Oct. 30, 1934. W. B. CLIFFORD 1,978,623

SPRINKLER HEAD

Filed Aug. 29, 1931

Fig. 1

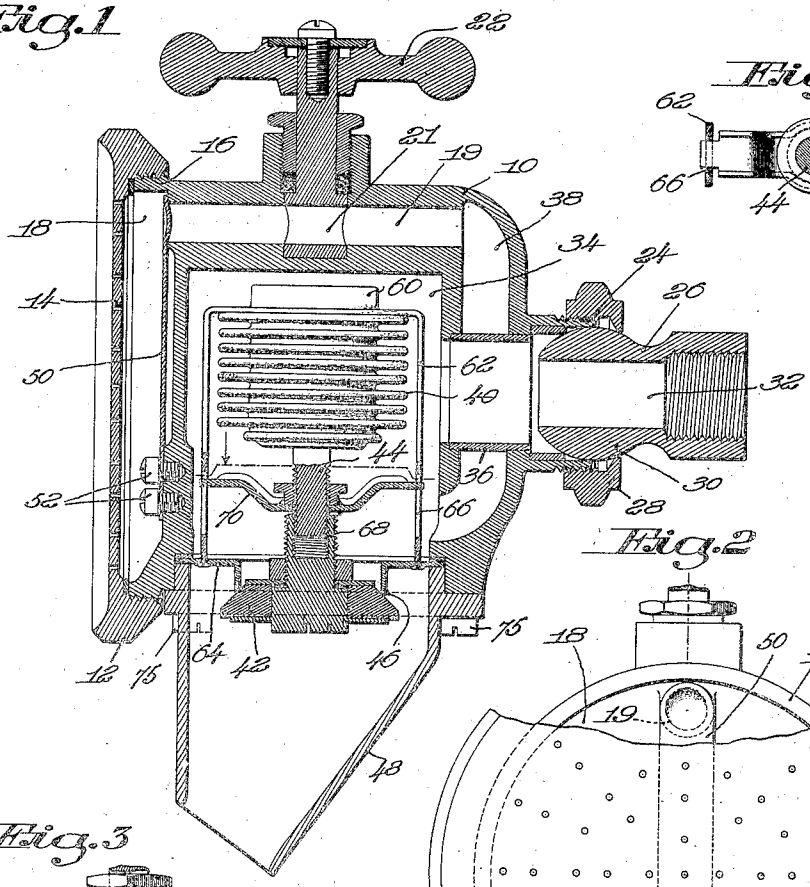


Fig. 4

Fig. 2

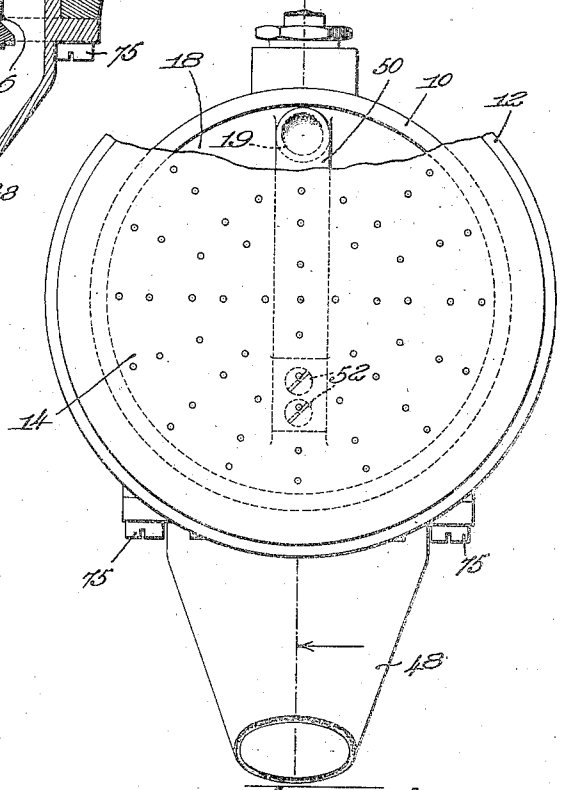
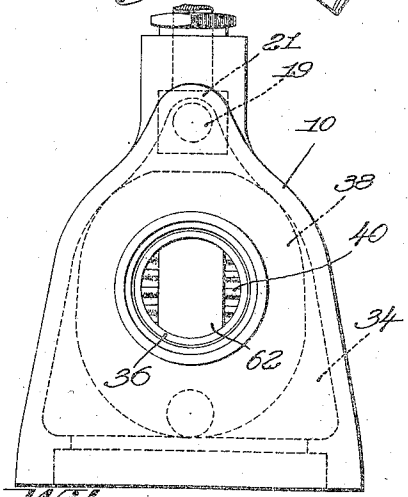


