

Electrical System

The six-volt, one-wire system is used. The several units composing the system are: the starting motor, generator, cutout, ignition timer, distributor, ignition coil and lock, storage battery, lights and horn.

Several of the above units are grounded; that is, the car frame serves as one conductor for the current. When disconnecting any unit from the system, the exposed terminals should be taped to prevent them from grounding (touching) on any metallic part of the car. Should this occur it would short-circuit either the generator or the storage battery, and would probably damage either or both of these units beyond repair. The cables and wires should be inspected occasionally to make sure that wires are in good condition.

All terminals and terminal binding nuts should be kept tight and free from dirt and oil. An occasional inspection of the electrical equipment by an experienced automotive electrician is advisable because it reduces the chances of trouble on the road.

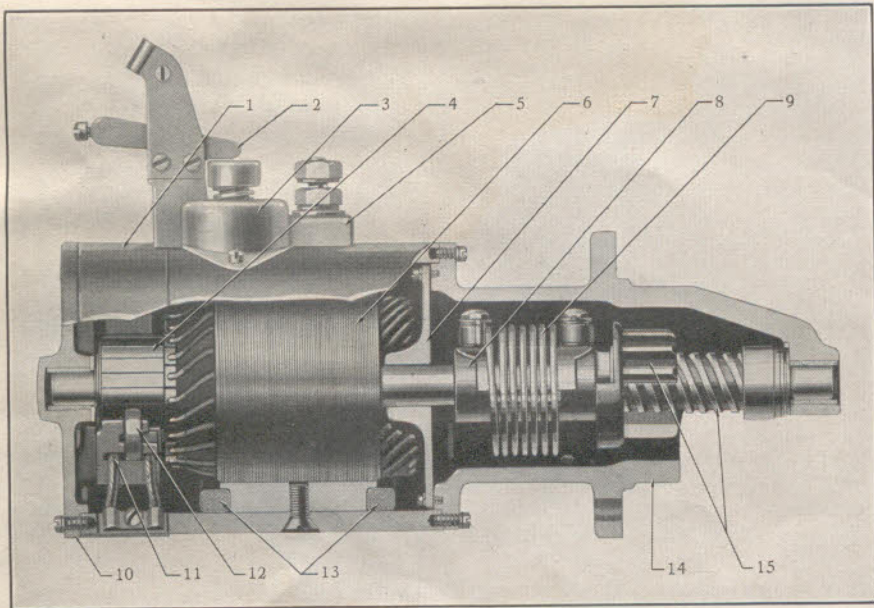


Fig. 9—Starting Motor

- | | |
|-----------------------------------|---|
| 1—Inspection cover band | 9—Bendix drive spring |
| 2—Starting switch contact lever | 10—Commutator-end housing |
| 3—Starting switch | 11—Commutator brush |
| 4—Commutator | 12—Brush spring |
| 5—Starting switch | 13—Field coils |
| 6—Armature | 14—Drive-end outer bearing housing |
| 7—Drive-end inner bearing housing | 15—Bendix screw shaft and pinion assembly |
| 8—Bendix drive head | |

Starting Motor

The starting motor is mounted on the left side of the flywheel housing and held in place by cap screws passing through the flange of the starting motor body.

The starting motor pinion is automatically meshed with gear teeth in the flywheel when the starting motor armature is caused to revolve by means of the electric current. As soon as the electric circuit is broken the starting motor pinion is automatically returned to its neutral position.

The commutator should be kept clean and free from oil and grease; if it appears dirty or rough, it should be cleaned with number 00 sandpaper. Emery paper should never be used for this purpose. If this treatment does not smooth the commutator, the armature should be removed and the commutator turned in a lathe. The mica should not be undercut on the motor commutator. The brushes should move freely in the brush holders and the full contact should bear on the commutator. The locations of the brushes should never be changed, as they are properly set when the instrument is built.

