May 22, 1951 L. H. HOLDER 2,554,409

ROOF COOLING DEVICE

Filed April 29, 1948

Fig. 1.

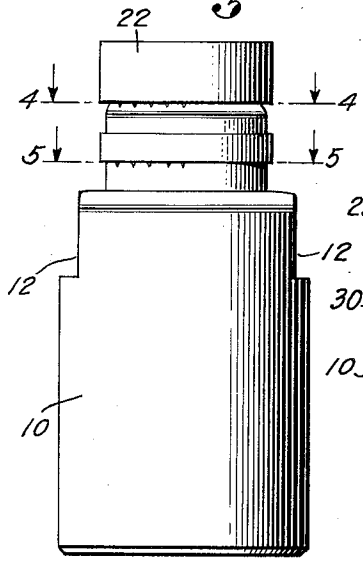
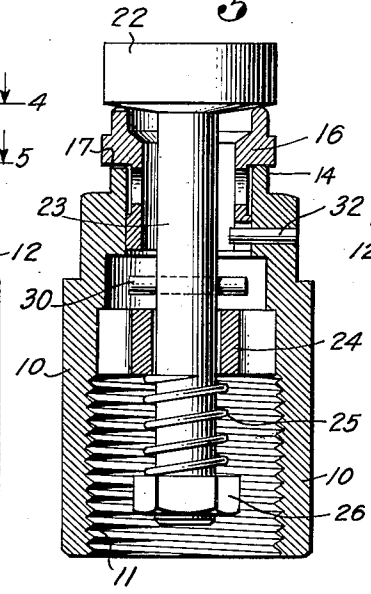


Fig. 2.



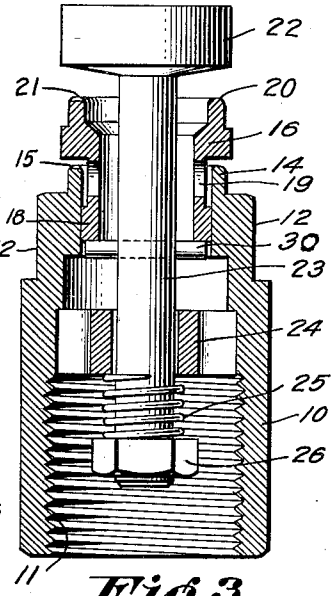


Fig. 3.

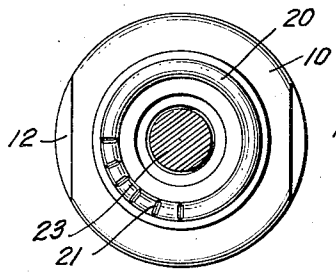


Fig. 4.

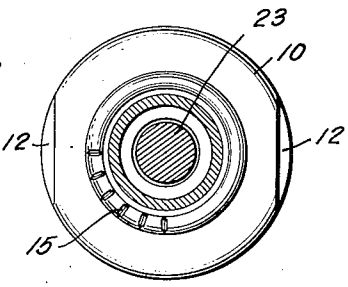


Fig. 5.

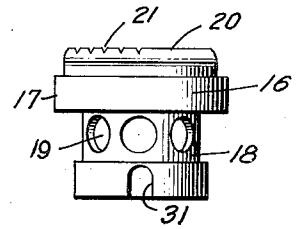


Fig. 6.

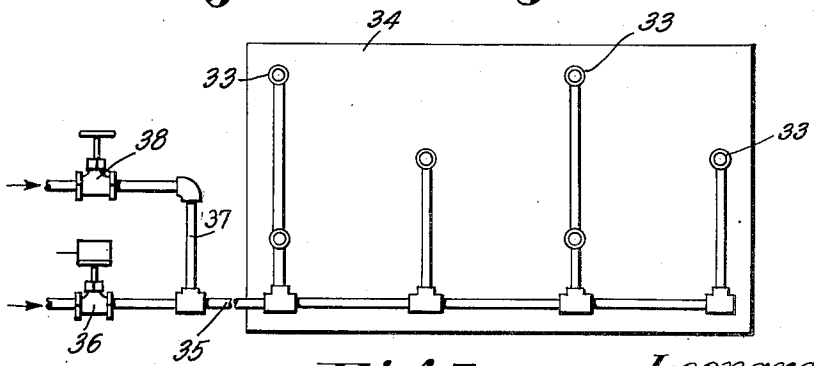


Fig. 7.

Inventor

Leonard H. Holder

By

Donald E. Lane

Attorney

Patented May 22, 1951

2,554,409

UNITED STATES PATENT OFFICE

2,554,409

ROOF COOLING DEVICE

Leonard H. Holder, Washington, D. C.

Application April 29, 1948, Serial No. 23,978

3 Claims. (Cl. 299—125)

1

This invention relates to roof cooling apparatus and more particularly to improvements in spray devices for supplying a restricted spray of water or the like to a roof area for the dissipation of heat by the vaporization of said water.

