Sept. 13, 1960 I. JEPSON 2,952,413

LAWN SPRINKLER

Filed May 20, 1957

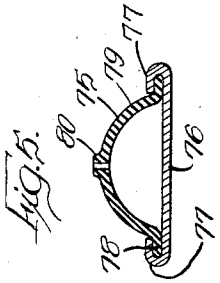


Fig. 5.

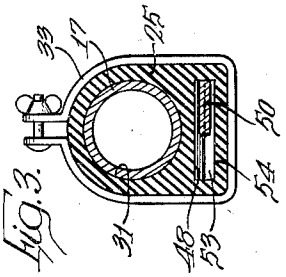


Fig. 3.

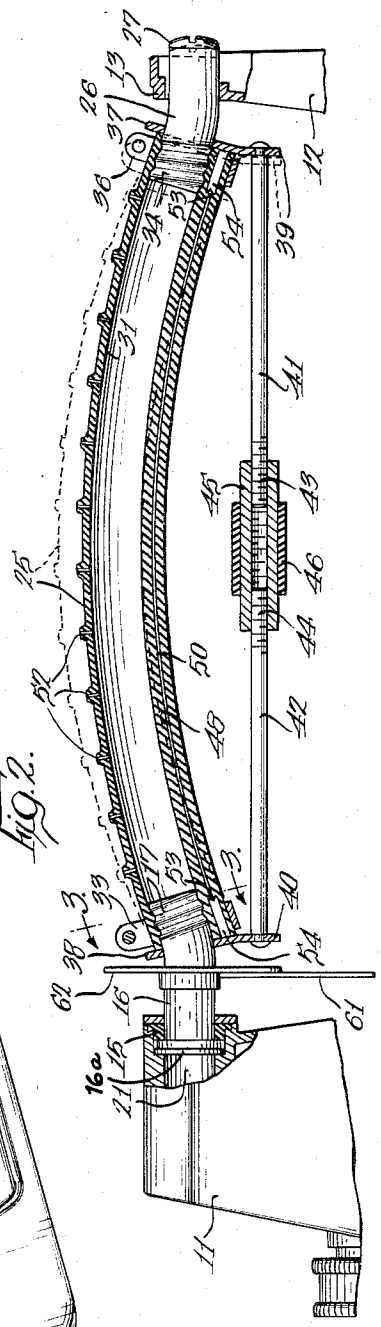


Fig. 2.

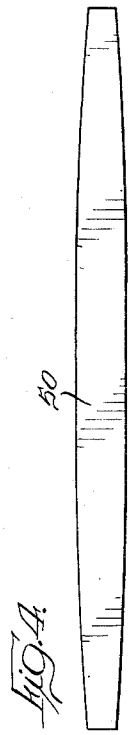


Fig. 4.

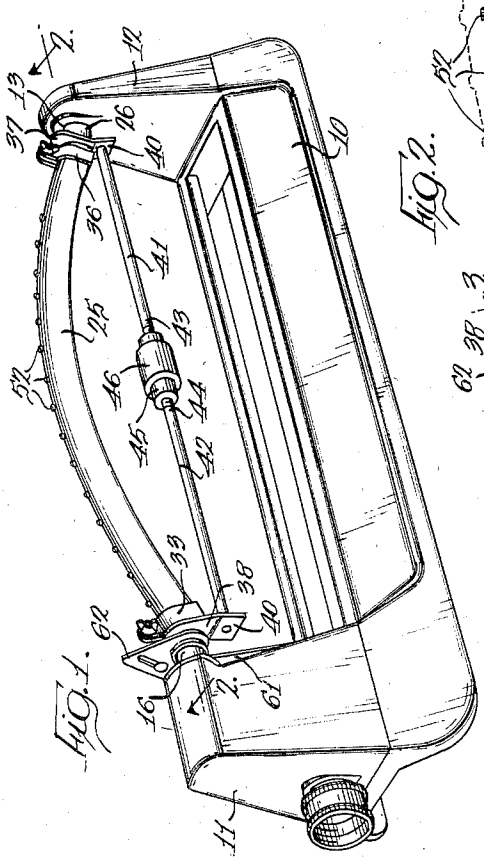


Fig. 1.

