

H. SAXTON & J. B. HILL, Double-Acting Pumps.

No. 153,850.

Patented Aug. 4, 1874.

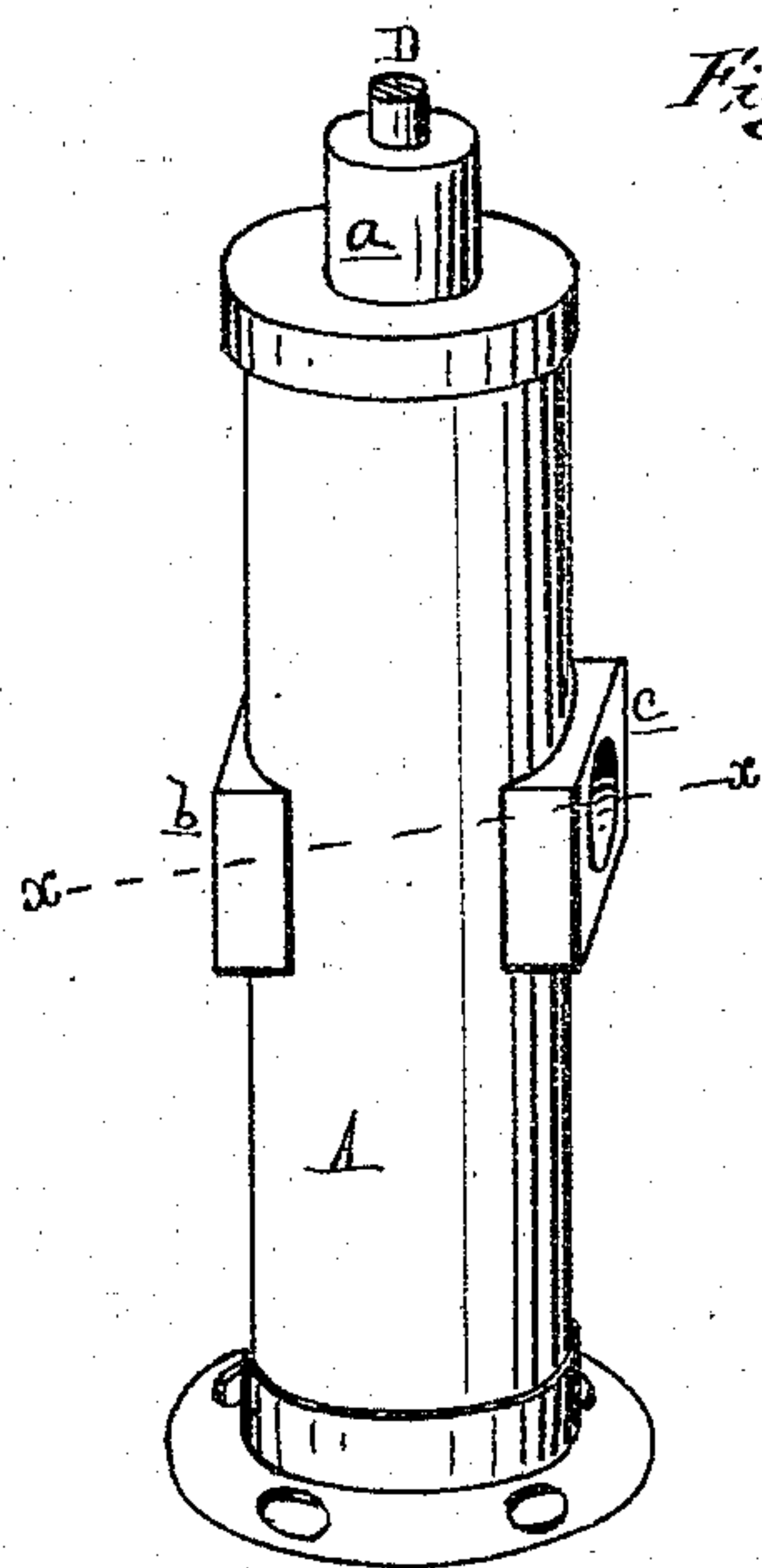


Fig. 1.