Generator

The generator is mounted on the left side of the engine at the front and driven by the fan belt. It generates current for the entire electrical system and feeds it to the storage battery. The generator may be easily and quickly removed by removing the mounting bolts.

The oil reservoirs at the ends of the armature shaft should be filled with engine oil every 2000 miles.

The generator begins charging at 8 to 10 miles per hour and reaches its maximum output of 16 amperes (with cold generator) at 20 to 22 miles per hour. For ordinary driving the rate should never exceed 12 amperes. The charging rate may be regulated by rotating the "third" brush holder. This is made accessible by removal of the commutator end cover band. The "third" brush rocker ring clamp screw may then be loosened and the "third" brush holder rotated in the direction of armature rotation to increase the rate, or against armature rotation to decrease.

If the generator charging rate is not up to the proper figure the difficulty may be due to a loose generator and fan drive belt. The belt should be adjusted as described under "Cooling System, Adjustments" (Page 33).

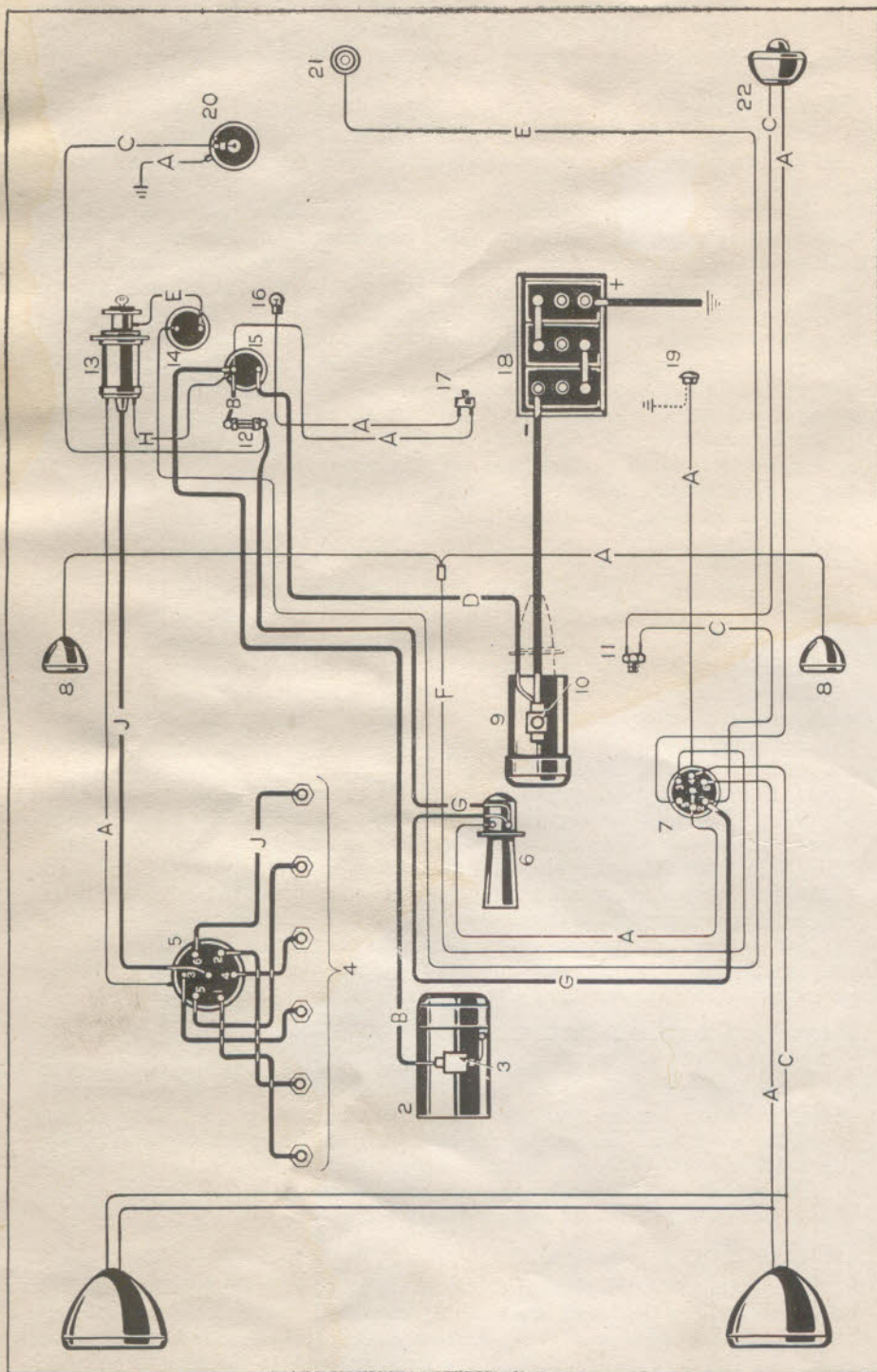
Reverse Current Cutout

The cutout, assembled on the top of the generator body, automatically breaks the circuit between the generator and the battery when the engine speed is too low for the generator to charge the battery. It automatically closes the circuit at the proper engine speed so the generator can charge the battery.

The cutout requires no lubrication or other attention. The adjustment of the movable arm should not be disturbed.

Distributor

The distributor, which is of the single breaker arm type with condenser on the outside of the base, is accessibly mounted above the cylinder block and driven through a shaft from the camshaft. The opening of the breaker points by the cam on the distributor shaft interrupts the flow of primary



current, which induces a high-tension current in the secondary winding of the coil, mounted on the rear of instrument panel. The high-tension current is delivered to the center terminal of the distributor cap, and thence through the rotor to the spark plugs. The cylinders are fired in the order 1-5-3-6-2-4.

To Adjust Point Opening

