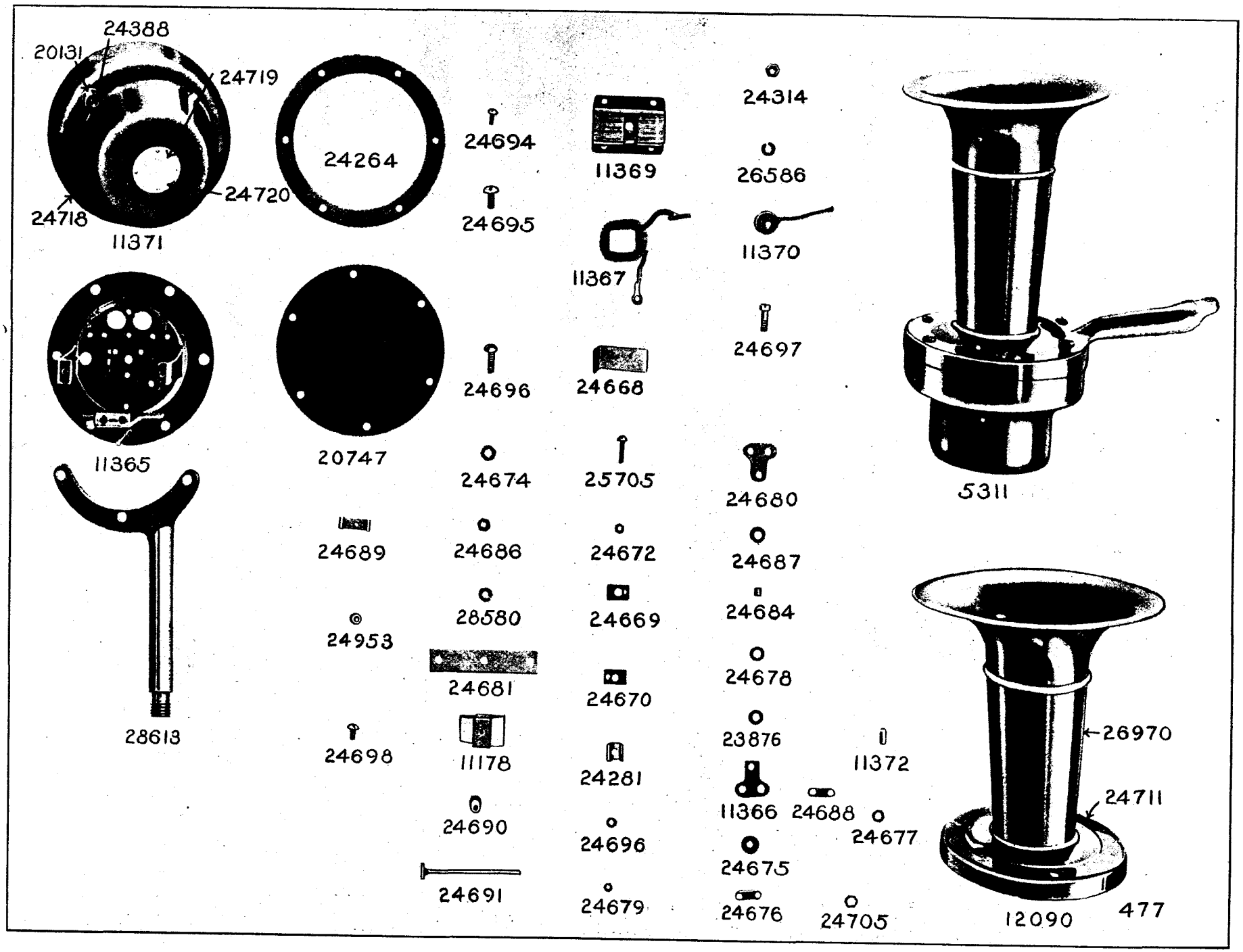
No. 5311 AUTO HORN

Piece Number	NAME OF PART	Quantity Required
5311	**AUTO HORN COMPLETE**	1
11371	**Shell Assembly Complete** (Includes the next 5 Items)	1
24719	Name Plate for Shell Assembly 11371	1
26838	Rivet for Name Plate 24719 (Not shown in Illustration)	4
26678	Thumb Nut for Shell Assembly 11371 (Not shown in Illustration)	1
20131	Lock Washer for Thumb Nut 26678 (Not shown in Illustration)	1
24389	Plain Washer for retaining Thumb Nut 26678	1
12090	**Horn Assembly Complete (Front)**	1
28613	Bracket for connecting Horn Assembly	1
26427	Protector for Diaphragm 20747 (Not shown in Illustration)	1
11367	**Coil Assembly**	1
24668	Retainer for Coil Assembly 11367	1
13689	**Housing Assembly** (Includes the next Item)	1
27036	Stud for retaining Shell Assembly 11371 (Not shown in Illustration)	1
11366	**Contact Spring Assembly (Lower Contact)**	1
12140	**Core Assembly for Coil Assembly 11367**	4
24694	Screw for retaining Core Assembly 12140	1
11372	**Contact Screw Assembly (Upper Contact)**	1
24705	Nut for Contact Screw Assembly 11372	1
24953	Lock Washer for Nut 24705	1
11178	**Armature Assembly Complete** (Includes the next Item)	1
24174	Pin for Armature Assembly 11178 (Not shown in Illustration)	1
11370	**Resistance Coil Assembly**	1
24314	Nut for retaining Resistance Coil Assembly 11370	4
26586	Lock Washer for Nuts 24314, 24686 and Screw 24697	1
24666	Clip for connecting Coil Assembly 11367 and Screw 25705 (Not shown in Illustration)	2
24669	Insulator for Terminal Base 24670 and Clip 24666	1
29484	Terminal Base for retaining Terminal Clip 23374 (Not shown in Illustration)	1
24671	Pin for Terminal Base 29484 (Not shown in Illustration)	1
24672	Bushing for Screw 25705	1
25705	Screw for retaining Terminal Clamp 24281 and Clip 24666	1
23450	Terminal Clamp for retaining Terminal Clip 23374 (Not shown in Illustration)	1
29485	Nut for Screw 25705 (Not shown in Illustration)	4
24969	Lock Washer for Nut 29485 and Screws 25705 and 24698 (Not shown in Illustration)	6
28580	Lock Washer for Nut 24674	6
24674	Nut for Screws 24695 and 24696	3
24695	Screw for retaining Horn Assembly 12090 (Short)	3
24696	Screw for retaining Horn Assembly 12090 (Long)	1
24675	Plain Washer for Contact Spring Assembly 11366 (Thin)	2
24687	Spacing Washer for Contact Spring Assembly 11366 (Thick)	2
24678	Plain Washer for Contact Spring Assembly 11366 (Thick)	2
24677	Insulating Washer for Contact Spring Assembly 11366	1
24680	Terminal Plate for retaining Contact and Nut Assembly 13494	2
24697	Screw for retaining Terminal Plate 24698 and Contact Spring Assembly 11366	1
24688	Plate for retaining Screw 24697	2
24676	Insulating Plate for Plate 24688	1
27036	Stud for retaining Shell Assembly 11371 (Not shown in Illustration)	6
24681	Spring Plate for operating Armature Assembly 11178	1
28334	Insulator for Stop Plate 24608 (Lower) (Not shown in Illustration)	1
25507	Insulator for Stop Plate 24608 (Upper) (Not shown in Illustration)	1
24608	Stop Plate for operating Contact Spring Assembly 11366 (Not shown in Illustration)	2
24684	Insulating Bushing for Screw 24697	1
24685	Clip for connecting Coil Assembly 11367 and Spring Terminal Assembly 11366 (Not shown in Illustration)	1
24686	Nut for Tapper 24691	1
24691	Tapper for operating Diaphragm 20747	1
20747	Diaphragm for Horn Assembly 12090 next to Housing Assembly 13689	1
21450	Insulating Ring for Diaphragm 20747 (Narrow) (Not shown in Illustration)	1
24264	Insulating Ring for Diaphragm 20747 (Wide)	2
24689	Clip for retaining Spring Plate 24681	1
24690	Bushing for Tapper 24691	1
24692	Bushing for Terminal Base 24670 (Not shown in Illustration)	1
23876	Plain Washer for Screw 25705	2
24698	Screw for retaining Spring Terminal 24681	1
23374	Terminal Clip for connecting Auto Horn 5311 (Not shown in Illustration)	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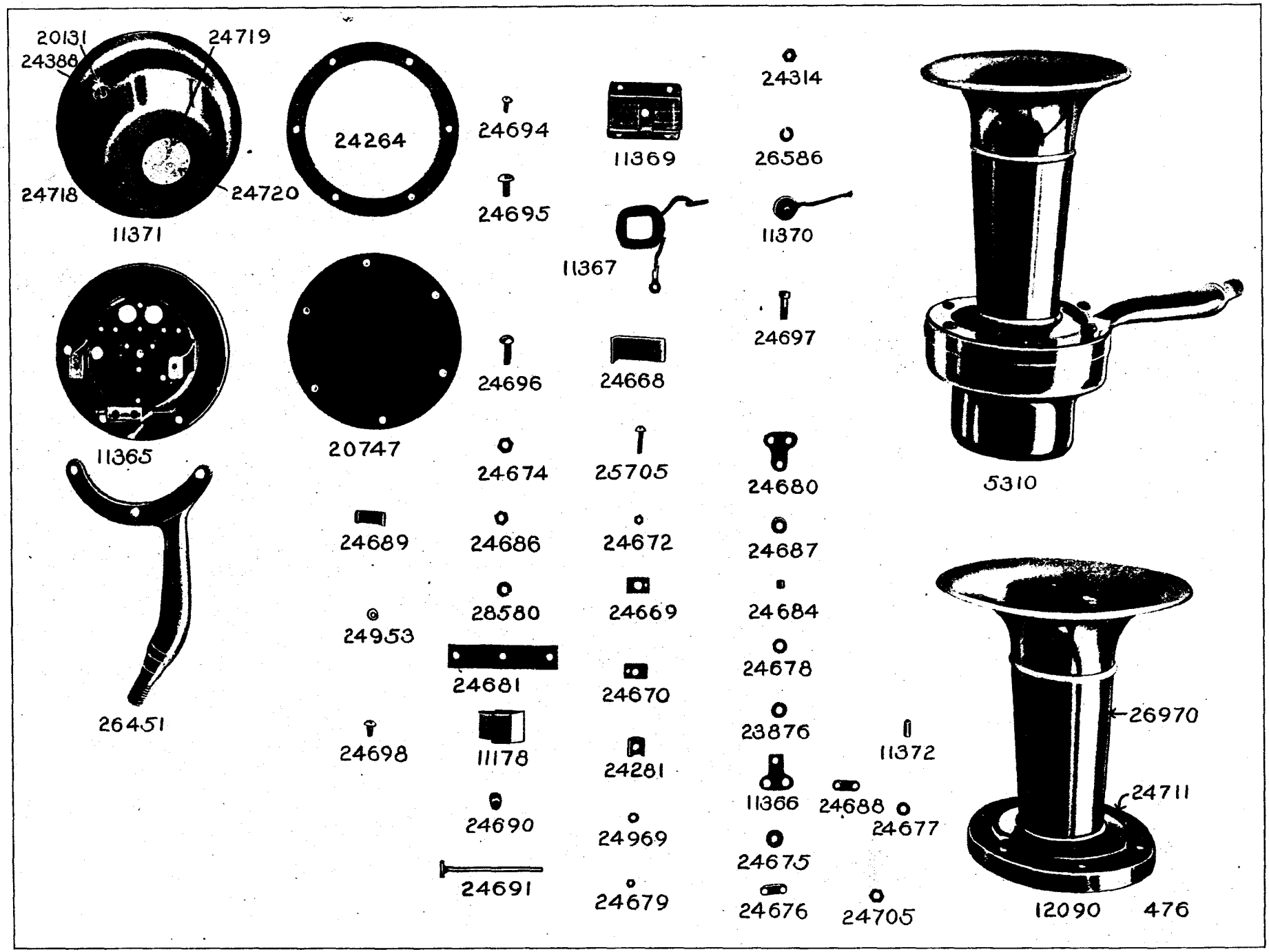
No. 5310 AUTO HORN

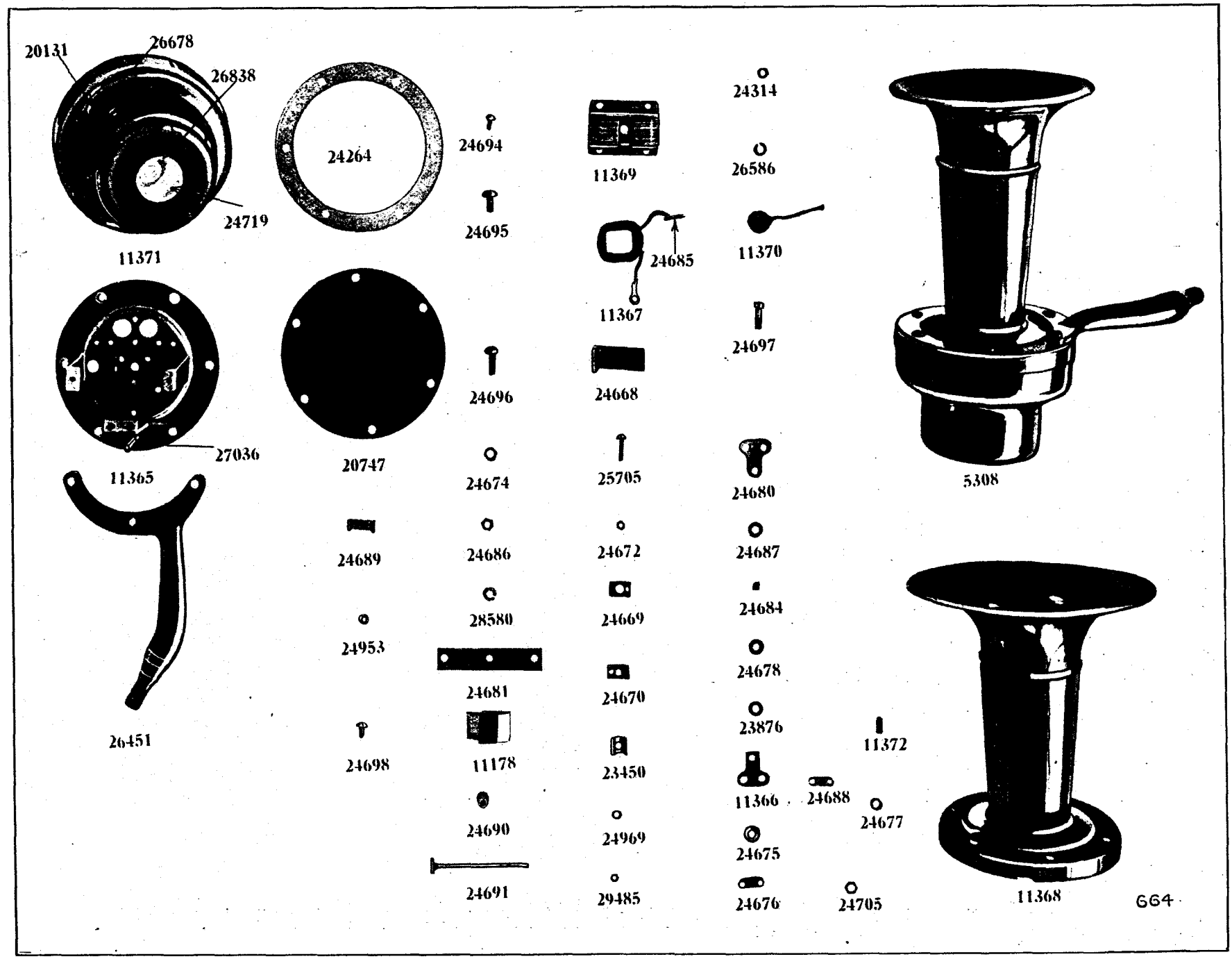
Piece Number	NAME OF PART	Quantity Required
5310	**AUTO HORN COMPLETE**	1
11371	**Shell Assembly Complete** (Includes the next 5 Items)	1
24719	Name Plate for Shell Assembly 11371	1
26838	Rivet for Name Plate 24719 (Not shown in Illustration)	1
26678	Thumb Nut for Shell Assembly 11371	4
20131	Lock Washer for Thumb Nut 26678	1
24389	Plain Washer for retaining Thumb Nut 26678 (Not shown in Illustration)	1
12090	**Horn Assembly Complete (Front)**	1
26451	Bracket for connecting Auto Horn	1
26427	Projector for Diaphragm 20747 (Not shown in Illustration)	1
11367	**Coil Assembly**	1
13689	**Housing Assembly** (Includes the next Item)	1
27036	Stud for retaining Shell Assembly 11371 (Not shown in Illustration)	1
11366	**Contact Spring Assembly (Lower Contact)**	1
12140	**Core Assembly for Coil Assembly 11367**	1
11372	**Contact Screw Assembly (Upper Contact)**	1
24705	Nut for Contact Screw Assembly 11372	1
24953	Lock Washer for Nut 24705	1
11178	**Armature Assembly Complete** (Includes the next Item)	1
24174	Pin for Armature Assembly 11178 (Not shown in Illustration)	2
11370	**Resistance Coil Assembly**	1
24314	Nut for retaining Resistance Assembly 11370	1
26586	Lock Washer for Nuts 24314, 24686 and Screw 24697	4
24666	Clip for connecting Coil Assembly 11367 and Screw 25705 (Not shown in Illustration)	1
24668	Retainer for Coil Assembly 11367	1
24669	Insulator for Terminal Base 24670 and Clip 24666	2
29484	Terminal Base for retaining Terminal Clip 23374 (Not shown in Illustration)	1
24671	Pin for Terminal Base 29484 (Not shown in Illustration)	1
24672	Bushing for Screw 25705	1
25705	Screw for retaining Clamp 24281 and Clip 24666	1
23450	Terminal Clamp for retaining Terminal Clip 23374 (Not shown in Illustration)	1
29485	Nut for Screw 25705 (Not shown in Illustration)	1
20393	Lock Washer for Nut 29485 and Screws 25705 and 24698	4
28580	Lock Washer for Nut 24674	6
24674	Nut for Screws 24695 and 24696	6
24695	Screw for retaining Horn Assembly 12090 (Short)	3
24696	Screw for retaining Horn Assembly 12090 (Long)	3
24675	Plain Washer for Contact Spring Assembly (Thin)	1
24687	Spacing Washer for Contact Spring Assembly 11366 (Thick)	2
24678	Plain Washer for Contact Spring Assembly 11366 (Thick)	2
24677	Insulating Washer for Contact Spring Assembly 11366	2
24680	Terminal Plate for retaining Contact Nut Assembly 13494	1
24697	Screw for retaining Terminal Plate 24680 and Contact Spring Assembly 11366	2
24688	Block for retaining Screw 24697	1
24676	Insulating Plate for Block 24688	2
27036	Stud for retaining Shell Assembly 11371 (Not shown in Illustration)	1
24681	Spring Plate for operating Armature Assembly 11178	6
28334	Insulator for Stop Plate 24608 (Lower) (Not shown in Illustration)	1
25507	Insulator for Stop Plate 24608 (Upper) (Not shown in Illustration)	1
24608	Stop Plate for operating Contact Spring Assembly 11366 (Not shown in Illustration)	1
24684	Insulating Bushing for Screw 24697	2
24685	Clip for connecting Coil Assembly 11367 and Contact Spring Assembly 11366 (Not shown in Illustration)	1
24686	Nut for Tapper 24691	1
24691	Tapper for operating Diaphragm 20747	1
20747	Diaphragm for Horn Assembly 12090 between Horn Assembly 12090 and Housing Assembly 11365	1
21450	Insulating Ring for Diaphragm 20747 (Narrow) (Not shown in Illustration)	1
24264	Insulating Ring for Diaphragm 20747 (Wide)	1
24689	Clip for retaining Spring Plate 24681	2
24690	Bushing for Tapper 24691	1
24692	Bushing for Terminal Base 24670 (Not shown in Illustration)	1
23876	Plain Washer for Screw 25705	1
24694	Screw for retaining Core Assembly 11369	4
24698	Screw for retaining Spring Plate 24681	2
23374	Terminal Clip for connecting Horn 5310 (Not shown in Illustration)	1



No. 5310 AUTO HORN

No. 5308 AUTO HORN

Piece Number	NAME OF PART	Quantity Required
5308	**AUTO HORN COMPLETE**	1
11371	**Shell Assembly Complete** (Includes the next 5 Items)	1
24719	Name Plate for Shell Assembly 11371	1
26838	Rivet for Name Plate 24719	4
26678	Thumb Nut for Shell Assembly 11371	1
20131	Lock Nut for Thumb Nut 26678	1
24389	Plain Washer for retaining Thumb Nut 26678 (Not shown in Illustration)	1
11368	**Horn Assembly Complete (Front)**	1
26451	Bracket for connecting Auto Horn Assembly	1
11367	**Coil Assembly**	1
13689	**Housing Assembly** (Includes the next Item)	1
27036	Stud for retaining Shell Assembly 11371	1
11366	**Contact Spring Assembly (Lower Contact)**	1
12140	**Core Assembly for Coil Assembly 11367**	1
11372	**Contact Screw Assembly (Upper Contact)**	1
24705	Nut for Contact Screw Assembly 11372	1
24953	Lock Washer for Nut 24705	1
11178	**Armature Assembly Complete** (Includes the next Item)	1
24174	Pin for Armature Assembly 11178 (Not shown in Illustration)	1
11370	**Resistance Coil Assembly**	1
24314	Nut for retaining Resistance Coil Assembly 11370	1
26586	Lock Washer for Nuts 24314 and 24686 and Screw 24697	4
24666	Clip for connecting Coil Assembly 11367 and Screw 25705 (Not shown in Illustration)	1
24668	Retainer for Coil Assembly 11367	1
24669	Insulator for Terminal Base 24670 and Clip 24666	2
29484	Terminal Base for retaining Terminal Clip 23374 (Not shown in Illustration)	1
24671	Pin for Terminal Base 29484 (Not shown in Illustration)	1
24672	Bushing for Screw 25705	1
25705	Screw for retaining Terminal Clamp 23450 and Clip 24666	1
23450	Terminal Clamp for retaining Terminal Clip 23374	1
29485	Nut for Screw 25705	1
20393	Lock Washer for Nut 29485 and Screws 25705 and 24698	4
28580	Lock Washer for Nut 24674	7
24674	Nut for Screws 24695 and 24696	6
24695	Screw for retaining Horn Assembly 11368 (Short)	3
24696	Screw for retaining Horn Assembly 11368 (Long)	3
24675	Plain Washer for Contact Spring Assembly 11366 (Thin)	1
24687	Spacing Washer for Contact Spring Assembly 11366 (Thick)	2
24678	Plain Washer for Contact Spring Assembly 11366 (Thick)	2
24677	Insulating Washer for Contact Spring Assembly 11366	2
24680	Terminal Plate for retaining Contact and Nut Assembly 13494	1
24697	Screw for retaining Terminal Plate 24680 and Contact Spring Assembly 11366	2
24688	Block for retaining Screw 24697	1
24676	Insulating Plate for Block 24688	2
27036	Stud for retaining Shell Assembly 11371	1
24681	Spring Plate for Operating Armature Assembly 11178	6
28334	Insulator for Stop Plate 24608 (Lower)	1
25507	Insulator for Stop Plate 24608 (Upper) (Not shown in Illustration)	1
24608	Stop Plate for Operating Contact Spring Assembly 11366 (Not shown in Illustration)	1
24684	Insulating Bushing for Screw 24697	2
24685	Clip for connecting Coil Assembly 11367 and Spring Terminal Assembly 11366	1
24686	Nut for Tapper 24691	1
24691	Tapper for Operating Diaphragm 20747	1
20747	Diaphragm for Horn Assembly 11368 between Horn Assembly 11368 and Housing Assembly 11365	1
21450	Insulating Ring for Diaphragm 20747 (Narrow) (Not shown in Illustration)	1
24264	Insulating Ring for Diaphragm 20747 (Wide)	1
24689	Clip for retaining Spring Plate 24681	2
24690	Bushing for Tapper 24691	1
24692	Bushing for Terminal Base 24670 (Not shown in Illustration)	1
23876	Plain Washer for Screw 25705	1
24694	Screw for retaining Core Assembly 12140	4
24698	Screw for retaining Spring Plate 24681	2
23374	Terminal Clip for connecting Auto Horn 5308 (Not shown in Illustration)	1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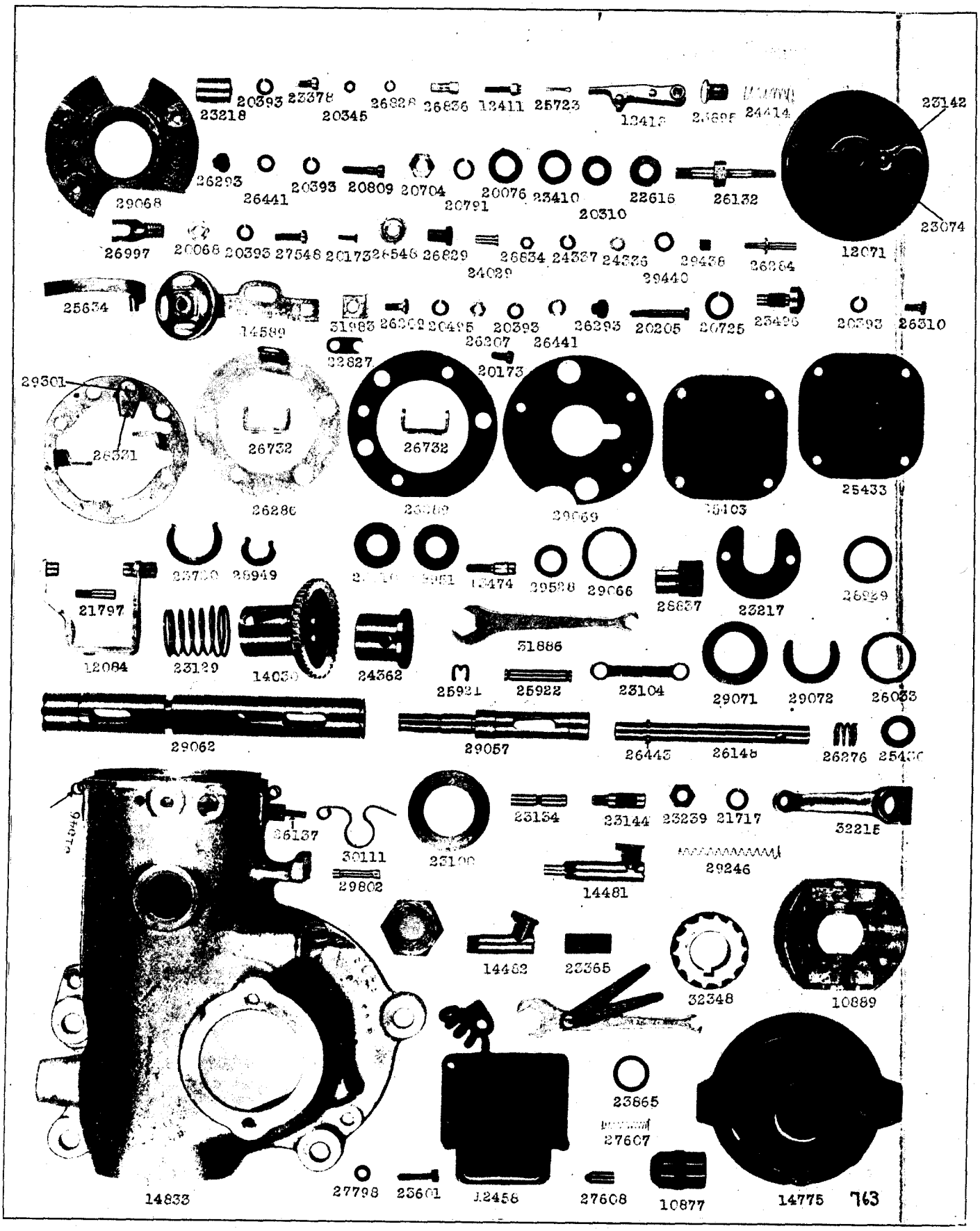
No. 5206 DISTRIBUTOR (Continued)

Piece Number	NAME OF PART	Quantity Required
26209	Screw for retaining Clip 31983	1
20393	Lock Washer for Nut 26207	1
31983	Clip for retaining Terminal Clip 26997	1
26207	Nut for Screw 26209	1
12458	**Condenser Assembly Complete**	1
	(Includes the next 2 Items)	1
23601	Screw for attaching Condenser Assembly 12458	4
27798	Bushing for Screw 23601	4
12084	**Advance Yoke Assembly for Distributor**	1
26148	Shaft for Advance	1
32215	Advance Lever for Shaft 26148	1
26443	Clip for retaining Spring 26276	1
23144	Screw for Advance Lever 32215	1
23239	Nut for Screw 23144	1
21717	Lock Washer for Nut 23239	1
20205	Screw for attaching Plate Assembly 13514 (Long)	2
20393	Lock Washer for Screw 20205	2
26293	Insulating Bushing for Screw 20205	2
26441	Plain Washer for Screw 20205	2
29072	Clip for retaining Bearing (Lower)	1
26033	Plain Washer above Clip 29072	1
12413	**Contact Arm Assembly for Distributor**	2
25723	Cotter Pin for retaining Contact Arm Assembly	2
25634	Spring for Contact Arm Assembly 12413	2
28548	Plain Washer for Nut 26208	1
26132	Stud for mounting Resistance Unit	1
22616	Plain Washer for Stud 26132 (Outer)	1
20068	Nut for retaining Resistance Unit	1
20495	Lock Washer for Nut 26208	1
20076	Insulating Washer for Stud 26132 (Outer)	1
22738	Insulating Bushing for Stud 26132 (Not shown in Illustration)	1
23410	Insulating Washer for Nut 20704	1
20310	Plain Washer for Nut 20704	1
20791	Lock Washer for Nut 20704	1
20704	Nut for Stud 26132 (Inner)	1
28837	Cam for operating Contact Arm Assembly	1
13474	**Screw Assembly for retaining Cam 28837**	1
21797	Screw for Advance Yoke Assembly 12084	1
25430	Felt Washer for Advance Shaft 26148	1
26276	Spring for Advance Shaft 26148	1
26829	Insulating Bushing for Resistance Unit	1
14482	**Oiler Assembly for Distributor (Upper)**	1
14481	**Oiler Assembly for Distributor (Lower)**	1
29074	Wick for Oiler Assembly 14481 (Not shown in Illustration)	1
29246	Spring for Wick 29074	1
12071	**Distributor Rotor Assembly Complete**	1
	(Includes the next 4 Items)	1
23074	Connector for Distributor Rotor Assembly 12071 (Old Style)	1
26803	Screw for retaining Connector 23074 (Old Style)	1
23895	Brush for Rotor Assembly 12071	1
24414	Spring for Brush 23895	1
25405	Cover Plate for Housing Assembly (Lower)	1
25433	Gasket for Cover Plate 25405	1
26310	Screw for attaching Cover Plate 25405	4
20393	Lock Washer for Screw 26310	4
26997	Terminal Clip for connecting Distributor	1
23365	Fibre Ferrule for Terminal Clip	1
10877	**High Tension Terminal Assembly No. Blank**	1
10878	**High Tension Terminal Assembly No. 1**	1
10879	**High Tension Terminal Assembly No. 2**	1
10880	**High Tension Terminal Assembly No. 3**	1
10881	**High Tension Terminal Assembly No. 4**	1
10882	**High Tension Terminal Assembly No. 5**	1
10883	**High Tension Terminal Assembly No. 6**	1
10884	**High Tension Terminal Assembly No. 7**	1
10885	**High Tension Terminal Assembly No. 8**	1
23865	Rubber Washer for High Tension Terminal Assemblies	9
14775	**Distributor Head Assembly Complete**	1
	(Includes the next 2 Items)	
27608	Plunger for Distributor Head Assembly 14775	1
27607	Spring for Plunger 27608	1
12741	**Distributor Wrench Assembly (With Gauge)**	1
31886	Distributor Wrench (Plain)	1
32348	Spiral Gear for Driving Spiral Gear 26151	1

No. 5206 DISTRIBUTOR

Piece Number	NAME OF PART	Quantity Required
5206	**DISTRIBUTOR**	1
14833	**Distributor Housing Assembly** (Includes the next 9 Items)	1
31546	Clip for retaining Clamp 30111	1
30111	Clamp for retaining Distributor Head	1
29802	Pin for retaining Clamp 30111	1
25049	Rivet for retaining Clip 31546 (Not shown in Illustration)	3
26137	Stud for resistance Unit Guide	1
32532	Name Plate for Distributor (Not shown in Illustration)	1
32821	Pin for retaining Name Plate 32532 (Not shown in Illustration)	2
12075	**Breather Nut Assembly Complete**	1
32957	Bearing for Distributor Housing	1
26732	Stop for Advance Yoke Assembly	1
20173	Screw for retaining Stop 26732	2
22827	Lock Plate for Screw 20173	1
13511	**Inner Shaft and Bearing Assembly Complete** (Includes the next 3 Items)	1
13342	**Ball Bearing Assembly for Distributor (Upper) (Not shown in Illustration)**	1
29057	Inner Shaft for Distributor	1
29066	Plain Washer for Ball Bearing Assembly 13342	1
30298	Plain Washer for Ball Bearing Assembly 13342 (Used when necessary instead of 29066)	1
28929	Washer (Felt) for Ball Bearing Assembly 13342 (Upper)	1
29528	Spacing Washer under Cam 28837 (When necessary)	1
28951	Collar retaining Washer 29066	1
28949	Clip retaining Collar 28951	1
29069	Retainer for Ball Bearing Assembly 13342 (Upper)	1
29068	Plate under Retainer 29069	1
26289	Insulator for Plate 26286	1
26286	Connector Plate for Contact Plate Assembly 13514	1
13514	**Distributor Contact Plate and Oil SpoutAssembly Complete** (Includes the next 2 Items)	1
28331	Oil Spout for Contact Plate Assembly 13514	1
29301	Rivet for Oil Spout 28331	1
26284	Stud for Mounting Contact Arm Assemblies	2
29438	Insulating Bushing for Stud 26284	2
29440	Insulating Washer for Stud 26284 (Upper)	2
24336	Plain Washer for Stud 26284	2
24337	Lock Washer for Nut 28834	2
28834	Nut for attaching Stud 26284	2
12411	**Contact Screw Assembly**	2
26828	Nut for Contact Screw Assembly (Small)	2
20345	Lock Washer for Nut 26836	2
26836	Nut for Contact Screw Assembly (Large)	2
20809	Screw for attaching Plate Assembly 13514 (Short)	1
20393	Lock Washer for Screw 20809	1
26441	Plain Washer for Screw 20809	1
26293	Insulating Bushing for Screw 20809	1
29062	Outer Shaft for Distributor	1
33466	Washer for end of Distributor Shaft (When necessary)	1
29072	Clip for retaining Washer 29066	1
26033	Plain Washer for Spring 23129 (Upper)	1
23129	Spring for Outer Shaft 29062	1
24362	Advance Collar for Outer Shaft 29062	1
25922	Pin for Advance Collar 24362 and Governor Ring Assembly 10889	2
25921	Clip for retaining Pin 25922	4
23104	Advance Arm for Advance Collar 24362	2
10889	**Governor Ring Assembly for Distributor**	1
23496	Screw for attaching Governor Ring Assembly 10889	2
24493	Lock Washer for Screw 23496	2
14030	**Distributor Shaft Pinion and Hub Assembly** (Includes the next 3 Items)	1
27548	Screw for attaching Plate 23217	2
20393	Lock Washer for Screw 27548	2
24029	Dowel Pin for Distributor Shaft Pinion and Hub Assembly 14030	1
23217	Plate for Distributor Shaft Pinion and Hub Assembly 14030	1
23100	Advance Ring for Outer Shaft 29062	1
23134	Pin for retaining Advance Ring 23100	1
23218	Clamp for Pin 23134	1
23378	Screw for Clamp 23218	1
20393	Lock Washer for Screw 23378	1
23720	Clip for retaining Washer 29071	1
29071	Plain Washer above Lower Distributor Shaft Bearing	1
14589	**Resistance Unit Assembly for Distributor**	1



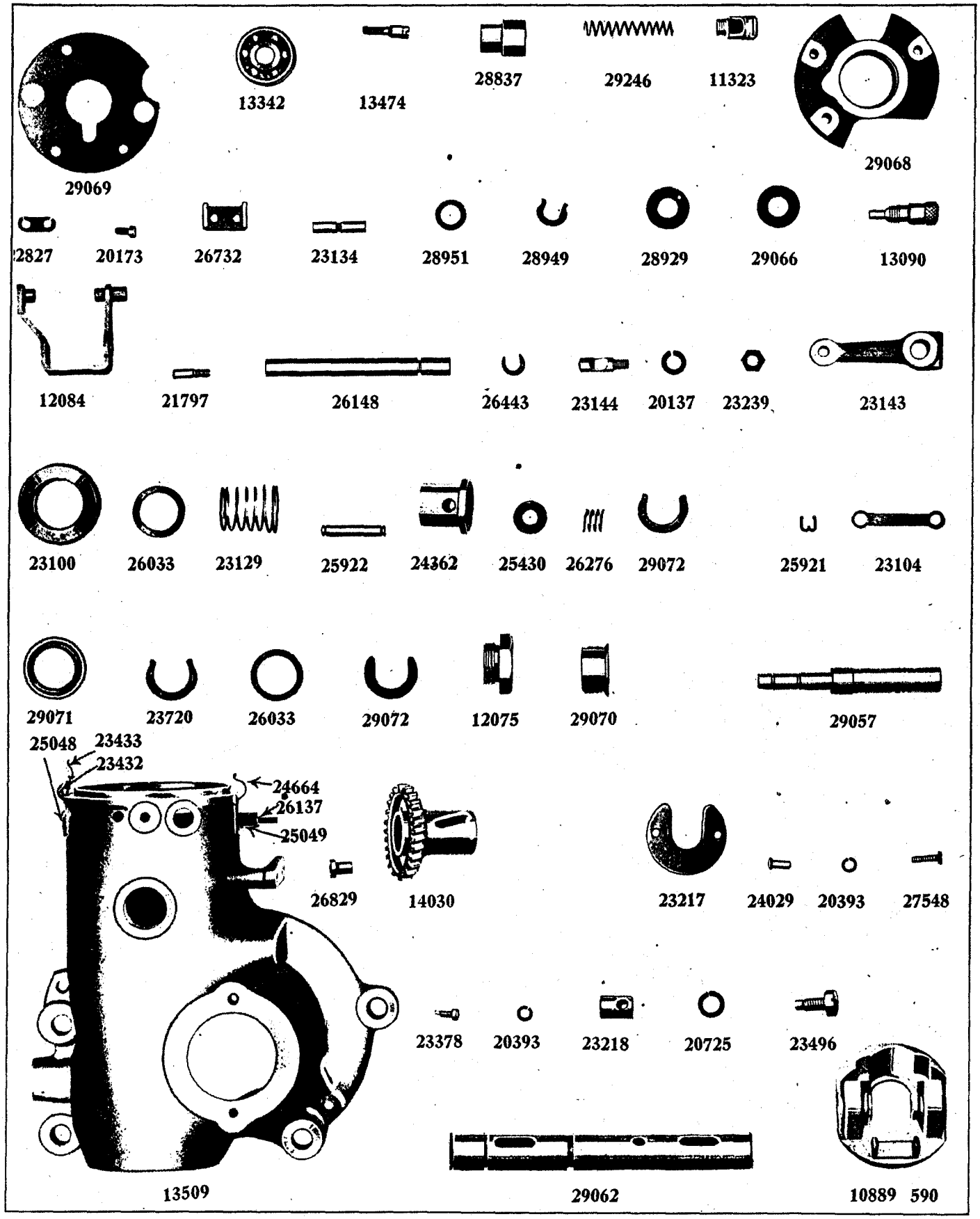
No. 5206 DISTRIBUTOR

No. 5166 DISTRIBUTOR (Continued)

Piece Number	NAME OF PART	Quantity Required
26207	Nut for Screw 26209	1
12458	**Condenser Assembly Complete** (Includes the next 2 Items)	1
23601	Screw for attaching Condenser Assembly 12458	4
27798	Bushing for Screw 23601	4
12084	**Advance Yoke Assembly for Distributor**	1
26148	Shaft for Advance	1
23143	Advance Lever for Shaft 26148	1
26443	Clip for retaining Spring 26276	1
23144	Screw for Advance Lever 23143	1
23239	Nut for Screw 23144	1
21717	Lock Washer for Nut 23239	1
20205	Screw for attaching Plate Assembly (Long)	2
20393	Lock Washer for Screw 20205	2
26293	Insulating Bushing for Screw 20205	2
26441	Plain Washer for Screw 20205	2
29072	Clip for retaining Bearing 29070 (Lower)	1
26033	Plain Washer above Clip 29072	1
12413	**Contact Arm Assembly for Distributor**	2
25723	Cotter Pin for retaining Contact Arm Assembly	2
25634	Spring for Contact Arm Assembly 12413	2
28548	Plain Washer for Nut 26208	1
26132	Stud for Mounting Resistance Unit	1
22616	Plain Washer for Stud 26132 (Outer)	1
20068	Nut for retaining Resistance Unit	1
20495	Lock Washer for Nut 26208	1
20076	Insulating Washer for Stud 26132 (Outer)	1
22738	Insulating Bushing for Stud 26132	1
23410	Insulating Washer for Nut 20704	1
20310	Plain Washer for Nut 20704	1
20791	Lock Washer for Nut 20704	1
20704	Nut for Stud 26132 (Inner)	1
28837	Cam for operating Contact Arm Assembly	1
13474	**Screw Assembly for retaining Cam 28837**	1
21797	Screw for Advance Yoke Assembly 12084	1
25430	Felt Washer for Advance Shaft 26148	1
26276	Spring for Advance Shaft 28148	1
26829	Insulating Bushing for Resistance Unit	1
13090	**Oiler Assembly for Distributor (Upper)**	1
11323	**Oiler Assembly for Distributor (Lower)**	1
29074	Wick for Oiler Assembly 11323 (Not shown in Illustration)	1
29246	Spring for Wick 29074	1
12071	**Distributor Rotor Assembly Complete** (Includes the next 4 Items)	1
23074	Connector for Distributor Rotor Assembly 12071 (Old Style)	1
26803	Screw for retaining Connector 23074 (Old Style)	1
23895	Brush for Rotor Assembly 12071	1
24414	Spring for Brush 23895	1
25405	Cover Plate for Housing Assembly 14219 (Lower)	1
25433	Gasket for Cover Plate 25405	1
26310	Screw for attaching Cover Plate 25405	4
20393	Lock Washer for Screw 26310	4
23374	Terminal Clip for connecting Distributor (Not shown in Illustration)	1
10877	**High Tension Terminal Assembly No. Blank**	1
10878	**High Tension Terminal Assembly No. 1**	1
10879	**High Tension Terminal Assembly No. 2**	1
10880	**High Tension Terminal Assembly No. 3**	1
10881	**High Tension Terminal Assembly No. 4**	1
10882	**High Tension Terminal Assembly No. 5**	1
10883	**High Tension Terminal Assembly No. 6**	1
10884	**High Tension Terminal Assembly No. 7**	1
10885	**High Tension Terminal Assembly No. 8**	1
23865	Rubber Washer for High Tension Terminal Assemblies	9
12568	**Distributor Head Assembly Complete** (Includes the next 2 Items)	1
27608	Plunger for Distributor Head Assembly 12568	1
27607	Spring for Plunger 27608	1
12741	**Distributor Wrench Assembly (With Gauge) (Not shown in Illustration)**	1
31886	Distributor Wrench (Plain) (Not shown in Illustration)	1
26795	Spiral Gear for Driving Spiral Gear 26151 (Not shown in Illustration)	1