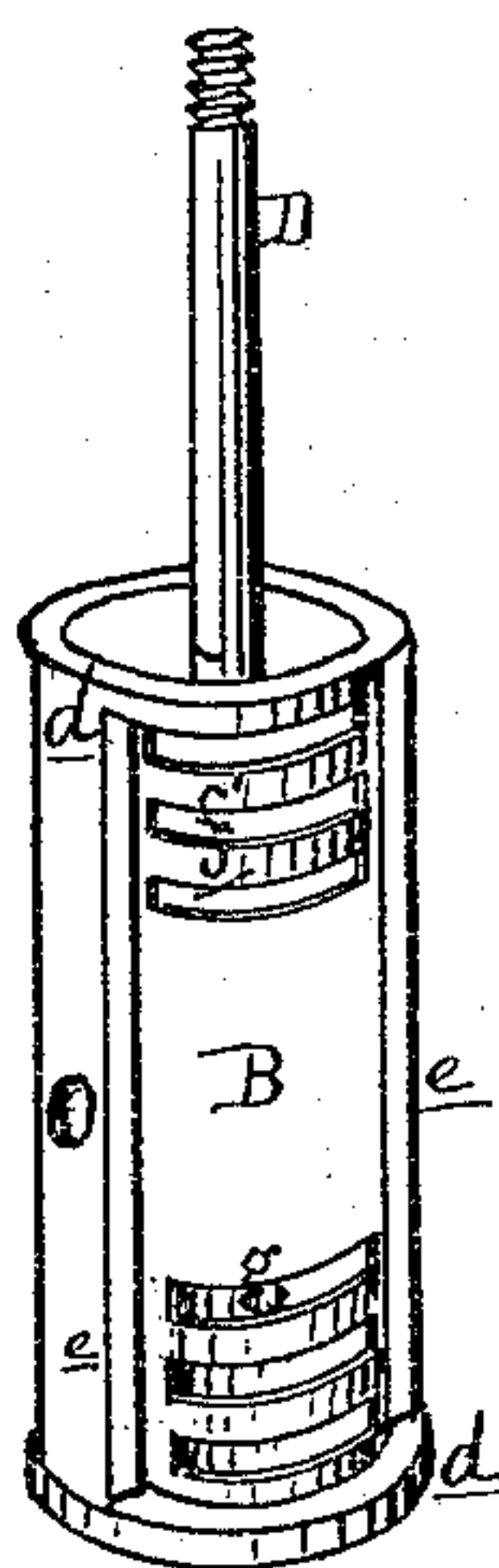


Fig. 2.

