

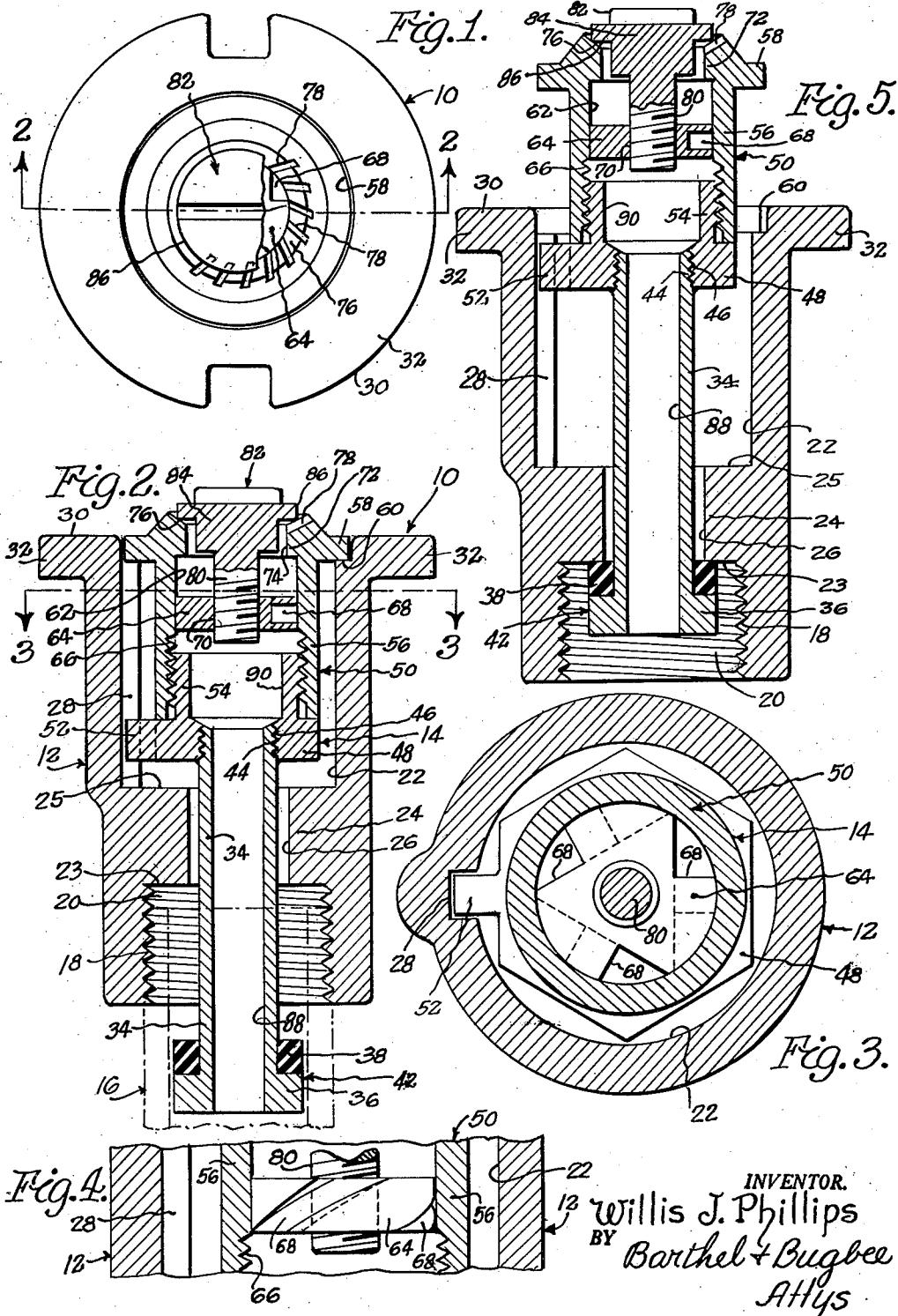
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## POP-UP LAWN SPRINKLER

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## POP-UP LAWN SPRINKLER

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1 Claim. (Cl. 299—61)

This invention relates to lawn spraying systems and, in particular to pop-up sprinklers for such systems.

