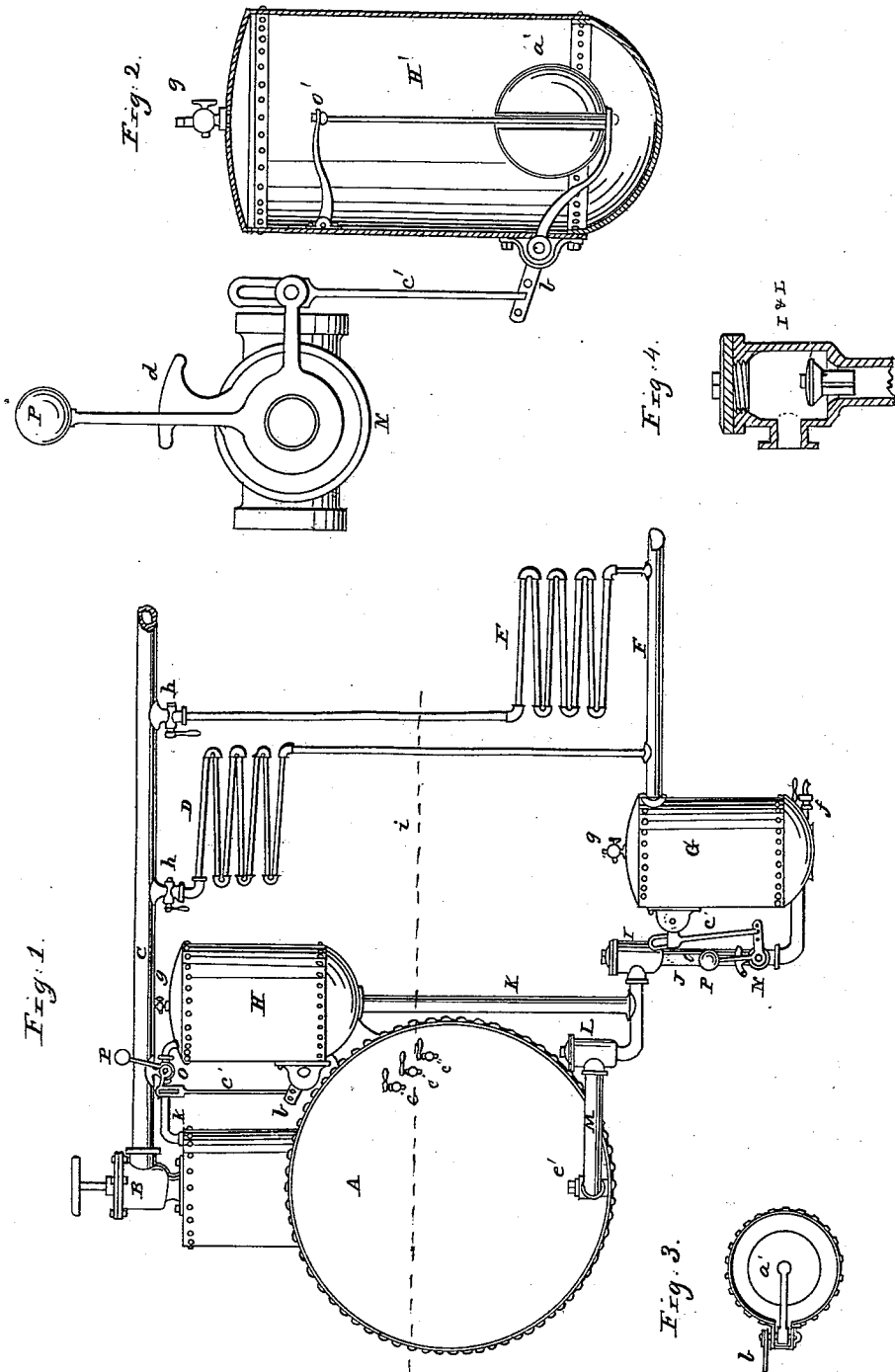


H. MERRILL. STEAM EVAPORATOR.

No. 64,347.

Patented Apr. 30, 1867.



United States Patent Office.

HELEM MERRILL, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 64,347, dated April 30, 1867.

IMPROVED MODE OF USING STEAM FOR HEATING AND EVAPORATING.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, HELEM MERRILL, a citizen of the United States of America, have invented a new and improved Mode of Using Steam for all Purposes of Heating or Evaporating; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My improvement consists in the manner of returning the water of condensation back into the steam boiler or generator when the heaters, evaporators, or condensers are above or below the water level in the boiler, thus keeping the coils and return pipes free from water. The steam being dry, imparts more heat for the purposes required, thereby causing a great economy in fuel.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction.

