J. R. GOULD.

FLUID ACTUATED LIQUID MEASURING PUMP.

APPLICATION FILED OCT. 20, 1916.

1,391,104.

Patented Sept. 20, 1921.

2 SHEETS—SHEET 1.

Fig. 2.

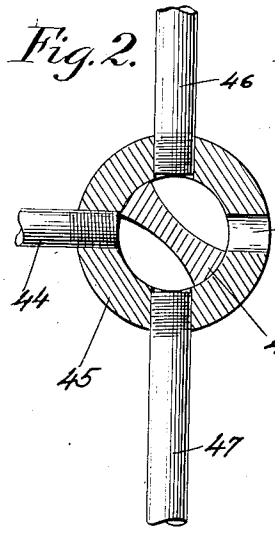


Fig. 1.

Fig. 3.

Witness:

C. Burnap

Inventor:

Joseph R. Gould

By Sheridan, Wilkinson & Scott

Attys.

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2 SHEETS—SHEET 2.

Fig. 4.

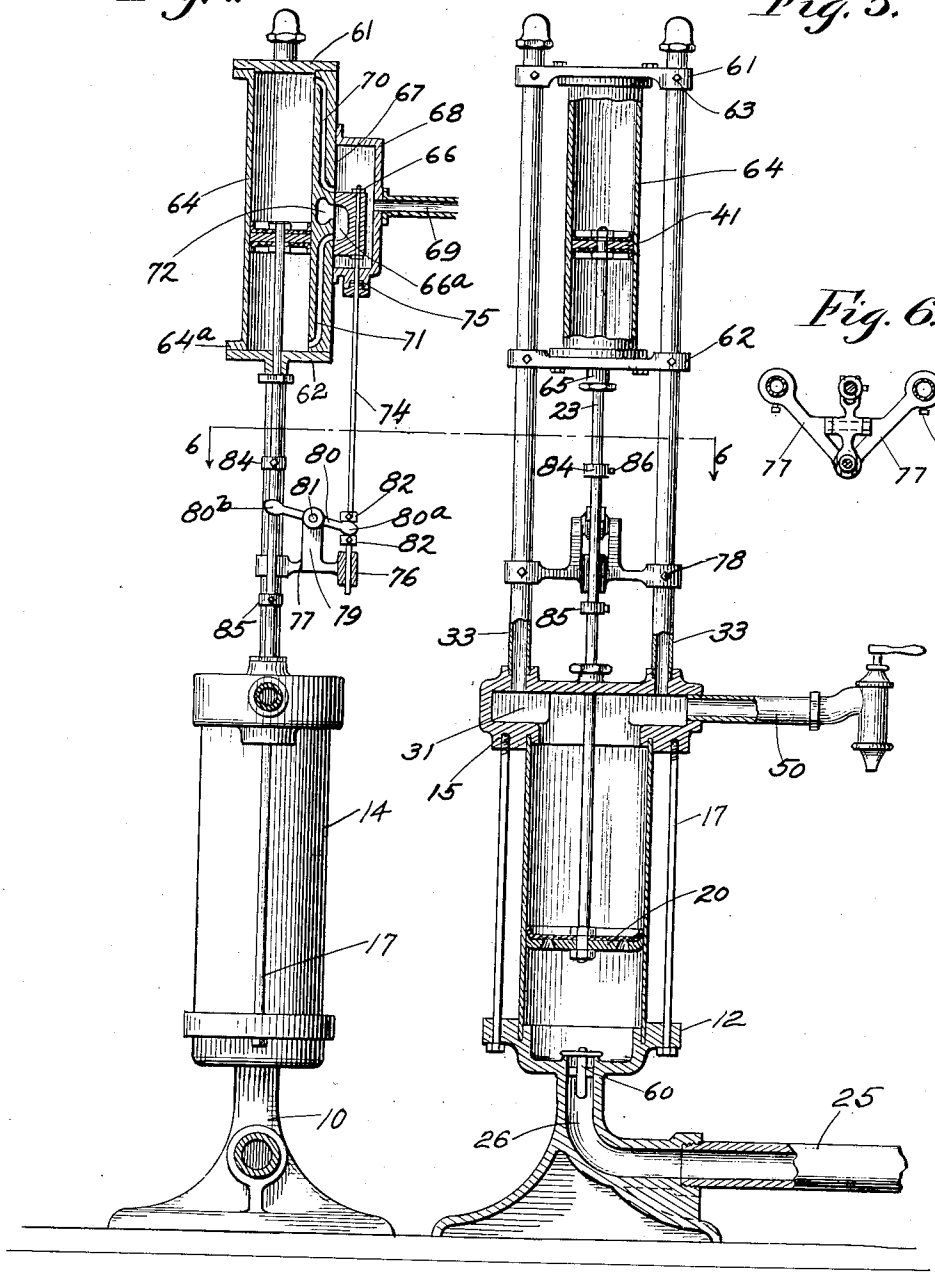


Fig. 5.

Fig. 6.

Witness:

C. C. Burnap

Inventor:

Joseph R. Gould

By Sheridan, Wilkinson & Scott, Attys.

UNITED STATES PATENT OFFICE.

JOSEPH R. GOULD, OF WEST SPRINGFIELD, MASSACHUSETTS.

FLUID-ACTUATED LIQUID-MEASURING PUMP.

1,391,104. Specification of Letters Patent. Patented Sept. 20, 1921.

Application filed October 20, 1916. Serial No. 126,761.

To all whom it may concern:

Be it known that I, JOSEPH R. GOULD, a citizen of the United States, residing at West Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Fluid-Actuated Liquid-Measuring Pumps, of which the following is a specification.

This invention relates to pumps of the kind used for measuring liquids, such as gasolene or the like, and the purpose of the present invention is to provide an improved pump of this kind comprising novel means of operation and features of construction.

Liquid measuring pumps are now commonly used for measuring gasolene and other similar hydrocarbon fuels in garages and other similar places, but these pumps now in use are hand operated and a relatively large amount of work is required of the operator for each gallon of gasolene pumped. It is desirable to provide a pump of this class which may be automatically operated by an economical source of power and which will be simple in construction, so that the cost thereof will not be increased as compared with the hand operated pumps now in use. In all public garages a compressed air supply is always maintained for the purpose of inflating tires, and I have taken advantage of this fact by providing an improved liquid measuring pump which may be operated by this compressed air supply, thus reducing the labor required of the operator while at the same time insuring perfect safety in the operation of pumping the combustible liquid.

The principal object of the invention is to provide an improved liquid measuring pump comprising improved means for operating the same by means of compressed fluid, or the like. Another object is to provide a pump of the class referred to in which the pumping operation is automatically performed by a suitable source of power. Another object is to provide an automatically actuated liquid measuring pump in which the quantity of liquid to be discharged by the pump upon each operation thereof may be varied as desired. Still another object is to provide a liquid measuring pump comprising improved features of construction and arrangement, whereby the pump is simple and economical in construction and efficient in operation.