The rotor should be removed and the engine turned until the breaker arm rests on a high point of the cam. The gap should be .020" and may be measured by standard feeler gauges. If necessary to correct the adjustment of the gap the stationary contact adjusting screw lock nut (No. 6, Fig. 12) should be loosened and the contact screw (No. 7) adjusted to the proper position. The breaker arm should move freely on its pivot and it is advisable to check the tension of the breaker arm spring.

Ignition Coil

The ignition coil needs little attention other than to be kept clean, dry, and well grounded. All terminals on the coil must be tight.

Ignition Switch and Lock

The ignition switch is mounted at the right of the instrument panel. The switch is controlled by a key which is vertical when "off", turned to the right when "on". The switch must be "on" whenever the engine is operating. The key should be removed from the switch whenever the driver leaves the car. The lock is built into the coil in such a manner that it is impossible to short circuit the lock without short circuiting the coil also.

The fuel gauge is inoperative when the ignition switch is "off".

Spark Plugs

The gap between the spark plug points must be .025". Too wide a gap will cause misfire, especially at high speeds and when laboring with open throttle, while a small gap causes poor idling. Dirty or fouled spark plugs should be washed in gasoline. Uniform gap setting insures evenness of engine firing.

Present day engines develop high compression and very high speed. This severe duty imposed on the spark plugs causes erosion. It is, therefore, advisable to replace spark plugs at intervals of every 10,000 miles of

Fig. 10—Wiring Diagram

- | | |
|-----------------------------------|---------------------------|
| 1—Headlamps | 17—Instrument lamp switch |
| 2—Generator | 18—Storage battery |
| 3—Generator cutout | 19—Horn push button |
| 4—Spark plugs | 20—Dome lamp |
| 5—Distributor | 21—Fuel gauge—tank unit |
| 6—Horn | 22—Tail and signal lamp |
| 7—Lighting switch | |
| 8—Cowl lamps | A—Small black |
| 9—Starting motor | B—Medium black |
| 10—Starting switch | C—Small red |
| 11—Signal lamp switch | D—Medium red |
| 12—Fuse | E—Small blue |
| 13—Ignition coil, switch and lock | F—Small yellow |
| 14—Fuel gauge—instrument | G—Medium green |
| 15—Ammeter | H—Small light brown |
| 16—Instrument lamp | J—High tension cable |