Figure 1 is a front view of a steam boiler with a receiving and discharging cylinder, also a heater above and one below the water level in the boiler, together with the necessary pipes and valves.

Figure 2 is an enlarged vertical section of one of the cylinders and float as attached to the steam or water-cock.

Figure 3 is a cross-section of a cylinder, float, and arm.

Figure 4 is a vertical section of one of the check-valves.

The letters of reference show corresponding parts in the different figures represented in the accompanying drawings.

Steam is generated in boiler A, fig. 1. The air-cocks, *g g*, fig. 1, receiving-cylinder G, and discharging-cylinder, H, fig. 1, are opened. The steam is let into the main pipe, C, through the stop-valve B, and into the coil D, which is above the water level, as indicated by red line *i*, and also into coil E, which is below the water line, through the cocks *h h*, all in fig. 1. As the steam is condensed in the coils by the process of heating or evaporating, the water of condensation passes down into and through the condensing pipe F into cylinder G, fig. 1. When all the air is exhausted through cock *g*, it is closed, and the water rises, carrying up the float *a'*, fig. 2, until it strikes the arm *a'*, fig. 2, and carries it up with the rod and arm *b*, figs. 2 and 3, which are connected together through a stuffing-box on the outer side of cylinder. The connecting-rod *c'* is attached by a loose joint to the arm *b*, fig. 2. The other end of the rod *c'* has a slot that moves on a pin on the side of the ball-arm P. When the float raises the arm *b*, fig. 1, it brings the end of the slot in contact with the pin, and throws the ball P past the centre, when it falls by its own weight, being loose on the pin which projects from the head of the key of the cock N, fig. 1. The quadrant, which is attached firmly to the key of the cock, has two points projecting outward, against which the shaft holding the ball strikes in its fall and carries the quadrant round, thereby opening the water-cock N, fig. 1, allowing the water to flow from cylinder G through pipe J, and check-valve I and pipe K, into discharging-cylinder H, fig. 1. The air-cock *g* in cylinder H being still open, there is no pressure on the top of the water, which rises, carrying the float and arms, as before described in fig. 2, until it is near the top, when the air-cock *g* is closed, and the float having raised the inner end of the arm *b*, fig. 1, it carries the outer end down by the shaft in the stuffing-box being the axis, until it has drawn the ball-arm P down by means of the connecting-rod *c'*, fig. 1, thus throwing the ball past the centre, it falls and operates as before described for receiving cylinder G, fig. 1. The ball P, in falling, moves the quadrant attached to the key of the cock O, admits the steam from the boiler A, through pipe *k*, into the cylinder H on top of the water, which being above the level, and by the pressure of the steam on its surface, causes it to flow downward by its own gravity through pipe *k*, up through valve L, pipe M, and cock *e'*, into the boiler A, fig. 1. When the water is nearly all out of cylinder H, the float having fallen, closes the steam cock O by means of the lever, connecting-rod, and ball-arm. By reversing the ball it stops the steam from entering the cylinder H, fig. 1. The cylinder G having discharged its water into the cylinder H, the float has fallen and closed the cock N in the same manner as described for the steam cock O. While the water is again filling the cylinder G, the steam is being condensed in the cylinder H, thus reducing the pressure, so that when the water again rises sufficiently to open the cock N, it rushes up as before described to fill the vacuum caused by the steam being condensed in the cylinder H. The pressure on the top of the water in the cylinder G also forces it up, thereby making the operation sure, the cylinders receiving and discharging alternately, as described. The

cock *f*, fig. 1, at the bottom of the cylinder *G*, is for drawing off the water when the whole apparatus is not in operation. The float *a'*, fig. 2, has a tube through its centre, and is air-tight. The rod which holds the float in the centre of the cylinder passes through the tube, the float thereby being independent of the levers until they come in contact by the rising or falling of the water. One or more coils or heaters may be used at the same time. If motive power is required from the same boiler, a separate pipe should be used for that purpose.

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

1. The retaining of the water in the receiving and discharging-cylinders until at required height it exerts a power sufficient to perform the operations, substantially as described and set forth.
2. The independent float, as connected and combined with the stop-cocks, making the whole apparatus self-acting, for the purposes substantially as set forth and described.
3. I claim the method of returning the water of condensation to the boiler, substantially as described.

HELEM MERRILL. [L. S.]

Witnesses:

JAMES G. COOPER,
P. J. MANNING.