These and other objects of the invention will appear more clearly from the following specification taken in connection with the accompanying drawings in which two embodiments of the invention are illustrated.

In the drawings—

Figure 1 is a vertical section through one embodiment of my invention showing certain parts thereof in elevation;

Fig. 2 is an enlarged detail sectional view of the valve for controlling the operation of the pump;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1, looking in the direction of the arrows;

Figs. 4 and 5 are vertical sections through another embodiment of my invention, in which the successive operations of the pump are automatically controlled, certain parts of the device being shown in elevation; and

Fig. 6 is a detail sectional view taken on the lines 6—6 of Figs. 4 and 5.

Referring to the embodiment of my invention illustrated in Figs. 1, 2, and 3, it will be seen that my improved pump comprises a metal base 10 having an annular flange 10^a which may be secured by screws, or the like, to the floor 11. The upper part of the base 10 is provided with an annular flange 12 having formed in the upper surface thereof a circular groove 13, adapted to receive and form a fluid tight connection with the lower end of the liquid cylinder 14, which may be a brass tube, or the like. A metal casing 15 seats upon the upper end of the cylinder or tube 14, being provided with an annular groove 16 to receive the upper end of said tube and with an annular flange 16^a which extends downwardly around the upper end of the tube. Suitable stay rods 17 are threaded into the casing 15 and extend downwardly at each side of the tube 14, and thence through suitable apertures in the annular flange 12 of the base. The lower projecting ends of these stay rods are engaged by the nuts 18, whereby the base, tube, and casing are held in assembled relation to form the liquid cylinder. A piston 20 is mounted to reciprocate in the cylinder 14 and has secured to the upper side thereof a leather washer or packing gland 21, which forms a part thereof and which has its outer edges upturned to engage closely the walls of the cylinder. Suitable apertures 22 are provided through the piston 20, and the piston is operated by the piston rod 23 which extends upwardly

