I. N. Forrester.

Pump.

No. 90,940. Patented Jun. 8, 1869.

Fig. 1

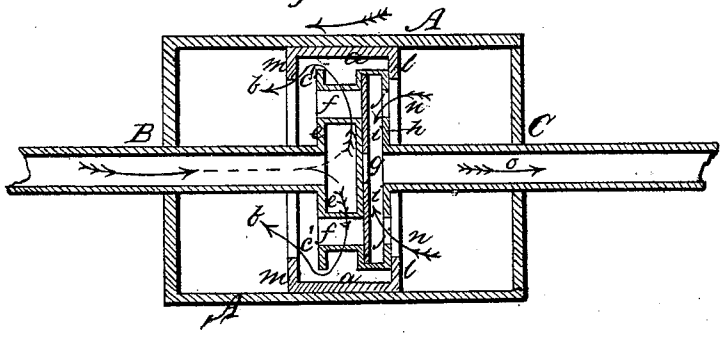


Fig. 3.

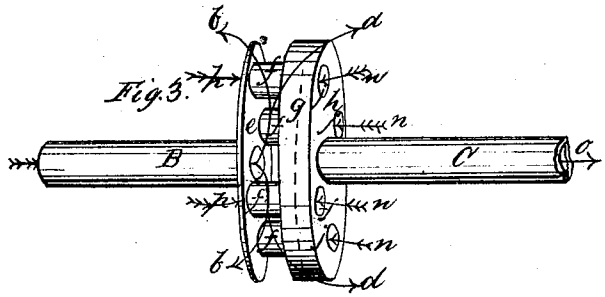
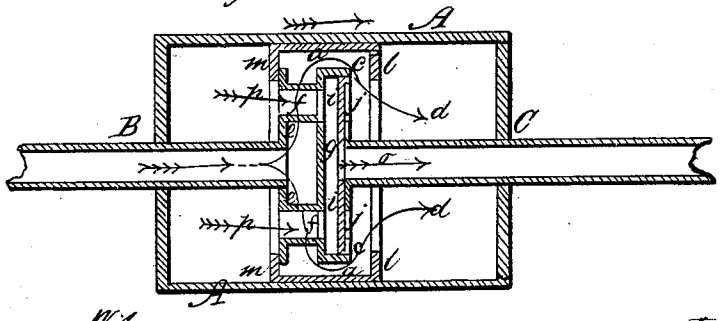


Fig. 2



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Letters Patent No. 90,940, *dated June* 8, 1869.

IMPROVEMENT IN PUMPS.

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

To all whom it may concern:

Be it known that I, ISAAC N. FORRESTER, of the city of Bridgeport, in the county of Fairfield, and State of Connecticut, have invented a new and useful Improvement in Double-Acting Pumps; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, which make a part of this specification, in which—

Figure 1 is a longitudinal section of the pump when ready for use, showing the relative position of the several parts, and the courses of the water when the outside or main cylinder is being moved to the left, or in the direction indicated by the dart.

Figure 2 is a like section of the same, showing the relative positions of the several parts, and the course of the water when the main cylinder is being moved to the right, or in the direction indicated by the dart.

Figure 3 is a perspective view of the inner part of the piston, showing the two sets of passages through which the water is forced into it, so as to be passed out through the eduction or discharge-tube.

My improvement consists in constructing a duplicate piston to operate in such a manner, that if the inner part be held stationary, it will form the pressure-chamber of the pump, while the outer part, or that in which the inner part is located and worked, will form the suction or exhaust-chamber of the pump, and will, by its movement in or with the main cylinder, exhaust the induction-tube, to fill either end of the main cylinder, which, by its alternate motion, will force the water into the pressure-chamber, and so out through the eduction or discharge-tube, whichever way the main cylinder may be moved, so that the pump will be double-acting in both senses; that is, double-exhaust and double-force, as, while the main cylinder moves in either direction, it must exhaust or suck on one side, and force on the other.

I make the main cylinder A A of cast-iron, or any other suitable material, with a hole in the centre of each head, to receive and slide on the two tubes B and C, with one or both heads made to screw in or on, substantially as represented in section in figs. 1 and 2.

I make the outer part of the piston of cast-iron, or any other suitable material, of a rim or web, as *a a*, and two internal rings or flanges, as *l l* and *m m*, one of which to be attached by means of a screw, all as represented in figs. 1 and 2, which I make to fit the inside of the main cylinder closely, but easily, so that no packing will be necessary generally.

