

E. P. LARSH.

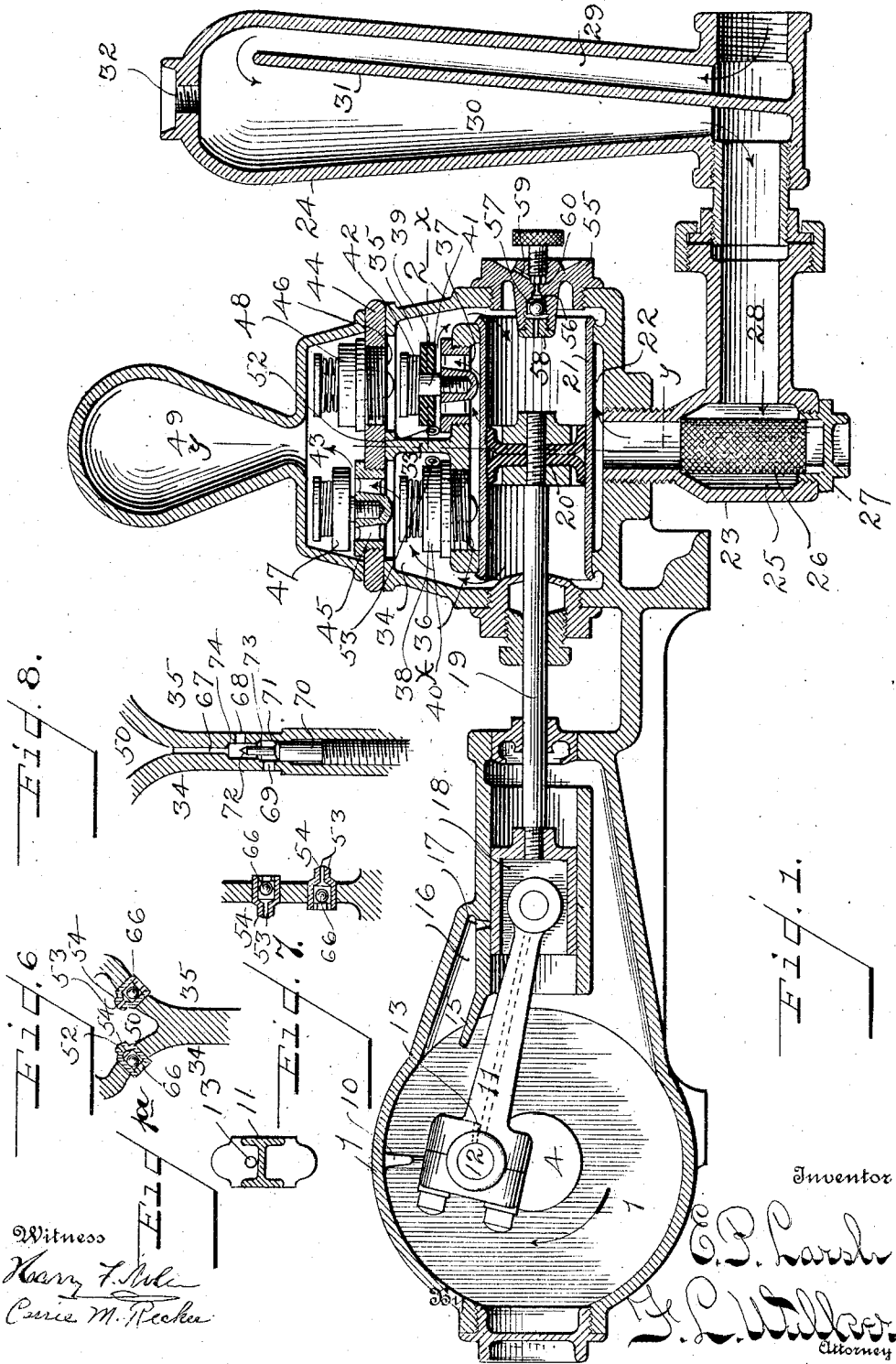
PUMP.

