(No Model.)

W. D. HOOKER.

PUMP.

No. 555,096. Patented Feb. 25, 1896.

FIG. 1.

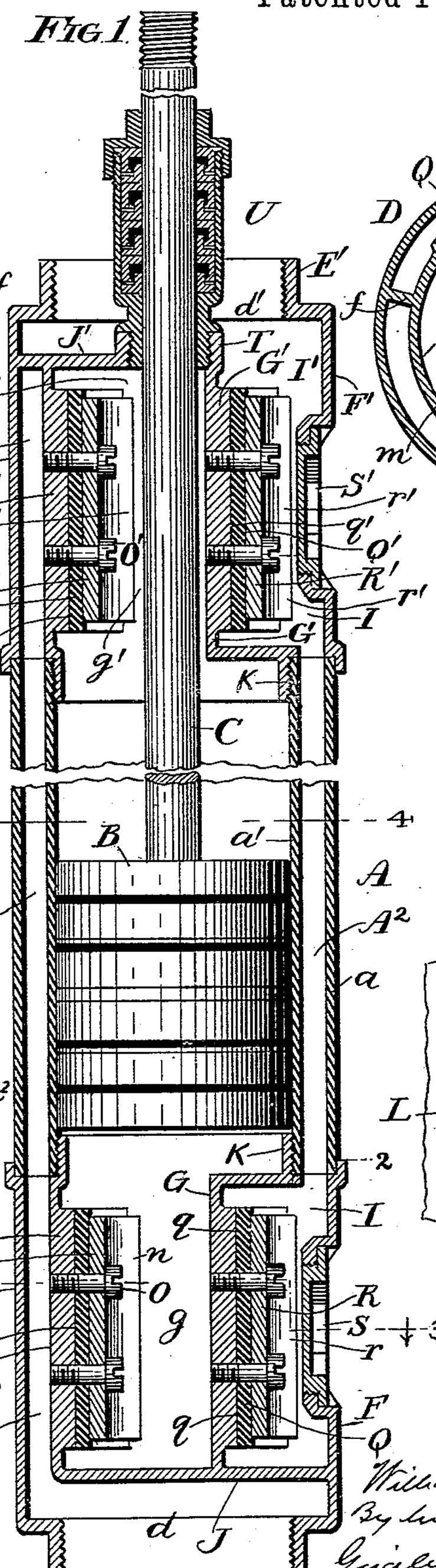


FIG. 2.

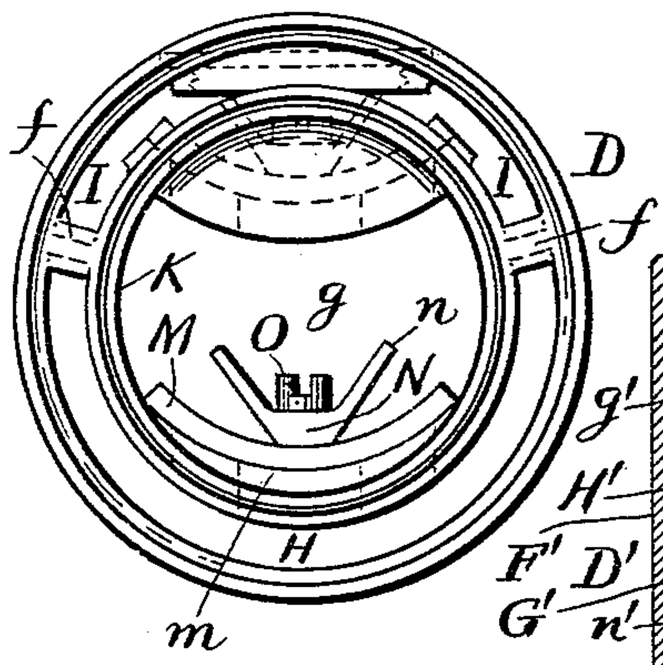


FIG. 3.

