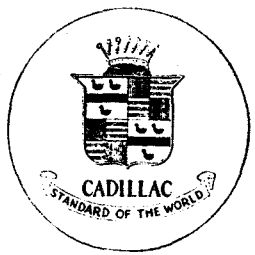
MANUAL

of

CARE AND OPERATION



1913

PRICE, 25 CENTS

Cadillac Motor Car Co.

Detroit, Michigan, U. S. A.

SIXTH EDITION

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Part I

OPERATION

AND

GENERAL CARE

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.

READ CAREFULLY THE FOLLOWING PORTIONS OF THIS BOOK

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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.

Fill the Water Circulating System

Remove the cap from the top of the radiator and fill the radiator 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.

In using anti-freezing solution, do not put in more than sufficient to cover the tubes to a depth of a half inch, as any in excess of that will be wasted, due to expansion.

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

Note:—In very cold weather it is a good plan to place a shield made of duck, rubber cloth or other suitable material over about half of the front of the radiator. This will prevent so much cold air striking it.

Gasoline System

To fill the tank take out the left seat cushion, raise the seat board and remove the cap from the tank. Clean gasoline, strained through fine wire cloth, should be used, as water, grit or lint will prevent the proper working of the carburetor.

To replace a seat cushion, first place the front end of the cushion down against the retaining strip on the front end of the seat, and then force the rear end of the cushion in place.

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

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 58 and other tests as high as 74. 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 *increasing* the supply of air. When a lower grade is used the carburetor efficiency is *increased* by *decreasing* the supply of air. In other words, the higher the grade or test of the gasoline the greater is the amount of air necessary. The supply of air to the carburetor is regulated by the screw "B" shown in illustration of carburetor.

INSTRUCTIONS

FOR STARTING AND OPERATING

TO START THE ENGINE

Be sure that the control lever is in neutral position and the emergency (hand lever) brake is set.

If the engine has been standing only a short time, first try to start on the spark as per directions in this book. See Index.

Do Not Prime the Carburetor

Do not prime the carburetor with the primer on the dash (except in extreme cold weather) until after you have tried to start the engine as follows:

Pull up the auxiliary air valve lever, which is on the steering post under the steering wheel.

Place the spark lever on center (marked "C" on sector) and place the throttle lever in its fully closed position.

Push in vibrator button on Delco switch on dash (marked "start").

Push in button which is on top of box containing the light switches and push forward on clutch pedal. This will bring the starter into operation, and cause the engine to "turn over."

As soon as the engine "fires," and commences to run under its own power, which should be in a few seconds, allow the clutch pedal to come all the way back, and push in the button marked "M" (Magneto) on the dash.

Push the air valve lever down as soon as the engine is warm enough to permit doing so.

Note This Particularly

If the engine doesn't start in 30 seconds, don't continue to crank. Look for the cause. You may have forgotten to put on the switch, or maybe you have no gasoline; no matter how sure you feel—look and see. We have been fooled ourselves.

The starter will crank the engine. Ignition and gas must be present to make it run.

In cold weather, if the engine is not started in 15 or 20 seconds, allow the clutch pedal to come clear back. This will stop the cranking operation. Now prime the carburetor, but be very careful not to prime it too much.

The primer should never be held down more than from 10 to 15 seconds. Then start the engine, following the instructions given.

When stopping the engine, it is a good plan to pull up the auxiliary air valve lever on the steering column, but push it down again as soon as the engine has actually stopped. Pulling the lever up enriches the mixture which is drawn into the cylinders and makes it easier to start the engine the next time.

In cold weather—(also in warm weather, providing the motor has been standing for some time)—starting will be facilitated if the auxiliary air valve lever is pulled up when starting the engine. The auxiliary air valve lever *should, of course, be pushed down* as soon as the engine is warm enough to permit doing so.

Caution

The action which causes the engine to "turn over" is produced by a gear of the electric motor sliding into mesh with the teeth in the face of the fly wheel, similar to the meshing of the teeth in the transmission. When pushing forward on the clutch pedal to throw these gears into mesh, if it should happen they should be in just such a position that the ends of the teeth in the starter gear come against the ends of the teeth on the flywheel, instead of the teeth in one sliding between the teeth in the other, be careful not to try to force them or you will strain something. Simply let the clutch pedal come back and try again and by that time they will probably have changed their relative positions sufficiently to allow the teeth to mesh properly.

TO START THE CAR

It will be seen 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 by 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.

tion

The operation of the clutch has purposely been made extremely easy. The driver therefore should not allow his foot to rest against the pedal while driving, because even a slight pressure may slightly disengage the clutch and cause it to slip.

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

To start car, 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. If the car is standing on a grade, it will be necessary to hold the car with the foot brake until ready to start.

Next, place the control or speed change lever in the section of the "H" plate which is marked "Low." Then open the throttle slightly by means of the accelerator pedal or by the throttle lever at the steering wheel, and let in the main clutch gradually by allowing your foot to come slowly toward you. After the car has gotten under way on low gear, release the clutch, and shift the lever into the section marked "Int." (intermediate). In shifting from low to intermediate gear, if you notice a tendency of the gears to clash, it will be advisable to pause for a moment in neutral position before shifting into intermediate. After the car has gotten under way on intermediate gear then release the clutch and 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), the throttle opened slightly and the clutch allowed to engage 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 shifting from high to intermediate speed in hill-climbing, or at other times, should it become necessary, first allow the car to slow down, and after disengaging the clutch, make the shift from high to intermediate speed quickly. Unless the shift from high to intermediate is made quickly, the difference in speeds between the two gears, which mesh to make intermediate speed, will be great, and consequently considerable noise will result.

While it is mechanically possible to shift from low to high speed, it is a bad practice, because this throws excessive strain on the high speed clutch connection. It is also bad practice to allow the main clutch to engage suddenly. This causes excessive strain on the entire driving mechanism. The clutch should always be allowed to engage gradually.

After the car has gotten under way, the speed may be controlled by the hand throttle or by the accelerator.

To Stop The Car

To stop the car—First close the throttle and disengage the main engine clutch by pushing forward on the left foot lever and apply the brake by the right foot lever. Next shift the control lever to neutral position. THIS MUST BE DONE. Then apply the emergency brake by means of the hand lever. Now place the spark lever (at the steering wheel) about half way between its extreme upward position and centre "C," and open the throttle about two inches or more. Push in the switch button on dash marked "off," at the same time pulling up on the auxiliary air lever. By following these directions, the car is in the correct position to be started on the spark.

To Start on the Spark

If the engine has been standing but a short time, it may be frequently started "on the spark." To start on the spark, place the spark lever at or near the "C" on the sector, and the throttle lever in its fully closed position. Push in the vibrator button on the Delco switch on the dash. If the vibrator does not vibrate, and the engine does not start, retard the spark lever to a point where the vibrator will start vibrating, afterwards quickly advancing the spark lever to the "C" on the sector. Retarding the spark lever brings the contact points in the timer together, completes the ignition circuit and causes a spark to occur at the spark plug in the proper cylinder for starting. If the engine fails to start "on the spark," it will be necessary to start in the regular manner.

HOW TO DRIVE

Driving an automobile does not mean simply starting, steering, applying the brakes and stopping. Pushing a wheelbarrow is one thing. Driving a more or less intricate piece of mechanism like an automobile necessarily is to some extent, and doing it right is quite another. To properly drive an automobile requires an understanding of the principles involved and the exercise of some intelligence and judgment.

We believe that we are safe in saying, that with well designed and correctly built automobiles, 95 per cent. of so-called troubles are directly traceable to abuse, lack of lubrication, 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 here 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 often ignore.

Taking it for granted that you have properly started the car, 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 engine, 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 engine 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 engine is 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 a vapor or gas. This gas is then drawn through the intake pipe and through the inlet valves into the cylinders of the motor, where it is compressed and 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 engine 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 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 takes place 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 engine, 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 the Cadillac there are two complete and independent ignition systems, each with its individual set of spark plugs. One is the Dynamo or Magneto, the other is the Delco distributor system with current from set of dry cells. The car may be operated on either system and changed from one to the other by simply pushing in the magneto or battery button on the dash switch as desired.

It will be seen that on the steering wheel there is a sector on which the outer ends of the throttle and spark levers rest. Just midway on this sector is stamped "C," meaning center. When the engine is running slowly on battery ignition, and the spark lever is set at "C" the charges of gas in the cylinders are being ignited just as the pistons reach their highest points.

When the pistons are at their highest position in the cylinders 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 it is loaded loosely.

But now there is another consideration.

If the electric spark were produced the very instant the contact in the timer 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 engine, 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 electricity which produces the spark is generated by the batteries for the Delco system or by the Dynamo, according to the system on which the car is running.

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 timer or distributor in whichever system the engine is running on.

A certain space of time is consumed from the instant the circuit is closed until the spark takes place 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 engine.

The lapse of time required to produce the ignition is always the same no matter whether the engine is running three hundred revolutions or two 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 about 20 feet per minute, up to as high as a rate of 1000 feet per minute, or fifty times as fast.

You will now realize that when the engine is running say 2000 revolutions per minute, the pistons are naturally traveling many times as fast as they do when it is running only 300 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, and that is when the piston is at its highest point.

Directly under the magneto timer is a ring governor. The governor is so constructed that the magneto spark is automatically advanced as the speed of the engine increases, and automatically retarded as the speed of the engine decreases. In this way, the "lag" in the magneto ignition system is automatically compensated for.

The magneto spark may, however, be advanced or retarded by the spark lever. (The spark lever is the shorter one).

When running on the magneto ignition system, it will seldom be necessary to move the spark lever after the correct spark lever position has been found. If it is found necessary at any time to run on the battery ignition system, however, the usual manipulation of the spark lever will be found necessary to get the best results from the engine.

The following instructions relative to the manipulation of the spark lever apply particularly when the engine is running on the battery ignition system.

If the engine be started on the magneto ignition the spark lever should be fully retarded.

Just how much the spark should be advanced, or rather how much spark advance the engine will stand, depends largely on how fast it is running. The faster the engine 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.

Furthermore, when the spark is advanced too far, a slight pounding noise in the engine 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 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.

We have now covered the subject of advancing the spark and the results of advancing 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 engine, always be very careful to see that the spark lever is at "C," or preferably slightly retarded, that is further up on the sector. If this caution is not observed and the spark should be advanced, that is below "C" on the sector, it would cause the charge in the cylinder to be ignited too early, causing undue strain on the starter.

With a retarded spark and a late explosion, the combustion or burning of the charge of gas is not complete. This causes a greater amount of carbon to be deposited on the wall of the cylinders, combustion chambers, piston heads, spark plugs, etc. It also causes the engine 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 cause 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 became necessary to replenish the water supply every twenty or thirty miles.

In two cases, the following was observed:

The first resulted from 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 second complaint was made because, as the complainant expressed it, "soon after the car was started the water ran out of the over-flow 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 engine is running normally. It is one of nature's laws that if the receptacle be 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.

The length of time that one filling of water or other cooling medium 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.

While it is not necessary that the radiator be always full, there should be at least one inch of water or other cooling medium above the tubes.

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 timer 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 top be raised, 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 engine 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 engine will permit, always being careful, however, to avoid advancing the spark too far.

To Coast

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

When descending a short grade, a good method is to close the throttle, shift switch to Battery system, 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 steep grades, 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 engine thus obtained is not sufficient, supplement it by the foot brake. Bear in mind that the more the resistance of the engine is used in coasting the longer the brake band linings will wear and the brakes retain their adjustment.

When descending a long grade with the engine used as a brake, the switch should be turned off to prevent heating of the engine which might occur if the spark be retarded.

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.

n'ts for Operating

Don't attempt to start the engine with the switch turned off or without gasoline in the tank.

Don't fill the lubricator on the engine, and neglect to lubricate all other parts of the car.

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

Don't advance the spark too far when starting the engine.

Don't allow the clutch to engage suddenly.

Don't apply the brakes suddenly unless absolutely necessary.

Don't prime the carburetor too much in warm weather.

Don't neglect to inspect the level of the acid in the storage battery every two weeks or every 1,000 miles.

Don't turn corners at high speed.

Don't neglect to keep the radiator filled with water, or with a good anti-freezing solution in cold weather.

Don't attempt to shift into reverse gear when the car is moving ahead.

Don't attempt to shift from high to intermediate gear when the car is running at a high rate of speed.

Don't attempt to shift from second to low gear unless the car is running very slowly.

Don't neglect to investigate any unusual sound which may develop in the car. The car should be immediately inspected by a Cadillac dealer.

Don't drive fast or attempt to stop suddenly on wet pavement.

Don't neglect to keep the tires properly inflated.

Part II

LUBRICATION

LUBRICATION

LUBRICATION AND ITS IMPORTANCE

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

All moving parts of the Cadillac car are manufactured with an unusual degree of accuracy and the parts are carefully assembled. In order to maintain the splendid running qualities of the car it becomes necessary to systematically introduce suitable lubricants between all surfaces which move in contact with one another.

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

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

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

The oiling diagrams shown in this chapter indicate 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 or grease. When they do, clean them out and be careful not to overlook them. Also be careful not to allow dirt or grit to get into any bearings.

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

LUBRICANTS

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

Cadillac Motor Oil

Cadillac Motor Oil is recommended and may be used both summer and winter. In the absence of Cadillac Motor Oil, Mobiloil A, Monogram Medium, or Amalie Non-Carbon Oil may be used during summer weather and Mobiloil Arctic Oil during winter weather.

The oil used should be a filtered one and not an acid or alkali treated oil. It should be refined from Pennsylvania crude or its equivalent.

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

Cadillac Rear Axle and Transmission Lubricant

Cadillac Rear Axle and Transmission Lubricant is recommended for the rear axle and transmission. In its absence we recommend a mixture of steam cylinder oil and a small amount of cup grease mixed to such a consistency that the mixture flows easily at temperatures from 60° to 70° Fahrenheit.

Cadillac Cup Grease

Cadillac Cup Grease is recommended for use in the grease cups. In its absence we recommend a neutral grease of medium consistency, made from an animal oil base.

Cadillac Wheel Bearing Grease

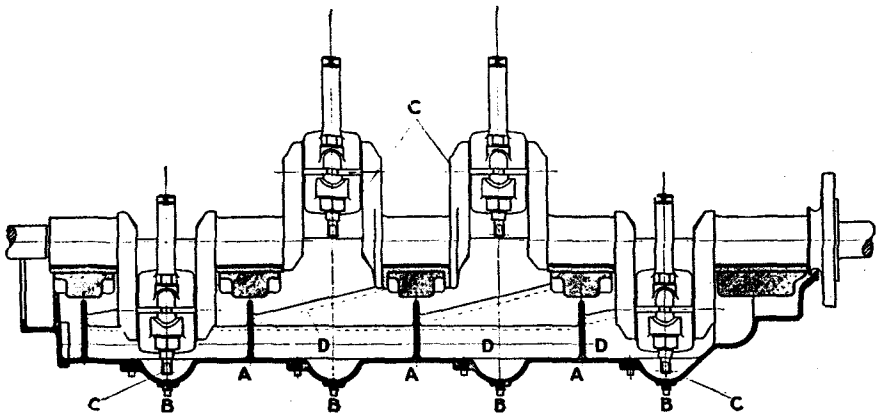
Cadillac Wheel Bearing Grease is recommended for the wheel bearings. In its absence we recommend neutral grease of vaseline consistency (soft), made from an animal oil base. Do not use a heavy grease for wheel bearings as it will roll away from the path of the rollers and will not return.

ENGINE LUBRICATION

We recommend Cadillac motor oil for this purpose.

The lubricating oi the Cadillac engine 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 right side of the engine, there is a lubricator tank or reservoir. See that this is filled as often as required. Attached to the lubricator cover are two pumps, one attached to the under side of the cover, and extending into the lubricator body, and the other fastened to the top face of the lubricator cover. When the motor is running, the pump inside the lubricator body draws oil from the lubricator, and forces it to the sight feed on the dash. The oil drops to the bottom of the sight feed, and is drawn out and forced into the crank case by the pump, which is fastened to the top face of the lubricator cover. The two pumps are connected by a common plunger. The quantity of oil which is supplied to the crank case is governed by the length of the stroke of this plunger. The longer the stroke of the plunger, the greater is the amount of oil forced through the feed pipe.

It will be seen that there is a hole drilled through the plunger and below the hole there is a nut which locks the adjustment. To adjust the stroke of the plunger, first loosen the lock nut, then with a piece of wire inserted in the hole, the stroke of the plunger may be lengthened or shortened as desired.

To increase the supply of oil, turn the plunger to the right (screw it down). To decrease the supply, turn the plunger to the left (screw it upward). After reaching the correct adjustment, be sure to lock it with the lock nut.

The quantity of oil which should be supplied to the crank case through the sight feed depends, of course, upon the amount the engine 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 five drops of oil into the sight feed for each two downward movements. This is for ordinary driving. For specially fast work or for long, hard pulling it will be well to increase it to about three drops or more for each movement of the pump plunger.

There is still another consideration. The 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, 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.

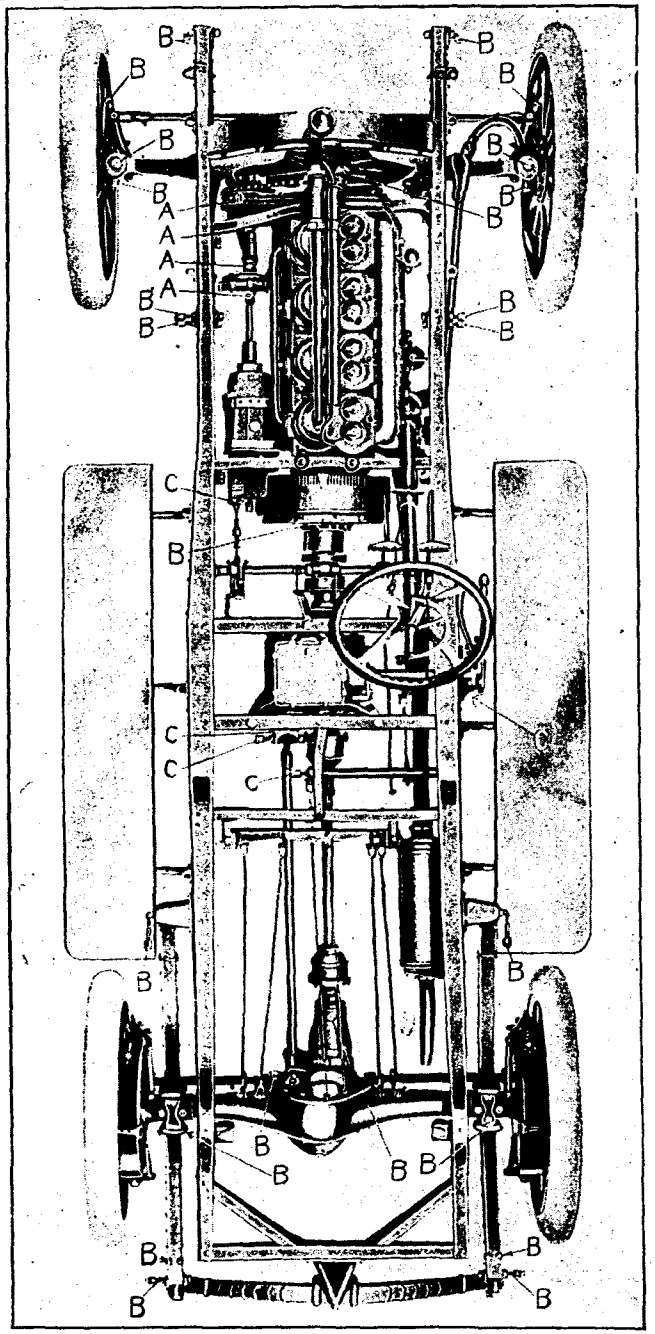
The sight feed glass may be cleaned by unscrewing it from its seat.

CARBON DEPOSIT

This is one of the greatest enemies to the engine 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 in the engine 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. Oft times 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, if 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. A 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 in alcohol.

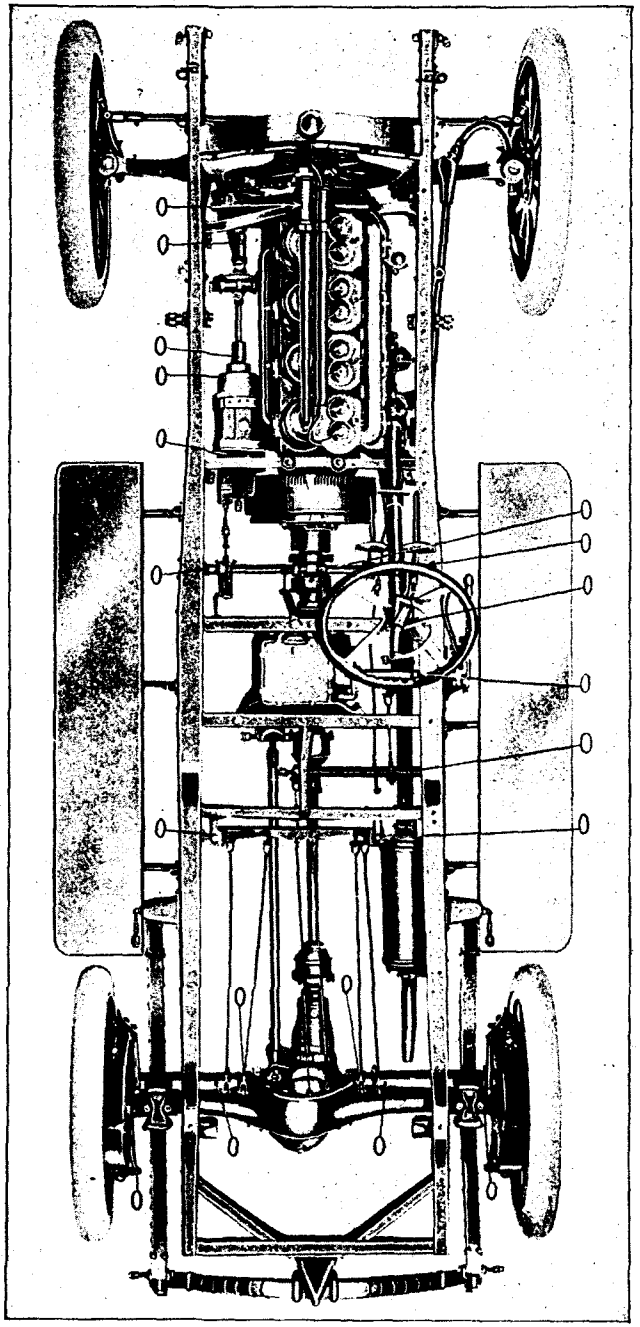


Each letter on the above view of the chassis indicates a grease cup.

"A" indicates that the cup should be turned down two full turns every 150 miles of travel.

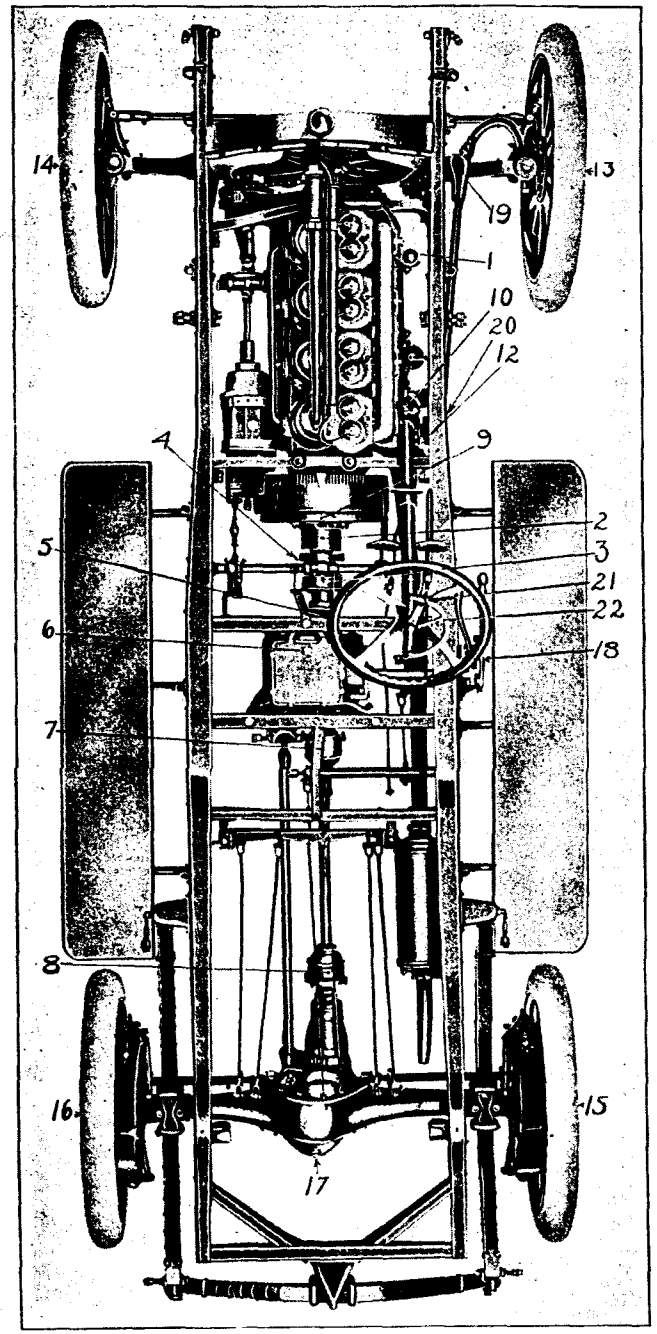
"B" indicates that the cup should be turned down about every 300 miles of travel and about half the contents of the cup injected each time.

"C" indicates that the cup should be turned down about every 500 miles of travel and the full contents of the cup injected.



The places marked on the above view of chassis indicate oil holes, where machine oil or gas engine oil should be applied every 300 miles of travel.

(NOTE.—*An arrow point on the end of a line indicates that the point of lubrication is underneath and does not show in the diagram.*)



The places marked on the above view of chassis should be lubricated in accordance with the following directions.

GENERAL LUBRICATION

Lubricator: 1

The lubricator which supplies the crank case should be supplied with motor oil as required. To fill it remove the cap which covers the filler hole.

Clutch Universal Joints: 2 and 3

These are the front and rear clutch universal joints respectively. To lubricate these, remove the plug screws and with an oil gun, fill the housings with cup grease about every 500 miles.

Clutch Thrust Ball Race: 4

Remove the plug screw and inject rear axle oil about every 300 miles.

Transmission Clutch Shaft Bearings: 5

Remove the plug and inject rear axle oil every two or three months.

Transmission: 6

The transmission gear case should always contain sufficient lubricant so that the under teeth of the largest gear will enter into it their full depth. Cadillac transmission lubricant is best for this. In its absence we recommend a compound of cup grease and motor oil mixed to such consistency that it flows very easily.

Drive Shaft: 7 and 8

These are the rear and forward universal joints on the drive shaft. Remove the plug screws and fill the housings with rear axle oil about every five hundred miles.

Spark and Throttle Levers: 21-22

Place the spark lever at the top and the throttle lever at the lowest point on the sector and put in a drop of oil occasionally so that it will run in and lubricate the friction plate which slides on the sector. If the spark and throttle levers seem to stick, rub a little oil on the sector where the friction shoes come in contact with it.

Also, place a drop of oil occasionally in the hole on the top face of the steering wheel spider, near the hub.

Clutch: 9

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.

Do not use ordinary oil on this part.

Steering Gear: 10-12

The internal mechanism of the steering gear should be lubricated about every three months. This can be done by removing the screw plugs, one in the side and the other in the rear of the steering gear housing. Rear axle oil with some flake graphite mixed in it is a good lubricant for this part.

Steering Rod Ends: 19 and 20

The steering rod ends which are encased in leather should be packed with cup grease once a year.

lco Electrical Apparatus

A little oil should occasionally be put on the top ball bearings of both magneto and battery timers. Do not put oil or grease on the cam of either timer.

About once a month take out the screws near the forward end of the case, remove the cover plate and wipe the commutators of the armature with a soft rag.

About once a month, or oftener if necessary, lift up the catch which retains the dust cover on the extreme forward end of the generator. Slip the dust cover forward, roll the clutch sleeve by hand until one of the oil holes comes uppermost and lubricate with light oil. Then roll the clutch sleeve another half turn and oil through the second hole. Replace cover.

heels: 13-14-15-16

About every three or four thousand miles, or at least once a year, all of the wheels should be removed and the bearings thoroughly washed and cleaned in either gasoline or kerosene oil, and should be examined to determine whether any foreign substance has gotten into the roller bearings that might damage them. The roller bearings should be thoroughly lubricated with a thin cup grease. (Do not use heavy grease because it will be rolled away from the path of the rollers and will not return.) Then the wheels should be replaced and adjusted as per instructions on that subject.

There is an oil cup in the hub of each wheel. Inject some motor oil here whenever you are oiling the car. Wipe the dirt from the cups first so that it will not get into the bearings.

ear Axle: 17

In placing oil in the rear axle housing, both the plug near the top of the rear axle cover, and the plug near the bottom of the cover should be removed. Oil should be poured into the hole near the top of the cover until it just starts to run out of the hole near the bottom of the cover. After oil has ceased running from the hole near the bottom of the rear axle cover plate, both plugs should be replaced.

The best lubricant for this part is Cadillac rear axle lubricant. In its absence we advise 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 should be just liquid enough to flow.

ontrol Lever H Plate: 18

Place a little oil occasionally wherever one part moves in contact with another; along the inside surfaces of the plate. Also between the bottom ends of the levers.

prings

In the tool kit of each car there is an appliance for forcing apart the leaves of the springs. This should be done occasionally and a mixture of oil and graphite inserted to prevent squeaking and rusting.

dditional

In addition to the places specially mentioned, note carefully and oil all of the small connections and joints throughout the car, such as the various connecting rod ends, the joints in the brake mechanism and the magneto advance shaft which runs from the lever attached to the steering gear housing to the magneto advance pull rod.

Remember that wherever one part moves in contact with another, the ease of movement will be assisted by lubricant and that wear will be reduced to the minimum.

Part III

ADJUSTMENTS

Adjustment of Carburetor

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. This may be accomplished by slightly changing the tension of the air valve spring by the adjusting screw "B."

The carburetor should not be tampered with unless you know that it needs attention. Before changing any carburetor adjustments, be sure that the electrical system is in perfect order. See that the spark plug points are the correct distance apart. Points on the battery spark plugs, which are those located over the exhaust valves, should be 3/64 inch apart, or possibly a little less. Points on the magneto spark plugs, which are located over the inlet valves, should be 1/32 inch apart. Also see that the spark plug cores are clean. See that the timers on both battery and magneto are properly set, that the points are clean, and in proper adjustment. Be sure that the batteries are not run down. See also that all electrical connections are tight. In fact, see that the entire electrical system is in proper working order.

When adjusting the carburetor always use the battery system.

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

1. Loosen the lock screw "A" and raise the finger "C" so that there is considerable clearance between the finger "C" and the air valve stem "D."

2. Adjust the air valve so that the knurled screw "B" is about ⅛ of an inch from being in its lowest position.

3. Open throttle lever about 2 inches on sector (at steering wheel), place the spark lever on center (stamped "C" on sector), and start engine on the battery system.

4. Run engine until the water jacket of carburetor is hot.

5. Move the throttle lever to a position which leaves the throttle in carburetor slightly open. Place the spark lever on center, and adjust the air valve screw "B" to a point which produces the highest engine speed.

6. Retard spark lever to the limit, close the throttle and adjust the throttle stop "E" to a point which allows the engine to run at a speed of 280 to 300 revolutions per minute.

7. Adjust the air valve screw "B" to a point which produces the highest engine speed. It is best to slightly favor the rich mixture side in making this adjustment.

8. Adjust the collar "F" on the throttle rod so that the throttle will start to open when the throttle lever at steering wheel is open about one-half inch.

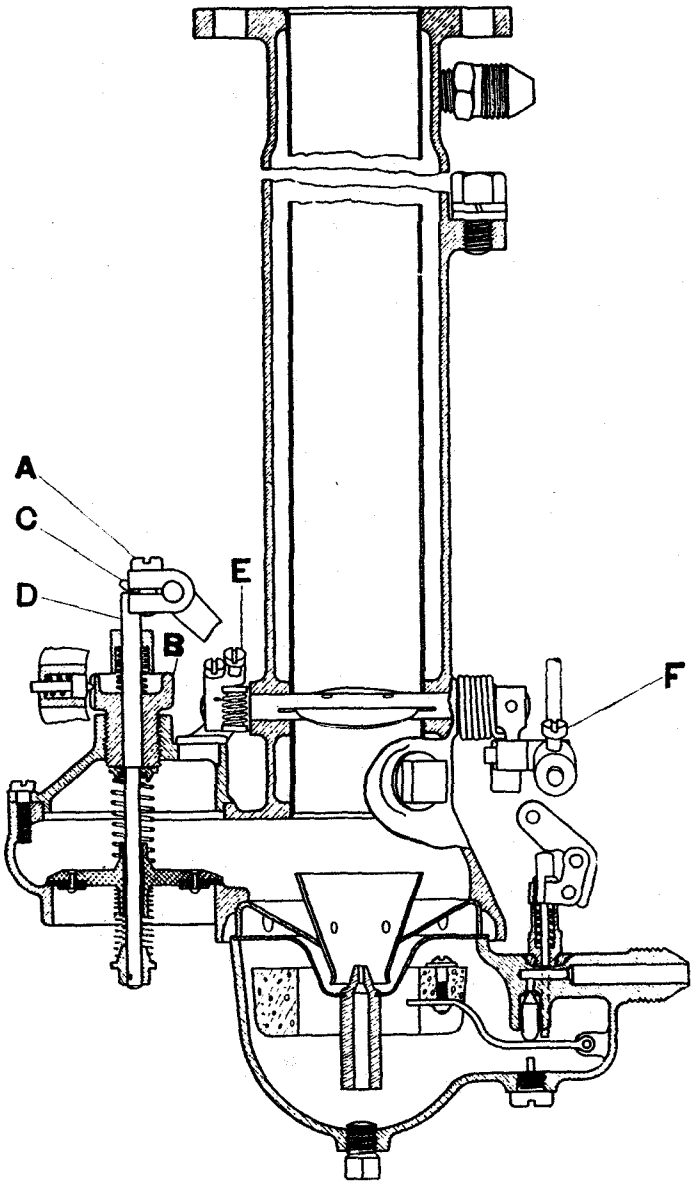
9. Place the air valve lever on the steering column as far forward as possible and adjust the finger "C" about one-sixteenth of an inch away from the air valve stem "D."

Personal Danger of Running Engine in Closed Garage

Carbon monoxide, a deadly poisonous gas, is present in the exhaust of gasoline engines. Increasing the proportion of gasoline to air in the mixture fed to the engine, in other words, enriching it, increases the amount of carbon monoxide given off at the exhaust pipe.

Because of the presence of carbon monoxide it is very dangerous to run the engine for any length of time while the car is in a small closed garage. If the doors and windows are open, the danger is very much lessened, but it is far safer, particularly if an adjustment of the carburetor is being attempted, to run the car into the open.

Serious personal injury may be caused by the presence of carbon monoxide in a garage if the percentage of it in the air is greater than a very small fraction of one per cent. Deaths resulting from the presence of carbon monoxide in garages have been reported.

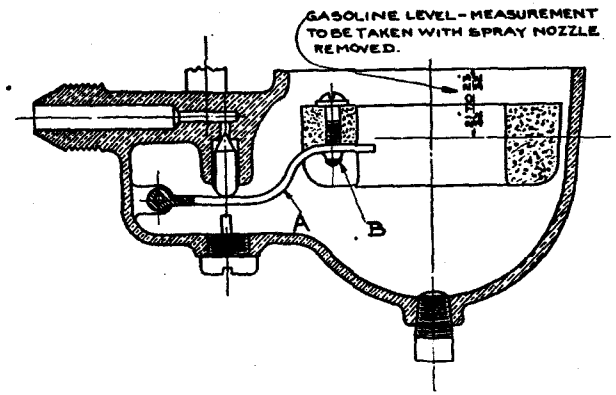


Carburetor

TO TEST GASOLINE LEVEL IN CARBURETOR

After the car has been used for some time there may be a slight amount of wear at the point of the needle valve and its seat. If this should occur the level of the gasoline in the carburetor bowl will rise.

The level of the gasoline in the bowl may be determined by removing the bowl from the remainder of the carburetor, attaching the bowl to the gasoline feed pipe and removing the spraying nozzle. When the bowl is held in a level position the distance from the top of the bowl to the liquid should be from 21/32 to 23/32 inch.

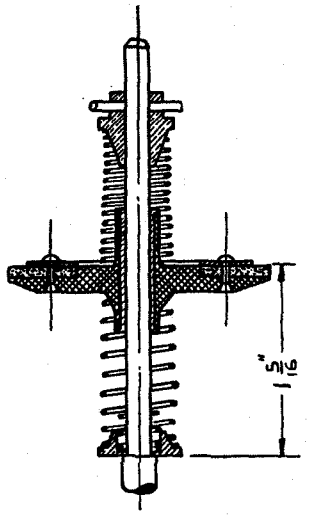


If, upon examination, it is found that this distance is less than 21/32 inch, it may be corrected by bending down slightly on the arm "A." If, on the other hand, the distance is found to be more than 23/32 inch, it may be corrected by bending up on the arm "A."

If it should be found necessary to remove the screw "B" to replace the float or for other reasons, the end of the screw should be shellaced at "B" when it is replaced. This will hold the screw from jarring out.

TO TEST AIR VALVE SPRINGS

The springs of the air valve may be used for a very long time without replacement, providing they are not tampered with. Should it be desired to test the air valve springs, this may be done as follows:



Remove the small cover over the air valve on the carburetor by removing the two small screws holding same to the carburetor body. Remove the small cotter pin near the top of the air valve stem and remove the air valve stem complete with valve and springs from the air valve stem adjusting nut. Hold the air valve in a position as indicated in the above cut. The distance from the leather face on the air valve to the under side of the collar on the air valve stem as indicated in the above cut, should be 1-5/16 inch. If this distance is found to be more or less than 1-5/16 inch, new springs should be substituted. It will be found far more satisfactory to substitute new springs than to attempt to make over the old springs.

DRAIN THE WATER

Where water is used as a cooling medium it should be drawn out about once a month, and clean water put in. It is also a good plan to have the water flow rapidly around through the cooling system to wash out as much sediment and dirty water as possible. In brief, it is best to keep the cooling water as clean as possible and prevent the sediment from settling and obstructing the pipes.

To drain the water, open the drain cock at the bottom of the radiator, and also remove the pipe plug in the inlet water pipe at No. 4 cylinder.

Remove the drain plug from the lower end of carburetor water jacket.

Also open the drain cock on the under side of the water pump.

CLEAN THE WATER STRAINER

At 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 sand, dirt, etc. When the strainer becomes clogged, it naturally retards the passage of water, and may cause over-heating of the motor. When this occurs, remove the hose connection at the bottom of the radiator, take out the strainer, clean and replace.

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. After it has reached the limits of its stretching, it will not require tightening so often.

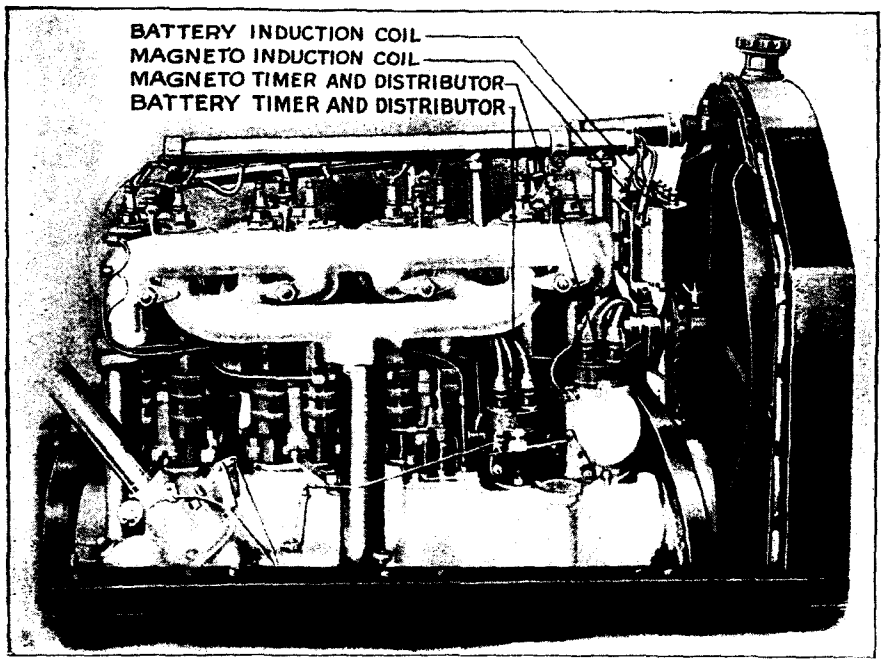
The belt should be adjusted so that it will not slip; at the same time it must not be so tight that there will be any undue strain on the bearings.

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 in alcohol.

In order to get the best results, points on the battery spark plugs, which are those located over the exhaust valves, should be 3/64 inch apart, or possibly a little less. Points on the magneto spark plugs, which are located over the inlet valves, should be 1/32 inch apart.

CADILLAC-DELCO ELECTRICAL SYSTEM



INITIAL CRANKING OPERATION

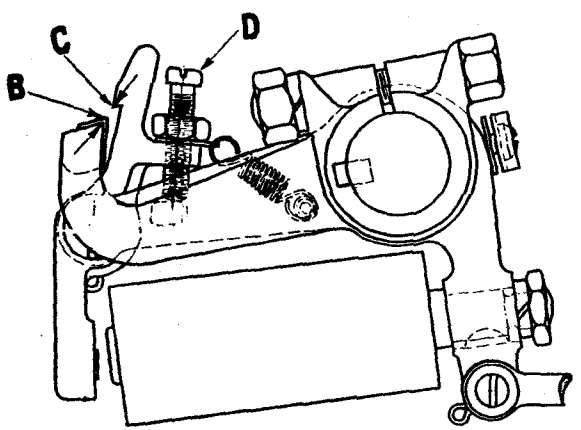
When the push button on the lighting switch box is depressed, it closes a circuit, and two things are accomplished:

Current flows from the storage battery through the magnetic latch coil circuit, and also flows through the generator windings, causing the armature to rotate slowly so that the starting gear will mesh into the motor pinion and with the teeth on the flywheel. The energizing of the magnetic latch coil causes the mechanism which operates the starting transmission and the generator switch, to be linked to the clutch pedal shaft, and consequently to be thrown into operation by the depression of the clutch pedal.

When pushing forward on the clutch pedal to throw these gears into mesh, if it should happen that they be in just such a position that the ends of the teeth in the clutch gear come against the ends of the teeth in the flywheel, instead of the teeth of one sliding between the teeth of the other, be careful not to try to force them. Simply let the clutch pedal come back a little, and try again. By that time they will probably have changed their relative positions sufficiently to allow the teeth to mesh properly.

ADJUSTMENT OF MAGNETIC LATCH

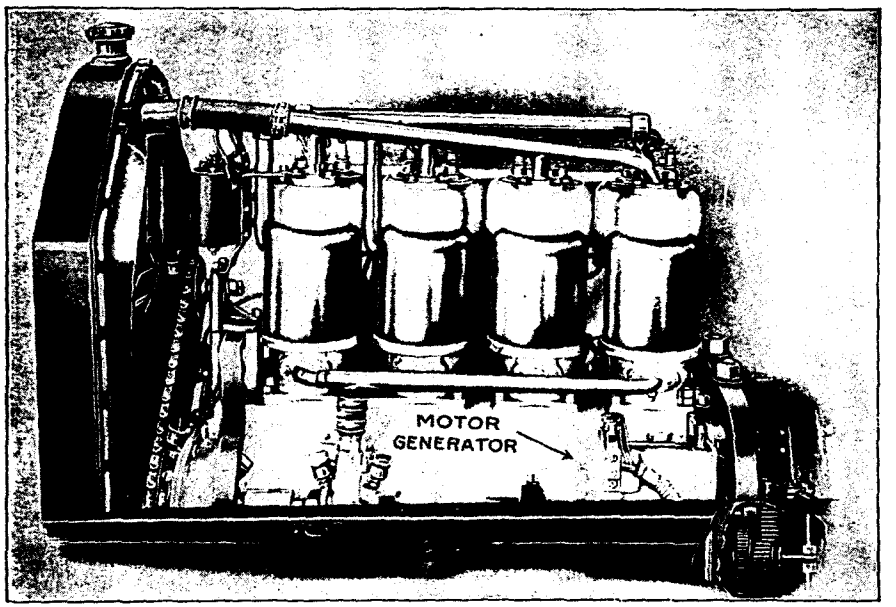
The magnetic latch pawl "C" should be so adjusted by the adjusting screw "D" that the arm "B" will pass the pawl "C" just allowing the point indicated by the arrows to clear each other when the main clutch is disengaged, and when the magnetic latch is in the disengaged position. Screwing up on the adjusting screw "D" decreases the distance between the points "B" and "C," and unscrewing the adjusting screw "D" increases the distances between these points.



Magnetic Latch

MOTOR-GENERATOR

In considering the motor-generator and its mechanical accessories, the functions, construction, and operation will be more readily grasped by viewing it first merely as an electric motor, with suitable means for transmitting power to the engine; and then as an electric generator, so arranged as to obtain power from the engine for revolving its armature.



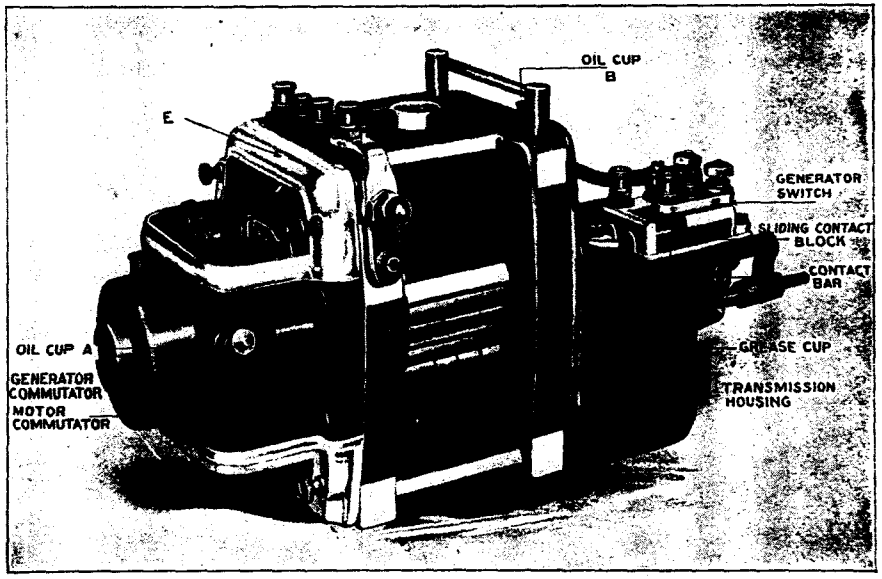
Engine—Left Side

Fig. 2

An analysis of the first condition shows simply a series wound motor, with a spur gear pinion upon the end of the armature shaft nearest the flywheel. Interposed between this pinion and the gear teeth cut in the periphery of the flywheel, is a pair of gears adapted to slide along and revolve upon an intermediate shaft. The sliding action causes one of these gears to engage with the motor pinion, while the other meshes with the gear teeth upon the flywheel.

There is a positive one-way clutch incorporated as part of the intermediate gear, for the purpose of permitting the engine to run ahead of the motor during the short time that the gears may be enmeshed while the engine is running under its own power. The total gear ratio between the armature shaft and the engine shaft is approximately 25 to 1 with the gear train above described in operation.

In performing its function as a charging unit, the motor-generator resolves itself into a shunt wound generator, driven from the engine by means of a shaft extended from the cam shaft gear housing. The generator is driven at crank shaft speed, and in order to compensate for the higher ratio when the unit is in starting relation to the engine, a second one-way clutch is provided adjacent to the forward housing. This clutch permits the armature to run ahead of the driving shaft.



Motor Generator—Cut Open View

Fig. 3

Fig. 3 shows the motor-generator with parts cut away in order to illustrate the construction.

Oil is conveyed to the ball bearings through oil cups "A" and "B." These should be given four or five drops of light oil about once a month. At the same time, the grease cup at the end of the transmission housing should be given one or two turns, or replenished if empty.

The generator commutator and motor commutator (Fig. 3) should be wiped off occasionally with a soft, smooth cloth, free from lint. These parts are made accessible by removal of the cover "E."

GENERATOR SWITCH

Location and Function

This unit, mounted upon the starter transmission housing (Fig. 4), serves, when in its forward position, to connect the generator windings with the battery and, when in its rear position, to complete a path for the current through the motor windings.

Description

The switch (Fig. 4) comprises a cover "A," carrying three conductors with terminals necessary for proper connection. Beneath this is mounted a sliding contact block "B," pressed against conductors in the cover and mounted upon an operating rod "C," the exposed rear end of which is connected by an arm to the transmission operating rod "D." The sliding contact block is not directly fastened to the pull rod, but is forced into its starting and operating positions by collars, a coiled spring "E" being interposed between the block and collar upon the forward end of the pull rod and the rear collar "F," abutting directly against the sliding block. A latch "G," engaging with pins upon the sliding block, serves to hold it in its forward position.

Operation

When the clutch pedal is depressed in starting, the inter-connected operating rods of the switch and transmission are pulled to the rear. The action of the switch operating rod is to first compress the coiled spring against the sliding block. When the pull rod nears the limit of its travel, the rear collar upon the switch rod trips the latch which retains the sliding block in its forward position, and the pressure of the coiled spring snaps the block into its rear position, permitting current from the battery to flow through the motor windings. It will be noted that the sliding block does not change its position until the sliding gears are fully meshed.

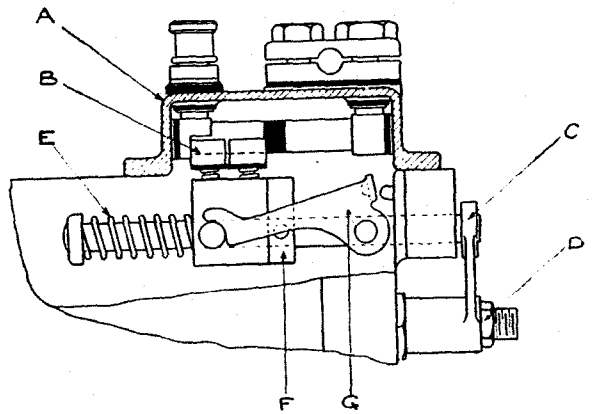


Fig. 4

Care

If the speed of cranking should gradually decrease, when the battery is in a fully charged condition, remove the cover "A." If contact blocks and contact bars are dirty, clean same, and if block or bars are pitted, grind in with valve compound. Then thoroughly clean and lubricate with a light oil.

VOLTAGE REGULATOR

Location

The voltage regulator (Fig. 5 and 7) is located under the battery box cover (Fig. 6).

Function

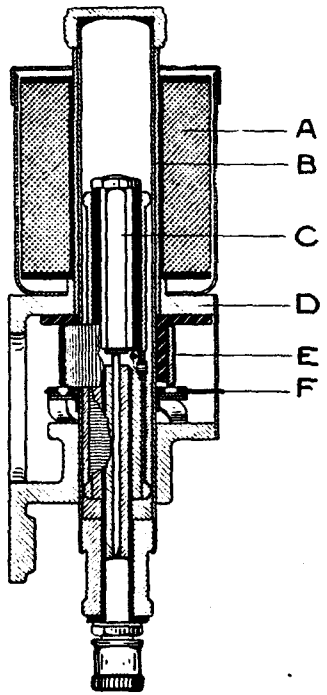
The Voltage Regulator serves to control the amount of current flowing from the generator to the storage battery.

Description

Reference to Figures 5 and 7 will make the construction of the device clear. A magnet coil "A" surrounds the upper half of the mercury tube (B) Within this mercury tube is a plunger "C," comprising an iron tube with a coil of resistance wire wrapped around the lower portion on top of mica insulation. One end of this coil is attached to the lower end of the tube the other being connected to a needle carried in the center of the plunger The lower portion of the mercury tube is divided by an insulating tube into two concentric wells, the plunger tube being partly immersed in the outer well, and the needle in the inner well. The space in the mercury tube above the body of mercury is filled with an especially treated oil, which serves to protect the mercury from oxydization, and to lubricate the plunger. A bracket "D" serves to support the parts described, and to enclose a variable resistance "E," operated by the lever "F" and connected in series with the magnet coil "A." Spring terminals are provided for making proper connections to magnet coil and the plunger-carried resistance.

Operation

Inasmuch as the voltage of the battery varies with its condition of charge, the intensity of the magnetic pull exerted by winding "A" upon plunger "C" varies and causes this plunger to move in or out of the mercury. When the battery charge is low, the plunger assumes a low position in the mercury tube, and vice versa. When the plunger is at a low position, the coil of resistance wire carried upon its lower portion is immersed in the mercury, and as the plunger rises the coil is withdrawn. Now, the current to the shunt field of the generator must follow a path leading into the outer well of mercury, through the resistance wound on the plunger tube, to the needle carried at the center of the plunger, into the center well of mercury and out of the regulator. It will be seen that as the plunger is withdrawn from the



Voltage Regulator
Fig. 5

mercury more resistance is thrown into this circuit, due to the fact that the current must pass through a greater length of resistance wire. This greater resistance in the field of the generator causes the amount of current flowing to the battery to be gradually reduced as the battery nears a state of complete charge, until finally the plunger is almost completely withdrawn from the mercury, throwing the entire length of the resistance coil into the field circuit, thus causing a condition of practical electric balance between the battery and generator, and obviating any possibility of overcharging the battery.

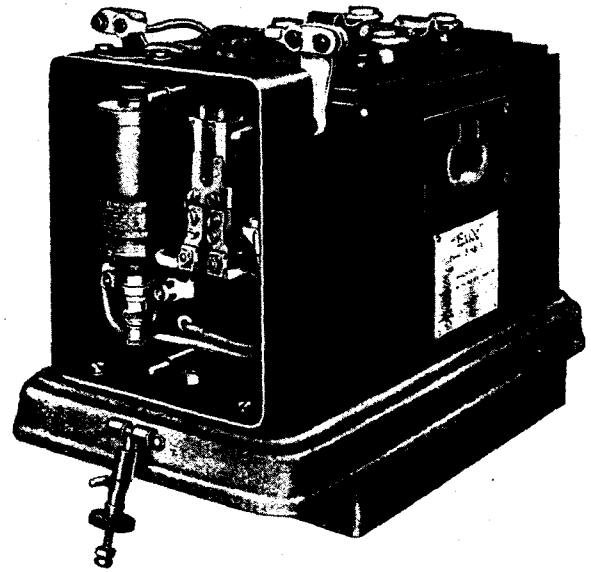
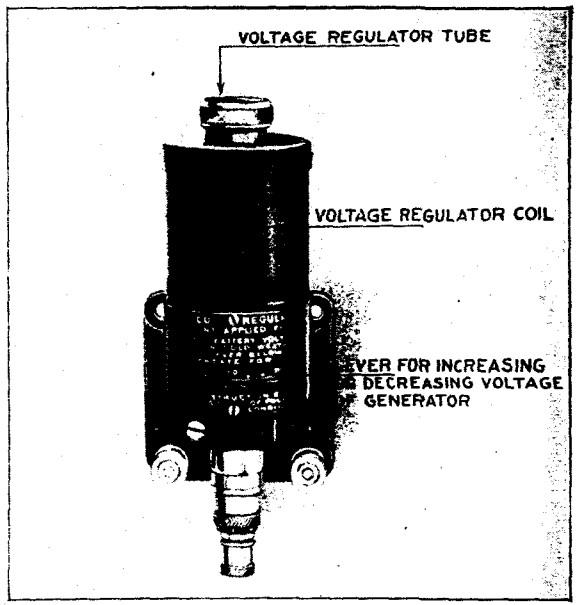


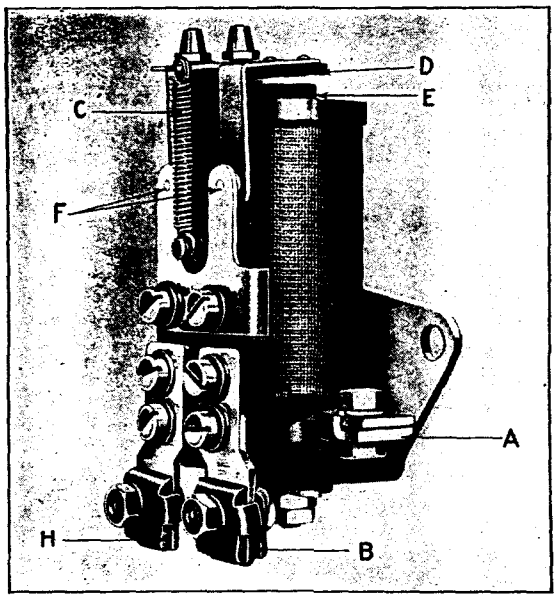
Fig. 6
Battery Box, Showing Position of Voltage Regulator

Temperature Compensation

Changes in temperature make it necessary to charge the battery at a variable voltage rate, a higher voltage being required in extreme cold weather than that which is proper for hot weather charging. This condition is cared for by the variable resistance, the operating lever of which is moved to the left when a higher voltage is desired (cold), and to the right when the voltage is to be reduced (hot). It is not necessary to alter this adjustment for slight temperature changes.



Voltage Regulator
Fig. 7



Cut-out Relay
Fig. 8

CUT-OUT RELAY

Location

The cut-out relay (Fig. 8) is located alongside of the voltage regulator in the apparatus box under the battery box cover (Fig. 6).

Function

The cut-out relay closes the circuit between the generator and the storage battery when the generator voltage is high enough to charge the storage battery. It also opens the circuit as the generator slows down and its voltage becomes less than that of the storage battery, thus preventing the battery from discharging back through the generator.

Description

The cut-out relay is an electro-magnet with a compound winding. The voltage coil or fine wire winding (terminals "A" and "H") is connected across the terminals of the generator. The current coil, or coarse wire winding (terminals "H" and "B"), is in series with the circuit between the generator and the storage battery, and is opened and closed at contacts "F."

When the engine is started, the generator voltage builds up, and when it reaches about 6 volts, a current passing through the voltage winding produces enough magnetism to overcome the tension of spring "C," attracting the magnet armature "D" to the core "E," which closes contacts "F." These contacts "F," which are in series with the coarse wire winding, close the circuit between the generator and the storage battery. The current flowing through the coarse wire winding increases the pull on the armature, and gives a good contact of low resistance at the contact points.

When the generator slows down and its voltage drops below that of the storage battery, the battery sends out a reverse current through the coarse wire winding, which kills the pull on the magnet armature "D," and the spring "C" will open the contacts "F," which will remain open until the generator is again started up.

The action of the cut-out relay is positive, and requires no adjustment.

AMMETER

Location

The ammeter (Fig. 9) is located on the driver's side of the dash between the ignition switch and the gasoline gauge.

Operation

When the starting switch button is depressed, the ammeter needle will momentarily indicate upon the "Discharge" side of the dial a current flow of from six to ten amperes. This is the amount of current necessary for starting the motor armature at a slow rate of speed for the purpose of meshing the starting transmission gears. After the initial rush of current, the reading will drop back to three or four amperes, and remain at this point as long as the push button on the lighting box is held down.

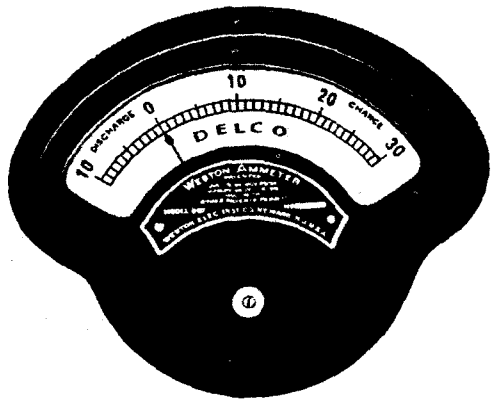


Fig. 9

As soon as the clutch pedal is depressed and the push button released, the ammeter needle should return to "zero." When the engine is running at a speed in excess of 300 R. P. M., the ammeter needle should move to the "Charge" side of the dial, indicating the amount of current being supplied by the generator to the storage battery, the lamps, if lighted, and to the magneto type ignition system, provided the "M" button on the ignition switch is depressed. The amount of current indicated on the "Charge" side of the meter when the car is running will depend upon the speed of the car and the state of the storage battery charge. If the car is being driven at a high rate of speed, with the battery pretty well discharged, the reading should be the maximum, or vice versa. In this connection, it is well to note that the Delco System charges the battery at a tapering rate, that is, a high amperage during the first portion of the charging operation. This rate is gradually reduced as the operation nears completion.

Care

The ammeter requires no attention, unless the needle fails to return to zero when no part of the system is in operation.

A corrector is provided on the front of the instrument which, when turned in the clockwise direction, advances the needle on the "Discharge" side of the dial, and when turned in the counter-clockwise direction advances the needle on the "Charge" side of the dial.

STORAGE BATTERY

General Description

The battery is designed especially for the Cadillac-Delco electrical cranking, lighting and ignition system and is made by the Electric Storage Battery Co. of Philadelphia, Pa., whose products for the trade are known as "Exide" batteries.

The specific gravity of the acid solution in the battery is an indication of the state of charge of the battery. (See under "Hydrometer Syringe.") In a fully charged battery the specific gravity should be from 1.270 to 1.290. If the specific gravity registers from 1.150 to 1.170 it indicates that the battery is practically discharged. A battery discharged below a specific gravity of 1.150 will not crank the engine nor will it burn the lights to full candlepower when the engine is not running.

Caution

Never run the engine with the storage battery disconnected or while it is off the car. Very serious damage to the motor generator may result from such action. Do not remove the motor generator without first disconnecting the storage battery.

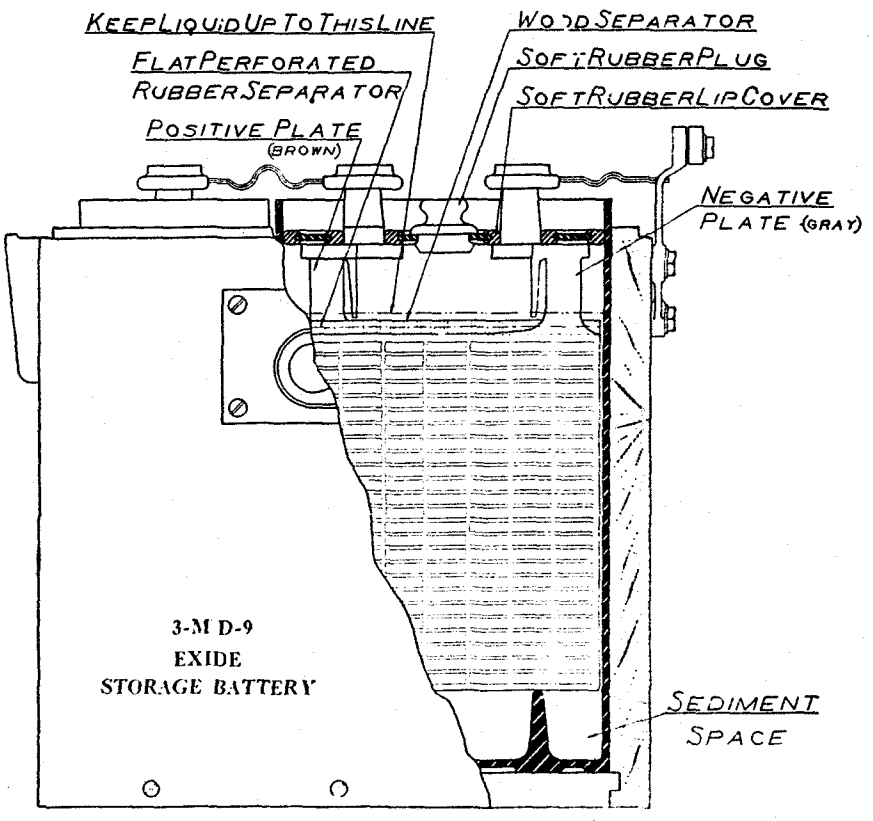


Fig. 10

ADDING WATER

The electrolyte must always cover the plates. Replace evaporation by adding *pure, fresh water. NEVER ADD ACID.*

Once every two weeks or every 1,000 miles, remove the soft rubber plugs (Fig. 10), and observe the height of the electrolyte. If below the acid line, add pure, fresh water with the filling syringe (Fig. 13) furnished for this purpose, bringing the liquid up to the proper height—3/8 inch above the tops of the plates—*but not higher.* Ordinarily it will require only a teaspoonful of water. In hot weather it may require more, but keep it up to this point.

The water must be pure

1. Distilled water,
2. Melted artificial ice, or
3. Fresh rain water.

Never keep the water in metal containers, such as a bucket or can. It is best to get a bottle of distilled water from your druggist, or an ice plant. A quart will last a long while. The whole point is to keep metal particles out of the battery. Spring water, well water, or hydrant water from iron pipes generally contains iron and other metals in solution, which will ultimately cause trouble if used.

CHARGING FROM AN OUTSIDE SOURCE

Battery Removed from Car

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

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

The diagram (Fig. 11) illustrates just how the connections should be made. The charge should be continued until all the cells have been gassing or bubbling freely for five hours, and there is no further rise in the voltage of the battery or specific gravity of the electrolyte over the same period. A battery in good condition in a discharged state will require about ten hours of recharging. If it has stood in a discharged condition for several weeks, it will require from twenty-five to fifty hours' charging, all depending upon the condition of the battery and the length of time it has stood discharged.

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

Putting Battery into Service Again

Before putting the battery into service again, inspect and add water, if necessary. If the battery has not been kept charged during the winter, it will be advisable to give it a 50-hour charge at a 5-ampere rate from an outside source before putting it into service again. Make sure that the terminals are free from corrosion and that good connections of the wires are made.

