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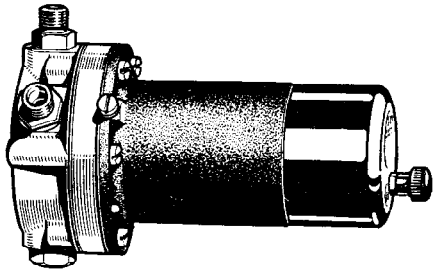
ELECTRIC FUEL PUMPS

CONSTRUCTION AND FUNCTIONING



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PART 1

Section A

DESCRIPTION AND CONSTRUCTION

The 'L' type pump (see Fig. 1) should be mounted in the region of the engine at approximately carburetter level in such a position that a minimum of manifold heat is radiated upon it; also, consistent with that position, the delivery pipe to the float-chamber should be kept as short as possible—the filter plug should be positioned at the bottom and the delivery union at the top.

The 'HP' pump, which is identified by a slightly greater length of body than that of the 'L' type, gives an increased pressure feed to the float-chamber and may be mounted at any point between the region of the engine and the region over the rear tank. It should be approximately at the height of the carburetter or just below it, and the inlet and outlet unions should point sideways in the 3 o'clock or 9 o'clock position. It should not be mounted in such a position that it is affected by heat from the engine and the pipe lines should be as short as possible.

The 'HP' pump may be fitted with single or double contact points, a condenser, an air bottle, or a light spring on the inlet valve.

The pump consists of three main assemblies—the body, the magnet assembly, and the contact breaker.

The body (A) is composed of two aluminium die-castings; into the bottom of the larger one the filter (B) is screwed. The inlet union (C) is screwed in at an angle on one side. The outlet union (D) is screwed into the top. This tightens down onto the delivery cage (E) which is clamped between two fibre washers (F) and (G). In the top of the cage is the delivery valve, a thin brass disc (H) held in position by a spring clip (I), the suction valve (K) being a similar disc resting on a seating machined in the body. Holes connect the space between the valves to the pumping chamber, which is a shallow depression on the forward face of the smaller body casting. This space is closed by a diaphragm assembly (L) which is clamped at its outer edge between the magnet housing (M) and the body. A bronze rod (P) is screwed through the centre of the armature to which the diaphragm is attached and passes through the magnet core to the contact breaker located at the opposite end. A

