Nov. 24, 1953 W. C. RICE 2,660,472

AMBULATING WATER SPRINKLER

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FIG. 1.

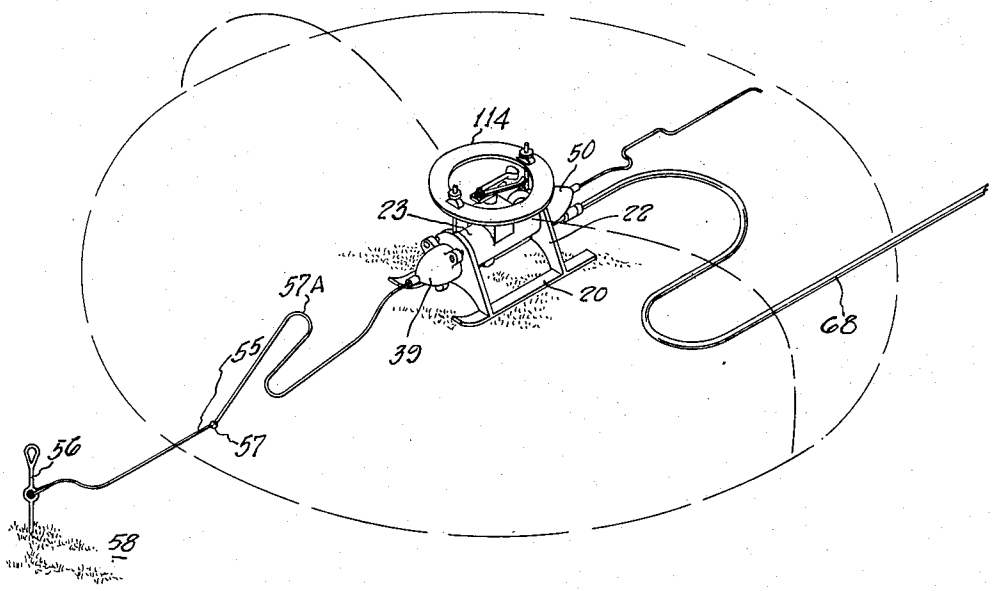


FIG. 2.

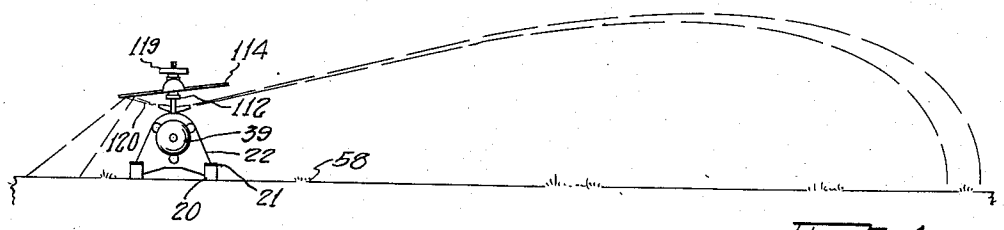


FIG. 3.

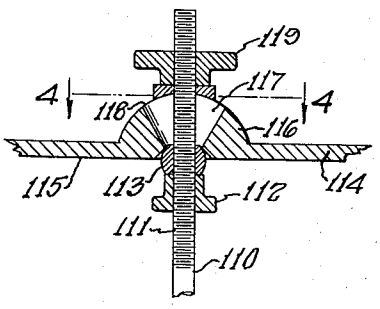
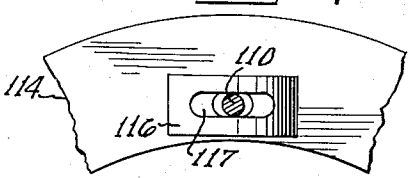


FIG. 4.



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FIG. 5.

