

Fig. 3

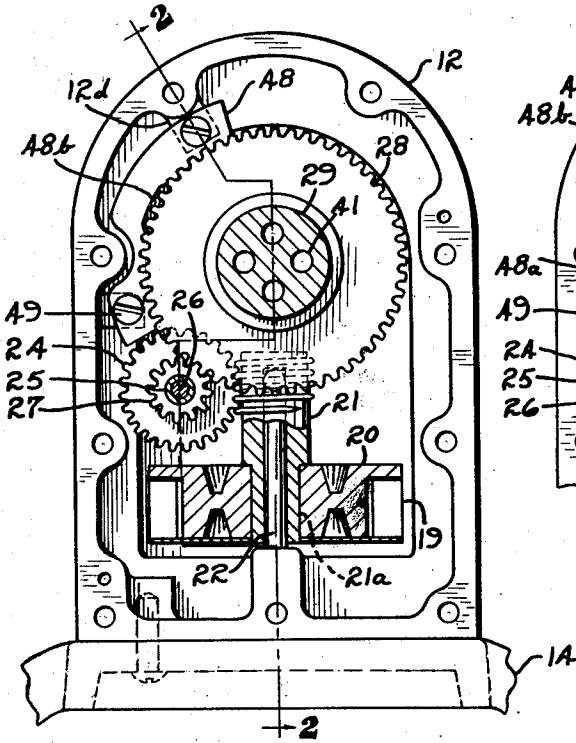


Fig. 4

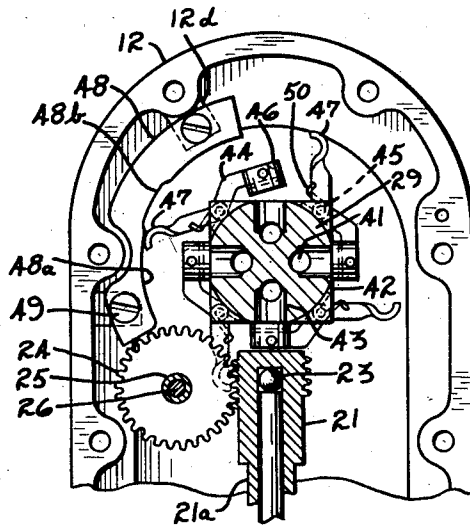


Fig. 9

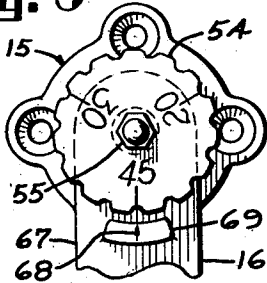


Fig. 7

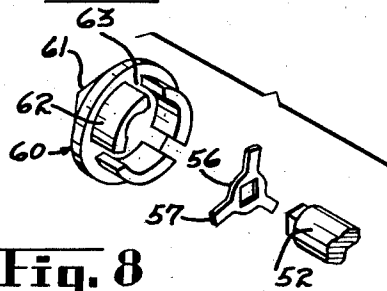


Fig. 8

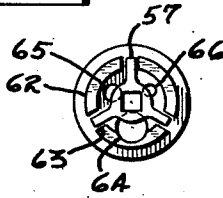
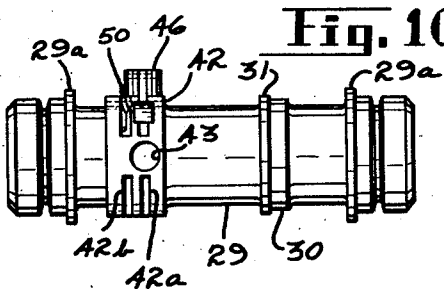


Fig. 10



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2,693,390

LAWN SPRINKLER

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5 Claims. (Cl. 299—18)

This invention relates to sprinklers for watering lawns, gardens or the like, and especially to sprinklers of the type where the water discharging members or nozzles are continuously moved about a horizontal axis as distinguished from that class where the arms or nozzles are spun about a vertical axis.

It is an object of this invention to provide an improved sprinkler having power-driven discharging nozzles arranged in a horizontal position for more uniformly sprinkling a square or rectangular area of a lawn. Heretofore, sprinklers of this general character have been of the oscillatory type in which the discharging nozzles are operated by a crank connecting with a rotating member resulting in a harmonic oscillatory motion which would always produce a long dwell at the opposite ends of the oscillatory stroke and resulting in a greater dispersion of water at the end of the sprinkled area than at the middle.