If the battery has been left on the car during the winter months, and received its periodic charges, it will not be necessary to give it any special attention other than to fill it to the proper height with distilled water. After the car has been driven for a number of hours, read the specific gravity of the electrolyte with the Hydrometer Syringe. It should register from 1.275 to 1.300 if the battery is fully charged.

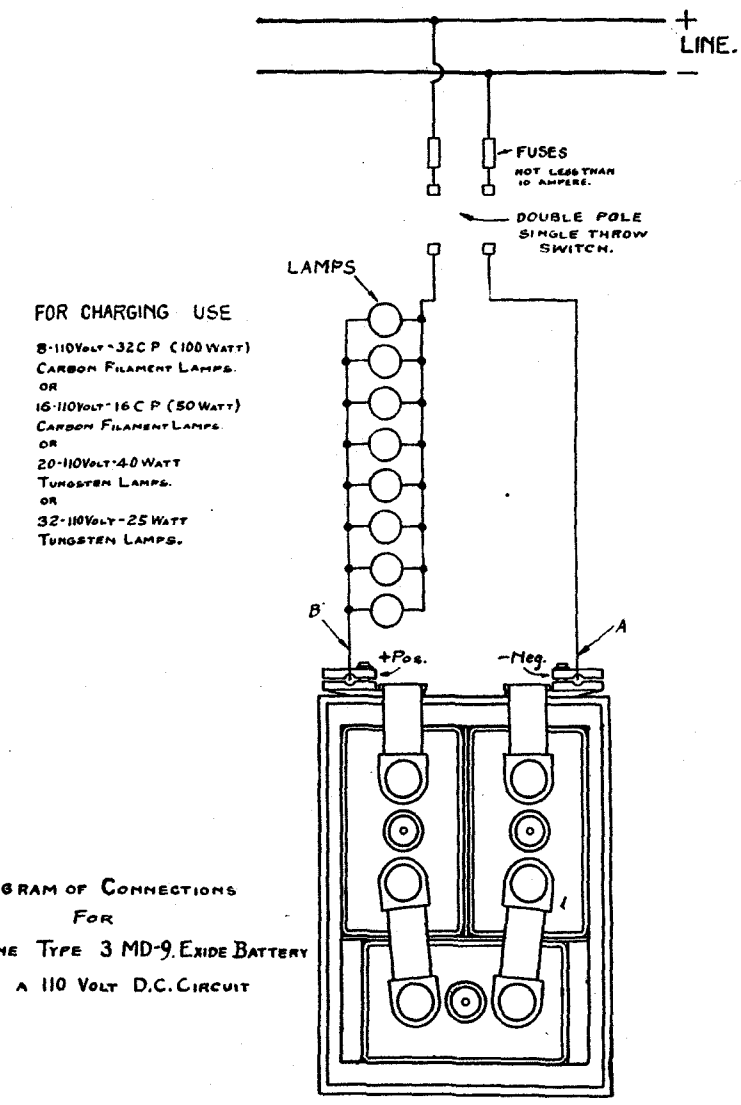


DIAGRAM OF CONNECTIONS FOR CHARGING ONE TYPE 3 MD-9 EXIDE BATTERY FROM A 110 VOLT D.C. CIRCUIT

Fig. 11

If electrolyte has been spilled from the cell, replace the loss with new electrolyte and follow with an overcharge, by running the engine for several hours, or charge the battery from an outside source (Fig. 11).

The specific gravity of the electrolyte to be used for replacing the loss when spilled from the cells, or due to broken jars, should be of the same specific gravity as that of one of the adjacent cells. This can be determined by the use of the Hydrometer Syringe (Fig. 12).

ELECTROLYTE

The proper specific gravity of the electrolyte, when the battery is fully charged, is 1.300, as indicated on the Hydrometer Syringe (Fig. 12), but a variation of from 1.275 to 1.300 is allowable. *Never add acid or electrolyte to the cells* except to replace loss from spilling, a broken jar or when removing sediment.

When new electrolyte is required, either to replace loss from spilling, or when removing sediment or replacing a broken jar, it can be made by mixing chemically pure sulphuric acid (1.840 specific gravity) and distilled water, in proportion of two parts of acid to five of water, by volume. *The acid must always be poured into the water, and not the water into the acid.* A glass, earthenware, or other acid-proof vessel, thoroughly cleaned, should be used for mixing, and the electrolyte allowed to cool before using. If a lower specific gravity than 1.300 is desired, more water should be added to the acid.

SEDIMENT

The sediment which gradually accumulates in the bottom of the jars should be removed before it reaches the bottom of the plates, as it is very harmful to the battery. The need of cleaning may be determined by inspection. Its necessity is indicated by lack of capacity, excessive evaporation of the electrolyte, and excessive heating when charging. When a battery requires removal of sediment, better results follow if the work is done at a place where they are thoroughly familiar with storage battery practice. If a battery is in need of cleaning or repairs, it is best to communicate with the Dayton Engineering Laboratories Co., who will advise you where to send the battery.

LAYING UP THE CAR FOR THE WINTER

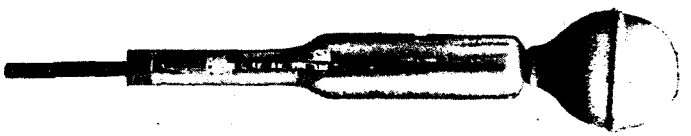
If the car is not to be used for some time, say the winter months or longer, care should be taken that just before the last time the car is used, water is added to the cells, if necessary, so that it will be thoroughly mixed with the electrolyte when the car is driven. When the car is laid up, the specific gravity of the electrolyte should register from 1.275 to 1.300. With this condition there will be no danger of freezing in any climate. The specific gravity of water is 1.000, and water freezes at 32° F. above zero.

The battery should be charged at intervals of every two months during the "out-of-service" period, either by running the engine, or charging from an outside source (Fig. 11). If either of the above is impossible, and there is no garage equipped for charging batteries to which the battery can be conveniently sent, the battery may be allowed to stand during the winter period without charging, provided the specific gravity of the electrolyte in the cells registers from 1.275 to 1.300 at the time the car is laid up. Much better results and longer life from the battery will be obtained by giving the periodic charges.

HYDROMETER SYRINGE

This instrument (Fig. 12) is for testing the specific gravity of the electrolyte of storage batteries. It is shipped unassembled, carefully packed in a substantial wooden box.

To assemble, hold the glass barrel, to which is attached the rubber bulb, in a horizontal position, and insert the hydrometer stem end first. Wet the soft rubber plug which is attached to the hard rubber pipette (nozzle) and *force rubber plug* grooved end first into the end of the glass barrel as far as it will go, or until it strikes the shoulder in the barrel. It is important not to force the pipette too much in making this attachment, as the end of the pipette must not extend beyond the base of the grooves of the rubber plug; otherwise the flow of the electrolyte will be retarded in emptying the Hydrometer Syringe.



Hydrometer Syringe

Fig. 12

Directions for Using

After removing the soft rubber plug from the cover of the cell, compress the rubber bulb of the syringe and insert the pipette in the solution of the cell to be tested. Holding the instrument as nearly vertical as possible, gradually lessen the pressure on the bulb until the electrolyte rising in the barrel causes the hydrometer to float. In general, only enough electrolyte should be drawn to float the hydrometer free of the bottom by about one-half to three-quarters of an inch. The specific gravity reading is taken on the hydrometer at the surface of the electrolyte in the glass barrel.

If the electrolyte is below the top of the plates, or so low that enough cannot be drawn into the barrel to allow of a proper reading of the hydrometer, fill the cell to the proper level (see Fig. 10) by adding pure water; then do not take a reading until the water has been thoroughly mixed with the electrolyte. This can be accomplished by driving the car for several hours.

The specific gravity of the electrolyte is an indication of the amount of charge in a battery. In a fully charged battery the specific gravity should be from 1.275 to 1.300. When the specific gravity registers from 1.150 to 1.175, the battery is practically discharged, and should be re-charged.

Hydrometer Syringes are not a part of the electric system, but can be purchased upon application to the Cadillac Motor Car Co., The Electric Storage Battery Co., or The Dayton Engineering Laboratories Co.



Filling Syringe

Fig. 13

MAGNETO DISTRIBUTOR AND TIMER

Location and Function

This unit is carried just above the lubricator, near the forward end of the engine (Fig. 1). Built in this unit is the mechanism for automatic control of timing. The timer serves to control the proper interval of time between the sparks, and as the primary contact through the timer is made, the distributor makes the contact in the secondary circuit, insuring a spark in the cylinder which is in firing position.

The automatic advance mechanism maintains a fixed relation between engine speed and angle of spark advance.

The distributor consists of a cap or head of insulating material, carrying one high tension contact in the center, with four similar contacts spaced equi-distant about this center, and a rotor, which maintains constant communication with the central contact. The rotor carries two contact buttons, one of which serves to close the secondary circuit to the spark plug in the proper cylinder, and the other merely to ground any induced current which may flow in the secondary circuit of the cylinder next in firing order.

Directly beneath the distributor is the timer, which consists of a cam with four lobes or projections and a swinging arm pressed outward by the lobes of the cam to make a contact which completes the primary circuit.

The shaft which transmits motion to the timer is in the form of a tube. A helical slot is cut through the wall of this hollow driving shaft. A smaller shaft, revolved by the engine gears, is carried inside this hollow shaft. A vertical slot is cut through this shaft. A pin, held by a collar which is adapted to slide upon the outside of the hollow timer shaft, passes through both the straight slot in the small shaft and the helical slot in the hollow shaft. Obviously, if the collar holding this pin be moved along the hollow shaft, it will change its angular relation to the smaller shaft, and this change in relative position of the two shafts affects the advance of the spark timing.

In the automatic system, the position of this collar is governed by a centrifugal device, comprising a spring loaded revolving ring which, as the speed increases, moves from an angular position toward a horizontal position.

This ring is connected to the sliding collar, and causes it to rise—advancing the spark as the engine speed increases; or to fall, retarding the spark as the engine speed decreases. (The spark position may be governed by the spark lever above the steering wheel if this be desirable.)

As a rule, the best point for setting the spark lever on the steering wheel sector is that when once determined by the operator of the car, it need not be changed, as the automatic advance mechanism should take care of the proper retarding of the spark for hill climbing and heavy pulling, also advancing for high speeds.

The position from which the automatic governor begins controlling the spark may be regulated by the spark advance lever on the steering wheel, as it has been found impossible to provide a full automatic control of the spark which will compensate for variations in gravity of gasoline and other conditions which cannot be held constant.

The condenser, which is attached to the outside of the housing, is a simple assembly of metal foil and insulating material. It need not be further described, as it will require no attention.

The distributor requires no attention save an occasional wiping of the contacts with a soft, smooth rag, free from lint.

The head of the distributor may be removed by pressing back the metal tongue at the side, rotating the head counter-clockwise until the notch in the rim of the head coincides with the tongue, and then lifting the head straight up.

The rotor may be removed by lifting straight up. The timer mechanism is exposed by the removal of this rotor.

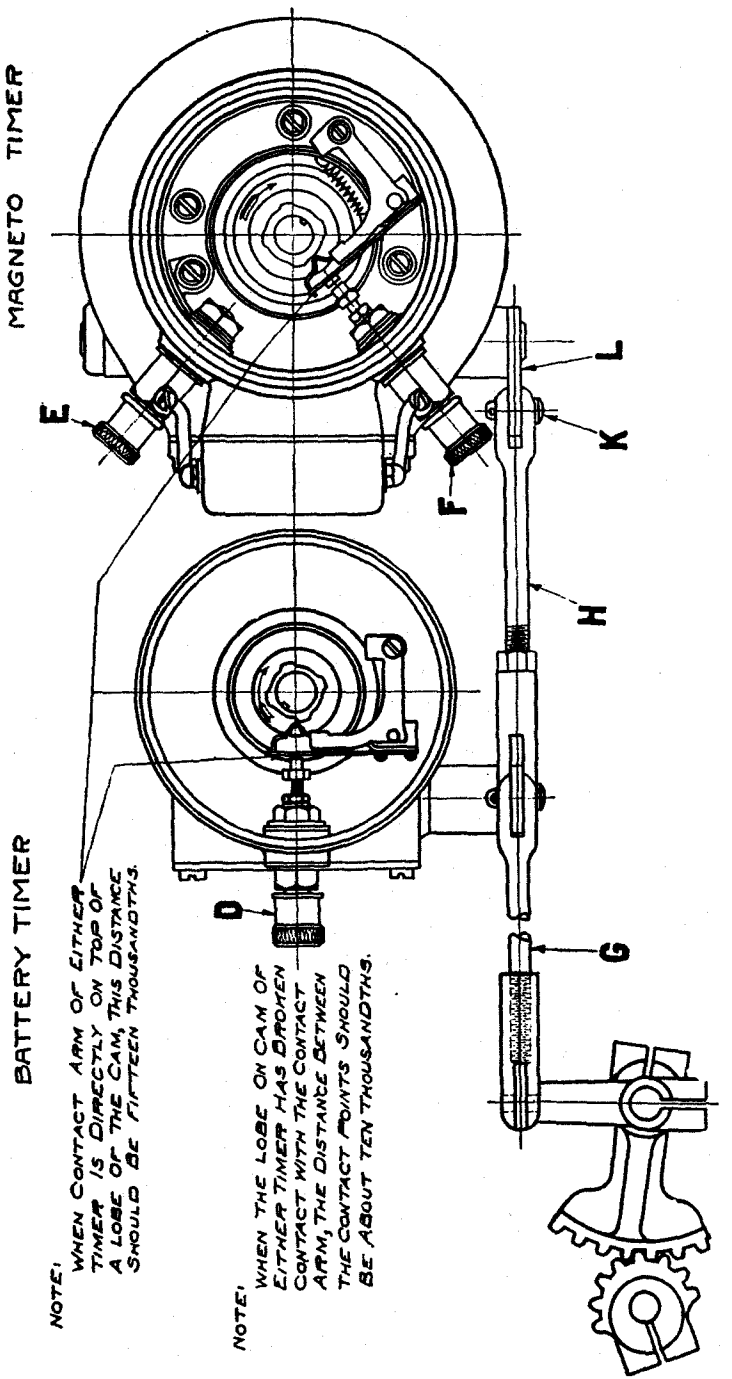


Fig. 11

BATTERY DISTRIBUTOR AND TIMER

This unit is located just behind the magneto distributor (Fig. 1), and serves the same functions in connection with the dry battery system as does the distributor just described in relation to the magneto type ignition. The construction is similar to that of the magneto distributor in all details, except the advancing mechanism, which is not automatic, but is controlled entirely by the spark lever above the steering wheel, and the condenser is omitted.

The same care should be given as prescribed for the other distributing unit. The spacing indicated by Fig. 14 should be maintained in connection with timer contacts. A few drops of light oil should be applied occasionally to the ball bearing directly beneath the timer cam.

THE MAGNETO AND BATTERY COILS

Location and Function

These coils are mounted in front of the engine (Fig. 1), and serve to transform the low voltage current in the primary circuits to a current of high tension in the secondary circuits.

Description

They consist simply of primary coils of coarse wire in comparatively few turns, and secondary coils of many turns of fine wire, with the necessary terminals and insulation.

Care

No attention is necessary, except an occasional inspection to insure that the terminals are tight.

RESISTANCE UNIT

This is a coil of resistance wire (Fig. 16), mounted with terminals upon the terminal board in front of the dash. Under ordinary conditions the wire remains cool, and offers little resistance to the passage of current. However, if for any reason the primary circuit of the magneto type ignition should remain closed for any considerable length of time, the passage of current through the coil would heat it, thus increasing its resistance to a point where very little current could pass, and insuring against waste of current from the battery and damage to the induction coil and timer contacts.

IGNITION RELAY WITH COVER REMOVED

Location and Function

This unit is mounted in front of the dash (Fig. 16). It is connected in the battery ignition circuit, and serves to break the primary circuit immediately after it is completed through the timer, thereby inducing a high tension flow through the secondary circuit, which results in a spark at the plug.

Description and Operation

Reference to Figs. 24 and 25, in connection with the following description, will enable the reader to understand the parts of the ignition relay and their functions.

Magnet "C" attracts armature "A" when the current is completed through the timer. This armature when attracted by magnet "C," forces contacts "P" apart, breaking the primary circuit.

There are two windings upon magnet "C," one of comparatively coarse wire, so connected that current ceases to flow through it when the contact through "P" is broken; and the other of comparatively fine wire, connected around contacts "P" in such a way as to hold the armature after the current is broken through the coarse wire coil. If this second coil were not effective, the contacts would vibrate, giving a shower of sparks at the plug instead of the single spark. This is done in starting only, as it is wasteful of current if continued under running conditions. A cylindrical condenser is mounted beside the magnet coil.

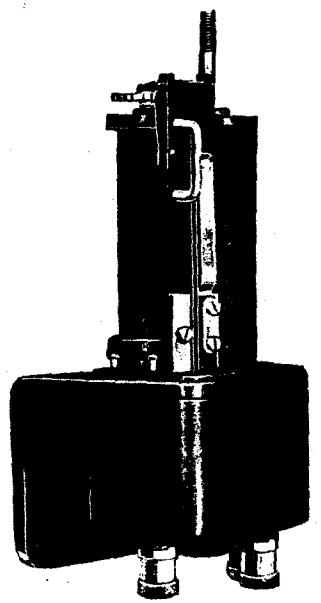


Fig. 24

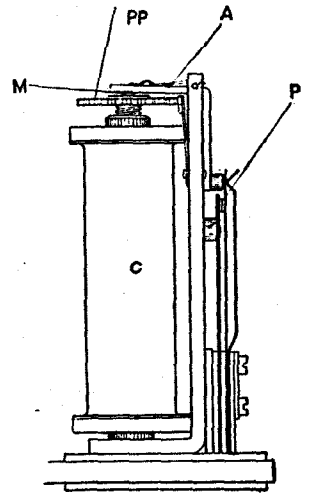


Fig. 25

Ignition Relay with Cover Removed

Care and Adjustment

As the ignition relay is of rather unusual construction, trouble is often attributed to it which really results from sources entirely outside the relay. Loose connections, grounded wire and weak batteries may cause improper working of the relay, through no fault of the device itself. The only point of adjustment in the relay is the pole piece "PP." This regulates the distance between armature and magnet pole, and the gap between contacts "P." Adjustment is made by turning the notched head clockwise, as one looks down upon it, to increase the gap between contacts, and vice versa. Normally, this adjustment should be such that the distance between contacts "P" when armature "A" is pressed down is about equal to the thickness of one sheet of paper on which this booklet is printed. A simple way in which this adjustment may be made, is to turn the notched head of the adjusting screw in the counter-clockwise direction until the motor stops firing. Then turn it four or five notches in the opposite direction. *Under no condition should the adjusting screw be turned very far in either direction.*

If particles of dirt get between the armature and pole piece at the point "M," they may be removed by slipping a piece of smooth paper between the parts mentioned, pressing down lightly upon the armature and pulling out the paper.

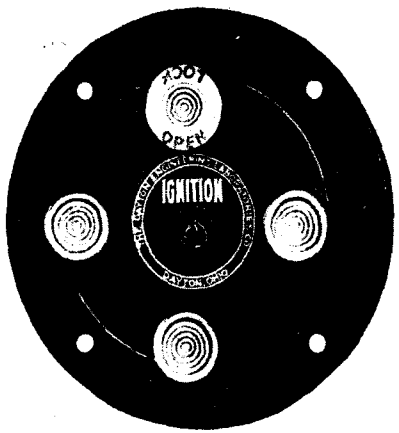
If the armature "A" vibrates rapidly when button "B" on the ignition switch is depressed, the holding coil circuit is open. Test out the circuit. In emergency, connect two terminals closest together on the relay with a wire. This will stop trouble if the break is outside of the relay.

If the armature vibrates freely, it indicates either weak batteries or dirt between either the relay or timer contacts.

If a cylinder misses, do not look for trouble in the relay. It acts in the same capacity for all cylinders. If it acts for one, it will function for all cylinders.

IGNITION SWITCH

This switch (Fig. 15) is mounted on the dash, and serves to make the necessary combinations for ignition. There are four buttons which operate plungers. The button marked "START" should only be used in starting the engine, as it establishes connections which give a shower of sparks across the spark plug points. This is necessary only in starting and would waste the current from the dry cells if used when running.



Front View of Ignition Switch

Fig. 15

The button "B" when pressed in throws the dry battery ignition into operation. Depression of button "M" will cause button "B" to spring out, cutting off the dry battery ignition when the generator ignition is in use. The "OFF" button when pushed in releases any other button which may be depressed, and cuts off ignition current from any source.

The switch is equipped with a Yale lock, and is closed by turning the key in the clockwise direction. It is opened by turning the key in the counter-clockwise direction.

The "OFF" button is provided with a locking device, which is made effective by rotating the button, the periphery of which is knurled for this purpose.

The words "LOCK" and "OPEN" are stamped on the face of the button.

When the word "LOCK" is turned to the bottom, the buttons cannot be depressed; but when the word "OPEN" is at the bottom, any one of the buttons may be pushed in.

When the switch is open, it may be locked by turning the "OFF" button half-way in the counter-clockwise direction, and vice versa.

WIRING

A. To 1 on storage battery (negative).
B. Wires to left headlight.
C. (Yellow wire) to 14 on dash.
D. (Red wire) to 4 on voltage regulator.
E. (Green wire) to 6 on cutout relay.
F. (Green wire) to latch coil.
G. (Red wire) to carbon on dry cell.
H. (Green wire) to zinc on dry cell.
I. (Red wire) to 18 on relay.
J. (Green wire) to 3 on battery coil.
K. (Yellow wire) to 1 on generator.
L. (Green wire) to 4 on controlling switch.
M. (Black wire) to 4 on generator.
N. (Green wire) to 3 on generator and magnetic latch coil.
O. (Red wire) to 3 on controlling switch.
P. Lighting wires.
Q. (Yellow wire) to 21 on switch.
S. (Black wire) to 23 on switch.
T. (Black wire) to 17 on relay.
W. (Yellow wire) to 16 on relay.
Y. (White wire) to 8 on magneto distributor.
Z. (White wire) to 13 on dash.
X. Ground wires to switch.
AA. (White wire) to 20 on switch.
BB. (Black wire) to 1 on magneto coil.
CC. (Black wire) to 7 on dash.
DD. (Red wire) to 10 on dash.

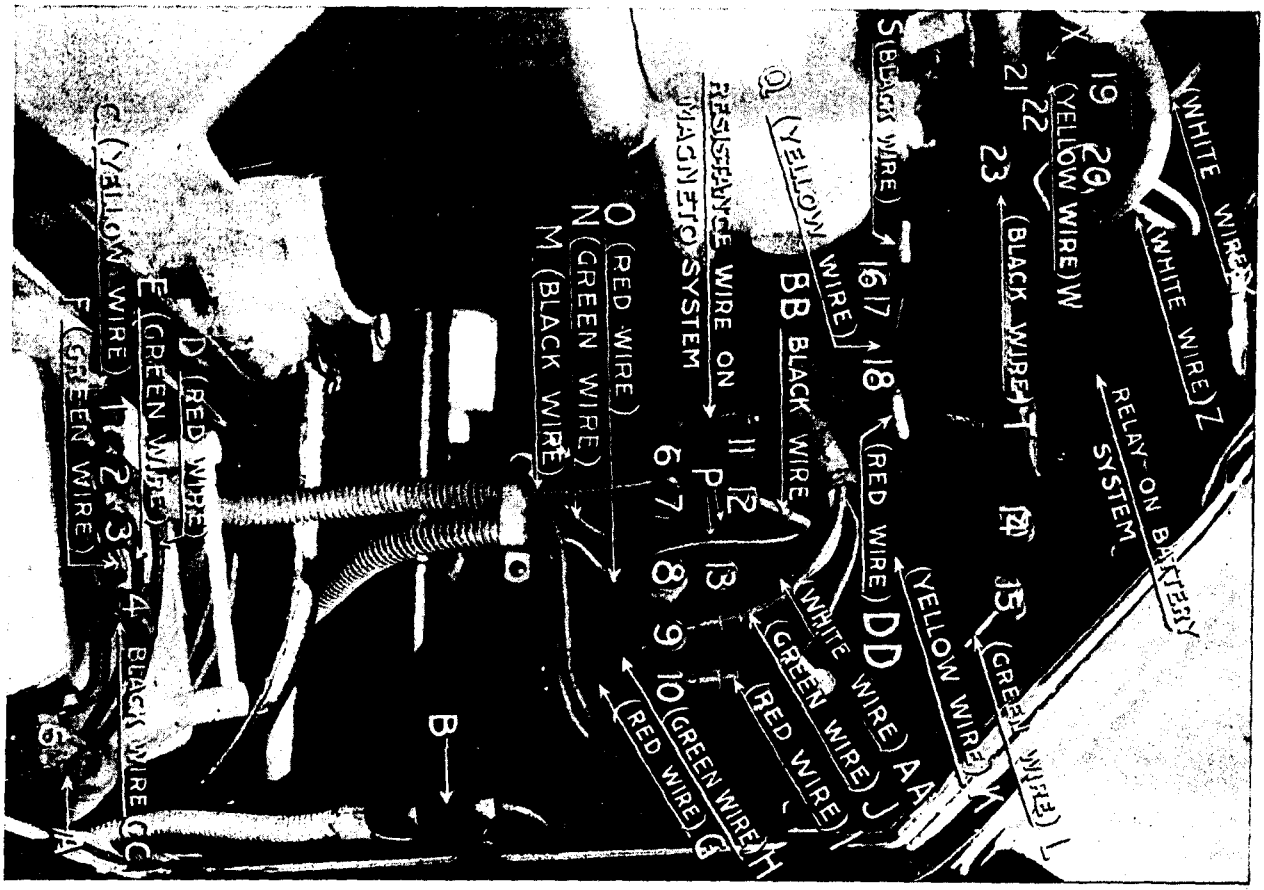


Fig. 16

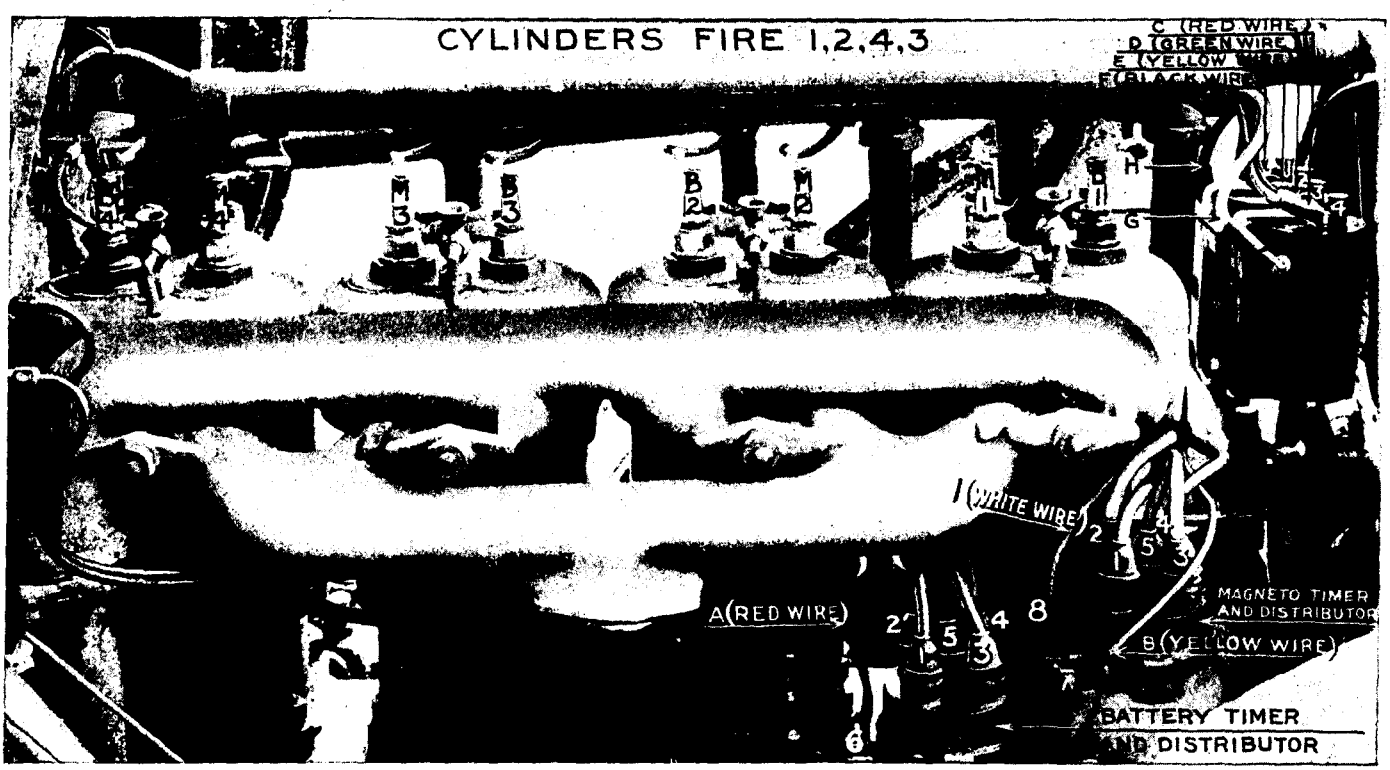


Fig. 17

A. (Red wire) to 4 on battery coil.
B. (Yellow wire) to 2 on magneto coil.
C. (Red wire) to 6 on battery timer.
D. (Green wire) to 9 on dash.
E. (Yellow wire) to 7 on magneto timer.
F. (Black wire) to 12 on dash.
G. To 5 on battery distributor.
H. To 5 on magneto distributor.
I. (White wire) to 19 on dash.

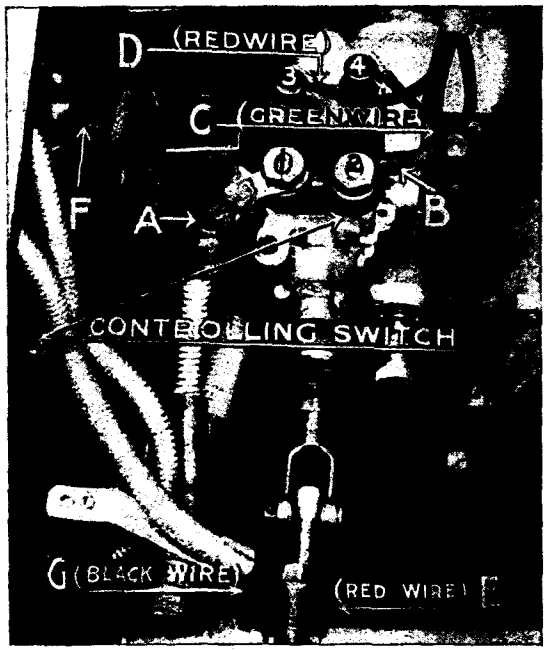


Fig. 18

A. To 2 on storage battery (positive).
B. To field on motor.
C. (Green wire) to 15 on meter on dash.
D. (Red wire) to 8 on dash.
E. (Red wire) to junction box on body.
F. Connection for electric horn.
G. (Black wire) to 3 on generator.

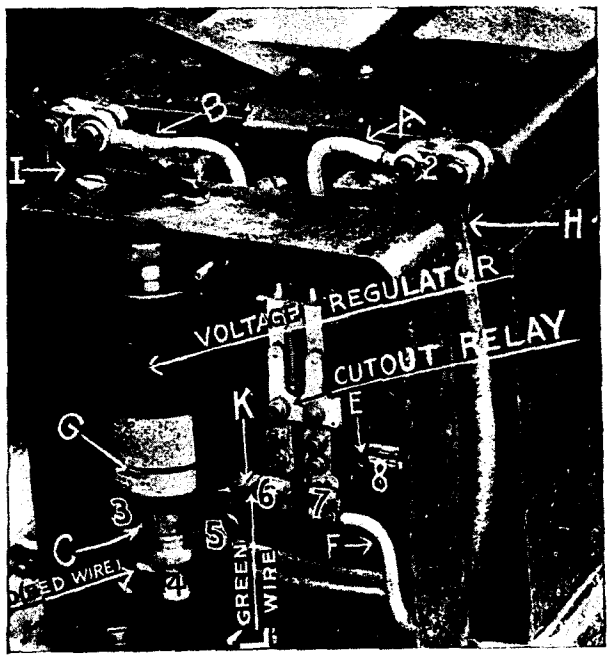


Fig. 19

A. To 8 on cut out relay and 3 on voltage regulator.
B. To 7 on cutout relay.
C. To 8 on cutout relay.
D. (Red wire) to 2 on generator.
E. To 2 on storage, and 3 on voltage regulator.
F. To 1 on storage battery.
H. To 1 on controlling switch (positive).
I. To 5 on generator (negative).
L. (Green wire) to 3 on generator.
K. Jumper wire between 6 on cutout relay and 5 on voltage regulator.

G. *Temperature Compensation*

Changes in temperature make it necessary to charge the battery at a variable voltage rate, a higher voltage being required in extreme cold weather than that which is proper for hot weather charging. This condition is cared for by the variable resistance, the operating lever of which is moved to the left when a higher voltage is desired (cold), and to the right when the voltage is to be reduced (hot). It is not necessary to alter this adjustment for slight temperature changes.

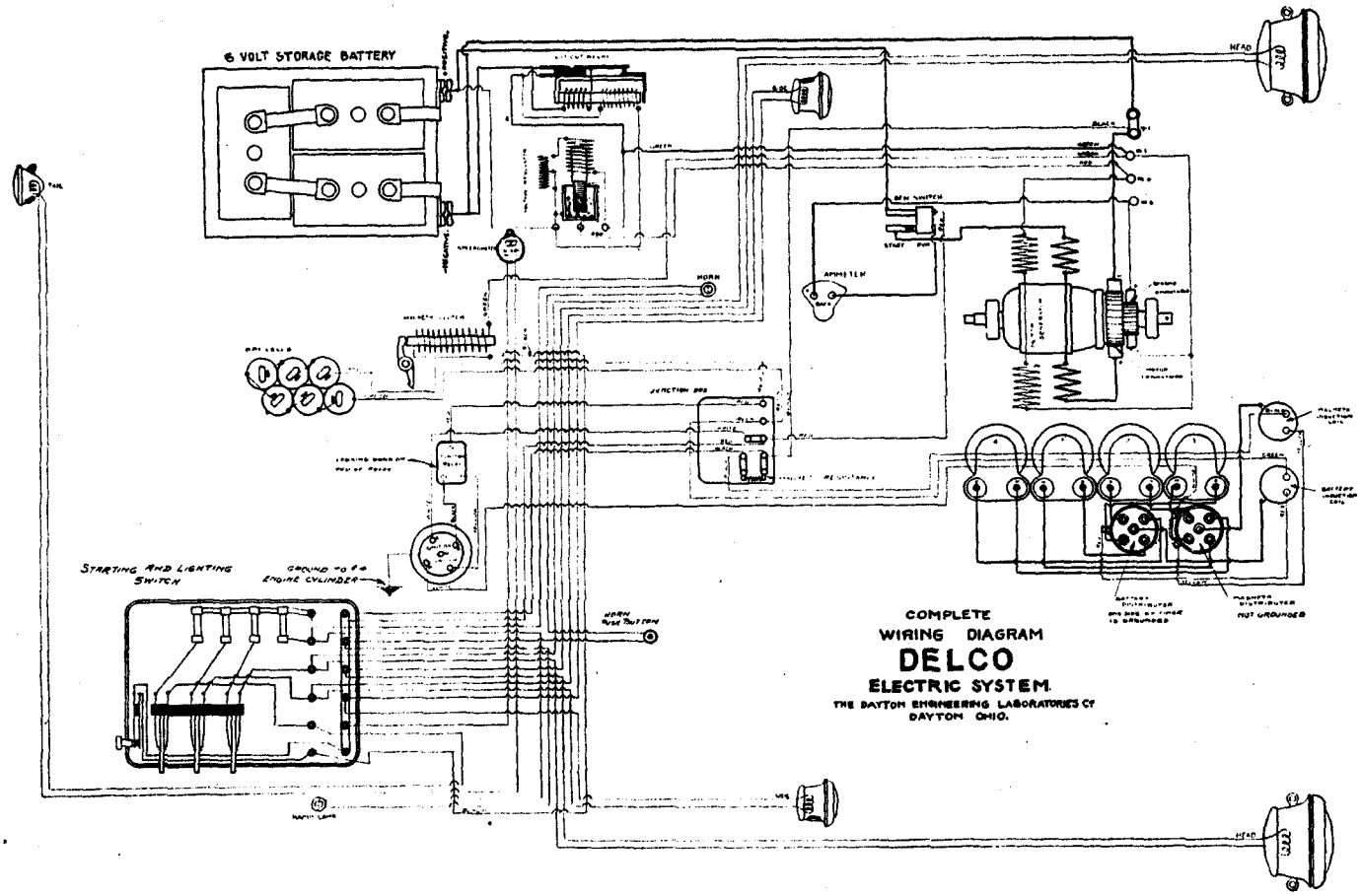

6 VOLT STORAGE BATTERY
HEAD
HORN
AMMETER
STARTING AND LIGHTING SWITCH
GROUND TO ONE ENGINE CYLINDER
COMPLETE
WIRING DIAGRAM
DELCO
ELECTRIC SYSTEM
THE DAYTON ENGINEERING LABORATORIES CO
DAYTON OHIO.

Fig. 20

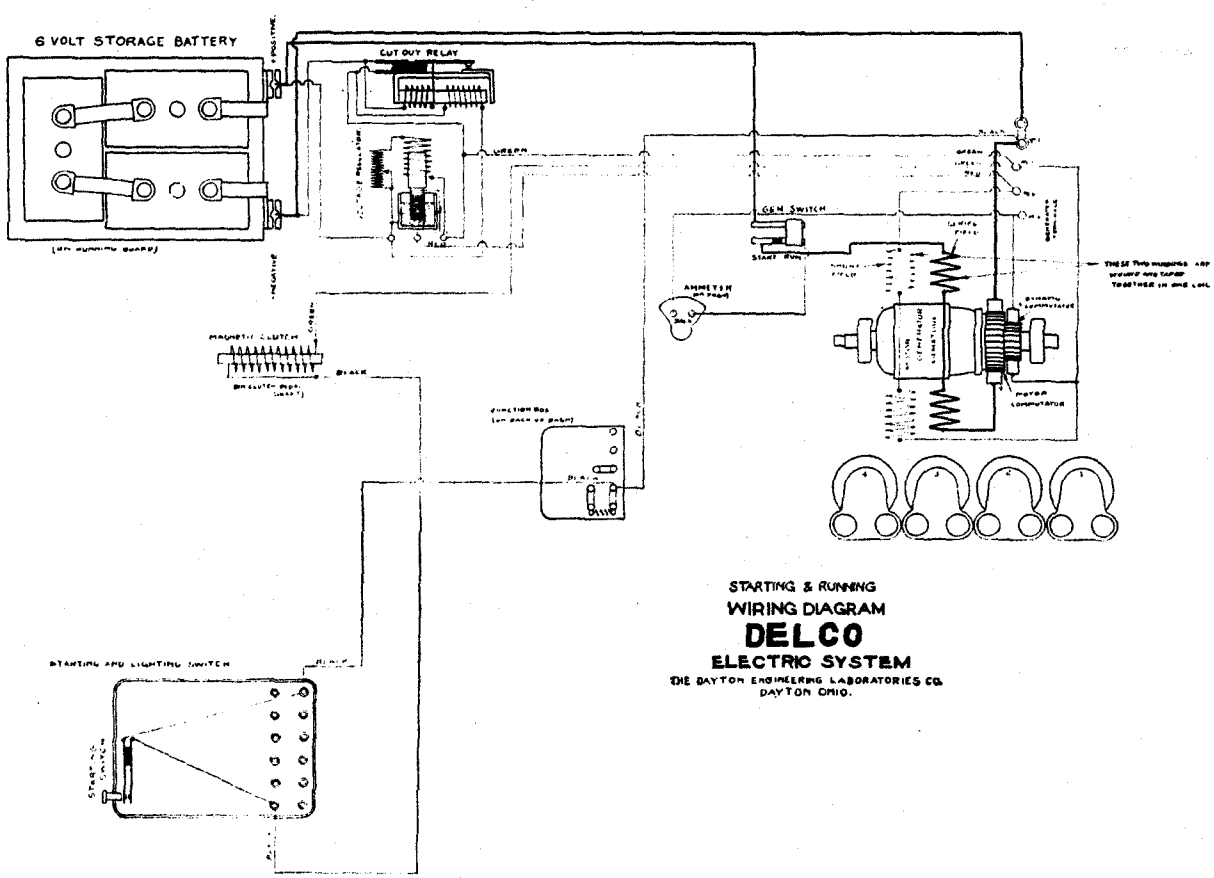

6 VOLT STORAGE BATTERY
CUT OUT RELAY
GEN. SWITCH
AMMETER
STARTING AND LIGHTING SWITCH
STARTING & RUNNING
WIRING DIAGRAM
DELCO
ELECTRIC SYSTEM
THE DAYTON ENGINEERING LABORATORIES CO.
DAYTON OHIO.

Fig. 21

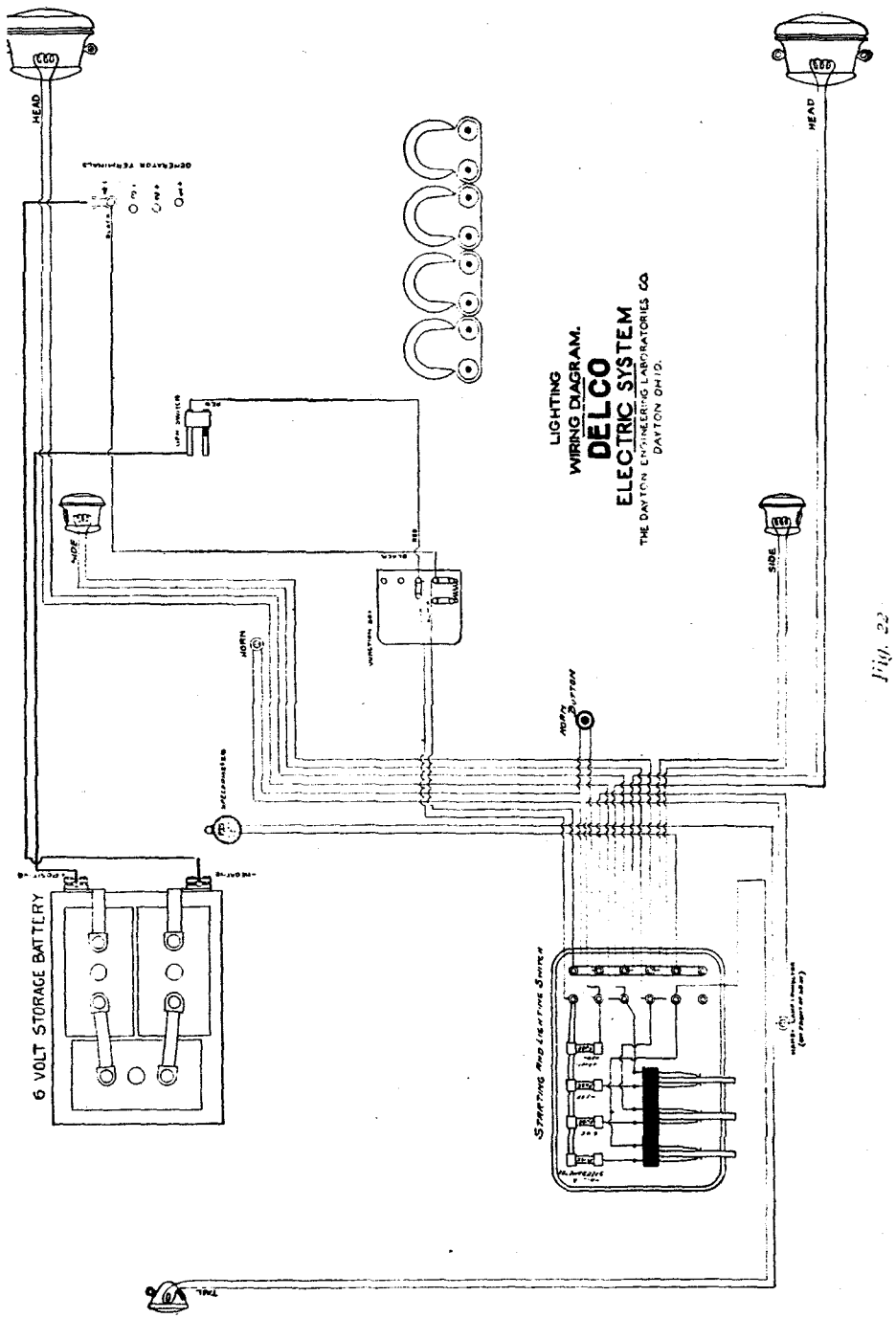

LIGHTING
WIRING DIAGRAM.
DELCO
ELECTRIC SYSTEM
THE DAYTON ENGINEERING LABORATORIES CO
DAYTON OHIO.
HEAD
HEAD
SIDE
SIDE
HORN
HORN BUTTON
6 VOLT STORAGE BATTERY
STARTING AND LIGHTING SWITCH
TAIL

Fig. 22

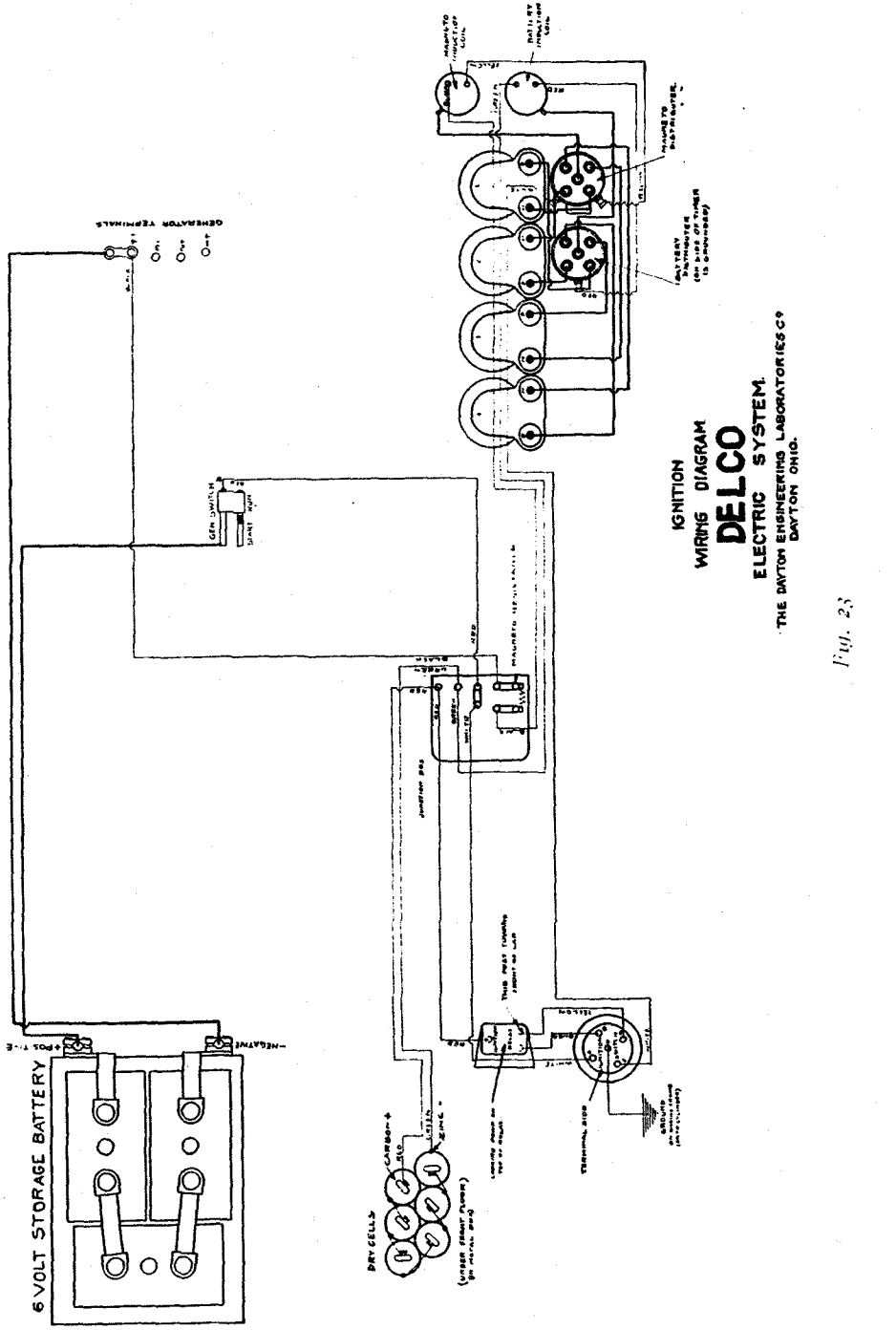

IGNITION
WIRING DIAGRAM
DELCO
ELECTRIC SYSTEM.
THE DAYTON ENGINEERING LABORATORIES CO
DAYTON OHIO.
GENERATOR TERMINALS
6 VOLT STORAGE BATTERY
DRY CELLS
TERMINAL BOX

Fig. 23

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 pistons are on "center," that is, that two of the pistons are at their highest points and the other two at their lowest points.

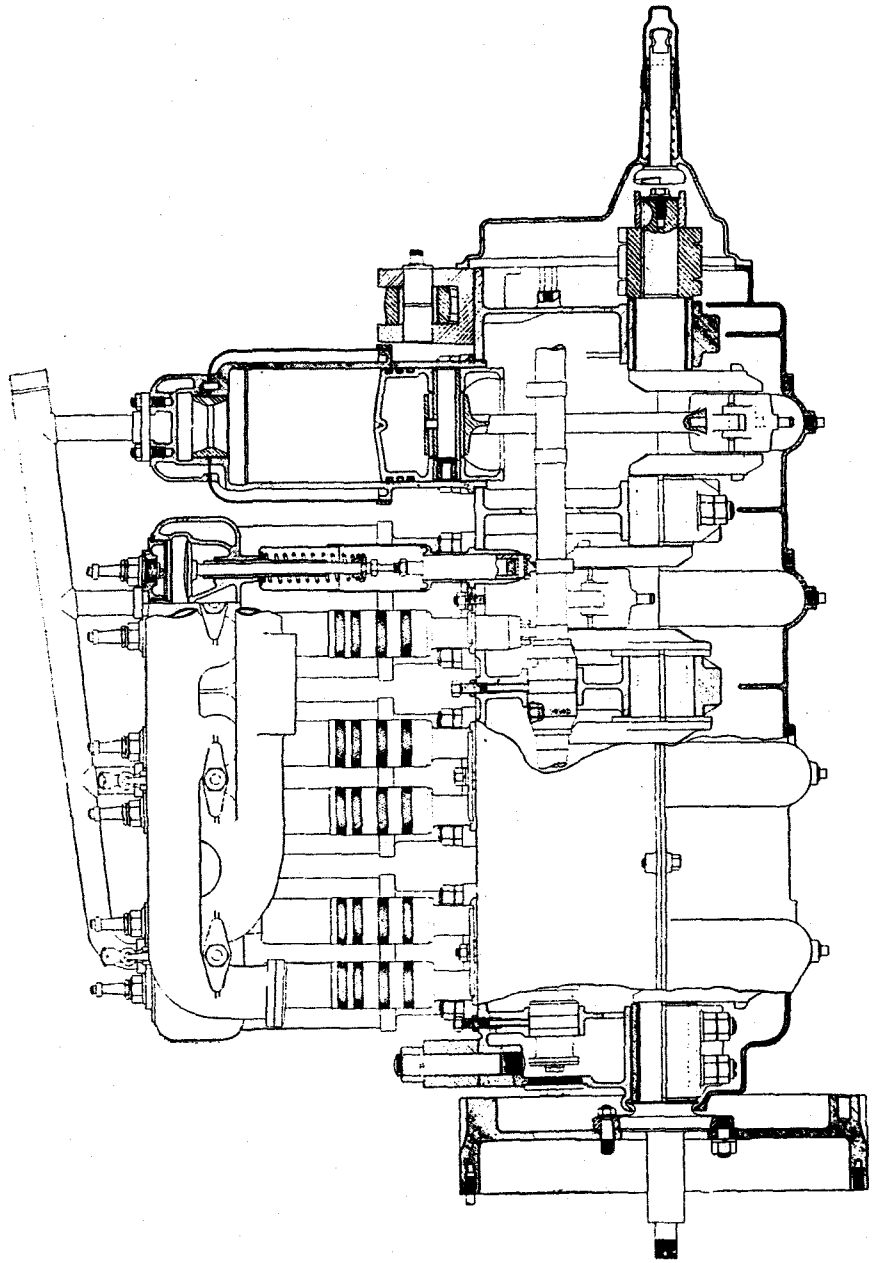
The positions of the letters on the fly-wheel clearly indicate the correct timing of the valves. There being four cylinders, the inlet and exhaust valves must be timed on each separately. As valves are all timed before the car leaves the factory, these instructions will be found adequate for such slight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

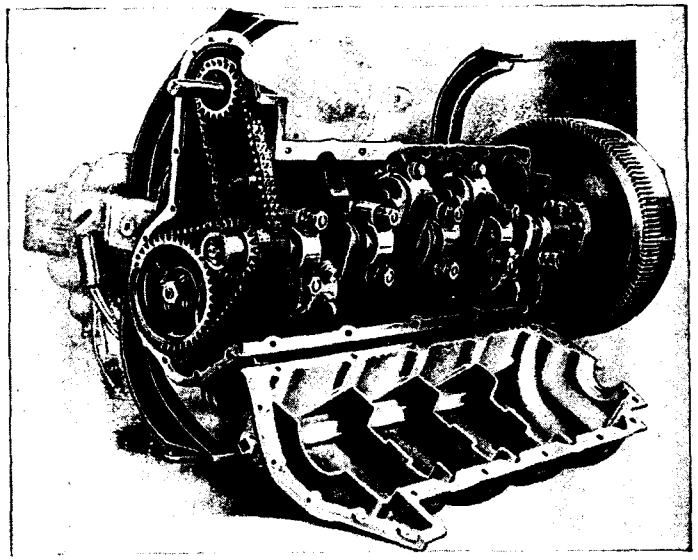
In timing the valves always turn the engine in the direction in which it runs.

For example, take the forward cylinder. The inlet valve should be so timed that it will just start to open when some part of the space marked "I O" is at the top, under the pointer which is fastened to the crank case of the engine, and so it will just be entirely closed when the line marked "I C" on the opposite side of the fly-wheel has reached the top. The exhaust valve should be so timed that it will begin to open when the line marked "E O" is at the top under the pointer, and so that it will just be entirely closed when some part of the space marked between "E C" on the opposite side of the fly-wheel has reached the top.

It will be noted that the timing of the inlet closing "I C" and the exhaust opening "E O" are positive, and that a limit is allowed in closing of the exhaust and opening of the intake valve.

The adjustments of the inlet and exhaust valves are made by means of the screw in the cam roll slide. Turning the screw in the cam roll slide to the left (screwing it out) causes the valve to open earlier and close later, while turning the screw in the cam roll slide to the right (screwing it down) causes the valve to open later and close earlier.





Engine with front cover plate and oil pan removed, showing engine bearings and silent chains driving cam shaft, and pump shaft.

ADJUSTMENT OF ENGINE BEARINGS

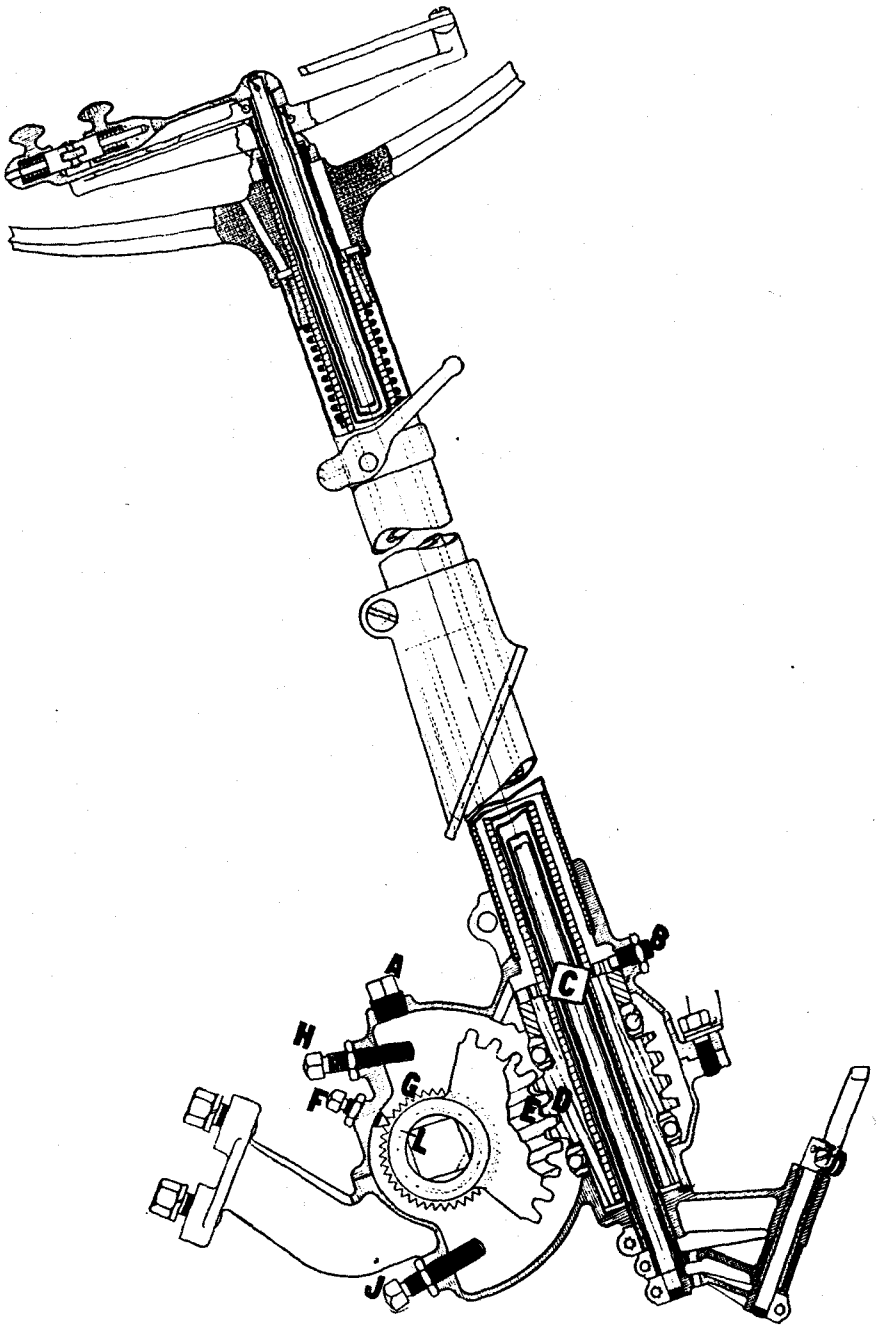
Do not neglect the crank shaft and connecting rod bearings. A slight knock or pound in the engine sometimes is caused by a looseness in one or more of these bearings, and they should always be kept properly adjusted. They are accessible by removing the sheet metal pan under the motor, and removing the oil pan 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 re-tighten 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 thousandths of an inch, thus .180. We make these liners in a number of sizes with a difference of .001 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.

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 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.



Steering Gear

STEERING GEAR

The internal mechanism of the steering gear is oiled at (A) and (C), after taking out the plugs. Rear Axle oil and flake graphite is a good lubricant for this part.

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 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

After a new car has been driven a few hundred miles there is a slight tendency for the spring clips to loosen, caused by the many surfaces on the spring leaves becoming smoother and harmonizing with each other, which causes them to pack a few thousandths of an inch closer together. If this matter is neglected for two or three seasons the springs will settle more rapidly and there is a greater tendency for them to break. As a matter of life insurance for the car, it is well to tighten all spring clip bolts on the car after it has been driven about 1,000 miles, and at the time the spring clips are tightened, all of the body bolts should be tightened, because they have a slight tendency to loosen on account of the heads of the bolts, washers, etc., more firmly seating into the wood.

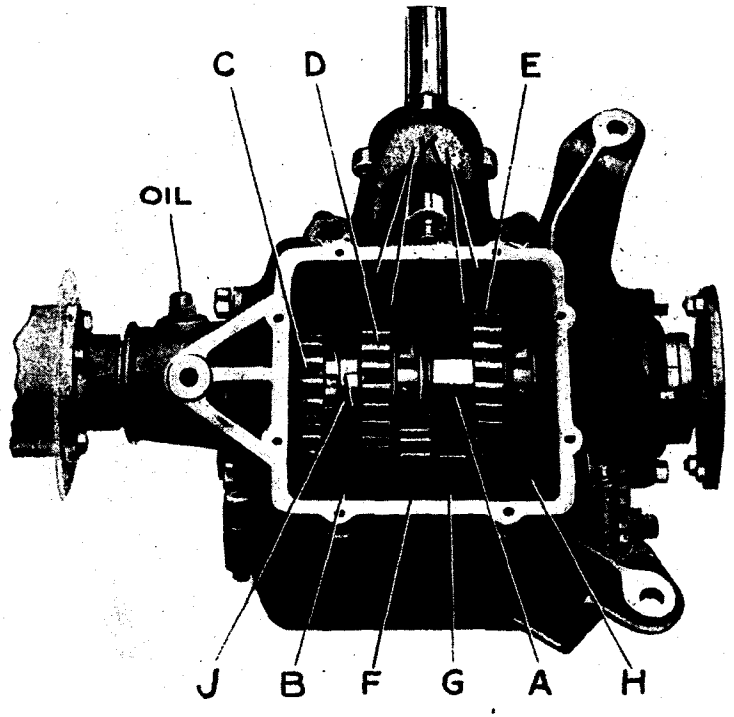
›ring Lubrication

When springs are not lubricated, water works its way in between the leaves and causes them to rust, often to such an extent that they become almost like solid pieces. This causes them to lose much of their spring action.

It is recommended that the springs be lubricated once every 500 to 1,000 miles by painting the edges and ends of the spring leaves with cylinder oil. An ordinary paint or varnish brush may be used. After applying the oil to the springs, the car should not be washed until it has been driven some distance to allow the lubricant to work in between the leaves.

It is also a good plan, about once a year, to have all the springs taken apart, the surfaces thoroughly cleaned and coated with a thick mixture of oil and graphite.

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 transmission lubricant. In its absence we recommend a mixture of cup grease and oil, mixed to such a consistency that it will flow easily into the transmission bearings.

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 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."

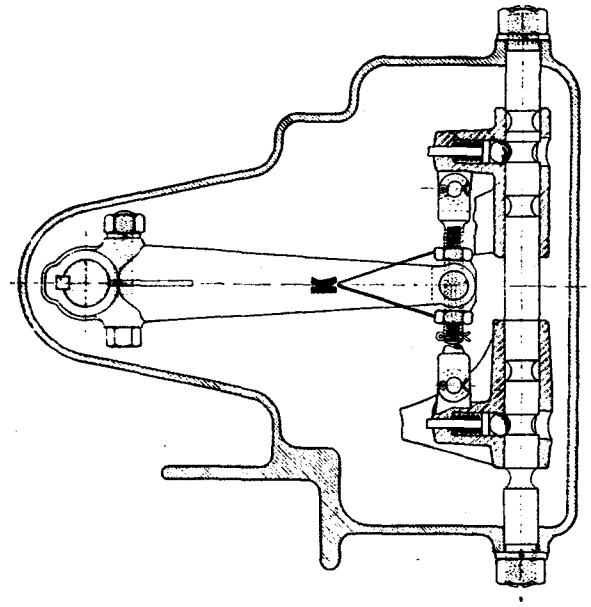
High speed is obtained by shifting the control lever so that the lugs at "J" interlock, thereby connecting the transmission shaft with the shaft which transmits the power to the rear axle.

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

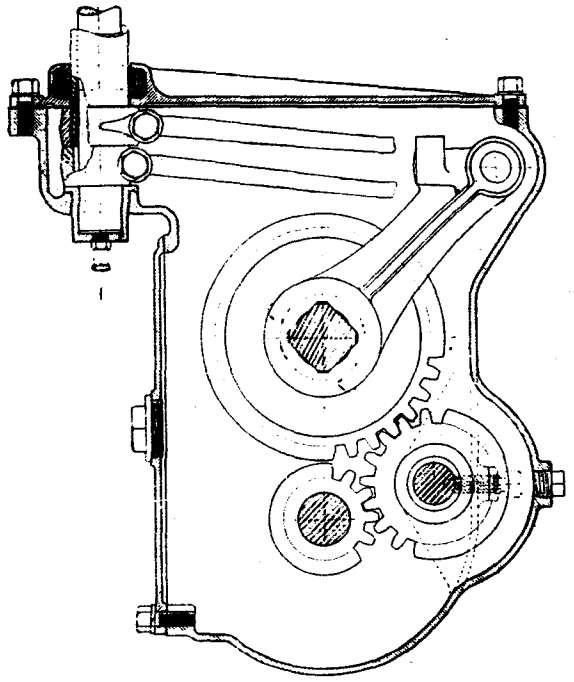
Low speed is obtained by shifting gear "E" into mesh with gear "G."

