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LIQUID FUEL PUMPS FOR INTERNAL COMBUSTION ENGINES

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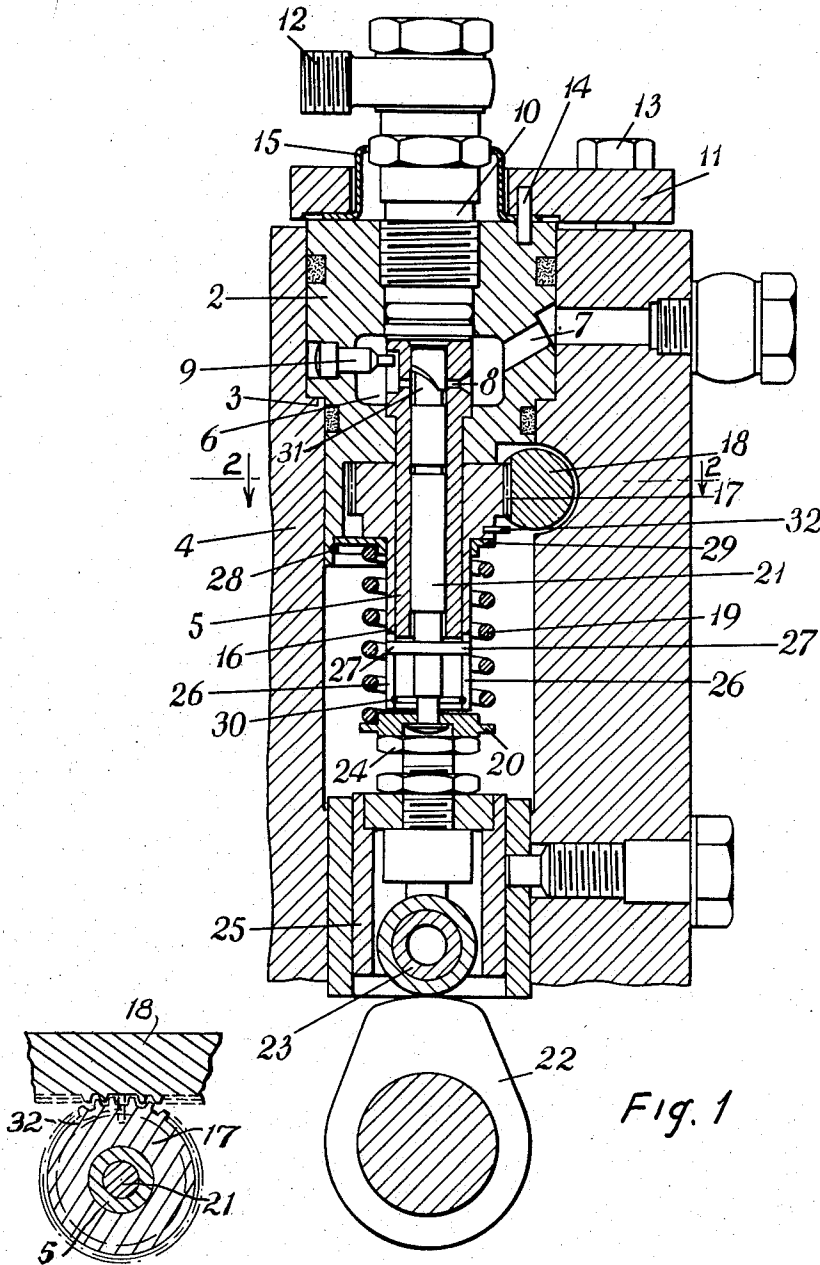


Fig. 1

Fig. 2

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LIQUID FUEL PUMPS FOR INTERNAL COMBUSTION ENGINES

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1 Claim. (Cl. 123—139)

This invention relates to liquid fuel pumps of the reciprocatory and cam-actuated type for internal combustion engines, and has for its object to provide such a pump in a form which enables it to be conveniently incorporated in the housing of the engine.

A pump in accordance with the invention comprises a stepped cylindrical body part adapted to be contained in a bore in the engine housing, a liner forming the pump barrel and extending from the inner end of the body part, a plunger having freedom of axial and angular movements in the barrel, a sleeve supported with angular freedom of movement on the barrel for imparting angular movements to the plunger, the sleeve having thereon teeth adapted to be engaged by a rack for imparting angular movements to the sleeve, a spring mounted on the sleeve for imparting the suction strokes to the plunger, a non-return discharge valve secured to one end of the body part and adapted for connection thereto of a discharge pipe, a securing plate adapted for attachment to the housing and connected to the said body part by a locating pin, and means as hereinafter described for ensuring proper relationship of the rack and sleeve when inserting the pump in the housing.

