

CHAPTER V

The Fuel System

The Fuel System—Fuel Pumps—Faulty Operation of Pumps—Fuel Tank—Strainers—Fuel Gauge—The Carburetters (Action)—Hand Starting Control—Adjustment of Carburetters—Automatic Air Valve—Throttle Control—Mixture Control and Slow Running—Float Feed Mechanisms—Further Dismantling of Carburetter—Air Cleaner and Silencer—Warning.

The Fuel System.

The fuel supply from the 18-gallon tank at the rear of the chassis is by means of a double electric pump (1 and 2, Fig. 11), mounted inside the right-hand side chassis frame member below the rear floor.

A pipe is arranged along the right-hand side frame member conveying fuel from the tank to the pumps. The pipe is seen at (4). A strainer is provided on this pipe line, being located on the frame cross member immediately in front of the tank, as shown in Fig. 12.

Location of a strainer on the suction side of the pumps ensures that the latter, as well as the carburetter, are protected from the deleterious effects of dirt or sediment in the fuel.

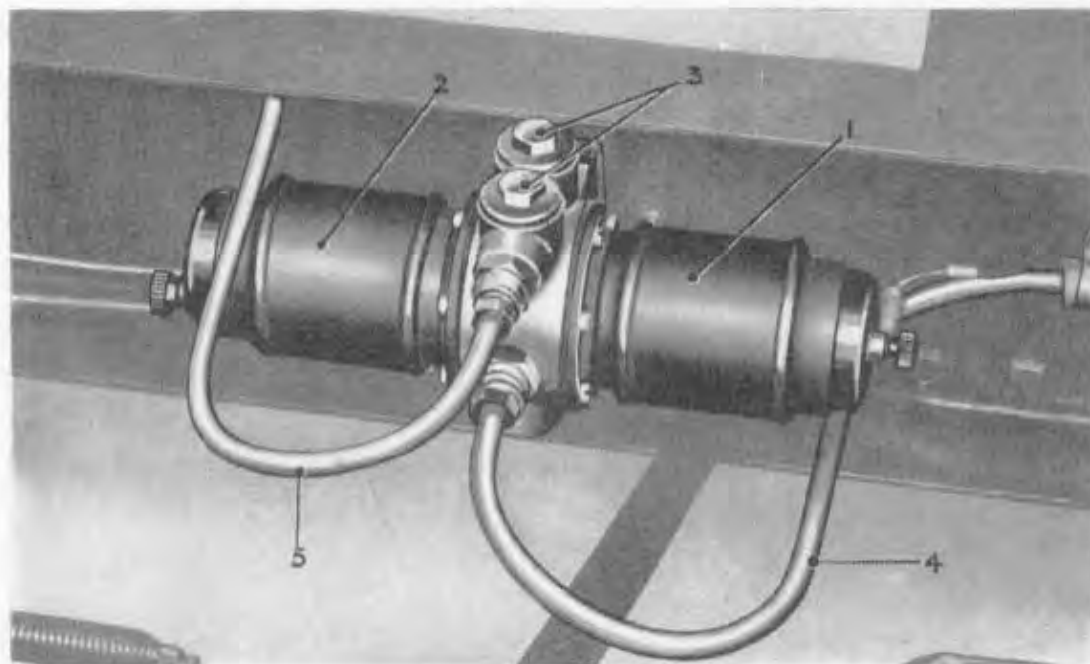


Fig. 11.—FUEL PUMPS.

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| 1. Fuel pump. | 4. Inlet pipe. |
| 2. Fuel pump. | 5. Outlet pipe. |
| 3. Valve caps. | |

From the strainer the fuel passes to the suction side of the pumps, and is delivered to the carburetter float chamber by way of a pipe (5), and another strainer located at the float chamber.

Fuel Pumps.

The fuel pumps (1 and 2, Fig. 11) are of the electric, solenoid-operated, diaphragm type, and comprise two independent pumps complete with diaphragms, solenoids, contact trip mechanisms, and suction and delivery valves.

