July 14, 1931. R. HETHERINGTON 1,814,512

THERMOSTATIC CONTROL FOR SHOWER HEADS

Filed Dec. 9, 1929

Fig. 1.

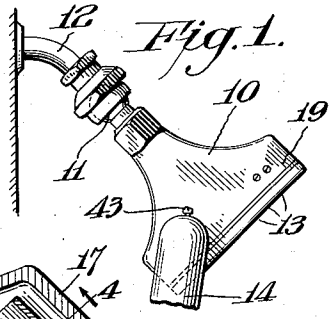


Fig. 2.

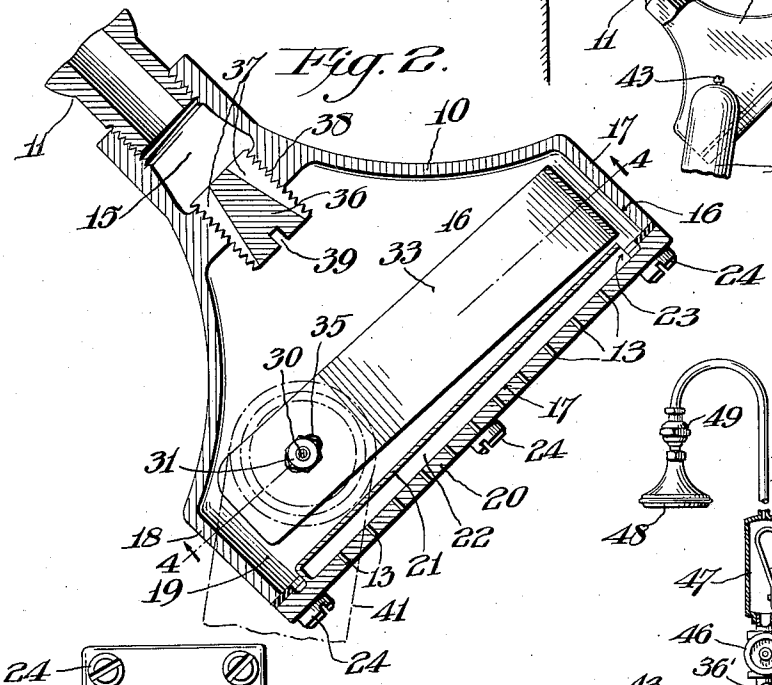


Fig. 5.

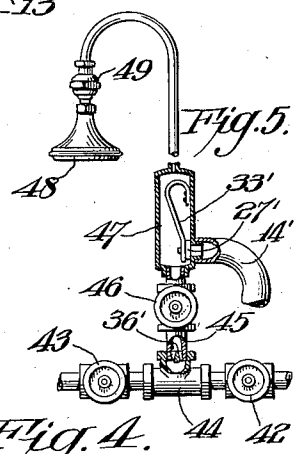


Fig. 3.

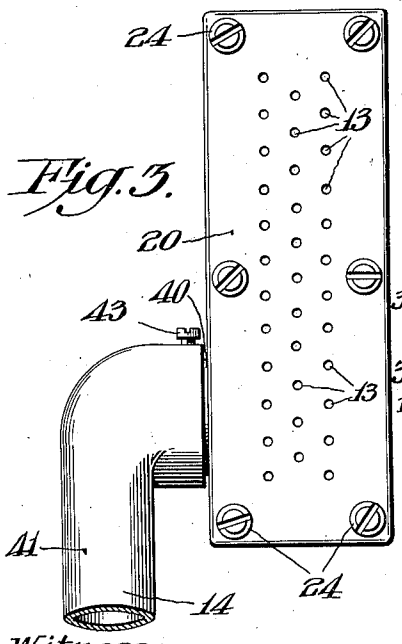
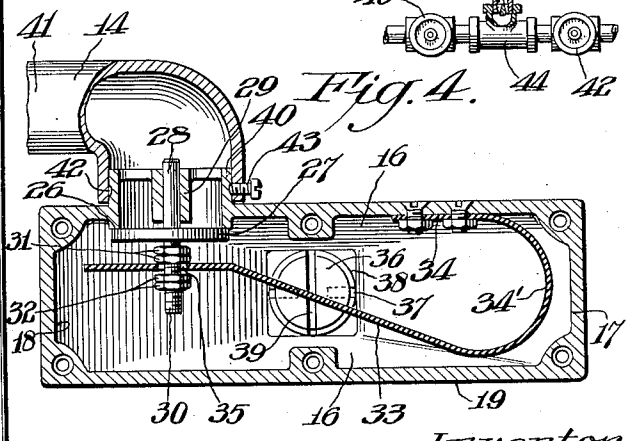


