Nov. 7, 1972 E. N. REYNOLDS 3,702,173

SPRINKLER HEAD

Filed Feb. 19, 1971

Fig. 1.

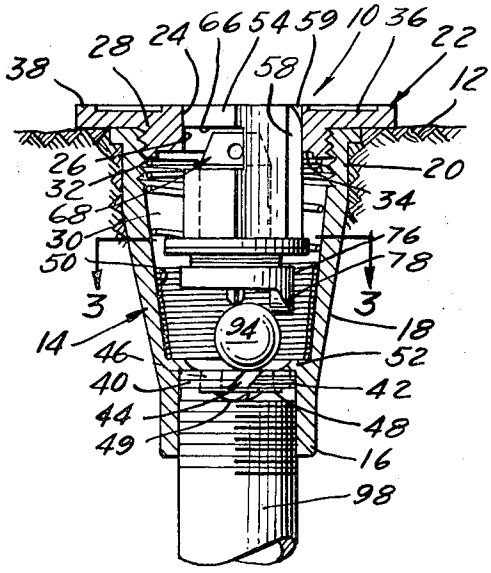


Fig. 2.

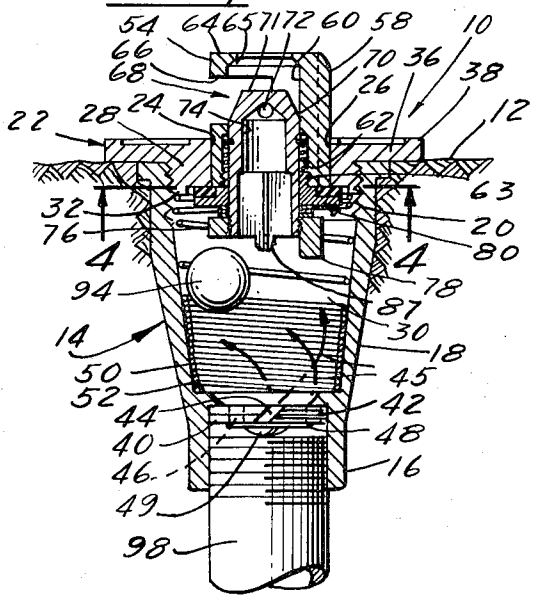


Fig. 3.

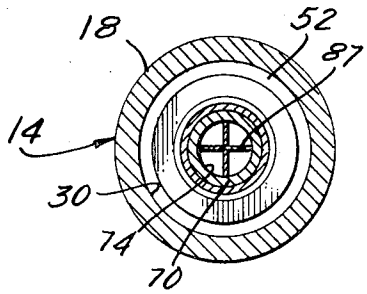


Fig. 4.

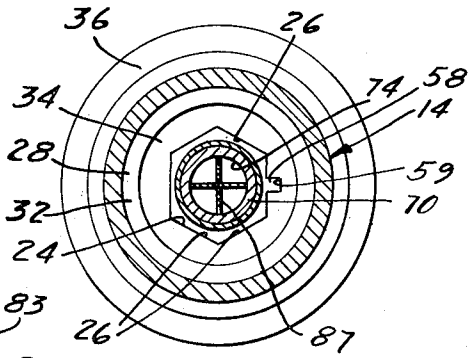


Fig. 5.

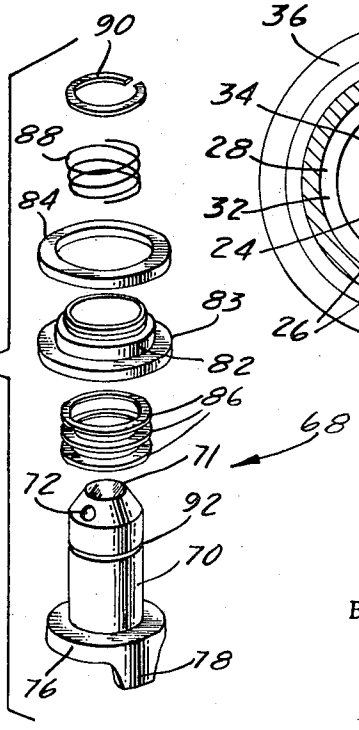
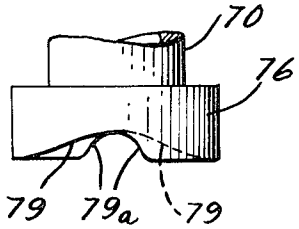


Fig. 6.



