

[54] **SPRINKLER HEAD**

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**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 767,154, Oct. 14, 1968, abandoned.

[52] U.S. Cl. .... **239/514**

[51] Int. Cl. .... **B05b 1/26**

[58] Field of Search ..... **239/513, 514, 515**

[56] **References Cited**

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**FOREIGN PATENTS OR APPLICATIONS**

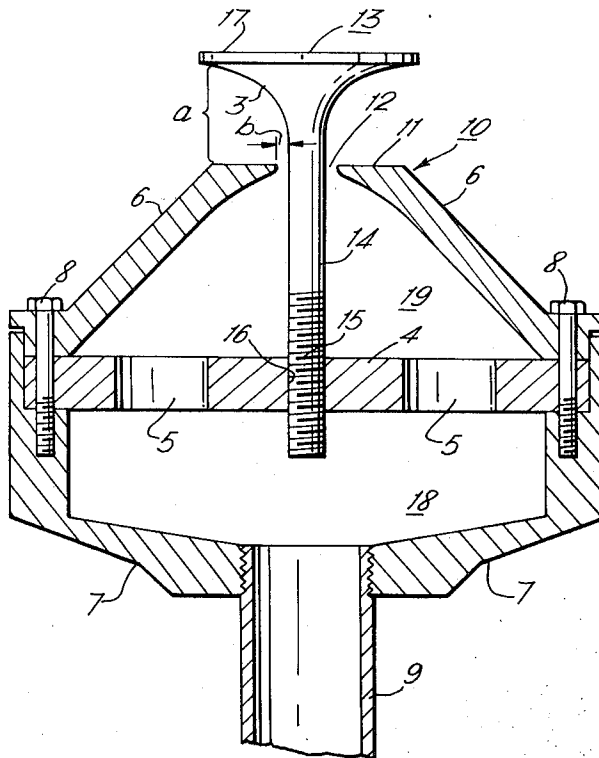
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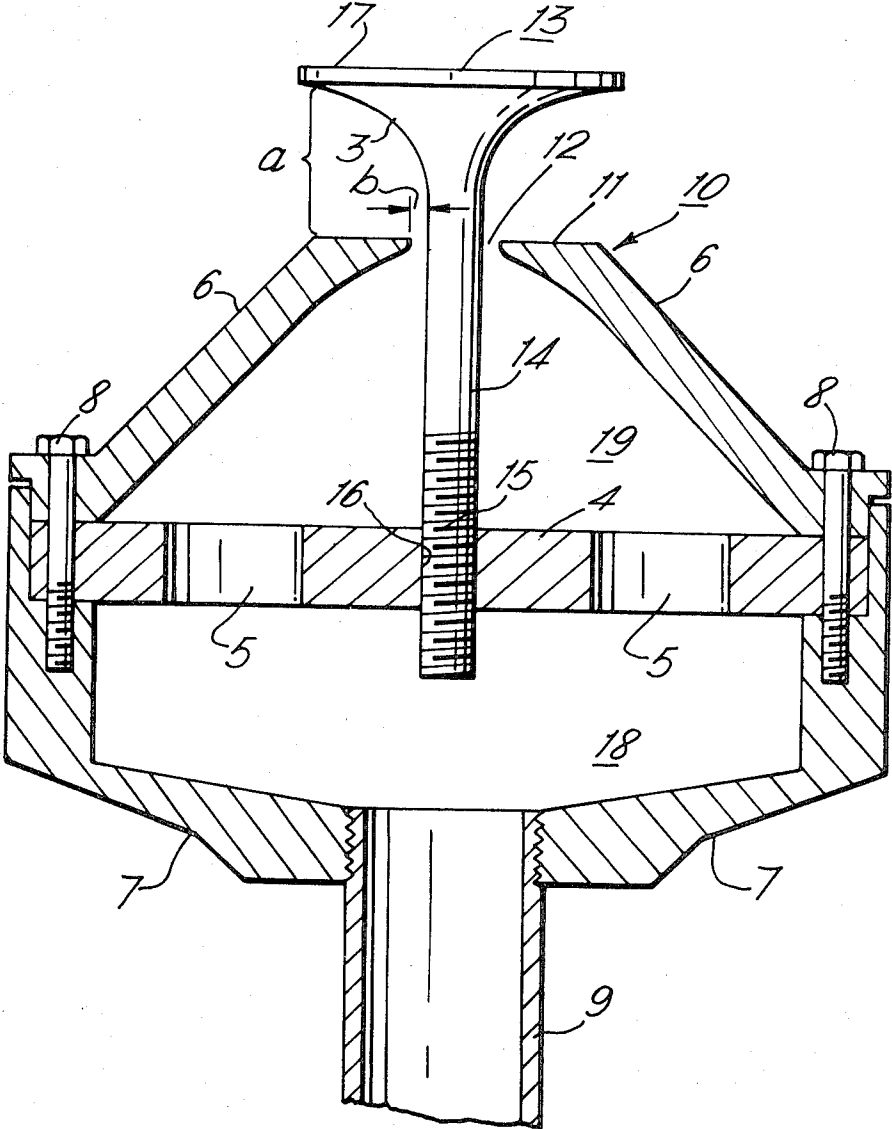
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[57] **ABSTRACT**

