

Foot-operated Oil Pump.

The chassis oil pump is shown in Fig. 5. Normally no attention to the system is necessary beyond filling of the reservoir with the correct oil (see page 28), after removal of the filling plug (2), as directed on page 29.

It should not be filled above one inch from the top of the filler cover.

When the reservoir is nearly empty it will be found that the pedal returns instantly after depression, due to the presence of air in the system.

On the other hand, if the pedal takes an abnormal length of time to return to its raised position, this may indicate that the felt strainer located at the bottom of the reservoir is choked. Under these circumstances a new felt strainer must be fitted.

This is arranged at the bottom of the reservoir, and is removed by disconnecting the two unions (3), and unscrewing the cap (4). An aluminium distance washer, the felt strainer pad, and a wire gauze support can then be taken out.

When replacing the parts, the wire gauze support should be refitted in the cap first, followed by a *new* felt pad and, finally, the aluminium distance washer *with its recessed face towards the felt pad*. Packing washers are provided on either side of the aluminium washer, and it should be observed that these are in position.

Normally, the felt strainer pad should be discarded and a new one fitted every 20,000 miles, as directed on page 33. It should never be necessary further to dismantle the pump.

Drip Plugs.

The drip plugs are non-adjustable and non-demountable, and are lettered and numbered to indicate their shapes and relative rates of oil emission respectively, a higher number indicating a greater rate.

The drip plugs never require cleaning, and, being non-demountable, no attempt must be made to take them apart. If one is suspected of being defective, it should be replaced with a new plug of the same rating. (See Fig. 4.)

