(No Model.)

F. A. LITTLEFIELD.

STEAM TRAP.

No. 491,486. Patented Feb. 7, 1893.

Fig: 3.

Fig: 1.

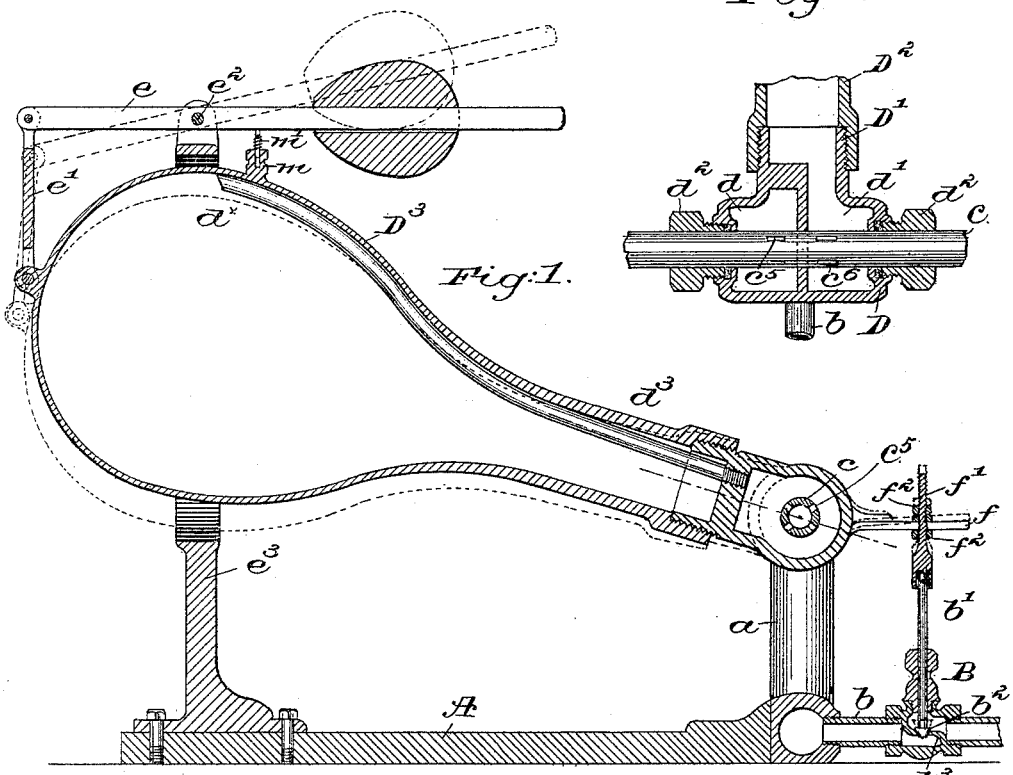


Fig: 4.

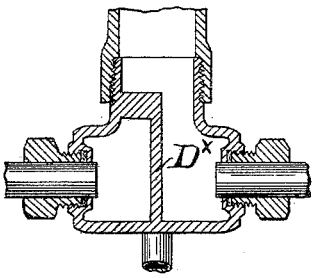
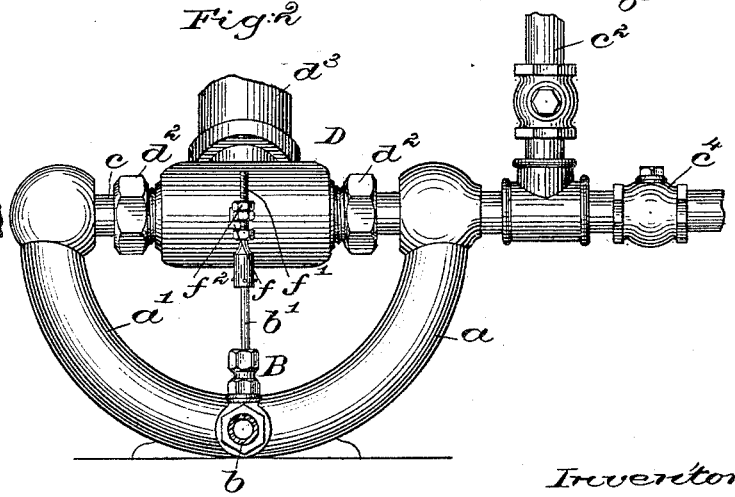


Fig: 2.



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UNITED STATES PATENT OFFICE.

