

[54] **IRRIGATION SPRINKLERS**

[76] Inventor: **Abraham S. Jooste**, 13 Exmouth Rd., Cape Town, South Africa

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[51] Int. Cl..... **B05b 1/14**

[58] Field of Search 239/204, 542, 547, 537, 239/498, 460

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Primary Examiner—M. Henson Wood, Jr.

Assistant Examiner—Michael Y. Mar

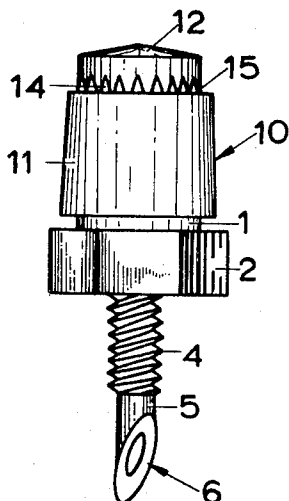
Attorney, Agent, or Firm—Cushman, Darby & Cushman

[57]

ABSTRACT

A sprinkler comprising a body, a passage having an inlet and an outlet end through the body, means associated with the inlet end for connecting it to a supply source of water and a distribution cap located over the outlet end, the cap having a skirt extending away from the body, a closed end remote from the body and a series of outlet perforations through the wall of the cap, the series extending at least partway around the periphery of the cap.

11 Claims, 5 Drawing Figures



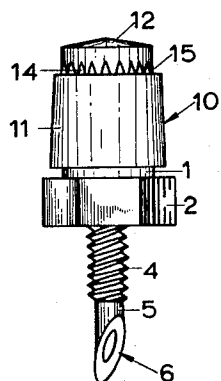


FIG. 1

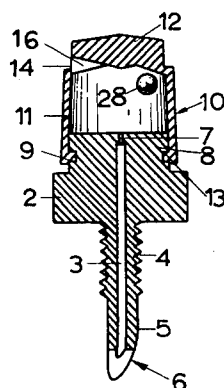


FIG. 2

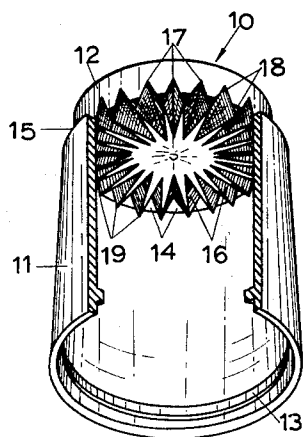


FIG. 3

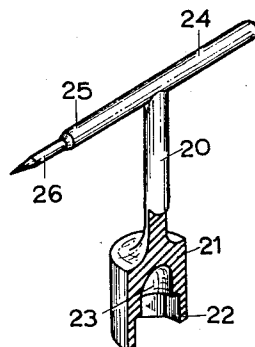


FIG. 4

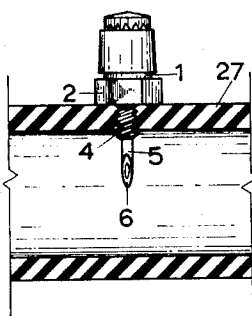


FIG. 5

IRRIGATION SPRINKLERS

This invention relates to irrigation sprinklers and to systems incorporating such sprinklers.

Irrigation sprinkler systems are often expensive and are generally at least fairly time-consuming to install.

It is the object of this invention to provide sprinklers and a system incorporating such sprinklers which is inexpensive and simple to install.

It is a further object of this invention to provide a tool for facilitating the assembly of a sprinkler system incorporating the sprinklers of this invention.

In accordance with this invention there is provided a sprinkler comprising a body, a passage through the body having an inlet and an outlet end, means associated with the inlet end for connecting it to a supply source of water and a distribution cap located over the outlet end, the cap having a skirt extending away from the body, a closed end remote from the body and a series of outlet perforations through the wall of the cap, the series extending at least part way around the periphery of the cap.