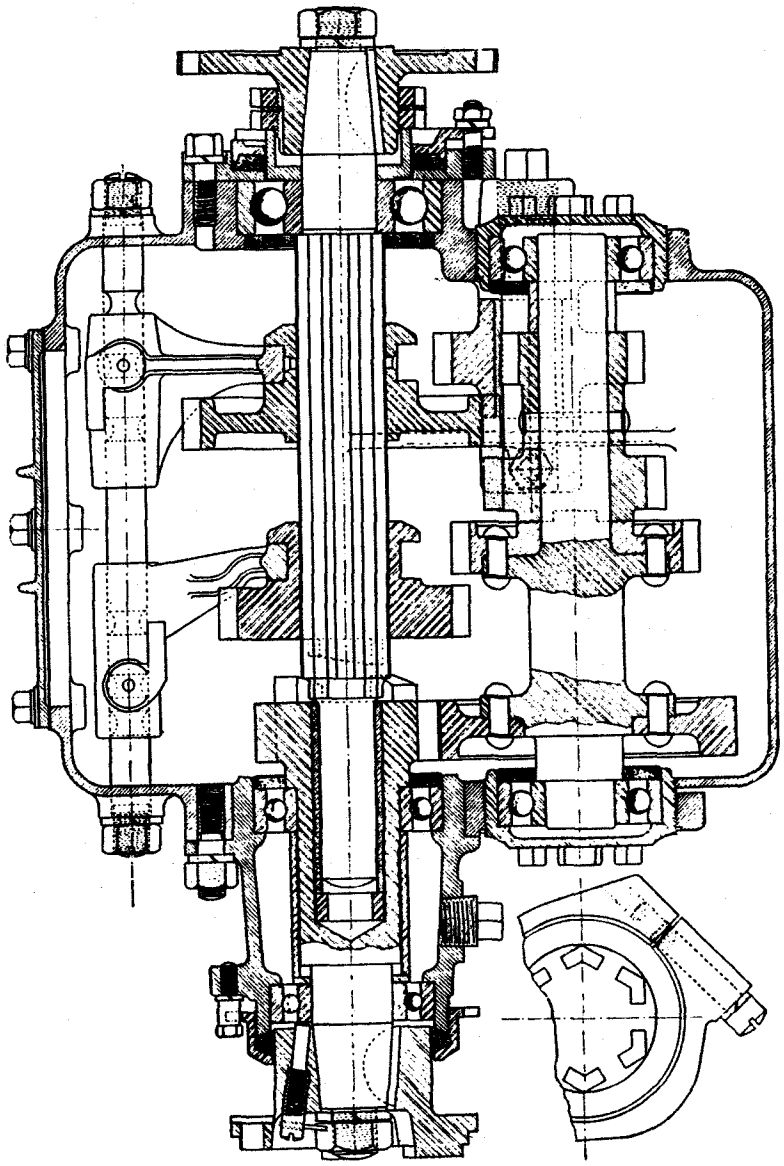
In reversing, gear "E" is shifted into mesh with the gear which is directly underneath gear "H."

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



Gear Shifting Mechanism





Transmission Assembly

justment 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 inch 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.

MAIN CLUTCH

Both the clutch pedal and the brake pedal are made in two pieces, slideably adjusted to accommodate different drivers. Additional adjustment of the brake pedal may be had by means of the attached pull rod and of the clutch pedal by means of the stay rod (D).

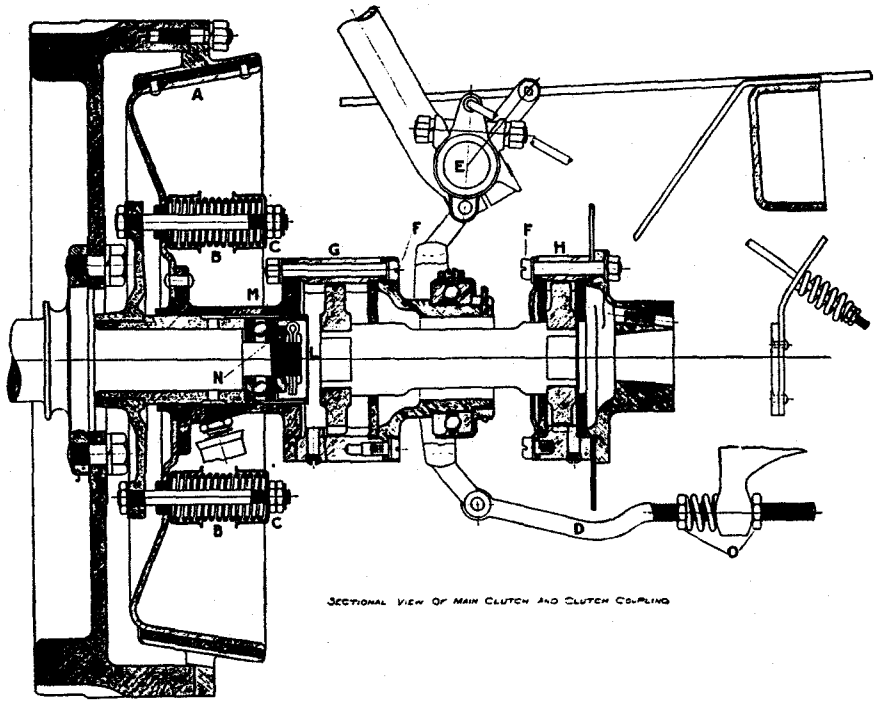
In altering the positions of either of these pedals, be sure not to alter them so much as to interfere with their proper action.

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. Do not use lubricating or mineral oil for this purpose.

Remove Main Clutch and Universal Joint

1. Remove the twelve screws (F-F) and close together the sleeves (G) and (H). The joint may now be removed.

2. Remove the nuts (C-C) and the springs (B). The clutch disc now may be removed.



SECTIONAL VIEW OF MAIN CLUTCH AND CLUTCH COUPLING

The clutch bushing may be withdrawn by removing the cap (L), the cotter pin (M), and the right-hand threaded nut (N).

In re-assembling the clutch, turn the nut (N) by hand until it brings up lightly, then back it off until the cotter pin can be inserted.

The ball race and the cap (L) both should be filled with dope before replacing.

Adjustment of Engine Clutch

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.

If the clutch should not seat firmly because the stay rod (D) does not permit it to do so, it will be necessary to lengthen the stay rod (D) by means of the nuts (O). However, if the stay rod (D) is so adjusted that it will permit the clutch to seat firmly but the clutch does not do so on account of insufficient spring tension, then the tension should be increased by turning up the nuts (C) on the six springs.

REAR AXLE

'll Floating

The driving gear housing should always contain enough oil so that the large bevel driving gear will dip into it. 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 lubricant. In its absence we recommend 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.

ıution in Adjusting Timken 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 bearings a little tighter. It is far better to have a bearing a trifle too loose than too tight.

ı Remove and Replace a Rear Wheel

Remove the screw which holds the hub cap and then unscrew the hub cap.

Withdraw the axle shaft.

Jack up the axle, so that the wheel will clear the floor.

Remove the two nuts S and the lock washer T.

The wheel can now be taken off.

Before putting the wheel on again see that the bearings are clean and filled with light grease which is free from grit and dirt.

In putting the wheel on again, adjust the nuts S very carefully so that the bearings will not be too tight and see that the lock washer T is between the two nuts S. Also be sure that the outer nut is pulled up tightly against the washer so that the adjustment will be held. Both the front and rear wheels should be removed every 3,000 or 4,000 miles to examine the bearings and see that they are kept properly filled with light grease. A few drops of lubricating oil should also be put in occasionally through the oil hole in the hub.

ı Remove and Replace Rear Axle

Disconnect all brake pull rods at rear axle.

Disconnect rear universal joints at flange.

Remove all nuts which retain the spring perch caps.

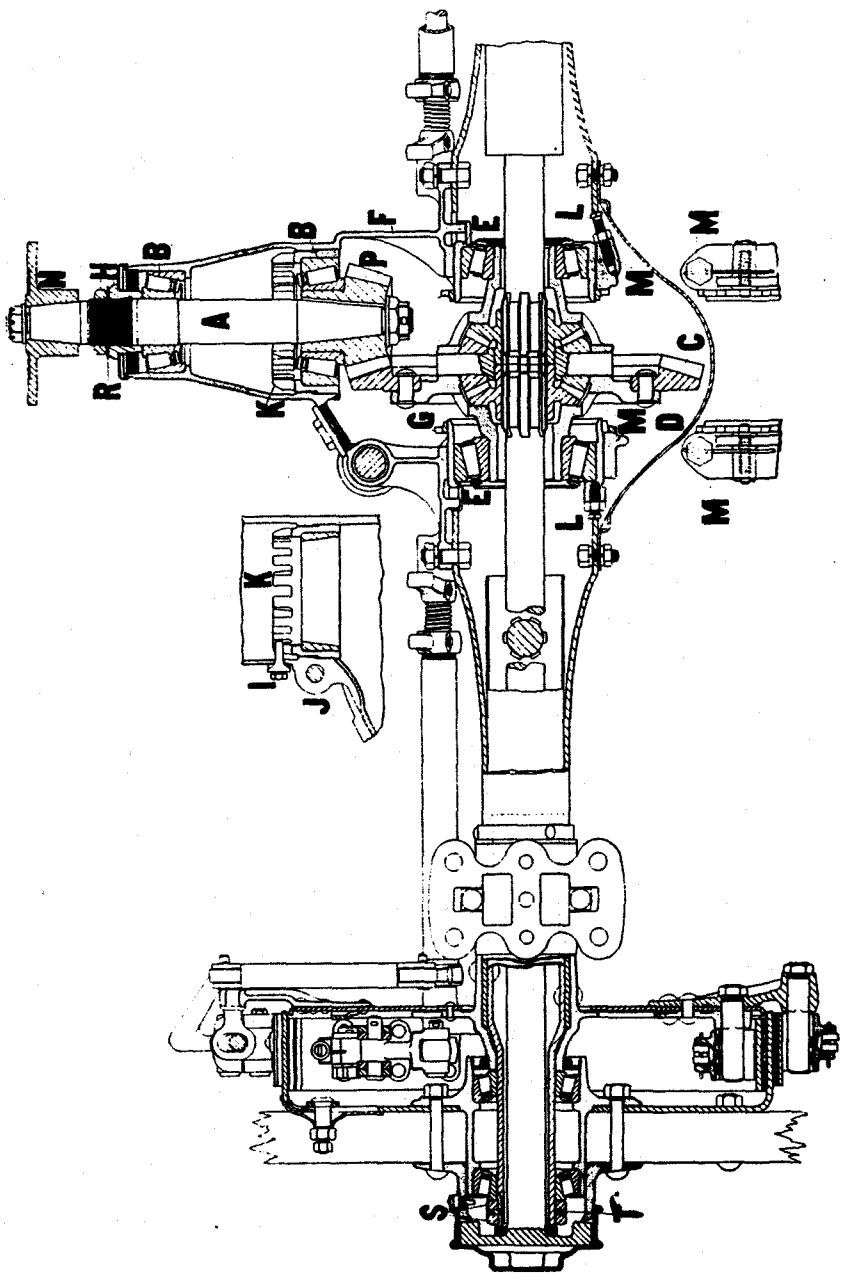
Disconnect front end of torque rod at cross member by removing bolt.

Jack up rear end of car by placing jacks under the rear springs just forward to suspend the rear of the car.

Block up the rear end of frame so that it cannot sway.

Roll axle and torque rod from under car.

To install axle reverse the order of the above operations. Care must be taken in installing the axle to get the brakes properly adjusted. (See special instructions for adjusting brakes.)



Rear Axle

djustment of Bevel Pinion and Large Bevel Driving Gear

In the design of the axle, provision is made for adjusting the pinion and gear so that their teeth may be correctly meshed and all adjusting nuts securely locked in position.

The large bevel gear C and the bevel pinion P, on the end of the shaft A, are correctly adjusted when the car is assembled, but after they have been in use for some time, the wear in the bearings may cause the gears to lose their original relative positions and to require readjusting.

These bevel gears should be so adjusted that the large ends of the teeth of one gear will be practically flush with the large ends of the teeth in the other gear. Extreme care should be used in adjusting because the tooth forms of the most accurately cut gears may be easily spoiled by running them when not properly meshed.

In order to adjust the gears to the best advantage, a crank should be provided which can be attached to the forward end of the driving pinion shaft A so that the gears can be turned by hand and the adjustment tried until a position is found where they will run smoothly.

If after the car has been driven several thousand miles, it is found that the wear in the bearings has caused the gears to lose their original relative positions, the wear may be compensated for by taking up the end play in the drive shaft A and the side play in the differential housing D.

If it be found that there is undue end play in the drive shaft, take off the locking plate I which covers the opening in the bearing carrier. This will give access to the adjusting nut K. Loosen the nut on the clamp bolt J and turn up the adjusting nut K as far as possible without making the bearing too tight. (See caution concerning adjustment of Timken bearings.)

If after following this method it should be found that further adjusting is required to bring the gears into proper mesh, it must first be determined whether it is necessary to move the drive shaft and its pinion toward the axle or the large bevel gear toward the pinion, or both.

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" hereinafter mentioned will not become confused. The "right" is at the driver's right as he sits in the car.

o Adjust Driving Pinion

If after taking up the end play as explained in a previous paragraph, it be found necessary to move the drive shaft with the pinion still further back toward the axle, then, in addition to loosening the clamp bolt J, and removing the locking plate I, also loosen the two nuts H. Then turn up the adjusting nut K, one notch at a time, the required amount. After the correct position has been found, turn up the adjusting nuts H, bringing the forward nut up tight against the lock washer R, being careful not to adjust the bearings too tight. (See caution in regard to adjustment of Timken bearings.) Replace the locking cap I and tighten the clamp bolt J.

o Adjust the Large Bevel Gear

By reference to the sectional drawing it will be seen that the large bevel gear C is attached to the mount D which has a hub projecting on each side that fits into a roller bearing. These bearings are carried in sleeves EE which are supported in the main carrier F. The sleeves are threaded on their inner ends to receive the adjusting nuts GG.

To adjust the large bevel gear, first loosen the four bolts which hold the two caps M and M. Draw the locking plungers out of the slots in the adjusting nuts GG in the sleeves which carry the bearings of the gear mount.

The adjusting nuts G and G can now be turned, moving the gear mount with the gear in either direction as required.

In making these adjustments be sure to allow just enough play or back lash between the teeth so that they do not bind in turning. After the gears are correctly positioned to turn smoothly by hand, all nuts and bearings should be securely locked.

Be careful not to get the bearings too tight. (See caution in regard to adjusting Timken bearings.)

The set screws LL in the cap should be adjusted so that they will set only very lightly against the edge of the hole in the housing and then locked in that position.

To Remove the Driving Gear Mount

Remove the wheel hub caps.

Withdraw the axle shafts.

Drain out the oil through hole in bottom of housing.

Remove the cover plate.

Move the gear mount D to the left or away from the bevel pinion by unscrewing the adjusting nut G on the left hand side. It is not necessary to disturb the adjustment of the right-hand nut.

Remove the two caps MM.

The gear mount and its bearings can now be removed.

To Remove the Driving Pinion and Shaft

Remove the large bevel gear mount as previously explained.

Disconnect the flange N on the driving pinion shaft A from the flange on the universal joint. Remove the flange N on the pinion shaft by means of a screw puller. Do not use a hammer to loosen the flange as the blows from the hammer are liable to injure the bearings.

Remove the two nuts HH and the lock washer R from the pinion shaft. The shaft and gear can now be removed through the opening in the axle.

After all adjustments of the gears are completed, do not forget to lock all adjusting nuts and bearings before putting on the cover plate. In putting on the cover plate be sure to use a good gasket between the housing and the plate so that the grease will not leak through the joint after the bolts are screwed up.

To Remove Front Wheel and Adjust Bearings

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 the 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 side ways. It is better that the bearings be a trifle too loose rather than too tight. (See caution in regard to adjusting bearings.)

Front wheels should be examined every three or four thousand miles, or at least once a year, and the bearings thoroughly cleaned in either gasoline or kerosene oil.

The bearings should be examined to determine whether any foreign substance has gotten into the roller cages that might damage them. The roller bearing should be thoroughly lubricated with a thin cup grease. (Do not use a heavy grease because it will be rolled away from the path of the roller and will not return.) A few drops of the lubricating oil should be applied occasionally through the oil cups.

BRAKES

There are two pairs of brakes. The regular service brakes, which are operated by the right foot lever marked "Brake," contract upon the outside of the drums. The emergency brakes, operated by a hand lever, expand within the drums.

Connections from the foot lever and hand lever are made through equalizing bars so that each drum will be gripped with practically the same pressure. While these equalizing bars compensate for a certain amount of inequality in the tension, it is desirable to adjust the brakes as nearly alike as possible.

Brake bands are lined with a special lining which can be renewed when worn.

If the brake bands become too dry and grip the drums too suddenly, apply a little graphite mixed with oil.

When brake bands are wet and muddy they are less effective than when in proper condition, hence more care should be exercised in driving at such times.

The brakes and all parts relating thereto should be examined and tested occasionally to be sure that they are in serviceable condition.

The joints and all working parts should be oiled occasionally to avoid any possibility of the parts rusting and sticking together.

If brakes are in good condition, either pair will offer sufficient resistance to lock and slide the wheels, but doing this is bad practice excepting in case of emergency as it is very injurious to the tires.

The brake band linings should not be allowed to drag on the drums when released, as that will cause unnecessary wear.

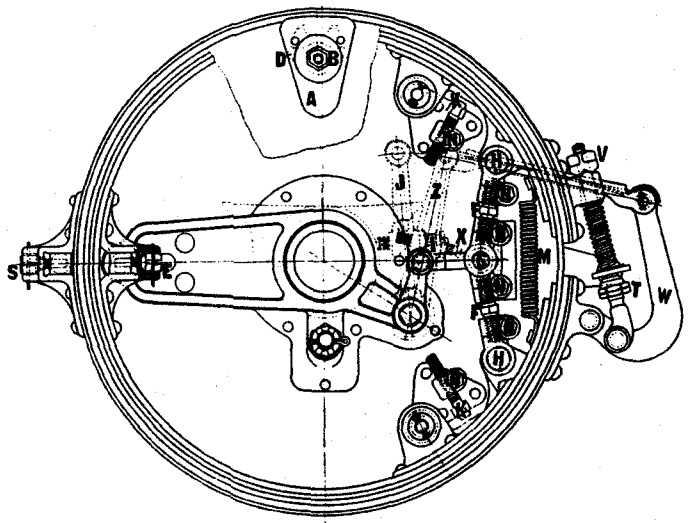
Do not attempt to adjust the brakes by the pull rods, as that will not properly compensate for wear on the linings.

Adjust External Brakes

Turn the adjusting screw S until that part of the band opposite the screw is brought as close as possible to the brake drum without touching it. Adjust the two nuts T on the eye-bolt until the lower part of the brake band lining just clears the drum. Next adjust the nut V on the upper end of the eye-bolt to bring the lever W to the position shown in the illustration when the brake is applied.

When the brake is released, if the upper part of the brake band lining clears the drum more than 1/32 inch, the clearance should be reduced by the set screw X in the rocker lever Z.

After all adjustments are completed, be sure to lock all adjusting nuts.



To Adjust Internal Brakes

The internal brake is designed so that all adjustments for clearance between the internal band and the drum can be made without removing the wheels.

Raise the axle with a jack so that the wheel can be turned by hand.

Remove the cover A from the opening in the brake drum. This can be done by unscrewing the lock nut B and turning the bolt to the left about one-quarter turn until the clamping bar D is released.

Now turn the wheel until the opening gives access to the adjusting screw E. Turn this screw E until that part of the brake band lining in line with said screw is brought as close to the inner surface of the brake drum as possible without touching it.

Turn the wheel until it gives access to the six locking screws NNNNNN. Loosen these six screws. Then turn the two adjusting screws F and F, which have right-hand threads on one end and left hand threads on the other, until the center of the pin G stands about ¾ inch back of an imaginary line drawn through the centers of the two pins HH when the brake is applied.

With the brake released, adjust the screw I in the lever J and the stop screws K and K until the lower and upper parts of the brake band lining clear the drum about 1/32 inch.

The three coil springs MMM *should be strong enough to hold the* brake band sideways and against the stop screws KK so that it will not rattle.

After making the adjustments be sure to lock each one with the locking screws N. Also replace and fasten securely the cover of the opening in the drum.

TIRES

e *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 the contents.

We give here a few 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. 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 tubes should be kept lightly inflated. This keeps them in good condition and prolongs their life. They should not be stored in a greasy toolbox under any circumstances.

If the car is not used during the winter, it is better to remove the tires from the rims, keeping casings and tubes in a fairly warm atmosphere away from the light. It will be better to slightly inflate the tubes, as that keeps them very nearly in the position in which they will be used later on. 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 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.

Spare tires should be strapped tightly to the tire holder; otherwise, the tires will chafe on the tire holders and become damaged.

REPAIR PARTS

dering New Parts

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

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

Where, however, conditions are such as in our judgment to warrant it, we will fill orders for parts at current list prices, f. o. b. factory, provided the order is accompanied by cash. In ordering, send us the engine number and type of car with an accurate description of the part desired, preferably accompanied by a sketch with dimensions. If this cannot be done, return the part properly tagged, transportation charges prepaid. (See below under "Returning Parts.") Otherwise we cannot promise prompt service or fill the order intelligently.

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

eturning Parts

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

ires and Speedometers

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

This Book
is a part
of your car

It should always
be kept where
it is readily
accessible

1913

SPECIFICATIONS IN BRIEF

ENGINE—*Long stroke, 4½-inch bore by 5¾-inch stroke, four cylinder, four cycle; cylinders cast singly.* Valves enclosed. Camshaft and generator shaft driven by silent chains from crankshaft. Five-bearing crankshaft, 2 inches diameter. Bearings, bronze with Babbitt lining.

HORSEPOWER—40—50.

COOLING—Water. Copper jacketed cylinders, copper inlet and outlet water manifolds. Centrifugal pump. Radiator, tubular and plate type of unequaled efficiency. Fan attached to motor, running on two point ball-bearings; center distance of fan pulleys adjustable.

IGNITION—Two complete and independent systems. Delco Dynamo which furnishes current for ignition, *electric cranking device and electric lights. Automatic spark control.* Also Delco Distributor system with dry cell current.

LUBRICATION—Automatic splash system, oil uniformly distributed. Supply maintained by mechanical force-feed lubricator with single sight feed on dash.

CRANKING DEVICE—*Delco electrical, patented.*

CARBURETOR—Cadillac, water jacketed, single adjustment, auxiliary air adjustment on *steering column.*

CLUTCH—Cone type, large, leather faced with special spring ring in flywheel. Clutch readily removable and extremely easy of operation.

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 to bevel gears of special cut teeth to afford maximum strength. Drive shaft runs on Timken bearings. Two universal joints, the forward telescopic, each enclosed in housing and running in oil bath.

AXLES—Rear, Timken full floating type; special alloy steel live axle shaft; Timken roller bearings. Double torsion tubes arranged in triangular form affording unusual strength. *Front* axle, drop forged I beam section with drop forged yokes, spring perches, tie rod ends and steering spindles. Upper ends of spindles fitted with Timken bearings.

BRAKES—*One internal and one external brake direct on wheels, 17 inch x 2½ inch drums.* Exceptionally easy of operation. Both equipped with equalizers.

STEERING GEAR—Our own patented worm and worm gear sector type, adjustable, with ball thrust bearings. 1¾ inch steering post, 18 inch steering wheel with corrugated walnut rim, aluminum spider.

FRAME—Double dropped (2½ inch drop,) pressed steel, channel section, width 30 inches in front, 33 inches in rear.

GEAR RATIOS—Touring Car, Six Passenger Car, Phaeton, Torpedo and Coupe, 3.43 to 1; options 3.66 to 1 and 3.92 to 1. Roadster 3.05 to 1; option 3.43 to 1. Limousine, 3.66 to 1; option 3.92 to 1.

WHEELS—Wood, artillery type, fitted with demountable rims, special large hub flanges and special strength heavy spokes. Rear wheel spokes bolted to brake drums. Demountable rims.

TIRES—*36 inches by 4½ inches.*

WHEEL BASE—120 inches.

TREAD—56 inches. Option 61 inches.

SPRINGS—Front, semi-elliptical 36 inches long by 2 inches wide; Rear—three-quarter platform; Sides, 46 inches long by 2 inches wide. *Rear cross 39½ inches long by 2 inches wide.*

CONTROL—Hand gear-change lever and emergency brake lever at driver's right, inside the car. Service brake, foot lever. Clutch, foot lever. Throttle accelerator, foot lever. Spark and throttle levers at steering wheel. Carburetor air adjustment, hand lever under steering wheel.

GASOLINE CAPACITY—*Touring Car, Six Passenger Car, Torpedo and Limousine 21 gallons. Phaeton,* Roadster and Coupe, 17 gallons.

OIL CAPACITY—6 quarts, sufficient for 600 to 900 miles.

BODIES—Touring Car, Six Passenger Car, Phaeton, Torpedo and Roadster, steel, improved process of manufacture. Limousine and Coupe, *aluminum; all bodies with fore doors.*

UPHOLSTERING—Hand buffed black leather over genuine curled hair and deep coil steel springs.

RUNNING BOARDS—Linoleum covered, with metal binding.

FINISH—Cadillac blue body and chassis, striped. Torpedo option, steel gray with black mouldings, hood and fenders.

STANDARD EQUIPMENT—Cadillac *Mohair Top, Windshield. Dynamo with 130 A. H. battery for* automatic cranking device, electric lights and ignition. Also Delco distributor ignition system with dry cell current. Lamps, Gray & Davis, especially designed for Cadillac cars, black enamel with *nickel trimmings; two head lights with adjustable globes to regulate light rays; two side lights,* tail light. Hans gasoline gauge on dash, horn; foot rail in tonneau of open cars, robe rail, tire irons, set of tools including pump and tire repair kit; cocoa mat in all tonneaux except closed cars. *Speedometer, Warner, with electric light.*

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 sold.

1913

SPECIFICATIONS IN BRIEF

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IGNITION—Two complete and independent systems. Delco Dynamo which furnishes current for ignition, electric cranking device and electric lights. Automatic spark control. Also Delco Distributor system with dry cell current.

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CRANKING DEVICE—Delco electrical, patented.

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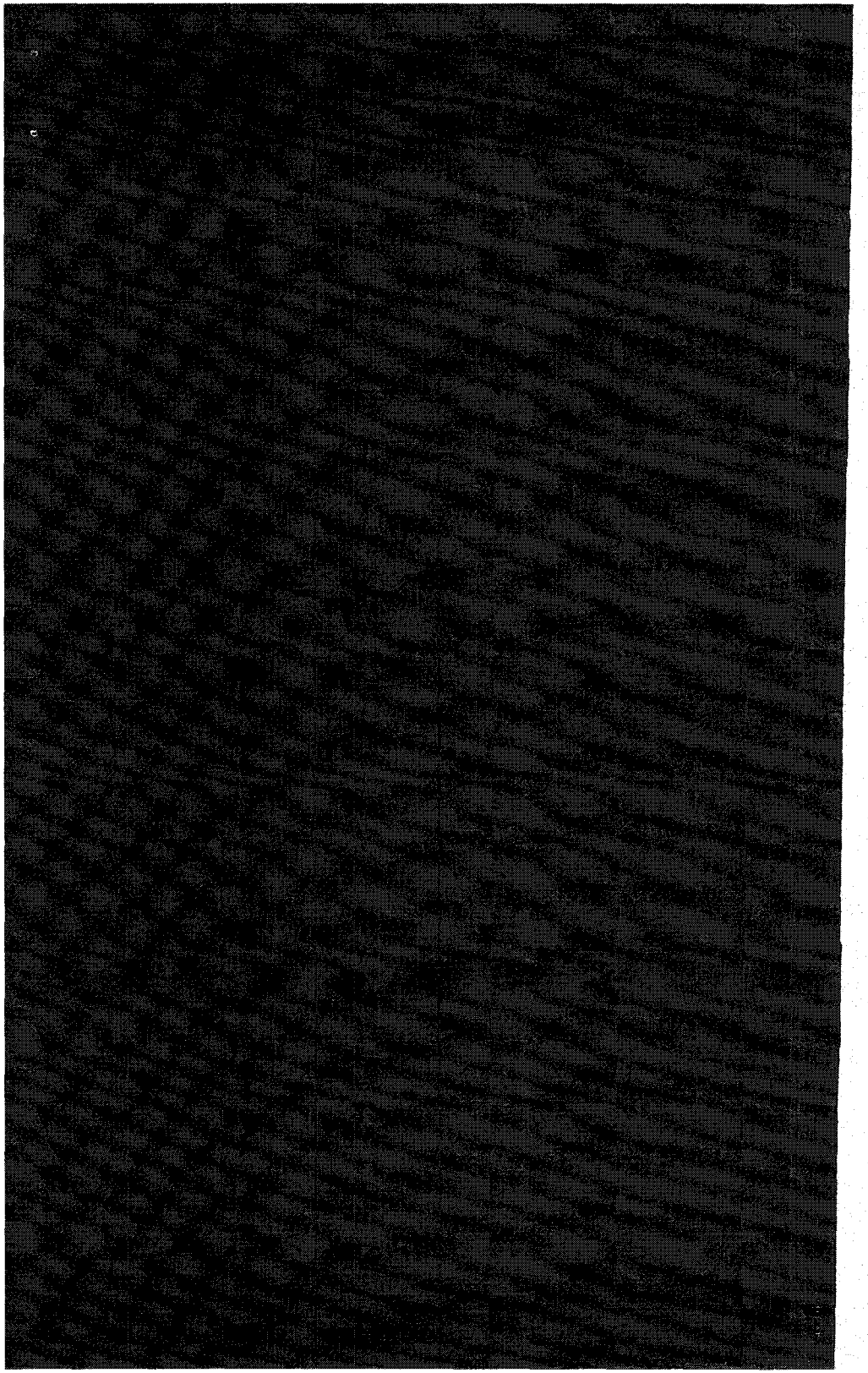
RUNNING BOARDS—Linoleum covered, with metal binding.

FINISH—Cadillac blue body and chassis, striped. Torpedo option, steel gray with black mouldings, hood and fenders.

STANDARD EQUIPMENT—Cadillac Mohair Top, Windshield. Dynamo with 130 A. H. battery for automatic cranking device, electric lights and ignition. Also Delco distributor ignition system with dry cell current. Lamps, Gray & Davis, especially designed for Cadillac cars, black enamel with nickel trimmings; two head lights with adjustable globes to regulate light rays; two side lights, tail light. Hans gasoline gauge on dash, horn; foot rail in tonneau of open cars, robe rail, tire irons, set of tools including pump and tire repair kit; cocoa mat in all tonneaux except closed cars. Speedometer, Warner, with electric light.

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INSTRUCTIONS

FOR THE CARE AND OPERATION

OF THE

DELCO

Library
General Motors Corporation
Research
Laboratories

ELECTRIC CRANKING, LIGHTING AND IGNITION SYSTEM

ON

1913
CADILLAC CARS

SECOND EDITION

THIS book is not intended as an advertisement, but is published purely and simply as an instruction book, covering the care and operation of the Delco Cranking, Lighting, and Ignition System.

If any part of this system fails to work properly, read the instructions carefully before attempting to make any adjustments.

Should the user fail to heed the advice given, the loss is not wholly his, but partly ours as well.

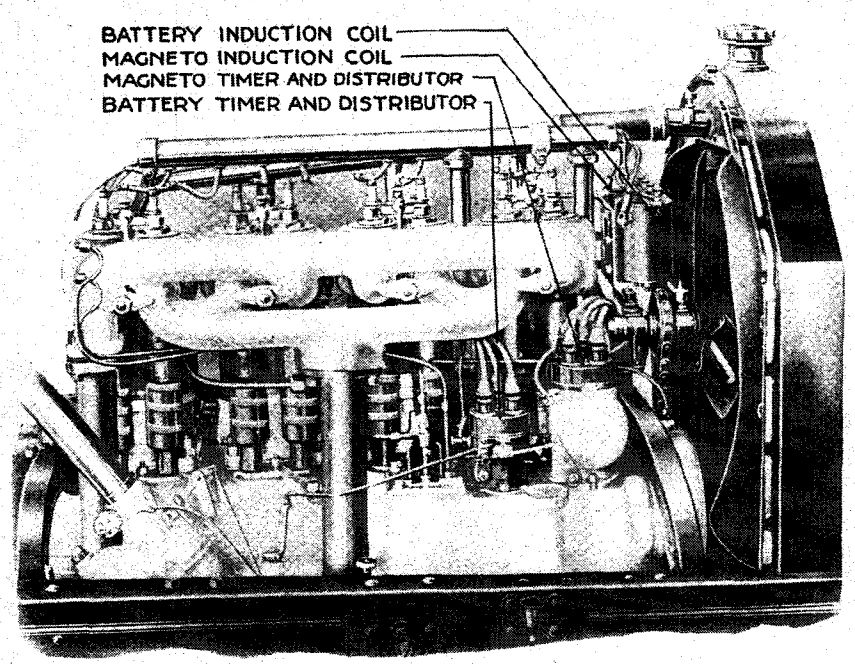


FIG. 1.

Cadillac Engine—Right Side.

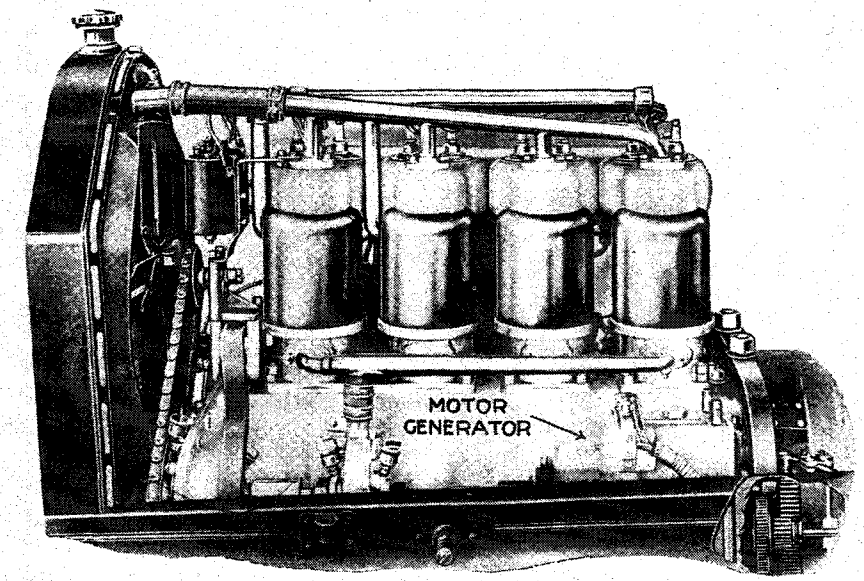


FIG. 2.

Cadillac Engine—Left Side.

Instructions for Starting and Operating

TO START THE ENGINE

BE sure that the control lever is in neutral position and the emergency (hand lever) brake is set.

If the engine has been standing only a short time, first try to start "on the spark."

Do not prime the carburetor.

Do not prime the carburetor with the primer on the dash (except n extreme cold weather) until you have tried to start the engine as ollows:

Pull up the auxiliary air valve lever, which is on the steering post nder the steering wheel.

Place the spark lever on center (marked C on sector), and the throttle ever in its fully closed position.

Push in vibrator button (marked "Start") on the ignition switch Fig. 15) located on the dash.

Depress the button on top of the box containing the light switches, nd push forward on the clutch pedal. This will bring the starter into peration and cause the engine to "turn over."

As soon as the engine "fires" and begins running under its own ower, which should be in a few seconds, allow the clutch pedal to come ll the way back and push the button marked "M" (magneto) on the gnition switch. **Do not run on the "START" button.**

Push the air valve lever down as soon as the engine is warm enough o permit doing so.

NOTE THIS PARTICULARLY.

If the engine doesn't start in thirty seconds, don't continue to crank. ook for the cause. You may have forgotten to put on the switch, or naybe you have no gasoline; no matter how sure you feel—look and ee. We have been fooled ourselves.

The starter will crank the engine. Ignition and gas must be pres- nt to make it run.

In cold weather, if the engine is not started in fifteen or twenty econds, allow the clutch pedal to come clear back. This will stop the ranking operation. Now prime the carburetor, but be very careful not o prime it too much. The primer should not be held down more than rom ten to fifteen seconds.

Then start the engine, following the above instructions.

When stopping the engine it is a good plan to pull up the auxiliary ir valve lever on the steering volumn, but push it down again as soon s the engine has actually stopped. Pulling the lever up enriches the nixture which is drawn into the cylinders and makes it easier to start he engine the next time.

In cold weather (also in warm weather, providing the motor has een standing for some time) starting will be facilitated if the auxiliary ir valve lever is pulled up while starting the engine. The lever should, f course, be pushed down as soon as the engine is warm enough to ermit doing so.

TO STOP THE ENGINE.

Place the spark lever about half way between its extreme upward position and "C," open the throttle about two inches and press the "OFF" button on the ignition switch.

In cold weather, or in warm weather, providing the engine has been standing for some time, starting the engine will be greatly facilitated by pulling up the auxiliary air valve lever when stopping the engine. This causes the last few revolutions of the engine to draw a rich mixture into the cylinders, which is beneficial in starting. After the engine has been started, and is warm enough to permit doing so, push the lever down again.

INITIAL CRANKING OPERATION.

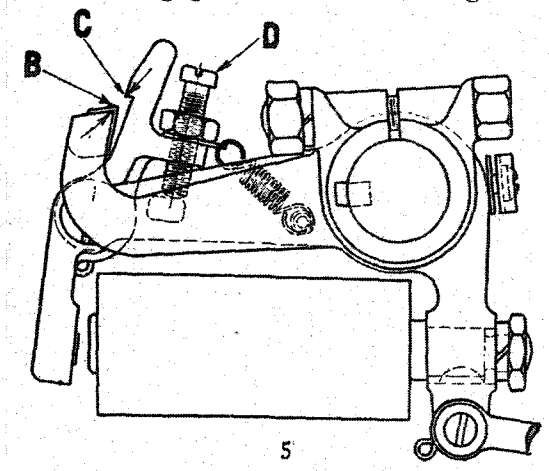
When the push button on the lighting switch box is depressed, it closes a circuit, and two things are accomplished:

Current flows from the storage battery through the magnetic latch coil circuit, and also flows through the generator windings, causing the armature to rotate slowly so that the starting gear will mesh into the motor pinion and with the teeth on the flywheel. The energizing of the magnetic latch coil, causes the mechanism which operates the starting transmission and the generator switch, to be linked to the clutch pedal shaft, and consequently to be thrown into operation by the depression of the clutch pedal.

When pushing forward on the clutch pedal to throw these gears into mesh, if it should happen that they be in just such a position that the ends of the teeth in the clutch gear come against the ends of the teeth in the flywheel, instead of the teeth of one sliding between the teeth of the other, be careful not to try to force them. Simply let the clutch pedal come back a little, and try again. By that time they will probably have changed their relative positions sufficiently to allow the teeth to mesh properly.

ADJUSTMENT OF MAGNETIC LATCH.

The magnetic latch pawl "C" should be so adjusted by the adjusting screw "D" that the arm "B" will pass the face of the pawl "C," just allowing the points indicated by the arrows to clear each other when the engine clutch is disengaged and when the magnetic latch is in the



lisengaged position. Screwing up on the adjusting screw "D" decreases he distance between the points "B" and "C," and unscrewing the djusting screw "D" increases the distance between these points.

MOTOR-GENERATOR.

In considering the Delco motor-generator and its mechanical accesories, the functions, construction, and operation will be more readily rasped by viewing it first merely as an electric motor, with suitable ieans for transmitting power to the engine; and then as an electric enerator, so arranged as to obtain power from the engine for revolving :s armature.

An analysis of the first condition shows simply a series wound iotor, with a spur gear pinion upon the end of the armature shaft earest the flywheel. Interposed between this pinion and the gear eeth cut in the periphery of the flywheel, is a pair of gears adapted o slide along and revolve upon an intermediate shaft. The sliding ction causes one of these gears to engage with the motor pinion, while he other meshes with the gear teeth upon the flywheel.

There is a positive one-way clutch incorporated as part of the interiediate gear, for the purpose of permitting the engine to run ahead)f the motor during the short time that the gears may be enmeshed vhile the engine is running under its own power. The total gear atio between the armature shaft and the engine shaft is approximately '5 to 1 with the gear train above described in operation.

In performing its function as a charging unit, the motor-generator esolves itself into a shunt wound generator, driven from the engine by neans of a shaft extended from the cam shaft gear housing. The enerator is driven at crank shaft speed, and in order to compensate for he higher ratio when the unit is in starting relation to the engine, a econd one-way clutch is provided adjacent to the forward housing. This clutch permits the armature to run ahead of the driving shaft.

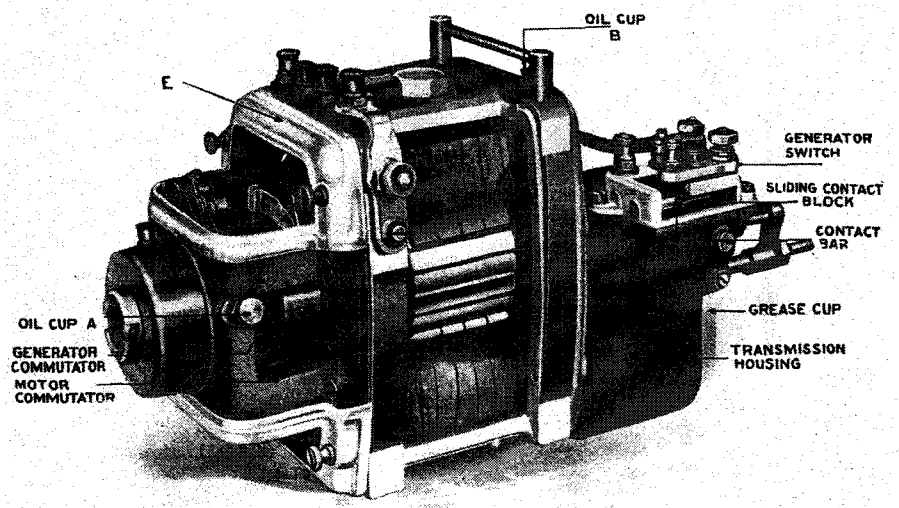


Fig. 3 shows the Delco motor-generator with parts cut away in order to illustrate the construction.

Oil is conveyed to the ball bearings through oil cups A and B. These should be given four or five drops of light oil about once a month. At the same time, the grease cup at the end of the transmission housing should be given one or two turns, or replenished if empty.

The generator commutator and motor commutator (Fig. 3) should be wiped off occasionally with a soft, smooth cloth, free from lint. These parts are made accessible by removal of the cover "E."

GENERATOR SWITCH.

Location and Function: This unit, mounted upon the starter transmission housing (Fig. 4), serves, when in its forward position, to connect the generator windings with the battery and, when in its rear position, to complete a path for the current through the motor windings.

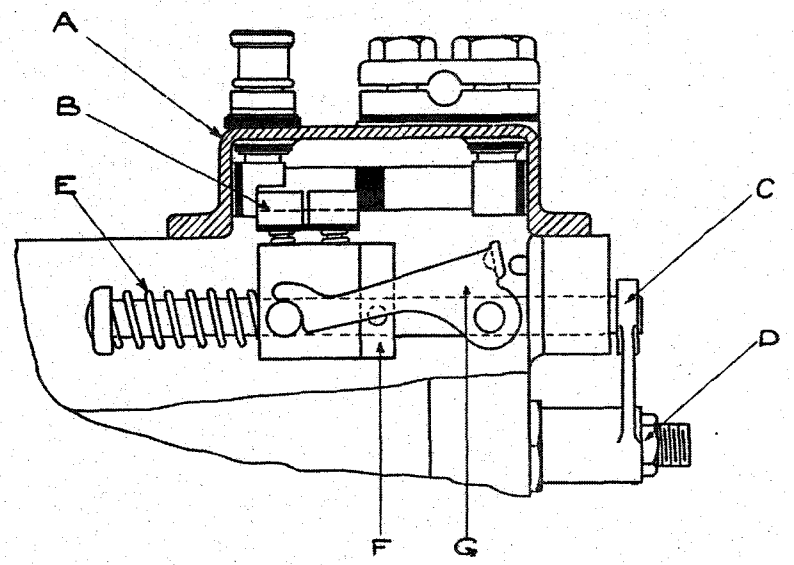


Fig. 4.

Description: The switch (Fig. 4) comprises a cover "A," carrying three conductors with terminals necessary for proper connection. Beneath this is mounted a sliding contact block "B," pressed against the conductors in the cover and mounted upon an operating rod "C," the exposed rear end of which is connected by an arm to the transmission operating rod "D." The sliding contact block is not directly fastened to the pull rod, but is forced into its starting and operating positions by collars, a coiled spring "E" being interposed between the block and collar upon the forward end of the pull rod and the rear collar "F," abutting directly against the sliding block. A latch "G," engaging with pins upon the sliding block, serves to hold it in its forward position.

Operation: When the clutch pedal is depressed in starting, the nter-connected operating rods of the switch and transmission are ›ulled to the rear. The action of the switch operating rod is to first ompress the coiled spring against the sliding block. When the pull od nears the limit of its travel, the rear collar upon the switch rod rips the latch which retains the sliding block in its forward position, and he pressure of the coiled spring snaps the block into its rear position, ›ermitting current from the battery to flow through the motor windings. It will be noted that the sliding block does not change its position until he sliding gears are fully meshed.

Care: If the speed of cranking should gradually decrease, when the ›attery is in a fully charged condition, remove the cover "A." If contact ›locks and contact bars are dirty, clean same, and if block or bars are ›itted, grind in with valve compound. Then thoroughly clean and lubri-:ate with a light oil.

VOLTAGE REGULATOR.

Location: The voltage regulator (Fig. 5 and 7) is located under the battery box cover (Fig. 6).

Function: The Delco Voltage Regulator serves to control the amount of current flowing from the generator to the storage battery.

Description: Reference to Figures 5 and 7 will make the construction of the device clear. A magnet coil "A" surrounds the upper half of the mercury tube (B). Within this mercury tube is a plunger "C," comprising an iron tube with a coil of resistance wire wrapped around the lower portion on top of mica insulation. One end of this coil is attached to the lower end of the tube, the other being connected to a needle carried in the center of the plunger. The lower portion of the mercury tube is divided by an insulating tube into two concentric wells, the plunger tube being partly immersed in the outer well, and the needle in the inner well. The space in the mercury tube above the body of mercury is filled with an especially treated oil, which serves to protect the mercury from oxydization, and to lubricate the plunger. A bracket "D" serves to support the parts described, and to enclose a variable resistance "E," operated by the lever "F" and connected in series with the magnet coil "A." Spring terminals are provided for making proper connections to magnet coil and to plunger-carried resistance.

Operation: Inasmuch as the voltage of the battery varies with its condition of charge, the intensity of the magnetic pull exerted by winding "A" upon plunger "C" varies and causes this plunger to move in or out of the mercury. When the battery charge is low, the plunger assumes a low position in the mercury tube, and vice versa. When the plunger is at a low position, the coil of resistance wire carried upon its lower portion is immersed in the mercury, and as the plunger rises the coil is withdrawn. Now, the current to the shunt field of the generator must follow a path leading into the outer well of mercury, through the resistance wound on the plunger tube, to the needle carried at the center of the plunger, into the center well of mercury and out of the regulator. It will be seen that as the plunger is withdrawn from the mercury more resistance is thrown into this circuit, due to the fact that the current must pass through a greater length of resistance wire. This greater

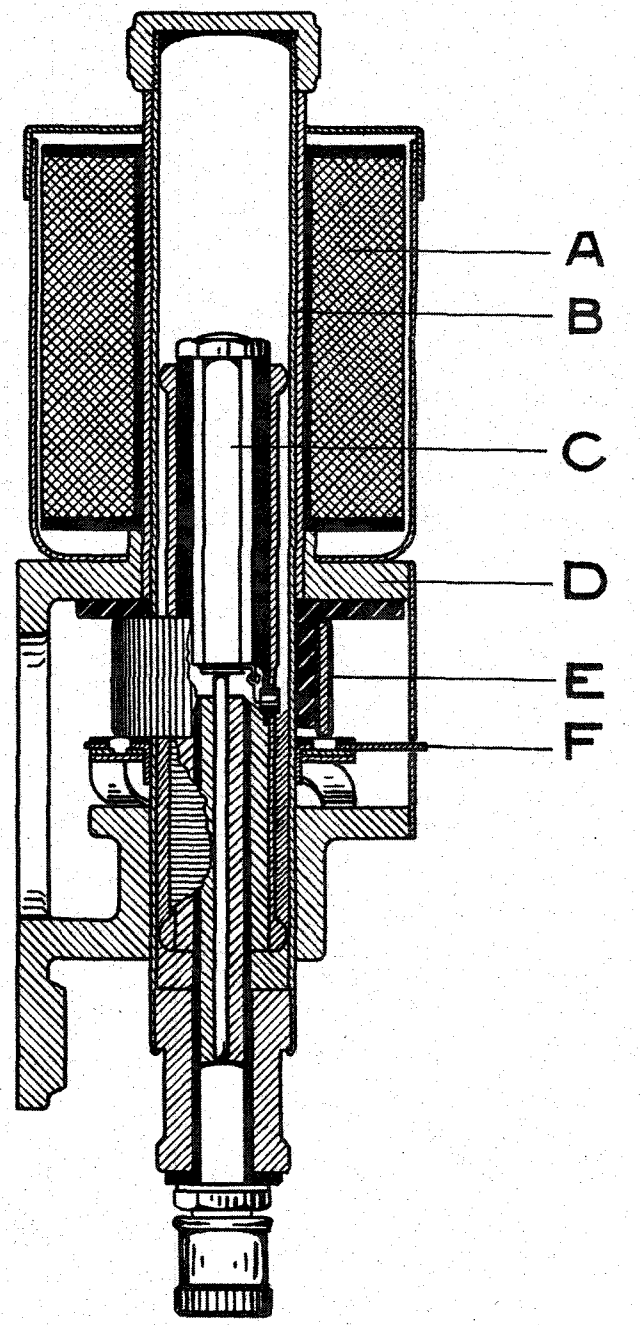


FIG. 5.

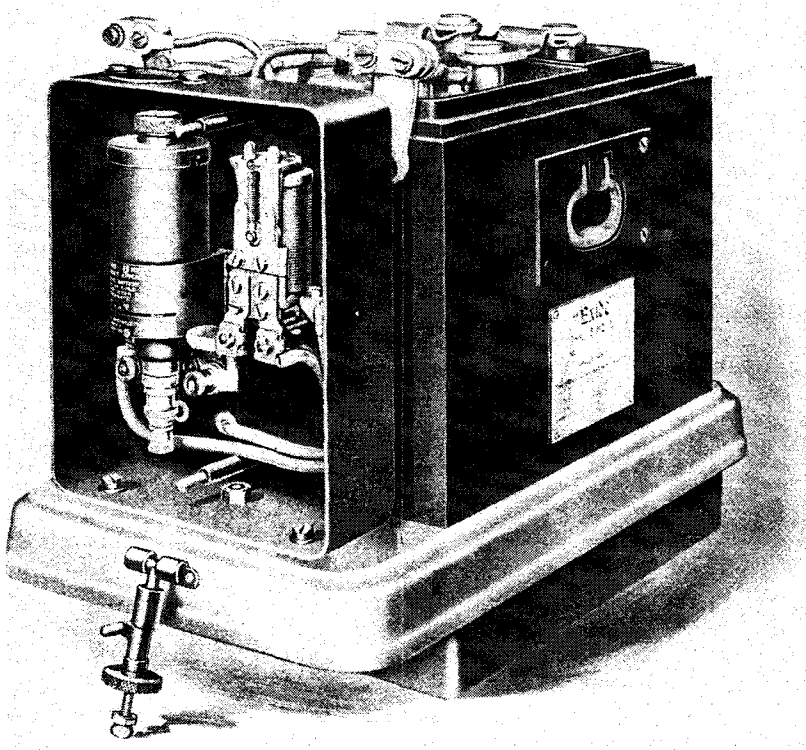


FIG. 6.

resistance in the field of the generator causes the amount of current flowing to the battery to be gradually reduced as the battery nears a state of complete charge, until finally the plunger is almost completely withdrawn from the mercury, throwing the entire length of the resistance coil into the field circuit, thus causing a condition of practical electric balance between the battery and generator, and obviating any possibility of overcharging the battery.

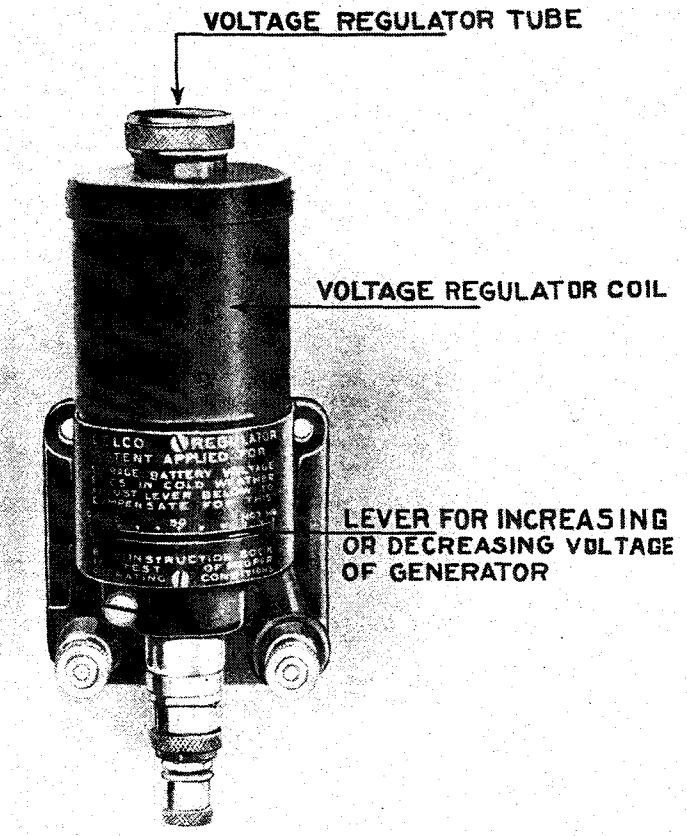


FIG. 7.

Temperature Compensation: Changes in temperature make it necessary to charge the battery at a variable voltage rate, a higher voltage being required in extreme cold weather than that which is proper for hot weather charging. This condition is cared for by the variable resistance, the operating lever of which is moved to the left when a higher voltage is desired (cold), and to the right when the voltage is to be reduced (hot). It is not necessary to alter this adjustment for slight temperature changes.

CUT-OUT RELAY.

Location: The cut-out relay (Fig. 8) is located along side of the voltage regulator in the apparatus box under the battery box cover (Fig. 6).

Function: The cut-out relay closes the circuit between the generator and the storage battery when the generator voltage is high enough to charge the storage battery. It also opens the circuit as the generator slows down and its voltage becomes less than that of the storage battery, thus preventing the battery from discharging back through the generator.

Description: The cut-out relay is an electro-magnet with a compound winding. The voltage coil or fine wire winding (terminals A and H) is connected across the terminals of the generator. The current coil, or coarse wire winding (terminals H and B), is in series with the circuit between the generator and the storage battery, and is opened and closed at contacts "F."

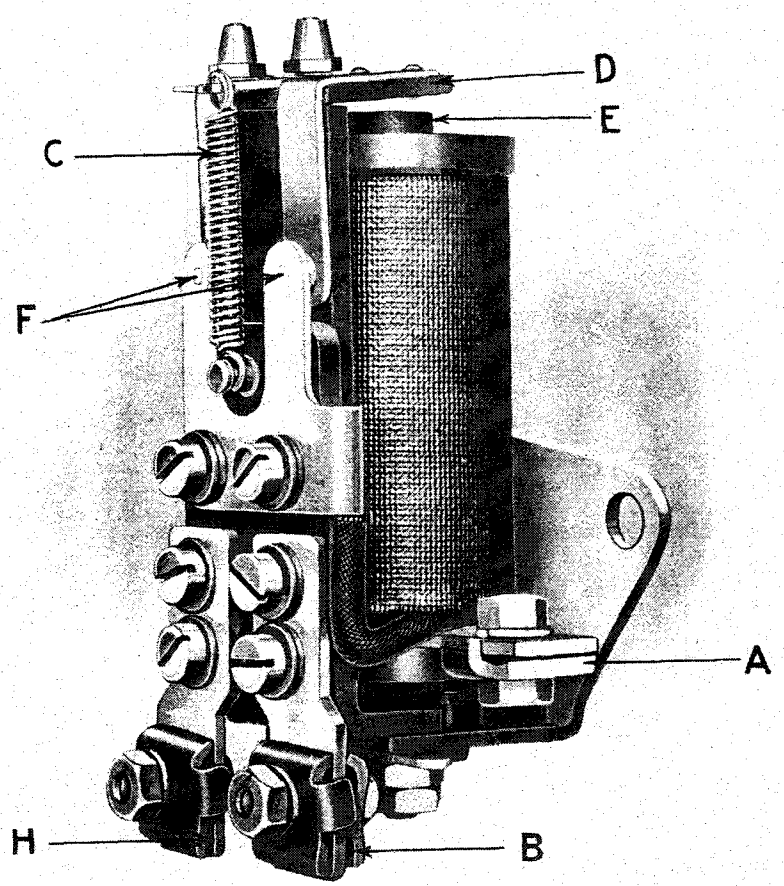


FIG. 8.

CUT-OUT RELAY

When the engine is started, the generator voltage builds up, and when it reaches about 6 volts, a current passing through the voltage winding produces enough magnetism to overcome the tension of spring "C," attracting the magnet armature "D" to the core "E," which closes contracts "F." These contacts "F," which are in series with the coarse wire winding, close the circuit between the generator and the storage battery. The current flowing through the coarse wire winding increases the pull on the armature, and gives a good contact of low resistance at the contact points.

When the generator slows down and its voltage drops below that of the storage battery, the battery sends out a reverse current through the coarse wire winding, which kills the pull on the magnet armature "D," and the spring "C" will open the contacts "F," which will remain open until the generator is again started up.

The action of the cut-out relay is positive, and requires no adjustment.

AMMETER.

Location: The ammeter (Fig. 9) is located on the driver's side of the dash between the ignition switch and the gasoline gauge.

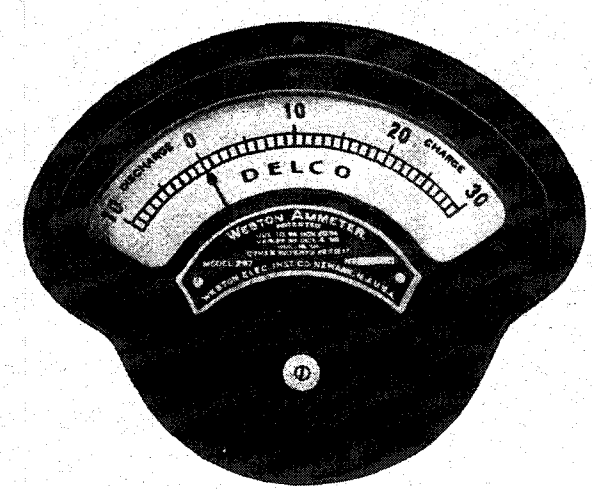


FIG. 9.

Operation: When the starting switch button is depressed, the ammeter needle will momentarily indicate upon the "Discharge" side of the dial a current flow of from six to ten amperes. This is the amount of current necessary for starting the motor armature at a slow rate of speed for the purpose of meshing the starting transmission gears. After the initial rush of current, the reading will drop back to three or four amperes, and remain at this point as long as the push button on the lighting box is held down.

As soon as the clutch pedal is depressed and the push button released, the ammeter needle should return to "zero." When the engine is running at a speed in excess of 300 R. P. M., the ammeter needle should

move to the "Charge" side of the dial, indicating the amount of current being supplied by the generator to the storage battery, the lamps, if lighted, and to the magneto type ignition system, provided the "M" button on the ignition switch is depressed. The amount of current indicated on the "Charge" side of the meter when the car is running will depend upon the speed of the car and the state of the storage battery charge. If the car is being driven at a high rate of speed, with the battery pretty well discharged, the reading should be the maximum, or vice versa. In this connection, it is well to note that the Delco System charges the battery at a tapering rate, that is, a high amperage during the first portion of the charging operation. This rate is gradually reduced as the operation nears completion.

Care: The ammeter requires no attention, unless the needle fails to return to zero when no part of the system is in operation.

A corrector is provided on the front of the instrument which, when turned in the clockwise direction, advances the needle on the "Discharge" side of the dial, and when turned in the counter-clockwise direction advances the needle on the "Charge" side of the dial.

STORAGE BATTERY

The 3-MD-9 battery used with the Delco Electric Cranking, Lighting, and Ignition System is designed especially for it, and is made by The Electric Storage Battery Co., of Philadelphia, Pennsylvania, whose products for automobile service are known to the trade as "Exide" batteries.

The Electric Storage Battery Co., has distributors who do battery repair work in towns of any considerable size, and "Exide Battery Depots" in the following list of cities, where complete assembled batteries and repair parts are carried in stock. These depots are fully equipped to do any kind of battery work.

LIST OF EXIDE BATTERY DEPOTS.

New York City—Yellow Taxicab Co., 8th Ave. and 49th.
Philadelphia—Allegheny Ave. and 19th Street.
Boston—789 Tremont Street.
Chicago—333 West 35th Street.
Cleveland—5121 Perkins Ave.
Atlanta—76 Marietta Street.
San Francisco—590 Howard Street.
Denver—1424 Wazee Street.
St. Louis—1415 Chestnut Street.

LIST OF SALES OFFICES

General Offices and Works, Allegheny Ave. and 19th Street, Philadelphia, Pennsylvania.

New York City—100 Broadway.
Boston—60 State Street.
Chicago—Marquette Building.
St. Louis—Fullerton Building.
Cleveland—Citizens Building.

Atlanta—Candler Building.
Denver—1424 Wazee Street.
Detroit—Ford Building.
Portland, Oregon—Spalding Building.
Seattle—Coleman Building.
Los Angeles—Pacific Electric Building.
San Francisco—118 New Montgomery Street.
Toronto, Ontario—Canadian General Electric Co., Ltd.

The storage battery (Fig. 6) consists of three (3) cells, each ce containing nine (9) plates—four positive and five negative. The batter when fully charged will burn the head, side, tail, and speedometer light for about ten hours.

The voltage regulator in the Delco System insures the proper charg ing, and also prevents the harmful overcharging which is so commo with generator systems on automobiles.

When the battery is fully charged, the electrolyte or solution in th cells should have a specific gravity of from 1.275 to 1.300, as indicate by the Hydrometer Syringe (see Fig. 12). The gravity will lower, du to discharge, and when completely discharged will register from 1.15 to 1.175—about 125 points less than when fully charged. The gravity therefore, is an indication of the state of charge of the battery. A bat tery discharged below a specific gravity of 1.150 will not crank over th engine, nor will it burn the lights to full candle power when the engin is not in operation.

ADDING WATER

The electrolyte must always cover the plates. Replace evaporatio by adding **pure, fresh water. NEVER ADD ACID.**

Once every two weeks, remove the soft rubber plugs (Fig. 10), an observe the height of the electrolyte. If below the acid line, add pur fresh water with the filling syringe (Fig. 13) furnished for this purpos bringing the liquid up to the proper height—3/8 of an inch above the top of the plates—**but not higher.** Ordinarily it will require only a teaspoon ful of water. In hot weather it may require more, but keep it up to thi point.

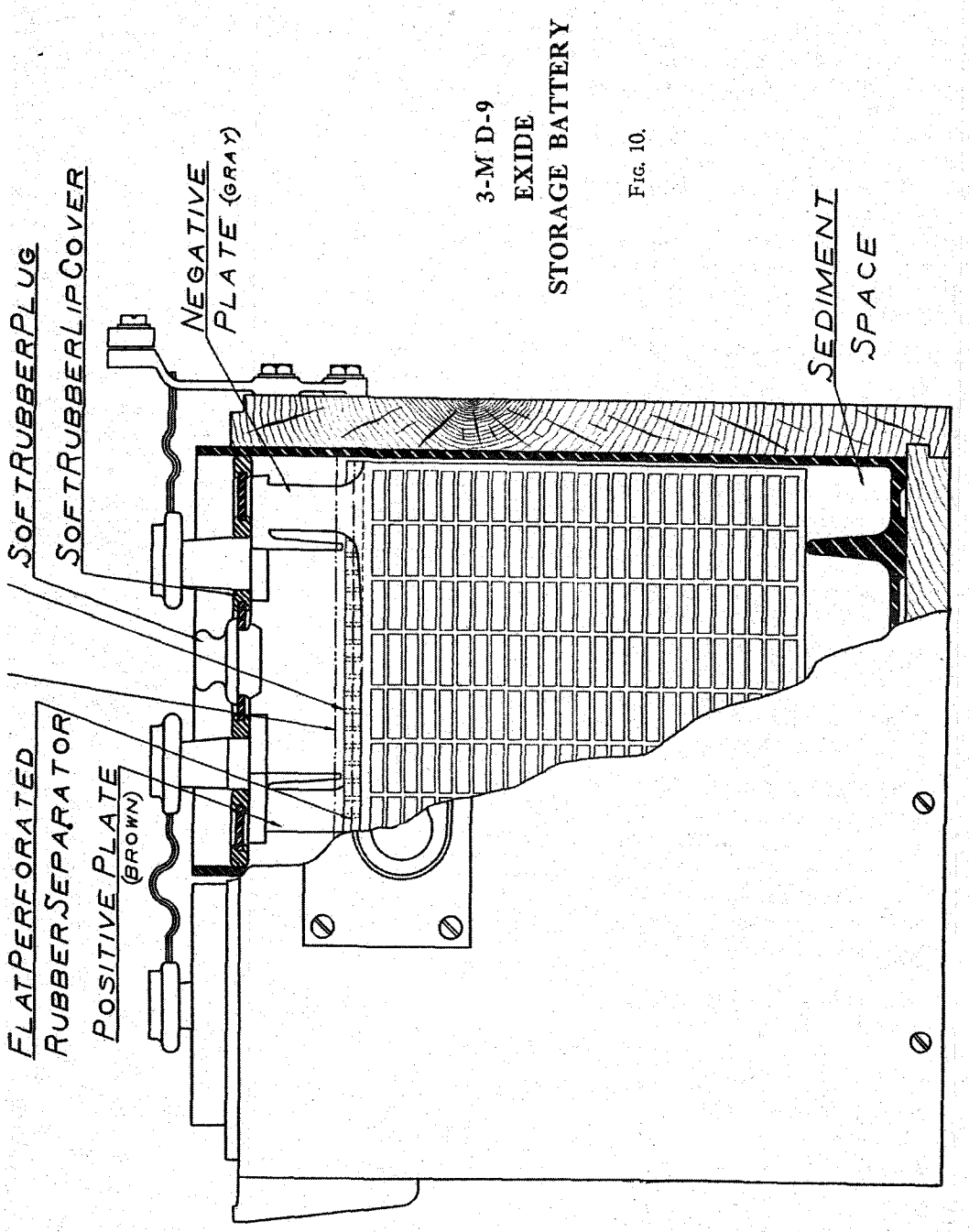
The water must be pure

1. Distilled water,
2. Melted artificial ice, or
3. Fresh rain water.

Never keep the water in metal containers, such as a bucket or car It is best to get a bottle of distilled water from your druggist, or an ic plant. A quart will last a long while. The whole point is to kee metal particles out of the battery. Spring water, well water, or hydran water from iron pipes generally contains iron and other metals in solu tion, which will ultimately cause trouble if used.

