ABSTRACT OF THE DISCLOSURE

A rotary pop-up sprinkler having a fixed cam for dispersing water over an area, the contour of which is determined by the shape of the cam while varying the volume of water dispersed directly with the instantaneous elevation of the nozzle and having a figure-eight cross-section nozzle for dispersion of water in a vertical plane at an equal volume along any radial line from the nozzle.

Background of the invention

The present invention relates to a rotary pop-up sprinkler and more particularly to a rotary pop-up sprinkler employing a fixed cam for varying elevations of the nozzle and in which water volume is directly proportional to the elevation of the nozzle.

Prior art rotary pop-up sprinklers employing a fixed cam for irregular areas being sprinkled have been plagued by many disadvantages. One of the problems encountered was an even dispersion of water regardless of the radial length of the area being sprinkled at any given instant under the nozzle. If an even distribution, or if a steady volume of water is dispersed from the nozzle regardless of any given height or elevation of the nozzle, the areas furthest from the nozzle will receive more water since in directing the water to the periphery of the area being dispersed, very little will fall short of that area resulting in a heavier concentration around the periphery of the area being sprinkled. Hence, the problem is two-fold, i.e., with an area having a fixed radius being sprinkled, the outside periphery will receive more water than the inner portions of the area and secondly, and if the radial distance from the sprinkler is varied according to an irregular contour, for example, areas having a shorter radial length will receive much more water than areas having a longer radial length, resulting in an overall uneven watering regardless of the contour of the area being sprinkled.

According to the invention, the first problem listed above is solved by providing a novel constricting mechanism which is coupled to a fixed cam which alters the elevation of the nozzle. This mechanism constrains a resilient tube or water line just prior to the nozzle itself inversely with the elevation of the nozzle. This means that the lower the nozzle is in elevation, the less volume of water is being dispersed, resulting in an even watering of the area in a radial line from the nozzle at any given time regardless of nozzle elevation or distance of the area being watered. The second problem encountered as outlined above is solved by the utilization of a unique nozzle configuration which disperses water in a vertical plane from the nozzle in a manner to ensure equal distribution of water over the entire radial length being sprinkled.

An object of the present invention is the provision of an improved rotary pop-up sprinkler having a cam-controlled nozzle elevation.

Another object is to provide a rotary pop-up sprinkler in which water is evenly dispersed along the entire radial length being sprinkled at any given time.

A further object of the invention is the provision of a rotary pop-up sprinkler which varies the volume of water being dispersed directly with the angle of elevation of the nozzle, varying volume with the radius of the area being sprinkled.

A further object of the invention is the provision of the rotary pop-up sprinkler having a cam-controlled nozzle elevation angle which is extremely simple to manufacture and install and requires a minimum of maintenance and adjustment.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures thereof and wherein:

FIG. 1 is an exploded perspective view partially a cross-section of the preferred embodiment of the present invention;

FIG. 2 is a side elevation in cross-section of the embodiment of FIG. 1;

FIG. 3 is an end view taken along lines AA of FIG. 2;

FIG. 4 is an end view taken along lines BB of FIG. 2;

and

FIG. 5 is a perspective view partially a section of the nozzle portion of the present invention.

Referring to FIGS. 1, 2 and 5, incoming water line 11 is coupled to a turbine drive unit 12 which is, in turn, coupled to a pipe 13 terminating at housing unit 14. Housing unit 14 has a ceiling flange 16 cooperating with top surface 18 of threaded adapter 19. Camming cylinder 21 has a cam surface 22 and is coupled to threaded extension 23. Coupling rod 24 terminates in mounting bracket 26 at the top end which carries a mounting extension 27 and hose fitting 28. Coupling rod 24 terminates in an end fitting 29. Retaining nuts 31 and 32 cooperate with the threads at the end of coupling rod 24. Resilient hose 33 cooperates with hose fitting 28 and is retained by retaining wire 34. Nozzle shaper 36 is received by hose 33 and retained by retaining wire 37. Cam bracket 38 is rotatably coupled to fitting 27 and rotatably carries constrictive wheel 39 by retaining pin 41 within aperture 42. Cam bracket also carries rod 42 by retaining pin 43. Cam follower wheel 44 is rotatably carried by rod 42. Coupling rod 10 couples turbine unit 12 to end fitting 29. Coupling rod 24 is rotatably carried within threaded extension 23 at bushing 30.

