Jan. 7, 1947. T. S. MARTIN 2,414,052

LAWN SPRINKLER

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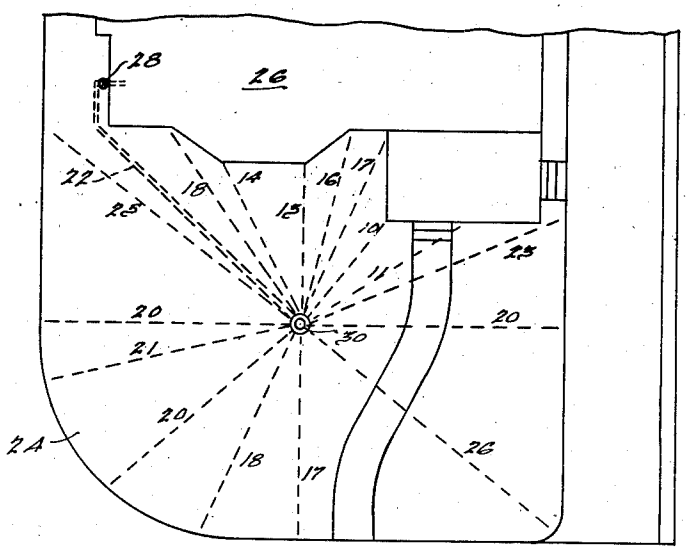


FIG. 1.

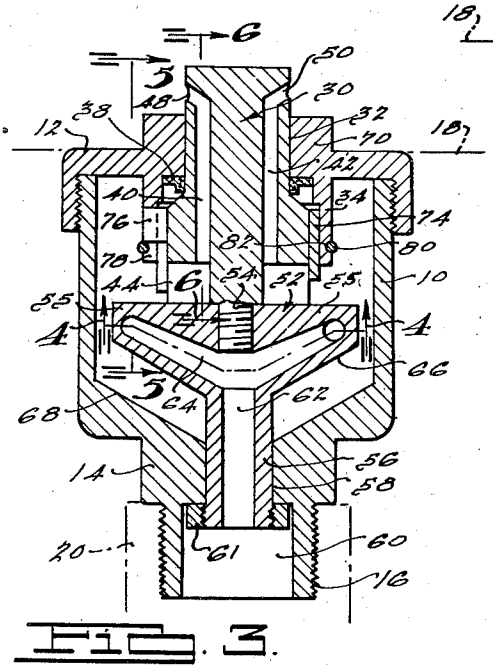


FIG. 3.

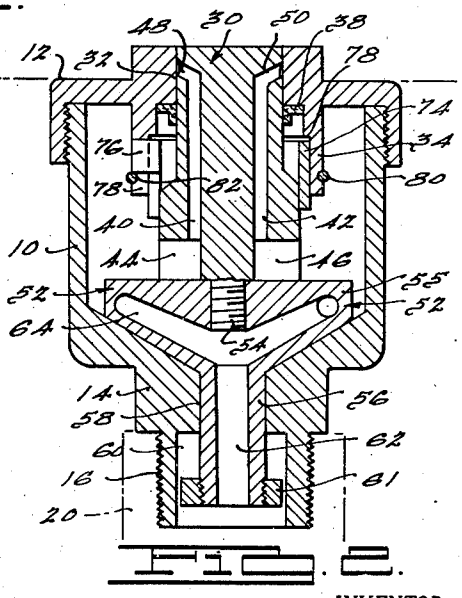


FIG. 2.

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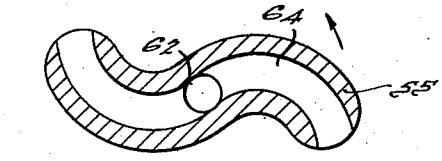


Fig. 4.

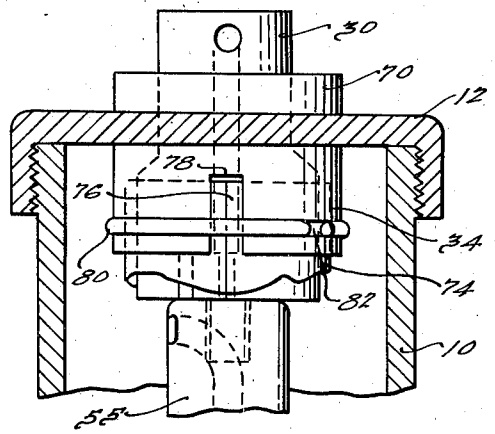


Fig. 5.

