April 25, 1933. V. FINA 1,906,052

BOILER RETURN TRAP

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Fig. 1.

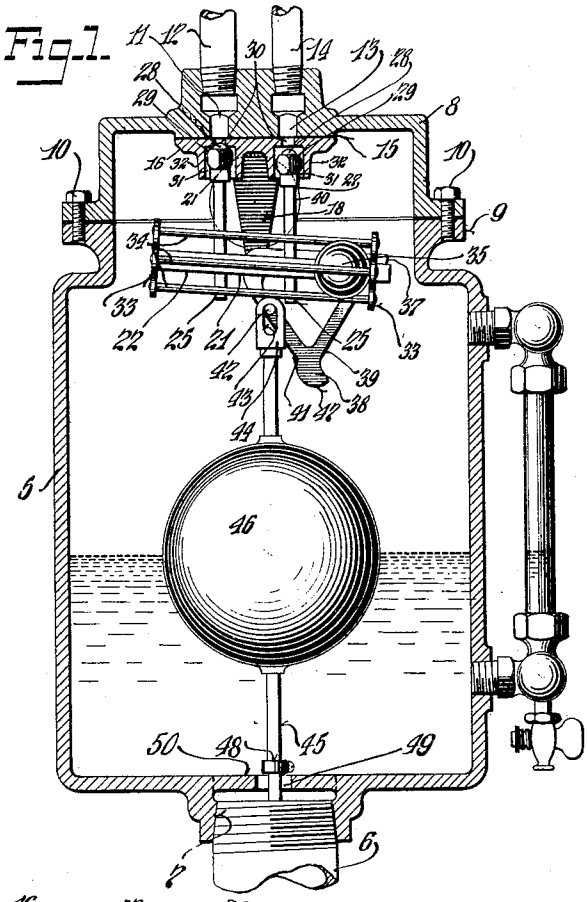
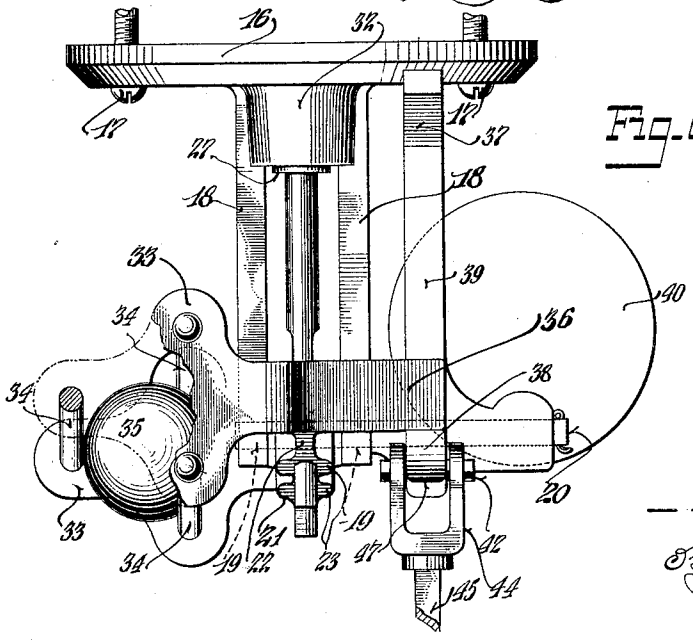


Fig. 2.



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Fig. 3.

