

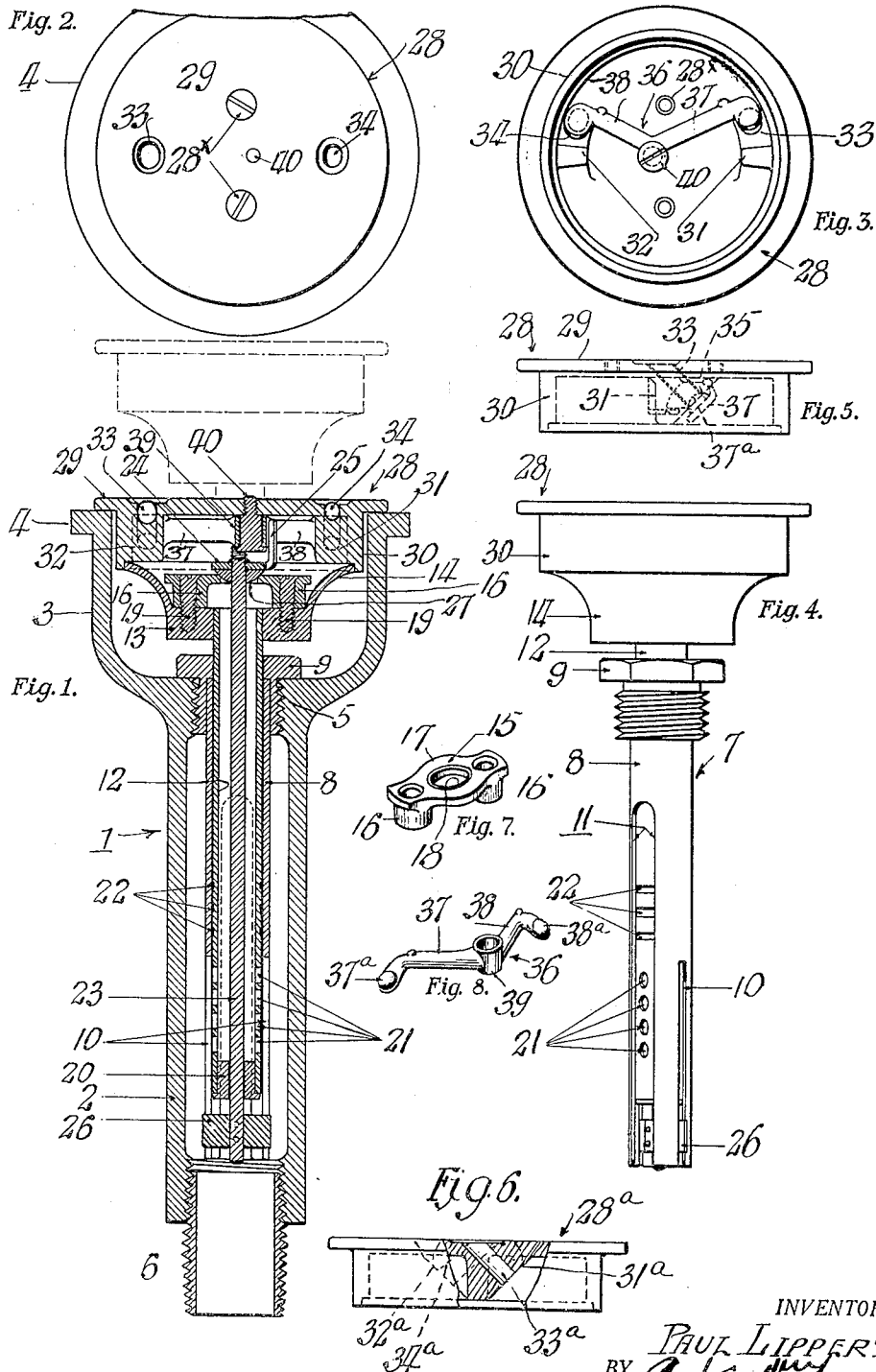
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P. LIPPERT

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SPRINKLER

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INVENTOR.
PAUL LIPPERT
BY *Arthur Nelson*
ATTORNEY

UNITED STATES PATENT OFFICE

PAUL LIPPERT, OF CHICAGO, ILLINOIS

SPRINKLER

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This invention relates to improvements in sprinklers and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

5 Sprinklers are employed in many industries for cooling, aerating and washing and have been in use for a long period of time for watering lawns. In large permanent installations for sprinkling lawns, certain types of
10 sprinklers are set flush with the lawn surface and are connected to underground piping systems. Such sprinklers are either of the rotating or oscillating type or of the stationary type and in some instances the structure
15 is such that the sprinkler head thereof, upon application of the water pressure, is elevated a distance above the lawn.