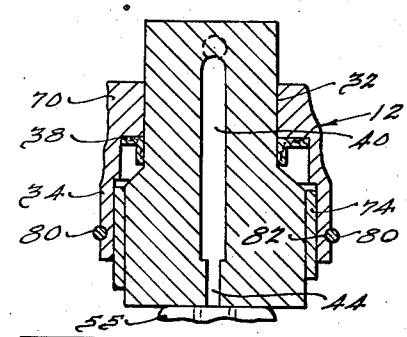


Fig. 6.

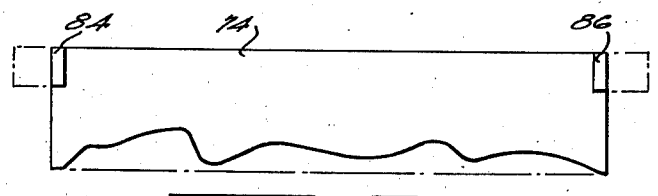


Fig. 7.

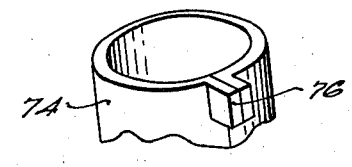


Fig. 8.

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LAWN SPRINKLER

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13 Claims. (Cl. 299—18)

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This invention relates broadly to sprinklers and more particularly to sprinklers of the type adapted to spray a fluid substantially uniformly over an area having a predetermined outline which may be either circular or non-circular and either regular or irregular.

The present invention can be adapted to any indoor or outdoor sprinkling system but, for the purpose of illustration, is here shown and described as embodied in a lawn sprinkling system.

Most conventional lawn sprinklers are provided with sprayers which discharge water in the form of a plurality of jets. These sprayers may be either stationary or rotatable, but in either event the jets are projected substantially equidistantly therefrom so that the spray covers a substantially circular area. Sprinklers of this type are generally satisfactory, but they obviously cannot be used in narrow or irregularly shaped areas without considerable waste of water. In the interest of efficiency and economy, the sprinkler should spray the entire area uniformly but confine the spray to the area.

More recently, efforts have been made to devise sprayers which project the various jets different distances so that an area having a non-circular or irregular outline can be watered and in such manner that the spray is uniformly distributed over but confined to the area. These latter type sprinklers are particularly efficacious when incorporated in underground sprinkling systems since in these systems, the individual sprinklers are permanently installed and the areas to be covered by each sprinkler can be definitely ascertained. Obviously, the areas covered by the various sprinklers vary according to the location of the sprinkler in the system. In the case of small residences, where one centrally located sprinkler may be used to cover the entire yard, the outline of the area varies according to the shape of the house and lot and the location of the house on the lot.

An important object of the present invention is to provide a sprinkler that will uniformly spray an area of non-circular or irregular outline.

Another object of the invention is to provide a sprinkler of the above-mentioned character that includes an element for controlling the spray so that it is confined to the area being watered.

Still another object of the invention is to provide a sprinkler of the above-mentioned character in which the outline of the spray can be adapted to any particular area by uniquely shaping the spray control element.

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Yet another object of the invention is to provide a sprinkler of the above-mentioned character in which the spray control element is detachably mounted in the sprinkler.

A further object of the invention is to provide a sprinkler of the above-mentioned character in which all of the sprinkler parts except the spray control element may be standardized.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the drawings, forming a part of this specification and wherein like numerals are employed to designate like parts throughout the same:

Fig. 1 is a fragmentary top plan view of a house and lot and showing a sprinkler embodying the present invention disposed substantially centrally in the portion of the lot extending forwardly of the house;

Fig. 2 is a longitudinal sectional view of the sprinkler, and showing the rotary sprayer in the lowered position which it normally occupies when the device is not in operation;

Fig. 3 is a view similar to Fig. 2 but showing the rotary sprayer in the raised position which it occupies during operation of the device;

Fig. 4 is a transverse sectional view through the sprayer taken on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary longitudinal sectional view taken on the line 5—5 of Fig. 3, showing the sprayer and spray control element in elevation;

Fig. 6 is a fragmentary longitudinal sectional view taken on the line 6—6 of Fig. 3;

Fig. 7 is an extended or developed view of a spray control element; and,

Fig. 8 is a perspective view of the spray control element.

