

AMAL

FUEL PUMP, Type 120

Made for
BLACKBURN AIRCRAFT LTD.
(Engine Section).

LIST OF PARTS.

	120/016	Body, top half.			
	120/020	" bottom half.			
C	140/019	Rocker Lever.			
D	140/010	Fulcrum Pin.			
D1	140/012	Fulcrum Pin Split Pin.			
E	140/011	Spindle.			
	136/021-2	Diaphragm Bolt.			
	136/022-1	Diaphragm Bolt Washer.			
	136/023	" " Rivet.			
F	120/029	Diaphragm.			
G	120/028-1	Top Diaphragm Washer.			
	120/030	Bottom Diaphragm Washer.			
H	120/039	Diaphragm Spring.			
K	120/090	Inlet Connection.			
	120/032	Union Nut.			
	120/033-1	" Nipple.			
	120/036	Fibre Washer.			
L	120/026	Filter Cup.			
M	136/068	Filter Gauze.			
	136/027	" " Ring.			
	120/024	" Body Assembly.			
N	136/024	Inlet Valve Disc.			
P	120/022	Delivery Valve Seating.			
	120/023	" " Ball.			
	120/088	" " Cage.			
	136/036	" " Washer.			
	136/056	Lock Wire.			
S	120/096	Priming Lever Complete.			
S1	120/096	" " " "			
T	120/098	Priming Lever Spring.			
	140/013	Side Cover.			
	140/015	" " Packing Washer.			
	140/016	Side Cover Screws.			
	136/006	Side Cover Screw Spring Washers.			
			U	120/119	EDrain Plug Connection.
				120/036	EDrain Plug Connection Washer.
				120/120-1	EDrain Plug Connection Nipple.
			V	120/121	EDrain Plug Connection Nut.
				136/008	SSpring Seat.
			W	140/017-1	SSpring.
			N	120/025A	IFilter Cup Washer.
				AGS939/9	Wing Nut.
				120/027	SStirrup.
				136/063-1	" Eye Bolt.
			Y	136/033-1	IDistance Piece for Stirrup.
				120/031	EBody Fixing Screws.
				136/040	" Washers.
			Z	120/204	ITop Cover.
				88/998	ITop Cover Screws.
				136/006	ITop Cover Screw Spring Washers.
					The following parts are peculiar to pump
				120/504-1 :-	
			I	120/034	IBanjo Bolt.
			R2	120/036	IBanjo Bolt Washers.
				120/091-2	IBanjo.
					The following parts are peculiar to pump
				120/505-1 :-	
			Q	120/118	IBanjo Bolt.
			R	120/089-1	IBanjo.
			and	120/036	IBanjo Washers.
			R1	120/032	IUnion Nut.
				120/033-1	" Nipple.

DESCRIPTION.

