May 15, 1923. 1,455,021

G. W. COLLIN

AUTOMATIC STEAM TRAP

Filed July 30. 1921

Fig. 1

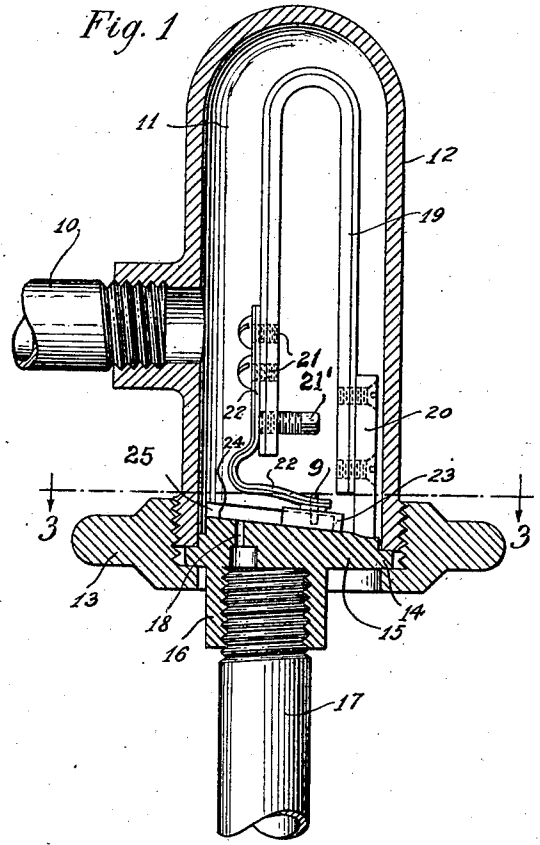


Fig. 2

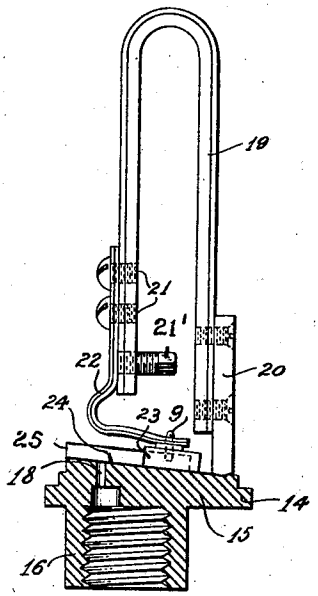


Fig. 3

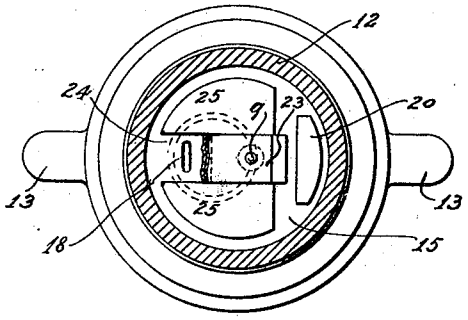
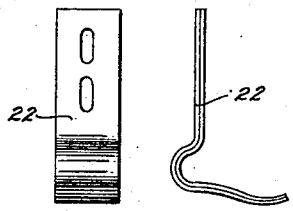


Fig. 4



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UNITED STATES PATENT OFFICE.

GEORGE W. COLLIN, OF BRIDGEPORT, CONNECTICUT.

AUTOMATIC STEAM TRAP.

Application filed July 30, 1921. Serial No. 488,544.

To all whom it may concern:

Be it known that GEORGE W. COLLIN, a citizen of the United States, and resident of Bridgeport, in the county of Fairfield and State of Connecticut, has invented certain new and useful Improvements in Automatic Steam Traps, of which the following is a specification.

This invention relates to new and useful improvements in steam-traps for installation in steam pipe lines or systems to receive and automatically discharge the condensed steam therefrom.