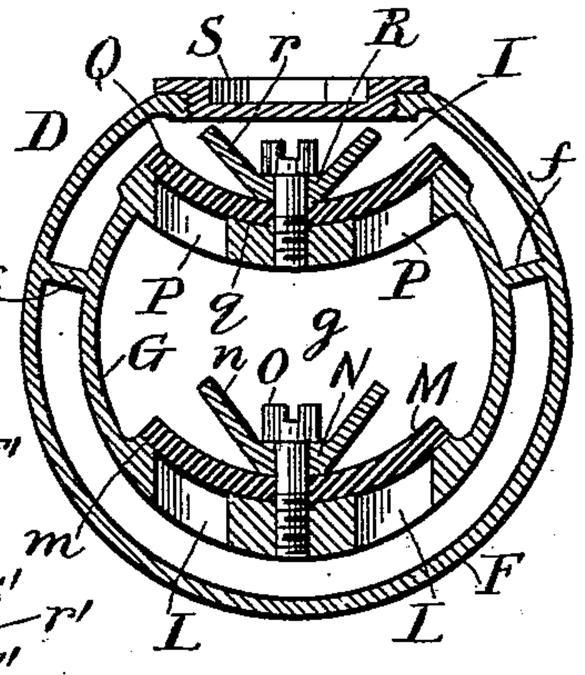


FIG. 4.

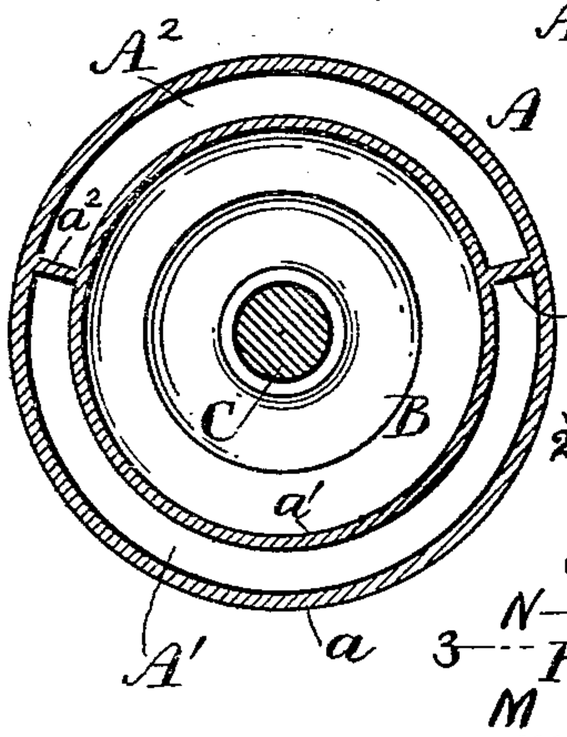
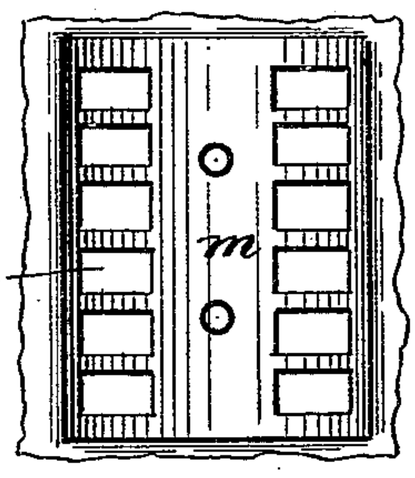


FIG. 5.



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PUMP.

SPECIFICATION forming part of Letters Patent No. 555,096, dated February 25, 1896.

Application filed November 7, 1894. Serial No. 528,166. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. HOOKER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pumps, of which the following is a specification, reference being had to the accompanying drawings, which are made a part hereof, and in which—

Figure 1 is a vertical central section of a pump embodying the invention. Fig. 2 is an end elevation of one of the valve-chests and its contained parts. Fig. 3 is a horizontal section of one of said chests on the line 3 3, Fig. 1. Fig. 4 is a horizontal section of the pump-barrel. Fig. 5 is a plan view of one of the valve-seats.