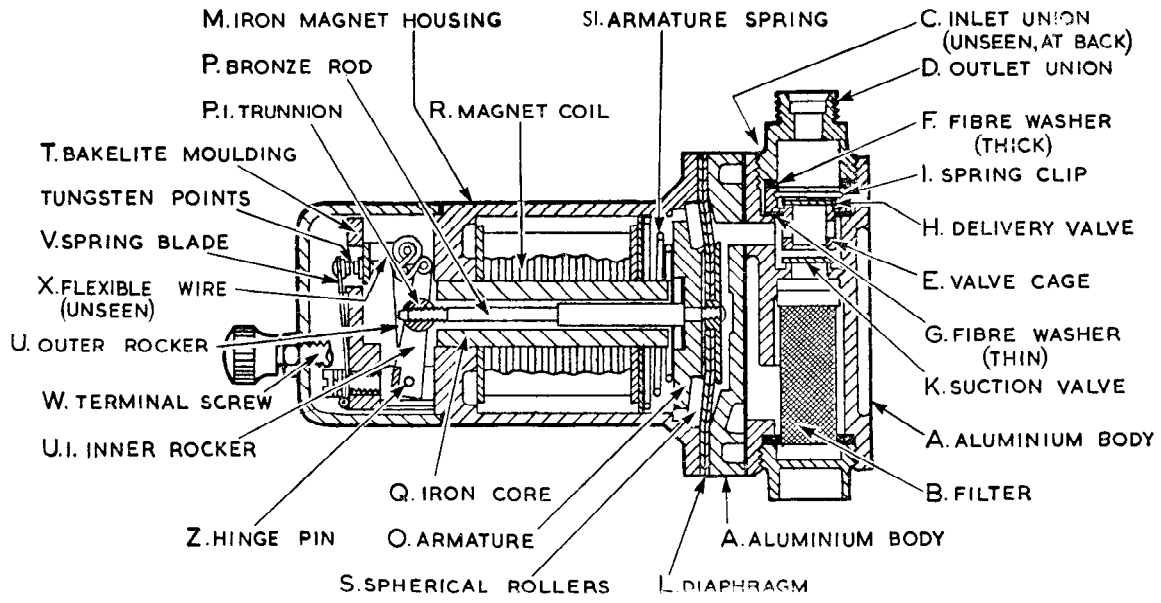

Fig. 1

A typical 'L' or 'HP' type pump in section. See Fig. 2 for 'Dual' type

spring (S.1) is interposed between the armature and the end plate of the coil. There is a fabric joint washer between the larger and smaller body castings.

In a 'Dual' type pump (see Fig. 2) twin filters (B) are held in the lower face of the casting. The inlet union (C) and the outlet union (D) are positioned at the side of the main casting. On the top of the body casting are twin hexagon-headed screwed plugs (F) giving access to the hollow screws (G) which retain the delivery valve cages (E). In the top of the cage is the delivery valve, positioned smooth side downwards and held in place by a spring clip (I), the suction valve (K) being a similar disc resting on the burnished end of an inserted brass tube.

Holes connect the space between the valves to the two pumping chambers, which are shallow depressions in each end face of the body casting. Each chamber is closed by a diaphragm assembly (L) which is clamped at its outer edge between the magnet housing and the body casting.

The magnet consists of a cast-iron pot having an iron core (Q) on which is wound a coil of copper wire (R) which energizes the magnet. Between the magnet housing and the armature are fitted 11 spherical-edged brass rollers (S). These locate the armature (O) centrally within the magnet and allow absolute freedom of movement in a longitudinal direction.

The contact breaker (two in 'Dual') consists of a small bakelite moulding (T) carrying two rockers (U) and (U.1), which are both hinged to the moulding at one end on the rocker hinge pin (Z) and are connected together at the top end by two small springs arranged to give a 'throw-over' action. A trunnion (P.1) is fitted into the centre of the inner rocker, and the bronze rod (P) connected to the armature is screwed into this. The outer rocker (U) is fitted with a tungsten point which makes contact with a further tungsten point on a spring blade (V). This spring blade is connected to one end of the coil and the other coil end is connected to the terminal (W). A short length of flexible wire (X) connects the outer rocker to one of the screws which hold the bakelite moulding onto the magnet housing, in order to ensure a good earth.

Section B

THE ACTION OF THE PUMP

When the pump is at rest the outer rocker lies in the outer position and the tungsten points are in contact. The current passes from the terminal through the coil, back to the blade, through the points, and to earth, thus energizing the magnet and attracting the armature. This comes forward, bringing the diaphragm with it, thus sucking fuel through the suction valve into the pumping chamber. When the armature has advanced nearly to the end of its stroke the 'throw-over' mechanism operates, and the outer rocker flies back, separating the points and breaking the circuit. The spring (S.1) then pushes the armature and the diaphragm back, forcing fuel through the delivery valve at a rate determined by the requirements of the engine. As soon as the armature gets near the end of this stroke the 'throw-over' mechanism again operates, the points again make contact, and the cycle of operations is repeated.