A sprinkler head is provided which includes four interassembled elements. The first three elements are: (A) a dished lower casing having means for connection to a source of liquid under pressure; (B) an aperture plate adapted to be secured to the lower casing; and (C) an upper frustoconical casing adapted to be secured to the plate and to the lower casing, the upper casing including a central discharge aperture at the apex thereof. These three elements are assembled to provide firstly a pressure equalization chamber provided with inlet means for liquid to be dispersed and outlet means, the cross-sectional area of the pressure equalization chamber being greater than the cross-sectional area of the inlet means by a factor of about 20 times or more; and secondly, a discharge chamber fed from the outlet means of the pressure equalization chamber, the discharge chamber being frustoconical and including a central outlet means at the apex thereof. The fourth element is (D) a diversification element including a stem of lesser diameter than the diameter of the central outlet disposed through the central outlet means and vertically adjustable with respect to the apex of the frustoconical member, the stem terminating in a threaded end threadedly secured to a central, internally threaded aperture in the plate (B).

**2 Claims, 1 Drawing Figure**





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## SPRINKLER HEAD

This application is a continuation-in-part of Ser. No. 767,154 filed Oct. 14, 1968, now abandoned.

## BACKGROUND OF THE INVENTION

## 1. The Field of the Invention

This invention relates to a sprinkler and more particularly to a water sprinkler head.

## 2. Description of the Prior Art

Sprinkler heads are known which have a chamber with an inlet at one end and an outlet orifice at the other end, and a spreading or deflecting member positioned externally of the orifice and carried on a stem passing through the orifice. The spreading or deflector member is variable in its position relative to the orifice.

It was suggested that areas within the sprinkler head have diminishing cross sections and also that the chamber be slightly larger in cross section than the inlet tube. However, in such apparatus, raising the component parts above the thread to the outlet would change the volume or amount of liquid emerging through the jet. Effecting a change in this manner would greatly cut down the pressure at the base of the spreader.

When sprinklers having such heads are used for irrigation purposes, there is very often a variation in the water pressure at the various heads due, for example, to variation in levels of the heads. This means that the pattern of irrigation will vary for each head. Also, manufacturing tolerances can cause the same variations in pattern. Further, the irrigation pattern may be different at certain positions, so the head must be adjustable to enable various areas to be irrigated.

## SUMMARY OF THE INVENTION

## 1. Advantages of the Invention

The sprinkler head of the present invention provides a simple, easily manufactured apparatus, which is very suitable for irrigation and similar purposes. With such sprinkler heads of the present invention, the pattern of water ejection can be varied at each head, either to equalize the pattern in spite of pressure or other variations, or to adjust the pattern to suit the locality being sprayed.

