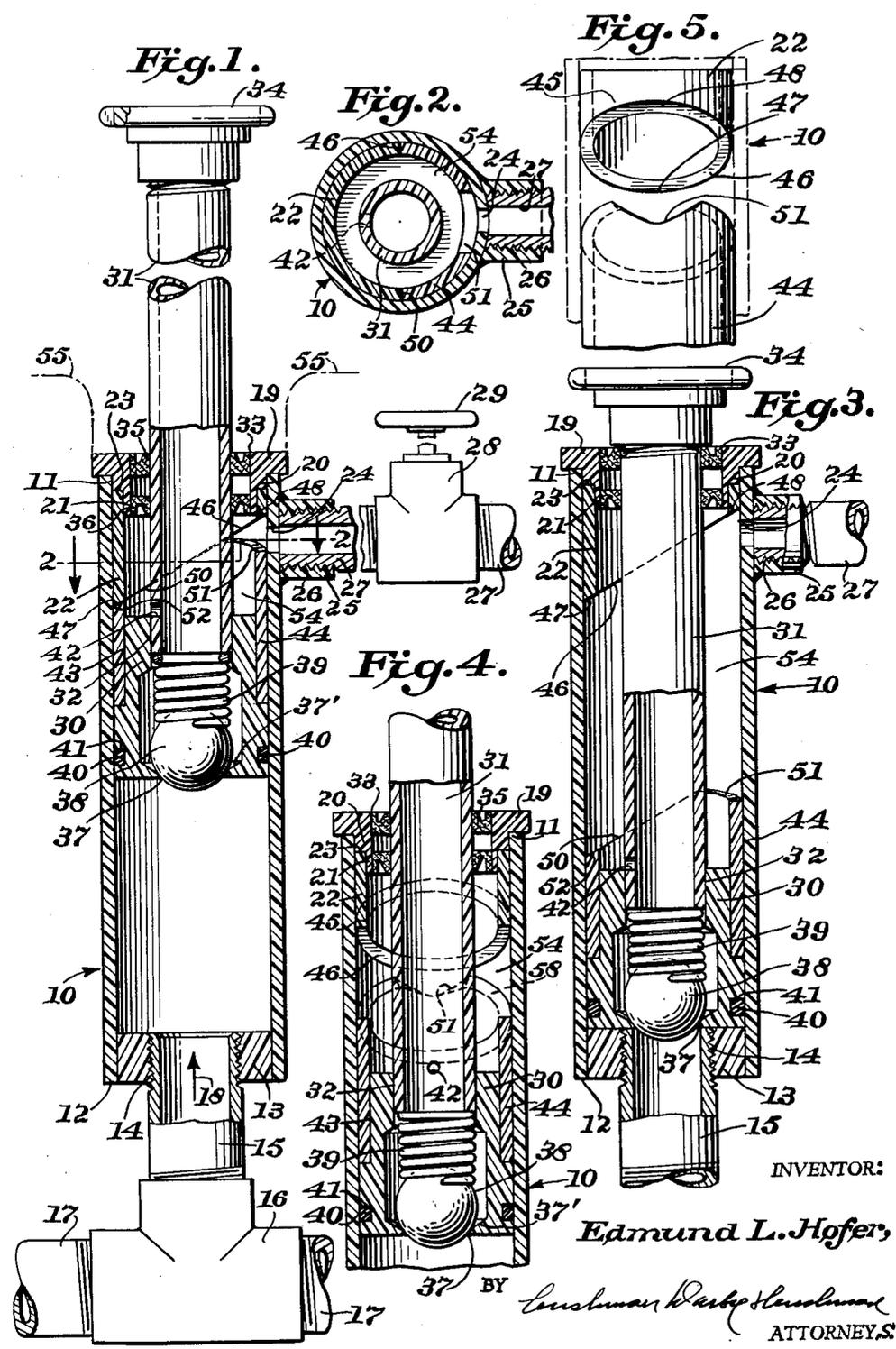


May 8, 1962

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LAWN SPRINKLER

3,033,467

Filed Jan. 19, 1959



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3,033,467

LAWN SPRINKLER

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Filed Jan. 19, 1959, Ser. No. 787,663

4 Claims. (Cl. 239—204)

The present invention relates to an improved lawn sprinkler and more particularly to a disappearing type of sprinkler which may normally be concealed beneath the surface of the ground.