The primary object of the invention is to provide an improved construction of sprinkler of the kind wherein the sprinkler head
20 is first elevated and thereafter turns about an axis, under the action of the pressure of the water employed.

Another object of the invention is to provide in a sprinkler of this kind a structure adapted for use in connection with either of two interchangeable nozzle members or caps, whereby the sprinkler may be readily
25 changed from a continuously rotating one to an oscillating or rotary reciprocating one.

Still another object of the invention is to provide a sprinkler structure wherein the bearing of rotation of the head is disposed
30 closely adjacent the center of gravity thereof, so as to reduce friction and wear on the bearing surfaces so that the effective life of the sprinkler as a whole is greatly increased.

These objects of the invention, as well as others, together with the many advantages thereof will more fully appear as I proceed
40 with my specification.

In the drawing:—

Fig. 1 is a longitudinal vertical sectional view through my improved sprinkler, embodying that nozzle member or cap that
45

makes the sprinkler an oscillating or rotary reciprocating one.

Fig. 2 is a top plan view of the sprinkler shown in Fig. 1.

Fig. 3 is a bottom plan view of the nozzle member or cap employed in the structure shown in Figs. 1 and 2.

Fig. 4 is a view in side elevation of the sprinkler head and supporting member or tube as an assembly when removed from the
55 casing.

Fig. 5 is a view in side elevation of the nozzle member or cap that makes the sprinkler an oscillating one.

Fig. 6 is a view in side elevation of another nozzle member or cap which is interchangeable with the first one to make the sprinkler
60 a continuously rotating one.

Fig. 7 is a perspective view of a certain bearing block employed in my improved
65 sprinkler.

Fig. 8 is a perspective view of a certain valve element embodied in my improved sprinkler.

The invention is herein illustrated and described as embodied in a sprinkler especially adapted for lawn purposes, but as will be apparent, the invention may also be embodied in sprinklers for other purposes, where its peculiar characteristics makes it of advantage to do so.

Referring now in detail to that embodiment of the invention illustrated in Figs. 1 to 5 inclusive and 7 and 8 respectively of the accompanying drawing, 1 indicates as a whole the upright tubular casing of the
75 sprinkler which comprises a tubular body 2, with a cup shape top end 3 having an outwardly extending radial flange 4. At the junction of the body and cup shaped top end is an interiorly threaded shoulder 5 the purpose of which will later appear. The bottom end of the body is interiorly threaded and when the sprinkler as a whole is in place in
80 a lawn, said bottom end is engaged upon a

water supply pipe 6 and the flange 4 is disposed substantially flush with the turf of the lawn.

Associated with the casing thus far described is a sprinkler assembly unit 7 as best shown in Fig. 4. Said unit comprises a guide tube 8 fixed at its top end to a nut 9 that has a screw threaded engagement within the shoulder 5. This guide tube terminates short of the bottom end of the body and is provided at its bottom end with a pair of relatively narrow guide slots 10 and a pair of wider and longer water inlet slots 11, with one pair of slots disposed in a plane at a right angle to the other pair of slots, both pairs of slots opening through the bottom end of the guide tube 8.

Slidable in the guide tube is a water supply tube or conduit 12, the top end of which normally extends above the nut 9 and is there fixed to the bottom wall of a sprinkler head member 13 that includes an upwardly and outwardly curved wall or rim 14. Secured to the bottom wall of the head member 13 is a bearing block 15 best shown in perspective in Fig. 7. Said block includes supporting sleeves 16—16 and a web 17 in which is formed a bearing opening and seat 18. Screws 19 extend down through said supporting sleeves into the bottom wall of the head to secure the block in position with its bearing opening disposed axially of the water tube or conduit 12. In the extreme bottom end of the tube is an axially apertured plug 20 and above said plug said tube is provided with a plurality of water inlet openings 21 of substantial diameter. In the outer periphery of said tube above the inlet openings 21 is provided a plurality of water ways 22 in the form of annular grooves as best shown in Fig. 4.

