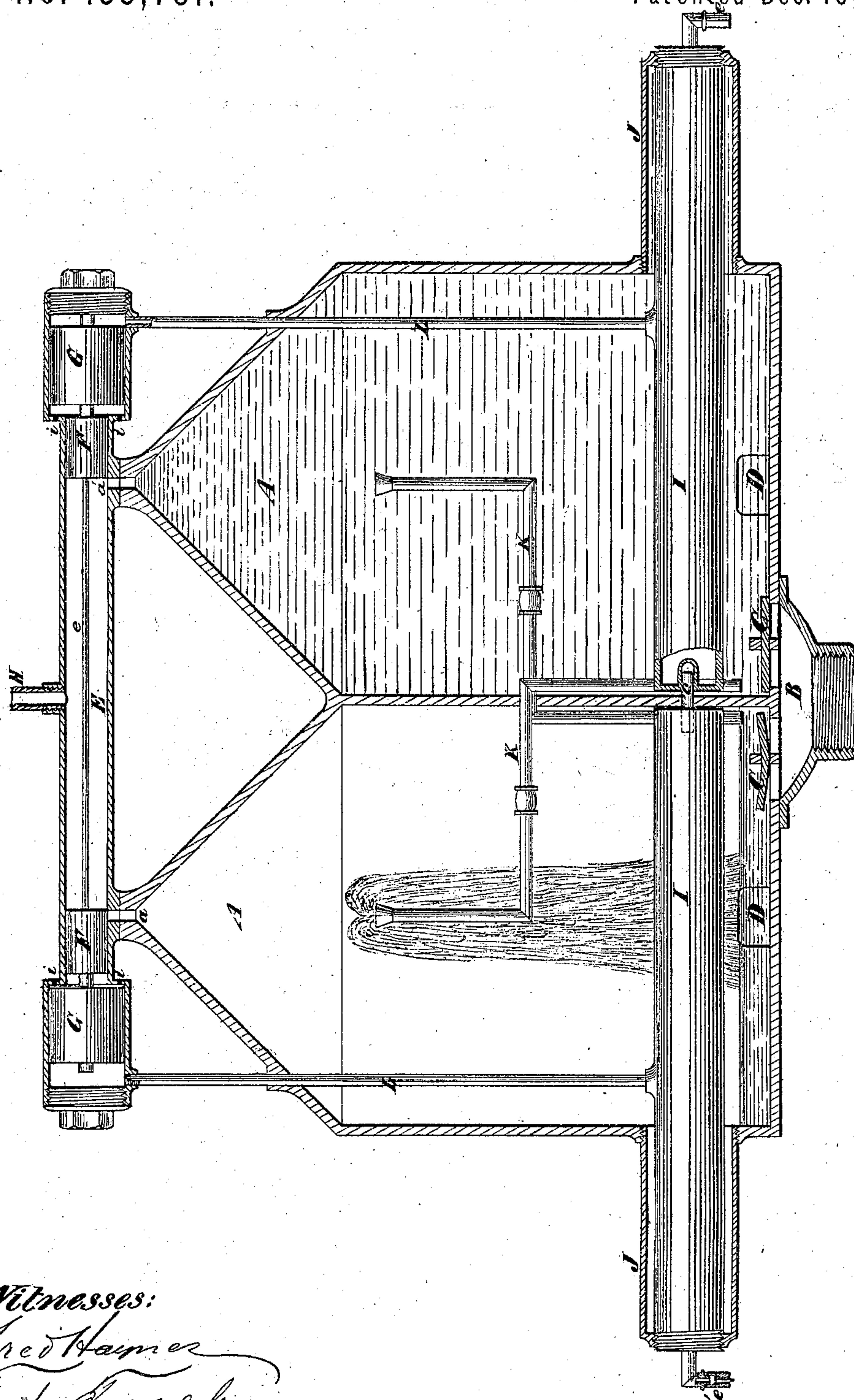


W. BURDON.
Steam Water-Elevators.

No. 133,751.

Patented Dec. 10, 1872.



Witnesses:
Fred Hamer
Fred Busch

W. Burdon

UNITED STATES PATENT OFFICE.

WILLIAM BURDON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN STEAM WATER-ELEVATORS.

Specification forming part of Letters Patent No. **133,751**, dated December 10, 1872; antedated December 4, 1872.

M'.

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 the accompanying drawing forming a part of this specification.