No. 5166 DISTRIBUTOR

Piece Number	NAME OF PART	Quantity Required
5166	DISTRIBUTOR	1
14219	**Distributor Housing Assembly** (Includes the next 9 Items)	1
23433	Clip for retaining Distributor Head (Long Tongue)	1
23432	Clip for retaining Distributor Head (Used with Clip 23433)	1
24664	Clip for retaining Distributor Head (Single)	1
25048	Rivet for retaining Clips 23432 and 23433	2
25049	Rivet for retaining Clip 24664	2
26137	Stud for retaining Clip 24664	1
32232	Name Plate for Housing 29149 (Not shown in Illustration)	1
32821	Pin for retaining Name Plate 32232 (Not shown in Illustration)	2
32957	Bearing for Distributor Housing	1
12075	**Breather Nut Assembly Complete**	1
26732	Stop for Advance Yoke Assembly 12084	1
20173	Screw for retaining Stop 26732	2
22827	Lock Plate for Screw 20173	1
13511	**Inner Shaft and Bearing Assembly Complete** (Includes the next 3 Items)	1
13342	**Ball Bearing Assembly for Distributor (Upper)**	1
29057	Inner Shaft for Distributor	1
29066	Plain Washer for Ball Bearing Assembly 13342	1
30298	Plain Washer for Ball Bearing Assembly 13342 (Used when necessary instead of 29066) (Not shown in Illustration)	1
28929	Washer (Felt) for Ball Bearing Assembly 13342 (Upper)	1
29528	Spacing Washer under Cam 28837 (Not shown in Illustration) (When necessary)	1
28951	Collar retaining Washer 29006	1
28949	Clip retaining Collar 28951	1
29069	Retainer for Ball Bearing Assembly 13342 (Upper)	1
29068	Plate under Retainer 29069	1
26289	Insulator for Plate 26286	1
26286	Connector Plate for Contact Plate Assembly 13514	1
13514	**Distributor Contact Plate and Oil Spout Assembly Complete** (Includes the next 2 Items)	1
28331	Oil Spout for Contact Plate Assembly 13514	1
29301	Rivet for Oil Spout 28331	1
26284	Stud for mounting Contact Arm Assemblies	2
29438	Insulating Bushing for Stud 26284	2
29440	Insulating Washer for Stud 26284 (Upper)	2
24336	Plain Washer for Stud 26284	2
24337	Lock Washer for Nut 28834	2
28834	Nut for attaching Stud 26284	2
12411	**Contact Screw Assembly**	2
26828	Nut for Contact Screw Assembly (Small)	2
20345	Lock Washer for Nut 26836	2
26836	Nut for Contact Screw Assembly (Large)	2
20809	Screw for attaching Plate Assembly 13514 (Short)	1
20393	Lock Washer for Screw 20809	1
26441	Plain Washer for Screw 20809	1
26293	Insulating Bushing for Screw 20809	1
29062	Outer Shaft for Distributor	1
29072	Clip for retaining Washer 29066	1
26033	Plain Washer for Spring 23129 (Upper)	1
23129	Spring for Outer Shaft 29062	1
24362	Advance Collar for Outer Shaft 29062	1
25922	Pin for Advance Collar 24362 and Governor Ring Assembly 10889	2
25921	Clip for retaining Pin 25922	4
23104	Advance Arm for Advance Collar 24362	2
10889	**Governor Ring Assembly for Distributor**	1
23496	Screw for attaching Governor Ring Assembly 10889	2
20725	Lock Washer for Screw 23496	2
14030	**Distributor Shaft Pinion and Hub Assembly** (Includes the next 3 Items)	1
27548	Screw for attaching Plate 23217	2
20393	Lock Washer for Screw 27548	2
24029	Dowel Pin for Distributor Shaft Pinion and Hub Assembly 14030	1
23217	Plate for Distributor Shaft Pinion and Hub Assembly 14030	1
23100	Advance Ring for Outer Shaft 29062	1
23134	Pin for retaining Advance Ring 23100	1
23218	Clamp for Pin 23134	1
23378	Screw for Clamp 23218	1
20393	Lock Washer for Screw 23378	1
23720	Clip for retaining Washer 29071	1
29071	Plain Washer above Bearing 29070	1
12013	**Resistance Unit Assembly for Distributor**	1
26209	Screw for retaining Clip 26153	1
20393	Lock Washer for Nut 26207	1
26153	Clip for retaining Terminal Clip 23374	1



No. 5166 DISTRIBUTOR

No. 5150 DISTRIBUTOR (Continued)

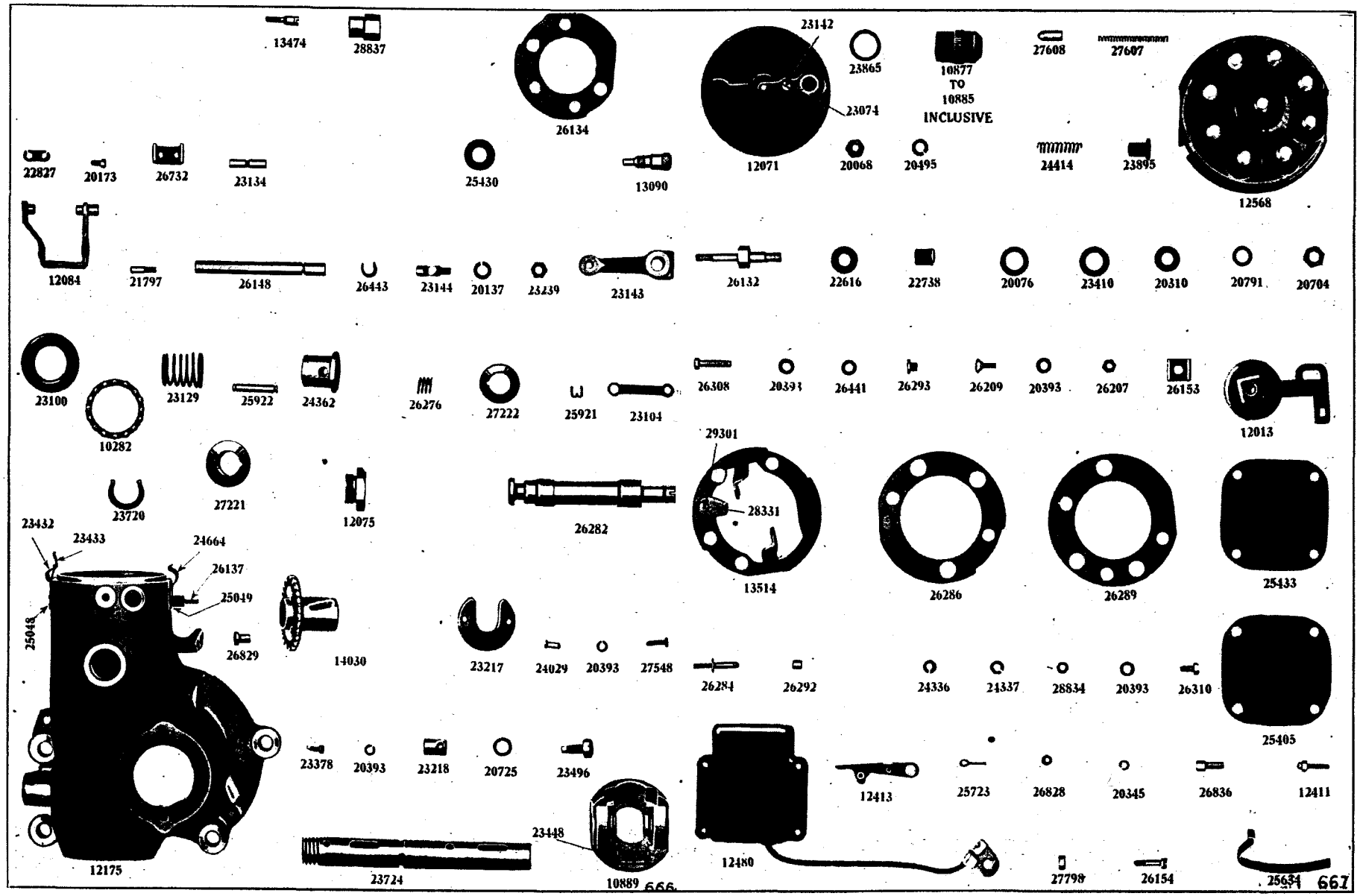
Piece Number	NAME OF PART	Quantity Required
12458	**Condenser Assembly (Service)** (Includes the next 2 Items)	1
23601	Screw for attaching Condenser Assembly 12458	4
27798	Bushing for Screw 23601	4
12084	**Advance Yoke Assembly**	1
26148	Shaft for Advance Shaft Assembly	1
23143	Advance Lever for Shaft 26148	1
26443	Clip for retaining Spring 26276	1
23144	Screw for Advance Lever 23143	1
23239	Nut for Screw 23144	1
21717	Lock Washer for Nut 23239	1
26308	Screw for retaining Mounting Plate 26134	1
20393	Lock Washer for Screw 26308	1
26293	Insulating Bushing for Screw 26308	2
25634	Spring for Contact Arm Assembly 12413	2
26132	Stud for Resistance Unit Assembly	1
22616	Plain Washer for Stud 26132 (Outer)	1
20068	Nut for retaining Resistance Unit Assembly (Outer)	1
20495	Lock Washer for Nut 20068	1
28548	Plain Washer for Nut 20068	1
20076	Insulating Washer for Stud 26132 (Outer)	1
22738	Insulating Bushing for Stud 26132	1
23410	Insulating Washer for Nut 20704 (Inner)	1
20791	Lock Washer for Nut 20704	1
20310	Plain Washer for Nut 20704	1
20704	Nut for Stud 26132 (Inner)	1
28837	Cam for Operating Contact Arm Assembly 12413	1
13474	**Distributor Cam Adjustment Screw Assembly for retaining Cam 28837**	1
21797	Screw for Advance Yoke Assembly 12084	1
25430	Felt Washer for Shaft 26148	1
26276	Spring for Shaft 26148	1
26829	Insulating Bushing for Resistance Unit Assembly	1
13090	**Oiler Assembly**	1
12071	**Distributor Rotor Assembly Complete** (Includes the next 4 Items. Do not count Service Part)	1
23074	Connector for Distributor Rotor Assembly 12071 (Old Style)	1
26803	Screw for retaining Connector 23074 (Service) (Old Style)	1
23895	Brush for Distributor Rotor Assembly 12071	1
24414	Spring for Brush 23895	1
25405	Cover Plate for Bottom of Housing 26150	1
25433	Gasket for Cover Plate 25405	1
26310	Screw for attaching Cover Plate 25405	4
20393	Lock Washer for Screw 26310	4
12568	**Distributor Head Assembly Complete**	1
27608	Plunger for Distributor Head Assembly 12568	1
21424	Spring (Old Style) for Plunger 21425	1
21425	Plunger (Old Style) for Distributor Head Assembly 12568	1
27607	Spring for Plunger 27608	1
10877	**High Tension Terminal Assembly (Blank)**	1
10878	**High Tension Terminal Assembly (1)**	1
10879	**High Tension Terminal Assembly (2)**	1
10880	**High Tension Terminal Assembly (3)**	1
10881	**High Tension Terminal Assembly (4)**	1
10882	**High Tension Terminal Assembly (5)**	1
10883	**High Tension Terminal Assembly (6)**	1
10884	**High Tension Terminal Assembly (7)**	1
10885	**High Tension Terminal Assembly (8)**	1
23865	Rubber Washer for High Tension Terminal Assemblies	9
12741	**Wrench Assembly (With Gauge) (Not shown in Illustration)**	1
31886	Wrench (Plain) (Not shown in Illustration)	1
23374	Terminal Clip for connecting Distributor (Not shown in Illustration)	1

No. 5150 DISTRIBUTOR

Note: No. 5150 Distributor superseded by No. 5166 Distributor. When ordering a complete new unit, order No. 5166.

Piece Number	NAME OF PART	Quantity Required
5150	**DISTRIBUTOR COMPLETE**	1
12175	**Distributor House Assembly**	1
	(Includes the next 8 Items)	
23432	Clip for retaining Distributor Head Assembly 12568 (With Clip 23433)	1
23433	Clip for retaining Distributor Head Assembly 12568 (Long Tongue Clip)	1
24664	Clip for retaining Distributor Head Assembly 12568 (Single)	1
25048	Rivet for retaining Clips 23432 and 23433	2
25049	Rivet for retaining Clip 24664	1
26137	Stud for retaining Clip 24664	1
32232	Name Plate for Housing 26150 (Not shown in Illustration)	1
32821	Pin for retaining Name Plate 32232 (Not shown in Illustration)	2
20775	Cup for Retainer and Balls Assembly 10282	1
12075	**Breather Nut Assembly**	1
26732	Stop for Advance Yoke Assembly 12084	1
20173	Screw for retaining Stop 26372	2
22827	Lock Plate for Screw 20173	2
10889	**Governor Ring Assembly**	1
	(Includes the next 2 Items)	
23448	Clip for Governor Ring Assembly 10889	1
24198	Screw for attaching Clip 23448 (Not shown in Illustration)	2
10282	**Retainer and Balls Assembly**	2
23724	Shaft for Distributor (Outer)	1
26282	Shaft for Distributor (Inner)	1
12413	**Contact Arm Assembly for Distributor**	2
12411	**Contact Screw Assembly for Contact Arm Assembly 12413**	2
26828	Nut for Contact Screw Assembly 12411 (Short)	1
26836	Nut for Contact Screw Assembly 12411 (Long)	2
25723	Cotter Pin for retaining Contact Arm Assembly 12413	2
20345	Lock Washer for Nut 26836	2
13514	**Plate Assembly for Contact Arm Assembly**	1
28331	Oiler Spout for Plate Assembly 13514	1
29301	Rivet for retaining Oiler Spout 28331	1
26289	Insulator for Plate 26295	1
26286	Connector for Plate 26295	1
26284	Stud for Contact Arm Assembly 12413	1
29438	Insulating Bushing for Stud 26284	2
29440	Insulating Washer for Stud 26284	2
28834	Nut for Stud 26284	2
24336	Plain Washer for 28834	2
24337	Lock Washer for Nut 28834	2
27221	Cone for Shaft 23724 (Upper)	1
23720	Clip for retaining Cone 27221	1
27216	Stud for Cones 27221 and 27219 (Not shown in Illustration)	2
26134	Mounting Plate for Distributor Shaft Assembly 12004	1
20775	Cup for Retainer and Balls 10282 (Upper)	1
23129	Spring for Shaft 23724	1
24362	Advance Collar for Governor Ring Assembly 10889	1
25922	Pin for retaining Arm 23104	2
25921	Clip for retaining Pin 25922	4
23104	Arm for connecting Advance Collar 24362 and Governor Ring Assembly 10889	2
23496	Screw for retaining Governor Ring Assembly 10889	2
24493	Lock Washer for Screw 23496	2
14030	**Distributor Shaft Pinion and Hub Assembly (Service)**	1
	(Includes the next 2 Items)	
27548	Screw for Spiral Gear 25151	2
20393	Lock Washer for Screws 27548, 23378 and 23879	11
23217	Plate for Spiral Gear 26151	1
24029	Pin for Hub 23977	1
26795	Spiral Gear for Driving Pinion and Hub Assembly 14030 (Not shown in Illustration)	1
26210	Spiral Gear (Old Style) (Used before Motor Generator Serial No. 352610)	1
23100	Advance Ring for Shaft 23724	1
23134	Pin for Advance Shaft 23100	1
23218	Clamp for Pin 23134	1
23378	Screw for Clamp 23218	1
27222	Cone for Shaft 23724 (Lower)	1
21443	Nut for Shaft 23724 (Round) (Not shown in Illustration)	1
21444	Nut for Shaft 23724 (Hexagon) (Not shown in Illustration)	1
23879	Screw for retaining Plate 26296 (Not shown in Illustration)	2
26293	Insulating Bushing for Screw 23879	2
23876	Plain Washer for Screw 23879 (Not shown in Illustration)	2
12013	**Resistance Unit Assembly**	1
26209	Screw for retaining Clip 25153	1
26153	Clip for retaining Terminal Clip 23374	1
26207	Nut for Screw 26209	1
20393	Lock Washer for Nut 26207	1

No. 5150 DISTRIBUTOR

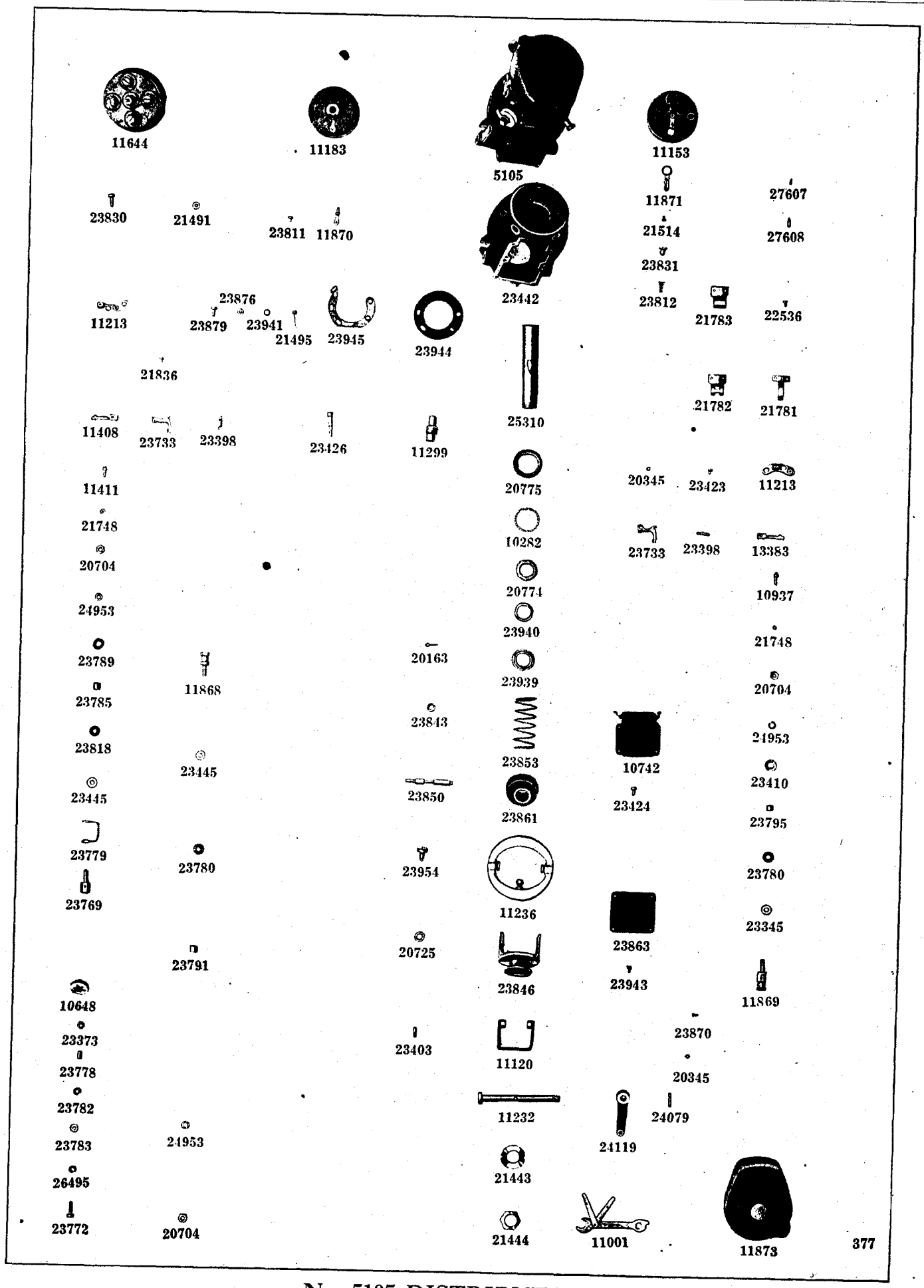


No. 5105 DISTRIBUTOR (Continued)

Piece Number	NAME OF PART	Quantity Required
23783	Plain Washer for Screw 23772	1
23782	Insulating Washer for Screw 23772	1
23778	Insulating Bushing for Screw 23772	1
23773	Washer for Resistance Unit Assembly 10648 (Shoulder)	1
23770	Protector for Resistance Unit Assembly 10648 (Not shown in Illustration)	1
23779	Connector for Resistance Unit Assembly 10648 and Housing 23442	1
11213	**Segment Assembly for retaining Contact Assemblies 14383 and 11408** (Includes the next 2 Items)	2
21493	Stud for mounting Stop 23733 (Not shown in Illustration)	1
21494	Stud for mounting Contact Arm Assemblies 11408 and 14383 (Not shown in Illustration)	1
23879	Screw for retaining Segment Assembly 11213	4
23876	Plain Washer for Screw 23879	4
23941	Insulating Washer for Screw 23879	4
21495	Insulating Bushing for Screw 23879	4
23945	Connector for Segment Assembly 11213	1
23944	Insulator for Segment Assembly 11213	1
14383	**Contact Arm Assembly (Battery) (Not shown in Illustration)** (Includes the next 2 Items)	1
24069	Hub for Contact Arm Assembly 14383 (Not shown in Illustration)	1
24947	Screw for attaching Hub 24069 (Not shown in Illustration)	2
11408	**Contact Arm Assembly (Magneto)** (Includes the next 3 Items. Do not count Old Style Parts)	1
11379	**Connector Assembly for Contact Arm Assembly 11408 (Not shown in Illustration(**	1
21801	Terminal Wire (Old Style)	1
24069	Hub for Contact Arm Assembly 11408 (Not shown in Illustration)	1
24947	Screw for attaching Hub 24069 (Not shown in Illustration)	2
12411	**Contact Screw Assembly (Battery)**	1
12411	**Contact Screw Assembly (Magneto) (Not shown in Illustration)**	1
21748	Nut for Contact Screw Assembly 12411	2
23733	Stop for Contact Arm Assemblies 14383 and 11408	2
23398	Spring for Contact Arm Assemblies 14383 and 11408	2
21836	Screw for retaining Stop 23733	2
11407	**Wrench for Distributor**	1
23835	Terminal Clip for Distributor Head Assembly 11644 (Not shown in Illustration)	5
20953	Terminal Clip for Spring Terminal Assemblies 11868 and 11869 (Not shown in Illustration)	2
11644	**Distributor Head Assembly Complete** (Includes the next 4 Items. Do not count Old Style Parts)	1
21425	Plunger (Old Style) for Distributor Head Assembly 11644 (Approximately ⅛" Diameter)	1
21424	Spring (Old Style) for Plunger 21425 (Approximately ⅛" Diameter)	1
27608	Plunger for Distributor Head Assembly 11644 (Approximately ¼" Diameter)	1
27607	Spring for Plunger 27608 (Approximately ¼" Diameter)	1
23830	Screw for Distributor Head Assembly 11644	4
21491	Nut for Distributor Head Assembly 11644	1

No. 5105 DISTRIBUTOR

Piece Number	NAME OF PART	Quantity Required
5105	**DISTRIBUTOR COMPLETE**	1
23442	Housing for Distributor Assembly 5105	1
14123	**Shaft Assembly (Service) (Including Shaft 25310 and Upper Cone) (Not shown in Illustration)**	1
25310	Shaft for Distributor	1
27222	Cone for Shaft 25310 (Not shown in Illustration)	2
21443	Clamp Nut for Shaft 25310 (Round)	1
21444	Lock Nut for Clamp Nut 21443 (Hexagon)	1
11299	**Cam Adjustment Assembly** (Includes the next 3 Items)	1
23458	Cam for Cam Adjustment Assembly 11299 (Not shown in Illustration)	1
23736	Pin for Cam 23458	1
23426	Screw for Cam Adjustment Assembly 11299	1
11153	**Distributor Rotor Assembly Complete** (Includes the next 6 Items)	1
11871	**Connector Assembly (Contact)**	1
21514	Screw for retaining Connector Assembly 11871	1
11870	**Clip Assembly for locating Distributor Rotor Assembly 11153**	1
23811	Screw for retaining Clip Assembly 11870	1
23831	Brush for Distributor Rotor Assembly 11153	1
23812	Spring for Brush 23831	1
11232	**Advance Shaft Assembly**	1
24119	Advance Lever for Advance Shaft Assembly 11232	1
24079	Dowel Pin for retaining Advance Lever 24119	1
11120	**Advance Yoke Assembly**	1
23403	Screw for Advance Yoke Assembly 11120	1
11236	**Governor Ring Assembly**	1
23954	Screw for retaining Governor Ring Assembly 11236	2
20725	Lock Washer for Screw 23954	2
23940	Spacing Washer for Shaft 25310 between Cone 27222 and Advance Ring 23861	1
23861	Advance Ring (for Manual Advance)	1
23846	Sleeve on Shaft 25310 for Governor Ring Assembly 11236 (Not shown in Illustration)	1
23939	Sleeve Collar on Shaft 25310 next to Upper Cone 27222 for Spring 23853	1
23853	Spring for Shaft 25310	1
20775	Cup for Retainer and Balls Assembly 10282	2
10282	**Retainer and Balls Assembly**	2
10745	**Condenser Assembly** (Includes the next Item)	1
32141	Screw for retaining Condenser Assembly 10745	4
23863	Cover Plate for Housing 23442	1
23943	Screw for retaining Cover Plate 23863	4
21782	Clip for retaining Distributor Head Assembly 11644 (With Clip 21781)	1
21781	Clip for retaining Distributor Head Assembly 11644 (Long Tongue Clip)	1
21783	Clip for retaining Distributor Head Assembly 11644 (Single)	1
22556	Screw for retaining Clips 21781 and 21782 (Not shown in Illustration)	2
23423	Screw for retaining Clip 21783	2
23850	Pin for connecting Shaft 25310 and Sleeve 23846	1
23843	Washer for retaining Pin 23850	2
20163	Cotter Pin for retaining Washer 23843	2
23870	Screw for connecting Condenser Assembly 10745 to Spring Terminal Assembly 11869 and Stud 23769	2
20345	Lock Washer on Screws 23870 and 21836	4
11873	**Protector Assembly for Distributor Head Assembly 11644**	1
11869	**Spring Terminal Assembly (Common)**	1
11868	**Spring Terminal Assembly (Battery)**	1
23769	Stud for Resistance Unit Assembly 10648	1
20704	Nut for Spring Terminal Assemblies 11868 and 11869 and Stud 23769	3
24953	Lock Washer for Nut 20704	3
23445	Plain Washer for Nut 20704 and Spring Terminal Assemblies 11868 and 11869 and Stud 23769	6
23785	Insulating Bushing for Stud 23769	1
23795	Insulating Bushing for Spring Terminal Assembly 11869	1
23791	Insulating Bushing for Spring Terminal Assembly 11868	1
23818	Insulating Washer for Stud 23769 (Outer)	1
23789	Insulating Washer for Stud 23769 and Spring Terminal 11888 (Inner)	2
23780	Insulating Washer for Spring Terminal Assemblies 11868 and 11869 (Outer)	2
23410	Insulating Washer for Spring Terminal Assembly 11869 (Inner)	1
10648	**Resistance Unit Assembly**	1
23772	Screw for retaining Resistance Unit Assembly 10648	1
20495	Lock Washer for Screw 23772	1

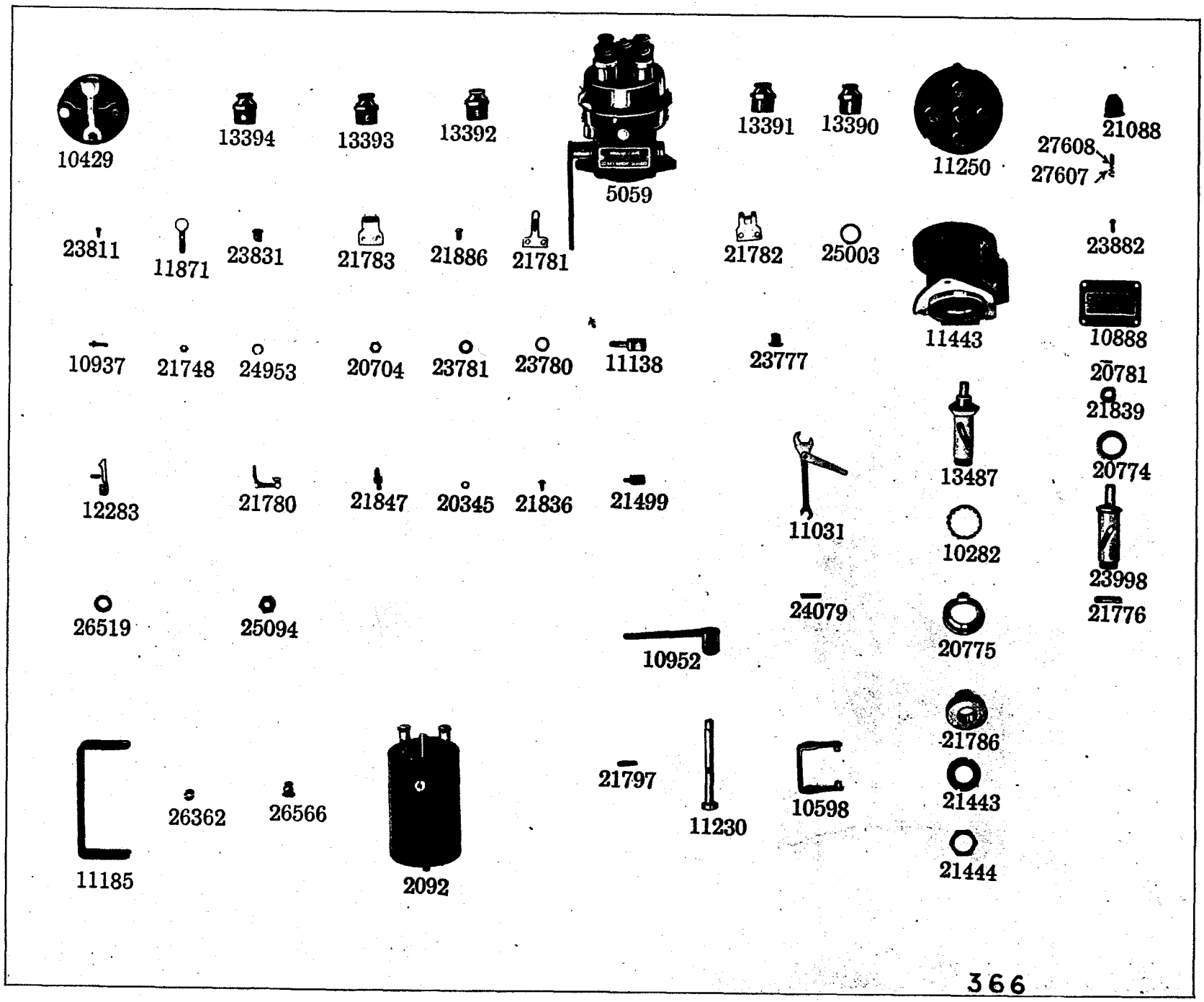


No. 5105 DISTRIBUTOR

No. 5059 DISTRIBUTOR

Piece Number	NAME OF PART	Quantity Required
5059	**DISTRIBUTOR ASSEMBLY COMPLETE**	1
24399	Housing for Distributor (Not shown in Illustration)	1
20775	Cup for Housing 24399	2
21443	Clamp Nut for Shaft Assembly 13487 (Round)	1
21444	Lock Nut for Clamp Nut 21443 (Hexagon)	1
27222	Cone for Shaft Assembly 13487 (Not shown in Illustration)	2
13487	**Shaft Assembly (Service) (Includes Shaft, Cam and Pin)**	1
10429	**Distributor Rotor Assembly Complete** (Includes the next 6 Items)	1
11871	**Connector Assembly (Contact)**	1
23811	Screw for retaining Connector Assembly 11871	1
11870	**Clip Assembly for locating Distributor Rotor Assembly (Not shown in Illustration)**	1
21514	Screw for retaining Clip Assembly 11870 (Not shown in Illustration)	1
23831	Brush for Distributor Rotor Assembly	1
23812	Spring for Brush 23831 (Not shown in Illustration)	1
10952	**Advance Lever Assembly**	1
11230	**Advance Shaft Assembly**	1
24079	Dowel Pin for retaining Advance Lever Assembly 10952	1
10888	**Cover Assembly for Housing 24399** (Includes the next 2 Items)	1
23849	Name Plate Cover Assembly 10888 (Not shown in Illustration)	1
23839	Rivet for Name Plate 23849 (Not shown in Illustration)	2
10598	**Advance Yoke Assembly**	1
11868	**Spring Terminal Assembly**	1
14383	**Contact Arm Assembly** (Includes the next 2 Items)	1
24069	Hub for Contact Arm Assembly 14383 (Not shown in Illustration)	1
24947	Screw for attaching Hub 24069 (Not shown in Illustration)	1
12411	**Contact Screw Assembly**	1
21748	Clamp Nut for Contact Screw Assembly 12411	1
23398	Spring for Contact Arm Assembly 14383 (Not shown in Illustration)	1
21780	Stop for Contact Arm Assembly 14383	1
21836	Screw for retaining Stop 21780	1
20345	Lock Washer for Screw 21836	1
10282	**Retainer and Balls Assembly**	2
21786	Advance Ring for Advance Yoke Assembly 10598	1
21776	Pin for Advance Ring	1
23777	Insulating Bushing for Spring Terminal Assembly 11868	1
23780	Insulating Washer for Spring Terminal Assembly 11868 (Inner)	1
23781	Insulating Washer for Spring Terminal Assembly 11868 (Outer)	1
23784	Plain Washer for Spring Terminal Assembly 11868 (Not shown in Illustration)	1
20704	Nut for Spring Terminal Assembly 11868	1
24953	Lock Washer for Nut 20704	1
23445	Plain Washer for Spring Terminal Assembly 11868 (Not shown in Illustration)	1
21782	Clip for Distributor Head Assembly 11250 (With Clip 21781)	1
21781	Clip for Distributor Head Assembly 11250 (Long Tongue Clip)	1
21783	Clip for Distributor Head Assembly 11250 (Single)	1
21847	Stud for retaining Contact Arm Assembly 14383	1
21499	Stud for retaining Stop 21780	1
21886	Screw for retaining Clip 21783	2
21887	Screw for retaining Clips 21781 and 21782 (Not shown in Illustration)	2
21797	Screw for Advance Yoke Assembly 10598	1
23882	Screw for retaining Cover Assembly 10888	4
12969	**High Tension Terminal Assembly for Distributor Head Assembly 11250 (Blank) (Not shown in Illustration)**	1
12970	**High Tension Terminal Assembly for Distributor Head Assembly 11250 (1) (Not shown in Illustration)**	1
12971	**High Tension Terminal Assembly for Distributor Head Assembly 11250 (2) (Not shown in Illustration)**	1
12972	**High Tension Terminal Assembly for Distributor Head Assembly 11250 (3) (Not shown in Illustration)**	1
12973	**High Tension Terminal Assembly for Distributor Head Assembly 11250 (4) (Not shown in Illustration)**	1
20953	Terminal Clip for connecting Distributor (Not shown in Illustration)	1
11250	**Distributor Head Assembly Complete** (Includes the next 2 Items. Do not count Old Style Parts)	1
21425	Plunger (Old Style) for Distributor Head Assembly 11250 (Approximately 1/8" Diameter)	1
29764	Plunger for Distributor Head Assembly 11250 (Not shown in Illustration) (Approximately 1/4" Diameter)	1
21424	Spring (Old Style) for Plunger 21425 (Approximately 1/8" Diameter)	1
27607	Spring for Plunger 29764 (Approximately 1/4" Diameter)	1
11407	**Wrench for Distributor**	1
25003	Rubber Washer for High Tension Terminal Assemblies	5

No. 5059 DISTRIBUTOR

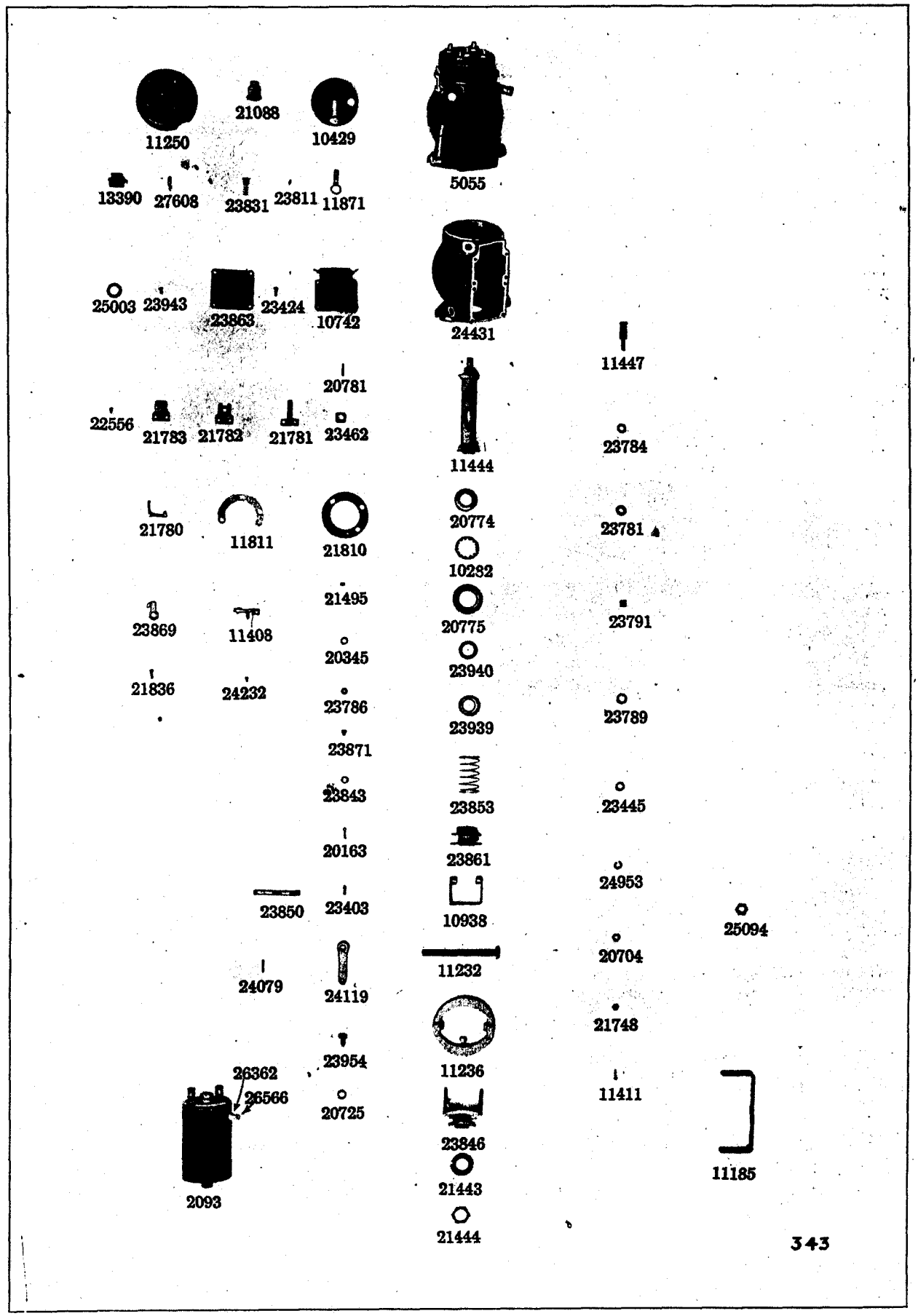


No. 5055 DISTRIBUTOR (Continued)

Piece Number	NAME OF PART	Quantity Required
10282	**Retainer and Balls Assembly**	2
23940	Spacing Washer on Shaft 24973 between Cone 20774 and Advance Ring 23861	1
23861	Advance Ring (for Manual Advance)	1
23846	Sleeve on Shaft 24973 for Governor Ring Assembly 11236	1
11236	**Governor Ring Assembly**	1
23939	Sleeve Collar on Shaft 24973 next to Upper Cone 27222 for Spring 23853	1
23853	Spring for Shaft 24973	1
23954	Screw for retaining Governor Ring Assembly 11236	1
20725	Lock Washer for Screw 23954	2
23850	Pin for connecting Shaft 24973 and Sleeve 23846	2
23843	Washer for retaining Pin 23850	1
20163	Cotter Pin for retaining Washer 23843	2
11250	**Distributor Head Assembly Complete** (Includes the next 2 Items. Do not count Old Style Parts)	2
21425	Plunger (Old Style) for Distributor Head Assembly 11250 (Approximately ⅛" Diameter)	1
29764	Plunger for Distributor Assembly 11250 (Approximately ¼" Diameter) (Not shown in Illustration)	1
21424	Spring (Old Style) for Plunger 21425 (Approximately ⅛" Diameter)	1
27607	Spring for Plunger 29764 (Approximately ¼" Diameter) (Not shown in Illustration)	1
20953	Terminal Clip for connecting Distributor (Not shown in Illustration)	1
12741	**Wrench for Distributor (Not shown in Illustration)**	2
12969	**High Tension Terminal Assembly for Distributor Head Assembly 11250 (Blank) (Not shown in Illustration)**	1
12970	**High Tension Terminal Assembly for Distributor Head Assembly 11250 (1) (Not shown in Illustration)**	1
12971	**High Tension Terminal Assembly for Distributor Head Assembly 11250 (2) (Not shown in Illustration)**	1
12972	**High Tension Terminal Assembly for Distributor Head Assembly 11250 (3) (Not shown in Illustration)**	1
12973	**High Tension Terminal Assembly for Distributor Head Assembly 11250 (4) (Not shown in Illustration)**	1
25003	Rubber Washer for High Tension Terminal Assemblies	1
		5