An important object consists in associating with the tubular body or cylinder of a lawn sprinkler or the like, a longitudinally or axially displaceable sprinkler head having a depending hollow stem extending into the top of the tubular body and operable to be moved from a concealed position to an elevated or raised operative position. In order to maintain the sprinkler head and its tubular stem in a fixed operative position, means are provided in the form of a fixed member within the cylinder, which is arranged to be engaged by a coaxing movable member connected to the stem of the sprinkler head, so that when the latter is elevated to its operative position, the movable member is brought into tight frictional engagement with the fixed member for the purpose of preventing rotation of the sprinkler head and its stem relative to the tubular body.

A further object consists in associating with the cylinder or body of the sprinkler, a piston which reciprocally mounted within the cylinder and has a tubular piston rod extending outwardly through one end of the cylinder. To the outer end of the piston rod is connected any well-known or conventional type of sprinkler head. A stationary sleeve having a lower curved or inclined edge surface is positioned within the cylinder adjacent a fluid inlet port. Connected to the reciprocating piston so as to be movable therewith is a displaceable sleeve arranged, when the piston is raised, to elevate the sprinkler head, to engage the confronting lower curved or cam surface of the fixed sleeve so as to provide releasable locking means for insuring the sprinkler head and the tubular piston rod or stem being maintained firmly in their proper operative position and without danger of the sprinkler head being displaced or tilted when moved from its disappearing position to its uppermost position.

Other objects and advantages of the invention will become apparent from the following description, when taken in conjunction with the accompanying claims and drawings.

Referring to the drawing in which is shown a preferred embodiment the invention may assume:

FIGURE 1 is a side view, with parts in section, of a disappearing lawn sprinkler constructed in accordance with the present invention, and showing the parts in their locked position;

FIGURE 2 is a sectional view taken substantially along the line 2—2 of FIG. 1;

FIGURE 3 is a detailed sectional view of the cylinder of the sprinkler and its associated parts and showing the piston and movable sleeve in their lowermost or retracted position;

FIGURE 4 is a detailed sectional view of the upper portion of the cylinder and taken at right angles to FIG. 1 so as to show the inclined confronting edges of the fixed sleeve and the movable sleeve appropriately spaced apart so as to form a clearance therebetween; and

FIGURE 5 is a detailed view showing the cut-away portion of the movable sleeve, spaced from the fixed sleeve.

Referring to the drawing, 10 indicates an elongated tubular body or cylinder of any suitable size, and having an open upper end 11 and a lower open end 12. The cylinder 10 may be made of any suitable material and is

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shown formed of transparent plastic. The lower end of the cylinder is closed by a plug 13 which may have a central integrally threaded opening 14 for receiving the external threads of a supply pipe or the like 15, which, in turn, may be connected to a T-fitting 16 of a main water or liquid supply line or pipe 17. The flow of the fluid from the pipe 17 upwardly into the cylinder 10 in the direction of the arrow 18 may be regulated by a remote control valve (not shown). The upper end of the cylinder 10 may be closed by a plug 19 having a depending annular skirt 20 which fits within the cylinder 10 so as to frictionally engage the inner wall thereof and may have an outer peripheral shoulder reduced portion 21 into which extends a fixed sleeve or member 22 secured thereto in any suitable manner, as at 23. One side of the cylinder 10 adjacent the top thereof has a lateral port 24 that may be surrounded by a tubular outwardly extending nipple 25 provided with an internally threaded portion 26 to which is connected one end of a fluid or water supply pipe 27. The flow of the water through the pipe 27 may be controlled by a suitable valve, such as 28, having an operating handle 29.