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LAWN SPRINKLER

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13 Claims. (Cl. 239—242)

The present invention relates to a lawn sprinkler, and more particularly to a lawn sprinkler of the oscillating type employing a horizontally disposed spray tube oscillated about its axis.

One form of the oscillating lawn sprinkler as it is known in the art, may be seen in my copending application Serial No. 575,881 on a "Lawn Sprinkler," filed April 3, 1956, now Patent No. 2,904,255. The sprinkling head disclosed in the above-identified application includes an arched metal tube disposed generally horizontally and oscillated about a horizontal axis. This tube has a number of longitudinally spaced orifices in line along the length of the tube. Since the tube is arched, water supplied to the interior of the tube flows through the orifices upwardly in streams having components of direction axially of the tube. In that the orifices are in line, the streams of water describe a fan-like pattern as they leave the arched spray tube. The tube is usually oscillated about a horizontal axis by a small water turbine, and the spray moves back and forth along a swath or path of a fixed width. In previously known sprinklers of this type, the angle through which the tube is oscillated may be increased or decreased to vary the length of the swath of coverage, and the angle of oscillation may be adjusted to one side of the center of the sprinkler so that the area of coverage is shifted. No means have heretofore been provided, however, whereby an oscillating sprinkler of the above discussed form may be adjusted to increase the width of the swath of coverage.

It is accordingly an object of the invention to provide a new and improved lawn sprinkler of the adjustable type.

Another object of the invention is to provide a lawn sprinkler having an elongated tube provided with orifices spaced therealong and directed upwardly and radially of the tube together with means for adjusting the divergence of said orifices along the tube.

Another object of the invention is to provide an improved lawn sprinkler of the oscillating tube type in which both the oscillatory movement may be varied and the width of the path of coverage of the sprinkler as well may be varied.

Still another object of the invention is to provide a sprinkler having a flexible tube sprinkler head which may be bowed to several positions to vary the width of the area sprinkled.

Yet another object of the invention is to provide an oscillating lawn sprinkler having a flexible tube provided with orifices spaced along one side of the tube together with means for oscillating the tube and draw bar means for selectively drawing the ends of the two toward one another to bow the tube to a desired extent.

A further object of the invention is to provide a conduit having a spring metal strip positioned on one side thereof together with means for bowing the strip whereby the conduit is also bowed.

A still further object of the invention is to provide a flexible conduit extruded with a central passage and a slot extending along one side thereof in which a spring steel strip extends so that when the strip is placed under longitudinal pressure it bows the conduit element.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the present invention, reference may be had to the accompanying drawings, in which:

Fig. 1 is a side perspective of a sprinkler embodying the present invention;

Fig. 2 is an enlarged fragmentary vertical section of the sprinkler shown in Fig. 1;

Fig. 3 is the enlarged vertical section taken along line 3—3 of Fig. 2;

Fig. 4 is an enlarged top plan view of an element forming a part of the sprinkler shown in Fig. 1; and

Fig. 5 is an enlarged vertical section of a flexible conduit forming a part of a sprinkler constituting an alternate embodiment of the invention.

The present invention provides an elongated tubular sprinkler head disposed generally horizontally for directing streams of water upwardly with components directed longitudinally of the head together with means for varying the bow of the head to increase or decrease the longitudinal components by changing the divergence of the streams of water. The sprinkler head may include a flexible conduit or tube having series of orifices formed on the top side thereof and also having the slot formed on the bottom side thereof. The tube is mounted on a driving arbor at one end and a driven arbor at the other end, and is supplied with water under pressure through the driving arbor. The arbors are provided with flanges at the ends of the tube, and compress a spring steel strip mounted in the slot in the tube to bow the strip and the tube upwardly. A draw bar rigidly connected to lugs on the arbors may be actuated manually to move the driven arbor more closely to the driving arbor to increase the bowing of the tube. This increased bowing causes greater divergence of the streams of water from the orifices to widen the swath of the coverage of the water streams from the sprinkler. Suitable means are also provided for oscillating the driving arbor to oscillate the tube. In an alternate embodiment of the invention the tube is composed of an elongated strip of spring steel having overturned edge portions clamping and sealed to the edges of a strip of plastic material somewhat wider than the strip of steel and provided with orifices to form a flexible conduit or tube.

