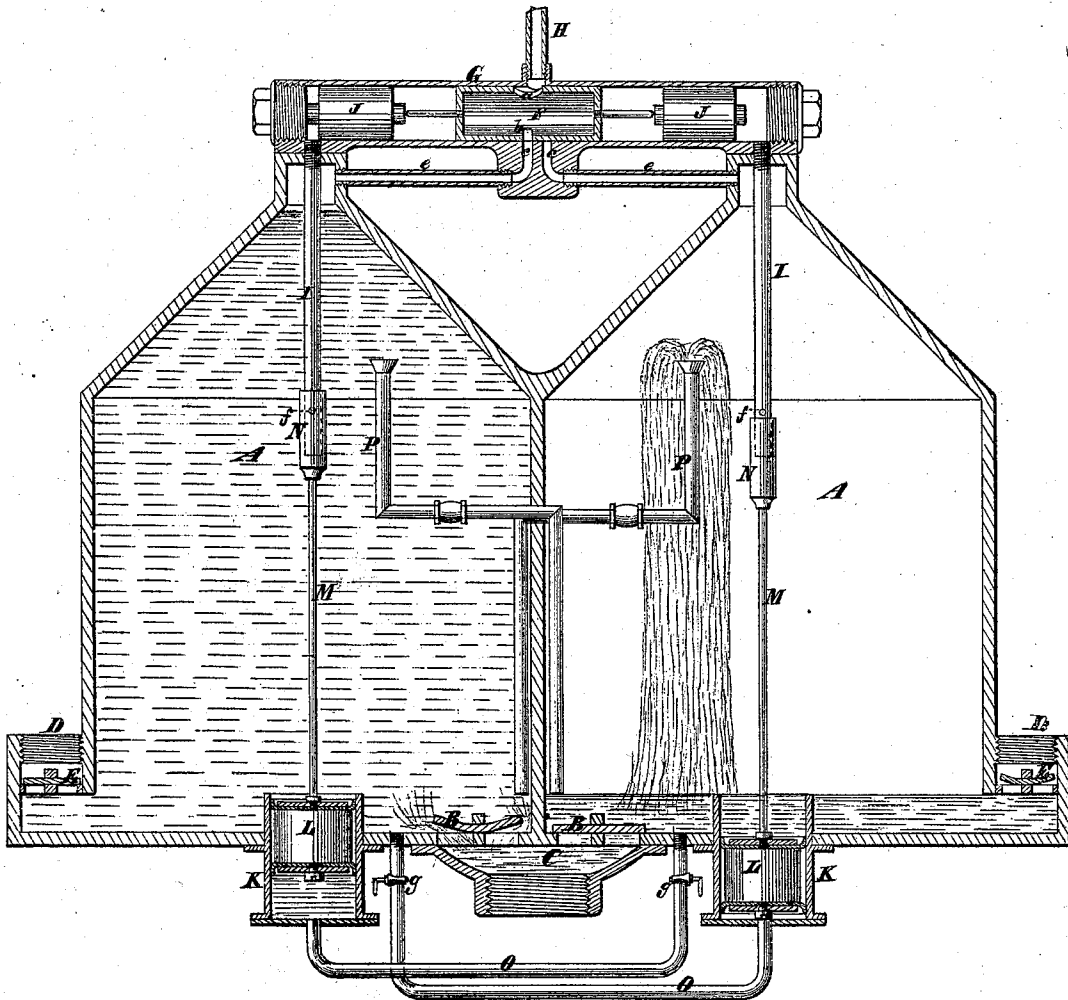


W. BURDON.

Steam Water-Elevators.

No. 133,753.

Patented Dec. 10, 1872.



Witnesses:
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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. **133,753**, dated December 10, 1872; antedated December 4, 1872.

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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 thereof, reference being had to accompanying drawing forming a part of this specification.

This invention relates to apparatus, for raising and forcing water, of that class in which a vacuum is formed alternately in one and the other of two chambers by the condensation of steam, and water raised into them by atmospheric pressure is afterward expelled by the pressure of steam, which is subsequently condensed to form a vacuum for the repetition of the operation. The improvement consists in the combination, with the two chambers of the apparatus, of piston water-rams, having attached to their pistons valves which control the escape of steam from the chambers to act upon pistons or their equivalents for the purpose of moving the steam-valve or valves to admit and shut off steam to and from each chamber in turn.

