(No Model.) 2 Sheets—Sheet 1.

W. E. WILLIAMS.

PUMP.

No. 318,066. Patented May 19, 1885.

Fig. 1.

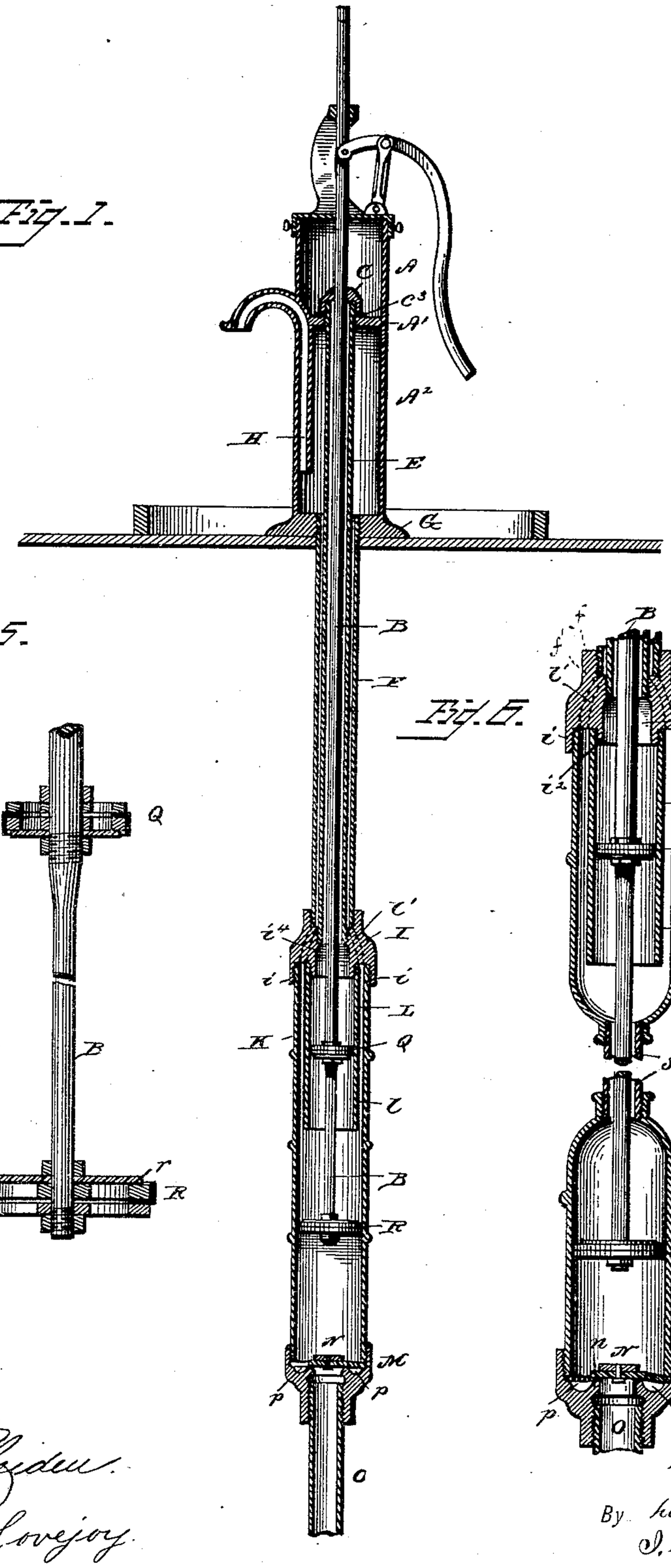

Fig. 5.

Fig. 6.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

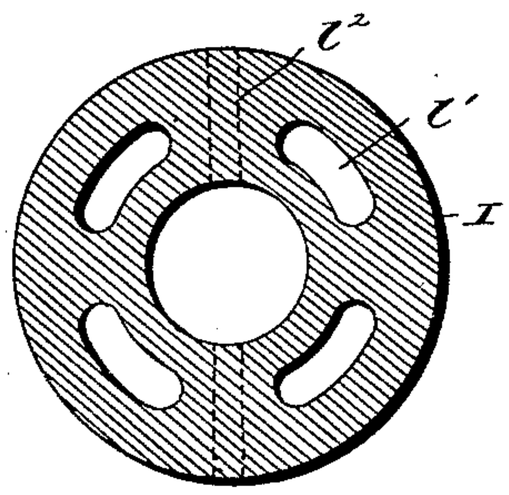


Fig. 2.