In the accompanying drawings Figure 1 is a longitudinal section of a pump embodying the invention, and Figure 2 is a fragmentary section on the line 2—2 of Figure 1.

Referring to the drawing, the body part 2 is made of cylindrical form, and is stepped to provide an annular shoulder 3, the body part being adapted to be accommodated in a stepped bore in the engine housing 4. Within the body part is contained a liner 5 which serves as the pump barrel, and which extends from the inner end of the body part. Around the end of the barrel within the body part there is formed in the latter an annular chamber 6 to which the fuel is supplied through a port or ports as 7 in the body part, and inlet ports 8 are formed in the barrel in communication with the said chamber.

The barrel is secured in position by a radially disposed peg 9 inserted in the body part and engaged with a groove in the barrel.

To the outer end of the body part is secured a discharge valve 10, which projects through a pump securing plate 11 and which at its outer end is adapted for attachment thereto of a discharge pipe 12.

The securing plate is adapted for attachment by screws as 13 to the exterior of the housing, and to ensure proper angular relation of the pump body part to the housing, a locating pin 14 is provided which at its ends occupies suitably located blind holes in the plate and body part.

To prevent accidental angular movement of the discharge valve relatively to the body part there is clamped between the securing plate and body part a locking piece 15 comprising a sheet metal sleeve which is flanged at one end and which at the other end has formed in it a hexagonal hole within which lies a hexagonal part of the valve.

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On the inner projecting end of the barrel is mounted an angularly movable sleeve 16 having at one end teeth 17 for engaging an axially movable rack 18 carried by the housing, this rack serving to vary the pump output as hereafter described. On this sleeve is mounted a spring 19 which at one end abuts against a collar 20 secured to the inner end of the pump plunger 21, the spring serving to impart the suction strokes to the plunger. The discharge strokes are effected by a rotary cam 22 in the engine, which cam acts on the plunger through a roller 23, and a thrust piece 24, the parts 23, 24 being carried by a slidable bush 25. Also in the sleeve are formed a pair of diametrically opposite slots 26 with which engage the ends of a pair of radial arms 27 formed on or secured to the plunger for transmitting angular movements from the sleeve to the plunger.

To prevent accidental detachment of the sleeve it is held in position by a circlip 28 which is engaged with a groove in the body part and which abuts against a washer 29 on the sleeve. To prevent detachment of the plunger another circlip 30 is provided in the sleeve and arranged to serve as a stop for the above mentioned arms 27 on the plunger.

For enabling a variable output to be obtained from the pump, the inner end of the plunger has formed on it a spill groove 31 of the known kind which by angular movement of the plunger under the action of the rack serves to return excess fuel to the annular supply chamber.

To ensure proper relationship of the spill groove in the plunger to the ports in the barrel, when placing the pump in position in the housing, one of the teeth in the rack is removed, and at a position opposite the gap between a pair of teeth on the sleeve is secured a radial pin 32, the arrangement being such that the pump can only be inserted in position when the pin can pass through the gapped portion of the rack.

By this invention a pump which in general is of a known type, is adapted to be incorporated with an engine housing in a very simple and convenient form.

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

A liquid fuel pump of the type specified for an internal combustion engine, comprising in combination a hollow body part of stepped cylindrical form adapted to be accommodated in a stepped bore in the engine housing, a pump barrel in the form of a liner secured within and extending from the inner end of the body part, a pump plunger slidable within the barrel and capable of angular movements about its axis, an abutment on the inner end of the plunger, a sleeve supported on the barrel with freedom of angular movement about the axis thereof, and provided with external teeth, means for transmitting angular movement from the sleeve to the plunger, a toothed rack adapted to be slidably supported by the engine housing at right angles to the axis of the sleeve, and engaging the teeth on the sleeve so that sliding movement of the rack is accompanied by angular movement of the sleeve, a securing plate situated at the outer end of the body part and adapted for attachment to the engine housing, a locating pin interconnecting the securing plate and the outer end of the body part, a spring mounted on the sleeve and acting on the abutment on the inner end of the plunger for imparting suction strokes to the latter, a non-return discharge valve secured to the outer end of the body part and extending through a hole in the securing plate, a discharge-pipe connection on the outer end of the valve, and a radial projection on the sleeve at the inner side of, and opposite to the space between two of, the teeth on the sleeve, the rack having one of its teeth removed to provide a gapped portion through which the radial projection on the sleeve can pass when the pump is being inserted into the bore

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in the engine housing, and thereby ensure proper relationship between the rack and sleeve.

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