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

A A are the main water-chambers of the apparatus, which are arranged side by side or in any other suitable manner, and may be of any form desired. Each communicates, through a valve, B, with a suction-pipe, C, and is provided, for the attachment of a discharge-pipe, with a socket, D, furnished with a valve, E. F is the main steam-valve, which is of hollow cylindrical form with closed ends, and is provided with two ports, one, *a*, in its upper side, and the other, *b*, in its lower. The valve-box G, within which it works, is of corresponding form, and horizontally arranged. The box is connected with a steam-generator by a pipe, H, which communicates with the port *a* in the upper side of the valve, and it has formed in the middle of its lower side two ports, *c c*, which lead through pipes *e e* into the chambers A A, and with which the port *b* in the valve F

alternately communicates, and so admits steam to either chamber and shuts it off from the other. From each end portion of the valve-box there extends into its adjacent chamber A a pipe, I, and between this pipe and the valve there is arranged, in the valve-box, a loose piston, J. Under its pipe I there is secured in the bottom of each chamber the cylinder K of a hydraulic ram, the piston L of which has attached to it a rod, M, furnished at its upper end with a sleeve-like valve, N, which, in the operation of the piston, slides on the lower part of the pipe I, and so covers and uncovers ports or holes *f* therein, and so governs the admission of steam from the chamber to the valve-box to shift the valve. The cylinder K of each chamber A communicates at the bottom through a pipe, O, with the lower part of the other chamber, and said pipe is provided with a cock, *g*. The chambers are provided with condensing-pipes P P, each of which communicates between the lower part of one chamber and the upper part of the other.

To start the apparatus, the chambers A A are first filled with water either by pouring it in through openings which are afterward closed or by shifting the valve and so admitting steam to both chambers and allowing it to condense therein and form vacuums, into which water will be raised by atmospheric pressure. By filling the chambers the pistons L L of the rams are raised. The valve is then shifted to admit steam to one of the chambers, which, for convenience, I will suppose to be the left, where, acting on the water, it expels it, and at the same time slowly forces down the piston L of its cylinder K, and so opens its valve N and allows steam to escape from the said chamber up its pipe I into the left-hand end of the valve-box to act upon the left-hand piston for the purpose of pushing it and the valve F to the right, and thereby shutting off steam from the said chamber and admitting it to the right one, which then commences discharging. The cock *g* on the pipe O is so adjusted that the lowering of the piston and consequent opening of the valve N takes place at or near the completion of the discharge of the chamber. When the steam is shut off from the left and admit-

ted to the right chamber water passes from the right to the left chamber through the proper condensing-pipe P and condenses the steam in the latter, thereby forming a vacuum therein so that it fills while the right one is discharging. While the right chamber discharges some water is forced therefrom through its connected pipe O against the bottom of the piston of the ram belonging to the left chamber, and the said piston is thereby slowly raised so that its attached valve N is made to close the ports or holes *f* in the pipe I, on which it works, while the piston of the right-hand ram is forced down by the pressure above it, and so made to open its attached valve N and admit steam to the right-hand end of the valve-box G to act upon the right-hand piston and move the valve F to the left, whereby the supply of steam is shut off from the right chamber and again admitted to the left. The discharge of the right chamber having been completed about the time the valve is reversed condensation then takes place and forms a vacuum into which water flows from the suction-pipe. Thus the operation is repeated, each chamber alternately filling and discharging simultaneously

with the discharging and filling of the other, the valves N N being each operated upon in turn at the proper time by its respective ram-piston L to allow the escape of steam from its respective chamber for the purpose of operating the steam-valve F.

I do not confine myself to the particular kind of main valve employed to admit and shut off the steam to and from the chambers, nor to the particular kind of valve used to control the escape of steam from the chamber to operate the first-named valve; but

What I claim as my invention is—

The combination, with each chamber of the apparatus and with the valve for controlling the escape of steam from the chamber to operate the main valve, of a piston water-ram, open to its own chamber and communicating by a pipe or contracted opening with the other chamber, for operation substantially as herein set forth.

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Witnesses:

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