Further features of the invention provide for the sprinkler to be made of moulded plastics material, for the cap to have at least a part-conical surface with the apex of the cone directed towards the passage outlet, the conical surface being roughly co-axial with said outlet, for the outlet from the passage to be restricted to the desired size thereof, for the cap to be a snap fit onto the body, for the perforations to be located on a circumference of the cap remote from the body and for the perforations to be defined by an external step decrease in diameter of the cap combined with a riffling or serrating of the inner surface of the closed end of the cap such that the end piece is held to the skirt by a series of spaced webs of material.

Still further features of the invention provide for the means for connecting the body to a supply source of water to be a spigot carrying external screw threads, for the screw threads to taper down to a smooth external wall adjacent the free end of the spigot, for the free end of the spigot to be inclined to the axis thereof and for the body to be provided with formations engageable by a socket spanner.

The invention also provides an irrigation pipe comprising a tube of plastics material having a series of sprinklers as above defined secured thereto with the inlet ends of the sprinklers communicating with the interior of the tube as well as distribution caps and sprinkler bodies apart from each other but suitable for forming a sprinkler as above defined when combined.

The invention still further provides a tool adapted to facilitate securing the sprinklers of this invention in the wall of a plastics pipe, said tool comprising a spanner of complementary shape to formations on the body of sprinkler and a spike adapted to be forced through the wall of a plastics tube to form a hole therein.

Further features of the tool provide for the spanner to be a socket spanner, having an extended socket therein to receive the distribution cap of a sprinkler and for the spike to be located at one end of a cross-piece of the spanner.

Various preferred embodiments of the invention will now be described by way of example, reference being made to the accompanying drawings in which:

FIG. 1 is a side elevation of a sprinkler;

FIG. 2 is a sectional elevation thereof;

FIG. 3 is an underneath isometric view of a cap with part of the skirt removed;

FIG. 4 is a part-sectional isometric view of a tool designed for use in inserting the sprinklers in a plastics tube; and

FIG. 5 is a sectional view of a sprinkler secured in a plastics tube.

In the embodiment of the invention illustrated in FIGS. 1, 2 and 3, the sprinkler comprises a body 1 of moulded plastics material having a hexagonal nut formation 2 on the exterior thereof and an axial passage 3 therethrough. Extending axially from the body is a screw-threaded spigot 4 wherein the screw threads taper downwardly to a smooth surface at the free end 5 of the spigot and the spigot defines an extension of the passage 3. Also, in order to facilitate the introduction of the spigot into a hole in a polyethylene tube, for example, the end thereof is at an incline to the axis as indicated by numeral 6. The outlet end 7 of the passage is constricted to the desired cross-sectional area for flow through the sprinkler.

The outlet end 8 of the sprinkler body is of circular cross-section and has a peripheral groove 9 in the outer surface thereof, a distribution cap 10 being carried on this end of the body. The cap 10 is in the form of skirt 11 having at its end remote from the body an endpiece 12 which is made integral with the skirt in the manner hereinafter described.

The skirt surrounds the end 8 of the body and has an internal circumferential ridge 13 on the inside thereof, the ridge engaging in the groove 9 in the body such that the cap is a snap fit onto the body and may be removed therefrom when desired.

This cap is provided with a circumferentially extending series of perforations 14 adjacent its endpiece 12, these perforations being formed by providing firstly a step decrease 15 in diameter of the cap which is slightly greater than the wall thickness of the skirt and secondly a circumferential series of radially extending serrations 16 in the endpiece 12 arranged such that the troughs 17 of these serrations extend beyond the step thereby defining the perforations 14. The endpiece of the cap is thus connected to the skirt by small webs 18 of material at the outer ends of the peaks 19 of the serrations.

The endpiece is further provided with a basically conical shape as shown clearly in FIG. 2 with the apex of the cone directed towards the construction 7 in the outlet from the body and the cone being co-axial with the latter. Thus the cone serves the function of directing water emerging from the outlet of the body evenly towards the perforations.

The cone and serrations are conveniently merged by making the troughs of the serrations follow the cone angle and the height of the serrations decreasing from their outer ends to merge with the cone at a point about one third of the radius of the endpiece from the apex of the cone. This construction will be clarified by reference to FIGS. 2 and 3 of the drawings.