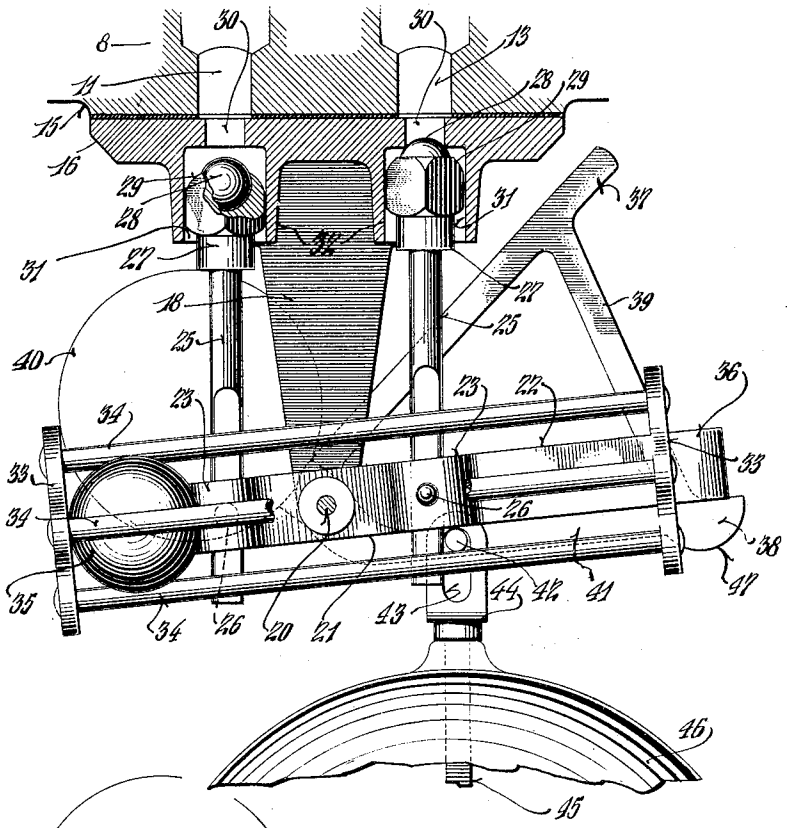
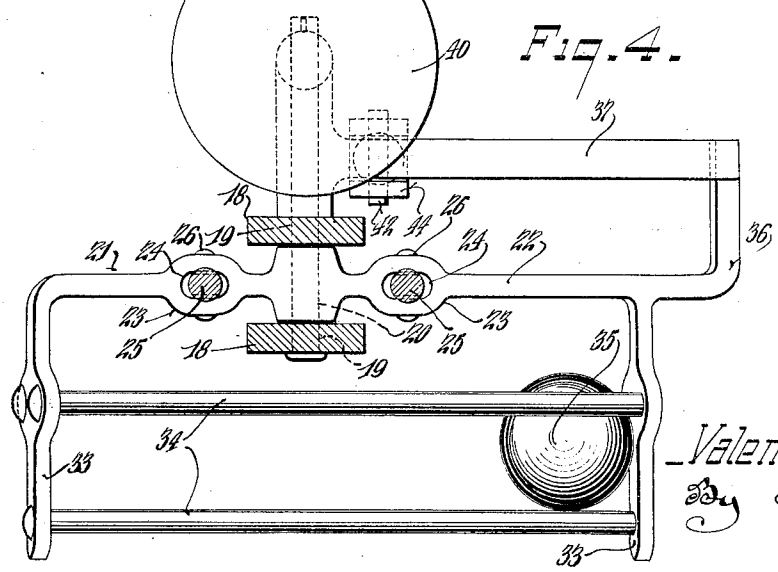


Fig. 4.



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UNITED STATES PATENT OFFICE

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BOILER RETURN TRAP

Application filed July 5, 1928. Serial No. 290,550.

This invention relates particularly to return traps especially adapted for use with heating system boilers.

In heating systems of the steam vapor and like types, the pressure within the return line piping and the boiler is customarily equalized by return traps that heretofore have been more or less dependent upon springs and other unreliable actuating means. It is, therefore, an object of this invention to provide a return trap of the character described which functions entirely independent of springs or other similar actuating means.

Another object of this invention resides in the provision of an improved valve structure for boiler return traps having gravity actuated means for maintaining the valves in their proper positions.

And a further object is to simplify and generally improve the construction of boiler return traps of the character described.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawings, I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a transverse, sectional view taken through a return trap embodying my invention, the parts being illustrated with the steam valve closed and the vent valve open;

Figure 2 is an enlarged, side view of the valve actuating mechanism detached from its supporting structure, parts thereof being broken away and in section;

Figure 3 is an enlarged view similar to Figure 1 of the valves and their actuating means in a position opposite of that shown in Figure 1; and

Figure 4 is a cross-sectional view taken through Figure 1 on the plane of the line 4—4.

