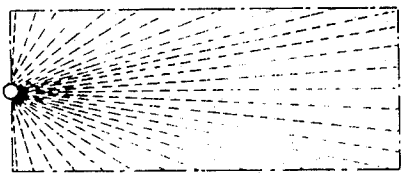
Sept. 23, 1969 E. J. HUNTER 3,468,484

SPRINKLER HEAD

Filed March 15, 1967

FIG. 5



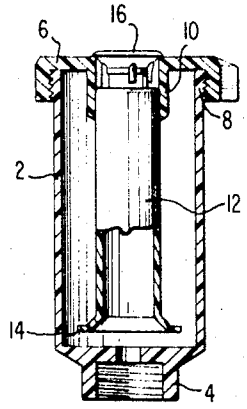


FIG. 1

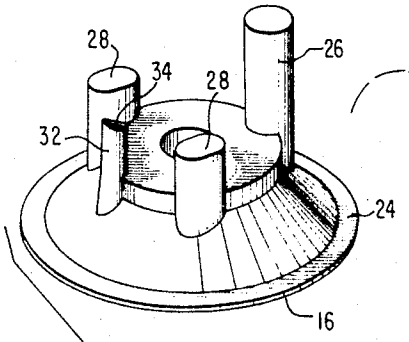
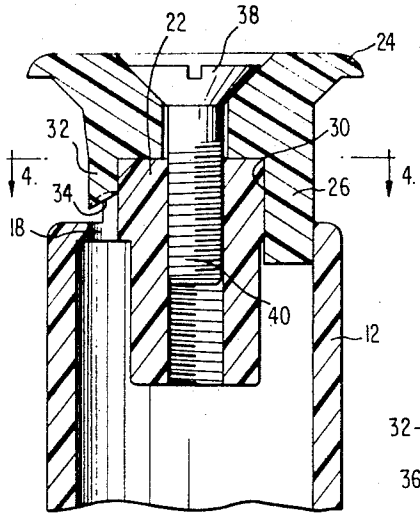
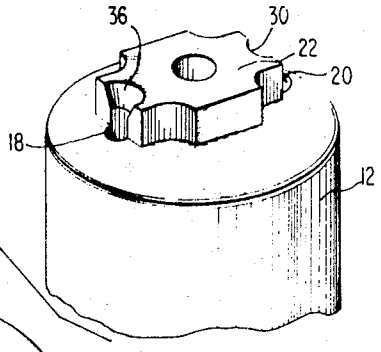


FIG. 2

FIG. 3





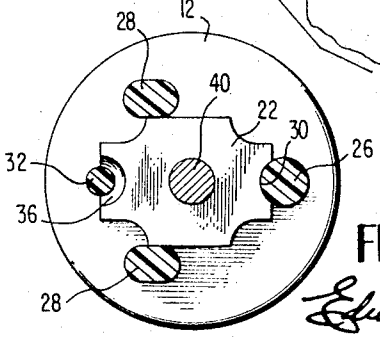


FIG. 4

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SPRINKLER HEAD

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ABSTRACT OF THE DISCLOSURE

A sprinkler head for forming a spray pattern, preferably a long narrow rectangle, which utilizes a partially shrouded orifice and a deflector pin of the same diameter as the orifice which has one end slanted and beveled and positioned directly above the orifice facing the shrouded portion. The water stream issuing from the orifice coacts with both the shrouded portion and the deflector pin to form the desired spray pattern.

This invention relates to sprinkler heads and, more particularly, to lawn sprinklers of the pop-up type which can control the shape of the spray pattern and achieve even distribution of water throughout the pattern.

It is an object of this invention to provide a sprinkling head which is of simple design having no moving parts and which makes use of the maximum kinetic energy of the available water to convert the same into a spray pattern while at the same time offering minimum resistance to the spray once it is formed.

It is another object of this invention, therefore, to provide a sprinkler head which incorporates a unique sprinkler spray control means that may be adjusted to vary the size of a given spray pattern.

It is yet another object of this invention to provide a sprinkling head which will emit a spray pattern of rectangular shape with substantially even distribution of water throughout the pattern.