It will be appreciated that the above sprinkler will spray water around a full 360°. If, however, only 180° of spread is required this may be effected by altering the dies such that perforations only extend for the required arc of circle around the cap.

To facilitate securing these sprinklers into a plastic tube, there is provided a tool, one form of which is illustrated in FIG. 4. In this form the tool is moulded from

plastics material and is of Tee-shape with the free end of the stem 20 formed into a socket 21 having a hexagonal formation 22 at the free end thereof an extension 23 shaped to receive the distribution cap and remainder of the body of a sprinkler of the above-described type. The cross-bar 24 of the Tee is to act as a handle and one limb 25 thereof has inset at its free end a sharp steel spike 26 of suitable size to form a hole in a plastics pipe such that the spigot of a sprinkler can be introduced therein.

In use, a plastics, for example, polyethylene, pipe 27 is used for irrigation and may be laid in the desired position. Sprinklers are then secured therein at the desired positions simply by puncturing the pipe at the desired points with the aid of the spike on the tool and screwing a sprinkler into this hole.

In general a variety of different sprinkler bodies will be available, each with a different sized constricted portion to the passage. Thus, large apertured ones may be used at the end of a pipe remote from the supply source of water and small apertured ones at the other end depending on the pressure drop along the length of the pipe. Also a variety of distribution caps will be provided each one having a different arc of spray. In general, each body with a different sized aperture or constriction will be differently colored as will each distribution cap having a different arc of spray. Thus, the exact combination of any sprinkler will be known simply by visual inspection thereof.

It will be understood that the above-described sprinklers will spray a number of small streams of water in use. If further breaking up of the streams is required a small loose metal ball 28 (FIG. 2) may be introduced into the cap. This ball, during use of the sprinkler, will rotate about the endpiece at high speed thereby further breaking up the streams of water. Also, the cap may be dimensioned such that the ridge 13 thereof engages only loosely in the groove 9 in the body and in this case with the ball in the body it is found that the whole cap rotates relative to the body if the friction between the ridge and groove is not too great. The latter will depend on the plastics material from which the sprinkler is made. In use the water pressure keeps the horizontal surfaces of the ridge and groove in sealing engagement while the cap rotates.

It will be appreciated that the invention provides inexpensive sprinklers which may be installed in a plastic pipe by unskilled labor thereby saving also in installation costs.

What I claim as new and desire to secure by Letters Patent is:

1. A sprinkler, comprising:
 - a body;
 - means defining a passage through the body and having an inlet end and an outlet end;
 - means associated with the inlet end for connecting the passage to a water supply source;
 - a separate distribution cap snap fit on the sprinkler and extending over the outlet end of the passage, so that water issuing therefrom impinges thereon;
 - means defining a series of outlet perforations through the cap, about at least part of the outer periphery thereof, so that water which has impinged on the cap may pass out through the perforations;
 - the cap, where the water impinges thereon having an at least part-conical surface with the apex thereof

directed towards the outlet end of the passage; the longitudinal axis of the conical surface being at least roughly coincident with the longitudinal axis of the outlet end.

2. A sprinkler as claimed in claim 1 in which the sprinkler is made of moulded plastics material.

3. A sprinkler as claimed in claim 1 in which the outlet from the passage is constricted to the desired size for flow therethrough.

4. A sprinkler as claimed in claim 1 in which the cap, once in position on the body is rotatable relative thereto.

5. A sprinkler as claimed in claim 1 in which the perforations are located on a circumference of the cap remote from the body.

6. A sprinkler as claimed in claim 1 in which the perforations are defined by an external step decrease in diameter of the cap combined with a riffling or serrating of the inner surface of the closed end of the cap at least adjacent the periphery of said closed end, the riffles or serrations thereby defining troughs and peaks, the troughs of the serrations or riffles defining the perforations and the peaks of the serrations or riffles connecting the said end to the skirt.