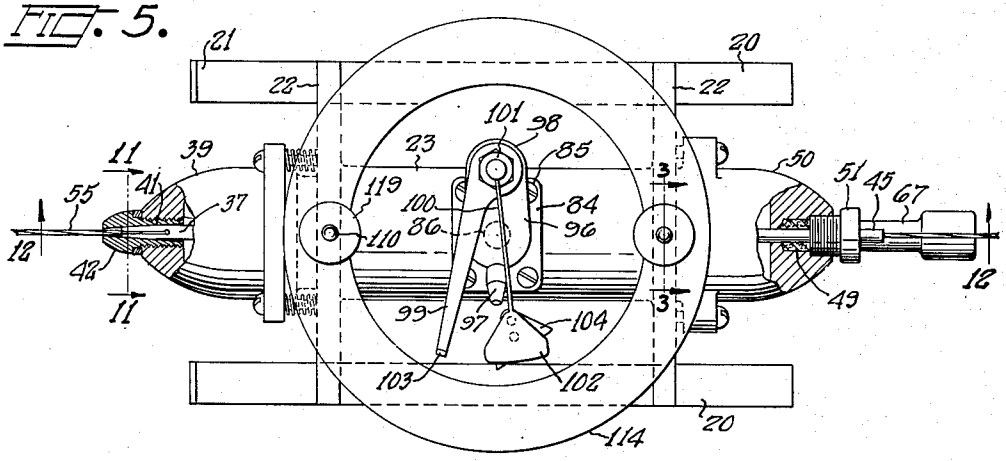


FIG. 6.

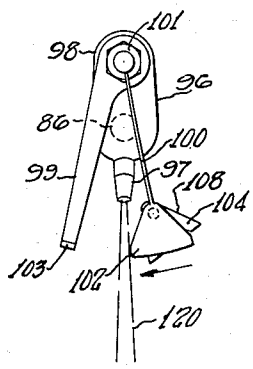


FIG. 7.

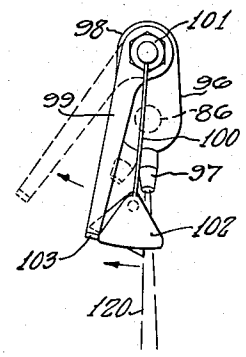


FIG. 8.

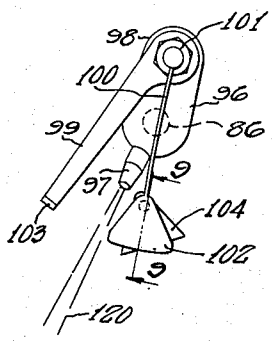


FIG. 9.

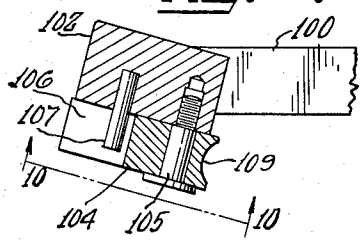


FIG. 10.

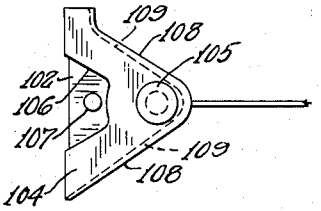
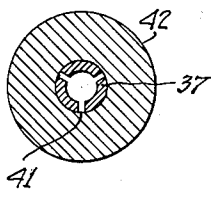


FIG. 11.



