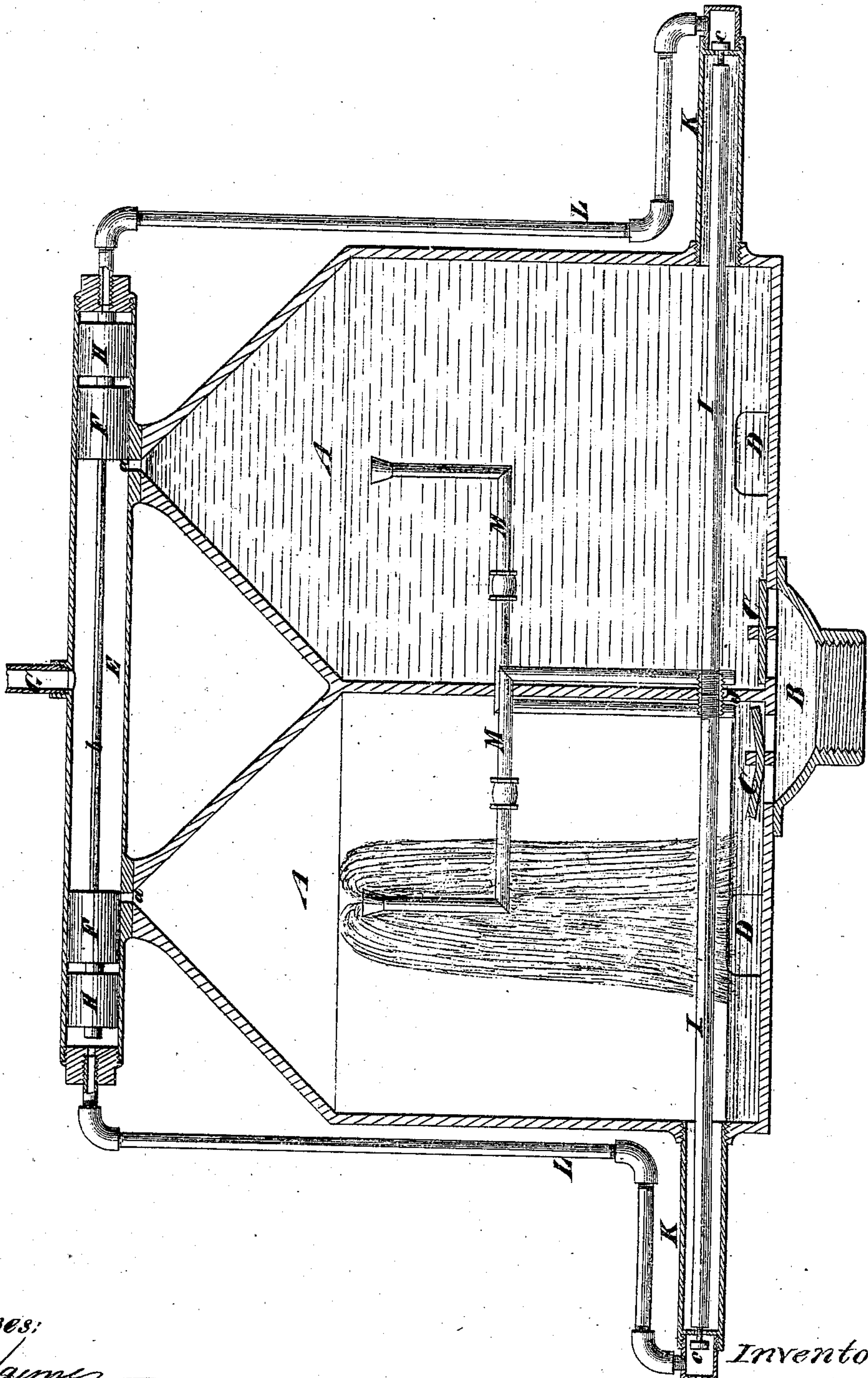


W. BURDON.
Steam Water-Elevators.

No. 133,746.

Patented Dec. 10, 1872.



Witnesses:
Fred Haines
Fred Lusch

Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM BURDON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN STEAM WATER-ELEVATORS.

Specification forming part of Letters Patent No. **133,746**, dated December 10, 1872; antedated December 4, 1872.