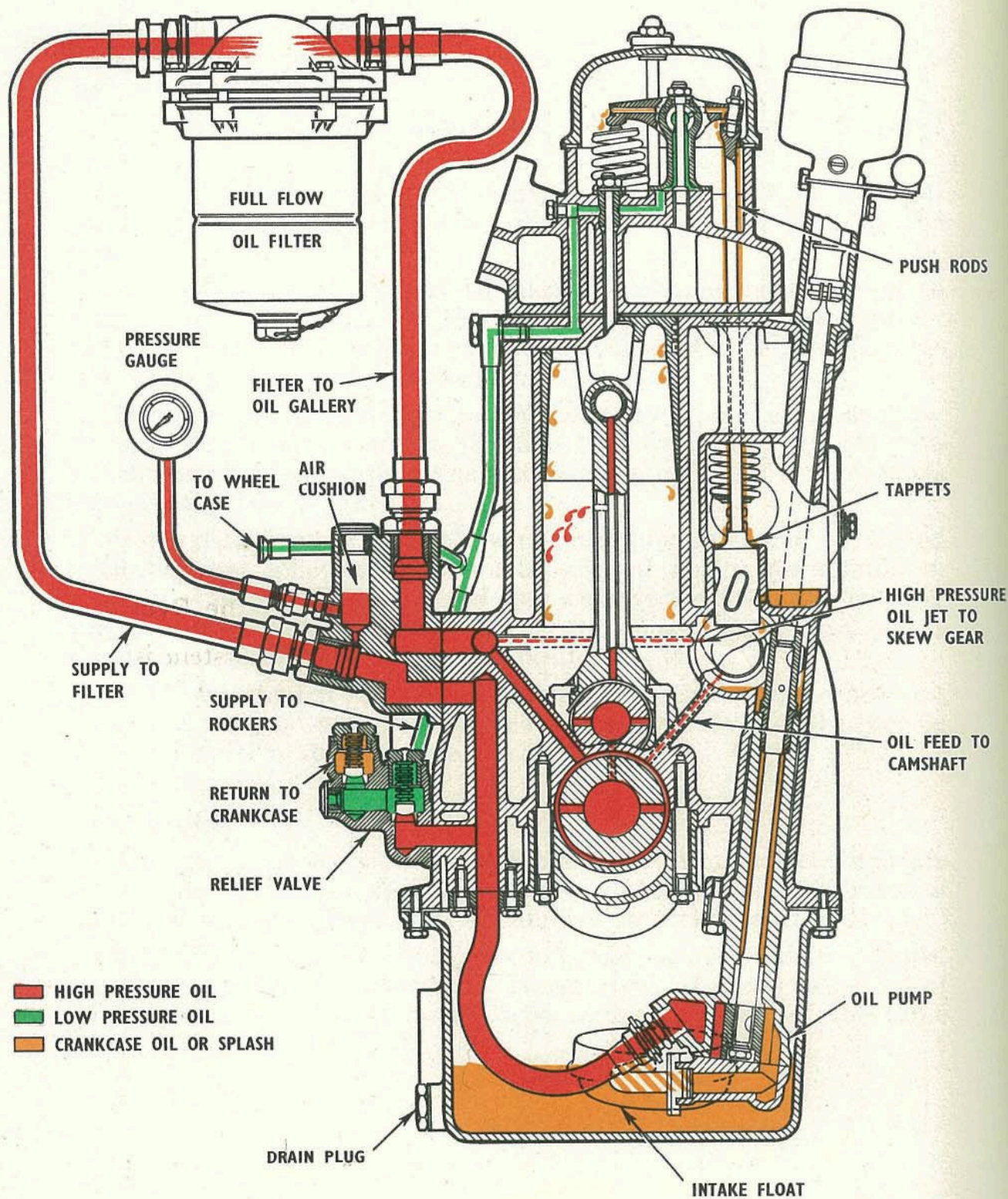


Fig. 6.—ENGINE LUBRICATION SYSTEM.

CHAPTER IV

Engine Lubrication System

Filling the System—Oil Pump—Oil Filter—Crankshaft and Connecting Rods—Relief Valves—Valve Rockers, Push Rods and Tappets—Camshaft—Oil Sump—Oil Level Indicator—Oil Pressure.

The engine lubrication system is of the forced feed, full-flow filtered type, and is diagrammatically illustrated in Fig. 6.