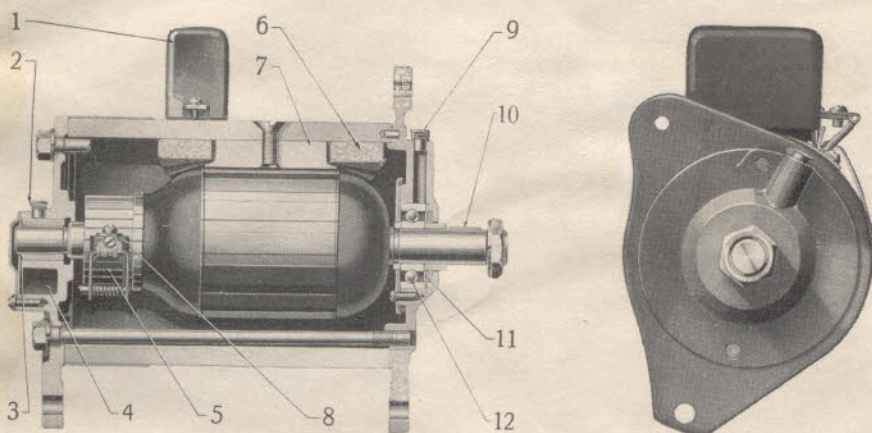


Fig. 11—Generator

- 1—Cutout
- 2—Oiler
- 3—Bearing
- 4—Oil reservoir
- 5—Commutator
- 6—Field coil

- 7—Pole piece
- 8—Brush
- 9—Oiler
- 10—Pulley key
- 11—Felt washer
- 12—Ball bearing

service. The installation of new spark plugs, properly adjusted, will have a marked effect upon the performance of the engine and aid materially in keeping the engine in condition for smooth flowing maximum power.

The engine performs best with the spark plugs furnished with the car. These are obtainable from Dodge Brothers Service Stations and should be used to the exclusion of all others. The use of so-called carbon-proof spark plugs and others having smaller diameter electrodes should be avoided. Such spark plugs will cause the engine to miss on heavy pulls.

Suggestions

Ignition trouble will make itself known by the engine misfiring or refusing to start.

If the engine misses regularly on one cylinder, the trouble is usually due to the spark plug in that cylinder being dirty, broken or improperly adjusted. If misfiring is not limited to one cylinder, the cap should be removed from the distributor and the contact points examined to make certain that they make good contact with each other and are clean. The correct point opening is .020".

If the contacts show a tendency to burn, the distributor may not be well grounded to its mounting bracket. Paint and dirt should be scraped off the bracket to insure a good ground. The condenser, which is on the distributor, should be tested and its connections from the coil should be tight.

When the engine will not start, the ignition should be checked as follows: The engine switch should be turned "on" and the cap removed from the distributor to see that the contact points are touching each other. Then the secondary wire should be disconnected from the coil and a piece of wire or metal held against the engine or dash and about $\frac{1}{8}$ " from the

