INFORMATION

covering use of Ammeter and Voltmeter

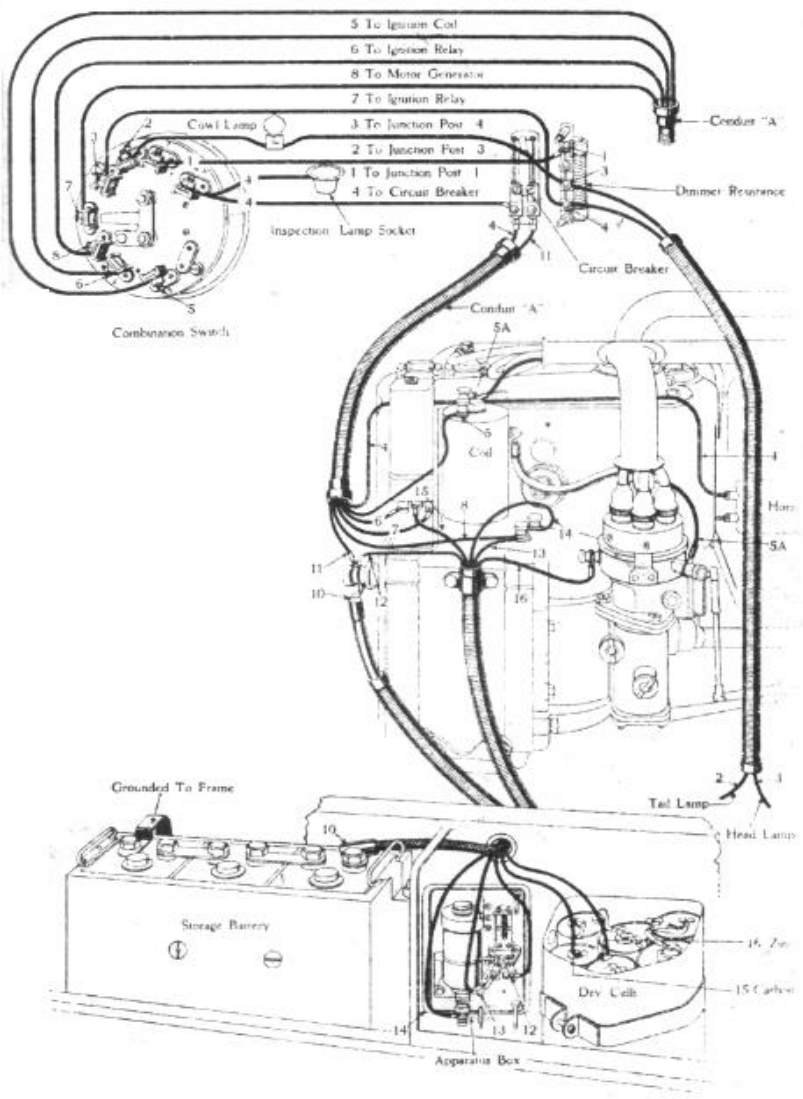
—ON-

1914 and 1915 Model Six-54

Electrical System

Hudson Motor Car Company

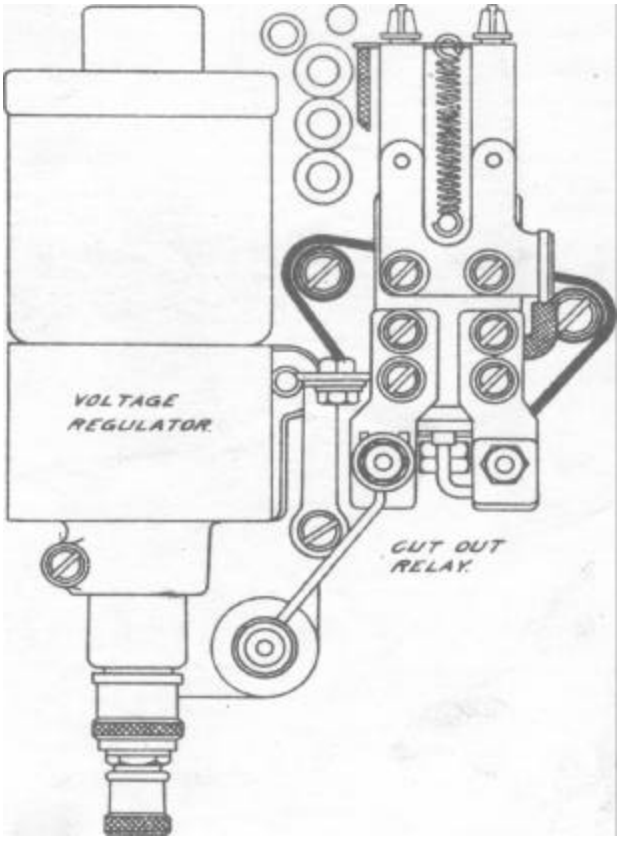
Detroit, Michigan, IX S. A


5 To Ignition Coil
6 To Ignition Relay
8 To Motor Generator
7 To Ignition Relay
3 To Junction Post 4
2 To Junction Post 3
1 To Junction Post 1
4 To Circuit Breaker
Conduit "A"
Dimmer Resistance
Cowl Lamp
Inspection Lamp Socket
Circuit Breaker
Combination Switch
Conduit "A"
5A
Coil
Horn
5A
Grounded To Frame
Tail Lamp
Head Lamp
Storage Battery
Dry Cells
Apparatus Box

USE OF AMMETER ON 1914 AND 1915 MODEL SIX-54

With the motor stopped, disconnect both wires at frontlarge terminal on generator nearest outside and connect same to negative wire of ammeter. Connect positive wire of ammeter to front large terminal of generator where wires were disconnected. Start motor running. With a battery, each cell of which reads from 1.250 to 1.275 specific gravity, speed up the engine (because vibration is necessary for regulation) and leave running for four or five minutes. When in operation, from 8 to 12 amperes should be a normal charging rate, regardless of the speed of the engine. This reading will vary widely with a battery of lower specific gravity.

If the ammeter shows from 20 to 30 amperes, it is a sign of: First, a wire burned out in the voltage regulator



winding and short circuiting on the tube, which may be caused by suddenly speeding up the engine' with the battery disconnected or by disconnecting the right hand wire from the cut out relay when the engine is running fast. Second, it will indicate a wire burned out or a loose connection in the voltage regulator magnet winding. Third, it will also indicate that the voltage regulator tube is short circuited at the bottom of the voltage regulator. The cause of this would be a terminal being bent out of place at the voltage