No. 5055 DISTRIBUTOR

Piece Number	NAME OF PART	Quantity Required
5055	**DISTRIBUTOR COMPLETE**	1
24431	Housing for Distributor 5055	1
20775	Cup for Retainer and Balls Assembly 10282	2
14005	**Shaft Assembly (Service) (Includes Shaft, Cam and Pin)**	1
14116	**Shaft and Cone Assembly (Service) (Includes Shaft Assembly 14005 and Upper Cone) (Not shown in Illustration)**	1
27222	Cone for Shaft Assembly 14005 (Not shown in Illustration)	1
21443	Clamp Nut for Shaft Assembly 14005 (Round)	1
21444	Lock Nut for Clamp Nut 21443	1
10745	**Condenser Assembly** (Includes the next Item)	1
32141	Screw for attaching Condenser Assembly 10745	4
23863	Cover Plate for Housing 24431	1
23943	Screw for retaining Cover Plate 23863	4
11869	**Spring Terminal Assembly (Common)**	2
20704	Nut for Spring Terminal Assembly 11869	2
24953	Lock Washer for Nut 20704	2
23445	Plain Washer for Nut 20704	2
23784	Plain Washer for Spring Terminal Assembly 11869	2
23781	Insulating Washer for Spring Terminal Assembly 11869	2
23789	Insulating Washer for Nut 20704 on Spring Terminal Assembly 11869	2
23791	Insulating Bushing for Spring Terminal Assemblies 11869	1
11408	**Contact Arm Assembly** (Includes the next 3 Items. Do not count Old Style Parts)	1
11379	**Connector Assembly for Contact Arm Assembly 11408 (Not shown in Illustration)**	1
21801	Terminal Wire (Old Style)	1
24069	Hub for Contact Arm Assembly 11408 (Not shown in Illustration)	1
24947	Screw for attaching Hub 24069 (Not shown in Illustration)	2
23398	Spring for Contact Arm Assembly 11408 (Not shown in Illustration)	1
21780	Stop for Contact Arm Assembly 11408	1
21836	Screw for retaining Stop 21780	1
20345	Lock Washer for Screws 21836 and 23871	3
23871	Screw for connecting Condenser Assembly 10745 to Spring Terminal Assembly 11869	2
12411	**Contact Screw Assembly (Not shown in Illustration)**	1
21748	Nut for Contact Screw Assembly 12411	1
21782	Clip for Distributor Head Assembly 11250 (With Clip 21781)	1
21781	Clip for Distributor Head Assembly 11250 (With Long Tongue Clip)	1
21783	Clip for Distributor Head Assembly (Single)	1
22556	Screw for retaining Clips 21781 and 21782	2
23423	Screw for retaining Clip 21783 (Not shown in Illustration)	2
11232	**Advance Shaft Assembly**	1
24119	Advance Lever for Advance Shaft Assembly 11232	1
24079	Pin for retaining Advance Lever 24119	1
10938	**Advance Yoke Assembly**	1
23403	Screw for Advance Yoke Assembly 10938	1
10429	**Distributor Rotor Assembly Complete** (Includes the next 6 Items)	1
11871	**Connector Assembly (Contact)**	1
23811	Screw for retaining Connector Assembly 11871 (Not shown in Illustration)	1
11870	**Clip Assembly for locating Distributor Rotor Assembly 10429 (Not shown in Illustration)**	1
21514	Screw for retaining Clip Assembly 11870 (Not shown in Illustration)	1
23831	Brush for Distributor Rotor Assembly 10429	1
23812	Spring for Brush 23831 (Not shown in Illustration)	1
11811	**Plate Assembly for retaining Contact Arm Assembly 11408** (Includes the next 2 Items)	1
21493	Stud for mounting Stop 21780 (Not shown in Illustration)	1
21494	Stud for mounting Contact Arm Assembly 11408 (Not shown in Illustration)	1
23879	Screw for retaining Plate Assembly 11811 (Not shown in Illustration)	3
23876	Plain Washer for Screw 23879 (Not shown in Illustration)	3
23941	Insulating Washer for Screw 23879 (Not shown in Illustration)	3
21945	Insulating Bushing for Screw 23879	3
21810	Insulator for Plate Assembly 11811	1
23869	Terminal for connecting Plate Assembly 11811 and Spring Terminal Assembly 11869	1
24232	Screw for retaining Terminal 23869	1



No. 5055 DISTRIBUTOR

No. 5049 DISTRIBUTOR

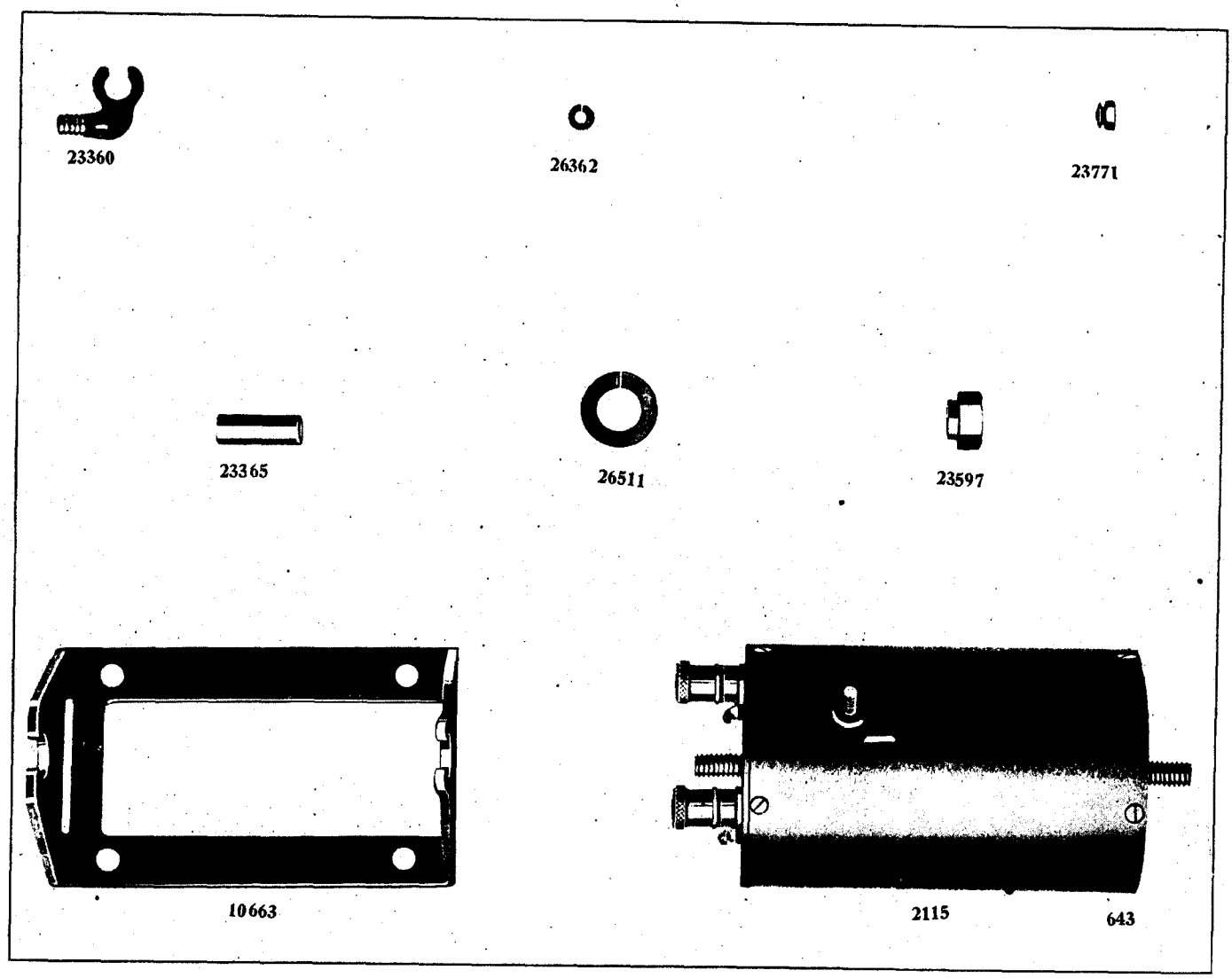
(Not Illustrated)

Piece Number	NAME OF PART	Quantity Required
5049	**DISTRIBUTOR ASSEMBLY COMPLETE**	1
11442	Housing Assembly Complete	1
	(Includes the next 2 Items)	
24406	Housing for Housing Assembly 11442	1
20775	Cup for Retainer and Balls Assembly 10282	2
21443	Clamp Nut for Shaft Assembly 11440 (Round)	1
21444	Lock Nut for Clamp Nut 21443	1
27222	Cone for Shaft Assembly 11440	2
11440	**Shaft Assembly (Includes Shaft, Cam, and Pin)**	1
14115	**Shaft and Cone Assembly Includes Shaft Assembly 11440) (Service) (and Upper Cone) (Service)**	1
10282	**Retainer and Balls Assembly**	2
10598	**Advance Yoke Assembly**	1
21797	Screw for Advance Yoke Assembly 10598	1
21786	Advance Ring for Advance Yoke Assembly 10598	1
21776	Pin for Advance Ring 21786	1
11869	**Spring Terminal Assembly (Magneto)**	2
10745	**Condenser Assembly**	1
	(Includes the next Item)	
32141	Screw for attaching Condenser Assembly 10740	4
23875	Separator for Condenser Assembly 10745	1
11408	**Contact Arm Assembly for Distributor**	1
	(Includes the next 3 Items. Do not count Old Style Parts)	
11379	**Connector Assembly for Contact Arm Assembly 11408**	1
21801	Terminal Wire (Old Style)	1
24069	Hub for Contact Arm Assembly 11408	1
24947	Screw for attaching Hub 24069	2
12411	**Contact Screw Assembly for Contact Arm Assembly 11408**	1
21748	Nut for Contact Screw Assembly 11411	1
23398	Spring for Contact Arm Assembly 11408	1
21780	Stop for Contact Arm Assembly 11408	1
21836	Screw for retaining Stop 21780	1
20345	Lock Washer for Screws 21836 and 23870	3
23870	Screw for connecting Condenser Assembly 10745 to Spring Terminal Assembly 11869	2
11111	**Advance Shaft Assembly**	1
23841	Collar for Shaft Assembly 11111	1
24079	Pin for retaining Collar 23841	1
11643	**Distributor Head Assembly Complete**	1
	(Includes the next 2 Items. Do not count Old Style Parts)	
21425	Plunger (Old Style) for Distributor Head Assembly 11643 (Approximately ⅛" Diameter)	1
27608	Plunger for Distributor Head Assembly 11643 (Approximately ¼" Diameter)	1
21424	Spring (Old Style) for Plunger 21425 (Approximately ⅛" Diameter)	1
27607	Spring for Plunger 27608 (Approximately ¼" Diameter)	1
10429	**Distributor Rotor Assembly Complete**	1
	(Includes the next 6 Items)	
11871	**Connector Assembly Contact**	1
23811	Screw for retaining Connector Assembly 11871	1
11870	**Clip Assembly for locating Distributor Rotor Assembly 10429**	1
21514	Screw for retaining Clip Assembly 11870	1
23831	Brush for Distributor Rotor Assembly 10429	1
23812	Spring for Brush 23831	1
21782	Clip for Distributor Head Assembly 11643 (With Clip 21781)	1
21781	Clip for Distributor Head Assembly 11643 (Long Tongue Clip)	1
21783	Clip for Distributor Head Assembly 11643 (Single)	1
21886	Screw for retaining Clip 21783	2
21887	Screw for retaining Clips 21781 and 21782	2
11811	**Plate Assembly for retaining Contact Arm Assembly 11408**	1
	(Includes the next 2 Items)	
21493	Stud for mounting Stop 21780	1
21494	Stud for mounting Contact Arm Assembly 11408	1
21747	Screw for retaining Plate Assembly 11811	3
23876	Plain Washer for Screw 21747	3
21495	Insulating Bushing for Screw 21747	3
23941	Insulating Washer for Screw 21747	3
23810	Insulator under Plate 11811	1
23869	Terminal for connecting Plate Assembly 11811	1
24232	Screw for retaining Terminal 23869	1
23777	Insulating Bushing for Spring Terminal Assembly 11869	2
23780	Insulating Washer for Spring Terminal Assembly 11869	4
20704	Nut for Spring Terminal Assembly 11869	2
24953	Lock Washer for Nut 20704	2
23445	Plain Washer for Spring Terminal Assembly 11869	4
12741	**Wrench for Distributor**	1
11863	**High Tension Terminal Assembly for Distributor Head Assembly 11643 (Blank)**	5
25003	Rubber Washer for High Tension Terminal Assemblies	5

No. 5001 DISTRIBUTOR

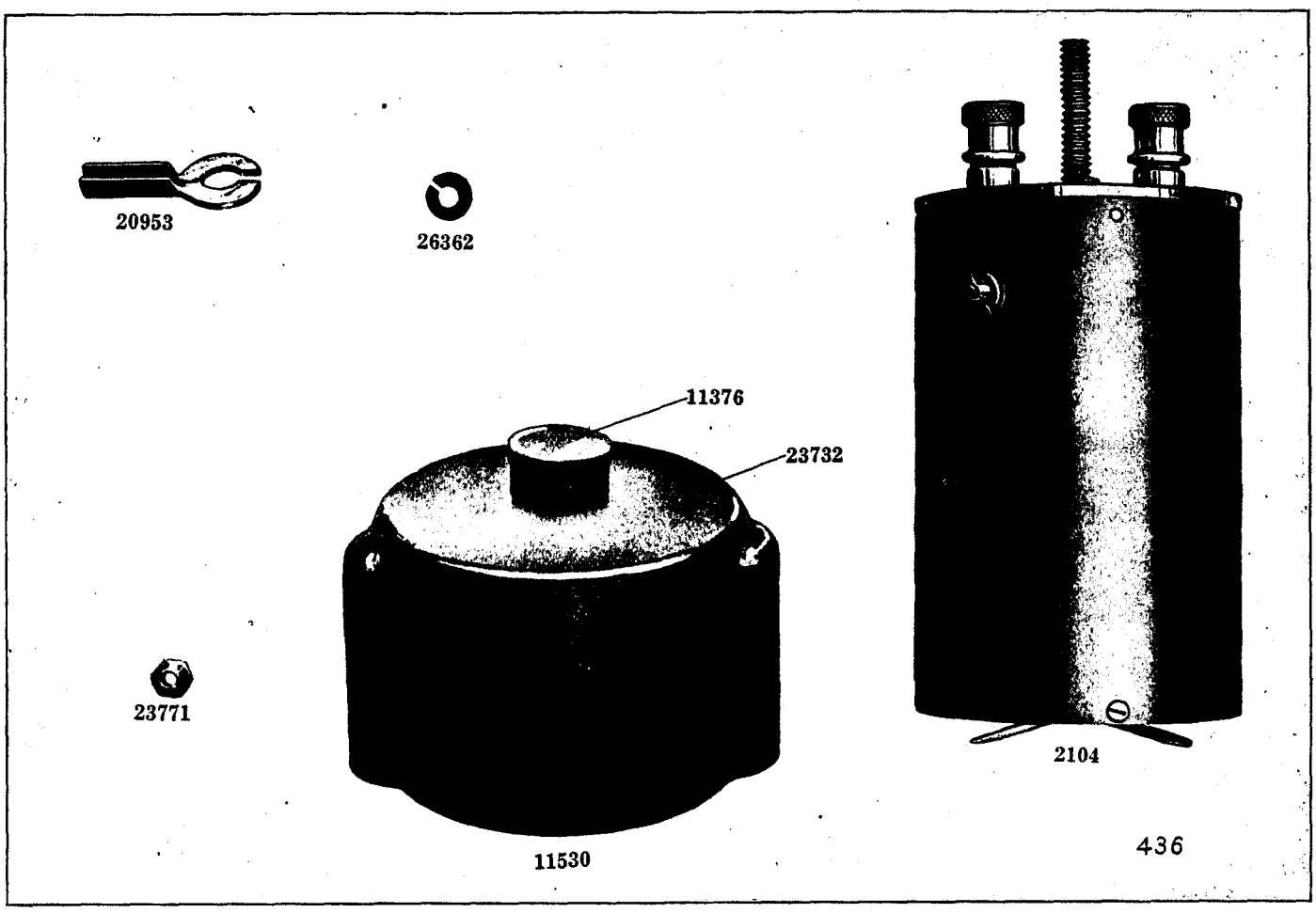
(Not Illustrated)

Piece Number	NAME OF PART	Quantity Required
5001	**DRY CELL DISTRIBUTOR COMPLETE**	1
11991	**Housing Assembly Complete**	1
	(Includes the next 2 Items)	
24367	Housing for Housing Assembly 11991	1
20775	Cup for retainer and Balls Assembly 10282	1
14114	**Shaft Assembly (Service) Including Shaft 11435 and Upper Cone)**	1
21443	Clamp Nut for Shaft Assembly 11435 (Round)	1
21444	Lock Nut for Clamp Nut 21443 (Hexagon)	1
27222	Cone for Shaft Assembly 11435	2
11435	**Shaft Assembly (Includes the Shaft, Cam and Pin)**	1
11667	**Shaft and Cone Assembly**	1
11226	**Advance Lever Assembly**	1
11230	**Advance Shaft Assembly**	1
24079	Dowel Pin for retaining Advance Lever Assembly 11226	1
10888	**Cover Assembly for Housing 24367**	1
	(Includes the next 2 Items)	
23849	Name Plate for Cover Assembly 10888	1
23839	Rivet for Name Plate 23849	2
10282	**Retainer and Balls Assembly**	2
12411	**Contact Screw Assembly**	1
11868	**Spring Terminal Assembly**	1
14383	**Contact Arm Assembly**	1
	(Includes the next 2 Items)	
24069	Hub for Contact Arm Assembly 14383	1
24947	Screw for attaching Hub 24069	2
10598	**Advance Yoke Assembly**	1
21797	Screw for Advance Yoke Assembly 10598	1
10429	**Distributor Rotor Assembly Complete**	1
	(Includes the next 6 Items)	
11871	**Distributor Rotor Connector Assembly (Contact)**	1
23811	Screw for retaining Connector Assembly 11871	1
11870	**Clip Assembly for locating Distributor Rotor Assembly 10429**	1
21514	Screw for retaining Clip Assembly 11870	1
23831	Brush for Distributor Rotor Assembly 10429	1
23812	Spring for Brush 23831	1
11643	**Distributor Head Assembly Complete**	1
	(Includes the next 2 Items. Do not Count Old Style Parts)	
21425	Plunger (Old Style) for Distributor Head Assembly 11643 (Approximately ⅛" Diameter)	1
27608	Plunger for Distributor Head Assembly 11643 (Approximately ¼" Diameter)	1
21424	Spring (Old Style) for Plunger 21425 (Approximately ⅛" Diameter)	1
27607	Spring for Plunger 27608 (Approximately ¼" Diameter)	1
21782	Clip for Distributor Head Assembly 11643 (With Clip 21781)	1
21781	Clip for Distributor Head Assembly 11643 (Long Tongue Clip)	1
21783	Clip for Distributor Head Assembly 11643 (Single)	1
21887	Screw for retaining Clips 21781 and 21782	2
21886	Screw for retaining Clip 21783	2
23777	Insulating Bushing for Spring Terminal Assembly 11868	1
23780	Insulating Washer for Spring Terminal Assembly 11868	2
23445	Plain Washer for Spring Terminal Assembly 11868	2
20704	Nut for Spring Terminal Assembly 11868	1
24953	Lock Washer for Nut 20704	1
21748	Lock Nut for Contact Screw Assembly 12411	1
21847	Stud for retaining Contact Arm Assembly 14383	1
21499	Stud for retaining Stop 21780	1
21780	Stop for Contact Arm Assembly 14383	1
21836	Screw for retaining Stop 21780	1
20345	Lock Washer for Screw 21836	1
23398	Spring for operating Contact Arm Assembly 14383	1
23882	Screw for attaching Cover Assembly 10888	4
21776	Pin for Advance Ring 21786	1
21786	Advance Ring for Advance Yoke Assembly 10598	1
13502	**Lead Assembly for connecting Distributor 5001**	1
	(Includes the next Item)	
20953	Terminal Clip for Lead Assembly 13502	2
12741	**Wrench for Distributor**	1
11863	**High Tension Terminal Assembly for Distributor Head Assembly 11643 (Blank)**	5
25003	Rubber Washer for High Tension Terminal Assemblies	5



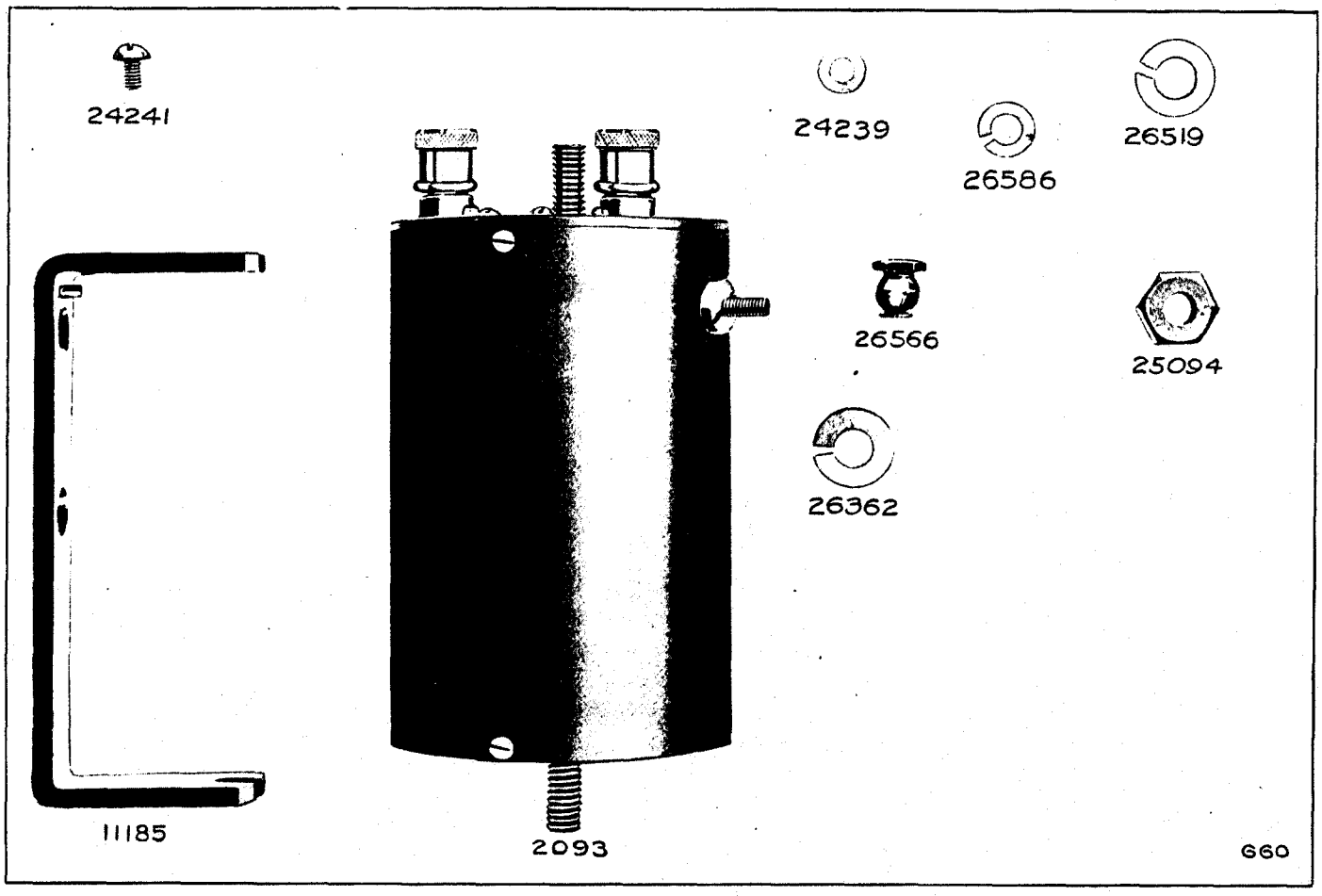
No. 2115 IGNITION COIL

Piece Number	NAME OF PART	Quantity Required
2115	**IGNITION COIL COMPLETE** (Includes the next 4 Items)	1
32115	Nut for High Tension Terminal	1
26362	Lock Washer for Nut 23771	1
23597	Nut for retaining Bracket Assembly 10663	2
26511	Lock Washer for Nut 23597	2
23360	Terminal Clip for connecting Ignition Coil 21115	1
23365	Fibre Ferrule for Terminal Clip 23360	1
10663	**Bracket Assembly for mounting Ignition Coil 2115**	1



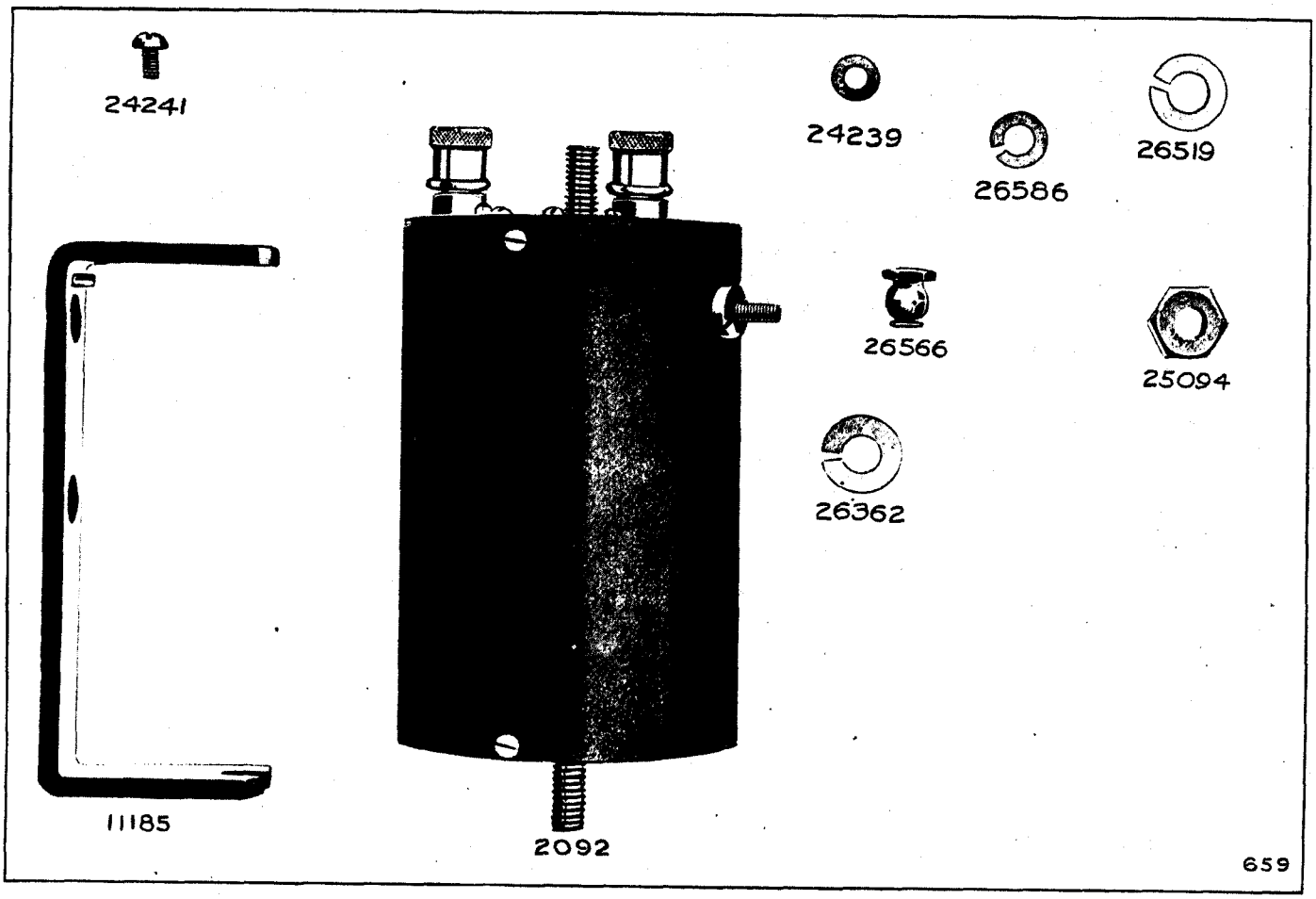
No. 2104 IGNITION COIL

Piece Number	NAME OF PART	Quantity Required
2104	**IGNITION COIL COMPLETE**	1
23771	Nut for High Tension Terminal	1
26362	Lock Washer for Nut 23771	1
11530	**Protector Assembly Complete** (Includes the next 3 Items)	1
23732	Protector for Protector Assembly 11530	1
11376	**Nut Assembly**	1
23447	Plain Washer for Nut Assembly 11376 (Not shown in Illustration)	1
20953	Terminal Clip for connecting Ignition Coil 2104	2
23835	Terminal Clip for High Tension Terminal (Not shown in Illustration)	1



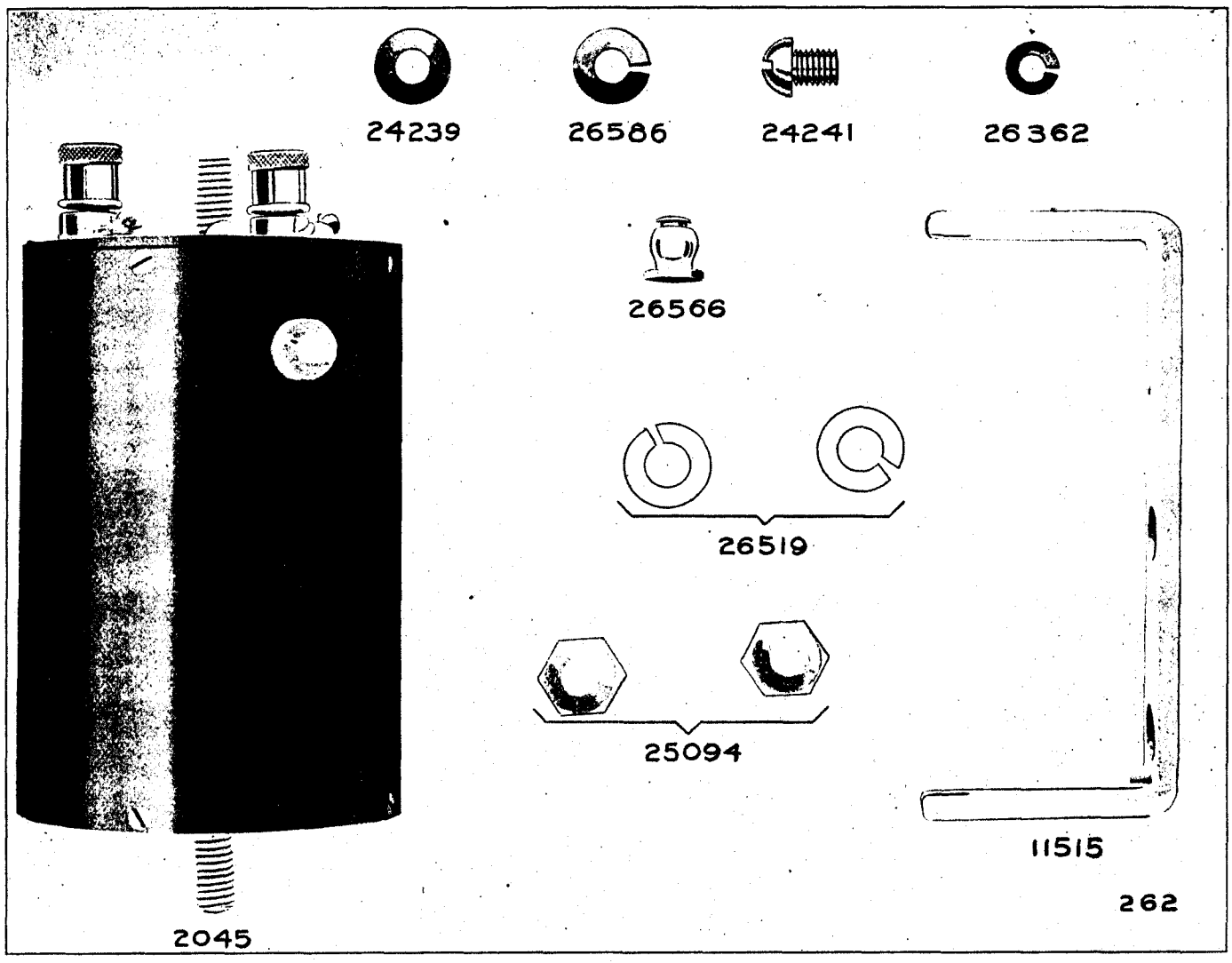
No. 2093 IGNITION COIL

Piece Number	NAME OF PART	Quantity Required
2093	**IGNITION COIL COMPLETE**	1
26566	Nut for High Tension Terminal	1
26362	Lock Washer for Nut 26566	1
25094	Nut for attaching Bracket Assembly 11185	2
26519	Lock Washer for Nut 25094	2
11185	**Bracket Assembly for mounting Ignition Coil 2093**	1
24241	Screw for Bracket Assembly 11185	1
26586	Lock Washer for Screw 24241	1
24239	Plain Washer for Screw 24241	1
20953	Terminal Clip for connecting Ignition Coil 2093 (Not shown in Illustration)	2



No. 2092 IGNITION COIL

Piece Number	NAME OF PART	Quantity Required
2092	**IGNITION COIL COMPLETE**	1
26566	Nut for High Tension Terminal	1
26362	Lock Washer for Nut 26566	1
11185	**Bracket Assembly for attaching Ignition Coil 2092**	1
25094	Nut for retaining Bracket Assembly 11185	2
26519	Lock Washer for Nut 25094	2
24241	Screw for Bracket Assembly 11185	1
26586	Lock Washer for Screw 24241	1
24239	Plain Washer for Screw 24241	1
20953	Terminal Clip for connecting Ignition Coil 2092 (Not shown in Illustration)	1



No. 2045 IGNITION COIL

Piece Number	NAME OF PART	Quantity Required
2045	**IGNITION COIL COMPLETE**	1
11515	**Bracket Assembly for mounting Coil**	1
25094	Nut for mounting Coil	2
26519	Lock Washer for Nut 25094	2
26566	Nut for High Tension Terminal	1
26362	Lock Washer for Nut 26566	1
24241	Screw for Bracket Assembly 11515	1
26586	Lock Washer for Screw 24241	1
24239	Plain Washer for Screw 24241	1

No. 2022 IGNITION COIL

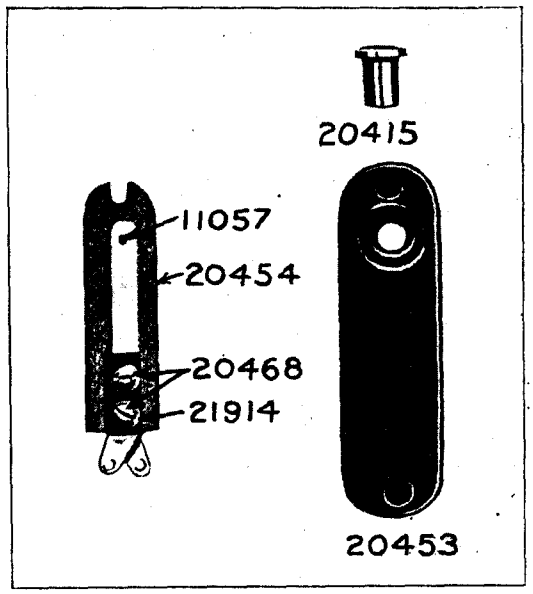
(Not Illustrated)

Piece Number	NAME OF PART	Quantity Required
2022	IGNITION COIL COMPLETE	1
26566	Nut for High Tension Terminal	1
26362	Lock Washer for Nut 26566	1
25094	Nut for retaining Bracket 21497	2
26519	Lock Washer for Nut 25094	2
21497	Bracket for attaching Coil 2022	1
24241	Screw for Bracket 21497	1
26586	Lock Washer for Screw 24241	1
24239	Plain Washer for Screw 24241	1
23573	Number Plate for Coil 2022	1
24747	Screw for attaching Number Plate 23573	2

No. 2004 COIL BOX

(Not Illustrated)

Piece Number	NAME OF PART	Quantity Required
2004	**COIL BOX COMPLETE**	1
10707	**Spring Terminal Assembly**	5
12882	**Coil Assembly**	1
12994	**Box Assembly**	1
	(Includes the next 2 Items)	
23568	Name Plate for Box Assembly 13013	2
24963	Rivet for Name Plate 23568	1
24960	Screw for retaining Box Assembly 12994	5
24694	Screw for retaining Spring Terminal Assembly 10707	5
28335	Plain Washer for Screw 24694	5
28333	Box for retaining Coil Assembly 12882	1
25374	Separator for Coil Assembly 12882	3
24487	Nut for High Tension Terminal	4
24744	Nut for retaining Coil Assembly 12882	4
25207	Plain Washer for Nut 24744	4
25373	Insulator for High Tension Terminal	4
25119	Plain Washer for Insulator 25373 (Large)	4
25189	Insulator for Separator 25374	1
25188	Bracket for mounting Coil Box 2004	1
28326	Screw for attaching Bracket 25188	4
28337	Strip for mounting Spring Terminal Assembly 10707	1
28336	Strip for retaining Coil Assembly 12882	1

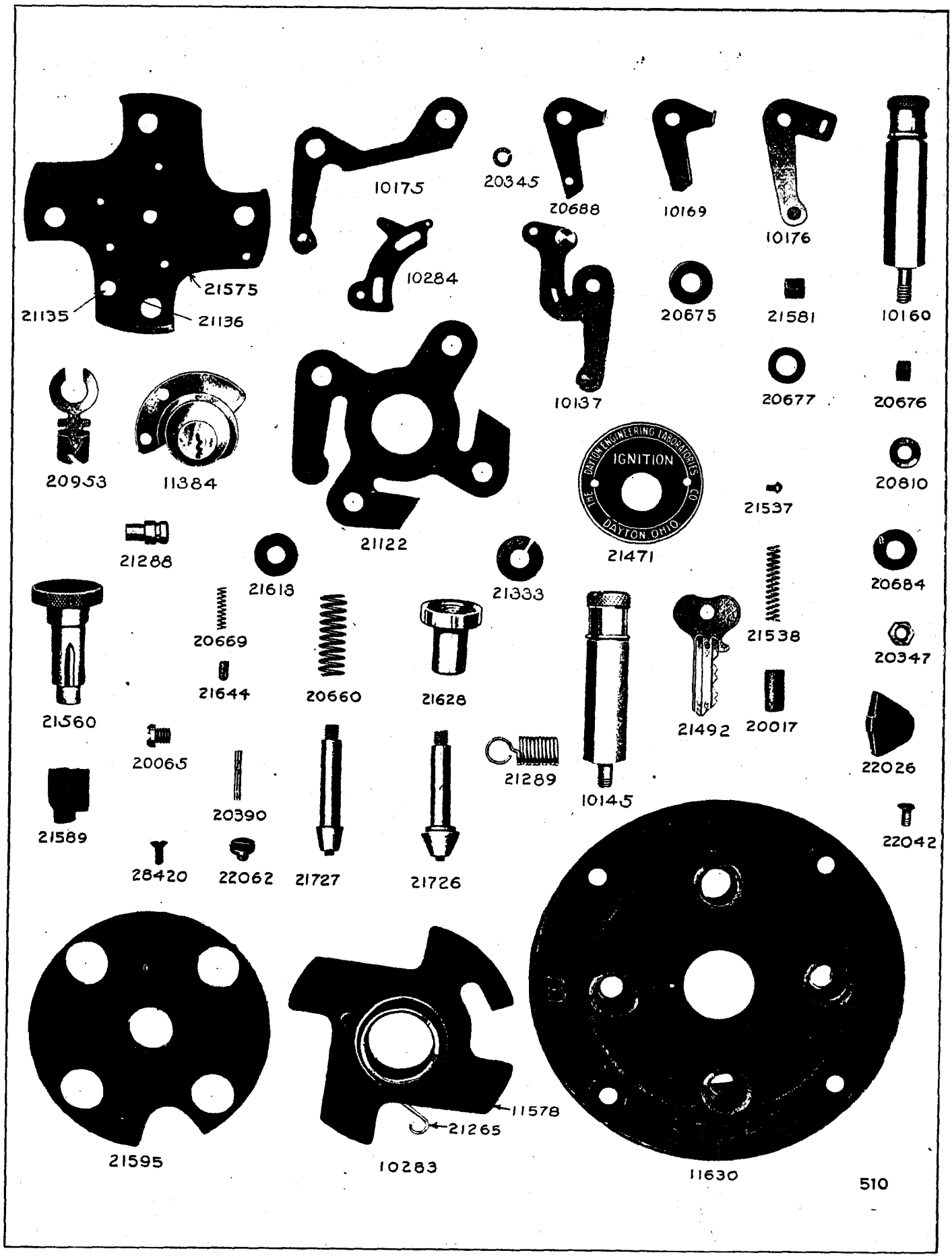


No. 1991 STARTING SWITCH

Piece Number	NAME OF PART	Quantity Required
1991	**STARTING SWITCH COMPLETE**	1
20453	Cover for Switch	1
20415	Plunger for operating Contact Spring Assembly 11057	1
20454	Plate for mounting Contact Spring Assembly 11057	1
11057	**Contact Spring Assembly for Switch**	2
20468	Screw for mounting Contact Spring Assembly 11057	2
20418	Insulating Bushing for Screw 20468 (Not shown in Illustration)	2
21914	Lock Washer for Screw 20468	2
20201	Insulator between Contact Spring Assembly 11057 (Not shown in Illustration)	3
20467	Insulator (Long) for Contact Spring Assembly 11057 (Not shown in Illustration)	1
20200	Insulator for Contact Spring Assembly 11057 under Screw 20468 (Not shown in Illustration)	1