Referring now more particularly to the accompanying drawings, in which like numerals designate like parts throughout the several views, 5 designates a fluid receptacle or body having an inlet pipe 6 threaded in an aperture 7 formed in its bottom wall which connects the receptacle with the return line piping of a heating system, not shown, the return water of the system entering the receptacle in the conventional manner. A flanged cover member 8 is secured over the flanged upper end 9 of the receptacle by cap screws or other like means 10 and has a steam inlet port 11 connected with the supply main of the heating system, not shown, through a pipe 12. A vent port 13, also formed in the cover member is connected with an air outlet valve, not shown, by a pipe 14.

A boss 15 on the under face of the cover 9 receives the flange 16 of a mounting member secured thereto by screws 17 or the like, a suitable gasket being interposed between the boss and flange to provide a fluid tight joint therebetween. A pair of downwardly directed spaced arms 18 extend from the flange 16 and have aligned apertures 19 in their outer ends through which a rod 20 passes to pivotally mount a valve actuating member, designated generally as 21.

The member 21 is substantially a walking beam having a main cross bar 22 through which the pivot 20 passes at a medial point and which is enlarged at two points equidistant from the pivot, as at 23. Each enlargement 23 is apertured, as at 24, to receive the lower ends of valve stems 25 which are pivotally connected thereto by rivets or other means 26. The upper ends of the stems are provided with approximately square enlargements 27 having their upper ends recessed to receive ball members 28 which are held in their recesses by peening over the adjacent edges 29.

The ball members 28 constitute the valves

that cooperate with the lower edges of apertures 30 in the flange 16 in alignment with the ports 11 and 13 to selectively close the same, and counterbores 31 communicating with the apertures 30 are formed in downwardly projected lugs 32 on the flange 16 to provide guides for the enlargements 27, the corners of which freely slidably engage the walls of the counterbores and provide fluid passages therepast. Inasmuch as the valve stems 25 are connected with the member 21 at points equally spaced from its pivotal mounting 20, rocking thereof simultaneously closes one valve while the other is opened.

Approximately triangular extensions 33 directed laterally from the ends of the arm 22 of member 21 are connected by three rods 34 substantially parallel with member 21 but transversely disposed with respect to the pivot 20. The rods 34 form a cage or trackway for a spherical weight 35 which is free to roll from one end of the member 21 to the other for the purpose to be later described. One end of the member 21 (the right with respect to Figures 1 and 4), has an arm 36 extended therefrom in a direction opposite to the end members 33 to lie within the path of the ends 37 and 38 of a subtsantially A-shaped trip fork 39.

The fork 39 is freely pivotally mounted at its apex by the rod 20 and carries a counterbalance weight 40 which is so positioned that when the parts are as shown in Figure 1, the center of gravity of the combined weight of the fork 39 and the weight 40 is to be right of a vertical line drawn through the pivot 20 and when the parts are as shown in Figure 4, the center of gravity above referred to moves to the left of the imaginary line.

The lower arm 41 of the fork 39 has a stud 42 secured therein at a medial point which is slidably received in elongated openings 43 in the sides of a yoke member 44 mounted on the upper end of a guide rod 45 on which a float 46 is freely slidable.

The operation of the return trap is simple and positive, as when the heating system with which it is used is operating under a very low pressure, or under atmospheric pressure only, the trap acts as a receiver and air vent but when the boiler pressure increases the fluid level within the trap rises carrying with it the float 46.

As the float 46 rises, it abuts a rounded toe 47 on the end 38 of the fork raising it a distance sufficient to permit the center of gravity of the combined weight of the fork and the weight 40 to pass to the left of the imaginary line drawn vertically through the pivot 20, the weight 40 then quickly moving the fork to its position illustrated in Figure 2. As the trip fork moves to this position, the end 38 thereof abuts the lower side of arm 36 moving the member 21 to close the vent 13 and open the steam port 11.

The pressure in the boiler and trap is then equalized and the fluid within the receptacle discharges from the receptacle by gravity and enters the boiler without collecting in the return mains regardless of the boiler pressure. The valves are maintained in this position by the spherical weight 35 which rolled to its position shown in Figure 3 as the member 21 was moved by the trip fork. The weight 35 is especially effective when the steam valve is closed as it then precludes its being opened by external pressure.

The elongated openings 43 in the U-shaped member 44 provide the desired lost motion between the rod 45 and the trip fork so that as the float rises to tilt the fork no additional weight is imposed which might tend to retard its movement. The valve actuating mechanism is thereby substantially full floating or in other words unretarded by exterior means being entirely actuated by gravity from one position to the other.