In the sprinkler shown in Figs. 1 and 2, there is provided a base **10** supporting a motor housing or standard **11** at one end and a spray tube supporting standard **12** at the other end, the standard **12** being provided with a bearing portion **13**. The standard **11** is provided with a bearing insert **15** supporting a hollow driving arbor **16** having a peripheral flange **16***a* thereon, and mounts the arbor **16** rotatably while limiting longitudinal movement of the arbor. The housing **11** houses a motor of the type disclosed and claimed in the above-mentioned copending application and discharges water under pressure to a passage **21** through the arbor **16** into a flexible tube or conduit **25**. The tube **25** is also mounted on a driven arbor **26** having its end plug closed by a plug **27**. The arbor **26** is rotatably mounted in the bearing **13** and is freely slidable longitudinally thereof in the bearing **13**. The arbor **16** is provided with a bent up nipple portion **17** having a corrugated periphery, and fits tightly into a passage **31** in the conduit **25**, which is clamped tightly to the nipple portion **17** by a shaped hose clamp **33**. Similarly, the arbor **26** is provided with a nipple portion

34 fitting into the other end of the tube 25 and sealed thereto by plastic cement or the like and clamped tightly thereto by a hose clamp 36.

A peripheral flange 37 integral with the arbor 26 abuts the right-hand end of the tube 25, as viewed in Fig. 2, and, similarly, a peripheral flange 38 is positioned on the arbor 16 near the end of the nipple 28. The flanges 37 and 38 are provided with parallel extending lugs 39 and 40, respectively, to which shoulder rods 41 and 42 are riveted and rigidly connect. The rods 41 and 42 are provided with oppositely threaded portions 43 and 44, respectively, which are connected by a turnbuckle sleeve 45 having a knurled plastic collar 46 connected rigidly thereto. After the sleeve 45 is screwed on the ends of the rods 41 and 42, the flanges 37 and 38 are held in position holding the portions of the arbors 16 and 26 in axial alignment with one another. The rods 41 and 42 prevent cocking of arbors 16 and 26 relative to one another and relative to the bearing elements 13 and 15 on which they are mounted, and thus avoiding binding.

The conduit 25 may be formed by continuously extruding an elastomeric compound such as, for example, a compound including vinyl as its essential ingredient, or other suitable plastic rubber-like compounds of the type used for making garden hose. The conduit 25 is formed with the central water passage 31, and radially directed orifices 52 which may be molded integrally with the upper side of the conduit in a row extending therealong. The orifices also may be formed by molded nozzles inserted into the upper side of the conduit when this is of the extruded type and secured thereto as by riveting, for example. A slot 48 on the bottom side of the conduit 25 extends along the entire length of the conduit, and, after the continuous length of the conduit is cut into the desired length, a thin spring steel strip 50 is inserted into the slot 48. The strip 50 extends to points near the ends of the conduit 25, and tapers from the central portion thereof which is of one width to narrow widths at the ends thereof to make the end portions of the strip 50 more flexible than the central portion thereof. The ends of the strip 50 are fitted in V-shaped notches 53 formed in butting plates 54 mounted in the end portions of the slot 48 and abutting the flanges 37 and 38 on the arbors 26 and 16, respectively. The notches 53 permit pivotal movement of the strip 50 relative thereto while securely holding the ends of the strip 50 when the strip 50 is placed under compression. The turnbuckle 46 may be turned to draw the arbor 26 closer to the arbor 16 thereby bowing the strip 50 and the highly flexible conduit 25 to a greater extent. This directs the orifices or nozzle portions 52 adjacent to the left-hand end of the conduit 25, as viewed in Fig. 2, much more to the left and the orifices to the right of the central portion of the conduit 25 much more to the right. That is, in the invention the conduit is bowed toward the side thereof on which the orifices are disposed so that the orifices are positioned on the convex side of the bowed conduit. Consequently, jets oscillate the arbor 16 through selected angles.