The invention more particularly relates to thermostatically operated steam-traps, wherein the thermostat is arranged wholly within the valve casing and thus directly exposed to the action of the varying temperatures of the water of condensation and steam, and whereby the varying temperatures will automatically open and close the valve to relieve the trap from the water of condensation accumulated therein.

The objects of the invention are to provide a steam trap which will include a thermostat and a slide valve connected thereto to be automatically operated thereby; to support the thermostat upon a detachable part which is removably supported within a casing and which can be conveniently removed therefrom for the purpose of cleaning or repairing; and to adjustably support the slide valve in position to engage and slide upon said detachable part to control the port of the outlet of the steam-trap.

With these and other objects in view the invention resides and consists in the construction and novel combination and arrangements of parts hereinafter more fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims may be resorted to without departure from the spirit or sacrificing any of the advantages of the invention.

Similar characters of reference denote like or corresponding parts throughout the several figures of the accompanying drawings forming a part of this specification, and upon which,

Fig. 1 is a central vertical sectional view through the improved steam-trap, shown connected to a steam pipe line, the slide valve being shown in the position it occupies when the thermostatic U-plate is at atmospheric temperature;

Fig. 2 is a central vertical sectional view of the removable closure plate, together with side view of the thermostat and slide valve mounted thereon;

Fig. 3 is a sectional plan view on line 3—3 of Fig. 1, looking in the direction of the arrows, and

Fig. 4 shows an elevational and an edge view respectively of that member of the thermostat adapted to carry the slide valve.

The steam trap is connected to the steam pipe line at any point where the condensation should be discharged. The chamber in the body is provided with a detachable closure plate, the upper face of which is formed into a seat for the slide valve, and an upwardly extending integral post to which the thermostatic U-plate is attached.

In the drawing, 10 denotes a steam pipe in a system entering the chamber 11 of the casing 12 at any convenient point. The lower edge portion of this casing is threaded to removably receive the flange of the nut 13 serving to engage and clamp the edge 14 of a closure member 15 in position against the lower annular end portion of the casing. The closure plate includes a hub 16 having a threaded hole to receive a water discharge pipe 17, and a port 18 affords communication between the chamber 11 and the water discharge pipe.

The thermostatic means for controlling the slide valve 23 consists of a loop 19 of thermostatic metal supported within the chamber 11 upon a post 20 extending from the removable closure member, upon the free leg of which loop is adjustably secured, as denoted at 21, a preferably thinner plate 22 of more sensitive thermostatic metal and which has its free end portions operatively connected, through a pin 9, with said slide valve. This slide valve operates upon the inclined seat 24 of the removable closure member to cover and uncover port 18. 21′ denotes a screw in the free end of loop 19 and engaging the thermo plate, whereby the latter can be adjusted with relation to the loop.

As will be apparent, the surface of the closure plate slants upwardly, from that portion of the plate which carries post 20, toward the portion in which the port 18 is situated, and upon said surface the two guide members 25 for the slide valve are ar-

ranged. This upwardly inclined plane 24 for the slide valve better accommodates the outward and upward movement of the thermostatic loop, as will be understood, while the thermostatic plate is of the conformation shown, so that when the thermostatic loop and plate are heated, they will cause the slide valve to move outwardly and upwardly to securely cover the port. The thinner and more sensitive thermostatic plate 22 provides a more flexible connection between the thermostatic loop and the slide valve.

As the water is discharging from the chamber 11 and steam contacts with the upper end of the U-plate 19 it is expanded. Before the water line has fallen much more than enough to expose one-half of the length of the U-plate the expansion and movement of the free leg of the U-plate is enough to move the connected slide valve to close the port.

This intermediate thermo element 22 attached to the free leg of the U-plate and engaging the slide valve gives a flexible connection which insures perfect closure of the port by the slide valve.