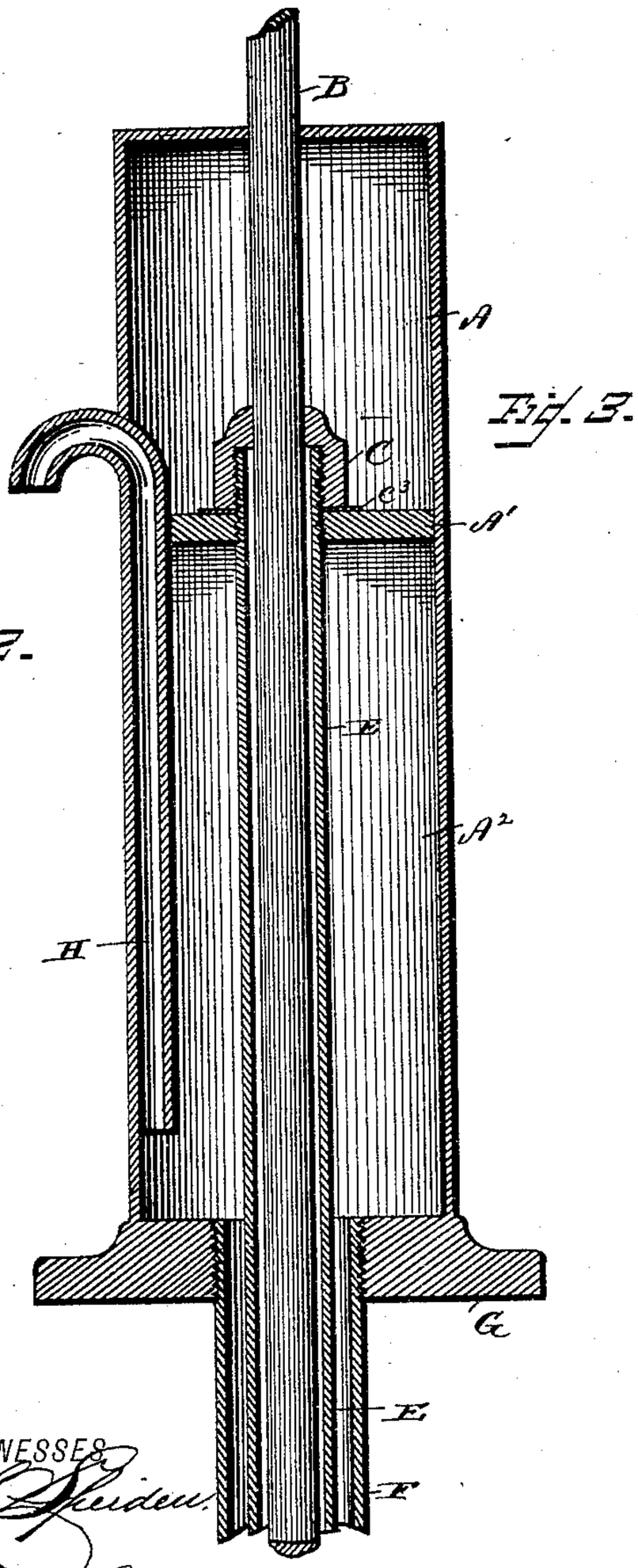
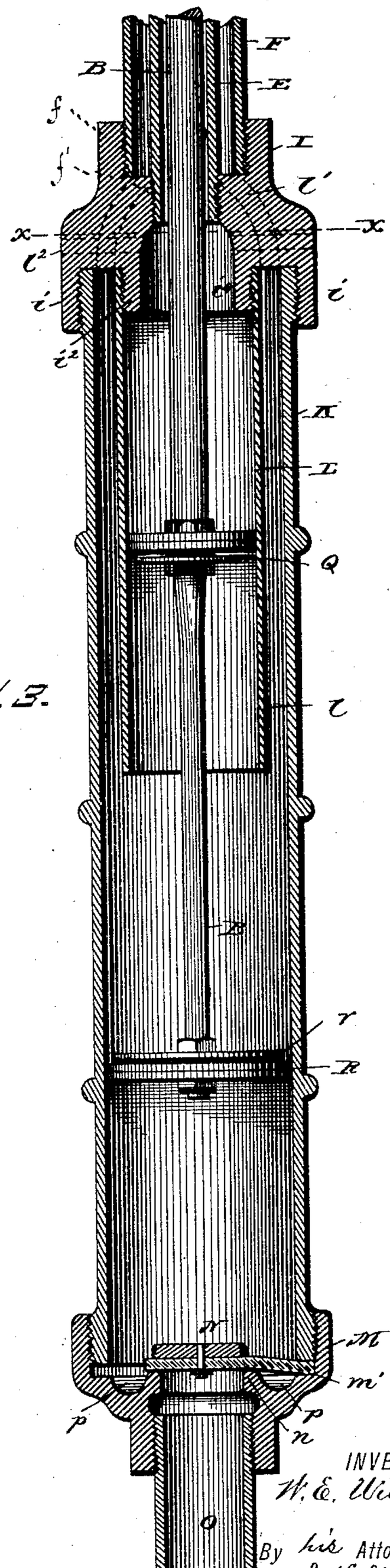