Fig. 3



Witness

Frederick L. Grundorf.

Inventor

Walter B. Clifford

by his Attorneys

Van Everen, Fish, Fishburn & Gray

Patented Oct. 30, 1934

1,978,623

UNITED STATES PATENT OFFICE

1,978,623

SPRINKLER HEAD

Walter B. Clifford, Boston, Mass., assignor to Clifford Manufacturing Co., Boston, Mass., a corporation of Delaware

Application August 29, 1931, Serial No. 560,204

8 Claims. (Cl. 236—93)

The present invention relates to sprinkler heads, and more particularly to this type of apparatus employed for generating spray for shower heads or the like.

The purpose of the invention is to produce a comparatively simple, practical and instantaneously operative shower head which serves to cut off the flow of water through the head upon occurrence of excessive temperatures.

I accomplish this result by locating within the chamber formed by the shower head itself, temperature-controlled apparatus which operates a vent or relief valve normally closed but instantaneously operated upon occurrence of excessive temperature within the water passing through the head. This vent directs the water in a direction away from the person standing beneath the shower, and insures against any contact with excessively hot water. I appreciate that suggestions have been made heretofore for safeguarding against the passage of hot water through a shower head, but so far as I am informed, all of these prior proposals are virtually ineffective and wholly impractical due to the fact that they completely terminate the flow of water through the head. Although such an arrangement may or may not be practical for terminating the flow of water through the head upon occurrence of excessive temperatures, they fail in their intended purpose because they do not serve to immediately restore the flow of water upon reduction of temperature to normal conditions, this due to the fact that cutting off the flow of water through the head merely serves to develop or build up a leg of hot water between the head and regulating valve, this hot water serving to heat the head itself and connected parts, and maintain an excessively high temperature for substantial periods after the water has either been cut off entirely or has been reduced to a normal temperature.

By virtue of my construction, the water supply is continuously flowing through the chamber head and about the thermostatic valve in such a fashion that the latter is at all times instantly responsive to the temperature of water as controlled by the mixing valve. After having initially opened the vent due to the presence of excessively hot water, cooling of the water due to operation of the mixing valve is instantaneously reflected because of the continuous flow of water, causing the vent to close and restoring the sprinkler head to its normal mode of operation.

My valve is furthermore designed to avoid any possibility of leakage of hot water through the usual spray device during the period that the vent is in operation. This I accomplish by providing virtually a dam which insures that the entire supply of water shall pass through the vent when the latter is opened due to excessively high temperatures.

In the accompanying drawing illustrating the preferred form of the invention, Fig. 1 represents an elevation partly in section of the improved sprinkler head; Fig. 2 is a bottom plan view of the sprinkler head shown in Fig. 1; Fig. 3 is an end elevation of the valve shown in Fig. 1; and Fig. 4 is a detail illustrating the limiting stop for the thermostatically operated valve.

In the sprinkler head shown in the illustrated embodiment of the invention, a housing 10 is provided which may be a brass casting, a die casting, or conceivably a forging, the head being provided with the usual sprinkler cap 12 having a perforated surface 14. This cap is threaded to the housing at 16, and has therebehind a chamber 18 co-extensive with the sprinkler surface to distribute water thereover, the chamber 18 being supplied with water for the sprinkler cap through a passage 19 cored or otherwise formed in the housing 10. This passage is controlled in the usual fashion through a rotatable cock valve 21, having an externally attached handle 22 to operate the valve and meter the flow of water through the sprinkler head.

