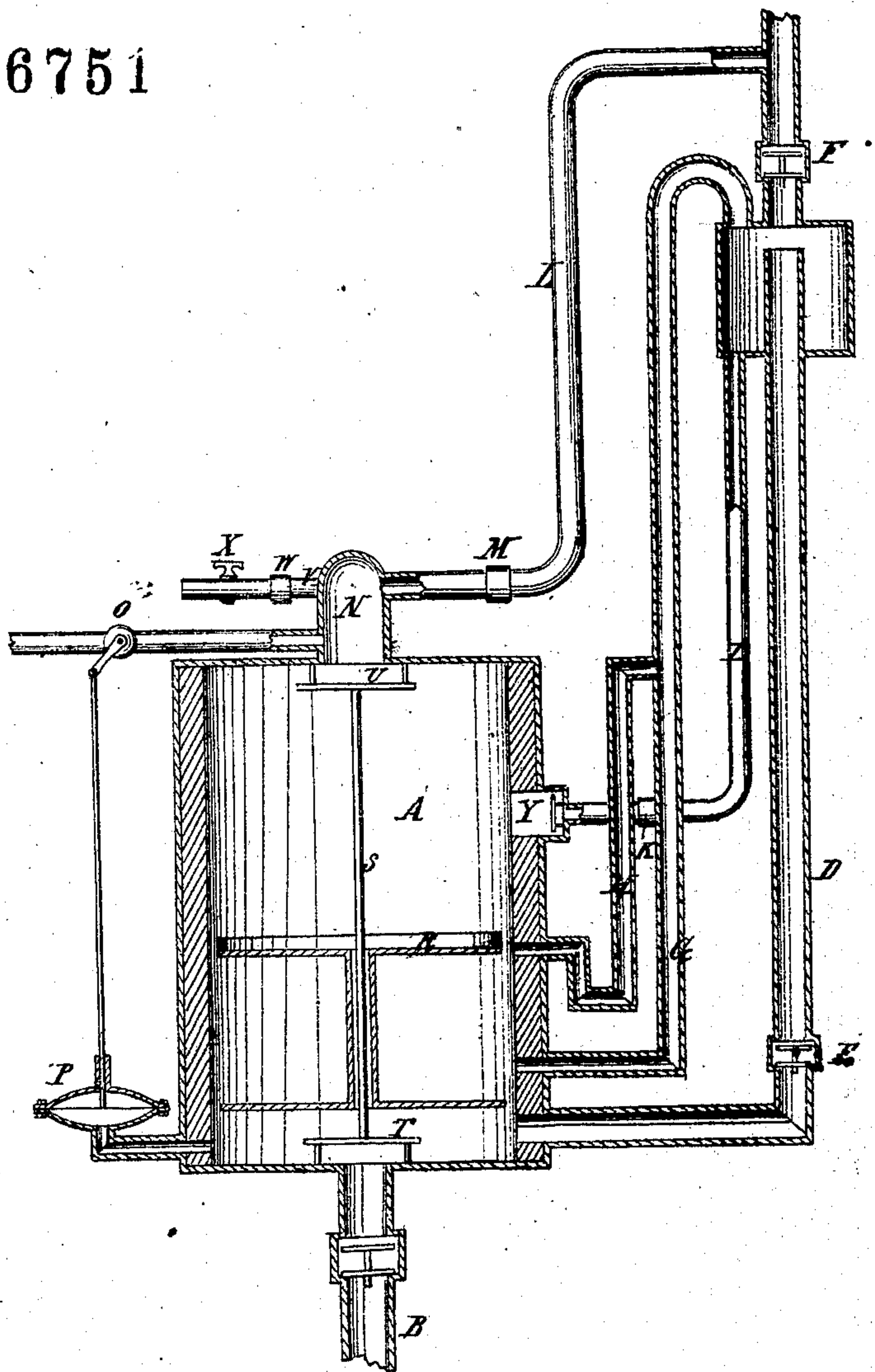


W. E. Prall.

Steam pump. PATENTED JUL 4 1871

116751



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM EDGAR PRALL, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN AUTOMATIC STEAM-PUMPS.

Specification forming part of Letters Patent No. 116,751, dated July 4, 1871.

To all whom it may concern:

Be it known that I, WILLIAM EDGAR PRALL, of the city of Washington, District of Columbia, have invented certain Improvements in Automatic Steam Pumps, of which the following is a specification:

The object of this invention is to produce a cheap, simple, and efficient, automatic steam-pump, that will utilize both the direct force of the steam and collapsing or vacuum force.