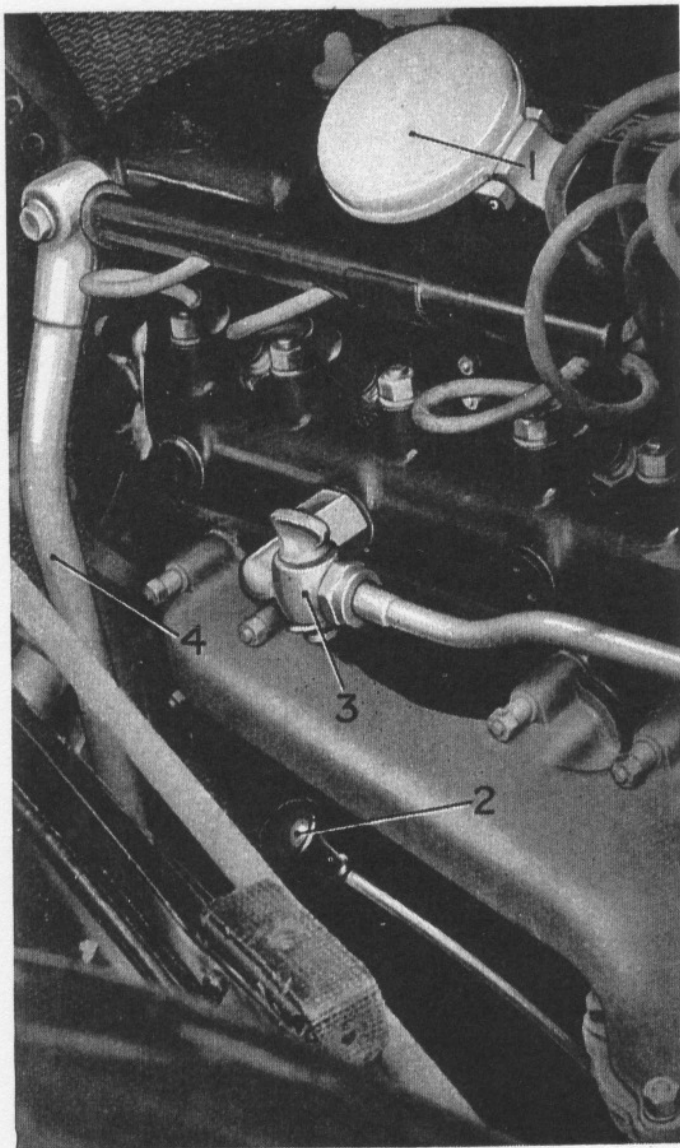


Fig. 7.—FILLER CAP AND DIPSTICK.

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| 1. Engine oil filler cap. | 3. Heater—Isolating tap. |
| 2. Dipstick. | 4. Breather pipe. |

Recommended oils will be found on page 27.

Filling the System.

The system is filled, or topped up, by opening the oil filler cap (1, Fig. 7), on the inlet rocker cover, and pouring in the required amount of recommended oil.

It should be appreciated that it takes a little time for the oil to drain through to the sump, especially if the oil is cold.

The level of the oil should be frequently checked with the dipstick (2, Fig. 7), **when the engine is not running**, and the system regularly topped up as required (see page 29), so as to keep the level of the oil up to the "Max" mark.

Oil Pump.

A gear type pump mounted in the lower half of the crankcase is driven by means of a vertically-mounted shaft and skew gears from the centre of the camshaft. A coupled extension of this shaft also drives the ignition distributor.

The oil intake from the sump is of the floating gauze filter type, ensuring the collection of clean oil, free from sludge.

Oil is drawn by the pump through the floating intake and delivered direct to the full-flow filter.

Oil Filter.

The full-flow filter is fitted on the right-hand side of the crankcase as shown in Fig. 8, and, as previously stated, oil is fed direct from the pump to the filter, and, after passing through the filter, is returned via the relief valves to the main oil gallery, as shown in the diagrammatic illustration, Fig. 6.



Fig. 8.—OIL FILTER.

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| 1. Filter bowl. | 3. Joint washer. |
| 2. Setscrews. | |

Every 5,000 miles, as directed on page 30, the filter element should be discarded and replaced with a new one. It is not practicable to clean the felt element, and no attempt must be made to do so.

To remove the element, unscrew the six setscrews (2, Fig. 8) in the cover and remove the bowl complete with the mesh canister.

Dismantle the canister by unsealing and removing the wing-nut from the bottom cover, extract the felt element and the two felt washers. Discard, and replace with new ones. Re-assemble the canister

and replace in bowl. Fill bowl with oil and refit in position.

When refitting the bowl, ensure that the rubber washer is in good condition and correctly fitted. On next running the engine, it should be inspected for oil leaks around the filter joint.

Crankshaft and Connecting Rods.

The filtered oil is conveyed to the relief valves, from where the main oil supply, controlled at approximately 25 lbs. per square inch, is delivered to the main oil gallery incorporated in the crankcase casting.

From there it is fed through oilways drilled in the crankcase webs to each of the seven crankshaft main bearings, which are of the copper-lead-indium lined steel shell type.

The crankshaft journals and crankpins are bored for lightness and to act as oil conduits, the ends of the holes being plugged with steel caps.

All the main bearings have circumferential oil grooves, and radial holes are drilled in the crank journals to register with these grooves.

Oil from the main bearings passes to the bore of each journal through the radial transfer holes in the crankshaft and then to the crankpins through diagonal ducts drilled in the crankshaft webs, and so through radial holes to each crankpin big-end bearing, these bearings being of a similar type and material to that of the main bearings.