No. 1979 IGNITION SWITCH

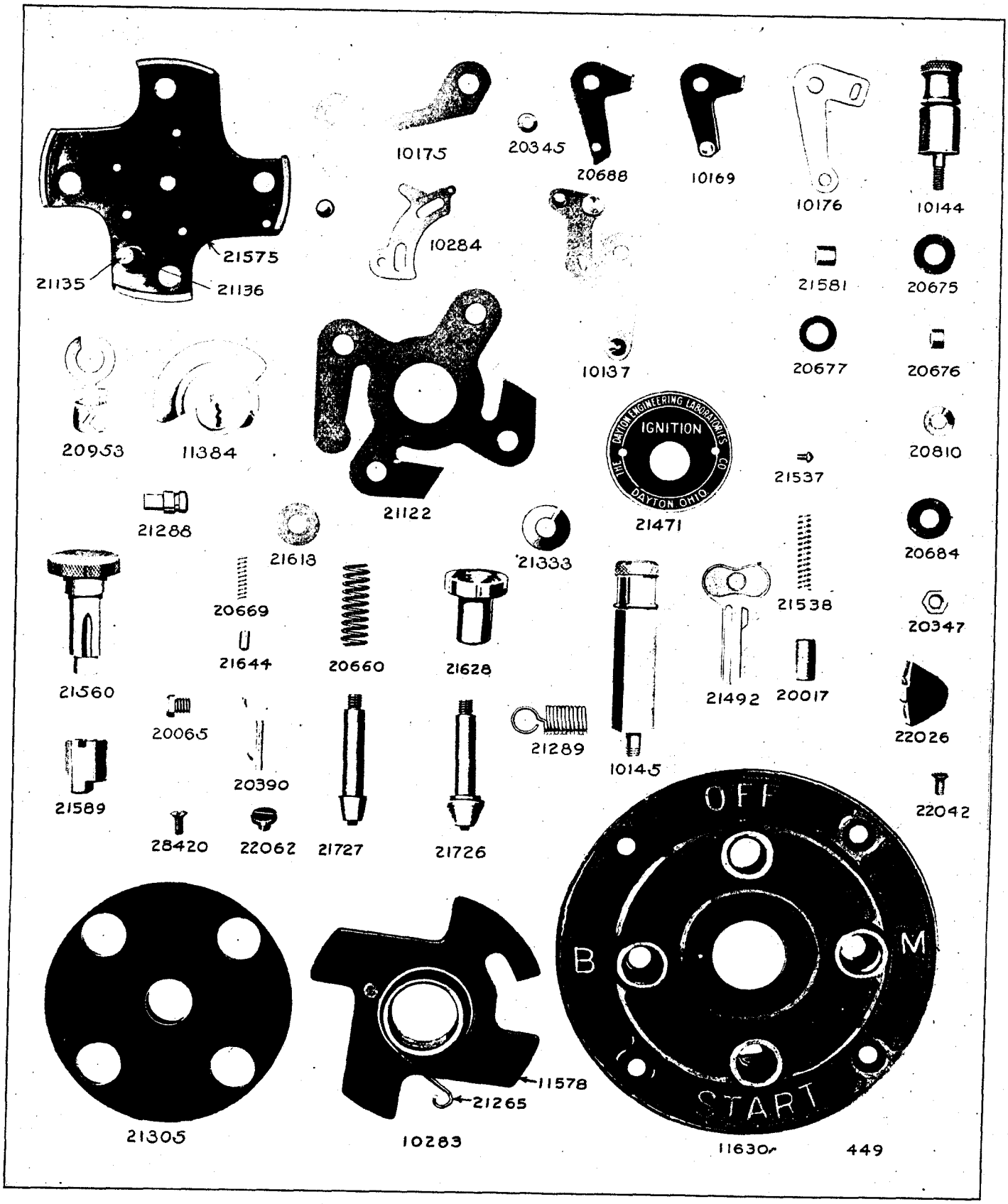
Piece Number	NAME OF PART	Quantity Required
1979	IGNITION SWITCH COMPLETE	1
10289	**Shell Assembly Complete** (Includes the next 16 Items)	1
10287	**Shell Assembly** (Includes the next 6 Items)	1
13836	**Shell Assembly**	1
21628	Button for Studs 21726 and 21727	3
21726	Stud for operating Contacts (Battery and Magneto)	2
21727	Stud for operating Contacts (Start)	1
20660	Spring for Push Button 21628	3
29284	Lock Washer for Button 21628 (Not shown in Illustration)	3
21560	Button for locking Switch	1
21644	Plunger for Button 21560	1
20669	Spring for Plunger 21644	1
20017	Plunger for Spring 21538	1
21538	Spring for Button 21560	1
22026	Bracket for retaining Spring 21538 and Plunger 20017	1
22042	Screw for retaining Bracket 22026	2
21589	Locking Cam for Button 21560	1
20390	Pin for Locking Cam 21589	1
10288	**Switch Mechanism Assembly Complete** (Includes the next 28 Items)	1
10285	**Support Plate Assembly** (Includes the next 6 Items)	1
10284	**Locking Cam Assembly**	1
21289	Spring for Locking Cam Assembly 10284	1
21288	Stud for Spring 21289	1
21137	Stud for Locking Cam Assembly 10284 (Not shown in Illustration)	1
21136	Plain Washer for Stud 21135	1
21135	Stud for retaining Spring 21265	1
10169	**Contact Arm Assembly (Short)**	1
10176	**Contact Arm Assembly (Single)**	1
10137	**Contact Arm Assembly (Double)**	1
10175	**Contact Arm Assembly (Common)**	1
10160	**Spring Terminal Assembly (Outer)**	1
10145	**Spring Terminal Assembly (Center)**	1
21122	Insulator for Contact Arm Assembly 10175	1
20677	Insulating Washing for Contact Arm Assemblies 10169 and 10176	2
20675	Insulating Washer for Nut 20347	4
20810	Plain Washer for Nut 20347	4
20684	Plain Washer for (Common) Spring Terminal Assembly (Thick)	1
21613	Plain Washer for Spring Terminal Assembly 10160 (Thin)	1
20347	Nut for Spring Terminal Assemblies 10145 and 10160	5
24240	Lock Washer for Spring Terminal Assembly 10145 (Not shown in Illustration)	1
20676	Insulating Bushing for Spring Terminal Assembly 10160 (Long)	3
21581	Insulating Bushing for Spring Terminal Assembly 10160 (Short)	1
20688	Support Plate for Contact Arm Assembly 10176	2
20345	Lock Washer for Screw 20065	3
20065	Screw for retaining Lock Assembly 11384	3
11384	**Lock Assembly Complete** (Includes the next Items)	1
29958	Key for Lock Assembly 11384 (Give Series No. of Lock)	2
10283	**Detent Assembly Complete** (Includes the next 2 Items)	1
21262	Stud for Spring 21265 (Not shown in Illustration)	1
21265	Spring for Detent Assembly 10283	1
21595	Cover Plate for Switch	1
21471	Name Plate for Switch	1
21537	Screw for retaining Name Plate 21471	2
28420	Screw for retaining Cover Plate 21595	4
22062	Screw for retaining Switch Mechanism Assembly 10268	4
20953	Terminal Clip for connecting Switch 1979	4



No. 1979 IGNITION SWITCH

No. 1978 IGNITION SWITCH

Piece Number	NAME OF PART	Quantity Required
1978	**IGNITION SWITCH COMPLETE**	1
10289	**Shell Assembly Complete** (Includes the next 16 Items)	1
10287	**Shell Assembly** (Includes the next 6 Items)	1
13836	**Shell Assembly**	3
21628	Button for Studs 21726 and 21727	2
21726	Stud (Battery and Magneto) for operating Contacts	1
21727	Stud for operating Contacts (Start)	3
20660	Spring for Push Button 21628	3
29284	Lock Washer for Button 21628 (Not shown in Illustration)	1
21560	Button for locking Switch	1
21644	Plunger for Button 21560	1
20669	Spring for Plunger 21644	1
20017	Plunger for Spring 21538	1
21538	Spring for Plunger 21560	1
22026	Bracket for retaining Spring 21538 and Plunger 20017	2
22042	Screw for retaining Bracket 22026	1
21589	Locking Cam for Button 21560	1
20390	Pin for Locking Cam 21589	1
10286	**Switch Mechanism Assembly Complete** (Includes the next 28 Items)	1
10285	**Support Plate Assembly** (Includes the next 6 Items)	1
10284	**Locking Cam Assembly**	1
21289	Spring for Locking Cam Assembly 10284	1
21288	Stud for Spring 21289	1
21137	Stud for Locking Cam Assembly 10284 (Not shown in Illustration)	1
21136	Plain Washer for Locking Cam Assembly 10284	1
21135	Stud for retaining 21265	1
10169	**Contact Arm Assembly (Short)**	1
10176	**Contact Arm Assembly (Single)**	1
10137	**Contact Arm Assembly (Double)**	1
10175	**Contact Arm Assembly (Common)**	4
10144	**Spring Terminal Assembly (Short)**	1
10145	**Spring Terminal Assembly (Long)**	1
21122	Insulator for Contact Arm Assembly 10175	2
26677	Insulating Washer for Contact Arm Assemblies 10169 and 10176	4
20675	Insulating Washer for Nut 20347	4
20810	Plain Washer for Nut 20347	1
20684	Plain Washer for (Common) Spring Terminal Assembly 10144 (Thick)	1
21613	Plain Washer for Spring Terminal Assembly 10144 (Thin)	5
20347	Nut for Spring Terminal Assemblies 10144 and 10145	1
24240	Lock Washer for Spring Terminal Assembly 10145 (Not shown in Illustration)	3
20676	Insulating Bushing for Spring Terminal Assembly 10144 (Long)	1
21581	Insulating Bushing for Spring Terminal Assembly 10144 (Short)	2
20688	Support Plate for Contact Arm Assembly 10176	3
20345	Lock Washer for Screw 20065	3
20065	Screw for retaining Lock Assembly 11384	1
11384	**Lock Assembly** (Includes the next Item)	2
29958	Key for Lock Assembly 11384 (Give Series No. of Lock)	1
10283	**Detent Assembly Complete** (Includes the next 2 Items)	1
21262	Stud for Spring 21265 (Not shown in Illustration)	1
21265	Spring for Detent Assembly 10283	1
21305	Cover Plate for Switch	1
21471	Name Plate for Switch	2
21537	Screw for retaining Name Plate 21471	4
28420	Screw for retaining Cover Plate 21305	4
22062	Screw for retaining Switch Mechanism Assembly 10286	5
20953	Terminal Clip for connecting Ignition Switch 1978	



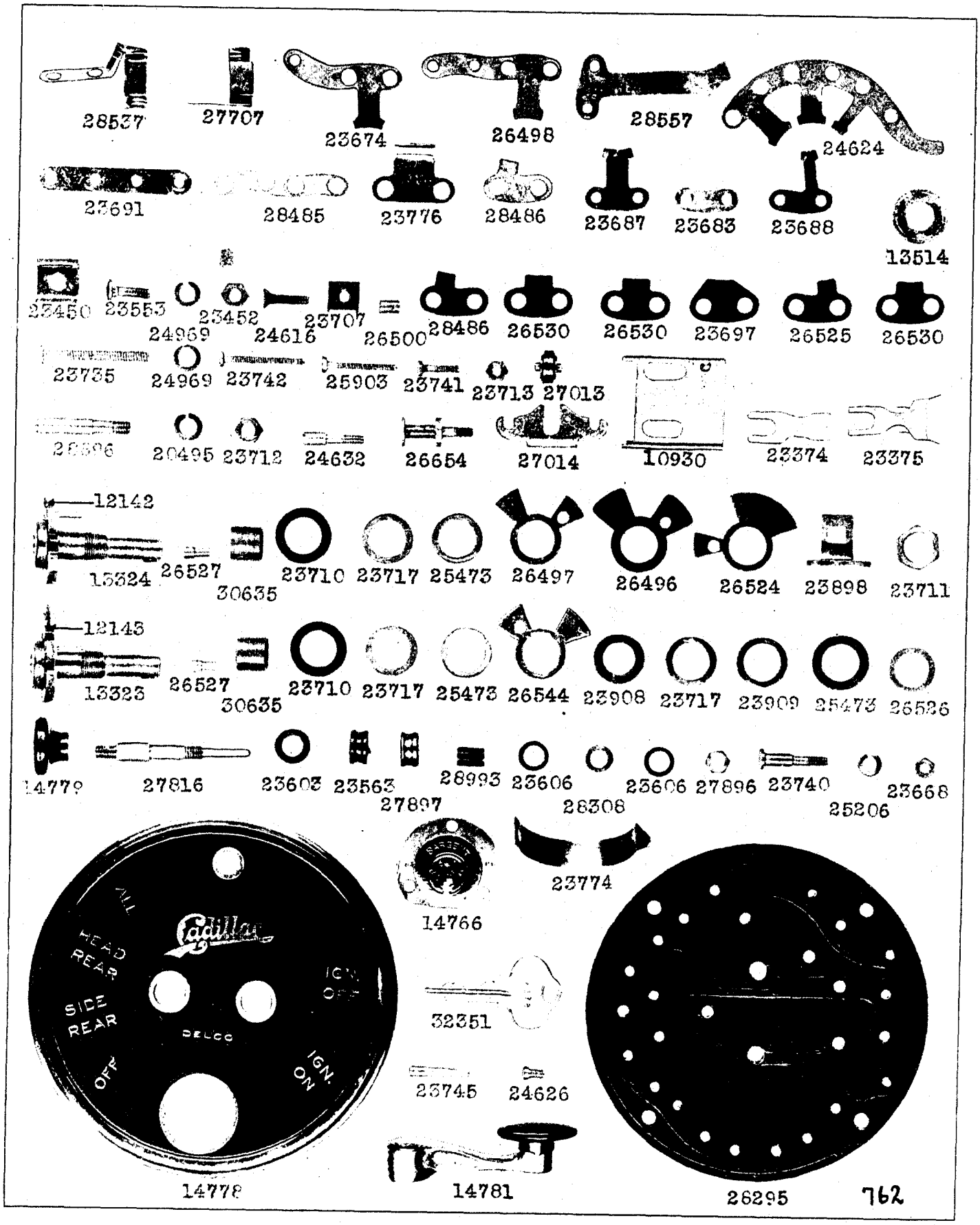
No. 1978 IGNITION SWITCH

No. 1150 COMBINATION SWITCH (Continued)

Piece Number	NAME OF PART	Quantity Required
26525	Insulating Plate for Terminals No. 1 and 8	5
26530	Insulating Plate for Terminals No. 2, 3, 5 and 6	11
28483	Insulating Bushing for Terminal No. 3 (Not shown in Illustration)	2
28486	Separator Plate for Terminal No. 8	2
28537	Contact Spring for connecting Terminal No. 8 and Plunger Assembly 13086	1
27705	Contact Spring for connecting Plunger Assembly 13086 and Terminal No. 9	1
23741	Screw for retaining Contact Spring 27707 and Terminal No. 4	4
23740	Screw for retaining Tumbler Assembly 10930	2
23683	Plate for retaining Screws 23741 on Terminal No. 4	1
23697	Insulating Plate for Terminal No. 6 under Brush 26498 (Large)	1
28485	Plate connecting Terminal No. 3 and Contact Spring 28537	1
23713	Nut for Screws 23740, 24632 and Stud 26654	5
23668	Nut for retaining Screw 23742	2
26654	Stud for retaining Roller Bracket 27014	1
25206	Lock Washer for Nut 23713	5
20495	Lock Washer for Nut 23712	2
20393	Lock Washer for Screw 23735	4
23735	Screw for retaining Housing Assembly	4
23707	Nut for Screw 24616	1
24616	Screw for retaining Spring 23774	1
23742	Screw for retaining Brushes 23674 and 24624 (Short)	2
24632	Stop Screw for Blade Assemblies	2
26523	Screw for retaining Terminal No. 7 (Not shown in Illustration)	2
31009	Spacing Washer for Blade Assemblies	2
28896	Stud for retaining Blade Assemblies	2
23712	Nut for retaining Stud 28896	2
23691	Terminal Plate under Terminal Plate No.4	1
23374	Terminal Clip for connecting Switch (Small)	7
23375	Terminal Clip for connecting Switch (Large)	2

No. 1150 COMBINATION SWITCH

Piece Number	NAME OF PART	Quantity Required
1150	**COMBINATION SWITCH**	1
14777	**Housing Assembly Complete** (Includes the next 12 Items)	1
32291	Escutcheon Plate for Switch	1
28612	Ferrule for retaining Plate 32291	2
14779	**Button Assembly for Plunger Assembly 15307**	1
28308	Insulating Washer for Plunger Assembly 15307	1
15307	**Plunger Assembly Complete** (Includes the next 7 Items)	1
27816	Plunger for Plunger Assembly 15307	1
23563	Insulating Collar for Plunger 27816	1
28993	Insulating Bushing for Plunger 27816	1
27897	Contact Collar for Plunger 27816	1
23606	Plain Washer for Nut 27896	1
23603	Insulating Washer for Contact Collar 27897	1
27896	Nut for Clamping Plunger Assembly 15307	1
23898	Terminal Post for connecting Switch	1
23553	Screw for retaining Terminal Clip 23450	1
23452	Nut for Screw 23553	1
20393	Lock Washer for Nut 23452	1
23450	Clip for Terminal Clip 23374	1
13290	**Blade Assembly Complete (Ignition)** (Includes the next 15 Items)	1
13323	**Stud Assembly**	1
12143	**Stop Wheel Assembly**	1
26527	Insulating Bushing for Stop Wheel Assembly 12143	1
30635	Insulating Bushing for Stud Assembly 13323	1
26497	Blade for Blade Assembly 13290 (Lower)	1
26524	Blade for Blade Assembly 13290 (Upper)	1
26496	Insulator between Blade 26497 and 26524)	1
23710	Insulating Washer for Blade 26497 and 26524	2
23717	Plain Washer for Stop Wheel Assembly 12143 (Thick)	2
25473	Plain Washer for Stop Wheel Assembly 12143 (Thin)	1
23908	Plain Washer for Blade 26524 (Thick)	1
23711	Nut for Clamping Blade Assembly 13290	1
26526	Lock Washer for Nut 23711	1
23909	Plain Washer for Nut 23711	1
25473	Plain Washer for Blades 26524 (Thin)	1
13291	**Blade Assembly Complete (For Lighting)** (Includes the next 13 Items)	1
13324	**Stud Assembly**	1
12142	**Stop Wheel Assembly**	1
26527	Insulating Bushing for Stop Wheel Assembly 12142	1
30635	Insulating Bushing for Stud Assembly 13324	1
26544	Blade for Blade Assembly 13291	1
23717	Plain Washer for Stop Wheel Assembly 12142 (Thick)	1
25473	Plain Washer for Stop Wheel Assembly 12142 (Thin)	1
23710	Insulating Washer for Blade 26544	2
25473	Plain Washer for Blade 26544 (Thin)	1
23908	Plain Washer for Blade 26544 (Thick)	1
23909	Plain Washer for Nut 23711	1
26526	Lock Washer for Nut 23711	1
23711	Nut for Clamping Blade Assembly 13291	1
14766	**Lock Assembly for Switch** (Includes the next Item)	1
32351	Key for Lock Assembly 14766 (Give Series No. of Lock	2
24626	Screw for retaining Lock Assembly 14766	3
10930	**Tumbler Assembly for Locking Blade Assemblies 13290 and 13291**	1
14781	**Lever Assembly for operating Blade Assemblies**	2
23745	Screw for retaining Lever	2
27014	Roller Bracket for retaining Roller 27013	1
27013	Roller for Blade Assemblies 13290 and 13291	2
23774	Spring for Roller Bracket 27014	2
23776	Spring for Tumbler Assembly 10930	1
28295	Mounting Plate for Switch	1
23674	Brush for Terminal No. 5 (Lower)	1
23687	Brush for Terminals No. 2, 3, 5, 6 (Upper)	4
23688	Brush for Terminal No. 1 (Upper)	1
28557	Brush for connecting Terminal No. 8 and Blade Assembly	1
24624	Brush for Terminals No. 1, 2 and 3 (Lower)	1
26498	Brush for Terminals No. 6 and 7 (Lower)	1
25903	Screw for retaining Terminals No. 1, 2, 3, 5, 6 and 8	12
26500	Insulating Bushing for Screw 25903	10



No. 1150 COMBINATION SWITCH

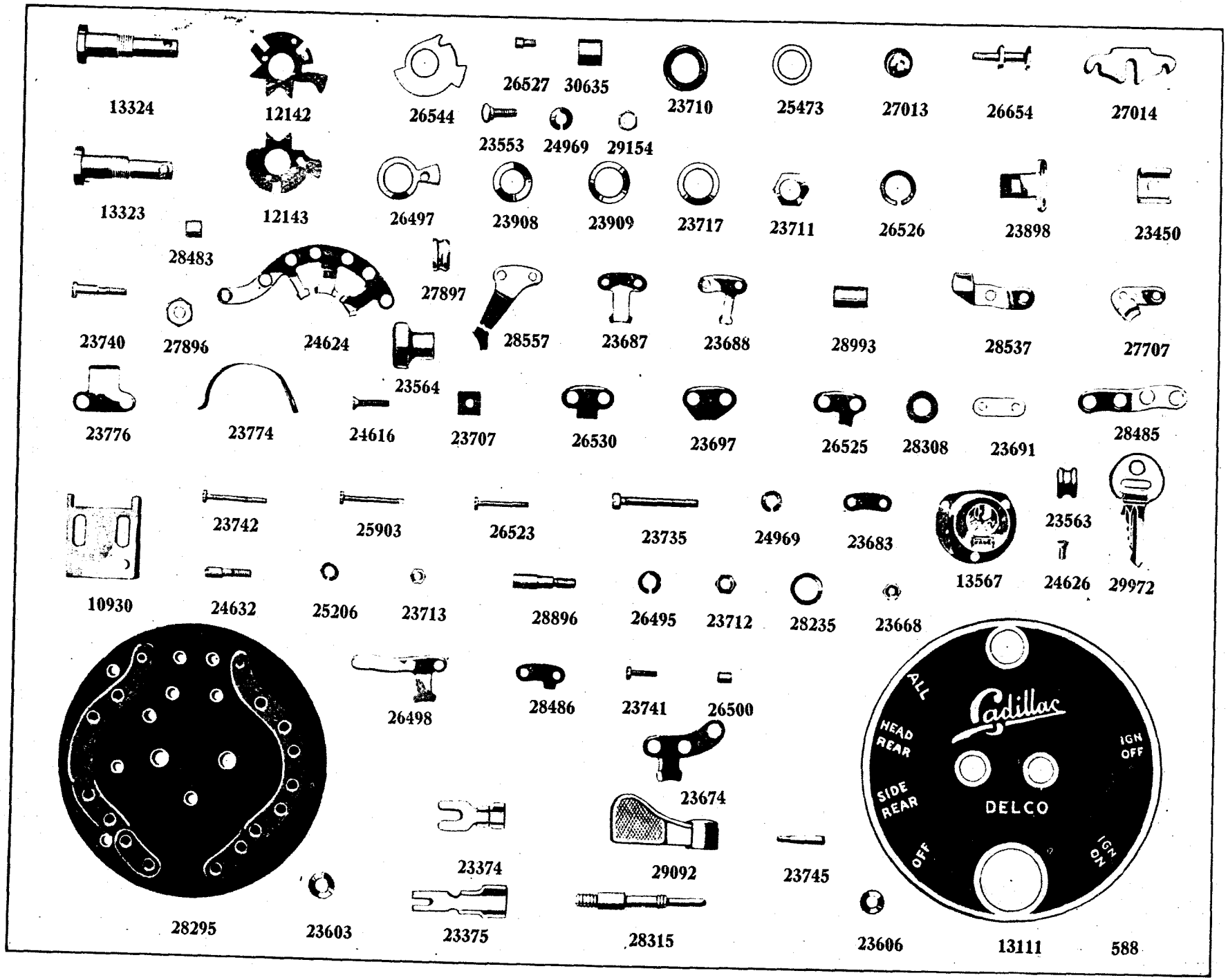
No. 1099 COMBINATION SWITCH (Continued)

Piece Number	NAME OF PART	Quantity Required
26498	Brush for Terminals No. 6 and 7 (Lower)	1
25903	Screw for retaining Terminals No. 1, 2, 3, 5, 6 and 8	12
26500	Insulating Bushing for Screw 25903	10
26525	Insulating Plate for Terminals No. 1 and No. 8	5
26530	Insulating Plate for Terminals No. 2, 3, 5 and 6	11
28483	Insulating Bushing for Terminal No. 8	2
28486	Separator Plate for Terminal No. 8	2
28537	Contact Spring for connecting Terminal No. 3 and Plunger Assembly 13110	1
27707	Contact Spring for connecting Plunger Assembly 13110 and Terminal No. 9	1
23741	Screw for retaining Contact Spring 27707 and Terminal No. 4	1
23740	Screw for retaining Tumbler Assembly 10930	2
23683	Plate for retaining Screws 23741 on Terminal No. 4	1
23697	Insulating Plate for Terminal No. 6 under Brush 26498 (Large)	1
28485	Plate connecting Terminal No. 3 and Contact Spring 28537	1
23713	Nut for Screws 23740, 24632 and Stud 26654	5
23668	Nut for retaining Screw 23742	2
26654	Stud for retainng Roller Bracket 27014	1
25206	Lock Washer for Nut 23713	5
20495	Lock Washer for Nut 23712	2
20393	Lock Washer for Screw 23735	4
23735	Screw for retaining Housing Assembly 13112	4
23707	Nut for Screw 24616	1
24616	Screw for retaining Spring 23774	1
23742	Screw for retaining Brushes 23674 and 24624 (Short)	2
24632	Stop Screw for Blade Assemblies 13290 and 13291	2
26523	Screw for retaining Terminal No. 7	2
31009	Spacing Washer for Blade Assemblies 13290 and 13291	2
28896	Stud for retaining Blade Assemblies 13290 and 13291	2
23712	Nut for retaining Stud 28896	2
23691	Terminal Plate under Termnal Plate No. 4	1
23374	Terminal Clip for connecting Switch (Small)	7
23375	Terminal Clip for connecting Switch (Large)	2

No. 1099 COMBINATION SWITCH

Note: No. 1099 Combination Switch superseded by No. 1150 Combination Switch. When ordering a complete new unit, order No. 1150.

Piece Number	NAME OF PART	Quantity Required
1099	**COMBINATION SWITCH**	1
13112	**Housing Assembly Complete** (Includes the next 12 Items)	1
28627	Escutcheon Plate for Switch	1
28612	Ferrule for Retaining Plate	2
23564	Button for Plunger Assembly 13110	1
28308	Insulating Washer for Plunger Assembly 13110	1
13110	**Plunger Assembly Complete** (Includes the next 7 Items)	1
28315	Plunger for Plunger Assembly 13110	1
23563	Insulating Collar for Plunger 28315	1
28993	Insulating Bushing for Plunger 28315	1
27897	Contact Collar for Plunger 28315	1
23606	Plain Washer for Nut 27896	1
23603	Insulating Washer for Contact Collar 27897	1
27896	Nut for Clamping Plunger Assembly 13110	1
23898	Terminal Post for connecting Switch	1
23553	Screw for retaining Terminal Clip 23450	1
23452	Nut for Screw 23553	1
20393	Lock Washer for Nut 23452	1
23450	Clip for Terminal Clip 23374	1
13290	**Blade Assembly Complete (For Ignition)** (Includes the next 15 Items)	1
13323	**Stud Assembly**	1
12143	**Stop Wheel Assembly**	1
26527	Insulating Bushing for Stop Wheel Assembly 12143	1
30635	Insulating Bushing for Stud Assembly 13323	1
26497	Blade for Blade Assembly 13290 (Lower)	1
26524	Blade for Blade Assembly 13290 (Upper) (Not shown in Illustration)	1
26496	Insulator between Blades 26497 and 26524 (Not shown in Illustration)	1
23710	Insulating Washer for Blades 26497 and 26524	2
23717	Plain Washer for Stop Wheel Assembly 12143 (Thick)	2
25473	Plain Washer for Stop Wheel Assembly 12143 (Thin)	1
23908	Plain Washer for Blade 26524 (Thick)	1
23711	Nut for Clamping Blade Assembly 13290	1
26526	Lock Washer for Nut 23711	1
23909	Plain Washer for Nut 23711	1
25473	Plain Washer for Blades 26524 (Thin)	1
13291	**Blade Assembly Complete (For Lighting)** (Includes the next 13 Items)	1
13324	**Stud Assembly**	1
12142	**Stop Wheel Assembly**	1
26527	Insulating Bushing for Stop Wheel Assembly 12142	1
30635	Insulating Bushing for Stud Assembly 13324	1
26544	Blade for Blade Assembly 13291	1
23717	Plain Washer for Stop Wheel Assembly 12142 (Thick)	1
25473	Plain Washer for Stop Wheel Assembly 12142 (Thin)	1
23710	Insulating Washer for Blade 26544	2
25473	Plain Washer for Blade 26544 (Thin)	1
23908	Plain Washer for Blade 26544 (Thick)	1
23909	Plain Washer for Nut 23711	1
26526	Plain Washer for Nut 23711	1
23711	Nut for Clamping Blade Assembly 13291	1
13567	**Lock Assembly for Locking Switch (Used on Model No. 57 Cadillac 1918)** (Includes the next Item)	1
29972	Key for Lock Assembly 13567 (Give Series No. of Lock)	2
14308	**Lock Assembly for Switch (Used on Model No. 59 Cadillac 1919)** (Includes the next Item)	1
31533	Key for Lock Assembly 14308 (Give Serial No. of Lock)	2
24626	Screw for retaining Lock Assembly 13567	3
10930	**Tumbler Assembly for Locking Blade Assemblies 13290 and 13291**	1
29092	Lever for operating Blade Assemblies 13290 and 13291	2
23745	Screw for retaining Lever 29092	2
27014	Roller Bracket for retaining Roller 27013	1
27013	Roller for Blade Assemblies 13290 and 13291	2
23774	Spring for Roller Bracket 27014	2
23776	Spring for Tumbler Assembly 10930	1
28295	Mounting Plate for Switch	1
23674	Brush for Terminal No. 5 (Lower)	1
23687	Brush for Terminals No. 2, 3, 5, 6 (Upper)	4
23688	Brush for Terminal No. 1 (Upper)	1
28557	Brush for connecting Terminal No. 8 and Blade Assembly 12176	1
24624	Brush for Terminals No. 1, 2 and 3 (Lower)	1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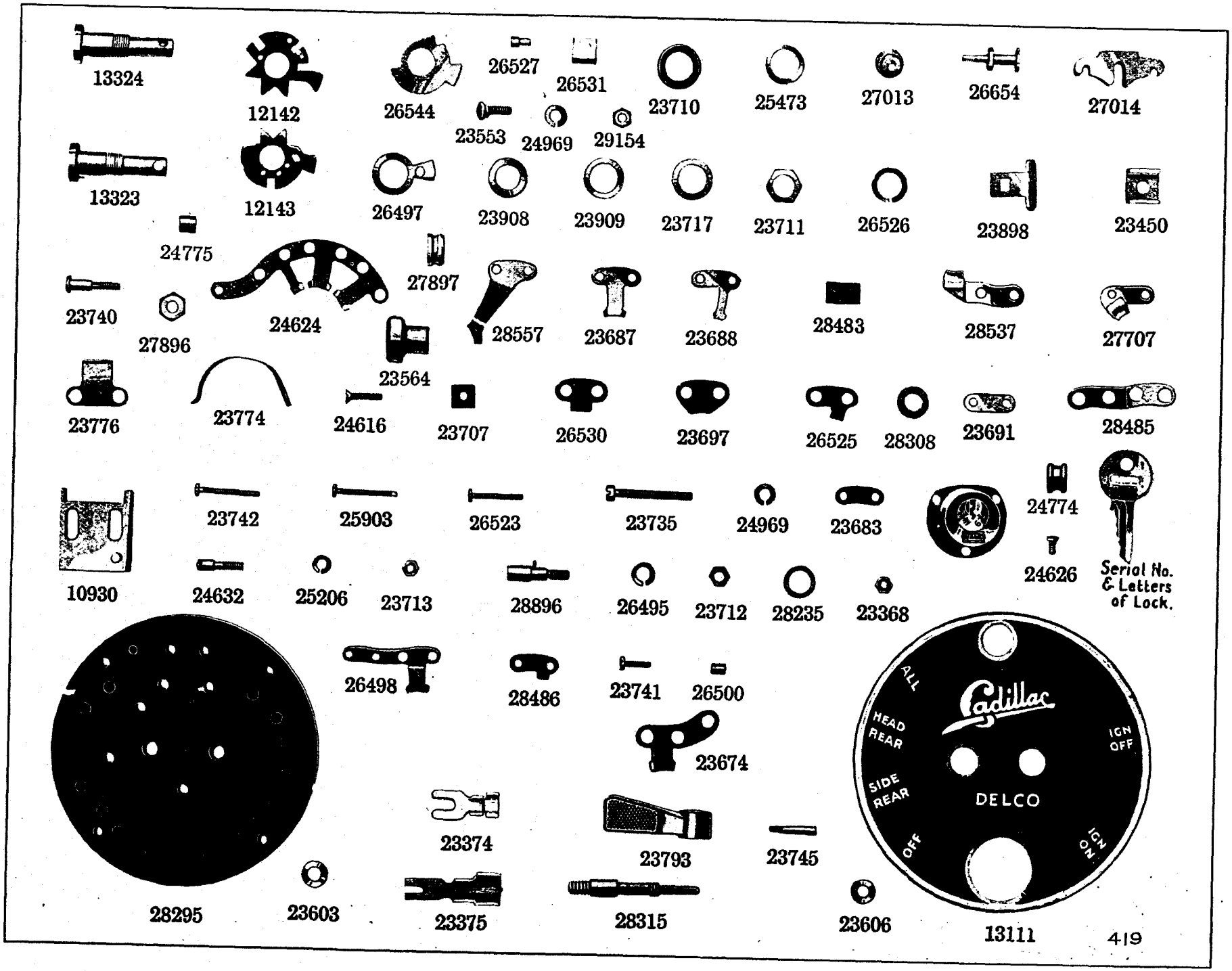
No. 1077 COMBINATION SWITCH (Continued)

Piece Number	NAME OF PART	Quantity Required
23688	Brush for Terminal No. 1 (Upper)	1
28557	Brush for connecting Terminal No. 8 and Blade Assembly 13290	1
24624	Brush for Terminals No. 1, 2 and 3 (Lower)	1
26498	Brush for Terminals No. 6 and 7 (Lower)	1
25903	Screw for retaining Terminals No. 1, 2, 3, 5, 6 and 8	12
26500	Insulating Bushing for Screw 25903	10
26525	Insulating Plate for Terminals No. 1 and 8	5
23696	Insulating Plate for Terminals No. 2, 3, 5 and 6	11
28483	Insulating Bushing for Terminal No. 8	2
28486	Separator Plate for Terminal No. 8	2
28537	Contact Spring for connecting Terminal No. 3 and Plunger Assembly 13110	1
27707	Contact Spring for connecting Plunger Assembly 13110 and Terminal No. 9	1
23741	Screw for retaining Contact Spring 27707 and Terminal No. 4	4
23740	Screw for retaining Tumbler Assembly 10930	2
23683	Plate for retaining Screws 23741 and Terminal No. 4	1
23697	Insulating Plate for Terminal No. 6 under Brush 26498 (Large)	1
28485	Plate connecting Terminal No. 3 and Contact Spring 28537	1
23713	Nut for Screws 23740 and 24632 and Stud 26654	5
23668	Nut for retaining Screw 23742 (Not shown in Illustration)	2
26654	Stud for retaining Roller Bracket 27014	1
25206	Lock Washer for Nut 23713	5
20495	Lock Washer for Nut 23712	2
20393	Lock Washer for Screw 23735	4
23735	Screw for retaining Housing Assembly 13112	4
23707	Nut for Screw 24616	1
24616	Screw for retaining Spring 23774	1
23742	Screw for retaining Brushes 23674 and 24624 (Short)	2
24626	Screw for retaining Lock Assembly 13039	3
24632	Stop Screw for Blade Assembly 13290	2
26523	Screw for retaining Terminal No. 7	2
31009	Spacing Washer for Blade Assemblies 13290 and 13291 (Not shown in Illustration)	2
28896	Stud for retaining Blade Assemblies 13290 and 13291	2
23712	Nut for retaining Stud 28896	2
23691	Terminal Plate under Terminal No. 4	1
23374	Terminal Clip for connecting Switch (Small)	7
23375	Terminal Clip for connecting Switch (Large)	2

No. 1077 COMBINATION SWITCH

Piece Number	NAME OF PART	Quantity Required
1077	**COMBINATION SWITCH COMPLETE**	1
13112	**Housing Assembly Complete** (Includes the next 12 Items)	1
28627	Escutcheon Plate for Switch	2
28612	Ferrule for retaining Plate 28627	1
23564	Button for Plunger Assembly 13110	1
28308	Insulating Washer for Plunger Assembly 13110	1
13110	**Plunger Assembly** (Includes the next 7 Items)	1
28315	Plunger for Plunger Assembly 13110	1
23563	Insulating Collar for Plunger 28315 (Not shown in Illustration)	1
28993	Insulating Bushing for Plunger 28315 (Not shown in Illustration)	1
27897	Contact Collar for Plunger 28315	1
23606	Plain Washer for Nut 27896	1
23603	Insulating Washer for Contact Collar 27897	1
27896	Nut for clamping Plunger Assembly 13110	9
23898	Terminal Post	9
23553	Screw for retaining Clip 23450	9
23452	Nut for Screw 23553 (Not shown in Illustration)	9
20393	Lock Washer for Nut 23452	1
23450	Clip for retaining Terminal Clip 23374	1
13290	**Blade Assembly Complete (For Ignition)** (Includes the next 16 Items)	1
13323	**Stud Assembly** (Includes the next Item)	1
23747	Pin for Stud Assembly 13323 (Not shown in Illustration)	1
12143	**Stop Wheel Assembly** (Includes the next Item)	1
23946	Stud for Stop Wheel Assembly 12143 (Not shown in Illustration)	1
26527	Insulating Bushing for Stop Wheel Assembly 12143	1
30635	Insulating Bushing for Stud Assembly 13323 (Not shown in Illustration)	1
26497	Blade for Blade Assembly 13290 (Lower)	1
26524	Blade for Blade Assembly 13290 (Upper) Not shown in Illustration)	1
26496	Insulator between Blades 26497 and 26524 (Not shown in Illustration)	2
23710	Insulating Washer for Blades 26497 and26524	2
23717	Plain Washer for Stop Wheel Assembly 12143 (Thick)	1
25473	Plain Washer for Stop Wheel Assembly 12143 (Thin)	1
23908	Plain Washer for Blade 26524 (Thick)	1
23711	Nut for clamping Blade Assembly 13290	1
26526	Lock Washer for Nut 23711	1
23909	Plain Washer for Nut 23711	1
13291	**Blade Assembly Complete (For Lighting)** (Includes the next 14 Items)	1
13324	**Stud Assembly** (Includes the next Item)	1
23747	Pin for Stud Assembly 13324 (Not shown in Illustration)	1
12142	**Stop Wheel Assembly** (Includes the next Item)	1
23946	Stud for Stop Wheel Assembly 12142 (Not shown in Illustration)	1
26527	Insulating Bushing for Stop Wheel Assembly 12142	1
30635	Insulating Bushing for Stud Assembly 13324 (Not shown in Illustration)	1
26544	Blade for Blade Assembly 13291	2
23717	Plain Washer for Stop Wheel Assembly 12142 (Thick)	1
25473	Plain Washer for Stop Wheel Assembly 12142 (Thin)	2
23710	Insulating Washer for Blade 26544	1
23908	Plain Washer for Blade 26544 (Thick)	1
23909	Plain Washer for Nut 23711	1
26526	Lock Washer for Nut 23711	1
23711	Nut for clamping Blade Assembly 13291	1
13039	**Lock Assembly for Locking Switch** (Includes the next Item)	2
29962	Key for Lock Assembly 13039 (Give Series No. of Lock)	1
10930	**Tumbler Assembly for locking Switch** (Includes the next Item)	1
23738	Stud for Tumbler Assembly 10930 (Not shown in Illustration)	2
23793	Lever for operating Blade Assemblies 13290 and 13291	2
23745	Screw for retaining Lever 23793	1
27014	Roller Bracket for retaining Roller 27013	2
27013	Roller for Blade Assemblies 13290 and 13291	2
23774	Spring for Roller Bracket 27014	1
23776	Spring for Tumbler Assembly 10930	1
28295	Mounting Plate (Back of Switch)	1
23674	Brush for Terminal No. 5 (Lower)	4
23687	Brush for Terminals No. 2, 3, 5 and 6 (Upper)	

No. 1077 COMBINATION SWITCH

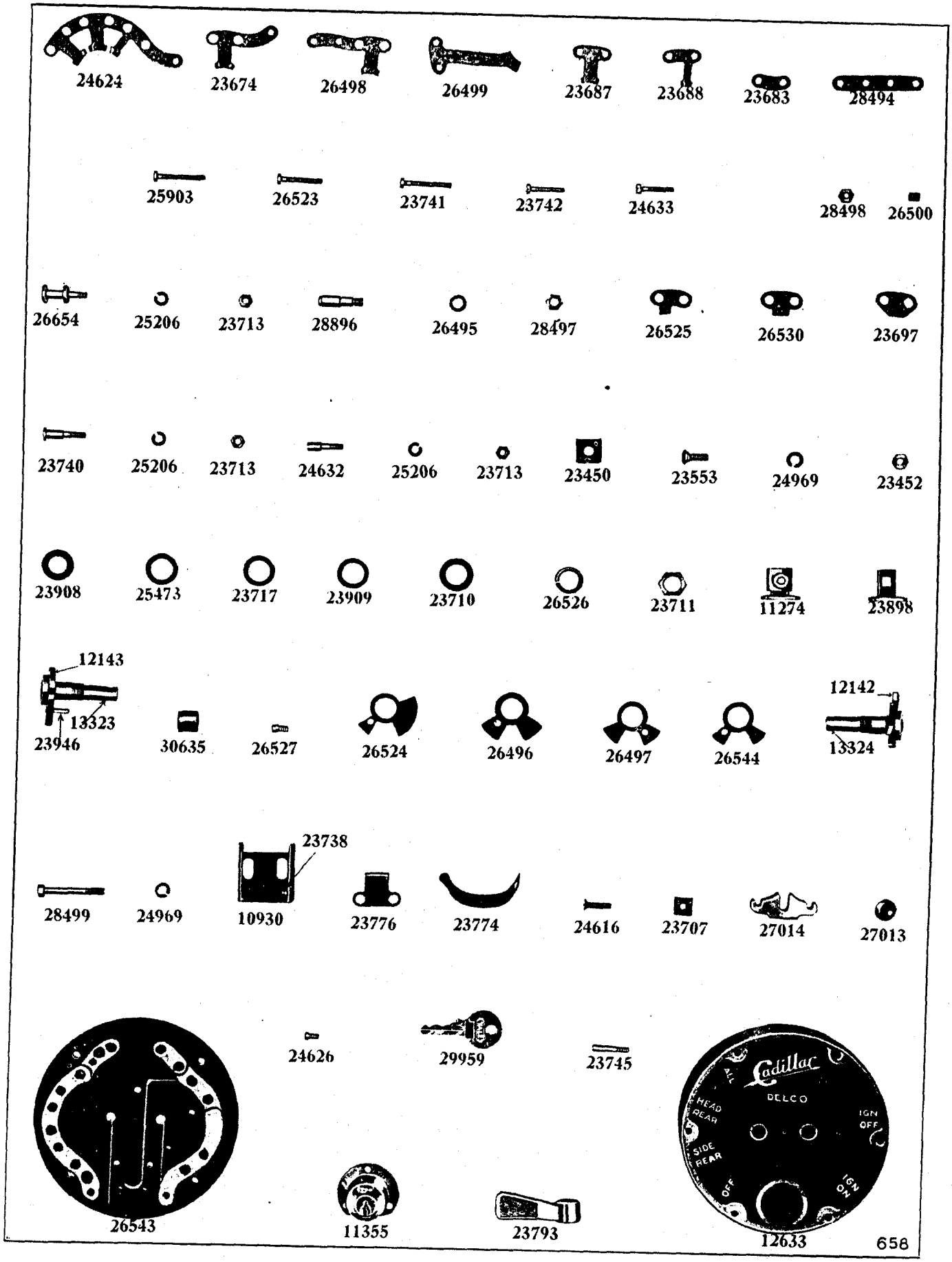


No. 1069 COMBINATION SWITCH (Continued)

Piece Number	NAME OF PART	Quantity Required
26496	Insulator between Blades 26497 and 26524	1
23710	Insulating Washer for Blades 26497 and 26524	2
23717	Plain Washer for Stop Wheel Assembly 12143 (Thick)	2
25473	Plain Washer for Stop Wheel Assembly 12143 (Thin)	1
23908	Plain Washer for Blade 26524 (Thick)	1
23711	Nut for clamping Blade Assembly 13290	1
26526	Lock Washer for Nut 23711	1
23909	Plain Washer for Nut 23711	1
13291	**Blade Assembly Complete (For Lighting)** (Includes the next 13 Items)	1
13324	**Stud Assembly** (Includes the next Item)	1
23747	Pin for Stud Assembly 13324 (Not shown in Illustration)	1
12142	**Stop Wheel Assembly** (Includes the next Item)	1
23946	Stud for Stop Wheel Assembly 12142 (Not shown in Illustration)	1
26527	Insulating Bushing for Stop Wheel Assembly 12142	1
30635	Insulating Bushing for Stud Assembly 13324	1
26544	Blade for Blade Assembly 13291	1
23717	Plain Washer for Stop Wheel Assembly 12142 (Thick)	2
25473	Plain Washer for Stop Wheel Assembly 12142 (Thin)	1
23710	Insulating Washer for Blade 26544	2
23908	Plain Washer for Blade 26544 (Thick)	1
23909	Plain Washer for Nut 23711	1
26526	Lock Washer for Nut 23711	1
23711	Nut for clamping Blade Assembly 13291	1
31009	Plain Washer for Blade Assemblies 13290 and 13291 (Not shown in Illustration)	2
23375	Terminal Clip for connecting Switch (Large) (Not shown in Illustration)	2
23374	Terminal Clip for connecting Switch (Small) (Not shown in Illustration)	6