Disposed axially in the water tube 12 is a guide rod or stem 23 and on the top end thereof above the bearing block 15 is a disc 24 having an upstanding stop arm 25. The plug 20 before mentioned, is free to slide longitudinally and to rotate about said rod or stem 23. To the bottom end of the rod is secured a cross bar 26, the ends of which extend into the guide groove 10 in the tube 8 whereby the rod is held against rotation. Loose on the rod, just below the disc 24 is a bearing member 27 in the form of a part of a sphere that bears upon the seat 18 of the bearing block 15.

28 indicates a nozzle member or cap which includes a top wall 29 and an annular depending flange 30 having a rabbet groove therein to receive the free edge of the wall 14 of the head 13 with a good snug but detachable fit, the cap being secured to the head by means of screws 28^x—28^x, best shown in Fig. 2. The top wall of said cap overhangs and normally engages upon the flange 4 of the casing to provide a closure for the cup like top end

of the casing and on the under side of the cap is a pair of substantially opposite lugs or blocks 31 and 32 respectively. Each block has a nozzle opening 33—34 therein both of which are disposed in the same direction and at an angle of about 45° to the perpendicular. The nozzle opening 33 is of a diameter greater than that of the nozzle opening 34 and one end of each nozzle opens through the top wall of the cap while the other end opens through its associated block by means of a spherical seat 35 as best shown in Fig. 5.

36 indicates a bell crank like valve lever best shown in Fig. 8. Said lever includes a long arm 37 and a shorter arm 38 disposed at a relatively obtuse angle and the junction of said arms is formed to provide a sleeve 39. Passing through this sleeve is a pivot pin 40 threaded into the top wall of the cap, off center with respect thereto. On the free end of each arm is a spheric boss 37^a—38^a respectively adapted for engagement upon the seat 35 of the associated nozzle openings 33 and 34 respectively. In this respect it is pointed out that the longer arm 37 is associated with the nozzle opening 33 of larger diameter and the shorter arm is associated with the nozzle opening 34 of smaller diameter.

In operation, assume that the sprinkler as a whole is embedded in a lawn and is attached to a water supply pipe 6. When the water is turned on, it enters the tubular body and passes through the slots 11 and openings 21 into the interior of the supply tube 12. It is pointed out at this time, that said openings 21 are so many in number and are so disposed about the tube 12 that no matter in what position said tube stops, certain of said openings will be in communication with either the guide slots 10 or water inlet slots 11 respectively. Thus so soon as water enters the tubular casing 1, its entrance into the tube 12 is assured for actuating the sprinkler in the manner intended. The water passes upwardly in this tube to emerge from the top end thereof into the space or chamber between the head 13 and cap 28 and the pressure builds up therein. Due to this pressure, the first action to take place is that the head and cap are elevated into a position above the top end of the casing as shown in dotted lines in Fig. 1, this movement being limited by the engagement of the cross bar 26 with the top ends of the slots 10.

In this upward movement of the head and cap, the inlet tube 12 of course is also elevated as well as the guide rod 23, the latter being incapable of rotation due to the engagement of the cross bar 26 in the guide slots 10. With the grooves 22 in the water inlet tube as before described such water as acts to seep up between the tubes 8 and 12 is directed out of its normal direction of flow, so that this seepage is materially retarded

or restricted due to the sealing like action of said grooves.

5 With the arms 37—38 of the lever 36 of unequal lengths and disposed at the obtuse angle mentioned, it is apparent that an unbalanced condition exists between said arms and as the water issues from the larger nozzle opening, it acts upon the longer arm to swing the lever in a direction closing off the smaller nozzle opening. As the lever 36 moves through but a small angle and the arms thereof are always in close proximity to the seats 35 at the inner ends of the nozzle openings 33—34 so that the closing of the smaller nozzle is almost instantaneous. The larger nozzle opening now being unobstructed, a jet of water will issue therefrom and the reaction of such jet causes the head and cap to rotate about the bearing member 27, the water tube 12 of course turning therewith. In the rotation of the cap and head as described, the short arm of the lever will engage the stop member 25 and will be swung in a reverse direction thereby, to cause the nozzle opening 34 to be opened and the nozzle opening 33 to be closed.