There is shown in Fig. 5 a flexible housing and conduit 75 forming an alternate embodiment of the invention being designed to be substituted for the conduit 25 and the spring strip 50 with suitable changes for connecting the arbors 16 and 26, which may be provided with flattened nipple portions (not shown) designed to fit closely into the ends of the conduit 75 and to be sealed thereto. The conduit 75 includes a strip 76 of spring metal having overturned edge portions 77 clamping edge portions 78 of a flat strip 79 of plastic rubber or rubber-like material having orifices or nozzle portion 80 arranged in a row along the central portion thereof. The edge portions 78 of the strip 79 may be sealed to the edge portions of the strip 76 by known cements. The strips 76 and 79 form a passage therebetween for water under pressure.

The strip 79 may be a flat member of a width greater than that of the strip 76. The greater width causes strip 79 to bow away from the strip 76 when the edge portions are enclosed in the overturned edge portions 77. Also the strip 79 may be molded into a semi-cylindrical form and be of the same width as the strip 76. The strips 76 and 79 may also be tapered in width from the central portion thereof toward the ends to make the ends more flexible than the central portion. This differential flexibility also may be obtained by having the strip 76 of uniform width while tapered in thickness from the central portion toward the ends thereof.

In a sprinkler (not shown) forming an alternate embodiment of the invention, the conduit corresponding to conduit 25 may be inflexible while angularly adjustable nozzles of a known type are provided in place of the nozzles 52. Then, if the width of the swath of sprinkling is sought to be changed, the nozzles are adjusted to different angles relative to the longitudinal axis of the conduit to provide such a variation.

While there has been illustrated and described what are considered to be the preferred embodiments of the present invention, it will be understood that various changes and modifications will readily suggest themselves to those skilled in the art, and it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the present invention.

What is claimed as new and is desired to be secured by Letters Patent of the United States is:

1. In a sprinkler, a flexible conduit having orifices spaced therealong on one side thereof, means connected to the ends of said conduit mounting said conduit for oscillatory movement, means for bowing said conduit toward said one side, and means for adjusting said bowing means to vary the degree of bowing of said conduit.

2. In a sprinkler, a flexible conduit having openings spaced therealong on one side thereof, a first means holding one portion of said conduit against longitudinal movement relative thereto, a second means holding a portion of said conduit spaced from said one portion thereof against longitudinal movement relative thereto, and adjustable means for holding said first means and said second means in any of a plurality of positions spaced different distances apart for bowing the flexible conduit toward said one side and varying the degree of bowing.

3. In a sprinkler, first arbor means, second arbor means, a conduit formed of flexible material mounted on said first and second arbor means and held against longitudinal movement relative to said arbor means, said conduit having fluid-directing orifices along one side thereof extending substantially perpendicularly to the longitudinal axis thereof, means for supplying fluid under pressure to said conduit, means for oscillating said conduit, and means mounting one of said arbor means for adjustment toward the other of said arbor means, whereby said conduit may be bowed toward said one side to cause divergence of said orifices for increasing the area of coverage of jets of fluid from said conduit.

4. In a sprinkler, a flexible conduit having perforations spaced therealong on one side thereof, driving arbor means holding one end of said conduit against longitudinal movement relative thereto, driven arbor means holding the other end of said conduit against longitudinal movement relative thereto and aligned with said driving arbor means, water-driven motor means for driving said driving arbor means so as to oscillate said conduit, means for supplying water under pressure to said motor means and said conduit, a base, means fixing said driving arbor means against longitudinal movement relative to one end of said base, means mounting said driven arbor for longitudinal movement toward and away from said driving arbor to bow said flexible conduit toward said one side, and selectively operable means for locking said driven arbor means against longitudinal movement relative to

said base in any of a plurality of positions spaced along said base.

