

Reference to the instrument-board thermometer will indicate that the thermostat is operating correctly and that there is no shortage of coolant.

An unusually and consistently low temperature, after the engine has been well warmed up, indicates failure of the thermostat.

A by-pass pipe acts to short circuit the radiator when the thermostat valve is closed or only partly open. This arrangement ensures a quick supply of heat to the induction pipes after starting from cold as well as a rapid warming up of the engine coolant jacket.

Radiator Mounting.

The radiator comprises two main units, namely, the outer shell and the matrix itself, the complete assembly being mounted on a single central rubber support. The shell is diagonally braced and is bolted to the wings and valance plates. The radiator matrix is secured in the shell at three points, which are arranged to provide freedom for expansion under heat.

The object of this special construction is to avoid sideways movement of the radiator assembly due to road shocks, and to isolate the matrix from such shocks.

No lubrication or attention is necessary in connection with the mounting.

Coolant Level.

The radiator filler is located under the left-hand side of the bonnet. A warning notice is embossed on the cap to the effect that it must not be removed when the engine is running. Hot coolant is likely to be forced out in such circumstances.

The correct level is approximately to the bottom edge of the filling orifice.

It is safe to run as long as the coolant is visible in the top tank when cold.

A drain tap is situated on the pipe connecting the pump with the bottom of the radiator. It is in the "off" position when the handle is pointing downwards.

On no account must any strong alkaline compound be used to clean out the coolant system. Several such compounds are available, but their use must be carefully avoided, owing to the fact that they have a detrimental chemical action on aluminium.

Frost and Anti-Freeze Mixtures.

As long as the original coolant is maintained in the system, no precautions need be taken against frost.

If, for any reason, the original coolant has been replaced with water, then the system must be drained if the car is to be left exposed to temperatures below 32° F.

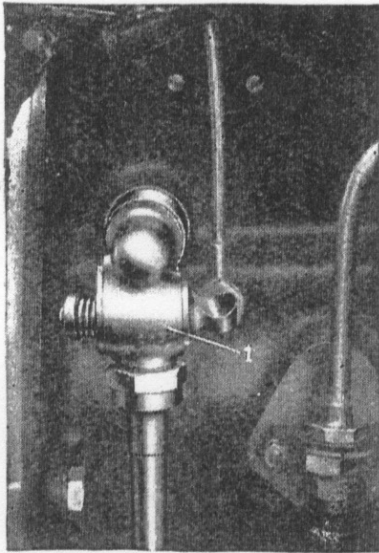


Fig. 38.—CYLINDER JACKET DRAIN TAP.

1. Drain tap.

Draining is accomplished by opening three drain taps, one situated on the pump inlet pipe, one on the right-hand side of the cylinder block (1, Fig. 38), and one on the car heater return pipe. The filler cap must also be released a few turns.

Also, before attempting to turn the crankshaft for starting after exposure to frost, *hot water should be poured over the coolant pump* to thaw any particles of ice which may be present in the casing, and which would probably damage the impeller.

A suitable anti-freeze mixture is made by mixing soft water with either Inhibited Ethylene Glycol or "Bluecol", in proportions dependent on the degree of frost likely to be encountered.

The following table gives an approximate indication of the amount of frost protection ensured by different strengths of mixture.

Freezing point	22° F.	12° F.	2° F.	-3° F.
Degrees of frost	10° F.	20° F.	30° F.	35° F.
1. Inhibited Ethylene Glycol ...	4½ pts.	6¾ pts.	10 pts.	11 pts.
2. "Bluecol"	4½ pts.	6¾ pts.	10 pts.	11 pts.

When changing from water to anti-freeze, the radiator system must be drained. New anti-freeze of the required amount should be mixed with an equal quantity of soft water before being poured into the radiator, the radiator being finally topped up with soft water.

The engine should then be run until normal operating temperature is reached, to ensure uniform distribution of the anti-freeze throughout the system.

The rubber connections must be carefully examined and replaced if unsound, as any leakage will necessitate replenishment with anti-freeze mixture.

When using an anti-freeze mixture as described, a similar mixture should be used for topping-up purposes.

Car Heater.

A hot water heater is fitted on the centre of the dash behind the facia panel, warm air being circulated by an electric fan which is integral with the heater.