Fig. 4.



Inventor
Robert Hetherington,
By
Attorney.

Witness:

Patented July 14, 1931 1,814,512

UNITED STATES PATENT OFFICE

ROBERT HETHERINGTON, OF SHARON HILL, PENNSYLVANIA

THERMOSTATIC CONTROL FOR SHOWER HEADS

Application filed December 9, 1929. Serial No. 412,314.

My invention relates to a conduit shower bath structure in which there is an automatic limiting of the shower temperature.

A purpose of my invention is to provide structure of the character indicated with a high temperature cut out that will operate automatically so quickly and surely as to avoid any danger of a user being subjected to a shower that is unduly hot.

A further purpose is to provide structure of the character indicated with a thermostatically controlled outlet to waste that will drain the water away from the shower outlets whenever and if ever the water flowing thereto becomes of undesirably high temperature and before any undesirably hot water can escape at the shower outlets.

A further purpose is to prevent any hot leakage that may enter conduit structure of the character indicated while not in use, from discharging at the shower outlets thereof.

A further purpose is to automatically close a leakage outlet from a conduit structure of the character indicated by turning on the shower, using the increased pressure incident to the increased flow whenever the shower is turned on to close the leakage outlet automatically.

A further purpose is to provide structure of the character indicated with a thermostatically controlled outlet to waste at a low portion thereof and with an inlet at a high portion thereof to shower outlets, providing a volume below the inlet to the shower outlets and a limited size of flow into the structure that will together insure an opening of the thermostatic outlet to waste before hot water can reach the shower outlets.

A further purpose is to relate the maximum inlet flow and volume of structure of the character indicated so as to insure time for the operation of the thermostatic element before the temperature of the water reaching the shower outlets can become unduly high.

Further purposes will appear in the specification and in the claims.

I have preferred to illustrate two only of the many different forms of my invention, selecting forms that are practical and efficient in operation and which well illustrate the principles involved.

Figure 1 is a side elevation of a spray nozzle embodying a desirable form of my invention, the nozzle being shown in a position of use.

Figure 2 is an enlarged longitudinal section of the nozzle shown in Figure 1.

Figure 3 is a view of the structure shown in Figure 2 looking toward the outlet face of the nozzle into the spray openings.

Figure 4 is a section taken on the line 4—4 of Figure 2 in the direction of the arrows.

Figure 5 is a reduced scale, partly sectioned side elevation of structure illustrating another desirable embodiment of my invention.

The embodiment of my invention illustrated in Figures 1 to 4 includes a spray nozzle 10 that is connected by a suitable union 11 to a hot and cold water supply pipe 12, the nozzle being provided with spray orifices 13, a valved waste pipe 14, and interior connections preventing water from reaching the spray orifices whenever the valve to the waste pipe is open and for opening this valve whenever the temperature of the water in the nozzle reaches any predetermined upper limit beyond which it is considered undesirable for water to discharge through the spray openings.

The nozzle 10 is preferably made of a good heat conducting metal such as brass, in that a rapid heat exchange between the walls of the nozzle and the thermostatic element makes the thermostatic action more quickly follow a sudden rise in temperature of the water flowing into the nozzle.

