Jan. 16, 1962 J. E. SMITH 3,016,843

PUMPS

Filed May 27, 1957

FIG.1.

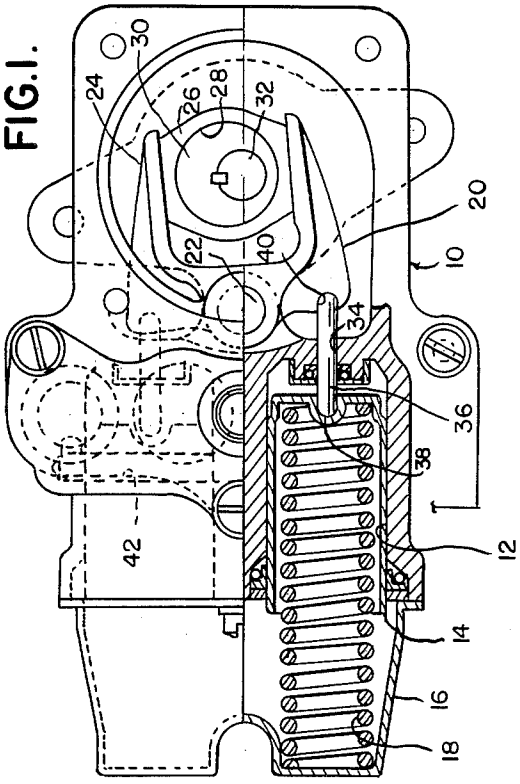


FIG.3.

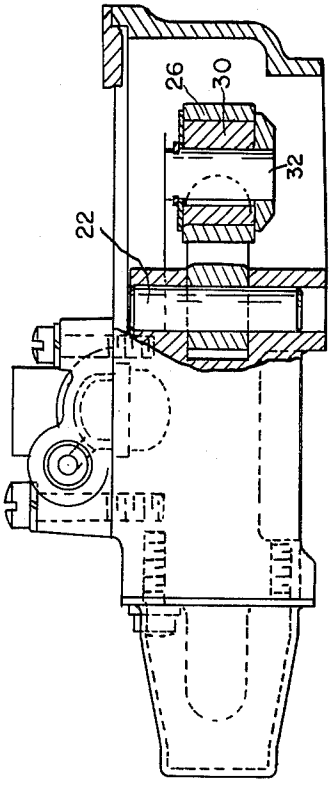
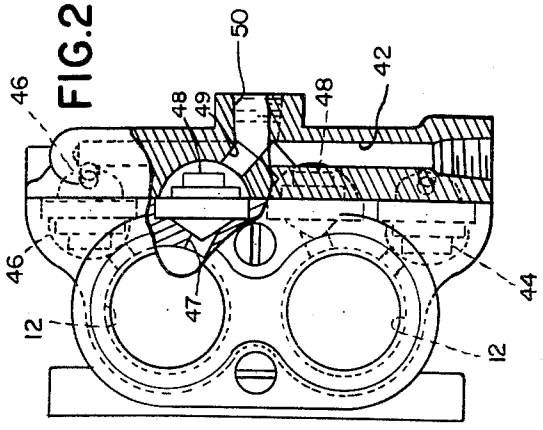


FIG.2.



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PUMPS

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3 Claims. (Cl. 103—170)

The present invention relates to pumps, and more particularly to fuel pumps.

It is an object of the present invention to provide a pump capable of delivering a fluid such as fuel under a substantially uniform pressure on demand.

More specifically, it is an object of the present invention to provide a fuel pump comprising a plurality of pumping chambers including movable pumping elements therein, mechanical means for driving said pumping elements in suction strokes against springs and releasing them for pumping strokes between suction strokes.

More specifically, it is an object of the present invention to provide a fuel pump having a pair of cylinders, pistons movable in said cylinders, springs urging said pistons in pumping strokes, an oscillating driver, mechanical means having a one-way connection between said oscillating driver and said pistons, and check valves controlling flow of fuel into and out of said cylinders.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawing, illustrating a preferred embodiment of the invention, wherein:

FIGURE 1 is an elevational view of a fuel pump with parts broken away.

FIGURE 2 is an end view of the fuel pump shown in FIGURE 1, as seen from the left in FIGURE 1, with parts broken away.

FIGURE 3 is a side elevational view of the device shown in FIGURE 1, as seen from below in FIGURE 1, with parts broken away.

The fuel pump comprises a main frame 10 having a pair of cylinders 12 therein, each cylinder being provided with an elongated cup type piston 14. One end of the cylinders is enclosed by a removable cap 16 which also serves as a seat for the relatively strong, relatively long compression springs 18.

Mounted for oscillation on the frame is a driver 20, the driver being mounted for rocking movement about a pivot pin 22. The driver has a pair of laterally spaced arms 24 between which is located a bushing 26 having an opening 28 in which is received an eccentric disc 30 driven by a rotating shaft 32. The shaft 32 is driven by suitable means such for example as an electric motor. Alternatively, the shaft 32 may be driven in any suitable manner by the engine or other device or apparatus to or from which the pump is to supply fuel or other fluid.

