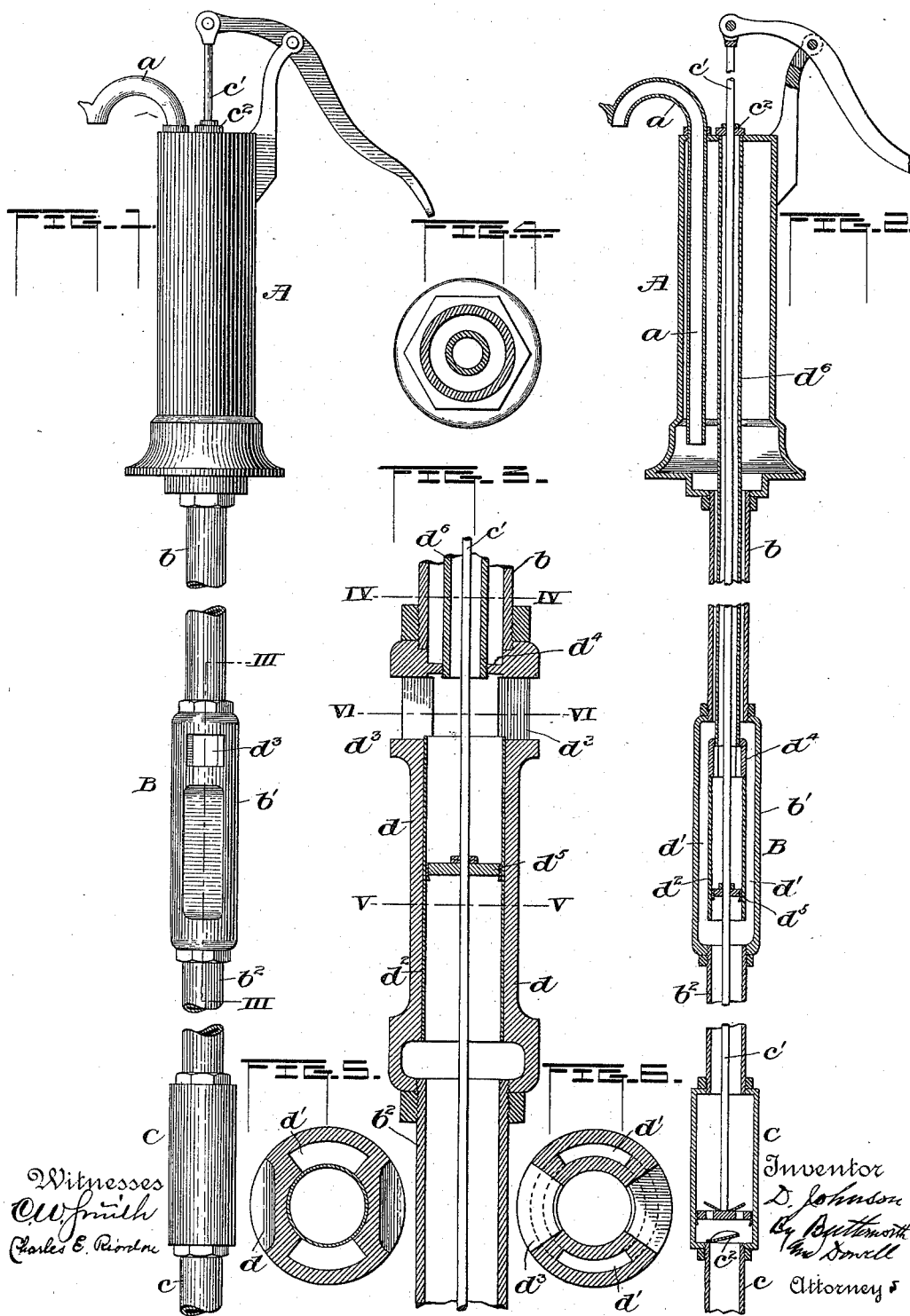


(No Model.)

D. JOHNSON.
LIFT AND FORCE PUMP.

No. 565,620.