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AMBULATING WATER SPRINKLER

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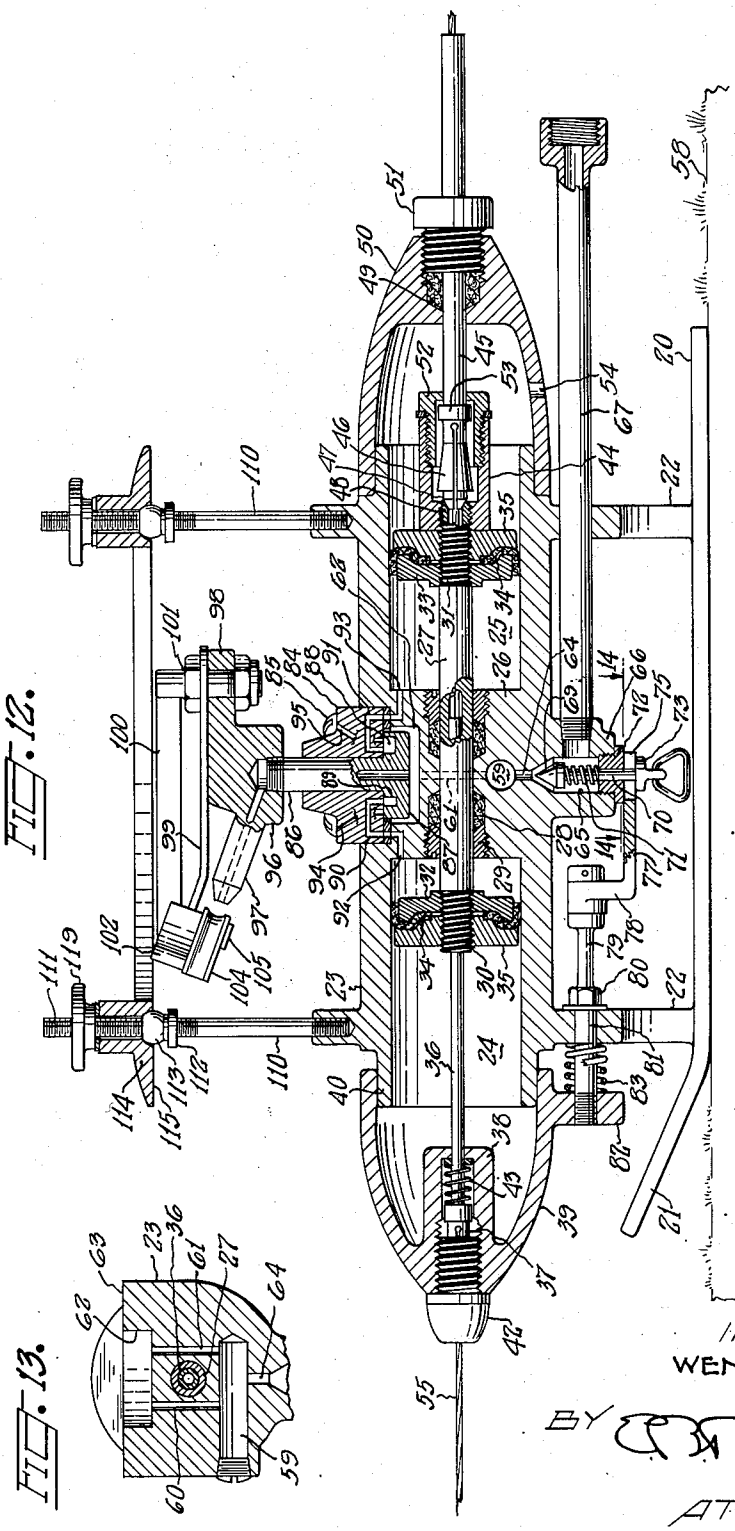


FIG. 12.

FIG. 13.

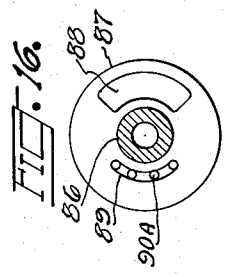


FIG. 16.

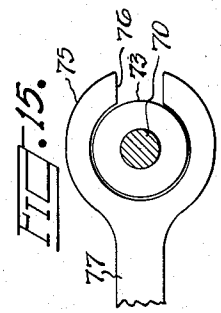


FIG. 15.

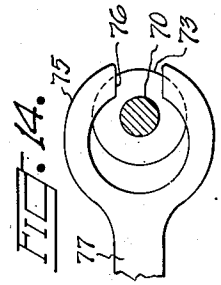


FIG. 14.

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UNITED STATES PATENT OFFICE

2,660,472

AMBULATING WATER SPRINKLER

Wendell C. Rice, Coulee Dam, Wash.

Application December 11, 1950, Serial No. 200,153

4 Claims. (Cl. 299—49)

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This invention relates generally to lawn sprinklers and particularly to an ambulating water sprinkler.

The main object of this invention is to produce an ambulating sprinkler by means of which the pattern of travel may be predetermined regardless of the contour of the ground.

The second object is to provide a travelling sprinkler with a means for controlling the sprinkling area on both sides of its line of travel.