This unwanted condition is overcome by our invention that has for one of its objects the operation of a horizontal discharge nozzle in a continuous rotary unidirectional motion about its longitudinal axis and having the water ejected periodically from the successive discharge nozzle orifices arranged about the nozzle when said orifices are passing through the upper arc of their rotation.

Another object is to provide a driven sprinkler of the above character in which the horizontal discharge nozzle is provided with a series of longitudinal rows of discharge orifices arranged about the nozzle and in which the water supply to each of the separate rows is individually controlled so that there will result in the continuously rotating nozzle a recurrent spray uniformly advancing always in one direction from one extremity of the pattern to the other and preferably through an arc of less than 180°.

Another object of this invention is to throttle the water flow to the separate rows of the discharge orifices as the rotating discharge orifices approach and leave the uppermost vertical position of their discharge so as to cut the fluid dispersion in the area of the center plane of the sprinkler.

Another object is to selectively throttle the flow of water to the power wheel without changing the wheel velocity for the purpose of cutting down on the area to be sprinkled.

With these and other objects in view the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more fully understood by reference to the following description when considered in connection with the accompanying drawings, in which,

Fig. 1 is a perspective view of the sprinkler as it appears in operation.

Fig. 2 is a vertical sectional view through the sprinkler on an enlarged scale, the view taken along the line 2—2 of Fig. 3.

Fig. 3 is a transverse sectional view taken along the line 3—3 of Fig. 2, with the right half of the casing removed.

Fig. 4 is another transverse sectional view taken along the line 4—4 of Fig. 2, with the right half of the casing removed.

Fig. 5 is a transverse sectional view of the discharge arm, the view taken along the line 5—5 of Fig. 2.

Fig. 6 is a horizontal sectional view taken along the line 6—6 of Fig. 2.

Fig. 7 is a perspective exploded view of the selective

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volume control valve at the entrance of the sprinkler housing.

Fig. 8 is an end view of the control valve with its operating spider.

5 Fig. 9 is an end view of the volume control unit removed from the casing, and,

Fig. 10 is a side view of a portion of the nozzle carrying hub member.

Referring now to the drawings in which like reference numerals denote like parts throughout the several views, the numeral 10 refers generally to a hollow casing formed of two companion parts, a right section 11 and a left section 12, the parts being secured together to form the casing as by screws 13. The casing 10 is supported on a pedestal or stand 14 which is preferably of the sled type to permit the sprinkler to be drawn over the area to be sprinkled. Water is directed into the casing through a volume-control unit 15 the details of which will be more fully explained later. This unit 15 is in the form of an elbow housing 16 secured to the right casing 11 as by screws 16a. The opposite end of the housing 16 is provided with a swivel nut 17 to which suitable connection may be made to a supply hose (not shown). The elbow housing 16, as best shown in Fig. 2, is attached to the right casing section 11 in line with an embossed part 11a within which embossed part is provided a port 18 biased to the axis of the control unit 15 so as to direct the water against the fins 19 of a waterwheel 20 positioned in the lower part of the casing 10.

The waterwheel 20 is mounted on the extension 21a of a worm pinion 21 by a drive fit so that the two parts will act as a unit. The waterwheel 20 and worm pinion 21 as a unit are rotatively mounted on a vertical spindle 22 projecting upwardly from the base of the left housing 12 and supported thereon by a thrust ball bearing 23. The worm pinion 21 drives a wormwheel 24 secured on a sleeve member 25 which in turn is freely rotatable on a horizontal axle shaft 26. The axle shaft 26 has its opposite ends suitably supported in projecting bosses 11b and 12b formed respectively on the inside of the right and left casing sections 11 and 12. Also rigidly mounted upon the sleeve member 25 is a pinion gear 27 which in turn meshes with a large drive gear 28 for operating a relatively large hub 29 horizontally supported in the casing 10. Specifically the gear 28 is force-fitted upon an enlarged section 30 of the hub 29 against a stop flange 31. The hub 29 is rotatably mounted in embossed bearings 11c and 12c formed as a part of the right and left casing sections 11 and 12 and held against endwise movement within the housing 10 as by means of flanges 29a formed as an integral part thereof and positioned adjacent the inner faces of the bearings 11c and 12c. The opposite ends of the hub 29 have rotatable engagement within the bearings 11c and 12c and are there suitably sealed as by sealing rings 32.

The fluid passing through the housing 10 is discharged through suitable nozzle units 33 attached to the opposite ends of the hub 29. These nozzle units are both alike and it is considered sufficient to describe only one. Each unit consists of a core 34 and a tubular shell 35 telescoped thereover and held in position thereon by means of an end cap 36. The core 34, shell 35 and end cap 36 as a unit are detachably secured to the end of the hub 29 as by an attaching screw 37.

