No. 627,235. Patented June 20, 1899.

C. E. NEWMAN.

DOUBLE ACTING FORCE PUMP.

(Application filed Mar. 24, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

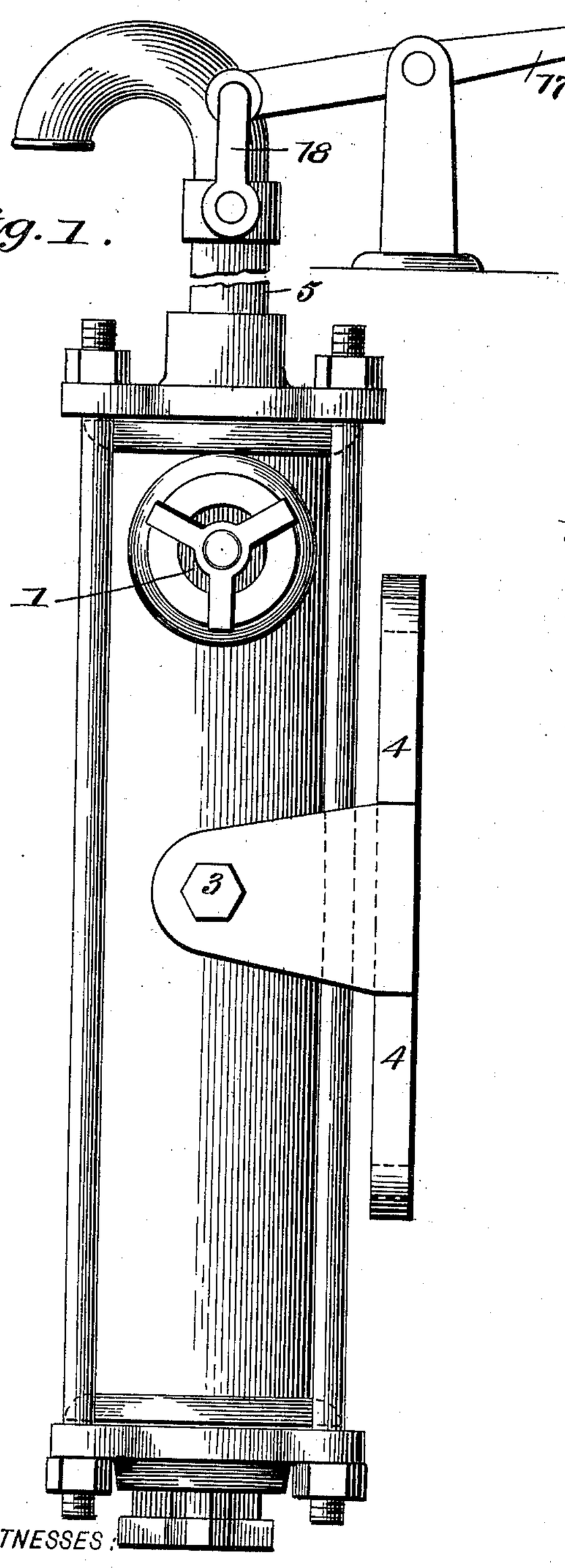

Fig. 3.