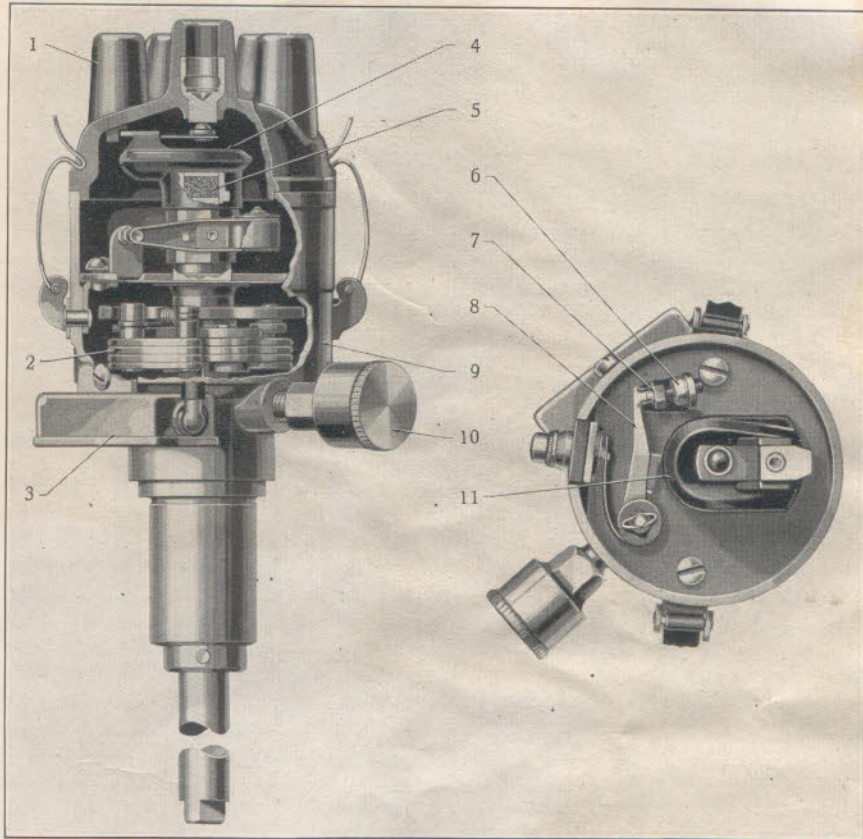


Fig. 12—Distributor

- 1—Cap
- 2—Shaft, advance and cam assembly
- 3—Condenser
- 4—Rotor
- 5—Oil wick
- 6—Contact stud lock nut

- 7—Contact stud
- 8—Breaker arm
- 9—Bearing and housing assembly
- 10—Grease cup
- 11—Rotor

terminal of the coil from which the secondary wire was removed. The contact points should next be separated by moving the breaker arm with the fingers. A spark should jump between the coil terminal and the piece of wire or metal touching the engine or dash if the coil and its connections are in good condition.

If no spark is obtained at the coil under the preceding conditions, it should be determined whether current passes through the coil.

A quick check may be made on the primary circuit of the coil by closing the ignition switch and cranking the engine. If the ammeter needle moves back and forth between 0 and 3 or 4 amperes discharge, it indicates the primary circuit is all right. If ammeter needle does not move, the following procedure should be observed:

With the ignition switch turned "on" and the distributor contact points separated, a screwdriver should be rested over the edge of the distributor housing with the end of the screwdriver touching against the stationary contact point. There should be a flash or spark to indicate the flow of current. If current flows, the secondary winding of the coil is apparently damaged and a new coil should be installed.

If no current can be detected on this test, the ignition lock and switch should be inspected.

If the wiring is in good condition it should be determined whether the current reaches the coil. A screwdriver should be rested over the "Bat" terminal of the coil and at the same time touch some metal part of car with the end of screwdriver. If a flash or spark is obtained, the coil is faulty and a new one should be installed. If no current reaches the coil, the trouble is due to a loose connection, broken wire, defective switch, dead battery, or poor ground connection.

To Set Ignition Timing

The breaker points should be adjusted to .020" opening and the manual spark control button set in the fully advanced position. The crankshaft should be rotated until No. 6 piston is coming up on exhaust stroke and stopped when the crank reaches 4° before top dead center as shown by the mark "IGN", as seen through the timing inspection window, on flywheel housing near the starting motor. The screw which clamps the distributor timing lever to the distributor should be loosened and the distributor cap removed to see that the rotor brush is at No. 1 spark plug cable terminal. The distributor clamp screw should next be loosened and the distributor rotated in an anti-clockwise direction, as viewed from above, until No. 1 cam begins to separate the breaker points. When doing this the distributor rotor should be pressed against the direction of rotation to be certain that all backlash is removed. The clamp screw should then be tightened and the

