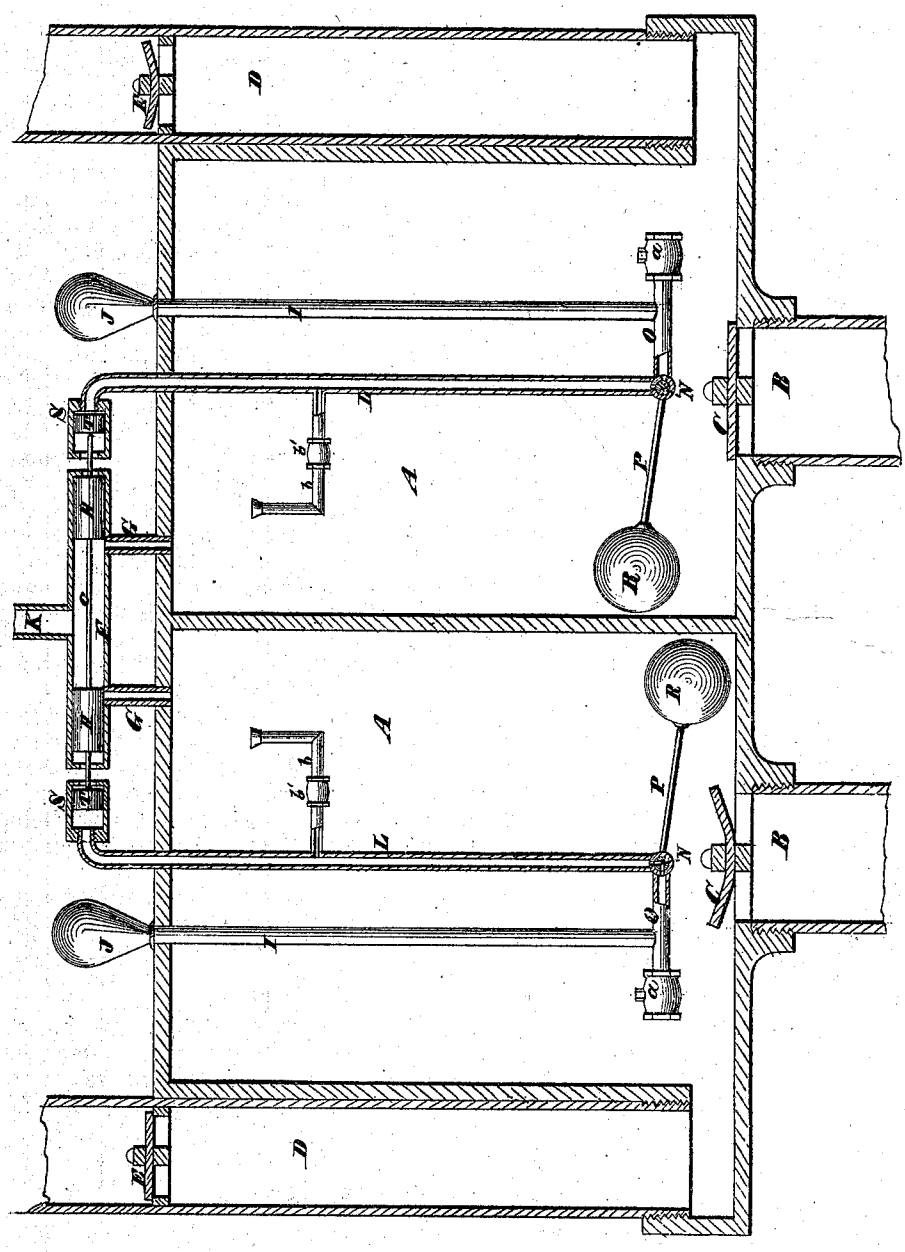
W. BURDON.

Improvement in Steam Water-Elevators.

No. 131,737. Patented Oct. 1, 1872.



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WILLIAM BURDON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN STEAM WATER-ELEVATORS.

Specification forming part of Letters Patent No. **131,737**, dated October 1, 1872; antedated September 26, 1872.

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 do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing forming a part of this specification.

This invention relates to that class of apparatus in which a vacuum is formed by the condensation of steam; and water raised into such vacuum 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 a novel means for operating the steam-inlet valve by the expansion of air which has been forced by the steam into an air-vessel and therein compressed during the discharge of the apparatus, such means of operation being controlled by a float applied to a cock.