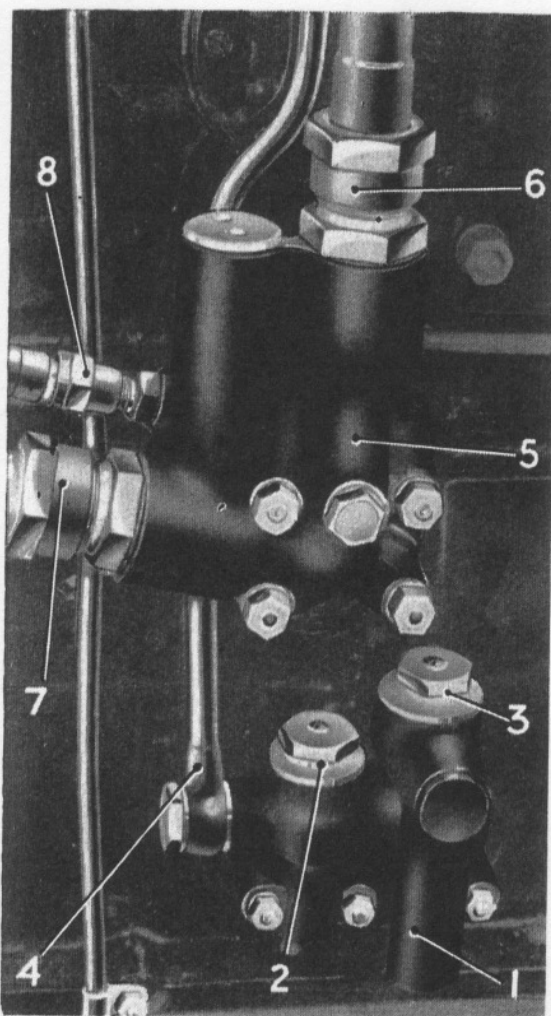


Fig. 9.—RELIEF VALVES.

1. Relief valve unit.
2. H.P. valve.
3. L.P. valve.
4. Feed to rockers.
5. High pressure oil connection.
6. Return from filter.
7. To filter.
8. Pressure gauge connection.

Each connecting rod is drilled to convey oil to the gudgeon pin bearing, the drilling passing through the big-end bearing shell. Small holes are cross-drilled into this oilway to allow a fine squirt of oil to lubricate the cylinder walls.

Two radial holes in the crankpin ensure communication, twice per revolution, with the oilway up the connecting rod. Thus, all the crankshaft and connecting rod bearings are supplied with oil under pressure.

Relief Valves.

The double relief valve unit is mounted on the right-hand side of the crankcase. (See Fig. 9.)

The two valves are in series, and their combined effect is to regulate the pressure of the main high-pressure supply to the crankshaft and connecting rod bearings to approximately 25 lbs. per square inch.

Oil passing the high-pressure valve (2, Fig. 9) enters the low-pressure chamber and from there via a pipe (4) to the inlet rocker shaft.

In order to ensure a supply of oil to the low-pressure system

under all conditions of running, small slots are cut in the seating of the high-pressure valve (2).

If it is suspected that the relief valves are not working properly, they can be inspected by removing the plugs (3 and 2) above the low and high-pressure valves respectively.

In each case the valve spring will be found retained on the plug, and when removed, the valves may be lifted out for inspection and cleaning of valves and seats.

No attempt must be made to alter the spring settings by interfering with the springs themselves, or by varying the number of washers under the plugs.

Care must be taken to replace all parts in a perfectly clean state.

Valve Rockers, Push Rods and Tappets.

The low-pressure oil supply from the relief valves is conveyed via a pipe and oilway through the cylinder block and head to the centre pedestal of the inlet valve rocker shaft, which is drilled longitudinally, and also radially, in the plane of each rocker, to lubricate the rocker arm bearings. The rocker arms are also drilled, the holes running through the bearing bushes, to lubricate the push-rod ball ends and the ends of the valve stems.

