Nov. 10, 1931. A. M. SANBORN 1,831,035

FLUID MOTOR

Filed July 22, 1929

Fig. 1

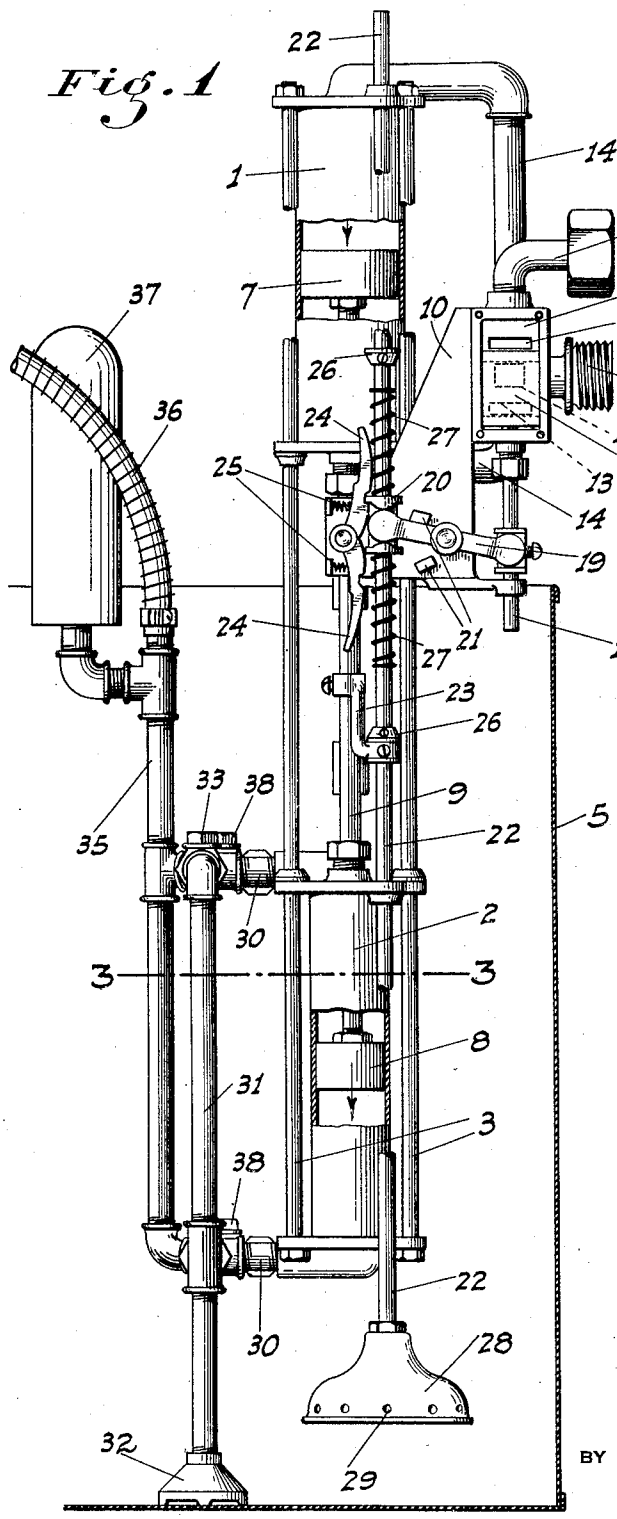


Fig. 2

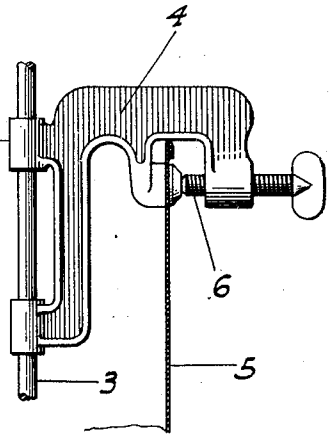
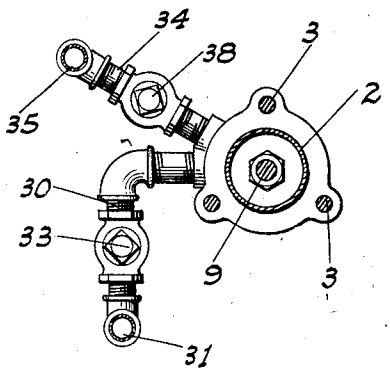


Fig. 3



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UNITED STATES PATENT OFFICE

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FLUID MOTOR

Application filed July 22, 1929. Serial No. 380,069.