The thinner thermo element being more sensitive and quicker to respond to varying temperature, and the water in the lower part of the chamber cooling first and faster than at the higher levels, the thinner thermo element contracts, removing the downward pressure on the slide valve and the friction between the valve and its seat, so that when the water of condensation has accumulated, filling the chamber, the lowered temperature causes the contraction of the thermo elements, moving the slide valve to uncover the port and permit discharge of water. The thermostatic elements are adjusted so that the operation will take place just as described. The thinner thermo plate is adjustably attached to the free leg of the thermo loop so that it can be set in two directions, that is, slipped up or down, and moved out and in.

As water is discharging from the chamber 11 and steam enters, the higher temperature expands the thermo-U-plate. The adjustment is such that the slide valve closes the port when the water line in the chamber falls to about one-half full. As the water line falls the temperature of the surface water below the steam increases and expands the connecting thermo element 22 and causes it to give a final "set" over the port and presses the slide valve onto its seat and over the port.

As the chamber fills, the water at rest quickly cools, the cooling beginning at the bottom of the chamber and first affecting the thermostatic plate 22 in the manner already described. The thermostatic means will discharge condensation water without passing any steam, there being at all times an ample water seal. This is an especially important feature when the steam trap is used in connection with vacuum systems. In such systems, when steam passes through the trap port, it is wasted, the vacuum is cut down, and the efficiency of the pump that returns the water to the boiler is impaired.

The slide valve employed sweeps all foreign matters from the valve seat and port, and thus eliminates one of the common faults with the poppet types of trap valves, viz, the lodging between the valve and the port seat of foreign matters such as pipe scale and products of corrosion.

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

1. In a steam trap, a chamber, a thermo loop, one end of which is secured within the chamber, said loop adapted to have an expansive movement in a given direction, a thermo plate secured to the end of said thermo loop, being bodily movable in said given direction therewith and also adapted to have independent expansive movement in a direction at a substantial right angle to its bodily movement, and a slide valve adapted to be operated by the combined movements of said thermo plate.

2. In a steam trap, a chamber, a thermo loop secured within the chamber, a thermo plate of material thinner than that of the thermo loop, said thermo plate secured to the free leg of said thermo loop and having an effective movement transversely to the movment of the loop, and a slide valve operated by said thermo loop and thermo plate, a seat for said valve, said thermo loop when expanded tending to reciprocate said slide valve upon said seat and said thermo plate when expanded tending to press said slide valve upon said seat.

3. In a steam trap, a chamber, a thermo loop secured within the chamber and positioned to operate in one plane and in a given direction, a thermo plate secured to said thermo loop, being bodily movable therewith and also adapted to have independent movement in a direction at a substantial right angle to its bodily movement, a slide valve, and a connection between said valve and thermo plate permitting free upward movement of said plate relatively to the valve.

4. In a steam trap, a chamber, a thermo loop, one end of which is secured within the chamber, a thermo plate secured to the free end of the thermo loop, adjustment means for changing the relation of the loop and plate, and a slide valve carried by said thermo plate.

5. A steam trap including a chamber, a thermo loop, one end of which is secured within the chamber and the other end of

which is free therein, a thermo plate of material thinner than that of the thermo loop, said thermo plate adjustably secured to the free leg of said thermo loop, a slide valve attached to said thermo plate, and a closure plate associated with said chamber, said closure plate having a port adapted to be controlled by said slide valve, said thermo loop adapted to, when expanded, move said slide valve outwardly and upwardly, and said thermo plate when expanded adapted to move said slide valve outwardly and downwardly.

6. A steam trap as recited in claim 5, wherein the inner surface of the closure plate slants upwardly in the chamber in the direction from the support for the thermo loop toward the outlet port, and said inner surface is provided with guides for said slide valve, for the purpose described.

Signed at Bridgeport in the county of Fairfield and State of Connecticut this 29th day of July, A. D., 1921.

GEORGE W. COLLIN.

Witnesses:
C. M. NEWMAN,
GRACE E. NOONAN.