The rear portion of the housing 10 is provided with a threaded extension 24, which may be connected to the usual service connection 26 through a sleeve 28. With this construction the valve is ideally adapted for replacement, as the usual sprinkler head may be removed and my improved type of head mounted thereon by merely unscrewing the coupling. As indicated, the sprinkler head may be mounted at any angle through the employment of the ball support 30, the member 26 normally projecting from the pipe connection in a horizontal direction, and the adjustment of the sprinkler head as a rule causing the perforated surface of the cap to be maintained at an angle which may be 45° more or less from a horizontal plane.

The incoming supply of water for the sprinkler head is directed through a passage 32 into the control chamber 34, the passage being caused to communicate directly with the chamber by a sleeve 36 inserted in the housing. Communication between the chamber 34 and the supply conduit 19 in the housing is provided through a passage 38 communicating at its upper end with the passage 19, and at its lower end with the low-

er portion of the chamber 34, this passage 38 being separated from the inlet passage through the sleeve 36. Incoming water is caused to impinge directly upon a bellows thermostat 40, mounted within the chamber 34 opposite the inlet passage so that this unit is caused to accurately reflect the temperature of the incoming water at a point considerably in advance of the point at which this body of water reaches the sprinkler cap. This bellows unit is preferably filled with a liquid which is volatile at the temperatures employed, which may be on the order of 100 to 105° F. Such a liquid develops substantial vapor pressures at these temperatures and causes the bellows unit to expand actively in a manner to open or unseat the disk valve 42, which is connected therewith through a stem 44. This disk valve normally seats upon a valve ring 46, and when unseated serves to vent water directly from the lower portion of the chamber 34 through a funnel-shaped outlet 48. Due to the area of the vent outlet and the fact that it discharges directly from the lower portion of the chamber 34, the entire supply entering the chamber is immediately vented without permitting any of the supply to be delivered to the sprinkler cap through the passages 38 and 19. The venting of the water immediately indicates to the operator the existence of excessive temperatures, and as the mixing valve is then manipulated to reduce the temperature, this water, reduced in temperature, is caused to impinge upon the bellows, closing the valve and restoring the normal operation of the sprinkler head. The passage 19 may be closed by a light flap valve 50 in the form of a leaf spring anchored at 52, the free end of this valve closing the end of the passage 19. In the normal operation of the sprinkler head the pressure within the chamber 34 and the communicating passages 38 and 19 is controlled by the pressure within the system, which is amply sufficient to maintain this valve open and permit the free flow of water to the sprinkler cap. Upon venting of the system through pressure within, the passage 19 is immediately reduced, causing the valve to close and insuring against any possible leakage of water through the sprinkler head itself.

The thermostatically-controlled valve unit may be simple and conveniently made from stampings, as indicated in the drawing, the bellows being anchored at the upper end 60 by a U-shaped strap 62, which is connected at its opposite free ends to a plate 64 in which the valve opening 46 is provided. The legs of this strap are slotted at 66, and the valve stem is provided with a limiting member 70, connected to the stem and engaged at opposite ends by the slots, this strap serving to limit the free movement of the bellows and valve under the creation of excessive temperatures. Without some such limiting device, the excessive vapor pressure created by contact with hot water might otherwise expand the bellows sufficiently to cause injury.

The valve disk 42 is connected to the stem 44 through the medium of a threaded sleeve 68, which permits a relative adjustment of the valve disk with respect to the stem and provides a means for regulating the venting temperature of the sprinkler head. This will be obvious to those skilled in the art. The entire thermostatic valve assembly is conveniently demountably supported within the housing 10 through engagement with the demountable vent member 48, which is provided with shoulders engaging and clamping the plate 64. The vent is connected to the housing through cap screws 75, and upon removal of the vent the valve assembly may be removed complete without dismantling the sprinkler head.