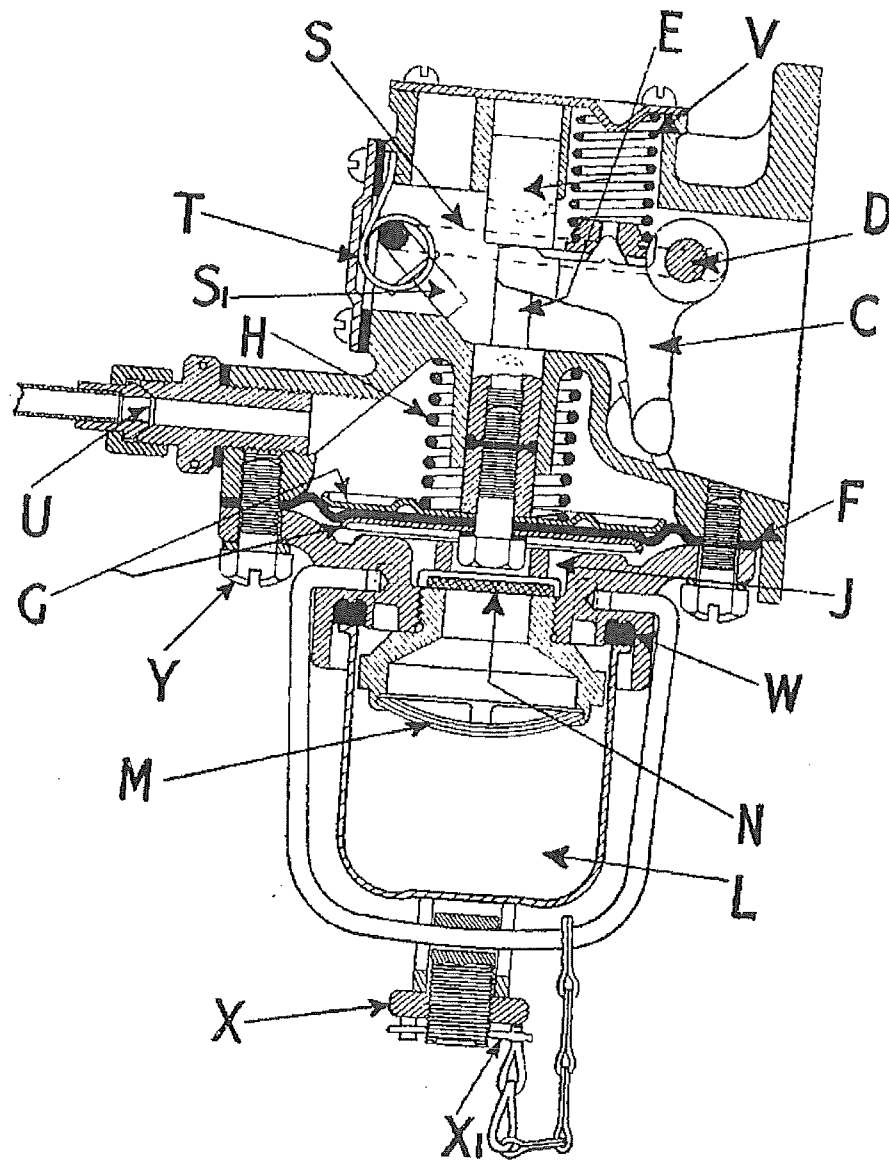


FIG. 1.—Diagrammatic sectional view of pump.
X is now replaced by a wing nut, and the chain and peg X1 by a copper wire.

OPERATION OF PUMP.

OPERATION OF PUMP, OF WHICH THERE ARE TWO.

The Pump is operated by an eccentric on the magneto drive, and this produces a reciprocating movement on a push rod, which operates the rocker lever C, pivoted on a pin D.

When the eccentric cam revolves, the rocker lever C lifts the spindle E to which is fixed the diaphragm F (which is interposed between two metal washers G) so inducing petrol to flow from the tank up the pipe K through the passage K1 into the filter cup L through the filter M and past the inlet valve disc valve N into the pump chamber J.

The eccentric continues to revolve and the diaphragm F commences its downward stroke solely under the influence of the diaphragm spring H. The inlet valve N closes, and the fuel is forced along the passage O past the ball delivery valve P and up to the pipe R1 (and R2) to the carburetter.

When the carburetter float chamber is filled, the float will shut off the needle valve thus creating a pressure in the pump chamber J. This pressure will react against the diaphragm F and the spring H, causing this to remain in a raised position. The lever C, under these conditions, can no longer give the spindle E any movement, due to the fact that it is raised beyond the point where the lever C engages the spindle E. The lever C then simply moves backwards and forwards idly, and when this occurs the pump can no longer deliver any fuel until such time as the needle valve opens in the carburetter float chamber to admit a further supply. The pressure in the pump chamber J then falls and allows the spindle E to drop, and once more to come in contact with the lever C.

The spring H is set at a predetermined pressure, and this cannot be exceeded under any circumstances of the pump's operation.

The spring V is for the purpose of maintaining the rocker arm C in contact with the eccentric cam to prevent noise, and it has no action on the fuel pump itself.