According to one embodiment utilizing the principles of this invention, there is provided a spray head having a partially shrouded orifice with a deflector pin having substantially the same dimensions of latitude as the orifice and coaxial aligned therewith. The deflecting pin cooperates with the shrouded portion of the orifice to control both the volume and the angle of the spray developed by the stream of water issuing from the orifice.

Other objects and advantages will become apparent from a study of the following specification and drawings in which:

FIG. 1 is a side view partially in elevation and partially in section with the sprinkler head according to the invention shown in its retracted position;

FIG. 2 is an exploded diagram showing the deflecting pin portion of the spray head separated from the shrouded orifice portion of the sprinkling head;

FIG. 3 is a sectional view showing the deflecting pin portion of the sprinkler head secured to the shrouded orifice portion;

FIG. 4 is a sectional view taken along line 4—4 in FIG. 3; and

FIG. 5 is a plan view of the rectangular shaped spray pattern formed by the sprinkler head according to the invention.

Referring now to FIG. 1 the sprinkler device includes a cylindrical casing 2 having a reduced lower end which is internally screw-threaded to form a water inlet 4 arranged for connection to a water supply line. The upper end of the casing 2 is open and receives a cap 6 having a marginal flange which fits over the casing 2. The casing and cap are joined by a screw-thread connection 8. Centered

in the cap 6 and extending into the casing is a tubular slide bearing. A riser member 12 is slidable within the casing and is arranged to protrude from the cap 6. The riser 12 forms a flow tube axially slidable in the bearing 10. The lower extremity of the bearing is internally beveled and the stem is provided with a mating beveled stop shoulder 14 which seals against the end of the bearing when the riser is extended.

As shown in FIGS. 2 and 3, the top surface of the riser member 12 is provided with two apertures arranged on a common diameter. Aperture 18 is the orifice for the water stream, whereas aperture 20 is utilized as a support means to be explained later. Between the apertures 18 and 20 there is provided a bridge member 22. The bridge serves both as a shroud partially surrounding the orifice 18 for a purpose to be later explained and as a support that cooperates with aperture 20 for positioning the spray head and its associated deflecting pin over the orifice 18.

The spray head 16, as shown in FIGS. 1 and 2, is provided with a flange portion 24 extending slightly beyond the diameter of the riser member 12 when the spray head is positioned on the bridge 22. This flange cooperates with the cap 6 to maintain the riser member 12 in its retracted position as best shown in FIG. 1. The spray head is further provided with three depending lugs spaced 120° apart for cooperation with the bridge 22. The lug 26 is longer and larger than the remaining lugs 28, and it fits in the aperture 20 of the riser member while at the same time engaging the supporting surface 30 of the bridge 22. The lugs 28 then straddle the bridge 22 for accurately positioning the spray head on the riser member 12.

With the spray head 16 positioned over the bridge 22 by means of the lug members 26 and 28, the deflecting pin 32 is positioned directly over the orifice 18. The pin 32 has the same diameter as the orifice 18 and is provided with a slanted beveled edge surface 34 as best shown in FIG. 2. The pin 32 also rests on the curved surface of the shrouded portion 36 partially surrounding the orifice 18. A screw 38 extends through a center hole of the spray head 16 into the threaded portion 40 of the bridge 22. As shown in FIGS. 3 and 4 the cap 16 is fitted flush to the bridge 22. However, by raising the screw 38 the cap 16 may similarly be raised above the surface of the bridge without losing its stability. This is made possible by the length of the lug 26 which can slide up and down the supporting surface 30 while still supported by the aperture 20. Also, the lugs 28 grip the sides of the bridge 22, as previously mentioned, and therefore slide up and down their respective supporting surfaces in the same manner as lug 26. By adjusting the vertical position of the spray head 16 with respect to the bridge 22, the distance between the orifice 18 and the curved deflecting surface 34 of the deflecting surface 34 of the deflecting pin 32 can be varied for reasons which will be explained below.