The third object is to provide a sprinkler whose speed of travel may be accurately controlled.

The fourth object is to provide a reliable means for shutting off the sprinkler at a predetermined point or time.

These and other objects are accomplished in the manner set forth in the following specifications as illustrated in the accompanying drawings, in which:

Fig. 1 is a general view showing in perspective a setup of the sprinkler and the hauling line.

Fig. 2 is a front elevation showing the deflector tilted to reduce the reach of the spray along one side of the sprinkler.

Fig. 3 is a section taken along the line 3—3 in Fig. 5.

Fig. 4 is a section taken along the line 4—4 in Fig. 3.

Fig. 5 is a plan of the sprinkler.

Fig. 6 is a plan of the vibrator unit showing the start of a vibrating stroke.

Fig. 7 is similar to Fig. 6 showing the parts at the moment of impact.

Fig. 8 is similar to Fig. 7 showing the head operating arm moved to the position shown in dotted lines in Fig. 7.

Fig. 9 is a section taken along the line 9—9 in Fig. 8.

Fig. 10 is a fragmentary elevation taken along the line 10—10 in Fig. 9.

Fig. 11 is a section taken along the line 11—11 in Fig. 5.

Fig. 12 is a section taken along the line 12—12 in Fig. 5.

Fig. 13 is a fragmentary section through the center of the sprinkler body showing the water passages.

Fig. 14 is a section taken along the line 14—14 in Fig. 12, showing the operating position.

Fig. 15 is similar to Fig. 14 but showing the shut-off position.

Fig. 16 is a section through the valve stem to show the ports which control the flow of water to the cylinders.

Like numbers of reference refer to the same

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or similar parts throughout the several views.

Referring in detail to the drawings there is shown a pair of elongated runners or skids 20 having upturned forward ends 21 and transverse uprights 22 which hold the runners 20 in spaced relation and form supports for a cylindrical body 23 in opposite ends of which are formed the cylindrical chambers 24 and 25 which are separated by the intermediate wall 26. Any other conveyance may be substituted for the skid 20.

Mounted in the wall 26, along the axis of the body 23, is a tubular piston rod 27 which is slidable in the packings 28 held by the glands 29. On the threaded ends 30 and 31 of the rod 27 are the pistons 32 and 33 which are provided with cup leathers 34 which are held in place by the circular nuts 35. Extending into the end of the piston rod 27 is a quill 36 having its outer end provided with a tapered split chuck 37. The quill 36 is slidable in the tubular hub 38 formed within the bullet shaped head 39 which is slidable on the reduced end 40 of the body 23. The chuck 37 extends into the tapered hole 41 formed in the tip 42 which is threaded into the bullet shaped head 39. The chuck 37 is urged toward the hole 41 by the spring 43 contained within the hub 38.

One end of the rod 27 extends through the piston 33 and its nut 35 and has threaded thereon a sleeve 44 through whose plugged end extends the tube 45 having on its inner end a split chuck 46 whose end 47 engages the countersunk interior 48 of the end 31 of the rod 27.

The tube 45 is slidable in the packing 49 held within the bullet shaped tail 50 by the gland nut 51. The tail 50 is mounted on the body 23.

A threaded cap 52 is mounted on sleeve 44 and forms a stop for the shoulder 53 on the chuck 46. A drain hole 54 is provided in the member 50. Extending through the tip 42, the quill 36, the chucks 37 and 46 and the tube 45 is a line 55 of any suitable material such as a closely braided fish line secured to the peg 56 which is stuck into the lawn 58.

In Fig. 13, which is a section taken through the wall 26, is formed a horizontal hole 59 open upwardly into the vertical ducts 60 and 61 which discharge into the recess 62 formed in the flat top 63 of the body 23.

The hole 59 opens downwardly through the duct 64 into the chamber 65 formed in the boss 66 to which water is supplied through a tube 67 which extends through the upright 22 to the hose line 68. Within the chamber 65 is a needle valve 69 on whose stem 70 is placed a compres-

sion spring 71 which is held in place by the bushing 72. On the lower end of the stem 70 is formed a head 73 provided with a ring 74 for manual setting of the valve 69.