The construction and operation are as follows, Figure 1 being a sectional view:

A is a cylinder made of iron, lined with wood or some other good non-conductor. B is an induction-pipe which connects the cylinder with the water. C is a valve placed within the induction-pipe. D is a discharge-pipe connected at the bottom of the cylinder A and conveys the water to the desired elevation. E and F are valves placed in said discharge-pipe, one near the bottom and the other at a point higher up, the object of which will be hereafter described. G, H, and I are small pipes connecting pipe D to the cylinder A between the valves E and F. K is a valve in pipe I opening into the cylinder A. L is a pipe connecting the discharge-pipe D, above valve F, with the steam-cylinder A. M is a valve in said pipe opening into the steam-cylinder. N is a dome placed on the top of cylinder A. O is a cock or valve placed in the steam-pipe leading from the boiler to the dome N on the top of cylinder A. P is a small diaphragm connected by a pipe to cylinder A near the bottom, and also to the cock O in the steam-pipe by means of a stiff rod. R is a hot-water drum, constructed in such a manner that it will float, but having a head at each end connected by a hollow tube in the center. S is a rod leading from the top of the cylinder to hold the drum in position as it moves up and down. T is a plate fastened to the bottom of the cylinder, and acts as a deflector to distribute the force of the water as it enters through the suction-pipe. U is a deflector placed at the top of the cylinder to distribute the force of the steam. V is a small pipe, with valve W and cock X, so arranged as to admit air during the vacuum, but prohibit the steam from escaping. Y is an injection-chamber placed on the side of the steam-cylinder A.

The operation of this machine is as follows: The cylinder is first filled with water through an opening for that purpose, the water expelling the

air from the pipes and filling them also. The weight of the water on the lower or inner side of the diaphragm P causes it to rise and turn the cock O in the steam-pipe; this permits the steam to enter the cylinder A and expel the water through pipe D, the water-drum moving down with the water in the cylinder. When the water has been forced down below the bend in pipe H, the water in said pipe, which has prevented the steam from escaping, will be withdrawn by pipe G and the steam will pass up through pipe G into the air-chamber formed by a portion of the enlarged part of pipe D, (or it may be admitted directly on the column of water in pipe D.) As soon as the water is withdrawn from the pipe G, and the pressure of the steam admitted on the water in pipe D, the valves E and F in pipe D will close and the water in said pipe between said valves will open the valve K in pipe I and force a passage into the steam-cylinder A. A sprinkler is placed on the end of pipe I, which enters the injection-box fixed on the side of the main cylinder; this is so arranged as to permit the water-drum to pass freely, (or the box may be placed on the top of cylinder A.) The injection of cold water into the steam-cylinder will cause a vacuum, the force of which will draw the diaphragm inward and communicate a motion to the cut-off valve or cock O, and prevent any steam from entering while the cylinder is filling with water. The diaphragm is so arranged that it will bear on the casement between which it is fastened in a manner so as to prevent any strain by the force of the steam or vacuum except the amount required to move the cut-off valve. The diaphragm may be placed in the pipe I, connecting the pipe on each side of it in that case, so that the descending water will force it up and cause it to open an exhaust.

I do not confine myself to any particular position or arrangement of the diaphragm, as it could be placed in connection with any part of the machine where the force of the steam and vacuum would cause it to move in opposite directions or a small movable piston of other material could be arranged and operated by the same force to communicate a motion to the cut-off or exhaust-valves. It will be seen that the merit of this device lies in its forming a part of the vessel which confines the steam, and being susceptible of a movement which it receives by the power of the vacuum or water in opposite directions. As soon

as the pressure is lessened in the cylinder by the injection of cold water, water will be forced through the pipe L from the column above valve F; this could be dispensed with if a sufficient quantity of water is contained in the pipe D between valves E and F, and for this purpose it is enlarged into a cylinder below valve F. Any air that may be let into the machine will pass out through pipes H and G into the upper part of pipe D and be forced out with the discharge water at each pulsation. When the water has supplied the vacuum and refilled the cylinder the weight of the column above the point at which the diaphragm is attached will cause it to move outward, and the weight of a ball may be added if necessary; this movement will again let on the steam. The great advantage of the hot-water drum R is to prevent the steam from coming in contact with cold surface and condensing. After the machine has been working a short time the water between the heads of the drum will become heated, and as none of the water within it is ever discharged, and the agitation of it being prevented by the lower flange, it effectually accomplishes this purpose, the great importance of which will be readily appreciated, as it not only prevents the steam from coming into contact with the cold water, but leaves the sides of the cylinder hot and prevents condensation there also. When the water to be raised is required to be warm, the exchange pipes G, H, and I would be placed at

the bottom of the cylinder A and the hot-drum dispensed with.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The construction of a hot-water drum, R, having two or more flanges to prevent the agitation or mixing of the hot and cold water, and operating, as shown and described, for the purpose of preventing condensation of the steam, as set forth.

2. The movable diaphragm, P, when combined with a water-elevator, operating substantially as and for the purpose set forth in the specifications.

3. The valves E and F and connecting-pipe D, when said pipe is made to contain water for condensation at an elevation above steam-cylinder A, as shown and described.

4. The pipes G, H, and I, connecting pipe D with cylinder A, as shown and described.

5. The pipe I, valve K, pipe D, and cylinder A, as shown and described, and operating substantially as set forth.

6. The combination of the cylinder A, constructed as shown and described, dome N, pipe D, and valves E, F, and K, operating as set forth.

7. The combination of pipe V, valve W, and cock X, with dome N, pipes L, G, H, and I, and pipe D, as shown and described.

Witnesses:

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