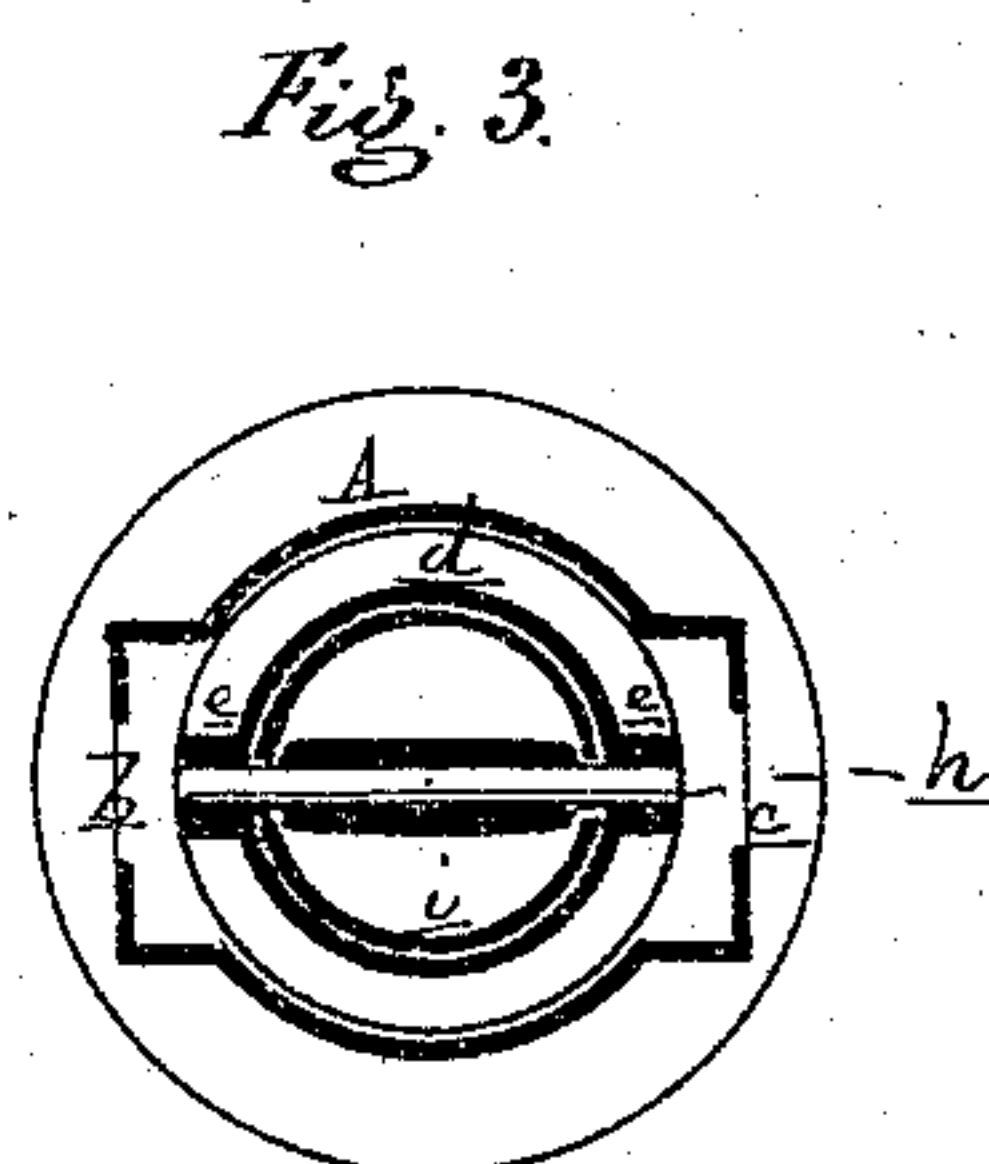


Fig. 3.