7. A sprinkler as claimed in claim 1 in which the means for connecting the body to a supply source of water comprises a spigot carrying external screw threads.

8. A sprinkler as claimed in claim 7 in which the screw threads taper down to a smooth external wall adjacent the free end of the spigot.

9. A sprinkler as claimed in claim 7 in which the free end of the spigot is inclined to the axis thereof.

10. A sprinkler as claimed in claim 7 in which the body is provided with formations engageable by means of a spanner.

11. An irrigation sprinkler, comprising:

a one-piece moulded plastic body having means defining a longitudinal passageway therethrough; a non-circular enlargement formed on the body intermediate the ends thereof for receipt of a tool for angularly turning the body; said body, extending below the enlargement being exteriorly threaded and terminating in a downwardly directed point, whereby the body may be stabbed into a flexible water pipe and turned with a tool to engage the threads in the material of the pipe; the body further including means defining a circumferentially extending, outer peripheral groove therein above said enlargement; and

a distribution cap, having an interiorly generally conical upper end wall and a depending peripheral skirt; the skirt having a circumferential flange near the lower end thereof, which is snapped into said groove to fasten the cap onto the body so that the upper end wall of the cap lies spaced above where the longitudinal passageway emerges upwardly from the body; means defining a plurality of angularly spaced outlets from the cap adjacent the outer periphery of the upper end wall thereof; and means defining a radiating array of serrations on the interiorly generally conical upper end wall, the serrations leading to the outlets from where irrigating liquid issuing upwardly from longitudinal passageway impinges on said upper end wall.

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REEXAMINATION CERTIFICATE (280th)

United States Patent [19] [11] **B1 3,815,831**

Jooste [45] Certificate Issued **Dec. 4, 1984**

[54] **IRRIGATION SPRINKLERS**

[76] Inventor: **Abraham S. Jooste**, 13 Exmouth Rd.,
Cape Town, South Africa

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Reexamination Certificate for:

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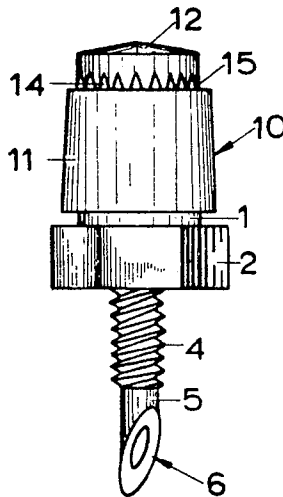
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Primary Examiner—John J. Love

[57] **ABSTRACT**

A sprinkler comprising a body, a passage having an inlet and an outlet end through the body, means associated with the inlet end for connecting it to a supply source of water and a distribution cap located over the outlet end, the cap having a skirt extending away from the body, a closed end remote from the body and a series of outlet perforations through the wall of the cap, the series extending at least partway around the periphery of the cap.



REEXAMINATION CERTIFICATE ISSUED UNDER 35 U.S.C. 307.

THE PATENT IS HEREBY AMENDED AS
INDICATED BELOW.

Matter enclosed in heavy brackets **[]** appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.

AS A RESULT OF REEXAMINATION, IT HAS
BEEN DETERMINED THAT:

Claims 1, 4-6 and 11 are determined to be patentable as amended.

Claims 2, 3 and 7-10, dependent on an amended 20
claim, are determined to be patentable.

1. A sprinkler, comprising:

a body;

means defining a passage through the body and hav- 25
ing an inlet end and an outlet end, *the diameter of the passage being smaller than the diameter of the outlet end*;

means associated with the inlet end for connecting
the passage to a water supply source; 30

a separate distribution cap, *constituted by a skirt and an integral endpiece at the end of the skirt and remote from the body, said skirt together with said integral endpiece defining an external step decrease in diameter of the cap and a substantially cylindrical space within the cap having a diameter greater than the diameter of said passage, said cap being snap fit [On the sprinkler] onto, carried on, and extending over the outlet end of the passage, so that water issuing [therefrom] from the outlet end impinges thereon;* 40

means defining a series of outlet perforations through the cap wall in the defined external step decrease, about at least part of the outer periphery thereof, so that water which has impinged on the cap may pass out through the perforations; 45

the cap, where the water impinges thereon having an at least **[part-conical]** *part-conical* surface with the apex thereof directed towards the outlet end of the passage and in an axially fixed position to direct water emerging from the outlet end evenly towards the perforations; 50

the longitudinal axis of the conical surface being **[at least roughly]** *substantially* coincident with the longitudinal axis of the outlet end. 55

