(No Model.)

R. MORTENSEN.

STEAM TRAP.

No. 260,599. Patented July 4, 1882.

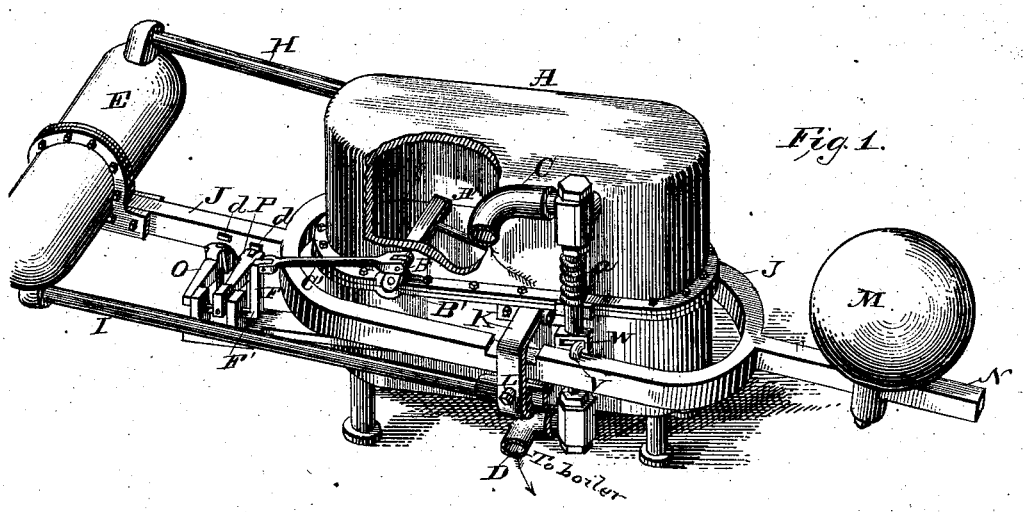

Fig. 1.

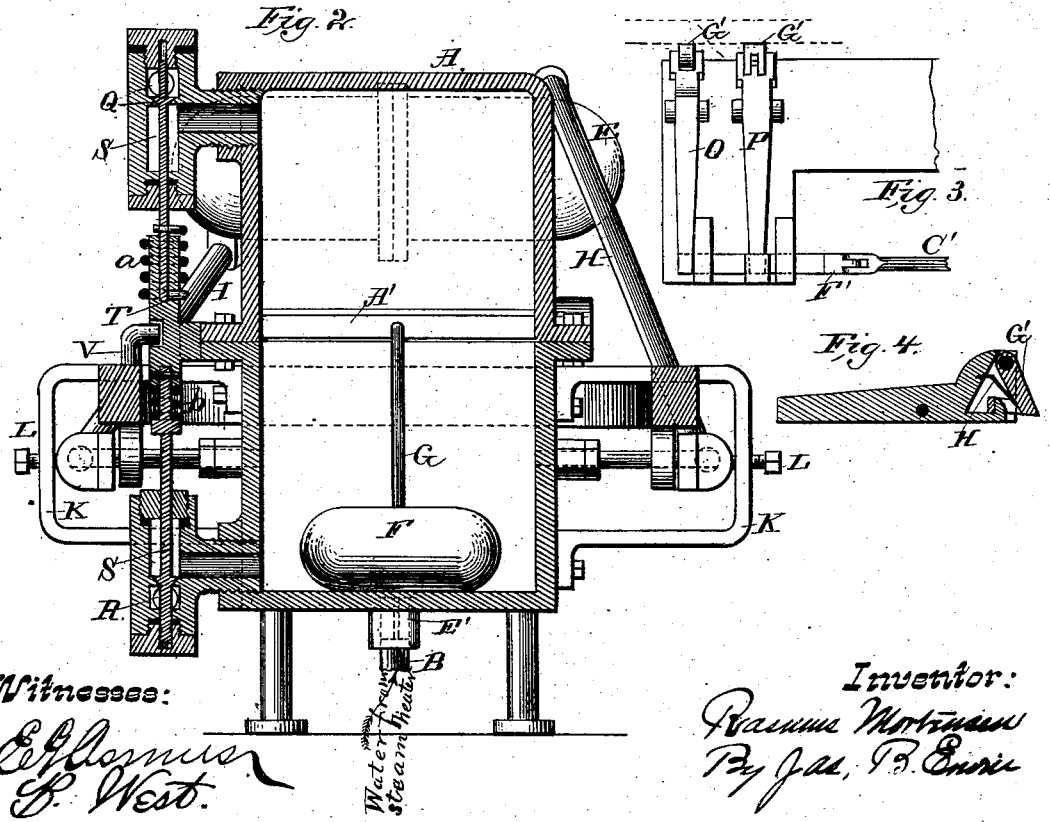

Fig. 2.