regulator tube, a short circuit at the small inside terminal at the top of the generator, or a chafed wire in the line between these two points. The remedy fur the first would be the installation of a new voltage regulator tube. The remedy for the second is to install a new voltage regulator tube, or if caused by loose connections, by cleaning and tightening up same. The remedy for the third is as follows: If a terminal is bent out of place, straighten it and make proper connection. If there is a short circuit on the small inside terminal on the top of the generator, insulate it carefully, or, if a chafed wire, install a new wire.

An open circuit between the cut out relay and the voltage regulator will give a zero reading. This can be remedied by installing a new resistance or pig-tail.

Should a high amperage be observed and none of the foregoing troubles be found, the high charging rate will probably be due to the fact that the rheostat in the voltage regulator is not set correctly. In order to regulate this rheostat, both a volt and ammeter have to be used. Instructions covering this will be found under heading, "Use of Voltmeter on Model Six-54."

Should a low amperage be seen, say of y_2 ampere, it is a sign of : First, the plunger sticking in the tube of the volta^{9}e regulator. Second, a wire burned out in the voltage regulator tube leaving an open circuit. To remedy the sticking, remove the tube and shake two or three times. To remedy the burned out wire, it is necessary to install a new tube. On no account must the voltage regulator tube be opened or tampered with,, as credit will not be allowed on tubes that hake been opened or tampered with.

The following are the specifications of the lamps used on the 1914 and 1915 Model Six-54:

Head lamps, 7 volts, 15 c. p. Together draw 5 amperes.

Head lamps, dim. Together draw 3 amperes.

Tail and cowl lamps, 3y) volts, 3 c. p. Together draw 1¼ amperes.