Both pumps deliver into a common chamber and are simultaneously rendered operative when the ignition and master switches are "On".

Duplicate pumps are provided primarily to ensure reliability. They also ensure that there shall be no starvation of fuel at maximum engine demands.

If it should ever be necessary to disconnect the fuel pipes at the pumps, it is important first to release the cover of the suction strainer (See page 46.) This will prevent loss of fuel by syphoning, due to the location of the pumps below the level of the main tank.

The current supply for the pumps is taken through the ignition fuse, No. 5, in the fuse box.

Faulty Operation of Pumps.

This would cause failure, or shortage, of fuel supply to the carburetter, and may be due to one or more of the following causes:—

1. *Shortage of fuel in the tank.*—This should have caused the green warning lamp to light, but if the tank has been allowed to run dry, the pumps will tick continuously and noisily. On severe gradients and side slopes, these symptoms may occur before the tank is completely empty, due to surging of fuel in the tank, which may uncover the suction pipe.
2. *Air leak on the suction side.*—Either at the strainer or on the pipe line. A slight air leak will cause the pumps to work rather faster than normal, but if sufficiently bad to cause a complete air lock, the pumps will tick continuously and noisily as if short of petrol.
3. *Pump valves not seating.*—The delivery valves do not give any easily detectable signs of their functioning. If a suction valve is not seating, the pump will tick continuously when the engine is switched on but not running. It is probable that foreign matter is lodged under one of the valves.
If the above is suspected, remove the caps (3, Fig. 11), the valves and valve cap assemblies may then be lifted out and cleaned.
4. *Sluggish operation of the pumps.*—Check that the electrical connection and contact points are clean and in proper order. Verify, by alternately disconnecting the pipes at the unions, that it is the pump, and not due to a blockage in the pipe line. If with the pipes disconnected the pumps still work sluggishly, the unit should be removed and returned to Messrs. Bentley Motors (1931) Ltd., or one of their "Special Retailers" for overhaul.

Note—The pumps will not work with both petrol pipes disconnected; in such circumstances, the pumps must be earthed to the chassis frame.

Fuel Tank.

The 18-gallon tank is shown in Fig. 12. The fitting (9) carries the suction pipe. Normally there should be no occasion to disturb these parts.

Every 20,000 miles as directed on page 33, the drain plug at the bottom of the tank should be released. It is not necessary to remove the plug. It need only be unscrewed a turn or two, and must afterwards be securely retightened. This will flush out any accumulation of sediment or water.

Strainers.

The rear strainer shown in Fig. 12, is provided with two circular gauzes located above a large settling sump. Fuel passes upwards through these gauzes, and dirt settles on their lower faces and in the sump.