through a suitable packing box 24 carried by the casing 15 previously described.

The liquid to be pumped, such as gasolene or the like, is drawn through an intake pipe 25 into a conduit 26 formed in the base 10, and thence through the inlet valve 27 to the chamber 28 below the piston 20. The intake valve 27 comprises a sleeve or guide 27^a which is seated in a suitable depression 29 formed in the upper side of the base 10 and which threadedly engages the walls of an opening communicating with the conduit 26. The cap 27^b of the valve 27 is normally in a closed position as shown in Fig. 1, but when the piston 20 moves upwardly the suction will open the valve cap 27^b and permit the gasolene to be drawn upwardly into the chamber 28 below the piston. Then upon the downward stroke of the piston the leather washer or packing gland 21 will move upwardly at its outer edges away from the piston 20, thus permitting the gasolene to pass upwardly through the apertures 22 into the chamber 30 above the piston, it being understood that upon the downward stroke of the piston the valve 27 will close owing to its weight and the pressure of the liquid in the chamber 28.

For the purpose of operating the pumping apparatus described above, I have provided the novel device now to be explained. The upper part of the casing 15 is provided at opposite sides thereof with two upwardly extending bosses 32 which are apertured and which have rigidly mounted therein the upwardly extending parallel pipes or tubes 33, which pipes are closed at their upper ends by the caps 33^a and which communicate with the chamber 31 of the casing 15, thereby providing air chambers which serve as cushions for the liquid moved upwardly by the pumping apparatus described above. A horizontally extending frame member or support 35, having suitable apertures 35^a to be engaged by the tubes 33, is mounted adjacent the upper ends of said tubes, being secured thereto by bolts 36, and a similar frame member or support 37 is secured to the tubes 33 at a suitable point between the casing 15 and the frame member 35 by means of other bolts 36. The projecting ends of these frame members are secured in rigid relation to each other by means of the stay rods 38. A compressed air cylinder 40 is mounted between the frame members 35 and 37, the ends of the cylinder being seated in suitable depressions formed in said frame members, so that fluid tight connections are formed. A piston 41 is mounted to reciprocate in the cylinder 40 being provided with suitable packing washers 41^a of leather, or the like, and this piston is connected to the upper end of the piston rod 23 previously described, which extends upwardly between the tubes 33 through a suitable packing box 42 carried by the lower frame member 37, and thence upwardly into the cylinder 40.

It will be seen that the operation of the piston 41 in the cylinder 40 will operate to actuate the pumping mechanism previously described, and for this purpose I have provided means for introducing a compressed fluid supply into the cylinder 40 above and below the piston 41, alternately, thereby effecting the reciprocation of the piston rod and the operation of the pump. The supply of compressed fluid, such as the compressed air supply normally found in garages, is introduced to the pumping apparatus through a suitable pipe 44 which leads to the valve 45, from which a pipe 46 extends upwardly to the upper frame member 35, and another oppositely disposed pipe 47 extends downwardly to the lower frame member 37. A suitable duct 48 leads through the upper frame member 35 from the outlet of the pipe 46 to the upper end of the cylinder 40, and a substantially similar duct 49 leads through the lower frame member 37 to the lower end of the cylinder 40. Both of these ducts have relatively large areas where they communicate with the cylinder, as shown in the drawings. The valve 45 is operated by a handle 45^a and it comprises the valve member 45^b which may be moved into different positions to connect the compressed fluid supply with the pipe 46 or with the pipe 47. When the valve is in the position shown in Fig. 2 of the drawings, the compressed fluid supply will be connected to the pipe 47 and thence to the lower end of the cylinder 40 so that an upward stroke of the piston 41 will be produced, and at the same time the fluid in the cylinder 40 above the piston 41 will be exhausted to the atmosphere through the pipe 46, valve 45, and the vent opening 45^c which is provided in the valve casing. When the valve is turned to a diametrically opposite position such as is shown in Fig. 1 of the drawings, the compressed fluid supply will be connected through the pipe 46 to the upper end of the cylinder to produce a downward stroke, and the pipe 47 will be connected to the vent opening 45^c to permit the fluid below the cylinder 41 to be exhausted to the atmosphere. It will be seen, therefore, that by manually operating the valve 45, the piston 41 may be caused to move alternately in opposite directions and thus effect the continuous operation of the pumping mechanism previously described.

