A. J. Reynolds,

Pump Lift,

No. 69,250. Patented Sep. 24, 1867

Fig. 1.

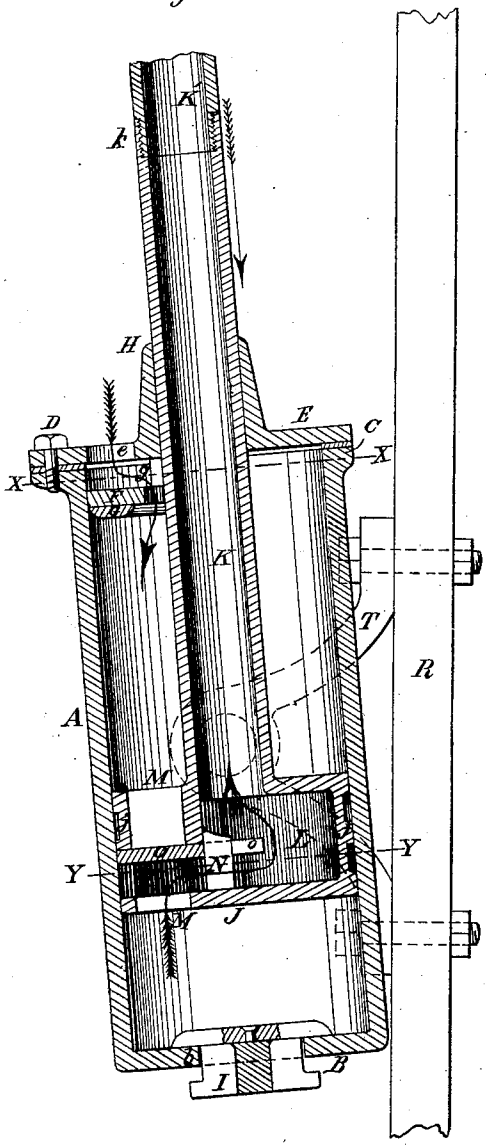


Fig. 2.

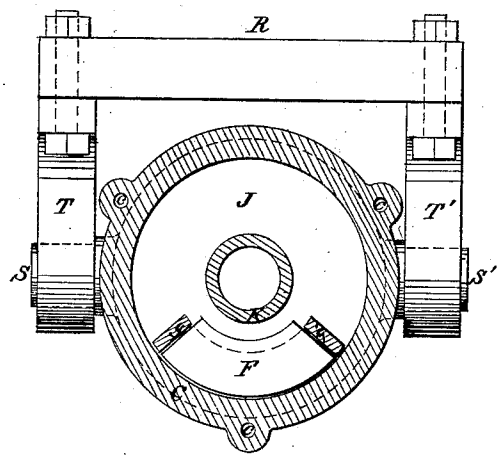
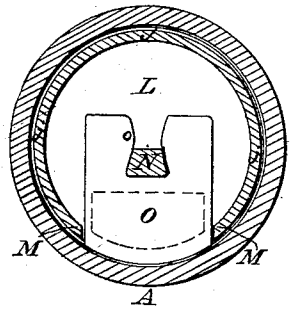


Fig. 3.



Witnesses:

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ANDREW J. REYNOLDS, OF STURGIS, MICHIGAN.

Letters Patent No. 69,250, *dated September* 24, 1867.

IMPROVEMENT IN PUMPS.

The Schedule referred to in these Letters Patent and making part of the same.

TO WHOM IT MAY CONCERN:

Be it known that I, ANDREW J. REYNOLDS, of Sturgis, St. Joseph county, Michigan, have invented a new and useful Improvement in Pumps; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

My improvements relate to that class of hydraulic apparatus commonly known as "submerged force-pumps," and the first part of my invention consists in a peculiar arrangement of the valves, by which the pump is rendered more certain and effectual in its action, and not so liable to get out of repair, and this mode of construction enables me to furnish a superior article at a reduced price.

The second part of my invention consists in a method of suspending the pump within the well or cistern, so that it will accommodate itself to any angular inclination of the piston-rod, thus insuring the pump from any injurious straining or binding, and enabling it to be operated with the least amount of power. In the accompanying drawings—

Figure 1 is an axial section of a force-pump embodying my improvements.

Figure 2 is a horizontal section of the same, taken at the line X X.