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

A A are two chambers, which are represented as being arranged side by side, but may be in any other suitable relation to each other, and of any convenient form. They are provided with suction-pipes B B, with which they communicate through valves C C opening inward, and with discharge-pipes D D, furnished with valves E E, opening outward. The steam-valve is of the piston kind, and works within a horizontal cylindrical valve-box, F, which communicates with the chambers A A by inlet-pipes G G, and with a steam-generator by a pipe, K, arranged between the valves. Said valve consists of two pistons, H, secured to a stem, *c*, at such distance apart that when one covers the port of one of the inlet-pipes the other of said pipes is uncovered by the other piston. The ends of the stem *c* project beyond the pistons into horizontal cylindrical boxes S S opposite the ends of the valve-box. I I are upright pipes, one for each chamber A, provided at their upper ends with air-vessels J J, and extending nearly to the bottoms of the chambers A A, the lower end of each being connected with a horizontal pipe, O, one end of which is connected, by a cock, N, with an upright pipe, L, that extends up through the top of its respective chamber, and connects with the outer end of one of the boxes S S, the said boxes being supported by the pipes L L, or otherwise. The other ends of the horizontal pipes O O are provided with check-valves *a a*, which open from their respective chambers A A, but close toward them. The cocks N N, at the connection of the side pipes with their respective pipes L L, have attached to their plugs or keys levers P P, provided at their outer ends with floats R R. In each of the cylindrical boxes S S, with which the upper ends of the pipes L L are connected, there is fitted a piston, T, which abuts against one end of the valve-stem *c*, for the purpose of shifting the valve, the ends of the said stem entering the said boxes through holes at their inner ends. The pipes L L are provided, at some distance from their upper ends, with branch pipes *b b*, which are provided with check-valves *b' b'*, closing inward for the purpose of preventing the steam-valves from being operated by water or steam entering them from the chamber.

To start the apparatus, water is first poured into the chambers A A through suitable openings, which are afterward closed; or by admitting steam into them, and allowing it to condense and form vacuums, into which water will be forced by atmospheric pressure. Steam is then, by a suitable movement of the valve H H produced by hand-gear or otherwise, admitted to one chamber, which, for convenience, I will suppose to be the right. Acting on the water, it expels it through its pipe D, but also forces some through the check-valve on the end of its pipe, through the said pipe, and through its cock N, which is opened by the float R, and up the pipe I, thereby compressing into its air-vessel J the air which before filling the chamber with water had been left in the said vessel and the pipe I. When the water gets below the float the latter descends and opens the cock N. The expansion of air in the air-chamber then drives down water through the pipe I, through the horizontal branch O, and up the pipe L, and into the

right-hand box S, in which it acts against the piston T, pushing the said piston against the contiguous end of the valve-stem *c*, and moving the valve H to the right, and thereby causing it to shut off the supply of steam from the right chamber A, and admit it to the left one. By this time the water-level in the right chamber has reached the bottom of its discharge-pipe, and, condensation then taking place, a vacuum is formed in the chamber, which then commences to be filled by atmospheric pressure. The steam admitted to the left chamber now discharges it, and also forces water into its pipe O, cock N, and pipe I, and compresses air into its air-vessel J. In the discharge of this chamber as soon as the water gets below the float R it drops, and, as was described with reference to the right chamber, admits water from the pipe I, under the pressure of the air in the air-vessel, to the pipe L. This, acting against the left-hand piston T, presses the latter against the contiguous end of the valve-stem *c*, and so shifts the steam-valve to the right, thereby shutting off steam from the left chamber A, and again admitting it to the right one. The steam here expels the water as before, and thus the operation is repeated automatically, each chamber alternately filling and discharging simultaneously with the discharging and filling of the other. As might have been hereinbefore stated, at the commencement of the filling of each chamber A with water its float R rises and closes its cock N; and after the vacuum begins to form in either chamber A water, issuing from the pipes *b*, assists in completing its formation.

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

The combination, with the steam-inlet valve of an apparatus of the character herein set forth, of the pipes I L, check-valve *a*, air-vessel J, pistons T T, cock N, and float R, the whole arranged to operate substantially as and for the purpose herein described.

WM. BURDON.

Witnesses:

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