Apparatus and methods effective for preventing the accumulation of excessive heat in exposed roof surfaces are generally shown and described in my prior Patent No. 2,266,321, issued December 16, 1941. The apparatus and methods disclosed in said patent have been found to be efficient and have been widely utilized in numerous installations throughout the country. The present improvement in said system is concerned primarily with the construction of the spray devices. If the spray devices shown in my prior patent should become clogged with impurities, which may be present in the liquids used in certain localities, it is necessary to clean each spray device individually by manually loosening the heads of the devices. This requires that a service man have access to the roof area in order that he may reach and clean each spray device individually.

It is an object of my present invention to provide an improved spray device for roof cooling which may be effectively and periodically cleaned by a self-flushing action.

It is another object of the invention to provide a spray device which provides a desired spray of moisture for roof cooling when supplied with a liquid under normal pressure, and which has a self-flushing action when temporarily supplied with a liquid at pressures somewhat higher than normal spraying pressures.

It is another object of this invention to provide a spray device adapted to project both a long range spray and a short range spray and adapted to subject all of its spray orifices to a self-flushing action upon the temporary application of high pressure.

It is a further object of this invention to provide a spray device having jet openings disposed to produce a spray only over an area of desired shape and size and adapted to resume said shaped spray automatically after said openings have been temporarily expanded during a self-flushing action.

It is still another object of this invention to provide a self-flushing spray device having two sets of jet openings and having means to assure the expansion of both sets of openings during the flushing operation.

Other objects and advantages of this invention will be readily apparent to those skilled in the art from the following description of a preferred embodiment of the invention illustrated in the accompanying drawings wherein:

2

Figure 1 is an elevation view of a spray device embodying my invention.

Figure 2 is an elevation view in section of the spray device shown in Figure 1 with the jets arranged for normal spray operation.

Figure 3 is an elevation view in section of the spray device shown in Figure 1 expanded during the flushing operation.

Figure 4 is a horizontal sectional view taken on line 4—4 of Figure 1.

Figure 5 is a horizontal sectional view taken on line 5—5 of Figure 1.

Figure 6 is an elevational view of the baffle member removed from the spray device of Figures 1–3.

Figure 7 is a plan view, partly diagrammatic, of a portion of a roof provided with a plurality of spray devices.

Referring now to Figures 1, 2, and 3 of the drawings, for the purposes of illustration, the body member of a preferred form of spray device is designated by the numeral 10. The spray device may be fabricated from brass or other non-corrosible materials. The hollow cylindrical body 10 is provided with threads 11 for attachment to a supply pipe and may be provided with flats 12 to receive a wrench. The upper end of the member 10 is provided with a flange or lip 14 having radial grooves or notches 15 formed therein to produce spray orifices, as shown, for example, in Figure 5. A cylindrical baffle core or member 16 is loosely positioned in the upper bore of the member 10, and is provided with a flange 17 extending outwardly over the lip 14 and over the grooves 15. The depending skirt 18 of baffle member 16 is provided with apertures or ports 19 to pass liquid from the central bore of member 10 to the orifice grooves 15 in lip 14. The upper portion of flange 17 is provided with a rounded lip 20 having a series of radial grooves or notches 21 formed therein to produce a second series of spray orifices, as shown for example, in Figure 4. A head 22 is provided with a depending stem 23 which extends downward within the central portion of body member 10 and passes loosely through an opening in the spider 24, the latter being positioned within and carried by the member 10. The spider 24 may be of cross-shape, formed, for example, from a disc with peripheral notches cut therein, to permit liquid to pass through the spider. The spider 24 may be a separate piece brazed to the member 10 or may

be seated against an internal shoulder in the bore of member 10 by a press fit. The lower end of stem 23 is provided with a compression spring 25 surrounding the stem 23 and extending from the underside of spider 24 to an adjusting nut 26 threaded on the lower end of stem 23.

The stem 23 is provided with a transverse pin 30 extending therethrough by press fit and adapted to engage the lower edge of skirt 18 of baffle member 16 when the stem 23 and head 22 are raised from the normal position shown in Figure 2 to the expanded or flushing position shown in Figure 3.

Where the spray device is to be used to spray liquid in a given area only, such as through a horizontal angle of ninety degrees as shown in Figures 4 and 5, the skirt 18 of baffle member 16 may be provided with a slot or notch 31 for engagement with a pin 32 projecting inward from and carried by the body member 10 as shown in Figure 2. Engagement of the pin 32 with the slot 31 prevents the baffle member 16 from turning in the body member 10, and, therefore, assures that the outlet orifice grooves 21 are kept directed in the direction of the specific area to be spray moistened.

During normal operation of the spray device, the baffle member flange 17 is in contact with the notched lip 14 of member 10, and the frusto-conical under side of head 22 is in contact with the notched lip 20 of baffle member 16. The notches or grooves 15 in lip 14 may be shaped and directed to project a spray in an area relatively close to the spray device, and the notches or grooves 21 in lip 20 of the baffle member 16 may be shaped and directed to project a spray to an area radially outward of the area covered by grooves 15, as shown in my prior patent. The compression of spring 25, tending to hold the mentioned parts in contact with one another, may be adjusted by tightening the nut 26. The compression force of spring 25 should be such that the pressure of the liquid supply utilized for normal spraying operations will be insufficient to lift the head 22 from contact with the lip 20 of the baffle member 16.