If electrolyte has been spilled from the cell, replace the loss wit new electrolyte and follow with an overcharge, by running the engin for several hours, or charge the battery from an outside source (Fig. 11

The specific gravity of the electrolyte to be used for replacing th loss when spilled from the cells, or due to broken jars, should be the same specific gravity as that of one of the adjacent cells. This ca be determined by the use of the Hydrometer Syringe (Fig. 12).



3-M D-9
EXIDE
STORAGE BATTERY

FIG. 10.

ELECTROLYTE

The proper specific gravity of the electrolyte, when the battery i fully charged, is 1.300, as indicated on the Hydrometer Syringe (Fig. 12 but a variation of from 1.275 to 1.300 is allowable. **Never add acid o electrolyte to the cells** except to replace loss from spilling, a broken ja or when removing sediment.

When new electrolyte is required, either to replace loss from spillin or when removing sediment or replacing a broken jar, it can be mad by mixing chemically pure sulphuric acid (1.840 specific gravity) an distilled water, in proportion of two parts of acid to five of water, b volume. **The acid must always be poured into the water, and not th water into the acid.** A glass, earthenware, or other acid-proof vesse thoroughly cleaned, should be used for mixing, and the electrolyte a lowed to cool before using. If a lower specific gravity than 1.300 desired, more water should be added to the acid.

SEDIMENT

The sediment which gradually accumulates in the bottom of the ja should be removed before it reaches the bottom of the plates, as it is ver harmful to the battery. The need of cleaning may be determined b inspection. Its necessity is indicated by lack of capacity, excessive eva oration of the electrolyte, and excessive heating when charging. When battery requires removal of sediment, better results follow if the wo is done at a place where they are thoroughly familiar with storage ba tery practice. If a battery is in need of cleaning or repairs, it is be to communicate with the Dayton Engineering Laboratories Co., who w advise you where to send the battery. **Do not send batteries to us.**

LAYING UP THE CAR FOR THE WINTER.

If the car is not to be used for some time, say the winter montl or longer, care should be taken that just before the last time the c is used, water is added to the cells, if necessary, so that it will be tho oughly mixed with the electrolyte when the car is driven. When the c is laid up, the specific gravity of the electrolyte should register from 1.2 to 1.300. With this condition there will be no danger of freezing any climate. The specific gravity of water is 1.000, and water freezes 32° F. above zero.

The battery should be charged at intervals of every two months du ing the "out-of-service" period, either by running the engine, or char ing from an outside source (Fig. 11). If either of the above is impossib and there is no garage equipped for charging batteries to which the ba tery can be conveniently sent, the battery may be allowed to stand du ing the winter period without charging, provided the specific gravity the electrolyte in the cells registers from 1.275 to 1.300 at the time t car is laid up. Much better results and longer life from the battery w be obtained by giving the periodic charges.

CHARGING FROM AN OUTSIDE SOURCE.

Battery removed from Car.

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

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

The diagram (Fig. 11) illustrates just how the connections should be made. The charge should be continued until all the cells have been gassing or bubbling freely for five hours, and there is no further rise in the voltage of the battery or specific gravity of the electrolyte over the same period. A battery in good condition in a discharged state will require about ten hours of recharging. If it has stood in a discharged condition for several weeks, it will require from twenty-five to fifty hours charging, all depending upon the condition of the battery and the length of time it has stood discharged.

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

PUTTING BATTERY INTO SERVICE AGAIN

Before putting the battery into service again, inspect and add water, if necessary. If the battery has not been kept charged during the winter, it will be advisable to give it a 50-hour charge at a 5-ampere rate from an outside source before putting it into service again. Make sure that the terminals are free from corrosion and that good connections of the wires are made.

If the battery has been left on the car during the winter months, and received its periodic charges, it will not be necessary to give it any special attention other than to fill it to the proper height with distilled water. After the car has been driven for a number of hours, read the specific gravity of the electrolyte with the Hydrometer Syringe. It should register from 1.275 to 1.300 if the battery is fully charged.

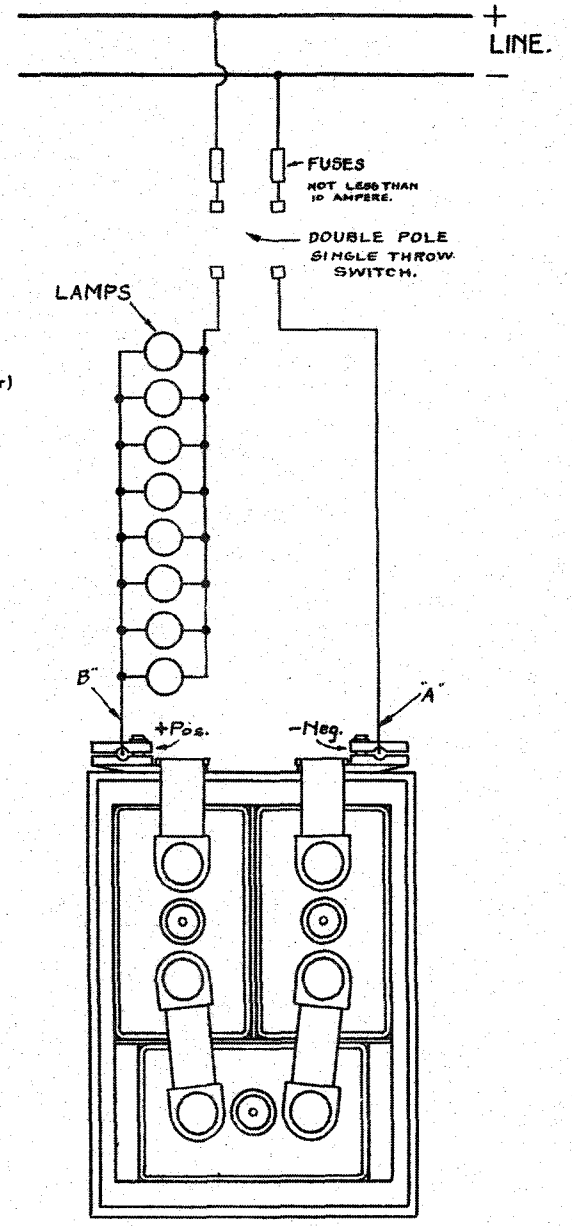


DIAGRAM OF CONNECTIONS FOR CHARGING ONE TYPE 3 MD-9 EXIDE BATTERY FROM A 110 VOLT D.C. CIRCUIT.

FIG. 11.

HYDROMETER SYRINGE

This instrument (Fig. 12) is for testing the specific gravity of the electrolyte of storage batteries. It is shipped unassembled, carefully packed in a substantial wooden box.

To assemble, hold the glass barrel, to which is attached the rubber bulb, in a horizontal position, and insert the hydrometer stem end first. Wet the soft rubber plug which is attached to the hard rubber pipette (nozzle) and **force rubber plug** grooved end first into the end of the glass barrel as far as it will go, or until it strikes the shoulder in the barrel. It is important not to force the pipette too much in making this attachment, as the end of the pipette must not extend beyond the base of the grooves of the rubber plug; otherwise the flow of the electrolyte will be retarded in emptying the Hydrometer Syringe.

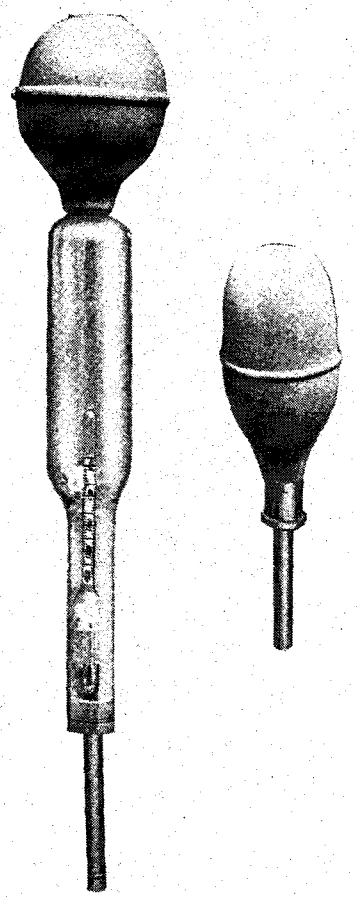
Directions for Using.

After removing the soft rubber plug from the cover of the cell, compress the rubber bulb of the syringe and insert the pipette in the solution of the cell to be tested. Holding the instrument as nearly vertical as possible, gradually lessen the pressure on the bulb until the electrolyte rising in the barrel causes the hydrometer to float. In general, only enough electrolyte should be drawn to float the hydrometer free of the bottom by about one-half to three-quarters of an inch. The specific gravity reading is taken on the hydrometer at the surface of the electrolyte in the glass barrel.

If the electrolyte is below the top of the plates, or so low that enough cannot be drawn into the barrel to allow of a proper reading of the hydrometer, fill the cell to the proper level (see Fig. 10) by adding pure water; then do not take a reading until the water has been thoroughly mixed with the electrolyte. This can be accomplished by driving the car for several hours.

The specific gravity of the electrolyte is an indication of the amount of charge in a battery. In a fully charged battery the specific gravity should be from 1.275 to 1.300. When the specific gravity registers from 1.150 to 1.175, the battery is practically discharged, and should be recharged.

Hydrometer Syringes are not a part of the Delco Electric System, but can be purchased upon application to the Cadillac Motor Car Co., The Electric Storage Battery Co., or The Dayton Engineering Laboratories Co.



HYDROMETER SYRINGE

FIG. 12.

FILLING SYRINGE

FIG. 13.

MAGNETO DISTRIBUTOR AND TIMER

Location and Function: This unit is carried just above the lubricator near the forward end of the engine (Fig. 1). Built in this unit is the mechanism for automatic control of timing. The timer serves to control the proper interval of time between the sparks, and as the primary contact through the timer is made, the distributor makes the contact in the secondary circuit, insuring a spark in the cylinder which is in firing position.

The automatic advance mechanism maintains a fixed relation between engine speed and angle of spark advance.

The distributor consists of a cap or head of insulating material, carrying one high tension contact in the center, with four similar contacts spaced equi-distant about this center, and a rotor, which maintains constant communication with the central contact. The rotor carries two contact buttons, one of which serves to close the secondary circuit to the spark plug in the proper cylinder, and the other merely to ground any induced current which may flow in the secondary circuit of the cylinder next in firing order.

Directly beneath the distributor is the timer, which consists of a cam with four lobes or projections and a swinging arm pressed outward by the lobes of the cam to make a contact which completes the primary circuit.

The shaft which transmits motion to the timer is in the form of a tube. A helical slot is cut through the wall of this hollow driving shaft. A smaller shaft, revolved by the engine gears, is carried inside this hollow shaft. A vertical slot is cut through this shaft. A pin, held by a collar which is adapted to slide upon the outside of the hollow timer shaft, passes through both the straight slot in the small shaft and the helical slot in the hollow shaft. Obviously, if the collar holding this pin be moved along the hollow shaft, it will change its angular relation to the smaller shaft, and this change in relative position of the two shafts affects the advance of the spark timing.

In the automatic system, the position of this collar is governed by a centrifugal device, comprising a spring loaded revolving ring which, as the speed increases, moves from an angular position toward a horizontal position.

This ring is connected to the sliding collar, and causes it to rise—advancing the spark as the engine speed increases; or to fall, retarding the spark as the engine speed decreases. (The spark position may be governed by the spark lever above the steering wheel if this be desirable.)

As a rule, the best point for setting the spark lever on the steering wheel sector is that when once determined by the operator of the car, it need not be changed, as the automatic advance mechanism should take care of the proper retarding of the spark for hill climbing and heavy pulling, also advancing for high speeds.

The position from which the automatic governor begins controlling the spark may be regulated by the spark advance lever on the steering wheel, as it has been found impossible to provide a full automatic control of the spark which will compensate for variations in gravity of gasoline and other conditions which cannot be held constant.

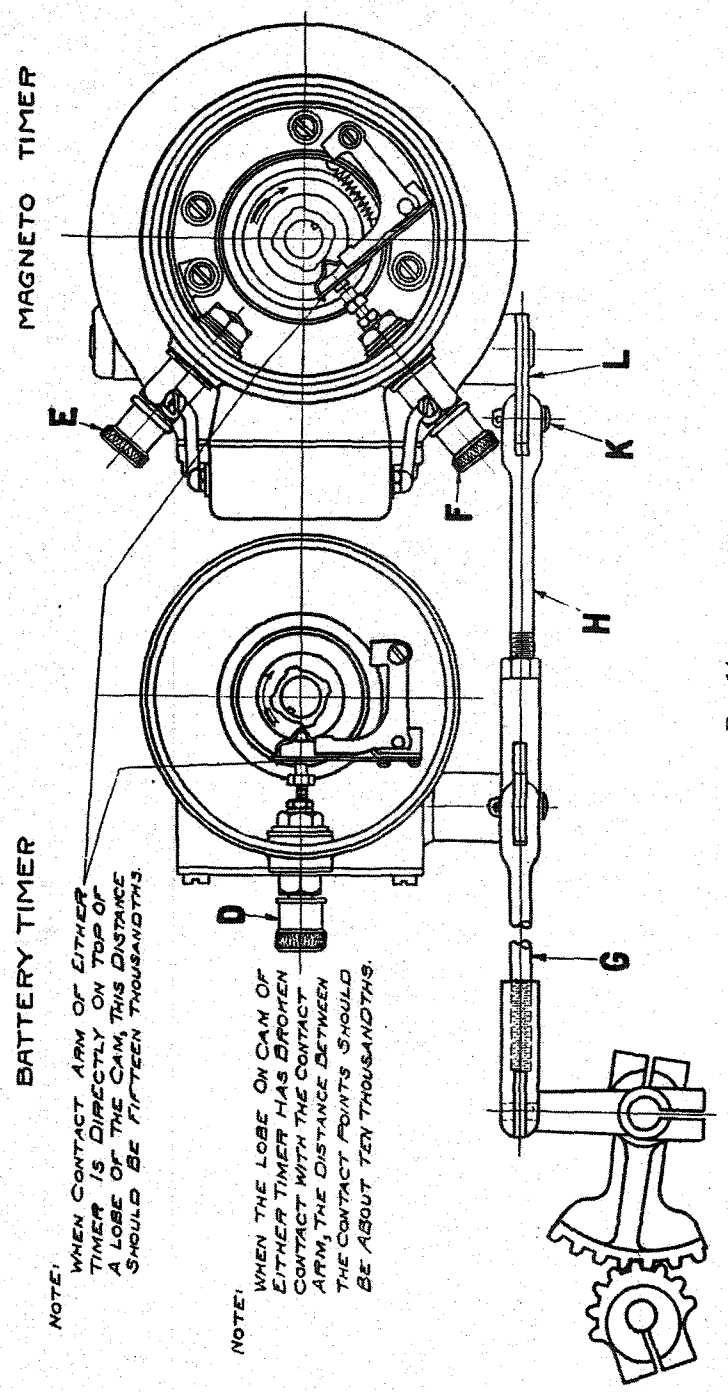


Fig. 14.

The condenser, which is attached to the outside of the housing, is a simple assembly of metal foil and insulating material. It need not be further described, as it will require no attention.

The distributor requires no attention save an occasional wiping of the contacts with a soft smooth rag, free from lint.

The head of the distributor may be removed by pressing back the metal tongue at the side, rotating the head counter-clockwise until the notch in the rim of the head coincides with the tongue, and then lifting the head straight up.

The rotor may be removed by lifting straight up. The timer mechanism is exposed by the removal of this rotor.

BATTERY DISTRIBUTOR AND TIMER.

This unit is located just behind the magneto distributor (Fig. 1), and serves the same functions in connection with the dry battery system as does the distributor just described in relation to the magneto type ignition. The construction is similar to that of the magneto distributor in all details, except the advancing mechanism, which is not automatic, but is controlled entirely by the spark lever above the steering wheel, and the condenser is omitted.

The same care should be given as prescribed for the other distributing unit. The spacing indicated by Fig. 14 should be maintained in connection with timer contacts. A few drops of light oil should be applied occasionally to the ball bearing directly beneath the timer cam.

THE MAGNETO AND BATTERY COILS

Location and Function: These coils are mounted in front of the engine (Fig. 1), and serve to transform the low voltage current in the primary circuits to a current of high tension in the secondary circuits.

Description: They consist simply of primary coils of coarse wire in comparatively few turns, and secondary coils of many turns of fine wire, with the necessary terminals and insulation.

Care: No attention is necessary, except an occasional inspection to insure that the terminals are tight.

RESISTANCE UNIT.

This is a coil of resistance wire (Fig. 16), mounted with terminals upon the terminal board in front of the dash. Under ordinary conditions the wire remains cool, and offers little resistance to the passage of current. However, if for any reason the primary circuit of the magneto type ignition should remain closed for any considerable length of time, the passage of current through the coil would heat it, thus increasing its resistance to a point where very little current could pass, and insuring against waste of current from the battery and damage to the induction coil and timer contacts.

IGNITION RELAY.

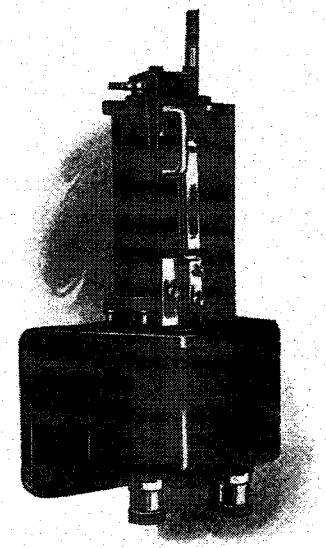


FIG. 24.

Ignition Relay with Cover Removed

Location and Function: This unit is mounted in front of the da (Fig. 16). It is connected in the battery ignition circuit, and ser to break the primary circuit immediately after it is completed throu the timer, thereby inducing a high tension flow through the second circuit, which results in a spark at the plug.

Description and Operation: Reference to Figures 24 and 25, connection with the following description, will enable the reader understand the parts of the ignition relay and their functions.

Magnet "C" attracts armature "A" when the current is comple through the timer. This armature when attracted by magnet " forces contacts "P" apart, breaking the primary circuit.

There are two windings upon magnet "C", one of comparativ coarse wire, so connected that current ceases to flow through it wl the contact through "P" is broken; and the other of comparatively f wire, connected around contacts "P" in such a way as to hold armature after the current is broken through the coarse wire coil. this second coil were not effective, the contacts would vibrate, giv a shower of sparks at the plug instead of the single spark. This is d in starting only, as it is wasteful of current if continued under runn conditions. A cylindrical condenser is mounted beside the magnet c

Care and Adjustment: As the ignition relay is of rather unus construction, trouble is often attributed to it which really results fr sources entirely outside the relay. Loose connections, grounded wi and weak batteries may cause improper working of the relay, throu

fault of the device itself. The only point of adjustment in the relay the pole piece "PP." This regulates the distance between armature d magnet pole, and the gap between contacts "P." Adjustment is ıde by turning the notched head clockwise, as one looks down upon it, increase the gap between contacts, and vice versa. Normally, this justment should be such that the distance between contacts "P" when mature "A" is pressed down is about equal to the thickness of one eet of paper on which this booklet is printed. A simple way in ıich this adjustment may be made, is to turn the notched head of e adjusting screw in the counter-clockwise direction until the motor ɔps firing. Then turn it four or five notches in the opposite direction. **ıder no condition should the adjusting screw be turned very far in :her direction.**

If particles of dirt get between the armature and pole piece at the int "M," they may be removed by slipping a piece of smooth paper tween the parts mentioned, pressing down lightly upon the armature ıd pulling out the paper.

If the armature "A" vibrates rapidly when button "B" on the ignition vitch is depressed, the holding coil circuit is open. Test out the rcuit. In emergency, connect two terminals closest together on the lay with a wire. This will stop trouble if the break is outside of the lay.

If the armature vibrates feebly, it indicates either weak batteries · dirt between either the relay or timer contacts.

If a cylinder misses, do not look for trouble in the relay. It acts the same capacity for all cylinders. If it acts for one, it will function r all cylinders.

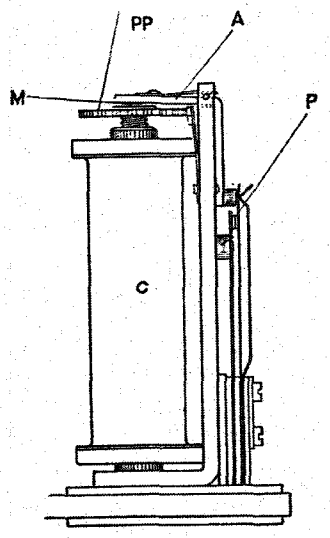


FIG. 25.

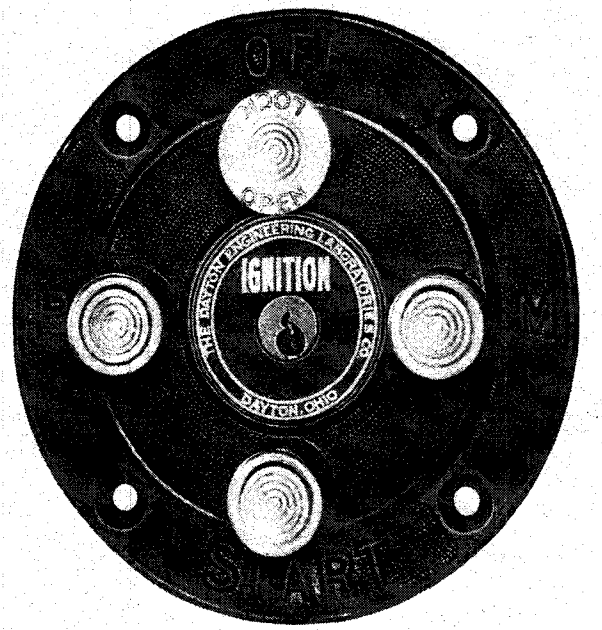
IGNITION SWITCH.

This switch (Fig. 15) is mounted on the dash, and serves to make the necessary combinations for ignition. There are four buttons which operate plungers. The button marked "START" should only be used in starting the engine, as it establishes connections which give a shower of sparks across the spark plug points. This is necessary only in starting, and would waste the current from the dry cells if used when running.

The button "B" when pressed in throws the dry battery ignition into operation. Depression of button "M" will cause button "B" to spring out, cutting off the dry battery ignition when the generator ignition is in use. The "OFF" button when pushed in releases any other button which may be depressed, and cuts off ignition current from any source.

The switch is equipped with a Yale lock, and is closed by turning the key in the clockwise direction. It is opened by turning the key in the counter-clockwise direction.

The "OFF" button is provided with a locking device, which is made



Front View of Ignition Switch

FIG. 15.

effective by rotating the button, the periphery of which is knurled for this purpose.

The words, "LOCK" and "OPEN" are stamped on the face of the button.

When the word, "LOCK" is turned to the bottom, the buttons cannot be depressed; but when the word, "OPEN" is at the bottom, any one of the buttons may be pushed in.

When the switch is open, it may be locked by turning the "OFF" button half-way in the counter-clockwise direction, and vice versa.

Wiring

For Cranking, Lighting and Ignition Circuits

A. To 1 on storage battery (negative).
B. Wire to left headlight.
C. (Yellow wire) to 14 on dash.
D. (Red wire) to 4 on voltage regulator.
E. (Green wire) to 6 on cutout relay.
F. (Green wire) to latch coil.
G. (Red wire) to carbon on dry cell.
H. (Green wire) to zinc on dry cell.
I. (Red wire) to 18 on relay.
J. (Green wire) to 3 on battery coil.
K. (Yellow wire) to 1 on generator.
L. (Green wire) to 4 on controlling switch.
M. (Black wire) to 4 on generator.
N. (Green wire) to 3 on generator and magnetic latch coil.
O. (Red wire) to 3 on controlling switch.
P. Light wires.
Q. (Yellow wire) to 21 on switch.
S. (Black wire) to 23 on switch.
Y. (White wire) to 8 on magneto distributor.
Z. (White wire) to 13 on dash.
X. Ground wires to switch.
AA. (White wire) to 20 on switch.
BB. (Black wire) to 1 on magneto coil.
CC. (Black wire to 7 on dash.
DD. (Red wire) to 10 on dash.
T. (Black wire) to 17 on relay.
W. (Yellow wire) to 16 on relay.

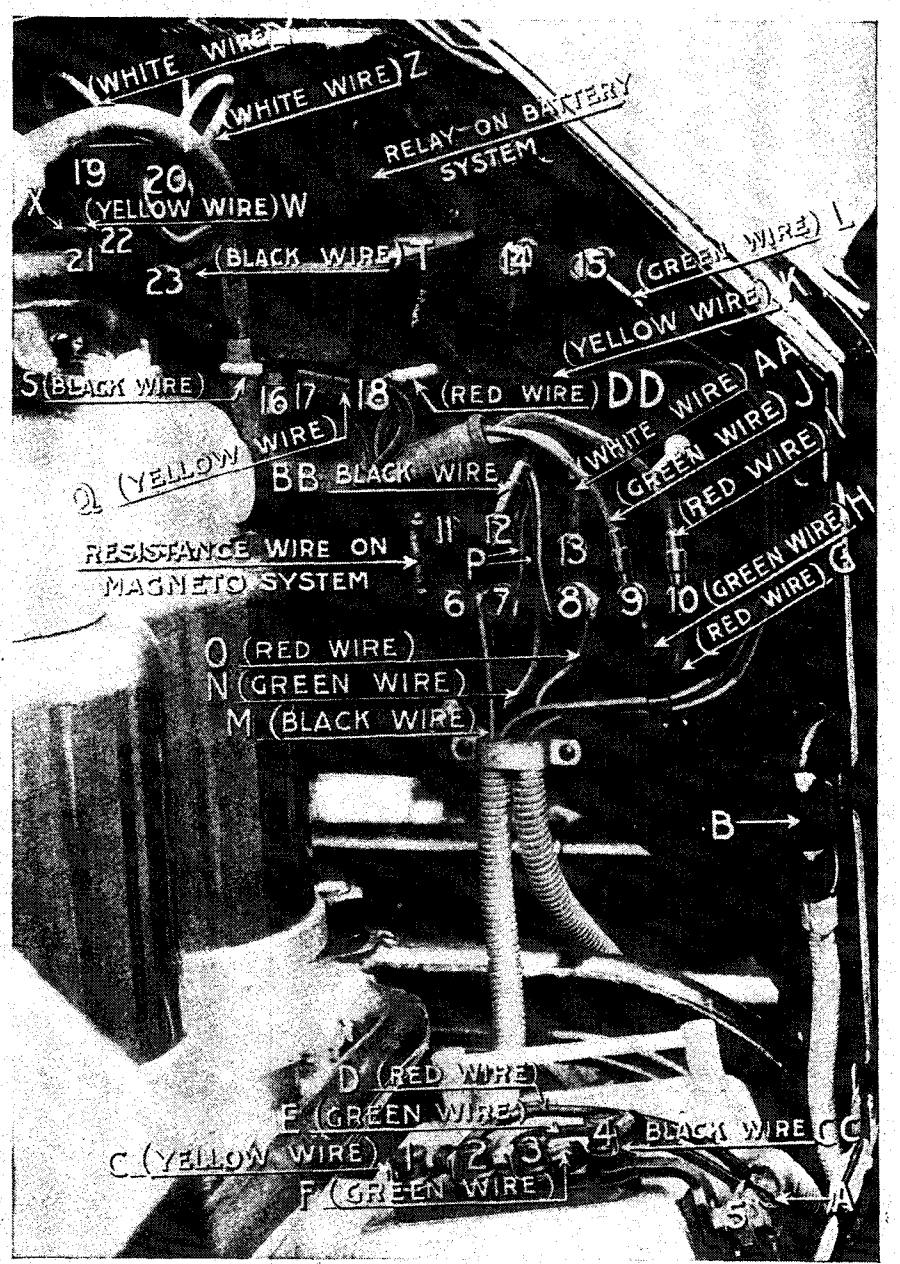
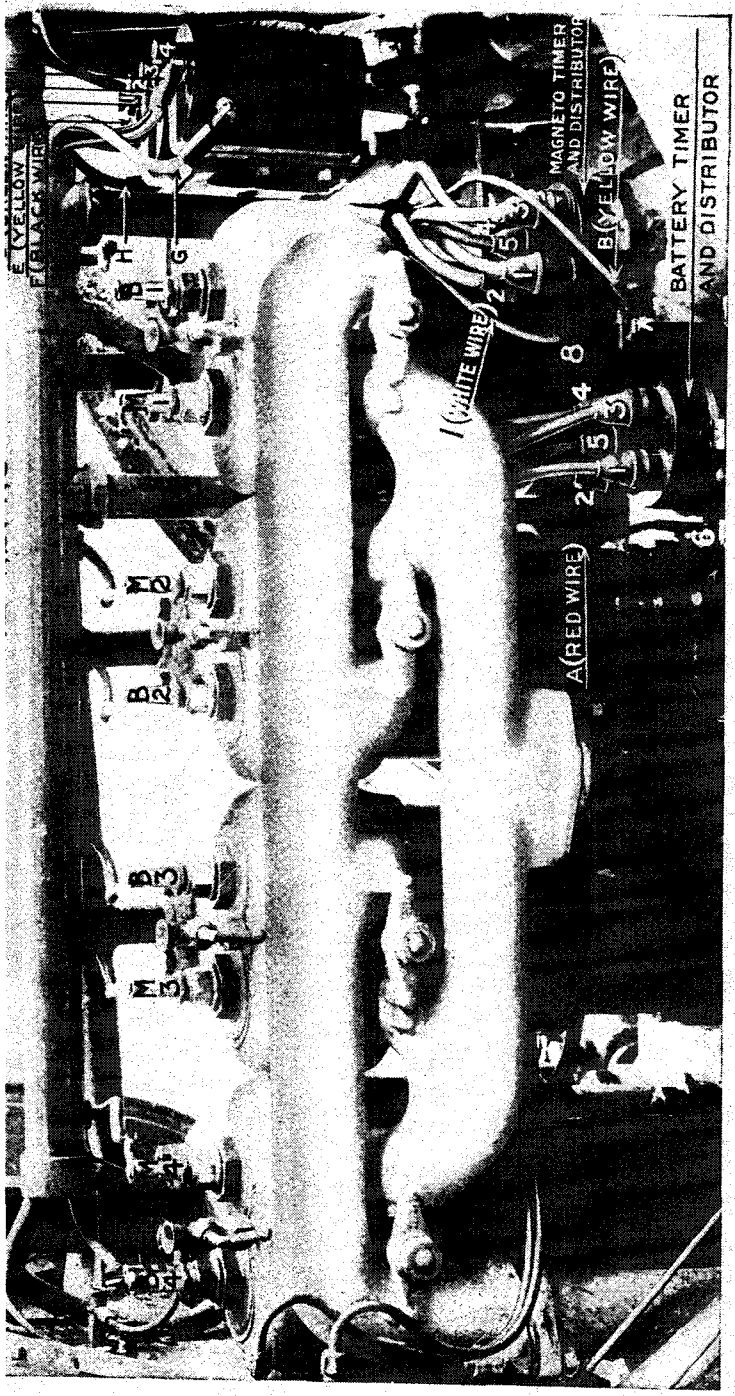


FIG. 16.



A. (Red wire) to 4 on battery coil.
B. (Yellow wire) to 2 on magneto coil.
C. (Red wire) to 6 on battery timer.
D. (Green wire) to 9 on dash.
E. (Yellow wire) to 7 on magneto timer.
F. (Black wire) to 12 on dash.
G. To 5 on battery distributor.
H. To 5 on magneto distributor.
I. (White wire) to 19 on dash.

FIG. 17.

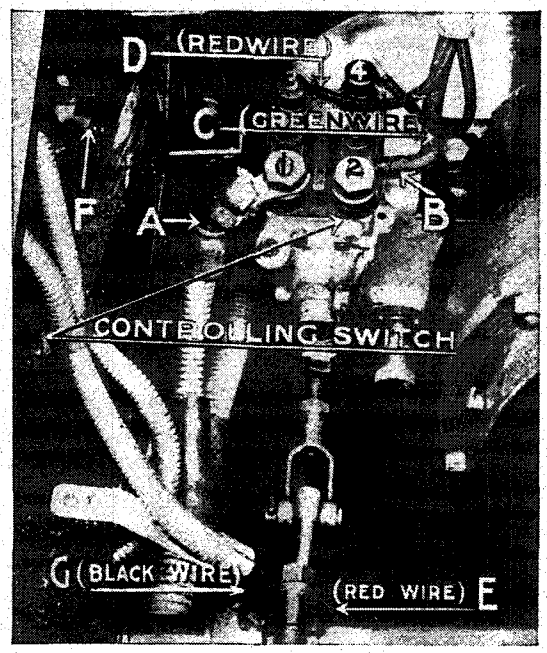


FIG. 18.

A. To 2 on storage battery.
B. To field on motor.
C. (Green wire) to 15 on meter on dash.
D. (Red wire) to 8 on dash.
E. (Red wire) to junction box on body.
F. Connection for electric horn.
G. (Black wire) to 3 on generator.

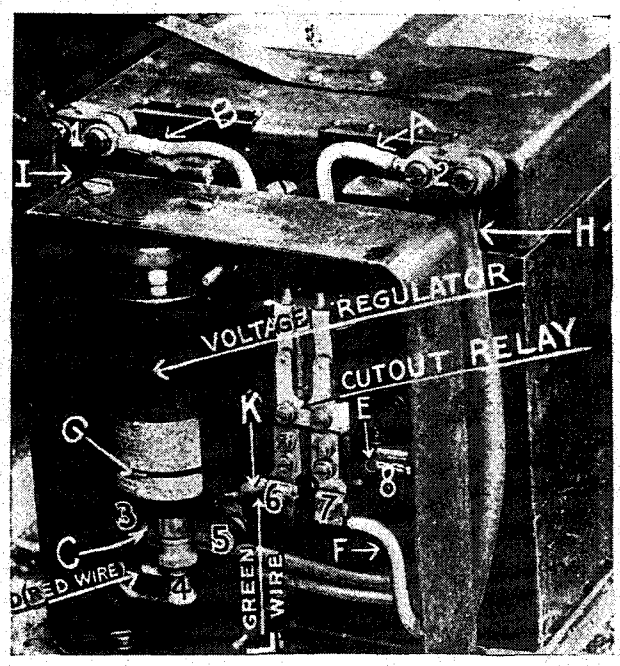


FIG. 19.

A. To 8 on cut-out relay and 3 on voltage regulator.
B. To 7 on cut-out relay.
C. To 8 on cut-out relay.
D. (Red wire) to 2 on generator.
E. To 2 on storage, and 3 on voltage regulator.
F. To 1 on storage battery.
H. To 1 on controlling switch, (positive).
I. To 5 on generator, (negative).
L. (Green wire) to 3 on generator.
K. Jumper wire between 6 on cut-out relay and 5 on voltage regulator.

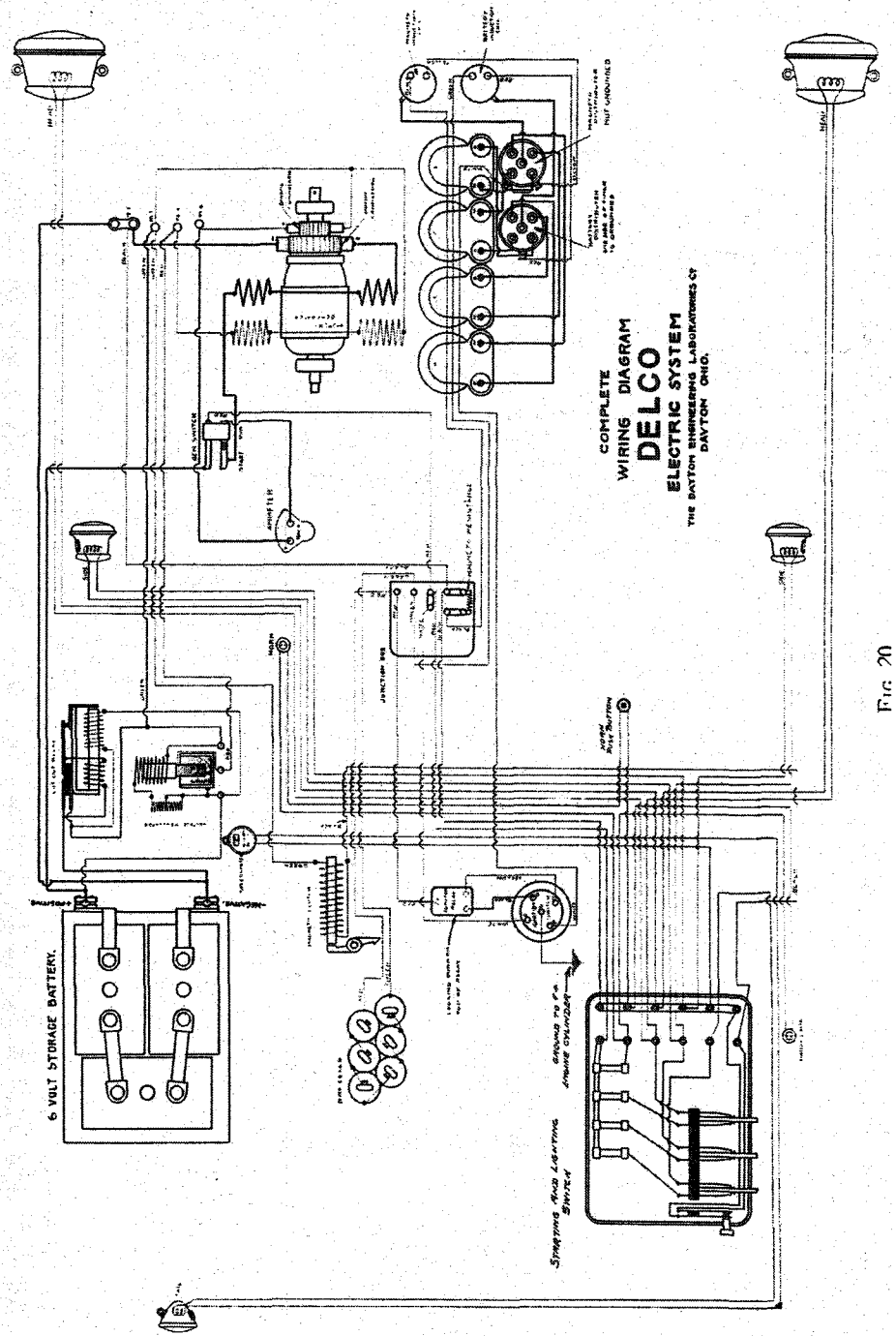


FIG. 20

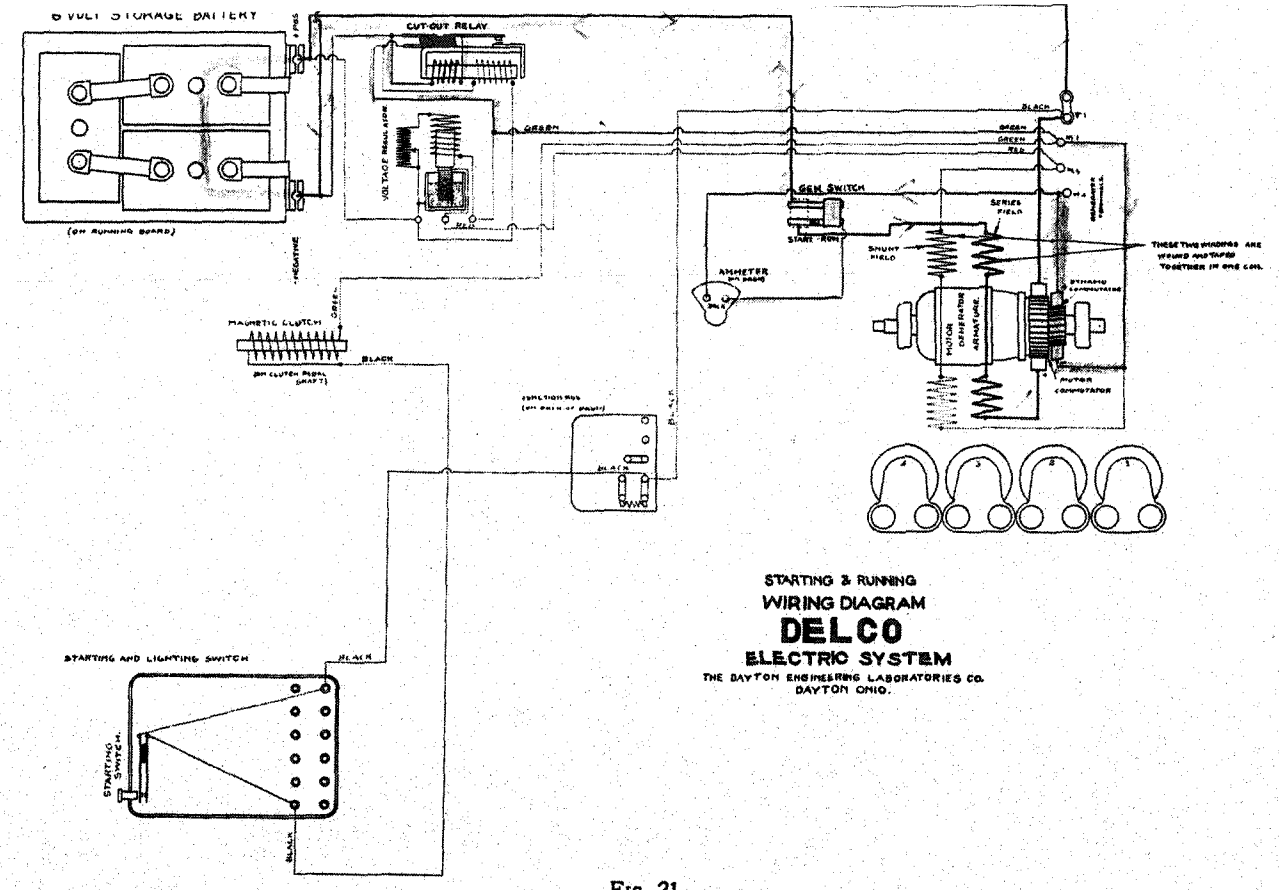

6 VOLT STORAGE BATTERY
CUT-OUT RELAY
GEN. SWITCH
SERIES FIELD
SHUNT FIELD
AMMETER
MAGNETIC CLUTCH
STARTING & RUNNING
WIRING DIAGRAM
DELCO
ELECTRIC SYSTEM
THE DAYTON ENGINEERING LABORATORIES CO.
DAYTON OHIO.
STARTING AND LIGHTING SWITCH
STARTING SWITCH.

FIG. 21.

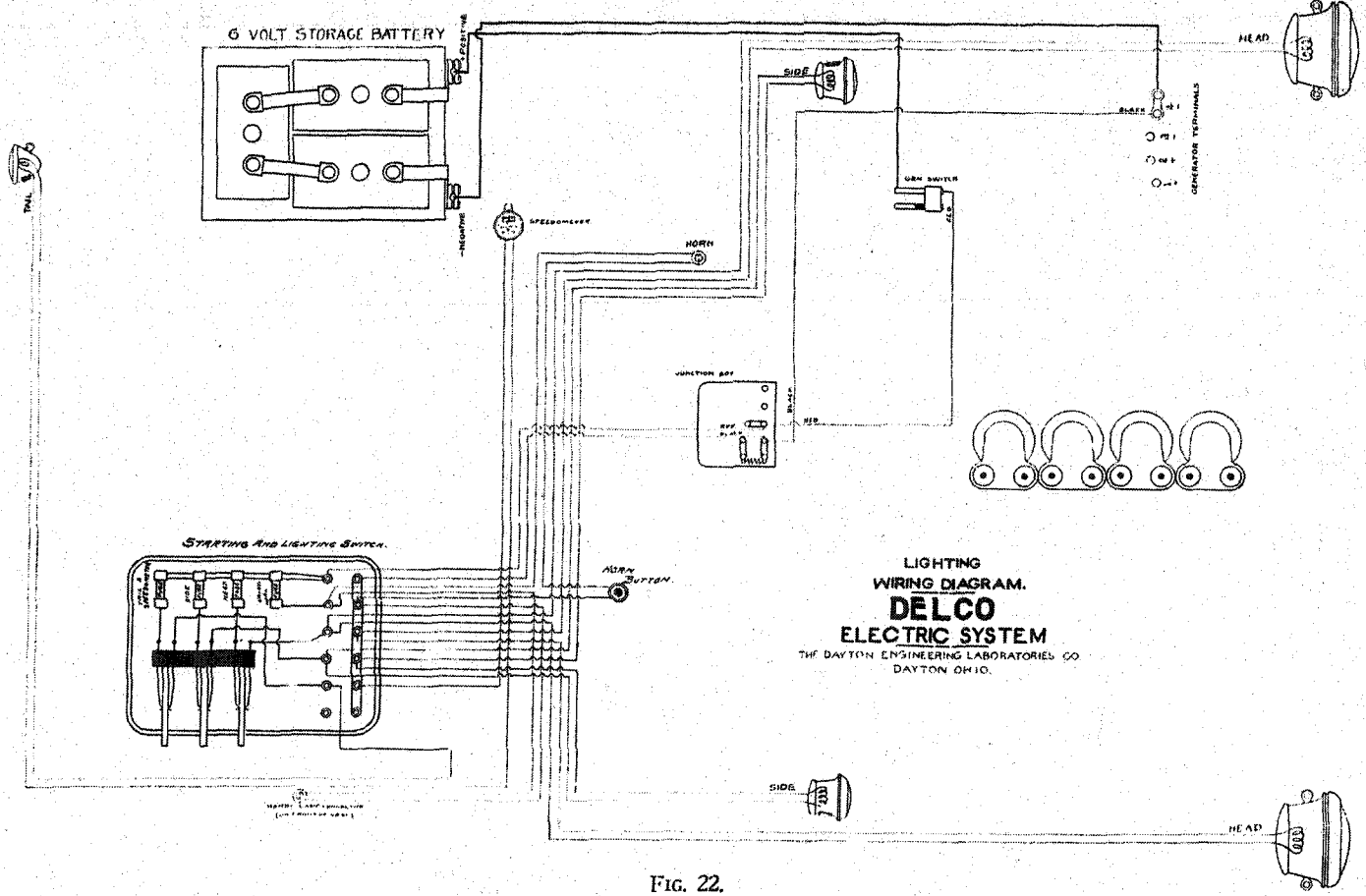
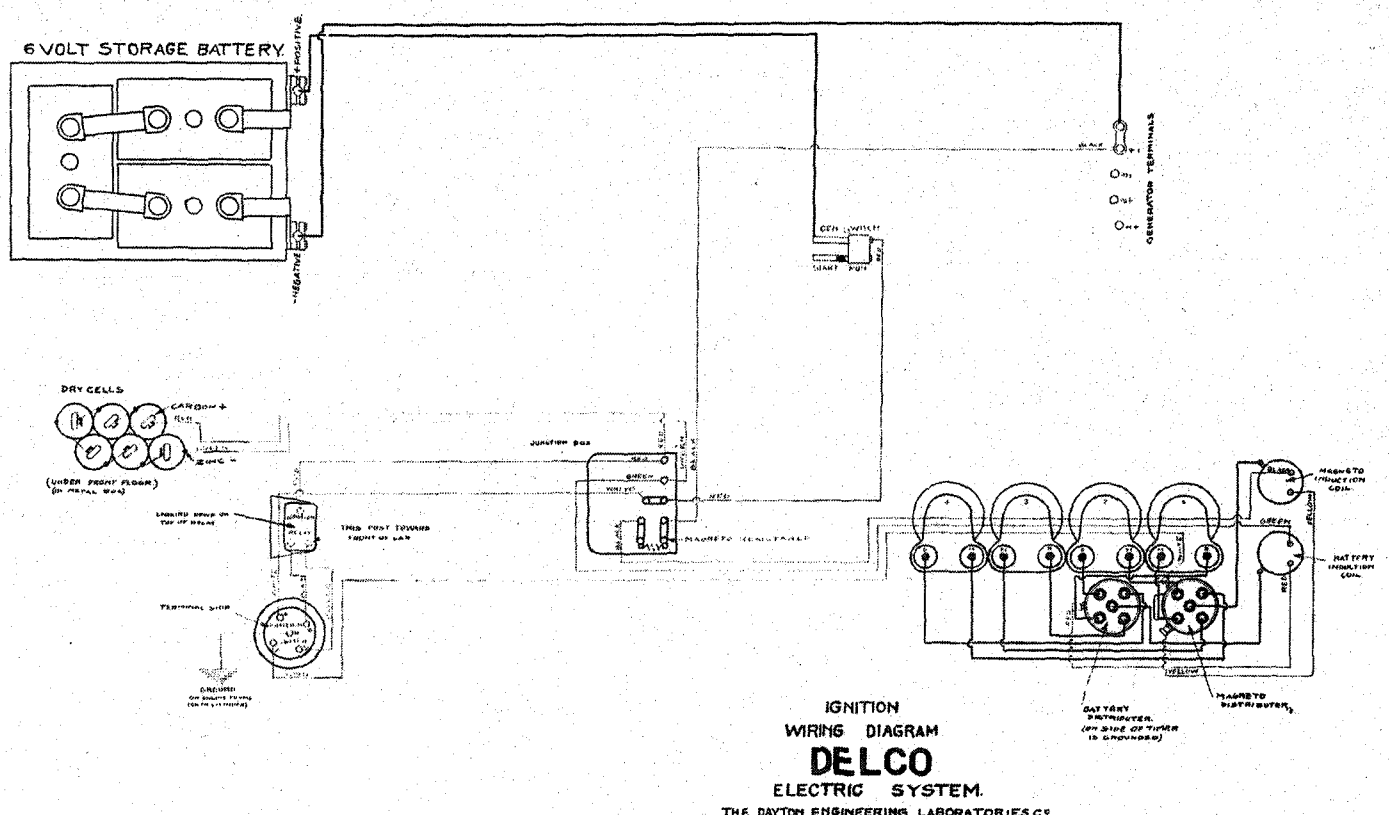

6 VOLT STORAGE BATTERY
SIDE
HEAD
GEN. SWITCH
SPEEDOMETER
HORN
JUNCTION BOX
STARTING AND LIGHTING SWITCH.
HORN BUTTON
LIGHTING
WIRING DIAGRAM.
DELCO
ELECTRIC SYSTEM
THE DAYTON ENGINEERING LABORATORIES CO.
DAYTON OHIO.

FIG. 22.



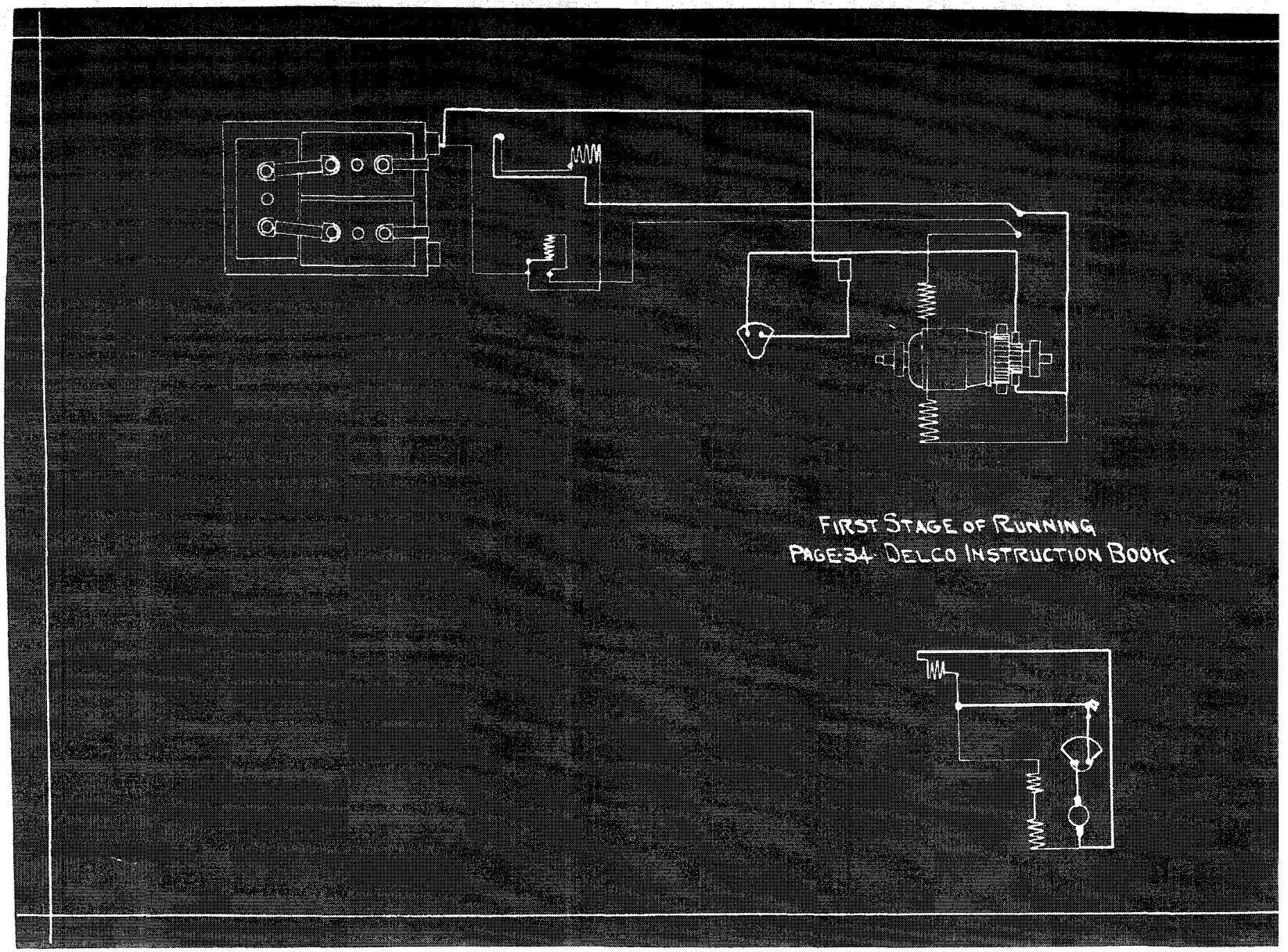
IGNITION
WIRING DIAGRAM

DELCO

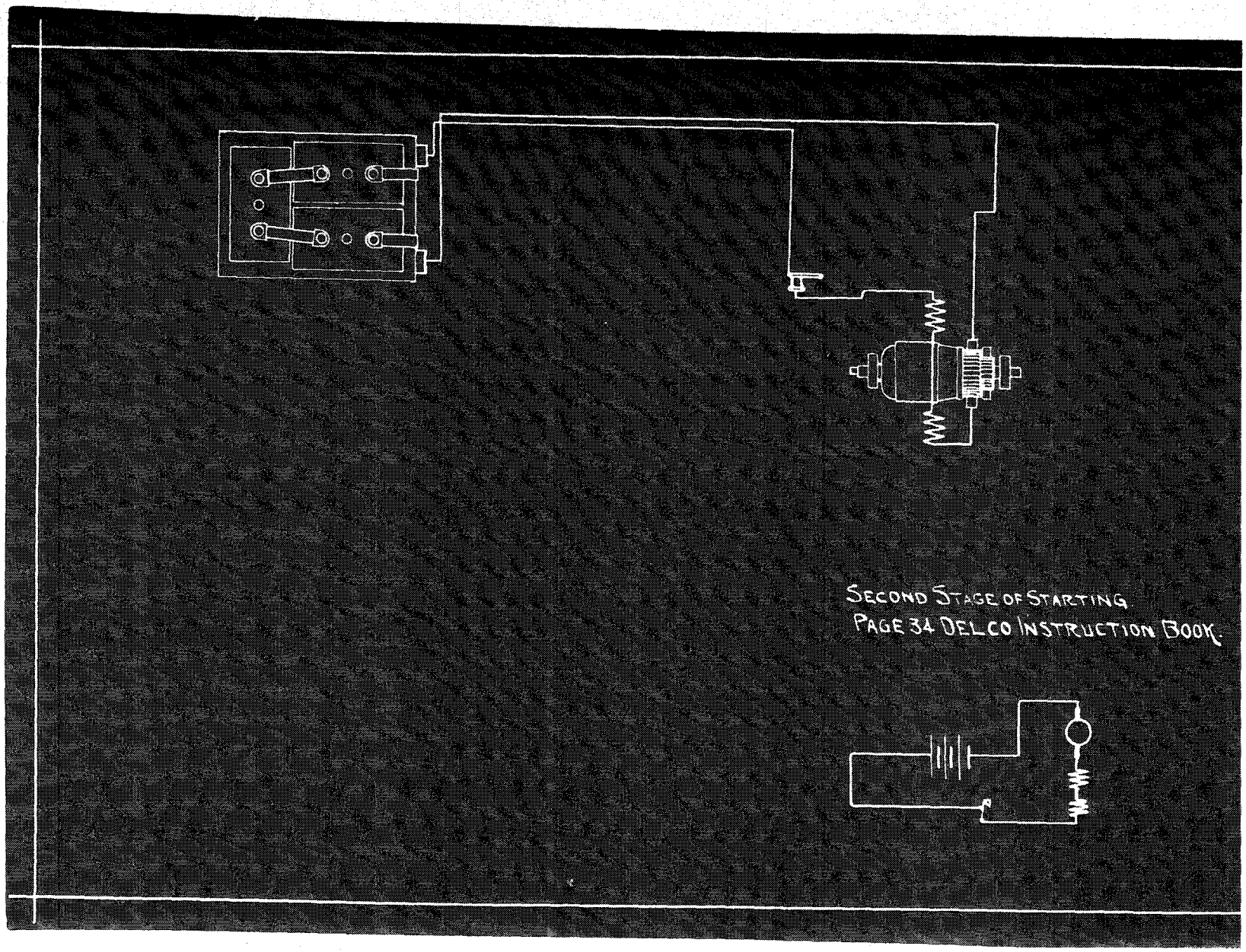
ELECTRIC SYSTEM.

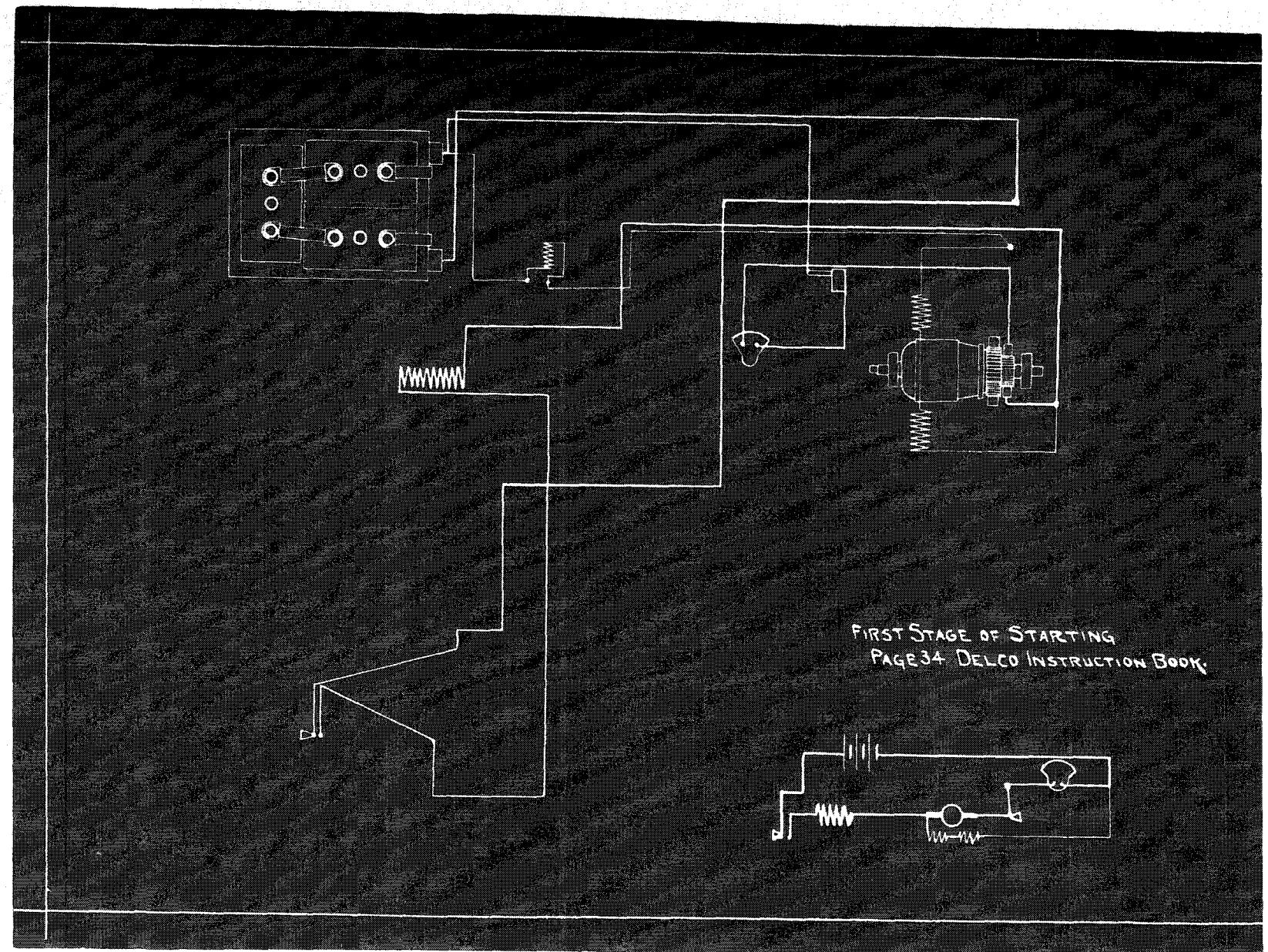
THE DAYTON ENGINEERING LABORATORIES Co
DAYTON OHIO.

FIG. 23.


FIRST STAGE OF RUNNING
PAGE 34 DELCO INSTRUCTION BOOK.

SECOND STAGE OF RUNNING.
PAGE 34 DELCO INSTRUCTION BOOK.


SECOND STAGE OF STARTING
PAGE 34 DELCO INSTRUCTION BOOK.


FIRST STAGE OF STARTING
PAGE 34 DELCO INSTRUCTION BOOK.

MOTOR CAR IGNITION

Ignition being one of the vital features of a motor car, it is important that the prospective buyer give it particular attention. The fact that a car is equipped with Delco Ignition is an indication that its other features are also good.

Remember that no matter how good a motor you may buy, poor ignition will most certainly decrease its efficiency.

And if your ignition requires adjustment or repairs every few hundred miles, or by heavy current usage forces you to carry an unwieldly and unsatisfactory storage battery, you have paid for something which deprives you of part of your motoring pleasure.

WHY DELCO IS SO SATISFACTORY

The Dayton Engineering Laboratories Company, makers of Delco Ignition, maintain in Dayton a well-equipped technical laboratory. Before any device is marketed it is given months of the most exhaustive laboratory and field tests. No expense is spared to make every Delco system unfailing and lastingly satisfactory.

Special systems are made to meet special conditions; when you by a Delco equipped car, you know the ignition on it is made for that car, and will make the motor do its best work.