Some features of the present invention are applicable to pumps other than double-acting, while other features are applicable only to pumps of this latter description.

The chief object of the invention is to provide a double-acting pump of improved construction that can be used in any situation where a pump is needed, but is particularly well adapted for use in Artesian wells.

Another object of the invention is to improve the construction and arrangement of the ports and passages of double-acting pumps for Artesian wells to the end that they may be made of ample capacity, notwithstanding the necessarily restricted diameter of the pump-barrel and valve-chests.

To these ends the invention consists in the features of novelty that are particularly pointed out in the claims.

In the drawings I have shown the several features of my invention embodied in a double-acting pump, and this specification will be confined to the pump as shown; but I desire to have it understood that I reserve to myself the right to use the several features of my invention in pumps other than double-acting, so far as they may be so used.

A represents the pump-barrel, which is shown as having an intermediate portion broken away, thereby indicating that it may be of any desired length. Within it fits a piston B, which may be of any desired construction and is secured to a rod C, which is suitably connected with the source of power. The barrel is preferably a single casting and comprises an outer shell *a*, an inner shell or cylinder *a'* of less diameter, and longitudinal partitions a^2 dividing the annular space between said shells into passages A' and A^2, which are called in this specification the "induction-passage" and "eduction-passage," respectively.

D is a part hereinafter called a "valve-chest," the objects of which are to close one end of the pump-barrel and inclose one set of the valves. The lower end of this chest has an opening *d*, which may or may not be surrounded by a threaded flange E, onto which may be screwed a suction-pipe that may extend downward far enough to submerge its lower end. If no suction-pipe is used the lower end of the chest should be submerged so that air will not be drawn in at the opening *d*, which constitutes what is hereinafter called the "suction-opening," and is the only suction-opening that a pump constructed in accordance with my invention requires.

The valve-chest has an outer shell, F, and an inner shell, G, of less diameter than the outer shell, so that a space is left between them, and this space is divided by longitudinal partitions *f* into two passages H and I, which correspond in position and at their inner ends register with the induction and eduction passages A' and A^2, respectively. The inner shell, G, is sustained in position partly by the partitions *f* and partly by a transverse diaphragm J, which is so shaped that it closes the lower end of the passage I and the lower end of a chamber *g*, which is formed by the inner shell, the upper ends of said passage and chamber being in open communication with the eduction-passage A^2 and the pump-cylinder, respectively. The passage H, at its respective ends, is in open communication with the suction-opening *d* and the induction-passage A'.

The inner end of the outer shell, F, is counterbored to receive the end of the outer shell, *a*, of the barrel, and the inner shell, G, supports an externally-screw-threaded ring K, which screws into the end of the inner shell, *a'*, and draws the barrel and valve-chest together with sufficient force to form a water-tight joint.

The inner shell, G, is not of cylindrical shape and need not be of the exact shape shown in the drawings. Its essential requisite in this re-

spect is that it be suitable for the provision of ports (hereinafter called "induction-ports") through which the passage H and chamber *g* communicate and other ports (hereinafter called "eduction-ports") through which the chamber *g* and passage I communicate, and that it leave sufficient room to accommodate the valves by which the flow of water through said ports is controlled. I prefer also that it be of such shape that the valve-seats are of concave form; but in its broadest aspect my present invention is not limited to this latter feature. The induction-ports are shown at L, the induction-valve at M, and the valve-seat at *m*. This valve is made of a sheet of flexible material, preferably rubber, which is normally flat, but which conforms to the convex curvature of the valve-seat when it is fixed thereto by a keeper N. This keeper extends lengthwise of the valve and is held down by screws O that are tapped into the valve-seat between the two parallel rows of ports L. By thus securing the valve to its seat its edges are left free from end to end, so that a suction within the chamber *g*, produced by the upstroke of the piston, will cause said valve to yield or lift and permit the passage of water from the induction-passage H to the chamber *g*. The keeper is provided with diverging flanges *n*, that form stops for engaging the valve and limiting its movement.

