

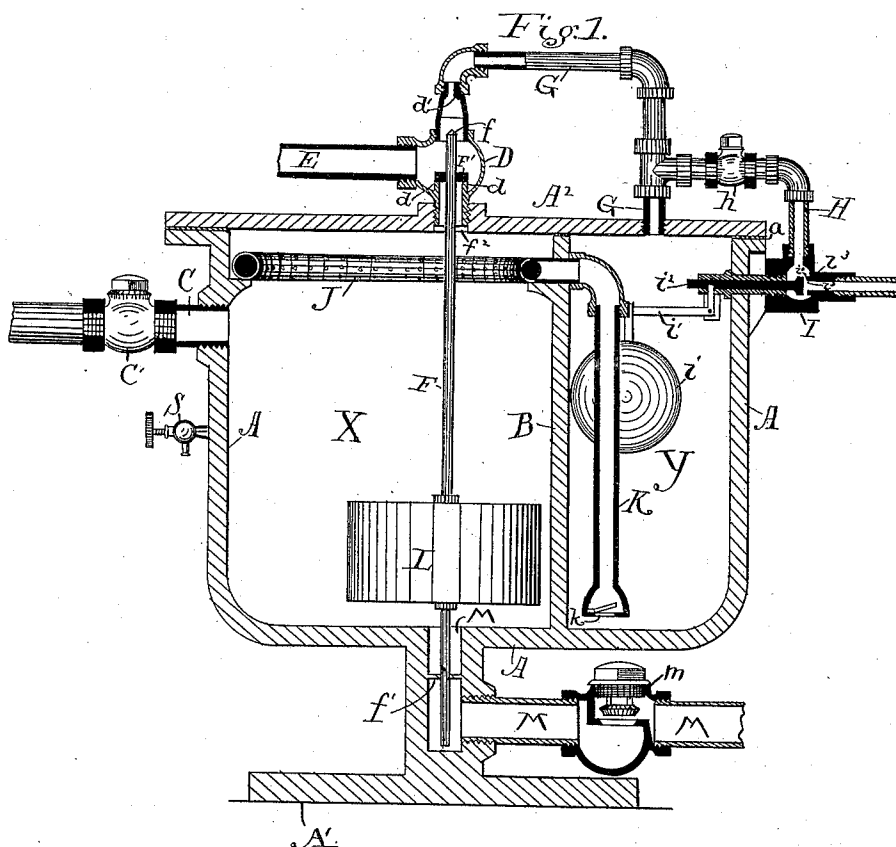
(No Model.)

F. B. EASTMAN.

STEAM TRAP.

No. 341,737.

Patented May 11, 1886.



Witnesses:

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UNITED STATES PATENT OFFICE.

FRED B. EASTMAN, OF WATERVILLE, MAINE.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 341,737, dated May 11, 1886.

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To all whom it may concern:

Be it known that I, FRED B. EASTMAN, a citizen of the United States, residing at Waterville, in the county of Kennebec and State of Maine, have invented certain new and useful Improvements in Steam-Traps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to steam-traps such as are use for forcing the condensed water from a system of steam-pipes back into the boiler when such water is to be returned from below the level of the boiler; and my invention consists in a steam-tight vessel having two chambers, one larger than the other, within the larger of which is a float operating a valve, by the action of which steam is allowed to enter the large chamber from the boiler, forcing out the contents of the chamber, and then automatically closing the steam-inlet and diverting it to the small chamber, from which it expels a charge of cold water (previously drafted in from a cold-water supply) into the large chamber, condensing the steam and creating a vacuum, and drafting in water from the drip-tank.

My steam trap may also be used as a water-elevator.

My invention is illustrated by means of the accompanying drawing, in which the figure represents a central vertical section of my steam-trap.

A is a steam-tight vessel resting on base A', and with a cover, A², put on with packing a. A partition, B, separates the vessel into two unequal chambers—X, the larger, and Y, the smaller. The chamber X has leading from it three pipes—M, which leads to the water-space of the boiler; C, which connects with the drip-tank, and E, which connects with the steam-space of the boiler. The pipe M has a check-valve, m, which stops the water from returning to the trap. The pipe C has a check, which prevents water from going from the trap. The pipe E is connected with the double-acting valve D, which valve has two openings—one

downward into the chamber X, and one upward into the pipe G, which discharges into the top of the chamber Y. The spindle F, bearing the float L, is steadied by the bearings f' and f'', and it has near its upper end the valve F', which rests on the valve-seat d, closing the opening downward into the chamber X. The upper end of spindle F has a conical point, which is adapted to fit the valve-seat d', thus closing the opening upward into the pipe G. The pipe G, near where it enters the small cylinder Y, has a branch, H, which connects with a source of cold-water supply, the ingress of the water being controlled by a ball-cock, I, of usual construction, the float i being so arranged that when the chamber is full to a certain level it will rise and shut off the cold-water supply at the point j.

Leading from the bottom of chamber Y to the top of chamber X is the pipe K, having at its lower end the upward-opening valve k. The pipe K connects with a hollow perforated ring or pipe, J, in the upper part of the chamber X.

The trap is supposed to be placed above the water-line of the boiler.