Referring to FIG. 3, it can be seen that nozzle shaper 36 slightly stretches hose 33 which, together with retaining wire 37, makes the end of hose 33 conform generally to an inverted figure-eight cross-sectional contour.

Referring to FIG. 4, an end view of end fitting 29 is shown which cooperates with coupling rod 10 to ensure rotatable coupling between turbine 12 and the mounting bracket 26.

Operation

Referring back to FIGS. 1, 2 and 3, it can be seen that cam cylinder 21 is fixedly coupled to threaded extension 23 which, in turn, is threadably engaged with threaded adapter 19. Threaded adapter 19 fits relatively loosely within pipe 13 having its upper travel limited with flange 16 of housing 14 and its lower limit and rotation limited by screw 15 within slot 15a. Hence, prior to water pressure being applied up through pipe 13, threaded adapter 19, together with threaded extension 23 drop down within pipe 13, cylindrical cam 21 resting on the top surface of flange 16 and within housing 14. Hose 33 is mounted at an angle resulting in its tendency to raise upwardly.
at the nozzle 36 end, which rotates cam bracket 38 upward, bringing cam follower wheel 44 in contact with cam surface 22 of cam cylinder 21. When water pressure is applied through water supply line 11, turbine 12 rotates coupling rod 10 which, in turn, rotates coupling rod 24 via end fitting 29, rotating the cam bracket 38, together with hose 33 and nozzle 36.

At the same time, water pressure exerted against the bottom of threaded adapter 19 moves the entire assembly upward until the top of threaded adapter 19 comes in contact with flange 16 of housing 14. O-ring 17 effects a seal between the top of threaded adapter 19 and flange 16. This raises the nozzle 36 of hose 33 up above the ground (assuming a subterranean installation) and the entire unit rotates, delivering water as it does. As the unit rotates and follower wheel 44 follows the contour of cam surface 22 of cam cylinder 21 which, as can be seen, varies, which will result in raising and lowering cam bracket 38 about mounting extension 27 in a vertical plane. Hose 33 follows the elevational changes of cam bracket 38 due to its resilience and tendency to move up into an almost vertical position, i.e., in axial alignment with hose fitting 28. At the same time, constriction wheel 39 is moving in and out against resilient hose 33 constraining it more as the angle of elevation lowers resulting in a smaller volume of delivered water at the lower angles of elevation and in a larger volume of delivered water at the higher angles of elevation.

It should be understood, of course, that the foregoing disclosure relates to only a preferred embodiment of the invention and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. A rotary pop-up sprinkler comprising:
a resilient nozzle member;
rotatable coupling means coupling said resilient nozzle member to a water supply;
a constriction means, said constriction means pivotally mounted for engagement with said resilient nozzle member;
cam means;
cam follower means for following said cam means; and
coupling means for coupling said cam follower means to said constriction means, whereby said constriction means will vary the angle of inclination and the cross-sectional area of said resilient nozzle member in accordance with the shape of said cam means.
2. The rotary pop-up sprinkler of claim 1 wherein:
said rotatable coupling means includes elevating means for elevating said nozzle when water pressure is applied to said rotary coupling means.
3. The rotary pop-up sprinkler of claim 1 and further including:
shaping means in contact with an open end portion of said resilient nozzle member, said shaping means operable to form an inverted figure-eight cross-sectional shape to the said open end portion of said nozzle member.

References Cited

UNITED STATES PATENTS
2,999,644 9/1961 Nobinger -------------- 239--229
3,272,437 9/1966 Coten -------------- 239--206

M. Henson Wood, Jr., Primary Examiner.
HOWARD NATTER, Assistant Examiner.
U.S. Cl. X.R.
239—97, 210, 229, 236, 240, 285; 251—6; 137—624.14