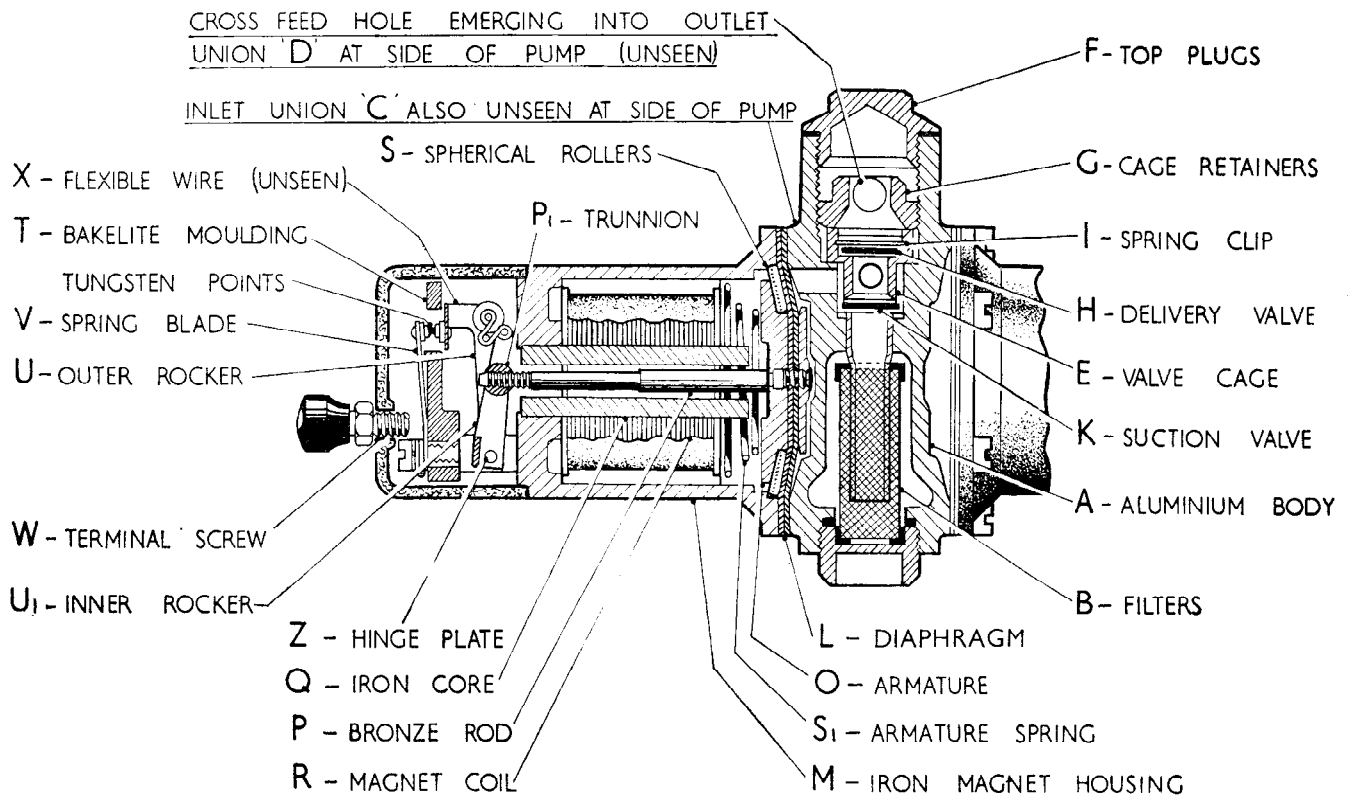

Fig. 2
Part section of a 'Dual' type pump

The spring blade rests against a small projection on the bakelite moulding, and it should be set so that when the points are in contact it is deflected back from the moulding. The width of the gap at the points is approximately ·030 in. (·76 mm.) when the rocker is pulled back against the face of the iron housing.

Section C

FAULT DIAGNOSIS

First disconnect the delivery pipe to the carburetter, and if the pump then works the most likely cause of the trouble is a sticking needle in the float-chamber. Should the pump not work, however, disconnect the lead from the terminal and strike against the body of the pump to see if it sparks and therefore if any current is available. If the current is there, remove the bakelite cover and touch the terminal with the lead when the points are in contact—then if the pump still fails to work it may be due to dirt on the contact faces. This may be cleaned off by inserting a piece of thin card between them and sliding it to and fro. If, however, the pump still fails to work with dirt-free points, check that the bottom filter is not clogged, as this will stop a pump, although a rare happening. Next slacken off the inlet pipe union, and if the pump then operates the trouble is probably due to an obstruction in the pipe line to the rear tank which can possibly be cured by blowing down the line with a tyre pump.

If, however, with the inlet pipe union slackened off, the pump fails to work, or only works slowly and spasmodically, then the trouble is probably due to a fault in the pump itself, such as a stiffened-up diaphragm, or to undue friction in the rocker 'throw-over' mechanism, or to a combination of both. In this case the pump should be returned to the nearest official S.U. Distributor or Dealer for overhaul.