No. 1069 COMBINATION SWITCH

Piece Number	NAME OF PART	Quantity Required
1069	**COMBINATION SWITCH COMPLETE**	1
12633	**Housing Assembly** (Includes next 2 Items)	1
27586	Escutcheon Plate for Switch	6
27229	Rivet for retaining Plate 27586	1
11355	**Lock Assembly Complete** (Includes the next Item)	2
29959	Key for Lock Assembly 11355 (Give Series No. of Lock)	1
10930	**Tumbler Assembly for locking Switch** (Includes the next Item)	1
23738	Stud for Tumbler Assembly 10930	1
26543	Mounting Plate for Terminal Post	8
23898	Terminal Plate	8
23553	Screw for retaining Clip 23450	8
23452	Nut for Screw 23553	8
20393	Lock Washer for Nut 23452	8
23450	Clip for retaining Terminal Clip	2
27013	Roller for Blade Assemblies 13290 and 13291	1
27014	Roller Bracket for Roller 27013	1
23674	Brush for Terminal No. 5 (Lower)	4
23687	Brush for Terminals No. 2, 3, 5 and 6 Upper)	1
23688	Brush for Terminal No. 1 (Upper)	1
26499	Brush for connecting Terminal No. 8 and Blade Assembly 13290	1
24624	Brush for Terminals Nos. 1, 2 and 3 (Lower)	1
26498	Brush for Terminals Nos. 7 and 6 (Lower)	1
26654	Stud for retaining Roller Bracket 27014	5
23713	Nut for Stud 26654 and Screws 23740 and 24632	5
25206	Lock Washer for Nut 23713	2
23740	Screw for retaining Tumbler Assembly 10930	2
24632	Stop Screw for Blade Assemblies 13290 and 13291	1
23776	Spring for Tumbler Assembly 10930	2
28896	Stud for retaining Blade Assemblies 13290 and 13291	2
23712	Nut for retaining Stud 28896	2
20495	Lock Washer for Nut 23712	4
23735	Screw for retaining Housing Assembly 12633	4
20393	Lock Washer for Screw 23735	2
26523	Screw for retaining Terminal No. 7	10
25903	Screw for retaining Terminals Nos. 1, 2, 3, 5 and 6	2
23793	Lever for operating Blade Assemblies 13290 and 13291	2
23745	Screw for retaining Lever 23793	2
24633	Screw for retaining Terminal No. 8	1
24616	Screw for retaining Spring 23774	2
23774	Spring for Roller Bracket 27014	2
23668	Nut for retaining Terminal Plate 23691	1
23691	Terminal Plate under Terminal No. 4	1
23683	Plate for retaining Screw 23741	1
23741	Screw for retaining Terminal No. 4	2
23742	Screw for retaining Brushes 23674 and 24624 (Short Screws)	1
23707	Nut for Screw 24616	3
24626	Screw for retaining Lock Assembly 11355	10
26500	Insulating Bushing for Screw 25903	1
23697	Insulating Plate for Terminal No. 6 (Lower)	12
26530	Insulating Plate for Terminals No. 2, 3 and 5	3
26525	Insulating Plate for Terminal No. 1	1
23696	Insulating Plate for Terminal No. 6	1
13290	**Blade Assembly Complete (For Ignition)**	1
13323	**Stud Assembly** (Includes the next Item)	1
23747	Pin for Stud Assembly 13323 (Not shown in Illustration)	1
12143	**Stop Wheel Assembly** (Includes the next Item)	1
23946	Stud for Stop Wheel Assembly 12143	1
26527	Insulating Bushing for Stop Wheel Assembly 12143	1
30635	Insulating Bushing for Stud Assembly 13323	1
26497	Blade for Blade Assembly 13290 (Lower)	1
26524	Blade for Blade Assembly 13290 (Upper)	1



No. 1069 COMBINATION SWITCH

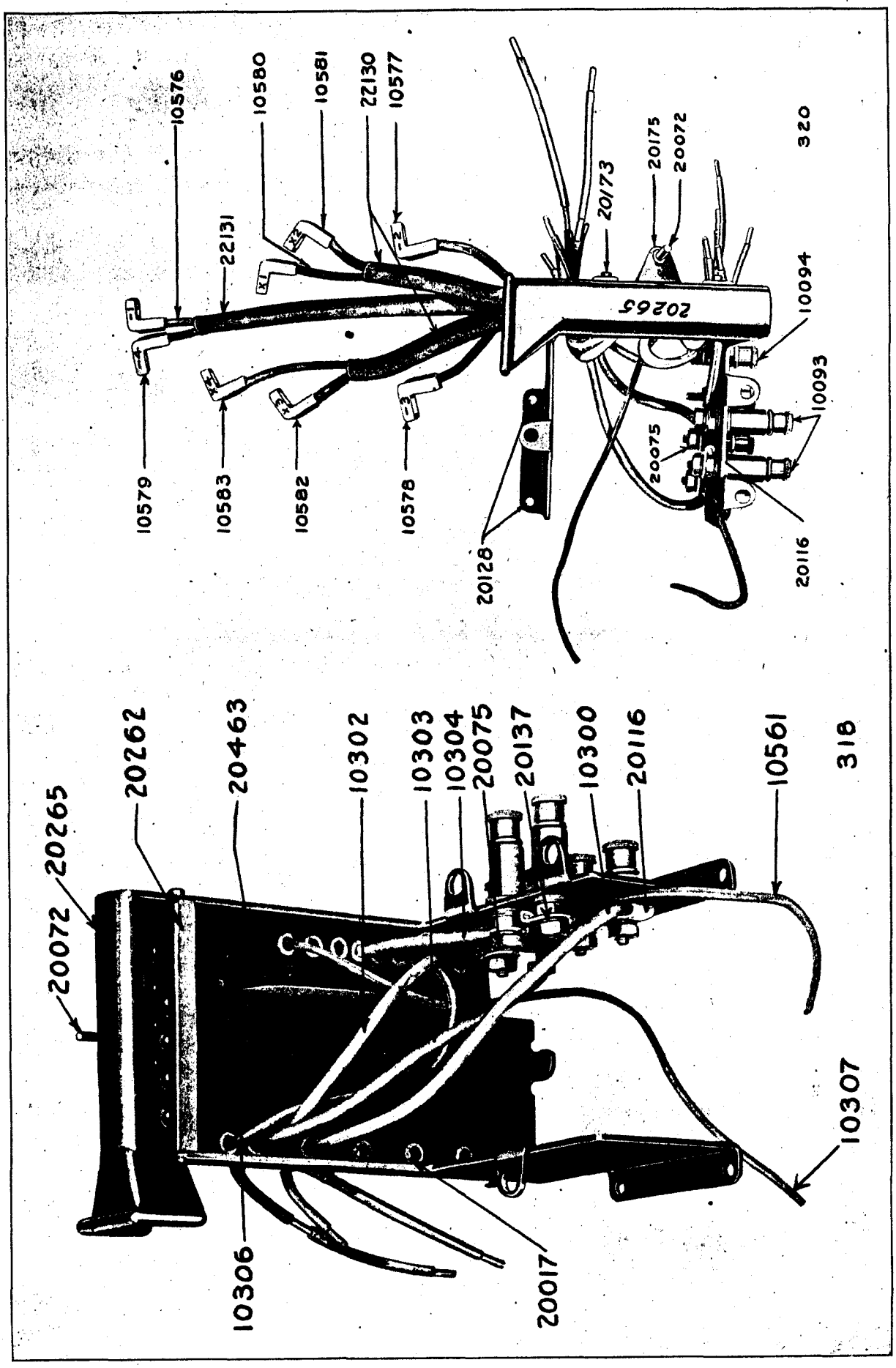
No. 1062 COMBINATION SWITCH (Continued)

Piece Number	NAME OF PART	Quantity Required
23908	Plain Washer for Blade 26524 (Thick)	1
23711	Nut for Clamping Blade Assembly 13290	1
26526	Lock Washer for Nut 23711	1
23909	Plain Washer for Nut 23711	1
25473	Plain Washer for Blade 26524 (Thin)	1
13291	**Blade Assembly Complete (For Lighting)**	1
	(Includes the next 13 Items)	1
13324	**Stud Assembly**	
	(Includes the next Item)	1
23747	Pin for Stud Assembly 13324 (Not shown in Illustration)	1
12142	**Stop Wheel Assembly**	1
	(Includes the next Item)	1
23946	Stud for Stop Wheel Assembly 12142 (Not shown in Illustration)	1
26527	Insulating Bushing for Stop Wheel Assembly 12142	1
30635	Insulating Bushing for Stud Assembly 13324	1
26544	Blade for Blade Assembly 13291	1
23717	Plain Washer for Stop Wheel Assembly 12142 (Thick)	2
25473	Plain Washer for Stop Wheel Assembly 12142 (Thin)	1
23710	Insulating Washer for Blade 26544	2
23908	Plain Washer for Blade 26544 (Thick)	1
23909	Plain Washer for Nut 23711	1
26526	Lock Washer for Nut 23711	1
23711	Nut for clamping Blade Assembly 13291	1
23375	Terminal Clip for connecting Switch (Large) (Not shown in Illustration)	2
23374	Terminal Clip for connecting Switch (Small) (Not shown in Illustration)	6

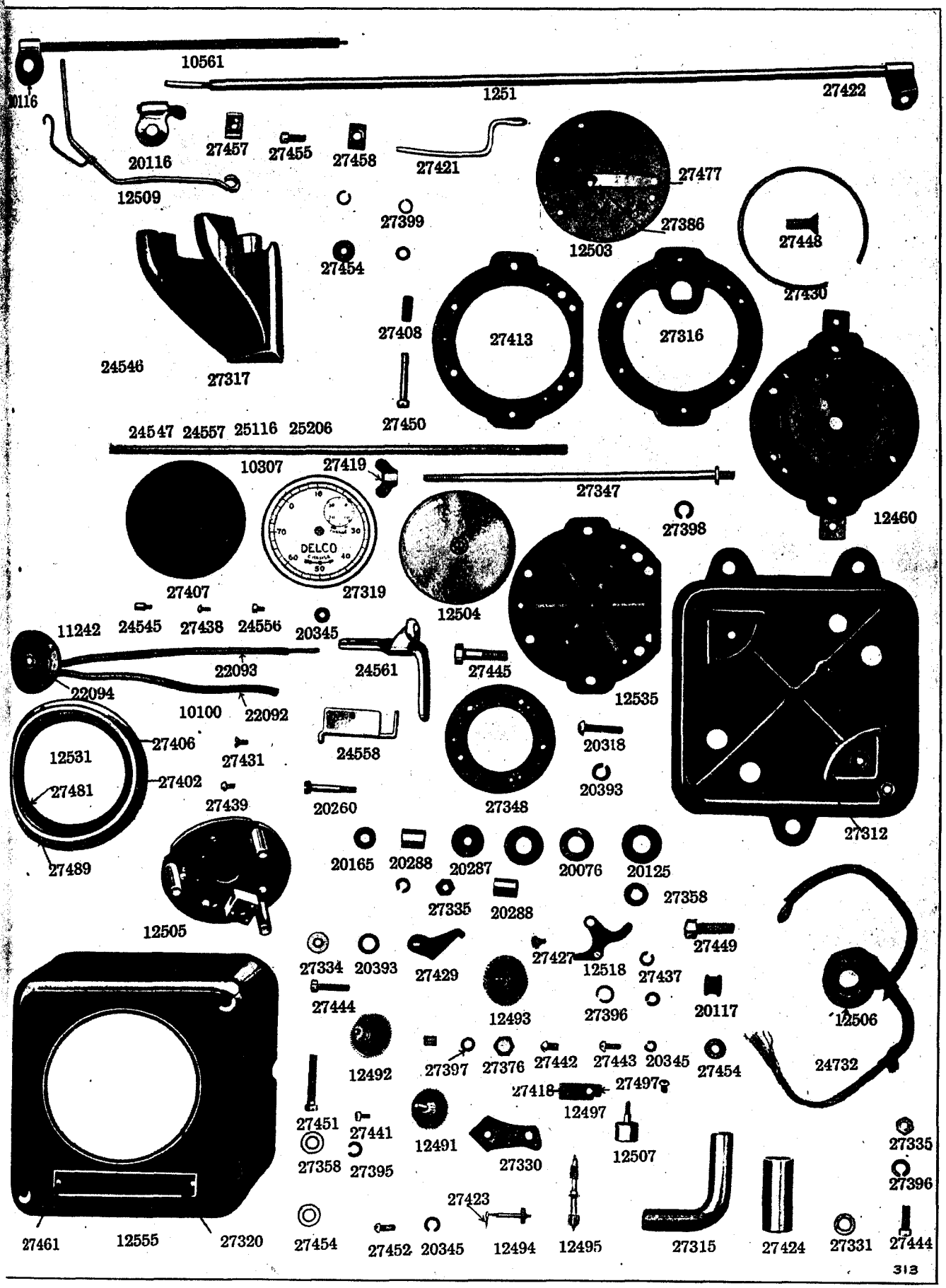
No. 1062 COMBINATION SWITCH

Note: No. 1062 Combination Switch superseded by No. 1069 Combination Switch. When ordering a complete new unit, order No. 1069.

Piece Number	NAME OF PART	Quantity Required
1062	**COMBINATION SWITCH COMPLETE**	1
14631	**Housing Assembly**	1
11355	**Lock Assembly Complete** (Includes the next Item)	1
29959	Key for Lock Assembly 11355 (Give Series No. of Lock)	2
10930	**Tumbler Assembly for Locking Blade Assemblies 13290 and 13291** (Includes the next Item)	1
23738	Stud for Tumbler Assembly 10930 (Not shown in Illustration)	1
26543	Mounting Plate for Terminal Post 23898	1
23898	Terminal Post	8
23553	Screw for retaining Clip 23450	8
23452	Nut for Screw 23553	8
20393	Lock Washer for Nut 23452	8
23450	Clip for retaining Terminal Clip	8
27013	Roller for Blade Assemblies 13290 and 13291	2
27014	Roller Bracket for Roller 27013	1
23674	Brush for Terminal No. 5 (Lower)	1
23687	Brush for Terminals Nos. 2, 3, 5 and 6 (Lower)	4
23688	Brush for Terminal No. 1 (Upper)	1
26499	Brush for connecting Terminal No. 8 and Blade Assembly 13290)	1
24624	Brush for Terminals Nos. 1, 2 and 3 (Lower)	1
26498	Brush for Terminals Nos. 7 and 6 (Lower)	1
26654	Stud for retaining Roller Bracket 27014	1
23713	Nut for Stud 26654 and Screws 23740 and 24632	5
25206	Lock Washer for Nut 23713	5
23740	Screw for retaining Tumbler Assembly 10930	2
24632	Stop Screw for Blade Assemblies 13290 and 13291	2
23776	Spring for Tumbler Assembly 10930	1
28896	Stud for retaining Blade Assemblies 13290 and 13291	2
23712	Nut for retaining Stud 28896	2
20495	Lock Washer for Nut 23712	2
23735	Screw for retaining Housing Assembly 12144	4
20393	Lock Washer for Screw 23735	4
26523	Screw for retaining Terminal No. 7	2
25903	Screw for retaining Terminals Nos. 1, 2, 3, 5 and 6	10
23793	Lever for operating Blade Assemblies 13290 and 13291	2
23745	Screw for retaining Lever 23793	2
24633	Screw for retaining Terminal No. 8 (Not shown in Illustration)	2
24616	Screw for retaining Spring 23774	1
23774	Spring for Roller Bracket 27014	2
23668	Nut for retaining Terminal Plate 23691 (Not shown in Illustration)	2
23691	Terminal Plate under Terminal No. 4	1
23683	Plate for retaining Screw 23741	1
23741	Screw for retaining Terminal No. 4	2
23742	Screw for retaining Brushes 23674 and 24624 (Short Screw)	2
23707	Nut for Screw 24616	1
24626	Screw for retaining Lock Assembly 11355	3
26500	Insulating Bushing for Screw 25903	10
23697	Insulating Plate for Terminal No. 6 (Lower)	1
26530	Insulating Plate for Terminals Nos. 2, 3 and 5	12
23698	Insulating Plate for Terminal No. 1 (Not shown in Illustration)	3
23696	Insulating Plate for Terminal No. 6 (Not shown in Illustration)	1
13290	**Blade Assembly Complete (For Ignition)** (Includes the next 15 Items)	1
13323	**Stud Assembly** (Includes the next Item)	1
23747	Pin for Stud Assembly 13323 (Not shown in Illustration)	1
12143	**Stop Wheel Assembly** (Includes the next Item)	1
23946	Stud for Stop Wheel Assembly 12143 (Not shown in Illustration)	1
26527	Insulating Bushing for Stop Wheel Assembly 12143	1
30635	Insulating Bushing for Stud Assembly 13323	1
26497	Blade for Blade Assembly 13290 (Lower)	1
26524	Blade for Blade Assembly 13290 (Upper)	1
26496	Insulator between Blades 26497 and 26524	2
23710	Insulating Washer for Blades 26497 and 26524	1
23717	Plain Washer for Stop Wheel Assembly 12143 (Thick)	2
25473	Plain Washer for Stop Wheel Assembly 12143 (Thin)	1



No. 5401 BATTERY BOX



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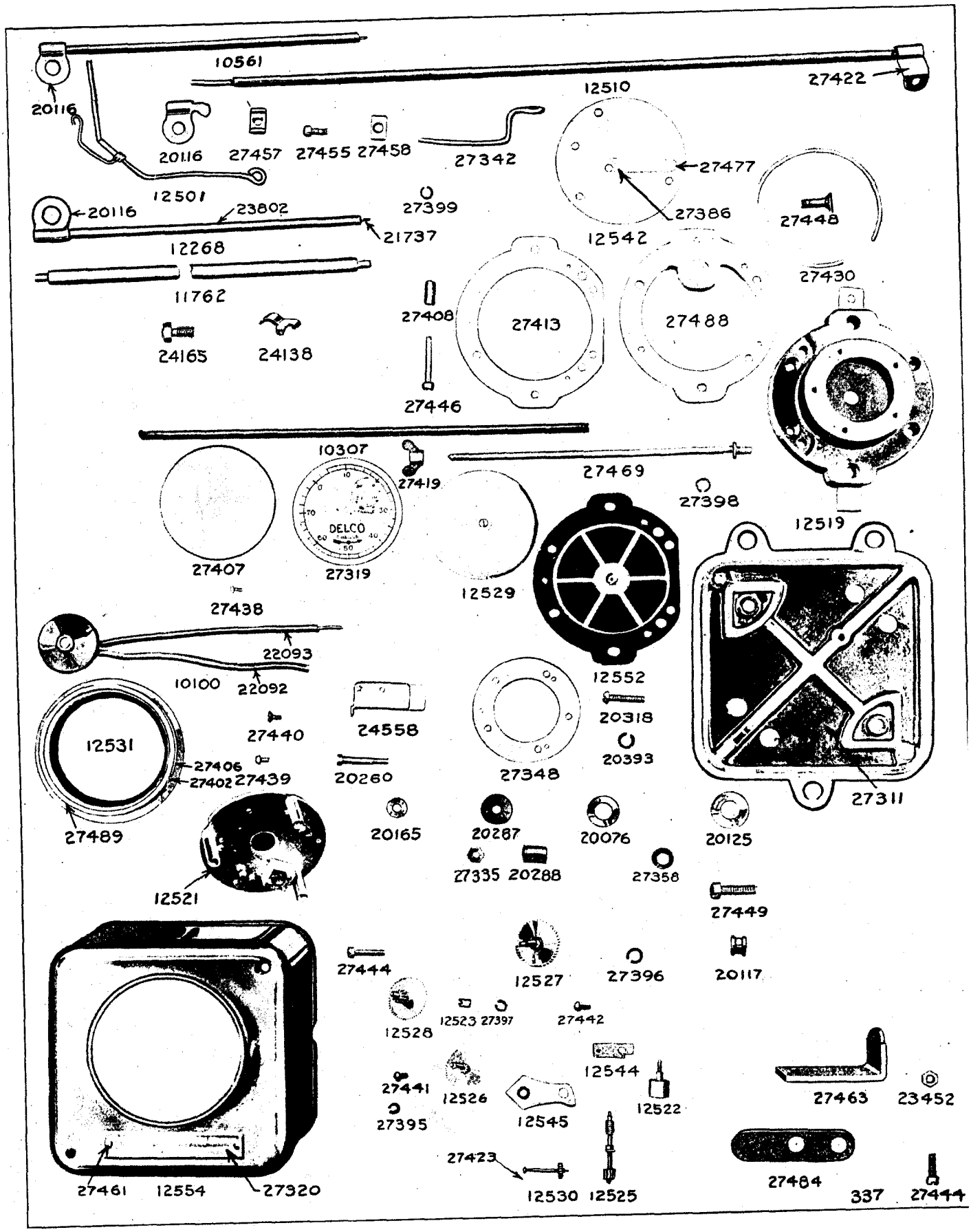

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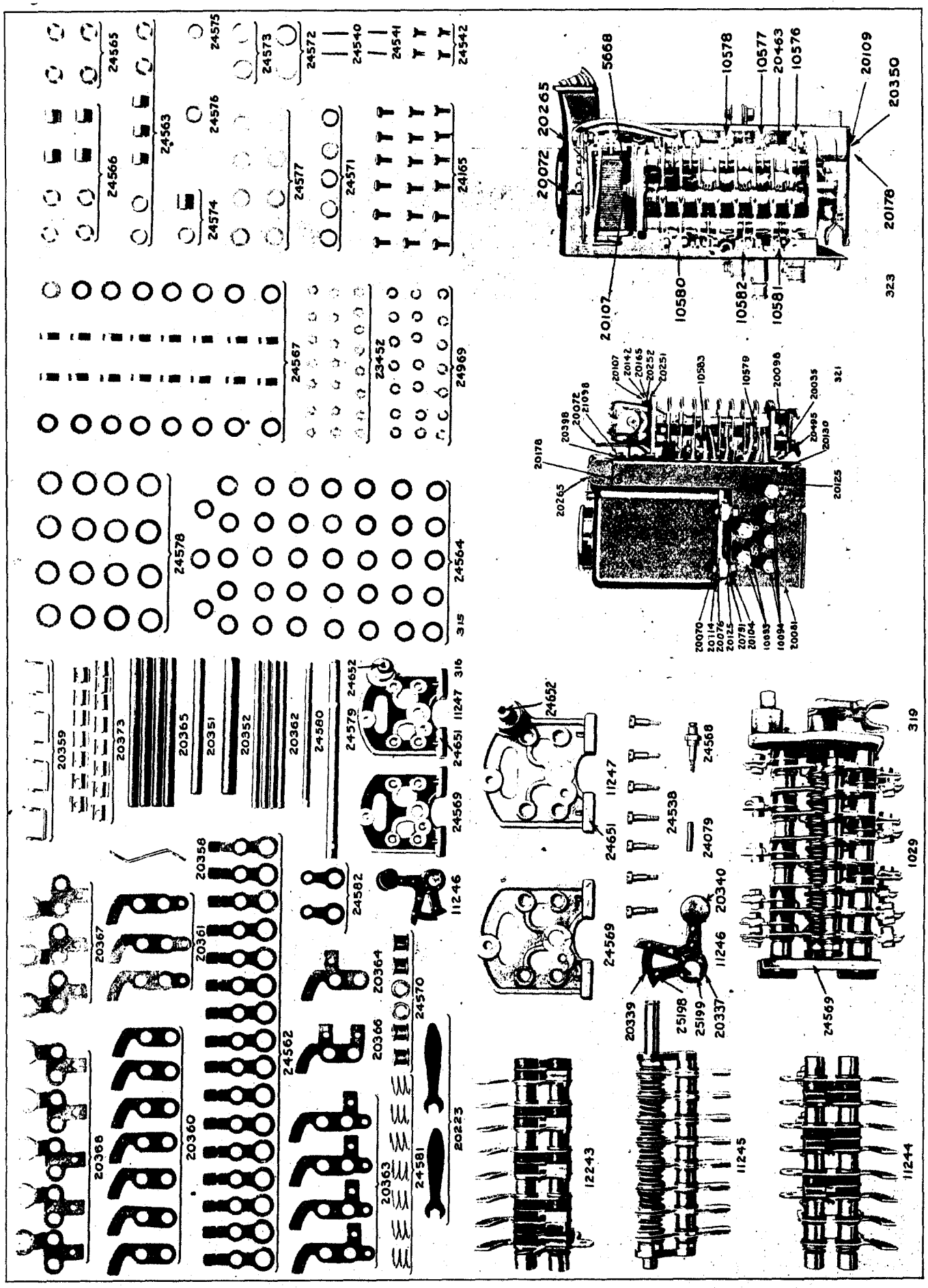

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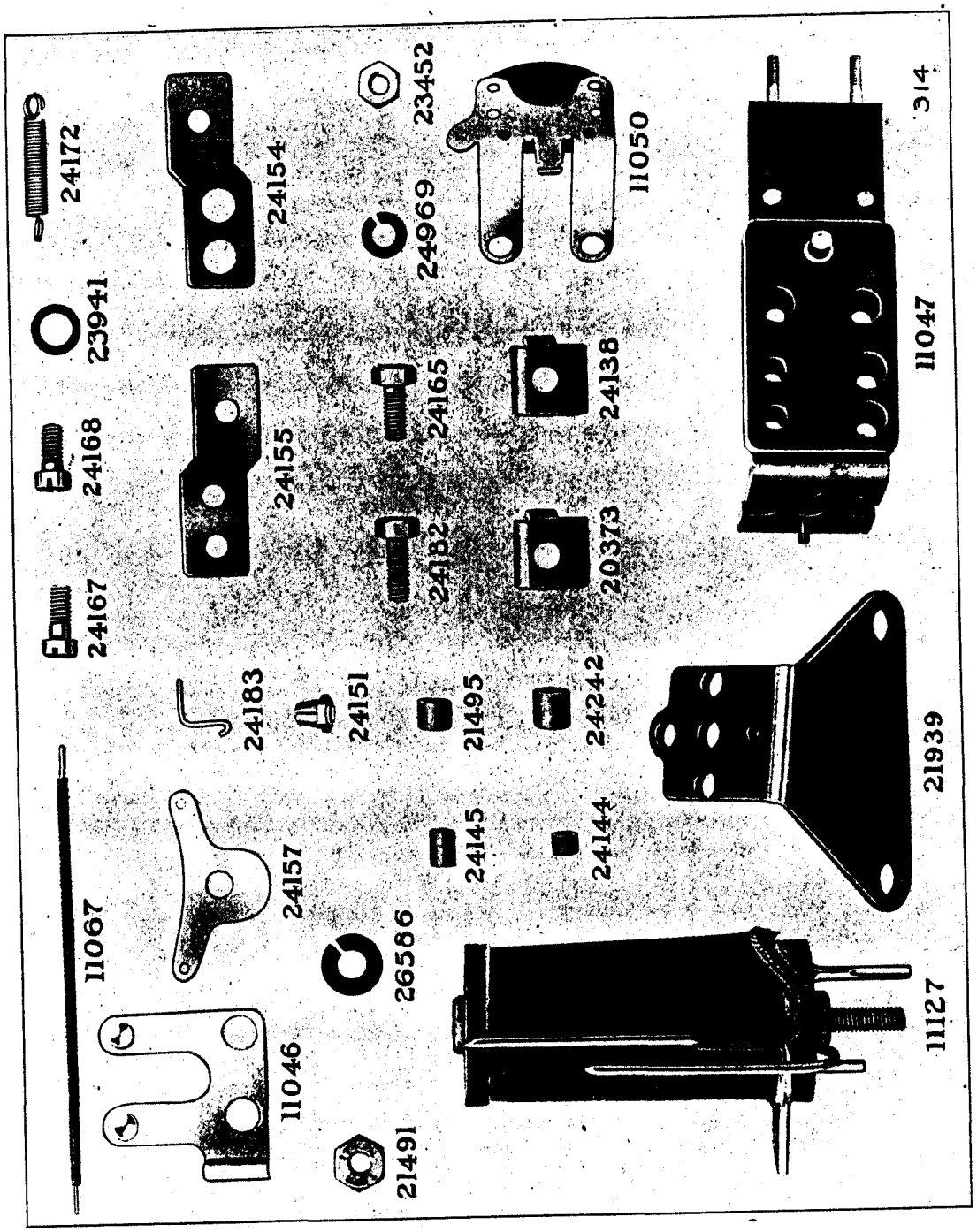


No. 5401 BATTERY BOX

No. 5401 BATTERY BOX

Piece Number	NAME OF PART	Quantity Required
5401	**BATTERY BOX COMPLETE**	1
10099	**Controller Bracket Assembly Complete for Battery Box Base Assembly 10533** (Includes the next 305 Items)	1
10091	**Controller Bracket Assembly (Not shown in Illustration)** (Includes the next 4 Items)	1
10090	**Controller Cover Clamp Stud Assembly Complete (Not shown in Illustration)** (Includes the next Item)	1
20072	Stud for Controller Cover Clamp Stud Assembly 10090	1
20197	Rivet for Bracket (Not shown in Illustration)	3
20130	Guide Stud for Cover Assembly 10108	2
20262	Conduit for retaining Battery Leads (Fiber Block)	1
20178	Screw for Conduit 20262	2
20265	Condulet for covering Battery Leads (Metal)	1
21098	Screw for Condulet 20265	2
20393	Lock Washer for Screw 21098	2
10094	**Spring Terminal for Bracket 20082 (Short)**	6
10095	**Controller Lead Assembly Complete for connecting Controller Switch** (Includes the next 14 Items)	1
10300	**Lead Assembly from Terminal No. 1 on Controller Bracket to the Fourth Terminal from the Bottom, on the Right Side of Controller Switch** (Includes the next 2 Items)	1
20116	Clip for Lead Assembly 10300	1
21737	Ferrule for Lead Assembly 10300 (Not shown in Illustration)	1
10561	**Lead Assembly from Terminal No. 2 on Controller Bracket to B. on Meter Contact Assembly 10766** (Includes the next Item)	1
20116	Clip for Lead Assembly 10561	1
10302	**Lead Assembly from Terminal No. 4 on Controller Bracket to Third Terminal from the Top on the Right Side of Controller Switch** (Includes the next 2 Items)	1
21737	Ferrule for Lead Assembly 10302 (Not shown in Illustration)	1
20116	Clip for Lead Assembly 10302	1
10303	**Lead Assembly from Terminal No. 5 on Controller Bracket to the Second Terminal from the Top on Right Side of Controller Switch** (Includes the next 2 Items)	1
20116	Clip for Lead Assembly 10303	1
21737	Ferrule for Lead Assembly 10303 (Not shown in Illustration)	1
10304	**Lead Assembly from Terminal No. 6 on Controller Bracket to the First Terminal from the Bottom on Left Side of Controller Switch** (Includes the next 2 Items)	1
20116	Clip for Lead Assembly 10304	1
21737	Ferrule for Lead Assembly 10304 (Not shown in Illustration)	1
20115	Insulating Bushing for Spring Terminal Assembly 10094 (Not shown in Illustration)	6
20125	Insulating Washer for Spring Terminal Assembly 10094 (Not shown in Illustration)	6
20076	Insulating Washer for Spring Terminal Assembly 10094 (Not shown in Illustration)	6
20137	Lock Washer for Nut 20075	6
20114	Plain Washer for Nut 20075 (Not shown in Illustration)	6
20075	Nut for Spring Terminal Assembly 10094	12
20117	Insulating Bushing for Bracket 20082	16
20272	Wire (Relay Controller Lead Wire) (Not shown in Illustration)	1
10096	**Battery Lead Assembly Complete (Not shown in Illustration)** (Includes the next 10 Items)	1
10580	**Lead Assembly from Positive Terminal on Battery to the Second Terminal from the Top on the Left Side of Controller Switch** (Includes the next Item)	1
22237	Ferrule for Lead Assembly 10580 (Not shown in Illustration)	1
10581	**Lead Assembly from Positive No. 2 Terminal on Battery to the Second Terminal from the Bottom on the Left Side of Controller Switch** (Includes the next Item)	1
22237	Ferrule for Lead Assembly 10581 (Not shown in Illustration)	1
10582	**Lead Assembly from Positive No. 3 Terminal on Battery to the Fourth Terminal from the Bottom on the Left Side of Controller Switch** (Includes the next Item)	1
22237	Ferrule for Lead Assembly 10582 (Not shown in Illustration)	1
10583	**Lead Assembly from Positive No. 4 on Battery to the Third Terminal from the Top on the Left Side of Controller Switch** (Includes the next Item)	1
22237	Ferrule for Lead Assembly 10583 (Not shown in Illustration)	1
10576	**Lead Assembly from Negative No. 1 on Battery, to the First Terminal from the Bottom, on Right Side of Switch** (Includes the next Item)	1
22237	Ferrule for Lead Assembly 10576 (Not shown in Illustration)	1

No. 5401 BATTERY BOX (Continued)

Piece Number	NAME OF PART	Quantity Required
10577	**Lead Assembly from Negative No. 2 on Battery to the Second Terminal from the Bottom on the Right Side of Controller Switch** (Includes the next 2 Items)	1
22237	Ferrule for Lead Assembly 10577 (Not shown in Illustration)	1
10578	**Lead Assembly from Negative No. 3 on Battery to the Third Terminal from the Bottom on the Right Side of Controller Switch** (Includes the next Item)	1
22237	Ferrule for Lead Assembly 10578 (Not shown in Illustration)	1
10579	**Lead Assembly from Negative No. 4 on Battery to the First Terminal from the Bottom on the Right Side of Controller Switch** (Includes the next Item)	1
22237	Ferrule for Lead Assembly 10579 (Not shown in Illustration)	1
22130	Tube for Lead Assemblies 10582, 10583, 10580 and 10581	2
22131	Tube for Lead Assemblies 10576 and 10579	1
13476	**Ampere Hour Meter Assembly Complete** (Includes the next 120 Items) (13476 Ampere Hour Meter Assembly has a single set of Magnets. 10101 Amper Hour Meter Assembly has two sets of Magnets. When ordering repair parts, order for the correct Meter. The two Amper Hour Meters as a whole are interchangeable. When ordering a complete new Ampere Hour Meter always order 10101. The above Ampere Hour Meter must be returned to Delco when any extensive repairs are required or when it is necessary to disassemble the unit to make internal repairs or adjustments. Delco will furnish parts for minor repairs that can be easily taken care of in the field.	1
10100	**Resistance Button Assembly Complete** (Includes the next 2 Items)	1
22092	Lead for Simplex Resistance Button 22094 (Short)	1
22093	Lead for Simplex Resistance Button 22094 (Long)	1
20125	Insulating Washer for Resistance Button Assembly 10100 and Meter Base 28311 (Large)	4
20287	Insulating Washer for Resistance Button Assembly 10100 (Small)	1
20318	Screw for retaining Resistance Button Assembly 10100	1
20165	Plain Washer for Screw 20318	1
20288	Insulating Bushing for Meter Base 27311	3
20076	Insulating Washer for Meter Base 27311 (Small)	3
10766	**Contact Assembly** (Includes the next 2 Items)	1
24556	Screw for attaching Guard 24558	2
24558	Guard for Contact Assembly 10766	1
20260	Screw for retaining Contact Assembly 10766	2
20393	Lock Washer for Screw 20260 and Nut 23452	4
20117	Insulating Bushing for Meter Base 27311	4
11762	**Lead Assembly from Terminal No. 2 on Meter, attached to Lead Assembly 10579 at Terminal on Controller Switch**	1
21737	Ferrule for Lead Assembly 11762	1
12268	**Lead Assembly from Terminal No. 3 on Controller Bracket to Terminal No. 1 on Meter** (Includes the next 2 Items)	1
20116	Clip for Lead Assembly 12268	1
21737	Ferrule for Lead Assembly 12268	1
10307	**Lead Assembly from (C) on Meter Contact to the First Terminal from Top on Left Side of Controller Switch** (Includes the next Item)	1
21737	Ferrule for Lead Assembly 10307	1
10561	**Lead Assembly from Terminal No. 2 on Controller Bracket to (B) on Meter Contact** (Includes the next Item)	1
20116	Clip for Lead Assembly 10561	1
24165	Screw for Meter Terminals	2
23452	Nut for Screw 24165	2
24138	Clip for Meter Terminals	2
12554	**Case Assembly Complete** (Includes the next 2 Items)	1
27320	Name Plate for Case 27313	1
27461	Pin for retaining Name Plate 27320	2
12520	**Large Hand Assembly**	1
12542	**Train Plate Assembly** (Includes the next 2 Items)	1
27386	Spring for Train Plate Assembly 12542	1
27477	Rivet for Spring 27386	1
12530	**Fifth Staff Assembly**	1
12528	**Fourth Staff Assembly**	1
12527	**Third Staff Assembly**	1
12526	**Second Staff Assembly**	1
12525	**Worm Staff Assembly**	1
12544	**Bracket Assembly for Worm Staff Assembly 12525** (Includes the next Item)	1
27466	Pin for Bracket Assembly 12544 (Not shown in Illustration)	1

No. 5401 BATTERY BOX (Continued)

Piece Number	NAME OF PART	Quantity Required
12521	**Hopper Plate Assembly** (Includes the next 6 Items)	1
12545	**Bridge Assembly**	1
27441	Screw for attaching Bridge Assembly 12545	1
27395	Lock Washer for Screw 27441	1
27475	Support for Worm Staff Assembly 12525 (Not shown in Illustration)	1
27484	Bracket for Worm Staff Assembly 12525	1
27479	Rivet for retaining Bracket 27484 (Not shown in Illustration)	2
12523	**Bearing Assembly (Upper)**	1
12519	**Armature Box Assembly**	1
12522	**Worm Spindle Assembly**	1
12529	**Armature Assembly**	1
12552	**Pole Plate Assembly**	1
12531	**Bezel Ring Assembly Complete** (Includes the next 7 Items)	1
12551	**Bezel Ring Assembly (Not shown in Illustration)** (Includes the next 2 Items)	1
27489	Ring for Bezel Ring Assembly 12551	1
27402	Dowel Pin for Ring 27489	2
27406	Snap Ring for Bezel Ring Assembly 12531	1
27407	Glass for Bezel Ring Assembly 12531	1
27430	Bezel Ring for Bezel Ring Assembly 12531	1
27481	Gasket for Glass 27407 (Not shown in Illustration)	1
27311	Base for Ampere Hour Meter Assembly 6077	1
27319	Dial for Ampere Hour Meter Assembly 6077	1
28471	Nut for Screw 27446	2
27348	Washer for Hopper Plate Assembly 12521 (Small Gasket)	1
27358	Plain Washer for Screw 27446	2
13839	**Magnet Assembly** (Includes the next Item)	1
27448	Screw for Magnet Assembly 13839	4
27376	Nut for Bearing Assembly 12523	1
26088	Spacing Washer for damping Pole (Not shown in Illustration)	4
27395	Lock Washer for Screws 27439, 27441, 27442 and 27465	10
27396	Lock Washer for Screws 27446 and 27444	8
27397	Lock Washer for Nut 27376	1
27398	Lock Washer for Stud 27469	2
27399	Lock Washer for Screws 27449 and 27446	5
27408	Insulator for Screw 27446	2
27413	Washer for Armature Box Assembly 12519 (Large Gasket)	1
27419	Nut for Stud 27469 (Wing Nut)	2
20117	Insulating Bushing for Meter Base 27311	4
27423	Small Hand for Third Staff Assembly 12527	1
27438	Screw for mounting Dial 27319	3
27439	Screw for Bracket 27464 (Small)	1
27440	Screw for mounting Train Plate Assembly 12542 (Flat Head)	1
27442	Screw for mounting Hopper Plate Assembly 12521	1
27444	Screw for Meter Terminals and for retaining Clamp Ring 27488	6
27446	Screw for mounting Armature Box Assembly 12519	2
27449	Screw for retaining Meter Base 27311 (Includes the next 3 Items)	2
14189	**Clamp Assembly (Not shown in Illustration)**	1
27455	Screw for connecting Friction Slider 27457 and Friction Clamp 27458	1
27457	Friction Slider for connecting Right Hand Shunt Lead Assembly 12501 and Left Hand Shunt Lead 27342	1
27458	Friction Clamp for connecting Right Hand Shunt Lead Assembly 12501 and Left Hand Shunt Lead 27342	1
27459	Insulating Tube for Case Stud 27469 (Not shown in Illustration)	2
27463	Ear Clip for Metal Terminals	2
27464	Bracket for Armature Box Assembly 12519 (Not shown in Illustration)	1
27465	Screw for Train Plate Assembly 12542 (Head Milled Down) (Not shown in Illustration)	2
27469	Case Stud for mounting Case Assembly 12554	2
27482	Gasket on Meter Base 27311 for Case Assembly 12554 (Not shown in Illustration)	1
27488	Clamp Ring under Pole Plate Assembly 12552	1
12501	**Right Hand Shunt Lead Assembly**	1
27342	Left Hand Shunt Lead, connecting Meter Terminal and Right Hand Shunt Lead Assembly 12501	1
10101	**Ampere Hour Meter Assembly Complete** (Includes the next 134 Items)	1

(No. 13476 Ampere Hour Meter Assembly has a single set of Magnets, the No. 10101 Ampere Hour Meter Assembly has two sets of Magnets. When ordering repair parts, order for the correct Meter. The two Ampere Hour Meters are interchangeable as a whole. When ordering a complete new Ampere Hour Meter, always order No. 10101. The above Ampere Hour Meter must be returned to Delco when any extensive repairs are required or when it is necessary to disassemble the unit to make internal repairs or adjustment. Delco will furnish parts for minor repairs that can be easily taken care of in the field.