Water then issues from the opening 34 as a jet and the reaction thereof causes the cap, head and water inlet tube to be turned in the opposite direction until the long arm 37 engages said stop 25, when direction is once again reversed, so that an oscillatory or rotary reciprocatory movement of the cap and head takes place through an angle of approximately 180°. By means of such a construction the sprinkling action can be regulated so far as certain limits or boundaries are concerned as when defined by sidewalks, buildings, runways and the like.

Thus with the water issuing in jet form, a high rotative speed is imparted to the head and cap and the jets throughout their range or spread are broken up in droplets which closely simulates a rain shower. Thus a satisfactory result so far as sprinkling a lawn is concerned, is attained.

By reason of the bearing plug in the bottom end of the tube, it is apparent that with the head and cap in an elevated position, the water pressure is exerted upon both ends of the plug in substantially the same proportions so that both interior and exterior pressure approximately balance, thereby reducing the upward pressure on the point of bearing of the head and cap. Assume that the water has been shut off from the sprinkler and that the head has ceased oscillation in such a position that both valves on the ends of the lever arms are open with respect to their associated nozzle openings. Assume that water is again turned on. Immediately upon issuance of fluid from both nozzle openings in the head, different reactions are obtained by reason of the difference in areas of the nozzles. Since the larger nozzle will have the

greater reaction and before sufficient reaction has developed to turn the nozzle head proper, enough difference in reaction acting on the faces of the valves at the ends of the lever arms occurs to swing the longer arm away from its nozzle opening. This will cause the smaller arm to swing towards its nozzle opening to close the same thereby making available the maximum starting torque with which to start rotation of the sprinkler head proper. Thus no matter whether the sprinkler has stopped in a position wherein both nozzles are open or only one of them is open, the initial movement to operate the valve into such a position that will produce the torque necessary to start the head is attained.

In Fig. 6 I have illustrated another cap member which is interchangeable with the first mentioned cap, when a continuously rotating instead of an oscillating sprinkler is desired. The cap 28^a is provided on its under side with integral nozzle opening blocks or lugs 31^a—32^a disposed diametrically opposite each other and each block is provided with nozzle openings 33^a and 34^a respectively of equal diameters but facing in the opposite directions. To substitute the cap 28^a for the cap 28, it is only necessary to take out the screws 28^x and remove the cap 28 and then apply the cap 28^a in its stead, after which the screws 28^x are replaced to secure the cap 28^a to the head.

With such a cap in place and with the water turned on pressure builds up in the chamber between the head and cap and first elevates the same and the water will then issue from the nozzle openings. As these openings are faced in opposite directions, the reaction is such as to rotate the head and cap continuously in one direction about the tube or stem 12 and bearing 27 as an axis. As there are no valve arms employed in connection with the cap, it is apparent that the stop 25 remains inactive, ready for operation for its intended purpose, when the caps are again changed as for instance when an oscillating type of sprinkler is desired.

It is pointed out that all water passage openings are of substantially large diameter, to permit free flow and discharge of all such grit as the water may contain. With the sealing grooves 22 as before described, the grit is prevented from passing up between the tubes 8 and 12 with the result that the grit cannot produce excessive wear between the tubes. Again such large particles as cannot pass through the ports or openings 21 are brushed off by the rotation of the tube so that the same cannot be clogged up.

With the center of gravity of the head, disposed in as close proximity to the top bearing as circumstances permit, it is apparent that the head and cap will rotate without tendency to wobble and thus the life of the bearing

surfaces is greatly prolonged as there is no undue friction between them.

While in describing the invention I have referred in detail to the form, arrangement and construction of parts thereof, the same is to be considered merely as illustrative so that I do not wish to be limited thereto except as may be specifically set forth in the appended claims.

