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LIQUID FUEL INJECTION PUMPS

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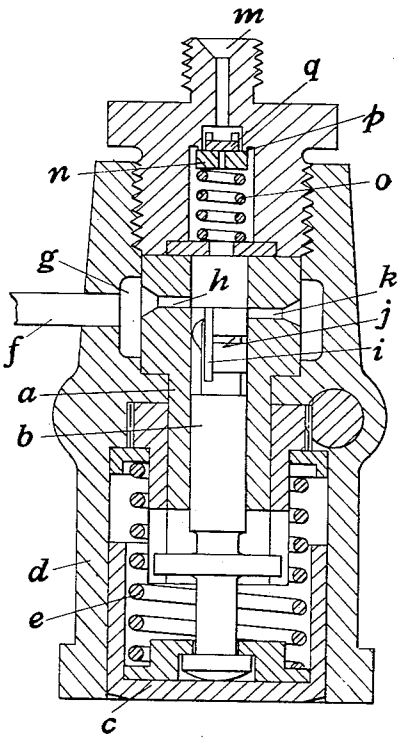


Fig.1

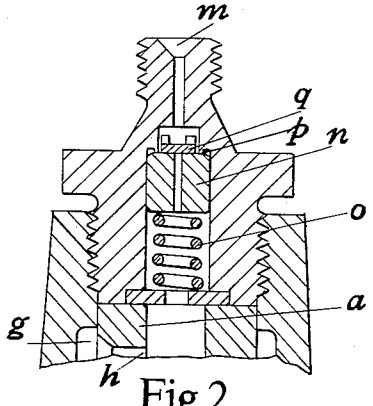


Fig.2

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LIQUID FUEL INJECTION PUMPS

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1 Claim. (Cl. 103—41)

This invention relates to liquid fuel injection pumps for use on internal combustion engines, and of the reciprocatory plunger type in which the discharge during the delivery stroke of the plunger or each plunger is effected in two stages, intermission being caused by the opening of a spill-port under the control of the plunger.

In such a pump it has hitherto been usual to employ either of two conventional forms of non-return delivery valves in association with the discharge end of the pump barrel or each such barrel. The one comprises a spring loaded ball. The other comprises a spring loaded poppet valve having associated with it a short cylindrical portion which occupies a cylindrical bore beneath the valve seating and which requires to be moved clear of the bore before discharge can occur. It has been found that neither of these forms of valves is entirely suitable, as it is desirable during the intermission, and at the end of the discharge, to relieve the pressure in the delivery passage between the valve and the associated nozzle in the engine, and at the same time, obviate risk of so-called cavitation of the liquid fuel in the said passage.

The object of the present invention is to enable the desired relief of pressure in the delivery passage to be obtained in a satisfactory manner.

The invention comprises a pump of the type specified, having combined with the outlet of the barrel or each barrel, a valve formed by a movable and spring-loaded seat member and a closure member supported on the seat member, the closure member being adapted to allow flow from the barrel to the delivery passage, and the seat member being adapted to allow relief of pressure in the delivery passage.

In the accompanying drawings:

Figure 1 is a sectional elevation of a pump embodying the invention.

Figure 2 is a fragmentary sectional view illustrating an alternative embodiment of the invention.

The greater part of the pump shown in Figure 1 is of known construction. It comprises a barrel *a* (or a plurality of such barrels) which contains (or each of which contains) a reciprocatory plunger *b*. The discharge stroke of the plunger is effected by a rotary cam (not shown) acting on the slider *c* contained in the body *d* of the pump, the suction stroke being effected by a spring *e*. Fuel is supplied through a passage *f* to an annular chamber *g* from which it can pass into the barrel through a port *h*. In the plunger is formed a longitudinal groove *i* communicating with a circumferential groove *j*, and in the barrel there is provided a relief port *k* at a lower level than the port *h*, the port *k* being closed by the plunger when the latter is at the commencement of the upward stroke. Other known features of the pump are also shown in the drawing, but as these have no relevance to the present invention, no further description is necessary.

Assuming the plunger to be in the position shown, the first effect of upward movement of the plunger is to cut off the port *h*. Further movement causes the initial discharge of the pump through the outlet *m* which is connected to the delivery pipe. Later the groove *j* reaches the relief port *k* and so interrupts the discharge.

After the groove *j* has passed the relief port *k*, the further movement of the plunger effects completion of the discharge.

According to the invention as illustrated in Figure 1, there is provided at the discharge end of the barrel a seat member *n* which is loaded by a spring *o*, and is held by the spring in contact with an annular seating *p* in the pump barrel. The said member *n* is provided with a central passage, and on the upper side of the said member is supported a closure member *q*.

When the pump is in action, the first part of each discharge occurs past the closure member *q*, and during the interval of intermission between the first and second parts of the discharge, the pressure in the delivery passage is momentarily relieved by the movement of the seat member *n* away from its seat *p* and against the action of its associated spring. The second part of the discharge occurs in like manner, and at the completion of the discharge the pressure in the delivery passage is again relieved by the seat member. In this example the liquid fuel relieved from the discharge passage, can flow around the seat member into the main part of the pump barrel.

The modification shown in Figure 2, is essentially the same as that shown in Figure 1, but differs in the following particulars. The seat member *n* is of piston-like form and is made to fit the adjacent end of the barrel. During the period of intermission and at the end of each discharge, the pressure in the delivery passage moves the closure method inwardly, so forming in the adjacent part of the barrel a chamber which accommodates the liquid fuel returned from the delivery passage.

By this invention the desired relief of pressure in the two stages of each discharge, and the avoidance of weeping at the injection nozzle or nozzles, can be ensured in a satisfactory manner.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

A liquid fuel injection pump having in combination a reciprocatory plunger, a barrel containing the plunger and provided with a fuel inlet port and a spill-port controllable by the plunger, an outlet through which fuel supplied to the barrel through the inlet port can be discharged in two stages by each delivery stroke of the plunger, the discharge being interrupted between the two stages by opening of the spill-port under the control of the plunger, a movable valve seat member situated between the plunger and the outlet and provided with a central passage through which fuel can flow under the action of the plunger, a spring acting on the side of the movable valve seat member remote from the outlet, a stationary annular seat against which the movable seat member abuts under the action of the spring so that liquid flowing to the outlet under the action of the plunger is compelled to pass through the central passage in the movable seat member, and a valve closure member loosely supported on the side of the movable seat member remote from the plunger, to prevent return flow of liquid through the central passage in the movable seat member, the closure member being separable from the movable seat member by fuel pressure to allow fuel flow from the barrel to the outlet, and the movable seat member being separable from the stationary seat by liquid pressure to allow relief of fuel pressure at the outlet with the valve closure member supported on the movable seat member.

References Cited in the file of this patent

UNITED STATES PATENTS

2,421,475	Beeh	June 3, 1947
2,463,374	Garday	Mar. 1, 1949
2,565,681	Fleck et al.	Aug. 28, 1951