

Oct. 14, 1952

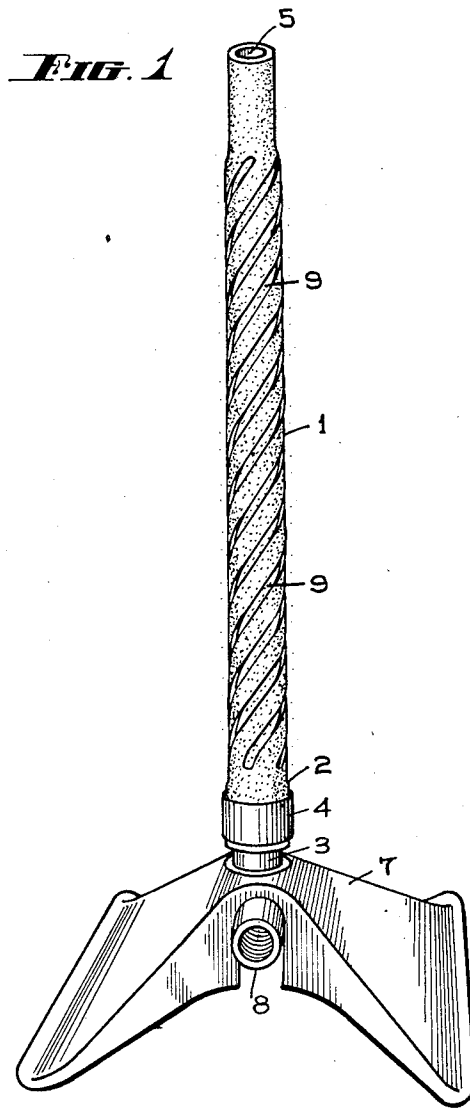
J. R. HOLDEN

2,613,993

SPRINKLER

Filed Feb. 4, 1947

3 Sheets-Sheet 1



INVENTOR
JAMES ROBERT HOLDEN
By: *Hamilton, Lake & Co.*
AGENTS

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J. R. HOLDEN

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3 Sheets-Sheet 2

FIG. 2

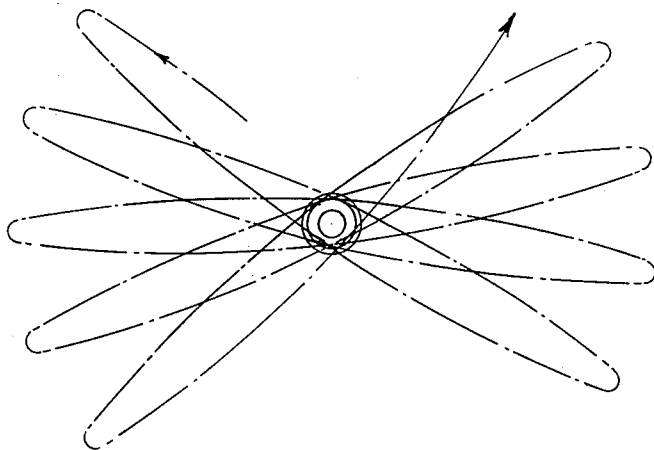
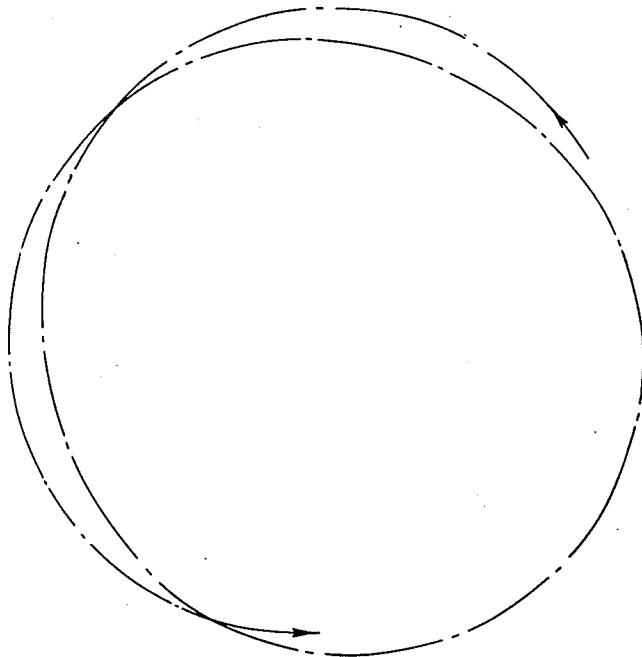


