C. E. NEWMAN.

Double-Acting Force-Pump.

No. 219,754. Patented Sept. 16, 1879.

Fig. 1.

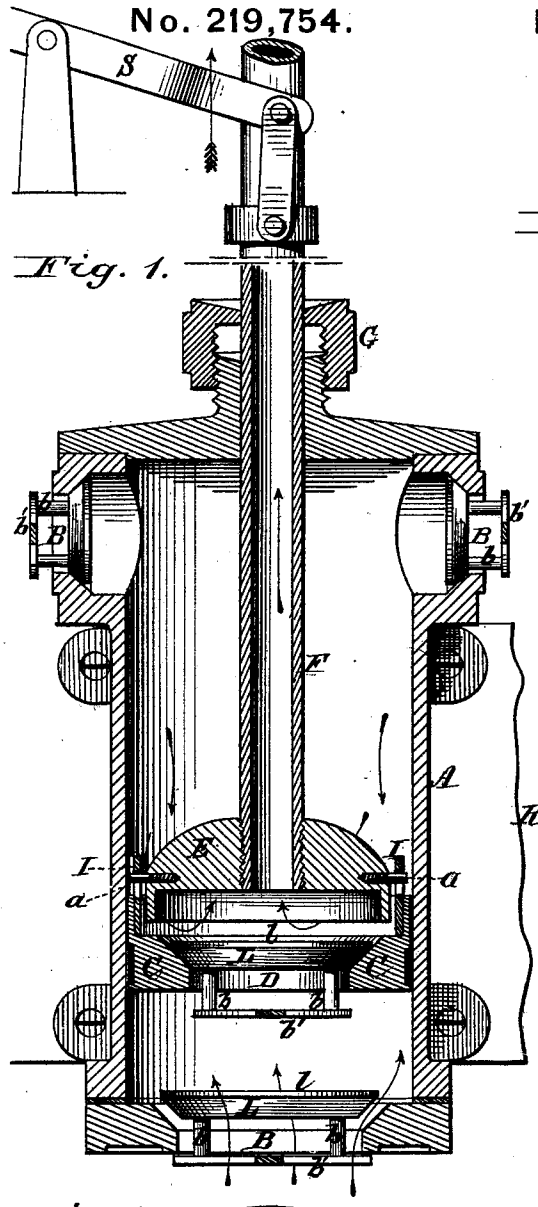


Fig. 2.

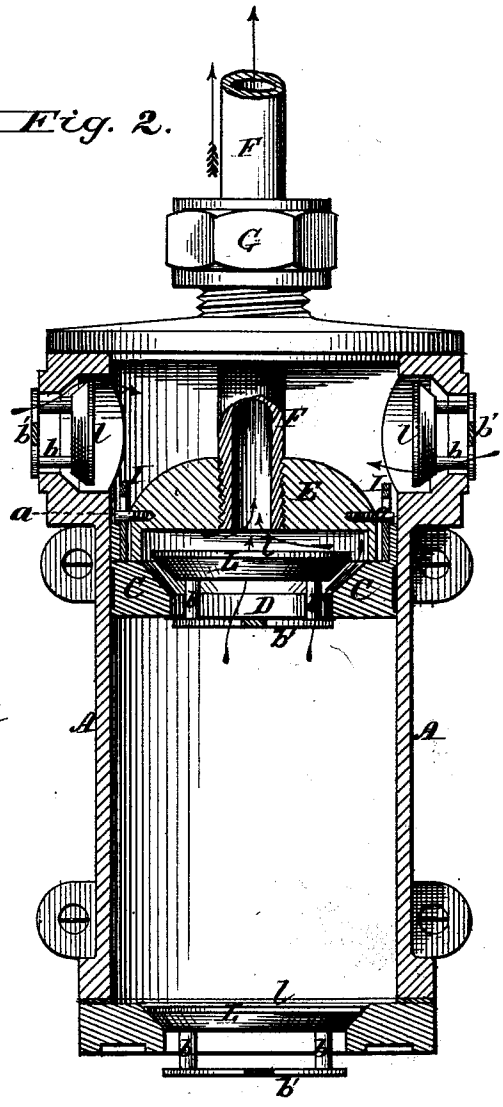


Fig. 4.