This invention relates to that class of apparatus in which water is raised by atmospheric pressure consequent upon the formation of a vacuum by the condensation of steam, and is afterward forced out by the pressure of steam subsequently condensed to form a vacuum for the repetition of the operation; and in which class of apparatus the steam-valve is shifted by the expansion and contraction of air contained in vessels in the chambers, and caused by contact with said vessels of steam and water. The invention consists in the arrangement of straight pipes constituting the air-vessels, and communicating with the ends of the valve-box, partly within the lower portion of the chambers, and projecting through them, in combination with cap-like pipes or tubes loosely surrounding the projecting portions of the aforesaid pipes, whereby increased surface is afforded to the air-vessels, and consequently the operation of the steam valve or valves rendered more certain. It also consists in the combination, with such air-vessels, of check-valves opening inwardly whereby the air-vessels are automatically supplied with fresh quantities of air to compensate for any leakage which may occur.

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 of any suitable shape, and may be arranged side by side, as represented, or in any other convenient relation to each other. They communicate with a suction-pipe, B, through valves C C, and through outlet-openings D D, with discharge-pipes furnished with outlet-valves. E is the valve-box,

which is of cylindrical form, and communicates with the chambers A A through ports *a*. The valves F F consist of two pistons secured to one stem, *e*, at such distance apart that when one covers its adjacent port, *a*, the other piston uncovers its adjacent port, *a'*. A pipe, H, leading from a steam-generator to the middle portion of the valve-box between the valves, supplies it with steam. G G are loose pistons, which are of considerably larger diameter than the valves F F, and work in enlarged portions of the valve-box at its ends. In the opposite ends of the enlarged portions of the valve-box there are perforations *i i* for permitting any air which may get between the pistons and the valves to escape, and thereby prevent it from cushioning between them. In the lower part of the chambers are straight pipes I I, whose adjacent ends hang on a stud or pin, *c*, arranged in the wall intermediate to both the main chambers, and whose outer ends project considerably beyond the said chambers, and are supported in cap-like pipes J J by being screwed into the outer ends thereof. They communicate with the enlarged end portions of the valve-box by pipes L L of much smaller diameter. The pipes or tubes J J surround the pipes I I, and are sufficiently larger than the latter to leave a space all round them, and the said tubes J J are open at their inner ends and screwed into the sides of the chambers A A. At the outer ends of the pipes I I there are check-valves *e' e'*, which open inwardly, and through which the said pipes are supplied with air. K K are pipes which extend each from the lower part of one chamber to the upper part of the other, and are provided with check-valves capable of opening upward only.

To start the apparatus, the chambers A A are first filled with water by any convenient means, and the valves are then shifted to admit steam to one chamber, which, for convenience, I will suppose to be the right. Acting on the water therein, the steam expels it through the discharge-opening D; and when the level of the water gets below the pipe I in the chamber said pipe is exposed to the steam throughout its length, and the air within it

expands, and, acting against the outer end of the right-hand piston, forces it over toward the left, and causes it to abut against the adjacent valve and shift both, and so shut off steam from the right chamber and admit to the left. Water then flows into the latter chamber from the former through the upper pipe K, and condenses the steam in the chamber, and by forming a vacuum therein causes it to fill by atmospheric pressure. As soon as the incoming water reaches the pipe I it cools and contracts the air therein. The steam admitted to the left chamber by the reversal of the valves expels the water, and when the level of the latter gets below the pipe I comes in contact with said pipe, and by heating it and its contained air expands the latter and causes it to shift the valves and shut off the steam from the left chamber and again admit it to the right. Water then flows from the latter chamber into the former through the pipe K leading thereto, and condenses the steam therein, and by forming a vacuum causes the chamber to fill through the suction-pipe.

Thus the operation continues, each chamber filling and discharging at the same time that the other discharges and fills.

In the expansion of the air in either air-vessel should any leak out, such loss will be compensated for at the next contraction by a new supply of air entering through the check-valve *e*.

Claims.

1. The arrangement, in the lower part of each chamber A, of a straight pipe or air-vessel, I, made to project beyond said chamber, in combination with the tubes J surrounding the projecting portions of said pipes, substantially as and for the purpose set forth.

2. The combination, with each pipe I, of a check-valve, *e*, substantially as and for the purpose specified.

WM. BURDON.

Witnesses:

FRED. HAYNES,

FRED TUSCH.