FIG. 3



INVENTOR

JAMES ROBERT HOLDEN

By:
Hauertine, Lake & Co.
AGENTS

Oct. 14, 1952

J. R. HOLDEN

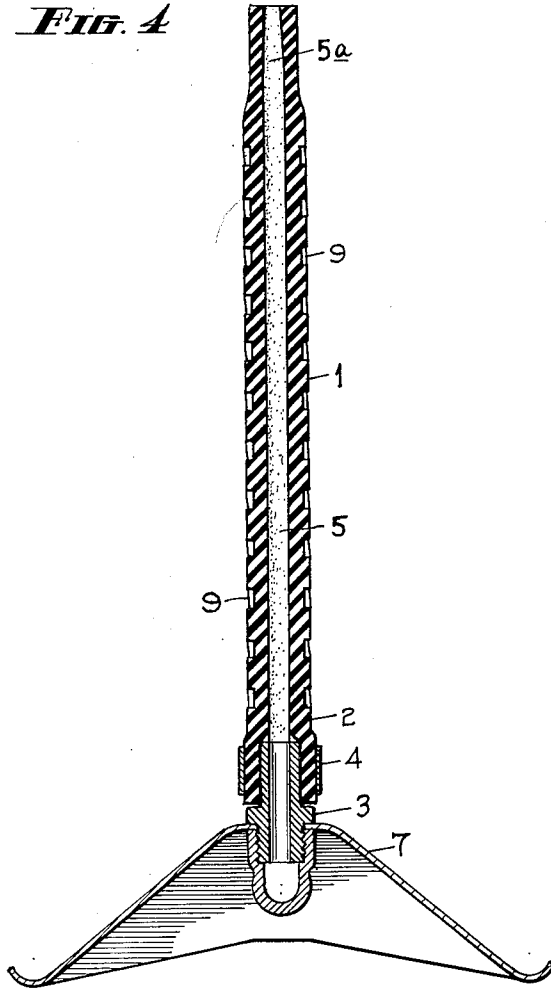
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SPRINKLER

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3 Sheets-Sheet 3

FIG. 4



INVENTOR
JAMES ROBERT HOLDEN
By: *Naselle, Lake & Co.*
AGENTS

UNITED STATES PATENT OFFICE

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SPRINKLER

James Robert Holden, Medindie, South Australia,
AustraliaApplication February 4, 1947, Serial No. 726,368
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1 Claim. (Cl. 299—65)

1

This invention relates to improvements in and to sprinklers and in particular it relates to sprinklers of the type in which a spraying is effected by movement of a nozzle or nozzles or similar device to cause the water to be distributed over a required area.

It has been known heretofore to use sprinklers in which water is allowed to issue from a nozzle or nozzles which are set to cause the nozzle or nozzles to revolve by the reaction of the water jets. It has also been known to construct sprinklers having a nozzle in which a jet of water is deflected against an inclined blade or the like which is so mounted that the blade is periodically moved out of the path of the water to allow a water jet to be projected for a considerable distance, the jets being moved around to give circular coverage, controlling of the blade being achieved by a centrifugal governor which withdraws the blade from the path of water when a given rate of rotation has been obtained but allows same to fall back into the path of the stream when the speed of rotation falls. It has also been known to use a freely swinging initially curved hose to distribute the water by whip of the hose when under pressure.

In the sprinklers used heretofore according to which a nozzle or nozzles were revolved to provide a controlled circular coverage about the sprinkler it has been necessary to provide some form of stuffing box or similar means through which the jets are fed with water from a central stem, this stuffing box adding materially to the expense of manufacture and also giving rise to mechanical difficulties in practice due to corrosion, wear, leakage of water and other causes. In the sprinklers of the whipping-hose type no certain coverage could be obtained as the whip was uncontrolled and did not follow a closely-calculated pattern which is necessary for good distribution.

It is the object therefore of this invention to provide an improved form of sprinkler in which the jet or jets will be movable along a desired pattern but in which the construction of the unit will be materially simplified by the elimination of a stuffing box or analogous device or guides.

In brief, the invention comprises an initially straight flexible tube which is rigidly fixed at one end to a supporting means whereby it can be coupled to a water supply, the tube having helical grooves in the wall to apply torque to the tube when pressure fluid flows through the tube.