Between the bushing 72 and the head 73 is placed a circular fork 75 having a slot formed on one end capable of freely admitting the stem 70. The shank 77 of the fork 75 has an upwardly turned end 78 to which is attached a bolt 79 having a head 80 between its ends and having its body 81 slidable in the upright 22 and threaded into the lug 82 formed on the point 39.

A spring 83 is placed on the body 81 between the lug 82 and the adjacent upright 22. The purpose of this arrangement is to provide an automatic stop. When the tip 42 engages an obstruction, such as a knot in the line 55, it moves the head 39 backwardly, causing the fork 75 to move to the position shown in Fig. 15 and allowing the valve 69 to close under the action of the spring 71, thereby cutting off the supply of water from the hose 68.

Mounted on the flat top 63 is a spindle base 84 which is held in place by the screws 85. A tubular spindle 86 journals in the base 84 and has formed on its lower end a reversing valve disk 87 having an arcuate exhaust recess 88 at one side thereof and a smaller arcuate pressure recess 89 at the other side thereof, but having holes 90–A therein extending through the disk 87.

The spindle base 84 has formed therein the exhaust ducts 90 and 91 which communicate between the chambers 24 and 25, and the outer portions of the arcuate recess 88 through the ports 92 and 93. The inner portion of the exhaust port 88 is connected by the holes 94 and 95 with the atmosphere and it is through these holes that water from the chambers 24 and 25 is wasted.

The function of the valve disk 87 is simply to reverse the flow of water to the chambers 24 and 26 and produce a reciprocating motion of the piston rod 27. Such valves are in common use and well understood.

It will be observed that as the piston rod 27 moves under the action of the piston 32, the chuck 46 seizes the line 55 and produces a pull on the line moving the conveyance 20 with the entire sprinkler forwardly. As the movement of the rod 27 is reversed, the chuck 46 is freed and the chuck 37 pushes the line 55 through the quill 36. Thus the line 55 is propelled through the device.

On the spindle 86 is mounted a sprinkler head 96 having an upwardly inclined radial tip 97 and an oppositely turned horizontal arm 98 on which are adjustably mounted a lever arm 99 and a spring arm 100, which is mounted on a bolt 101 which forms a clamp for the lever arm 99. On the spring arm 100 is disposed a hammer 102 which can vibrate in the path of the outer end 103 of the arm 99. On the under side of the hammer 102 is mounted a V-shaped vane 104 which pivots on the bolt 105. The vane 104 has a notch 106 within which is a pin 107 which is mounted in the hammer 102. The innermost sides 108 of the vane 104 are provided with grooves 109 to better receive the water from the tip 97. As the spring arm 100 vibrates under the action of water from the tip 97, the hammer 102 strikes the end 103 of the arm 99 driving it around in a circular orbit, the action being clearly shown in Figs. 6, 7 and 8. Thus the sprinkler is revolved and the reversing valve disk 87 is operated causing the movement of the sprinkler on the skids 20.

On the uprights 22 are mounted the vertical posts 110 on whose threaded upper ends 111 are disposed the thumb nuts 112 on each of which rests a washer 113 having the edge rounded as shown in Fig. 3. On the washers 113 rests a circular shroud disk 114 having a flat under side 115 and having a pair of rounded bosses 116 on opposite sides thereof provided with slots 117 through which the post ends 111 extend. A concave washer on each end 111 rests on the rounded boss surfaces 118 and can be clamped thereon by the nut 119 on the end 111 so that the disk 114 may be tilted laterally.

It will be noted in Fig. 2 that as the disk 114 is tilted to intersect the stream of water 120, it is deflected downwardly at a reduced radius. Thus the longitudinal pattern and lateral range of the sprinkler can be changed at will. Also by changing the setting of the arm 99, or the flow of water, or both, the speed of travel may be controlled.

In the normal operation of the sprinkler only one stake 56 is employed, although if a circuitous path is to be followed, guiding pins are placed along the desired path to hold the line 55 until it enters the head 39.