4. A sprinkler as claimed in claim 1 in which the cap, once in position on the body, is rotatable relative thereto.

5. A sprinkler as claimed in claim 1 in which the perforations are located on a circumference of the cap remote from the body, *the apex of the cap's conical surface being directed toward and coaxial with the outlet end of the body.* 60

6. **[A sprinkler as claimed in claim 1 in which the] A** sprinkler comprising: 65

a body;

means defining a passage through the body and having an inlet end and an outlet end;

means associated with the inlet end for connecting the passage to a water supply source;

a separate distribution cap, constituted by a skirt and an integral endpiece at the end of the skirt and remote from the body, snap fit onto, carried on, and extending over the outlet end of the passage, so that water issuing from the outlet end impinges thereon;

means defining a series of outlet perforations through the cap, about at least part of the outer periphery thereof, so that water which has impinged on the cap may pass out the perforations; said perforations **[are]** being defined by an external step decrease in diameter of the cap combined with a riffling or serrating of the inner surface of the **[closed end]** *integral endpiece* of the cap at least adjacent the periphery of said **[closed end]** *integral endpiece*, the riffling or serrations thereby defining troughs and peaks, the troughs of the serrations or riffling defining the perforations and the peaks of the serrations or riffling connecting the **[said end]** *integral endpiece* to the skirt;

the cap, where the water impinges thereon, having an at least part conical surface with the apex thereof directed towards the outlet end of the passage;

the longitudinal axis of the conical surface being substantially coincident with the longitudinal axis of the outlet end.

11. An irrigation sprinkler, comprising:

a one-piece moulded plastic body having means defining a longitudinal passageway therethrough and provided with an inlet and an outlet end, the diameter of the passage at the outlet end being smaller than the diameter of the outlet end;

a non-circular enlargement formed on the body intermediate the ends thereof for receipt of a tool for angularly turning the body;

said body **[,]** extending below the enlargement being exteriorly threaded and terminating in a downwardly directed point, whereby the body may be stabbed into a flexible water pipe and turned with a tool to engage the threads in the material of the pipe;

the body further including means defining a circumferentially extending, outer peripheral groove therein above said enlargement; and

a separate distribution cap, having **[an interiorly generally conical upper end wall and]** a **[depending peripheral]** skirt and an integral endpiece at the end of the skirt and remote from the body, the skirt together with the integral endpiece defining an external step decrease in diameter of the cap and defining a substantially cylindrical space within the cap having a diameter greater than the diameter of said passage at the outlet end;

the skirt having a circumferential flange near the lower end thereof, which flange is snapped into said groove to fasten the cap onto the body so that the **[upper end wall]** *endpiece* of the cap lies spaced above **[where the longitudinal passageway emerges upwardly from the body]** *the outlet end, water issuing from the passageway impinging on the endpiece;*

means defining a plurality of angularly spaced outlets **[from]** through the cap **[adjacent]** wall in the defined external step decrease about the outer periphery **[of the upper end wall thereof]** so that water which has impinged on the endpiece may pass out the outlets;

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and means defining a radiating array of serrations on the interiorly generally conical upper end wall, the serrations leading to the outlets from where irrigating liquid issuing upwardly from longitudinal passageway impinges on said upper end wall] 5
the endpiece, where the water impinges thereon, having a generally conical interior surface with the apex

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thereof directed towards the outlet end, the conical surface being substantially coincident with the longitudinal axis of the outlet end and fixed with respect thereto so as to evenly distribute water impinging thereon toward the outlets.

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