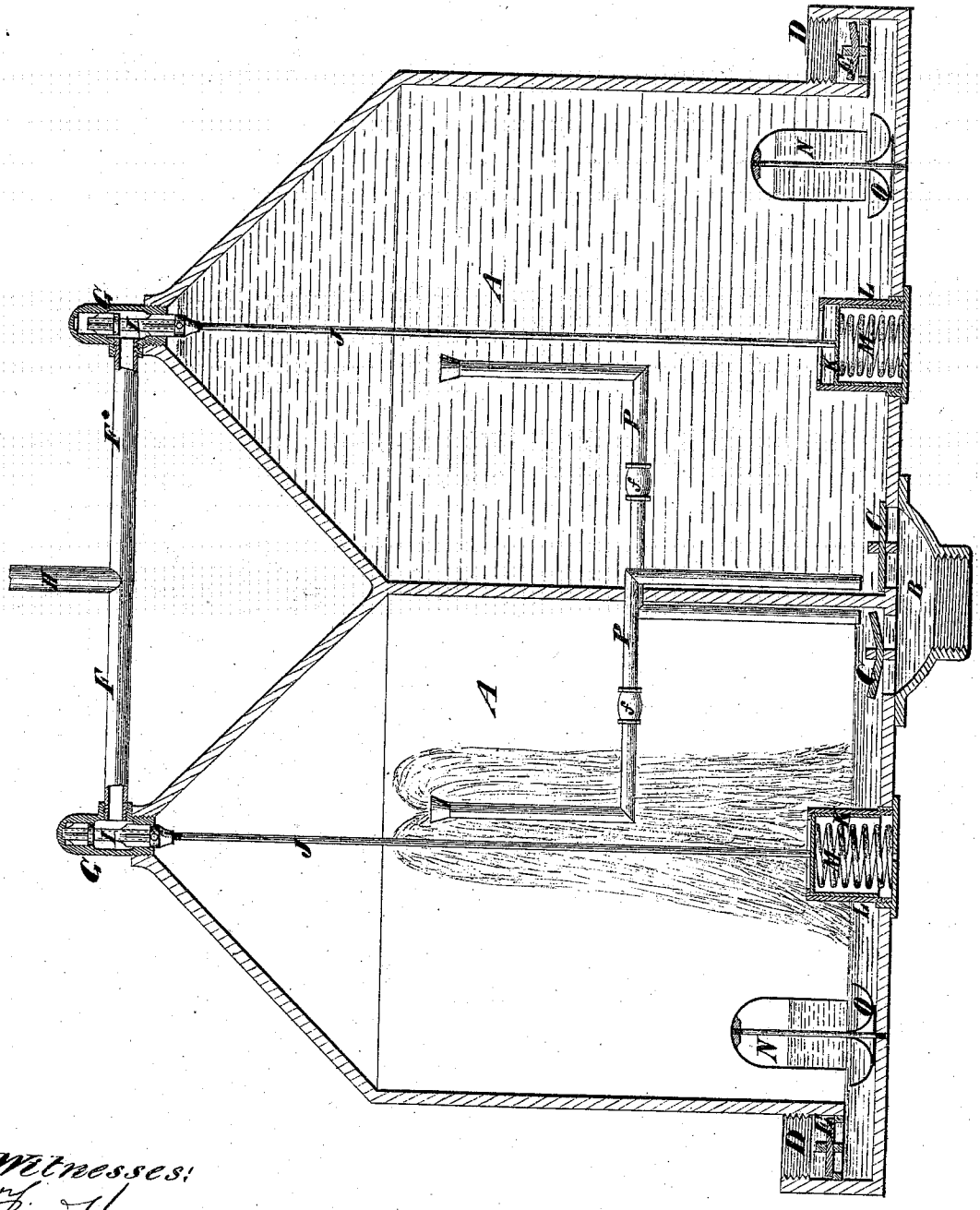
W. BURDON.

Steam Water-Elevators.

No. 133,752. Patented Dec. 10, 1872.



Witnesses:
Fred Haynes
Fred Knuck

W. Burdon

UNITED STATES PATENT OFFICE.

WILLIAM BURDON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN STEAM WATER-ELEVATORS.

Specification forming part of Letters Patent No. **133,752**, 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 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 a part of this specification.

