Jan. 14, 1930. S. WILTSE 1,743,584

PUMP MECHANISM

Filed June 9, 1927

Fig 1

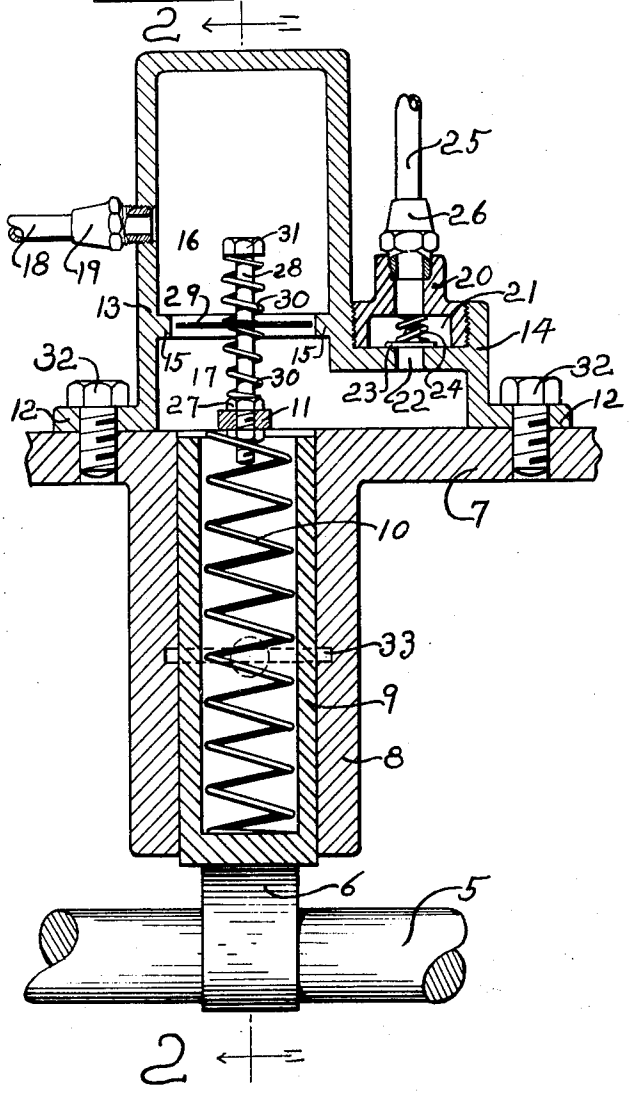
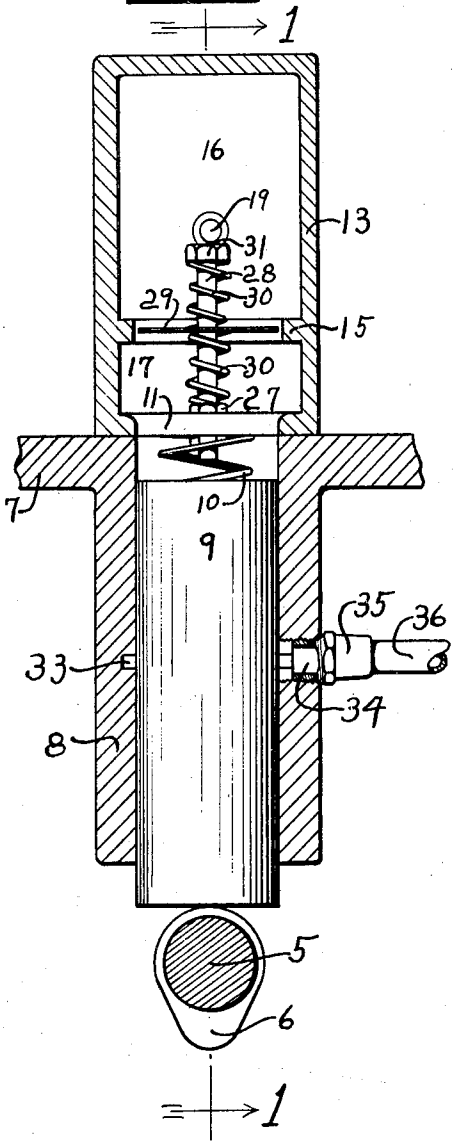


Fig 2



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PUMP MECHANISM

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This invention relates to pumps and particularly to that type employed for supplying fuel to the carburetors of internal combustion engines, the principal object being the provision of a simple, efficient pump mechanism, economical to manufacture.

Another object is to provide a pump comprising a positively reciprocating piston member adapted to set liquid fuel in motion whereby the inertia of the moving fuel will cause it to be pumped to the carburetor.

Another object is to provide a pump mechanism comprising a positively actuated piston member, a pumping chamber, inlet and outlet passages leading to and from the pumping chamber, a check valve being provided for the outlet passage, and a resilient valve member being provided in the path of inflowing liquid adapted to resist the inertia of the liquid set in motion by the piston member whereby the same will be forced past the check valve into the outlet passage.