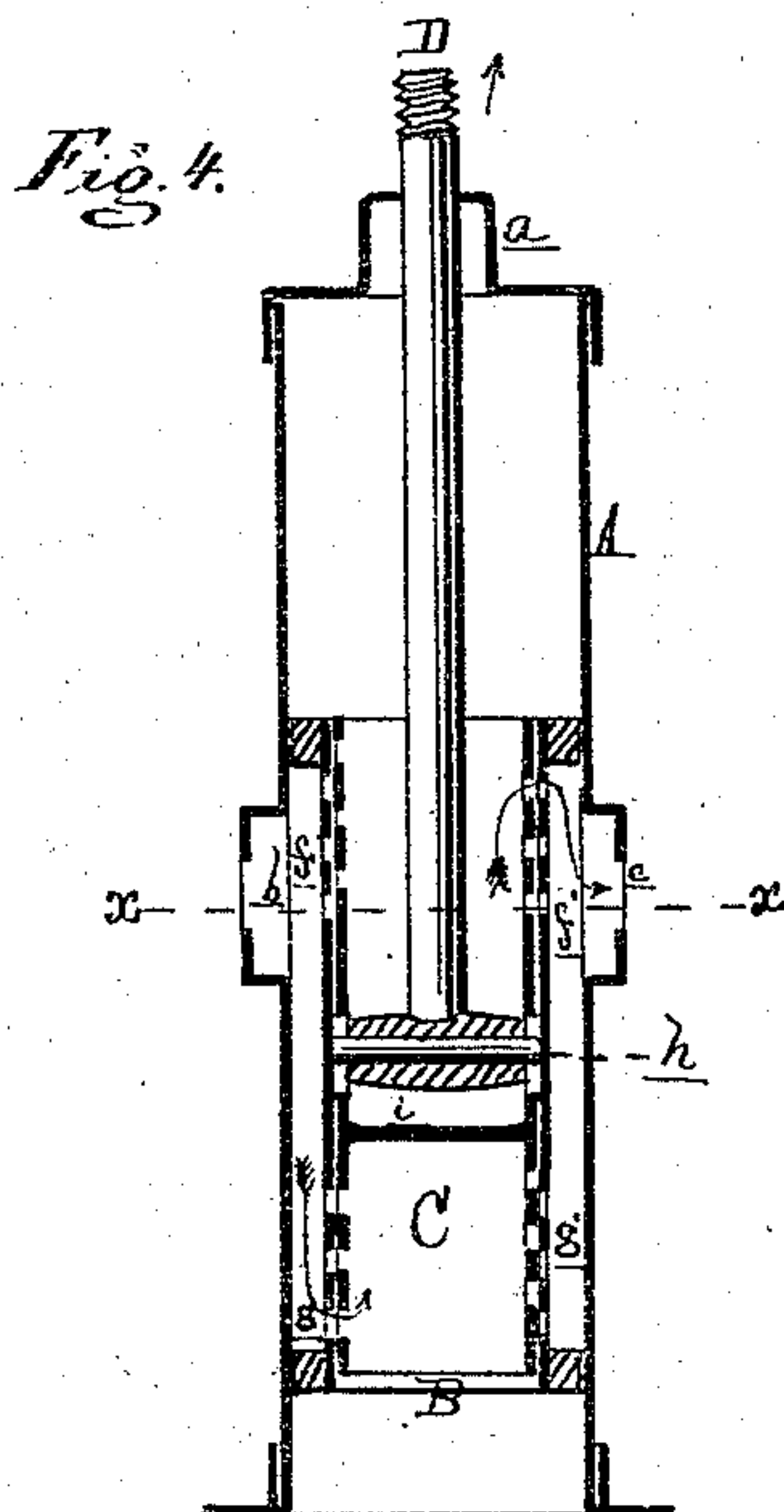


Fig. 4.

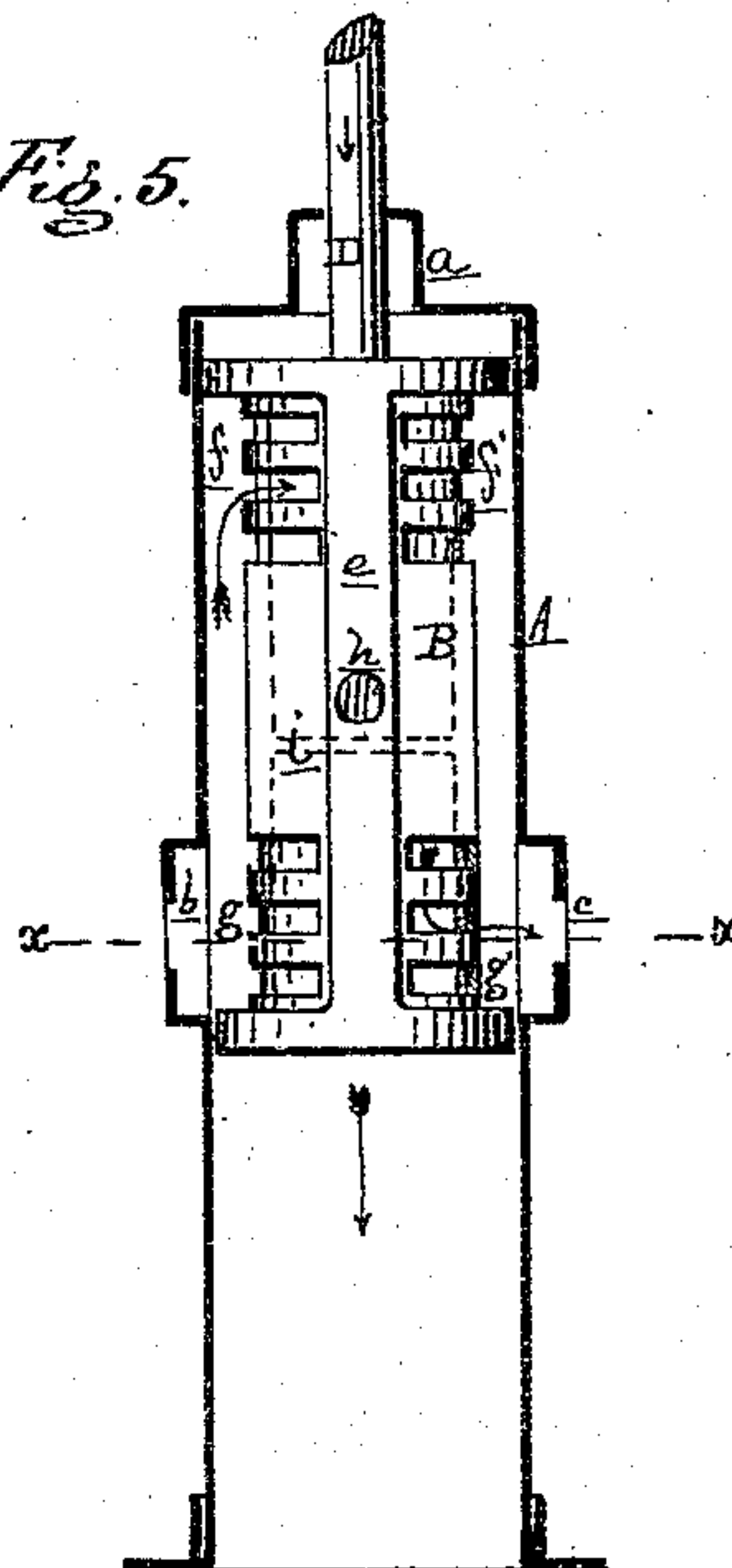


Fig. 5.