This invention relates to that class of apparatus in which a vacuum is formed by the condensation of steam in one and the other of two adjacent chambers alternately, and water raised into them by atmospheric pressure is afterward expelled by the pressure of steam, which is subsequently condensed to form vacuums for the repetition of the operation. The improvement consists in the combination, with such apparatus, of balanced upwardly-closing valves governing the admission of steam to its main chambers, attached pistons arranged in cylinders in the lower part of said chambers, springs applied to said pistons, pipes extending each from the lower portion of one chamber to the upper portion of the other, and suitable condensing devices, whereby, on the filling of one chamber, its steam-valve is opened against the force of its spring by a pressure of steam from the other chamber, and on the completion of the discharge of the latter, and a slight reduction of pressure therein, its steam-valve is closed by its spring, and vice versa.

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 of any suitable form, and may be arranged side by side, as represented, or in any other convenient relation to each other. Each communicates with a suction-pipe, B, through a valve, C, and is provided near the bottom for the attachment of a discharge-pipe with a screw-threaded socket, D, furnished with a valve, E. In the central portion of the top of each chamber there is arranged an upright valve-box, G, which is connected at the middle of its length by one of two branch pipes, F, with a pipe, H, leading from a steam-generator. In each valve-box there works a valve, I, composed of two pistons, one above and the other below the mouth of the pipe F, and connected by a hollow stem. These valves are opened by a downward movement sufficient to bring their lower pistons below the valve-boxes, and are closed by a contrary movement. Steam, entering the valve-boxes by the branch-pipes F F while the valves are closed, exerts an upward pressure on the upper piston, and a downward pressure on the lower one, so that the valves are balanced when closed. Each valve has attached to it a rod, J, to the lower end of which is attached a piston, K, which works within a cylinder, L, that is arranged in the bottom part of the chamber, and is open at the top, with the exception of a slight internally-projecting rim which retains the piston within it. Under each piston there is arranged, in its cylinder, a spiral spring, M, which, when not prevented by a pressure on the top of the piston, forces the latter up as far as permitted by the rim on the cylinder. N N are bell-shaped or inverted cup-shaped condensing-vessels, which are arranged in the chambers A A in such position that their lower edges or mouths are about level with the bottoms of the discharge-sockets D D. Under these vessels there are arranged saucer-shaped deflectors O O. P P are pipes which extend each from the lower portion of one chamber, A, to the upper portion of the other, and are provided with check-valves *f f* opening only toward their upper ends.

To start the apparatus, the chambers A A are first filled with water by any suitable means, and one of the steam-valves—which, for convenience, I will suppose to be the right—is then opened by suitable hand-gear, or otherwise, to admit steam to its respective chamber, which is thereby discharged through its discharge-pipe D. Besides expelling the water from the right chamber, the steam admitted to it forces a stream of water into the left one through the pipe P, the upper end of which is within the latter, exerts a pressure on the

water in the latter equal to its own pressure in the right chamber, and so forces down the left piston K, and opens the valve I attached to it, and admits steam to discharge the left chamber. At the completion of the discharge of the right chamber the water in its condensing-vessel N flows out, and, by condensing a portion of the steam in said chamber, effects a slight reduction of pressure on the top of its piston K, and permits the spring M to force it up and close its attached valve I, and thereby shut off the supply of steam from that chamber, into which water now flows from the left chamber through the proper pipe P, and condenses the remaining steam therein, and forms a vacuum, thereby causing the right chamber to fill by atmospheric pressure. The steam now admitted to the left chamber discharges it, and at the same time continues to force through the proper pipe P a stream of water into the right until the latter is full, when it continues to exert a pressure on it, and thereby forces down the right piston K, opening its attached valve, and thereby admitting steam to the right chamber to discharge it. As soon as the left chamber completes its discharge the water in its condensing-vessel runs out, and, by condensing a portion of steam in it, effects a slight reduction of pressure on the top of the left piston K, and permits the spring M on its under side to raise it up and close its attached valve, thereby shutting off the supply of steam from the chamber. Water now flows into the left chamber from the right one through the proper pipe P, and perfects the condensation of steam in the former and forms a vacuum within it, and causes it to fill by atmospheric pressure while the right chamber discharges. The operation continues, each chamber filling and discharging simultaneously with the discharging and filling of the other.

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

1. The combination, with either chamber A and its steam-inlet valve, of a cylinder, L, piston K, and spring M, arranged to operate substantially as herein described.

2. The combination, with an apparatus substantially such as described, of the upwardly-closing balanced valves I I, attached pistons K K, springs M M, pipes P P, and suitable condensing devices, the whole arranged to operate substantially as and for the purpose set forth.

WM. BURDON.

Witnesses:

FRED. HAYNES,

FERD. TUSCH.