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Miscellaneous
1922

Index of all Cadillac Models using Delco Equipment

1910 CADILLAC MODEL

Delco System No. 142

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

1911 CADILLAC MODEL

Delco System No. 4411

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

1912 CADILLAC MODEL

Delco System No. 1

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

1913 CADILLAC MODEL

Delco System No. 4

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

Index of all Cadillac Models using Delco Equipment

1910 CADILLAC MODEL

Delco System No. 142

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

1911 CADILLAC MODEL

Delco System No. 4411

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

1912 CADILLAC MODEL

Delco System No. 1

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

1913 CADILLAC MODEL

Delco System No. 4

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

1914 CADILLAC MODEL

Delco System No. 27

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

51 MODEL—1915 CADILLAC

Delco System No. 69

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

53 MODEL—1916 CADILLAC

Delco System No. 98

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

55 MODEL—1917 CADILLAC

Delco System No. 130

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

57 MODEL—1918 CADILLAC

Delco System No. 177

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

57 MODEL—1919 CADILLAC

Delco System No. 177

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

59 MODEL—1920 AND 1921 CADILLAC

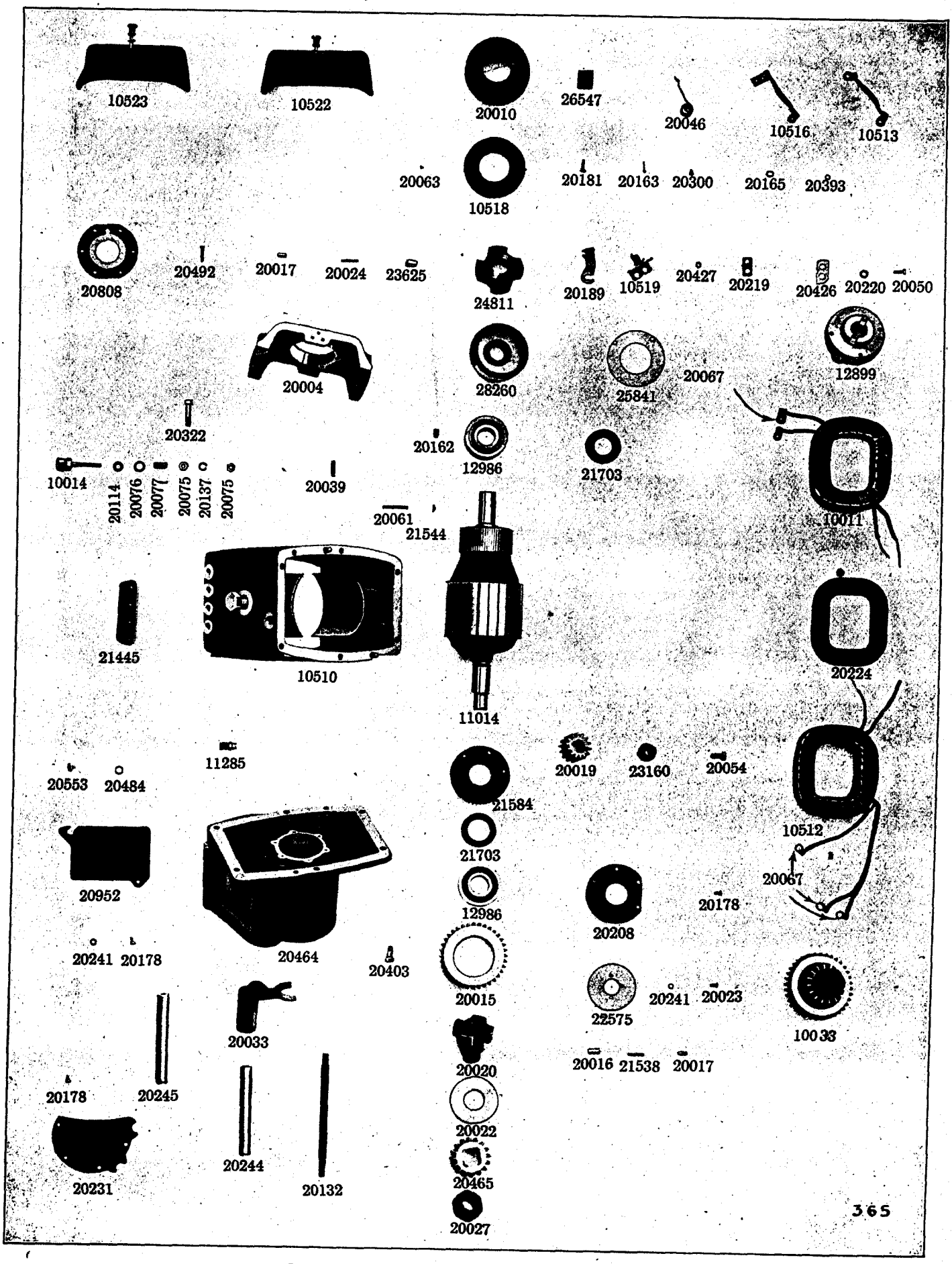
Delco System No. 291

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

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

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

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



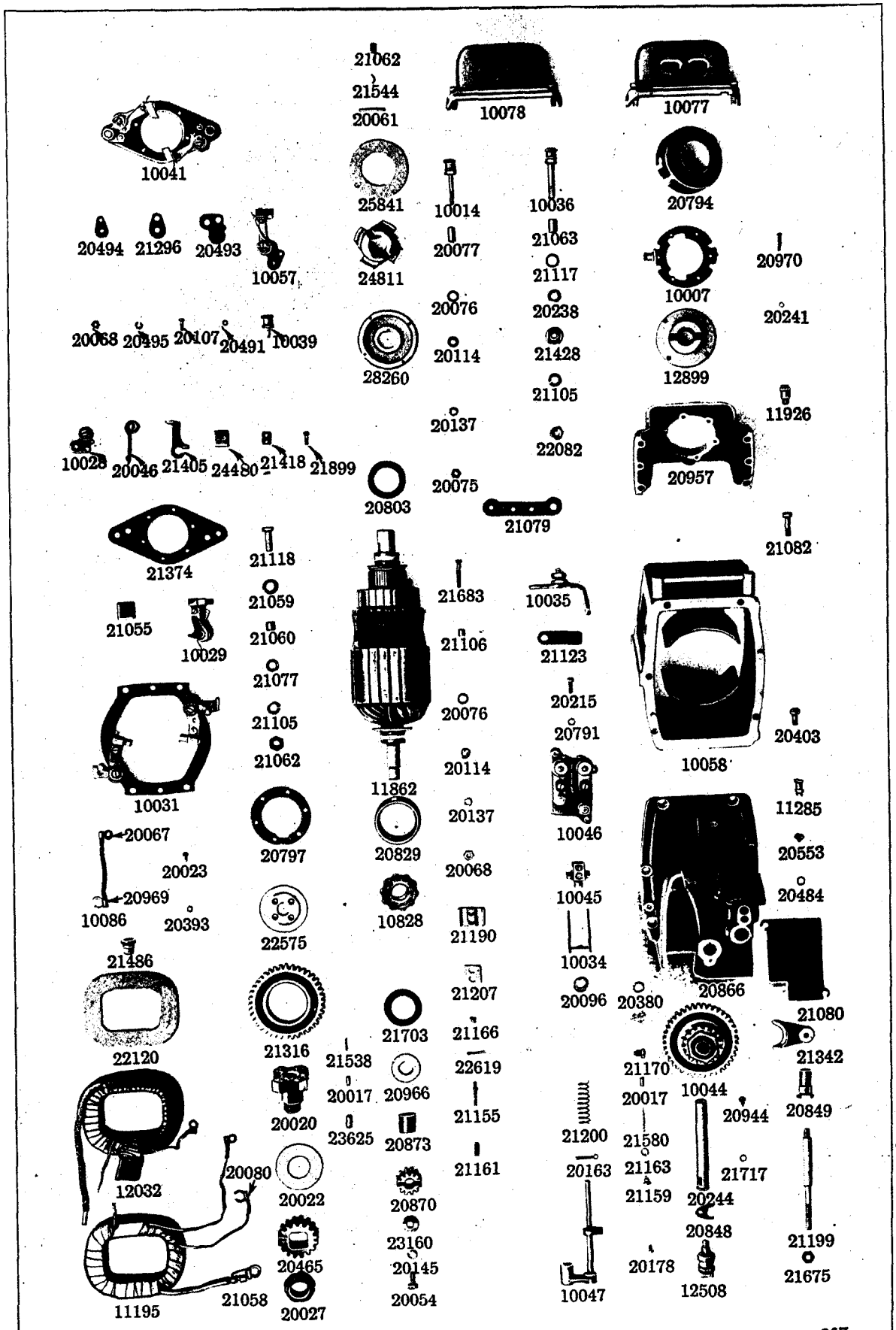
No. 1 MOTOR GENERATOR

No. 1 MOTOR GENERATOR

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

No. 1 MOTOR GENERATOR (Continued)

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



No. 4 MOTOR GENERATOR

No. 4 MOTOR GENERATOR

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

No. 4 MOTOR GENERATOR (Continued)

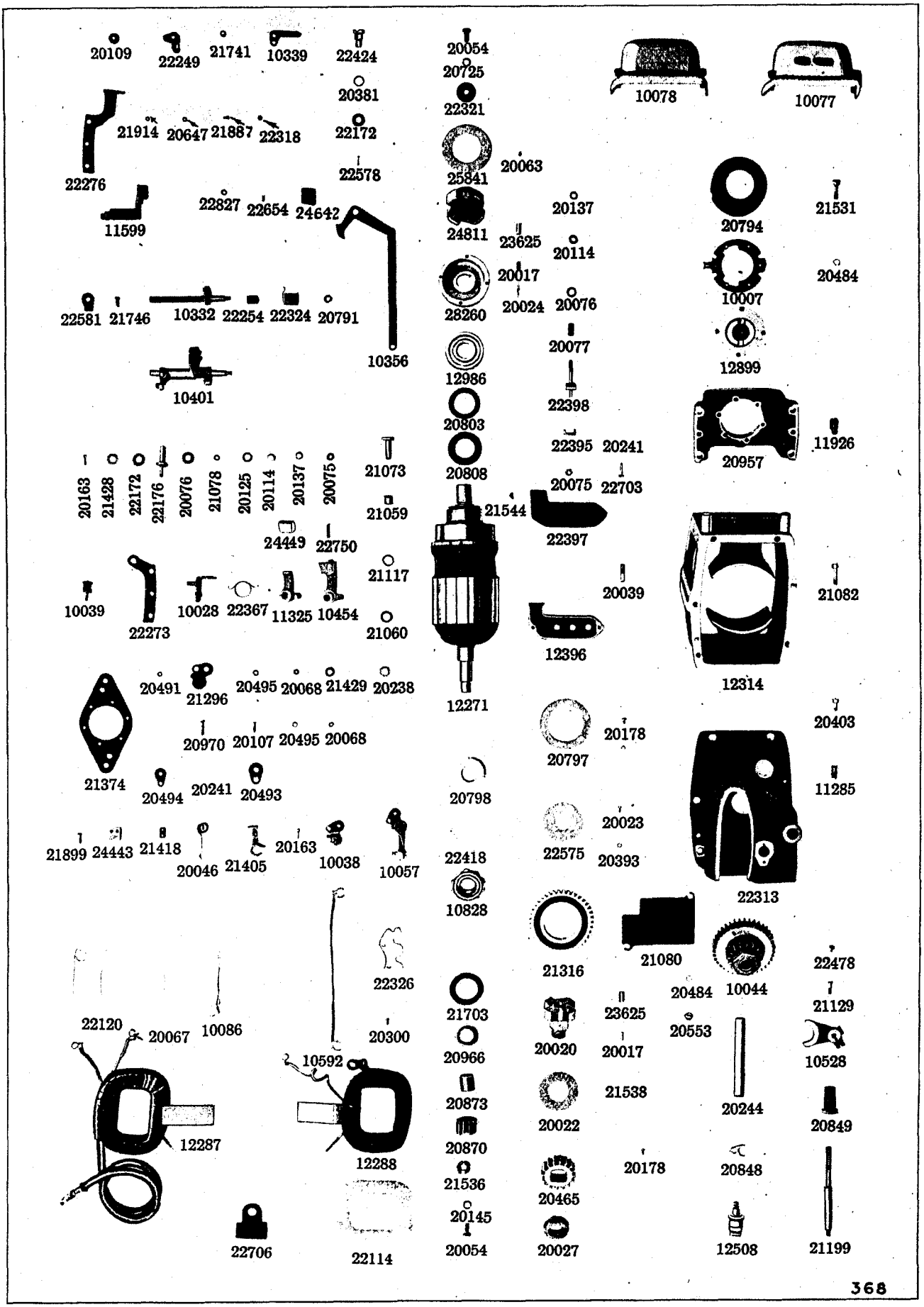
Piece Number	NAME OF PART	Quantity Required
22082	Clamp Nut for Spring Terminal Assembly 10036	1
11862	**Armature Assembly for Motor Generator**	1
21405	Generator Brush Arm	1
24480	Brush for Arm 21405	1
21418	Plate for Arm 21405	2
21899	Screw for attaching Brush 24480	2
22826	Lock Plate for Screw 21899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

No. 4 MOTOR GENERATOR (Continued)

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

No. 4 MOTOR GENERATOR (Continued)

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



No. 24 MOTOR GENERATOR

No. 24 MOTOR GENERATOR

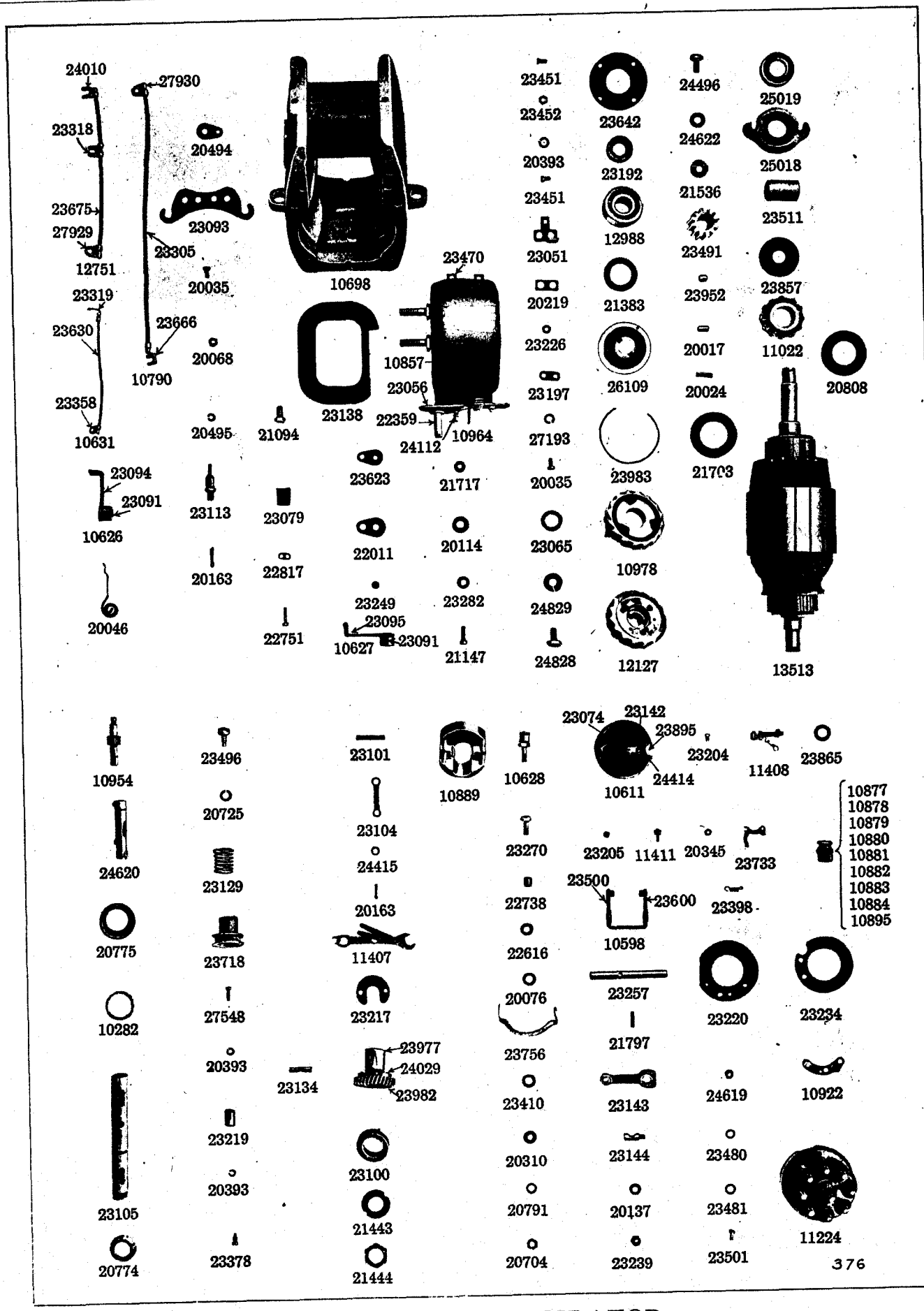
Piece Number	NAME OF PART	Quantity Required
24	**MOTOR GENERATOR COMPLETE**	1
12314	**Generator Frame Assembly** (Includes the next 2 Items)	1
20041	Screw for Pole Piece (Not shown in Illustration)	2
20039	Dowel Pin for Pole Piece (Not shown in Illustration)	4
10384	**Field Coil Assembly Complete (Not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

No. 24 MOTOR GENERATOR (Continued)

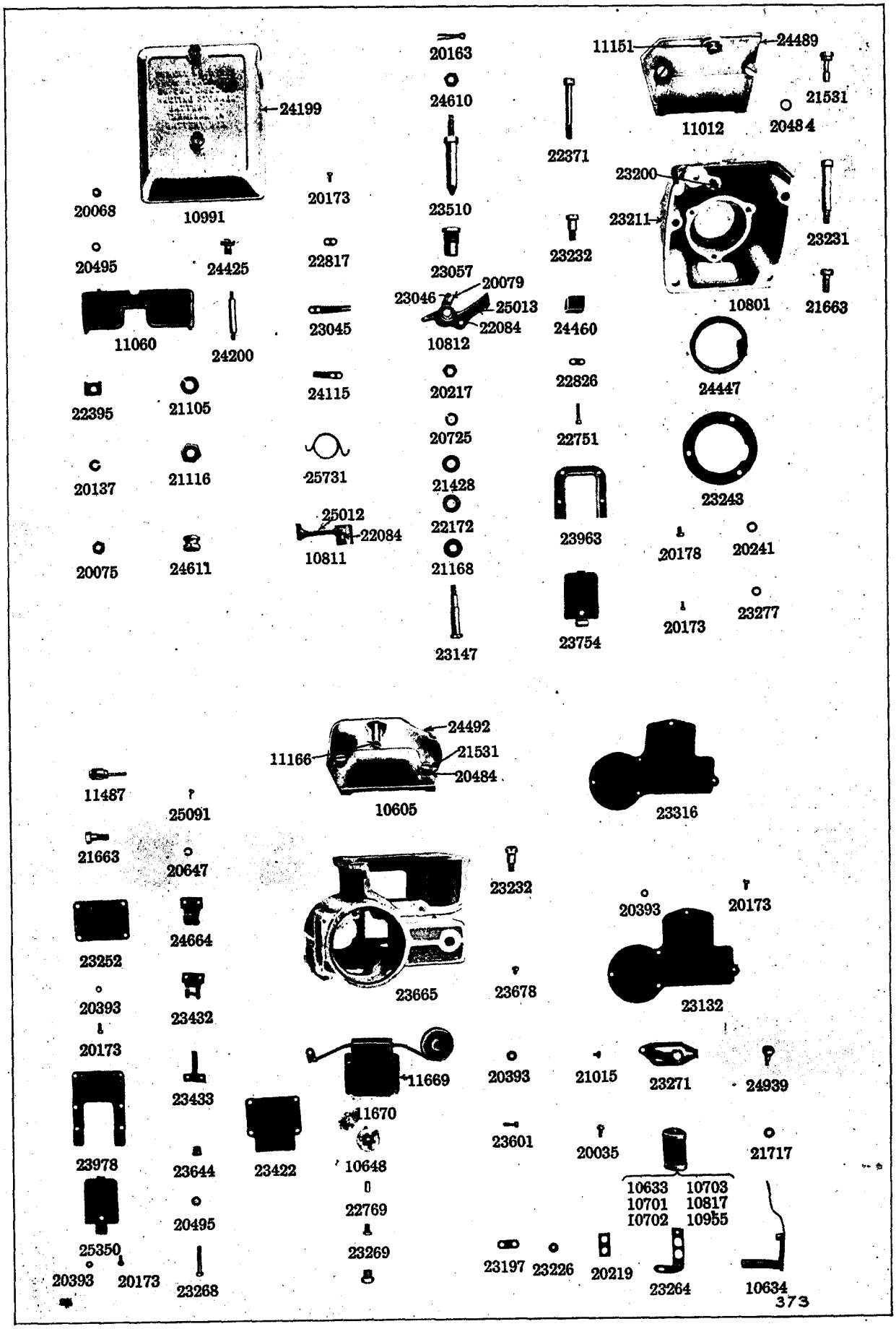
Piece Number	NAME OF PART	Quantity Required
22542	Stud for End of Shaft 22250 (Not shown in Illustration)	1
20791	Lock Washer for Stud 22542	1
21428	Plain Washer for retaining Lower Motor Brush Arm Assembly 11325	1
22570	Wedge for Field Coil Assembly 10384 (Not shown in Illustration)	2
22367	Spring for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

No. 24 MOTOR GENERATOR (Continued)

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



No. 44 MOTOR GENERATOR



No. 44 MOTOR GENERATOR

No. 44 MOTOR GENERATOR

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

No. 44 MOTOR GENERATOR (Continued)

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

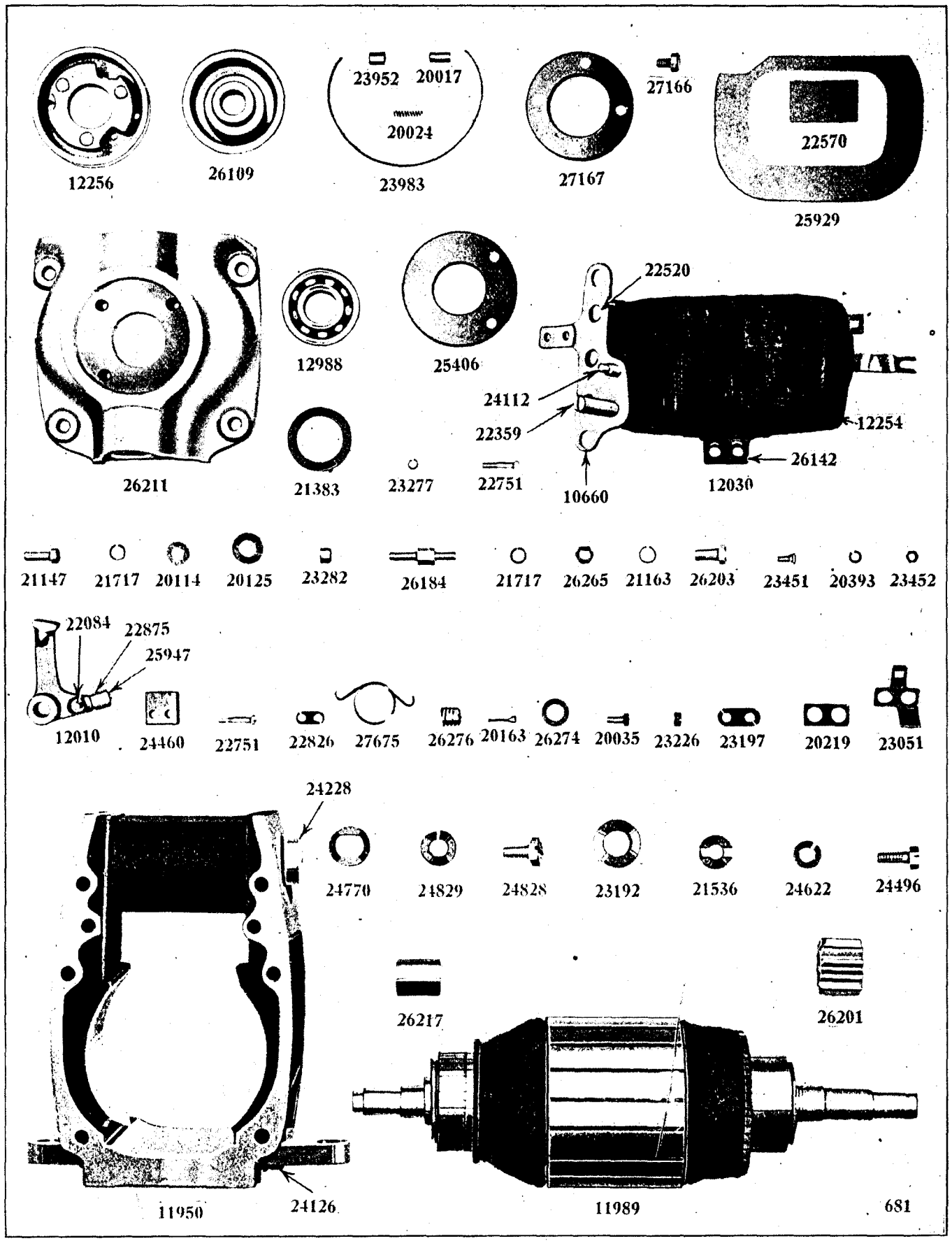
Piece Number	NAME OF PART	Quantity Required
23642	Retainer for Ball Bearing Assembly 12988 (Inner)	1
21094	Screw for retaining Retainer 23642	4
23271	Bracket for Current Regulator Resistance Unit Assembly 10703 ,etc. (Upper)	1
23678	Screw for attaching Bracket 23271	1
20373	Lock Washer for Screw 23678	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)

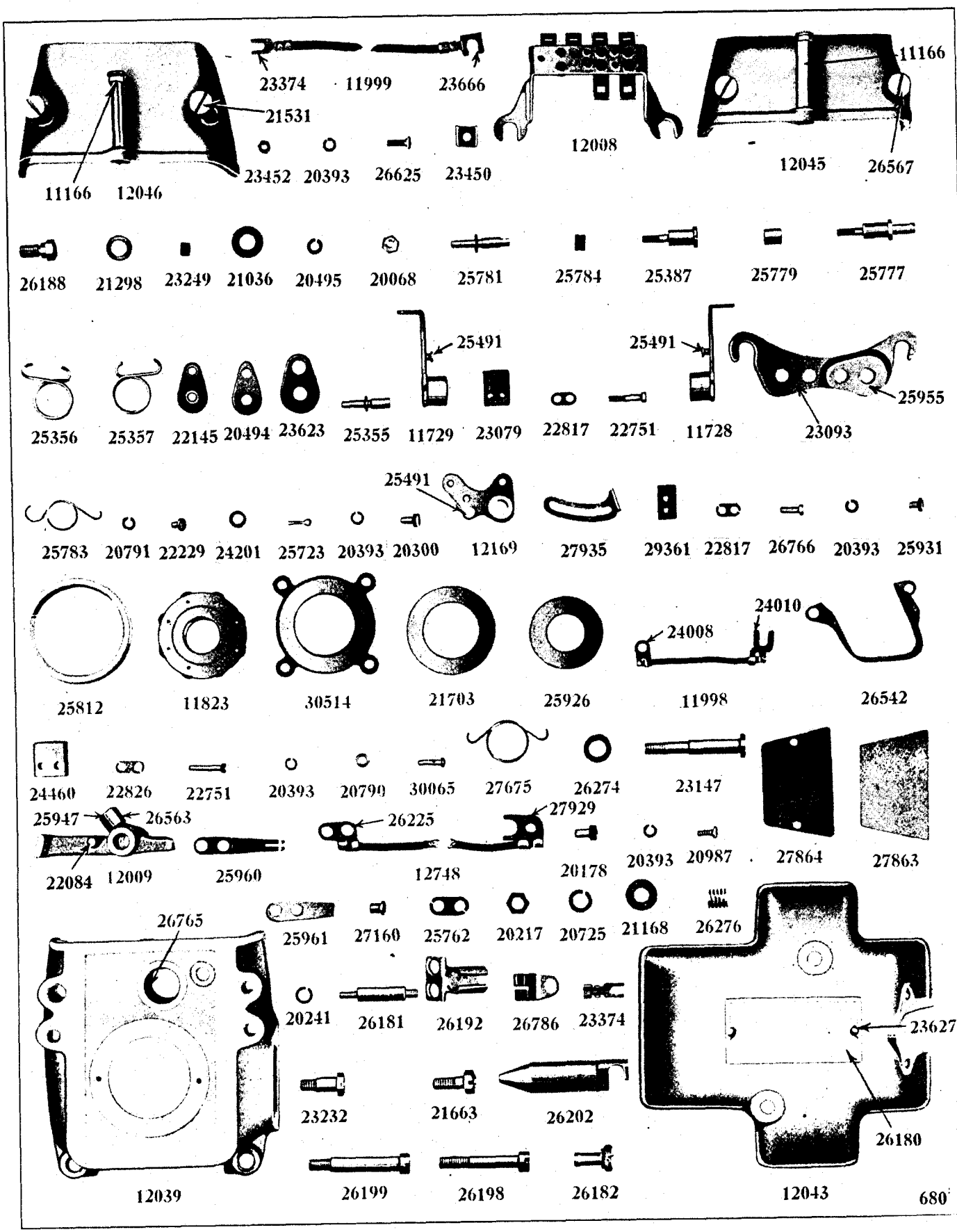
Piece Number	NAME OF PART	Quantity Required
22817	Lock Plate for Screw 20173	1
24115	Plate for Spring 23045	1
24621	Screw for Adjusting Grounded Motor Brush Arm Assembly 10812	1
24619	Nut for Screw 24621	1
21717	Lock Washer for Nut 24619	1
23147	Stud for Holding Grounded Motor Brush Arm Assembly 10812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

No. 44 MOTOR GENERATOR (Continued)

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



No. 78 MOTOR GENERATOR



No. 78 MOTOR GENERATOR

No. 78 MOTOR GENERATOR

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

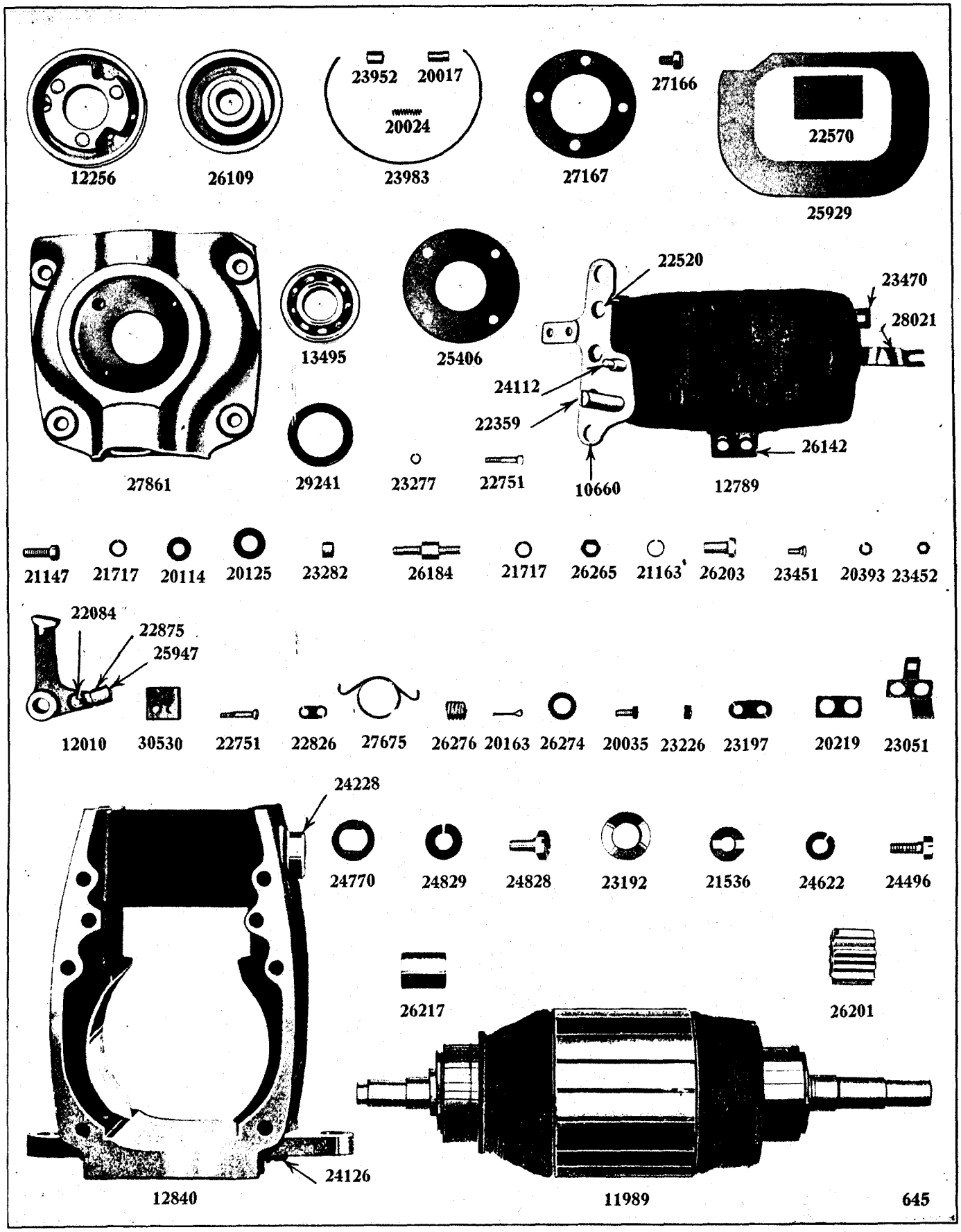
Piece Number	NAME OF PART	Quantity Required
78	**MOTOR GENERATOR COMPLETE**	1
11950	**Generator Frame Assembly** (Includes the next 3 Items)	1
24228	Screw for binding Generator Frame (Upper)	1
24126	Screw for binding Generator Frame (Lower)	2
24494	Lock Washer for Screw 24126 (Not shown in Illustration)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

No. 78 MOTOR GENERATOR (Continued)

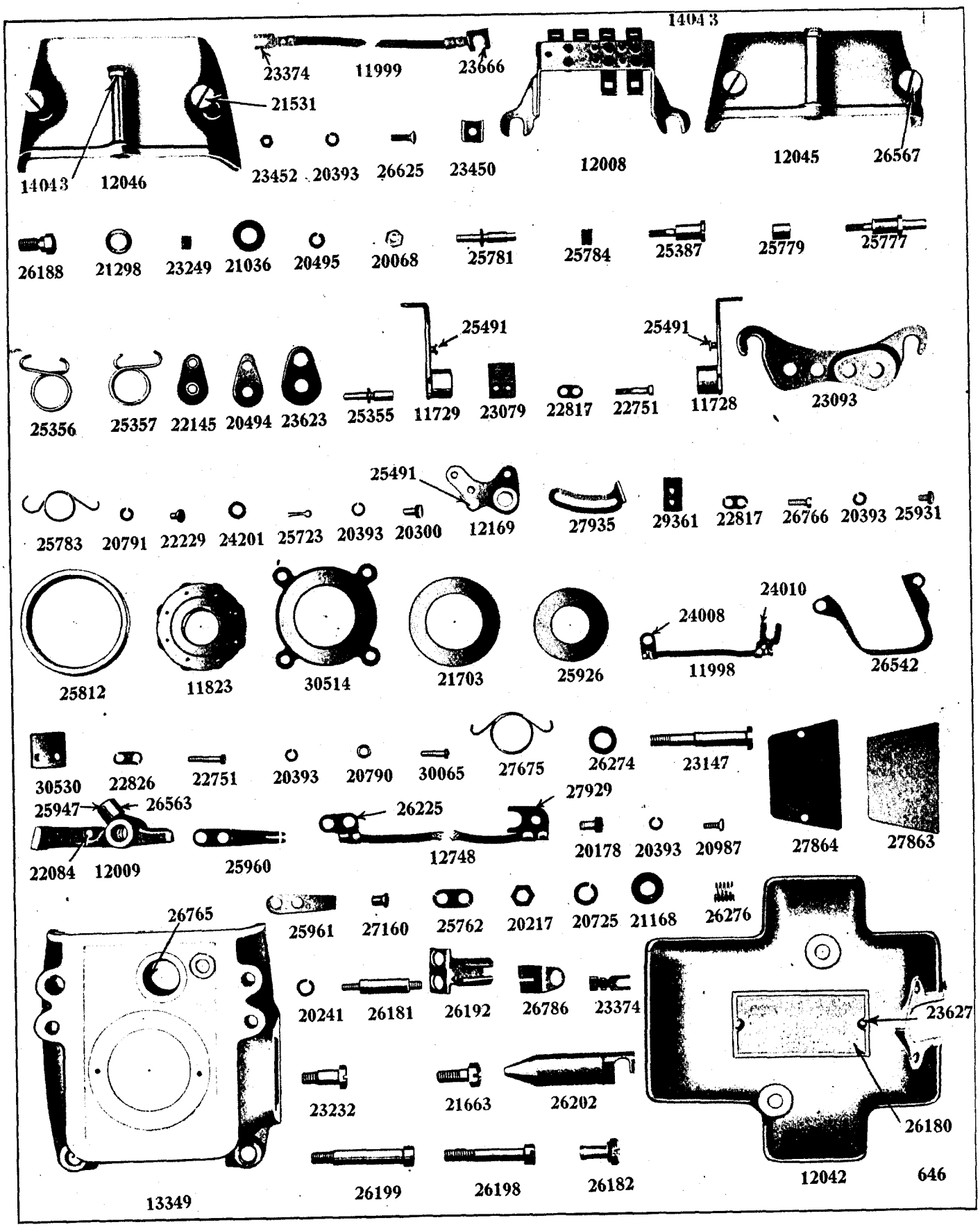
Piece Number	NAME OF PART	Quantity Required
23983	Binding Spring for Generator Clutch Assemby 12257	1
27167	Coupling for Generator Clutch Assembly 12257	1
27166	Screw for attaching Coupling 27167	1
11823	**Inner Race and Balls Assembly for Pinion End of Armature Shaft**	1
11989	**Armature Assembly for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

No. 78 MOTOR GENERATOR (Continued)

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



No. 98 MOTOR GENERATOR



No. 98 MOTOR GENERATOR

No. 98 MOTOR GENERATOR

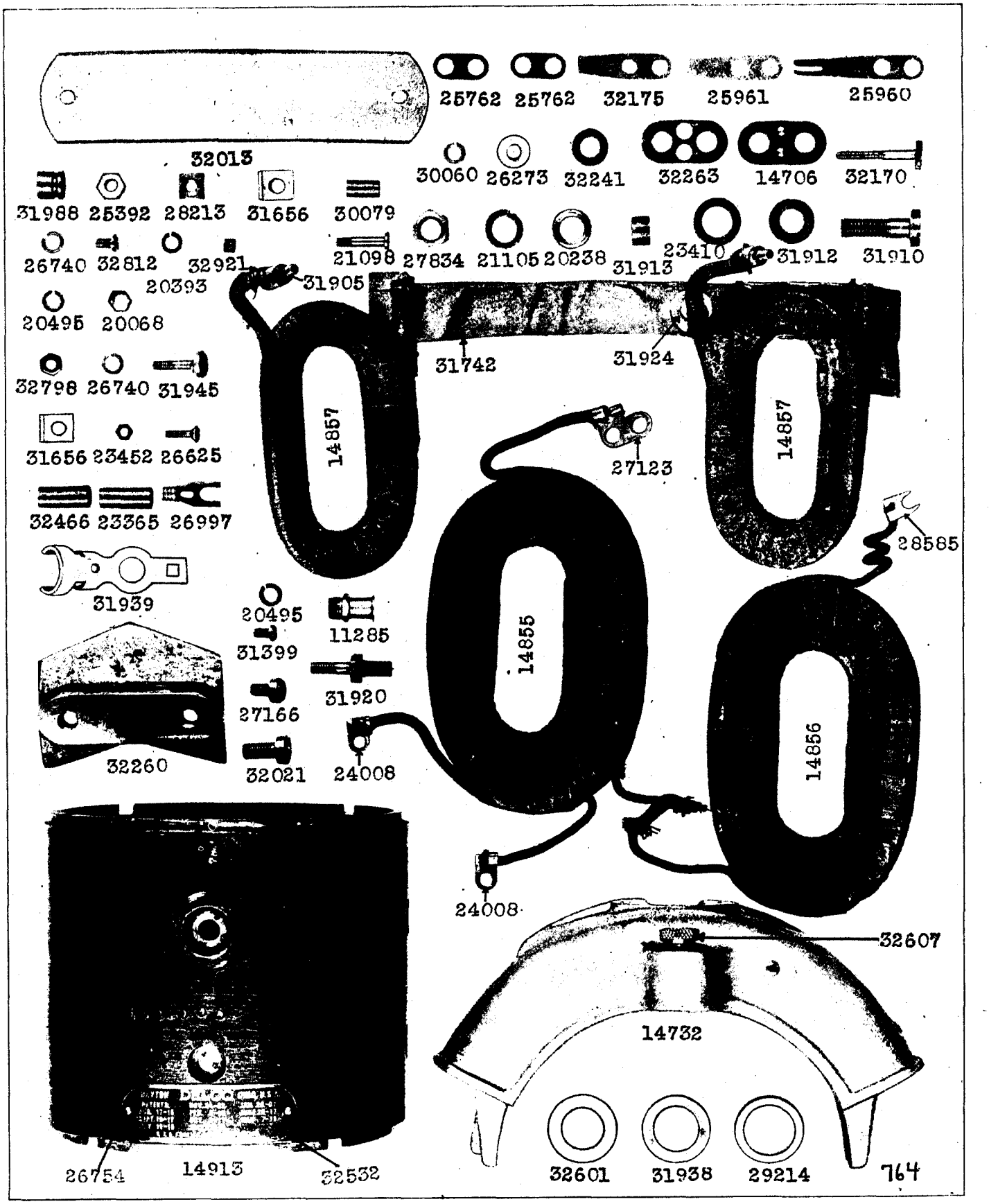
Piece Number	NAME OF PART	Quantity Required
98	**MOTOR GENERATOR COMPLETE**	1
12840	**Generator Frame Assembly**	1
	(Includes the next 3 Items)	
24228	Screw for Binding Generator Frame (Upper)	1
24126	Screw for Binding Generator Frame (Lower)	2
24494	Lock Washer for Screw 24126	2
13076	**Field Coil Assembly**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

No. 98 MOTOR GENERATOR (Continued)

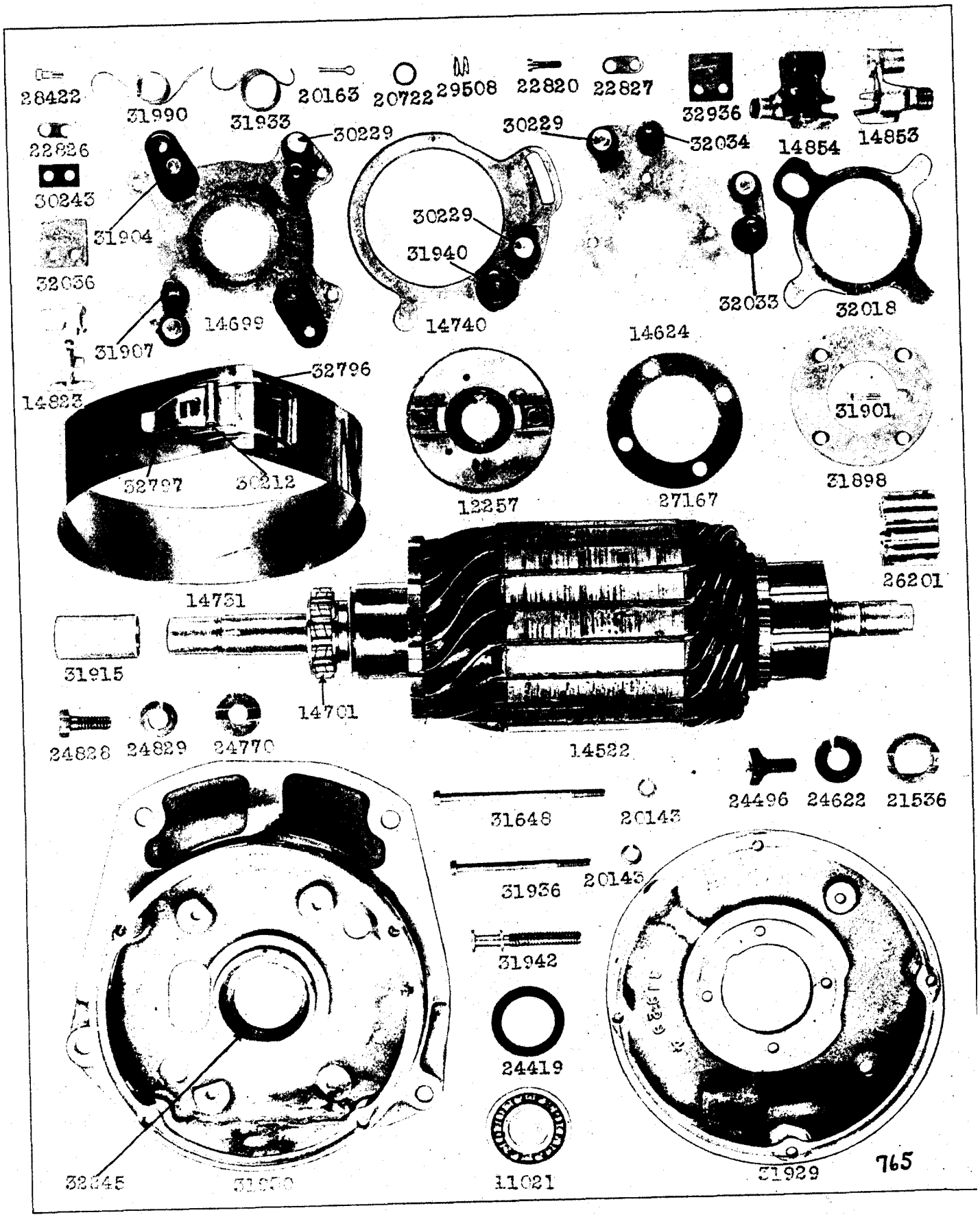
Piece Number	NAME OF PART	Quantity Required
27147	Retainer for Outer Race 25812 (Old Style before Serial No. 9809528) (Not shown in Illustration)	1
30514	Retainer for Outer Race 25812	1
20241	Lock Washer for Screw 20178	1
20178	Screw for retaining Retainer 30514	4
24111	Felt Plug Oil Hole in Motor End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

No. 98 MOTOR GENERATOR (Continued)

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



No. 162 MOTOR GENERATOR



No. 162 MOTOR GENERATOR

No. 162 MOTOR GENERATOR

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

No. 162 MOTOR GENERATOR (Continued)

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

No. 162 MOTOR GENERATOR (Continued)

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

No. 1007 IGNITION SWITCH

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

(Not Illustrated)

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

No. 1009 IGNITION SWITCH

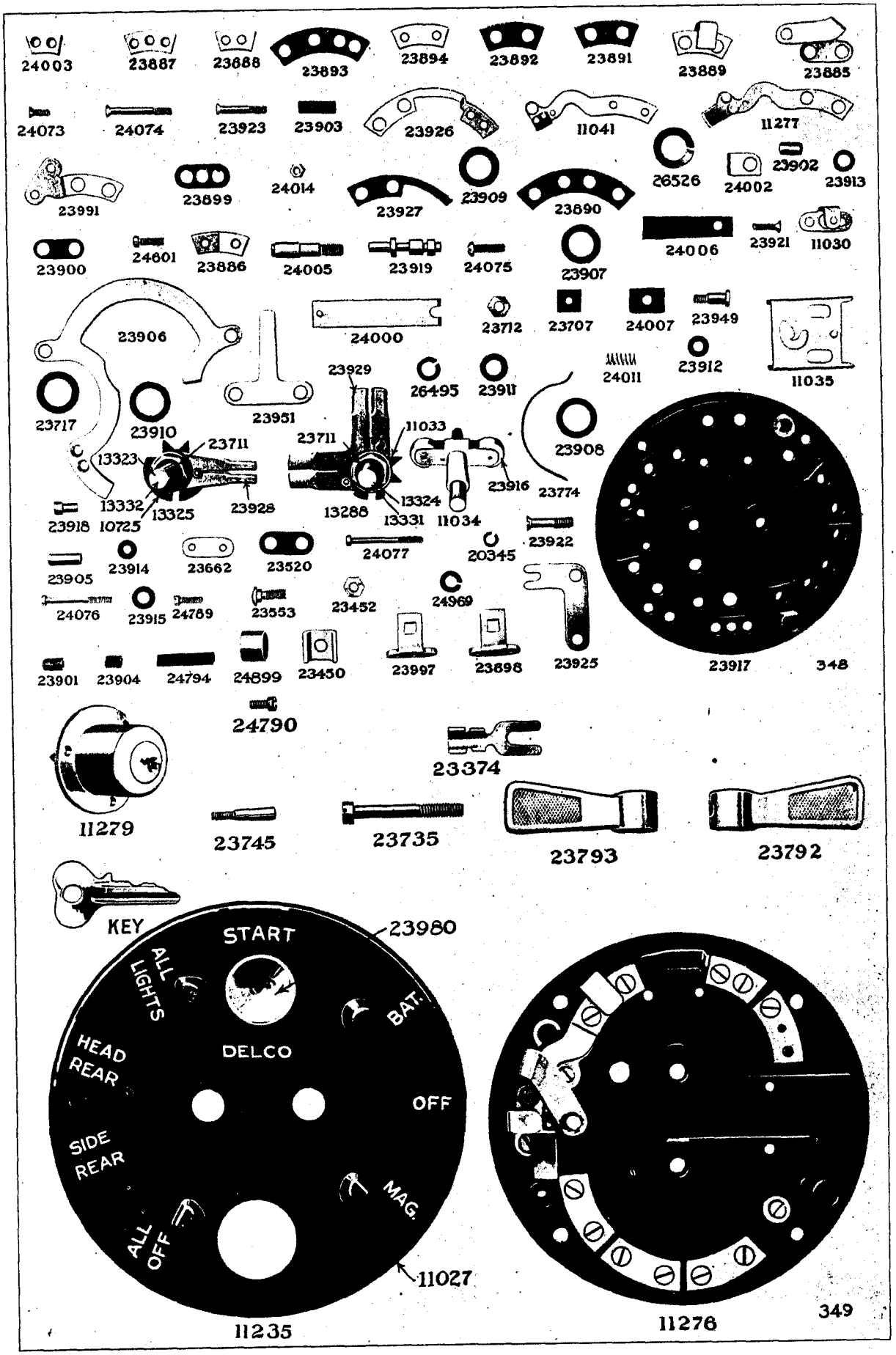
(Not Illustrated)

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

No. 1018 IGNITION SWITCH

(Not Illustrated)

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



No. 1035 COMBINATION SWITCH

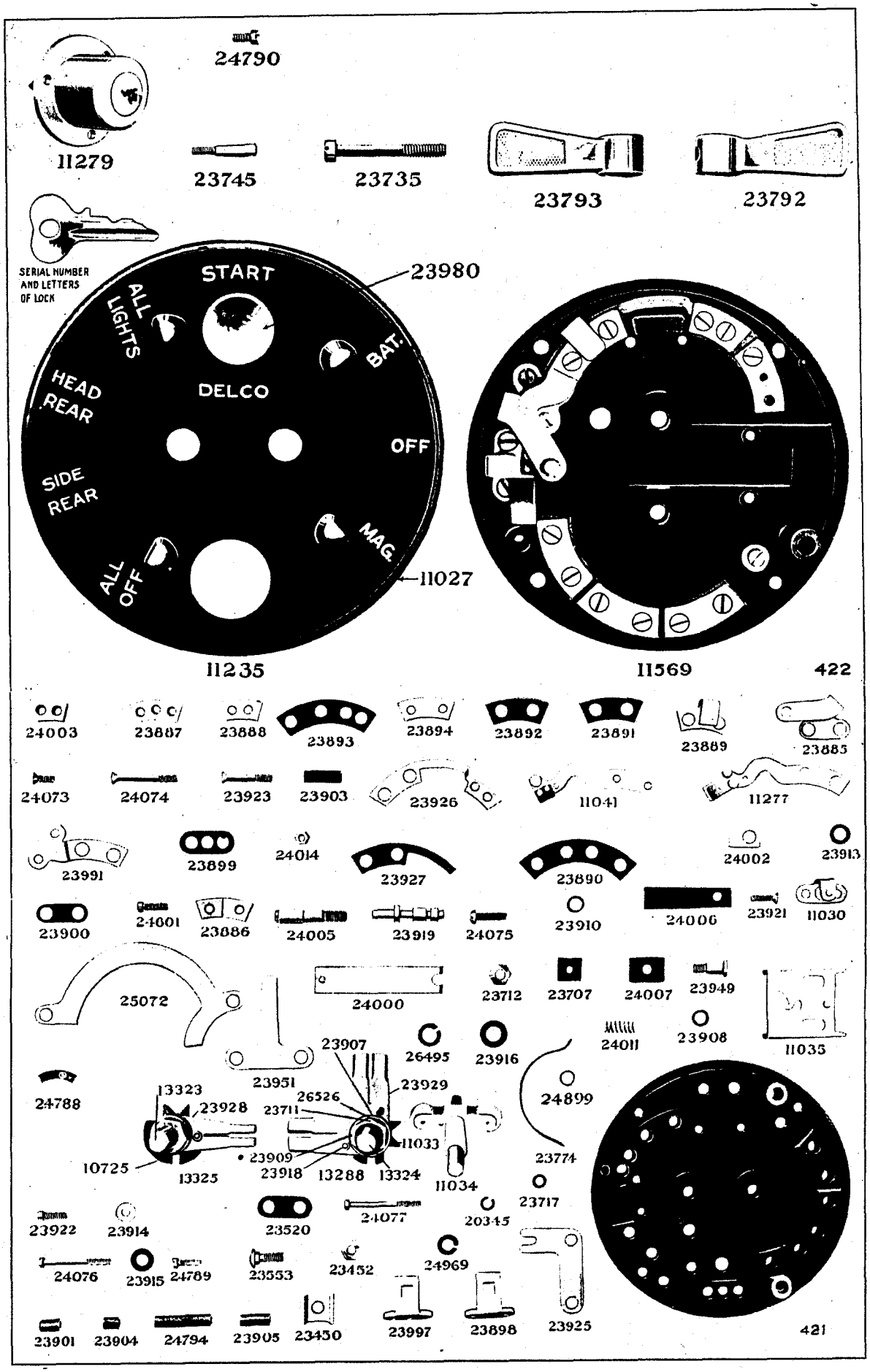
No. 1035 COMBINATION SWITCH

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

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

No. 1035 COMBINATION SWITCH (Continued)

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



No. 1042 COMBINATION SWITCH

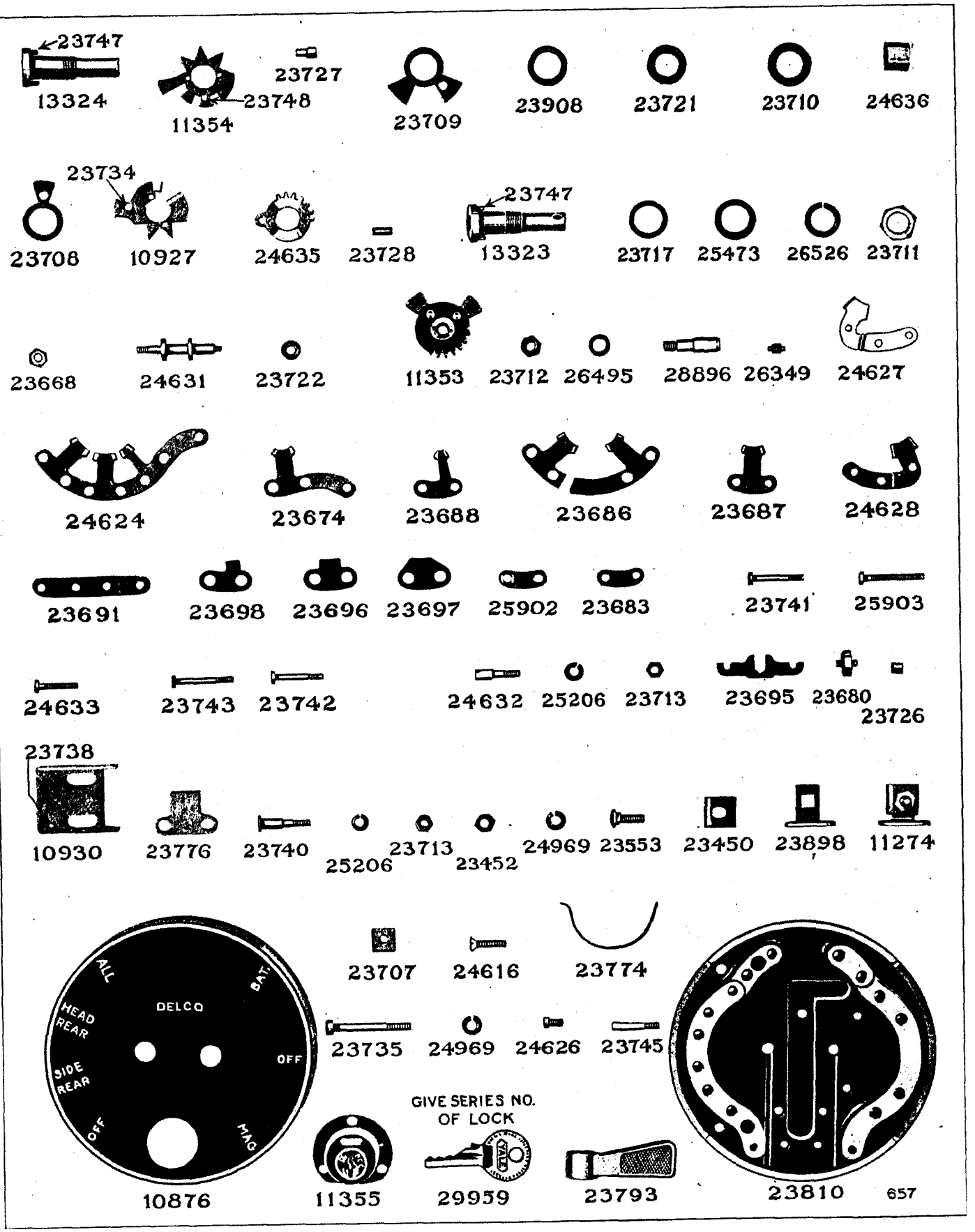
No. 1042 COMBINATION SWITCH

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

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

No. 1042 COMBINATION SWITCH (Continued)

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



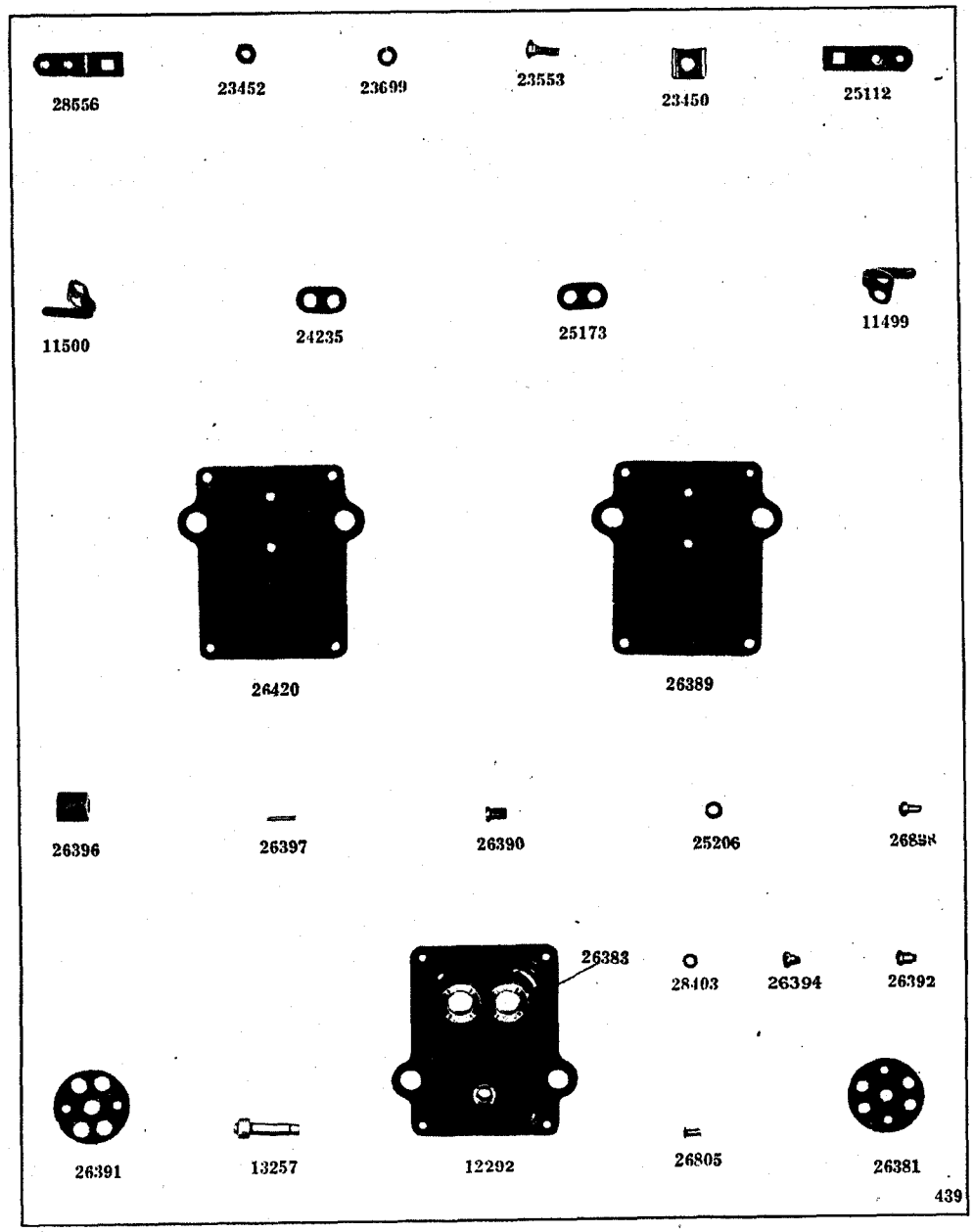
No. 1045 COMBINATION SWITCH

No. 1045 COMBINATION SWITCH

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

No. 1045 COMBINATION SWITCH (Continued)

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



No. 1061 AUTO HORN SWITCH

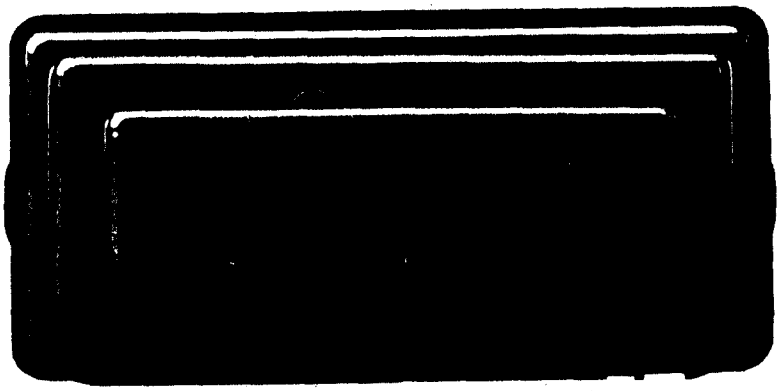
No. 1061 AUTO HORN SWITCH

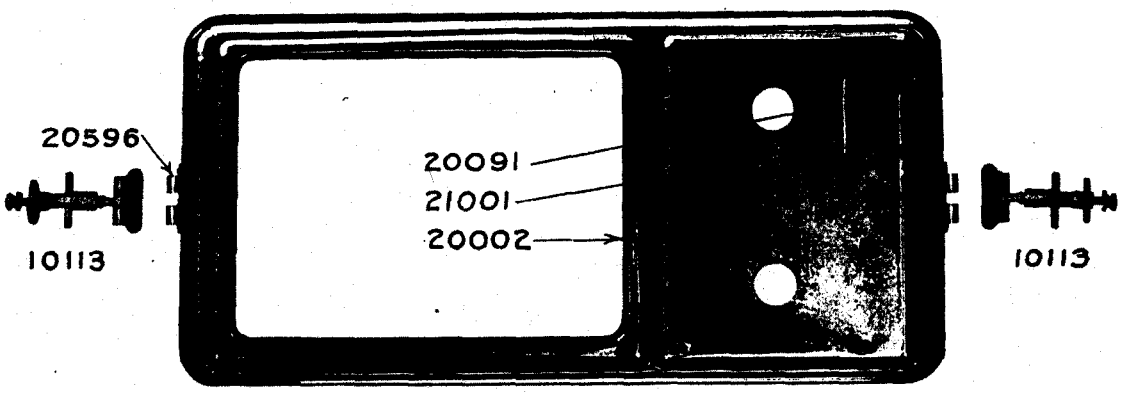
Piece Number	NAME OF PART	Quantity Required
1061	**AUTO HORN SWITCH COMPLETE**	1
14110	**Cover Assembly Complete (Service)** (Includes the next 6 Items)	1
12292	**Cover Assembly** (Includes the next 2 Items)	2
	Bushing for Plunger Assembly 13257 (Not shown in Illustration)	2
26963	Hub for Cover Assembly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