No. 5401 BATTERY BOX (Continued)

Piece Number	NAME OF PART	Quantity Required
20117	Insulating Bushing for Meter Base 23712	4
10100	**Resistance Button Assembly** (Includes the next 2 Items)	1
22092	Lead (Short) for Resistance Button	1
22093	Lead for Simplex Resistance Button (Long)	1
20125	Insulating Washer for Resistance Button Assembly 10100 (Large)	1
20287	Insulating Washer for Resistance Button Assembly 10100 (Small)	1
20165	Plain Washer for Resistance Button 10100	1
20318	Screw for mounting Resistance Button Assembly 10100	1
20288	Insulating Bushing for Screw 20070	3
20076	Insulating Washer for Screw 20070 (Large, for Top of Meter Base)	3
20125	Insulating Washer for Screw 20070 (Large, under Top of Meter Base)	3
10766	**Contact Assembly Complete (Not shown in Illustration)** (Includes the next 2 Items)	1
24556	Screw for mounting Guard 24558	2
24558	Guard for Contact Spring Assemblies	1
20260	Screw for retaining Contact Assembly 10766	2
20393	Lock Washer for Screw 20260	2
20345	Lock Washer for Nut 27334 on Meter Dial	1
12555	Case Assembly Complete with Name Plate (Cover for Meter) (Includes the next 2 Items)	1
27320	Name Plate for Case 27495	1
27461	Pin for retaining Name Plate 27320	2
12503	**Train Plate Assembly Complete** (Includes the next 2 Items)	1
27386	Lifting Spring for Train Plate 27393	1
27477	Rivet for Lifting Spring 27386	1
12493	**Center Staff Assembly**	1
12492	**Compound Staff for Driving Center Staff Assembly**	1
12491	**Worm Wheel Staff for Driving Compound Staff 12492**	1
12494	**Counting Staff for Small Indicator Hand 27423**	1
12495	**Worm Staff for Driving Worm Wheel Staff 12491**	1
12497	**Worm Wheel Bracket for Worm Staff Assembly 12495** (Includes the next Item)	1
27418	Pin for Worm Wheel Bracket 12497	1
12505	**Hopper Plate Assembly Complete (Lower Plate for mounting Compound Staff Assembly 12492 and Worm Wheel Staff 12491)** (Includes the next 3 Items)	1
27330	Bridge for Center Staff Assembly 12493	1
27441	Screw for retaining Bridge 27330	1
27395	Lock Washer for Screw 27441	1
12460	**Armature Box Assembly for Meter**	1
12523	**Upper Bearing Assembly (For Coupling Spindle Assembly 12507 (Not shown in Illustration)**	1
12507	**Coupling Spindle Assembly for Driving Worm Staff Assembly 12495**	1
12504	**Armature Assembly for Meter**	1
12535	**Pole Plate Assembly (For retaining Armature Assembly 12504)**	1
12506	**Compensation Coil Assembly Complete for Meter**	1
12509	**Right Hand Lead Assembly for connecting No. 1 and No. 2 Terminals on Meter**	1
27421	Left Hand Lead for connecting Right Hand Lead Assembly 12509 to Terminal No. 2 on Meter	1
14189	**Clamp Assembly (Not shown in Illustration)** (Includes the next 3 Items)	1
27458	Clamp (Outside) for connecting Right Hand Lead Assembly 12509 and Left Hand Lead 27421	1
27457	Slide(Inside) for connecting Right Hand Lead Assembly 12509 and Left Hand Lead 27421	1
27455	Screw for Clamp 27458 and Slide 27457	1
12518	**Contact Lever Assembly Complete for Operating Contact Assembly 10766**	1
12531	**Bezel Ring Assembly Complete** (Includes the next 7 Items)	1
12551	**Bezel Ring Assembly (Not shown in Illustration)** (Includes the next Item)	1
27402	Dowel Pin for Bezel Ring Assembly 12551	2
27406	Snap Ring for Bezel Ring Assembly 12531	1
27407	Glass for Bezel Ring Assembly 12531	1
27430	Spring for Bezel Ring Assembly 12531	1
27481	Gasket for Glass 27407 (Not shown in Illustration)	1
27312	Base for Ampere Hour Meter	1
13840	**Magnet Assembly** (Includes the next Item)	1
27448	Screw for Magnet Assembly 13840	8
26088	Spacing Washer for Damping Pole (Not shown in Illustration)	4
27315	Compensating Pole (Mounted in Compensating Coil Assembly 12506)	1
27316	Clamp Ring (Mounted between Pole Plate Assembly 12535 and Pole Pieces)	1
27319	Dial for Meter	1
27331	Washer between Compensating Pole 27315 and Driving Pole 27318	1
27334	Nut for retaining Hand Lever 27429 on Center Shaft Assembly 12493	1
28471	Hexagon Nut on Screw 27445	2
27347	Case Stud for Meter Case Assembly 12555	2

No. 5401 BATTERY BOX (Continued)

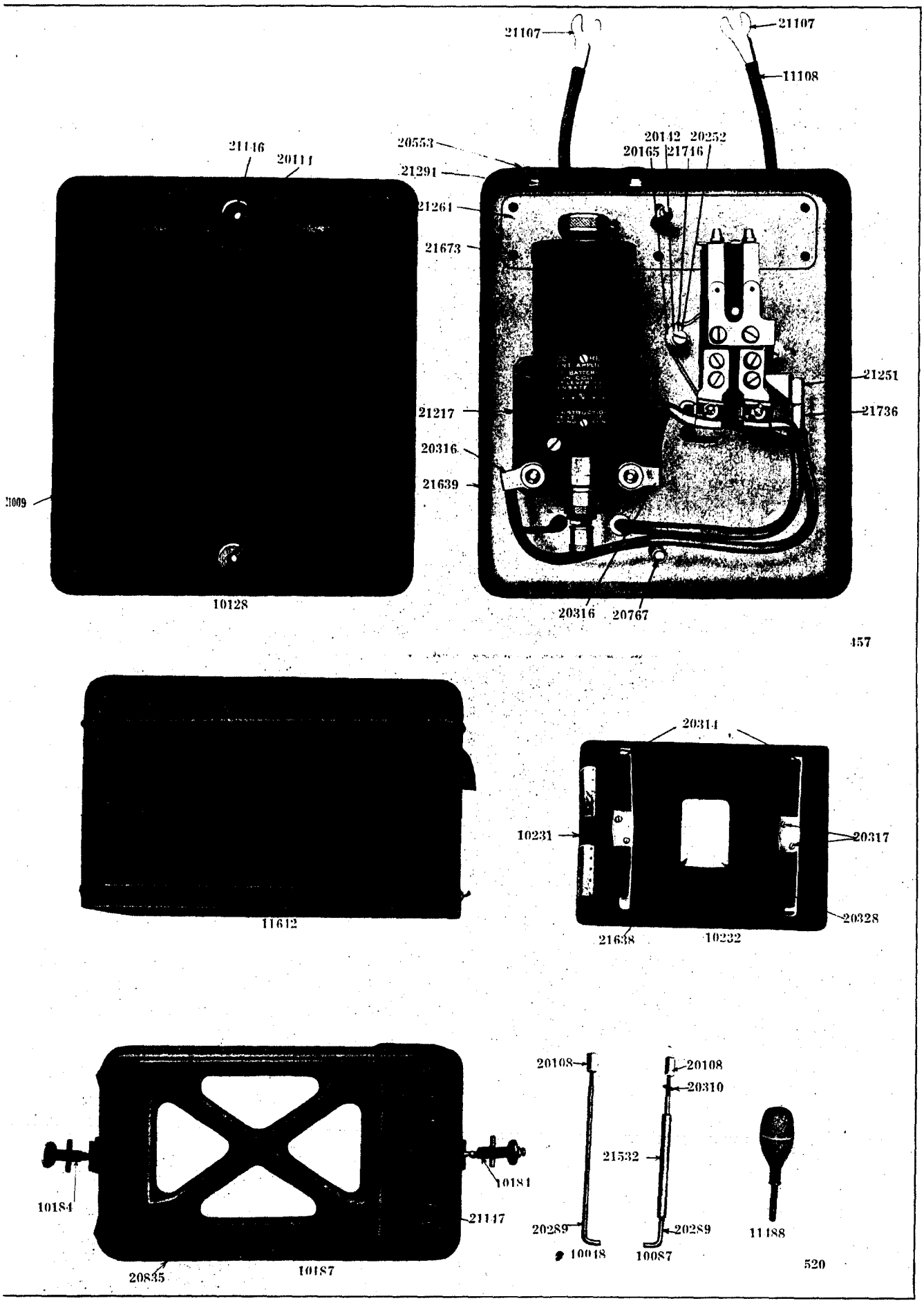
Piece Number	NAME OF PART	Quantity Required
27348	Washer for Hopper Plate Assembly 12505 (Small)	1
27358	Plain Washer for Screws 27444 and 27445	3
27376	Nut for Upper Bearing Assembly 12523	1
27395	Lock Washer for Screws 27452, 27439, 27443 and 27442	8
27396	Lock Washer for Screws 27450, 27444 and 27445, 27451	11
25397	Lock Washer for Nut 27376 (For Upper Bearing)	1
27398	Lock Washer for Case Stud 27347	2
27399	Lock Washer for Screw 27449	2
27431	Screw for mounting Upper Train Plate Assembly 12503 (Taper Head)	1
27408	Insulating Tube for Screw 27450	1
27413	Washer for Armature Box (Large Paper Gasket)	1
27419	Wing Nut for retaining Case Assembly 12555 (Wing Nut)	2
20117	Insulating Bushing for Insulating Leads through Meter Base 27312	4
27423	Small Indicator Hand on Dial 27319	1
27427	Screw for Contact Lever 27429	1
27429	Contact Lever for Operating Contact Assembly 10766	1
20810	Plain Washer under Contact Lever 27429 (Not shown in Illustration)	1
27438	Screw for mounting Dial 27319	3
27439	Screw for Train Plate Assembly 12503 (Round Head)	3
27442	Screw for Hopper Plate Assembly 12505 (Short Round Head)	3
27443	Screw for Hopper Plate Assembly 12505 (Long Round Head)	1
27444	Screw for mounting Armature Box Assembly 12460 and for Meter Terminal No. 1 (Short Fillister Head)	3
27445	Screw for Meter Terminal No. 2	1
27449	Screw for retaining Meter Base 27312	2
27450	Long Screw for Armature Box Assembly 12460 on Driving Pole 27318	1
27451	Screw for mounting Compensating Pole 27315	1
27452	Screw for mounting Hopper Plate Assembly 12505 (Round Head, milled down)	1
27454	Plain Washer for Screws 27450 and 27444	6
27459	Insulating Tube for Case Stud 27347 (Not shown in Illustration)	2
27482	Gasket around Meter Base 27312 for Case Assembly 12555 (Not shown in Illustration)	1
10306	**Lead Assembly from Side Terminal on Cut-Out Relay to the Third Terminal from Bottom on Left Side of Controller Switch** (Incudes the next Item)	1
21737..	Ferrule for Lead Assembly 10306 (Not shown in Illustration)	1
10307	**Lead Assembly from (C) on Meter Contact Assembly 10766 to the First Terminal from the Top on Left Side of Controller Switch** (Includes the next Item)	1
21737	Ferrule for Lead Assembly 10307 (Not shown in Illustration)	1
27432	Lead from Terminal No. 3 on Controller Bracket to Compensating Coil Assembly 12506 (Not shown in Illustration)	1
20116	Clip for Lead 27432 (Not shown in Illustration)	1
12510	**Lead Assembly from Terminal No. 1 on Ampere Hour Meter to the First Terminal from Bottom on Left Side of Controller Switch** (Includes the next Item)	1
27422	Clip for Lead Assembly 12510	1
10561	**Lead Assembly** (Includes the next Item)	1
20116	Clip for Lead Assembly 10561	1
5668	**Cut-Out Relay Assembly Complete** (Includes the next 27 Items)	1
11127	**Coil Assembly for Relay 5668**	1
21939	Bracket for mounting Cut-Out Relay 5668	1
11047	**Bracket for mounting Contact Assembly 11046 and Armature Assembly 11050** (Includes the next 3 Items)	1
24144	Bushing for Frame Assembly 11047 (Not shown in Illustration)	1
24149	Insulator for Frame Assembly 11047 (Not shown in Illustration)	1
24169	Stud for retaining Insulator 24149 (Not shown in Illustration)	1
11050	**Armature Assembly for Cut-Out Relay 5668**	1
11046	**Contact Assembly (Upper)**	1
24151	Nut for Armature Assembly 11050	1
24154	Terminal Plate (Small Screw Holes for mounting Screws)	2
24155	Terminal Plate (Large Screw Holes for mounting Screws)	1
24168	Screw for mounting Terminal Plate 24154	2
24167	Screw for mounting Terminal Plate 24155 and Contact Assembly 11046	4
24969	Lock Washer for Screws 24167 and 24168	6
23941	Insulating Washer for Screw 24167	4
21495	Insulating Bushing for Screw 24167 for Contact Assembly 11046	2
11067	**Lead Assembly for connecting Armature Assembly 11050**	1
24138	Terminal Clamp (on Top of Terminal Plates 24154 and 24155)	2
20373	Terminal Clamp (under Terminal Plate 24155 and for Terminal on Side of Coil)	2
21491	Nut for Coil Assembly 11127	2
26586	Lock Washer for Nut 21491	1
24242	Insulating Bushing for Screw 24167 for mounting Terminal Plate 24155	2
24145	Insulating Bushing for Coil Studs (Long)	2

No. 5401 BATTERY BOX (Continued)

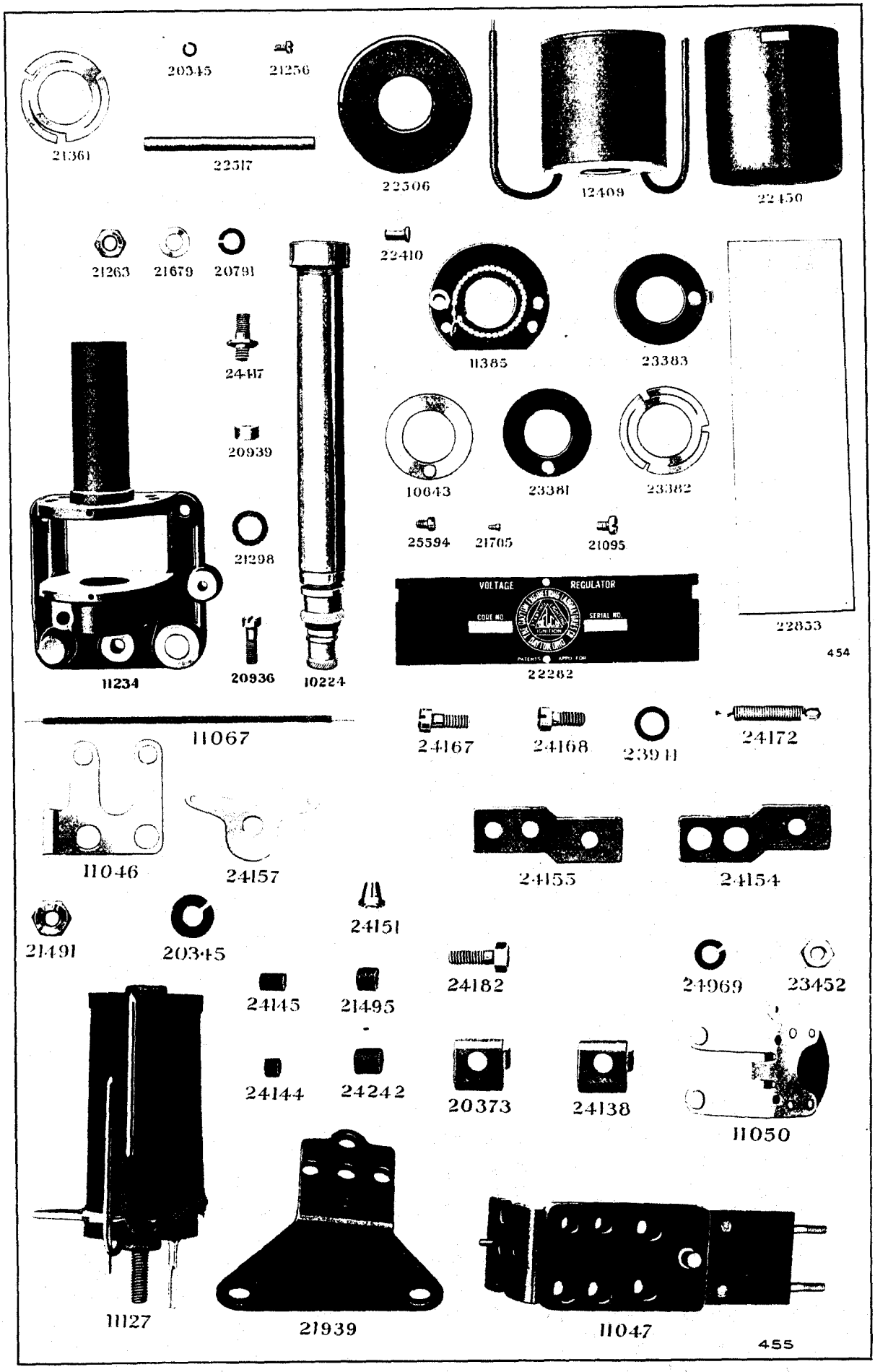
Piece Number	NAME OF PART	Quantity Required
24144	Insulating Bushing for Coil Studs (Short)	1
24157	Plate for grounding Terminal Lead Assembly 11067	1
24182	Screw for retaining Terminal Clamps on Terminal Plate 24155	1
24165	Screw for retaining Terminal Clamp on Terminal Plate 24154 and Terminal on Side of Coil Assembly 11127	2
24969	Lock Washer for Nut 23452	3
23452	Nut for Screws 24182 and 24165	3
24172	Spring for operating Armature Assembly 11050	1
21937	Insulator for Cut-Out Relay 5668 (Not shown in Illustration)	1
20107	Screw for retaining Cut-Out Relay Assembly 5668	2
20251	Insulating Bushing for Screw 20107	2
20252	Insulating Washer for Screw 20107	2
20165	Plain Washer for Screw 20107	2
20142	Lock Washer for Screw 20107	2
10532	**Controller Switch Assembly Complete** (Includes the next 78 Items)	1
10076	**Controller Latch Arm for Controller Switch Assembly 1029 (Not shown in Illustration)**	1
10335	**Shunt Wire for Switch Assembly 1029 (To be used when charging rate is low) (Not shown in Illustration) (Double Shunt Service)**	1
10118	**Shunt Wire Assembly (Single Shunt) (Not shown in Illustration)**	1
20098	Spring for Latch Arm Assembly 10076	1
20178	Screw for Latch Arm 10076	1
20350	Lock Washer for Screw 20178	1
20109	Plain Washer for Screw 20178	1
1029	**Controller Switch Complete** (Includes the next 63 Items)	1
24569	Frame (Upper) for Controller Switch Assembly 1029	1
11247	**Frame Assembly Complete (Lower) for Controller Switch Assembly 1029**	1
20358	Connector across Back of Switch connecting Top Terminal on Right Side of Switch to Fourth Terminal from Top on Left Side of Switch	1
20359	Connector for Blades on Left Side of Switch	4
11244	**Controller Blade Assembly (Blades Assembled Complete for Left Side of Switch)** (Includes the next 13 Items)	1
20361	Blade (Blades on Left Side of Switch with Extension for Connectors)	3
20366	Blade on Left Side of Switch with Extension for Two Binding Posts	1
20363	Blade on Left Side of Switch with Extension for Binding Posts and Connectors	3
20364	Blade on Left Side of Switch with Extension for One Binding Post	1
20367	Connector on Left Side of Switch Connecting with Brush	3
20362	Rod for supporting Blades	2
20365	Insulating Sleeve for Blades	2
24574	Brass Collar between Blades and Lower End Frame (On Left Side of Switch)	1
24564	Insulating Washer for Blade on Left Side of Switch	9
24566	Brass Collar between Blades on Left Side of Switch	4
24565	Brass Collar between Blades and Upper End Frame	1
24567	Insulating Collar between Blades on Left Side of Switch (Hard Rubber)	6
27963	Lock Washer between Blades and Upper End Frame	1
11243	**Blade Assembly (Blades Assembled Complete for Right Side of Switch)** (Includes the next 10 Items)	1
20363	Blade on Right Side of Switch with Extension for Connector and Bind Post	1
20360	Blade on Right Side of Switch with Extensions	7
20368	Connector on Right Side connecting with Brush	5
20362	Rod for supporting Blades on Right Side of Switch	2
20365	Insulating Sleeve for Blades on Right Side of Switch	2
24564	Insulating Washer between Blades and End Frame on Right Side of Switch	1
24570	Brass Collar with Shoulder between Blades on Right Side of Switch	3
24567	Insulating Collar between Blades on Right Side of Switch (Hard Rubber)	9
24565	Brass Collar between Blades and Upper End Frame	1
27963	Lock Washer between Blades and Upper End Frame (Not shown in Illustration)	1
11245	**Brush Assembly Complete (Blades Assembled Complete for Center of Switch)** (Includes the next 18 Items)	1
24572	Lock Washer on Ends of Rod 24579 for Pivoting Brush Blades	2
24582	Arm for Binding Brush Parts together	2
24581	Compression Spring for Brush Blades	7
24578	Insulating Washer on Pivoting Rod 24579 for Brush Blades	16
24573	Brass Collar on Ends of Pivoting Rod 24579	2
24580	Rod for locating Brush Blades on Brush Assembly 11245	1
20351	Insulating Sleeve for locating Rod 24580 (Hard Rubber)	1
24579	Rod for locating Brush Blades on Brush Assembly 11245 (Not shown in Illustration)	1
20352	Insulating Sleeve for Pivoting Rod 24579 (Hard Rubber)	1
24576	Brass Collar on Lower End of locating Rod 24580	1
24562	Blades for Brush Assembly 11245	16
24563	Brass Collar on locating Rod 24580 between Blades	7
24540	Dowel Pin for Pivoting Rod 24579	2
24541	Dowel Pin for locating Rod 24580	2
24564	Insulating Washer on Rod 24580 for Brush Blades	16

No. 5401 BATTERY BOX (Continued)

Piece Number	NAME OF PART	Quantity Required
27963	Lock Washer on Upper End of Rod 24580 (Not shown in Illustration)	1
24575	Brass Collar on Upper End of Rod 24580	1
24577	Spacing Washer between Blades 24562	8
23452	Nut for Screws 24165 and 24542	22
24969	Lock Washer for Nut 23452	22
20373	Terminal Clamp for Binding Posts	15
11246	**Arm Assembly for Operating Brush Assembly 11246**	1
24079	Dowel Pin for retaining Arm Assembly 11246	1
24538	Screw for End Frame 24569 and End Frame Assembly 11247	7
24165	Screw for Terminal Clamps on Binding Posts, and Long Screws for Connectors on Back of Switch	18
24542	Screws (Short Screw for Connectors on Back of Switch)	4
24568	Stud in End Frame Assembly 11247 for Spring 20098	1
20463	Insulator (Back of Controller Switch)	1
20035	Screw for mounting Controller Switch	4
20495	Lock Washer for Screw 20035	4
20104	Nut for mounting Ampere Hour Meter Assembly 10101	3
20070	Screw for mounting Ampere Hour Meter Assembly 10101	3
20791	Lock Washer for Screw 20070	3
20114	Plain Washer for Screw 20070	3
20125	Insulating Washer for Screw 20070 (Large)	3
20075	Nut for Spring Terminal	1
20137	Lock Washer for Nut 20075	1
22237	Ferrule Placed over Ends of Lead Assemblies 10579 and 11262, and Leads 10304 and 10582 and soldered (Not shown in Illustration)	2
22238	Insulator Placed over Ferrule 22237 after soldering (Not shown in Illustration)	2
10108	**Cover Assembly Complete for Controller Switch** (Includes the next 4 Items)	1
20168	Clamp Nut for Cover Assembly 10108	1
20310	Plain Washer for Clamp Nut 20168	1
21923	Name Plate for Cover Assembly 10108 (Not shown in Illustration)	1
20687	Rivets for Name Plate 21923 (Not shown in Illustration)	2
20128	Screw for attaching Controller Bracket Assembly 10099 (Not shown in Illusration)	5
20129	Nut for Screw 20128 (Not shown in Illustration)	5
20137	Lock Washer for Nut 20129	5
12135	**Base Assembly for Battery Box Base Assembly 12135 (Not shown in Illustration)** (Includes the next 13 Items)	1
10113	**Battery Box Latch Assembly for mounting Battery Box Cover Assembly** (Includes he next 5 Items)	1
20584	Latch for Battery Box Latch Assembly 10113 (Not shown in Illustration)	1
20587	Bolt for Battery Box Latch Assembly 10113 (Not shown in Illustration)	1
20586	Nut for Battery Box Latch Assembly 10113 (Not shown in Illustration)	1
20588	Spring for Battery Box Latch Assembly 10113 (Not shown in Illustration)	1
20585	Nut for Battery Box Latch Assembly 10113 (Round) (Not shown in Illustration)	1
12002	**Base Assembly for Battery Box Base Assembly 12135** (Includes the next 4 Items)	1
20091	Guide for Controller Rod Assembly 10107	1
21001	Rivet for Guide 20091 and Plate	9
20596	Plate for retaining Latch Assembly 10113	2
21001	Rivets for Plate 20596	6
10122	**Battery Cover Assembly Complete for Battery** (Includes the next 4 Items)	1
20314	Spring for Battery Cover Assembly 10122	2
20317	Screw for Spring 20314	4
21267	Date Card for Battery Cover Assembly 10122 (Not shown in Illustration)	2
20328	Pin for Date Card 21267 on Battery Cover Assembly 10122	2
21565	Base Support for Battery Box (Not shown in Illustration)	4
20080	Terminal Clip for connecting Battery Box (Not shown in Illustration)	6
20289	Bolt for Battery	1
20108	Nut for Bolt 20289	1
20310	Plain Washer for Nut 20108	1
11536	**Battery Box Cover Assembly**	1
20223	Wrench for Controller Switch 1029	2
10534	**Controller Operating Rod Assembly Complete** (Includes the next 6 Items)	1
10535	**Controller Operating Rod Assembly** (Includes the next Item)	1
21162	Dowel Pin for retaining Collar 20236	2
20048	Spring for Controller Operating Rod Assembly 10534	1
20389	Sleeve for Rod 20123	1
20176	Guide for Sleeve 20389	1
20096	Cup for Spring 20048	2



No. 5404 BATTERY BOX



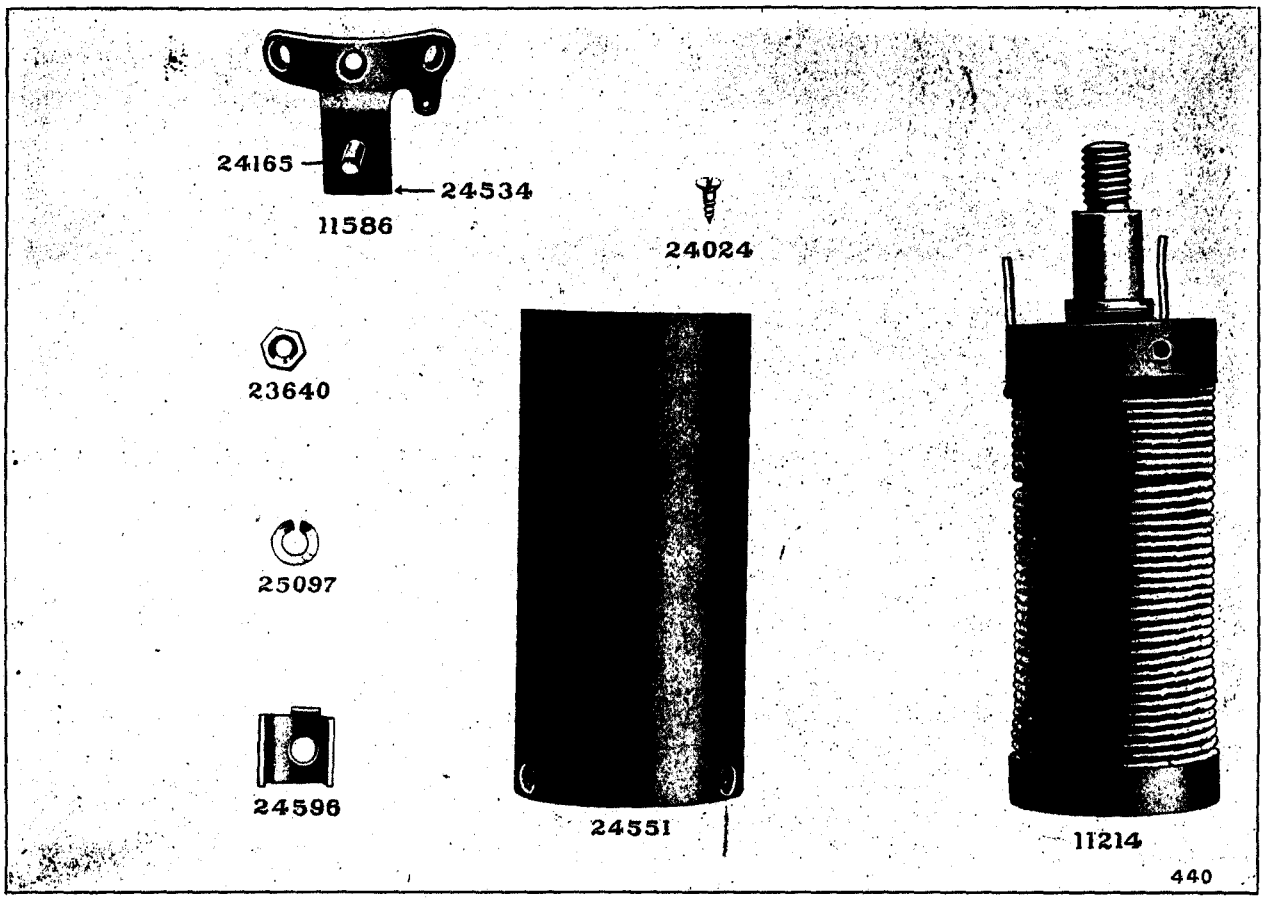
No. 5404 BATTERY BOX

No. 5404 BATTERY BOX

Piece Number	NAME OF PART	Quantity Required
5404	**BATTERY BOX COMPLETE**	1
11642	**Cover Assembly**	1
20316	Terminal Clip for Voltage Regulator 5602	1
11488	**Syringe for Filling Storage Battery**	1
10232	**Cover Assembly Complete for Storage Battery (Wood)** (Includes the next 4 Items)	1
20314	Spring for Cover Assembly 10231	2
20317	Screw for retaining Spring 20314	4
21638	Date Card for Cover Assembly 10232	1
20328	Pin for retaining Date Card	4
20289	Bolt for Battery Bolt Assembly	1
20108	Nut for Bolt 20289	1
20310	Plain Washer for Nut 20108	1
10087	**Battery Bolt Assembly Complete** (Includes the next 4 Items)	1
20289	Bolt for Battery Bolt Assembly 10087	1
20108	Nut for Bolt 20289	1
20310	Plain Washer for Nut 20108	1
21532	Sleeve for Bolt 20289	1
20835	Base for Battery Box	1
21600	Screw for retaining Clamp Plate 21597 (Not shown in Illustration)	4
21601	Nut for Screw 21600 (Not shown in Illustration)	4
20393	Lock Washer for Nut 21601 (Not shown in Illustration)	4
10184	**Latch Assembly Complete** (Includes the next 8 Items)	2
20588	Spring for Latch Assembly 10184 (Not shown in Illustration)	1
20585	Clamp Nut for Latch Assembly 10184 (Not shown in Illustration)	1
20586	Cap Nut for Latch Assembly 10184 (Not shown in Illustration)	1
20584	Latch for Latch Assembly 10184 (Not shown in Illustration)	1
20310	Plain Washer for Spring 20588 (Not shown in Illustration)	1
10183	**Latch Assembly (Not shown in Illustration)** (Includes the next 2 Items)	1
20587	Bolt for Latch Assembly 10183 (Not shown in Illustration)	1
21597	Clamp Plate for Bolt 20587 (Not shown in Illustration)	1
20129	Nut for Screw 21147 (Not shown in Illustration)	3
21147	Screw for retaining Apparatus Box 5502 (Not shown in Illustration)	1
20137	Lock Washer for Nut 20129 (Not shown in Illustration)	3
5502	**Apparatus Box Complete** (Includes the next 96 Items)	1
20939	Insulating Bushing for Screw 20128 (Long) (Not shown in Illustration)	2
21078	Insulating Bushing for Screw 20128 (Short) (Not shown in Illustration)	1
20117	Insulating Bushing for Box 21639 (Rubber) (Not shown in Illustration)	3
21193	Cover Plate for Box 21639 (Not shown in Illustration)	1
20553	Screw for attaching Cover Plate 21193 (Not shown in Illustration)	2
20484	Lock Washer for Screw 20553 (Not shown in Illustration)	2
21291	Nut for retaining Screw 20553 (Not shown in Illustration)	2
21684	Clip for retaining Lead (Outside of Box) (Long Clip) (Not shown in Illustration)	1
21208	Clip for retaining Lead (Outside of Box) (Short Clip) (Not shown in Illustration)	1
21217	Insulator for Voltage Regulator 5502	1
20068	Nut for retaining Screws 21746 and 20107 (Not shown in Illustration)	2
20347	Nut for retaining Screw 20349 (Not shown in Illustration)	1
20393	Lock Washer for Nut 20347 (Not shown in Illustration)	1
20128	Screw for retaining Voltage Regulator 5502 (Not shown in Illustration)	3
20349	Screw for Side Terminal on Relay 5678 (Not shown in Illustration)	1
20114	Plain Washer for Screw 20128 (Not shown in Illustration)	3
20137	Lock Washer for Screw 20128 (Not shown in Illustration)	3
20076	Insulating Washer for Screw 20128 (Not shown in Illustration)	3
20107	Screw for attaching Relay 5678 (Inner) (Not shown in Illustration)	1
20251	Insulating Bushing for Screw 21746 (Not shown in Illustration)	1
20252	Insulating Washer for Screw 21746	1
20165	Plain Washer for Screw 21746	1
20142	Lock Washer for Screw 21746	1
21746	Screw for attaching Relay 5678 (Outer)	1
10126	**Box Assembly Complete** (Includes the next 4 Items)	1
21264	Insulator for Box Assembly 10126	2
21673	Rivet for retaining Insulator 21264	6
21923	Number Plate for Box Assembly 10125 (Not shown in Illustration)	1
22216	Rivet for retaining Number Plate 21923 (Not shown in Illustration)	2
11108	**Lead Assembly (Long Single)** (Includes the next 2 Items)	1
21107	Clip for Lead Assembly 11108	1
21737	Ferrule for Clip 21107 (Not shown in Illustration)	1
11109	**Lead Assembly (Double) (Not shown in Illustration)** (Includes the next 5 Items)	1
21736	Connector for Lead Assembly 11109	1
20316	Clip for Voltage Regulator End of Lead Assembly 11109	1
21107	Clip for Lead Assembly 11109	1
21251	Clip for Cut-out Relay End of Lead Assembly 11109	1
20117	Insulating Bushing for Lead Assembly 11109	1

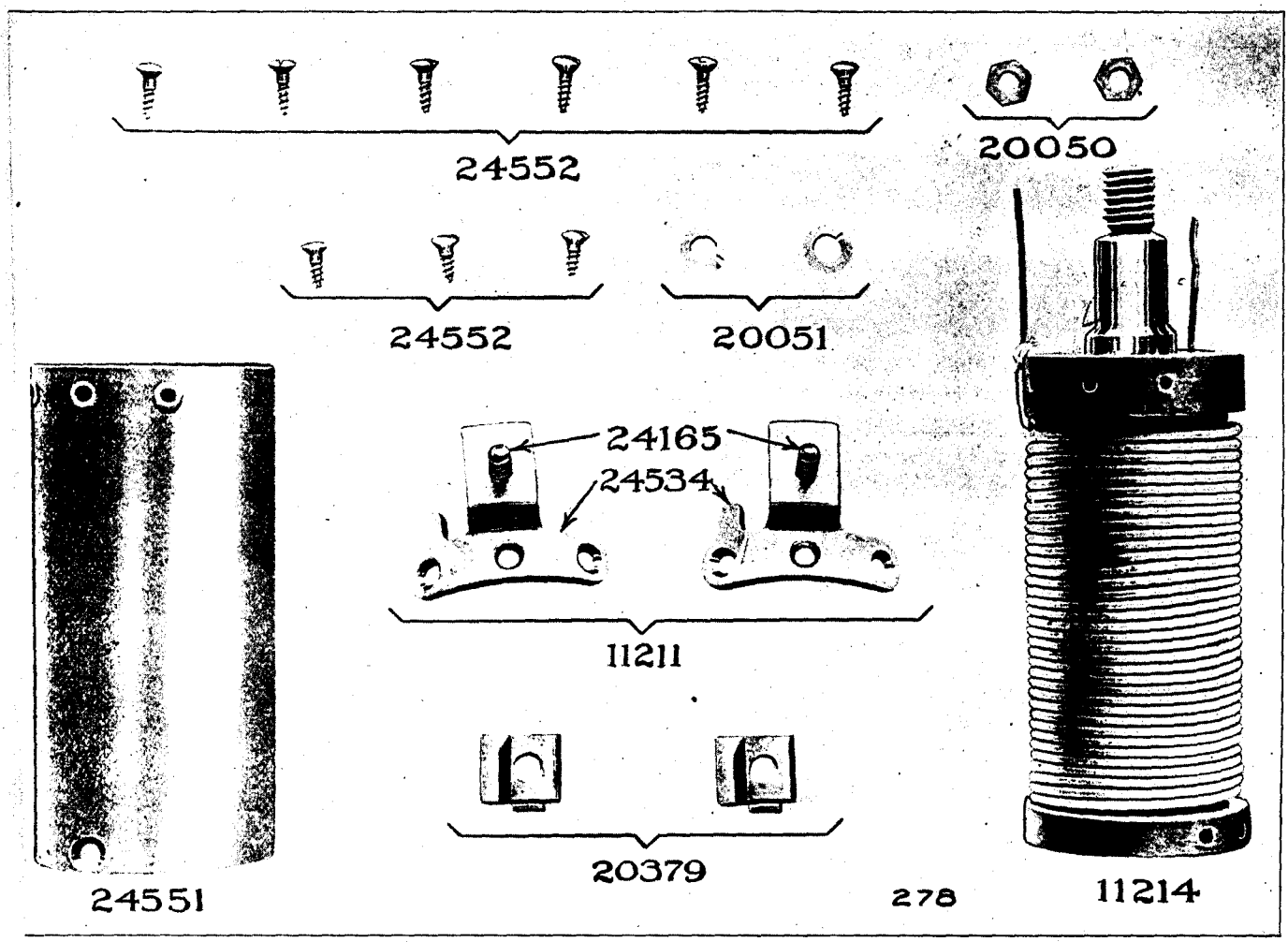
No. 5404 BATTERY BOX (Continued)

Piece Number	NAME OF PART	Quantity Required
11110	**Lead Assembly (Short Single) (Not shown in Illustration)**	1
	(Includes the next 2 Items)	
20316	Clip for Lead Assembly 11110	1
21737	Ferrule for Clip 20316	1
5678	**Cut-Out Relay Complete**	1
	(Includes the next 27 Items)	
11127	**Coil Assembly**	1
11067	**Lead Assembly for connecting Contact Spring Assembly 11050**	1
11050	**Contact Spring Assembly (Lower Contact)**	1
11046	**Contact Spring Assembly (Upper Contact)**	1
24151	Nut for retaining Contact Spring Assembly 11050 (Split Nut)	2
24167	Screw for attaching Contact Spring Assembly 11046 and Terminal Plate 24155	4
23941	Insulating Washer for Screws 24167, 24182 and 24168	4
21495	Insulating Bushing on Screw 24167 for Contact Spring Assembly 11046	2
24242	Insulating Bushing on Screw 24167 for Terminal Plate 24155	1
24168	Screw for retaining Contact Plate 24154	2
24154	Terminal Plate (Small Hole)	1
24155	Terminal Plate (Large Hole)	1
24138	Terminal Clip for Terminal Plates 24154 and 24155 (Upper)	2
20373	Terminal Clip for Terminal Plates 24154 and 24155 (Lower)	2
24182	Screw for retaining Terminal Clips 20373 and 24138	2
23452	Nut for Screw 24182	2
24969	Lock Washer for Nut 23452	2
11047	**Bracket Assembly for retaining Contact Spring Assemblies 11050 and 11046**	1
	(Includes the next 3 Items)	
24169	Stud for Insulator (Not shown in Illustration)	1
24149	Insulator for Bracket Assembly 11047 (Not shown in Illustration)	1
24144	Bushing for Stud 24169	1
21939	Bracket for attaching Relay 5678	1
24172	Spring for operating Contact Spring Assembly 11050	1
21491	Nut for retaining Coil Assembly 11127	2
24345	Lock Washer for Nut 21491	1
24145	Insulating Bushing for Coil Assembly 11127 (Long)	1
24144	Insulating Bushing for Coil Assembly 11127 (Short)	2
24157	Plate under Nut 21491 for Grounding Lead Assembly 11067	1
21937	Insulator for Bracket 21939 (Not shown in Illustration)	1
24969	Lock Washer for Screws 24167, 24182 and 24168	8
5602	**Voltage Regulator Complete**	1
	(Includes the next 30 Items)	
10884	**Voltage Regulator Assembly (Service) (Complete 5602 Assembly less Mercury Tube 10224) (Not shown in Illustration)**	1
11234	**Bracket Assembly for Voltage Regulator 5602**	1
10224	**Mercury Tube Assembly**	1
22450	Shell for Coil Assembly 15279	1
15279	**Coil Assembly**	1
22512	Terminal Clip for Coil Assembly 15279 (Not shown in Illustration)	1
22853	Insulator for Coil Assembly 15279	1
22517	Insulator for Lead on Coil Assembly 15279	1
11385	**Rheostat Coil Assembly**	1
22506	Cover for Shell 22450	2
22410	Insulating Bushing for Lead on Coil Assembly 15279	2
21256	Screw for retaining Shell 22450	2
20345	Washer for Screw 21256	1
22282	Name Plate for Voltage Regulator 5602	2
21705	Screw for retaining Name Plate 22282	1
20936	Screw in Bracket Assembly 11234 for Clamping Mercury Assembly 10224	1
21095	Screw for retaining Rheostat Coil Assembly 11385 (Large Head)	1
25594	Screw for Rheostat Coil Assembly 11385 (Small Head)	1
22417	Terminal Stud for retaining Terminal Stud Assembly 10591	1
21263	Nut for Terminal Stud 22417	1
21679	Plain Washer for Nut 21263	1
20791	Lock Washer for Nut 21263	1
20939	Insulating Bushing for Terminal Stud 22417	2
21298	Insulating Washer for Terminal Stud 22417	2
10643	**Contact Plate Assembly for Rheostat Coil Assembly 11385**	1
23381	Insulating Plate for Contact Plate Assembly 10643	1
23382	Tension Spring for Contact Plate Assembly 10643	1
23383	Adjusting Plate for Contact Plate Assembly 10643	1
21361	Tension Spring for Coil Assembly 15279	1
22526	Screw for Voltage Regulator 5602 (Not shown in Illustration)	1
10591	**Terminal Stud Assembly for connecting Voltage Regulator 5602 (Not shown in Illustration)**	1
	(Includes the next 4 Items)	
22894	Stud for Terminal Stud Assembly 10591 (Not shown in Illustration)	1
24281	Clamp for Terminal Stud Assembly 10591 (Not shown in Illustration)	1
20347	Nut for Stud 22894 (Not shown in Illustration)	1
20393	Lock Washer for Nut 20347 (Not shown in Illustration)	1
10128	**Cover Assembly for Apparatus Box 5502**	1
	(Includes the next 4 Items)	
21146	Nut for Cover 21009	2
20114	Washer for Nut 21146	2