The ignition draws 2 amperes at approximately 560 R. P. M., and decreases as the speed increases.

The amperage of the lamps may be tested by inserting an ammeter in the lamp line in the following manner:

Remove the small brown wire from the large rear terminal of the generator leading to the junction box. Connect same to the positive terminal of the ammeter. Connect the negative terminal

of the ammeter to the generator large rear terminal where wire was removed. If, however, an ammeter with a discharge reading on the dial is used, the connections must be reversed. Pull on the various lamp switches and the lamp amperage will be shown.

By inserting the ammeter at the junction box connection and comparing this reading with the reading which was obtained with the generator in the generating line, a leak at the connection or in the conduit can be detected. Connect the ammeter at the junction box as follows: Disconnect the various wires at the junction box, which will be found on the dash inside of the bonnet on the left hand side. Connect one of these wires to the positive terminal of the ammeter and connect the negative terminal of the ammeter to the terminal on the junction box where wire was disconnected. Pull on this lamp switch and take the reading.

A much finer leakage test can be obtained by connecting a voltmeter in series with the battery when the engine is not running, using the voltmeter as a sensitive ammeter. A very slight leak will indicate almost a full voltage reading.

In order to take the reading of the magneto ignition, remove wire No. 5-A from the distributor and connect same to the positive terminal of the ammeter. Connect the negative terminal of the ammeter to the distributor terminal where wire No. 5-A was taken off. Start motor running and ignition current will be shown. If this reading is taken with an ammeter having a dial showing charge only, the indicator will show charge, but this must be read discharge. However, if an ammeter is used with a dial showing discharge, the wires must he reversed.

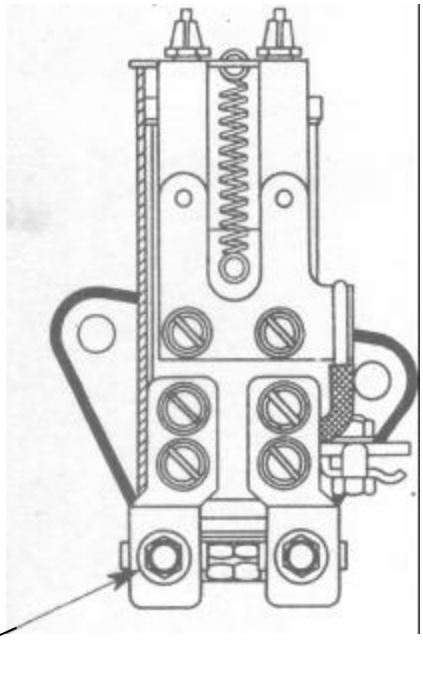
Full description of the voltage regulator will be found on page 38 of the 1915 Six-54 instruction hook.

VOLTMETER READINGS ON 1914 AND 1915 MODEL SIX-54

The most important voltmeter reading on the Model 54 is the determination of the point at which the cut out relay closes, which should be 7 volts. To obtain readings, the motor must be stopped; connect positive terminal of the voltmeter to the left side bottom terminal "A" of the relay, and negatives terminal of voltmeter to ground. Start the engine running. If the cut out relay does not close at 7 volts, adjust the spring tension until it does. This may be done by slightly bending at the top the arm to which the spring is attached, using a small pair of pliers for this operation.

A voltmeter may also be used for testing the voltage drop at battery connection or lamp circuit, indicating leakage or poor connections in the following manner :

Connect voltmeter across the positive and negative terminals of the battery and take battery voltage reading: This should be 6.3 volts with a fully charged battery. Then connect positive wire of voltmeter to the head lamp wire close to the head lamp and negative



wire of voltmeter to ground. Switch on lights and take reading. Same may he done with the tail lamp. There should be a voltage drop of approximately one-half volt in the line between the readings of the lamps and the battery. If the drop is more than one-half volt, it indicates a leakage or poor connection at fuses, lamp sockets, switch, etc. The engine must not be running while this test is being taken.

