B. S. Hill,

Pump Lift,

No. 48,401. Patented June 27, 1865.

Fig. 1

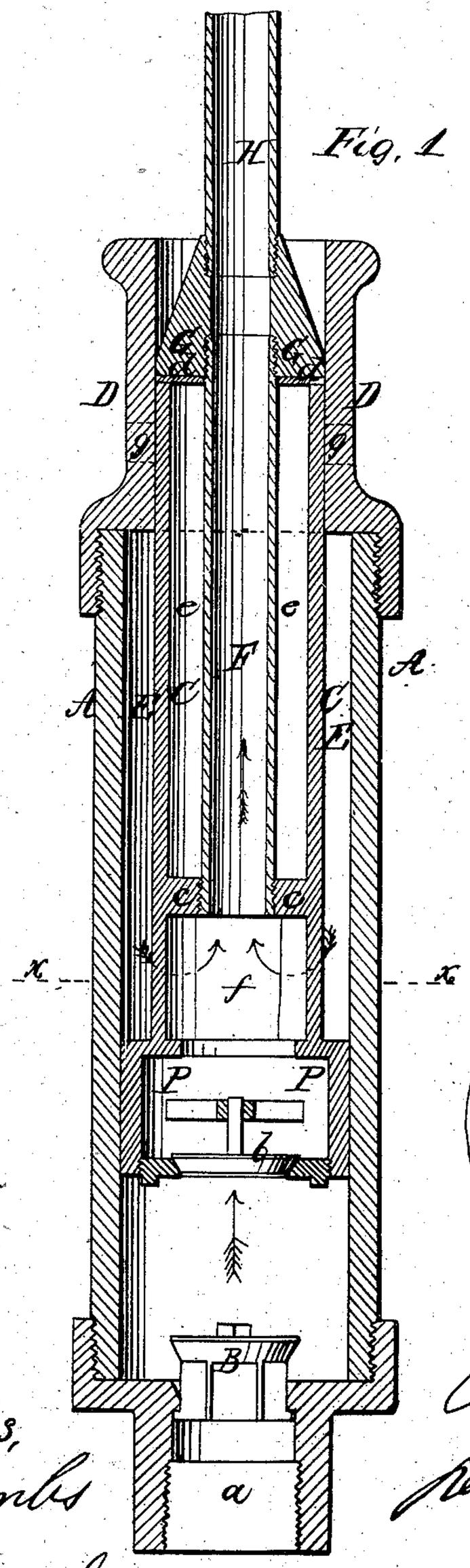
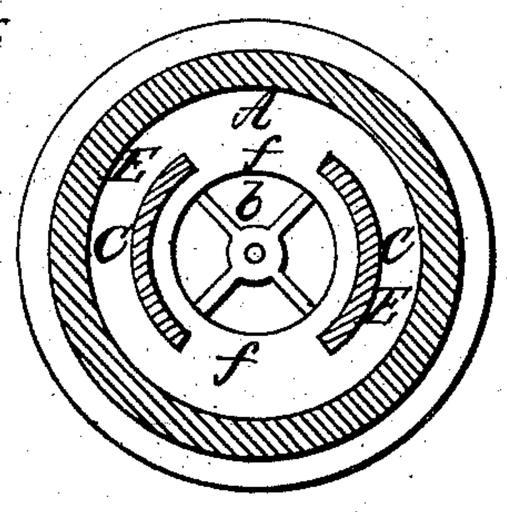


Fig. 2.



Witnesses,
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UNITED STATES PATENT OFFICE.

BENJAMIN S. HILL, OF NEW YORK, N. Y.

IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. **48,401**, dated June 27, 1865.

To all whom it may concern:

Be it known that I, BENJAMIN S. HILL, of the city, county, and State of New York, have invented a new and useful Improvement in Pumps; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical section of a pump constructed according to my invention. Fig. 2 is a horizontal section of the same in the plane indicated by the line *x x* in Fig. 1.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in an improvement whereby I obtain a double-acting pump with only two valves.

To enable others skilled in the art to construct a pump according to my invention, I will proceed to describe it with reference to the drawings.

A is the main cylinder of the pump, having an inlet-valve, B, at the bottom, above where the suction-pipe is connected at *a*.

P is the piston, containing a central valve, *b*. To this piston is connected an open-bottomed cylinder, C, of smaller diameter, which fits and works through a cylinder, D, which is screwed tightly onto and forms an air and water tight cover to the main cylinder A, and which closes the annular chamber E formed above the margin of the piston, between the main cylinder A and the cylinder C. In the center of the cylinder C there is a pipe, F, the lower end of which is screwed tightly into a hole in the center of a diaphragm or transverse partition, *c*, provided in the cylinder C at some distance above the piston. A cap, G, is screwed onto the upper end of this pipe, to form by the aid of a packing-ring, *d*, of india-rubber or other material, an air-tight cover to the cylinder C, and the said cap, which has an opening right through it, has screwed into it the discharge-pipe H, which also constitutes the rod for working the piston, the said discharge-pipe always communicating with the interior of the piston by means of the pipe F. The annular space *e* between the cylinder C and the pipe F is air-tight, and the water perfectly excluded from it. Below the diaphragm or partition *c* there are openings *f f* in the cylinders C, which form a constant communication between the piston and the reserve chamber E.

This pump may be used as a submerged or as a lift and force pump. When a reciprocating motion is given to the piston its action is as follows: In the downward stroke of the piston the valve *b* opens and the valve B closes, and the water with which the cylinder has been previously filled below the piston rushes up through the piston, and a portion of it which is displaced by the cylinder C, passing through the passages *f f*, fills the chamber E, while the remainder passes up through the pipe F and is discharged through the discharge-pipe F. In the upward stroke of the pump the valve *b* is closed and B open, and while water comes up through the suction-pipe and follows up the piston the water with which the chamber E was filled during the previous upward stroke is expelled from the said chamber through the passages *f f*, pipe F, and discharge-pipe H. It will thus be seen that the pump, though having but two valves, is double-acting, delivering water in the downward as well as in the upward stroke of the piston. In the upward stroke of the piston the air-tight chamber *e* forms a float to balance the weight of the discharge-pipe.

To provide for the draining of the pipe F and suction-pipe when desirable, one or more openings may be provided, as shown in dotted lines at *g g* in Fig. 1, in the cylinder-cap D, so that by raising the piston and cylinder C a little higher than they are raised in the operation of the pump the upper parts of the openings *f f* may be brought opposite to the above-mentioned openings *g g*, when the water from the pipes will run out through the latter openings.

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

1. The cylinder having openings *f f*, combined with the piston P, and arranged in relation to the discharge-pipe H substantially as and for the purpose herein specified.

2. Combining the discharge-pipe H with the piston by means of the cap G of the cylinder C and the pipe F, the latter pipe serving also as a means of securing the cap G tightly to the cylinder C and of forming an air-tight chamber, *e*, within the said cylinder, all substantially as herein specified.

3. The combination and arrangement of the piston P, cylinder, C, chamber E, and discharge-pipe H, substantially as herein specified.

B. S. HILL.

Witnesses:
J. W. COOMBS,
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