Considered in certain of its broader aspects, the sprinkler comprises a valve casing which may be imbedded in the ground and is adapted for attachment to a water supply pipe. Mounted within the casing is a sprayer having a plurality of fluid passages through which water is discharged from the casing. The sprayer is normally disposed below the top of the casing but fluid pressure in the casing rotatably drives the sprayer and forces it upwardly so that the discharge orifices of the passages are positioned above the ground surface to direct the water radially outwardly in the form of a plurality of jets. A stationary range control band surrounds the sprayer within the casing and controls the inlet orifices of the passages when the sprayer is in the raised position. If the inlet orifices have identical cross-sec-

tional areas and are positioned in alignment around the circumference of the sprayer, and the lower edge of the range control band is rectilinear so that it reduces the cross-sectional area of each orifice by an equal amount, all of the jets will be of the same length and a substantially circular area will be watered. However, if instead of being rectilinear the lower edge of the range control band is irregular and formed with a downward extension, the cross-sectional areas of the inlet orifices are successively reduced as they rotate to a position behind the extension. Consequently, the jet from the outlet of each passage is reduced in length as its inlet orifice moves into register with the extension. If the extension is formed with straight sides the jets will be abruptly shortened. On the other hand, if the extension is formed with a curved edge, so that in effect it constitutes a downward bulge or swell in the range control band, the jets will be gradually shortened and then lengthened as the inlet orifices move into and out of register therewith. Thus, by properly shaping the lower edge of the range control band and correctly positioning it in the casing the length of the jets can be continually controlled and made to follow the outline of an area of substantially any predetermined shape. Moreover, if the size and shape of the area to be watered is known, together with the location of the sprinkler in the area, a range control band can be fashioned that will adapt the spray to the particular area. From the foregoing it will be readily appreciated that the shape of the band depends entirely upon the outline of the particular area to be watered.

The range control band is preferably made from light-weight sheet metal and is removably mounted in the casing. All the other parts of the sprinkler are standardized and from a commercial standpoint, this is very important. Except for the range control bands, the sprinklers can be made relatively inexpensively by mass production methods. If the manufacturer is informed with respect to the size and shape of the area to be sprinkled, he can easily determine the best location for the sprinkler and devise a range control band that will adapt the sprinkler to the area. Thus, only the range control band must be specially fabricated.

For a more complete description of the invention reference is had to the accompanying drawings wherein the numeral 10 designates a hollow valve casing. The open upper end of casing 10 is provided with a removable cap 12 and the lower end thereof is formed with a centrally located downward extension 14 which is provided with external screw threads 16. As best shown in Figs. 1–3, the casing 10 is adapted to be imbedded in the ground preferably with the cap 12 substantially flush with the ground surface 18 and the extension 14 is screwed into a pipe fitting 20 provided at the outer end of an underground water supply pipe 22. In Fig. 1, the casing is shown disposed substantially centrally in the yard 24 of a residence or other building 26 and pipe 22 is shown attached to a conventional sillcock 28 through which water from the city main is supplied to the sprinkler casing.

Mounted for rotation and limited vertical movement in the casing 10 is a sprayer which is designated generally by the numeral 30. The upper portion of the sprayer projects through an opening 32 provided centrally in the cap 12 and the lower portion thereof is disposed in the casing 10 and within an annular extension 34 on the cap. A leather washer 38 which seats upwardly against the cap 12 within the extension 34 and snugly fits the sprayer 30 provides a watertight joint between the cap and sprayer and seals the opening 32. The sprayer 30 is provided with a pair of diametrically opposed vertical passages 40 and 42. At their lower ends the passages 40 and 42 are provided with relatively narrow, vertically elongated lateral extensions 44 and 46, respectively, which open through the side wall of the sprayer 30 and constitutes inlet orifices through which water in the casing is admitted to the passages. At their upper ends passages 40 and 42 are provided with upwardly and outwardly inclined portions 48 and 50 which constitute discharge orifices through which water is projected in the form of concentrated streams or jets. The lateral extensions 48 and 50 are preferably disposed at an angle of approximately 45 degrees to throw the water a substantial distance from the sprinkler.

While the sprayer is here shown provided with a pair of fluid discharge passages, it is to be understood that it may be formed with any desired number of passages depending upon the distance the jets are to be projected from the sprayer. Since water is supplied to the casing at substantially a constant pressure, the jets will be projected a maximum distance from the sprinkler if only one passage is provided and progressively lesser distances as the number of passages is increased.