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM E. WILLIAMS, OF PITTSFORD, MICHIGAN.

PUMP.

SPECIFICATION forming part of Letters Patent No. 318,066, dated May 19, 1885.

Application filed February 13, 1885. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. WILLIAMS, a citizen of the United States, residing at Pittsford, in the county of Hillsdale and State of Michigan, have invented certain new and useful Improvements in 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.

My invention relates to improvements in double-acting force-pumps; and it consists in an air-chamber and details of construction therewith, and with the several valves and casings therefor and for the piston-rod, as will be hereinafter more fully set forth in the specification, and pointed out in the accompanying drawings, in which—

Figure 1 is a vertical section of the pump complete; Fig. 2, a vertical section of the air-chamber, the tubular casing for the piston-rod, and exterior casing forming a water-conduit to the air-chamber; Fig. 3, a vertical section of the lower end of the pump, the piston-valves, and coupling on the top of the outer and inner cylinders; Fig. 4, a section of the coupling on the line $x\ x$, Fig. 3; Fig. 5, a detailed view of the valve in the inner cylinder; Fig. 6, a modification of the outer cylinder for deep wells with the connecting-pipe.

Referring more particularly to the drawings, A represents the stand of the pump, divided by a partition, A′, the lower portion, A^2, forming the air-chamber of the pump. A discharge spout or tube, H, is made integral with this chamber. The piston-rod B, provided with any suitable form of lever, passes down through the stand A and partition A′ into a tubular casing, E. This latter casing passes through the portion A, and is covered by a screw-threaded cap, C, provided with a gasket, c^3, which renders the chamber A^2 air-tight, and prevents the passage of air or water above said partition A′. This stand A, air-chamber A′, base G, and discharge H are all cast or made in one piece. The outer pipe or casing, F, forms the stock of the pump. This stock extends downward to a coupling, I, provided with four or more ports, l', and a transverse slot or groove, l^2, for the drainage of the stock and escape of waste water. This stock is secured to said coupling by means of a screw-thread in the upper flange, f, as shown in Fig. 3. The tubular casing or pipe E is also secured to another flange, f', in the upper part of said coupling, in the same manner as shown in same Fig. 3. This coupling is also provided with two lower flanges, $i'\ i^2$, which are screw-threaded to receive the lower cylinder or cylindrical casing, K, and the inner cylinder, L. The piston-rod B extends down through the casing and into the cylinder K, and has at its lower end a piston having a valve, r, opening upward with the downstroke of the piston. Within the inner cylinder the piston-rod has another valve, Q, opening downward with the upstroke of the piston. The express purpose of said valve is to permit the escape of waste water in the chamber i back into the lower cylinder, L, on the upstroke of the piston. The lower end of casing K is screw-threaded to receive a cap, N, which at its lower end connects the suction-pipe O to the pump, and has a raised seat, n, for the check-valve N. The valve-seat n is a little higher than the pivot-point m' of the valve, and the intervening space p forms a receptacle for sand and sediment. It will be observed in Fig. 3 that the ports or openings l' in the coupling I are curved upward to the point where they enter the water space or passage between pipes E F.