One object of this invention is to provide a pop-up sprinkler for lawn spraying systems having a reciprocable spray head with means for quickly and easily cleaning or removing dirt from the spray head without having to remove the head itself, as in prior spray heads.

Another object is to provide a pop-up sprinkler of the foregoing character where the spray head is cleaned or dirt removed therefrom, merely by removing a screw while leaving the remainder of the nozzle in place, the sealing of the spray head being in the nozzle itself rather than in a separate sealing cap, as in prior sprinklers.

Another object is to provide a pop-up sprinkler of the foregoing character wherein means is provided for preventing the spray head from dropping downward into the housing out of reach of the threaded shank of the water-deflecting screw when the latter is removed for cleaning purposes, so that the internal parts will not become difficult of access when cleaning is attempted.

Another object is to provide a pop-up sprinkler of the foregoing character wherein the water jets are directed by non-radial grooves in the spray head to drop at varying distances from the sprinkler so as to thoroughly spray the area intended to be covered by the sprinkler.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawings, wherein:

Figure 1 is a top plan view of a pop-up sprinkler for a lawn spraying system, according to one form of the invention, with the central portion thereof broken away to show the construction thereunder;

Figure 2 is a central vertical section through the pop-up sprinkler shown in Figure 1, taken along the line 2—2 therein, with the spray head in its retracted position;

Figure 3 is a horizontal cross-section taken along the line 3—3 in Figure 2;

Figure 4 is an enlarged fragmentary longitudinal section of the upper portion of Figure 2, but with the water-swirling core in side elevation so as to show the oblique water-swirling grooves therein; and

Figure 5 is a view similar to Figure 2, but with the spray head in its extended position.

Hitherto, pop-up sprinklers used in permanently-installed lawn spraying systems have been of reduced efficiency because of dirt or other foreign matter entering the spray orifices in the spray head and either partially or wholly clogging these orifices. In such prior pop-up sprinklers, it was necessary to take the major portion of the sprinkler nozzle apart in order to clean out the dirt, corrosion or other foreign matter accumulating therein, especially during the long period of winter inactivity of the system.

The present invention provides an improved pop-up sprinkler which affords quick and easy cleaning of the spray orifices merely by removing a single small screw in the upper end of the spray head and then using a

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small wire brush in order to brush the dirt out of the spray orifices or notches.

Referring to the drawing in detail, Figures 1 to 3 inclusive show a pop-up sprinkler, generally designated 10, for permanently-installed lawn spraying systems wherein such sprinklers are embedded in the lawn at intervals and interconnected by piping which in turn is connected to the house water supply system so that the mere turning of a valve supplies water to all of the sprinklers and causes them to spray the lawn over its entire area. Such lawn spraying systems have recently become of increased commercial importance and more widespread use by being made available for self-installation, chiefly by the use of plastic pipe instead of the former metal pipe used in such systems. The sprinkler 10 consists generally of a stationary, generally cylindrical outer housing 12 and a reciprocable inner nozzle 14 movable from the retracted position of Figure 2 to the extended position of Figure 5 in response to the arrival of water under pressure in the hose 16 threaded into the internally-threaded portion 18 at the lower end of the housing 12 and forming a lower actuating chamber 20 separated from an upper bore 22 by an internal annular portion 24 having lower and upper annular shoulders 23 and 25 thereon and containing a reduced diameter bore 26. The upper bore 22 is provided with a longitudinally-extending guide groove 28 (Figure 3) for guiding the nozzle 14 in its reciprocation, whereas the housing 12 is provided at its upper end 30 with an outwardly-extending flange 32 which is placed substantially at the ground level of the lawn and prevents the sprinkler 10 from sinking into the soil an undesired amount.

Reciprocably mounted in the passageway 26 and spaced radially therefrom is a tubular piston rod 34 having on its lower end a piston head 36 and a sealing washer 38 on the inner side thereof, the sealing washer being of resilient material, such as natural or synthetic rubber, and adapted to engage the annular shoulder 23 between the threaded bore 18 and the reduced diameter bore 25 (Figure 2). The tubular piston rod 34 and its head 36 together form a reciprocable plunger 42, the upper end of the piston rod being threaded as at 44 so as to enter a correspondingly-threaded bore 46 in the base 48 of a sprinkler head, generally designated 50, mounted on the upper end of the plunger 42.