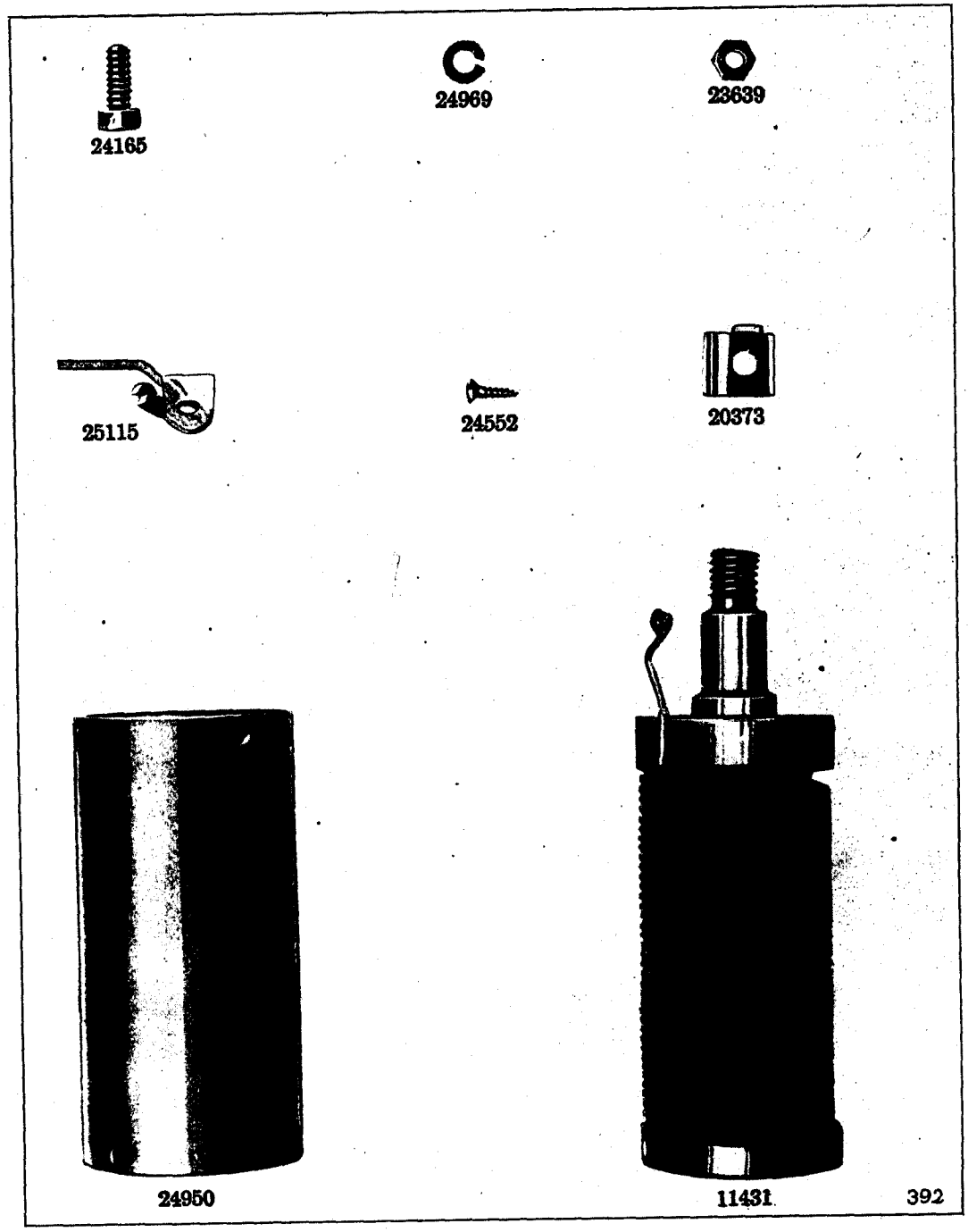
No. 5440 CLUTCH MAGNET

Piece Number	NAME OF PART	Quantity Required
5440	CLUTCH MAGNET COMPLETE	1
11214	**Latch Magnet Coil Assembly**	1
24551	Shell for Clutch Magnet Coil Assembly 11214	1
24024	Screw for retaining Shell 24551 and Terminal Assembly 12126	9
12126	**Terminal Assembly Complete (Not shown in Illustration)** (Includes the next 5 Items)	2
11586	**Terminal Assembly** (Includes the next Item)	1
24165	Screw for connecting Clutch Magnet	1
24596	Clip for Screw 24165	1
23640	Nut for Screw 24165	1
25097	Lock Washer for Nut 23640	1



No. 5442 CLUTCH MAGNET

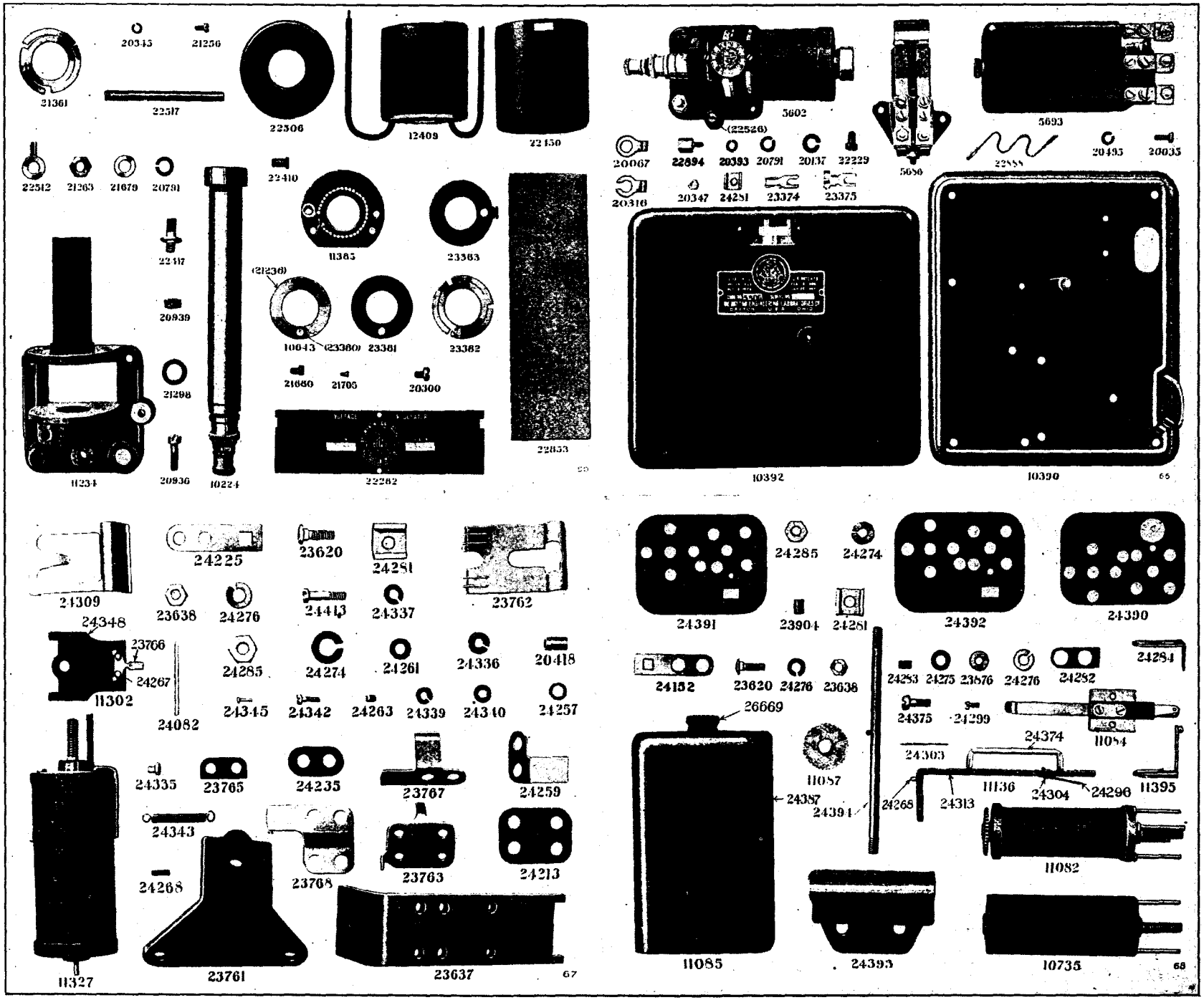
Piece Number	NAME OF PART	Quantity Required
5442	**CLUTCH MAGNET COMPLETE**	1
11214	**Coil Assembly**	1
24551	**Shell for Coil Assembly 11214**	1
24552	Screw for retaining Shell 24551 and Terminal Assembly 11508	9
11508	**Terminal Assembly Complete (Not shown in Illustration)** (Includes the next 5 Items)	2
11211	**Terminal Assembly** (Includes the next Item)	1
24165	Screw for connecting Clutch Magnet	1
20373	Clip for Screw 24165 (Not shown in Illustration)	1
23639	Nut for Screw 24165	1
24539	Lock Washer for Nut 23639	1



No. 5447 CLUTCH MAGNET

Piece Number	NAME OF PART	Quantity Required
5447	**CLUTCH MAGNET COMPLETE**	1
11431	**Coil Assembly**	1
24950	Shell for Coil Assembly 11413	1
24552	Screw for retaining Shell 24950 and Terminal Assembly 13492	8
13492	**Terminal Assembly Complete** (Includes the next 5 Items)	2
11432	**Terminal Assembly** (Includes the next Item)	1
24165	Screw for connecting Clutch Magnet	1
20373	Clip for Screw 24165	1
23639	Nut for Screw 24165	1
20393	Lock Washer for Nut 23639	1

No. 5506 APPARATUS BOX



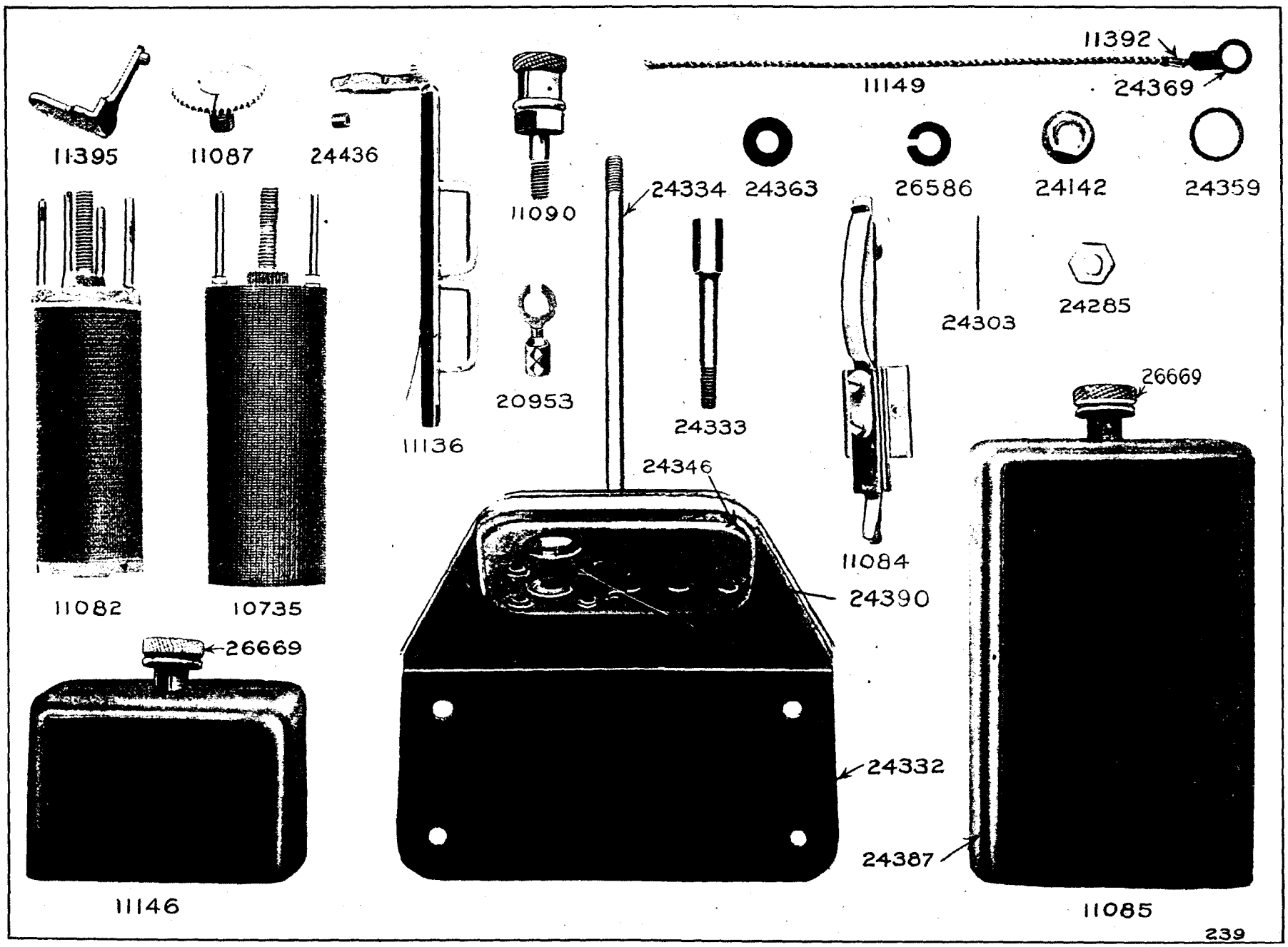
No. 5506 APPARATUS BOX

(No. 5510 Apparatus Box is the same as No. 5506 Apparatus Box with the Voltage Regulator taken out. No. 5510 Apparatus Box is used with No. 28B Motor Generator. No. 5506 Apparatus Box is used with No. 28 Motor Generator.

Piece Number	NAME OF PART	Quantity Required
5506	APPARATUS BOX COMPLETE	1
10392	**Cover Assembly Complete**	1
	(Includes the next 8 Items)	
22907	Clamp Nut for Cover Assembly 10392 (Not shown in Illustration)	1
20114	Plain Washer for Clamp Nut 22907 (Not shown in Illustration)	1
22439	Indicator Guard for Cover 22423 (Not shown in Illustration)	1
22440	Indicator Cover for Indicator Guard 22439 (Not shown in Illustration)	1
20810	Plain Washer for Rivet 22731 (Not shown in Illustration)	2
22731	Rivet for Indicator Guard 22439 (Not shown in Illustration)	2
22408	Name Plate for Cover 22423 (Not shown in Illustration)	1
22216	Rivet for Name Plate 22408 (Not shown in Illustration)	2
10390	**Base Assembly**	1
20035	Screw for Mounting Relays 5693 and 5686	4
20495	Lock Washer for Screw 20035	4
22229	Screw for mounting Regulator 5602	2
20137	Lock Washer for Screw 22229	3
22881	Protector Strip for Cover Assembly 10592 (Not shown in Illustration)	1
22962	Rubber Bushing for Leads	1
22888	Battery Charging Resistance for connecting Regulator 5602 and Relay 5686	1
10591	**Terminal Stud Assembly for Battery Charging Resistance 22888 (Service)**	1
	(Includes the next 4 Items)	
22894	Connector Stud for Terminal Stud Assembly 10591	1
24281	Clip for Connector Stud 22894	1
20347	Nut for Connector Stud 22894	1
20393	Lock Washer for Nut 20347	1
22526	Ground Screw Regulator 5602	1
20791	Lock Washer under Terminal Stud Assembly 10591	1
5686	**Cut-Out Relay Complete**	1
	(Includes the next 37 Items)	
11327	**Coil Assembly for Relay**	1
23761	Mounting Bracket for Mounting Relay	1
23637	Bracket for Mounting Contact	1
11302	**Armature Assembly for operating Double Contact Arm 23762**	1
24309	Indicator Mounted on Armature Assembly 11302	1
24343	Spring for operating Armature Assembly 11302	1
24345	Pin for mounting Indicator Shutter 24309	2
24268	Pin for locating mounting Bracket 23761 and Bracket 23637	1
24335	Stud for Double Contact Arm 23762	2
24082	Pin for mounting Armature Assembly 11302	1
24285	Nut for mounting Coil Assembly 11327	1
24274	Lock Washer for Nut 24285	1
23763	Terminal Plate for Grounding Coil Assembly 11327	1
24259	Connector for connecting Coil and Terminal Plate 24225	1
23762	Double Contact Arm for Armature Assembly 11302	1
23767	Single Contact Arm for Cut-Out Relay (Two Holes)	1
23768	Single Contact Arm for Cut-Out Relay (Four Holes)	1
24266	Screw for mounting Double Contact Arm 23762	2
24263	Insulating Bushing for Screw 24266	2
24339	Lock Washer for Screw 24266	2
24340	Plain Washer for Screw 24266	2
24257	Insulating Washer for Screw 24266	2
23765	Insulator for Double Contact Arm 23762	1
24225	Terminal Plate for Connecting Relay	2
23620	Screw for Terminal Plate 24225	2
24281	Clip for Terminal Plate 24225	2
23638	Nut for Screw 23620	2
24276	Lock Washer for Nut 23638	2
24413	Screw for mounting Terminal Plate 24225	4
20418	Insulating Bushing for Screw 24413	4
24336	Plain Washer for Screw 24413	4
24337	Lock Washer for Screw 24413	4
24261	Insulating Washer for Screw 24413	1
24235	Insulator for Contact Arms 23767 and 23768	2
24213	Insulator under Contact Arms 23767 and 23768	1
5602	**Voltage Regulator Complete**	1
	(Includes the next 28 Items)	
10844	**Voltage Regulator Assembly (Service) (Voltage Regulator complete less Mercury Tube Assembly)**	1
11234	**Bracket Assembly for Regulator 5602**	1
10224	**Mercury Tube Assembly**	1
22450	Coil Shell for Coil Assembly 15279	1
15279	**Coil Assembly for Regulator**	1

No. 5506 APPARATUS BOX (Continued)

Piece Number	NAME OF PART	Quantity Required
22512	Terminal Clip for Coil Assembly	1
22853	Insulator for Coil Assembly 15279	1
22517	Insulator for Lead on Coil Assembly 15279	1
11385	**Rheostat Coil Assembly**	1
22506	Cover for Coil Shell 22450	1
22410	Insulating Bushing for Lead on Coil Assembly 12409	1
21256	Screw for retaining Coil Shell 22450	2
20345	Lock Washer for Screw 21256	2
22282	Name Plate for Regulator	2
21705	Screw for Name Plate 22282	1
20936	Screw in Bracket Assembly 11234 for Clamping Mercury Tube Assembly 10224	2
25594	Screw for mounting Rheostat Coil Assembly 11385 (Small) (Not shown in Illustration)	1
21095	Screw for mounting Rheostat Coil Assembly 11385 (Large) (Not shown in Illustration)	1
22417	Terminal Stud for mounting Terminal Stud Assembly 10591	1
21263	Nut for Terminal Stud 22417	1
21679	Plain Washer for Nut 21263	1
20791	Lock Washer for Nut 21263	1
20939	Insulating Bushing for Terminal Stud 22417	1
21298	Insulating Washer for Terminal Stud 22417	1
10643	**Contact Plate Assembly Complete for Rheostat Coil Assembly 11385**	2
23381	Insulator Plate for Contact Plate Assembly 10643	1
23382	Tension Spring for Contact Plate Assembly 10643	1
23383	Adjusting Plate for Contact Plate Assembly 10643	1
21361	Tension Spring for Coil Assembly 12409	1
5693	**Ignition Relay Complete**	1
	(Includes the next 45 Items)	1
24393	Mounting Bracket for Mounting Relay	1
24394	Stud for mounting Shell Assembly 11085	1
10735	**Condenser Assembly for Relay**	1
11082	**Coil Assembly for Relay**	1
	(Includes the next Item)	1
11087	**Adjustment Screw for Coil Assembly 11082**	1
11085	**Shell Assembly Complete Relay**	1
	(Includes the next Item)	1
26669	Clamp Nut for Shell 24387	1
24389	Plain Washer for retaining Nut 26669	1
11136	**Mounting Bracket Assembly Complete for mounting Contact Assembly 11084**	1
	(Includes the next 2 Items)	1
24296	Spring for Bracket Assembly 11136	1
24304	Rivet for attaching Spring 24296	2
11395	**Armature Assembly for operating Contact Assembly 11084**	1
24303	Pin for mounting Armature Assembly 11395	1
11084	**Contact Assembly Complete for Relay**	1
24285	Nut for mounting Coil Assembly 11082 and Condenser Assembly 10735	1
26586	Lock Washer for Nut 24285 (Not shown in Illustration)	4
24299	Screw for mounting Contact Assembly 11084	2
24391	Dust Pad for mounting Bracket 24393	2
24392	Mounting Plate (Outside) for mounting Coil Assembly 11082 and Condenser Assembly 10735	1
24390	Mounting Plate (Inside of Mounting Coil Assembly 11082 and Condenser Assembly 10735)	1
23904	Insulating Bushing for Coil Assembly 11082 and Condenser Assembly 10735	1
24152	Base Plate for mounting Relay	6
24375	Screw for mounting Base 24152	3
24283	Insulating Bushing for Screw 24375	6
24275	Insulating Washer for Screw 24375	6
23876	Plain Washer for Screw 24375	6
24276	Lock Washer for Screw 24375	6
24282	Insulator for Connector 24284	6
24284	Connector for connecting Coil Assembly 11082 and Condenser Assembly 10735 to Terminal Plate 24225	3
24281	Clip for retaining Terminal Clips	3
23620	Screw for retaining Clip 24281	3
23638	Nut for Screw 23620	3
24276	Lock Washer for Nut 23638	3
20316	Terminal Clip for Voltage Regulator	3
23375	Terminal Clip for Cut-Out Relay	1
23374	Terminal Clip for Ignition Relay	2
20067	Terminal Clip (Ground)	3
		1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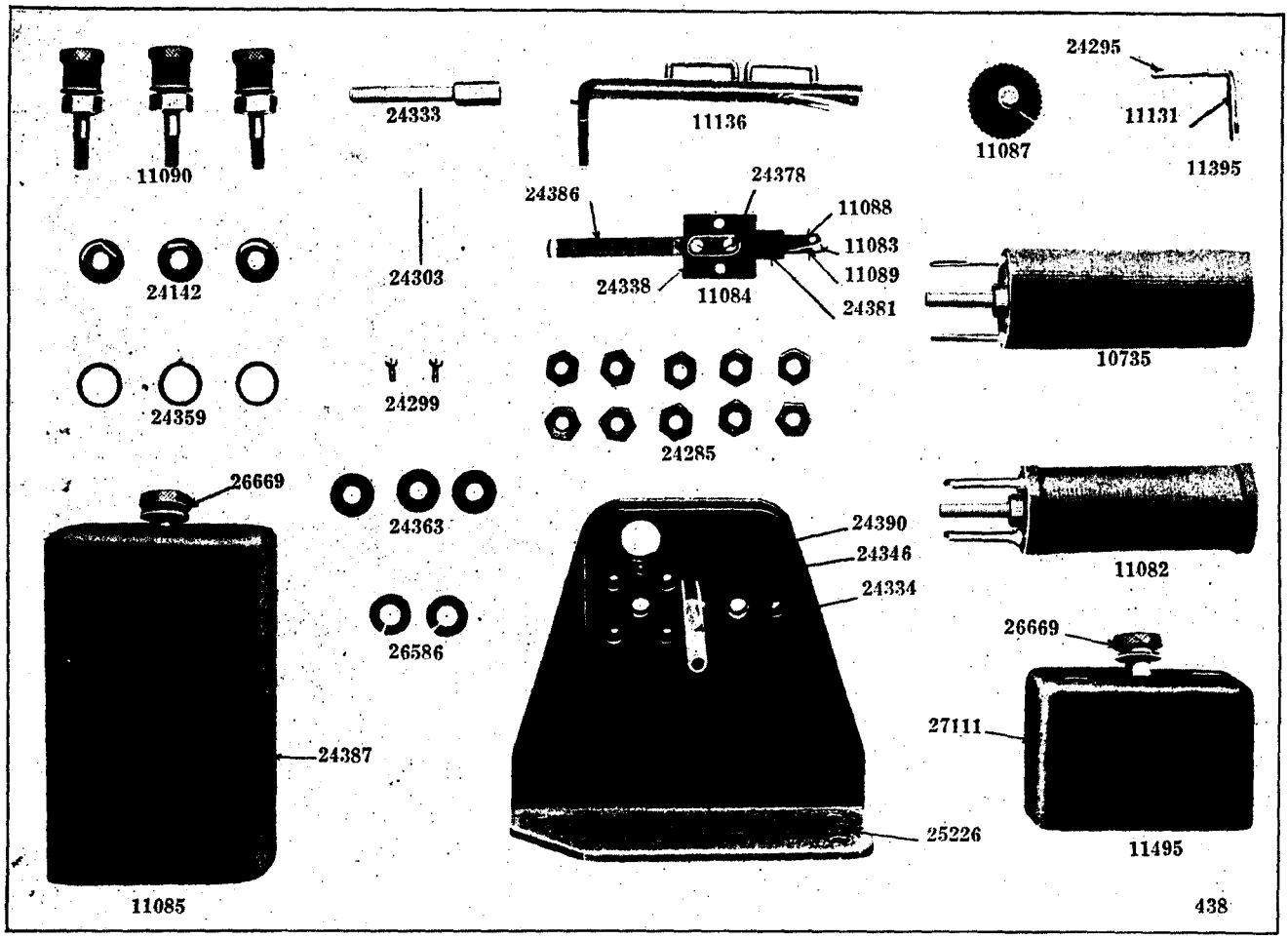
26669
24346
11084
11082
10735
24390
26669
24332
24387
11146
11085
239

No. 5661 IGNITION RELAY

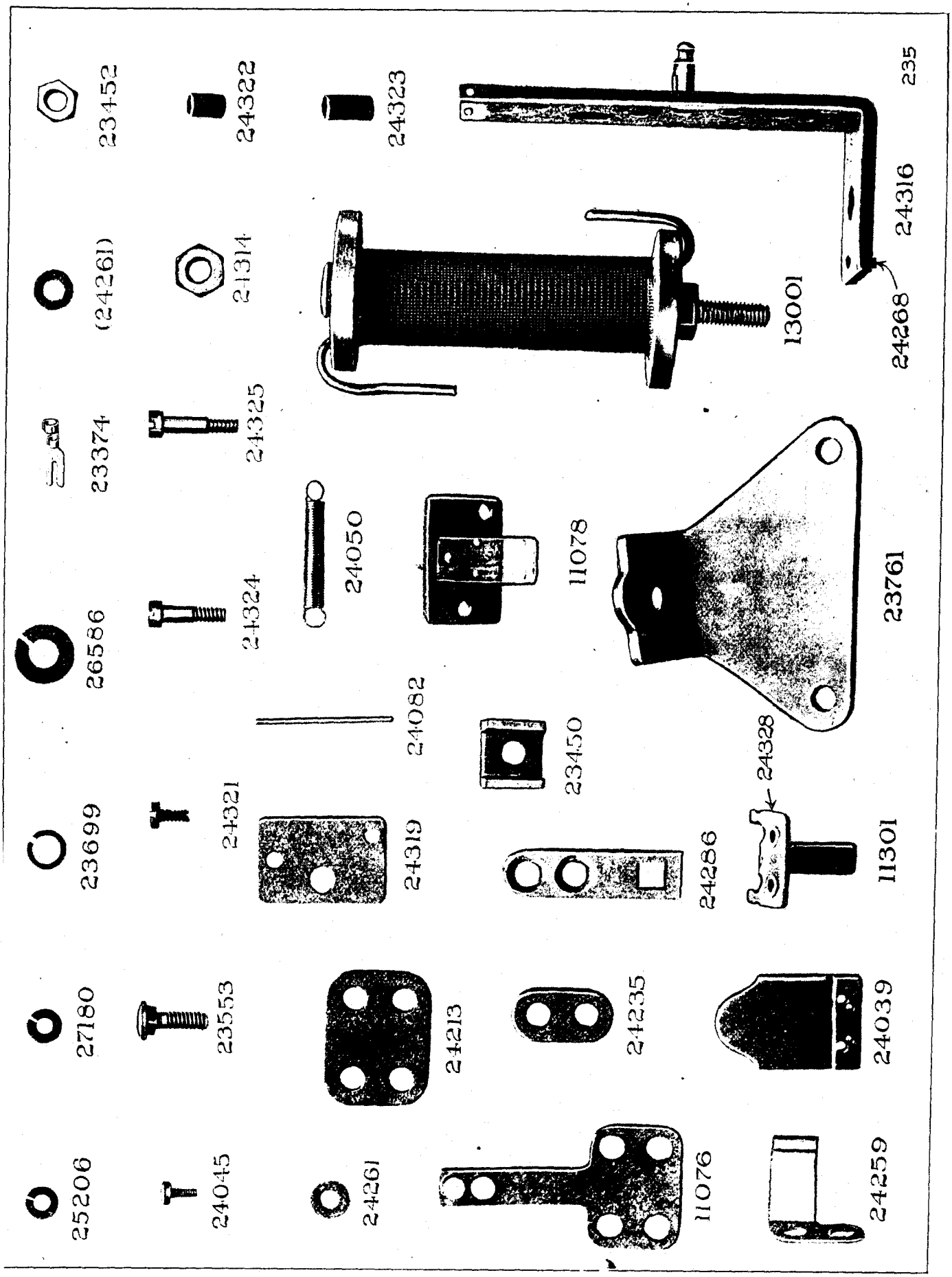
Piece Number	NAME OF PART	Quantity Required
5661	**IGNITION RELAY**	1
24332	Mounting Bracket for Mounting Ignition Relay 5661	1
24436	Insulating Bushing for Coil Assembly 11082 and Condenser Assembly 10735	6
24333	Stud for Mounting Shell Assembly 11146	1
24334	Rod for Mounting Shell Assembly 11085	1
11085	**Shell Assembly Complete for Governing Coil Assembly 11082 and Condenser Assembly 10735** (Includes the next Item)	1
26669	Nut for Shell Assembly 11085	1
24285	Nut for Mounting Coil Assembly 11085 and Condenser Assembly 10735 and Spring Terminal Assembly 11090	10
26586	Lock Washer for Nut 24285	2
10735	**Condenser Assembly for Relay**	1
11149	**Lead Assembly Complete for connecting Terminal Assembly 11090 to Coil Assembly 11082** (Includes the next 3 Items)	3
24369	Clip for connecting Lead Assembly 11149 to Terminal Assembly 11090	1
11392	**Copper Wire Assembly for Lead Assembly 11149**	1
24461	Sleeve for Lead Assembly 11149 (Not shown in Illustration)	1
11146	**Shell Assembly Complete for Mounting Spring Terminal Assembly 11090** (Includes the next Item)	1
26669	Nut for Shell Assembly 11146	1
24346	Gasket for Mounting Plate 24390	2
24390	Mounting Plate for Shell Assemblies 11085 and 11146	2
11090	**Spring Terminal Assembly for connecting Relay**	3
24142	Insulating Bushing for Spring Terminal Assembly 11090	3
24359	Insulating Washer for Spring Terminal Assembly 11090	3
24363	Plain Washer for Spring Terminal Assembly 11090	3
24285	Nut for Spring Terminal Assembly 11090	6
11084	**Contact Spring Assembly for Relay**	1
11395	**Armature Assembly Complete for Operating Contact Spring Assembly 11084**	1
24303	Pin for Mounting Armature Assembly 11395	1
11136	**Bracket Assembly for Mounting Spring Assembly 11084**	1
11082	**Coil Assembly for Relay**	1
11087	**Adjusting Screw Assembly for Coil Assembly 11082**	1
20953	Terminal Clip for Ignition Relay 5661	1



No. 5677 IGNITION RELAY

No. 5677 IGNITION RELAY

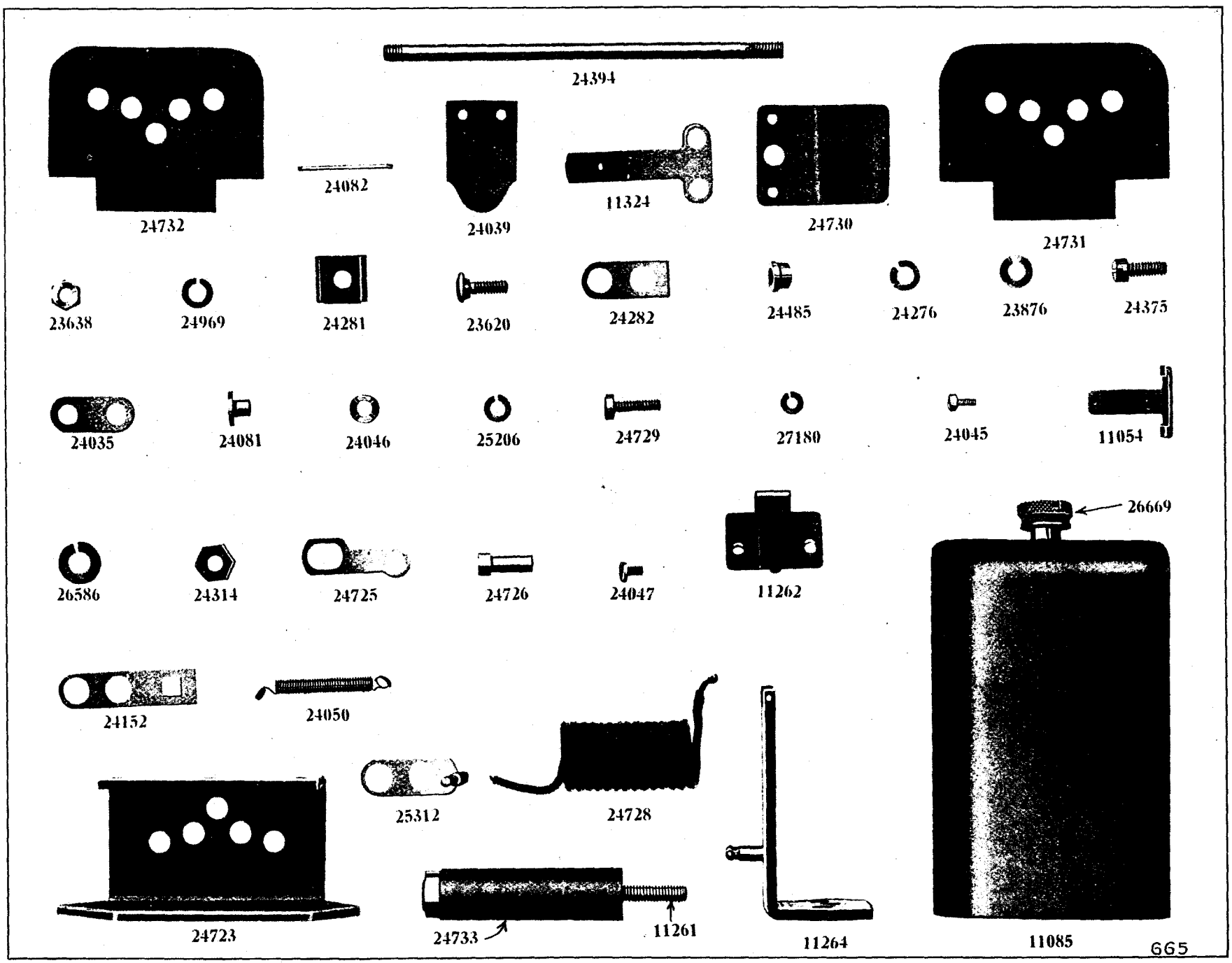
Piece Number	NAME OF PART	Quantity Required
5677	**IGNITION RELAY COMPLETE**	1
11084	**Contact Spring Assembly**	1
24299	Screw for attaching Contact Spring Assembly 11084	2
11395	**Armature Assembly**	1
24303	Pin for attaching Armature Assembly 11395	1
11136	**Bracket Assembly for Contact Spring Assembly 11084**	1
11082	**Coil Assembly** (Includes the next Item)	1
11087	**Adjusting Screw Assembly for Coil Assembly 11082**	1
11085	**Shell Assembly Complete (Long)** (Includes the next Item)	1
26669	Nut for Shell Assembly 11085	1
24389	Plain Washer for retaining Nut 26669	1
24285	Nut for retaining Spring Terminal Assembly 11090	6
24363	Plain Washer for Nut 24285	3
11090	**Spring Terminal Assembly for Shell Assembly 11446**	3
24142	Insulating Bushing for Spring Terminal Assembly 11090	3
24359	Insulating Washer for Spring Terminal Assembly 11090	3
11149	**Lead Assembly for Connecting Spring Terminal Assembly 11090 to Coil Assembly 11082 and Condenser Assembly 10735 (Not shown in Illustration)**	3
11495	**Shell Assembly** (Includes the next Item)	1
26669	Nut for Shell Assembly 11495	1
24333	Stud for retaining Shell Assembly 11446	1
24334	Rod for retaining Shell Assembly 11085	1
24390	Mounting Disc for Shell Assemblies 11446 and 11085	2
24346	Gasket for Mounting Disc 24390	2
24436	Insulating Bushing for Coil Assembly 11082 and Condenser Assembly 10735 (Not shown in Illustration)	6
24285	Nut for retaining Coil Assembly 11082 and Condenser Assembly 10735	4
26586	Lock Washer for Nut 24285	2
25226	Bracket for attaching Relay Assembly 5677	1
10735	**Condenser Assembly**	1
24270	Wire for connecting Terminals on Coil Assembly 11082 and Terminals on Condenser Assembly 10735 (19-32" long) (Not shown in Illustration)	1
24964	Wire for connecting Terminals on Coil Assembly 11082 and Terminals on Condenser Assembly 10735 (.759" long) (Not shown in Illustration)	1
24962	Wire for connecting Terminals on Coil Assembly 11082 and Terminals on Condenser Assembly 10735 (2 9/32" long) (Not shown in Illustration)	1
24271	Wire for connecting Terminals on Coil Assembly 11082 and Terminals on Condenser Assembly 10735 (1 29/32" long) (Not shown in Illustration)	1
24278	Sleeving for Wire 24962 (Not shown in Illustration)	1



No. 5692 CIRCUIT BREAKER

No. 5692 CIRCUIT BREAKER

Piece Number	NAME OF PART	Quantity Required
5692	**CIRCUIT BREAKER COMPLETE**	1
23761	Mounting Bracket for mounting Circuit Breaker	1
24316	Bracket for mounting Terminal Clip Assembly 11078	1
11078	**Terminal Clip Assembly for connecting Coil Assembly 13001**	1
24319	Insulator for Terminal Clip Assembly 11078	1
24321	Screw for mounting Terminal Clip Assembly 11078	2
13001	**Coil Assembly for Circuit Breaker**	1
24314	Nut for mounting Coil Assembly 13001	1
26586	Washer for Nut 24314	1
24039	Armature for operating Stop Assembly 11301	1
11301	**Stop Assembly for operating Contact Arm Assembly 11076**	1
24328	Stop for operating Contact with Fibre Bumper (Not shown in Illustration)	1
24330	Stud for Stop 24328 (Not shown in Illustration)	1
24050	Spring for operating Armature 24039	2
24045	Screw for mounting Stop Assembly 11301	2
27180	Washer for Screw 24045	2
24082	Pin for mounting Armature 24039	1
11076	**Contact Assembly**	1
11438	**Contact Assembly (Old Style) With Fibre Bumper (Not shown in Illustration)**	1
24213	Insulator under Contact Assembly 11076	2
24325	Screw for mounting Contact Assembly 11076 (Long)	2
24324	Screw for mounting Contact Assembly 11076 (Short)	2
24322	Insulating Bushing for Screw 24324	2
24323	Insulating Bushing for Screw 24325	2
25206	Lock Washer for Screws 24324 and 24325	4
24046	Plain Washer for Screws 24324 and 24325 (Not shown in Illustration)	4
24261	Insulating Washer for Screws 24324 and 24325	4
24259	Connector for connecting Oil Assembly 13001 to Terminal Plate 24286	1
24286	Terminal Plate for connecting Circuit Breaker	2
23553	Screw for retaining Clip 23450	2
23450	Clip for retaining Terminal Clips	2
23452	Nut for Screw 23553	2
23699	Lock Washer for Nut 23452	2
24235	Insulator for Connector 24259	1
24268	Pin for locating Mounting Bracket 23761 and Bracket 24316	1
23374	Terminal Clip for Circuit Breaker 5692	2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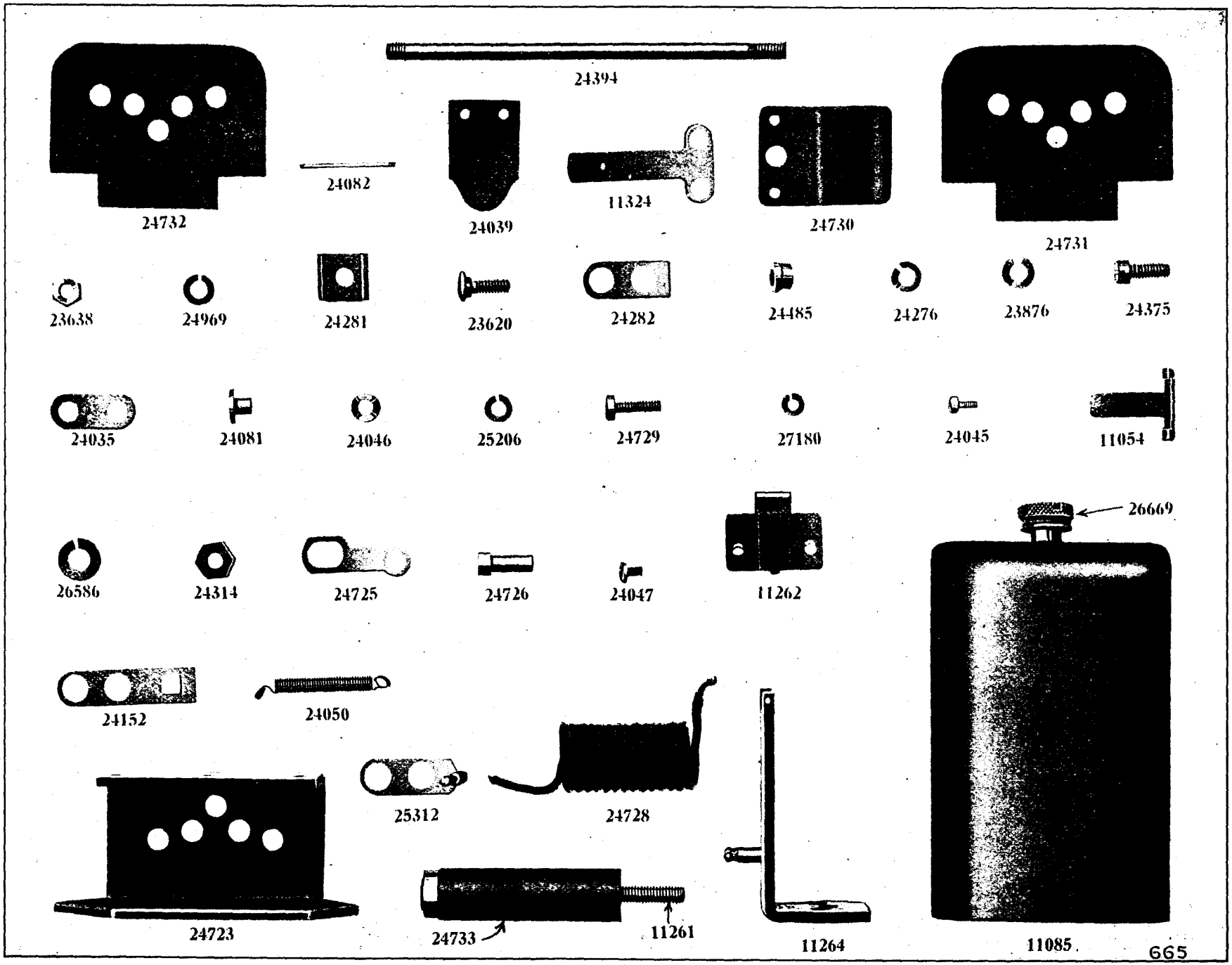
No. 5695 CIRCUIT BREAKER