The nozzle walls desirably flare outwardly and upwardly and downwardly from an inlet 15 to the side walls 16 and the upper and lower end walls 17 and 18 to a forward rectangular box-like portion 19 of the nozzle.

The spray plate 20 perforated at 13 to pass the spray is preferably removably mounted upon the face of the box, of which it forms one wall.

The spray plate is across the open side and end walls of the box-like portion and carries on its inner side back of the spray openings 13 a light sheet metal 21 which forms with

the main plate 20 a header chamber 22 which opens at the top at 23 into the interior of the box at a high point thereof being preferably closed from the box except at this high overflow inlet 23.

The spray plate is preferably removable from the forward face of the nozzle in order to give easy access to operating structure inside the box, and is shown held to place by suitable screws 24 and sealed against leakage around the joint by a gasket.

I provide the outlet 14 with a valve seat 26 and valve 27 both inside the box, the valve being mounted upon an intermediate point of a stem member 28, the outwardly projecting part of the stem fitting and sliding in a stationary guide 29. The inwardly directed portion 30 of the stem is threaded and carries spaced sets of nuts 31 and 32 which are used for making a loose operating connection with a thermostat 33.

The thermostatic element 33 has one end fastened at 34 to the wall of the box at preferably an intermediate point of the box length whence it extends diagonally upwardly to near the upper end of the box, makes an easy return bend at 34′ and extending downwardly presents its free end to make a loose operating connection at 35 with the stem of the valve 27.

As illustrated the thermostatic element is perforated at 35 to pass the valve stem 30 with easy clearance, the sets of nuts 31 and 32 forming abutments on opposite sides of the thermostatic element.

Preferably the abutments 31 and 32 presented by the stem on opposite sides of the thermostatic element are so set that the thermostatic element holds the valve slightly open at ordinary temperatures when the pressure inside the box is atmospheric.

As soon as a user turns water into the nozzle for use as a spray, the liquid pressure inside the box increases sufficiently to close the valve against the slight opening pull of the thermostat.

If the temperature of the water rises, the force with which the thermostat tends to open the valve progressively increases with the progressive increase in temperature until at the selected high temperature this force is sufficient to overcome the liquid closing pressure upon the inside of the valve, the valve being snapped open by the pull of the thermostat which immediately stops discharge through the spray openings 13, the hot water draining away through the waste outlet.

It will be seen that the liquid pressure inside the nozzle will be determined for a given liquid by the rate of flow into the nozzle and the size and number of the spray openings.

For a given size and number of spray openings and a given size of inlet opening the amount of water entering the nozzle will depend upon the available pressure in the supply pipe 12 which is frequently different in different communities, and I accommodate my nozzle to operate alike on different commercial supply pressures by adjustably throttling the nozzle inlet.

This adjustable throttle desirably includes a screw plug 36 provided with one or more longitudinal outside taper slots 37 that provide conduit connection between opposite sides of a wall 38 into which the plug is threaded.

The plug 36 is adjustably threaded through the wall 38 across the inlet opening 15 of the nozzle, the wall 38 having a thickness small as compared to the length of the plug.

The pressure control can, of course, be located elsewhere.

The conduit slots being progressively deeper at one end than at the other, any desired amount of throttling may be attained by varying the longitudinal position of the plug.

As illustrated the plug may be conveniently inserted or adjusted while the spray plate is off, the outer end of the plug being provided with a screw driver slot 39 so that a scriver may be conveniently used for inserting or adjusting the plug.

I preferably provide the nozzle outlet with a cylindrical extension 40 upon which I mount a short L discharge fitting 41.

As illustrated the mouth of this fitting makes a machine fit with the outside of the cylindrical extension 40 which is grooved at 42 to receive the end of a screw 43 of the fitting 41, the angular position of the discharge end of the fitting being adjustable after loosening the screw.

Normally the member 41 discharges into one end of a bathtub or on the drained floor of the shower compartment sufficiently distant from the spray.