APPLICATION FILED FEB. 12, 1916.

Patented Apr. 22, 1919.

2 SHEETS—SHEET 1.

1,301,282.



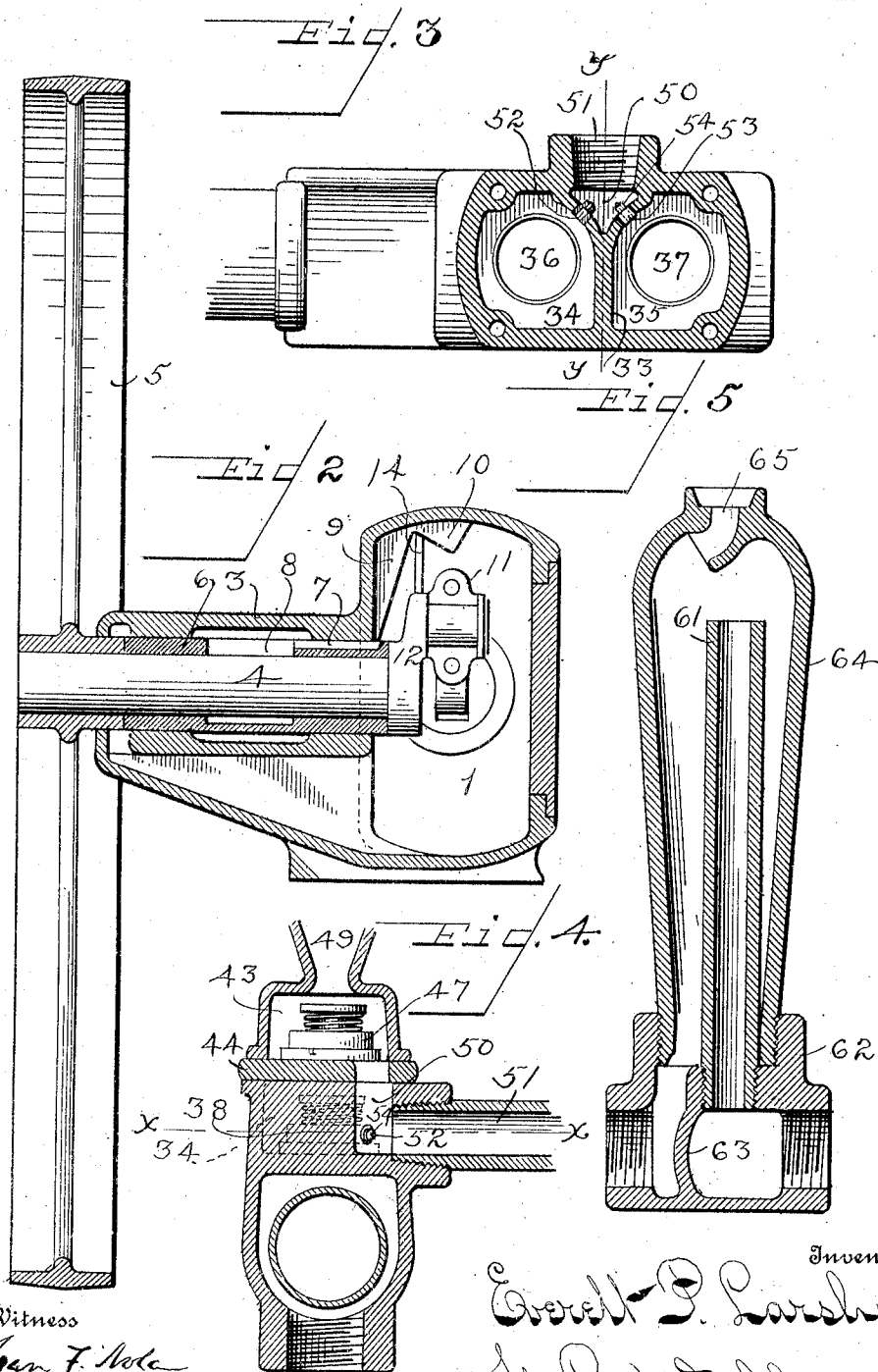
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

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## PUMP.