This invention relates to reciprocating fluid operated pumps, and particularly to one of a nature which may be operated by water at the ordinary city or domestic pressure, and which may be made as a relatively small and portable device, especially intended for use as a spray pump.

As is well known, the feeding of the water into the power cylinder of the pump must be abruptly halted and reversed at the ends of the strokes, and the object of this invention is to provide a novel and efficient valve controlling mechanism whereby the valve is moved in the sudden manner necessary to obtain the desired result as above outlined.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a side elevation of my improved pump partly broken out shown as mounted in connection with a spray mixture receptacle.

Fig. 2 is a fragmentary view showing the means for detachably clamping the pump to the receptacle.

Fig. 3 is a fragmentary cross section on the line 3—3 of Fig. 1.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes a vertical power cylinder and 2 a pump cylinder longitudinally alined with said power cylinder but spaced therefrom. These cylinders are rigidly connected together as a unit by a plurality of tie rods 3. One of these rods between the cylinders has a clamping frame 4 secured thereto which is adapted to extend inwardly from and overhang the rim of a receptacle 5 (such as a five gallon can) and is provided with clamping means 6 for detachable engagement with the receptacle. The power cylinder is then above the can while the pump cylinder depends into the same.

The pump and power cylinders have pistons 7 and 8 respectively which are connected by a common piston rod 9. Mounted in rigid connection with the power cylinder to one side of the same is a bracket 10 on which is secured a slide valve structure of common form such as is used in steam engines and the like, and which includes a ported box 11 in which a reciprocating valve member 12 is disposed. This box (which is shown with its cover removed) has longitudinally spaced ports 13 connecting with passages 14 leading to the top and bottom of the power cylinder, an intermediate port 15 connected with a discharge passage 16, and a water intake passage member 17. As usual in such devices the valve member 12 is adapted to allow or establish communication between one of the ports 13 and the intake 17 at the same time that the other port 13 is in communication with the discharge port 15; the reciprocation of the valve causing alternating communication to be had between the different ports and passages. The passage member 17 is provided with means for attachment to one end of an ordinary garden hose, the other end of which is attached to an ordinary hydrant. The discharge member 16 is also adapted to be connected to a hose so that the water as discharged may be directed to some point of use, as into an irrigation ditch or the like.

The valve is disposed so as to slide in a plane parallel to the piston rod and its stem 18 is likewise parallel to the rod. Toward its outer end this stem is swivelly connected to one end of a substantially horizontal rocker arm 19 pivoted on the bracket 10, the other end of which arm is swivelly connected to a sleeve 20. This may be conveniently done by forking both ends of the rocker arm, one of the forked ends straddling the sleeve 20 and rockably fitting between the end flanges thereof, and the other forked end similarly engaging a flanged sleeve 18a fixed on the valve stem 18. Stops 21 on the bracket limit the rocking movement of the arm in both directions. The sleeve is freely slidable on a rod 22 parallel to the piston rod and which is itself slidably mounted in connection with the structure. This rod moves through the same stroke as the piston rod by reason of a coupling arm 23 connecting the two. The sleeve 20 at either end of the

stroke of the arm 19 is engaged and held against movement by one or the other of a pair of vertically disposed and oppositely extending catch arms 24 which are pivoted in common at their adjacent ends on the bracket 10. Springs 25 yieldably press the arms toward the sleeve. Fixed on the rod 22 above and below the sleeve are bevel collars 26 which are adapted as the rod approaches one end or the other of its stroke to engage the corresponding catch arm and move the same clear of the sleeve 20. Normally idle compression springs 27 are disposed on the rod between the sleeve and then collapse, said springs being only compressed by the movement of the corresponding collars toward the sleeve, which, as above stated, is normally held against movement by the adjacent catch arm.

