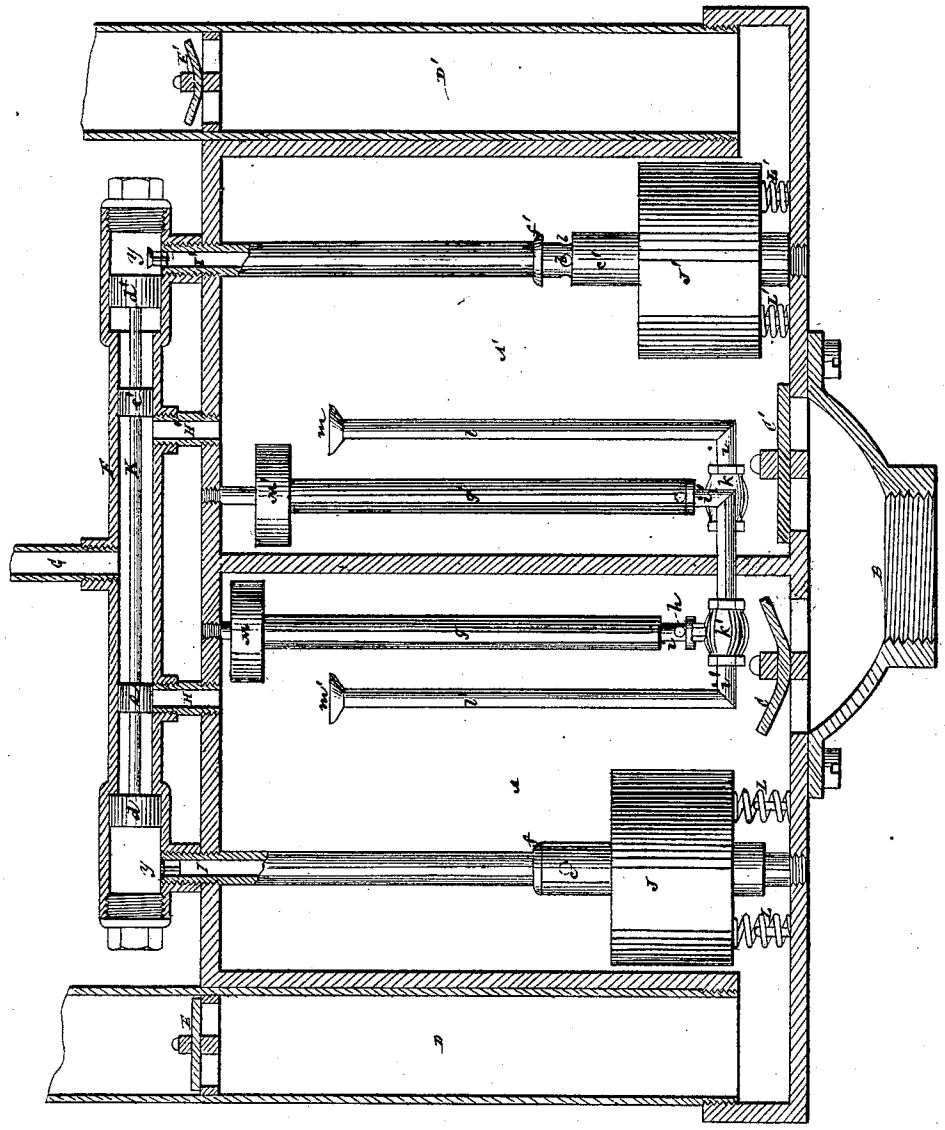
W. BURDON.

Improvement in Water-Elevators.

No. 129,648. Patented July 23, 1872.



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IMPROVEMENT IN WATER-ELEVATORS.

Specification forming part of Letters Patent No. **129,648**, dated July 23, 1872; antedated July 20, 1872.

G

To all whom it may concern:

Be it known that I, WILLIAM BURDON, of the city of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Apparatus for Raising and Lowering Water by the Condensation and Pressure of Steam; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification.

This invention relates to apparatus of a double-acting or continuous kind for raising and forcing water, in which a vacuum is formed by the condensation of steam alternately in two adjacent cylinders or chambers, and the water, which is raised by atmospheric pressure alternately within either chamber by reason of the vacuum, is subsequently and alternately expelled from said chambers by the pressure of steam, the condensation of which produces a vacuum within either chamber for a repetition of the process. The improvements consist in a combination with such apparatus of a float or floats, having a limited motion within the main chambers up and down perforated pipes in communication at their upper ends with a valve-box or chamber, the valve of which controls the ingress of steam to the main chambers, said floats serving to shut off the steam from either main chamber before water is admitted to effect condensation therein; also serving to pass steam to effect the reversal of the valve. Springs may be used under the floats to assist in giving them a lively or quick upward action for the purpose of preventing back action on the valve as a vacuum is formed in either main chamber. The improvements also comprise an arrangement of upper floats with attached sleeves, and perforated pipes with check-valves, for causing the water, as it completes its ascent in either one of the main chambers, to pass a limited portion of it into the upper portion of the other chamber to effect or perfect the condensation of the steam therein.