1,301,282.

Specification of Letters Patent.

Patented Apr. 22, 1919.

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*To all whom it may concern:*

Be it known that I, EVERETT P. LARSH, citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

My invention relates to pumps and more particularly to that type of pumps commonly known as force pumps especially adapted for use in private water distribution systems but also capable of use as bilge pumps for drainage and for other purposes.

The object of the invention is to simplify the structure as well as the means and mode of operation of such devices whereby they will not only be cheapened in construction, but will be more efficient in use, positive in operation, easily controlled, and unlikely to get out of repair.

A further object of the invention is to provide improved means for automatically priming the suction valves whereby they will be maintained in operative condition throughout extended periods of non-use.

With the above primary and other incidental objects in view, as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation, or their equivalents as hereinafter described and set forth in the claims.

Referring to the drawings, Figure 1 is a longitudinal sectional view of the assembled pump. Fig. 1<sup>a</sup> is a detail sectional view of the pitman. Fig. 2 is a transverse sectional view through the crank casing illustrating the crank shaft and the automatic oiling devices. Fig. 3 is a transverse sectional plan view through the intake valve chambers on line *x-x* of Figs. 1 and 4. Fig. 4 is a vertical sectional view on line *y-y* of Figs. 1 and 3. Fig. 5 is a vertical sectional view of a modification of the vacuum chamber. Figs. 6, 7, and 8 are modifications of the bypass or relief port construction showing same valved.

Like parts are indicated by similar characters of reference throughout the several views.

In the drawings, the invention forming the subject matter hereof has been shown

embodied in a pump of the horizontal type. It is to be understood, however, that the features of invention are not limited to this type of pump but may be embodied in pumps of vertical or other types. Such embodiment in pumps of other types, being within the skill of ordinary mechanics skilled in pump manufacture and construction, have not been illustrated in the present drawings but are to be understood as included in the scope of the present invention.

In constructing the pump forming the subject matter hereof there is employed a main frame having at one end a crank casing or housing 1 in which are inclosed the actuating parts of the structure while at the opposite end of the main frame is located the pump body 2 inclosing the cylinder and valve mechanism.

Mounted in suitable bearings extended laterally from the crank casing 1 is a crank shaft 4 carrying at its outer end a wheel 5 which serves as a balance or fly wheel and in the event the pump is driven by an electric or other high speed motor this wheel 5 may be employed as a driving pulley.

The sliding head 18 is connected with the usual piston rod 19 to which is secured the pump piston 20. The pump piston 20 is reciprocated by the rotation of the crank 12, within the pump cylinder 21 which is mounted within the pump housing 2 in such manner as to form about the exterior of the pump cylinder 21 an annular intake chamber 22. This intake chamber 22 communicates through a strainer or filter 23 and the vacuum chamber 24 with the supply line leading from the cistern, well or other source of supply.

Before reaching the filter or screening member the supply of water is drawn through the vacuum chamber 24 which comprises a vertically disposed housing or dome having therein an interior wall or septum, dividing the chamber or dome into two intercommunicating passages, an ascending passage 29 and a descending passage 30.

