

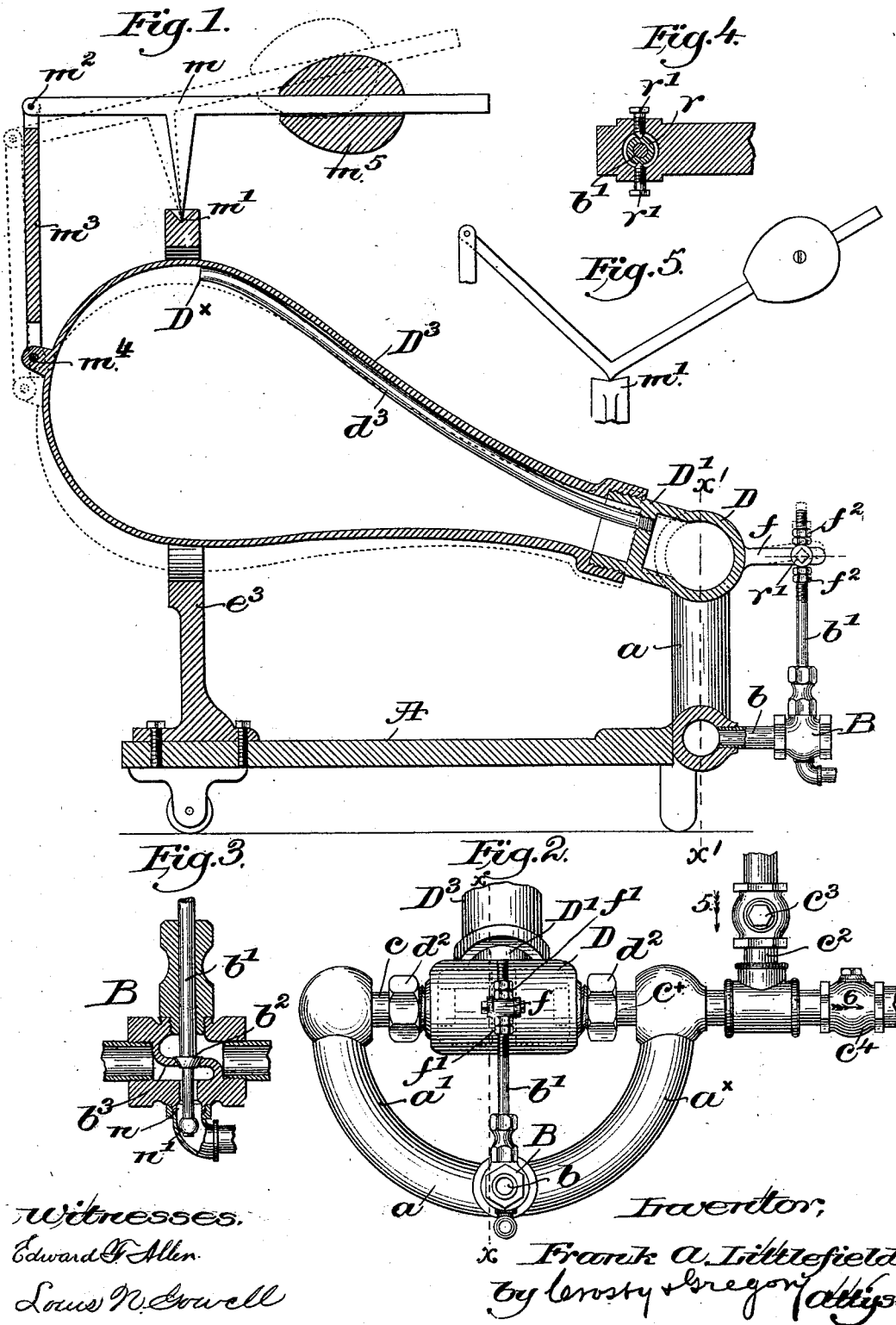
(No Model.)

2 Sheets—Sheet 1.

F. A. LITTLEFIELD.
STEAM TRAP.

No. 513,648.

Patented Jan. 30, 1894.



Witnesses:
Edward F. Allen.
Louise N. Corwell

Inventor,
Frank A. Littlefield
by Henry S. Gregory, atty.

(No Model.)

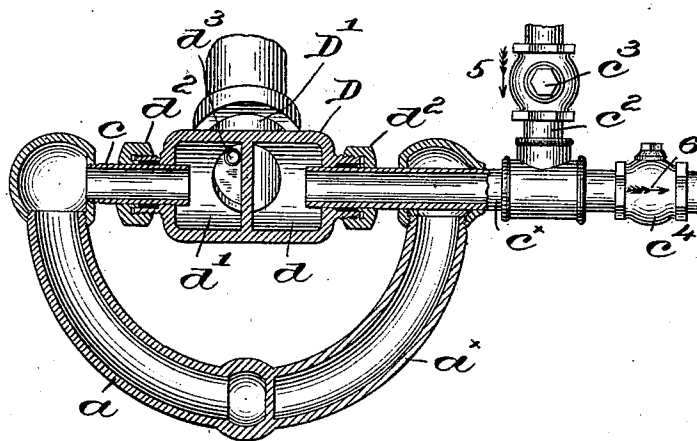
F. A. LITTLEFIELD.
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Fig. 6.



witnesses.