Another object is to provide a pump mechanism comprising a positively actuated piston member, a pump housing, an outlet passage from the pump housing provided with a check valve for allowing fuel to pass therethrough in one direction only, and a spring controlled valve member restricting the inward flow of liquid into said chamber yieldable to allow return flow of liquid through the supply passage to said pump chamber whereby the maximum pressure in the outlet passage is controlled.

Another object is to provide a pump mechanism for liquids comprising a casing enclosing a reciprocable piston member, suitable means being provided for reciprocating said member, a passage leading into said casing, a check valve for allowing flow of liquid out of said outlet passage and preventing inward flow therethrough, a constricted portion of relatively large diameter being provided in the said casing in the path of the inward flowing liquid, a post positioned centrally and axially of said portion, and a flexible disc slidably positioned on said post and held centrally of said constriction, said disc being resiliently confined within said constriction whereby it may be displaced from its normal position to allow flow of liquid therepast in both directions.

A further object is to provide a pump for liquids comprising a casing provided with a cylinder portion, a reciprocable piston member in said portion for setting the liquid in motion, means for resisting the inertia of the liquid set in motion by the piston member for forcing said liquid through a discharge opening, and a groove in the wall of said cylinder for receiving a lubricant under pressure for preventing leakage of said liquid past said piston.

The above being among the objects of the present invention, the same consists in certain features of construction and combinations of parts to be hereinafter described, with reference to the accompanying drawing, and then claimed, having the above and other objects in view.

In the accompanying drawing which illustrates a suitable embodiment of the invention, and in which like numerals refer to like parts in both the views;—

Fig. 1 is a sectional view taken centrally through a pump built in accordance with the present invention axially of the piston member, as on line 1—1 of Fig. 2.

Fig. 2 is a view similar to Fig. 1 but taken on a line 90 degress removed therefrom, as on line 2—2 of Fig. 1.

In the drawings, by way of illustration, I show a cam shaft 5 of an internal combustion engine provided with a conventional type cam 6 thereon. The adjacent wall 7 of the engine is provided with an inwardly projecting tubular extension 8 suitably bored out to form a cylinder for the piston 9 which is slidably received therein. The cylinder formed within the extension 8 is open at both ends and the piston 9 which is received therein is of substantially the same length as the cylinder. The piston 9 is cup-shaped in section, its closed hardened end abutting against the cam 6 and being resiliently held in contact therewith by means of the coil spring 10 received within its hollow interior and held under compression between the blind end of piston 9 and the cross bar 11 which will be more fully explained in detail hereafter.

Secured to the outer face of the wall 7 by the screws 32 to form a liquid tight joint, is a casing comprising attaching flanges 12, an outwardly extending tubular portion 13 having a closed end, and an off-set portion 14. Within the tubular portion 13 is an interiorly formed abutment or flange 15 dividing the interior thereof into an outer chamber 16 and an inner chamber 17. A pipe or tube 18 connected to a suitable source of liquid, which in the present application may be a liquid fuel, is connected by means of a suitable connection 19 through the end of the portion 13 to the interior of chamber 16. A plug member 20 having a hollow interior 21 communicating with the chamber 17 through the passageway 22 is threadably secured to the off-set portion 14. A disc 23 positioned within the hollow interior 21 of the plug 20, and overlying the opening 22, and which is constantly urged to close the passage by the coil spring 24, forms a check valve for permitting liquid to flow from the chamber 17 past the disc 23 into the interior 21 of the plug 20 but prevents reversal of the flow of the liquid therepast. A suitable discharge pipe or tube 25 communicates through a suitable connection 26 with the hollow interior 21 of the plug 20.

The bar 11 is formed as an integral part of the casing and extends across the open end of the piston in such a manner as not to interfere with the passage of liquid thereby. Supported in the bar 11 and secured thereto against movement by suitable nuts 27 is a screw member 28 serving as a post, positioned centrally and axially of the interior flange 15, and projecting substantially equal distances above and below the same. Slidably supported on the post 28 is a disc 29 of a diameter slightly less than the inner diameter of the flange 15 so as to be freely movable therethrough. The disc 29 is normally held centrally of the flange 15 by means of coil springs 30 surrounding the post 28 on either side of the disc 29, the outer spring 30 being held under slight compression between the disc 29 and the head 31 of the post 28, and the inner spring 30 being held under a like compression between the disc 29 and adjacent nut 27.

The action of the pump is as follows:

When the cam shaft 5 is rotated the tip of the cam 6 is moved inwardly and outwardly to and from the wall 7, the spring 10 causing the piston 9 to follow the inward movement of the cam 6 and imparting a reciprocating movement to the same. As the piston 9 moves inwardly toward the cam shaft 5, the effective volume within the pump housing is increased with the result that liquid is drawn thereinto through the pipe 18. As the piston 9 moves inwardly a suction is created under the disc 29 with the result that the disc is distorted inwardly, in cases where a sufficiently flexible disc is employed, or the inner spring 30, where the disc is not thus flexible, is compressed sufficiently to allow the liquid to flow through the pipe 18 into the chamber 16 and thence past the disc 29 into the chamber 17. Upon outward movement of the piston 9, the liquid within the chamber 17 is put under a slight pressure, the tendency being to force the liquid out of the chamber 17 both past the disc 23 of the check valve and also past the disc 29, the disc 29 tending to resist the inertia of the liquid and force it past the check valve 23 into the pipe 25.

