March 14, 1933. J. H. KEYS 1,901,655

LAWN SPRINKLER

Filed April 1, 1929

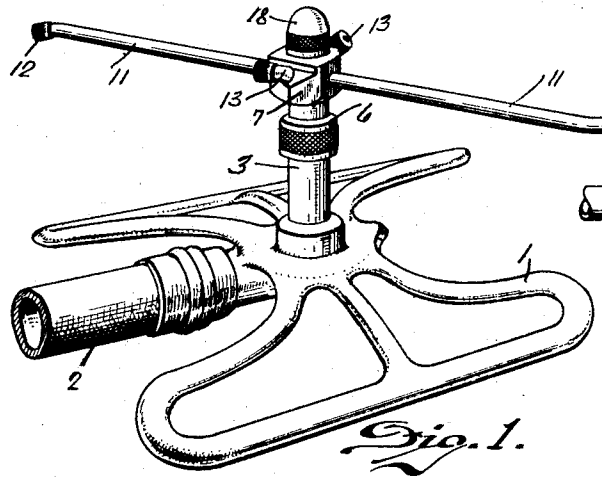


Fig. 1.

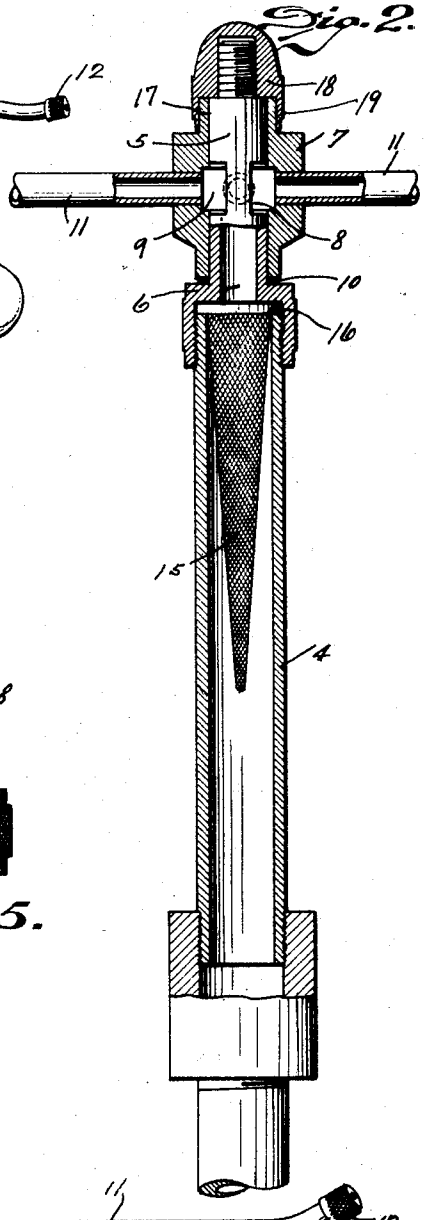


Fig. 2.

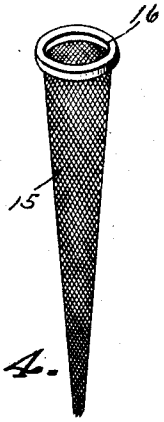


Fig. 4.

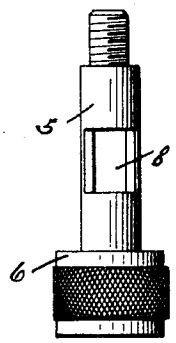


Fig. 5.

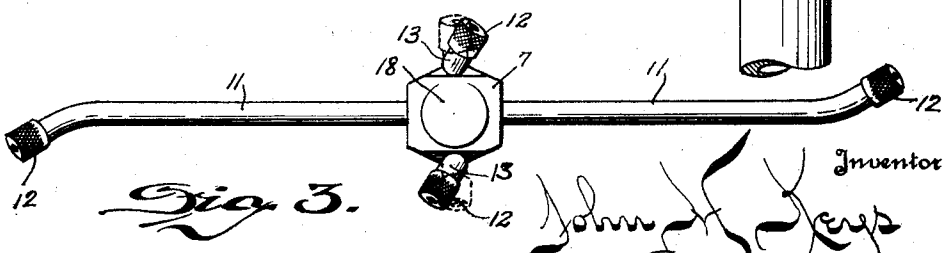


Fig. 3.

