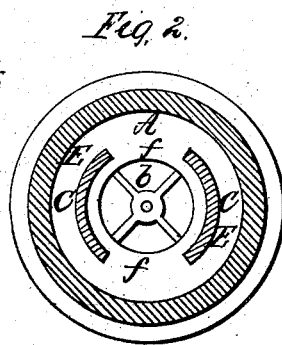
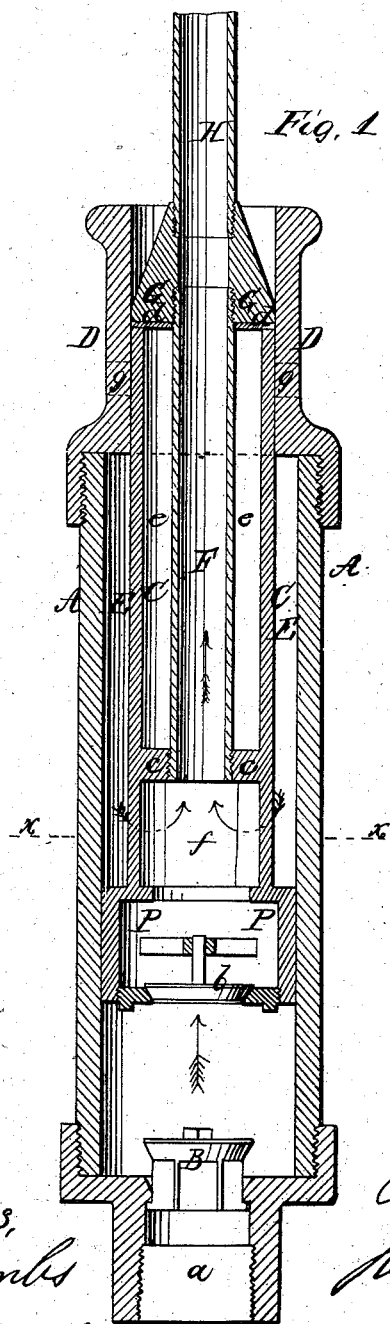


B.S. Hill,

Pump Lift,

No 48,401,

Patented June 27, 1865.



Witnesses,
J. W. Coombs
G. W. Reed.

Inventor,
Benj. S. Hill
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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, *e*, 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 *e* 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,
G. W. REED.