A fluid pressure actuated driving rotor 52 is attached to the lower end of sprayer 30 by a threaded stud 54. The rotor comprises a horizontally elongated head 55 formed with a tubular shank 56 which is mounted for vertical sliding movement in an opening 58 provided centrally in the bottom of casing 10. The projecting end of the shank extends into an enlarged recess 60 and carries a nut 61 which engages the top of the recess to limit upward movement of the rotor and sprayer. As best shown in Figs. 3 and 4, the central passage 62 of the shank communicates at its upper end with a horizontal passage 64 in head 55. The latter passage is substantially S-shaped and its ends open through the head substantially in opposite directions.

When the supply of water to the sprinkler is shut off, the driving rotor 52 and sprayer 30 are in the lowered, inoperative position shown in Fig. 2. In this position, rotor head 55 seats on the bottom of the casing 10 while sprayer 30 is disposed flush with the cap 12 and with outlets 48 and 50 covered by the wall of opening 32. In this connection, the cap 12 is preferably formed with a centrally located boss 70 which projects above the ground surface 18 to prevent dirt and the like from entering passages 40 and 42. Boss 70 provides additional bearing surface for the sprinkler and also forms a nut by means of which the cap 12 can be tightened or loosened on the casing.

When sillcock 28 is open so that water under pressure is supplied to the sprinkler, water discharges into the casing 10 in two oppositely directed streams through the ends of passage 64 and rotatably drives rotor 52 and sprayer 30. Water in the casing 10 also lifts the rotor 52 and sprayer 30 from the lowered or inoperative position shown in Fig. 2 to raised operative position shown in Fig. 3. In this position of the sprayer, discharge orifices 48 and 50 are uncovered so that water escapes from the casing 10 through passages 40 and 42 and is projected therefrom in oppositely directed jets. Rapid rotation of the sprayer tends

to break up the jets and distribute the water more or less uniformly over the area being sprinkled.

The distance the jets of water are projected from the sprinkler is controlled by a range control ring or band 74 interposed between the rotatable sprayer 30 and the stationary extension 34 on the cap 12 which closely surrounds the enlarged lower end portion of sprayer 30. The range control band 74 is formed with a radial lug 76 which projects through a longitudinal slot 78 in the tubular extension 34 above the split ring 80. The latter seats in an annular groove 82 in the extension 34 and holds the range control band in proper vertical position with respect to the water inlets 44 and 46. It will be readily apparent that the slot 78 fixedly positions the range control band 74 circumferentially on the extension 34 and that the ring 80 can easily be disengaged from the extension to permit insertion or removal of the range control band.

The range control band 74 partially covers the inlet orifices 44 and 46 when the sprayer 30 is in raised position and its lower edge is shaped as best shown in Figs. 7 and 8 selectively to control the volume of water entering passages 40 and 42. The manner in which the range control band 74 functions continually to control the length of the jets of water projected from the sprayer has been described in detail and it will be apparent that, if the band is properly shaped, the jets will follow the outline of the yard 24 as the sprayer 30 rotates. The numerals beside the dotted lines which extend radially from the sprinkler in Fig. 1 indicate the relative distances from the sprinkler of various points on the edge of yard 24.

As shown in Figs. 7 and 8, the range control band is preferably made from a strip of relatively thin sheet metal, the lug 76 being fashioned from tabs 84 and 86 formed integrally on the ends of the strip. In Fig. 7, the band is shown in the extended or developed position and in Fig. 8 it is shown fully formed and ready for mounting in the sprinkler casing. It will be noted that when fully formed the band is substantially circular in transverse section and the tabs 84 and 86 are positioned together and bent to extend radially from the body of the band.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of same and that various changes in the size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. A sprinkler comprising a hollow body provided with a fluid inlet; a sprayer mounted for rotation in said body and provided with a plurality of apertures through which fluid is discharged from the body; a stationary range control band in the body coactive with said sprayer to control said apertures; and means detachably securing said range control band to the body.

2. A sprinkler comprising a hollow body provided with a fluid inlet; a sprayer mounted for rotation in said body and provided with a plurality of apertures through which fluid is discharged from the body; a stationary range control band in the body coactive with said sprayer to control the apertures; and a mounting for said range control band including a stationary support; and means for detachably fastening the range control band to said support.

3. A sprinkler comprising a hollow body provided with a fluid inlet; a sprayer mounted for rotation in said body and provided with a plurality of apertures through which fluid is discharged from the body; a stationary range control band in the body coactive with said sprayer to control the apertures; and a mounting for said range control band including a stationary support interengaging with parts of the range control band to hold the latter against movement in one direction, and catch means carried by the support and coacting with the range control band to hold it against movement in another direction.