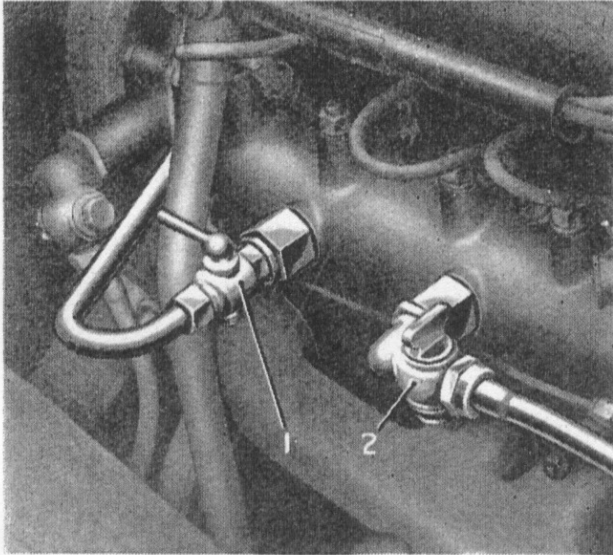


Fig. 39. ISOLATING TAPS.

1. De-mister heater.
2. Car heater.

Hot coolant is circulated through the heater from the engine cooling system, the coolant being taken from the cylinder block through a tap (see Fig. 39), the latter being used to isolate the heater when not required.

The switch for the heater fan incorporates a rheostat, and is mounted on the instrument board, as shown in Fig. 1, thus giving a variable control of the interior temperature.

DIAGRAM
ELECTRICAL WIRING

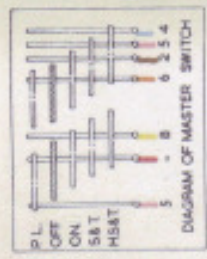
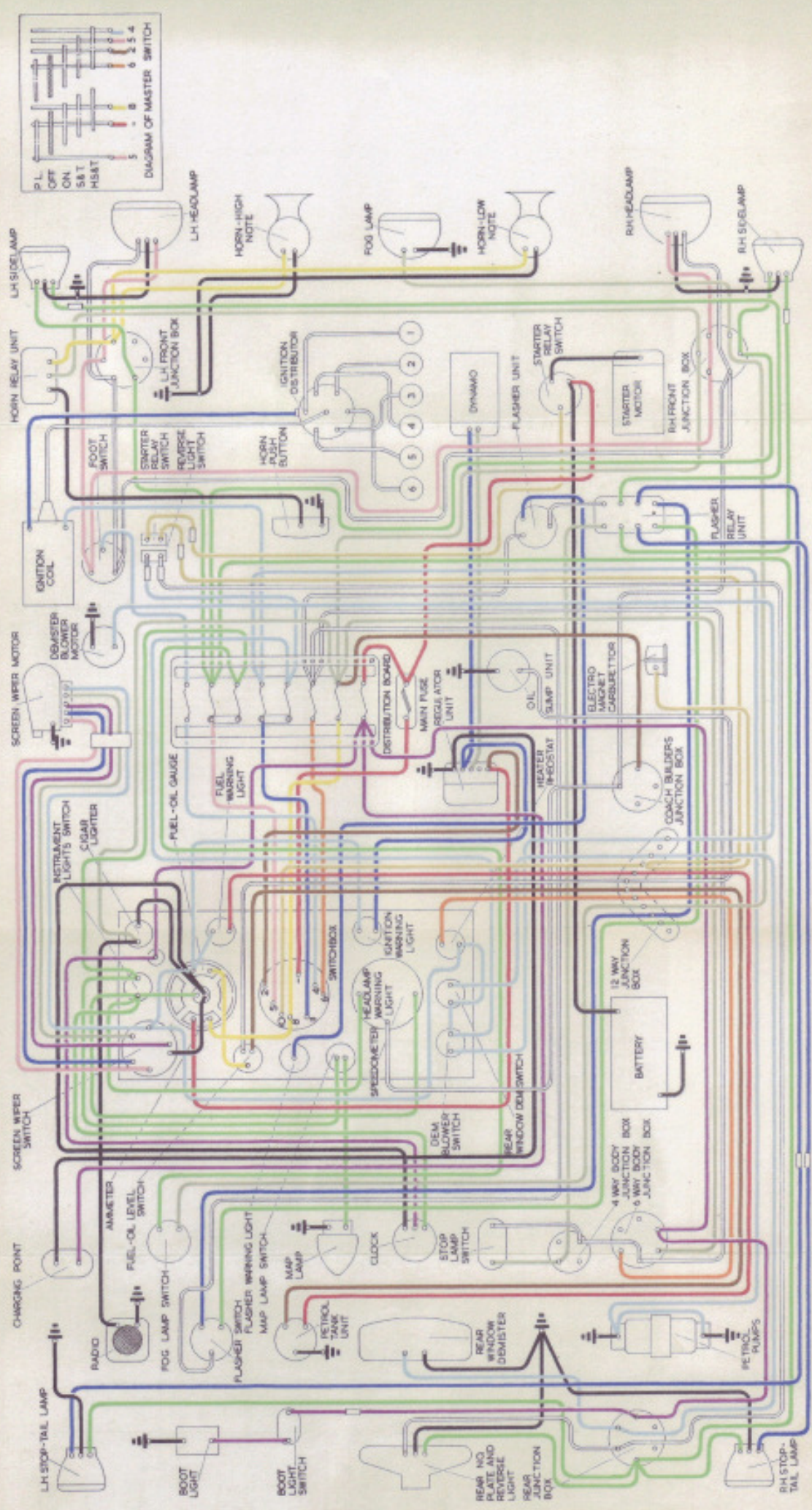