Each valve stem is provided with a packing gland, held in position by the inner valve spring, which prevents excess oil from percolating down the valve guides. Oil is returned from the rocker casing to the crankcase through the push rod tunnels.

Camshaft.

The camshaft, driven by single helical gears, is carried in from plain bearings, these being lubricated with high-pressure oil through drillings in the crankcase webs.

The camshaft driving gears are lubricated by the jet in the wheelcase, from the low-pressure system.

Oil Sump.

Under normal circumstances, and with proper attention, the oil filter will maintain the oil in a clean condition.

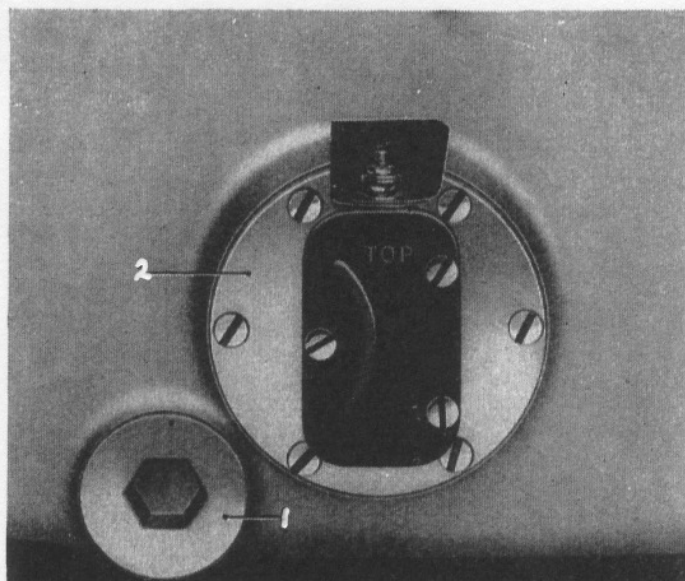


Fig. 10.—CRANKCASE DRAIN PLUG.

1. Drain plug. 2. Oil level indicator float unit.

Owing to the risk of dilution of the oil, however, it is advisable to drain the sump and renew the oil every 10,000 miles, as directed on page 31.

To drain the oil, a plug (1, Fig. 10) is provided in the crankcase sump, which should be unscrewed and the oil allowed to drain out when the engine is warm.

On replacing the plug, ensure that the joint washer is sound and in position.

Oil Level Indicator.

In order that a quick check may be obtained, the petrol gauge on the instrument panel has been so arranged that by depressing the switch (see Fig. 1), it will register the approximate quantity of oil in the engine sump.

The gauge is electrically connected to a float unit fitted into the right-hand side of the crankcase sump (2, Fig. 10.)

The reading should be taken when the car is standing as nearly level as possible.

The amount of oil should be maintained at "**Full**", this corresponding with the "**Max**" mark on the dipstick, and showing that there is approximately 16 pints of oil present. A red line on the gauge indicates "minimum", and the engine should never be run with the oil level below this mark.

Oil Pressure.

Under normal conditions of engine temperature and speed, the instrument board pressure gauge should read approximately 25 lbs.

On starting the engine from cold, however, a higher oil pressure will be indicated, but this need not cause alarm, as the pressure will fall when the engine becomes warmed up.

When the engine is idling and hot, the pressure may fall to 4 lbs., but provided that it increases as the engine speed increases, this is in order.

The car must on no account be run if the gauge reads as low as this *continuously*.

Such a persistently low pressure, which may be accompanied by fluctuations of the gauge needle, may be due to one or more causes.

In the first place, it should be ascertained that there is sufficient oil in the sump by referring to the oil level indicator.

If this is found to be in order, the trouble may be due to a particle of foreign matter having lodged on one of the relief valve seatings and preventing the valve from closing. If the latter is suspected, the relief valve should be inspected and cleaned as directed on page 39.