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UNITED STATES PATENT OFFICE

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LAWN SPRINKLER

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This invention relates to rotary sprinklers for lawn and garden purposes, and more particularly to a rotary sprinkler of the jet propulsion type.

Rotary sprinklers having radially disposed jet arms discharging their streams angularly to the radii of the distributor head are quite commonly employed. Such sprinklers when operating under comparatively high water pressure, are caused to rotate at such high rate of speed that the discharged streams are so broken and diffused that they do not have a long range carrying capacity and hence the area of operation covered by such sprinkler is quite restricted.

The present invention contemplates providing upon such reaction propelled sprinkler, additional discharge nozzles which will have an increased range and will cover a circle of operation beyond the range of the propulsion jet, and which may be adjusted to various inclined positions to vary and regulate the field of operation. Such additional jet nozzles are also capable of being adjusted to inclined position in opposition to the propulsion jet arms whereby the reaction of the discharged streams from such nozzles will have a neutralizing or retarding affect upon the rotation of the distributor head under the influence of the jet arms, thereby enabling the sprinkler to be adjusted for most effective operation under various water pressures. The present construction is further provided with a protective cap for excluding sand and grit from the bearing of the rotary head, and the device is further provided with a strainer element removably located in the supply conduit.

The object of the invention is to simplify the structure as well as the means and mode of operation of rotary lawn and garden sprinklers whereby they will not only be cheapened in construction but will be more efficient in use, positive in operation, uniform in action, easily controlled and unlikely to get out of order.

A further object of the invention is to provide means for increasing the effective range of operation of such rotary sprinklers, and to further provide means for regulating the rate of rotation to accommodate the sprinkler to variations of water pressure and to control the character and range of the discharge stream.

A further object of the invention is to provide fluid pressure control means for regulating the rate of rotation of such sprinkler.

A further object of the invention is to provide improved strainer means removably applicable to the supply conduit of the sprinkler.

A further object of the invention is to provide means for excluding sand and grit from the bearing of the rotary head.

With the above primary and other incidental objects in view, as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof, and the mode of operation or their equivalents as hereinafter described and set forth in the claims.

Referring to the accompanying drawing wherein is shown the preferred but obviously not necessarily the only form of embodiment of the invention, Fig. 1 is a perspective view of an assembled rotary lawn sprinkler in which the present invention has been embodied.

Fig. 2 is a vertical sectional view of the rotary head and its mounting.

Fig. 3 is a top plan view of the rotary head illustrating the relation of the propulsion jet arms and the governing discharge nozzle.

Fig. 4 is a perspective view of the strainer member removed from the supply conduit.

Fig. 5 is a side elevation of the stationary trunnion upon which the rotary head is mounted.

Like parts are indicated by similar characters of reference throughout the several views.

The rotary sprinkler, forming the subject matter hereof, is adapted for lawn use in which case the rotary head is mounted upon a portable base, as shown in Fig. 1, and is also applicable to garden use and for spraying orchards and the like, in which case the rotary head is preferably elevated upon an upright supply column as illustrated in Fig. 2.