Patented Aug. 11, 1896.



UNITED STATES PATENT OFFICE.

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LIFT AND FORCE PUMP.

SPECIFICATION forming part of Letters Patent No. 565,620, dated August 11, 1896.

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To all whom it may concern:

Be it known that I, DANIEL JOHNSON, a citizen of the United States, residing at Ashland, in the county of Ashland and State of Ohio, have invented certain new and useful Improvements in Lift and Force Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to pumps, but more particularly to lift and force pumps for drilled wells.

It is desirable in the manufacture of drilled-well pumps employing two cylinders that the several parts should be in the same line or plane and no part below the pump-stand of a diameter larger than that of the lower cylinder. Owing to this requirement and the smallness of the diameter of the two cylinders, the lower being ordinarily two and one-half inches and the upper cylinder one and three-quarters inches in diameter, it has been difficult to cast the upper cylinder in one piece, so as to provide suitable passages for the liquid, for the reason that the core is so delicate that it will not hold the molten iron. It has been proposed to suspend the upper cylinder or barrel from the piston-rod tube or other portion of the cylinder-casing, so as to provide an annular space for the passage of the water, but in such, as well as in other constructions, it is difficult to relieve the upper portion of the barrel of the water which collects above the piston, and, furthermore, such constructions require a very heavy tube or barrel for the piston, as they have to be threaded and capped at the upper end, which, being of brass and sold by the pound, materially adds to the cost of the pump.

The primary object of my invention is to overcome these objectionable features and to provide means whereby the parts may be arranged in the same line or plane and the diameter of no part below the pump-stand larger than that of the lower cylinder, in order that the parts may be readily inserted into a well having a small diameter, and to provide means whereby a continuous and uniform flow of the liquid may be effected.

A further object is to provide a simple, neat, compact, and efficient upper cylinder for pumps, whereby the passages for the fluid may be readily cast therein, and a light barrel or lining employed, so as to reduce the cost of manufacture to a minimum, and at the same time to provide means whereby the liquid which collects above the piston may readily escape into the well.

With these and other objects in view the invention consists in the construction and combination of the several parts, substantially as hereinafter described, and then pointed out in the claims at the end of the description.

Referring to the accompanying drawings, forming a part of this specification, Figure 1 is a side elevation of a pump embodying my invention, showing the connecting pipes or tubes broken away in order to bring the several parts assembled closer together for illustration. Fig. 2 is a vertical sectional view of the parts in the position shown in Fig. 1. Fig. 3 is an enlarged vertical sectional view of the upper cylinder, the section being taken on the line III III of Fig. 1. Fig. 4 is a sectional plan view on the line IV IV of Fig. 3. Fig. 5 is a sectional plan view on the line V V of Fig. 3, illustrating a cross-section of the waterways or passages; and Fig. 6 is a sectional plan view on the line VI VI of Fig. 3, showing the ports through the outer casing for the escape of water which may collect above the upper piston.

In the drawings, A may denote a pump-stand of any suitable form, having a hollow body portion which may be cast in one piece or constructed of tubular material provided with a cap at each end for inclosing the same, as desired. This stand has a pipe *a* depending from the upper portion thereof, which passes through the cap or upper end of the stand, so as to form an air-tight joint therewith, and has its outer end curved, in order to provide an outlet or spout for the water and to convey the same to one side of the stand, though instead of the outlet-pipe any suitable means may be employed for this purpose. A pipe *b* has one of its ends secured to the lower portion of the stand A by a screw-thread or otherwise, and its other end screw-

threaded and engaging a threaded aperture in the upper portion of the casing b' of the cylinder B, so as to communicate therewith, said casing being provided with a threaded aperture in its lower end, which is engaged by one of the threaded ends of the pipe b^2 , the other end of which may be similarly secured to the upper portion of the lower cylinder C. This latter cylinder may have a pipe c depending from its lower end, and its upper end may be provided with an upwardly-opening valve c^2 . In said cylinder C may be arranged the usual or any preferred form of valved piston secured to the lower end of the piston-rod c' , the latter passing centrally through the casing b' and pipe connections through a cap c^3 , located on the stand and connected at its upper end to the end of the pump-handle or other operating means in the usual manner. The several connecting-pipes form a direct communication between the lower and upper cylinders and the pump-stand, and may have lock or jam nuts arranged upon their ends adapted to rigidly hold and prevent independent rotary motion of the several parts, thereby avoiding the liability of the parts separating and dropping into the well.

