H. BERG.
Pump.

No. 202,512. Patented April 16, 1878.

Fig. 1.

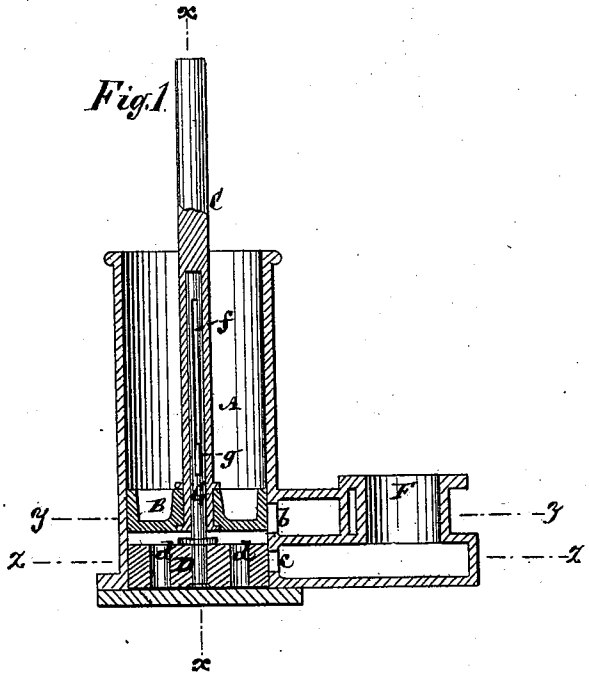


Fig. 2.

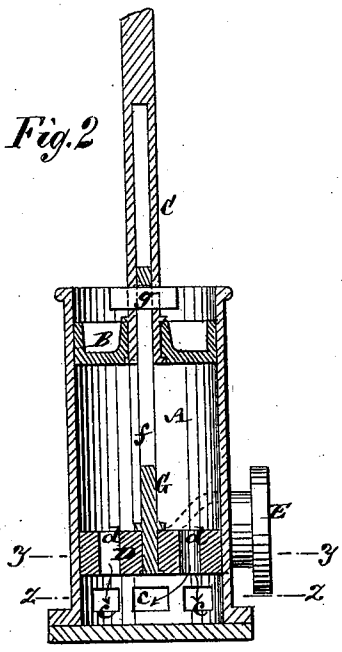


Fig. 3.

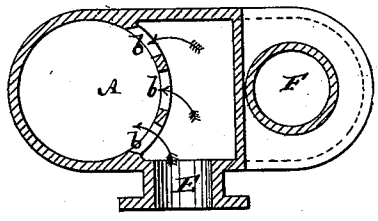
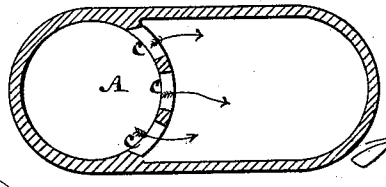


Fig. 4.



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IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **202,512**, dated April 16, 1878; application filed February 20, 1878.

To all whom it may concern:

Be it known that I, HEINRICH BERG, of Meinhardt, near Hard-on-the-Seig, Germany, have invented a new and useful Improvement in Pumps, of which the following is a description, reference being had to the accompanying drawing, which forms part of this specification.

This invention relates to that description of reciprocating plunger-pumps, both suction and force, in which the plunger is a close one, and the working-barrel of the pump is provided with a perforated valve or valves arranged to control the inlet and outlet ports in said barrel, and is operated mechanically by the plunger to alternately open and close said inlet and outlet ports.

The invention consists in a combination, with the working-barrel of the pump, having inlet and outlet ports arranged one in advance of the other at either end of it, and a close suction and delivery piston or plunger working in said barrel, and having a hollow rod, of a perforated supplementary piston, having a rod arranged to enter the hollow rod of the main piston or plunger, and means for operating said supplementary piston through the agency of said rods to shift the supplementary piston, which acts as a valve and controls the ports of the working-barrel, substantially as hereinafter described.

In the accompanying drawings, Figure 1 represents a vertical section of an upright single-acting pump having my invention applied; Fig. 2, a further vertical section on the line *x x;* Fig. 3, a horizontal section on the lines *y y*, and Fig. 4 a further horizontal section on the lines *z z.*

A is the working-barrel of the pump, and B its suction and delivery piston or plunger, which may be worked up and down within the barrel by any suitable means, C being the rod by which it is operated.

D is the other piston, which takes the place of the ordinary valves, and has its action restricted to that end of the cylinder or barrel A in which are the inlet-ports *b b* and outlet-ports *c c*. The inlet-ports *b b* communicate with a suction pipe or branch, E, and the outlet-ports *c c* with a delivery pipe or branch, F. These pipes or branches may or may not have air-vessels connected with them.

Both pistons B D are provided with cast-steel packing-rings or other suitable packings, to secure a close fit for them within the barrel. The piston D has any number of passages, *d*, in or through it, and its motion is controlled by the piston B to alternately open and close the ports *b* and *c*, as hereinafter described. This control of the piston D by the piston B may be effected by making the rod C of the piston B hollow, and causing the rod G of the piston D to pass up within the rod C, the rod G having a longitudinal slot, *f*, in it, and the rod C having a key, *g*, arranged to pass up through said slot, so that as the piston B approaches the termination of its upstroke the key *g*, striking the upper end of the slot *f*, will lift the piston D from the position shown in Fig. 2, and consequently cause the piston D to uncover the outlets *c* and close the inlets *b*. A reverse action of the piston B causes the latter, as it approaches the end of its bottom stroke, to shift the piston D and make the latter open or uncover the inlet-ports *b* and close or cover the outlet-ports *c*. Instead of this last-named action of the piston D being effected by the key *g* striking the lower end of the slot *f*, it may be done by facial projections or rings on the inner side of the piston B and upper side of the piston D, to give a steadier action and break shock on the packing-rings of the pistons.

The operation is as follows: Supposing the pistons B and D to be in the positions shown in Fig. 1; then the piston B, in commencing to rise, leaves the piston D behind it, and in closed relation with the ports *c*, while the inlet-ports *b* are open for the ingress of water below the piston B. As, however, the piston B approaches the upper end of its stroke, the key *g* lifts on the rod G, and raises the piston D sufficiently to open the outlet-ports *c* and close the inlet-ports *b*. The piston B then descends, leaving the piston D in such changed position, and forces the fluid previously drawn in by the piston B out through the passages *d* in the piston D and through the outlet-ports *c*. When, however, the piston B approaches the end of its bottom stroke, it again shifts

the piston D, so as to cause the latter to close the outlet-ports *c*, or, in other words, to return the piston D to its normal position, as shown in Fig. 1, to repeat the action already described with reference to the piston B.

Chambers or openings may be made in the rims of the pistons, to allow for the escape above the pistons of any water which may remain after the outlets *c* are closed by the piston D as the piston B completes its descent.

Although the invention here has been described as applied to an upright pump, it is equally applicable to a horizontal one, and, by providing inlets and outlets at both ends of the cylinder, and a perforated piston, D, at both of said ends, the invention is made to apply to a double-acting pump.

I claim—

The combination of the working-barrel A, having inlet-ports *b* and outlet-ports *c*, arranged one in advance of the other, the main working piston B, having a hollow rod, C, and provided with a cross-piece or key, *g*, and the supplementary perforated piston D, having a slotted rod, G, arranged to enter the hollow piston-rod C, and receiving the key *g* through it, essentially as and for the purposes herein described.

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