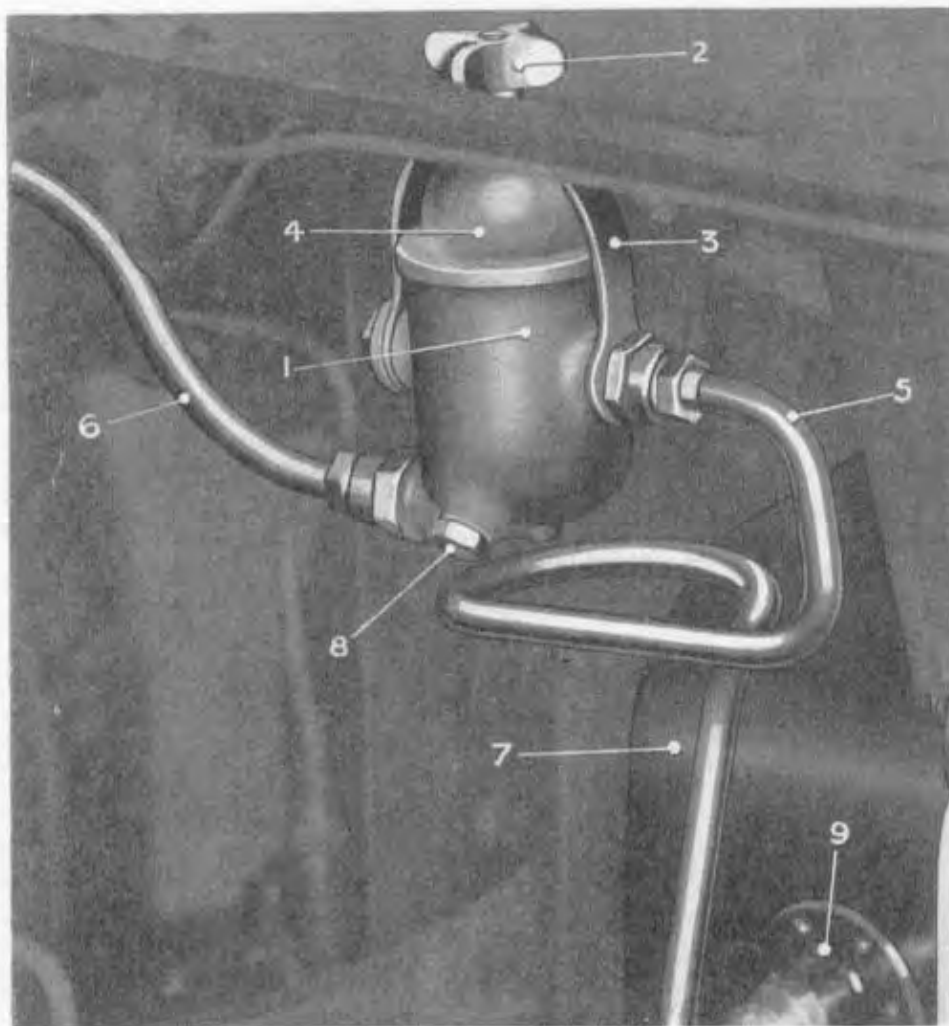


Fig. 12.—FUEL TANK AND STRAINER.

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| 1. Body. | 5. Inlet pipe. |
| 2. Cover nut. | 6. Outlet pipe. |
| 3. Yoke. | 7. Main fuel tank. |
| 4. Cover. | 8. Strainer drain plug. |

The filter should be cleaned every 20,000 miles, as directed on page 33.

When refitting the cover, care must be taken that the cork washer is sound, and properly in position, and the nut (2, Fig. 12) tightly screwed up. Any leaks on this—the suction side of the pumps—although they may not be apparent by leakage of fuel, will impair the proper functioning of the pumps by admitting air.

In addition a small gauze strainer, shown at (12, Fig. 14), is arranged on each carburetter. These should be removed and cleaned every 20,000 miles, as directed on page 33.

Removal is effected by unscrewing the two union nuts (2, Fig. 13). The strainer gauzes can then be removed and cleaned in petrol.

When refitting the parts, care must be taken to replace each gauze with its open end outwards and that the aluminium joint washers are in position on the unions.

Fuel Gauge.

The fuel gauge registers when the master and ignition switches are "On".

As mentioned on page 41, this gauge also registers the amount of oil in the engine sump, when the appropriate switch is depressed.

The Carburetters (Action).

Two carburetters of the S.U. controllable jet type are fitted as shown in Figs. 13 and 14, one being shown in section to illustrate the principal parts.

This type of carburetter automatically adjusts both its choke area and its jet to suit the engine demands. This is effected by using the manifold depression to operate a piston or air valve, which carries a tapered needle to regulate the fuel passage. The upper side of the piston is connected by passage ways to the base of the piston facing the throttle valves, and is subject to the depressions in the throttle body.