If the pump becomes noisy look for an air leak on the suction side. The simplest way to check for this is to disconnect the fuel pipe from the carburetter and allow the pump to pump fuel into a pint can. If the end of the pipe is then submerged in the fuel and bubbles come through there must be an air leak. Noise can also be caused by fuel boiling before it gets to the pump. This occurs most particularly on cars on which the fuel pipe runs near the exhaust pipe, and this is usually noticed in hot weather when slowing down after driving hard. This trouble can sometimes be overcome by using a different brand of fuel.

If the pump keeps beating without delivering any fuel it is possible that a piece of dirt is lodged under one of the valves. These can be removed for cleaning by unscrewing the top union and lifting the valve cage out. When replacing it see that the thin hard fibre washer is below the valve cage and the thick one above. A choked filter or an obstruction on the suction side will make the pump very hot and eventually cause a failure.

PART 2

Section A

DESCRIPTION AND CONSTRUCTION

The 'LCS' type pump (Fig. 3) can be mounted at any point between the region of the carburetter and the region over the rear tank, and in the vertical plane should be just level with the carburetter or just below it; whilst consistent with the above locations, the pipe lines should be as short as possible.

Do not mount the pump in a position exposed to close and direct heat radiation from exhaust manifolds, etc.

The pump consists of three main assemblies—the body, the magnet assembly (sometimes also referred to as the coil housing assembly), and the contact breaker.

The body (A) is an aluminium die-casting, to which are attached by 2 B.A. screws two identical lids ([B] the top and [C] the lower), the lower one retaining the filter. The top lid gives access to the cage (D) for the outlet valve (E) and, when the cage is unscrewed, to the inlet valve (F) also. These inlet and outlet valves are thin brass discs and should be assembled smooth side downwards; the outlet valve can be extracted (rarely necessary) after the spring circlip has been detached, and care should be taken not to distort this circlip or the correct valve lift may be affected. A $\frac{3}{8}$ in. diameter hole connects the space between the valves to the pumping chamber, which is a shallow depression in one face of the body casting. This space contains the diaphragm unit (J) which is