Fig. 3.

Fig. 4.

Witnesses:
E. Glasmus
P. West.

Inventor:
Rasmus Mortensen
By Jas. P. Ennis
Attorney.

UNITED STATES PATENT OFFICE.

RASMUS MORTENSEN, OF MILWAUKEE, WISCONSIN.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 260,599, dated July 4, 1882.

Application filed April 20, 1882. (No model.)

To all whom it may concern:

Be it known that I, RASMUS MORTENSEN, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Steam-Traps; and I do hereby 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 drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The object of my invention is to provide a device for elevating the condensed water which accumulates in the heating-coils of steam-pipes which are located below the boiler.

The construction and operation of my invention are further explained by reference to the accompanying drawings, in which—

Figure 1 represents a perspective view. Fig. 2 is a vertical cross-section. Figs. 3 and 4 are detail views.

Like parts are represented by the same reference-letters throughout the several views.

A is a receiving-chest or main reservoir, which is located on the top of the boiler, and communicates directly with the lower coils of the steam-pipe through pipe B. C is the inlet-pipe, through which steam enters the chest A. Pipe C is connected with the boiler above the water-line. D is an outlet-pipe, through which water escapes from the chest A. E is an oscillating cylinder or secondary reservoir. F is a float. G is a lever. The reservoir E is connected with the chest A by pipes H and I. J is an oscillating frame or lever, which is pivoted to the stationary frame K K by pivots L L. M is a weight, which serves as a counterpoise to the chamber E. The counterpoise M is made adjustable upon the arm N, and may be adjusted farther from or nearer to the pivots L, according to the weight of the cylinder E. O and P are pawls by which the reservoir E is retained in a fixed position, both while filling with water and when being emptied, as hereinafter explained, whereby a more positive movement is attained.

Q is a valve by which the admission of steam from the boiler is closed. R is a valve by which admission of water from the boiler is closed. The valves Q and R are connected with each other by valve-rods S S and T, and are thereby simultantously operated by the action of the oscillating lever or frame J. Motion is communicated from the frame J to the valve-rods S S by arm V, which arm is rigidly attached at one end to frame J, and its other end operates in a groove or recess, W, formed in the connecting-rod T. The groove W permits of the required horizontal movement of the arm caused by the circular movement of the frame J as said frame rocks upon its central pivots, while the arm carries the valve-rod with it in its upward and downward movement. When the trap is placed on the boiler, the main reservoir A and secondary cylinder E being empty and the valves Q and R being consequently closed, it is obvious that as there is no steam pressing in the chamber A, and as there is a great excess of pressure from the boiler back of the water in the lower coils of the steam-pipe the water in said coils will be forced by said steam-pressure from the coils up into the chamber A through pipe B. Before the water enters, the weight of the ball M carries down the end of the frame upon which said ball rests and closes the valves, as shown in Fig. 2, while it elevates the reservoir E, and the frame J is locked in the inclined position shown by the pawl P. It is now obvious that as the water enters the chamber A it not only fills the same, but also fills the cylinder E, while the pawl P prevents the reservoir E from being carried down by the gravity of the water therein until the float F is raised to the top of the chamber A, at which point said float, acting through the lever G, horizontal bar A′, crank or arm B′, and rod C′, moves the slide F′, whereby the pawls P and O are thrown out of contact with the frame J, when the weight of the water in the cylinder instantly causes said cylinder and frame to descend, whereby the valves Q and R, which are connected with the ascending side of the frame J, are raised and opened. When said valves are thus opened the steam rushes in through pipe C from the boiler above the water, and, the equilibrium of steam-pressure being thus

restored, the water gradually flows out through pipe D into the boiler of its own gravity. The pipe H being connected with the upper side of the cylinder E, the steam enters through said pipe, while the water in said cylinder passes out through the lower pipe, I.