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UNITED STATES PATENT OFFICE.

FRANK A. LITTLEFIELD, OF PEPPERELL, MASSACHUSETTS.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 513,648, dated January 30, 1894.

Application filed November 2, 1892. Serial No. 450,722. (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 relates to steam traps of the class wherein the water of condensation is collected in a movable receiver, which, when filled more or less by the water of condensation is moved by the weight of the same, and by its movement actuates suitable valve or valves to effect the discharge of the accumulated water from the receiver. In steam traps of this class the movements of the rocking receiver are controlled or regulated by a counterbalancing lever connected at one side of its fulcrum with the receiver, and carrying at the opposite side of its fulcrum a counterbalancing weight, adjustment of which toward and from the fulcrum of the lever varies the movements of the receiver, such a trap being represented in my Patent No. 491,486, dated February 7, 1893. In traps of this class the movements of the receiver from one to another position are apt to be slow as the movements depend upon the overbalancing of the weight by the accumulated water, and vice versa, and in seeking to improve the construction of such traps whereby a quicker and more positive movement may be secured, I have discovered that by placing the active points of the lever, that is, the point at which the lever is connected with the receiver, and the center of the counterbalancing weight above the fulcrum and forming therewith an angle of less than one hundred and eighty degrees, the movement of the lever in either direction when once begun is thereafter greatly accelerated, causing a quick and positive movement of the receiver in both directions.

In the drawings Figure 1 represents in vertical section one form of trap embodying this invention; the section being taken on the line x, x , Fig. 2; Fig. 2, a right-hand end view of the same partially broken away, the base being omitted; Fig. 3, a sectional detail on an enlarged scale showing the steam valve with its connected air valve; Fig. 4, a sectional detail to be referred to; Fig. 5, a modification

to be described, and Fig. 6 a vertical section taken on the dotted line $x'-x'$, Fig. 1, the check valves being shown in elevation. 55

Referring to the drawings, in the particular construction of trap selected for the purpose of illustrating this invention, A represents the base, of suitable shape and construction to support the various parts, it having secured to it at one end a U-shaped support a , into which is tapped the steam supply pipe b leading from a boiler or generator, not shown and communicating with the hollow arm a' of said support, said pipe being provided with a valve B containing a vertically movable valve stem b' carrying at its lower end the valve proper b^2 , the valve normally resting upon a suitable seat in the partition b^3 of the valve. A pipe c is tapped into the head of the arm a' of the support a at its inner side, and a second pipe c^x is mounted in and extends through the head of the other arm a^x of the said support and leads to the boiler or other receptacle which is to receive the discharged water, the two pipes c and c^x projecting inwardly toward each other but not meeting. 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 system to be drained, 80 is provided with a check valve c^3 , while the pipe c^x 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. A revolving head D is mounted upon the inner facing ends of the two pipes, c, c^x , between the arms of the U-shaped support a , see Fig. 6, said head D being provided with suitable packing nuts d^2 by means of which a tight revoluble joint is formed between the said head and pipes. The head D is divided centrally by a partition into two chambers, d, d' into which respectively the pipes c^x and c enter, and the said head has a neck D' which is threaded to receive the end of an egg-shaped or spherical receiver D^3 , the said receiver communicating with one of the chambers d in the said head and with the pipe 100

c^x , while the other chamber of said head, which is in communication with the pipe c , is provided with an outlet or steam pipe d^3 , see Fig. 1, which follows the upper part of the receiver and terminates at or near the point D^x . See Fig. 1. The head D has a rearwardly extended arm f connected with the valve stem b' to operate the valve B in the manner fully described in my Patent No. 491,486, referred to, although this invention comprehends a novel means for connecting the stem b' of the valve with the said arm, which means will be more fully hereinafter described.

In accordance with one part of this invention a counterbalancing lever m having its fulcrum at m' is connected at one end at m^2 to one end of the link m^3 in turn connected with the receiver at m^4 , the said lever at the opposite side on its fulcrum sustaining a counterbalancing weight m^5 as shown, the center of gravity m^5 of the counterbalancing weight and the point m^2 from which connection is made with the receiver constituting the active points of the lever, said points in accordance with this invention being above the fulcrum m' and forming therewith an angle of less than one hundred and eighty degrees, the normal position of the lever being such that the points m^2 and m^5 shall lie substantially in a horizontal plane.

