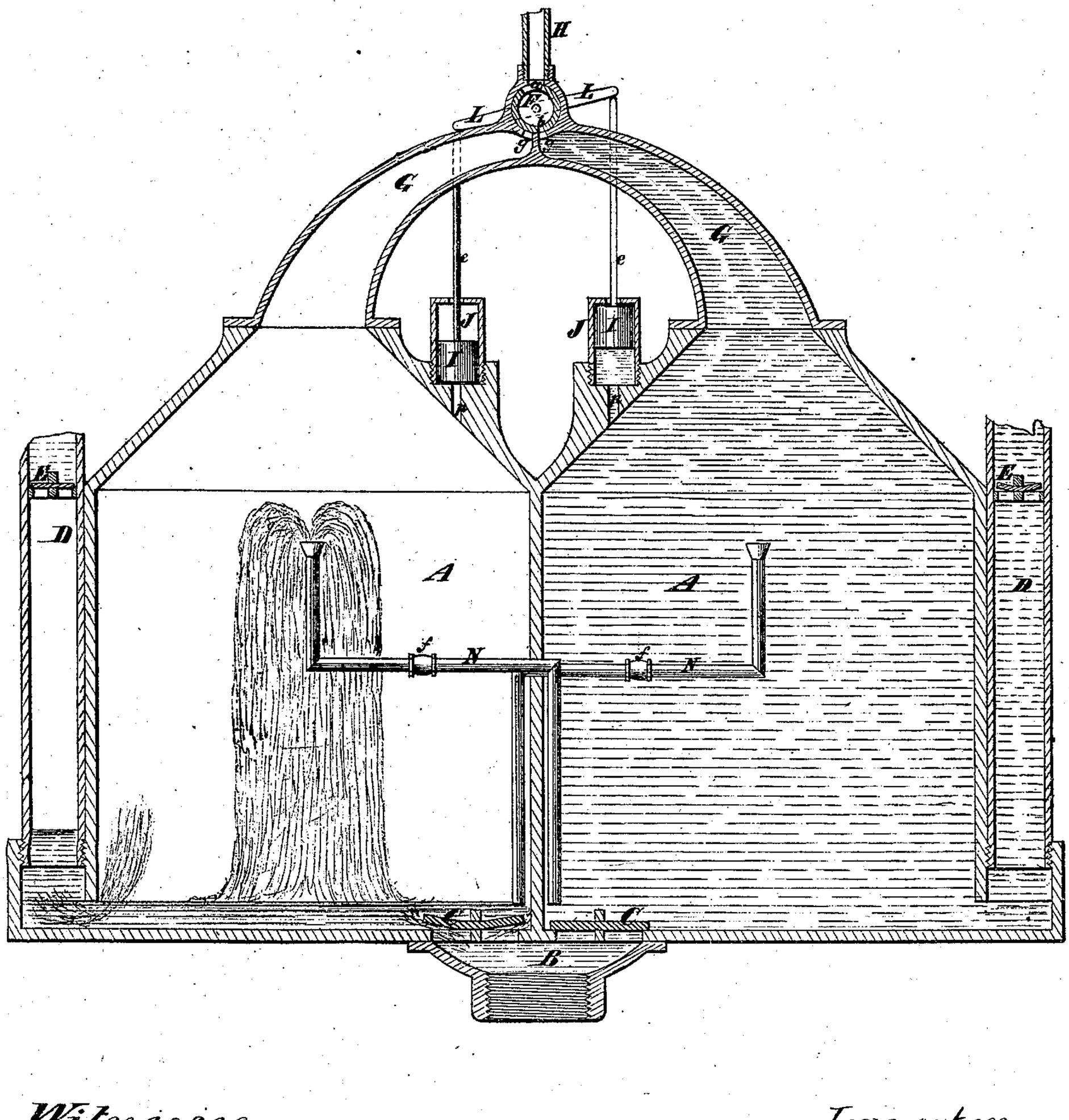
W. BURDON.

Steam Water-Elevators.

No. 133,754. 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. **133,754**, dated December 10, 1872; antedated December 4, 1872.

D′.

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 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 the accompanying drawing forming part of this specification.