To prevent the cylinder being thrown up before it is entirely empty, by the gravity of the counterpoise M, the pawl O is provided, which pawl is adapted to engage upon said frame J, and retain said frame J and cylinder down until the float F has reached its lowest point in the chamber A, at which point said float, acting in the opposite direction through said lever G, crank B′, and rod C′, moves said slide F′, whereby said pawl O is thrown out of contack with said lever, when the weight of the counterpoise instantly throws back the cylinder E into the elevated position shown, thereby again closing the valves Q and R, when the condensed water is again forced, in the manner described, into the trap, and from thence to the boiler, as mentioned.

It is obvious that this device is automatic in its operation, and will operate without the care or attention of any one. To provide against the derangement of the valves caused by the expansion of the connecting-rods, said rods are adjustably connected with each other, as shown in Fig. 2. The rods S and S are loosely socketed into the central rod T, and are each provided with a spiral spring, *a* and *b*, which springs are both adapted to draw the rods S S toward each other, thereby counteracting the effect of expansion, which would otherwise open either one or both of said valves.

To prevent the water, when under steam-pressure, from passing back from the trap to the coil, a check-valve, E′, is provided in the mouth of pipe B, which valve is opened by the force of the water as it enters, and closes by the weight of the water as soon as it ceases to enter. Short lugs *d d* are formed on frame J, against which the pawls O and P engage. Said pawls O and P are thrown out of contact with said lugs *d d* by a horizontal movement of the slide F′, caused by the movement of said float, as described. The slide F′ engages against the rear ends of said pawls and retains them in their respective locking positions, one of said pawls being adapted to lock or engage upon said lugs *d* from its upper side and the other from the lower side. Thus one locks the lever J when raised and the other when lowered, as described. To permit the lugs *d* to pass the respective ends of said pawls when moving into the locking position past the ends of the respective pawls, they are each provided with a latch, G′, which is pivoted therein and adapted to be thrown out from the end of said pawl by a spring, H. Thus as the frame J passes said pawl the lugs *d* press in the latch until they pass below it, when the latch is thrown out above the lugs by said spring in position to engage upon said lug *d*, whereby the frame J is locked, as mentioned. The pawls are released from said lugs, as before mentioned, by the horizontal movement of said slide F′, which, when thrown out of contact with the gear ends of said pawls, permits them to be thrown respectively one upward and the other downward as the lugs *d* slip past the ends of the latches.

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

1. In a steam-trap, a secondary reservoir supported upon pivotal bearings in connection with the main reservoir or chest, and communicating therewith by open passages, through which water passes from the main reservoir to said secondary reservoir, said secondary reservoir being adapted to be actuated by the gravity of the water thus received, whereby the steam and water valves communicating from said main reservoir to the boilers are opened, substantially as set forth.

2. In a steam-trap, a main reservoir or chest, a frame supported upon pivotal bearings, in combination with said main reservoir, a secondary reservoir supported upon one end of said frame, provided with steam and water passages communicating with said main reservoir or chest, and a counterpoise supported upon the opposite end of said frame, said counterpoise being adapted by its gravity to cause said secondary reservoir, when emptied, to rise, whereby the steam and water valves communicating from said main reservoir to said boiler are closed, substantially as set forth.

3. In that class of steam-traps the steam and water valves of which are opened by the gravity of water in a water-reservoir and closed by the gravity of a counterpoise, the combination of the oscillating frame J, lugs *d d*, pawls O and P, arm C′, crank B′, bar A′, lever G, and float F, one of said pawls being adapted to lock said frame when the secondary reservoir is filling and the other when it is emptying, said float being adapted to disengage said pawls from said frame at the proper time for opening and closing the steam and water valves, substantially as set forth.

4. The pawls O and P, provided with latches G and spring H, in connection with slide F′, lugs *d d*, and frame J, as set forth.

5. The combination of the valves Q and R, valve-rods S S, rod T, provided with slot W, arm V, and oscillating frame J, being adapted as it oscillates to open and close said valves, as set forth.

6. The device for connecting and simultaneously operating the valves Q and R, consisting in the combination of rods S S and T, said rods S being loosely socketed into said rod T, and springs *a* and *b*, said springs being adapted to draw said valves toward each other, and into their seats, thereby counteracting the effects of expansion, as set forth.

7. The combination, with the reservoir A,

of frame J, adjustable counterpoise M, pipes H and I, reservoir E, said pipes being connected with said reservoir A by hollow movable joints, frames K K, and pivots L L, as set forth.

8. The combination, with the reservoir A, of the inlet steam-passage C and outlet water-passage D, said passages being provided with valves Q and R, as set forth.

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

RASMUS MORTENSEN.

Witnesses:
JAS. B. ERWIN,
BENJ. WEST.