

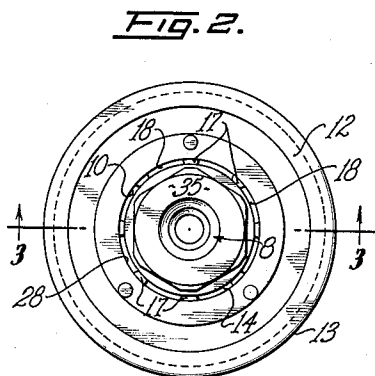
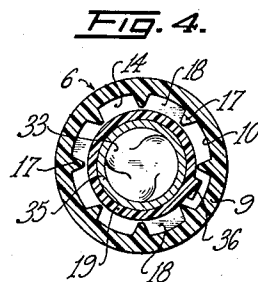
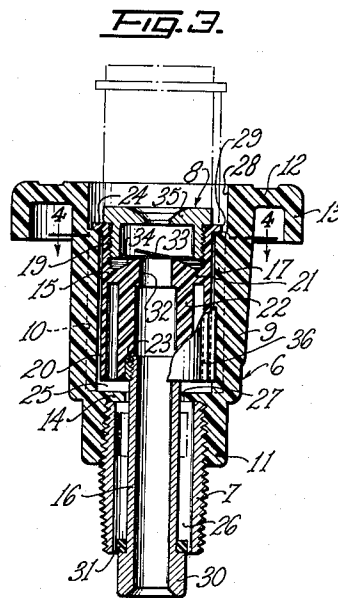
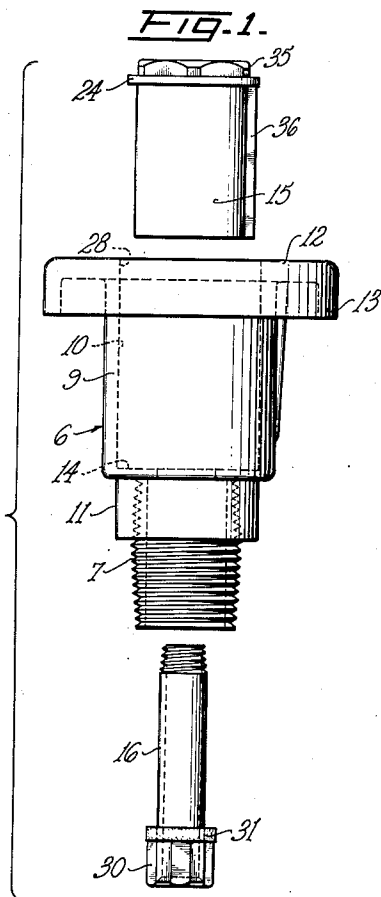
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POP-UP SPRINKLER HEAD

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POP-UP SPRINKLER HEAD

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This invention relates to sprinkler heads of the pop-up type and has as its general object to provide an improved sprinkler head having a pop-up nozzle adapted to be elevated by the pressure of water in a sprinkler line when the water is turned on, and to sink back to a lowered normal position flush with the ground level when the water is turned off.

Since underground lawn sprinkling systems with sprinkler heads permanently positioned in a lawn have come into widespread use, many efforts have been made to provide a sprinkler head that will normally be disposed flush with the ground level to avoid interference with lawn trimming operations, and the "pop-up" type of sprinkler head has become generally known though not widely used because of an inherent defect that has characterized all previous pop-up sprinkler heads. In all of the commercially available pop-up heads, the nozzle, telescopically mounted in a cylindrical casing for vertical sliding movement which is initially designed to be a loose-free sliding movement, invariably becomes silted-in by the deposit of fine sand, silt, mud, etc., in the annular clearance space between the nozzle and the casing, and often the body of silt builds up over the top of the nozzle. The silting-in process eventually locks the nozzle into the casing so tightly that the water pressure acting on the bottom of the nozzle is insufficient to elevate the nozzle to its normal operating position, and the result will be a blocking of the spray by the overhanging vegetation.

The general object of my invention is to provide an improved pop-up sprinkler head embodying means defining a plurality of flushing channels extending vertically between the neck of the spray nozzle and the throat of the casing in which the nozzle is mounted for vertical movement, whereby a plurality of flushing streams of water may pass upwardly between the nozzle and the casing for flushing out silt deposits. In general, this is attained by providing in the casing throat a series of vertically extending bearing ribs which are circumferentially spaced to define between them a series of flushing channels, these bearing ribs functioning further to define at their inner extremities, a series of bearing lands for positioning the neck of the spray nozzle for its vertical movements.

I am aware that prior attempts have been made to utilize a series of circumferentially spaced bearing ribs defining between them a series of flushing channels for combating the silting problem. However, such prior attempts have been only partially successful in combating the silting problem for the reason that they are restricted to the concept of combating the inflow of silt-carrying flows of water into the casing throat after the nozzle has been elevated and the sprinkler head is in operation, and provide only means for directing upward flows around the nozzle after it is elevated. I have found that such sprinkler heads can become silted in and stuck by the settling of silt around and over the nozzle after the water has been turned off, since the backwash of silt from the ground into the sprinkler head casing and the sump or depression in which it is mounted, will continue after the water flow has been cut off.