It sometimes happens that the valves from the spray line 12 leak or are not entirely closed with the result that a small quantity of water flows into the nozzle when the nozzle is not in use. This water escapes out the waste valve, irrespective of whether it is hot or cold, the valve being kept open by the thermostatic member and the flow of water into the nozzle being too small to permit accumulation of water sufficient to either close the valve or to make the thermostatic member function as a thermostat.

When the spray water is turned on for use at the spray, the first rush of water increases the pressure inside the nozzle and effects a closure of the waste valve.

The box does not fill instantaneously with water due to the inlet flow being limited at the throttle plug 36.

If the water is too hot for use at the spray the thermostat will force open the waste valve before the box has filled sufficiently to overflow into the orifice header 19, the water falling as soon as the valve opens.

If the temperature of the water is too low to operate the thermostat the water fills the nozzle, overflows into the header compartment and discharges as spray through the openings 13. If the user inadvertently turns on too much hot water there is no danger of scalding at the spray as the hot water can not reach the spray orifices.

In Figure 5 I show an embodiment of my invention that separates the spray nozzle from the chamber carrying the thermostatic element and the valve to waste.

In this view hot and cold water valves 42 and 43 deliver into opposite sides of a T 44 which has a branch pipe 45 to the nozzle.

Preferably a valve 46 is placed at the branch outlet control of the total flow to the spray without affecting the relative openings of the hot and cold water valves 42 and 43.

I place a chamber 47 in the pipe 45 and inside this chamber I place the thermostatic element 33′ to operate a valve 27′ that connects the chamber to waste through a suitable pipe 14′.

The operation of the thermostat may be exactly as already described so that description of the thermostatic element in the first form may be considered to apply also to the second.

The spray nozzle 48 is connected to the top of the chamber 47 through suitable intermediate piping, shown with a union 49 near the downwardly directed nozzle.

Preferably a suitable throttle plug 36′ is inserted in the branch pipe 45 before the volume chamber 47 carrying the thermostatic element as at the inlet side of the valve 46.

The operations of both forms are as already described.

It will be evident that the conduit connection between the inlet and the spray nozzle openings may vary greatly comprising all or a large part of the compartment within which the thermostat is placed, for example, as in Figures 1–4 or including all of the compartment containing the thermostat plus additional piping, for example, as in Figure 5; the purpose and intent being that the level to which the water must rise in order to be sprayed shall be high enough above the waste outlet controlled by the thermostat so that action of the thermostat will drain the water away from the nozzle openings or from the passage or path of the water to reach these nozzle openings. As the water pressures upon the equipment will be different in different installations it is desirable that the equipment shall be suited for the highest water pressure available or that the pressure be standardized by intermediate valves or mechanism.

The outlet to the waste pipe must of course be carried so as not to splash the user. I have not considered it necessary to illustrate this further than to show the outlet, the piping connections for this purpose being fully within the judgment of plumber whether the apparatus be part of the spray head and so exteriorly open to view as in the first figures or concealed as in Figure 5.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

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

1. In conduit shower equipment, a shower nozzle having shower outlets, a throttled liquid inlet conduit, a conduit between the inlet and shower outlets, a safety outlet conduit adapted to drain away the liquid entering the intermediate conduit to prevent a hot discharge at the shower outlets, a valve in the safety conduit normally closed during use of the shower and a thermostat adapted to open the valve at high temperatures of the liquid.

2. In a conduit shower equipment, a throttled inlet conduit, a shower nozzle having shower outlets, an intermediate conduit between the inlet and outlets, a safety outlet conduit adapted to drain away the liquid entering the intermediate conduit to prevent it reaching the shower outlets, a valve for the safety outlet conduit and a thermostat inside the intermediate conduit operatively connected to the valve adapted to open the valve at high temperature.