The filter cup L is held in position on a cork washer W by a stirrup, on which there is mounted a nut X, which is screwed up against the filter bowl and is held in a locked position by a copper wire.

To operate the pump apart from engine movement a priming lever S is provided. When operated by hand the point of the priming lever S1 is in contact with the spindle E so lifting the diaphragm. A return spring T is fitted to the priming lever. The operation of the priming lever by hand will lift the diaphragm into a higher position than when operated by the rocker lever C.

The diaphragm F is nipped between the two halves of the pump castings by means of screws Y. In the top half of the pump, that is on the atmospheric side of the diaphragm, there is a drain pipe connection U, so that if in the unheard-of event, a diaphragm were to leak, any leakage would be carried away and would not drain into the engine.

It is recommended that this drain connection be carried to the outside of the machine cowling by a light copper pipe.

On the top of the pump there is an inspection plate Z held down by 4 screws. This plate takes the end pressure of spring V and covers the guide-bore of the pump spindle E.

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T120/504-1 AIRCRAFT FUEL PUMP. T120/505-1

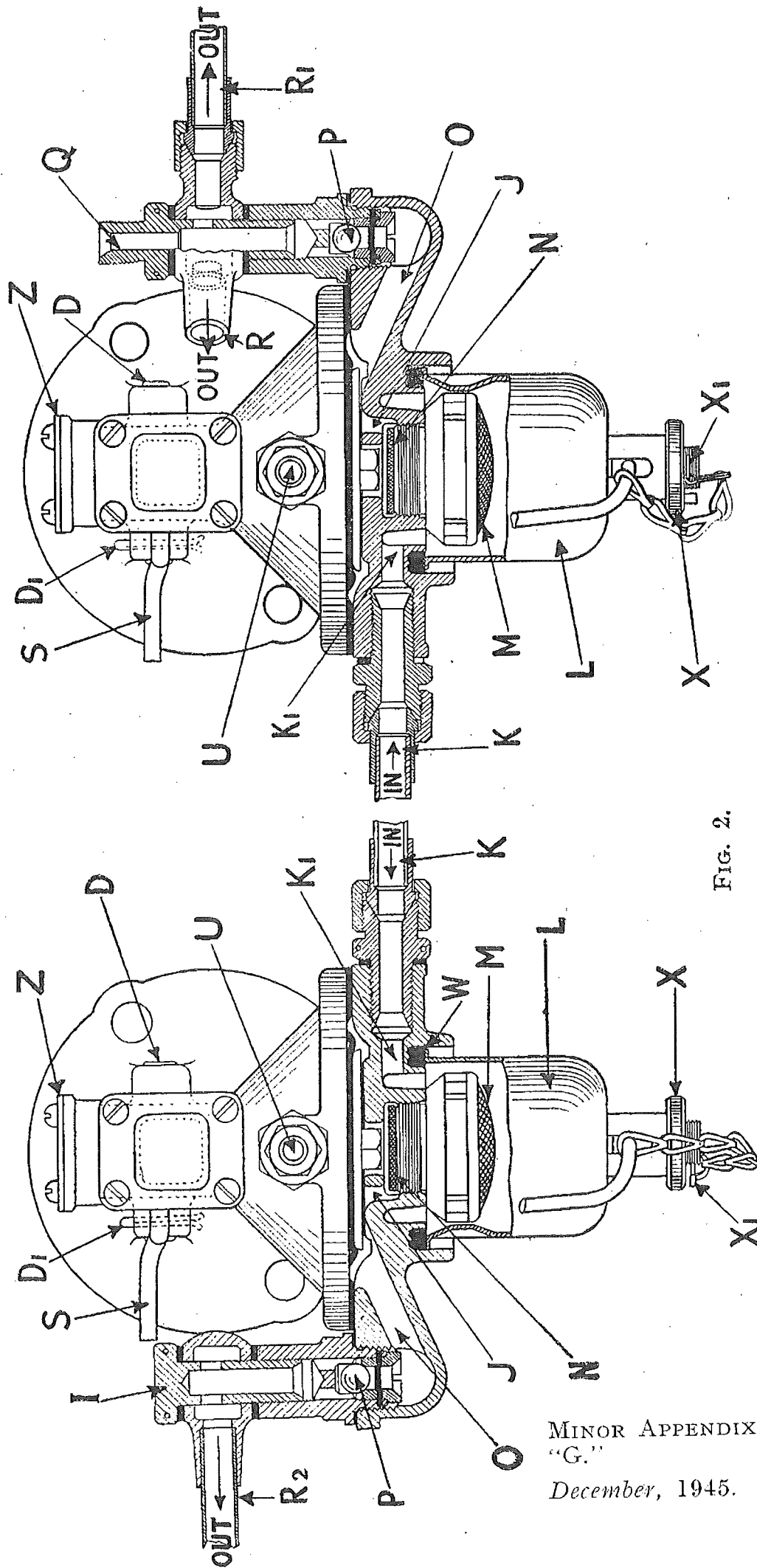


FIG. 2.

MINOR APPENDIX
"G."
December, 1945.

POSSIBLE REASONS FOR FAILURE.

The pump can only fail for two major reasons :—

Firstly, failure of movement of the diaphragm :

- (a). Due to the spindle E not working freely up and down, which fact can be checked by removing the top cover Z and turning the engine over. (The float chamber must be empty or the feed pipe K disconnected at the time).
- (b). Or by the diaphragms having become loose on the spindle or by actual mechanical breakage, which is very unlikely.
- (c). The failure by rupture of the diaphragms is an unheard-of defect, and in the unlikely event of a puncture the pump would continue to work in a certain degree, but a leak of petrol would be seen dripping from the drain plug connection U.

Secondly, due to external air leaks, which should be examined in the following order :

- (1). The connection between the filter cup L and the bottom half of the pump body at the cork washer W. See that the nut X is screwed up tightly, and that the jointing washer W is in good condition.
- (2). Check over for air leaks in the fuel inlet connection K and the piping between the fuel tank and the pump, making certain that all the joints and unions are tight, and that there are no air leaks or leaks in the piping itself. The same remarks apply to the outlet connections R, R1, R2 and Q.