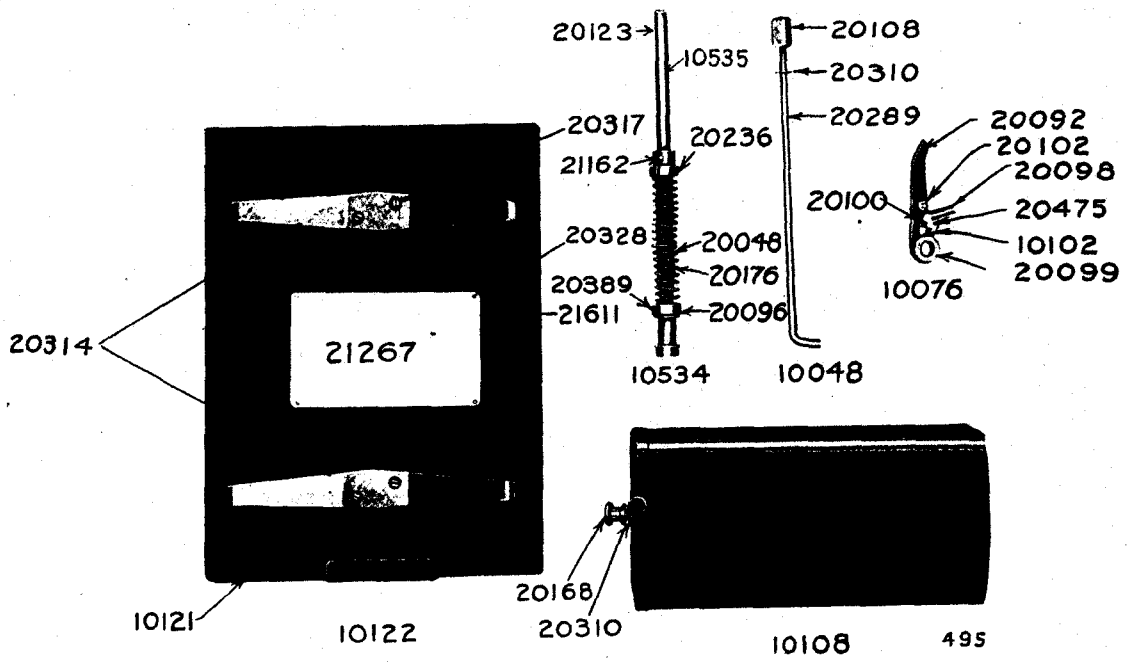


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No. 1062 COMBINATION SWITCH





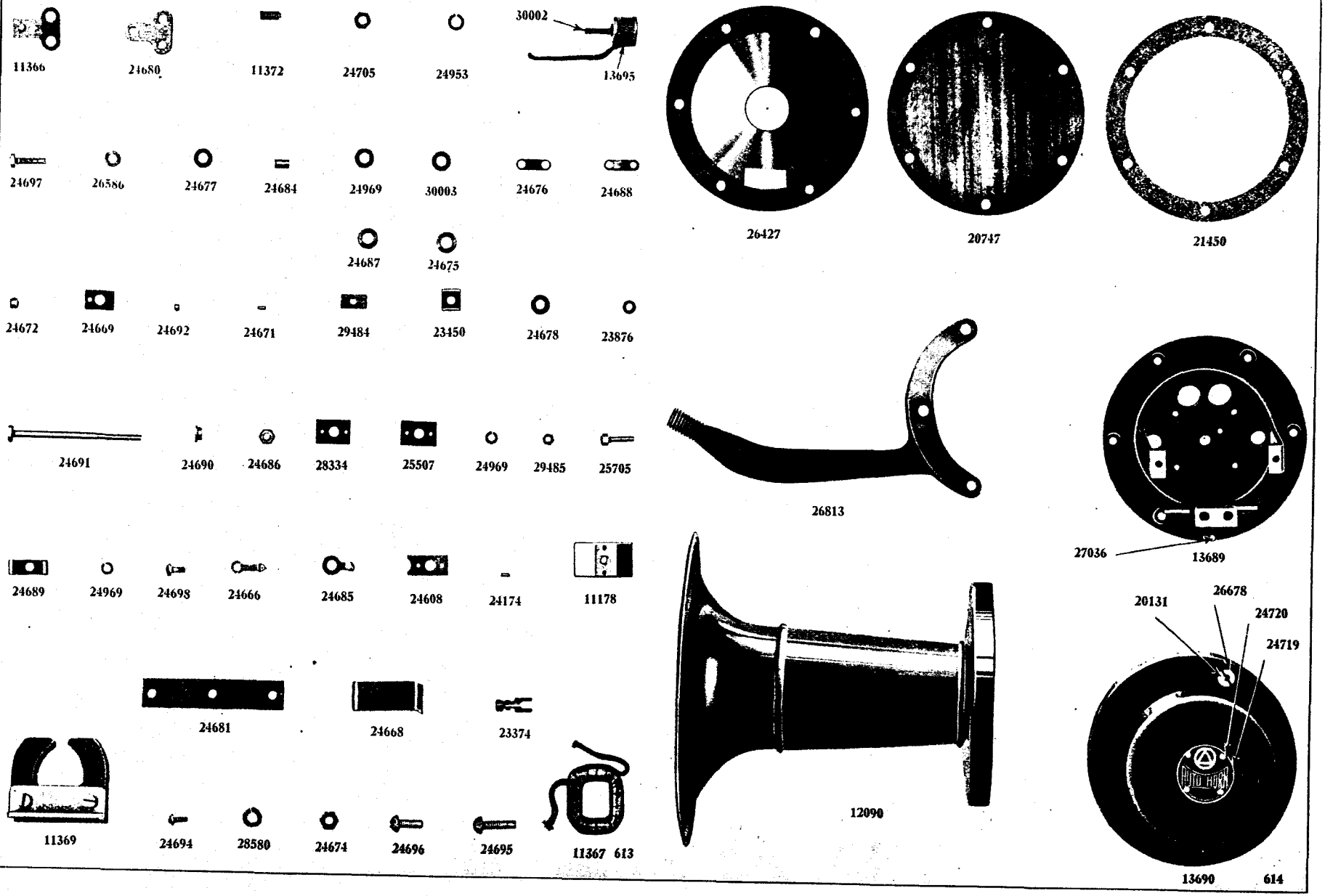


No. 5401 BATTERY BOX

No. 5312 AUTO HORN

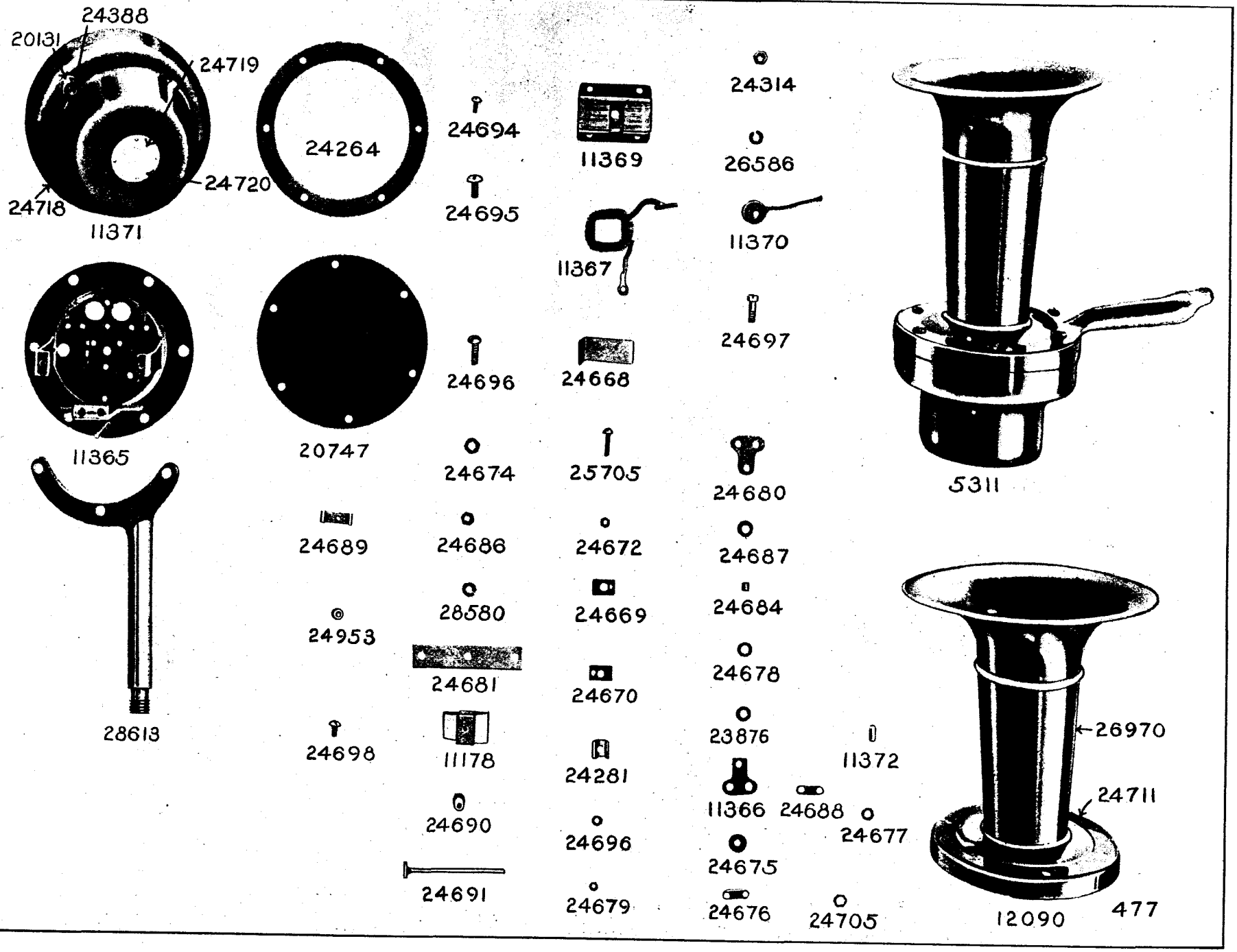
Piece Number	NAME OF PART	Quantity Required
5312	**AUTO HORN ASSEMBLY**	1
13690	**Shell Assembly Complete**	1
	(Includes the next 5 Items)	
24719	Name Plate for Shell Assembly 13690	1
26838	Rivet for attaching Name Plate 24719	4
26678	Thumb Nut for retaining Shell Assembly 13690	1
20131	Lock Washer for Thumb Nut 26678	1
24389	Plain Washer for retaining Thumb Nut 26678 (Not shown in Illustration)	1
12090	**Horn Assembly Complete (Front)**	1
28613	Bracket for connecting Auto Horn	1
26427	Protector for Diaphragm	1
11367	**Coil Assembly for Horn**	1
13689	**Housing Assembly for Horn**	1
	(Includes the next Item)	
27036	Stud for retaining Shell Assembly 13690	1
12140	**Contact Spring Assembly (Lower Contact)**	1
11369	**Core Assembly for Coil Assembly 11367**	1
11372	**Contact Screw Assembly**	1
24705	Nut for Contact Screw Assembly 11372	1
24953	Lock Washer for Nut 24705	1
11178	**Armature Assembly Complete**	1
	(Includes the next Item)	
24174	Pin for Armature 24158	2
13695	**Resistance Coil Assembly for Horn**	1
29777	Screw for Resistance Coil Assembly 13695	1
24969	Lock Washer for Screw 29777	1
30003	Plain Washer for Screw 29777	1
26586	Lock Washer for Nuts 24686 and Screw 24697	3
24666	Clip connecting Coil Assembly 11367 to Screw 25705 and Resistance Coil Assembly 13695	4
24668	Retainer for Coil Assembly 11367	1
24669	Insulator for Terminal Base 29484 and Clip 24666	4
29484	Terminal Base for retaining Terminal Clip 23374	2
24671	Pin for Terminal Base 29484	2
24672	Bushing for Screw 25705	1
25705	Screw for retaining Terminal Clamp 24281 and Clip 24666	1
23450	Terminal Clamp for retaining Terminal Clip 23374	2
29485	Nut for retaining Screw 25705 and Resistance Coil 13695	2
24969	Lock Washer for Nut 29485 and Screws 25705 and 24698	6
28580	Lock Washer for Nut 24674	6
24674	Nut for Screws 24695 and 24696	6
24695	Screw for retaining Horn Assembly 12090 (Short)	3
24696	Screw for retaining Horn Assembly 12090 (Long)	3
24675	Plain Washer for Contact Spring Assembly 11366 (Thin)	2
24687	Spacing Washer for Contact Spring Assembly 11365 (Thick)	2
24678	Plain Washer for Contact Spring Assembly 11366 (Thick)	2
24677	Insulating Washer for Contact Spring Assembly 11366	2
24680	Terminal Plate for retaining Contact	1
24697	Screw for retaining Plate 24680 and Contact Spring Assembly 11366	2
24688	Block for retaining Screw 24697	1
24676	Insulating Plate for Block 24688	2
24681	Spring Plate for operating Armature Assembly 11178	6
28334	Insulator for Stop Plate 24608 (Lower)	1
25507	Insulator for Stop Plate 24608 (Upper)	1
24608	Stop Plate for operating Contact Spring Assembly 11366	1
24684	Insulator Bushing for Screw 24697	2
24685	Clip for connecting Coil Assembly 11367 and Contact Spring Assembly 11366	1
24686	Nut for Tapper 24691	1
24691	Tapper for operating Diaphragm 20747	1
20747	Diaphragm for Horn Assembly 12090	1
21450	Insulating Ring for Diaphragm 20747 (Narrow)	1
24264	Insulating Ring for Diaphragm 20747 (Wide) (Not shown in Illustration)	1
24689	Clip for retaining Spring Plate 24681	2
24690	Bushing for Tapper 24691	1
24692	Bushing for Terminal Base 24670	1
23876	Plain Washer for Screw 25705	1
24694	Screw for retaining Core Assembly 11369	4
24698	Screw for retaining Spring Plate 24681	2
23374	Terminal Clip for connecting Auto Horn 5312	1

No. 5312 AUTO HORN



No. 5311 AUTO HORN

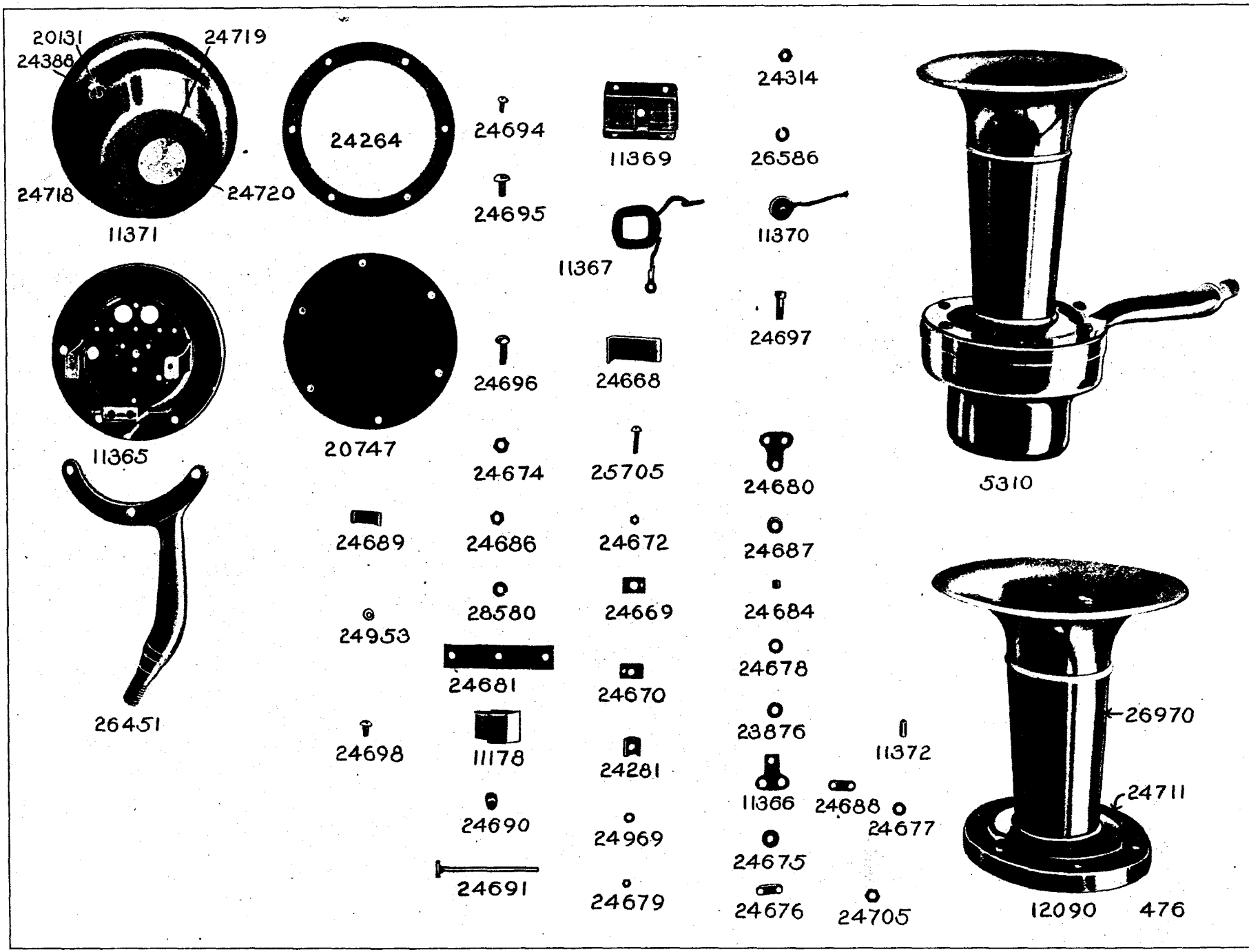
Piece Number	NAME OF PART	Quantity Required
5311	**AUTO HORN COMPLETE**	1
11371	**Shell Assembly Complete**	1
	(Includes the next 5 Items)	
24719	Name Plate for Shell Assembly 11371	1
26838	Rivet for Name Plate 24719 (Not shown in Illustration)	4
26678	Thumb Nut for Shell Assembly 11371 (Not shown in Illustration)	1
20131	Lock Washer for Thumb Nut 26678 (Not shown in Illustration)	1
24389	Plain Washer for retaining Thumb Nut 26678	1
12090	**Horn Assembly Complete (Front)**	1
28613	Bracket for connecting Horn Assembly	1
26427	Protector for Diaphragm 20747 (Not shown in Illustration)	1
11367	**Coil Assembly**	1
24668	Retainer for Coil Assembly 11367	1
13689	**Housing Assembly**	1
	(Includes the next Item)	
27036	Stud for retaining Shell Assembly 11371 (Not shown in Illustration)	1
11366	**Contact Spring Assembly (Lower Contact)**	1
12140	**Core Assembly for Coil Assembly 11367**	4
24694	Screw for retaining Core Assembly 12140	1
11372	**Contact Screw Assembly (Upper Contact)**	1
24705	Nut for Contact Screw Assembly 11372	1
24953	Lock Washer for Nut 24705	1
11178	**Armature Assembly Complete**	1
	(Includes the next Item)	
24174	Pin for Armature Assembly 11178 (Not shown in Illustration)	1
11370	**Resistance Coil Assembly**	1
24314	Nut for retaining Resistance Coil Assembly 11370	4
26586	Lock Washer for Nuts 24314, 24686 and Screw 24697	1
24666	Clip for connecting Coil Assembly 11367 and Screw 25705 (Not shown in Illustration)	2
24669	Insulator for Terminal Base 24670 and Clip 24666	1
29484	Terminal Base for retaining Terminal Clip 23374 (Not shown in Illustration)	1
24671	Pin for Terminal Base 29484 (Not shown in Illustration)	1
24672	Bushing for Screw 25705	1
25705	Screw for retaining Terminal Clamp 24281 and Clip 24666	1
23450	Terminal Clamp for retaining Terminal Clip 23374 (Not shown in Illustration)	1
29485	Nut for Screw 25705 (Not shown in Illustration)	4
24969	Lock Washer for Nut 29485 and Screws 25705 and 24698 (Not shown in Illustration)	6
28580	Lock Washer for Nut 24674	6
24674	Nut for Screws 24695 and 24696	3
24695	Screw for retaining Horn Assembly 12090 (Short)	3
24696	Screw for retaining Horn Assembly 12090 (Long)	1
24675	Plain Washer for Contact Spring Assembly 11366 (Thin)	2
24687	Spacing Washer for Contact Spring Assembly 11366 (Thick)	2
24678	Plain Washer for Contact Spring Assembly 11366 (Thick)	2
24677	Insulating Washer for Contact Spring Assembly 11366	1
24680	Terminal Plate for retaining Contact and Nut Assembly 13494	2
24697	Screw for retaining Terminal Plate 24698 and Contact Spring Assembly 11366	1
24688	Plate for retaining Screw 24697	2
24676	Insulating Plate for Plate 24688	1
27036	Stud for retaining Shell Assembly 11371 (Not shown in Illustration)	6
24681	Spring Plate for operating Armature Assembly 11178	1
28334	Insulator for Stop Plate 24608 (Lower) (Not shown in Illustration)	1
25507	Insulator for Stop Plate 24608 (Upper) (Not shown in Illustration)	1
24608	Stop Plate for operating Contact Spring Assembly 11366 (Not shown in Illustration)	2
24684	Insulating Bushing for Screw 24697	1
24685	Clip for connecting Coil Assembly 11367 and Spring Terminal Assembly 11366 (Not shown in Illustration)	1
24686	Nut for Tapper 24691	1
24691	Tapper for operating Diaphragm 20747	1
20747	Diaphragm for Horn Assembly 12090 next to Housing Assembly 13689	1
21450	Insulating Ring for Diaphragm 20747 (Narrow) (Not shown in Illustration)	1
24264	Insulating Ring for Diaphragm 20747 (Wide)	2
24689	Clip for retaining Spring Plate 24681	1
24690	Bushing for Tapper 24691	1
24692	Bushing for Terminal Base 24670 (Not shown in Illustration)	1
23876	Plain Washer for Screw 25705	2
24698	Screw for retaining Spring Terminal 24681	1
23374	Terminal Clip for connecting Auto Horn 5311 (Not shown in Illustration)	


24388
20131
24719
24720
24718
11371
24264
24694
24695
11369
24314
26586
11370
11367
24697
24696
24668
11365
20747
24674
25705
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24953
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24691
24679
24676
24705
26970
24711
12090
477

No. 5310 AUTO HORN

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

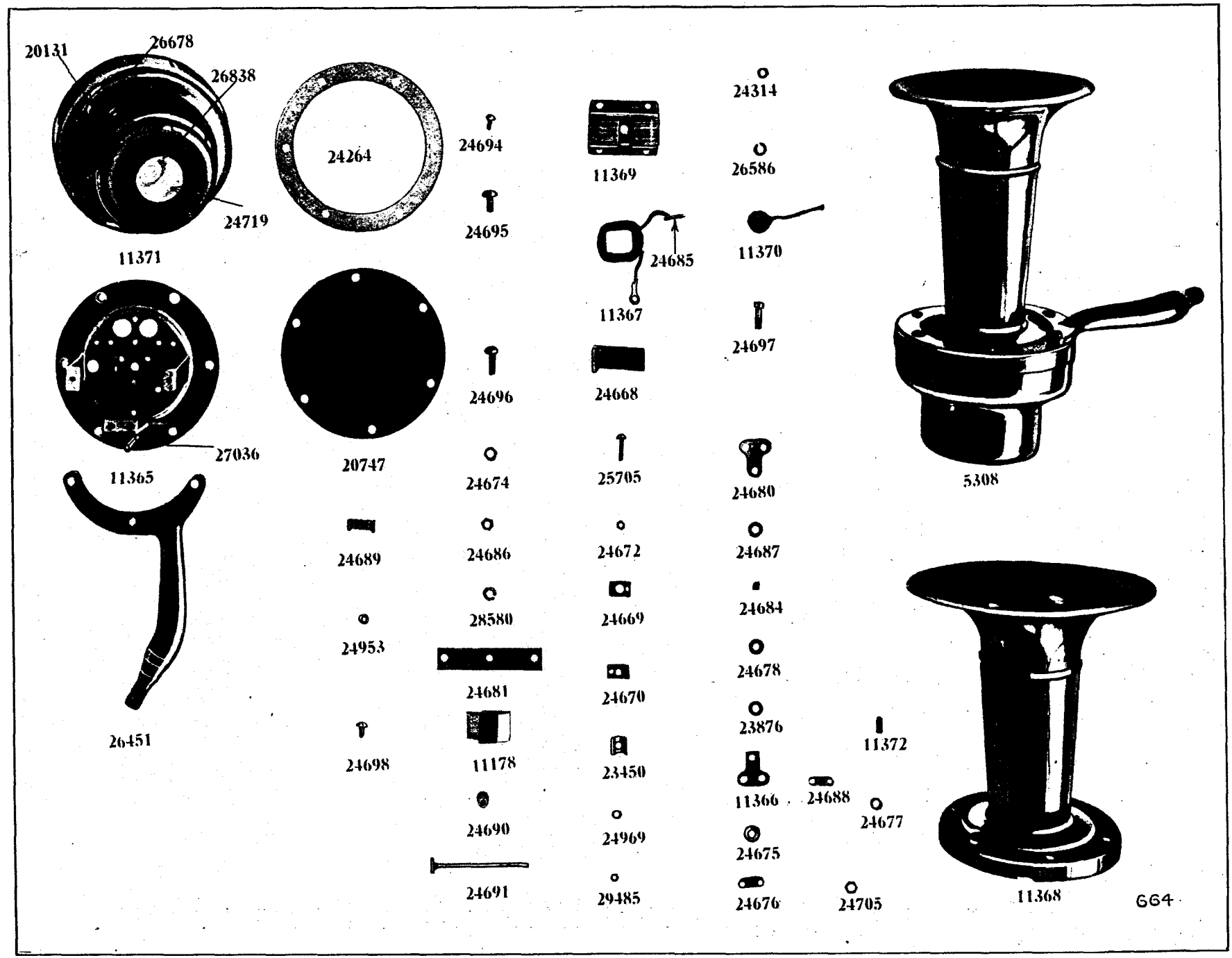
No. 5310 AUTO HORN



No. 5308 AUTO HORN

Piece Number	NAME OF PART	Quantity Required
5308	**AUTO HORN COMPLETE**	1
11371	**Shell Assembly Complete** (Includes the next 5 Items)	1
24719	Name Plate for Shell Assembly 11371	1
26838	Rivet for Name Plate 24719	4
26678	Thumb Nut for Shell Assembly 11371	1
20131	Lock Nut for Thumb Nut 26678	1
24389	Plain Washer for retaining Thumb Nut 26678 (Not shown in Illustration)	1
11368	**Horn Assembly Complete (Front)**	1
26451	Bracket for connecting Auto Horn Assembly	1
11367	**Coil Assembly**	1
13689	**Housing Assembly** (Includes the next Item)	1
27036	Stud for retaining Shell Assembly 11371	1
11366	**Contact Spring Assembly (Lower Contact)**	1
12140	**Core Assembly for Coil Assembly 11367**	1
11372	**Contact Screw Assembly (Upper Contact)**	1
24705	Nut for Contact Screw Assembly 11372	1
24953	Lock Washer for Nut 24705	1
11178	**Armature Assembly Complete** (Includes the next Item)	1
24174	Pin for Armature Assembly 11178 (Not shown in Illustration)	1
11370	**Resistance Coil Assembly**	1
24314	Nut for retaining Resistance Coil Assembly 11370	1
26586	Lock Washer for Nuts 24314 and 24686 and Screw 24697	4
24666	Clip for connecting Coil Assembly 11367 and Screw 25705 (Not shown in Illustration)	1
24668	Retainer for Coil Assembly 11367	1
24669	Insulator for Terminal Base 24670 and Clip 24666	2
29484	Terminal Base for retaining Terminal Clip 23374 (Not shown in Illustration)	1
24671	Pin for Terminal Base 29484 (Not shown in Illustration)	1
24672	Bushing for Screw 25705	1
25705	Screw for retaining Terminal Clamp 23450 and Clip 24666	1
23450	Terminal Clamp for retaining Terminal Clip 23374	1
29485	Nut for Screw 25705	1
20393	Lock Washer for Nut 29485 and Screws 25705 and 24698	4
28580	Lock Washer for Nut 24674	7
24674	Nut for Screws 24695 and 24696	6
24695	Screw for retaining Horn Assembly 11368 (Short)	3
24696	Screw for retaining Horn Assembly 11368 (Long)	3
24675	Plain Washer for Contact Spring Assembly 11366 (Thin)	1
24687	Spacing Washer for Contact Spring Assembly 11366 (Thick)	2
24678	Plain Washer for Contact Spring Assembly 11366 (Thick)	2
24677	Insulating Washer for Contact Spring Assembly 11366	2
24680	Terminal Plate for retaining Contact and Nut Assembly 13494	1
24697	Screw for retaining Terminal Plate 24680 and Contact Spring Assembly 11366	2
24688	Block for retaining Screw 24697	1
24676	Insulating Plate for Block 24688	2
27036	Stud for retaining Shell Assembly 11371	1
24681	Spring Plate for Operating Armature Assembly 11178	6
28334	Insulator for Stop Plate 24608 (Lower)	1
25507	Insulator for Stop Plate 24608 (Upper) (Not shown in Illustration)	1
24608	Stop Plate for Operating Contact Spring Assembly 11366 (Not shown in Illustration)	1
24684	Insulating Bushing for Screw 24697	2
24685	Clip for connecting Coil Assembly 11367 and Spring Terminal Assembly 11366	1
24686	Nut for Tapper 24691	1
24691	Tapper for Operating Diaphragm 20747	1
20747	Diaphragm for Horn Assembly 11368 between Horn Assembly 11368 and Housing Assembly 11365	1
21450	Insulating Ring for Diaphragm 20747 (Narrow) (Not shown in Illustration)	1
24264	Insulating Ring for Diaphragm 20747 (Wide)	1
24689	Clip for retaining Spring Plate 24681	2
24690	Bushing for Tapper 24691	1
24692	Bushing for Terminal Base 24670 (Not shown in Illustration)	1
23876	Plain Washer for Screw 25705	1
24694	Screw for retaining Core Assembly 12140	4
24698	Screw for retaining Spring Plate 24681	2
23374	Terminal Clip for connecting Auto Horn 5308 (Not shown in Illustration)	1

No. 5308 AUTO HORN

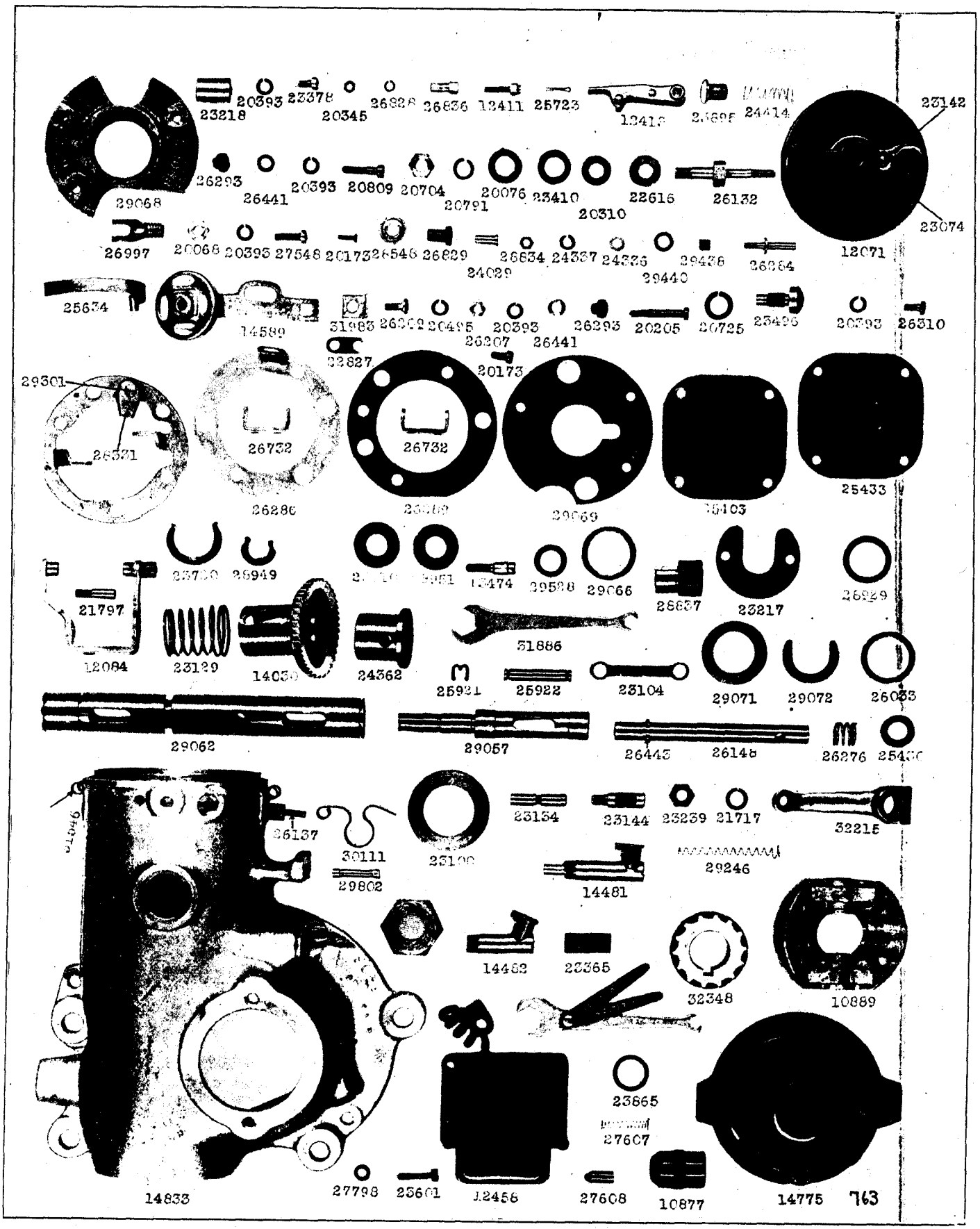


No. 5206 DISTRIBUTOR (Continued)

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

No. 5206 DISTRIBUTOR

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



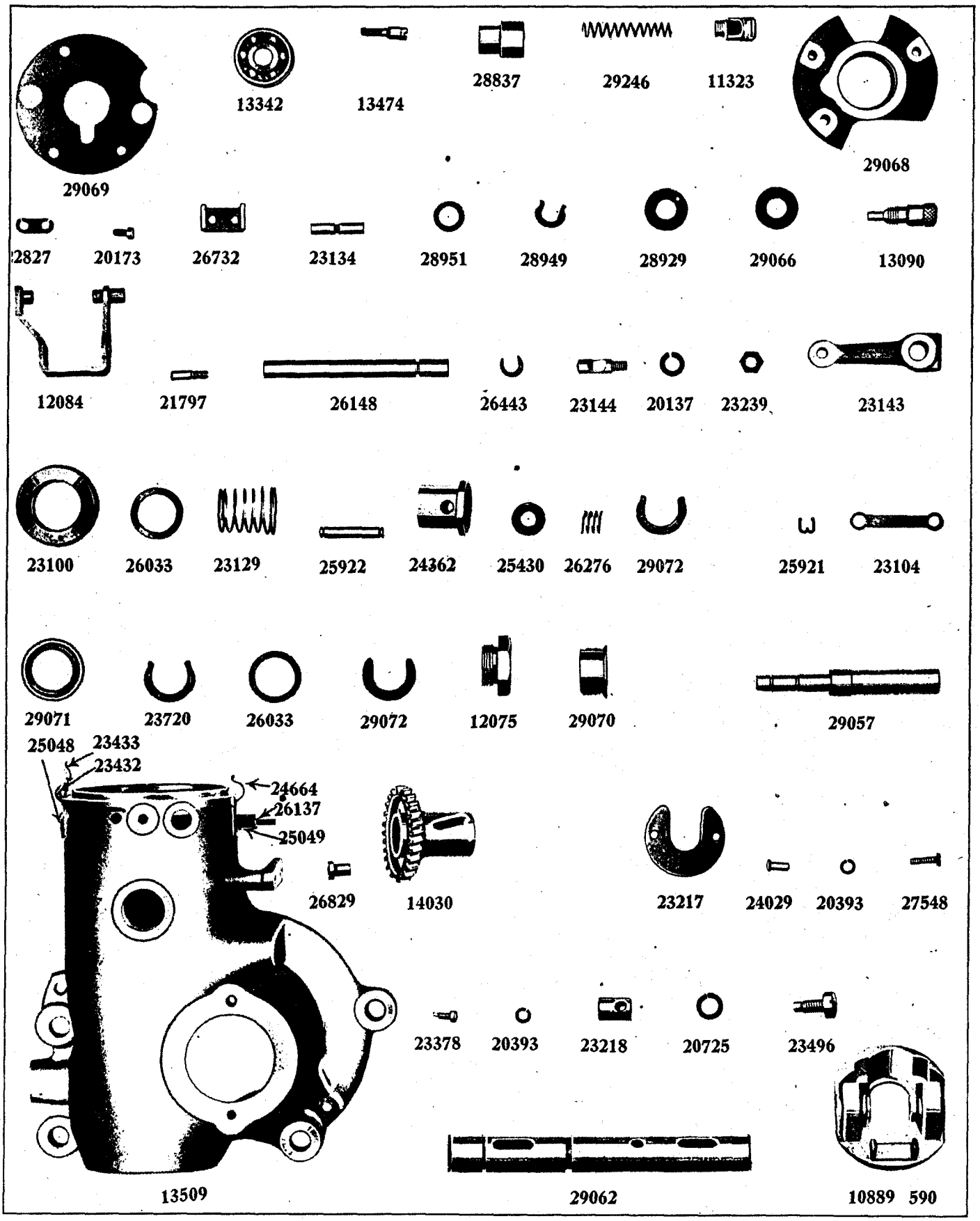
No. 5206 DISTRIBUTOR

No. 5166 DISTRIBUTOR (Continued)

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

No. 5166 DISTRIBUTOR

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



No. 5166 DISTRIBUTOR

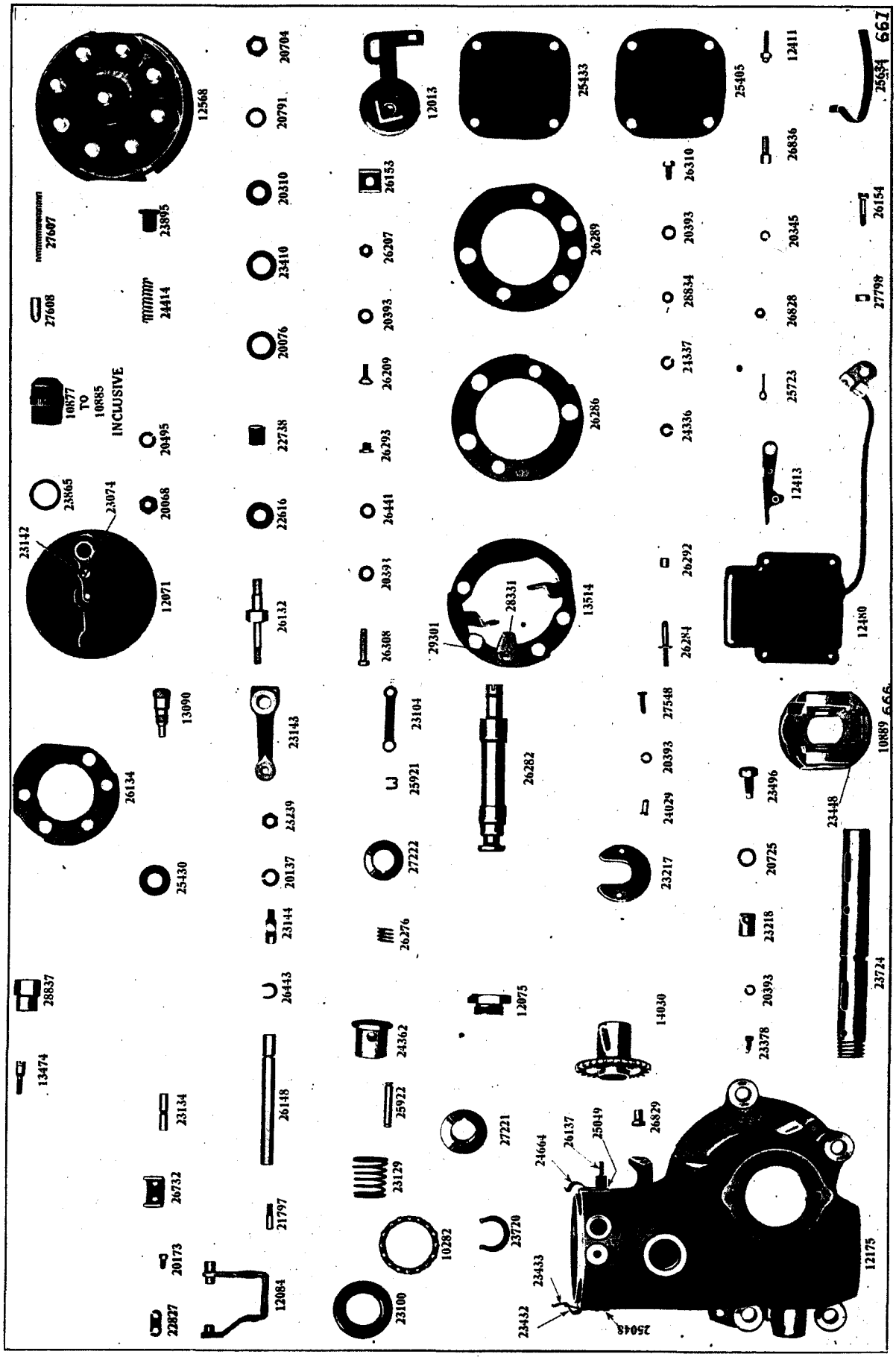
No. 5150 DISTRIBUTOR (Continued)

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

No. 5150 DISTRIBUTOR

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

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



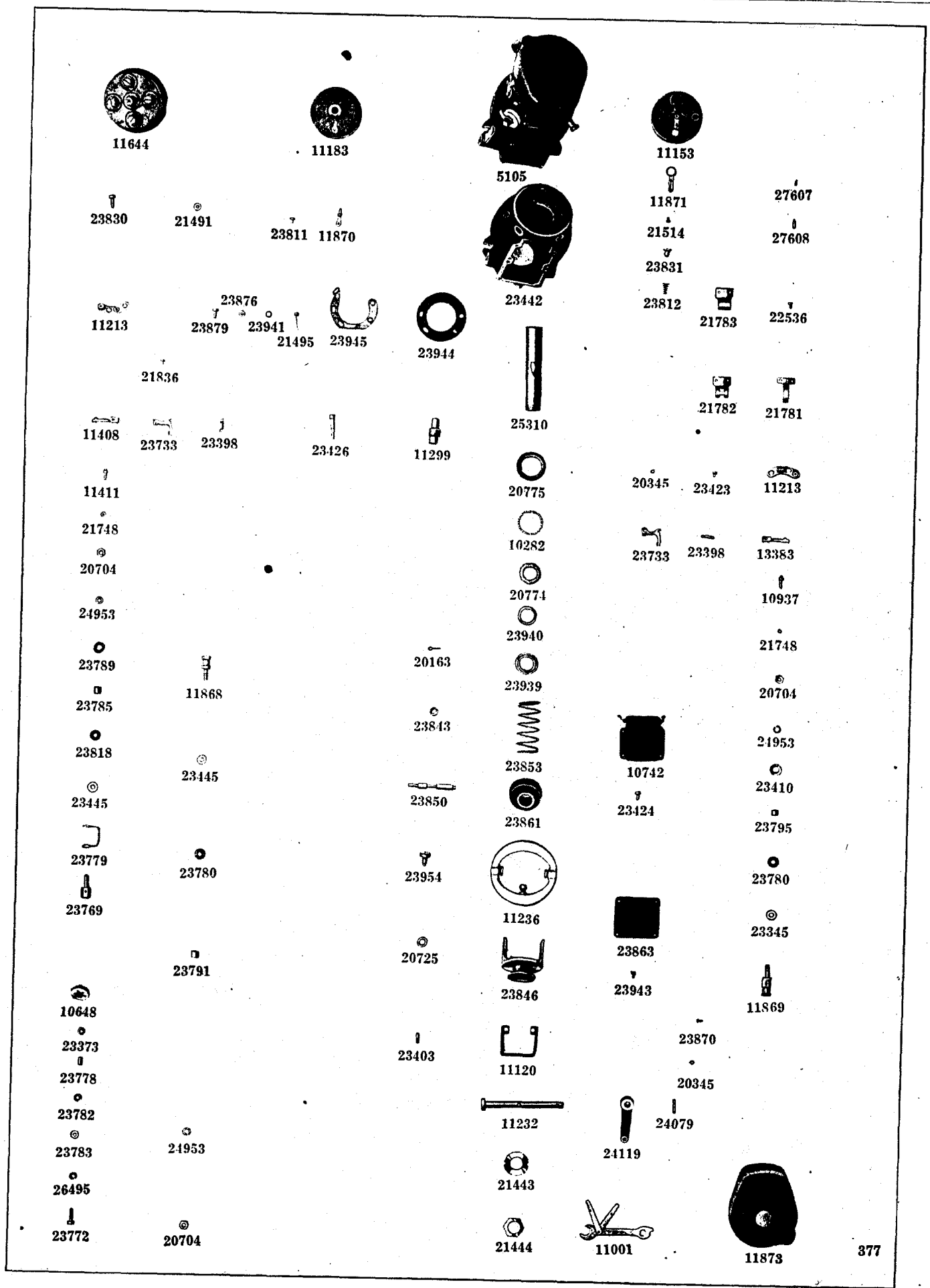
No. 5150 DISTRIBUTOR

No. 5105 DISTRIBUTOR (Continued)

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

No. 5105 DISTRIBUTOR

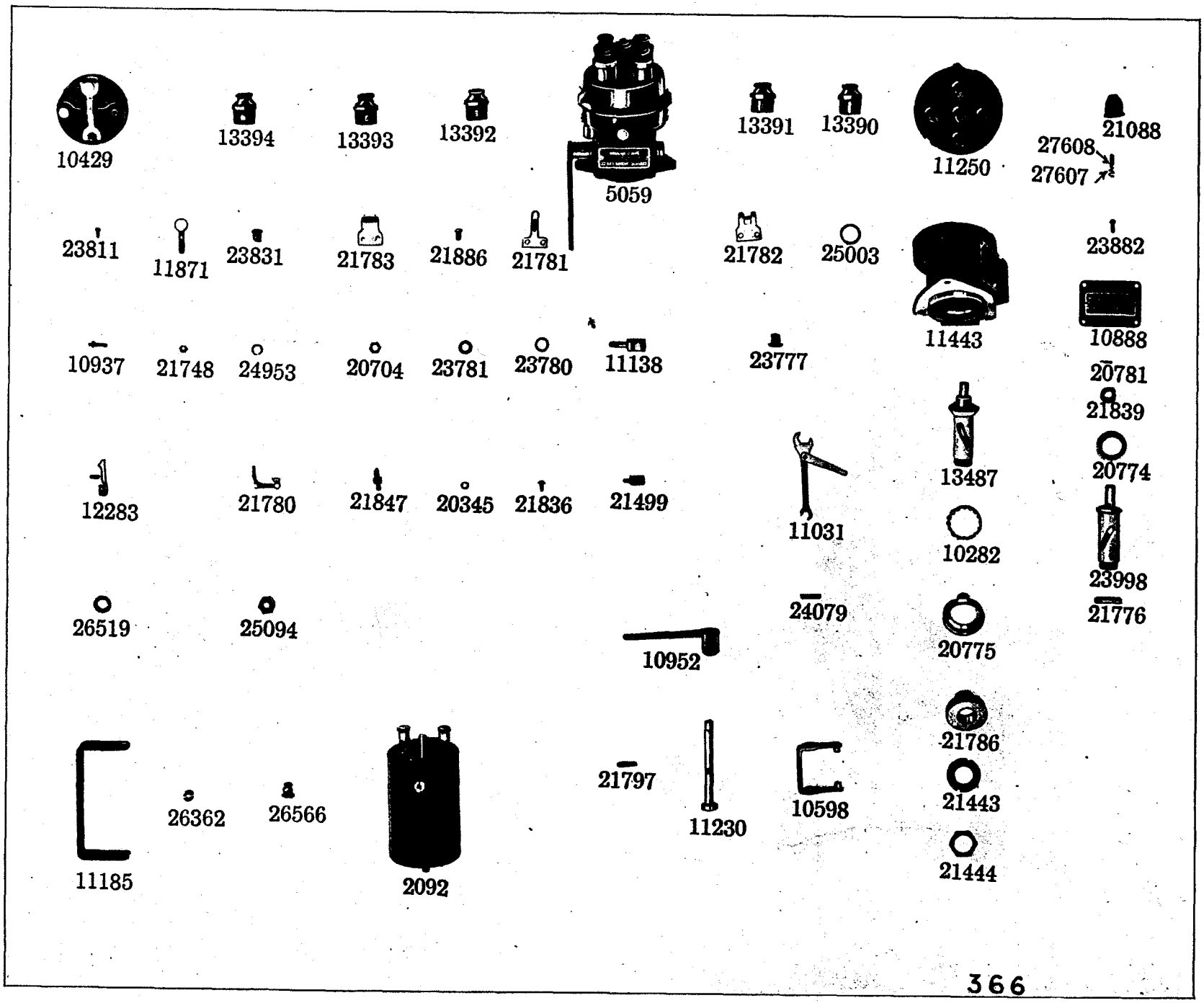
Piece Number	NAME OF PART	Quantity Required
5105	**DISTRIBUTOR COMPLETE**	1
23442	Housing for Distributor Assembly 5105	1
14123	**Shaft Assembly (Service) (Including Shaft 25310 and Upper Cone) (Not shown in Illustration)**	1
25310	Shaft for Distributor	1
27222	Cone for Shaft 25310 (Not shown in Illustration)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



No. 5105 DISTRIBUTOR

No. 5059 DISTRIBUTOR

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

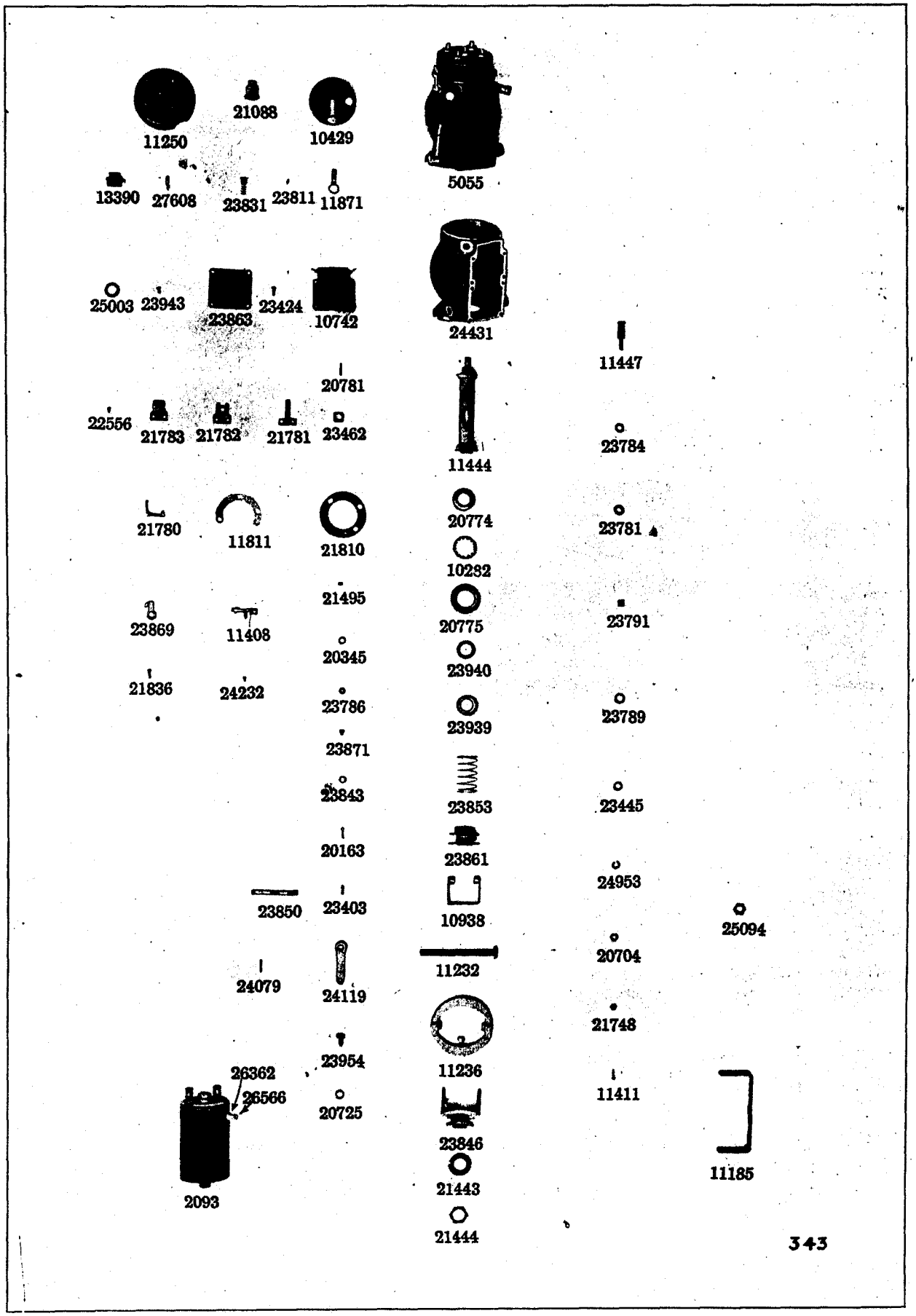

10429
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21782
25003
23882
11443
10888
10937
21748
24953
20704
23781
23780
11138
23777
20781
21839
20774
13487
12283
21780
21847
20345
21836
21499
11031
10282
23998
21776
26519
25094
24079
20775
10952
21786
21797
11230
10598
21443
26362
26566
21444
11185
2092
366

No. 5055 DISTRIBUTOR (Continued)

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

No. 5055 DISTRIBUTOR

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



No. 5055 DISTRIBUTOR

No. 5049 DISTRIBUTOR

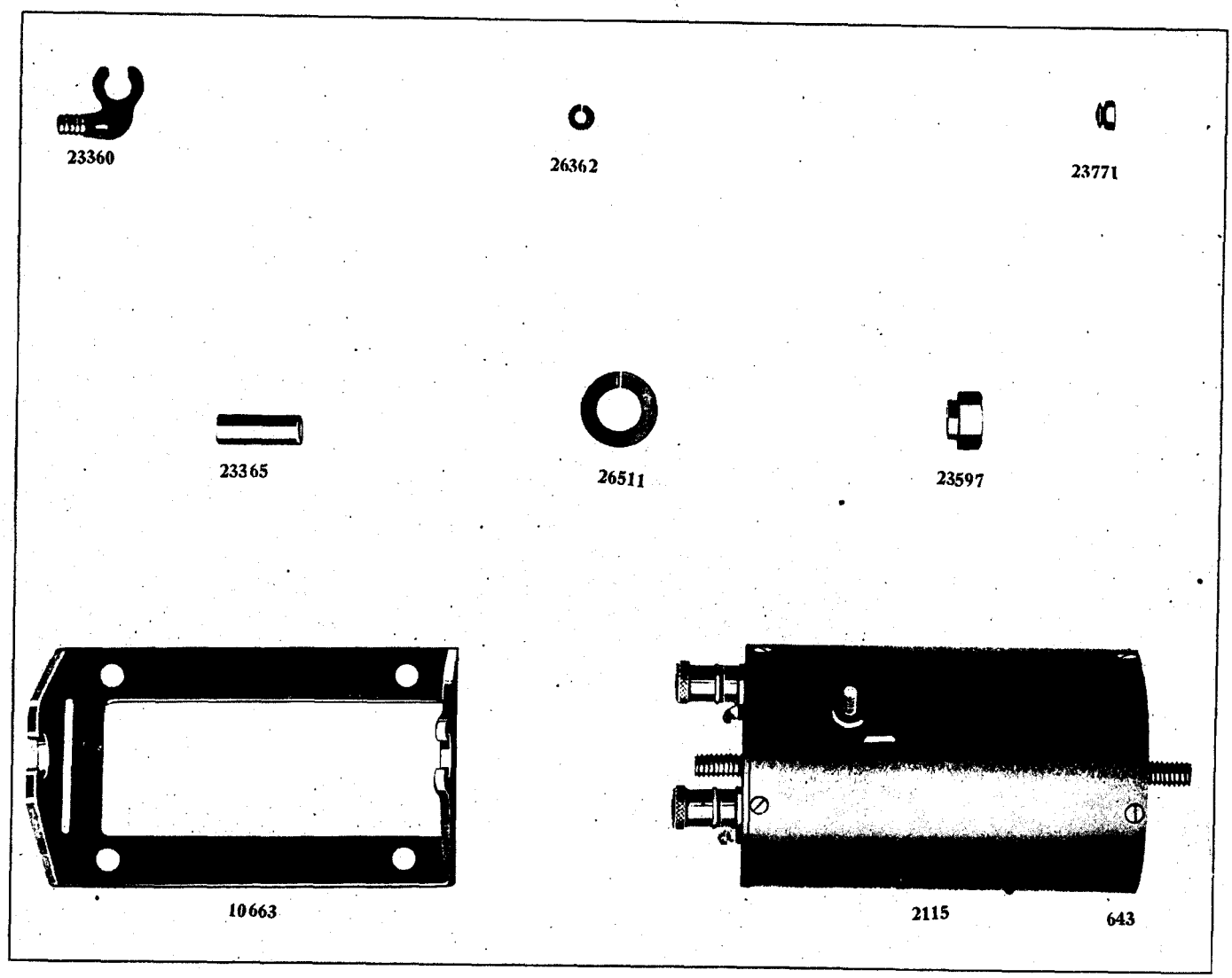
(Not Illustrated)

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

No. 5001 DISTRIBUTOR

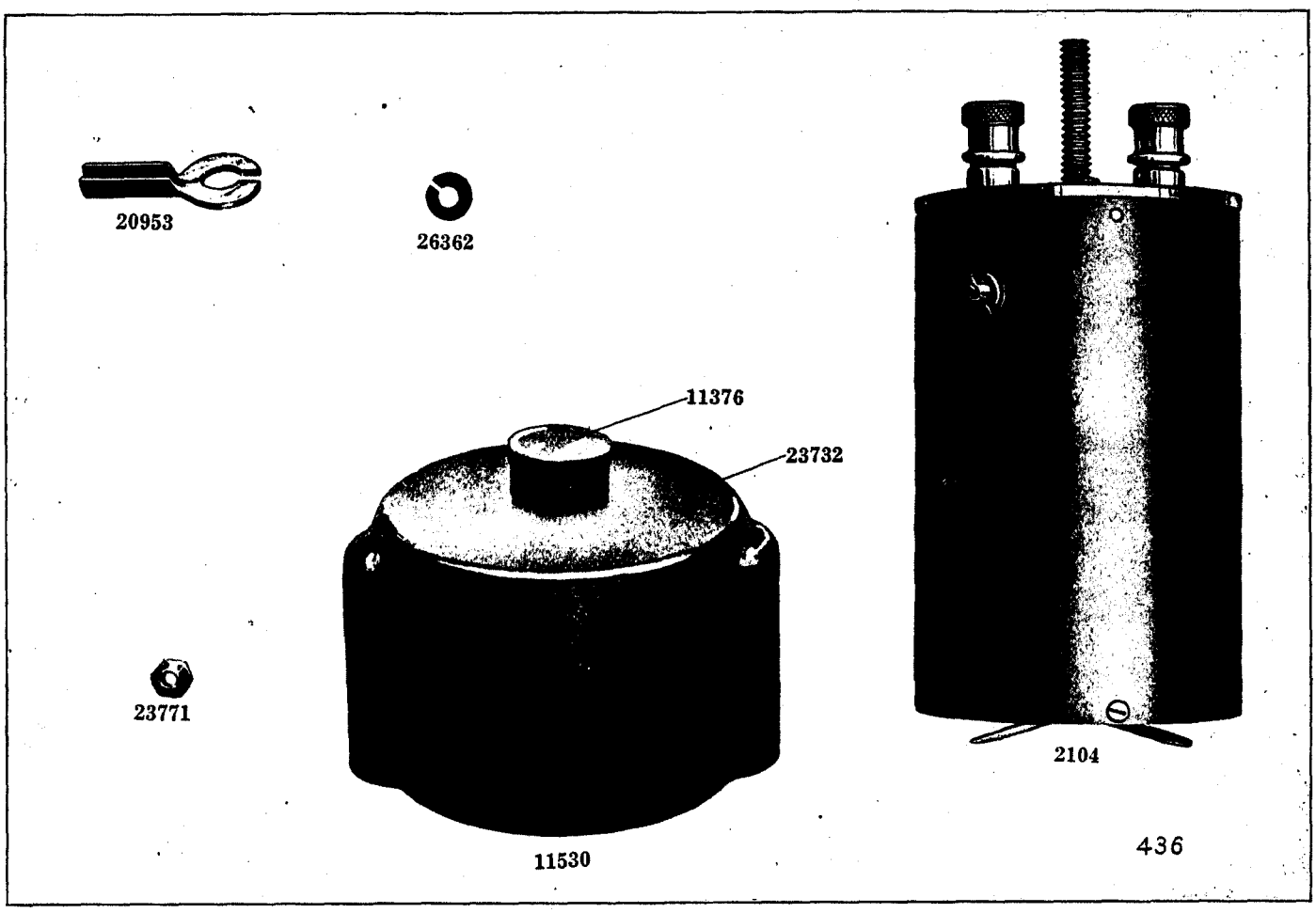
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Piece Number	NAME OF PART	Quantity Required
5001	**DRY CELL DISTRIBUTOR COMPLETE**	1
11991	**Housing Assembly Complete**	1
	(Includes the next 2 Items)	
24367	Housing for Housing Assembly 11991	1
20775	Cup for retainer and Balls Assembly 10282	1
14114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