FRANK A. LITTLEFIELD, OF PEPPERELL, MASSACHUSETTS, ASSIGNOR TO THE PEPPERELL MACHINE COMPANY, OF SAME PLACE.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 491,486, dated February 7, 1893.

Application filed July 1, 1892. Serial No. 438,680. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. LITTLEFIELD, of Pepperell, county of Middlesex, State of Massachusetts, have invented an Improvement in Steam-Traps, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to simplify and improve the construction and operation of steam traps, particularly what are known as return steam traps, for returning water of condensation to a boiler.

Figure 1, of the drawings represents in vertical section a trap embodying this invention. Fig. 2, a right-hand end view of the same, the receiver being broken away. Fig. 3, a sectional detail taken on the dotted line x—x, Fig. 1; and Fig. 4, illustrates a modified construction.

Referring to the drawings, the base A of suitable shape to contain the various parts has secured to it at one end a U-shaped support a, into the hollow arm a' of which is tapped the steam supply pipe b leading from a boiler or generator, not shown, said pipe being provided with a valve B containing a vertically movable valve or stem b' carrying at its lower end the valve proper b^2, the latter normally resting upon a suitable seat in the partition b^3 of the valve. The pipe c tapped into the head of the arm a' of the support a, at its inner side, is passed loosely through the head of the other arm of the support and leads therefrom to the boiler or other receptacle to receive the discharged water. A branch c^2 leading into the pipe c outside the support a, and connected with the outlet of the steam heating system or other steam to be drained, is provided with a check valve c^3, while the pipe c between the said branch and boiler or receptacle is provided with a check valve c^4. The check valve c^3 in the branch c^2 permits communication with the pipe c in the direction of the arrow 5, and prevents communication in the opposite direction, while the check valve c^4 in the pipe c permits communication with the boiler in the direction of the arrow 6 but closes against the same in the opposite direction. The pipe c, preferably at a point midway between the arms of the support a, is closed by a block or partition shown in dotted lines Fig. 3, at each side of which are arranged one or more openings c^5, c^6, which open respectively into the chambers d, d', of a revolving casing or head D mounted loosely upon the pipe c and provided at its opposite ends with suitable packing boxes or devices d^2 which permit the head to be revolved about the stationary pipe c without leakage.

The head D is provided with a neck D′ threaded to receive the threaded end of an egg-shaped or spherical receiver D^3, the said receiver communicating through the pipe c with the chamber d' of the head D. The chamber d of the head D has an outlet through the pipe d^3 which preferably follows the interior of the upper part of the receiver D^3 terminating at a point $D^\times$ preferably at or near the top of the receiver, as best shown in Fig. 1. If desired, this outlet may be formed in the wall of the receiver. The receiver is connected by a link e' with one end of the lever e pivoted at e^2 between ears formed on a suitable frame e^3 mounted on the base A, said lever at the opposite side of its pivotal point sustaining a weight w. The head D has a rearwardly extended arm f through which is passed a threaded rod f' jointed at its lower end at f^2 to the valve stem b' of the valve B, lock nuts f^2 being run upon the rod f' at opposite sides of the arm f, as shown, so that rocking of the head D on the pipe c will cause vertical movement of the valve stem b'.

The operation of the trap is as follows, viz:—Water of condensation from a heating system or other receptacle flowing through the branch pipe c^2 in the direction of the arrow 5 enters the pipe c and escapes therefrom through the opening c^6 in the pipe into the chamber d' in the head D, flowing thence into and collecting in the receiver D^3. When the water of condensation has accumulated in the receiver in sufficient quantity to overbalance the weight w, the receiver falls into its dotted position Fig. 1, thereby rocking the head D on the stationary pipe c causing its arm f to lift the valve stem b' and valve b^2 to admit steam from the boiler through the valve B, arm a' of the support a, pipe c, through the opening c^5 into the chamber d,

thence by the pipe d^3 to the interior of the receiver D^3 above the surface of the accumulated water therein. The pressure upon the accumulated water is thus equalized, the pressure upon the surface of the water in the receiver being the same as that from the generator in pipe c back of the check valve c^4, so that the water accumulated within the receiver will flow out from the chamber c' through the opening c^6 into the pipe c, thence through the check valve c^4 to the boiler, located at a level below the trap. When the water has escaped from the receiver D^3 the weight w will return the same to its full line position Fig. 1, thereby closing the valve B and permitting the water of condensation from the branch c^2 to again fill the receiver, when the operation will be repeated; the water as fast as it accumulates in the receiver being quickly returned into the boiler without attention of an operator. By carrying the steam to the top of the receiver, the steam pressure is exerted over a greater area of the accumulated water than were the steam admitted at the neck of the receiver below the water level, so that the water will be forced from the receiver more readily than otherwise.