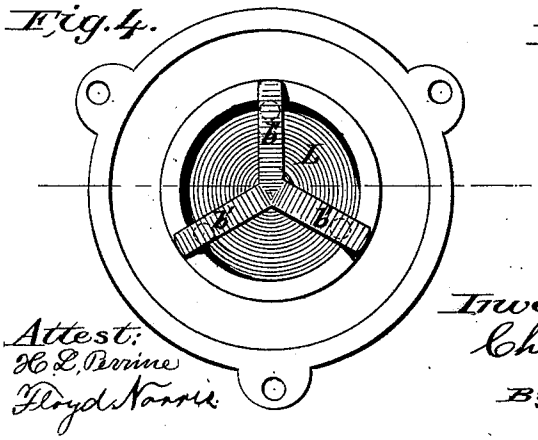
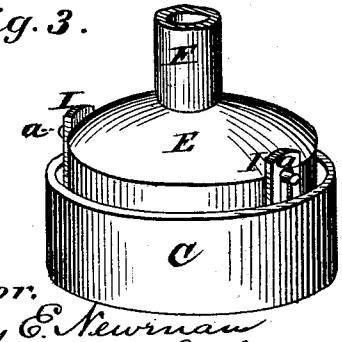


Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES E. NEWMAN, OF FORT WORTH, TEXAS.

IMPROVEMENT IN DOUBLE-ACTING FORCE-PUMPS.

Specification forming part of Letters Patent No. **219,754**, dated September 16, 1879; application filed July 22, 1879.

To all whom it may concern:

Be it known that I, CHARLES ELIJAH NEWMAN, of Fort Worth, in the county of Tarrant and State of Texas, have invented certain new and useful Improvements in Double-Acting Force-Pumps; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My improved pump is of the kind in which a single cylinder and hollow piston-rod operate in connection with upper and lower cylinder-valves, and with a valved piston adapted to have a reciprocal motion independent of and upon the hollow piston-rod, to discharge the water from both sides of the piston with a double action and in a continuous stream through said hollow piston-rod.

The piston proper is connected to the piston-rod in a manner to allow of the free pivotal adjustment of the valved piston in its reciprocal motion with its hollow carrying-rod, and thereby render certain this independent action of the valved piston in forming a cut-off, to cause the water to be forced up through the piston-rod as the piston is operated. This pivotal adjustment of the piston is important in maintaining its connection with the piston-rod free from binding and liability to jam and stick, and to fail of its cut-off function. For this purpose the valved piston is connected by slotted circumferential extensions with a recessed plunger of the piston-rod by horizontal diametric pivot-pins, thus connecting the two parts at circumferential points and by horizontal bearings, upon and over which the piston has a free vertical and swinging adjustment.

The plunger is recessed on its under side for two purposes—to form a circumferential bearing-rim, fitting within and making a close joint upon the upper recessed face of the piston when the two are closed, and to form an annular space within which the valve of the piston is forced, yet leaving an open and unobstructed passage for the water between said valve and the plunger-head when the piston is closed therewith. While in the open position of the piston the lateral pressure upon the plunger is equalized in the escape of the water from the upper part of the cylinder through the annular space between the rims of the piston and plunger. These are the important points which render the pump effective in its operation, while with valves of beveled disks confined by guide-stems within beveled seats the durability of these parts is very greatly increased.

In the drawings, Figure 1 represents a vertical sectional view of my improved pump, the piston being shown as rising; Fig. 2, a similar section, the piston being shown as descending; Fig. 3, a detached perspective view of the piston and plunger; and Fig. 4, a view of the lower cylinder-head inverted, showing the valve and the skeleton-guide.

The pump-cylinder A is provided with induction-ports B B at its upper and lower ends for the admission of water, and with inwardly-opening valves, to be hereinafter more particularly described.

The piston C is formed with a cylindrical recess on its upper side, and with an aperture, D, in its bottom, which is provided with an upwardly-opening valve, similar in construction to the valves of the induction-ports.

A cylindrical plunger, E, recessed on its under side, is attached to a hollow piston-rod, F, passing through a suitable stuffing-box, G, at the upper end of the cylinder, and extending upward, where it terminates in a curved discharge. The said plunger fits into the recess in the piston, and the piston is secured to the same by means of slotted lugs I on said piston and the pins or screws *a*, passing through said slots and secured to the plunger.