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HENRY SAXTON AND J. BENSON HILL, OF ELK RAPIDS, MICHIGAN.

IMPROVEMENT IN DOUBLE-ACTING PUMPS.

Specification forming part of Letters Patent No. **153,850**, dated August 4, 1874; application filed April 14, 1874.

To all whom it may concern:

Be it known that we, HENRY SAXTON and J. BENSON HILL, M. D., of Elk Rapids, in the county of Antrim and State of Michigan, have invented an Improvement in Double-Acting Pumps, of which the following is a specification:

This invention has for its object to so construct a plunger-pump that it will deliver a continuous stream, thereby avoiding the expense of an air-chamber; and, the suction being also continuous, no check or foot valve will be required.

The invention consists in the peculiar construction and arrangement of a hollow and ported plunger having an internal cylinder-valve, with relation to a peculiar pump-barrel, as more fully hereinafter set forth.

Figure 1 is a perspective view of our pump, with portions of the barrel broken away. Fig. 2 is a detached perspective view of the plunger. Fig. 3 is a cross-section at *x x*. Fig. 4 is a vertical section of the pump, showing the courses of the currents at the commencement of an up-stroke. Fig. 5 is a similar section of the pump, showing the courses of the currents at the commencement of a down-stroke.

In the drawing, A represents the cylinder or barrel of the pump, closed at both ends, the upper head having a stuffing-box, *a*, through which the plunger-rod plays. *b* is the suction-opening in one side of the barrel, about mid-height, and directly opposite it is the discharge-opening *c*. B is the plunger, in the form of a hollow cylinder, open at both ends, and of less diameter than the bore of the pump, but is fitted thereto by an annular packing-ring, *d*, at each end. *e e* are two longitudinal ribs extending from ring to ring, on opposite sides of the plunger. In the top part of the plunger two sets of segmental ports, *f f'*, are cut. *g g'* are similar ports in the lower end of the plunger. C is a cylindrical valve loosely fitted in the plunger. At each end a series of ports are cut in it, corresponding in number to those of the plunger, but with this difference: that the ports of each end are in different horizontal planes, so that if the ports *f* and *g'* of the plunger be opened the ports *f'* and *g* will be closed, and vice versa. D is the plunger-rod, having an eye in its lower end, which is pivoted to the plunger by a trans-

verse bolt, *h*, passing through the ribs *e e*. Below this bolt the valve is divided, by a diaphragm, *i*, into two chambers—an upper and a lower one. The bolt passes through the walls of the valve, which are longitudinally slotted to give the valve play enough in the plunger to cover and disclose the ports in its reciprocation.

The suction and discharge pipes being connected with the openings *b* and *c*, respectively, it will be seen, on referring to Fig. 4 of the drawing, that in the up-stroke of the plunger the water entering at *b* follows up the plunger, filling the space under the valve diaphragm, passing through the open ports on the suction side of the plunger. At the same time the water above the diaphragm is expelled through the ports at the top of the plunger, which are open on the discharge side thereof, those on the suction side of the plunger being closed.

On the down-stroke of the plunger the resistance of the water below the diaphragm forces up the valve, closing one set of ports and opening the other, when the water entering at *b* passes up into the plunger above the diaphragm, while that below it will be forced out at *c*, as seen in Fig. 5. Thus it will be seen that the suction and discharge are continuous, requiring neither check-valve or air-chamber to hold the suction, or to insure a steady delivery.

This pump is adapted to all kinds of duty, as, being entirely of metal, all liquids can be lifted and forced by it. If used as a well-pump, it can be submerged to avoid the trouble of freezing up during cold weather.

What we claim as our invention, and desire to secure by Letters Patent, is—

The herein-described double-acting plunger-pump, consisting of the cylinder A provided with the openings *b c*, the hollow plunger B provided with the rings *d d*, ribs *e e*, and ports *f f' g g'*, the ported cylinder-valve C provided with the diaphragm *i*, and the plunger-rod D, substantially as set forth.

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Witnesses:

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