The casing b' of the upper cylinder B is preferably cylindrical and of the same or less diameter than the lower cylinder C, and may have its periphery flattened or recessed, as at d , Fig. 5, for a portion of its length, so as to lighten and reduce the cost of production as much as possible. This casing is provided with annular chambers at its upper and lower ends, communicating with the pipes b and b^2 , respectively, and has internally-open waterways or passages d' , which extend longitudinally of the casing, so as to communicate with and form a continuation of said annular chambers. The water-passages may be arranged diametrically at right angles to the flattened portions d of the cylinder, and each preferably extends in an arc of a circle about one-quarter of the distance around the internal circumference of the casing, in order to form seats, ribs, or bearing-surfaces between the same for a barrel or lining d^2 . The barrel or lining may be held in binding contact with the inner surfaces of the ribs or seats, so as to be supported throughout its length within the casing and to inclose and form the inner surface for the waterways or grooves, so that the water may be readily forced from the barrel into the stand A.

Above the barrel d^2 are escape or outlet ports d^3 , Figs. 3 and 6, which communicate with the upper portion of the barrel and extend transversely through the casing, said ports being separated from the upper annular chambers by an arch d^4 , in order to prevent the water which is forced up the waterways or channels d' from escaping back or being forced through the ports into the well, this arch being extended downward, so that the upper edge of the barrel may abut and form

a close joint with its lower surface, as shown in Fig. 2. The barrel or lining d^2 is preferably of light material and about one-half the area in cross-section of the cylinder C and has a piston d^5 of the usual or of any preferred form working therein and secured to the piston-rod c' , so that both the upper and lower pistons may work in unison. Surrounding the rod c' and centrally disposed within the pump-stand A and the pipe b is a small tube or pipe d^6 , which has its upper end secured to the cap or upper closed end of the stand, so as to form a tight joint therewith, and its lower end is secured by a screw-thread or otherwise to the arch d^4 of the cylinder-casing B. By this means the pump-stand may be made to serve as an air-chamber and the construction of the cylinder B simplified and its cost of production materially reduced.

The operation of the invention will be readily understood from the foregoing description when taken in connection with the accompanying drawings. Assuming the parts to be in the position shown, and that the piston-rod is drawn upward by the handle or other means, it will be seen that a vacuum will be formed below the piston in the cylinder C, which will cause an inflow of the water past the valve c^2 , which closes the upper end of the pipe c . If the rod be now moved downward, the water contained in the cylinder C will be forced through the valve-ports in the piston therein, and on the next upstroke a part of the water will be forced into and through the waterways d' and thence into the pipe b , one-half or part of the water being drawn by the suction of the piston d^5 into the barrel d^2 , according to the relative diameters of the barrel and lower cylinder, so that on the downstroke the water therein may be forced up through the pipe b into the pump-stand. By continuing this operation the water in the stand A will be forced into the lower end of the pipe a and out through its upper end, and, by means of the air-chamber formed in the stand, a continuous and uniform stream of water may be forced out of the spout or outlet-pipe. Any water which might collect above the piston d^5 is permitted to escape freely through the ports d^3 of the casing b' .

I thus provide a simple, efficient, and compact pump, which may be used in drilled or other wells, and in which all the parts below the stand A are in the same plane and no larger than the diameter of the cylinder C, and at the same time requiring only three threads in the upper cylinder for securing the connecting pipes or tubes thereto, also materially reducing the cost and increasing the efficiency of the upper cylinder by permitting the casing and waterways to be readily cast, and a very light barrel or lining to be employed, which latter need not ordinarily be of greater thickness than the usual lining for the iron cylinders.