When some or all of the notches 15 or 21 have become clogged by virtue of impurities carried in the water supply in certain localities, the spray device may be quickly and automatically flushed by the application of a temporary sudden increase in pressure to the supply lines to the spray devices. The increase in pressure should be enough to cause the head 22 to move outward from the body member 10 by compressing the spring 25. As the head moves upward from the lip 20 of baffle member 16, a strong flow of liquid will quickly flush impurities from the grooves 21. Further upward movement of the head 22 will cause the pin 30 carried by the stem 23 to engage the lower edge of the skirt 18 of the baffle member 16, thereby positively raising the flange 17 from the notched lip 14 of body member 10, so that a strong flow of liquid may flush impurities from the grooves 15. When the flushing action is completed and the liquid supply pressure is reduced to normal pressure, the spring 25 causes the head 22 and baffle member 16 to return from the expanded position shown in Figure 3 to the normal position shown in Figure 2. Thereafter the spray cooling operation is continued at normal pressures until it is again desired to flush the spray device by a temporary application of an increased pressure.

In the partial system illustrated in Figure 7, six spray devices 33, spaced on the roof 34 so that the sprays therefrom overlap each other, are connected to a supply line 35 provided with a control valve 36. The valve 36 may be an automatic valve controlled by roof temperature responsive mechanisms, such as disclosed in my prior patent referred to. A high pressure line 37 is connected to the supply line 35 and may be provided with a shut-off valve 38. The normal supply line pressure may be of the order of thirty pounds per square inch. The high pressure fluid applied temporarily through line 37 for flushing the spray devices may be of the order of one hundred pounds per square inch. The high pressure may be compressed air or any other available source of high pressure. In the flushing operation, the high pressure need only be applied momentarily to build up the water pressure in the system enough to flush each of the spray devices connected in the system with the water already in the supply lines. Where compressed air is used as a source of high pressure, the high pressure need not be applied long enough for air to enter the supply lines or flow out through the spray devices. As soon as the momentary application of high pressure is completed, the system returns to normal operation and the spray jets resume the normal operating position shown in Figure 2.

It will be readily apparent that the herein described spray devices provide for easy cleaning and flushing without requiring individual attention by a service man. The flushing operation may be effected at the ground level by any suitable arrangement of supply conduits to introduce a sudden shot of high pressure to the supply line 35 running to the spray devices on the roof. The spray devices are designed to automatically return to the normal operation of projecting a close-in and a distant spray of liquid to the various areas each is designed to cover. The pin and slot connection between the body member and the baffle member prevents the latter from turning during the flushing operation and assures that the distant spray will be directed to the proper area when normal spraying operation is resumed.

Changes may be made in the form of construction and arrangement of parts without departing from the spirit of the invention and without sacrificing any of its advantages, the foregoing preferred embodiment having been disclosed merely for illustrative purposes to enable one skilled in the art to readily comprehend the nature of the invention. The right is, therefore, reserved to make all such changes and variations as fairly fall within the scope of the following claims.

The invention claimed is as follows:

1. A spray device for supplying a spray of moisture over a surface to be cooled comprising in combination, a hollow body member, said body member having an upstanding notched lip, a hollow baffle member having a flange for engaging said lip of said body member and also having an upstanding notched lip, a head having a stem extending through said baffle member into said body member and having a flange for engaging said lip of said baffle member, a spring extending between said body member and said stem for normally holding said flanges against said notched lips, and projecting means carried by said stem engageable with said baffle member.

2. A spray device for supplying a spray of moisture over a surface to be cooled comprising in combination, a tubular body member, said

body member having an upstanding annular lip with radial notches in a portion thereof, a tubular baffle member having an annular flange engageable with the lip of said body member and also having an upstanding annular lip with radial notches in a portion thereof, a head having a depending stem extending through said baffle member into said body member and having a frusto-conical flange engageable with said lip of said baffle member, pin means extending between said body member and said baffle member to limit rotary movement of said baffle member with respect to said body member, and resilient means extending between said stem and said body member for biasing said head toward said body member.

3. A spray device for supplying a spray of moisture over a surface to be cooled comprising in combination, a tubular body member having an upstanding lip with radial notches therein, a tubular baffle member having a flange engageable with the lip of said body member and also having an upstanding lip with radial notches therein, a head having a stem extending through said baffle member into said body member and having

a flange engageable with the lip of said baffle member, a spider-like member secured within the inner portion of said body member, a spring extending between said spider-like member and said stem, and projecting means carried by said stem engageable with said baffle member to lift the latter from the lip of said body member.

LEONARD H. HOLDER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
945,867	Richter	Jan. 11, 1910
1,286,333	Johnson	Dec. 3, 1918
1,628,823	Chester et al.	May 17, 1927
2,069,150	Holder	Jan. 26, 1937
2,266,321	Holder	Dec. 16, 1941
2,393,328	Mahone	Jan. 22, 1946

FOREIGN PATENTS

Number	Country	Date
373,491	Germany	Apr. 12, 1923