As the air flow through the carburetter increases, so the depression between the piston and the throttle valve increases, thereby causing the piston to rise and admit more air, and consequently the needle to be withdrawn from the jet, thus allowing more fuel to flow. Similarly, as the air flow falls, due to reduced engine requirements, so the piston falls. In this way, a state of balance is maintained whereby the piston keeps at a certain height, dependent on the engine speed and the throttle opening. Thus the carburetter automatically adjusts itself to the varying requirements of the engine under all conditions.

Hand Starting Control.

The jet is so mounted that it is vertically adjustable by hand from the steering wheel.

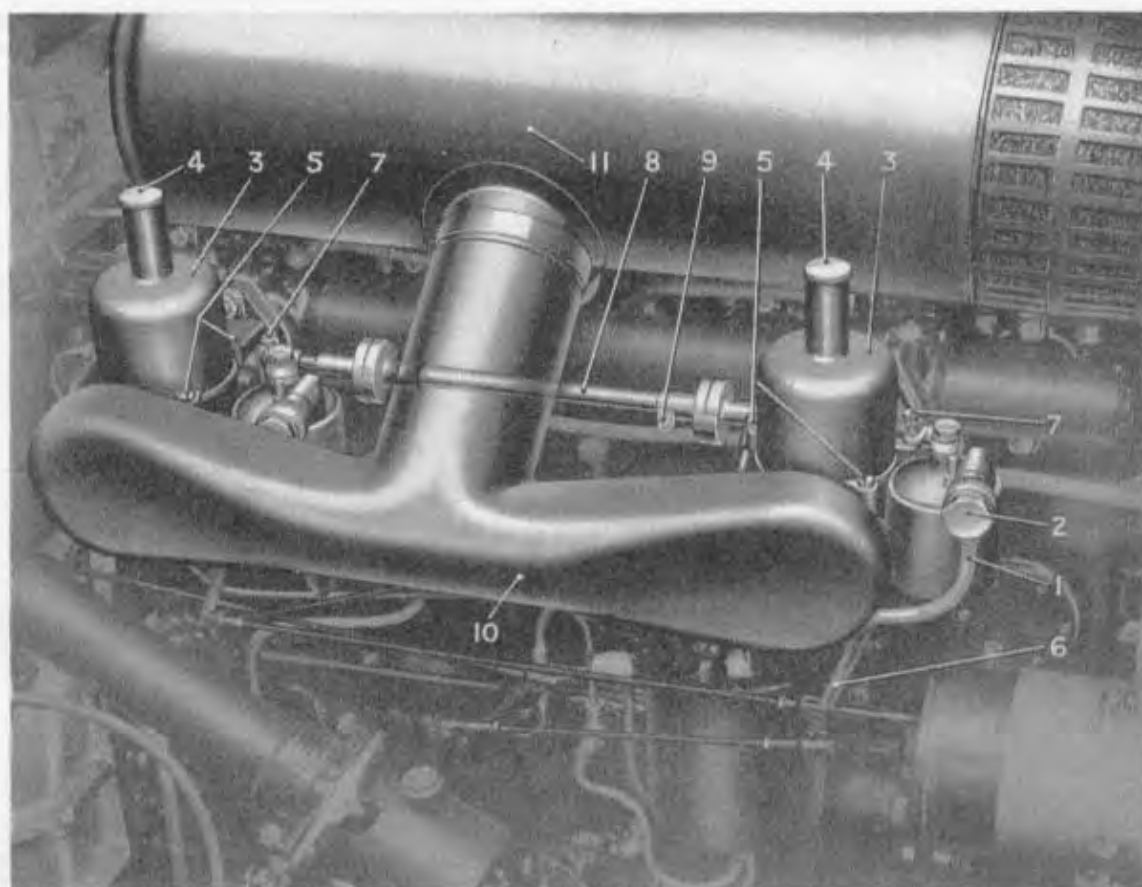


Fig. 13. CARBURETTERS IN POSITION ON ENGINE.