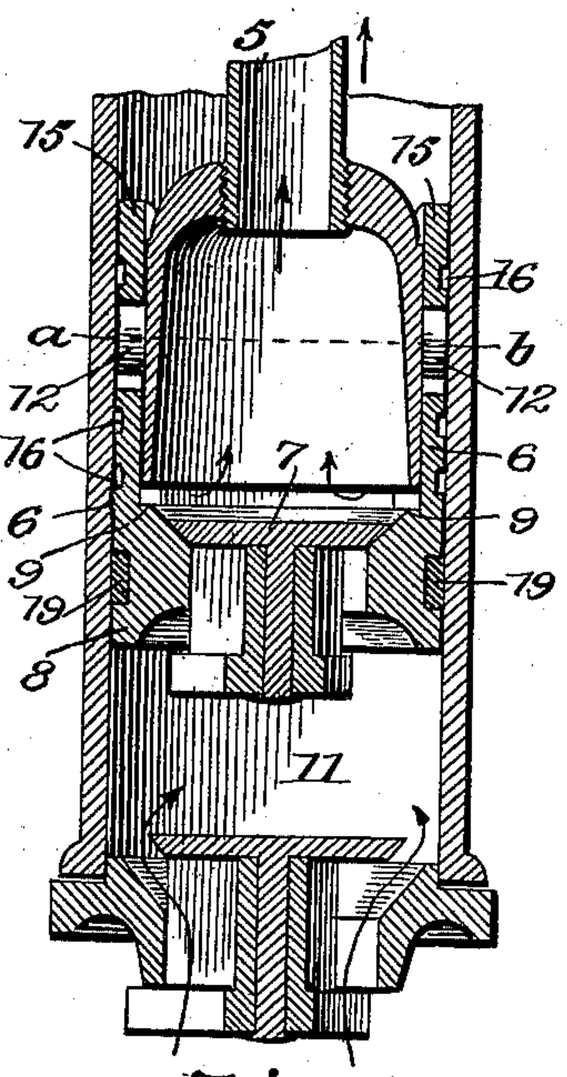

Fig. 4.

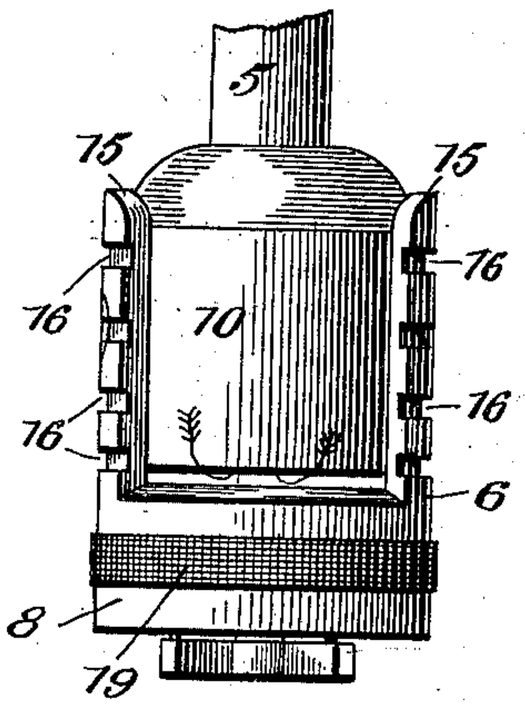

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Fig. 2.