The piston and plunger are capable of a slight reciprocal motion with respect to each other, which is limited by the length of the slots in the lugs I, an annular passage for water being formed between the two when separated, which is closed when they are brought together, for the purpose to be more fully hereinafter explained.

The valves L, for opening and closing the respective ports of the pump, are formed with conical or beveled bearing-faces, and their respective seats are similarly beveled, the areas

of the bearing-surfaces of the valves and their beveled or conical seats bearing such relation to each other, however, that the surfaces *l*, against which the pressure of the water is exerted when the valves are seated, will fall below or back of the edge of the seat, as clearly shown in Figs. 1 and 2 of the drawings, so that no pressure will be exerted upon the sides of the valve, but will be wholly confined to the surfaces *l*, whereby a joint is formed which will be rendered tighter as the depth of the well, or water in which the pump is submerged, is increased, and as the pressure of the column of water to be lifted is augmented. The said valves are provided with skeleton-guides, consisting of three or more projections, *b*, passing through their respective ports, and having attached to their outer ends skeleton-stops *b'*, which hold them in place and limit the movements with respect to their seats.

The pump is provided with suitable means by which to attach it to the support R, which is let down and properly secured in the well, and the piston-rod is secured to one end of a lever, S, suitably pivoted above ground, by means of which the pump may be operated.

The ports at the upper end of the cylinder should be equal in combined area to the area of the port at the lower end of the cylinder, in order to supply the water to both ends of the cylinder uniformly; and for this reason it is evident that a single port at the upper end of the cylinder, equal in area to that at the lower end of the cylinder, may be employed, or that more than two ports may be employed at said upper end of the cylinder, so long as their combined areas equal the area of the lower port. Moreover, it is evident that the lower end, instead of being provided with a port at its bottom, may be provided with one or more side ports, similar to the upper ports.

The operation of my improved pump will be readily understood in connection with the above description, and is as follows: The piston being at its full downstroke, upon elevating it the valve at the bottom will be raised, and the water will flow in below the piston, following it until it has reached its full upstroke. Upon depressing the piston the upper valves will be opened, allowing the water in a similar manner to enter the cylinder above the piston. At the same time the lower valve will be closed, and the water, finding no escape through the lower port, will force open the valve in the piston and pass upward through the opening in the same. Now, as the downstroke of the plunger forces it into the recess in the piston, the passage of water between said plunger and piston is cut off, and the water from the lower chamber is compelled to pass up through the hollow piston-rod and out of the discharge-spout. Upon again elevating the piston water is taken in the cylinder below the piston, as before, and the water, previously taken in above the piston, pressing against the upper valves, closes them, affording no outlet through the upper ports. The plunger, in its upward movement, separates from the piston, leaving an annular space between the two leading into the recess in the plunger. Through this space the water in the upper part of the cylinder finds an outlet, and is forced up through the hollow piston-rod and discharged.

The pump is secured to its support in a manner to allow it to have a slight oscillation with the movement of the piston-rod.

I claim—

1. In a submerged double-acting force-pump, the valved piston C and the plunger E of the hollow piston-rod, attached to each other by pivotal and slotted bearing-connections, whereby to allow them to open and close with each other with a free pivotal adjustment of said piston in effecting the cut-off of the water from one side of the piston to the other, substantially as herein set forth.

2. In a submerged double-acting force-pump, the valved piston C, having the vertical slotted extensions I, and the plunger E of the hollow piston-rod, having the diameter-bearings *a a* for the said slotted extensions, whereby to unite the parts and suspend the said valved piston, substantially as and for the purpose herein set forth.

3. In a submerged double-acting force-pump, the recessed piston C and the recessed plunger E, having the circumferential bearing-rim, united to each other, substantially as herein set forth, in combination with a flat beveled valve, L, operating in connection with the piston and the hollow piston-rod, substantially as herein set forth.

4. A submerged double-acting pump, consisting of the cylinder having induction valved ports at each end, the valved recessed piston C L, the hollow piston-rod having the recessed plunger E, and the circumferential slotted pivotal connections I *a* of the valve and plunger, all constructed and adapted for operation substantially as herein set forth.

In testimony that I claim the foregoing I have hereto affixed my signature in the presence of two witnesses.

CHARLES ELIJAH NEWMAN.

Witnesses:

M. H. JOHNSON,

W. H. MCBRIDE.