Slideably mounted within the elongated cylinder 10 is a reciprocating piston 30 having an upwardly extending tubular piston rod or hollow stem 31 suitably secured thereto, as at 32, and which is of such length as to extend through a central opening 33 in the plug 19, and to which is secured above the cylinder 10, a suitable spraying head in the form of a nozzle or the like 34. Interposed between the tubular plug 19 and the outer wall of the piston rod 31 may be positioned vertically spaced annular sealing means 35 and 36 so as to prevent water, dust and the like from entering the interior of the cylinder 10 during the operation of the sprinkler. The bottom of the piston 30 is provided with an opening 37 and a tapered valve seat 37'. The opening 37 may be controlled by a ball valve 38 which is normally urged in engagement with the valve seat 37' by the tension of an expansion spring 39 that is confined between the ball 38 and the lower end of the piston rod 31. A packing, preferably in the form of an O-ring 40, may be positioned within an annular recess 41 so as to provide suitable sealing means between the piston and the inner wall of the cylinder or tubular body 10. The lower end of the hollow piston rod 31 may be formed with a lateral orifice 42 so as to provide means for relieving pressure in the chamber surrounding the piston rod, as explained below.

The fixed upper sleeve 22 has its lower end portion 45 provided with an end face 46 disposed upon a plane inclined with respect to the axis of the sleeve so as to provide a lower point 47, and a high point 48 (FIG. 3) that is positioned above the opening 24 that communicates with the pipe 27. The angularly disposed end face 46 of the upper sleeve 22 constitutes fixed inclined surfaces that extend downwardly from opposite sides of the high point 48 to the lower point 47 for determining the angular or rotative positions of the piston 30 and the spray head 34 when in their uppermost positions, as will now be described.

Surrounding the piston 30, and suitably secured thereto by appropriate means, as indicated at 43, so as to be axially displaceable therewith, is a sleeve 44 having the major portion of its upper end face inclined (FIG. 3) on a plane disposed on the same angle as that of the confronting lower end surface 46 of the fixed sleeve 22. At its upper end portion, the sleeve 44 is cut away, as indicated at 51, to provide a transverse portion that forms a mouth registering with the port 24 when in the upper position for admitting water from the pipe 27 and port 24 into the chamber 54 formed above the piston 30, and between the sleeves 22 and 44 and the piston rod 31. When the piston 30 is

in its uppermost position, as shown in FIG. 1, the upper surface 50 of the lower sleeve 44 is disposed in abutting relation to the lower surface 46 of the fixed upper sleeve 22 (FIG. 1) so that the confronting inclined edges fit together, except at the cut-away portion 51, in order to maintain the sleeves and the piston rod in predetermined angular relation. Thus, simple, efficient and economical means are provided for accurately determining the angular position of the piston 30, hollow piston rod 31, and sprinkler head 34. If by chance the parts should be angularly displaced slightly when in a lower or intermediate position, camming action between the lower surface 46 of sleeve 22 and the upper surface 50 of sleeve 44 serves to bring them back in proper relationship upon upward movement of the piston to its upper limit under the force of the water pressure therebelow.

The accurate determination of the angular position of the sprinkler head 34 is of the utmost importance in many installations, particularly where it is desired to spray a particular area or pattern. The head 34 may be of a well-known type, adapted to operate only on one side of a straight line, for instance along a sidewalk path, terrace or the like. In such cases, accurate determination of its angular position is a major consideration to prevent spraying of undesired areas.

When in the inoperative position, the parts are as shown in FIG. 3, with the cylinder disposed below the surface 55 of the lawn (FIG. 1) and with the head 34 substantially flush therewith. At this time the valve 28, which may supply water to a plurality of pipes 27 leading to a large number of sprinkler units, is closed. When it is desired to operate the sprayers, water pressure is delivered to pipe 17 by opening an appropriate valve, not shown, with the result that the water flows into the space below the piston 30 and ball valve 38, causing the piston to rise. Water in the chamber or space 54 above the piston 30 and between the cylinder wall 10 and the piston rod 31, flows through the relief opening 42, as the piston rises, and may bleed upwardly and outwardly through the sprinkler head. When the piston reaches its upper limit of movement (FIG. 1) and the upper inclined face or edge 50 of the sleeve 44 is in abutting relation with the lower inclined edge 46 of the upper sleeve 22, the angular positions of the piston 30, piston rod 31 and nozzle 34 are accurately determined, and upward movement of the parts is arrested so as to insure the proper operating of the liquid over the desired area. The pressure of the water in the cylinder 10 below the piston 30 now opens ball valve 38, permitting water to flow upwardly through the hollow piston rod 31 and outwardly through the sprinkler head 34.