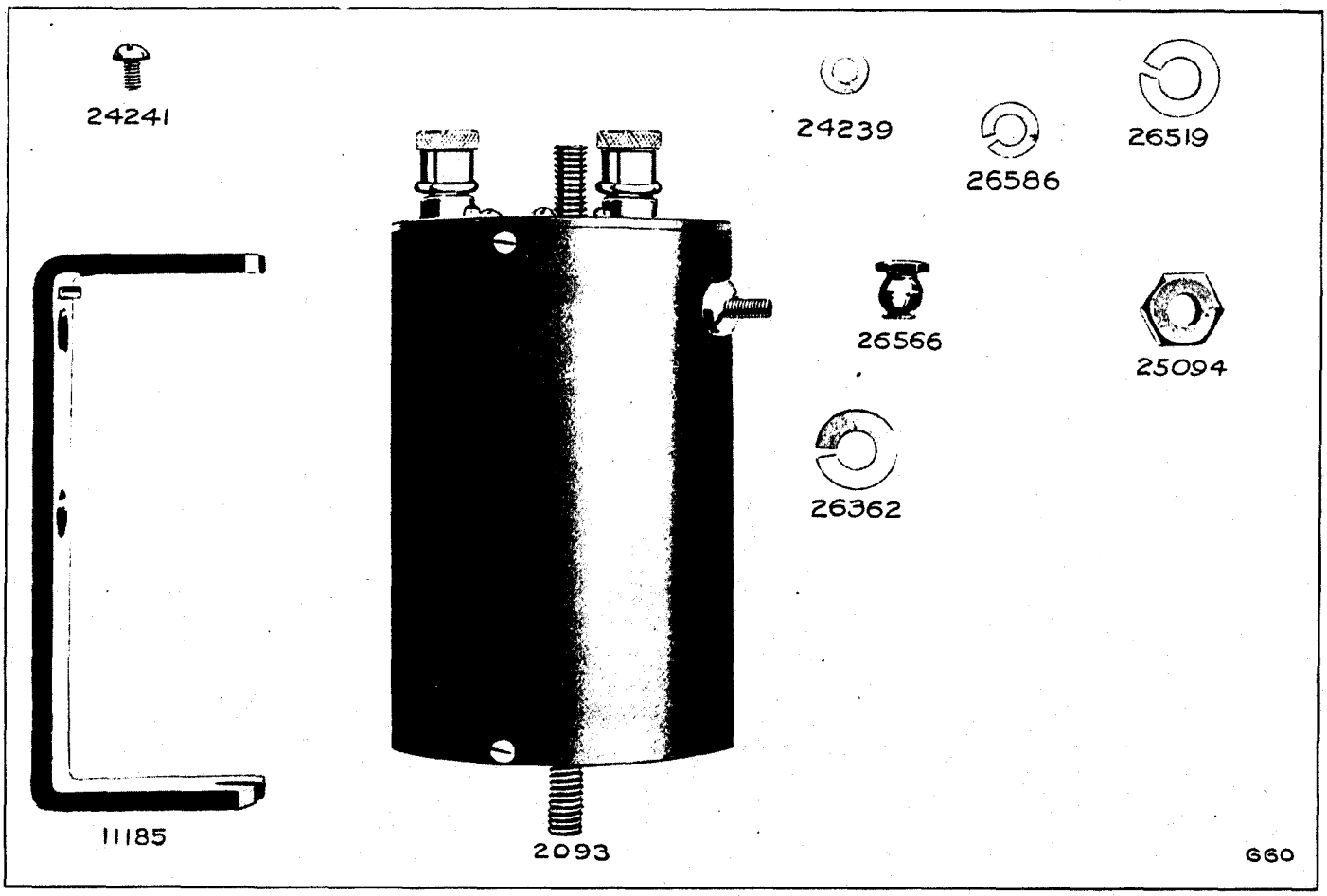
No. 2115 IGNITION COIL

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



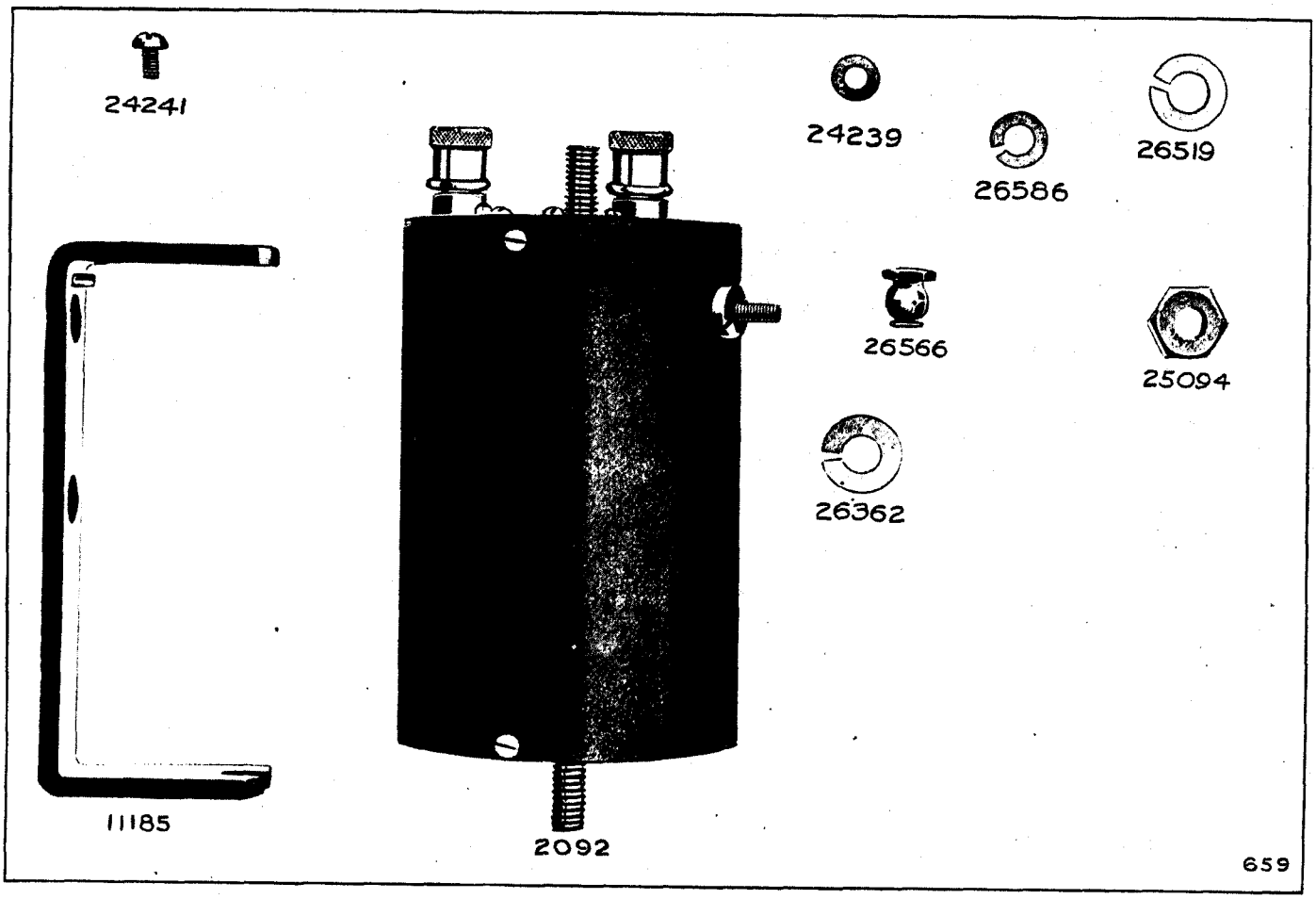
No. 2104 IGNITION COIL

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



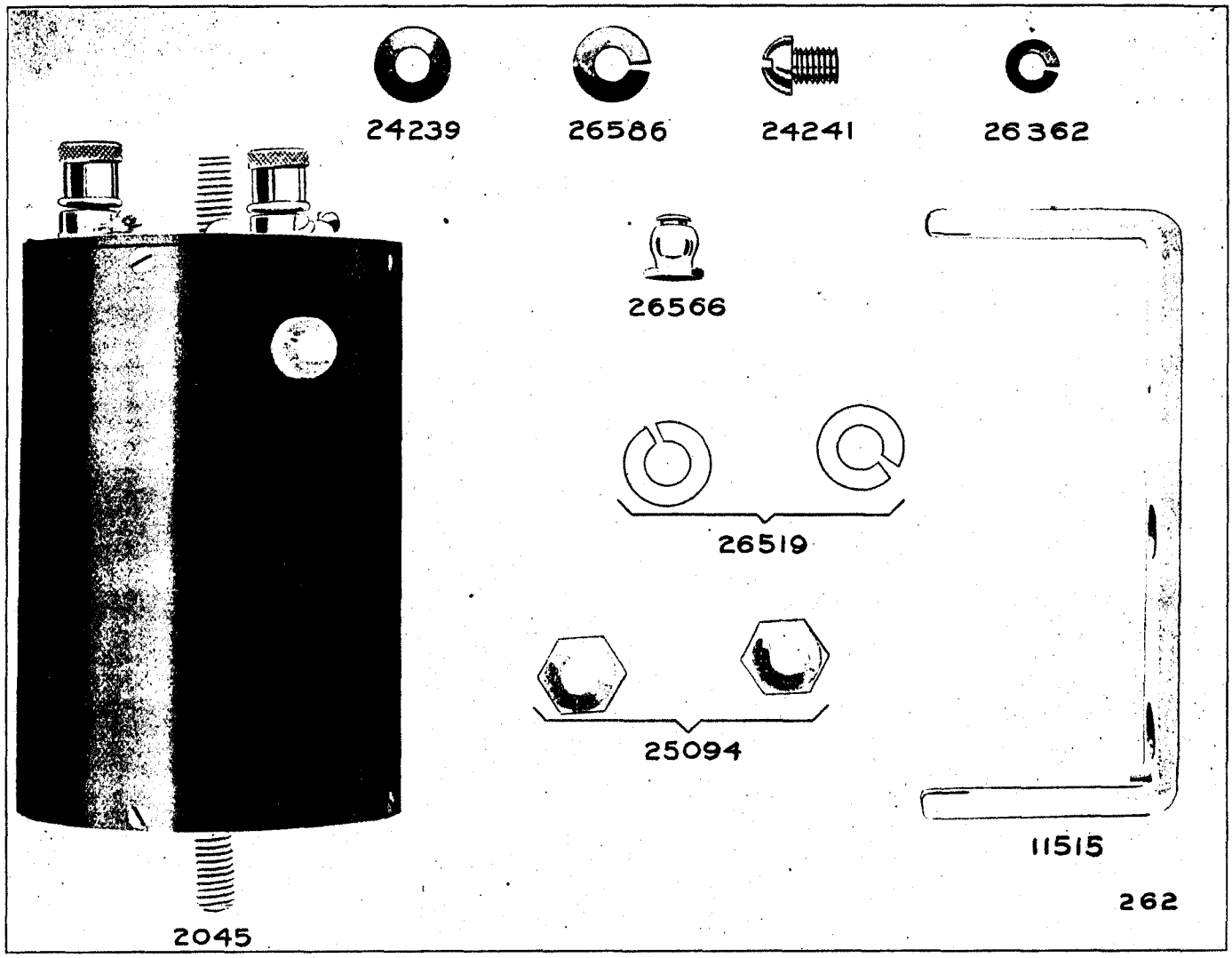
No. 2093 IGNITION COIL

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



No. 2092 IGNITION COIL

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



No. 2045 IGNITION COIL

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

No. 2022 IGNITION COIL

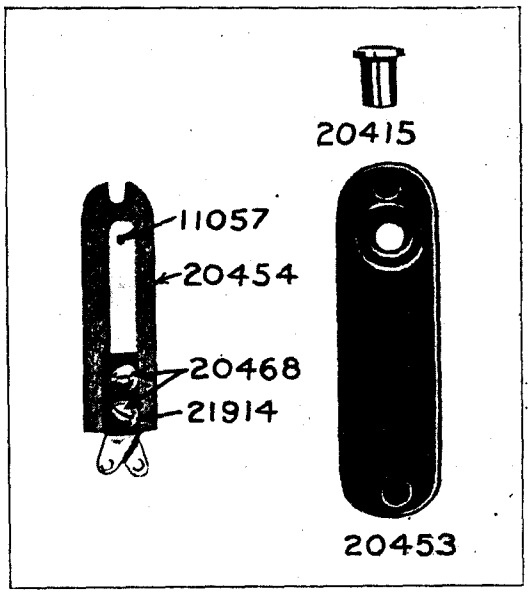
(Not Illustrated)

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

No. 2004 COIL BOX

(Not Illustrated)

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

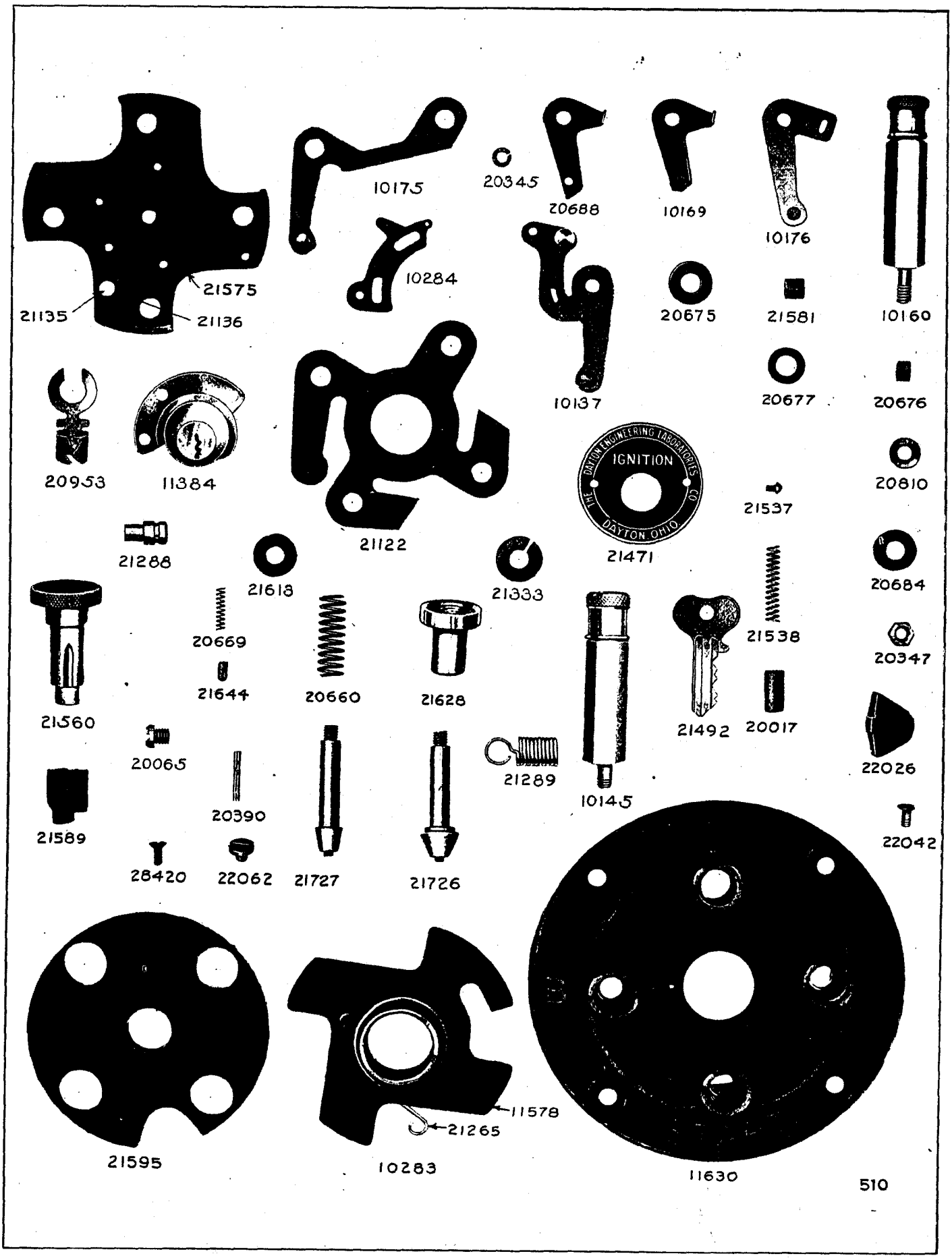


No. 1991 STARTING SWITCH

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

No. 1979 IGNITION SWITCH

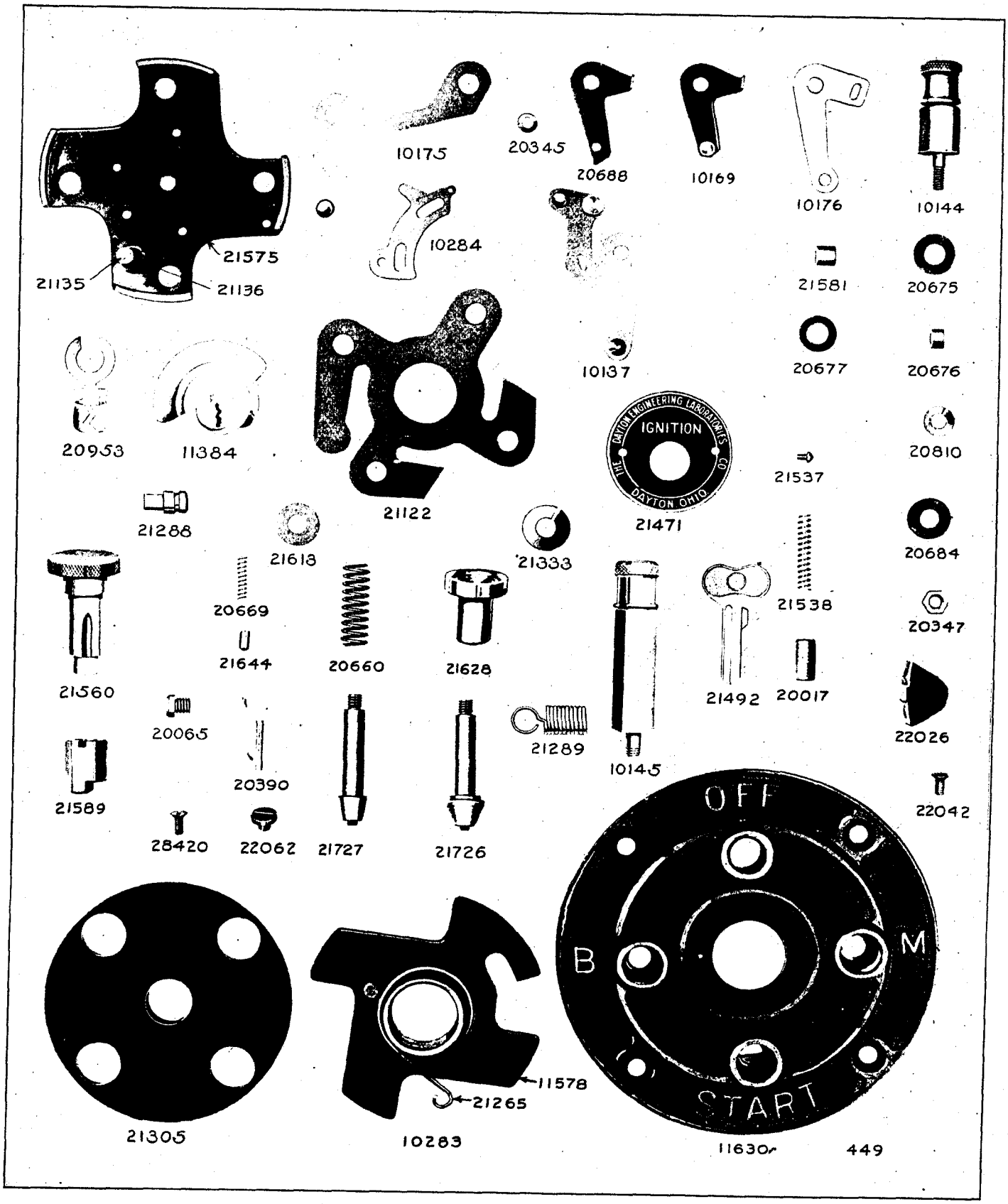
Piece Number	NAME OF PART	Quantity Required
1979	**IGNITION SWITCH COMPLETE**	1
10289	**Shell Assembly Complete** (Includes the next 16 Items)	1
10287	**Shell Assembly** (Includes the next 6 Items)	1
13836	**Shell Assembly**	1
21628	Button for Studs 21726 and 21727	3
21726	Stud for operating Contacts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



No. 1979 IGNITION SWITCH

No. 1978 IGNITION SWITCH

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



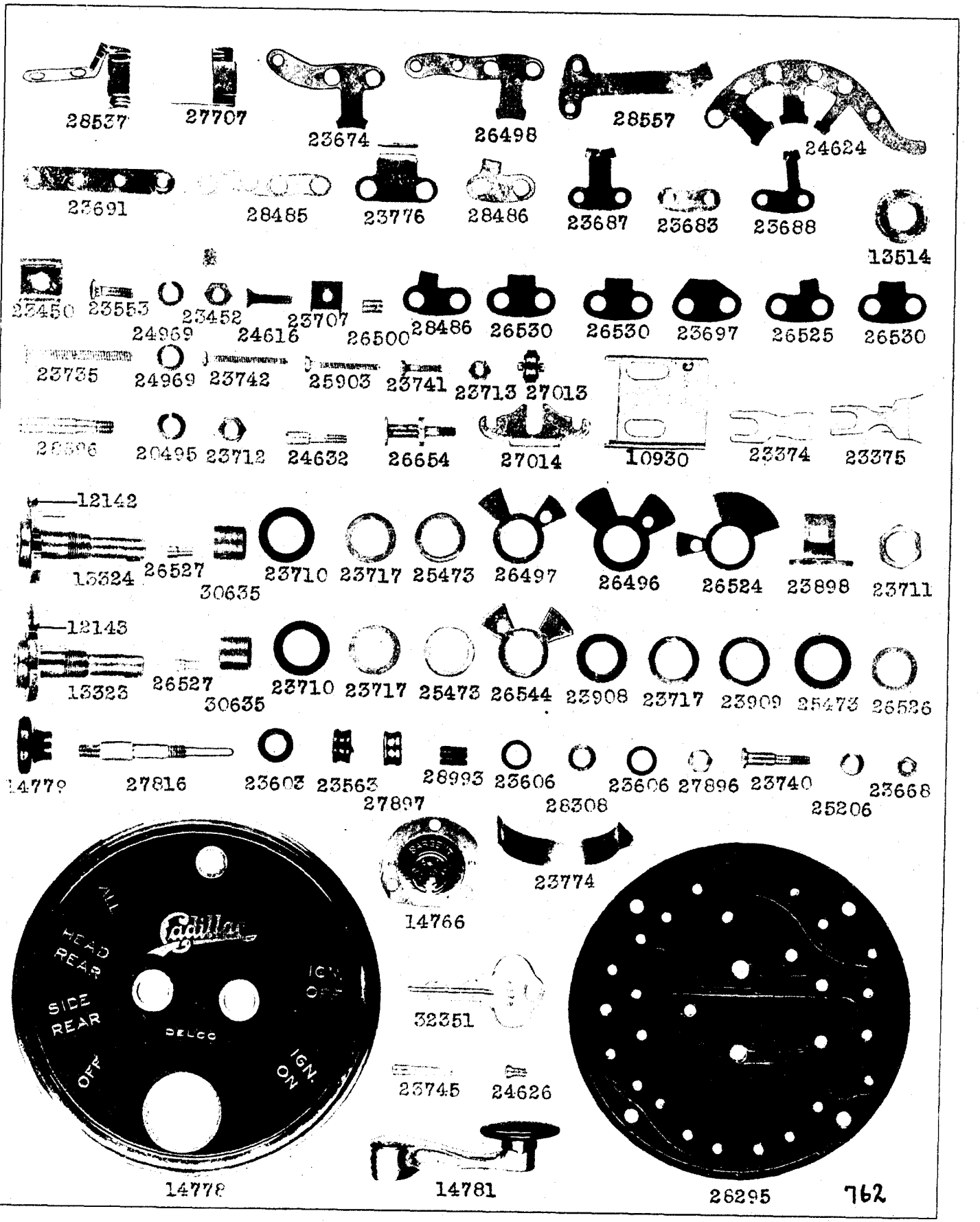
No. 1978 IGNITION SWITCH

No. 1150 COMBINATION SWITCH (Continued)

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

No. 1150 COMBINATION SWITCH

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



No. 1150 COMBINATION SWITCH

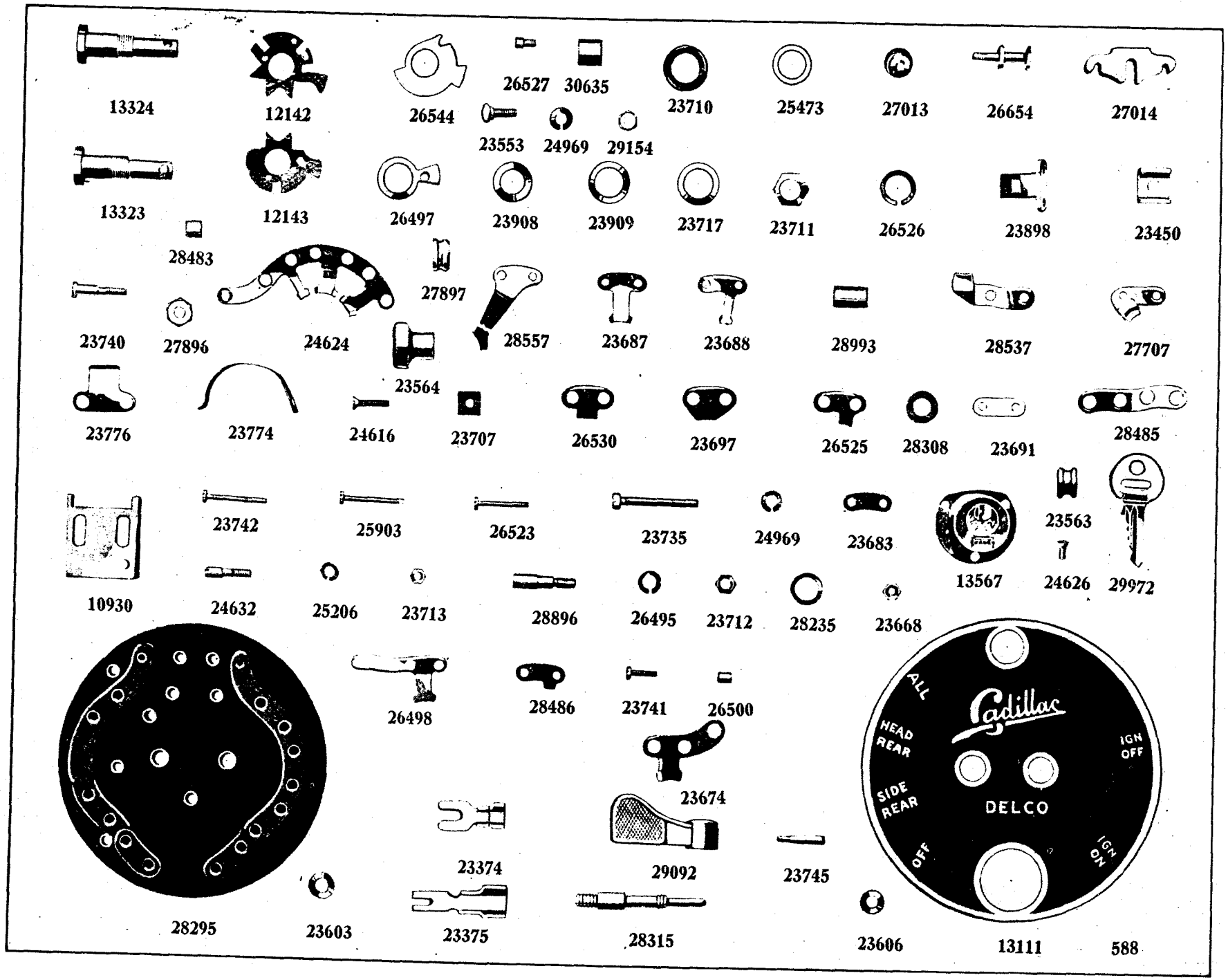
No. 1099 COMBINATION SWITCH (Continued)

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

No. 1099 COMBINATION SWITCH

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

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

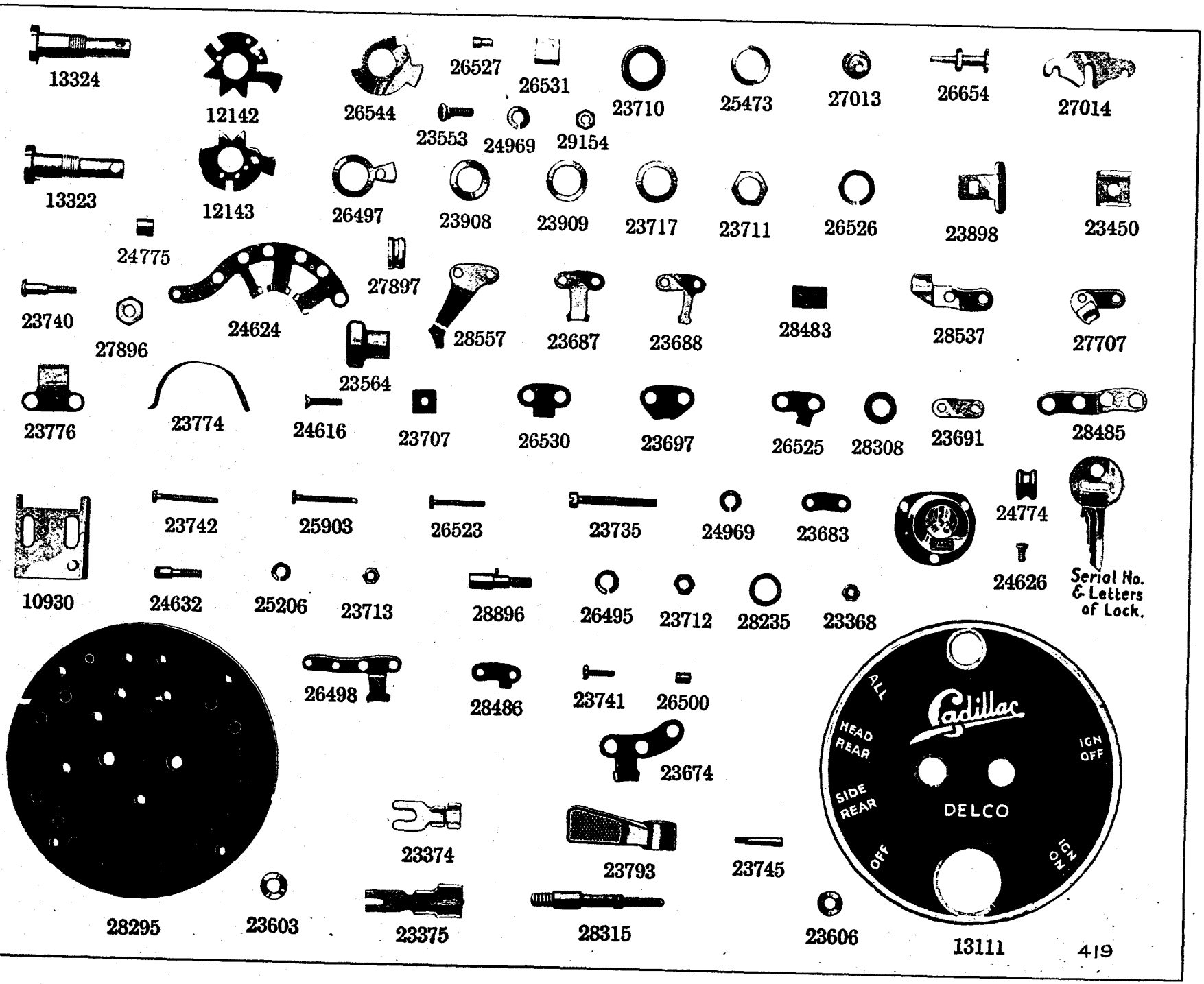

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29972
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10930
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25206
23713
28896
26495
23712
28235
23668
26498
28486
23741
26500
23674
23374
29092
23745
28295
23603
23375
28315
23606
13111
588
ALL
HEAD REAR
SIDE REAR
OFF
Cadillac
DELCO
IGN OFF
IGN ON

No. 1077 COMBINATION SWITCH (Continued)

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

No. 1077 COMBINATION SWITCH

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

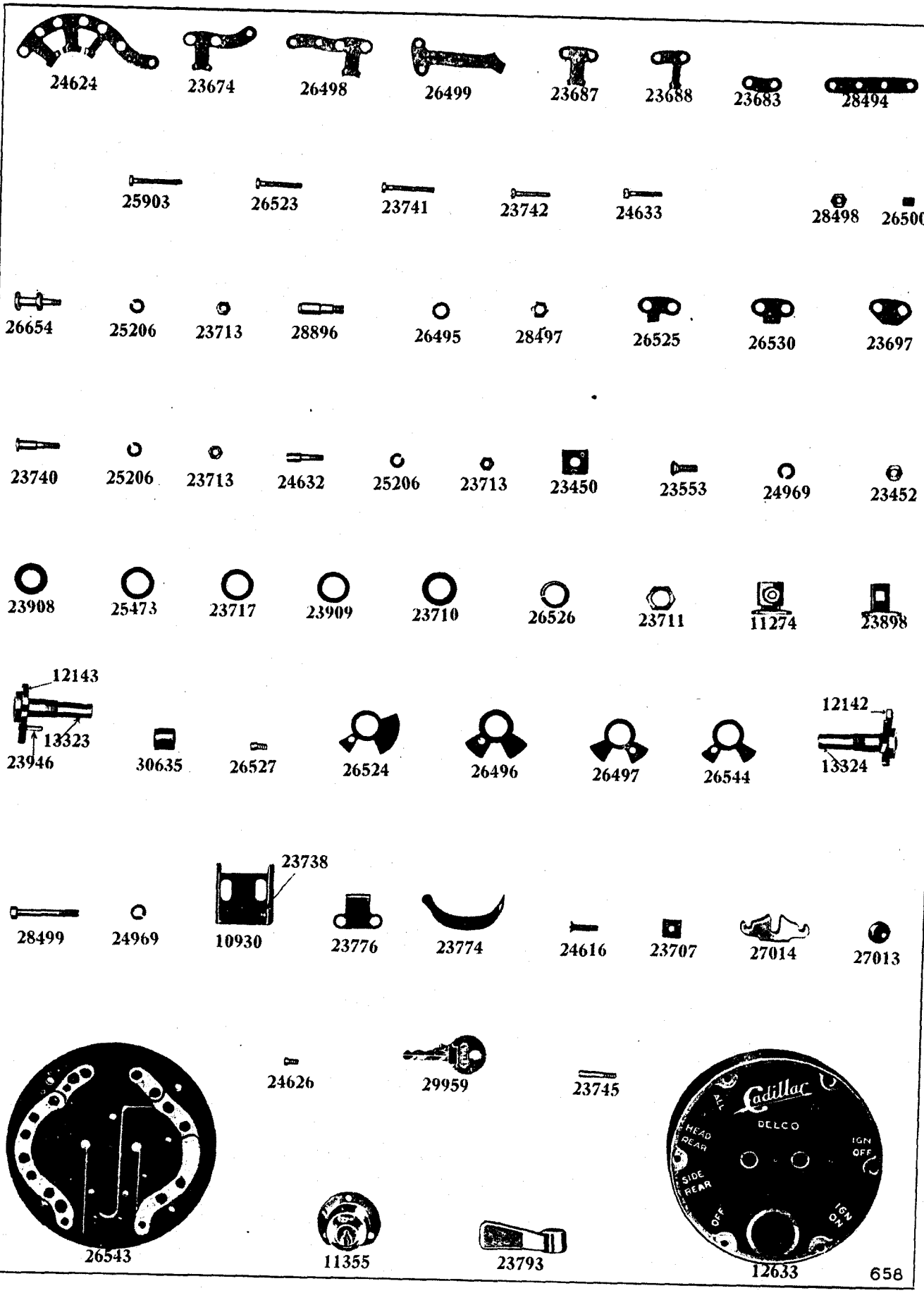

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24624
28557
23687
23688
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28537
27707
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23776
23774
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26530
23697
26525
28308
23691
28485
23742
25903
26523
23735
24969
23683
24774
24626
Serial No. & Letters of Lock.
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24632
25206
23713
28896
26495
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28235
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26498
28486
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26500
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23374
23793
23745
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23603
23375
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23606
13111
ALL
HEAD REAR
SIDE REAR
OFF
Cadillac
DELCO
IGN OFF
IGN ON
419

No. 1069 COMBINATION SWITCH (Continued)

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

No. 1069 COMBINATION SWITCH

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



No. 1069 COMBINATION SWITCH

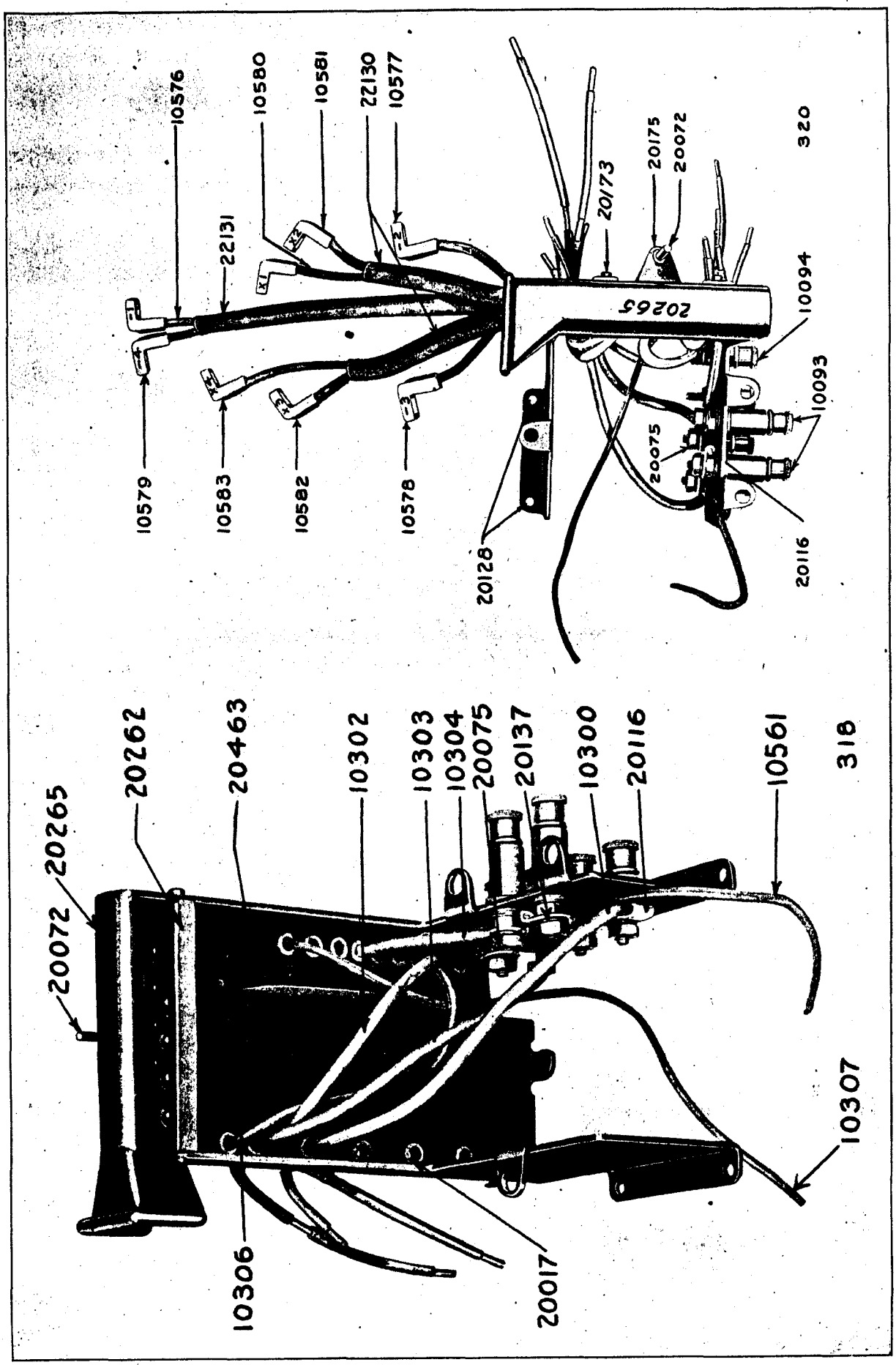
No. 1062 COMBINATION SWITCH (Continued)

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

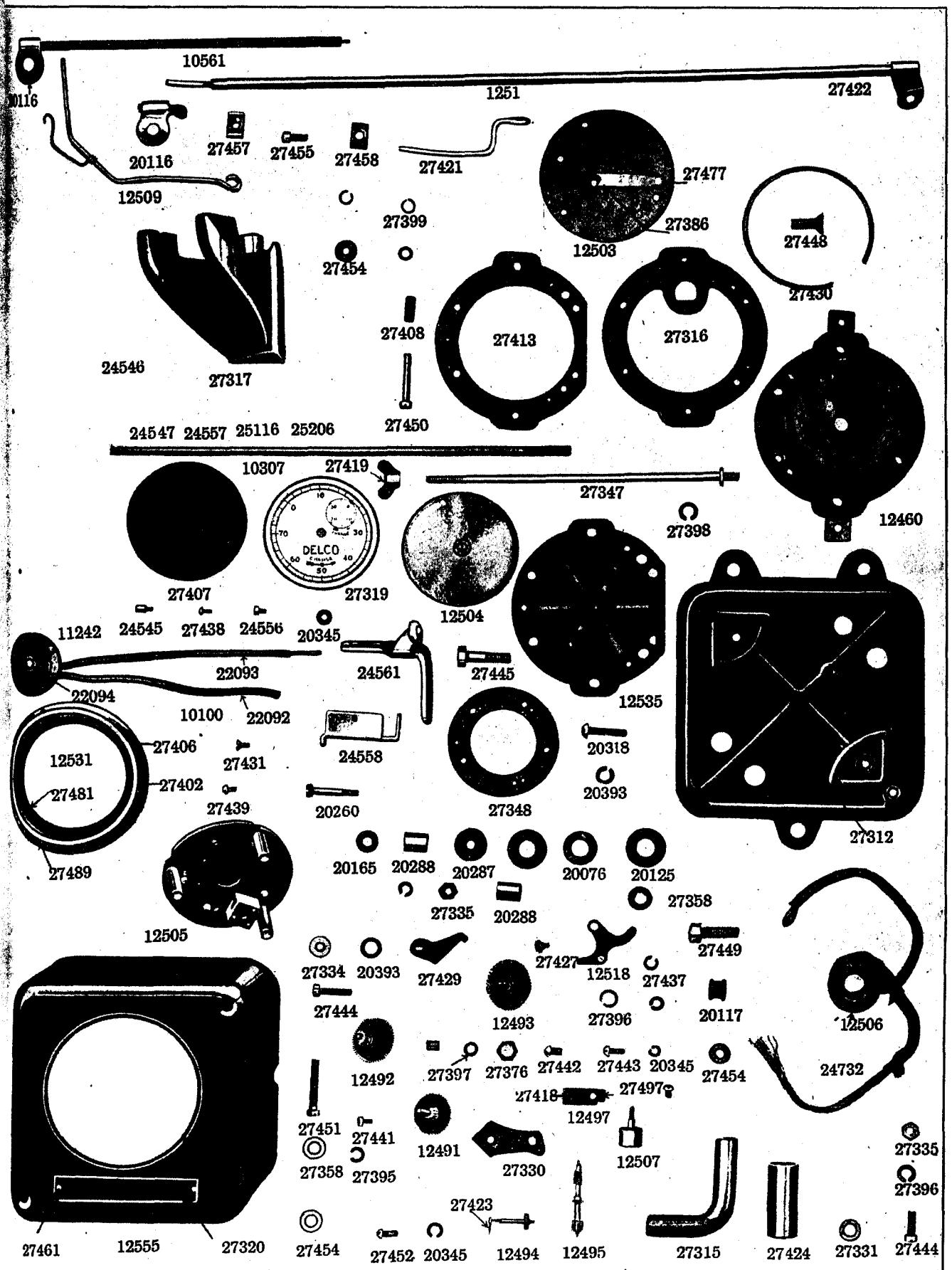
No. 1062 COMBINATION SWITCH

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

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

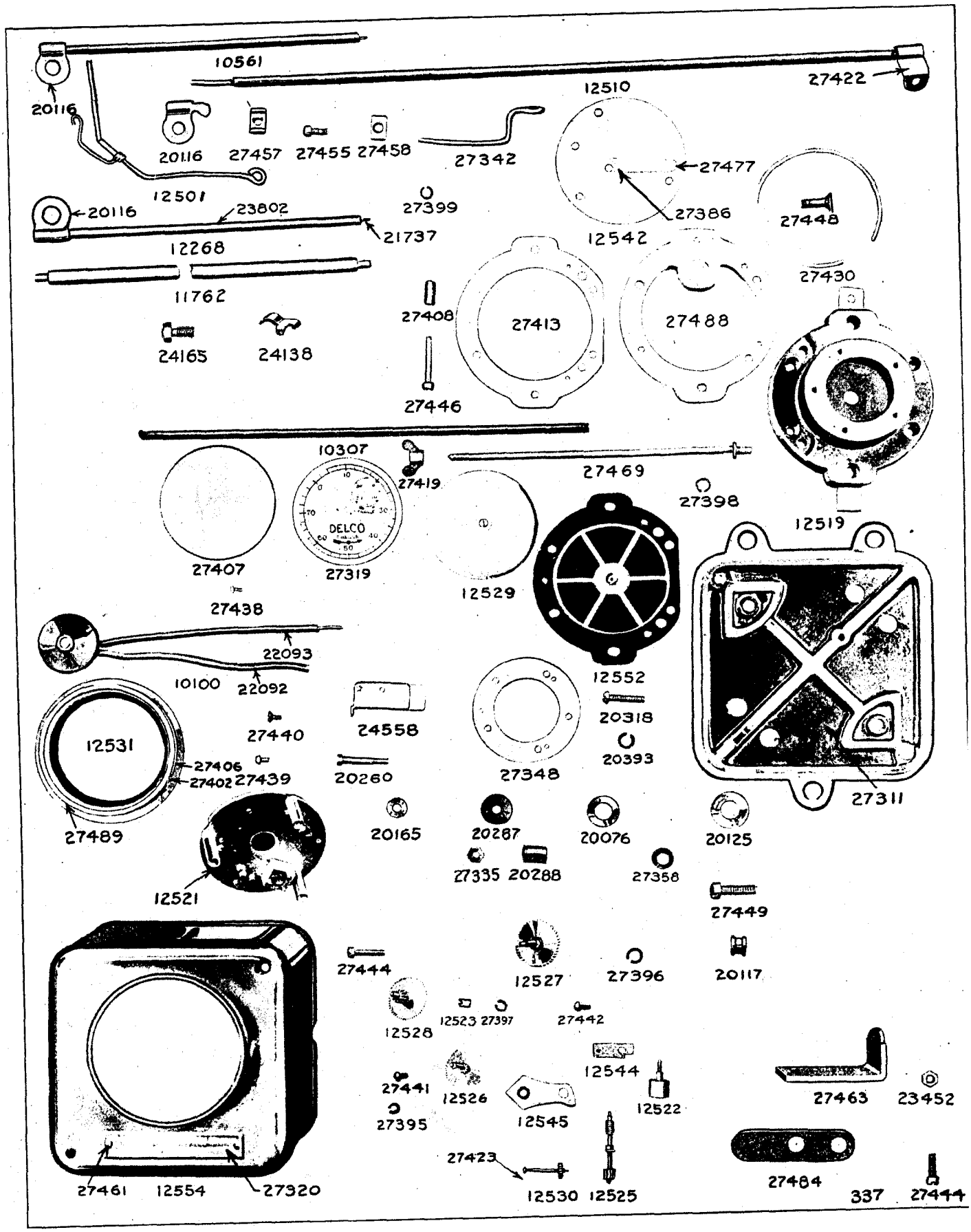


No. 5401 BATTERY BOX

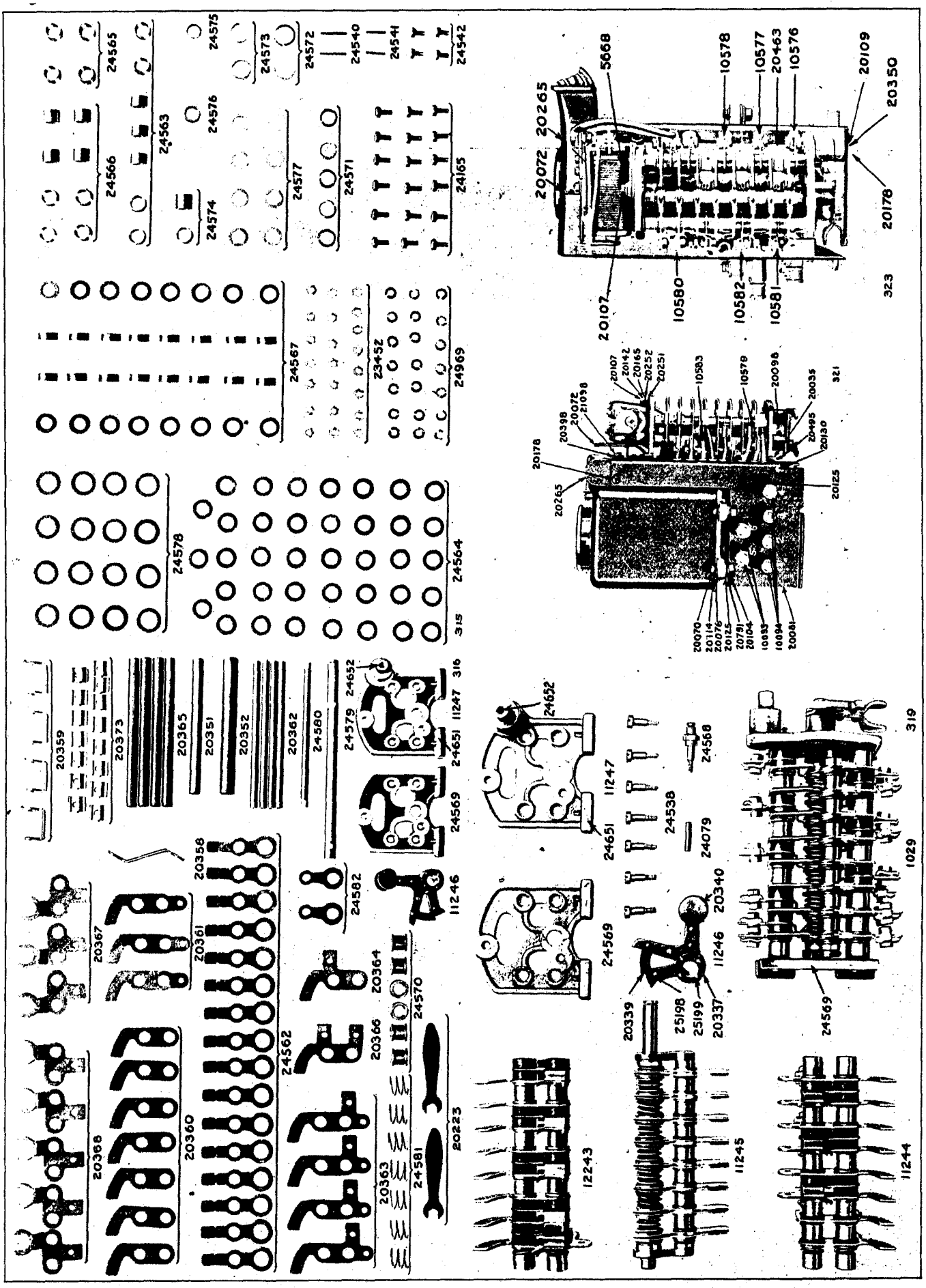


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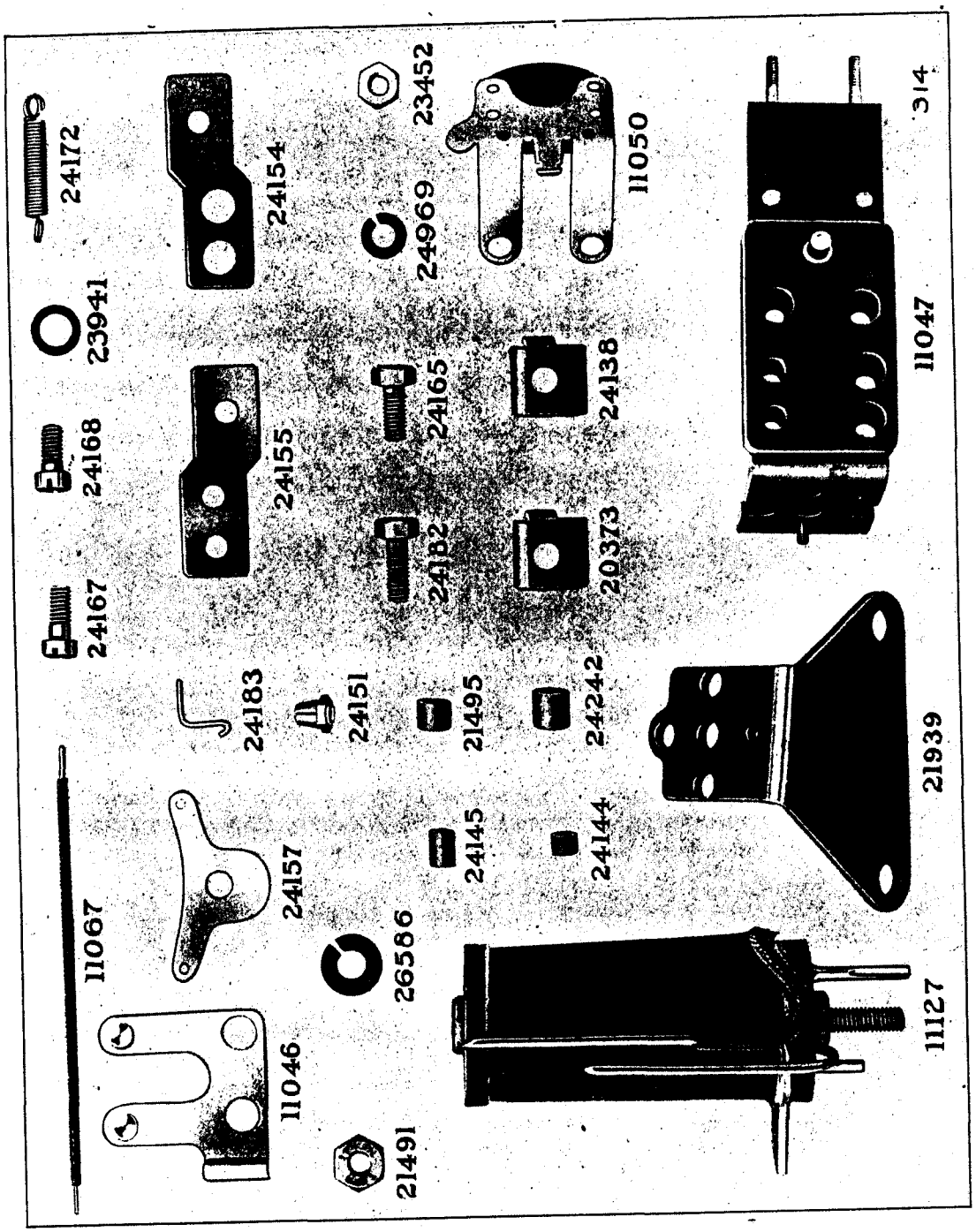
THE DAYTON ENGINEERING LABORATORIES CO., DAYTON, OHIO



No. 5401 BATTERY BOX



No. 5401 BATTERY BOX



No. 5401 BATTERY BOX

No. 5401 BATTERY BOX

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

No. 5401 BATTERY BOX (Continued)

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

No. 5401 BATTERY BOX (Continued)

Piece Number	NAME OF PART	Quantity Required
12521	**Hopper Plate Assembly**	1
	(Includes the next 6 Items)	
12545	**Bridge Assembly**	1
27441	Screw for attaching Bridge Assembly 12545	1
27395	Lock Washer for Screw 27441	1
27475	Support for Worm Staff Assembly 12525 (Not shown in Illustration)	1
27484	Bracket for Worm Staff Assembly 12525	1
27479	Rivet for retaining Bracket 27484 (Not shown in Illustration)	2
12523	**Bearing Assembly (Upper)**	1
12519	**Armature Box Assembly**	1
12522	**Worm Spindle Assembly**	1
12529	**Armature Assembly**	1
12552	**Pole Plate Assembly**	1
12531	**Bezel Ring Assembly Complete**	1
	(Includes the next 7 Items)	
12551	**Bezel Ring Assembly (Not shown in Illustration)**	1
	(Includes the next 2 Items)	
27489	Ring for Bezel Ring Assembly 12551	1
27402	Dowel Pin for Ring 27489	2
27406	Snap Ring for Bezel Ring Assembly 12531	1
27407	Glass for Bezel Ring Assembly 12531	1
27430	Bezel Ring for Bezel Ring Assembly 12531	1
27481	Gasket for Glass 27407 (Not shown in Illustration)	1
27311	Base for Ampere Hour Meter Assembly 6077	1
27319	Dial for Ampere Hour Meter Assembly 6077	1
28471	Nut for Screw 27446	2
27348	Washer for Hopper Plate Assembly 12521 (Small Gasket)	1
27358	Plain Washer for Screw 27446	2
13839	**Magnet Assembly**	1
	(Includes the next Item)	
27448	Screw for Magnet Assembly 13839	4
27376	Nut for Bearing Assembly 12523	1
26088	Spacing Washer for damping Pole (Not shown in Illustration)	4
27395	Lock Washer for Screws 27439, 27441, 27442 and 27465	10
27396	Lock Washer for Screws 27446 and 27444	8
27397	Lock Washer for Nut 27376	1
27398	Lock Washer for Stud 27469	2
27399	Lock Washer for Screws 27449 and 27446	5
27408	Insulator for Screw 27446	2
27413	Washer for Armature Box Assembly 12519 (Large Gasket)	1
27419	Nut for Stud 27469 (Wing Nut)	2
20117	Insulating Bushing for Meter Base 27311	4
27423	Small Hand for Third Staff Assembly 12527	1
27438	Screw for mounting Dial 27319	3
27439	Screw for Bracket 27464 (Small)	1
27440	Screw for mounting Train Plate Assembly 12542 (Flat Head)	1
27442	Screw for mounting Hopper Plate Assembly 12521	1
27444	Screw for Meter Terminals and for retaining Clamp Ring 27488	6
27446	Screw for mounting Armature Box Assembly 12519	2
27449	Screw for retaining Meter Base 27311	2
	(Includes the next 3 Items)	
14189	**Clamp Assembly (Not shown in Illustration)**	1
27455	Screw for connecting Friction Slider 27457 and Friction Clamp 27458	1
27457	Friction Slider for connecting Right Hand Shunt Lead Assembly 12501 and Left Hand Shunt Lead 27342	1
27458	Friction Clamp for connecting Right Hand Shunt Lead Assembly 12501 and Left Hand Shunt Lead 27342	1
27459	Insulating Tube for Case Stud 27469 (Not shown in Illustration)	2
27463	Ear Clip for Metal Terminals	2
27464	Bracket for Armature Box Assembly 12519 (Not shown in Illustration)	1
27465	Screw for Train Plate Assembly 12542 (Head Milled Down) (Not shown in Illustration)	2
27469	Case Stud for mounting Case Assembly 12554	2
27482	Gasket on Meter Base 27311 for Case Assembly 12554 (Not shown in Illustration)	1
27488	Clamp Ring under Pole Plate Assembly 12552	1
12501	**Right Hand Shunt Lead Assembly**	1
27342	Left Hand Shunt Lead, connecting Meter Terminal and Right Hand Shunt Lead Assembly 12501	1
10101	**Ampere Hour Meter Assembly Complete**	1
	(Includes the next 134 Items)	
	(No. 13476 Ampere Hour Meter Assembly has a single set of Magnets, the No. 10101 Ampere Hour Meter Assembly has two sets of Magnets. When ordering repair parts, order for the correct Meter. The two Ampere Hour Meters are interchangeable as a whole. When ordering a complete new Ampere Hour Meter, always order No. 10101. The above Ampere Hour Meter must be returned to Delco when any extensive repairs are required or when it is necessary to disassemble the unit to make internal repairs or adjustment. Delco will furnish parts for minor repairs that can be easily taken care of in the field.	

No. 5401 BATTERY BOX (Continued)

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

No. 5401 BATTERY BOX (Continued)

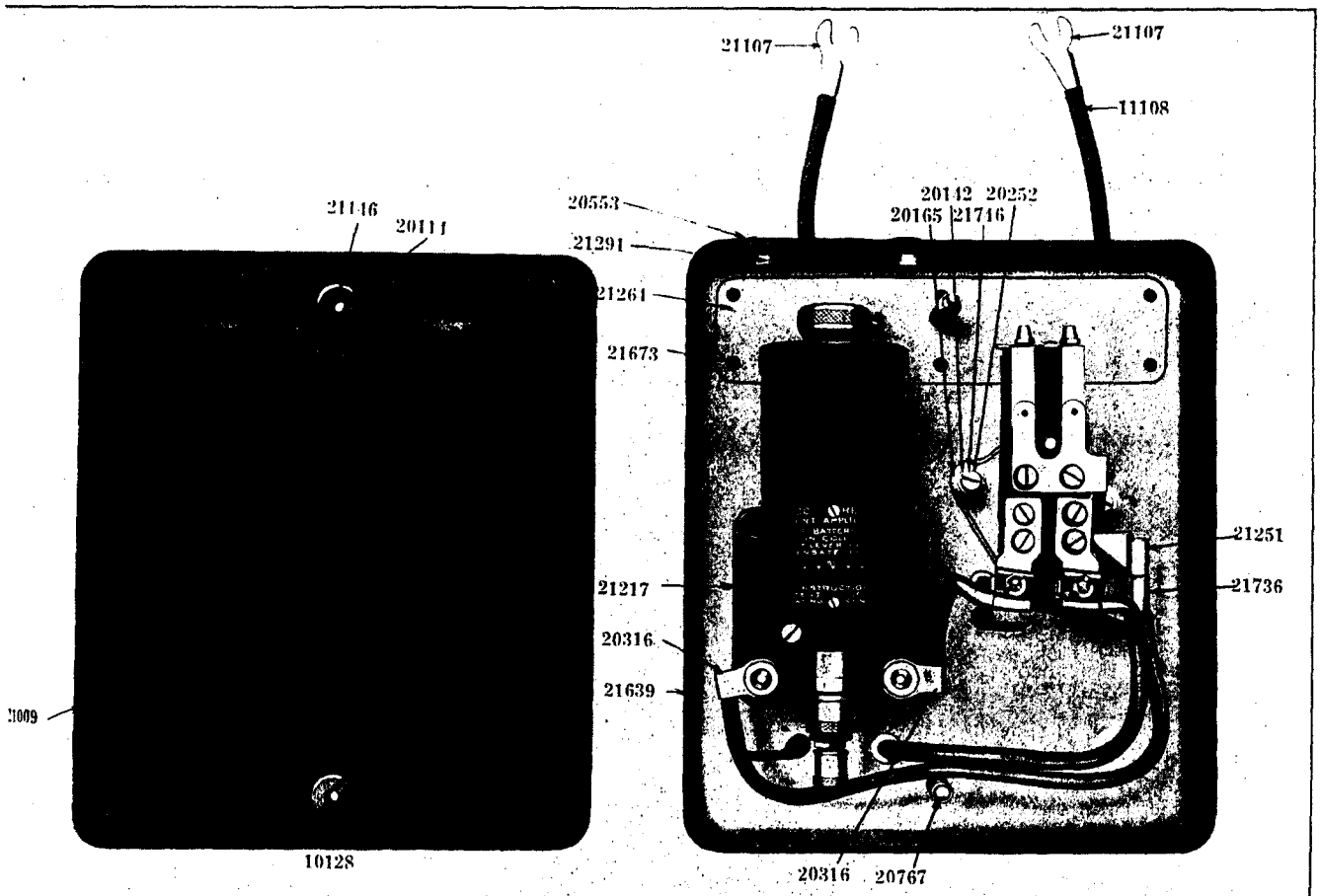
Piece Number	NAME OF PART	Quantity Required
27348	Washer for Hopper Plate Assembly 12505 (Small)	1
27358	Plain Washer for Screws 27444 and 27445	3
27376	Nut for Upper Bearing Assembly 12523	1
27395	Lock Washer for Screws 27452, 27439, 27443 and 27442	8
27396	Lock Washer for Screws 27450, 27444 and 27445,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

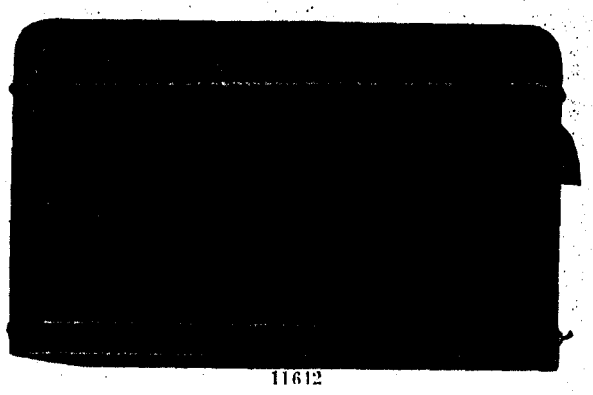
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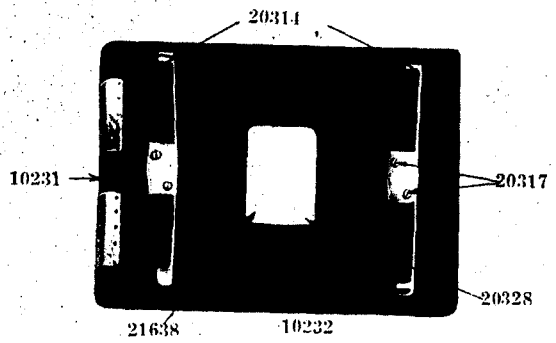
Piece Number	NAME OF PART	Quantity Required
24144	Insulating Bushing for Coil Studs (Short)	1
24157	Plate for grounding Terminal Lead Assembly 11067	1
24182	Screw for retaining Terminal Clamps on Terminal Plate 24155	1
24165	Screw for retaining Terminal Clamp on Terminal Plate 24154 and Terminal on Side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

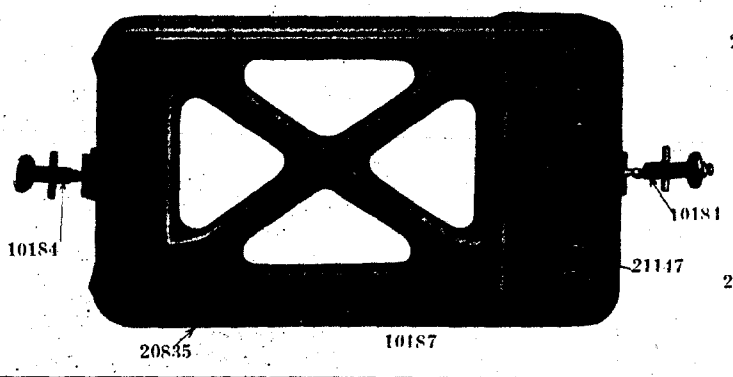
No. 5401 BATTERY BOX (Continued)

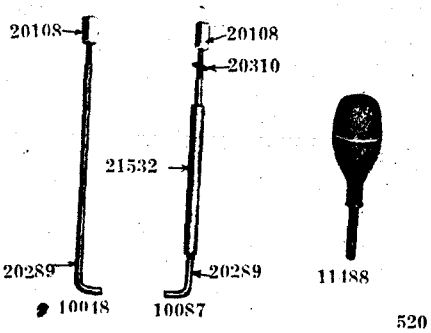
Piece Number	NAME OF PART	Quantity Required
27963	Lock Washer on Upper End of Rod 24580 (Not shown in Illustration)	1
24575	Brass Collar on Upper End of Rod 24580	1
24577	Spacing Washer between Blades 24562	8
23452	Nut for Screws 24165 and 24542	22
24969	Lock Washer for Nut 23452	22
20373	Terminal Clamp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