The sprinkler head base 48 is preferably of generally hexagonal outline (Figure 3) and from one side thereof projects a tongue or lug 52 which loosely and slidably engages the longitudinal guide groove 28 so as to prevent the sprinkler head 50 from rotating while it reciprocates. Rising from the upper side of the base 48 is an externally-threaded tubular portion 54 upon which is threaded the internally-threaded tubular casing 56 of the spray head 50. The casing 56 has an annular flange 58 near its upper end which engages an annular counterbore 60 at the top of the upper bore 22, and immediately inside the flange 32.

The casing 56 is provided with a bore 62 into which is tightly inserted a swirl-producing core 64 immediately above the internally-threaded lower portion 66 thereof. The periphery of the core or plug 64 is provided with circumferentially-spaced grooves 68 disposed obliquely to the axis or center line of the plug 64 (Figure 4), which at its center contains an axially-directed threaded hole 70. The upper end portion of the casing 56 is provided with an inwardly-extending annular portion 72 containing a bore 74 of smaller diameter than the bore 62 of the casing 56 and terminating at its upper end in a flared or conical portion 76 provided with upwardly-inclined non-radial spray grooves 78 (Figure 1).

The spray grooves 78 are spaced apart and diverging

outwardly from one another circumferentially either partially or wholly around the flared portion 76. The particular form of the invention shown in Figures 1 to 5 inclusive, and particularly in Figure 1, shows the grooves 78 extending only approximately halfway around the flared portion 76 so as to project the water sprays in an approximately semi-circular path. Such a sprinkler 10 would be used adjacent the edge of a lawn in order to spray inward without spraying the sidewalk or driveway, as the case may be.

Threaded into the hole 70 in the circumferentially-obliquely-grooved plug 64 is the threaded shank 80 of a water-deflecting screw 82 having a head 84 with a marginal water-deflecting flange 86 near the upper end thereof adapted to project into the flared opening or portion 76 approximately halfway along the grooves 78. As a consequence, the screw 82 may be quickly and easily removed by means of a screw driver by unscrewing it from the hole 70 in order to clean corrosion or dirt out of the grooves 78, as described below in connection with the operation of the invention. It will be understood that the plug 64 is so tightly seated in the bore 62 of the casing 56 as to remain fixedly in position and not move when the screw 82 is tightened or loosened in its hole 70. The flange 58 and counterbore 60 prevent the spray head casing 56 and consequently the spray head 50 from dropping downward to the shoulder 25 at the lower end of the bore 22 in the housing 12 and consequently placing the threaded hole 70 in the plug 64 out of reach of the threaded shank 80 of the screw 82 when reinsertion of the latter is attempted, as has occurred in prior pop-up sprinklers of different construction.

As a consequence of the foregoing construction, the tubular piston rod 34 is provided with a bore 88 which opens into a bore 90 in the upstanding tubular portion 54 of the base 48, and this in turn opens into the threaded lower end portion 66 of the bore 62, whence the water passes through the oblique grooves 68 of the plug 64 into the upper end of the bore 62 and thence outward through the reduced diameter bore 74 and the obliquely-grooved flared portion 76 at its outlet.

In the operation of the invention, let it be assumed that a hose or other pipe 16 has been threaded into the threaded bore 18 at the lower end of the sprinkler housing 12 (Figure 2) which in turn has been embedded in a lawn with the top 30 of the upper flange 32 at the ground level thereof, and that the hose 16 has been connected to a source of water under pressure. When the water supply is shut off, the weight of the nozzle 50 causes it to drop under the force of gravity into its retracted position within the bore 22 of the housing 12 (Figure 2). In this position, the upper end of the spray head 50, including the screw 82, projects only slightly above the ground level and insufficiently to interfere with the action of a lawnmower in cutting the grass. When it is desired to spray the lawn, however, the user turns on the water which flows, under the usual pressure of approximately 60 pounds, through the hose 16 until it encounters the piston head 36 of the plunger 42 and forces the latter upward into the position of Figure 5 until the resilient washer 38 engages the annular shoulder 40 at the upper end of the threaded bore 18 and seals the opening between the lower end of the reduced diameter bore 25 and the piston head 36. This action moves the spray head 50 upward out of the housing 12 into its spraying position. The water pressure holds the piston head 36 against the annular shoulder 40 in the extended position of Figure 5, so long as the water is under sufficient pressure.