In describing the action of my steam-trap it will be shown that the chamber X is alternately filled with water and steam, and I will suppose that the water is entering chamber X through the pipe C, being drafted in by the vacuum which has been formed within chamber X. As the chamber fills with water to a certain point, the float L, which is adjusted in size to be of the right buoyancy, rises, lifting the valve F' from its seat d and opening a passage for the steam, which comes through the pipe E into the chamber X. At the same time the pointed end of the spindle f closes the opening d' and prevents steam from passing through the pipe G. As the steam enters the top of chamber X, it drives the water down and out of the pipe M, the check C' closing and preventing the steam from passing outward through the pipe C. When the water has been expelled from the chamber X, the weight of the float L will cause it to drop, closing the valve F' and opening the valve d', the chamber X of course being filled with steam. The steam, now passing through the pipe G, enters the top of chamber Y, which we assume to be filled with water by means hereinafter to be

described, and forces the water upward through the pipe K, and thence into the hollow perforated ring J, where it passes through the perforations in the form of spray, condensing the steam contained in the chamber X, and there forming a vacuum. Immediately the steam begins to condense the water is drawn through the pipe K, hastening the condensation of the steam in chamber X, and emptying the small chamber Y. As the water in chamber Y is drawn down, the cold water from the cold-water supply is drafted in through the pipe H, the ball-cock I remaining open while the chamber is empty. Steam is also drawn in through the pipe G, but meeting the cold water entering through the pipe H, it is rapidly condensed. The vacuum thus formed in the chamber X also draws water through the pipe C, and this water added to the smaller quantity drawn through the pipe K, which is designed to be of much smaller diameter than pipe C, fills up the chamber X and relieves the vacuum. The chamber X being filled with water, the float L rises, as above explained, opening valve F' and closing valve d', and admitting steam into the chamber X to drive out the water contained therein. When the steam is thus admitted to the chamber X, the pressure closes the check-valve k. This operation is continually repeated.

The ball-cock I is of practical use only when the cold-water pressure is greater than that of the steam-pressure, so that it would enter the chamber Y in a continuous stream if it were not shut off by the use of the ball-cock when it reached a certain height in chamber Y. If the cold-water pressure is low, the ball-cock may be dispensed with, because cold water will only enter chamber Y during the continuance of the vacuum. The pipe H may connect with a cold-water supply below the level of the trap, the water being drawn in by the vacuum. It is desirable to admit only so much cold water as is necessary to condense the steam in the chamber X, and with this end in view the pipes H and K are made of small size as compared with the sizes of the pipes C and M.

The ball-cock I is of usual construction, having a spindle, i^2 , the end of which is enlarged and closes against the opening i^3 , the spindle being operated by ball i , attached to the elbow-lever i' . When the ball is submerged, it closes the inlet, and when it is unsubmerged it opens the inlet.

The trap may be started in a variety of different ways. An air-cock may be placed in chamber X, which, being opened, admits steam into both chambers, and the air-cock S and the steam-supply being then closed the steam contained in the trap will gradually condense, drawing in water through pipes C and H. If now the steam is admitted through pipe E, the trap will be set in operation. It may also be set in motion by other means not here shown.

It is evident that my device can be used as a pump or a water-elevator, as well as a steam-trap, by connecting the pipe C with the source of supply and the pipe M with tank above to which it is desired to lift the water.

I claim—

1. In a steam-trap or water-elevator, in combination with a steam-tight reservoir having two chambers, a double-acting valve operated by a float by which steam is alternately admitted to and shut off from each chamber, substantially as and for the purpose set forth.

2. In a steam-trap or water-elevator, a steam-tight reservoir having two chambers, X and Y, combined with a double-acting valve operated by a float in chamber X, by which steam is alternately admitted to and shut off from the two chambers, a cold-water supply admitted to chamber Y, a pipe leading from the bottom of chamber Y into the top of chamber X, and there connected with means for spraying the water, and an outlet-pipe leading from the bottom of chamber X, all substantially as and for the purpose set forth.

3. In a steam-trap or water-elevator, a steam-tight reservoir having two chambers, X and Y, combined with a double-acting valve operated by a float in chamber X, by which steam is alternately admitted to and shut off from the two chambers, a cold-water supply admitted to chamber Y, a pipe leading from the bottom of chamber Y into the top of chamber X, and there connected with a pipe with perforations, for spraying the water, an outlet and an inlet pipe leading from and to chamber X, all of said pipes being suitably provided with check-valves, substantially as and for the purpose set forth.

4. In a steam-trap or water-elevator, a steam-tight reservoir having two chambers, X and Y, combined with a double-acting valve operated by a float in chamber X, by which steam is alternately admitted to and shut off from each of the two chambers, a cold-water supply admitted to chamber Y and controlled by a ball-cock, a pipe leading from the bottom of chamber Y into the top of chamber X, and there supplied with means for spraying the water, and an outlet and an inlet pipe leading from and to chamber X, said pipes being suitably supplied with check-valves, all substantially as and for the purpose set forth.

5. In a steam-trap, the spindle F, the upper end of which is provided with valve f , adapted to fit the valve-seat d' , and the valve F', fitting valve-seat d , said spindle having attached to it the float L, which, by rising and falling opens and closes alternately the valves d and d' , substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FRED B. EASTMAN.

Witnesses:

S. W. BATES,
H. D. BATES.