The form and construction of the stand and the manner of supporting the parts below the

same may be varied in some instances. The form of the waterways or grooves and the form of the ports for the escape of the water from the upper portion of the barrel of the upper cylinder, as well as the manner of separating the waterways from the escape-ports, may be changed without departing from the spirit of my invention.

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

1. A cylinder for pumps, comprising an open-ended casing provided with internally-open grooves or waterways extending lengthwise thereof so as to form internal ribs or seats between the same, and a barrel or lining inclosing the open faces of the waterways and having its outer surface in binding contact with the inner surfaces of the seats or ribs, so as to be rigidly supported within the casing by such binding contact, whereby channels for the passage of the fluid may be provided and the cylinder readily and cheaply constructed, substantially as described.

2. A cylinder for pumps, comprising an open-ended casing provided with internally-open grooves or waterways extending lengthwise thereof so as to form seats or ribs between the same, and a barrel or lining inclosing the open faces of the waterways and having its outer surface in binding contact with the inner surfaces of the seats or ribs, so as to be rigidly supported within the casing; said casing being provided with an outlet or escape port or ports which communicate with the upper portion of the barrel, whereby channels for the passage of the fluid may be provided, and the liquid which may collect in the upper portion of the barrel permitted to escape, substantially as described.

3. A cylinder for pumps, comprising an open-ended casing provided with upper and lower chambers and grooves or waterways communicating therewith and extending lengthwise of the casing, so as to form internal ribs or seats, and a barrel or lining inclosing the open faces of the waterways and having its outer surface in binding contact with the inner surfaces of the seats or ribs, so as to be rigidly supported within the casing; said casing being provided with outlet or escape ports located above the barrel and separated by an arch or partition from the upper chamber and the waterways, so as to communicate with the upper end of the barrel, substantially as described.

4. In a pump, the combination with a lower cylinder and a piston working therein, of an upper cylinder comprising a casing provided with internally-open water ways or passages

extending lengthwise thereof, and a barrel or lining supported within the casing and arranged to form the inner surfaces of the waterways, so as to inclose the same, a piston working in said barrel, a pump-stand communicating with the waterways of the upper cylinder and inclosed so as to form an air-chamber, an outlet or spout for conveying the water from the stand, and means for operating the pistons, whereby a uniform and continuous flow of the liquid may be effected, substantially as described.

5. In a pump, the combination with a lower cylinder and a piston working therein, of an upper cylinder comprising a casing provided with internally-open waterways or grooves extending lengthwise thereof so as to form internal seats or ribs, and a barrel or lining inclosing the open faces of the waterways and having its outer surface in binding contact with the inner surfaces of the ribs so as to be rigidly supported within the casing, a piston working within the barrel, an air-tight pump-stand forming an air-chamber, pipe connections between the upper and lower cylinders and the stand, and means for operating the pistons; said casing of the upper cylinder being provided with outlet or escape ports communicating with the upper portion of the barrel and separated from the water ways or passages, whereby a uniform and continuous flow of the liquid may be effected, and the liquid which collects above the upper piston permitted to escape, substantially as described.

6. A cylinder for pumps, comprising a casing provided with open screw-threaded ends adapted to receive the ends of pipe connections, and with grooves or waterways extending lengthwise of the casing so as to form internal seats or ribs, and a barrel or lining inclosing the open faces of the waterways and having its outer surface in binding contact with the inner surfaces of the seats or ribs so as to be rigidly supported within the casing; said casing being provided with outlet or escape ports which communicate with the upper portion of the barrel, and an arch or partition having a threaded aperture adapted to receive the threaded end of a pipe or tube and its lower end form an abutting surface for the upper end of the barrel so as to separate the outlet or escape ports from the grooves or waterways, substantially as described.

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

DANIEL JOHNSON.

Witnesses:

S. G. CUMMINGS,
E. J. GILBERT.