By removing the two screws which hold the name plate on the voltage regulator and removing the plate, a rheostat will be found. This is regulated by a small arm similar to the fast and slow indicator on a clock. The purpose of this rheo¬stat is to adjust the voltage regulator to hold the voltage be¬tween the points of 7.2 and 7.5 volts. As the action of the voltage regulator is dependent upon both amperage and volt¬age, according to the battery condition, it is necessary to use both an ammeter and a voltmeter.

To test the action of the rheostat, first test the battery with a hydrometer to see that it reads from 1.250 to 1.275, being sure that it is brought to these figures by charging and not by adding electrolyte. Test each cell individually. If the electrolyte is

correct but voltage low, it Will indicate poor connections at the straps or leaky connections at the top cover, due to dirt, acid or moisture. Each cell should show approximately 2.1 volts if the electrolyte reads as above when tested across the terminals.

Next, connect the voltmeter across the positive and negative terminals of the battery. Connect an ammeter as instructed under the heading, "Ammeter Reading on the Model Six-54." Start the engine running, and after allowing it to run for a few minutes, gradually speed it up so that it will show a charging rate not exceeding 20 amperes. During this operation the battery voltage should rise to between 7.2 and 7.5 volts, when the voltage regulator will automatically decrease the ampere charging rate. The ampere charging rate will possibly never reach 20 amperes, regardless of the engine speed if the battery tests from 1.250 to 1.275, as above.

If the voltage rises above 7.5 volts without decreasing the charging rate, move the controlling arm slightly to the right until the voltage does hold between the points of 7.2 and 7.5 volts. If, on the other hand, the charging rate decreases before the voltage rises to 7.2 volts, move the hand slightly to the left until the charging rate decreases at the correct point. If the battery is discharged to an acid density of 1.200 or less and the plates are not sulphated, the voltage regulator will allow approximately 25 amperes to pass into the battery, providing the engine speed is sufficient (approximately 30 miles per hour, 1055 R. P. M.

There is a resistance between the voltage regulator and the cut out relay, its function being to allow the voltage to build up high enough to bring the voltage regulator into play. The voltage taken at the voltage regulator terminal will, in either case, be from 8 to 8.5 volts before automatically decreasing the charging rate. While in the first instance the battery voltage will read from 7.2 to 7.5 volts, in the second instance the battery voltage will read approximately 6 to 6.5 volts.

The wire running from the front terminal of the generator should always be connected to the voltage regulator and not to the relay terminal, and in no case ground the -wire from the small front terminal on the generator to the voltage regulator tube.

Indications of voltage regulator troubles: (1) The generator will not turn to mesh the gears when the starter button is pressed; (2) The generator will not generate.

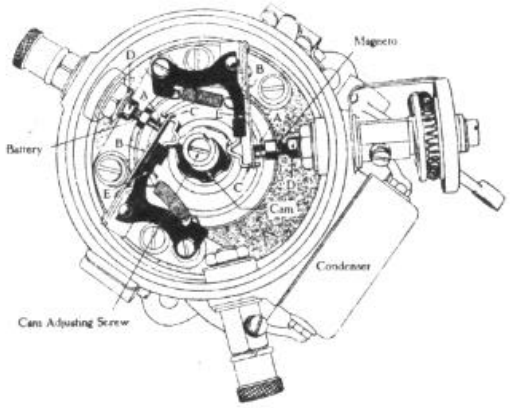
In order to test for and remedy the above troubles, proceed as follows: Depress the starter button and if the armature does not revolve, remove the lead to the bottom terminal • on voltage regulator tube and connect same to the tube above. The armature will not revolve when the starter button is depressed. In order to make repairs, replace tube complete.

It is also well to check this out in another way, namely, by allowing the engine to run, and observing whether at normal speed

the cut out relay will remain open. This will also indicate a burned out voltage regulator resistance. Under these same conditions, if the lead connecting to the binding post at the bottom of the tube is moved up to the tipper connection before referred to, the cut out will immediately be drawn closed and the generator will start to charge the battery.