The apparatus, as above described, is constructed so that a complete upward stroke of the piston 20 of the pump will carry with it some suitable unit of gasolene, such as a gallon, and the liquid so moved by the piston is discharged through a suitable outlet pipe 50, which, in this instance, is connected to one of the tubes 33, and which has secured to the

outer end thereof the usual anti-drip nozzle or valve 51, having a handle 51ª by which it is operated, and a suitable projection 51ᵇ adapted to support a suitable vessel for receiving the liquid. It will be understood, of course, that the tube 50 may be either a rigid pipe or a flexible hose of any suitable length.

In order to regulate the limit of the complete upward stroke of the pump, I have provided an adjusting screw or member 52 which threadedly engages a boss 53 formed on the upper frame member 35 and which extends downwardly into the upper end of the cylinder 40, where its end is adapted to engage the upper surface of the piston 41 when the latter is at the upper limit of its stroke. It will be seen that by varying this upper limit the amount of liquid discharged through the valve 51 may be varied to secure the desired unit of measure, such as a gallon. Upon each upward stroke of the piston 20 a part of the liquid will enter the tubes 33 and thus prevent any shock upon the parts of the apparatus, and upon the downward stroke of piston 20 this liquid which does not flow out of the nozzle 51, will flow back into the chamber 30 where it commingles with a new supply of liquid which passes upwardly through the openings 22 of the valve 20 upon the downward stroke of the latter. It will be understood that this residue of liquid which remains in the pump above the piston at the end of each upward stroke, is a quantity in addition to the full gallon which is discharged by the pump, the parts of the apparatus being so proportioned and adjusted that a full gallon will be discharged by the complete stroke of the piston regardless of any residue which enters the tubes 33 or which remains in other parts of the pump. In the normal operation of the pump this residue will be substantially constant and will not interfere with the accuracy of the pump as a measuring device.

In order to provide means for measuring other quantities of liquid, such as fractional parts of a gallon, I have provided a fixed threaded rod 54 which is rigidly secured to the bosses 55 carried by the upper part of the casing 15 and the lower part of the frame member 37. Threaded on this rod 54 are a plurality of stop members 56, 57, and 58, the projecting arms of which are adapted to be swung into alinement with a suitable collar or stop 59 fixed on the piston rod 23 by means of a set screw 60. The stop members 56, 57, and 58 may be secured in adjusted position on the rod 54 by means of other set screws 61, or, if desired, the projecting arms of these stop members may themselves be set screws for securing the stop members in adjusted positions. When the stop member 58 is swung into the position shown in Fig. 1 of the drawings, it will engage the stop 59 and thus limit the upward movement of the piston so that three quarters of a gallon of liquid, for instance, will be discharged by the pump. The stop member 57 may be arranged to limit the operation of the piston 20 so that it will discharge one-half a gallon only upon one stroke thereof, and the other stop member 56 may be arranged to control the operation of the pump so that it will discharge some other quantity of liquid, such as one quarter of a gallon, per stroke.

In the operation of the above device, the operator merely manipulates the valve 45 at the upper and lower limits of the stroke of the pump in order to produce the successive operations of the pump, and at the same time he counts the upward strokes to determine the number of gallons of liquid discharged, or, if desired, some automatic counting means may be attached for the purpose of counting the upward strokes.