The operation of the trap is substantially like that of the trap shown in my patent referred to, viz: When the water from the heating or other system entering through the pipe c^2 , has sufficiently filled the receiver D^3 , the same will overcome the weight m^5 and will drop the receiver into its dotted position Fig. 1 thereby opening the valve b^2 of the valve B and admitting steam from the boiler through the pipe d^3 into the receiver above the accumulated water therein, forcing said water out through the pipe c^x and past the check valve c^4 into the boiler, the receiver returning again to its normal position as soon as the water is discharged.

Assuming the parts to be in the position shown in full lines Fig. 1, referring to the drawings, the operation of the same will be understood as follows: When the accumulated water within the receiver D^3 overcomes the weight m^5 , the receiver will move toward its dotted position, thereby turning the lever m into its dotted position, and as the active point m^2 moves downwardly on its arc it thereby increases the effective length of the arm m^2, m' , of the lever, while the weight m^5 moving upwardly in its arc thereby lessens the effective length of the arm m', m^5 , of the lever, the result being that as soon as the receiver overcomes the weight m^5 and begins to fall, the lever is so moved in the method described, as to increase the leverage in favor of the point m^2 and cause an acceleration of the movement of the receiver and weight, so that a quick movement from one to the other position is secured. On the other hand, assuming the receiver to have fallen to its lowest position when the accumu-

lated water has been sufficiently drained to permit the weight m^5 to move the receiver back to its normal position it moves downwardly in its arc and the point m^2 moves upwardly in its arc so that on this movement the leverage is changed in favor of the weight m^5 , and as soon as the weight once begins to move the receiver, the constantly increasing leverage in its favor produces an accelerated movement of the weight and receiver and a quick return of the latter, so that a much more positive movement is thus secured, and the efficiency of the trap is increased.

While I prefer the form of straight lever m' , shown in Fig. 1, the fulcrum being formed upon the apex of the wedge-shaped arm reaching downwardly from the receiver, still the invention is not restricted to such construction, as I may form the lever as shown in Fig. 3, the action, however, being identical with the operation of the lever in Fig. 1.

Referring to Figs. 1 and 3, the valve casing B at that side of the valve b^2 adjacent to the receiver is provided with an air valve opening n , which is controlled by a valve n' carried by the valve stem b' of the valve b^2 extended below the latter, so that when the valve b^2 is closed upon its seat the valve n' is removed from its seat or open, and vice versa when the valve b^2 is open the valve n' is closed. By this arrangement during the time the valve b^2 is closed and the receiver is filling with water of condensation, the air from the receiver which is displaced by the inflowing water escapes through the hollow arm of the support and the open valve n ; when, however, the receiver fills and falls to open the valve b^2 and admit steam through the hollow arm of the support to the interior of the receiver to equalize the same with the boiler pressure, the valve n' is by the same movement seated to prevent escape of the steam through the air valve.

Referring particularly to Figs. 1 and 4, the stem b' of the valve is passed through a collar r centered between two set screws r' in the arm f on the head D , and the said stem is also threaded to receive the lock nuts f^2 both above and below the arm by means of which the valve stem and arm may be adjusted to produce proper opening and closing of the valve by the rocking movement of the head and receiver.

The lateral screws r' may be adjusted to vary the position of the collar r and thereby retain the valve stem in proper alignment. This invention in this respect is not restricted to the particular shape or construction of the valves b^2 and n' .

I claim—

1. In a steam trap, the combination with a moving receiver, of a counterbalancing lever connected at one side of its fulcrum with and to be moved by said receiver and sustaining a weight at the opposite side of its fulcrum, the active points of said lever being above the fulcrum and forming therewith an angle

of less than one hundred and eighty degrees, substantially as described.

2. In a steam trap, a rocking receiver, a water inlet and outlet therefor, and a steam inlet, combined with a steam valve controlling the steam inlet, an air valve for the receiver and connections between it and said steam valve whereby movement of one also causes movement of the other, substantially as described.

3. In a steam trap, a rocking receiver, a water inlet and outlet therefor, and a steam inlet, combined with the valve B controlling the steam inlet and containing the valve proper b^2 , and an air valve n' on the valve stem with the valve b^2 , both valves operating, substantially as described.

4. In a steam trap, a rocking receiver, a water inlet and outlet therefor, and a steam inlet pipe, combined with a steam valve in said pipe, and an air valve to permit escape of air from said pipe between the steam

valve and receiver, both the steam and air valves being actuated by the rocking of the receiver whereby the air valve is opened to permit escape of air from the receiver through the steam pipe when the steam valve is closed, and vice versa, substantially as described.

5. In a steam trap, the combination with a rocking receiver, a rocking head to support the same and an arm f on the said head, of a steam valve B, its valve stem provided with lock nuts f^2 and a collar r through which the stem is passed and centered between lateral screws in the said arm, 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:

ELMER E. HANDLEY,
WARREN M. BLOOD.