When it is desired to terminate the sprinkling operation, the valve delivering water to the pipe 17, fitting 16, and nipple 15, is closed. Valve 29 is then opened, thereby delivering water to the chamber or space 54 above the piston 30, thus forcing the same downwardly to the position of FIGURE 3. This movement is permitted by the upward flow of water from the lower end of the cylinder 10, past the valve 38, and upwardly through the hollow piston rod 31 and spray head 34. Instead of providing fluid pressure means for returning the piston 30 and sprinkler head 34 to their lowermost position, these parts may be moved manually, if desired, in which event the port 24 would be closed by a plug or the like. Instead of providing coacting inclined or cam surfaces of the type shown, for locking the sprinkler head against relative rotation in its elevated position, other suitable means may be employed so as to insure the sprinkler head being held at all times in proper spraying position.

It will be understood that the form of the invention shown is merely illustrative and such changes may be made as come within the purview of the following claims and their equivalents.

**I claim:**

1. A sprinkler of the class described, including a

cylinder having a top provided with a through opening, a piston axially slideable in said cylinder, said cylinder having a liquid-receiving chamber above said piston, said cylinder adjacent the top thereof having a fluid inlet port communicating with said chamber so that fluid forced through said port will displace the piston relative to the cylinder, a fixed sleeve in said cylinder adjacent the top thereof, said sleeve having a lower end portion provided with an inclined edge, and said piston having an encircling sleeve movable therewith, the movable sleeve having an upper end provided with an inclined edge arranged to engage the inclined edge of the fixed sleeve, whereby when said piston is displaced upwardly a predetermined distance said movable sleeve is brought into contact with said fixed sleeve in order to prevent rotation of the sprinkler head relative to the cylinder

2. A sprinkler of the class described, including a cylinder having a top provided with a through opening, a piston axially slideable in said cylinder, said cylinder having a liquid-receiving chamber above said piston, said cylinder adjacent the top thereof having a fluid inlet port communicating with said chamber so as to displace the piston relative to the cylinder, a fixed sleeve in said cylinder adjacent the top thereof, said sleeve having a lower end portion provided with an inclined edge extending downwardly from a point above said port to a point below the same, said piston having an encircling sleeve movable therewith, said movable sleeve having an upper end provided with an inclined edge arranged to engage the inclined edge of the fixed sleeve, said movable sleeve having the inclined edge thereof provided with a transverse flat portion arranged, when the movable sleeve is in contact with the fixed sleeve, to provide a space between said sleeves, whereby when said piston is displaced upwardly a predetermined distance said movable sleeve is brought into contact with said fixed sleeve in order to prevent rotation of the sprinkler head relative to the cylinder, and means connected to said inlet port for introducing liquid into said chamber so as to move the movable sleeve and piston away from the fixed sleeve.

3. A lawn sprinkler of the class described, including a cylinder having a top provided with an opening, a reciprocating piston in said cylinder, said piston having a tubular piston rod extending upwardly through said opening, a sprinkler head connected to the outer end of said piston rod, said cylinder having a liquid-receiving chamber above said piston, said cylinder having a lateral port positioned adjacent the top thereof and communicating with said chamber for introducing liquid into the chamber so as to displace said piston, a fixed sleeve within the cylinder and extending above said port, said sleeve having a lower inclined edge shaped so that a portion thereof extends below said port, said piston having a sleeve movable therewith and provided with an inclined upper edge shaped to engage the lower edge of said fixed sleeve when the piston is raised a predetermined distance, and means connected to said inlet port for supplying liquid into said chamber so as to move said movable sleeve and piston away from said fixed sleeve.

4. A lawn sprinkler as called for in claim 3 in which said movable sleeve has its inclined edge provided with a cut-out flat portion so as to form a space between the confronting edges of said sleeves when the latter are in engagement.

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