Referring to Fig. 1, 1 is the portable base or support with which is connected a supply hose 2 communicating through an upstanding stem 3 with the rotary distributor head. Mounted on the upper end of the stem 3 of the portable sprinkler, or upon the upper end of the supply column 4 of the stationary installation, shown in Fig. 2, is a hollow trunnion 5 having at its lower end an enlarged internally screw threaded head for engagement with the stem 3 or column 4. This head 6 of the hollow trunnion 5 is shouldered to form a step bearing for the rotary head 7. The trunnion 5 extends entirely through the rotary head 7 and is provided with lateral discharge openings 8 which register with an annular chamber 9 within the head 7, with which in turn the propulsion jet arms and discharge nozzles communicate. The discharge openings 8 in the hollow trunnion 5 have a capacity somewhat greater than the bore of such trunnion and extend throughout the full height and preferably slightly beyond the limits of the annular chamber 9 within the distributor head 7. The construction is such that the water pressure upwardly and downwardly within the head 7 is equalized and the head will rotate freely with a floating effect upon its trunnion. Thus the water pressure neither depresses the rotary head 7 strongly against the shoulder or step bearing formed by the head 6 of the trunnion 5, nor elevates the head off of such bearing. An anti-friction collar or washer 10 preferably though not necessarily, of German silver, is interposed between the rotary head 7 and the shoulder or step bearing of the trunnion. The rotary head 7 may be provided with any number of propulsion jet arms. In the drawing, but two of such arms are shown which extend in diametrically opposite position from the head 7 with their terminal ends bent slightly rearwardly with reference to the direction of rotation of the head. At their inner ends these jet arms 11 communicate with the chamber 9 interiorly of the head 7 and at their outer ends are provided with removable perforated caps 12 through which jets of water under pressure are discharged. The reaction of the discharged streams exerts a propelling effect upon the head 7 causing it to rotate upon its trunnion 5. Under high water pressure, this rate of rotation becomes so great that such discharged streams are broken and diffused, materially reducing their range. In the present case, additional discharge nozzles 13 are provided. These nozzles are unaligned or elbow shaped and are revolubly mounted in the head 7 as shown by the dot-dash position in Fig. 3. These nozzles also communicate with the water supply chamber 9. Such nozzles 13 are further provided with removable perforated caps similar to the caps 12 of the jet arms. These jet nozzles 13 are preferably so positioned and the orifices of their caps are so proportioned that they will discharge their streams through a higher trajectory and to greater range than the propulsion jet arms 11. This range of operation may be varied by slightly turning the nozzles 13 about their connection with the head 7 to raise or lower the trajectory of the discharged streams. These discharge nozzles 13 are preferably directed reversely to the jet arms 11. That is to say, where the jet arms 11 discharge streams rearwardly with reference to the direction of rotation of the head 7 which is propelled thereby, the nozzles 13 preferably discharge in a forwardly direction relative to the direction of rotation. Thus the reactive influence of the streams discharged from the nozzles 13 opposes the propelling influence of the jet streams discharged from the arms 11. This opposition of the discharged streams from one set of nozzles to the influence of the discharged streams from the other nozzles exerts a retarding influence upon the rotation of the head 7 and reduces its speed to such extent that the streams are not so greatly broken up and diffused, and consequently a larger area may be covered. By varying the inclinations of the nozzles 13 relative to the plane of rotation and thus varying the opposing effect of the discharged streams, the speed of rotation may be regulated. In the event of an extremely low water pressure, the direction of inclination of the nozzles 13 may be reversed, in which case the influence of the discharged streams will augment that of the streams discharged from the jet arms 11, and so increase the rotative tendency of the distributor head under low pressure.

The capability for adjustment of the nozzles 13 is also of great advantage and usefulness when the sprinkler is set in close proximity to a building, in which case the field of operation may be limited by depressing the inclination of the nozzles 13 so that the water will not be thrown upon or through the windows, or in other localities where such sprinkling is undesirable. It is also quite feasible to vary the range of operation and the action of the sprinkler by substituting for the perforated terminal caps of the nozzles 13 and arms 11, other similar caps having orifices of different size.

In some localities the water supply contains sand or gravel which may be carried through the supply conduit and find lodgement within the distributor head or in the outlet orifices from the nozzles or jet arms. To intercept such entrained sand or grit, there is provided within the stem 3, or within the column 4 of the stationary installation, a strainer member 15 of elongated tapered or conical form and preferably, though not necessarily, formed from wire

gauze or screen cloth. About its larger end, the strainer cone 15 is provided with a collar or peripheral flange 16 which is engageable between the end of the stem 3 or column 4 and the interior of the head 6 of the trunnion 5, which forms a continuation of such supply conduit. Thus the strainer member 15 is removably clamped in position with its apex turned in a direction opposite to that of the flow of water through the conduit. Thus any sediment, sand, gravel or scales from the interior of the conduit pipe is collected upon the exterior of the conical strainer 15 where it is more easily dislodged and not so likely to become compacted and solidified, as it would be interiorly of such strainer. In some localities, particularly in the southern states where the soil is sandy, protection must be afforded not only against entrance of grit and sand with the water supply stream but also against the entrance of such grit from external sources. To this end, the top of the distributor head 7 is formed with a concentric hub or flange 17 surrounding the upper end of the trunnion 5. Screw threaded upon the extremity of the trunnion 5 is a cap nut 18 having a dependent annular flange 19 which exteriorly surrounds and overlaps the hub or flange 17 upon the edge 7. The cap nut 18 and trunnion are stationary while the hub or flange 17 rotates freely within the dependent flange 19 of the cap nut. This construction is such that air blown sand and dust is not likely to find lodgment in the bearing of the distributor head.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its forms, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific details shown, but that the means and construction herein disclosed comprise the preferred form of several modes of putting the invention into effect and the invention is, therefore, claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:—