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| 1. Fuel pipe. | 7. Throttle stop. |
| 2. Union. | 8. Throttle coupling rod. |
| 3. Air valve cylinder | 9. Pinch bolt. |
| 4. Oil cap nut. | 10. Air intake. |
| 5. Cylinder retaining screws. | 11. Air silencer and cleaner. |
| 6. Mixture lever. | |

For starting, the jet is lowered away from the needle by setting the mixture control to **"Start"**. This provides an enriched mixture to ensure easy starting and even running when the engine is cold. As soon as the engine has warmed up, the control lever should gradually be re-set to **"Run"**.

Adjustment of Carburetters.

There should be no necessity for any variation of the adjustment of the carburetters as fixed by the makers.

It is realised, however, that information as to the methods for restoring adjustments may prove valuable under special circumstances, and is consequently given, as far as practicable, in the paragraphs which follow.

Automatic Air Valve.

The automatic air valve is of the conventional S.U. pattern, and includes a hydraulic suction piston damper to delay the rise of the air valve piston during acceleration and when starting the engine

from cold. The damper consists of a small cylindrical brass plunger (2, Fig. 14), attached by a thin steel rod to the oil cap nut (4, Fig. 13). Inside the plunger is a one-way ball valve which seats in an upward direction. The plunger is a free fit in the hollow guide rod of the automatic air valve piston, the chamber being filled with a thin oil. The action of the device being as follows:—

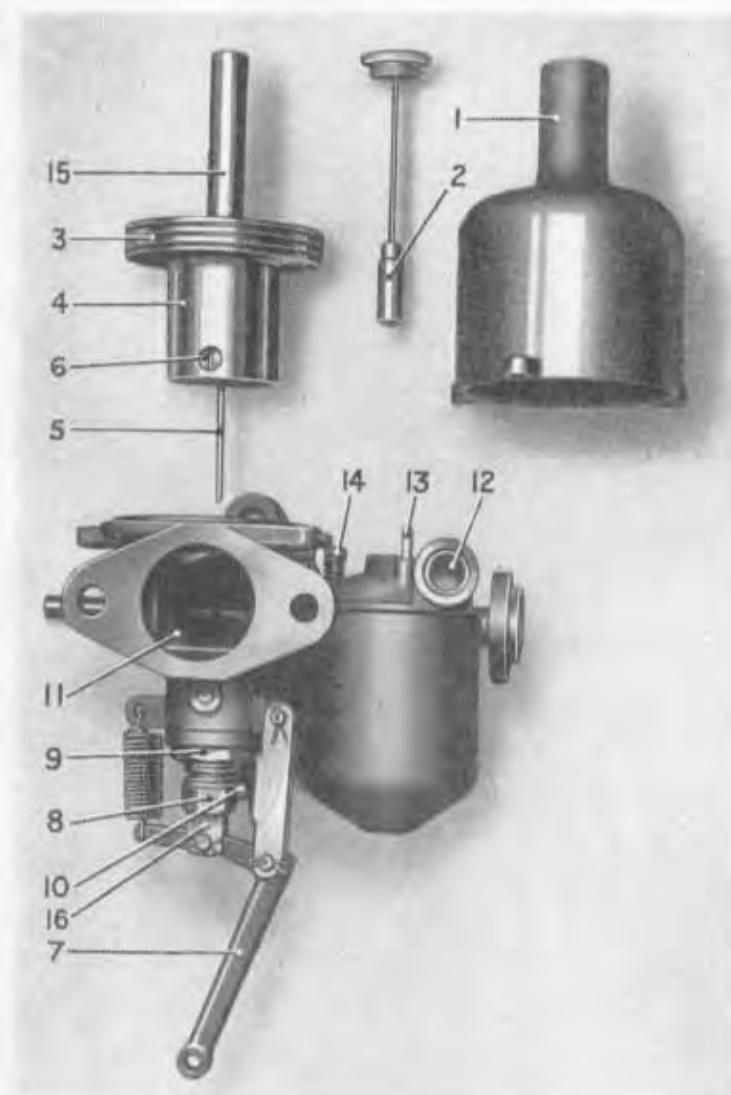


Fig. 14.—CARBURETTER—EXPLODED VIEW.