The operation of the pump is as follows: With the downstroke of the piston the valve N is closed, valve r opened, and valve Q closed. The water contained within the inner cylinder, L, is forced out and passes up through the ports l^2. Now, when the piston is raised, valves N and Q are opened and valve r closed. In either case the water is forced up into the space between the cylindrical casing K and the inner cylinder, L. It will be observed that the inner cylinder only extends down about half the length of the casing and affords a water-way between them. By means of this inner cylinder I am enabled to use a much smaller valve, such as Q. By forming the stand, air-chamber, and discharge-spout in one piece I can make the stand much stronger and more durable, less liable to get out of order, and much cheaper to manufacture.

In locating the air-chamber in the base of the stand (instead of at the top, as in the or-

dinary forms of pumps) I bring it below the spout, and therefore bring the compressed air below and behind all water in the discharge-pipe, consequently greatly assisting in forcing the water out of the discharge; therefore the pump is not only easier to operate, but, after ceasing to pump, the compressed air in the chamber A^2 immediately forces all water in the discharge to and out of the spout, therefore leaving no water in the stand above the base or platform, and leaving no water in the exposed part of the stand to freeze.

By means of the four-flanged coupling I, I unite the four main parts of the invention, besides having the central waste-water chamber, i^4, which forms a receptacle for waste water. Sometimes, when there is leakage of the valve-packing about the valve Q, water may pass into this chamber i^4; but immediately upon the upstroke of the piston this chamber will be emptied by the water falling back through valve Q into the inner cylinder, L. Moreover, the several ports afford a ready passage for the water from the cylinder to the stand.

In fact there are but ten parts in my device, whereas in the general form of pumps from eighteen to thirty-five parts are required. I therefore greatly simplify and cheapen the pump. The valve Q in the inner cylinder, which is closed with the downstroke of the piston, as before explained, allows all waste or dead water which might accumulate in the waste-water chamber i^4 or tubular casing E to readily escape into the lower cylinder, K, for this valve is normally open, and is only closed on the downstroke of the piston. It is apparent, therefore, from the foregoing, that all waste water is emptied or let back into the cylinder K through this combination-valve; whereas in the pumps in ordinary use such water is thrown to the surface, thereby rendering it unfit for house or indoor service. In deep wells I avoid the necessity of making the cylinders K L of great length by simply dividing the cylinder K into two parts, such as shown in Fig. 6, and connecting the two by the intermediate pipe, *s*. The arrangement and operation of the several parts is the same in both deep and shallow wells.

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

1. In a pump, a coupling, I, provided with two upper and two lower flanges and four or more curved ports opening to the air-chamber, said coupling by means of its four flanges forming a connection between the stock, air-chamber, piston-rod casing, and outer and inner cylinders, K L, substantially as set forth.

2. In a pump, the combination, with the air-chamber, discharge-pipe, piston-casing, and the four-flanged coupling I, provided with curved ports, of the outer lower tubular casing and inner tubular casing provided with a waste-water chamber, i^4, substantially as set forth.

3. In a pump, the combination, with the air-chamber A^2, piston, stock, perforated flanged coupling I, and outer and inner tubular casings, of a valve, Q, in the inner casing normally opening downward, substantially as set forth.

4. In a pump, the combination, with the air-chamber and operating-piston, stock, and flanged connecting-coupling, of the lower outer and inner tubular casings and the valves Q *r*, one of which is normally opened downward and closes with the downstroke of the piston, the other opening upward with downstroke of piston, substantially as set forth.

5. In a pump, the combination, with the flanged coupling uniting the upper and lower portions of the pump, of the inner tubular casing provided with a waste-water chamber and a piston having a valve opening downward in said casing, substantially as and for the purpose set forth.

In testimony whereof I hereunto sign my name in presence of two witnesses.

WILLIAM E. WILLIAMS.

Witnesses:
W. H. EDGAR,
EMMA M. GILLETT.