Fig. 40. ELECTRICAL WIRING DIAGRAM

CHAPTER X

The Electrical System

General—Dynamo—Fuse Box—Fuse Data—Output Regulator and Cut-out—Switchbox—Ammeter—Battery—Ignition—Ignition Coil—Ignition Timing—Firing Order of Cylinders—Sparkign Plugs—Starter Motor—Starter Motor Switch—Micro-switch—Use of Starter Motor—Electric Fuel Pumps and Gauge—Electric Horns—De-misting and Air Conditioning—Direction Indicators—Headlamps—Replacing a Headlamp Bulb—Aligning the Headlamps—Side Lamps—Electrical Fault Location.

General.

The equipment comprises a dynamo, fuse box, automatic output regulator and cut-out, switchbox, ammeter, a 12-volt, approximately 55-ampere-hour battery, a starter motor with relay-operated switch, two electric horns with push-button switch at head of steering column, head, side, rear and interior lights, windscreen wiper, direction indicators, de-froster, de-mister, car heater, electric fuel pumps and gauge, and battery ignition, consisting of coil with combined low-tension contact breaker and high-tension distributor, and the necessary wiring.

Incorporated in the distributor is a governor, which effects automatic control of the ignition timing.

The wiring diagram (Fig. 40) shows the units with their electrical connections, the various wires being indicated in colours to correspond with those of their actual coverings.

The electrical system is earthed on the positive side of the battery to the chassis frame, and all switching is done in the negative leads.

Before doing any work on a chassis which is likely to involve the electrical system, it is advisable to remove the chassis frame connection from the positive battery terminal, and so render the whole system dead, but do not disconnect whilst any charge or discharge current is passing.

Dynamo.

The dynamo, shown in Fig. 41, is driven by the same belt which also drives the water pump and fan. It is of the shunt-wound type, the excitation of the field being automatically regulated, in order to adjust the charge rate to suit the dynamo speed, the state of charge of the battery and the lighting load.

There are three external terminal connections, two large and one small, one large terminal being the "armature" connection, the other one being earthed to the chassis frame. The smaller terminal is the "field" connection.

The armature lead from the large terminal is taken to the output regulator and connected to the terminal marked "D", and similarly the field connection is to the terminal marked "F" in the fuse box.

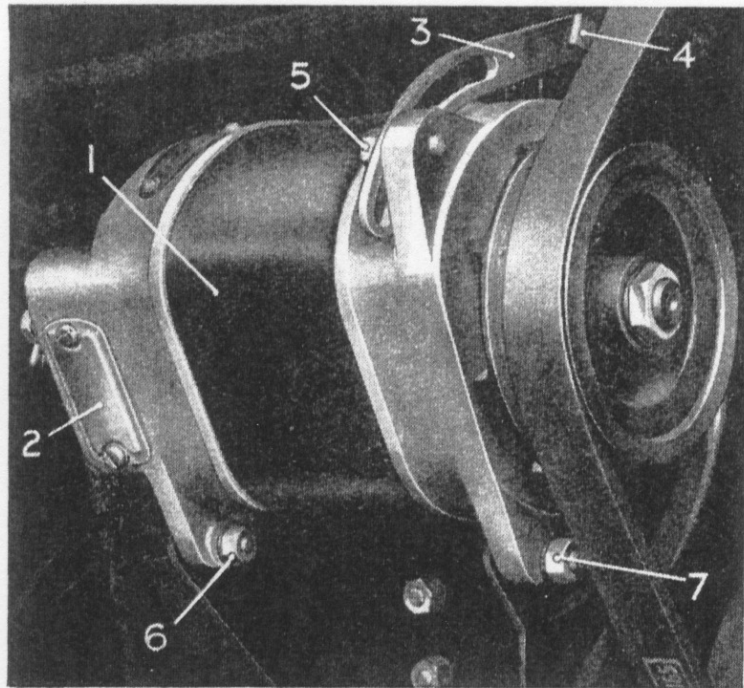


Fig. 41.—THE DYNAMO.