1. A rotary sprinkler including a supporting structure, a stationary hollow trunnion carried thereby and communicating with a source of supply of water under pressure, said trunnion having a lateral discharge orifice, a rotary distributor head revolubly mounted upon said trunnion and communicating with the discharge orifice of the trunnion, jet arms carried by the head, a shoulder upon said trunnion forming a step bearing for the rotary head, a circular hub formed on the top of the rotary head, and a cap member stationarily secured to the trunnion, a dependent flange upon the cap member enclosing the hub of the rotary head which is relatively revoluble therein.

2. In a rotary sprinkler, a supporting structure, a rotary distributor head carried thereby, a pair of oppositely extending propulsion jet arms carried by the head in balanced relation, and additional jet nozzles carried by the rotary head intermediate the first mentioned jet arms, on opposite sides of the head and discharging in such relation with the direction of rotation that the reaction influence of the discharged streams therefrom is in opposition to the propulsion influence of the jet arms whereby rotation of the head will be retarded, and means for supplying water to the rotary head.

3. A rotary sprinkler including a rotary distributor head, and two sets of reaction jet nozzles, one set being distantly spaced from the head and the other set being spaced intermediate those of the first set and close to said head, the respective sets of jet nozzles being disposed in transverse radial planes, and balanced relative to each other, the reaction of the discharged streams from one set of nozzles tending to rotate the head in one direction while the reaction of the discharged streams from the other set of nozzles tend to rotate the head in the opposite direction, the reaction of the streams discharged from the respective sets of nozzles being unbalanced whereby the rate of rotation of the head is retarded; and means for supplying water under pressure to said nozzles.

4. A rotary sprinkler including a rotary distributor head, and two sets of reaction jet nozzles arranged in transverse radial planes relative to the axis of the head, the respective members of each set of nozzles being substantially balanced relative to each other, the reaction of the discharged streams from one set of nozzles tending to rotate the head in one direction while the reaction of the discharged streams from the other set of nozzles tend to rotate the head in the opposite direction, one set of such nozzles being adjustable independently of the other set to vary the reactive relation of the streams discharged from the respective sets of nozzles whereby the speed of rotation of the head may be regulated, and means for supplying water under pressure to the rotary head.

5. A rotary sprinkler including a rotary distributor head, reaction jet arms carried by the head in relatively balanced relation and transmitting thereto a rotary motion, and jet nozzles adjustably mounted in relatively balanced relation intermediate said arms and adjustable to various stationary positions in-

clined to the horizontal, the jet arms or nozzles being of materially different radial extent; and means for supplying water under pressure to the rotary head.

6. In a rotary sprinkler, a rotary sprinkler head, a stationary trunnion upon which said head is mounted and extending through said head, an annular flange upon the head surrounding the trunnion, and a cap member stationarily secured to the trunnion and including a dependent flange overlapping the flange upon said head within which the enclosed portion of the head is relatively revoluble.

7. A rotary sprinkler, including a rotary distributor head, reaction jet arms having nozzles carried thereby for transmitting rotary motion to the head, the reactions of the jet arms producing a torque having its axis concentric with the axis of rotation, and inclined jet nozzles carried by said head, the reactions of which produce a torque concentric with said axis but unequally opposed to the torque of said jet arms, the inclination of which to the horizontal is variable so as to change the torque of the same, and means for supplying water under pressure to the rotary head.

8. A rotary sprinkler, including a rotary distributor head, reaction jet arms having nozzles carried by the head for transmitting rotary motion thereto, the reactions of said arms producing a torque having its axis concentric with the axis of rotation, and jet nozzles adjustably mounted upon the head for various inclination to the plane of rotation and discharging in a direction angular to the radii, the direction of the reaction of said jet nozzles being in opposition to the torque of said arms and concentric therewith, and means for supplying water under pressure to the head.

In testimony whereof, I have hereunto set my hand this 25th day of February, A. D. 1929.

JOHN H. KEYS.