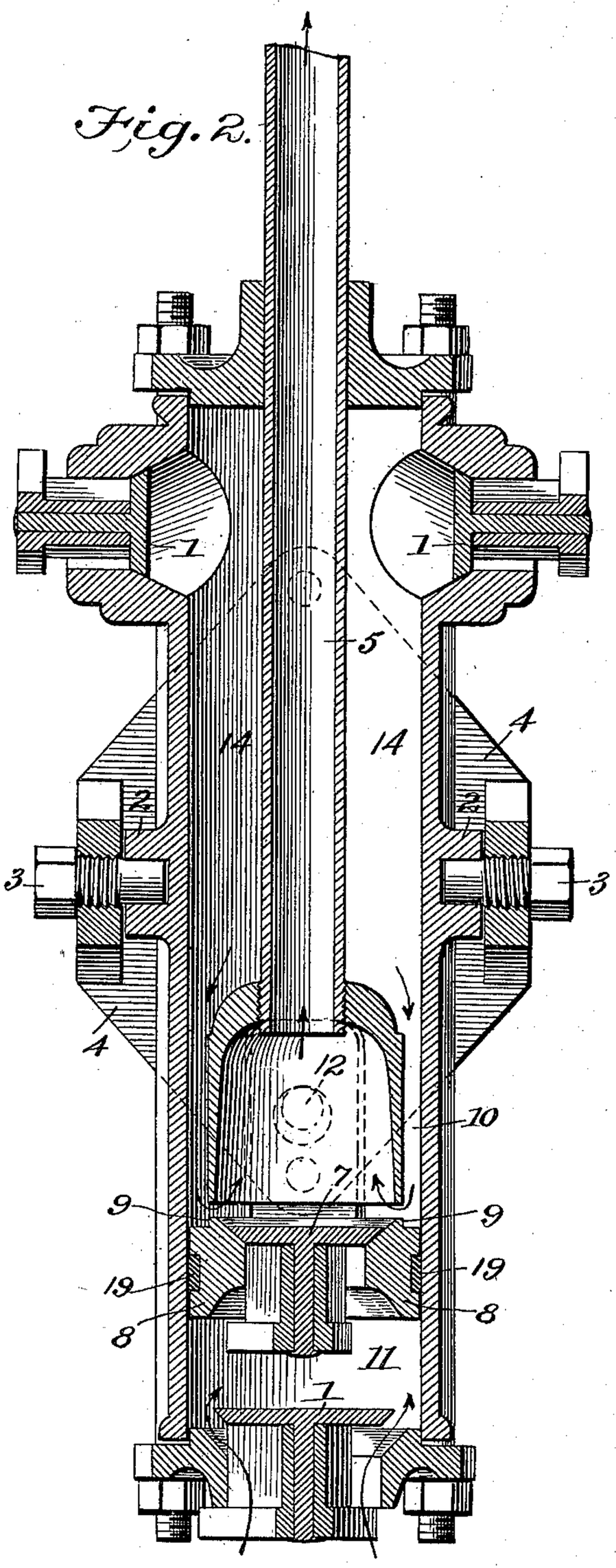


Fig. 5.

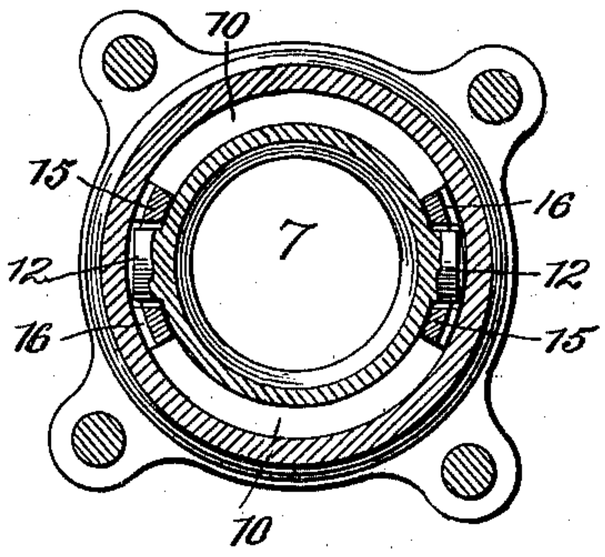


Fig. 6.

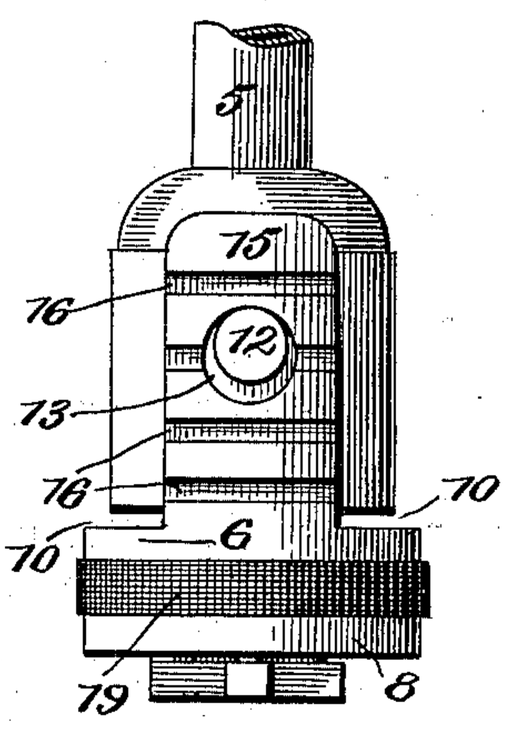
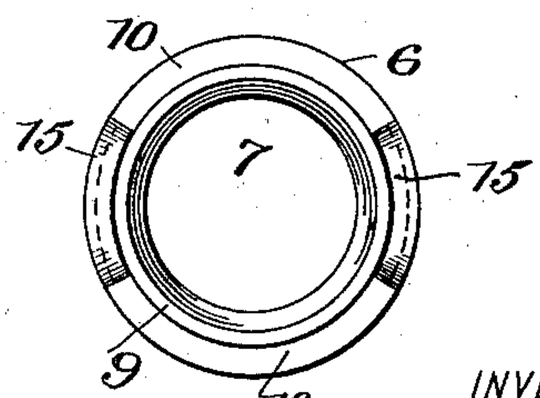