IGNITION TIMING ON THE 1914 AND 1915 MODEL SIX-54

Give full advance to the spark lever on top of steering wheel. Open priming cocks on motor and turn slowly by hand, using the starting crank until the priming cock on No. 1 cylinder begins to blow, indicating that the piston of this cylinder is on the compression stroke. (To determine this, hold the finger over the priming cock.) No. 1 cylinder is due to fire in its advanced position when the line marked which is 6" before the mark DC-1-6 on the flywheel reaches the pointerattached to the crankcase
The spark from the magneto circuit takes place when the spring "A" is moved so that the contact points "C" just start to separate. The timer should be adjusted by loosening the cam adjusting screw and revolving the rotor shaft so that when the rotor is in place on this shaft, the contact brush conies under No. 1 terminal on the distributor head. When this position is reached, reset cam adjusting screw. In this position, the back lash in the rotor shaft should be sufficient to just make and break the magneto circuit at contact points "C." The gaps at the contact points "C" should be equal to two thicknesses of paper. such as this sketch is printed on. Replace rotor and distributor, first rubbing a little vaseline on the rotor race.



ARMATURE TROUBLES AND THEIR REMEDIES

For 1914 and 1915 Model Six-54

Failure to turn over at uniform speed when starter pedal is slightly depressed.

Blackening and burning of the generator commutator.

Failure to keep the battery charged.

Slow cranking even with a well charged battery.

Excessive heating of the generator.

Method of Testing Out the Armature

If any of the above indications exist, first see that all connections are complete and made correctly in accordance with wiring diagram.

Observe if the commutator has the same appearance all the way around or whether some of the segments are burned more than others. See whether it will turn over uniformly when the starter pedal is depressed slightly. If the generator commutator is burned black on two or more adjacent seg- ments and it revolves unevenly when the pedal is partly depressed, it almost invariably indicates that one or more of the armature coils are shorted, which will entirely eliminate the action of the winding in question so that the armature will revolve only a fraction of a revolution. This will cause the relay to vibrate while the engine is running. If an ammeter is connected into the circuit it will swing back and forth at each revolution both when the engine is running and starter pedal is partly depressed. If this condition exists, 'the winding on the armature may be tested as follows:

To Test for Grounds in Armature Winding

In order to make the following test, it is advisable to use a 100-volt circuit in series with a 16 candle power Carbon Filament lamp. The test may be made with the generator either mounted or taken from the car.

1. Insulate all brushes from the commutator by placing sheets of paper between them. Then, with the test points, test for a ground from each commutator to the frame, as shown diagramatically below. Neither commutator on either generator or motor winding should show a ground.

1. With the brushes and commutator bars insulated, as in the first test, try for connections between the motor and generator winding, holding one test point on a segment of the motor commutator, and the other on the generator commutator. There should he no connections between the two windings and no grounds indicated.

If the motor fails to crank when the battery tests up to normal specific gravity, turn on the head lamps and operate the starter lever. If the lights go out, it indicates a bad cell in the storage battery, or a loose or poor connection either in the cell connectors or at one end of the large cable leading

of the large cable leading rom the battery to the generator If the light continues to burn but the motor makes no effort to crank, it is caused by poor contact between the motor brushes and commutator, either due to accumulation of dirt or grease, or else to improper spring tension on the motor brushes. When this condition exists, added pressure such as will result from pressing the brushes firmly against the commutator with the fingers will usually result in the armature turning over, proving the contentions as above.

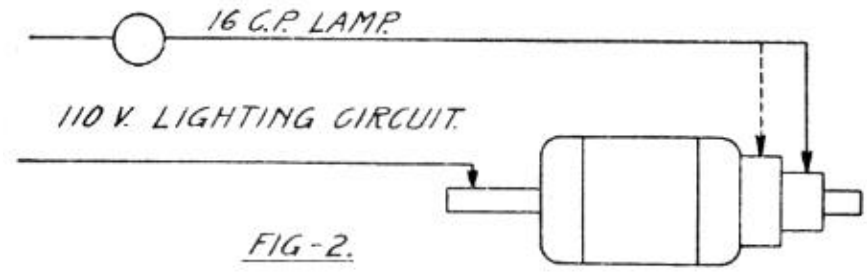


FIG-2.