It will be observed that the sprinkler can be stopped at any desired place or time by placing a knot 57 at the desired point of cut-off. If it is merely desired to have a more thorough job of watering done at a given point, it is only necessary to draw out enough line to form a loop 57–A. While this is being taken up, the sprinkler will, of course, operate in one spot and then move on following the line 55 in whichever direction it is laid. Thus place and time controls are provided. In the operation of the device water enters the tube 67 from the hose line 68, passing through the duct 64 into the recesses 62 and then, depending upon the position of the valve disk 87, flows to the foremost cylinder 24 or to the lowermost cylinder 25. If the pressure builds up in front of the piston 33, it cause the piston to move rearwardly and the first portion of the movement causes the countersunk end 48 of the rod 27 to close the chuck 46 upon the line 55, exerting a pull on the line 55 which, if that line be secured, will cause a forward movement of the conveyance.

Now, if the action of the hammer 102, which is operated by the sprinkler head, reverses the position of the valve disk 87 and admits water pressure behind the piston 32, it moves the rod 27 forwardly and wastes water from the cylinder 25 through the hole 95. A reverse movement causes water from the cylinder 24 to waste through the hole 94.

Briefly then the improvements in sprinklers consist in the use of the adjustable shroud, the use of an oscillating sprinkler head to drive a reversing valve and the use of telescoping tubes with line grips, all of which may be used separately or in conjunction with each other for the purpose of providing a satisfactory ambulating lawn sprinkler.

The mechanics herein illustrated and described are merely for the purpose of explaining the purpose of the invention and the method of accomplishing that purpose. The details thereof may be varied at will without departing from the spirit of this invention.

I claim:

1. In a vehicle propelling device, the combination of a water motor having a tubular piston

rod, a quill slidable in said piston rod having a chuck on the outer end thereof, a second chuck at one end of said piston rod opposite the chuck on said quill, a line passing through both chucks, and through said quill and tube, valve means for imparting a reciprocating movement to said piston rod, a spring for urging said quill chuck toward a closed position and means for actuating said second chuck from said piston rod whereby said chucks will function in alternate succession.

2. A vehicle propelling device having in combination a conveyance, a water motor mounted on said conveyance comprising two tandem cylinders having pistons therein, a tubular piston rod joining said pistons, a quill passing through said rod, a chuck at each outermost end of said pair of cylinders, one of said chucks being fixed with relation to the cylinders and the other chuck being movable with relation thereto, a line passing through said quill and chucks, a water supply tube, a valve admitting water from said tube to adjacent ends of said cylinders in alternate succession, a revolving sprinkler head connected to said tube, a movable head on the leading cylinder forming a support for the movable chuck and a cut-off valve actuated by said movable head for stopping the flow of water to said cylinders when said head engages an obstruction.

3. A self-propelling lawn sprinkler having in combination a pair of skids having their leading end upturned, a pair of tandem cylinders mounted on said skids in parallelism therewith, a cup leather piston in each cylinder responsive to the pressures against their adjacent sides, said cylinders having ports therein, a rotary valve controlling said ports, a water supply line communicating with said rotary valve, a spring closed needle valve controlling the flow of water to said rotary valve, a latch for holding said needle valve open, a trip for said latch permitting said needle

valve to close when the sprinkler head engages an obstruction, a hammer head sprinkler mounted on said valve and driving same, a cable passing through said pistons, and chuck members for engaging said cable.

4. An ambulating sprinkler having in combination a conveyance, a pair of tandem cylinders mounted longitudinally on said conveyance, said cylinders having opposed cup leather pistons disposed therein and joined by a tubular piston rod passing through the intermediate wall between said cylinders, an elongated quill passing slidably through said tube, a line passing through said quill, a chuck mounted on said quill for grasping said line and drawing it to and through said quill, a rotary valve for admitting water alternately to adjacent cylinder ends, a hammer head sprinkler nozzle mounted on said valve and constituting a means of driving the same, a flexible water hose attached to said conveyance and delivering water to said rotary valve, a needle valve between said hose and rotary valve, said needle valve having a spring for urging it toward a closed position and a latch for holding it temporarily in an open position and a movable head at the foremost end of the sprinkler through which the line enters the cylinders and a release for said latch actuated by said movable head.

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