Figure 3 is a horizontal section at the line Y Y, the piston valve being represented in its depressed position.

The cylinder A of the pump, together with the lower head B and upper flange C, are all cast in one piece, and said flange is provided with a number of screw-threaded apertures, *c*, for the reception of the bolts D, by which the upper head E is attached to the cylinder. This upper cylinder-head has a port, *e*, closable by an internal induction valve, F, which plays between the under side of said head and the seat G. This seat is cast with the cylinder-head, and is connected therewith by two short projections or lugs, *g g'*, and the distance between the cylinder-head E and the seat G determines the stroke of the valve F. Rising vertically from the cylinder-head E is an elongated boss or neck, H, within which the piston-rod moves, and said neck performs the functions of a stuffing-box, but no packing is contained within it. The lower head B is provided with an annular port, *b*, for the reception of an ordinary valve, I. The piston J and tubular piston-rod K are cast in one piece, the exterior surfaces of both being turned cylindrical, so that they may fit snugly, and at the same time play freely within the pump-barrel A and the neck H. The upper end of the piston-rod is screw-threaded at *k*, and a joint of gas pipe or other suitable tubing, K', is connected to the piston-rod, and this extra tube is attached to the lever by which the pump is operated. In deep wells any number of intermediate tubes may be employed between the lever and the pump. The piston J is a mere shell, being chambered out at L, and this chamber comprises the greater portion of the interior of the piston. The remaining portion of the piston is occupied by a port, M, which passes completely through the piston, and this port communicates with the chamber L. Rising vertically from the bottom of this chamber is a short pin, N, which serves to confine to a vertical path the piston-valve O, which may be of leather, India rubber, or any other suitable material. The pin N flares from towards the centre of the piston outwards, and the piston-valve O being notched at *o*, so as to embrace said pin, it cannot be accidentally detached therefrom. In order to enable the piston to be "water-packed" it is provided with a series of circumferential grooves, *j*. The pump is attached to the beam R by the following devices: Projecting from the sides of the pump-cylinder A are two trunnions, S S', which have journal-bearings within the two brackets T T', the latter being securely attached to the beam R.

The operation of my pump is clearly shown in fig. 1, in which the black arrow indicates the direction in which the piston is supposed to be moving, the red arrow shows the inflowing current of water, and the blue arrow represents the body of water which is being expelled from the pump-cylinder. The pump being submerged, the cylinder will be always filled, the upper valve F resting upon its seat G, and the piston-valve O being in its depressed condition, and covering the lower entrance to the port M, as shown in fig. 3. The moment the piston is elevated the water will be compressed in the upper portion of the cylinder, thereby lifting the valve F and closing the port *e*, and as no water can escape through said port, the contents of the cylinder are forced out through the port M, chamber L, and tubular piston-rod K K'. This upward movement of the piston retains the valve O in its depressed position, and also lifts the lower eduction valve I, by which means the lower part of the pump-cylinder is filled as rapidly as the piston ascends. When the up-stroke has ceased, and as soon as the piston is reversed, the valve I is closed, thus compressing the water in the lower part of the cylinder, by

which means the piston-valve O is elevated, so as to prevent any communication between the upper portion of the cylinder and the discharge pipe K K′, and the contents of the lower part of the pump are expelled through the port M, chamber L, and piston-rod K K′, as indicated by the blue arrow. This reversed movement of the piston allows the upper eduction valve F to drop to its seat G, and the pump is filled through the port *e*, as shown by the red arrow, and the continued reciprocation of the piston fills and empties the pump in the manner described. As the pump is not attached rigidly to the beam R, but is allowed to turn upon its trunnions S S′, it will be seen that it can give sufficiently to enable the piston-rod to move with ease, as the cylinder can oscillate at each and every stroke, by which means the durability of the pump is greatly increased.

I claim herein as new, and of my invention—

1. The arrangement in a hollow piston of the piston-valve O and guide-pin N, as and for the purpose set forth.

2. The construction of the upper cylinder-head, with the induction port *e* and valve-seat G *g g′*, as and for the purpose specified.

3. The arrangement in a submerged pump of the ports *o e* M, valves F I O, and hollow piston and rod L K, as herein described and represented.

In testimony of which invention I hereunto set my hand.

A. J. REYNOLDS.

Witnesses:

GEO. H. KNIGHT,

JAMES H. LAYMAN.