The present invention fully solves the problem by providing a pop-up head having flushing channels that are open at all times including the condition where the sprinkler nozzle is fully withdrawn into the casing. Whereas, in prior art devices, the nozzle in its lowered position seals the throat of the casing so that a flushing flow cannot

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start in the event the nozzle is silted in, the present invention provides an arrangement wherein the nozzle, even though silted in, will be freed by a flushing flow which commences when the water is turned on. To this end, the invention provides flushing channels terminating at their upper ends in flushing ports which are permanently open, both in the elevated and the lowered position of the nozzle, so that the flushing action can commence regardless of how much silt may be deposited on top of the nozzle. In fact, even though the sprinkler head should become completely covered with silt, the water will commence to seep through the flushing ports when the sprinkler is turned on and will gradually flush out the deposited silt until the nozzle is freed and will rise to its elevated spraying position.

Other objects and advantages will become apparent in the ensuing specification and appended drawing, in which:

FIG. 1 is an exploded side view of a spray head assembly embodying the invention;

FIG. 2 is a plan view of the spray head;

FIG. 3 is a vertical sectional view of the same with the nozzle shown in its normal retracted position in full lines and with its elevated spraying position being indicated in broken lines, the figure being taken on the line 3-3 of FIG. 2; and

FIG. 4 is a transverse sectional view through the nozzle and the casing throat taken on the line 4-4 of FIG. 3.

Referring now to the drawings in detail, I have shown therein, as an example on one form in which the invention may be embodied, a sprinkler head embodying, in general, a casing 6 of molded synthetic resin plastic material, having at its lower end an externally threaded nipple 7 which forms no part of the present invention for attachment to a conventional sprinkler line, and a nozzle assembly 8 which is mounted in the casing 6 for vertically sliding movement. Nipple 7 provides for conventional attachment of the sprinkler head assembly into a coupling of a vertical riser in a sprinkler line, the water entering the sprinkler head from the riser through the open lower end of the nipple 7.

The casing 6 embodies a barrel 9 having a throat 10 of interrupted cylindrical contour, a collar 11 projecting downwardly from the lower end of barrel 9 and molded tightly around the upper end of nipple 7, and a cape 12 extending radially from and integral with the upper end of barrel 9 and terminating in a rim 13 for seating in the ground surface to provide an area of enlarged circumference around the barrel for keeping the vegetation away from the spray nozzle 8, in accordance with conventional sprinkler head construction. An internal radial flange 14 defines the bottom of the throat 10, and provides an abutment against which the upper end of nipple 7 is positioned. Slidably mounted in throat 10 is a piston portion 15 of the nozzle assembly 8.

The nozzle piston 15, which is cylindrical, is laterally supported by a series of circumferentially spaced vertically extending bearing ribs 17, prism shaped, with a cross section of truncated isosceles triangle form, the ribs 17 having narrow bearing lands at their inner extremities, disposed on a common cylindrical surface of slightly greater radius than the cylindrical outer wall of nozzle piston 15 so as to guide the latter for free vertical sliding movement in concentric relation to the barrel 9. Between the ribs 17, and the external wall of piston 15 within the throat 10 are defined a series of circumferentially spaced flushing channels 18 through which water may flow upwardly for flushing silt out of the nozzle throat 10.

Piston 15 is molded of synthetic resin plastic material and includes a threaded socket portion 19 at its upper end, a thin walled cylindrical skirt 20 extending downwardly from the socket 19, an annular internal web 21

at the junction of the socket 19 and skirt 20, and a cylindrical internal sleeve 22 integrally joined to the socket 19 and skirt 20 through web 21 and extending downwardly from the latter in inwardly spaced relation to the skirt 20. Fixed in the lower end of sleeve 22 is an internally threaded metal ferrule 23 into which is threaded the upper end of tubular stem 16. A narrow supporting flange 24 is formed integrally with the upper end of socket 19 and extends outwardly therefrom to rest upon seats defined by the upper ends of the bearing ribs 17, to support the nozzle assembly 8 in its normal, lowered position. Flange 24 is received in a sump 28 which is defined in the upper end of casing 6, by a cylindrical wall constituting an upward extension of throat 10 above the upper ends of ribs 17. When the nozzle assembly is thus supported in its lowered position, an annular space 25 is defined between the lower end of nozzle piston 15 and the casing flange 14.

A flushing stream is developed in an annular cylindrical passage 26 defined between the bore of nipple 7 and the outer wall of nozzle stem 16, this flushing stream passing upwardly through an annular port 27 defined between the inner margin of casing flange 14 and the outer wall of stem 16, and thence passing through the annular space 25 radially outwardly into the lower ends of the flushing channels 18, through which it will rise.