As the piston rod is on its down stroke the valve is positioned so that water is being constantly fed to the top of the power cylinder from the intake 17 and is being discharged from the outlet 16. The sleeve 20 is then engaged by the upper catch arm 24 and the upper collar 26 is of course descending. As the piston rod and the rod 22 approach the bottom end of their stroke, said collar engages and compresses the upper spring 27 and finally engages the upper arm 24 and forces the same away from the sleeve. The latter being thus released and free to move the compressed spring acts to suddenly force the same down until it engages the lower catch arm 24, again holding the sleeve against movement by having caused the reversal of position of the valves to take place. The water then enters the power cylinder from below and discharges from the top and the movement of the piston rod and rod 22 are reversed. The valve remains in this last position until with the upward movement of the rod 22, the lower collar 26 compresses the lower spring 27 and finally releases the lower catch arm from the sleeve, causing the position of the valve to be again reversed. The pistons of the power and pump cylinder are therefore continuously reciprocated as long as water under pressure is fed to the intake 17. The lower end of the rod 22 carries a collapsible rubber cup or bell 28 having a row of holes 29 around its lower edge. This cup is positioned so that while it clears the bottom of the receptacle when the rod is at the top of its stroke it engages the bottom of said receptable before the rod reaches the bottom of its stroke and will be flattened or collapsed somewhat with a further downward movement of the rod. This collapsing causes any solid matter settling in the bottom of the receptacle to be agitated and kept in suspension, as will be evident, the upward movement of the cup in the liquid after it clears the bottom of the receptacle also aiding in the agitating movement.

Intake passages 30 lead to the top and bottom of the pump cylinder 2 from a common intake pipe 31 which depends toward the bottom of the receptacle and which at its lower end has a strainer 32 of common form. Check valves 33 opening only toward the cylinder are provided in the passages 30. The cylinder also has top and bottom outlets 34 communicating with a common discharge pipe 35 to the upper end of which a spray hose 36 of common character is attached. An air pressure chamber 37 is associated with the discharge pipe to exert a steadying influence on the flow from the hose. The outlets also have check valves 38 therein opening only away from the cylinder. With this arrangement, as will be evident, the spray liquid from the receptacle is being constantly drawn into one end of the cylinder and is being forced out of the other. The pump cylinder is of considerably smaller cross sectional area than the power cylinder so that a correspondingly greater pressure is obtained in the spray hose than there is in the water supply hose leading to the power cylinder.

Although I have specifically described this structure as being a spray pump of a portable nature and relatively small size, it will be obvious that it may be used for other purposes; and may be made in any size and be arranged as a portable or permanently mounted unit.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

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

1. A valve control structure for the power cylinder of a motor pump, said cylinder having ports to the top and bottom, a piston movable between the ports, and a valve structure arranged to control communication between a water-pressure supply pipe and said cylinder ports; said structure including a reciprocating valve member and a stem depending therefrom; the control structure comprising a rod separate from the valve stem movable parallel to the axis of the piston and connected to the piston to move therewith, a rocker arm pivoted intermediate its ends in a fixed position between the rod and valve stem and engaged at one end with the latter, a sleeve slidable on the rod and engaged by the other end of the rocker arm, oppositely extending and closely associated catches arranged to alternately engage the sleeve to hold the same against movement and main-

tain the valve at one end or the other of its stroke, collars on the rod for alternately bearing against the catches to disengage the same from the sleeve when the rod and piston reach the end of a stroke in either direction, and normally slack compression springs on the rod between the sleeve and collars and adapted to be compressed by the collars before the latter reach and engage the catches.

2. A valve control structure for the power cylinder of a motor pump, said cylinder having ports to the top and bottom, a piston movable between the ports, and a valve structure arranged to control communication between a water-pressure supply pipe and said cylinder ports; said structure including a reciprocating valve member and a stem depending therefrom; the control structure comprising a rod separate from the valve stem movable parallel to the axis of the piston and connected to the piston to move therewith, a sleeve slidable on the rod, a rocker arm connecting the sleeve and valve stem, catch means to alternately engage and hold the sleeve against movement to hold the valve in one position or the other during a full stroke of the piston and rod, means on the rod for releasing an engaged catch when the rod reaches the end of its stroke, and spring means on the rod then acting on the sleeve to shift the same so as to reverse the setting of the valve.

In testimony whereof I affix my signature.

AUGUSTUS M. SANBORN.