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|----------------------|--------------------------------|
| 1. Dynamo. | 3. Slotted link. |
| 2. Cover—Brush gear. | 4, 5, 6, and 7. Securing nuts. |

Every 10,000 miles, as directed on page 34, take out the securing screws and remove the cover. This will expose the commutator and brushes, which should be inspected. Deposits of brush dust, moisture and oil should be removed, and note taken of any appreciable wear of the brushes.

Cleanliness of the commutator and freedom of the dynamo brushes in their holders are the most important points in the maintenance of the dynamo.

Premature failure or excessive wear, however, indicates some definite fault in the machine, which should be returned for correction. In normal circumstances the brushes should need replacing only after

considerable running; in the event, however, of a new set of brushes being required, it is recommended that this work should be done by Messrs. Bentley Motors (1931) Ltd., or one of their "Special Retailers". Emphasis is laid on this point, as cases have arisen of faulty operation of the dynamo, due to inexpert fitting of brushes.

When it is necessary to disconnect the wires to the dynamo, care must be taken to ensure their correct replacement.

Fuse Box.

The large fuse box (2, Fig. 42) carries the circuit fuses. Each circuit fuse is one strand of No. 32 S.W.G. tinned copper wire.

The small fuse box (1) carries the main fuse. This is three strands of No. 32 S.W.G. tinned copper wire.

Spare wire of this gauge is provided on a special holder within the circuit fuse box.

Special care must be taken that all fuses are gripped firmly in their holders, and that the contacts are clean and tight.

Output Regulator and Cut-out.

The output regulator and cut-out are mounted on the front of the dashboard, and are shown (5, Fig. 42).

The output regulator operates to control the dynamo output by varying the field excitation in accordance with the load on the battery and its state of charge.

The operation of the regulator depends upon the fact that the voltage of a battery varies between certain fixed limits according to the state of charge of the battery, the voltage being, of course, a maximum when the battery is fully charged, and a minimum when the battery is fully discharged.

The regulator is combined structurally with the cut-out. The regulator and cut-out are, however, electrically separate, employing separate armatures, though they possess field systems which are common over a portion of the magnetic path.

The cut-out is operated when the dynamo speed rises high enough for the dynamo to charge the battery by means of its shunt coil connected across the main terminals of the dynamo. This closes the cut-out contacts and so connects the dynamo with the battery, via the regulator and ammeter, as shown in the wiring diagram (Fig. 40).

The series coil is so connected that, when carrying the charging current, it assists the shunt coil in holding the contacts firmly together.

