W. H. RICHMOND.

Force-Pump.

No. 213,692. Patented Mar. 25, 1879.

Fig. 1

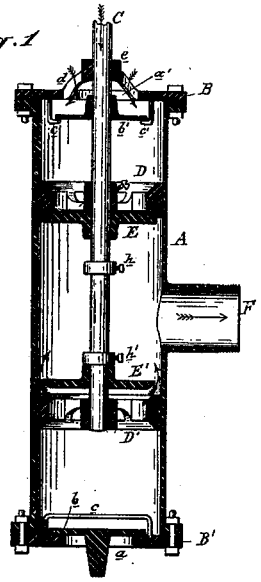


Fig. 3

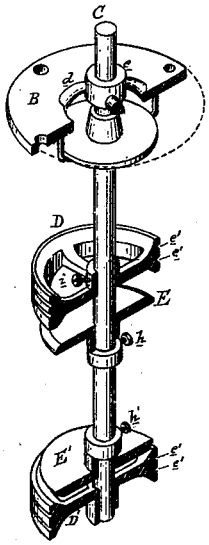
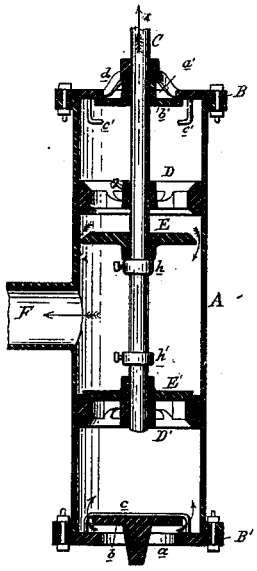


Fig. 2



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WILLIAM H. RICHMOND, OF MOUNT PLEASANT, MICHIGAN.

IMPROVEMENT IN FORCE-PUMPS.

Specification forming part of Letters Patent No. **213,692**, dated March 25, 1879; application filed November 12, 1878.

To all whom it may concern:

Be it known that I, WILLIAM H. RICHMOND, of Mount Pleasant, in the county of Isabella and State of Michigan, have invented an Improvement in Force-Pumps, of which the following is a specification:

The nature of my invention relates to certain new and useful improvements in that class of pumps to be used at the bottom of wells, and submerged in the water therein contained, and employed to raise such water to any desired height; and the invention consists in the details of construction, and in their various combinations to accomplish the desired result, as more fully hereinafter set forth.

In the drawings, Figure 1 is a vertical central section, showing the piston-rod with its downward stroke completed. Fig. 2 is a like view, showing the piston-rod with its upward stroke completed. Fig. 3 is a perspective, partially in section, showing the piston-rod and its connections detached from the cylinder.

In the accompanying drawings, which form a part of this specification, A represents a cylinder, provided with heads B B′, secured to each end of said cylinder in any convenient manner. The head B′ has a central opening, *a*, which is alternately opened and closed in the operations of the pump by the valve *b*. A yoke, *c*, rigidly secured to said head, as shown, secures the valve in place and limits its vertical action.

The head B is also provided with a central opening, *a′*, and this opening is alternately opened and closed by the valve *b′*, which is sleeved upon the piston-rod C, and is held in place by the hooks *c′*, which are rigidly secured to the head B, and which limit the vertical play of said valve. The head B is provided with a spider, *d*, which carries a stuffing-box, *e*, through which the piston-rod C reciprocates.

Spider-shaped plungers or buckets D D′ are secured to the piston-rod C, as shown. These plungers or buckets should correspond in diameter to the internal diameter of the cylinder; and to prevent the necessity of employing packing, annular channels *e′* are turned in the outer periphery of said buckets, which, in the operation of the pump, are filled with water, thereby making what is ordinarily denominated "water packing."

A valve, E, is sleeved upon the rod C, its vertical play being limited by the adjustable collar and set-screw *h* in one direction, and in the other by seating itself against the lower side of the bucket D, alternately opening and closing the apertures *i* in said bucket. A similar valve, E′, similarly sleeved upon the rod, alternately opens and closes similar apertures through the bucket D′ and the limit of its vertical throw by the collar and set-screw *h′*.

An outlet, F, centrally situated, affords an outlet for the water in the cylinder between the buckets D D′ and their operating valves. A pipe or hose connected to said outlet F leads the water to the surface of the ground. The piston C also extends to the surface, and required power for giving the same a reciprocating motion may be attached to it.

In practice this pump is placed in the bottom of the well, resting upon any suitable foundation, and, with the exception of the piston-rod, entirely submerged in the water. The downward throw of the piston-rod allows the valve *b* to disclose the opening in the head B by the pressure of the water above the head. Such motion also lowers the buckets. The bucket D′ drops from the valve E′, thereby allowing the water in the lower chamber to pass, as indicated by arrow in Fig. 1, through the openings in said bucket, to the center chamber and to the outlet. A reverse of this motion allows the pressure from the bottom to raise the valve *b*, closes the valve *b′*, unseats the valve E, and allows the water to pass from the upper chamber, through the bucket D, to the center chamber and outlet.

Thus it will be seen that the working of the piston-rod allows the water to be alternately taken in at the top and bottom of the cylinder, into the upper and lower chambers thereof, and thence alternately to the center chamber and outlet, thereby giving a continuous flow, which may be carried to any desired height.

What I claim as my invention is—

1. In a force-pump, substantially as described, the cylinder A, provided with heads B B′, with central openings, *a a*, in combination with the valves *b b′* and yoke *c* on hooks *c′*, for the purpose of limiting the vertical throw of said valves, substantially as described.

2. A force-pump consisting of the cylinder A, heads B B′, piston-rod C, buckets D D′, valves E E′ *b b′*, yokes or hooks *c c′*, collars *h h′*, and outlet F, the parts being constructed, arranged, and operating substantially as and for the purposes set forth.

WILLIAM H. RICHMOND.

Witnesses:
H. S. SPRAGUE,
CHAS. J. HUNT.