It will be understood that when a construction of this type is applied to an internal combustion engine, the amount of fuel consumed through the carburetor varies considerably, and it is therefore necessary to pump an amount of fuel normally greater than the maximum needs of the engine requirements. Due to this fact the pressure of the liquid which has passed the check valve 23 and entered the pipe 25 will soon reach a point sufficient for the needs of the engine. When this occurs, the check valve 23 will no longer open as long as the pressure remains at this stage, and the liquid in the chamber 17 instead of passing the check valve 23 will cause the disc 29 to be forced outwardly and allow the liquid drawn into the chamber 17 by the piston 9 to be forced back into the chamber 16 and into the pipe 18, there to be drawn back into the pump on the next inward movement of the piston 9. The tension of the springs 30 and the distortable characteristics of the disc 29 as well as the tension of the spring 24 back of the disc 23 may be varied to effect the desired maximum pressure obtainable in the discharge pipe 25, this pressure being kept constant throughout the range of speed of the engine of which the pump forms a part.

In constructions of this type, when applied to internal combustion engines as illustrated, it is important to provide means for preventing the flow of the fuel pumped, past the piston and into the interior of the engine, as in such case the fuel would commingle with and dilute the lubricating oil fed to the bearings of such engine. This leakage is prevented in the present case by providing a circumferential groove 33 in the wall of the cylinder formed within the extension 8 in which the piston 9 reciprocates, the groove 33 being connected by a passage 34, connection 35 and tube or pipe 36 to the pressure side of the engine lubrication system. Oil under pressure is thus introduced into the groove 33 which not only serves to lubricate the piston 9 but which effectively seals the space between the piston 9 and its cooperating cylinder wall against leakage of fuel thereby by reason of the superior pressure of the oil in comparison to the pressure of the fuel in the chamber 17.

It is apparent, of course, that instead of

utilizing the wall 7 of the engine as part of the pump, this portion may be formed separately and be secured with the casing portion, as a unit, to any suitable support.

Formal changes may be made in the specific embodiment of the invention described without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim is:

1. In a fluid pump mechanism, a pumping chamber, a positively actuated piston, inlet and outlet passages leading to and from said chamber, a check valve for said outlet passage, and a resiliently confined valve member in the path of fluid flowing into said chamber, said valve member being displaceable to allow flow of fluid therepast in both directions.

2. In a fluid pump mechanism, a pumping chamber, a reciprocable piston, inlet and outlet passages connecting with said chamber, a check valve for said outlet passage for preventing reversal of flow of fluid therethrough, a constriction in said chamber, and a member normally closing said constriction yieldable to allow flow of fluid therepast in both directions.

3. In a fluid pump mechanism, a pumping chamber, a reciprocable piston, inlet and outlet passages leading into and from said chamber, means for preventing reversal of flow of fluid through said outlet passage, and means in the path of fluid entering said chamber for yieldably resisting the inertia of the flow of fluid therepast.

4. In a fluid pump mechanism, a pumping chamber, a reciprocable piston member cooperating therewith, an inlet and an outlet passage for said chamber, a check valve for preventing reversal of flow of fluid through said outlet passage, a constriction within said chamber, a post axially concentric with said constriction, and a member slidably confined on said post and yieldably held centrally of said constriction whereby to normally substantially close the same.

5. In a pumping mechanism for fluids, a pumping chamber, a reciprocable piston cooperating therewith, an inlet and an outlet passage connected to said chamber, a check valve for said outlet passage, a constriction in said chamber, a post disposed centrally of said constriction, a valve member slidably confined on said post normally closing said constriction, and springs surrounding said post for holding said valve member in its normal position, said springs allowing said valve member to be moved on said post out of its normal position whereby to resistingly allow the passage of fluid thereby in either direction.

6. In a pumping mechanism for fluids, a pumping chamber, a reciprocable piston, an inlet passage and an outlet passage leading to and from said chamber, means for preventing reversal of flow of fluid through said outlet passage, a constriction in said chember, a post positioned axially concentric with said constriction, and a disc supported on said post normally closing said constriction, said disc being yieldable to allow the peripheral edge thereof to be moved past either side of said constriction whereby to permit the flow of fluid therepast in either direction.

7. In combination with an internal combustion engine and a rotatable cam thereof, a fuel pump mechanism comprising an open ended cylinder, a piston reciprocable in said cylinder, spring means urging said piston into contact with said cam, a housing covering said cylinder forming a chamber provided with a constriction, an inlet and an outlet passage connected to said chamber, a check valve closing said outlet passage to reversal of flow of fuel therethrough, a yieldable valve normally closing said constriction allowing flow of fuel therepast in both directions, and means for preventing leakage of fuel from said chamber through said cylinder comprising a circumferential groove in the walls of said cylinder adapted to receive oil under pressure.

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