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CHAPTER V

The Fuel System

The Fuel System—Fuel Pumps—Faulty Operation of Pumps—Fuel Tank—Fuel Filters—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 filter 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.

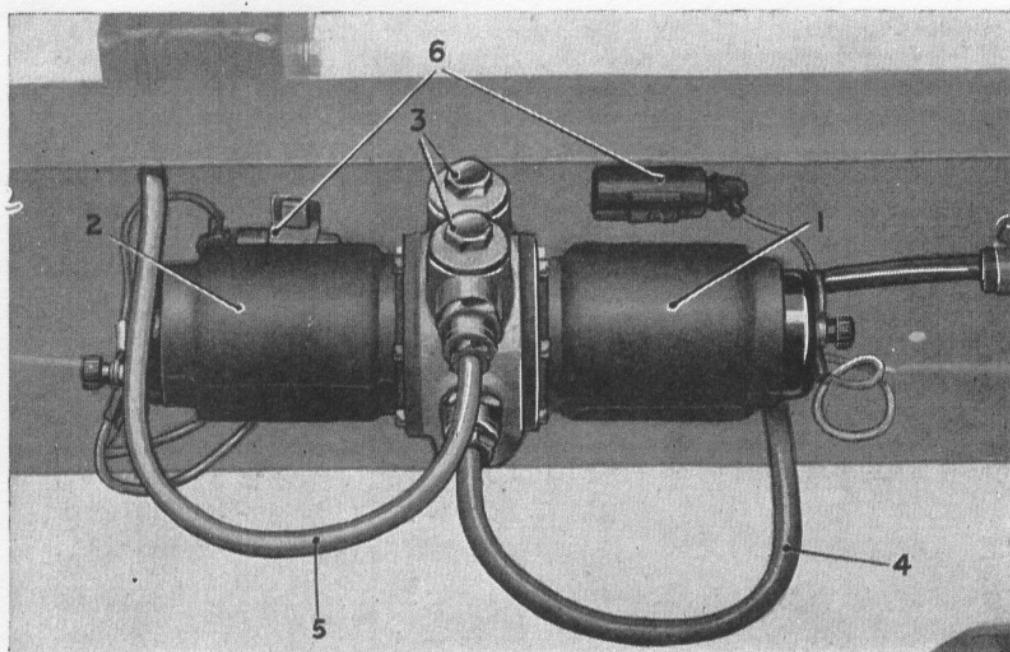


Fig. 11.—FUEL PUMPS.

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| 1. Fuel pump. | 4. Inlet pipe. |
| 2. Fuel pump. | 5. Outlet pipe. |
| 3. Valve caps. | 6. Suppressor condensers. |

From the filter 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 rear filter. (See page 45.) 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.

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.

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.

Fuel Filters.

The rear filter, 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.