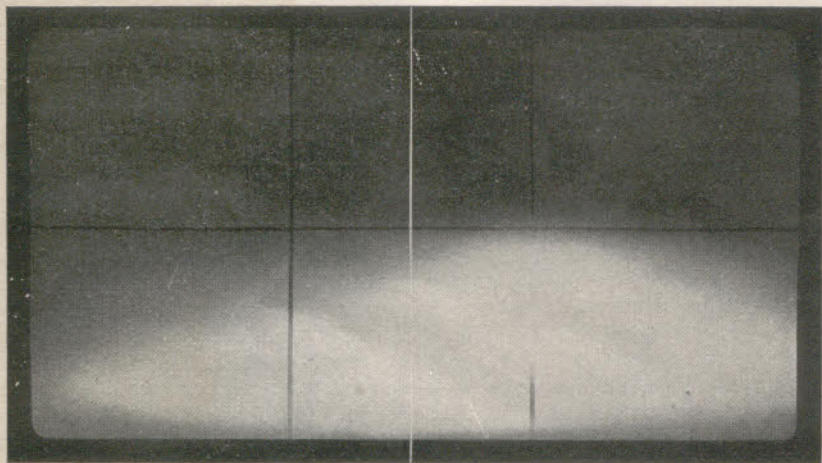


Fig. 13—Upper beam of right hand headlamp correctly focused and aimed

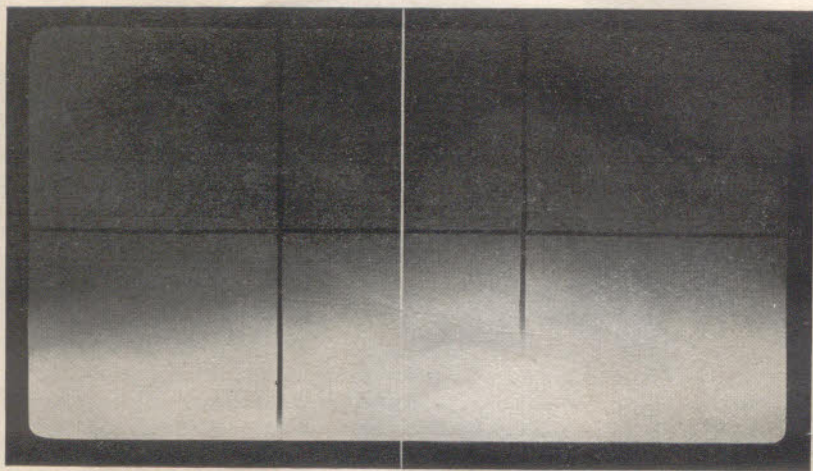


Fig. 14—Lower beam of headlamp shown in Fig. 13

distributor cap reinstalled as well as the spark plug cables connected to the proper spark plugs and terminals on the distributor cap. The spark control button should be checked for full advance and retard.

Firing Order

The firing order of the cylinders is 1-5-3-6-2-4. The wires from the spark plugs should be connected to the terminals on the distributor corresponding with the number of the cylinder in which the spark plugs are placed. Number 1 cylinder is nearest the radiator.

The wiring diagram (Fig. 10) indicates the location of the distributor terminals for the different spark plugs.

Spark Advance

For all ordinary road driving the spark control button should be in the advanced position which is all the way in to the instrument panel. When cranking the engine by hand, the spark control button should be all the way out. The automatic advance will take care of all other conditions.

Light Control

The head, cowl, and tail lights are all controlled by the lower lever above the steering wheel. When the lever is in the vertical or central position, no connection is made. When the lever is turned to the right, the cowl and tail lights are connected. When the lever is turned to the left one notch, the lower beam of the headlamps and the tail light are connected. The upper beam of the headlamps is connected by moving the control lever one notch farther to the left.

The instrument panel light is operated by a separate switch at the base of the instrument board.

The dome lamp is controlled by a switch on the lamp itself.