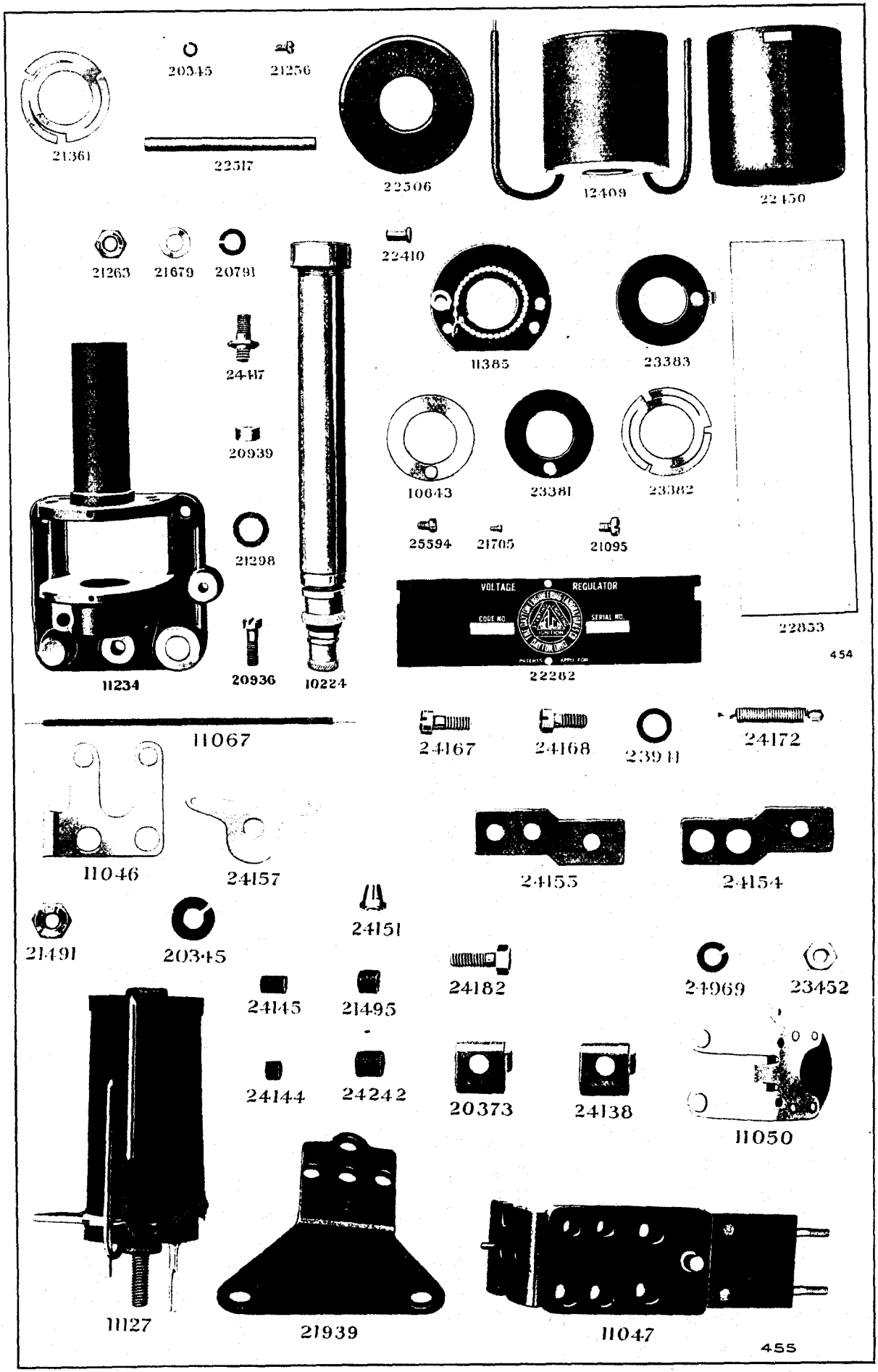








No. 5404 BATTERY BOX



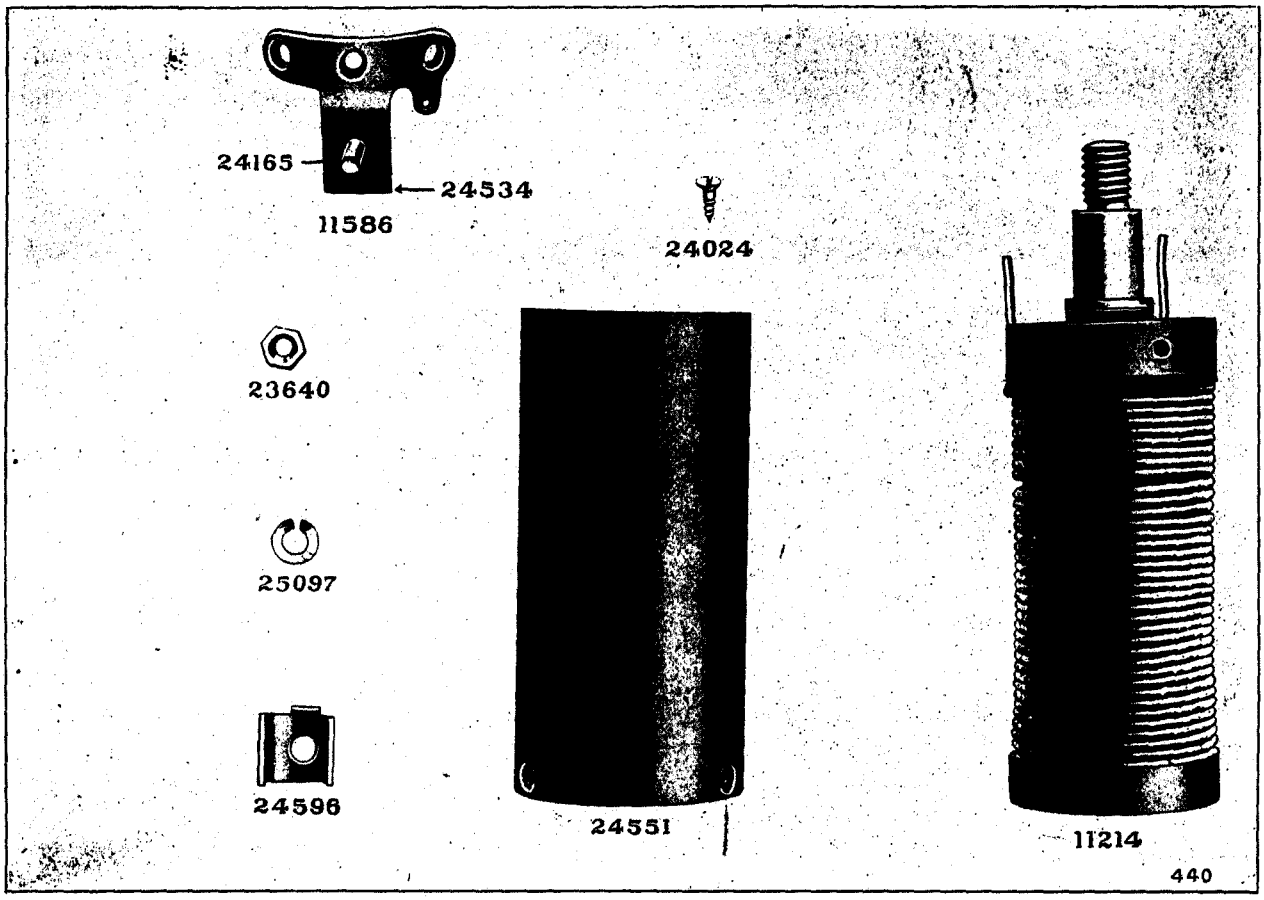
No. 5404 BATTERY BOX

No. 5404 BATTERY BOX

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

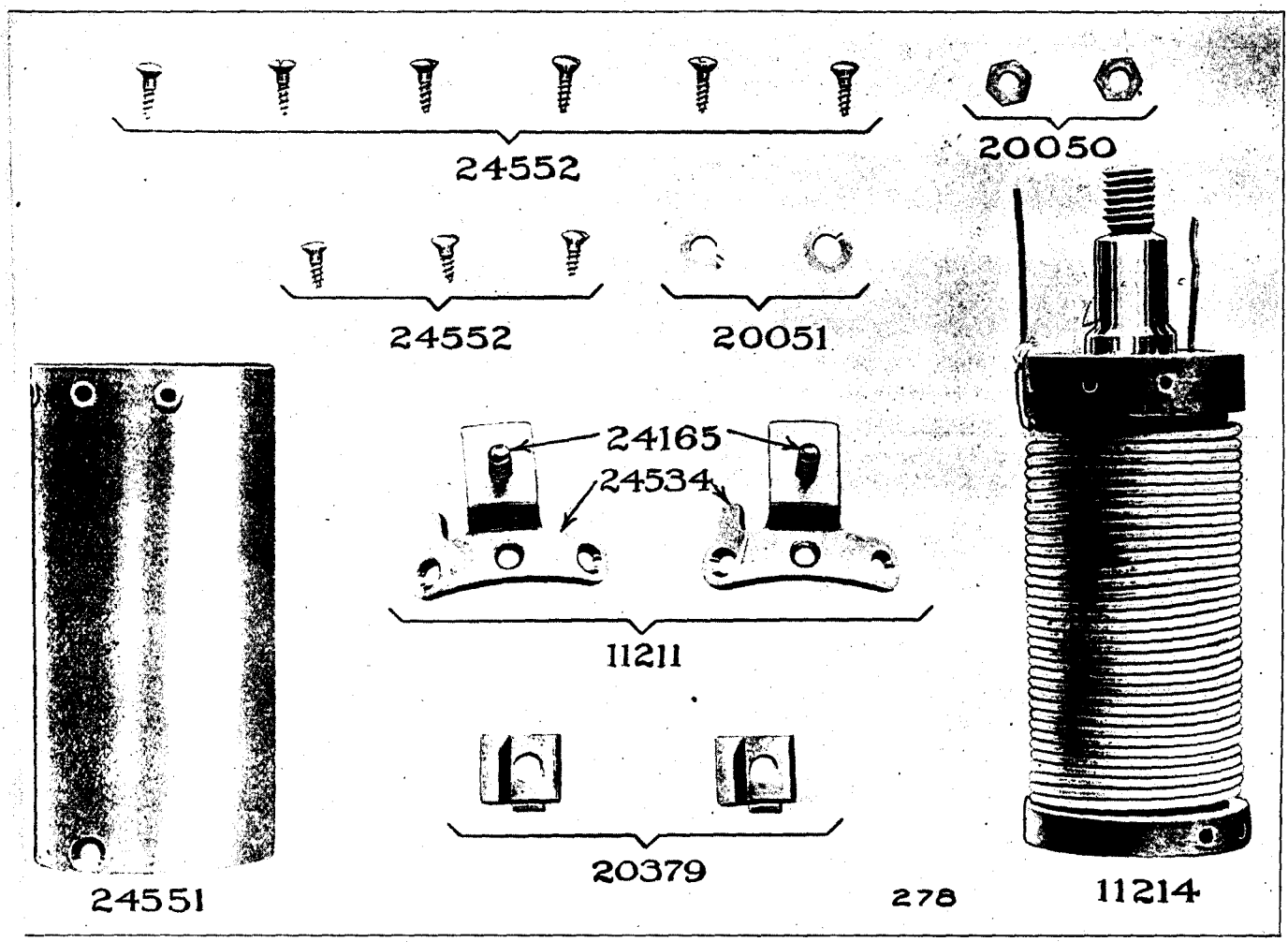
No. 5404 BATTERY BOX (Continued)

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



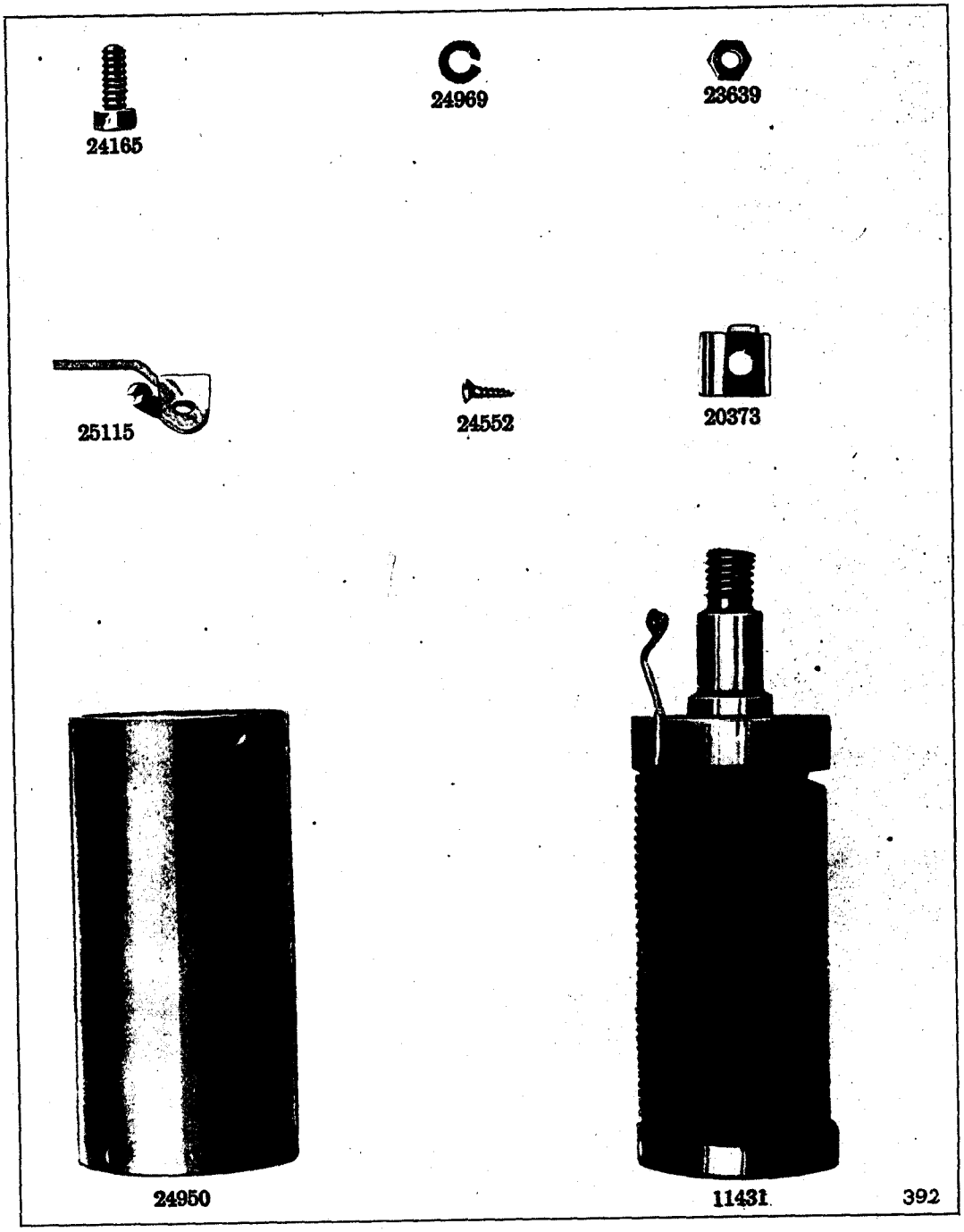
No. 5440 CLUTCH MAGNET

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



No. 5442 CLUTCH MAGNET

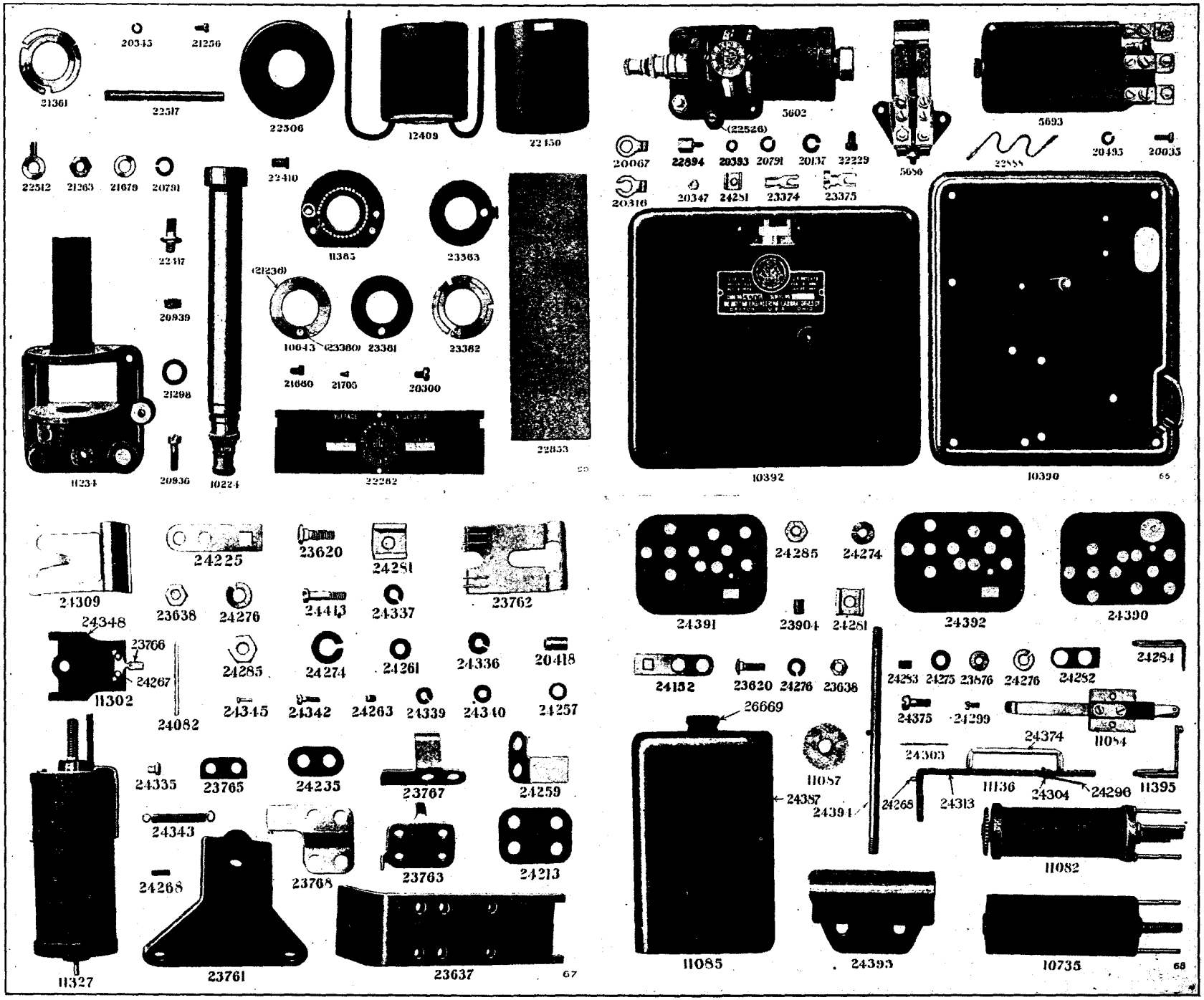
Piece Number	NAME OF PART	Quantity Required
5442	**CLUTCH MAGNET COMPLETE**	1
11214	**Coil Assembly**	1
24551	**Shell for Coil Assembly 11214**	1
24552	Screw for retaining Shell 24551 and Terminal Assembly 11508	9
11508	**Terminal Assembly Complete (Not shown in Illustration)** (Includes the next 5 Items)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



No. 5447 CLUTCH MAGNET

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

No. 5506 APPARATUS BOX



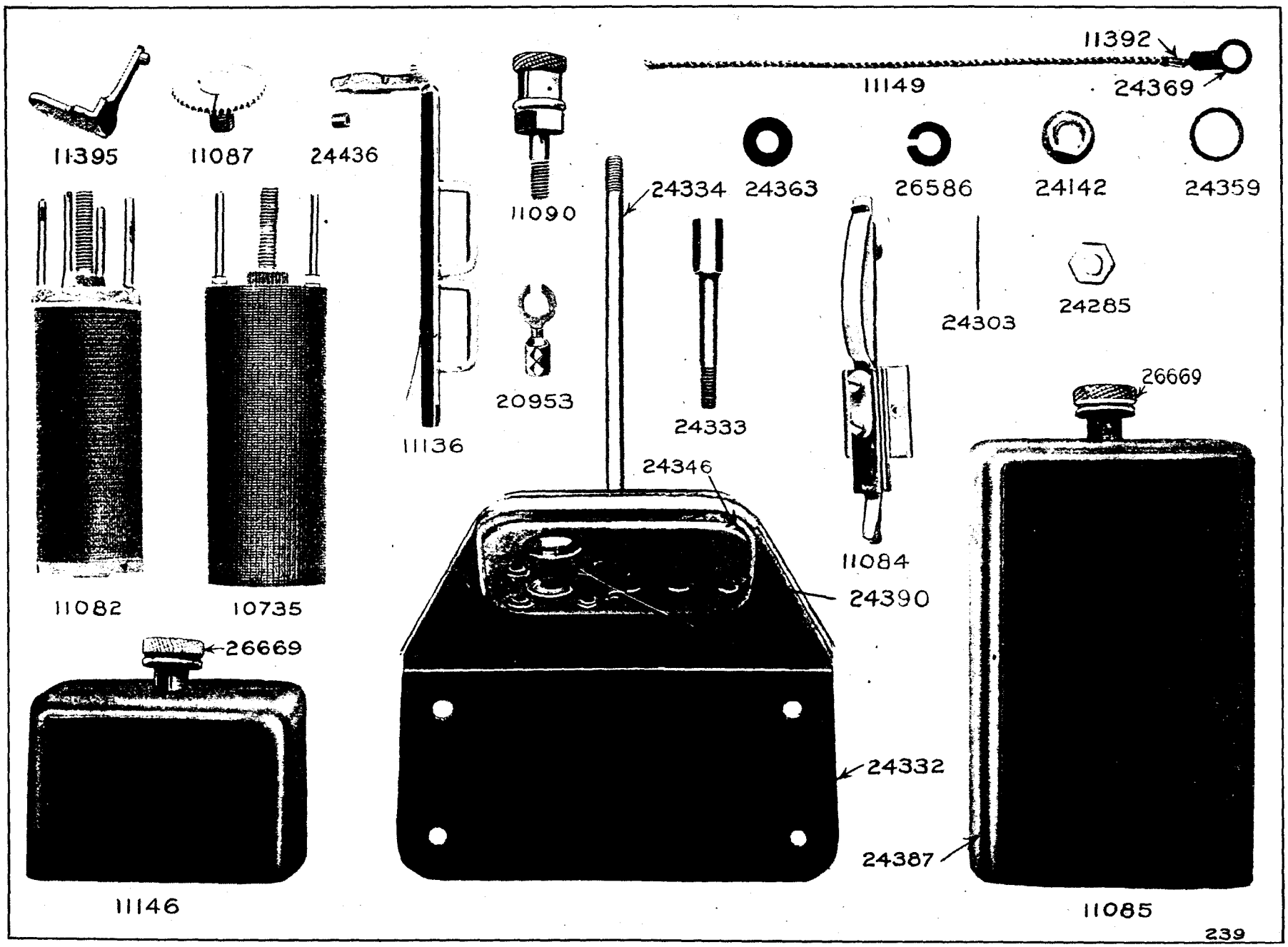
No. 5506 APPARATUS BOX

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

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

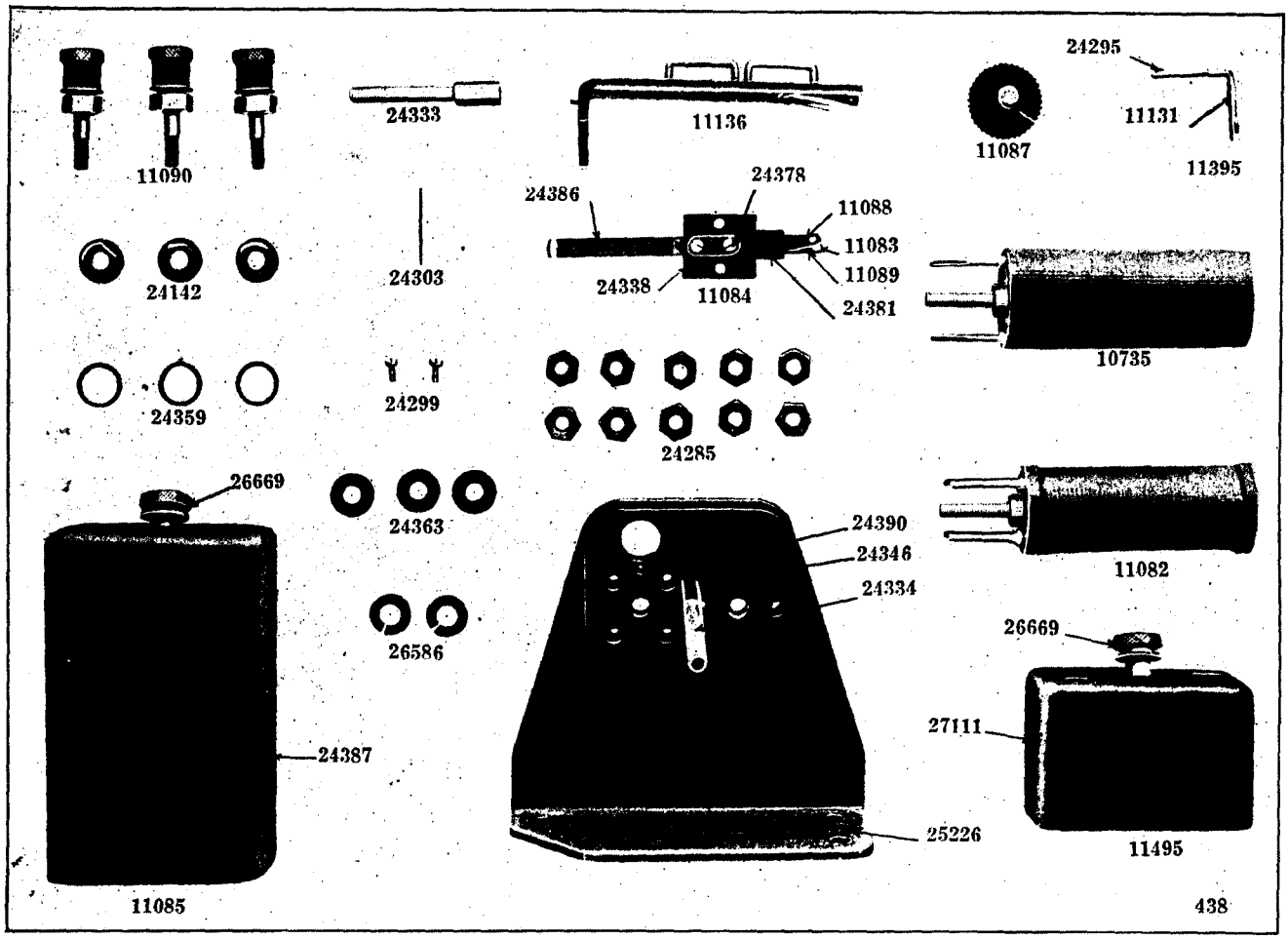
No. 5506 APPARATUS BOX (Continued)

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


11395
11087
24436
11136
11090
20953
11392
11149
24369
24334
24363
26586
24142
24359
24333
24303
24285
11084
26669
11082
10735
24346
24390
24332
24387
11085
26669
11146
239

No. 5661 IGNITION RELAY

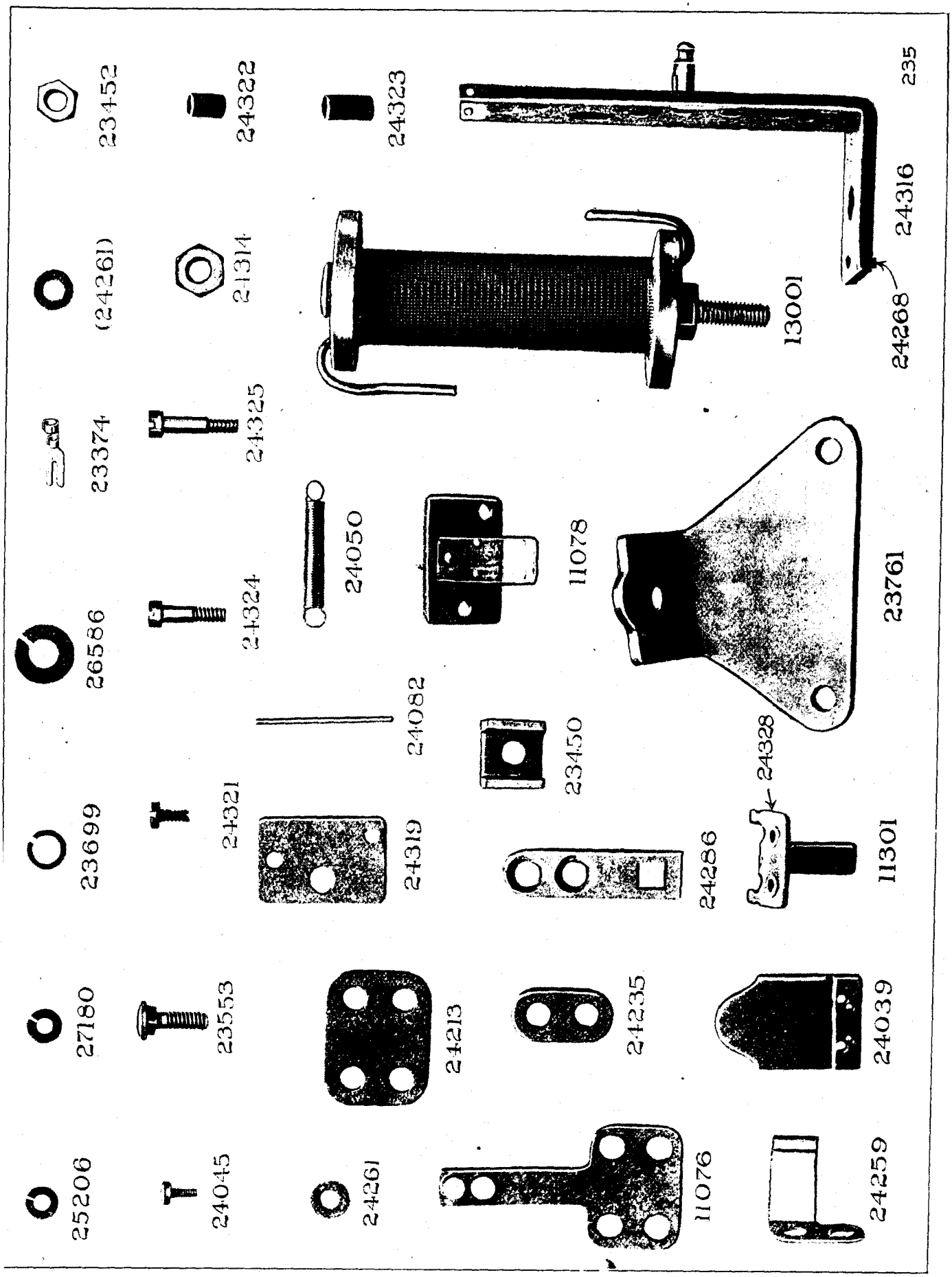
Piece Number	NAME OF PART	Quantity Required
5661	**IGNITION RELAY**	1
24332	Mounting Bracket for Mounting Ignition Relay 5661	1
24436	Insulating Bushing for Coil Assembly 11082 and Condenser Assembly 10735	6
24333	Stud for Mounting Shell Assembly 11146	1
24334	Rod for Mounting Shell Assembly 11085	1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



No. 5677 IGNITION RELAY

No. 5677 IGNITION RELAY

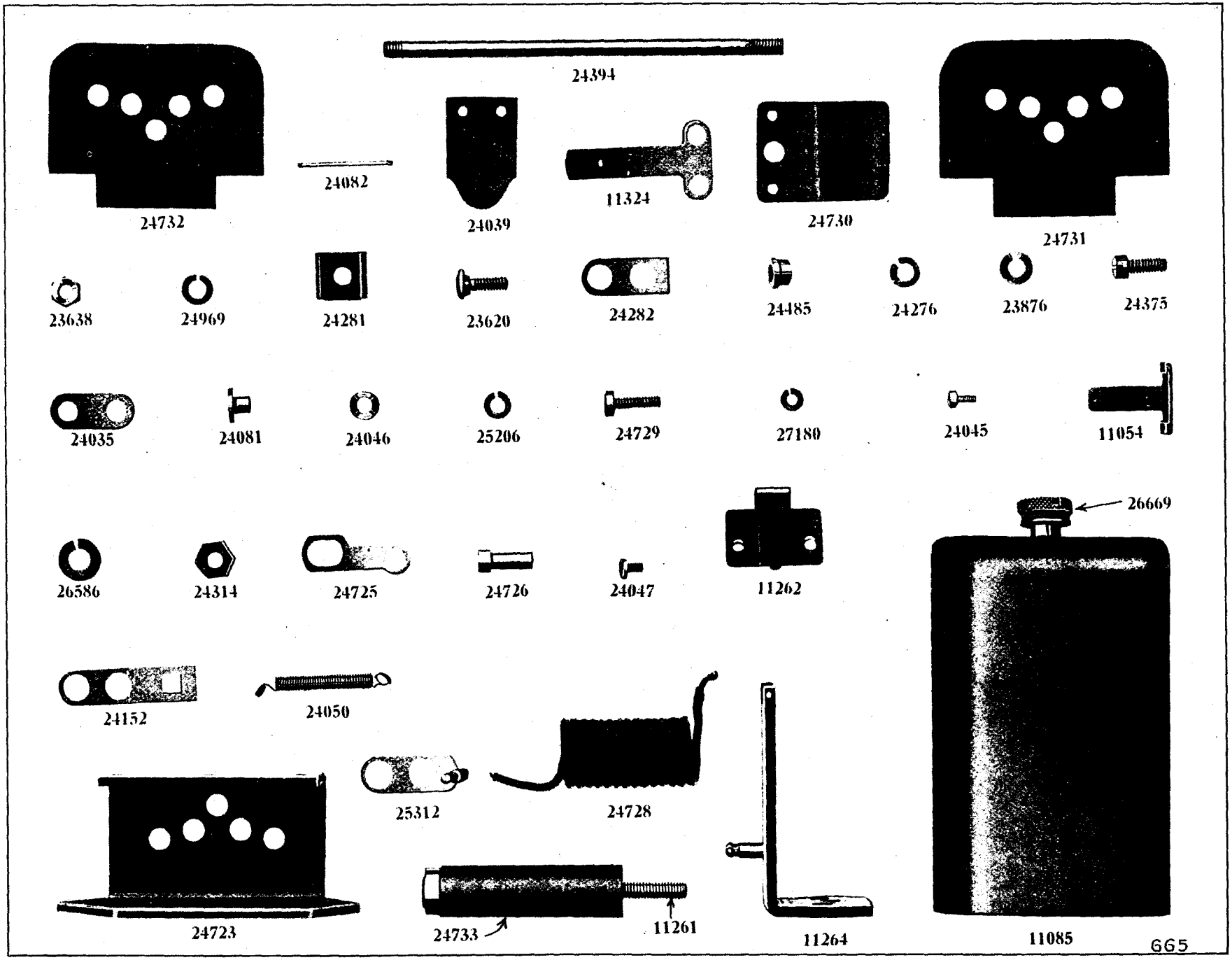
Piece Number	NAME OF PART	Quantity Required
5677	**IGNITION RELAY COMPLETE**	1
11084	**Contact Spring Assembly**	1
24299	Screw for attaching Contact Spring Assembly 11084	2
11395	**Armature Assembly**	1
24303	Pin for attaching Armature Assembly 11395	1
11136	**Bracket Assembly for Contact Spring Assembly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



No. 5692 CIRCUIT BREAKER

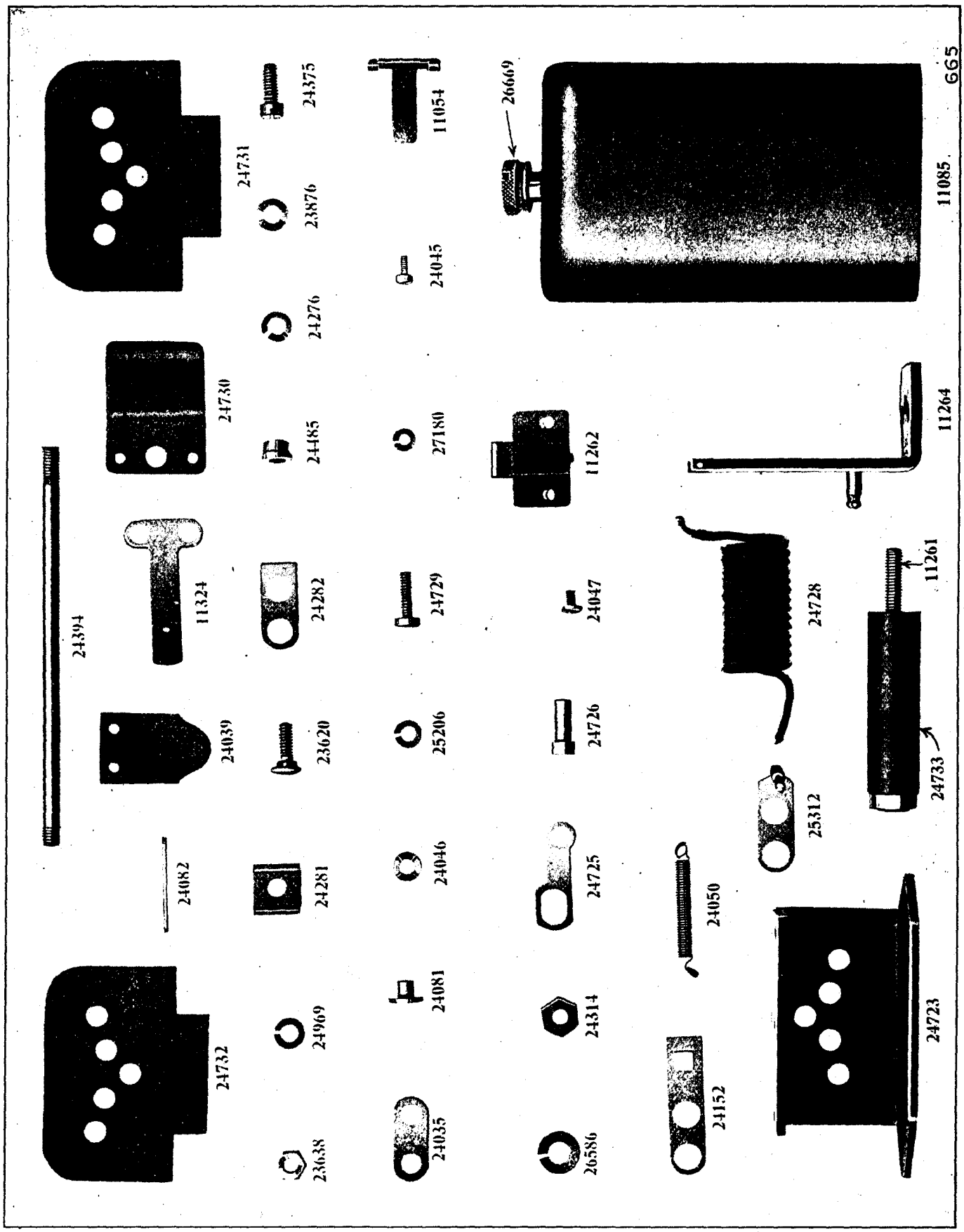
No. 5692 CIRCUIT BREAKER

Piece Number	NAME OF PART	Quantity Required
5692	**CIRCUIT BREAKER COMPLETE**	1
23761	Mounting Bracket for mounting Circuit Breaker	1
24316	Bracket for mounting Terminal Clip Assembly 11078	1
11078	**Terminal Clip Assembly for connecting Coil Assembly 13001**	1
24319	Insulator for Terminal Clip Assembly 11078	1
24321	Screw for mounting Terminal Clip Assembly 11078	2
13001	**Coil Assembly for Circuit Breaker**	1
24314	Nut for mounting Coil Assembly 13001	1
26586	Washer for Nut 24314	1
24039	Armature for operating Stop Assembly 11301	1
11301	**Stop Assembly for operating Contact Arm Assembly 11076**	1
24328	Stop for operating Contact with Fibre Bumper (Not shown in Illustration)	1
24330	Stud for Stop 24328 (Not shown in Illustration)	1
24050	Spring for operating Armature 24039	2
24045	Screw for mounting Stop Assembly 11301	2
27180	Washer for Screw 24045	2
24082	Pin for mounting Armature 24039	1
11076	**Contact Assembly**	1
11438	**Contact Assembly (Old Style) With Fibre Bumper (Not shown in Illustration)**	1
24213	Insulator under Contact Assembly 11076	2
24325	Screw for mounting Contact Assembly 11076 (Long)	2
24324	Screw for mounting Contact Assembly 11076 (Short)	2
24322	Insulating Bushing for Screw 24324	2
24323	Insulating Bushing for Screw 24325	2
25206	Lock Washer for Screws 24324 and 24325	4
24046	Plain Washer for Screws 24324 and 24325 (Not shown in Illustration)	4
24261	Insulating Washer for Screws 24324 and 24325	4
24259	Connector for connecting Oil Assembly 13001 to Terminal Plate 24286	1
24286	Terminal Plate for connecting Circuit Breaker	2
23553	Screw for retaining Clip 23450	2
23450	Clip for retaining Terminal Clips	2
23452	Nut for Screw 23553	2
23699	Lock Washer for Nut 23452	2
24235	Insulator for Connector 24259	1
24268	Pin for locating Mounting Bracket 23761 and Bracket 24316	1
23374	Terminal Clip for Circuit Breaker 5692	2


24394
24732
24082
24039
11324
24730
24731
23638
24969
24281
23620
24282
24485
24276
23876
24375
24035
24081
24046
25206
24729
27180
24045
11054
26586
24314
24725
24726
24047
11262
26669
24152
24050
25312
24728
24723
24733
11261
11264
11085
665

No. 5695 CIRCUIT BREAKER

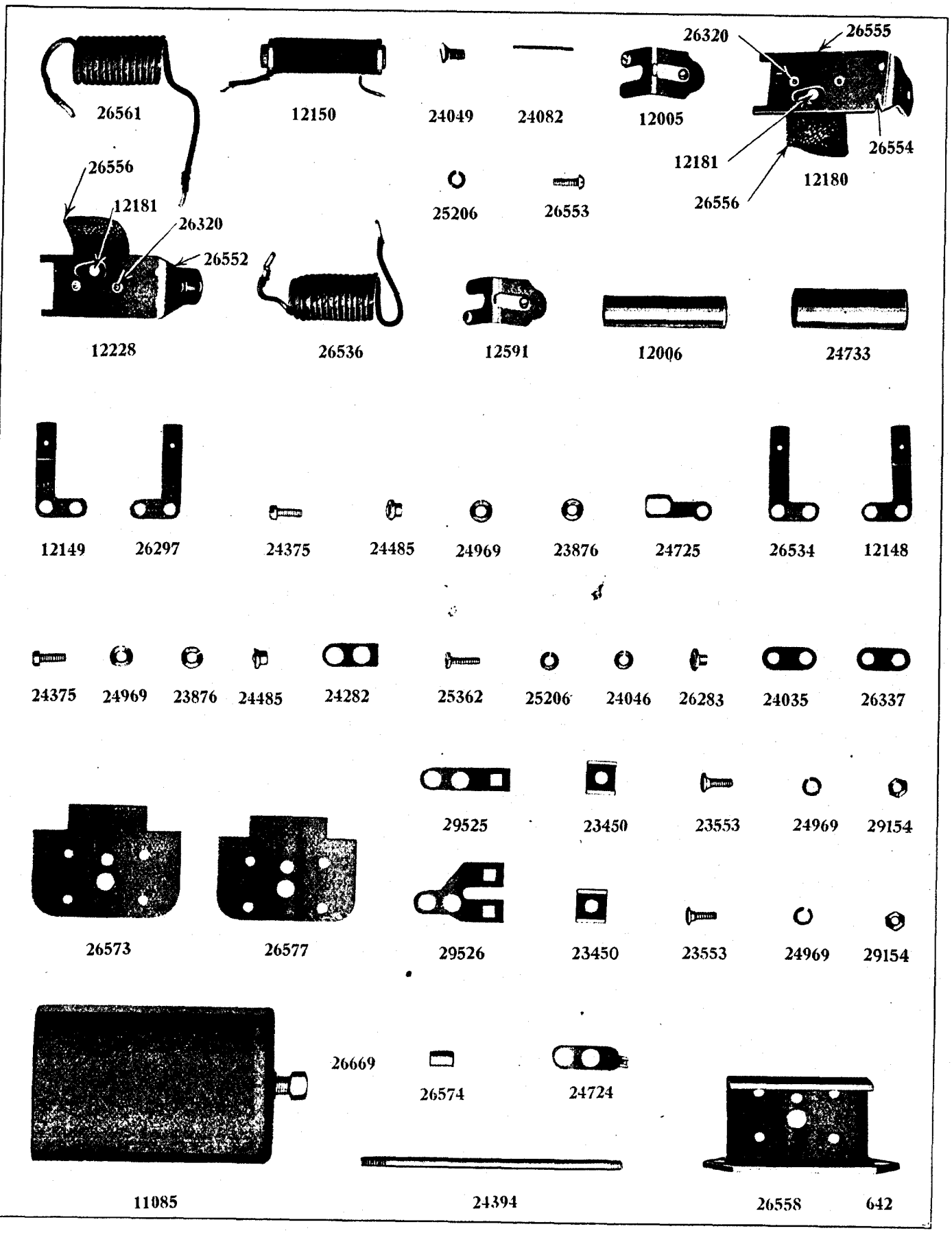
Piece Number	NAME OF PART	Quantity Required
5695	**CIRCUIT BREAKER COMPLETE**	1
11085	**Shell Assembly Complete** (Includes the next 2 Items)	1
26669	Nut for Shell Assembly 11085	1
24389	Plain Washer for Nut 26669 (Not shown in Illustration)	1
11324	**Contact Spring Assembly (Upper Contact)**	2
11054	**Stop Assembly for Operating Contact Spring Assembly 11324**	2
11262	**Terminal Assembly (Lower Contact)**	1
24039	Armature for Operating Stop Assembly 11054	2
11261	**Core Assembly for Coils 24728 and 25580**	2
24733	Insulating Sleeve for Coils 24728 and 25580	2
11264	**Bracket Assembly for Coil Assembly 11261 and Contact Spring Assembly 11324**	2
24723	Bracket for Bracket Assembly 11264	1
25312	Terminal Clip under Center Terminal for connecting Coils 24728 and 25580	1
23876	Plain Washer for Screw 24375	6
20393	Lock Washer for Screw 24375	6
24485	Insulating Bushing for Screw 24375	6
24282	Insulator for Terminal Post Assembly 11135	3
24375	Screw for attaching Terminal Post Assembly 11135	6
24276	Lock Washer for Screw 24375	6
24152	Base Plate for connecting Circuit Breaker	1
23620	Screw for retaining Terminal Clamp 24281	1
23638	Nut for Screw 23620	1
20393	Lock Washer for Nut 23638	1
24281	Terminal Clamp for retaining Terminal Clip 23375	1
24314	Nut for retaining Core Assembly 11261	4
26586	Lock Washer for Nut 24314	2
24729	Screw for retaining Contact Spring Assembly 11324	4
25206	Lock Washer for Screw 24729	4
24046	Plain Washer for Screw 24729	4
24081	Insulating Bushing for Screw 24729	4
24725	Terminal Plate for connecting Terminal Assembly 11135 and Contact Spring Assembly 11324	2
24732	Mounting Plate for Shell Assembly 11085 (Large)	1
24731	Mounting Plate for Shell Assembly 11085 (Small)	1
24726	Insulating Bushing for Coils 24728 and 25580	2
24035	Insulating Plate for Contact Spring Assembly 11324	4
24730	Insulator for Terminal Assembly 11262	2
25580	Coil for Right Hand Relay (Not shown in Illustration)	1
24728	Coil for Left Hand Relay	1
24050	Spring for Operating Armature 24039	4
24082	Pin for retaining Armature 24039	2
24394	Pin for retaining Shell Assembly 11085	1
24047	Screw for attaching Terminal Assembly 11262	1
24045	Screw for attaching Stop Assembly 11054	2
27180	Lock Washer for Screw 24045	4
23375	Terminal Clip for connecting Circuit Breaker (Not shown in Illustration)	3



No. 5696 CIRCUIT BREAKER

No. 5696 CIRCUIT BREAKER

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

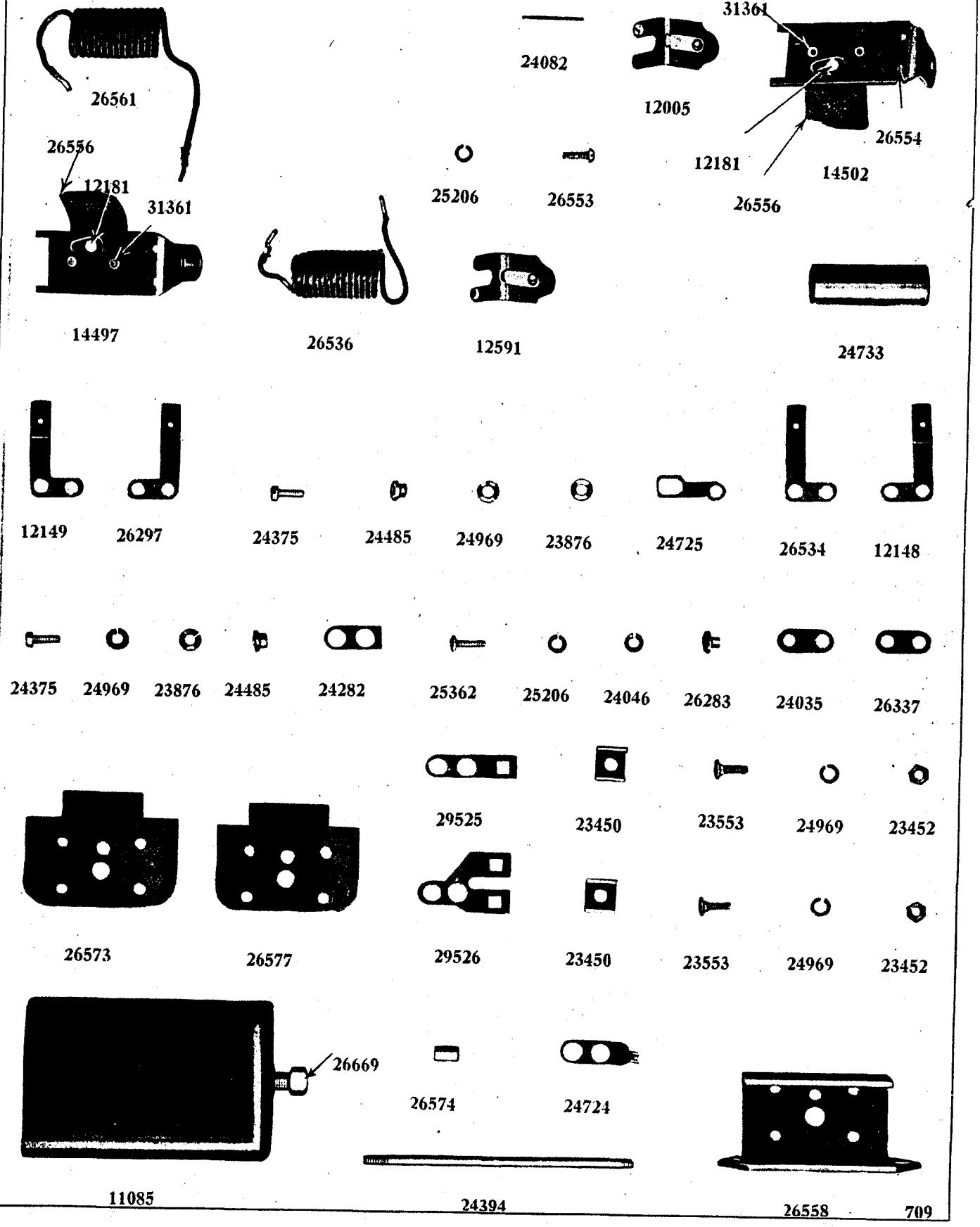


No. 5705 CIRCUIT BREAKER

5705 CIRCUIT BREAKER

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

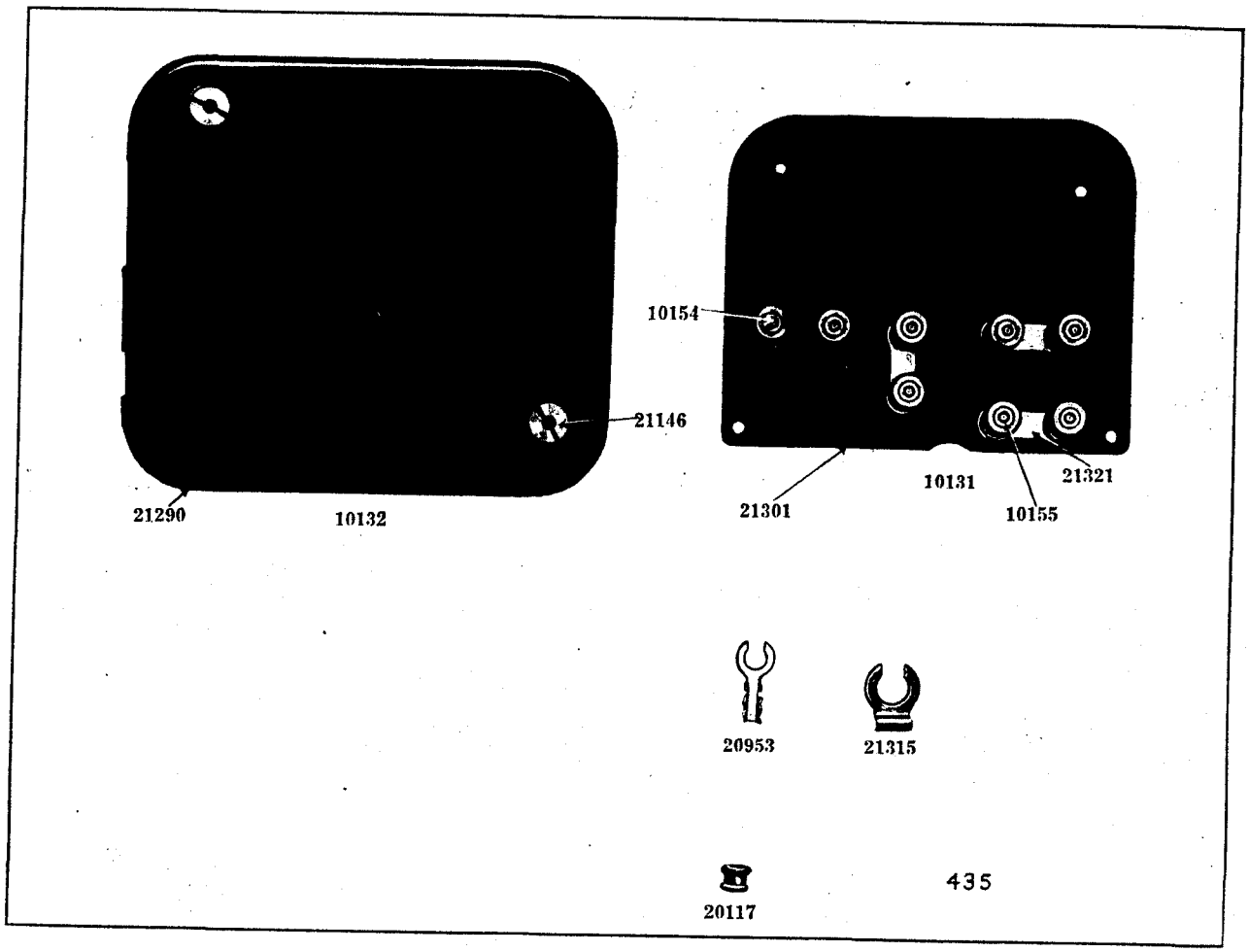
Piece Number	NAME OF PART	Quantity Required
5705	**CIRCUIT BREAKER COMPLETE**	1
26558	Bracket for Mounting Assembly	1
24394	Pin for retaining Shell Assembly 11085	1
29526	Terminal Post for Switch (Double)	1
23553	Screw for retaining Clamp 23450	3
23452	Nut for Screw 23553	3
20393	Lock Washer for Nut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



No. 5742 CIRCUIT BREAKER

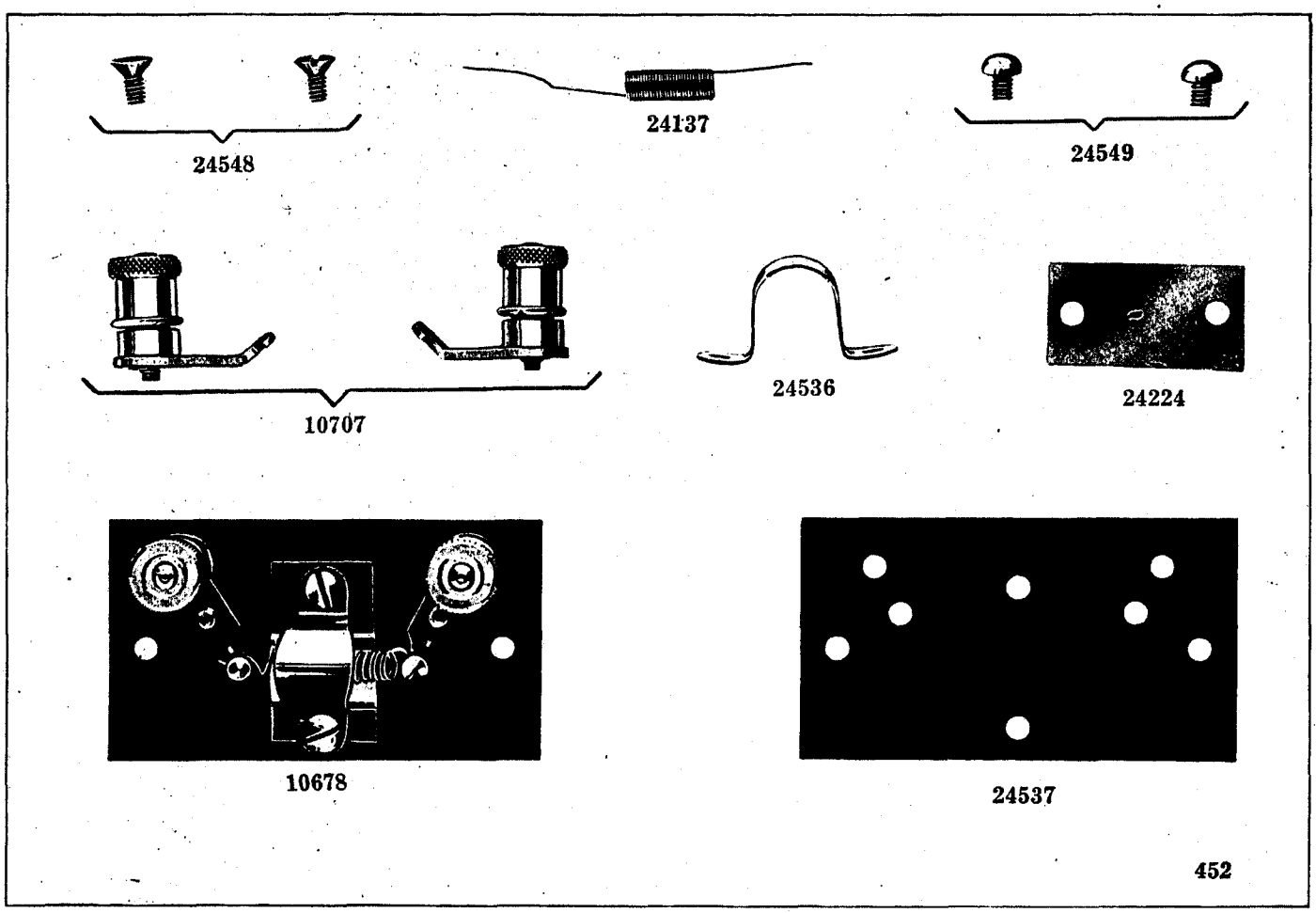
No. 5742 CIRCUIT BREAKER

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



No. 10131 TERMINAL BOARD

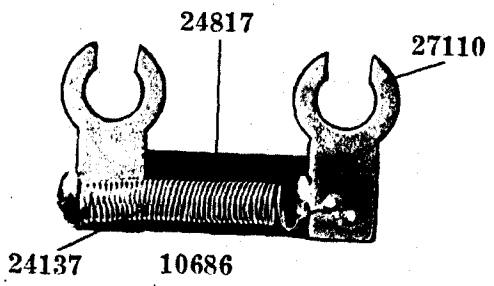
Piece Number	NAME OF PART	Quantity Required
10131	**TERMINAL BOARD ASSEMBLY COMPLETE** ..... (Includes the next 6 Items)	1
10154	**Spring Terminal Assembly (Short)**	8
21301	Plate for Terminal Board Assembly 10131	1
21321	Connector for Spring Terminal Assembly 10154	3
21314	Screw for retaining Spring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

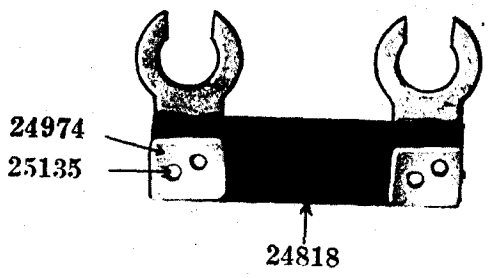


No. 10678 RESISTANCE UNIT

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

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

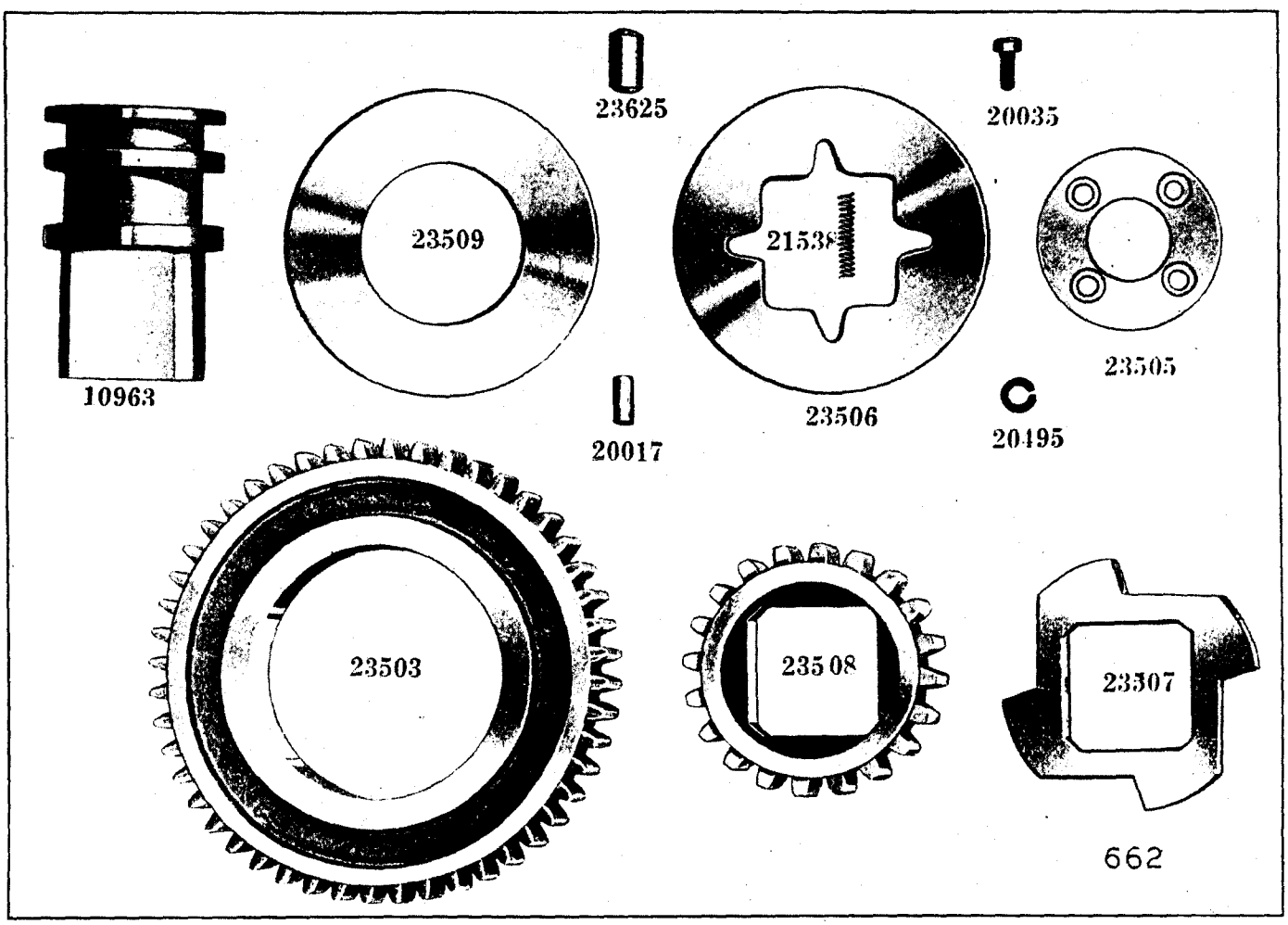




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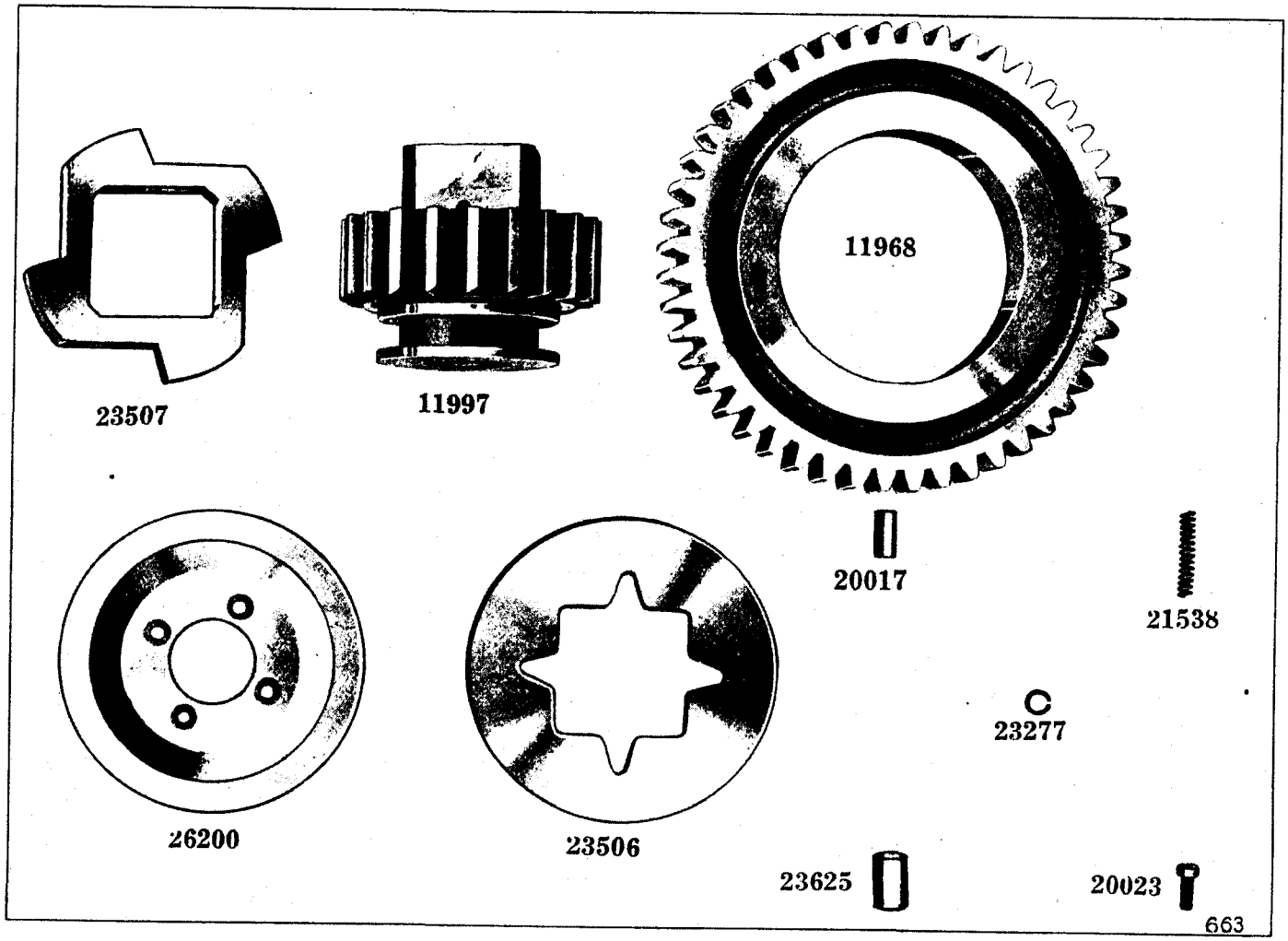
No. 10686 RESISTANCE UNIT

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