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| 1. Air valve cylinder. | 9. Nut (not to be disturbed). |
| 2. Hydraulic damper piston. | 10. Plug securing float chamber. |
| 3. Suction disc. | 11. Throttle valve. |
| 4. Piston, air valve. | 12. Gauze strainer. |
| 5. Needle valve. | 13. Float depressing plunger. |
| 6. Grub screw. | 14. Throttle stop. |
| 7. Mixture lever. | 15. Piston guide rod. |
| 8. Adjustable stop. | 16. Jaw, jet head. |

When the automatic air valve piston rises in accordance with the demands of the engine, the movement is retarded due to the displacement of oil through the clearance existing between the damper plunger and the guide rod. The fall of the automatic air valve is unimpeded due to the ball valve being opened, which allows the unrestricted passage of the displaced oil. No attention should be necessary other than the replenishment of the oil in the reservoir.

Every month, as directed on page 30, the oil reservoir cap nut (4) (Fig. 13), should be unscrewed and the plunger withdrawn, *great care being taken to avoid damage to the plunger rod by bending*, the reservoir should be topped up, if required, with the recommended oil, so as to maintain the level of the oil to the

top of the guide rod only. The plunger should then be replaced, taking care that no dirt or grit is present. A slight steady pressure may be required to displace the oil sufficiently to allow the engagement of the thread of oil reservoir cap nut.

If it is suspected that the automatic air valve is not working correctly, the air intake (10, Fig. 13), should be removed, and a check made by lifting the piston with the fingers, when it should be noted that the piston falls quite freely on to its seat when released.

If any sticking or sluggishness is apparent, it will be necessary to dismantle the air valve assembly; first remove the hydraulic piston damper, next remove the three screws (5, Fig. 13), and lift off the cylinder (3). The piston valve can be then lifted out, *the utmost care being taken not to bend or damage its depending needle valve* (5, Fig. 14), *or to bruise the valve in any way*. The valve, cylinder and guide, should be carefully wiped with a piece of clean cloth dipped in petrol, and the piston rod ONLY lubricated with a few drops of thin oil.

No polishing paste or abrasives should be used to clean the valve or cylinder.

The suction disc (3, Fig. 14), does not touch the walls of the cylinder, there being a small clearance, and it is centralised solely by the piston rod working in the guide. Therefore, any sluggishness in movement is probably due to dirt in the guide, or on the cylinder walls.

When replacing the valve, it will be noticed that there is a slot which must engage a tongue provided on the carburetter body. The cylinder can only be replaced in one position, the three screw holes being unevenly spaced to ensure this.

If the above treatment does not effect a cure, the fault may be due to a bent jet needle or alternatively to the needle fouling the jet. If this is suspected it is recommended that communication is made with Messrs. Bentley Motors (1931) Ltd., or one of their Special Retailers.

The needle valve is secured in position by means of a grub screw, (6, Fig. 14), and if it should be necessary to remove this, as, for instance, when replacing an accidentally damaged needle, it must be particularly noticed that the location of the valve is determined by a shoulder. The valve should be pushed into the piston until this shoulder is just flush with the lower face and the grub screw tightened.

If a needle should be accidentally damaged, a new one must be obtained from either Messrs. Bentley Motors (1931) Ltd., or one of their "Special Retailers". A number is stamped on the end of the needle, denoting the size, and it is essential that only one of the same number is refitted.

Throttle Control.

The quantity of mixture for slow running is determined by means of an adjustable screw stop on the front carburetter (7, Fig. 13), which limits the closing movement of both throttles. This is so adjusted that the engine will idle slowly but reliably when the hand throttle lever on the steering wheel is set right to the bottom of its range and the accelerator pedal released. The stop on the rear carburetter is normally inoperative, and is only used to help initial adjustment.

