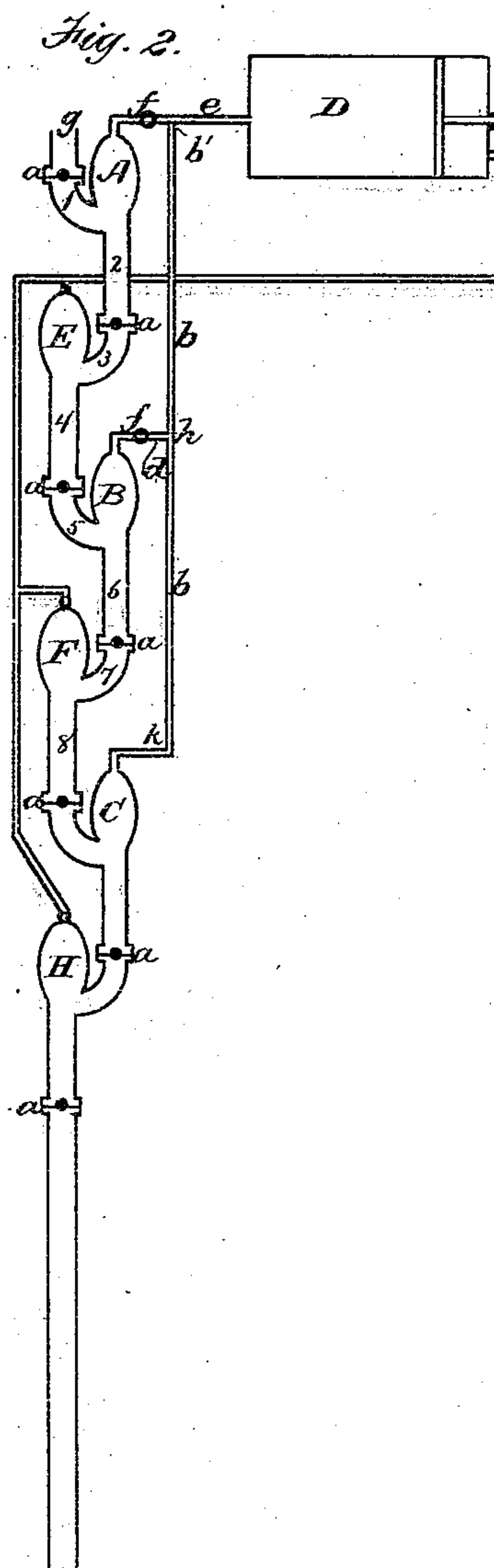
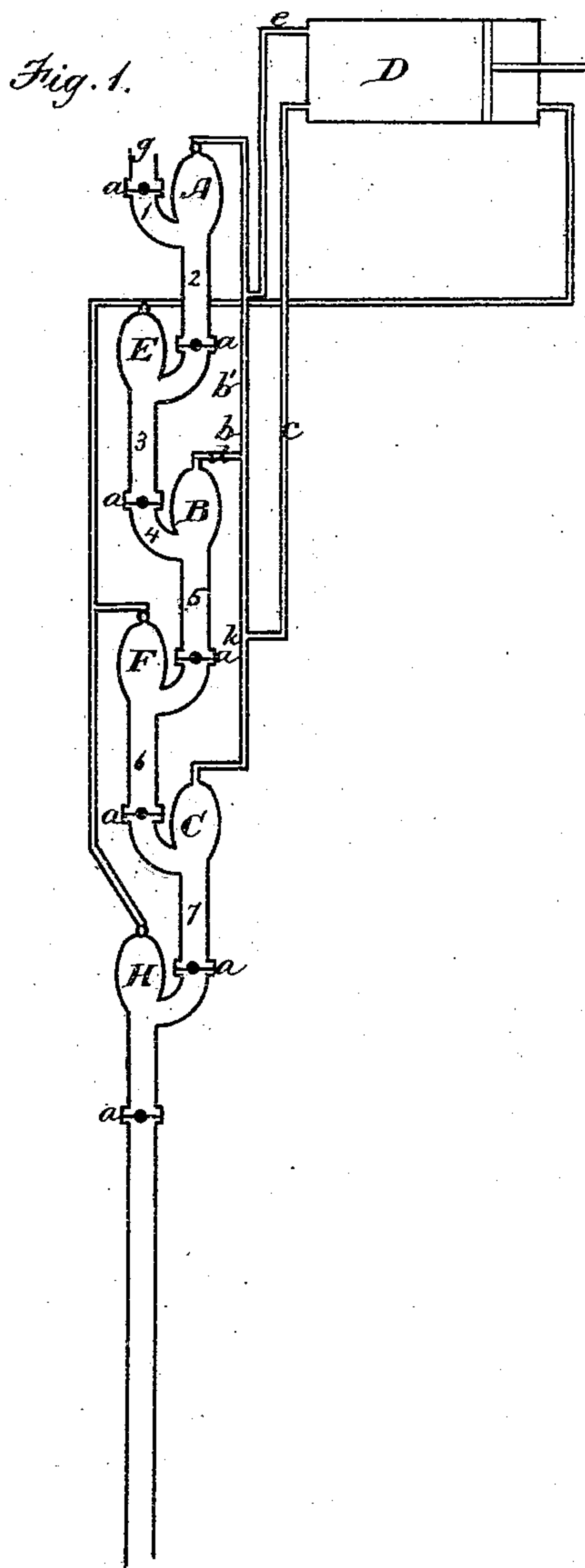