This invention relates to that class of apparatus for raising and forcing water in which a vacuum is formed in one and the other of two adjacent chambers alternately by the condensation of steam, and water raised into them by atmospheric pressure is afterward expelled by steam, which is subsequently condensed to form vacuums for the repetition of the operation. The improvement consists in the combination, with the chambers and steam-valve or valves of such apparatus, of pipes communicating each from the lower part of one chamber to the upper part of the other, and pistons working in cylinders communicating with said chambers, whereby, on a diminution of pressure in either chamber by condensation, the piston in the cylinder open to the other chamber is raised and caused to effect the reversal of the steam-valve, and thereby admit steam to its own chamber and shut it off from the other.

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, which 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 have communication with a suction-pipe, B, through valves C C, and are provided with discharge-pipes furnished at some distance from their bottoms with valves E E. F is the steam-valve, which is of the hollow rolling kind, and is arranged some distance above the chambers A A, and communicates with them through inlet-pipes G G, which are made flaring from their upper ends to their junction with the chambers, so that the steam on its way to the chambers comes in contact with a very small area of water-surface, which gradually increases till the largest diameter of the chamber is reached. The object of this is to obviate the rapid condensation of steam consequent upon bringing it suddenly in contact with a large surface of cold water. The pipes G G constitute, in effect, elevated portions of the chambers A A. The valve is provided in its upper side with a port, *a*, with which communicates the main steam-pipe H, leading from a steam-generator, and in its lower side a port, *b*, which, in the rocking or rolling of the valve, alternately communicates with one and the other of two ports, *g g*, in the shell, within which it works, leading to the inlet-pipes G G. I I are pistons, working in cylinders J J, secured to the tops of the chambers A A, under the ends of a lever, L, attached to the spindle of the valve F. The bottoms of these cylinders communicate through passages *p p* with the interior of the chambers A A. The pistons have attached to them stems *e e*, which pass through the tops of the cylinders, and which, in the operation of the pistons, abut against the ends of the valve-lever L for the purpose of shifting and reversing the valve. N N are pipes which extend each from the lower portion of one chamber to the upper part of the other, and are provided with check-valves opening only toward their upper ends.

To start the apparatus, the chambers A A are first filled with water, either by pouring it through openings that are afterward closed, or by admitting steam to them and allowing it to condense and form vacuums in the chambers, which will then be filled with water by atmospheric pressure. The valve is then shifted by means of its lever L to admit steam to one chamber—which, for convenience, I will suppose the right—where, acting on the water therein, it expels the latter through the discharge-pipes D D, but at the same time forces some through the proper pipe N to the left chamber, thereby entirely filling its inlet-pipe G. As soon as the right chamber has completed its discharge the water in its discharge-pipe below the valve falls back into it and condenses a portion of the steam therein, thereby effecting a reduction of pressure on the right piston I,

and so enabling the weight of the column of water in the left pipe G to slightly raise the left piston I, whose stem, abutting against the adjacent arm of the lever, L shifts the valve sufficiently to shut off the supply of steam from the right chamber. Water flowing into this latter chamber through the pipe N leading thereto perfects the condensation of steam therein and forms in it a vacuum, which is filled with water through the suction-pipe by atmospheric pressure, while the weight of the water in the left pipe G raises the left piston I to its fullest extent, and so completes the shifting of the valve and admits steam to the left chamber to discharge it and also force a stream of water into the right one. At the completion of the discharge of the left chamber the water below the valve in the discharge-pipe of said chamber falls back, and, by condensing the steam in said chamber, causes a slight reduction of pressure therein, whereupon the column of water in the right pipe G acts upon the right piston I and raises it as far as permitted by the pressure on the left, and so shifts the valve and shuts off the supply of steam from the left chamber. On the completion of condensation in the latter chamber the weight of the water in the right pipe G raises the right piston to its fullest extent, and so further shifts the valve and admits steam again to the right chamber, which is thereby discharged while the left fills with water by reason of the formation of a vacuum in it. Thus the operation continues, each chamber alternately filling and discharging simultaneously with the discharging and filling of the other.

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

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

The combination, with the chambers A A and steam-valve F of an apparatus substantially like that described, of the pistons I I, working in cylinders open at the bottom to the said chambers, the elevated pipes or portions of the chambers G G for receiving columns of water to act on said pistons, and the pipes N N, each leading from the lower portion of one chamber to the upper portion of the other, the whole arranged for operation essentially as and for the purpose set forth.

WM. BURDON.

Witnesses:

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