- (3). Make sure that there are no air leaks at the diaphragm joint between the diaphragm and the two halves of the pump. The 6 screws Y must be screwed up tightly.
- (4). Ascertain that there are no impurities lodged on the inlet valve N or on the ball valve seating P, which would cause either of these valves to have an imperfect seating.

MAINTENANCE.

GENERAL CLEANING. Never separate the two halves of the pump by removing the 6 screws Y unless it is absolutely necessary, even though it may be desirable to detach the whole pump from the engine for cleaning or inspection. If it is desired to clean out the fuel passages O, J, and K1, it is easy to remove the connections R, R1, R2 and Q, to sluice out the non-return ball valve passage. The petrol inlet connection K, the filter cup L, are also similarly easily detached, the latter exposing the filter M, which can itself be screwed out, exposing the inlet valve disc and then the fuel passages under the diaphragm can be flushed out with petrol. When replacing these parts note that the filter cup L beds down properly on its cork washer W.

The pump is automatically lubricated from the engine and needs no other lubrication.

INSTRUCTIONS FOR DISMANTLING AND RE-ASSEMBLING.

1. For completely dismantling a pump or pumps, disconnect the fuel pipe connections K, and the outlet connections series R, by undoing the bolts Q and I and the drain pipe connection U. Then remove the pump in its entirety from the engine by undoing the nuts on the flange that hold the pump to the engine.
2. Screw out the delivery valve seating P. If it is desired to remove the non-return ball valve note that the seating is in the form of a screw with a screw-driver slot underneath, but before this can be unscrewed a locking pin will have to be knocked out.
3. Remove the filter cup L by first withdrawing the lock wire at X1, and screw down the nut X, and swing the stirrup to one side. When the cup L is withdrawn the filter M can then be unscrewed and the inlet valve disc will come away. Note that the inlet valve disc N seats on the face at the end of the thread on the filter M and that there is no spring to hold it on its seat.
4. Remove the rocker lever spindle D by extracting the split pin D1 and knocking out the spindle D towards the split pin end. The rocker lever C will then come away, also the spring and spring seating V.
5. Remove the top plate Z, by undoing the 4 screws, with their spring washers, and also the square plate at the front of the pump by undoing its 4 screws and spring washers. The priming lever S with its return spring T will then come away.

continued on page 7.