The interior of the pumping head or body 2 immediately above the intake chamber 22 and cylinder 21 is divided by a medial wall 33 into two pulsation or pump chambers, 34 and 35, communicating through downward extensions of said chambers with opposite

ends of the cylinder 21. Leading from the intake chamber 22 to the chambers 34 and 35 are ports 36 and 37 respectively each of which is controlled by an independently operated valve 38 and 39. These valves are of the suction type and may be of any suitable form. In the drawing they have been illustrated as comprising disks 40 movable vertically upon stems 41 against the tension of springs 42. The form of valve shown in the drawings is one commonly used in pumps of this character and inasmuch as the valve does not form any part of the invention, *per se*, it need not be here described in detail. The construction is such that as the piston 20 is reciprocated within the cylinders the valves 38 and 39 will be alternately lifted against the tension of the springs 42 to draw a charge of fluid from the intake chamber 22 through the corresponding port 36 or 37 into the chamber 34 or 35 and thence into the corresponding end of the cylinder 21. Located above the pulsation chambers 34 and 35 is a discharge chamber 43 separated from the chambers 34 and 35 by the discharge valve plate or deck 44 having therein ports 45 and 46 communicating with the chambers 34 and 35 respectively. Each of the ports 45 and 46 is controlled by an independently operated valve 47 and 48 of a construction similar to that of the suction or intake valves before referred to. The discharge chamber 43 is extended upward to form a dome or air chamber 49.

The construction is such that as the crank 12 rotates in the direction indicated by the arrow in Fig. 1 the piston 20 will be moved toward the right within the cylinder 21 thereby causing the valve 39 to be elevated off its seat against the tension of its spring 42 to admit a charge of water from the intake chamber 22 through the port 37 to the chamber 35 and thence into the open right hand end of the cylinder 21. At the same time the movement of the piston 20 toward the left discharges the water previously drawn into the left hand end of the cylinder through the valve 38, outward through the chamber 34 and thence through the port 45 forcing the valve 47 off its seat against the tension of its spring and discharging the water into the chamber 43. The direction of movement of water in this operation is indicated by darts in Fig. 1. Upon reversal of the movement of the piston the operation of drawing in and discharging a charge of water is reversed and the water is drawn from the intake chamber 22 into the cylinder 21 through the valve 38 and chamber 34 and is discharged from the cylinder on the opposite side of the piston 20

through the chamber 35 and valve 48 into the discharge chamber 43.

Substantially coincident with the plane of the chambers 34 and 35 is a well or cistern 50 shown in detail in Figs. 3 and 4 with which the outlet conduit 51 communicates. It has been customary heretofore to connect the discharge conduit directly with the discharge chamber 43 whereby the disconnection of the conduit was essential to afford access to the valve. It will be seen in the present construction that the hood or housing forming the discharge chamber 43 is entirely independent of the discharge conduit 51 and may be removed to afford access to the valves 47 and 48 or by removal of said valves access through the ports 45 and 46 to the suction valves 38 and 39 without the necessity of disconnecting the discharge conduit.

To at all times water seal the suction valves 38 and 39 or to automatically prime said valves there are provided in the vertical walls separating the chambers 34 and 35 from the well or cistern 50 horizontally disposed ports 52 and 53 which are preferably permanently open to permit the free flow of water in return direction from the well or cistern 50 into the chambers 34 and 35 when the pump is at rest to insure the proper priming or water sealing of the suction valves 38 and 39. The small quantity of water which may pass through these ports from the chamber 34 or 35 into the outlet cistern 50 under the influence of the piston is a negligible quantity as is also the quantity which may be drawn through said ports into said chambers upon the suction stroke of the piston. These ports are quite small in size. By arranging them in horizontal position the possibility of the ports being clogged by sediment or scale is reduced to minimum. I am aware that heretofore it has not been unusual to provide such ports in the discharge valve plate or deck as for instance in the deck 44 between said chambers and the discharge chamber 43 or in some instances ports have been provided in the rim of the discharge valve seat or through the body of the valve itself. However, such ports when located in a vertical position are found objectionable and are also quite likely to collect sediment when located adjacent to the bottom of the discharge chamber. However, these difficulties are overcome in the present instance by locating the relief and priming ports below the level of the discharge valve deck and in a horizontal position. To further guard against the lodgment of sediment the ports 52 and 53 are preferably located in small tapered or conical nozzles 54 inserted horizontally in the vertical walls of the chambers 34 and 35.