The inner or closed ends of the cylinders 12 are provided with openings 34 through which extend actuating pins 36. One end of the pins is engaged in cup-like recesses 38 in the heads of the pistons and the opposite end of the pins is seated in suitably shaped recesses 40 in the driver.

Referring now to FIGURE 2, in which the body is broken away to two different planes, the casting or frame 10 is provided with an inlet passage 42 which communicates through branch inlet passages, check valves 44 and 46 with the cylinders 12 adjacent the upper ends thereof. The cylinders 12 also communicate through passages 47, check valves 48 and passages 49 with the outlet passage 50.

The operation is believed apparent from the foregoing but will be briefly reviewed. In the first place, it is noted that the stroke of the pistons 14 is relatively short, particularly compared to the length of the springs 18. Accordingly, the force exerted by the springs in different portions of the stroke is not appreciably different. In other words, the particular arrangement of pistons and springs is effective to produce a substantially constant pressure delivery of fuel.

It will also be observed that the pumping action or movement of the pistons is non-positive and accordingly, the pump will deliver fuel only on demand. Thus, when there is no demand for fuel both of the pistons will be depressed against their spring and will be in readiness to deliver fuel on demand.

The cylinders and pistons are proportioned relative to anticipated demand such that delivery under the maximum demand conditions anticipated will not result in movement of the pistons through the extreme stroke permitted by mechanical movement of the actuating pins 36. Since this is the case both pistons will be in condition to deliver fuel during a substantial portion of the cycle. If for example, maximum demand results in movement of each piston throughout half of its permissible stroke it will be understood that movement of the piston is effected against its spring by its actuating pin for an interval only equal to approximately one-quarter of the time and during the remaining three-quarters of the time each of the pistons is effective to deliver fuel under substantially uniform pressure on demand.

It will of course be apparent that the pressure at which fuel is delivered from the outlet 50 by the fuel pump is determined by the strength of the springs 18 and the cross-sectional area of the pistons 14.

While the pump disclosed herein has a particular application as a pump for liquid fuel, it is also adapted to pump any fluid, including air, to provide a vacuum pump capable of pulling a vacuum of about 23 inches of mercury.

The drawing and the foregoing specification constitute a description of the improved fuel or other pump in such full, clear, concise and exact terms as to enable any person skilled in the art to practice the invention, the scope of which is indicated by the appended claims.

What I claim as my invention is:

1. A pump comprising a body having a pair of pump cylinders therein, said body having an inlet passage provided with independent branch inlet passages, one of which is connected to each of said cylinders, a check valve in each of said branch inlet passages disposed to prevent flow of fluid from said cylinders to said branch inlet passages while permitting flow of fluid into said cylinders from said branch inlet passages, said body having an outlet passage provided with independent branch outlet passages, one of which is connected to each of said cylinders, a check valve in each of said branch outlet passages disposed to prevent flow of fluid into said cylinders from said branch outlet passages while permitting flow of fluid out of said cylinders, a piston in each of said cylinders, spring means in each of said cylinders urging said pistons in pumping strokes, and mechanical positive-acting drive means having one-way engagement with said pistons to drive said pistons alternately in suction strokes and thereafter to release said pistons for pumping strokes under the influence of said springs, said drive means comprises a pivoted rocker having a pair of oppositely extending arms alternately movable toward and away from the ends of said cylinders, and actuating means extending into said cylinders and engageable therein with said pistons and engageable with said arms.

2. A pump as defined in claim 1 in which said actuating means comprises pins operatively connected to said arms and having ends freely seated in recesses in said pistons.

3. A pump comprising a body having a pair of pump

cylinders therein, said body having an inlet passage provided with independent branch inlet passages, one of which is connected to each of said cylinders, a check valve in each of said branch inlet passages disposed to prevent flow of fluid from said cylinders to said branch inlet passages while permitting flow of fluid into said cylinders from said branch inlet passages, said body having an outlet passage provided with independent branch outlet passages, one of which is connected to each of said cylinders, a check valve in each of said branch outlet passages disposed to prevent flow of fluid into said cylinders from said branch outlet passages while permitting flow of fluid out of said cylinders, a piston in each of said cylinders, spring means in each of said cylinders urging said pistons in pumping strokes, and mechanical positive-acting drive means having one-way engagement with said pistons to drive said pistons alternately in suction strokes and thereafter to release said pistons for pumping strokes under the influence of said springs, said drive means comprises a drive shaft having an eccentric portion rotatable in said body, an oscillating drive member pivoted in said body and having a parallel sided drive slot, a block slidable in said slot and having an opening receiving the eccentric shaft portion, and actuating means operatively connected to said drive member and engageable with said pistons.

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