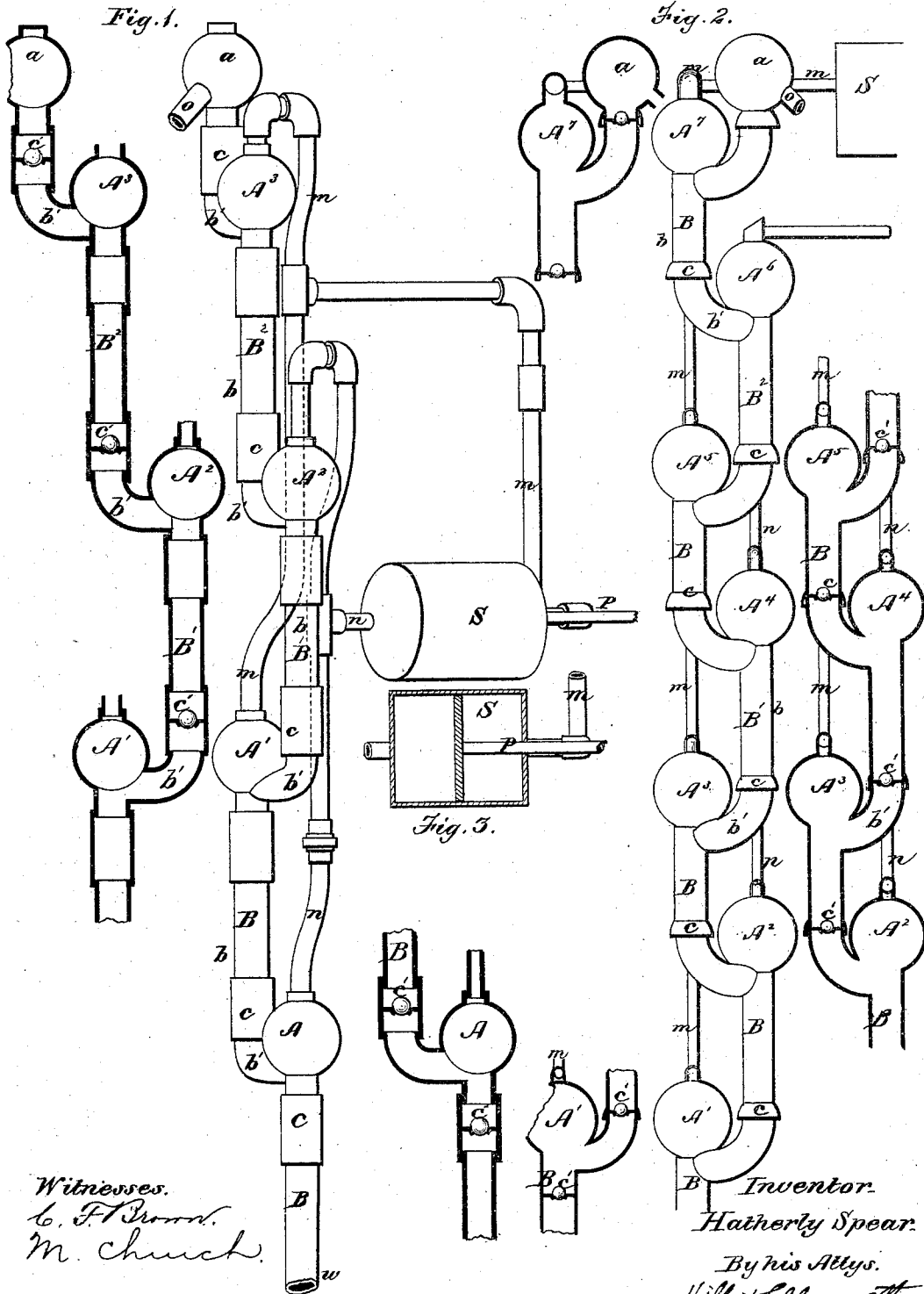


H. SPEAR.

Pump.

No. 133,266.

Patented Nov. 19, 1872.