5. In a sprinkler, a base, a first arbor at one end of said base, a second arbor mounted on said base and movable along said base toward and away from said first arbor, means for locking said second arbor in selected positions on said base, a bowed flexible conduit having a row of holes therein along the convex side of said bowed conduit, means mounting one end of the conduit on said first arbor, means mounting the other end of said conduit on said second arbor, motor means carried by said base for oscillating said conduit, and means for supplying water under pressure to said conduit.

6. In a sprinkler, a pair of aligned bearings spaced from one another, a tubular arbor having a lug projecting therefrom and said arbor being mounted rotatably in one of said bearings, a second arbor having a lug projecting therefrom and said second arbor being mounted rotatably and slidably in the other of said bearings, an adjustable pull rod connecting said lugs together, a bowed flexible conduit having nozzle portions extending transversely thereof and spaced therealong on the convex side of said bowed conduit, said conduit being connected at opposite ends to said arbors, means for supplying liquid under pressure to said tubular arbor, and means for oscillating one of said arbors to oscillate said conduit.

7. In a sprinkler, a pair of generally aligned bearings which are spaced from one another, a pair of arbors mounted rotatably in said bearings, one of said arbors being slidable longitudinally in the bearing in which it is mounted, a bowed flexible conduit fastened to said arbors and being provided with transversely directed nozzle portions spaced therealong on the convex side of said bowed conduit, a draw bar connecting said arbors together for moving said arbors toward and away from one another to vary the degree of bow of said conduit, means for oscillating said conduit and said arbors, and means for supplying water under pressure to said conduit.

8. In a sprinkler, a flexible conduit having transversely directed nozzle portions spaced from one another along one side of said conduit, a pair of oscillatory mounting means connected to the ends of said conduit, and means for moving said mounting means toward one another to bow said conduit toward said one side.

9. In a sprinkler, a first vertical standard, a second vertical standard, a driving arbor mounted rotatably on said first standard, a driven arbor mounted rotatably and slidably on said second standard, each of said arbors having a lug projecting laterally therefrom, a first rod rigidly secured to the lug of said driving arbor, a second rod rigidly secured to the lug of said driven arbor and aligned with said first rod, turnbuckle means connecting said rods adjustably together for adjusting the spacing of said arbors relative to one another, a bowed flexible conduit mounted on said arbors and longitudinally compressed therebetween, said conduit being provided with transversely directed orifices spaced therealong on the convex side of said bowed conduit, and means for supplying liquid under pressure to said conduit.

10. In a sprinkler, a flexible conduit having nozzle portions on one side thereof, a spring strip secured to and extending along the other side of said conduit, means connected to the ends of said conduit for turning the conduit, and means for moving the ends of said strip toward one another to bow said strip and said conduit toward said one side.

11. In a sprinkler, a conduit having orifices spaced along one side thereof and a slot extending along the opposite side thereof, a spring strip tapering toward the ends thereof, said strip being mounted in said slot and secured to said opposite side, a pair of plates having notches in the ends thereof mounted in the ends of said slot and receiving the ends of said strip in said notches, a pair of arbors secured to the ends of said conduit and provided with transversely extending portions engaging said plates, and means for drawing said arbors toward one another to bow said strip and said conduit toward said one side.

12. In a sprinkler, first bearing means, second bearing means, a conduit formed of flexible material mounted in said first and second bearing means, said conduit having fluid-directing bores along one side thereof extending substantially perpendicularly to the longitudinal axis of the conduit, means for supplying fluid under pressure to said conduit, means for oscillating said conduit, and means mounting one end of said conduit for adjustment toward the other end thereof, whereby bowing of said conduit toward said one side is effected to increase the area of coverage by jets of fluid from said conduit.

13. In a sprinkler, a pair of arbors spaced apart and rotatable on aligned axes, a bowed conduit formed of flexible material secured to said arbors, said conduit having laterally directed nozzles along the convex side thereof, means for supplying fluid under pressure to said conduit, draw bar means connecting said arbors together, and means for oscillating said arbors.

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