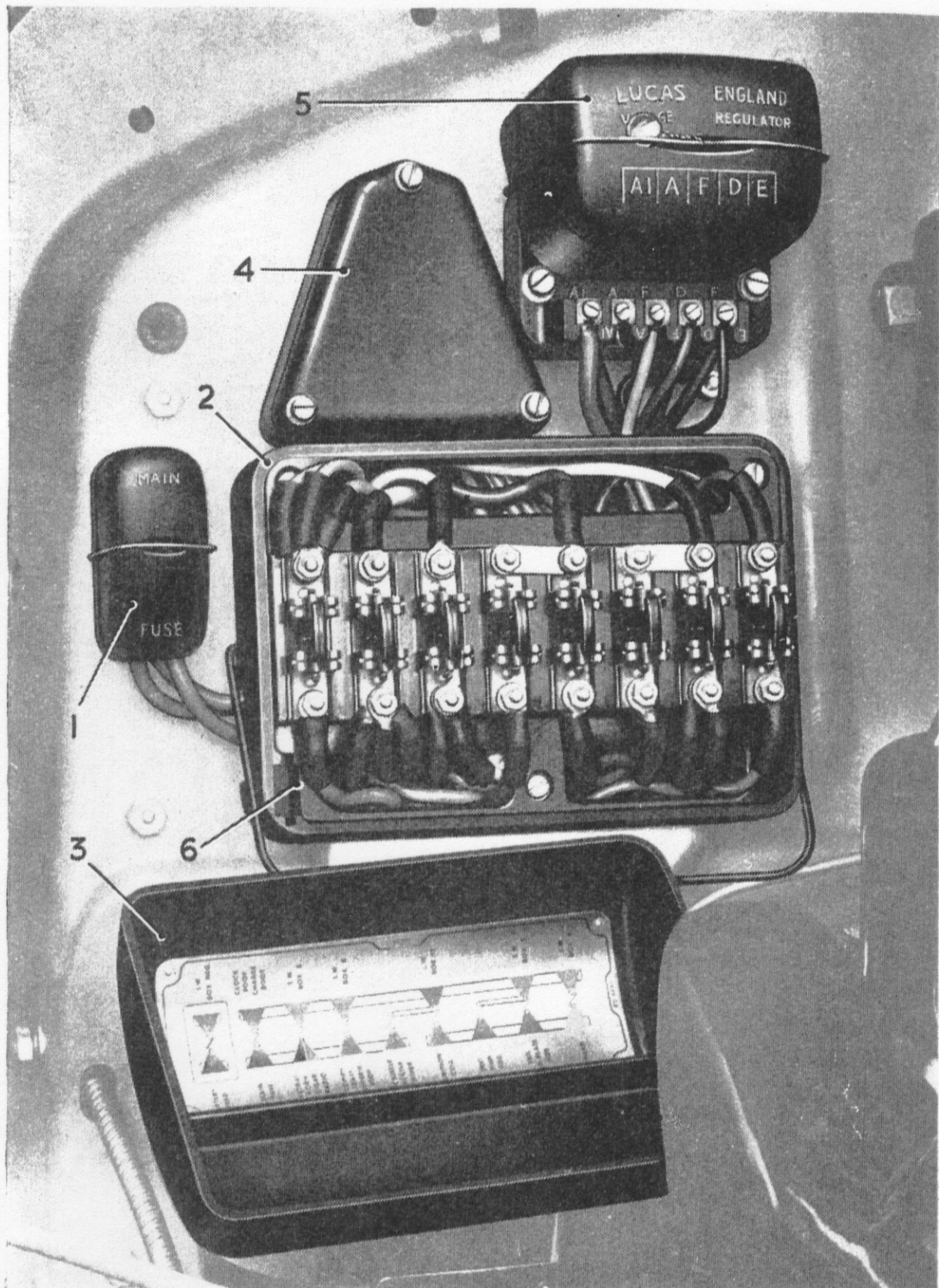


Fig. 42.—FUSE BOX, OUTPUT REGULATOR AND CUT-OUT.

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|----------------------|---------------------|-----------------------------------|
| 1. Main fuse box. | 3. Cover, fuse box. | 5. Output, regulator and cut-out. |
| 2. Circuit fuse box. | 4. Joint box. | 6. Spare fuse wire holder. |

When the dynamo slows down, and its voltage falls below that of the battery, the current reverses through the series coil, and the effect of the shunt winding becomes neutralised, which results in the contacts falling apart.

The output regulator and cut-out requires no attention; it is a sealed unit, and no adjustment of any kind must be attempted. If any defects in operation should develop, as described under "Electrical Fault Location" (page 104); which are traceable to the regulator, it must be detached bodily and returned, *with the seal unbroken*, to Messrs. Bentley Motors (1931) Ltd., or one of their "Special Retailers", for correction.

Switchbox.

Mounted on the instrument panel, this unit includes:—

- (a) Master switch and lamp switch combined.
- (b) Ignition switch.
- (c) Push-button switch for the starter motor.
- (d) A lock which can be locked and the key withdrawn either:—
 1. When the master switch is in the "**Off**" position; or,
 2. When the master switch is in the "**P.L.**" (parking lights) position.

No attempt must be made to lock the switch in other positions.

With the master switch in the "**Off**" position, all accessories and lighting circuits, with the exception of the roof lamp, are rendered inoperative. Movement of this master switch to the "**On**" position renders these accessories available.

The various combinations controlled are clearly indicated, as follows:—

Off.—All circuits off except for clock, inspection and roof lamps.

On.—Accessories available.

S. and T.—Side and tail lamps on and accessories available.

H., S. and T.—Head, side and tail lamps on and accessories available.

P.L.—"Parking Lights", side, tail and roof lamps on. (No reading is shown on the ammeter and all other accessories are "off".)

A separate switch is provided for the ignition, marked "**On**" and "**Off**". Normally, this switch can be left in the "**On**" position, and the switching to start the engine can be carried out on the master switch.

No independent charge position is provided owing to the presence of the output regulator. Whenever the master switch is on, connections are made which cause the dynamo to charge the battery through the regulator, as previously described.

Operation of the push-button switch for the starter motor completes a relay circuit, which in turn causes the main starter switch to close.