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES E. NEWMAN, OF ALBION, NEW YORK.

DOUBLE-ACTING FORCE-PUMP.

SPECIFICATION forming part of Letters Patent No. 627,235, dated June 20, 1899.

Application filed March 24, 1899. Serial No. 710,296. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. NEWMAN, a citizen of the United States, residing at Albion, in the county of Orleans and State of New York, have invented certain new and useful Improvements in Double-Acting Force-Pumps, of which the following is a specification.

The invention herein is an improvement in the pump for which Letters Patent were granted to me October 5, 1880. In this patent an outer and inner cup part form the piston, in which the outer cup part has its entire circumferential wall in water-tight joining with the cylinder-wall and the inner cup part is inverted on the end of a hollow piston-rod and forms an annular space between the cup parts through which the water from the upper cylinder-chamber part passes into the under open inner cup part and is discharged through its connected hollow piston-rod. In this construction two causes tended to render the piston hard in its movements, because, primarily, the area of its outer packed walls is too extensive and the friction too much and because the downflow of the water between the cups to the inner cup is not sufficiently free in the upstroke of the piston, and from these two causes the working of the pump required too much strength, and particularly in the lifting displacing action of the piston. My present improvement is to render it easier to operate the cup-piston in connection with its discharge-pipe, which forms also the piston-rod, and the construction which embodies the precise improvement is illustrated in the accompanying drawings and set out in the concluding claim.

Referring to the drawings, Figure 1 shows in elevation a submerged pump to which my improvement is applied. Fig. 2 is a vertical section of the same, the piston being shown on its upstroke. Fig. 3 is a like section taken at right angles to the section-line of Fig. 2. Fig. 4 is a side view of the piston cup parts. Fig. 5 is a horizontal section of the same, taken on the line *a b* of Fig. 3. Fig. 6 is a view of the side of the piston cup parts at right angles to the side seen in Fig. 4, and Fig. 7 is a top view of the valved cup piston part.

The cylinder is used submerged in the well and has induction-ports provided with valves 1 1 1, opening inwardly at its lower and at its upper ends, the upper valves being on opposite sides of the cylinder. About mediately of its length and on opposite sides the cylinder is preferably formed with hollow bosses 2 2, by which it is mounted on trunnions 3 3 in a metal frame 4, which is firmly supported in the well, the trunnions being preferably screw-bolts tapped into arms of the supporting-frame.

The piston-rod 5 is hollow, serves as the discharge-pipe working through a stuffing-box at the top of the cylinder, and carries at its lower end a double-acting piston of two connected cup parts, one within the other, the inner part inverted on the end of the hollow piston-rod, the outer part working with packed walls within the cylinder, with a stroke suited to the size of the cylinder. The working piston part 6 is open at its upper end and is provided with an upward-opening valve 7 at its lower end. At its lower end its circumference is unbroken to form the packing ring or head 8, while its cup part proper, which extends from said base ring or head to its open top, is open at its opposite sides to form spaces 10 10, Fig. 2, between this cup part and the walls of the cylinder for a purpose which gives importance to my improvement. The lower open end of the piston-rod cup part extends to and works on the seat 9, which surrounds the valve 7 of the working cup part, so that in the descent of the piston-rod its cup part will be seated, and the valve 7 being thereby caused to open will put the hollow piston-rod in direct communication with the lower chamber part 11 of the cylinder and with the well, and thereby force and discharge the water into and from the hollow piston-rod. For this purpose the piston cup part has trunnions 12, on which the working cup part is hung by openings 13 in its walls, which openings being vertically oblong allow the cup parts to have a movement upon each other on the descent of the piston sufficient to seat and to close or to unseat and to open the two parts at the valve to open their interior communication with the lower chamber part of the cylinder for the discharge of the water, as stated, or to open the piston parts for the discharge of the water from the upper cylinder-chamber. On the ascent of the piston-rod the cup parts will separate with