As best shown in Fig. 5 each of the cores 34 is provided with four longitudinal grooves 38 which are preferably U-shaped in cross section and extend the entire length of the core. The tubular shell 35 is formed with longitudinal rows of serrated-like formations 39 which increase in angularity from their inner end to their outer end and each of these serrations is provided with a discharge orifice 40. These serrations as noted in Fig. 5 extend downwardly into the grooves 38 in the core 34 to prevent relative rotation. When the nozzle units 33 are attached to the end of the hub 29 the core grooves 38 will line up with longitudinal holes or passages 41 provided in the hub 29 and passing entirely therethrough from end to end.

In order to periodically supply water to the nozzle units 33 the hub 29 is formed with an integral squared section 42 having entrance ports 43 therein that intercept the holes 41, and it is through these ports that water

is directed from the interior of the casing 10 to the discharge nozzle units 33. The fluid that passes through the casing is directed periodically into the interior of the hub 29 through a cam-controlled valve mechanism which is best shown in Fig. 4. This unit consists of four levers 44 each of which is fitted into slot 42a and pivotally connected to each corner of the squared section 42 as by a pivot pin 45. To one of the ends is hingedly attached a closure valve 46 which when in closed position serves to close off its respective port 43. The opposite end of each lever 44 is provided with a cam follower 47 adapted to engage against the arcuate face 48a of a cam member 48 secured to supporting bosses 12d formed on the interior of the left casing 12 as by screws 49. The levers 44 are normally tensioned in a clockwise direction as by springs 50 located in slots 42b in squared section 42 and there held in position by the pivot pins 45 and tensioned against the adjacent face of the hub 29 and the edge of the levers 44.

Volume control unit

A more detailed description of the volume control unit 15 is now given. The construction of this unit is best shown in Figs. 2, 6, 7 and 8. The elbow housing 16 of this unit previously referred to has an integral hub portion 51 in which is pivotally mounted a stud shaft 52 and having sealing engagement therewith as by any suitable sealing ring 53. The outer end of the stud shaft 52 is provided with an operating knob 54 held in place by a cap nut 55. To the opposite inner end of the shaft 52 is riveted a spider member 56 having three radially extending arms 57 (see Fig. 7).

The embossed part 11a of the housing 11 to which the control unit 15 is attached is provided with a recess 58 terminating in a conical base 59. This conical base 59 in fact serves as a valve face with which the port 18 intercepts. The port 18 is adapted to be closed off by valve member 60 consisting of a conical shaped head 61 complementary to the conical base 59 and extending from the opposite wall of the valve member as a cylindrical sleeve 62 intercepted by three equally spaced slots 63. The head 61 of the valve member 60 is provided with three jet orifices, a large one 64, an intermediate one 65 and a small one 66. These orifices are all biased to the axis of the valve member 60 and arranged to be coincident with the axis of the port 18 upon the proper adjustment of the operating knob 54. The valve member 60 is preferably held within the recess 58 to permit some amount of floating. This is accomplished by reason of the fact that the elbow housing 16 is formed with an integral sleeve 67 that telescopically fits into the recess 58 and is of a length to remain just short of contacting with the valve member 60 in the manner shown in Figs. 2 and 6. The valve member 60 is adapted to be turned to selectively register any one of the three jet orifices 64, 65 and 66, with the port 18 through the connection of the spider member 56 having its radial arms 57 engaging in the slots 63 of the valve sleeve 62.

In order to predetermine the size of the area to be sprinkled the operating knob 54 is provided with indicia such as 20, 30 and 45, representing the size of the area in feet to be sprinkled and these indicia may be turned to line up with an indicator arrow 68 provided on the end of an extension 69 formed as an integral part of the elbow housing 16. The turning of the knob 54 to align an indicium with the indicator arrow will bring the desired jet orifice of the valve member 60 in alignment with the port 18.

Also if it is desired to modulate the amount of fluid dispensed from the discharging orifices 40 of the nozzles 33 during their period of operation, this can be readily accomplished by the particular shaping of the cam surface 48a of cam 48. As for instance, the dispersion could be cut down when the discharging row of orifices are passing through the mid portion of their respective discharging period by providing a slight arcuate cutout in the cam face as indicated at 48b (see Fig. 4).