It may now be noted that the outer diameter of supporting flange 24 of the nozzle piston is of substantially smaller diameter than the cylindrical wall of sump 28. Accordingly, a series of circumferentially separated flushing ports 29 are defined between the rim of flange 24 and the wall of sump 28 at the upper ends of the respective flushing channels 18, through which small initial flushing streams may flow from the channels 18 into the sump 28 immediately upon turning on the water in the sprinkler line and before the nozzle unit 8 begins to rise. Thus even though the sump 28 should be completely filled with silt covering the upper end of the nozzle 8, the flushing streams passing through the ports 29 will gradually flush the silt out of the sump 28, the flushing streams gradually increasing in force as the sump 28 is cleared. As the flow thus increases, any silt that has collected in the throat 10 below the flange 24 will be flushed out, thus completely freeing the nozzle for smooth upward movement under the force of the water pressure applied to the underside of the piston 15 in the annular space 25 upwardly of the stem 16.

At its lower end, stem 16 is formed with a head 30 which defines at its upper end a shoulder against which is seated a soft resilient packing washer 31 (of soft rubber or equivalent thermoplastic resin material). When the nozzle unit 8 reaches its elevated position, packing washer 31 will seat against the underside of casing flange 14, thus sealing the upper end of flushing passage 26 and directing the entire flow of water through the hollow stem 16, through the sleeve 22, through a valve port 32 within the web portion 15 of the nozzle piston, past a conventional disc valve 33 seated on a conical valve seat 34 on the upper side of web 21, and thence through a conventional spray head 35 which is threaded into the socket 19.

To restrain nozzle assembly 8 from rotating during spraying operation, piston 15 is provided on one side with a vertical key 36 which is received in one of the flushing channels 18.

I claim:

1. In a pop-up sprinkler head, a casing including a barrel having a flushing throat and a series of integral bearing ribs projecting radially inwardly from the wall of said throat in circumferentially spaced relation to define a series of vertical flushing channels, said bearing ribs having at their inner extremities respective bearing lands disposed on a common cylindrical surface, said casing having at its upper end a sump defined above the upper ends of said bearing ribs and at its lower end

being provided with means for attachment to a riser of a sprinkler line, said casing being of molded synthetic resin plastic material and said attachment means comprising a metal nipple secured in the lower end thereof, said casing further including an integral flange projecting radially from its upper end for seating against the ground surface and a radial flange projecting inwardly at the lower ends of said bearing ribs and at the upper end of said nipple and overhanging the bore of said nipple; and a nozzle assembly including a piston of molded synthetic resin plastic material having a cylindrical outer wall supported by said bearing lands in coaxial relation to said barrel and with clearance for free vertical sliding movement of said piston within said barrel, a radial flange projecting outwardly from the upper end of said piston and normally resting upon the upper ends of said bearing ribs and in inwardly spaced relation to the wall of said throat within said sump, so as to define a series of constantly open flushing ports at the upper ends of said flushing channels, a tubular stem secured in the lower end of said piston and projecting downwardly through an aperture defined within said radial flange and spaced from the inner margin of said flange to define an annular flushing port, said stem extending downwardly into said nipple and spaced radially inwardly from the inner wall thereof to define an annular cylindrical flushing passage within said nipple communicating with said annular flushing port, said stem having at its lower end an annular head adapted to engage the underside of said radial flange to define an elevated spraying position of said nozzle assembly, and a spray head in the upper end of said piston, said piston having an axial water flow passage extending from said stem to said spray head.

2. In a pop-up sprinkler head, a casing including a barrel having a flushing throat and a series of integral bearing ribs projecting radially inwardly from the wall of said throat in circumferentially spaced relation to define a series of vertical flushing channels, said casing having at its upper end a sump defined above the upper ends of said bearing ribs and at its lower end being provided with a threaded nipple for attachment to a riser of a sprinkler line, said bearing ribs having at their inner extremities respective vertical bearing lands disposed on a common cylindrical surface, said casing further including a radial flange projecting inwardly at the lower ends of said bearing ribs and at the upper end of said nipple and overhanging the bore of said nipple; and a nozzle assembly including a piston having a cylindrical outer wall supported by said bearing lands in coaxial relation to said barrel and with clearance for free vertical sliding movement of said piston within said barrel, means projecting outwardly from the upper end of said piston and normally resting upon the upper ends of said bearing ribs and in inwardly spaced relation to the inner wall of said sump, so as to define a series of constantly open flushing ports at the upper end of said flushing channels, a tubular stem secured in the lower end of said piston and projecting downwardly through an aperture defined within said radial casing flange and spaced from the inner margin of said latter flange to define an annular flushing port, said stem extending downwardly into said nipple and spaced radially inwardly from the inner wall thereof to define an annular cylindrical flushing passage within said nipple communicating with said annular flushing port, and a spray head in the upper end of said piston, said piston having an axial water flow passage extending from said stem to said spray head.

3. A sprinkler head as defined in claim 2, wherein said stem has at its lower end an annular head defining an upwardly facing annular shoulder, a packing washer seated upon said annular shoulder and adapted to engage the underside of said radial flange to define an elevated position of said nozzle assembly and to seal said annular flushing port when said nozzle assembly is in said elevated position so as to direct the flow through said stem and cut it off from said flushing passages, and a spray head in

the upper end of said piston, said piston having an axial water flow passage extending from said stem of said spray head.

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