I claim as my invention:

1. A sprinkler embodying therein a sprinkler head, a conduit fixed to said head for supplying fluid thereto under pressure, a supporting means in which said conduit is both rotatively as well as longitudinally mounted, a nozzle member associated with the head, a member disposed axially of the head and movable longitudinally therewith and a bearing element on said last mentioned member engaged by said head, said last mentioned member including parts operable to engage with said supporting means in a manner limiting the longitudinal movement of said head.

2. A sprinkler embodying therein a sprinkler head, means for supporting said head for a turning movement, a conduit for supplying fluid under pressure to said head, a nozzle member associated with the head, a member disposed axially of the head and movable longitudinally therewith, a bearing element loose on the top end of said member and engaged by said head and a cross bar carried on the bottom end of said member and so engaged with the supporting means as to limit the longitudinal movement of the head in one direction.

3. A sprinkler embodying therein a sprinkler head, means for supporting said head for a turning movement, a conduit for supplying fluid under pressure to said head, a nozzle member mounted on said head and having nozzle openings therein, means pivoted on said nozzle member for an oscillatory movement and including unbalanced arms operated upon by water issuing from the nozzle openings to open and close said nozzle openings and a non-rotative element adapted to be alternately engaged by said arms of said pivoted means to cause the same to open one nozzle and close the other and vice versa in the turning movement of the head and nozzle member.

4. A sprinkler embodying therein a sprinkler head, means for supporting said head for a turning movement, a conduit for supplying fluid under pressure to said head, a nozzle member mounted on said head and having nozzle openings therein facing in the same direction, an unbalanced lever pivoted on said member, and including rigidly connected together arms, one associated with each nozzle opening and a non-rotative member disposed in said head and adapted to be

alternately engaged by said arms to open one nozzle opening and to close the other.

5. A sprinkler embodying therein a sprinkler head, means for supporting said head for a turning movement, a conduit for supplying fluid under pressure to said head, a nozzle member mounted on the head and having nozzle openings therein facing in the same direction and, the one being of a diameter greater than the other, a two armed lever pivoted on said nozzle member and having one arm longer than the other but rigidly connected thereto, the longer arm being associated with said larger nozzle opening and the shorter arm being associated with the smaller nozzle opening and a non-rotative element arranged in said head and adapted to be engaged by said arms to cause said arms to alternately close and open the associated nozzle opening.

6. A sprinkler embodying therein a sprinkler head, a nozzle member associated with said head, a tube upon the top end of which said head is mounted, said tube being closed at its bottom end but having water inlets therein above said bottom end, a second tube in which the first tube has bearing, a guide rod disposed axially in the first mentioned tube and extending through the closed bottom end thereof, a bearing member on the top end of said rod engaged by said head, and a cross bar in the bottom end of said rod and engaged with said second tube in a manner holding the rod against rotation.

7. A sprinkler embodying therein a sprinkler head, a nozzle member associated therewith, a tube upon one end of which said head is mounted and closed at its other end but having fluid inlets in its sides, a second tube in which the first tube is journaled, said second tube having two sets of slots therein and through one of which sets fluid is admitted to the fluid inlets of the first tube, a rod disposed axially in said first tube, a bearing member on one end thereof and engaged by said head and a cross bar on the other end of said rod and engaged in one of said sets of slots in said second tube.

8. In a sprinkler, a nozzle member having nozzle openings therein facing in the same direction and an oscillatable lever pivoted off center of said member and having rigidly connected together arms of unequal length, one associated with each nozzle opening, each arm having means thereon operating in the oscillation of the lever to close and open its associated nozzle opening.

9. A sprinkler embodying therein a sprinkler head, means for supporting said head for a turning movement, a conduit for supplying a fluid to said head, which head is formed and adapted to receive either of two members, each having nozzles, the nozzles of one head being operative under the action of fluid jets discharged therefrom to produce

a rotary movement to the head and the nozzles of the other member being operative under the action of fluid jets discharged therefrom to produce an oscillating movement to said head, each member being so constructed for cooperation with said head that when it is applied thereto, one will produce a rotary movement for the head and the other will produce an oscillatory movement for the head.

In testimony whereof, I have hereunto set my hand, this 18th day of January, 1929.

PAUL LIPPERT.