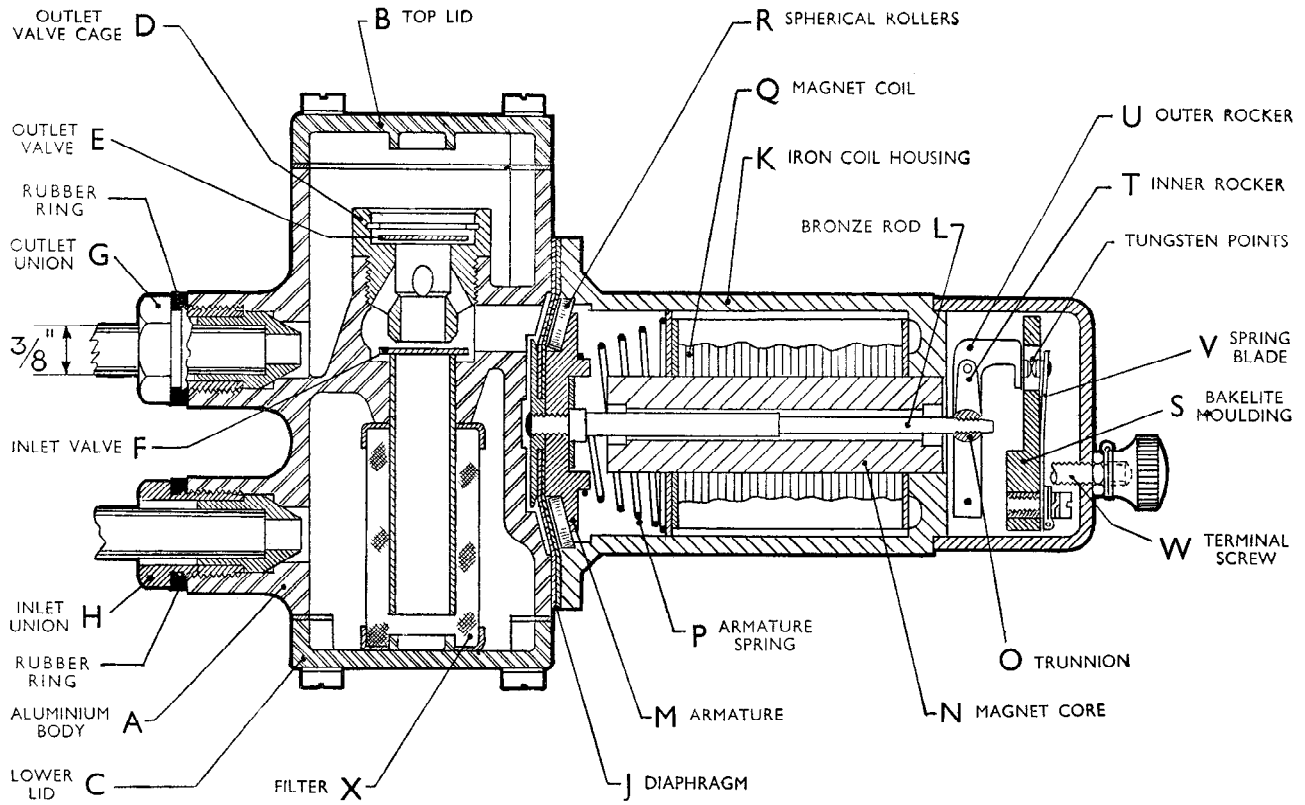

Fig. 3
An 'LCS' type pump in section

clamped on its rim between the iron coil housing (K) and the main body (A).

A bronze rod (L) is screwed to the centre of the armature (M), to which the diaphragm is also fastened, and it passes through the magnet core (N) to the trunnion (O) in the contact breaker. An armature return spring (P) is interposed between the armature and the end of the magnet coil.

The magnet consists of a cast-iron housing (K) having an iron magnet core (N) on which is wound a coil of copper wire (Q) which energizes the magnet. Between the magnet coil housing (K) and the armature (M) are fitted 11 spherical-edged rollers (R). These locate the armature centrally within the magnet and allow absolute freedom of movement in a longitudinal direction.

The contact breaker consists of a small bakelite moulding (S) carrying two rockers, an inner rocker (T) and an outer rocker (U), which are both hinged to the moulding at one end and connected together at their top end by two small springs arranged to give a 'throw-over' action. A trunnion bearing (O) is fitted into the centre of the inner rocker, and the bronze armature sliding rod (L) is screwed into this.

The outer rocker is fitted with tungsten points which make contact with corresponding points on the spring blade (V). This blade is connected to one end of the coil and the second coil end is connected to the terminal screw (W).

A short length of flexible wire connects the outer rocker to one of the screws which holds the bakelite moulding, in order to provide a good earth.

This pump has a good delivery head and can be mounted fairly low down on the chassis. On such a layout it is possible for water or spray from the road wheels to find its way onto the pump, and cases have occurred where this water has percolated between the threads of the union nuts on the fuel pipes and their corresponding threads in the aluminium body; corrosion between the threads has followed, ultimately causing the union nuts to become immovable. To cure this a rubber sealing ring (Part No. AUA4979) has been introduced which should be slipped over the unions before they are screwed into the pump body so that they are nipped between the head of the union and the boss on the pump body to make a watertight seal.

Section B

THE ACTION OF THE PUMP

When the pump is at rest the outer rocker lies in the outer position and the tungsten points are in contact. The current passes from the terminal through the coil, back to the blade, through the points, and to earth, thus energizing the magnet and attracting the armature. This comes forward, bringing the diaphragm with it, thus sucking fuel through the suction valve into the pumping chamber. When the armature has advanced nearly to the end of its stroke the 'throw-over' mechanism operates and the outer rocker flies back, separating the points and breaking the circuit. The spring (P) then pushes the armature and the diaphragm back, forcing fuel through the delivery valve at a rate determined by the requirements of the engine. As soon as the armature gets near the end of this stroke the 'throw-over' mechanism again operates, the points again make contact, and the cycle of operations is repeated.