DISMANTLING AND RE-ASSEMBLING—continued

6. To separate the two halves of the pump to extract the diaphragm and spindle undo the six screws Y and then pull the two halves apart. If there should be any tendency for the diaphragm to cause the two halves to stick together never under any circumstances force any instrument between the diaphragm and the pump flanges, as this method would damage the facings. When the two halves are apart the diaphragm F, with its spindle E and spring H, will slip out.
7. If it is absolutely necessary, and only then, to detach the 4 leaves of the diaphragm from the spindle, the small hexagon-headed pin must first be removed, and to do this the lock pin through the spindle must be punched out. The diaphragm leaves will then come apart from between the two washers G.

RE-ASSEMBLING (Cleanliness is essential).

8. Examine the two large diameter faces of the bottom and top half of the pump castings, and see that they are clean. Be careful, if scraping them, not to damage the faces, otherwise a leak might be caused when the diaphragm is nipped up between them.
9. If new diaphragms are to be fitted to the spindle it is preferable that a new complete unit of diaphragm and spindle be obtained. Otherwise to re-assemble, note carefully the drawing on page 2 showing the relative position of the two washers G and the position of the diaphragm. First, thread on to the small hexagon-headed screw the fibre washer, then the smaller of the two large diameter washers, then the diaphragm leaves, then the larger of the two washers G. Then screw the pin into the spindle; (this must be screwed up tightly into the spindle), and tightened up until the lock pin hole in the screw coincides with the cross hole in the spindle. To make these two holes coincide it may be necessary to fit a new fibre washer. Also carefully note that in tightening up the fibre washer does not split. A new lock pin will have to be fitted, and it must be so riveted in that its ends are underneath the diameter of the spindle in such a way that under no circumstances can the pin move either way. Great care must be exercised not to bend the spindle or to damage its surface.
10. To assemble the top half of the pump, slip the spring H over the spindle E, and place in the top half of the body. Now fit the fixing screws Y with their spring washers into the lower half of the body, and start them screwing up through the diaphragm into the top half, making sure that the bottom half of the body is in the right position in relation to the top

continued on page 8.

half. Then screw them up, but do not tighten up. Next re-assemble the priming lever S with its spring T, and replace the plate, its washers and the 4 screws. Now lift the diaphragm as high as it will go by means of the priming lever S and tighten up the 6 screws Y.

11. Replace the rocker lever C with its fulcrum pin D and the split pin D1, and open out the split pin. Then replace the spring seat into the spring V and push these through the hole nearest the engine flange, making sure that the spring seat fits over the conical projection on the rocker arm. Then replace the plate Z and its 4 screws and washers.
12. Now make sure that the rocker lever works freely against its spring, and that the diaphragm works up and down freely when operated by the priming lever S. This can be seen by looking through the chamber J.
13. Place the inlet valve disc N on to the filter M and screw this up. Replace the filter cup L noting first that the washer W is in good condition. Swing over the stirrup and tighten up the nut X so that it centres in the recess at the bottom of the cup. Then secure by a copper locking-wire.
14. Re-fit the inlet connection K and the delivery valve seating P. The pump is then ready for reconnection to the engine, when the inlet pipe connection K and the outlets series R and Q, and the drain pipe union U may be coupled up and re-wired through the locking holes.

Note that if there is a washer between the crank case and the pump flange, a replacement washer must be of the same thickness, otherwise the stroke of the pump will be varied.

For further instructions, see page 2, section 2.

Finally ascertain that the pump is working freely as the engine is turned over, and also that it pumps the fuel.