4. A sprinkler comprising a hollow body provided with a fluid inlet; a sprayer mounted for rotation in said body and provided with a plurality of apertures through which fluid is discharged from the body; a stationary range control band in the body coactive with the sprayer to control said apertures; and a mounting for said range control band including a slotted stationary support, a lug on the range control band disposed in said slot, and a catch carried by the support and coacting with the lug to hold the same in the slot.

5. A sprinkler comprising a hollow body provided with a fluid inlet; a sprayer mounted for rotation in said body and provided with an annular series of apertures through which fluid is discharged from the body; a stationary control band mounted within the body and surrounding the sprayer so that one edge thereof controls said apertures; an annular support surrounding the range control band; and means for detachably fastening the range control band to said support.

6. A sprinkler comprising a hollow body provided with a fluid inlet; a sprayer mounted for rotation in said body and provided with an annular series of apertures through which fluid is discharged from the body; a stationary range control band mounted within the body and surrounding the sprayer so that one edge thereof controls said apertures; an annular support surrounding the range control band, said support interengaging with parts of the range control band to hold the latter against rotative movement; and catch means carried by the support and coactive with the range control band to hold it against axial movement.

7. A sprinkler comprising a hollow body provided with a fluid inlet; a sprayer mounted for rotation in said body and provided with an annular series of apertures through which fluid is discharged from the body; a stationary range control band mounted within the body and surrounding the sprayer so that one edge thereof controls said apertures; a slotted annular support surrounding the range control band; a lug on the range control band disposed in said slot; and a catch carried by the support and coacting with the lug to hold the same in said slot.

8. A sprinkler comprising a hollow body provided with a fluid inlet; a fluid pressure actuated sprayer mounted for rotation and limited vertical movement in the body, said sprayer provided with a plurality of apertures through which fluid is discharged from the body; and a stationary range control band removably mounted in the body around the sprayer, the lower edge of the band controlling flow of fluid through the apertures when said sprayer is in the raised position.

9. A sprinkler comprising a hollow body provided with a fluid inlet; a fluid pressure actuated sprayer mounted for rotation and limited vertical movement in the body, said sprayer provided with a plurality of apertures through which fluid is discharged from the body; a stationary range

control band disposed in the body and around the sprayer, the lower edge of the band controlling flow of fluid through the apertures when said sprayer is in the raised position; and means for detachably securing the range control band in the body.

10. A sprinkler comprising a hollow body provided with a fluid inlet; a fluid pressure actuated sprayer mounted for rotation and limited vertical movement in the body, said sprayer provided with a plurality of apertures through which fluid is discharged from the body; a stationary range control band disposed in the body and around the sprayer, the lower edge of the band controlling flow of fluid through the apertures when said sprayer is in the raised position; and a mounting for said range control band including a stationary support and means detachably fastening the range control band to said support.

11. A sprinkler comprising a hollow body provided with a fluid inlet; a fluid pressure actuated sprayer mounted for rotation and limited vertical movement in the body, said sprayer provided with a plurality of apertures through which fluid is discharged from the body; a stationary range control band disposed in the body and around the sprayer, the lower edge of the band controlling flow of fluid through the apertures when said sprayer is in the raised position; a slotted annular support for said range control band; a lug on the range control band extending through a slot in said support; and catch means engaging said lug to hold the range control band detachably secured to the support.

12. A sprinkler comprising a hollow body provided with a fluid inlet; a fluid pressure actuated sprayer mounted for rotation and limited vertical movement in the body, said sprayer provided with a plurality of apertures through which fluid is discharged from the body; a stationary range control band disposed in the body and around the sprayer, the lower edge of the band controlling flow of fluid through the apertures when said sprayer is in the raised position; an annular support for the range control band, said support having a free lower edge and a vertical slot opening through and extending upwardly from said lower edge; a lug on the range control band projecting through said slot; and catch means engaging said lug to hold the range control band detachably secured to the support.

13. A sprinkler comprising a hollow body provided with a fluid inlet; a fluid pressure actuated sprayer mounted for rotation and limited vertical movement in the body, said sprayer provided with a plurality of apertures through which fluid is discharged from the body; a stationary range control band disposed in the body and around the sprayer, the lower edge of the band controlling flow of fluid through the apertures when said sprayer is in the raised position; an annular support for the range control band, said support having a free lower edge and a vertical slot opening through and extending upwardly from said lower edge; a lug on the range control band projecting through said slot; and a split ring around the support below the projecting end of the lug holding the range control band detachably associated with the support.

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