The eduction-ports are shown at P, the eduction-valve at Q, the valve-seat at *q*, the keeper at R, and the stops at *r*, all of these parts being similar in construction and operation to the corresponding parts already described, excepting that the keeper is formed in two parts for convenience in putting it in place. The keeper N is introduced through the open upper end of the chamber *g*, but the ring K prevents the introduction of the keeper R through the open upper end of the passage I. For this reason it is necessary to form through the outer shell, F, an opening, and this opening is closed by a countersunk screw-cap S.

I believe myself to be the first to arrange the valve-chest at the end of the barrel and provide it with a chamber registering with the cylinder and with induction and eduction passages registering with induction and eduction passages extending along the barrel, the ports being formed through an internal diaphragm or shell which is arranged lengthwise of the barrel, so that the water in passing through said ports moves in a direction that is transverse to the barrel, and to provide said ports with valves which move laterally. The advantage of this arrangement is that without increasing the diameter of the barrel the capacity of the ports may if desired be made fully equal to the suction-opening of the pump.

At the other end of the barrel is a valve-chest which has features of construction and contains parts that are similar in construction, arrangement and operation to those of the chest already described, and similar parts and features of these two chests bear similar letters of reference, excepting that in one instance an exponent (the prime-mark) is added for the sake of distinction. The opening *d'* is of course the discharge-opening and is in direct communication with the eduction-passages I', A^2 and I just as the induction-passages H', A' and H are in direct communication with the suction-opening *d*. In one instance the diaphragm J cuts off communication between the passage I and opening *d* and in the other the diaphragm J' cuts off communication between the passage H' and opening *d'*. The diaphragm J' has an opening for the passage of the piston-rod, and surrounding this opening is a screw-threaded flange T, to which is screwed a suitable stuffing-box U. To the flange E' is screwed the riser or discharge pipe, which extends to the desired point.

This completes the description of the improved pump, the operation of which is apparent to those skilled in the art. The upstroke of the piston draws water from the induction-passage H through ports L and chamber *g* into the lower end of the cylinder and at the same time expels water from the upper end of the cylinder through chamber *g'* and ports P' into passage I', and thence through opening *d'* into the riser. The downstroke of the piston draws water through passages H, A', and H' and thence through ports L' and chamber *g'* into the upper end of the cylinder and at the same time expels water from the lower end of the cylinder through chamber *g* and ports P into passage I, and thence through passages A^2 and I' and opening *d'* into the riser.

What I claim is—

1. In a pump the combination with the cylinder, of a valve-chest located at the end of and in line with the cylinder and having a longitudinally-disposed web or shell dividing its interior into induction and eduction passages, and a chamber which is in open communication with the cylinder, ports formed through said shell and connecting the induction and eduction passages with the chamber aforesaid, and valves controlling said ports, said valves being movable laterally with relation to the cylinder, substantially as set forth.

2. In a double-acting pump the combination of a barrel having an inner cylinder, an outer shell and partitions dividing the space between them into induction and eduction passages, two valve-chests, one located at each end of the barrel and in line therewith, each of said chests having an outer shell, an inner shell, and partitions dividing the space between them into induction and eduction chambers or passages communicating with the induction and eduction passages of the barrel, the inner shell being disposed lengthwise of the barrel and having through it ports through which the induction and eduction chambers communicate with the cylinder, and

valves movable laterally with relation to the cylinder and controlling said ports, substantially as set forth.

3. In a double-acting pump the combination of a barrel having an inner cylinder, an outer shell and partitions dividing the space between them into induction and eduction passages, two valve-chests, one located at each end of the barrel and in line therewith, each of said chests having an outer shell, an inner shell, and partitions dividing the space between them into induction and eduction chambers or passages communicating with the induction and eduction passages of the barrel, the inner shell being disposed lengthwise of the barrel and having through it ports through which the induction and eduction chambers communicate with the cylinder, the interior of the inner shell being in open communication with the interior of the cylinder, and valves movable laterally with relation to the cylinder and controlling said ports, substantially as set forth.

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