The spring blade rests against a small projection on the bakelite moulding, and it should be set so that when the points are in contact it is deflected back from the moulding. The width of the gap at the points is approximately ·030 in. (·76 mm.) when the rocker is pulled back against the face of the iron housing.

Section C

FAULT DIAGNOSIS

First disconnect the delivery pipe to the carburetter, and if the pump then works the most likely cause of the trouble is a sticking needle in the float-chamber. Should the pump not work, however, disconnect the lead from the terminal and strike against the body of the pump to see if it sparks and therefore if any current is available. If the current is there, remove the bakelite cover and touch the terminal with the lead when the points are in contact—then if the pump still fails to work it may be due to dirt on the contact faces. This may be cleaned off by inserting a piece of thin card between them and sliding it to and fro. If, however, the pump still fails to work with dirt-free points, check that the bottom filter is not clogged, as this will stop a pump, although a rare happening. Next slacken off the inlet pipe union, and if the pump then operates the trouble is probably due to an obstruction in the pipe line to the rear tank which can possibly be cured by blowing down the line with a tyre pump.

If, however, with the inlet pipe union slackened off, the pump fails to work, or only works slowly and spasmodically, then the trouble is probably due to a fault in the pump itself, such as a stiffened-up diaphragm, or to undue friction in the rocker 'throw-over' mechanism, or to a combination of both.

To check over these two matters unscrew the six flange screws and detach the coil housing and rocker unit from the main body (taking care not to lose any of the 11 rollers under the diaphragm), and then by gently pressing in and out the centre of the diaphragm assembly observe whether the 'throw-over' mechanism seems to operate freely. If it does not and there

are traces of rust on any of the small steel spindles, lubricate *sparingly* with a spot of thin oil on a matchstick where they pass through the brass rockers. Then turn to the diaphragm, and in order to restore its original pliability, ruckle each of the two fabric layers vigorously between the thumb and fingers, after which it can be reassembled and carefully reset for the 'throw over'.

If the pump becomes noisy look for an air leak on the suction side. The simplest way to check for this is to disconnect the fuel pipe from the carburetter and allow the pump to pump fuel into a pint can. If the end of the pipe is then submerged in the fuel and bubbles come through there must be an air leak. Noise can also be caused by fuel boiling before it reaches the pump. This occurs particularly on cars where the fuel pipe runs near the exhaust pipe and is usually noticed in hot weather when slowing down after driving hard. The use of a different brand of fuel will sometimes cure the trouble.

If the fuel pump keeps beating without delivering any fuel it is possible that a piece of dirt is lodged under one of the valves. The valves can be removed for cleaning by unscrewing the top lid and outlet valve cage.

PART 3

Section A

TEST DATA

Brief Technical Data for the Three Basic Types of S.U. Fuel Pump

Figures quoted are for the single pump, but it should be noted that the dual editions of the 'L' or the 'HP' are the same, except that the maximum output is just over double.

Type	*Recommended mounting position*	*Fuel pipe outside diameter*	*Maximum output gal./hour*	*Maximum suction lift (approx.)*	*Maximum output lift (approx.)*
'L'	In region of engine, at approximately carburetter level ..	$\frac{5}{16}$ in. single $\frac{3}{8}$ in. dual	8 (36 litres)	48 in. (122 cm.)	10 in. (61 cm.)
'HP'	Amidships or over rear tank, at carburetter level or just below	$\frac{5}{16}$ in. single $\frac{3}{8}$ in. dual	10 (45 litres)	33 in. (81 cm.)	48 in. (122 cm.)
'LCS'	Amidships or over rear tank, at carburetter level or just below	$\frac{3}{8}$ in.	$12\frac{1}{2}$ (56 litres)	33 in. (81 cm.)	48 in. (122 cm.)

Section B

ILLUSTRATED PARTS LISTS

Pump type	*Voltage*	*Parts List No.*
'L'	6 and 12	AUA207
'HP'	12	AUA208
'LCS'	12 and 24	AUA209
'Dual'	12	AUA210

Identification

Fuel pump voltages may be identified by the colour of the bakelite cap:

Brown 6-volt
Black 12-volt
Blue 24-volt

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