I make the inner part of the piston of cast-iron, or any other suitable material, of considerably less diameter than the outer part, as shown in section in figs. 1 and 2, and make the whole substantially as represented in fig. 3.

The tube B may be cast in one piece with the disk *e*, or be otherwise attached to it.

I also cast with the disk *e*, or otherwise attach to it, two or more short pipes, as shown at *f f*, &c., to join it with the closed part *g*.

I cast the tube C in one piece with the disk *h*, or otherwise attach them, and I screw this disk *h* into the rim of the closed vessel *g*.

I make two or more holes, or perforations in this disk, as indicated at *j j*, &c., to receive the water from the upper or right-hand portion of the main cylinder A A, as indicated by the darts *n n*, &c., figs. 1 and 3.

Within this closed vessel *g*, I place a loose disk, as indicated in section, at *i i*, figs. 1 and 2, which will be moved from side to side by the pressure of the water, so as to serve as a valve, to close the holes *j j*, &c., in the disk *h*, as shown in fig. 2, or the ends of the pipes *f f*, &c., as shown in fig. 1.

In the central part of this disk-valve *i i*, I make a hole or space, as indicated, so that it will not obstruct the passage of the water to the eduction-tube C.

Having made the several parts as before described, I drop the disk-valve *i i* into the pressure-vessel *g*, and screw in the disk *h* with its tube C, when the whole will appear as represented in fig. 3.

I then place this inner part of the piston into the outer part *a a*, and screw in the movable flange, or internal ring *l l*, figs. 1 and 2, when the compound or double-acting piston will be complete, and, when inserted into the main cylinder A A, the whole will appear as indicated in section in figs. 1 and 2, and will be ready for use.

I then insert the induction-tube B into the water, as a well, or any other source, and secure the tubes B and C, so as to hold the inner part of the piston stationary, and apply the motive power to the main cylinder A A, so as to give it a longitudinal reciprocating motion to the proper extent, when, if the cylinder A A is moved downward, or to the left, in the direction indicated by the dart in fig. 1, the outer part *a a* of the piston will be moved with it until the ring, or flange *l l* strikes the disk *h* of the inner part, so as to open a space or passage between the disk *e e* and the flange, or ring *m m*, as indicated at *c' c'*; and as the cylinder A A, by its motion, will create a partial vacuum, the water will rush through the tube B, pass by or among the pipes *f f*, &c, and through the open space at *c' c'*, into the lower or left-hand end or portion of the cylinder, as indicated by the darts *b b*, figs. 1 and 3, while the upper or right-hand end of the cylinder, by approaching the piston, will force the disk-valve *i i* to the position shown in fig. 1, and force the air into the pressure-vessel *g*, and so out through the eduction, or discharge-tube C, as indicated by the darts *n n* and *o*.

When the main cylinder A A is moved in the opposite direction, as indicated by the dart in fig. 2, the vacuum will be formed in the upper or right-hand end, and the outside part *a a* of the piston will be carried

with the main cylinder until its ring, or flange *m m* comes in contact with the disk *e e*, and thus opens a space or passage between the disk *h* and the ring, or flange *l l*, as indicated at *c c*, so that the water will rush through the tube B around or among the pipes *f f*, and through the passage *c c*, into the upper or right-hand end of the cylinder, as indicated by the darts *d d*, and at the same time the lower or left-hand end will, by closing on the piston, force the water which it contains into the pipes *f f*, as indicated by the darts *p p*, figs. 2 and 3, and thereby force the disk-valve *i i* against the disk *h*, closing the apertures *j j*, so that the water which passes through the pipes *f f* will pass through *g*, and out through the discharge-tube C, so that a stream will be constantly issuing from that tube C.

This pump may be worked horizontally or vertically, as convenience may require, and the main cylinder A A may be held stationary, and the piston receive the reciprocating motion, but in that case a sliding joint would be needed in each of the main tubes; that is, in the induction-tube B and the eduction-tube C, so that the portion of the induction-tube which is immersed, and the eduction-tube at the point of discharge, may be stationary; but I prefer to have the inner part of the piston and the two tubes stationary, whether the pump works horizontally or vertically.

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination of the piston, consisting of the tubes *f f*, disk *i i*, and main tubes B and C, with the main cylinder A A, when they are arranged substantially as herein described and set forth.

I. N. FORRESTER.

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