Operation

When it is desired to operate the sprinkler it will first be connected to the end of a supply hose by the swivel nut 17. Next, the size of the area to be sprinkled will be judged and a proper setting made of the control knob 54 in accordance with the larger, intermediate or smaller area to be covered. When the water is turned on it will

fill the control unit 15 and pass through the selected jet orifice 64, 65 or 66 in the valve head 61 depending on the size of the area to be sprinkled and thence through the port 18 and impinge against the fins of the waterwheel 20 causing the latter to rotate. Rotation of the waterwheel 20 will impart a relatively slow continuous rotation to the hub 29 through the worm gears 21 and 24 and the spur gears 27 and 28.

The nozzle units 33 being attached to the hub 29 will, of course, rotate in a continuous direction with said hub. It will be understood that streams of water will be forced through the rows of discharge orifices 40 only when they turn through an arc above the horizontal plane coincident with the nozzle axis. This intermittent discharge of water from the individual rows of orifices is controlled by the closure valves 46 cooperating with the intake ports 43 in the squared section 42 of hub 29. The proper time sequence is controlled by the valves 46 being operated only when the cam followers 47 on the levers 44 wipe against the arcuate face 48a of the cam member 48. It is to be understood that the length of the cam member 48 and the relative position and construction of the port valve levers 44 are such that each succeeding row of orifices will start a jet delivery before the preceding row of nozzle orifices cease their jet delivery in order to maintain continuous flow of water into and through the casing and insure uninterrupted operation of the waterwheel 20.

It is to be understood that the speed of rotation of the waterwheel 20 and discharge nozzles 33 are substantially constant throughout the complete range setting of the area control despite the fact that there is a change in size of the jet orifices to control the area to be sprinkled. The largest jet orifice 64 will be selected to align with the port 18 for the largest area as indicated by 45 on the hand knob 54, the intermediate orifice 65 will be aligned with port 18 as determined by the setting 30 on the knob, and the smaller orifice 66 will be aligned with port 18 as determined by the setting 20 on the knob. These are just arbitrary settings and it is conceivable that numerous jet orifices could be provided in the valve head 61 with a corresponding number of indicia on the knob 54 for a finer selection of area control.

This invention is directed primarily to the provision of a sprinkler accomplishing the purposes of an oscillating sprinkler but differing in that a repeating sheet of jet sprays is always passing in the same direction across the area being sprinkled. So far as is known this is new in the art of lawn sprinklers. The new results are that there is no dwell period at the end of the sheet of jet sprays such as occurs at the end and return stroke of oscillating sprinklers and deposits an excessive amount of water at the extreme ends of the area sprinkled and a lesser amount at the intermediate area.

While there is shown only a single embodiment of our invention it is to be understood that the invention is not to be limited thereto but may comprehend other constructions included within the scope and sphere of the appended claims.

We claim:

1. A sprinkler comprising a hollow casing, a horizontal nozzle rotatably mounted on the casing, said nozzle having a plurality of discharge orifices, a waterwheel within the casing, means directing a stream of water against said waterwheel to rotate the same, gear train means for rotating said nozzle continuously in one direction from said waterwheel at a reduced speed, valve means rotating with said nozzle, and stationary cam means for operating the valves to admit water only to those orifices which are passing through their upper arc of rotation.

2. A sprinkler comprising a hollow casing, a nozzle rotatably mounted on the casing, said nozzle having discharge orifices around its periphery, a waterwheel within the casing, means directing a stream of water against said waterwheel to rotate the same, means transmitting rotary motion of the waterwheel to the nozzle at a reduced rate of speed, intake ports on said nozzle for receiving fluid from said casing, valve means carried by said nozzle, and cam means in said casing cooperating with said valve means for operating the valve means to open and close said ports in timed series during the rotation of said nozzle.

3. A sprinkler as defined by claim 2 wherein the means for directing the water against the waterwheel consists of various sizes of jet orifices which may be manually op-

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erated to change the character of the stream of water directed against the waterwheel for the purpose of obtaining different sprinkled areas.

4. A sprinkler as defined by claim 2 wherein the cam means can operate to modulate the character of the stream of water discharging from said nozzle. 5

5. A sprinkler comprising a hollow casing and nozzle member projecting horizontally from the casing and journaled in the wall of said casing for rotating movement around its longitudinal axis, means for admitting water to the casing, power means inside the casing operated by the flow of water therethrough to rotate said nozzle continuously in one direction about its longitudinal axis, said nozzle having a plurality of rows of discharge orifices extending lengthwise thereof, a separate lengthwise passageway communicating with each row of orifices, and valve means inside said casing for selectively controlling com- 10 15

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munication between said casing and said passageways so as to admit water only to those orifices which are passing through their upper arc of rotation.

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