As the fluid within the receptacle is discharged, the float drops to the bottom of the trap and abuts a stop 48 secured to the lower end of the rod 45 opening the vent valve and closing the steam valve. This action is repeated as long as there is a differential in the pressure between the boiler and the return line piping. The lower end of the guide rod 45 is suitably guided in an aperture 49 in an arm 50 extended across the aperture 7 in the receptacle bottom.

From the foregoing description, taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art to which an invention of the character described appertains, that I have provided a return trap for boilers in which the actuating means is positive in operation being entirely independent of springs or other like unreliable means.

What I claim as my invention is:

1. In a return trap, a receptacle having ports in one wall, valves for the ports, a member within the receptacle connecting the valves whereby one is open while the other is closed, a guideway carried by the member, a weight movable along the guideway to maintain the valves in either position by gravity, and means including a pivotally connected weight for moving the member to cause the weight to move along the guideway.

2. In a return trap, a receptacle having ports in one wall, valves for the ports, a member within the receptacle connecting the valves whereby one is open while the other is closed, means pivotally mounting the member at a medial point, arms projected from the member, rods connecting said arms to form a guideway, a first named weight movable along the guideway and

adapted to maintain the valves in either position by gravity, and means including a pivotally connected weight for moving the member about its pivotal mounting to effect a corresponding movement of the valves and the first named weight.

3. In a return trap, a receptacle having ports in one wall, valves for the ports, a member within the receptacle coordinating the valves whereby one is closed while the other is open, a guideway carried by the member, a first named weight movable along the guideway and adapted to maintain the valves in either position, a trip member including a pivotally mounted weight, a single means pivotally mounting the member coordinating the valves and the trip member, and float means for moving the trip member to effect movement of said member coordinating the valves, whereby the valves are moved from one position to the other and the first named weight moves along its guideway.

4. In a return trap, a supporting member having ports therein, valves for the ports, a member within the receptacle coordinating the valves for inverse movement whereby one is open while the other is closed, a guideway carried by the member, a first named weight movable along the guideway and adapted to maintain the valves in either position by gravity, a trip member including a pivotally mounted weight, a single means carried by the supporting member for pivotally mounting said member coordinating the valves and the trip member cooperating means carried by the member coordinating the valves and the trip member whereby movement of the trip member is imparted to said member, the weight of the trip member being so distributed with relation to its pivotal mounting as to maintain the same in either of two positions by gravity, and a float for moving the trip member from one position to the other to effect a reversal of the positions of the valves and the movement of the first named weight along the guideway.

5. In a return trap, a receptacle having a pair of ports in one wall, a valve for each of said ports, a member within the receptacle pivoted about an axis, said member connecting the valves whereby one of said valves is opened while the other of said valves is closed, a plurality of rods carried by the member to form a guideway, a weight movable along the guideway and adapted to maintain the valves in either of said positions, a frame pivoted about said axis and adapted at the limits of its movement to move said member from one position to another, a weight connected to said frame adapted to effect a snap action to said member and a float in said receptacle having a lost motion connection with said frame whereby said float actuates the frame to change the seating of said valves.

6. In a return trap of the character described, a receptacle having a pair of ports in one wall, a valve for each of said ports, a member within said receptacle pivotally mounted about an axis therein, said member having means to retain a ball for rolling movement thereon, means connecting said member with said valves whereby one of said valves is open while the other of said valves is closed, a frame pivotally mounted on said axis and adapted at the limits of its movement to move said member to actuate said valves, a weight connected to said frame and adapted to give a snap action to said member and a float connected to said frame to effect movement thereof.

7. In a return trap of the character described, a receptacle having a pair of ports in one wall, a valve for each of said ports, a member within said receptacle pivotally mounted about an axis therein, said member having means to retain a ball for rolling movement thereon, means connecting said member with said valves whereby one of said valves is open while the other of said valves is closed, a frame pivotally mounted on said axis and adapted at the limits of its movement to move said member to actuate said valves, a weight connected to said frame and adapted to give a snap action to said member and a float having a lost motion connection with said frame whereby action of said valves is controlled by the level of water in said receptacle.

In testimony whereof I have hereunto affixed my signature.

VALENTINE FINA.