Operation of the sprinkler head according to this invention is as follows:

When the sprinkler is inactive, the riser 12 is retracted as shown in FIG. 1. As mentioned above, the flange 24 rests on the cap 6 and thereby holds the riser 12 in its retracted position. The flange 24 further acts to seal the sprinkler head when the sprinkler is inactive to prevent the escape of low pressure water as well as to exclude dirt from entering the sprinkler.

When the sprinkler is activated, water pressure acting on the area of the riser stem 12 causes the riser to extend its own length. When the riser is extended, the shoulder 14 seats against the lower end of the slide bearing 10 and stops flow of water therethrough.

As soon as the spray head is clear of the cap 6, water flows through the riser flow tube 12 and out through orifice 18. The water stream then strikes the surface 34 of

the deflecting pin **32**. Both the shroud **36** partially surrounding the orifice **18** and the deflecting pin **32** convert the water stream into a spray having a long narrow pattern approximately 4 by 25 feet as shown in FIG. 5. This pattern is made possible by the fact that both the orifice **18** and the pin **32** are circular and have the same diameter, and further because the slanted end surface **34** of the pin is beveled and faces toward the shroud **36**. The spray is controlled primarily by two factors, the distance between pin **32** and the orifice **18** which determines the volume of water discharged, and the angle of slant of the end surface **34** which determines the angle of spray and hence its distance.

It is conceivable that the surface **34** of the deflecting pin **32** may have its shape varied which, in turn, will vary the spray pattern. For example, in the case of a square-shaped deflecting pin, not shown, a rectangular spray pattern would change to a semi-circular pattern. The size of the area the spray pattern can cover with a given volume of water at a given pressure is primarily determined by the efficiency of the sprinkling head.

The orifice **18** according to this invention makes efficient use of the kinetic energy (pressure x volume) available which breaks the water stream up into droplets and thus spreads the water over as large an area as possible. This provides for maximum efficiency, since both turbulence and plural deflecting surfaces are avoided by locating the critically dimensioned deflecting pin **32** at the mouth of the orifice **18**.

As mentioned earlier, the spray cap **16** may be adjusted vertically by virtue of its sliding engagement with bridge **22**. Thus, one need only raise the screw **38** a desired distance and then pull the cap **16** to the extent allowed by the new position of the screw.

With the type of deflecting pin as shown, a long narrow spray pattern is effected as earlier stated. This type of spray pattern is desirable for most residential lawns which are normally rectangular in shape. With the use of circular spray patterns on rectangular shaped lawns, much overlapping of the spray pattern unavoidably occurs and consequently both water and time are wasted. With the rectangular spray pattern, however, no overlapping occurs, since this pattern can be multiplied to fit the overall rectangular shape of a lawn.

The method of controlling spray patterns according to the principles of this invention give unusually good control of both volume and distance, and not only is the shape of the spray pattern controlled by the shape of the deflector pin, but an even distribution of water throughout the pattern is achieved as well.

What is claimed is:

1. In a pop-up spray head for a lawn sprinkling device, the combination comprising, a flow tube, an axially disposed riser having a plurally perforated top wall slidably arranged in said flow tube, adjustable cap means mounted on said riser having means arranged to slidably engage with at least one of said perforations in the top wall and a deflecting pin also carried by said cap means to control the water stream issuing from another one of the perforations in said riser.

2. In a pop-up spray head for a lawn sprinkling device as claimed in claim **1**, wherein the top wall of the riser is provided with an upstanding bridge means interposed between the perforations provided in said riser.

3. In a pop-up spray head for a lawn sprinkling device as claimed in claim **2**, wherein said cap means includes diametrically spaced lug means, said lug means being firmly engaged with means carried by said bridge means and the top wall of said riser.

4. In a pop-up spray head for a lawn sprinkling device as claimed in claim **2**, wherein the bridge means further includes a shroud means partially surrounding said other of the perforations, said shroud means being arranged to coact with said deflecting pin and to thereby control the pattern of water stream issuing from the perforation into a predetermined rectangular spray pattern.

5. In a pop-up spray head for a lawn sprinkling device as claimed in claim **2**, wherein the deflector pin on said cap means includes means to vary the volume of the water stream issuing through the other of said perforations.

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