The embodiment of my invention illustrated in Figs. 4, 5, and 6 is, in most respects, similar to the form described above in so far as the construction of the pump is concerned. However in this construction I have substituted a modified form of intake valve 60 for the valve 27 previously described, and, in this instance, I have shown the outlet pipe 50 as connected to the chamber 31 of the casing 15 instead of being connected to one of the pipes or tubes 33. In this construction the frame members 61 and 62 correspond to the frame members 35 and 37 of the preceding form of the invention, and they are secured to the tubes 33 by means of bolts 63. The piston 41 reciprocates in a cylinder 64 corresponding to the cylinder 40 of the preceding form of the invention, this cylinder being provided with annular flanges 64ª which are secured to the frame members 61 and 62, these frame members serving as cylinder heads for closing the ends of the cylinder. The piston rod 23 leads through a suitable stuffing box 65 into the cylinder 64 and is connected to the piston 41 in the manner previously described. Instead of governing the successive operations of the pump by a manually controlled means, I have provided in this instance a slide valve 66 which is mounted to slide upon the valve seat 67 formed on the enlarged wall of the cylinder 64, being contained within a suitable chest or chamber 68 which is attached to the cylinder and which has communicating therewith a pipe 69 leading from a supply of compressed fluid such as the usual compressed air supply. When the valve is in its lowermost position as shown in Fig. 4 of the drawings, the compressed air will pass from the valve chest 68 through the duct 70 in the wall of the cylinder to the upper end of the cylinder, thereby producing a downward stroke

of the piston 41. At the same time, the fluid in the cylinder 64 below the piston 40 will pass outwardly through the duct 71 to the chamber 66[a] of the slide valve, and thence to the exhaust port 72 which leads to the atmosphere through the wall of the cylinder. When the slide valve is moved upwardly, the fluid above the piston 41 will be exhausted through the duct 70 and the compressed fluid will pass from the valve chest 68 through the duct 71 to the lower end of the cylinder 40.

For the purpose of causing the automatic operation of the slide valve 66, I have provided the valve rod 74 which is slidably mounted in a suitable stuffing box 75 carried by the valve chest 68, and which has its lower end mounted in a suitable bearing 76 carried by the supporting arms 77 which have their enlarged ends apertured to be engaged by the tubes 33, to which they are secured by the set screws 78. It will be seen that these arms 77 are angularly disposed in order to clear the piston rod 23 and to support the bearing member 76 in proper position. These arms 77 are further provided between their extremities with upwardly and inwardly extending arms 79 which serve as supports for the valve control lever 80, which is pivotally mounted thereon at 81. One end 80[a] of this lever is mounted between the collars 82 which are adjustably secured to the valve rod 74 by set screws, or the like, and the other end 80[b] of the lever occupies a position adjacent the piston rod 23 where it is adapted to be engaged by the collars 84 and 85, which are secured to the piston rod by means of the set screws 86. When the pistons 20 and 41 have reached their lower limits of travel, the collar 84 will engage the end 80[b] of the lever 80 and thus move the slide valve 66 upwardly, thereby connecting the upper end of the cylinder 64 to the exhaust port 72, and connecting the lower end of the cylinder 64 to the valve chest 68 so that the compressed fluid supply will then produce an upward stroke of the piston 41 and a corresponding upward stroke of the piston 20, which will effect the discharge of a predetermined quantity of liquid from the nozzle 51. When the upper limit of this stroke is reached, the collar 85 will engage the end 80[b] of the lever 80, thereby moving the slide valve 66 downwardly and causing the lower end of the cylinder 64 to be connected to the exhaust port and the upper end of the cylinder to be connected to the compressed air supply. By means of this construction, the operation of the pump is carried on automatically after the compressed fluid has been admitted to the valve chest 68, and it is only necessary to count the upward strokes of the piston to determine the amount of liquid discharged by the pump. When it is desired to vary the amount of liquid discharged upon each stroke of the pump, the positions of the collars 84 and 85 may be varied on the piston rod 23 to regulate the points at which the valve 66 is operated by the lever 80.

Although I have shown and described certain embodiments of my invention for purposes of illustration, it will be understood that my invention is not limited to these precise forms and that it may be embodied in various different constructions without departing from the scope thereof as defined in the appended claims.