In order however that the invention may be more clearly understood it will now be described

2

with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a sprinkler according to this invention;

Figure 2 is a plan showing how the free end of the flexible tube progresses incrementally when a low torque is applied to the tube;

Figure 3 is a similar view but showing the movement when a higher torque is used; and

Figure 4 is a central section of the sprinkler.

A straight resilient tube 1 of rubber or similar material has one end 2 secured co-axially over a pipe 3 by means of a clamping band 4, and has a central bore 5 extending therethrough and terminating at the free end of tube 1 in a single reduced diameter passageway 5a forming a nozzle to project a stream of water.

The pipe 3 is secured to a stand 7 and terminates in a socket 8 to which a hose-fitting can be secured to allow water under pressure to be fed to the inside of the tube 1.

The wall of the tube has a series of helical grooves 9 formed in the external surface thereof and terminating short of the opposite ends of the tube. When water under pressure passes through the tube 1, the tube is caused to whip due to the reaction of the water, the whip causing the free end of the tube to swing from one side to the other about its lower end 2 and thus causing the water to be sprayed from one side towards the other. Owing, however, to the torque which is applied to the tube, due to the helical grooves 9, the tube, instead of oscillating in one plane, progresses incrementally so that a full circle is covered. By increasing the torque, such as by increasing the water-pressure, the end of the tube can however be caused to follow a path which closely approaches a circle. The reason for this may be seen if it is considered that when a tube having a swing applied to it by water-pressure also has torque applied to it, its free-end will follow an elliptical path with the major axis moving constantly around, the magnitude of the minor axis increasing with an increase in torque until it closely approaches a point where both axes are of nearly the same length.

In explanation of the functioning of the tube it may be mentioned that when a plain flexible tube oscillates under water pressure, longitudinal lines of tension are set up in the tube walls, but when helical grooves are formed within the wall of the tube itself, the normal longitudinal lines of tension are converted to lines at an angle to the plane of oscillation. It will be seen that by this means a regular amount of torque or twist will

3

be imparted to the tube each time it is caused to bend. The resultant of twist applied to a tube which is secured at one end and in a curved position, is for the tube to change the direction in which it is curved by an equal number of degrees to the number to which the end of the tube has been turned from normal, consequently at each bending of the tube in question the torque which it generates causes it to change its plane of oscillation by a regular number of degrees as predetermined.

The length of the minor axis of the incrementally progressing ellipse, see Figure 2 of the drawings, may be varied by changing the torque applied to the tube for instance by increasing the torque the minor axis of the constantly revolving ellipse will be lengthened and the end of the tube can be made to follow a path which closely approaches a circle. This is illustrated in Figure 3 where it will be noted that the oscillation, because of the rapid change of direction due to the heavy torque, keeps the free end from swinging back near the centre. By adjusting the torque, such as by varying the water pressure or the resiliency of the tube or the angle of the grooves, any intermediate effect can be obtained as it is possible to closely control the length of the major and minor axis.

From the foregoing it will be appreciated that the use of a straight resilient tube materially simplifies the construction of the sprinkler in that it obviates the need to use costly and elaborate stuffing boxes while at the same time it allows effective distribution of the water due to the pattern followed by the free end of the hose.

An advantage of the invention is that a spray of large drops can be obtained which gives a better and greater coverage, the distribution being relatively uniform over the entire area owing to the progressive acceleration and deceleration of the free end of the tube as the tube swings from

4

one end to the other of its traverse, the greatest rate of movement being at the centre of the swing where water is deposited at each swing while the momentary dwell at each end of the stroke deposits more water on the outer periphery of coverage where the water is deposited only once during each revolution and not on each swing.

What I claim is:

An improved sprinkler comprising an initially straight resilient tube having a central bore, supporting means at one end of said tube having a bore co-axial with said bore of the tube and opening into the latter, means to connect said supporting means with water conveying means so that water flowing through said bore of the supporting means is forced through said bore of the tube, said bore of the resilient tube terminating at the free end of the latter in a single passageway of reduced diameter and in coaxial alignment with the remainder of said bore of the tube, the wall of said tube having helical grooves formed therein to apply torque to said tube when water under pressure flows through said bore and passageway and is projected from the latter to give a reaction which bends the tube.

JAMES ROBERT HOLDEN.

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