Witnesses.  
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# UNITED STATES PATENT OFFICE.

HATHERLY SPEAR, OF CAPE ELIZABETH, MAINE.

## IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. 133,266, dated November 19, 1872.

*To all whom it may concern:*

Be it known that I, HATHERLY SPEAR, of Cape Elizabeth, in the county of Cumberland and State of Maine, have invented a new and Improved Pump; and I do hereby declare the following to be a full and exact description of the same, reference being had to the accompanying drawing forming part of this specification, in which—

Figure 1 comprises a side elevation and two partial sections, showing one form of the pump; Fig. 2 comprises a side elevation and three partial sections, representing another form; and Fig. 3 is an axial section of the cylinder.

This invention relates to that class of pumps for which Letters Patent were granted to me November 21, 1871, No. 121,209, in which water is raised by the combined action of exhausting the air in the pump-cylinder, and at the same time compressing the air in appropriate reservoirs, so that the advantages of both a force and suction pump are obtained; and to attain these ends my invention consists in the employment of reservoirs connected by tubes having valves opening upward, in connection with a cylinder having a reciprocating piston, the said cylinder being connected at its heads with pipes opening each into every alternate reservoir, so as to exhaust and compress the air alternately in each set of pipes and reservoirs, by means of which construction the simplicity and efficiency of this class of pumps are much increased, as hereinafter more fully set forth.

In the drawing,  $A^1 A^2$ , &c., are air-chambers or reservoirs, jointed together by water-pipes  $B B^1 B^2$ , &c., which are constructed of long straight sections  $b$  and short curved sections  $b'$ , forming a quarter of a circle, the several pipes and chambers being arranged with relation to each other substantially as shown. In each of the pipes  $B B^1$ , &c., there is an enlargement,  $c$ , designed for the accommodation of a valve,  $c'$ , seating downward within the pipe, to prevent the regurgitation of the water.  $S$  is a larger cylinder, within which is a double-acting piston operated by a piston-rod,  $P$ , by means of power derived from any suitable source. One end of this cylinder is connected to alternate chambers  $A A^2 A^4$ , &c., by means of an air-pipe,

$n$ , and the other end to all the other air-chambers  $A^1 A^3 A^5$ , &c., by means of a similar pipe,  $m$ . The water is admitted to the lower section of the pump at  $W$ , and discharged from the upper section at  $o$ , the globe designated as  $a$  being simply an air-chamber to equalize the flow at the outlet.

The method of operation is as follows: At each stroke of the piston the air is exhausted from every alternate chamber  $A^1 A^3 A^5$ , &c., into one end of the cylinder  $S$ , and condensed from the other end of the cylinder into all the other chambers  $A A^2 A^4$ , &c., so that both the exhausting and the condensing power will be fully and simultaneously utilized in raising the water through each section of the pump. Thus, the piston being at the left-hand end of the cylinder, and the connections properly made, on forcing the piston toward the right-hand end a vacuum will be created in the alternate reservoirs  $A A^2 A^4$ , &c., and the water will rise into said reservoirs through the valves below them. At the end of the stroke the valves referred to will seat, and on the return stroke the air will be simultaneously compressed upon the water in said reservoirs, and exhausted from the alternate reservoirs  $A^1 A^3 A^5$ , &c., thus both lifting and forcing the water upward through the pump, from which it will be finally discharged in a continuous stream at  $o$ .

The number of sections may be increased indefinitely by pairs, the cylinder being correspondingly enlarged so as to exhaust one-half of the reservoirs at each stroke. Thus the pump may be of any length, each valve sustaining the column of water in its own section alone, however high the water is to be raised.

Having thus described my invention, what I claim is—

A pump constructed of the reservoirs  $A A^1 A^2$ , &c., the pipes  $B B^1 B^2$ , &c., the valves  $c'$ , the pipes  $m n$ , the cylinder  $S$ , and the double-acting piston working therein, all said parts being constructed and arranged substantially as and for the purposes set forth.

HATHERLY SPEAR.

Witnesses:

GEORGE F. JUNKINS,  
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