The well or cistern in which the ports are located whether horizontally disposed or otherwise serves to collect adjacent to the port and so make available the last remaining supply of water. The valves are thus kept primed for a greater period of time and even a minute quantity of water remaining will be available for this purpose.

The ports 52 and 53 have heretofore been described as permanently open comprising either merely holes or ducts drilled in the walls between the chambers 34 and 35 and the cistern 50 or open ducts in nozzles 54 inserted in said wall. It is to be understood that if so desired these ports may be valved. In Fig. 6 there is shown a detail sectional view in which the nozzles 54 are chambered to provide seats for ball valves 66 which will close the ports 52 and 53 against the passage of fluid in one direction. As shown in this figure, the valved ports will permit the entrance of water from the cistern 50 to the chambers 34 and 35 in sufficient quantity to prime the valves but on the compression stroke of the piston the ball valve 66 will seat itself to prevent the escape of water from the chamber 34 or 35 through the ports before mentioned.

In Fig. 7 there is shown a modified valved construction employing an air valve operating in one direction and a water valve operating in the other direction. It will be understood that there will be provided two valved ports, an air port and a water port, for each chamber 34 and 35.

In Fig. 8 there is shown a further modification in which a duct 67 leading from the cistern 50 communicates through a port 68 with one chamber and through the port 69 with the other chamber. These ports are adapted to be closed by a double valve member 70 comprising a screw threaded stem having two beveled shoulders 71 and 72 adapted to engage the seats 73 and 74 in the counterbore of the duct 67. In this construction the valve stem may be operated to open the ports 68 and 69 for either the escape of entrained air or the admission of priming fluid. This construction may also be employed in conjunction with that shown in Fig. 6.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable but which is obviously susceptible of modification in its form, proportion, detail construction, or arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language

more or less specific as to certain structural features, it is to be understood that the invention is not limited to any specific details, but that the means and construction herein described comprise but one mode of putting the invention into effect, and the invention is therefore claimed broadly in any of its possible forms or modifications within the scope of the appended claims.

Having thus described my invention, I claim:

1. The combination of a pump having a pulsation chamber and a discharge chamber intercommunicating through a main valved discharge port, and a vertical wall separating portions of said pulsation and discharge chambers and having therein a permanently open intercommunicating port independent of said main valved port, substantially as and for the purpose specified.

2. The combination of a pump having a pulsation chamber and a discharge chamber intercommunicating through a main valved discharge port, and a well or cistern communicating with the discharge chamber and adapted to collect fluid therefrom and having a substantially horizontally disposed port independent of said main valved port forming an intercommunication between the well or cistern and the pulsation chamber, substantially as and for the purpose specified.

3. The combination of a pump having a pulsation chamber and a discharge chamber intercommunicating through a main valved discharge port, said chambers being extended into horizontal relation one with the other and having a horizontally disposed intercommunicating port connecting the horizontally related portions of said chambers independent of said main valved discharge port.

4. The combination of a pump having a pulsation chamber and a discharge chamber intercommunicating through a main valved discharge port, said discharge chamber having a dependent portion or collecting reservoir, and having a horizontally disposed intercommunicating port connecting said dependent portion or reservoir with the pulsation chamber.

5. The combination of a pump having a pulsation chamber and a discharge chamber intercommunicating through a main valved discharge port, said chambers having a substantially horizontally disposed intercommunicating passage independent of said main valved discharge port located below the level of said main valved discharge port, substantially as specified.

6. The combination with a pump having a pulsation chamber and a discharge chamber intercommunicating through a main valved

discharge port, the discharge chamber having in the bottom thereof a depression or collecting cistern for the residue of fluid therein, and an intercommunicating port between said depression or cistern and the pulsation chamber substantially as and for the purpose specified.

In testimony whereof, I have hereunto set my hand this 9 day of February A. D. 1916.

EVERETT P. LARSH.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."