Piece Number	NAME OF PART	Quantity Required
5695	**CIRCUIT BREAKER COMPLETE**	1
11085	**Shell Assembly Complete**	1
	(Includes the next 2 Items)	
26669	Nut for Shell Assembly 11085	1
24389	Plain Washer for Nut 26669 (Not shown in Illustration)	1
11324	**Contact Spring Assembly (Upper Contact)**	2
11054	**Stop Assembly for Operating Contact Spring Assembly 11324**	2
11262	**Terminal Assembly (Lower Contact)**	1
24039	Armature for Operating Stop Assembly 11054	2
11261	**Core Assembly for Coils 24728 and 25580**	2
24733	Insulating Sleeve for Coils 24728 and 25580	2
11264	**Bracket Assembly for Coil Assembly 11261 and Contact Spring Assembly 11324**	2
24723	Bracket for Bracket Assembly 11264	1
25312	Terminal Clip under Center Terminal for connecting Coils 24728 and 25580	1
23876	Plain Washer for Screw 24375	6
20393	Lock Washer for Screw 24375	6
24485	Insulating Bushing for Screw 24375	6
24282	Insulator for Terminal Post Assembly 11135	3
24375	Screw for attaching Terminal Post Assembly 11135	6
24276	Lock Washer for Screw 24375	6
24152	Base Plate for connecting Circuit Breaker	1
23620	Screw for retaining Terminal Clamp 24281	1
23638	Nut for Screw 23620	1
20393	Lock Washer for Nut 23638	1
24281	Terminal Clamp for retaining Terminal Clip 23375	1
24314	Nut for retaining Core Assembly 11261	4
26586	Lock Washer for Nut 24314	2
24729	Screw for retaining Contact Spring Assembly 11324	4
25206	Lock Washer for Screw 24729	4
24046	Plain Washer for Screw 24729	4
24081	Insulating Bushing for Screw 24729	4
24725	Terminal Plate for connecting Terminal Assembly 11135 and Contact Spring Assembly 11324	2
24732	Mounting Plate for Shell Assembly 11085 (Large)	1
24731	Mounting Plate for Shell Assembly 11085 (Small)	1
24726	Insulating Bushing for Coils 24728 and 25580	2
24035	Insulating Plate for Contact Spring Assembly 11324	4
24730	Insulator for Terminal Assembly 11262	2
25580	Coil for Right Hand Relay (Not shown in Illustration)	1
24728	Coil for Left Hand Relay	1
24050	Spring for Operating Armature 24039	4
24082	Pin for retaining Armature 24039	2
24394	Pin for retaining Shell Assembly 11085	1
24047	Screw for attaching Terminal Assembly 11262	1
24045	Screw for attaching Stop Assembly 11054	2
27180	Lock Washer for Screw 24045	4
23375	Terminal Clip for connecting Circuit Breaker (Not shown in Illustration)	3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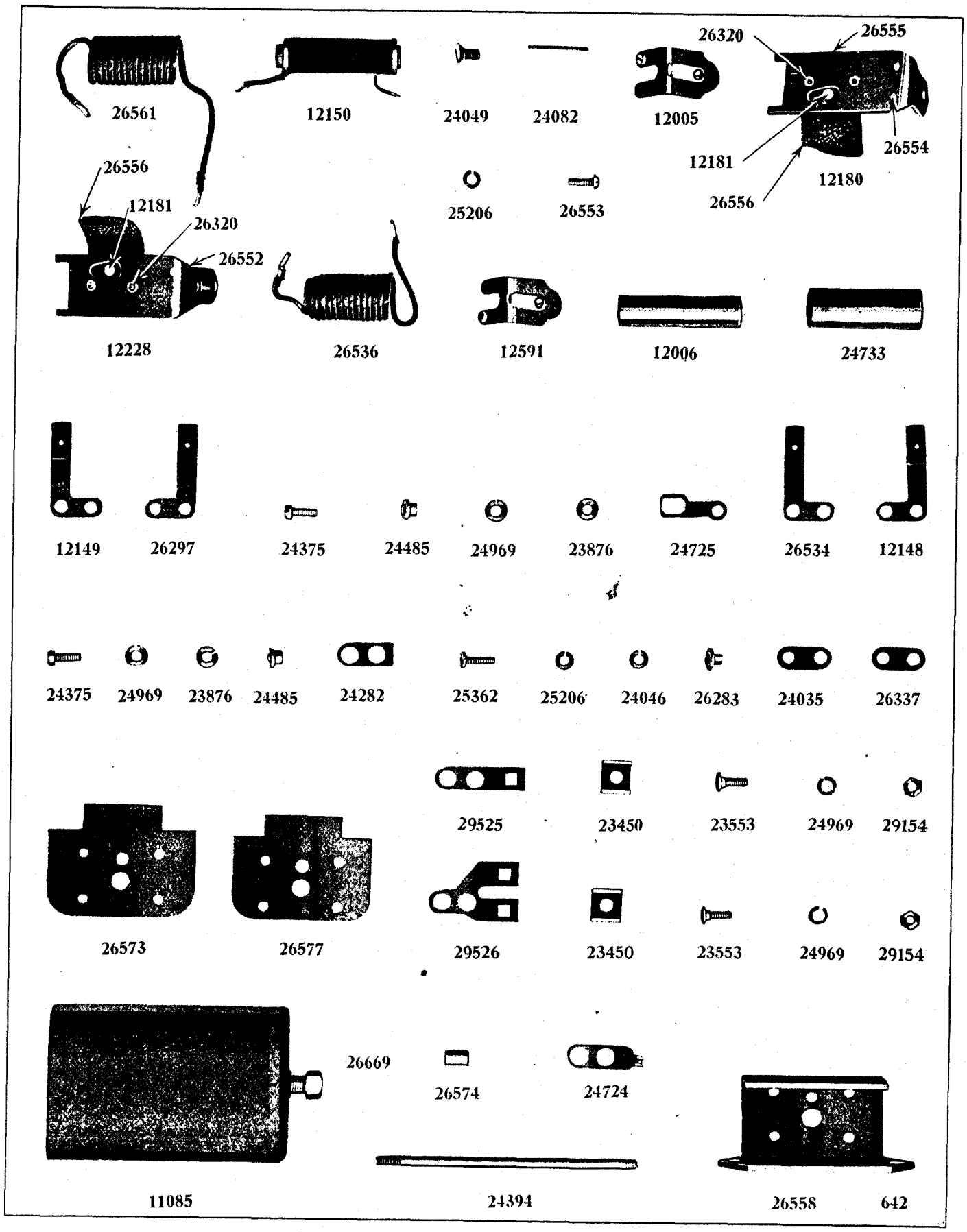
No. 5696 CIRCUIT BREAKER

Piece Number	NAME OF PART	Quantity Required
5696	**CIRCUIT BREAKER COMPLETE**	1
11085	**Shell Assembly Complete** (Includes the next 2 Items)	1
26669	Nut for retaining Shell Assembly 11085	1
24389	Plain Washer for Nut 26669 (Not shown in Illustration)	1
11324	**Contact Spring Assembly (Upper Contact)**	1
11264	**Bracket Assembly for Armature 24039 and Contact Spring Assembly 11324**	1
11054	**Stop Assembly Complete for Operating Contact Spring Assembly 11324**	1
11262	**Terminal Assembly (Lower Contact)**	1
11261	**Core Assembly for Coil 24728**	1
24723	Bracket for Circuit Breaker	1
24724	Terminal for connecting Coil 24728 and Terminal Post Assembly 11135 (Not shown in Illustration)	1
24375	Screw for retaining Terminal Post Assembly 11135	3
20393	Lock Washer for Screw 24375	3
23876	Plain Washer for Screw 24375	3
24485	Insulating Bushing for Screw 24375	3
24282	Insulator for Terminal Post Assembly 11135	2
24152	Base Plate for connecting Circuit Breaker	1
23620	Screw for retainnig Terminal Clip 24281	1
23638	Nut for Screw 23620	1
24276	Lock Washer for Nut 23638	1
24281	Terminal Clamp for retaining Terminal Clip 23375	1
24394	Pin for retaining Shell Assembly 11085	1
24728	Coil for Circuit Breaker 5696	1
24314	Nut for retaining Core Assembly 11261	2
26586	Lock Washer for Nut 24314	1
24050	Spring for Operating Contact Spring Assembly 11324	2
24039	Armature for Operating Stop Assembly 11324	1
24082	Pin for attaching Armature 24039	1
24045	Screw for retaining Stop Assembly 11054	2
27180	Lock Washer for Screw 24045	2
24729	Screw for retaining Contact Spring Assembly 11324	2
25206	Lock Washr for Screw 24729	2
24046	Plain Washer for Screw 24729	2
24081	Insulating Bushing for Screw 24729	2
24726	Insulating Bushing for Coil 24728	2
24732	Mounting Plate for Shell Assembly 11085 (Large)	1
24731	Mounting Plate for Shell Assembly 11085 (Small)	1
24733	Insulating Sleeve for Coil 24728	1
24035	Insulating Plate for Contact Spring Assembly 11324	2
24730	Insulator for Terminal Assembly 11262	1
24047	Screw for retaining Terminal Assembly 11262	2
24375	Screw for retaining Terminal Plate 24725	1
24725	Terminal Plate for connecting Contact Spring Assembly 11324 and Terminal Post Assembly 11135	1
20393	Plain Washer for Screw 24375	1
24485	Insulating Bushing for Screw 24375	1
23876	Plain Washer for Screw 24375	1
23375	Terminal Clip for connecting Circuit Breaker 5696 (Not shown in Illustration)	2

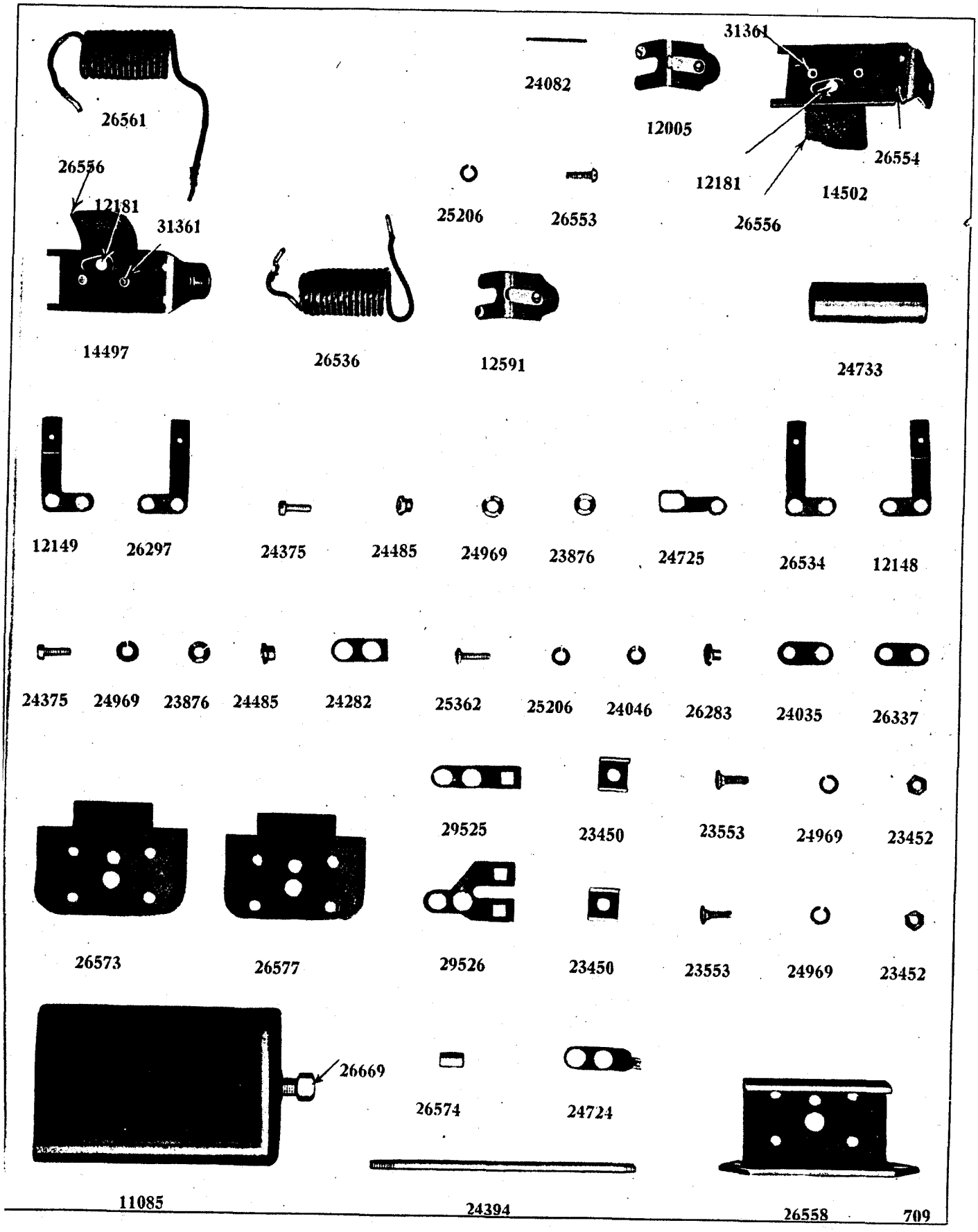


No. 5705 CIRCUIT BREAKER

5705 CIRCUIT BREAKER

Note: No. 5705 Circuit Breaker superseded by No. 5742 Circuit Breaker. When ordering a complete new unit, order No. 5742.

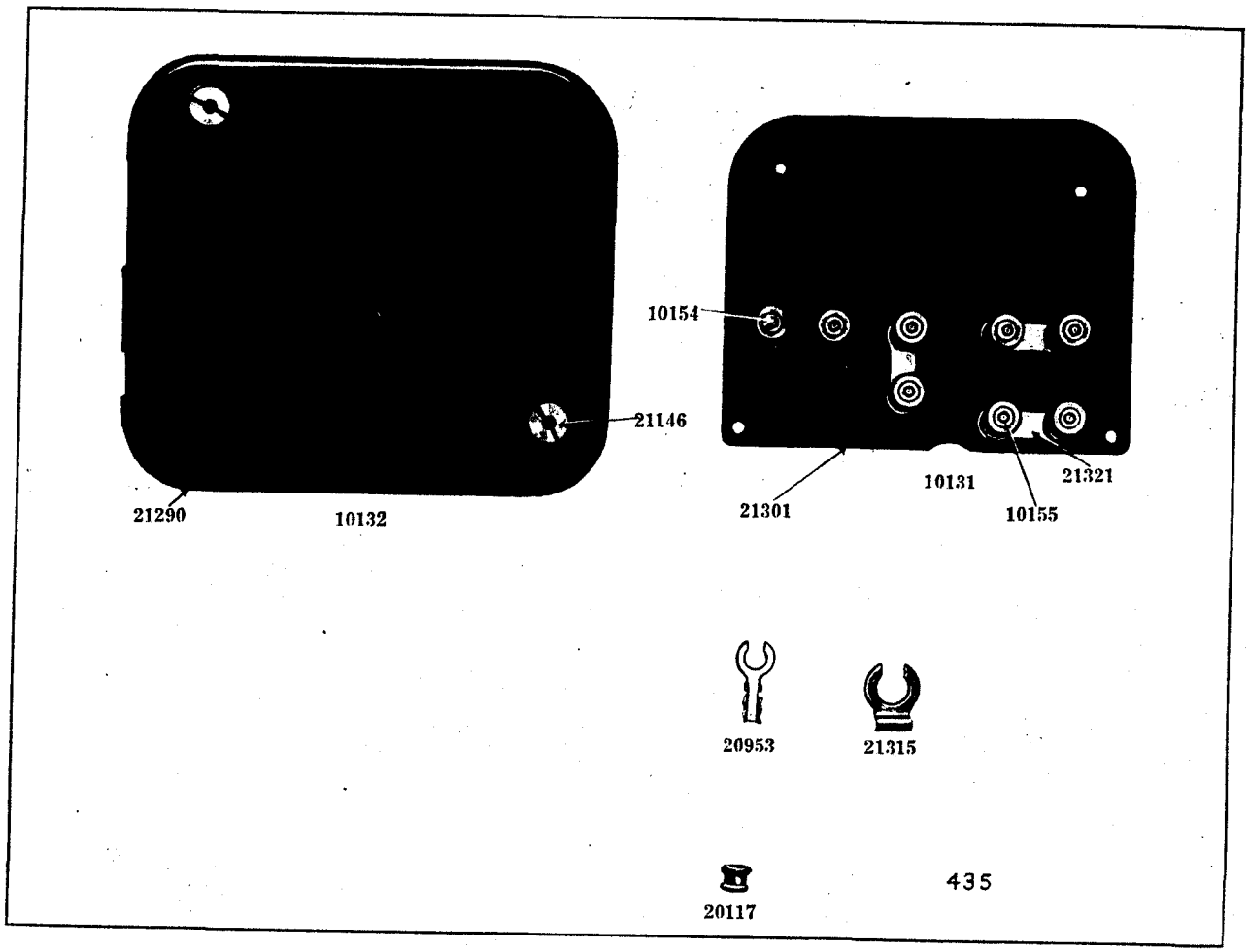
Piece Number	NAME OF PART	Quantity Required
5705	**CIRCUIT BREAKER COMPLETE**	1
26558	Bracket for Mounting Assembly	1
24394	Pin for retaining Shell Assembly 11085	1
29526	Terminal Post for Switch (Double)	1
23553	Screw for retaining Clamp 23450	3
23452	Nut for Screw 23553	3
20393	Lock Washer for Nut 23452	3
23450	Clip for retaining Terminal Clip	3
29525	Terminal Post for Switch (Single)	2
24375	Screw for retaining Terminal Post Assemblies	4
20393	Lock Washer for Screw 24375	4
23876	Plain Washer for Screw 24375	4
24485	Insulating Bushing for Screw 24375	4
26574	Insulating Bushing in Bracket 26558 for Coils 26561 and 26536	1
26573	Mounting Plate for Shell Assembly 11085 (Large)	1
26577	Mounting Plate for Shell Assembly 11085 (Small)	1
24724	Terminal Plate for connecting Coils 26536 and 26561	1
24282	Insulator for Terminal Post Assemblies 12186 and 12187	3
11085	**Shell Assembly Complete** (Includes the next 2 Items)	1
26669	Nut for Shell 24387	1
24389	Plain Washer for Nut 26669	1
26536	Coil for Vibrating Relay	1
26561	Coil for Lock Out Relay (Outer)	1
12150	**Coil Assembly for Lock Out Relay (Inner)**	1
12006	**Core Assembly for Vibrating Relay**	1
24733	Insulating Sleeve for Core Assembly 12006	1
12591	**Armature Assembly for Vibrating Relay**	1
12005	**Armature Assembly for Lock Out Relay**	1
24082	Pin for attaching Armature Assemblies 12005 and 12591	2
24049	Screw for retaining Core Assembly 12006 and Coil Assembly 12150	2
26297	Spring for operating Armature Assembly 12005	1
26534	Spring for operating Armature Assembly 12591	1
12148	**Contact Spring Assembly for Vibrating Relay (Upper Contact)**	1
12149	**Contact Spring Assembly for Lock Out Relay (Upper Contact)**	1
24035	Insulating Plate for Contact Spring Assemblies 12148 and 12149 (Thick)	2
26337	Insulating Plate for Contact Spring Assemblies 12148 and 12149 (Thin)	2
24725	Terminal Plate for connecting Terminal Post Assemblies 12186 and 12187 to Contact Spring Assemblies 12148 and 12149	2
24375	Screw for retaining Terminal Plate 24725	2
20393	Lock Washer for Screw 24375	2
23876	Plain Washer for Screw 24375	2
24485	Insulating Bushing for Screw 24375	2
25362	Screw for retaining Contact Spring Assemblies 12148 and 12149	4
25206	Lock Washer for Screws 26553 and 25362	8
24046	Plain Washer for Screw 25362	4
24081	Insulating Bushing for Screw 25362	1
26553	Screw for retaining Bracket Assemblies 12180 and 12228	4
12180	**Bracket Assembly for Lock Out Relay** (Includes the next 5 Items	1
26555	Bracket for Bracket Assembly 12180	1
12181	**Terminal Assembly (Lower Contact)**	1
26320	Rivet for retaining Terminal Assembly 12181	2
26556	Insulator for Terminal Assembly 12181	1
26554	Bushing for Bracket 26555	1
12228	**Bracket Assembly for Vibrating Relay** (Includes the next 4 Items)	1
26552	Bracket for Bracket Assembly 12228	1
12181	**Terminal Assembly (Lower Contact)**	1
26556	Insulator for Terminal Assembly 12181	1
26320	Rivet for retaining Terminal Assembly 12181	2
23374	Terminal Clip for connecting Circuit Breaker (Small) (Not shown in Illustration)	2
23375	Terminal Clip for connecting Circuit Breaker (Large) (Not shown in Illustration)	2



No. 5742 CIRCUIT BREAKER

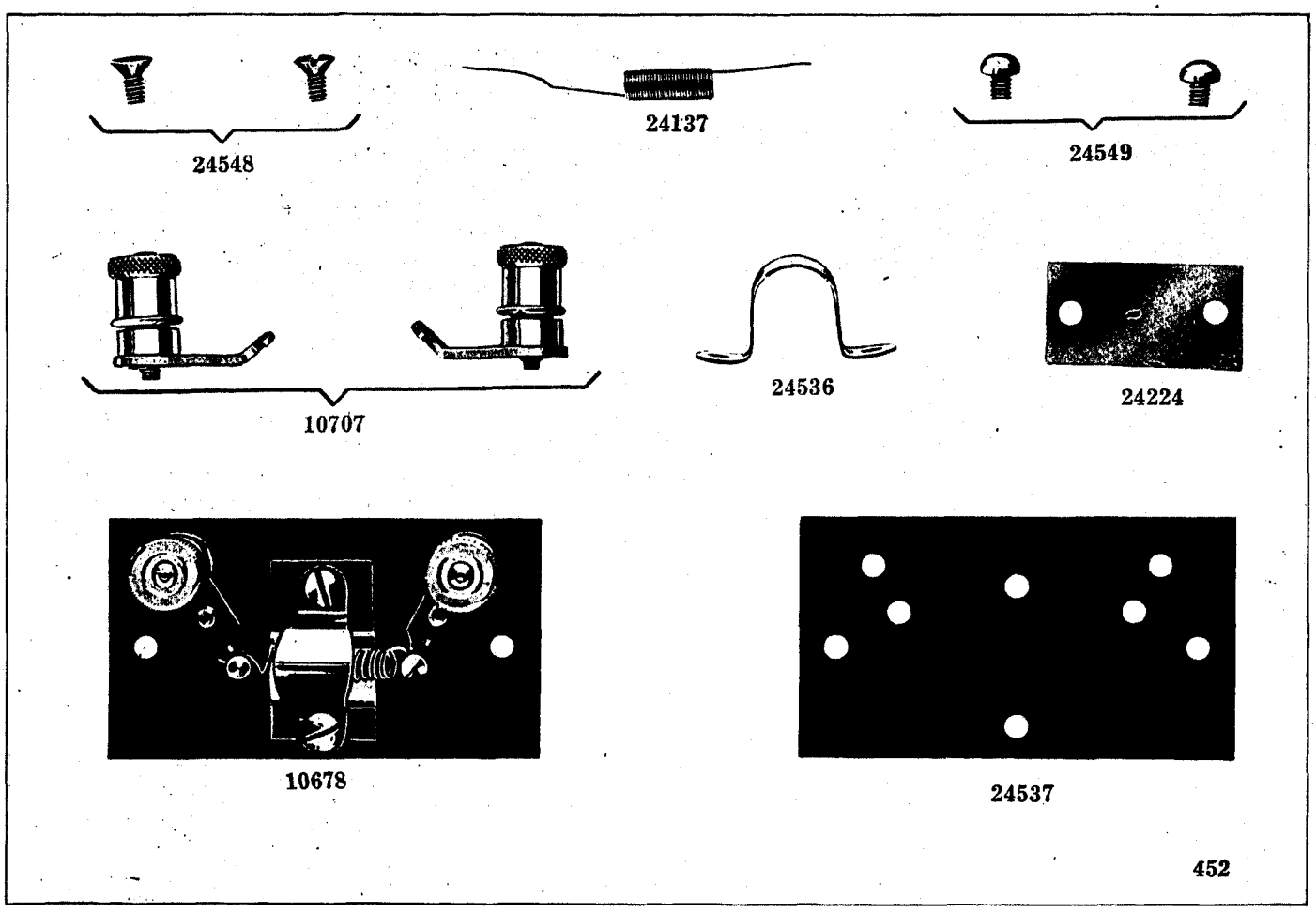
No. 5742 CIRCUIT BREAKER

Piece Number	NAME OF PART	Quantity Required
5742	**CIRCUIT BREAKER CMPLETE**	1
26558	Bracket for mounting Circuit Breaker	1
24294	Pin for retaining Shell Assembly 11085	1
29525	Terminal Post (Single)	1
29526	Terminal Post (Double)	1
23553	Screw for retaining Clamp 23450	4
23452	Nut for Screw 23553	4
20393	Lock Washer for Nut 23452	4
23450	Clamp for retaining Terminal Post	4
24375	Screw for retaining Terminal Posts 29525 and 29526	4
20393	Lock Washer for Screw 24375	4
23876	Plain Washer for Screw 24375	4
24485	Insulating Bushing for Screw 24375	4
26574	Insulating Bushing in Bracket 26558 for Coils 26561 and 26536	1
26573	Mounting Plate for Shell Assembly 11085 (Large)	1
26577	Mounting Plate for Shell Assembly 11085 (Small)	1
24724	Terminal Plate for connecting Coils 26536 and 26561	1
24282	Insulator for Terminal Posts 29525 and 29526	3
11085	**Shell Assembly Complete**	1
	(Includes the next 2 Items)	
26669	Nut for Shell	1
24389	Plain Washer for Nut 26669	1
26536	Coil for Vibrating Relay	1
26561	Coil for Lock Out Relay (Outer)	1
24733	Insulating Sleeve for Coil 26536	1
12591	**Armature Assembly for Vibrating Relay**	1
12005	**Armature Assembly for Lock Out Relay**	1
24082	Pin for attaching Armature Assemblies 12005 and 12591	2
26297	Spring for operating Armature Assembly 12005	1
26534	Spring for operating Armature Assembly 12591	1
12148	**Contact Spring Assembly for Vibrating Relay (Upper Contact)**	1
12149	**Contact Spring Assembly for Lock Out Relay (Upper Contact)**	1
24035	Insulating Plate for Contact Spring Assemblies 12148 and 12149 (Thick)	2
26337	Insulating Plate for Contact Spring Assemblies 12148 and 12149 (Thin)	2
24725	Terminal Plate for connecting Terminal Posts 29525 and 29526 to Contact Spring Assemblies 12148 and 12149	2
24375	Screw for retaining Terminal Plate 24725	2
20393	Lock Washer for Screw 24375	2
23876	Plain Washer for Screw 24375	2
24485	Insulating Bushing for Screw 24375	2
25362	Screw for retaining Contact Spring Assemblies 12148 and 12149	4
25206	Lock Washer for Screws 26553 and 25362	8
24046	Plain Washer for Screw 25362	4
24081	Insulating Bushing for Screw 25362	1
26553	Screw for retaining Bracket Assemblies	4
14502	**Bracket Coil and Contact Assembly**	1
	(Includes the next 3 Items)	
12181	**Terminal Assembly (Lower Contact)**	1
26320	Rivet for retaining Terminal Assembly 12181	2
26556	Insulator for Terminal Assembly 12181	1
26554	Bushing for Bracket Assembly	1
14497	**Bracket Core and Contact Assembly**	1
	(Includes the next 3 Items)	
12181	**Terminal Assembly (Lower Contact)**	1
26556	Insulator for Terminal Assembly 12181	1
26320	Rivet for retaining Terminal Assembly 12181	2
23374	Terminal Clip for connecting Circuit Breaker (Small) (Not shown in illustration)	2
23375	Terminal Clip for connecting Circuit Breaker (Large) (Not shown in illustration)	2



No. 10131 TERMINAL BOARD

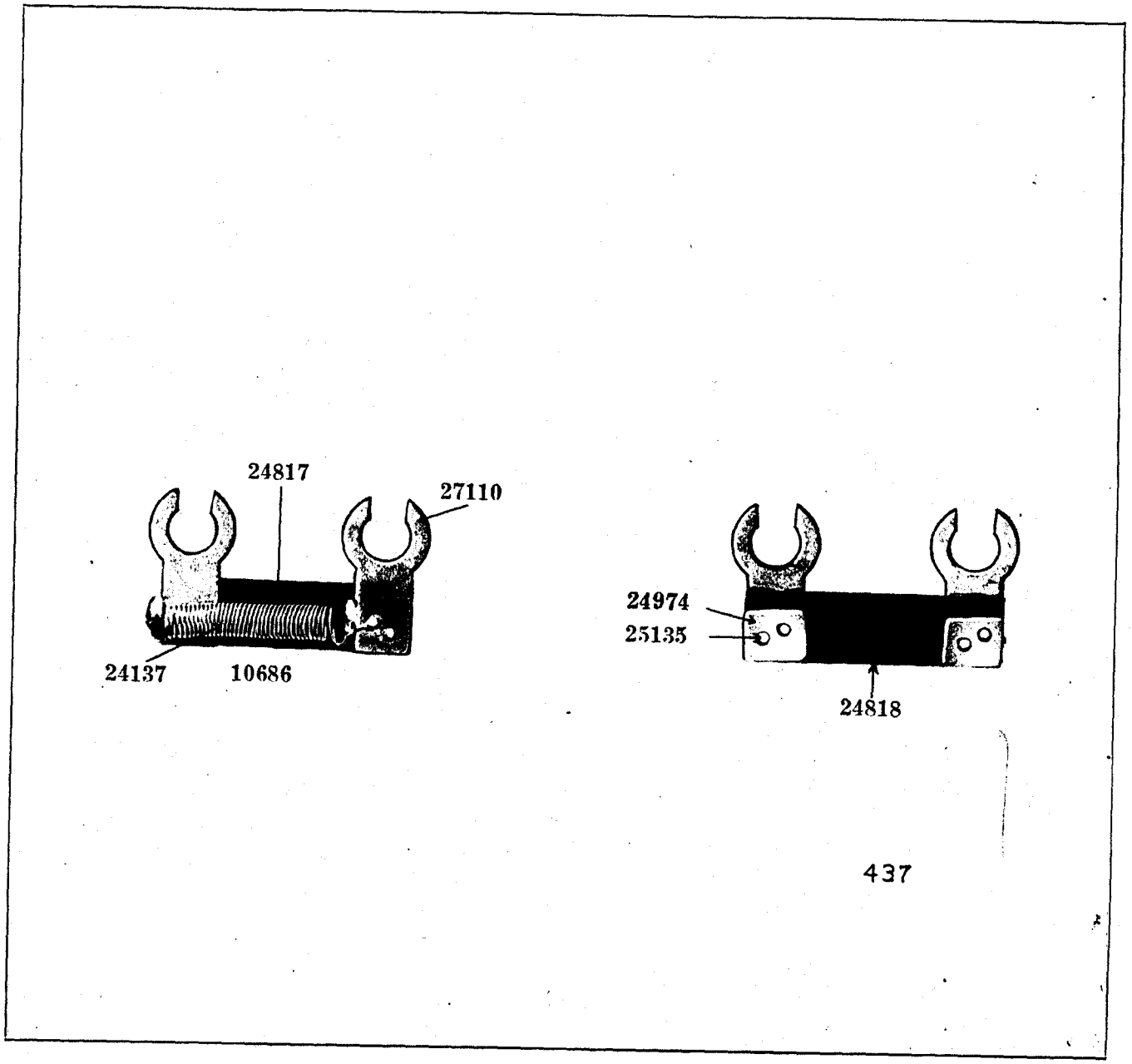
Piece Number	NAME OF PART	Quantity Required
10131	**TERMINAL BOARD ASSEMBLY COMPLETE** (Includes the next 6 Items)	1
10154	**Spring Terminal Assembly (Short)**	8
21301	Plate for Terminal Board Assembly 10131	1
21321	Connector for Spring Terminal Assembly 10154	3
21314	Screw for retaining Spring Terminal Assembly 10154 (Not shown in Illustration)	8
21333	Lock Washer for Screw 21314 (Not shown in Illustration)	8
10132	**Terminal Board Cover Assembly Complete** (Includes the next 2 Items)	1
21146	Nut for Cover 21290	2
20114	Lock Washer for Nut 21146 (Not shown in Illustration)	2
20953	Terminal Clip (Long)	1
21315	Terminal Clip (Short)	1
20117	Insulating Bushing for Plate 21301	2



No. 10678 RESISTANCE UNIT

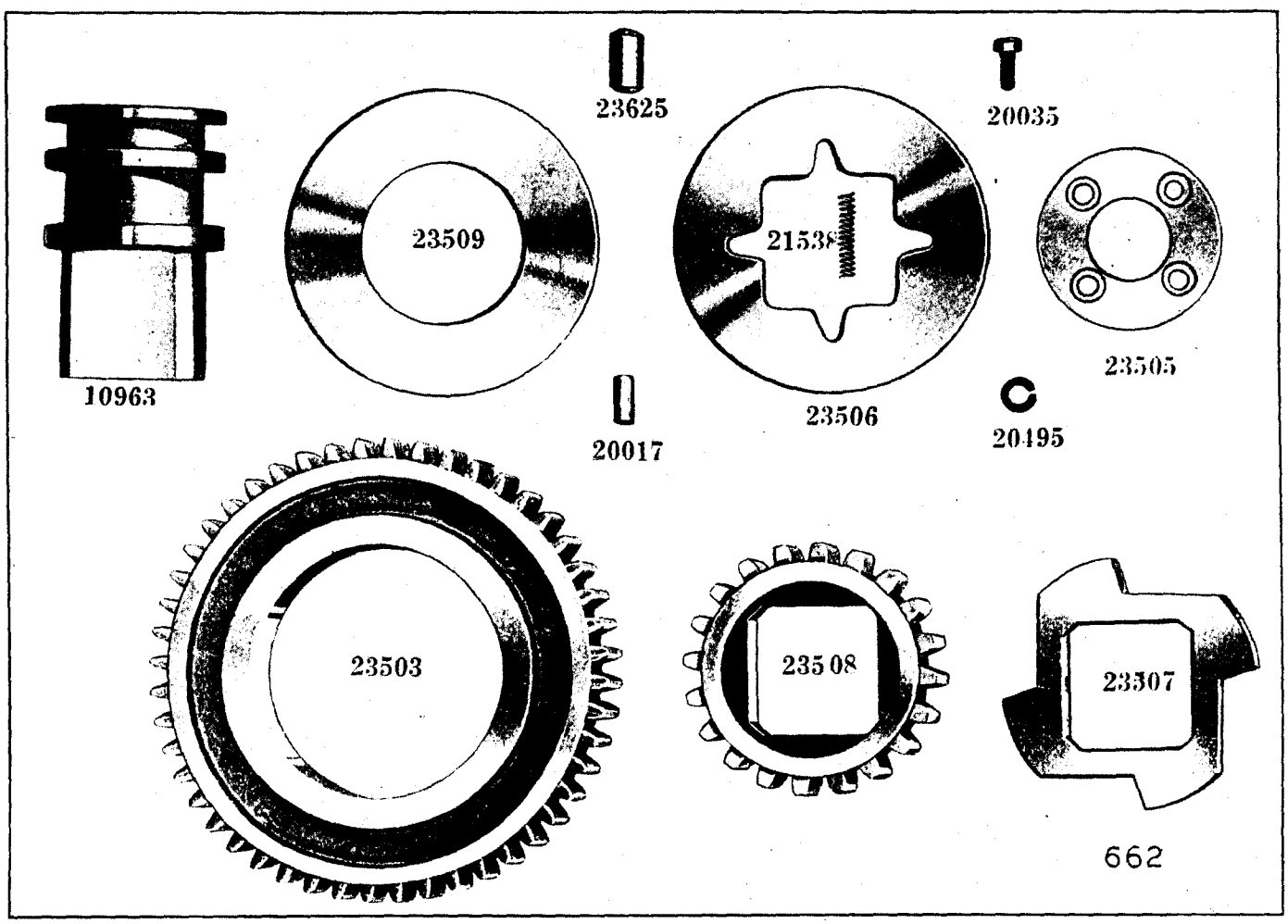
Note: No. 10678 Resistance Unit superseded by No. 10680 Resistance Unit. When ordering a complete new unit, order No. 10680.

Piece Number	NAME OF PART	Quantity Required
10678	**RESISTANCE UNIT ASSEMBLY COMPLETE** (Includes the next 7 Items)	1
24537	Plate for holding Spring Terminal Assembly 10707	1
10707	**Spring Terminal Assembly**	2
24548	Screw for attaching Spring Terminal Assembly 10707	2
24536	Protector for Coil 24137	1
24549	Screw for retaining Protector 24536	2
24137	Coil for Resistance Unit Assembly 10678	1
24224	Insulator for Coil 24137	1



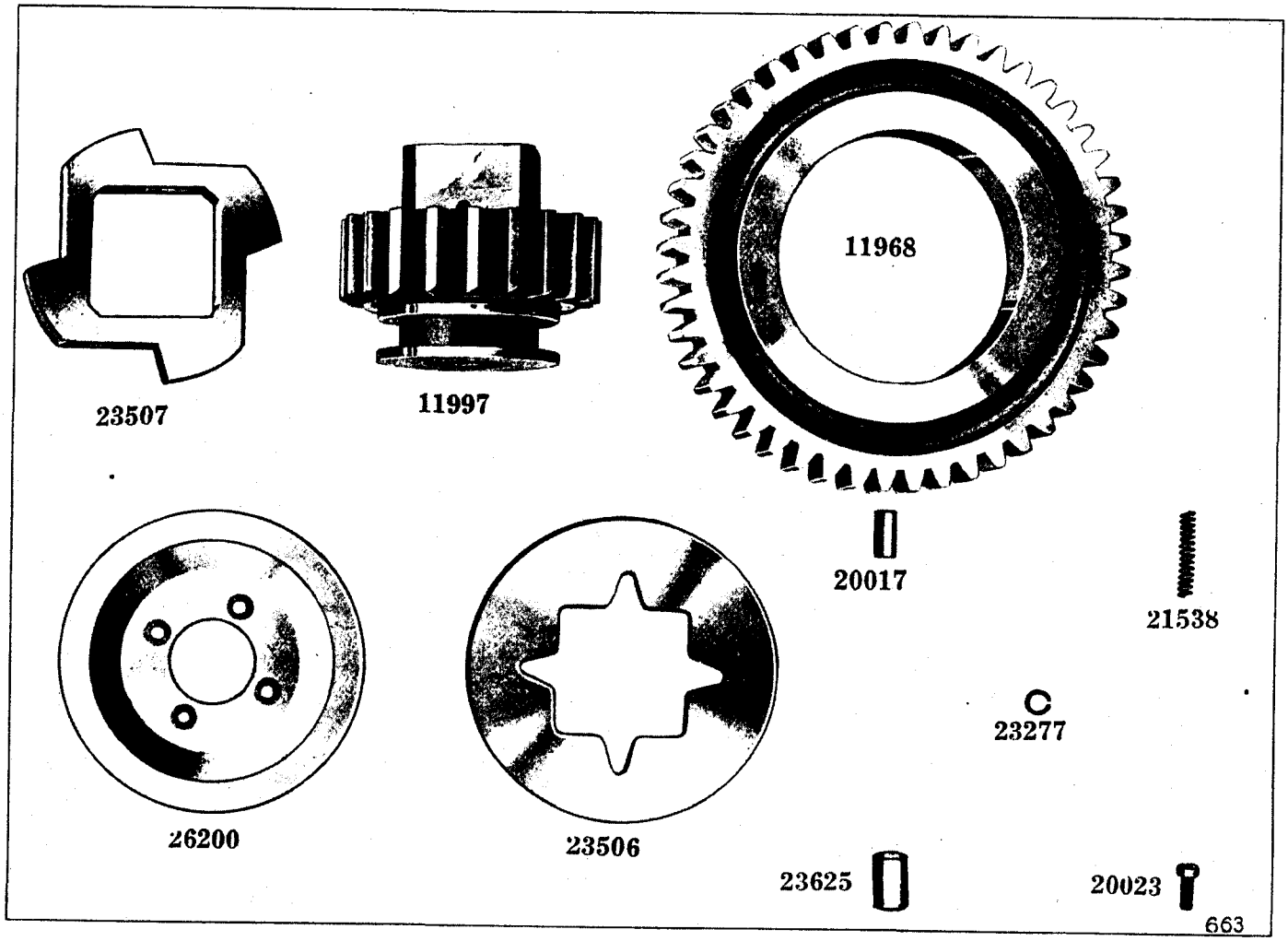
No. 10686 RESISTANCE UNIT

Piece Number	NAME OF PART	Quantity Required
10686	RESISTANCE UNIT ASSSEMBLY COMPLETE (Includes the next 6 Items)	1
24974	Plate for mounting Terminal 27110	1
27110	Terminal for Resistance Unit Assembly 10686	2
25135	Rivet for retaining Terminal 27110	4
24137	Coil for Resistance Unit Assembly 10686	1
24817	Insulator for Coil 24137 (Mica)	1
24818	Insulator for Coil 24137 (Black Fibre)	1



No. 10726 MOTOR CLUTCH

Piece Number	NAME OF PART	Quantity Required
10726	**MOTOR CLUTCH ASSEMBLY COMPLETE** (Includes the next 12 Items)	1
10963	**Sleeve Assembly**	1
23508	Pinion for Motor Clutch Assembly 10726	1
23503	Gear for Motor Clutch Assembly 10726	1
23507	Cam for Gear 23503	1
23625	Roll for Cam 23507	4
23509	Retainer for Roll 23625 (Large Hole) (Inner)	1
23506	Retainer for Roll 23625 (Small Hole) (Outer)	1
20035	Screw for Retainers 23506 and 23509	4
20495	Lock Washer for Screw 20035	4
23505	Clamp Washer for Pinion 23508	1
20017	Plunger for Roll 23625	4
21538	Spring for Plunger 20017	4



No. 11973 MOTOR CLUTCH

Piece Number	NAME OF PART	Quantity Required
11973	**MOTOR CLUTCH ASSEMBLY COMPLETE** (Includes the next 10 Items)	1
11997	**Pinion Assembly**	1
11968	**Gear Assembly**	1
23506	Retainer for Roll 23625 (Inner)	1
26200	Retainer for Roll 23625 (Outer)	1
20023	Screw for Retainers 26200 and 23506	4
23277	Lock Washer for Screw 20023	4
23507	Cam for Gear Assembly 11968	1
23625	Roll for Cam 23507	4
20017	Plunger for Roll 23625	4
21538	Spring for Plunger 20017	4