D. F. SMITH & O. JACKSON.  
Methods of Operating Pumps.

No. 153,389.

Patented July 21, 1874.



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# UNITED STATES PATENT OFFICE.

DANIEL F. SMITH AND OSCEOLA JACKSON, OF PORTLAND, MAINE.

## IMPROVEMENT IN METHODS OF OPERATING PUMPS.

Specification forming part of Letters Patent No. **153,389**, dated July 21, 1874; application filed November 29, 1873.

*To all whom it may concern:*

Be it known that we, DANIEL F. SMITH and OSCEOLA JACKSON, both of Portland, in the county of Cumberland and State of Maine, have invented a new and useful Improvement in the Method of Operating Pumps; and we do hereby declare the following to be a full and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification, in which—

Figure 1 is a vertical central section of our pump, with the pipe leading from the right-hand side of cylinder D to the air-chambers E F H removed. Fig. 2 is a view of the same, showing a modification of the manner of arranging the pipes that connect the cylinder D with the air-chambers A B C, for the purpose hereinafter set forth.

The object of our invention is to produce a pump of that class which raises water by exhausting air from a pump-cylinder, which, in turn, compresses the air in certain chambers in the pump, whereby the force and suction pump are united in one, which will more uniformly divide the air as it comes from the air-cylinder at each stroke of the piston between the several air-chambers; and also a pump simple in construction, not liable to get out of order, and one that can be furnished at a comparatively small cost to the purchaser.

A E B F C H are the air-chambers, attached to and connected by the water-pipes 1 2 3 4, &c., of alternate curved and straight sections of tubing, as represented in the drawings. *a a* are valve-seats, that are closed by the downward dropping of the valves at certain times, to prevent the water escaping down the pump. D is an air-cylinder, of a size corresponding to the size or capacity of the air-chamber used. *e* is an air-pipe, leading from the cylinder D to the main air-pipe *b*, and joining it at *b'* in Fig. 1, or half-way between the air-chambers A B.

Upon reference to Fig. 1, it will be seen that air-pipe C also connects the cylinder D with the main pipe *b* at a point about half-way between chambers B C. The main pipe *b* at each end is joined to, and communicates with, the air-chambers A C, and to the cylinder D, by a branch pipe, *d*. The right-hand end of cylinder D is connected to the chambers E F H in like manner.

In Fig. 2, it will be seen we dispense with the additional pipe *e*, and in lieu thereof provide the following: *ff* are adjustable cocks, gates, or ways, situated in the air-pipe *b*, as shown, and in the branch pipe *d*, so that the amount of the air may be regulated at these points, and thus the division of the air made equal as it passes to and from each air-chamber. By this means the less amount of the air through the shorter portion of the air-pipes connecting with the near air-chamber can be increased and made equal to the greater amount through the longer portions connecting the remote air-chambers.

The pump operates as follows: The alternate strokes of the piston in the air-cylinder D exhausts in each reciprocation the air-chambers A B C, and, consequently, condenses in turn the air in the chambers E F H. The result of each full stroke of the piston, or the condensation and exhaustion of the chambers, unites in continually drawing and pushing the water from one valve up through another in the pump, and, finally, out of the opening *g*.

What we claim as new and of our invention is—

1. The air-cylinder D, provided with a piston, in combination with the air-pipes *cc*, leading from the cylinder D to the main air-pipe *b*, and joining it midway between the air-chambers A and B and B C and branch pipes *d*, either being like conducting air-pipes, similarly constructed, arranged, and connected with the opposite head of the air-cylinder and the air-chambers E F H, by means of which the flow of air is divided equally between the cylinders and the several air-chambers, substantially as described, and for the purpose set forth.

2. The air-cylinder D, provided with a piston and conducting air-pipes at each end, as set forth, leading to the air-chambers A B C E F H, the air-pipes being provided with adjustable cocks or gates *ff*, substantially as described, and for the purposes set forth.

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