J'

To all whom it may concern:

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

This invention relates to that class of apparatus for raising and forcing water in which a vacuum is formed by the condensation of steam alternately in two adjacent chambers, and water raised into the vacuum so formed expelled by the pressure of steam, which is subsequently condensed to form vacuums for the repetition of the operation. The improvement, in connection with such an apparatus, consists of valves controlled by metal pipes or hollow rods arranged horizontally in the main chambers of the apparatus, and rigidly secured at one end and free at the other, for opening and closing said valves by the expansion and contraction of the hollow rods consequent on their exposure to steam or water, in combination with pipes for conveying steam passing said valves to operate the main steam-valve or valves of the apparatus.

The accompanying drawing represents a central vertical section of an apparatus constructed according to my invention.

A A are the main chambers of the apparatus. They may be arranged side by side, as represented, or in any other convenient relation to each other, and may be of any suitable form. They communicate with a suction-pipe, B, through valves C C, and are provided with discharge-openings D D furnished with valves, not shown in the drawing. The valve-box E is of cylindrical form, and is arranged horizontally over the chambers A A, with which it communicates through ports *a a*. F F are the valves, which consist of two pistons, secured to the same stem, *b*, at such distance apart that when one covers its adjacent port the other piston uncovers its port. Between

the valves the valve-box is connected with a steam-generator by a pipe, G, and in its ends beyond the valves are loose pistons H H. In the lower portion of each chamber A, just above its discharge-opening D, there is horizontally arranged a metal pipe or hollow rod, I. These are the expanding rods previously mentioned, and in order to give them greater length, for the purpose of producing greater motion, they are made to project some distance beyond the chambers. The inner or adjacent ends of these pipes are secured in a screw-nipple, J, arranged in the partition or wall intermediate to both chambers, and their outer ends are free, and furnished with puppet-valves *c c*. The projecting portions of the rods I I are surrounded by tubes K K of much larger diameter, communicating with the chambers A A, and provided beyond the ends of said rods with seats for their valves *c c* communicating through pipes L L with the ends of the valve-box. M M are condensing-pipes, leading each from the lower portion of one chamber to the upper part of the other, and provided with check-valves opening only toward their upper ends.

To start the apparatus, its chambers A A are first filled with water by any convenient means, and the expanding rods I I are, by contact of the water, contracted and their attached valves *c c* closed. The steam-valves are then shifted to admit steam to one of the chambers, which, for convenience in explanation, I will suppose to be the right; acting on the water therein, the latter is expelled by it, and when its level gets below the rod I in the chamber the steam expelling the water comes in contact with said rod, and, by heating it, expands it, and so opens its attached valve *c* and permits the escape of some of the steam up the pipe L to the valve-box, where, acting on the adjacent piston H, it throws it over against the adjacent valve F and shifts both, thereby shutting off the steam from the right chamber and admitting it to the left. A stream of water flowing from the pipe M, leading into the right chamber, now condenses the steam therein, and by forming in the chamber a vacuum causes it to fill by atmospheric pressure.

As soon as the water entering the chamber comes in contact with the rod I it cools the latter, and thereby contracts it and closes its valve *c*, shutting off communication between the chamber and the valve-box. The steam admitted to the left chamber by the reversal of the valves expels the water through the discharge-pipe, and when the level gets below the rod I the steam comes in contact with it, and by expanding it opens its valve *c* and permits the escape of steam to the adjacent end of the valve-box, where it acts on the left piston H, and throws it against the adjacent valve F and shifts both valves, and so shuts off the steam from the left chamber and admits it to the right. Water flowing into the left chamber from the pipe M leading thereto condenses the steam therein, and by forming a vacuum in the chamber causes it to fill by atmospheric pressure, and when the water comes in contact with the rod I the latter is contracted and made to close its valve, and so shut off communication between its chamber

and the valve-box. The steam admitted to the right chamber discharges it while the left is filling, and thus the operation is kept up, each chamber alternately filling and discharging simultaneously with the discharging and filling of the other.

I do not confine myself to the particular kind of valve used; but

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

The combination, in an apparatus substantially such as described, of the valves *c c*, horizontally arranged, expanding and contracting metal rods or pipes I I arranged in the lower portions of the main chambers, and the pipes L L, whereby the escape of steam from the chambers is made to effect the shifting of the steam valve or valves, substantially as set forth.

WM. BURDON.

Witnesses:

FRED. HAYNES,
FERD. TUSCH.