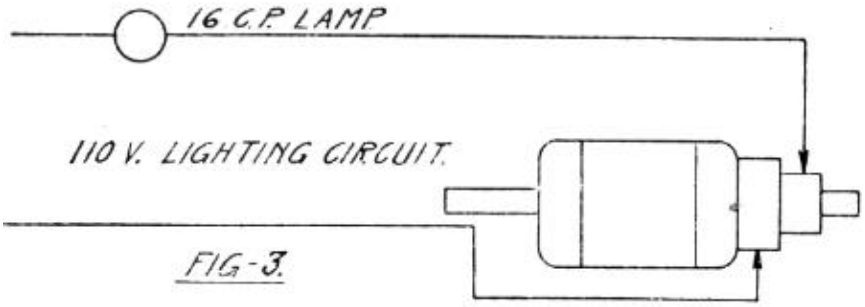
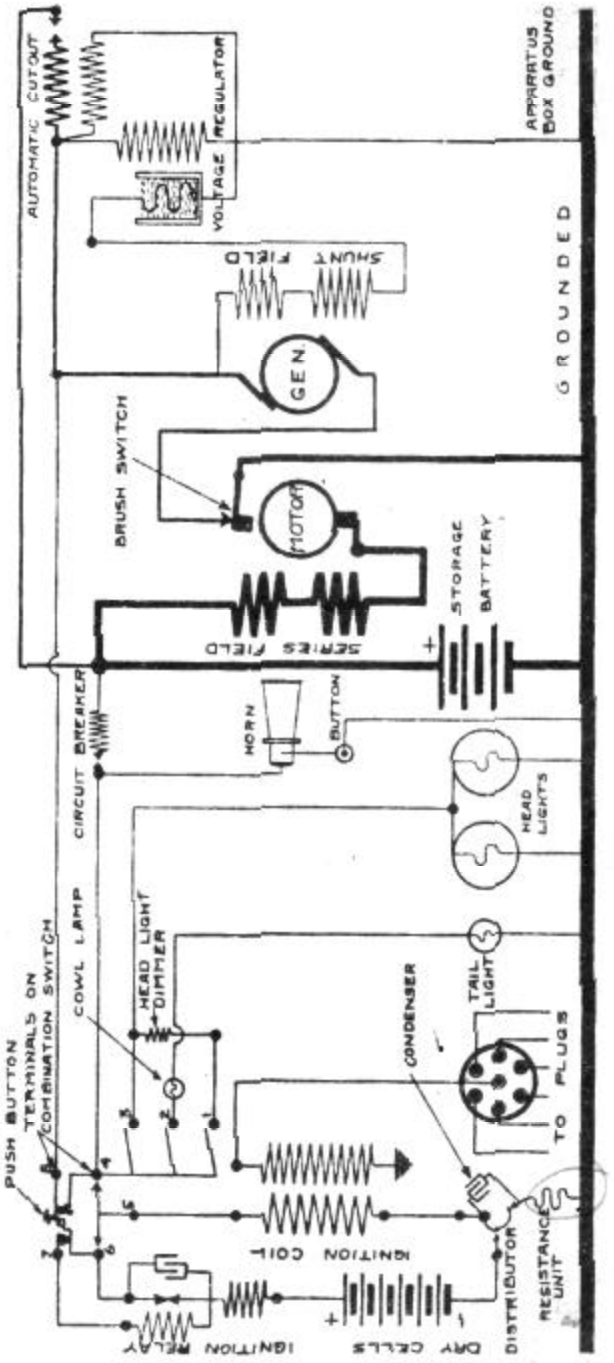
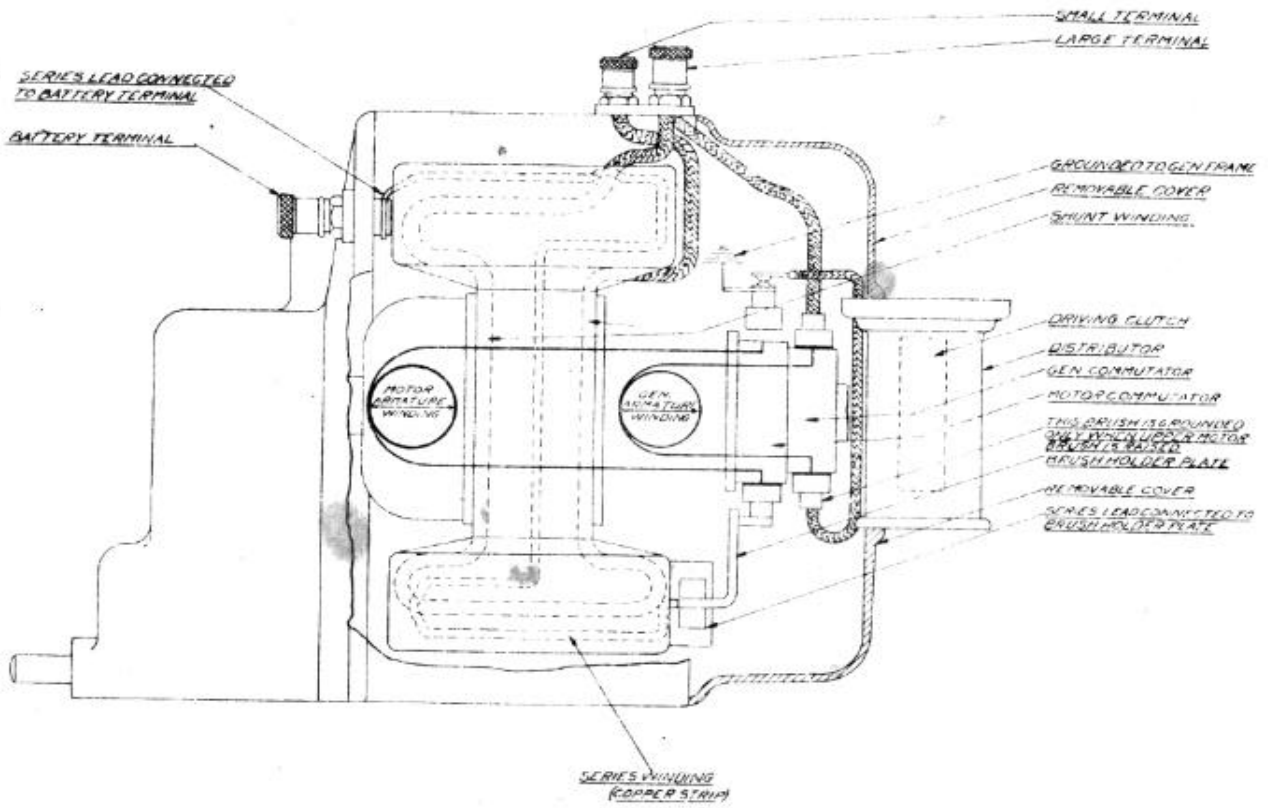