Re-adjustment of the jets, and of the control shaft between the carburetters, should not normally be required. If, however, the whole adjustment has been disturbed, first adjust the throttles so that both carburetters function equally at "fast idle". An indication that both pistons have risen can be felt by depressing the top of the piston guide rod (15, Fig. 14) by means of a small rod inserted through the top of the cylinder (3, Fig. 13), after removal of the oil cap nut and hydraulic piston damper (4, Fig. 13). The jets should then be adjusted subsequent to this operation, as described below.

Mixture Control and Slow Running.

The mixture control lever on the steering wheel operates to raise or lower the actual fuel orifice or jet, through the medium of the levers (6, Fig. 13.). Raising the jet causes the taper needle to sink further into the orifice, so weakening the mixture. Conversely, lowering the jet enriches the mixture. This control is only intended to provide a means of strengthening the mixture for starting from cold, for normal running the jets must be in their highest position, the back of both the jaws (16, Fig. 14), abutting against the adjustable stops (8, Fig. 14), simultaneously.

The strength or quality of the mixture for slow running is set by means of these adjustable stops, the procedure being as follows:—

With the engine warm, the control rods should be disconnected from the ends of the levers (6, Fig. 13), and the latter pushed up until the jaws (16, Fig. 14), are against the stops (8, Fig. 14). Then, with the engine running, the stops should be manipulated until the engine runs regularly. Any sign of "hunting" is due to the mixture being too rich, and one or both of the stops must be screwed further in and the lever pushed up so that the jaw is against it.

On the other hand, irregular firing, indicated by irregular pulsations from the exhaust pipe, shows the mixture to be weak, and one or both stops must be screwed out a little.

The correct positions for the stops having been found, the control rods must be adjusted so that the jaws of both jets are definitely against the stops when the lever on the steering wheel is at "**Run**".

Float Feed Mechanisms.

These are of the usual "top feed" pattern, whereby, as the level of the petrol rises in the float chamber, a lever bearing on the top of the float moves the conical seat "needle" upwards on to its seating, so shutting off the supply.

If it is required to dismantle the float chambers, it will be most convenient to remove them bodily—after removing the fuel pipes—by unscrewing the hexagon plugs (10, Fig. 14), which secure each to its carburetter body.

When the covers are removed, care must be taken that the fulcrum pins of the levers do not fall out. They are normally retained by means of the walls of the float chambers.

The chambers should be wiped out with a piece of clean wash-leather before being refitted. When replacing them, care must be taken to see that the packing washers are in position, one above and one below the boss which couples each to the carburetter body.

Further Dismantling of Carburetter.

It should never be necessary to remove any other parts of the carburetters than those referred to in the foregoing pages.

The large hexagon (9, Fig. 14), should not be disturbed, as the refitting of this requires special tools to ensure that the jet is accurately centralised relative to the taper needle valve.

Air Cleaner and Silencer.

A cleaner is provided within the front end of the air silencer to prevent the passage of dust and grit to the engine.

The cleaner comprises a composite steel-wool element through which the air passes on its way to the carburetter. It is removed by unscrewing the wing nut in the centre of the end cover, and removing the cover, the element may then be withdrawn.

Every 10,000 miles, unless the car is being operated under particularly dusty conditions, when the cleaning must be carried out at 5,000 miles intervals or even less, depending upon the dust concentration, the cleaner element should be removed and carefully washed in petrol or paraffin, and afterwards oiled with engine oil. It should be thoroughly drained before re-fitting.

Warning.

On no account should the engine be kept running for any appreciable period with the car in a closed garage. There is a grave danger of people in the garage being asphyxiated, owing to the presence of poisonous gases in the exhaust.

Consequently, particular care should be taken always to open the garage doors wide before starting the engine.