The trap will preferably be arranged so that in both of its positions the receiver will lie above the pipe c, for when the pressure has been equalized by the admission of steam above the water, the weight of the body of water in the receiver being above the pipe c will cause the water to empty into the boiler more quickly than were the receiver on the same level as or below the pipe c. The pipe c being stationary and supported at both ends provides a construction best calculated for durability.

The action of the steam from the boiler on the top of the valve b^2 tends to hold the same closed and to prevent tipping of the receiver for a period longer than would be possible were the weight w alone depended upon, so that the receptacle really contains a greater amount of water than that actually necessary to overbalance the weight w when the receptacle in fact does tip, so that when once started it moves quickly and opens the valve wide, this large body of water being quickly returned to the boiler. While the action of the steam upon the receptacle tends to hold the valve closed, and to increase the accumulation of water in the receptacle, when the valve has once opened the action of the steam beneath the valve tends to hold the same open and to prevent the weight w returning the receiver to its elevated position as quickly as would otherwise be the case, so that the water is more completely drained from the receiver.

The air relief valve m in the top of the receiver has its spring-controlled stem m' normally acted upon by the lever e when the receiver is in its elevated position and held open to permit the air within the receiver to escape and be displaced by the inflowing water of condensation. When the receiver fails to discharge the accumulated water into the boiler, the valve closes by reason of its stem moving away from the lever e and thereby prevents the escape of the steam when the latter is admitted into the interior of the chamber.

In lieu of the construction of head shown in Figs. 1 to 3, I may form the head with a partition D^x extending completely across and dividing the head into two chambers, into which enter respectively the steam and water inlet pipes as shown in Fig. 4.

This invention is not limited to the particular construction of the various parts herein shown to illustrate my invention, as it is obvious the same may be varied without departing from the scope of this invention.

I claim—

1. In a steam trap, a support, a rocking receiver, a steam inlet pipe connected therewith, and a valve therein actuated by movement of the receiver, combined with a single pipe communicating with said receiver and serving both as a water inlet and water outlet therefor, an inlet pipe leading to said single pipe and provided with a check valve adapted to close when said single pipe serves as an outlet for the receiver; an outlet pipe connected with said single pipe and provided with a check valve adapted to close when said single pipe serves as an inlet for the receiver, whereby said single pipe by the alternate closing of the said check valves is caused to serve first as an inlet and then as an outlet for the receiver, substantially as described.

2. In a steam trap, a support, an axial pipe supported at its ends thereby and extending continuously from one point of support to the other and stopped at its middle, having outlet openings at each side thereof; a receiver mounted to rock about the said axial pipe; inlet and discharge openings connected through said axial pipe with the receiver; and a steam supply pipe connected with one end of said pipe, and a valve in said steam supply pipe operated by movement of said receiver, substantially as described.

3. In a steam trap, a support, an axial pipe carried thereby stopped at its middle and having outlet openings at each side thereof, a steam supply connected with one end of said pipe water inlet and discharge pipes connected with the opposite end of said pipe, a rocking head mounted on said axial pipe and having two chambers and into which the said openings respectively enter, a receiver carried by said head and communicating with one of said chambers, and a passage in the said receiver and communicating with the other of said chambers, substantially as described.

4. In a steam trap, a U-shaped support having a hollow arm connected with a steam supply, a steam valve to control the same, and inlet pipe carried by and communicating with the hollow arm of said support, and an outlet pipe carried by the other arm

of said support with its axis in line with the axis of said inlet pipe, combined with a rocking receiver connected with the said inlet and outlet pipes and with and to move said steam valve, substantially as described.

5. In a steam trap, the U-shaped support *a*, the axial pipe *c* having openings c^5, c^6, connected at one end with a steam supply and at its opposite end with the water inlet and discharge pipes, combined with the head D having chambers connected respectively with said openings, a receiver connected with one chamber and a pipe leading into said receiver connected with the other of said chambers, and a counterbalance for the receiver, the valve B and its stem connected with and moved by the arm on the said head D, to operate, substantially as described.

6. In a steam trap, a rocking receiver D^3, and an inlet and outlet therefor, combined with a weighted lever *e* connected with and to act as a counterbalance for the said receiver, and a relief valve *m* for the receiver actuated by said lever, to operate, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK A. LITTLEFIELD.

Witnesses:
FREDERICK L. EMERY,
FRANCES M. NOBLE.