FIG-3.


AUTOMATIC CUTOUT
VOLTAGE REGULATOR
APPARATUS BOX GROUND
GROUNDED
SHUNT FIELD
GEN
BRUSH SWITCH
MOTOR
STORAGE BATTERY
SERIES FIELD
HORN
BUTTON
CIRCUIT BREAKER
HEAD LIGHTS
COWL LAMP
HEAD LIGHT DIMMER
TAIL LIGHT
CONDENSER
TO PLUGS
PUSH BUTTON TERMINALS ON COMBINATION SWITCH
IGNITION COIL
IGNITION RELAY
DRY CELLS
DISTRIBUTOR
RESISTANCE UNIT


SMALL TERMINAL
LARGE TERMINAL
SERIES LEAD CONNECTED TO BATTERY TERMINAL
BATTERY TERMINAL
GROUNDED TO GEN FRAME
REMOVABLE COVER
SHUNT WINDING
DRIVING CLUTCH
DISTRIBUTOR
GEN COMMUTATOR
MOTOR COMMUTATOR
MOTOR ARMATURE WINDING
GEN ARMATURE WINDING
THIS BRUSH IS GROUNDED WHEN MOTOR ARMATURE IS BUCKED
BRUSH HOLDER PLATE
REMOVABLE COVER
SERIES LEAD CONNECTED TO BRUSH HOLDER PLATE
SERIES WINDING (COPPER STRIP)