a movement sufficient to open them at their seat, forming surface 9, as seen in Figs. 2 and 3, and the valve 7 of the working cup part being thereby closed the water from the upper chamber part 14 of the cylinder will be forced down into and through the spaces 10 10 into and discharge from the hollow piston-rod. In this movement of the piston it will be noted that the water from the cylinder passes into the piston cup part between its walls and the walls of the cylinder, and this results from the construction of the working cup part, which provides the side spaces 10 by its open walls. The importance of this construction of open walls in the working cup is that it reduces the frictional contact of such working cup part to a minimum, and it is this construction which is the improvement that makes the working of the piston easy, and especially in its ascent, for referring to Figs. 6 and 7 it will be seen that the walls of the working part of the piston form only arms 15 15, by which the two cup parts are coupled, and these arms form only about one-third the circumference of the working cup, leaving the other two-thirds part as open spaces for the water-flow and leaving only a base-ring part as the friction-surface.

By reason of the length of the coupling-arms of the working piston part its ring base is prevented from having any undue binding on the cylinder-walls, and to render these coupling-arms practically without friction on the cylinder-walls they are provided with horizontal water-packed grooves or channels 16, which opening at their ends into the water-spaces 10 10, as in Figs. 6 and 7, keep them free of sand or dirt.

Referring to Fig. 2, it will be understood that the piston being on its ascending movement the water will be displaced from the upper cylinder-chamber part into the inner piston cup part, the upper cylinder-valves will be closed and the lower cylinder-chamber part will fill with water, as indicated by the arrows, while on the descending movement of the piston the water will be displaced from the lower cylinder-chamber part into the inner piston cup part, the upper cylinder-valves will be opened, and the upper chamber part will thereby fill with water.

The mounting of the cylinder upon trunnions, as in Fig. 2, gives it a self-adjusting function under the action of the piston-rod, while the provision of the lever 17 and its link 18, pivotally connecting the lever to the discharge-pipe in a vertical line with said pipe, conduces very much to give ease and quick movements to the piston and to coöperate with the trunnioned cylinder in controlling the rocking movements of the cylinder to prevent any binding of the piston and its rod with the cylinder.

I have shown the outer base ring or head 8 as having a packing-ring 19; but the groove or channel itself will form a sufficient water-packing, so that no rubber or leather is necessary, and water does not stand in the discharge-pipe.

While the handle connection shown gives easy work, yet it is obvious that any suitable handle connection may be used.

I claim as my improvement—

In a submerged double-acting force-pump wherein a hollow discharging piston-rod is combined with pivotally-coupled telescoping piston cup parts and the valved cylinder, the outer cup part forming the valved piston-head and having its cup-forming walls circumferentially interrupted or open the full length of the telescoping cups forming opposite side-wall water-spaces 10, 10 uncovering two sides of the inner piston cup part and opening directly into its lower end, the pivot-bearing wall parts of said outer cup forming circumferential guide-surfaces in contact with the cylinder-walls and with the walls of the inner cup, whereby the lift of the piston is rendered easy and the water caused to flow full and free into the inner cup between its outer walls and the inner walls of the cylinder.

In testimony whereof I affix my signature in presence of two witnesses.

CHAS. E. NEWMAN.

Witnesses:
AUGUSTUS W. BEHREND,
J. W. WRIGHT.