While the nozzle 14 is being held in its extended or upwardly-projecting position (Figure 5) by the water pressure, the water flows through the bore 88 in the plunger 42, and the bore 90 in the base 48 into the threaded lower portion 66 of the bore 62 and thence through the oblique peripheral groove 68 in the swirl-producing plug

64 into the upper portion of the bore 62, acquiring a swirling or vortex motion because of its passage through the oblique peripheral groove 68. The swirling water then passes upward through the reduced diameter bore 74 in the inwardly-projecting annular portion 72 where it encounters the flange 86 upon the screw head 84 and passes outward through the non-radial grooves 78 in an upward and outward direction. As the grooves 78 are at different angles relatively to the radii of the bore 74 drawn thereto, the water jets passing therethrough will receive different action from the swirling stream of water entering them, with the result that the jets will drop at different distances from the spray head 50 and consequently will thoroughly spray the lawn-area intended to be covered by the spray from the sprinkler 10.

If, now, the spray grooves 78 become partially or wholly clogged by dirt, corrosion or other foreign matter, the operator merely applies a screw driver to the head 84 of the screw 82 and unscrews the latter from its hole 80 in the plug 64, fully exposing the grooves 78 so that a small bronze wire brush may be used to clean out the foreign matter from the grooves 78. Since the spray head 50 is prevented by the flange 58 and counterbore 60 from moving downward an undesirable depth into the bore 22 of the housing 12, such as to the bottom 25 thereof as in prior sprinklers of different construction, the threaded hole 70 of the plug 64 remains accessible for reinsertion of the shank 80 of the screw 82 after such cleaning has been carried out. After cleaning, the screw 82 is then reinserted in its former position shown in Figures 2 and 5, and the sprinkler 10 is again ready for use.

When the water is shut off, and ceases to flow through the pipe 16, the pressure upon the piston head 36 becomes insufficient to hold up the weight of the nozzle 14. The nozzle 14 then drops under the force of its own weight from the extended position of Figure 5 to the retracted position of Figure 2, thereby withdrawing the sprinkler head 50 into the bore 22 of the housing 12 and freeing it from any possibility of interference with the action of the lawnmower, seeder or other equipment used upon the lawn.

What I claim is:

A pop-up sprinkler for a lawn spraying system, comprising a casing having a top portion adapted to be installed substantially flush with the lawn ground level, said casing having a bore therethrough and a water supply pipe connection at the lower end of said bore, a tubular spray nozzle reciprocably mounted in said bore, said nozzle having a tubular spray head on the upper portion thereof disposed approximately at the level of said casing top portion in the retracted position of said nozzle, and a piston therebelow responsive to the arrival of water under pressure to lift said spray head out of said casing high above said top portion, said spray head having an open-topped recess at the upper end thereof with an annular side wall containing a multiplicity of upwardly-inclined water spray grooves communicating with said bore, a water deflecting screw support disposed within said spray nozzle below said recess and having a central threaded hole therein, and a water deflecting screw having a threaded shank removably threaded into said hole and having a closure head engageable with said side wall in substantially closing relationship with the top of said recess exclusive of said grooves, said casing top portion having a substantially annular counterbore with a substantially annular seat at the bottom thereof extending inwardly to said bore and said spray head having a substantially annular flange extending outwardly from the upper portion thereof into nesting engagement with said counterbore and overlapping engagement with said seat in the lowered position of said spray head whereby to permit complete removal of said water deflector screw from said support and spray head for cleaning out said grooves and spray head while preventing dropping of said spray head

deep down into said casing bore into a position difficult of access.

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