3. In a conduit shower equipment, a throttled inlet conduit, a shower nozzle having shower outlets, an intermediate conduit between the inlet and outlets, a safety outlet conduit adapted to drain away the liquid entering the intermediate conduit to prevent it reaching the shower outlets, a valve for the safety outlet opening against the liquid pressure inside the intermediate conduit, and a resilient theremostat inside the intermediate conduit connected to the valve and adapted to pull the valve open at a high temperature by overcoming the said liquid pressure.

4. In a conduit shower equipment, a throttled inlet conduit, a shower nozzle having shower outlets, an intermediate conduit between the inlet and outlets, a safety outlet conduit adapted to drain away the liquid entering the intermediate conduit to prevent it reaching the shower outlets, a valve for the safety outlet opening against the liquid pressure inside the intermediate conduit, and a resilient thermostat inside the intermediate conduit connected to the valve and adapted to pull the valve open at a high temperature by overcoming the said liquid pressure, the thermostat resiliently holding the valve open

at conditions of ordinary temperature and atmospheric pressure and the valve normally closing against the normal pull of the thermostat responsive to liquid pressure inside the intermediate conduit during use of the shower, the thermostat being adapted to pull the valve open at a high temperature by overcoming the said liquid pressure.

5. In conduit shower equipment, an inlet conduit, a nozzle having spray outlets, a conduit between the inlet and outlets having a high connection to the nozzle, a safety conduit from a low point of said intermediate conduit adapted to drain the liquid entering at the inlet so that it may not reach the shower outlets, a valve for the safety conduit and a thermostat inside the intermediate conduit adapted to open the valve at high temperature.

6. In a shower nozzle having shower outlets, a safety outlet adapted to drain the liquid entering the nozzle away from the shower outlets, a valve at the safety outlet and thermostat inside the nozzle adapted to open the valve at high temperatures.

7. In a shower nozzle, an outlet chamber having spray orifices from one side thereof, and an overflow conduit connection at a high point to the outlet chamber, a valve across the safety outlet, a thermostatic element in the main chamber effectively lower than the overflow to the outlet chamber and connections adapting the element to open the valve at a predetermined temperature.

8. In a shower nozzle, an outlet chamber having spray orifices, a main chamber having an adjustably throttled inlet, a safety outlet and an overflow conduit connection at a point higher than the safety outlet to the outlet chamber, a valve across the safety outlet, a thermostatic element in the main chamber effectively lower than the overflow to the outlet chamber and connections adapting the element to open the valve at a predetermined temperature.

9. In a shower nozzle, an outlet chamber having spray orifices, a main chamber having an inlet, a safety outlet near a low point and an overflow conduit connection at a high point to the outlet chamber, a valve inside the main chamber across the safety outlet, a thermostatic element in the main chamber effectively lower than the overflow to the outlet chamber and connections adapting the element to hold the valve open at ordinary temperatures and atmospheric pressure, the liquid pressure inside the main chamber when shower liquid is turned into the main chamber initially closing the valve and subsequently holding it shut against the pull of the thermostatic element unless or until rise in temperature to a predetermined limit progressively increases the opening pull of the thermostat to overcome the holding pressure of the shower liquid to snap open the valve.

10. In a shower nozzle, an outlet chamber including inner and outer plates, the outer plate having spray orifices from the chamber, a main chamber having an inlet, a safety outlet near a low point and an overflow conduit connection at a high point to the outlet chamber, a valve in the safety outlet, a thermostatic element in the main chamber effectively lower than the overflow to the outlet chamber and connections adapting the element to open the valve at a predetermined temperature, the outlet chamber removably closing one end of the main chamber.

11. In a shower nozzle, a metal chamber having an inlet, a throttling plug therein, walls of the chamber flaring outwardly and upwardly and downwardly from the inlet, another wall of the chamber having shower orifices, a header chamber on the inside of the said other wall discharging out the orifices, the header chamber having a high inlet from a high portion of the first chamber, and a thermostatically controlled safety outlet conduit and valve at a low part of the first chamber adapted to open automatically at a high temperature.

ROBERT HETHERINGTON.