Sprinkler heads in accordance with the invention can also be used in firefighting and similar installations. Again, the pattern of the water spray can be adjusted to suit local conditions.

## 2. Broad Statement of the Invention

By one broad aspect of this invention, a sprinkler head is provided comprising: (1) a pressure equalization chamber provided with inlet means for liquid to be dispersed and outlet means, the cross-sectional area of the pressure equalization chamber being greater than the cross-sectional area of the inlet means by a factor of 20 times or more; (2) a discharge chamber fed from the outlet means of the pressure equalization chamber, the discharge chamber being frustoconical and including a central outlet means at the apex thereof; and (3) a diversification element including a stem of lesser diameter than the diameter of the central outlet disposed through the central outlet means and vertically adjustable with respect to the apex of the frustoconical member, the stem terminating in a flared concave cap.

By another aspect of this invention, a sprinkler head is provided comprising: (A) a dished lower casing having means for connection to a source of liquid under pressure; (B) an aperture plate adapted to be secured to the lower casing; and (C) an upper frustoconical casing adapted to be secured to the plate and to the lower casing, the upper casing including a central discharge aperture at the apex thereof; whereby, when elements (A), (B) and (C) are assembled, they provide: (1) a pressure equalization chamber provided with inlet means for liquid to be dispersed and outlet means, the cross-sectional area of the pressure equalization chamber being greater than the cross-sectional area of the inlet means by a factor of about 20 times or more; and (2) a discharge chamber fed from the

outlet means of the pressure equalization chamber, the discharge chamber being frustoconical and including a central outlet means at the apex thereof; and (D) a diversification element including a stem of lesser diameter than the diameter of the central outlet disposed through the central outlet means and vertically adjustable with respect to the apex of the frustoconical member, the stem terminating in a threaded end threadedly secured to a central, internally threaded aperture in plate (B).

## BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawing, the single FIGURE is a central vertical section of one embodiment of this invention.

## DETAILED DESCRIPTION OF THE DRAWINGS

The sprinkler 10 includes a head provided by a lower casing 7, threadedly secured to the end of liquid inlet pipe 9, a plate 4 including perforations 5 therein and an upper conical casing 6. Upper casing 6 and plate 4 are secured to lower casing 7 by threaded bolts 8. The volume contained between the dished lower casing 7 and the plate 4 provides a pressure equalization chamber 18, while the volume contained between the plate 4 and the conical casing 6 provides a discharge chamber 19. The cross-sectional area of chamber 18 is 20 times or more greater than the cross-sectional area of inlet pipe 9.

The apex 11 of the upper casing 6 is flattened and is provided with a central aperture 12. Passing through the central aperture 12 is a diversification element 13, comprising a stem 14, threaded at its lower end 15 for insertion in a central internally threaded aperture 16 in plate 4, terminating in a flared concave cap 3, having a flattened top 17.

In operation, liquid to be sprayed, usually water, is admitted under pressure to the pressure equalization chamber 18. Here, the pressure of the water, e.g., in lb./in.<sup>2</sup>, is reduced and equalized since the cross-sectional area of chamber 18 is much greater than the cross-sectional area of the inlet pipe 9. Water, at this lower equalized pressure, enters discharge chamber 19 through apertures 5, and its pressure, e.g., in lb./in.<sup>2</sup>, gradually increases as it moves towards central aperture 12. The volume of water finally discharged and the degree of atomization thereof is controlled by diversification element 13, and in particular, by the dimensions of *a* and *b*. This is adjusted by rotation of element 13 in internally threaded hole 16. It is noted that, for a major part of its vertical travel, dimension *b* is unchanged, while dimension *a* changes, until both dimensions decrease as concave cap 3 approaches flattened apex 11.