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

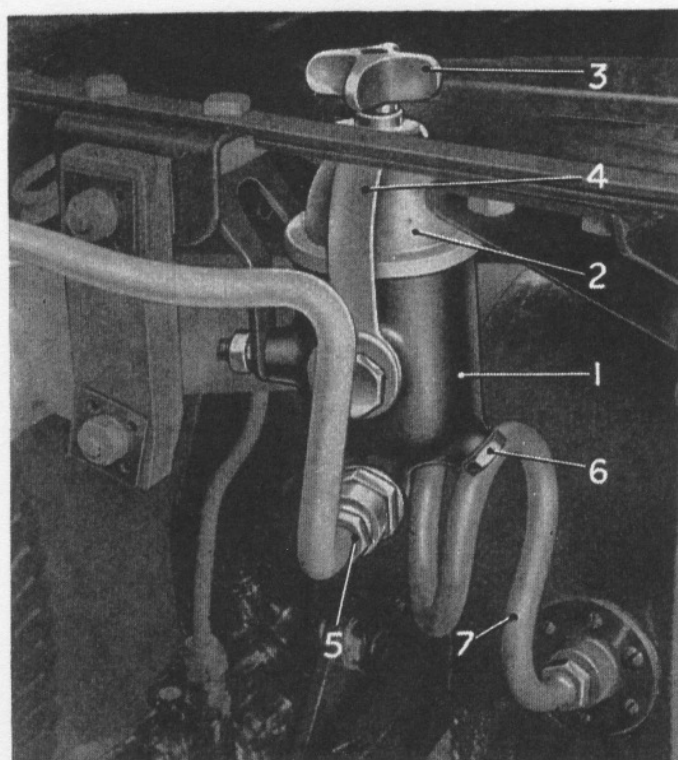


Fig. 12. REAR FILTER.

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| 1. Body. | 5. Outlet pipe. |
| 2. Cover. | 6. Drain plug. |
| 3. Cover nut. | 7. Inlet pipe. |
| 4. Yoke. | |

When refitting the cover, care must be taken that the cork washer is sound, and properly in position, and the nut (3, 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.

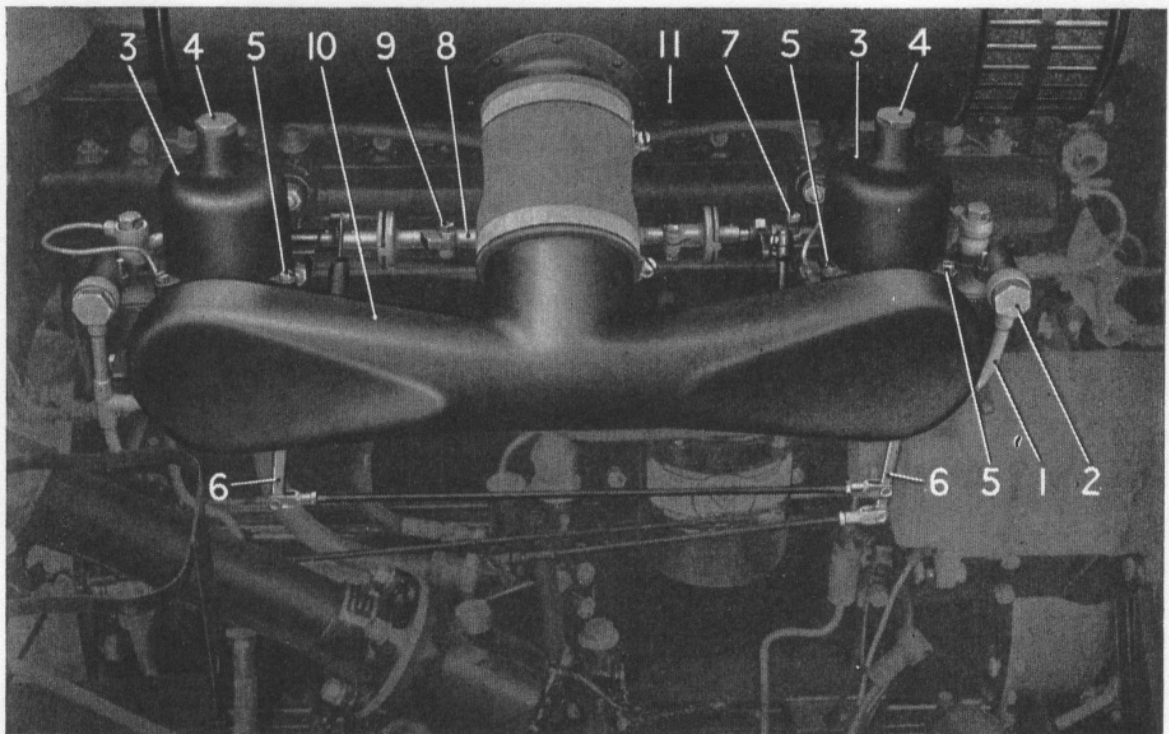


Fig. 13. CARBURETTERS IN POSITION ON ENGINE

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

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