A hydraulic switch assembled in the brake master cylinder completes the circuit for the rear signal lamp when the brake pedal is depressed.

Headlamp Adjustment

The car should be placed with normal passenger load on a level surface with the headlamps located twenty-five feet from a garage door or light-colored vertical wall.

A horizontal line should be drawn on this surface at a height of the lamp centers. A center point should be located on this line by sighting through the center of the rear window of the car and in line with the radiator cap. Equidistant from this center point two vertical lines should be drawn at a distance from each other equal to the distance between the centers of the headlamps. These two lines will be directly ahead of and in line with the respective headlamps.

With the lighting switch lever turned to the left one lamp should be adjusted (with lens in place) while the other is covered. The best driving light beam is obtained when there is a high intensity near the top of the beam. This is accomplished by turning the adjusting screw, accessibly located at the rear of the lamp. When properly adjusted, the light will be intense at the top and shallow in height, as well as quite widespread. By loosening a single nut, which fastens the lamp to its bracket, the light beam may be adjusted in both vertical and horizontal directions.

When one lamp has been properly adjusted, it should be covered and the other lamp uncovered, then the necessary adjustments made to the latter. The lower beams of light will not require further adjustment.

Flickering lights indicate a loose connection, usually at the light sockets or the terminals on the switch. The fuse should be inspected to see that it is tight in the fuse clips.

Battery

The battery is of a six-volt, three-cell type and is carried under the front floor board. When installing a battery, care must be taken to make certain that the positive terminal is grounded and that the negative terminal is connected to the starting and lighting cable before attempting to use any part of the electrical system. Damage may be done to the entire system if the wrong connections are made.

The starting motor should never be used for a period to exceed 5 to 10 seconds. Continual cranking of the engine will discharge the battery until it is no longer able to supply sufficient current to turn the starting motor. If the engine fails to start, the procedure on Page 72 should be followed. The clutch should be disengaged when cranking the engine to reduce the load on the battery, especially during cold weather.

When storing the car for an extended period, the battery should be removed and delivered to a battery service station for attention during the period of car storage.

Care of Battery

The battery must be kept securely fastened in its rack. It should be cleaned and dried frequently. The terminals and connections should be coated with vaseline. If the solution has been slopped or spilled, the surface

of the battery should be wiped with a piece of waste, wet with ammonia.

If a sufficiently charged battery will not crank the engine it is probable that there is corrosion at the battery clamps and posts. In this case the clamps should be removed and all corrosion scraped from them, as well as the posts, to insure proper contact. The ground terminal and frame at the point of contact should also be scraped.

The electrolyte in the battery should always be maintained at the proper level and pure distilled water added to each cell of the battery until the solution is about $\frac{1}{2}$ " above the top of the plates. If distilled water is not available, clean rain water will be satisfactory. Acid or electrolyte should only be added to a battery by an experienced battery repairman. The filling hole plugs should be screwed in by hand.

The specific gravity of the solution in each cell should be tested occasionally with a hydrometer before adding water. If the reading is above 1.225, the battery is more than half charged. If it is below 1.225 but above 1.150, the battery is less than half charged, and is a warning to use the lights sparingly until the specific gravity is restored to at least 1.250. If one cell regularly requires more water than the others, it is probably due to a leak and should be repaired at once. If there is no leak and one cell shows a specific gravity markedly lower than the others, there is a short-circuit or some other trouble in that cell and it should have the prompt attention of a good battery repairman.

A fully charged battery will not freeze in temperatures ordinarily encountered. The electrolyte will freeze in a one-half discharged battery at about 20° below zero (specific gravity 1.210).

Horn

The horn is of the 6-volt motor-driven type and is adjustable for tone by movement of the flat head screw in the rear end of the horn cover at the top. The round head screw in the rear of the cover at the bottom fastens the cover in place and must be removed when lubrication is necessary.

Two drops of very light machine oil should be put on the felt washers at each end of the armature shaft about once every three months, or every 5000 miles.