Thus, the fluid under pressure discharged through central aperture 12 strikes the outwardly flared cap 3 and is deflected a greater or lesser distance according to the pressure, the shape or angle of taper of cap 3, the distance *a* of the top of the cap 3 from the flattened apex 11 and the free size of the opening 12, i.e., distance *b*. Furthermore, fluid is directed more or less horizontally or vertically according to the shape or angle of taper of the cap 3, the distance *a* of the top of cap 3 from the flattened apex 11, and the free size of opening 12, i.e., distance *b*. The size of the drops of fluid, i.e., the degree of atomization, is adjusted by varying distance *a*, i.e., the distance of the cap 3 from the flattened apex 11. The rate of discharge of fluid per unit time is also adjusted by varying *b*, i.e., the free size of the opening 12, and by varying *a*, i.e., the distance between 3 and flattened apex 11.

The present invention thus provides a sprinkler head which includes a pressure equalization chamber which is attached to the water supply and a discharge chamber which is connected to the pressure equalization chamber which is provided with a central discharge aperture through which the outwardly flared diversification element is situated. In the sprinkler head of this invention, the water under pressure is first admitted to a pressure equalization chamber where the pressure of the water in units per square inch is uniformly reduced. The water then passes from the pressure equalization chamber to the frustoconical discharge chamber where the pressure of the

water gradually increases as it passes to the discharge aperture. When it reaches the discharge aperture, it is discharged and strikes the bottom outwardly flared cap of the diversification element. The amount of deflection and both the horizontal and vertical spread of the discharged liquid and the size of the drops of the liquid and the rate of discharge of liquid is controlled by varying the free size of the opening (i.e., distance *b* shown in the drawing) and by varying the distance between the cap and the apex (i.e., *a* shown in the drawing). More uniform coverage is provided with the sprinkler head of this invention due to the full pressure at the base of the diversification element. Such pressure is provided by the relative cross-sectional area relationship between the inlet line, the pressure equalization chamber and the frustoconical discharge chamber, i.e., the 20:1 ratio as particularly claimed.

Minor modifications can be made to the arrangement illustrated without departing from the invention. In particular, the inlet pipe 9 can be in the side of the lower casing 7 instead of at the bottom. In addition, plate 4 can take other forms and can readily be cast in the form of a grid, or similar.

There is then provided a simple, cheap, sprinkler head, readily adjustable, which will give a steady spray of determinable form, and which is not easily clogged.

I claim:

- 1. A sprinkler head comprising:
  - 1. a pressure equalization chamber provided with inlet means for liquid to be dispersed and outlet means, the cross-sectional area of said pressure equalization chamber being greater than the cross-sectional area of said inlet means by a factor of about 20 times or more;
  - 2. a discharge chamber fed from said outlet means of said pressure equalization chamber, said discharge chamber being frustoconical, and including a central outlet means at the apex thereof; and

- 3. a diversification element including a stem of lesser diameter than the diameter of said central outlet, said stem being disposed through said central outlet means and being vertically adjustable with respect to the apex of said frustoconical member, said stem terminating in a flared concave cap.

2. A sprinkler head comprising:

- A. a dished lower casing having means for connection to a source of liquid under pressure;

- B. an aperture plate adapted to be secured to said lower casing;

- C. an upper frustoconical casing adapted to be secured to said plate and to said lower casing, said upper casing including a central discharge aperture at the apex thereof, whereby, when said elements (A), (B) and (C) are assembled, they provide

- 1. a pressure equalization chamber provided with inlet means for liquid to be dispersed and outlet means, the cross-sectional area of said pressure equalization chamber being greater than the cross-sectional area of said inlet means by a factor of about 20 times or more; and

- 2. a discharge chamber fed from the outlet means of said pressure equalization chamber, said discharge chamber being frustoconical and including a central outlet means at the apex thereof; and

- D. a diversification element including a stem of lesser diameter than the diameter of said central outlet, said stem being disposed through said central outlet means and being vertically adjustable with respect to the apex of said frustoconical member, said stem terminating in a threaded end threadedly secured to a central, internally threaded aperture in said plate (B).

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