As will be evident from an inspection of the drawing, if the sprinkler head as a unit is mounted at an angle of approximately 45°, which is the usual mounting of this type of apparatus, the vent serves to direct hot water directly down into the space therebeneath and away from the person standing in the range of the shower. By the same token, regardless of whatever adjustment may be given the sprinkler head, a person standing within the range of water delivered through the surface 14 will be entirely without the range of the stream delivered from the vent 48, so that there can be no liability of danger of scalding or burning therefrom. On the other hand, the instant that the relief valve opens to permit flow of water directly from the lower portion of the chamber 34, there is no further possibility of water being delivered through the perforated surface of the sprinkler cap, eliminating the hazard therefrom.

The bellows unit in this apparatus may be satisfactorily filled with a mixture of acetone and ether, or some equivalent fluid affording sufficient vapor pressure to impart the desired activity to the bellows throughout the operating range, which may approximate 100 to 105° F. or thereabouts. Although a fill causing operation of the bellows by liquid expansion might conceivably be employed within the bellows, nevertheless such a fill would not be as active, nor give as instantaneous response both to raising and lowering of the temperature, as in the case of a fill boiling at temperatures below the working range.

What is claimed is:

1. A sprinkler head comprising a housing having a control chamber therein, a perforated sprinkler surface, a circuitous passage connecting the sprinkler surface with the control chamber, a water inlet leading directly to the control chamber, a valve normally closing the passage except when pressure is created therein, a vent communicating directly with the control chamber, and thermostatically operated means within the chamber for regulating the delivery of water through the vent.

2. A sprinkler head comprising a housing having a sprinkler surface connected therewith, a water inlet communicating with the housing, a second and vent opening from the housing, means for thermostatically controlling the flow of water either through the sprinkler surface or the vent from the housing, and a pressure operated valve for preventing delivery of water to the sprinkler surface upon reduction of pressure within the housing due to diversion of water through the second opening.

3. A sprinkler head comprising a chamber having a water inlet opening thereinto, sprinkling and diversion outlets, a valve controlling the diversion outlet, and a thermostatically filled bellows connected with the valve and positioned opposite the inlet and subjected directly to water entering therethrough, the bellows being arranged to normally hold the valve closed against water pressure within the chamber and to open the valve with the pressure upon exceeding a predetermined temperature range therein.

4. A sprinkler head comprising a housing, a water inlet connected to the housing, a water sprinkler outlet, a diversion outlet, and a bellows and valve assembly detachably mounted in

the diversion outlet and normally sealing the outlet against the escape of water therethrough, the valve being designed to open with pressure upon exceeding a predetermined temperature range within the chamber.

5. A sprinkler head comprising a housing, water sprinkling means connected with the housing, a water inlet to the housing, a diversion outlet, a bellows within the housing, a valve connected with the bellows and designed to normally close the diversion outlet against pressure within the housing, and means for adjusting the valve with relation to the bellows to vary the temperature within the housing at which the valve opens.

6. A sprinkler head comprising a housing, a water inlet connected to the housing, a sprinkler outlet for the housing, a diversion outlet, a thermostatically controlled valve assembly designed to be inserted within the housing through the diversion outlet, and a diversion nozzle for detachably clamping the assembly within the housing.

7. A sprinkler head comprising a housing, a water inlet to the housing, a sprinkler outlet from the housing, a bellows controlled valve assembly mounted within the housing, the bellows being thermostatically filled to normally maintain the valve seated against pressure within the housing and operating to allow the valve to open with pressure upon exceeding a predetermined temperature range, and means for normally closing the sprinkling outlet when the housing is vented through the diversion outlet.

8. A sprinkler head comprising a housing connected with an inlet supply, means for delivering a sprinkling spray from the housing, a diversion vent opening from the housing, a valve controlling the diversion vent and opening with pressure, a bellows filled with thermostatic fluid connected to the valve and normally operating to open the valve upon occurrence of a predetermined excessive temperature range and normally serving to retain the valve seated against pressure due to vacuum pull within the bellows, and means for normally limiting the excessive movements of the bellows under the influence of excessive temperatures.

WALTER B. CLIFFORD.