The accompanying drawing shows a vertical section of an apparatus with my improvements.

A A′ represent the main chambers, into which the water is raised alternately, and from which it is expelled alternately, as hereinbefore referred to. B is a suction-pipe, common to both chambers, and communicating therewith at their bottoms through valves C C′, which open inward. D D′ are the water-discharge pipes, extending downward from the tops of said chambers, and with their mouths or lower ends in communication with the lower portions of the chambers. These discharge-pipes are provided, at some distance above their mouths, with valves E E′, opening outward. Arranged over the chambers A A′ is a valve-box, F, provided with an intermediate steam-supply pipe, G, and connecting with the main or water chambers A A′ by pipes H I and H′ I′. The pipes I I′ are only in communication with said water-chambers by perforations *b*, arranged in the lower portions of said pipes, and covered or exposed by sleeves *c c′*, or floats J J′, as said floats are raised or lowered. These pipes I I′ connect with enlarged end portions of the valve-box containing pistons *d d′* of a compound valve, K, the rod of which connects said pistons, and also carries smaller pistons, *e e′*, arranged to work in an intermediate portion of the valve-box. The pistons *e e′* serve to open and close the steam-pipes or inlets H H′, accordingly as the valve is thrown by the pressure of the steam on its one large piston *d* or *d′*. The floats J J′, with their attached sleeves *c c′*, have only a slight movement up and down the pipes I I′, and are checked in their upward movement by stops *f f′*. When down, said floats may rest on springs L L′. M M′ are smaller floats, arranged in the upper portions of the chambers A A′, and provided with elongated sleeves *g g′*, which, as said floats rise or fall, serve to cover or expose lower perforations, *h*, in pipes *i i′*, having check-valves *k k′*, and connecting the one main chamber with the other by upward extensions *l l′*, having mounted on them sprinklers *m m′*.

The operation is as follows: Supposing the chamber A′ to be filled with water, and steam to be entering by the inlet H′ to expel the water therefrom, the float J′ will remain in its raised position, so as to close the openings *b* in the pipe I′, until toward the completion of the descent of the water in said chamber, after which the float is forced down upon the springs L′, and the holes *b* in the pipe I′ uncovered to pass steam from the chamber A′ to the right

hand of the valve-box F, and, by its pressure on the back of the piston d', causing the valve K to be moved, so that it closes the steam-inlet H′, and opens the steam-inlet H, thus reversing the action of the apparatus. Immediately as this is done, the temporary rush of water from the discharge-pipe D′ into the chamber A′ raises the float J′, which action is assisted by the springs L L′, and the apertures in the pipe I′ are closed, thus preventing the vacuum in the chamber A′ from producing a back action on the valve K, and shutting off the steam before water is admitted to effect condensation in said chamber. A like action takes place in either main chamber alternately as the valve K is thrown first to the one side and then to the other, and as water is raised in one chamber from the suction-pipe B it is being expelled from the other. As water is raised in either chamber, A A′, the float M or M′ within said chamber is lifted, so as to uncover the perforation h in the pipe i or i', and so allow of water passing from said chamber into the upper portion of the adjacent main chamber to effect or perfect the vacuum therein.

Each pipe I may be fitted, at its junction with the valve-box F, with a check-valve, y, opening upward and closing downward, for the purpose of preventing the piston d or d', after it has operated, from being driven back by reason of the formation of the vacuum in the chamber A or A′ before its valve c or c' closes.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination, herein described, with the water-receiving and discharging chambers A A′, of the floats J J′, the pipes I I′, having lower perforations, b, the valve K, and steam-inlets H H′, whereby said floats, having only a limited movement, are caused to shut off the steam from their respective chambers before water is admitted to effect condensation, essentially as herein set forth.

2. The springs L L′, in combination with the floats J J′, the perforated pipes I I′, and the discharge-pipes D D′, substantially as specified.

3. The combination, with chambers A A′, of the floats M M′, the perforated pipes i i', the check-valves k k', and the upper extensions l l', all arranged for operation essentially as described.

4. In an apparatus for raising water by the pressure of steam, as described, I claim a float, J or J′, with attached valve or valvular sleeve c or c', arranged and working on the exterior of a pipe, substantially as and for the purpose herein set forth.

5. The check-valves y y, combined with the valve-box F and pipes I I′, substantially as and for the purpose herein specified.

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