I claim:—

1. In combination, a liquid cylinder and a compressed fluid cylinder mounted in axial alinement with each other, a piston mounted in said liquid cylinder, an inlet valve carried by the piston, a conduit leading to the space on the inlet side of said piston, a second inlet valve leading from said conduit to said space, a second piston mounted in said compressed fluid cylinder, a piston rod connecting said pistons, means to admit compressed fluid to said compressed fluid cylinder on each side of said second named piston alternately, a stop member carried by said piston rod, and an adjustable stop arm mounted adjacent said piston rod to engage said stop member and thereby regulate the length of stroke of said pistons.

2. In liquid measuring and pumping mechanism, a pump cylinder and a compressed fluid cylinder mounted in alinement with each other, a piston mounted in said pump cylinder, an inlet valve carried by said piston, a conduit leading to the space in said pump cylinder on the inlet side of said piston, a second inlet valve leading from the conduit to said space, a second piston mounted in said compressed fluid cylinder, a piston rod connecting said pistons, means to admit compressed fluid to said compressed fluid cylinder on each side of said second-named piston alternately, a discharge outlet leading from the space in said pump cylinder on the outlet side of said first-named piston, and an air chamber to cushion the liquid in said last-mentioned space in said pump cylinder.

3. In liquid measuring and pumping mechanism, a base adapted to rest upon a support and having a duct leading therethrough, a cylinder mounted vertically on said base and communicating with said duct, an inlet valve mounted in said base to control the passage of liquid from said duct to said cylinder, a casing mounted upon the upper end of said cylinder and having a chamber communicating therewith, a pair of vertically extending parallel members secured to said casing, a piston mounted in said cylinder, a piston rod connected to said piston and extending upwardly through said

casing between said vertical members, a compressed fluid cylinder carried by said vertical members, a second piston connected to said piston rod and mounted in said compressed fluid cylinder, and means to admit compressed fluid to said compressed fluid cylinder on opposite sides of said second-named piston.

4. In combination, a base adapted to rest upon a support and having a duct leading therethrough, liquid measuring and dispensing means including a cylinder mounted vertically on said base and communicating with said duct, an inlet valve mounted in said base to control the passage of liquid from said duct to said cylinder, a casing mounted upon the upper end of said cylinder and having a chamber communicating therewith, a pair of vertically extending parallel members secured to said casing, a piston mounted in said cylinder, a piston rod connected to said piston and extending upwardly through said casing between said vertical members, a compressed fluid cylinder carried by said vertical members, a second piston connected to said piston rod and mounted in said compressed fluid cylinder, means to admit compressed fluid to said compressed fluid cylinder on opposite sides of said second-named piston, and a discharge opening communicating with the chamber of said casing, said vertically extending members being hollow to provide air cushions for the liquid discharged through the discharge opening.

5. In combination, a base adapted to rest upon a support, a liquid pumping and measuring means carried by said base, a casing mounted at the upper end of said pumping means, a pair of vertically extending parallel members secured to said casing, a piston rod connected to said pumping means and extending upwardly through said casing between said vertical members, a compressed fluid cylinder carried by said vertical members, a piston connected to the piston rod and mounted in said compressed fluid cylinder, means to admit compressed fluid to said compressed fluid cylinder on opposite sides of said piston, a screw-threaded member fixed on said casing and extending upwardly therefrom, adjustable stop arms engaging said screw-threaded member, and a stop member mounted on said piston rod to be engaged by one of said stop arms to regulate the length of stroke of said piston.

6. A pump of the class described, comprising a gasolene cylinder, a piston therein, a discharge opening leading from said cylinder, a plurality of elongated hollow members extending upwardly from said cylinder and communicating therewith to provide air pockets for the liquid discharged through said opening when said pump is operated, a compressed fluid cylinder supported by said hollow members above said gasolene cylinder, a piston mounted in said compressed fluid cylinder, and a piston rod connecting both said pistons whereby said pump is operated upon actuation of said fluid piston.

In testimony whereof, I have subscribed my name.

JOSEPH R. GOULD.

Witnesses:
J. G. DUNNING,
HENRY L. DAVIS.