This invention has for its object to provide in a simple form a liquid fuel injection pump for an internal combustion engine.

A pump in accordance with the invention comprises a body part having therein a cylindrical bore and a lateral fuel inlet port, a plunger reciprocable in the body part, a toothed regulating rack carried by the body part and slidable in a direction at right angles to the axis of the plunger, and a toothed pinion on the plunger engaging the rack, the plunger being so adapted that under the action of the rack and pinion the output of the pump can be varied.

In the accompanying drawings, Figure 1 is a sectional side elevation, and Figure 2 a cross section on the line 2.2 of Figure 1, illustrating a pump embodying the invention.

In the example illustrated by the drawings, the body part of the pump is made of substantially cylindrical form and has therein a cylindrical bore which at one end forms the working chamber of the pump. The said body part is adapted to be secured to the engine by a flange which embraces the body part at a convenient position. The fuel inlet to the working chamber consists of a lateral port in the body part, and the portion of the lateral adjacent to the said port is embraced by an angularly adjustable collar shaped internally to form an annular fuel reception chamber and having a feed pipe connection with the said chamber, a fluid tight joint between the collar and body part being effected by any convenient sealing rings.

On one end of the body part is secured by a union nut in screw thread connection with the body part, a fuel outlet nipple, and between the inner end of this nipple and the adjacent end of the bore of the body part is contained a non-return valve, the closure member of which co-operates with an annular sealing formed at the outlet end of the bore and is loaded by a spring.

The plunger contained in the bore of the body part extends beyond the end of the said part remote from the discharge end, and has attached to its projecting end a gapped collar which serves as an abutment for one end of a spring which at its other end is supported on the body part. The said projecting end is also adapted to co-operate with a cam (not shown) provided on the engine, the arrangement being such that the cam effects the discharge stroke of the plunger and the spring the suction stroke.

On the plunger is formed a toothed pinion of any convenient length, and in a circular bore in the adjacent portion of the body part is contained a cylindrical regulating rack having teeth formed around it for engagement with the pinion plunger, the said rack being slidable in the body part in a direction at right angles to the axis of the plunger. The rack is operable by the driver or (if desired) by a governor, and its range of movement is determined by a flat groove (Figure 2) formed thereon and a pin which extends across the groove. This pin serves also to lock the body part to the above mentioned fixing flange by engaging a hole in the latter.

Regulation of the output of the pump is effected by imparting an angular movement to the plunger by the rack and pinion, the plunger being adapted to effect control of the amount of fuel discharged in each working stroke. In the example illustrated by the drawings, there is formed on the plunger an obliquely disposed circumferential groove which communicates with the working chamber of the pump through a passage in the plunger.

The mode of action of the pump is as follows: Starting with the plunger at the end of its suction stroke in which position the inlet port is exposed by the plunger, fuel then flows into the working chamber from the surrounding annular feed chamber. During the initial part of the discharge stroke of the plunger the first effect is to close the inlet port. Thereafter fuel is discharged from the working chamber through the non-return valve. Later the oblique groove moves into coincidence with the inlet port, and the residual fuel in the working chamber is returned to the inlet. The instant at which this occurs is variable by actuation of the regulating rack. The return stroke is effected by the spring, and during this stroke the pump outlet is isolated from the working chamber by the non-return valve.

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

A liquid fuel injection pump for an internal combustion engine, comprising in combination a body part provided with a cylindrical bore and with a lateral fuel inlet port leading to the bore, a plunger reciprocable in the bore and capable of angular movement therein, a toothed pinion on the plunger, a toothed regulating rack of cylindrical form slidable in the body part and at right angles to the axis of the plunger, and in engagement with the pinion, the rack having a flat groove thereon, a fixing flange surrounding the body part, and a pin carried by the body part and extending across the groove on the rack into a hole in the fixing flange, so that the pin serves the dual purpose of determining the range of movement of the rack and locking the body part to the fixing flange.

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