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SPRINKLER HEAD

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ABSTRACT OF THE DISCLOSURE

A sprinkler head comprising a main body housing, having a threaded cap member secured to the upper end thereof, adapted with an opening therein to receive a sleeve member which is slidably disposed within the opening, and a core assembly being adapted to be rotatably secured within the sleeve member, the core assembly being provided with a frictional clutch assembly which includes a plurality of slip rings, a spring and a lock ring when axially aligned within the sleeve member, allowing the core or nozzle member to rotate by means of a ball striking a base portion of the core assembly.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates generally to sprinkler heads and, more particularly, to a pop-up rotatable, fluid-pressure operable sprinkler head.

Description of the prior art

As is well known in the art, various problems and difficulties are encountered in providing suitable means for watering lawns and the like. Particularly in pop-up sprinklers, that is sprinklers having slidable heads which discharge water as the water pressure forces the discharge head upwardly from the sprinkler body and recedes back into the sprinkler body when the water pressure is turned off and not in use, many problems relating to material wear, water leakage, high-frictional characteristics, corrosion and, in particular, clogging by foreign material have been encountered. Rotary-type sprinkler heads are generally complex in structure, having many moving parts causing a high percentage of breakdowns. The pop-up type sprinkler heads are disposed at ground level and are, thereby, exposed to additional problems wherein foreign material, such as dirt, grass and leaves, may clog the area around the slidable head, causing the head not to operate properly, or not at all.

SUMMARY OF THE INVENTION

The present invention comprises a sprinkler head having a hollow body, threaded at both the upper and lower ends. The upper threaded end receives a cap member and the lower end receives a conventional pipe, or conduit, whereby water may flow into the hollow body. Within the cap member there is provided an opening adapted to receive a slidable sleeve which is forced upwardly as the water pressure increases within the hollow body. Rotatably secured within the sleeve by a threaded bushing is a core assembly which includes a tubular nozzle or core member having a bore therein for passage of water from the hollow body to atmosphere. Rotation of the tubular core is caused by the swirling action of the water which, in turn, causes a ball to whirl upwardly and strike a lug or shoulder projecting downwardly into the interior of the main body, thereby forcing the nozzle to rotate at a specific stabilized rate.

OBJECTS AND ADVANTAGES OF THE INVENTION

The present invention has for an important object a provision wherein clogging of the nozzle head is prevented.

It is another object of the invention to provide a sprinkler head of this character wherein the raised nozzle is moved in a rotary manner in a plurality of increments of rotation.

It is further another object of the invention to provide a sprinkler head adapted with a frictional clutch assembly for smooth and stable rotation of the nozzle head.

It is a further object of the invention to provide a nozzle of this character having a greatly improved operation.

A still further object of the invention is to provide a pop-up rotary sprinkler which is used at ground level and that does not allow foreign material to enter therein.

It is another object of the invention to provide a device of this character that is simple and rugged in construction.

It is still another object of this invention to provide a device of this character having a relatively long working life.

It is a further object of the invention to provide a rotary pop-up sprinkler head having relatively few operating parts.

It is still a further object of the invention to provide a device of this character that is easy to service and maintain.

It is still another object of the invention to provide a device of this character that is relatively inexpensive to manufacture.

The characteristics and advantages of the invention are further sufficiently referred to in connection with the accompanying drawings, which represent one embodiment. After considering this example, skilled persons will understand that variations may be made without departing from the principles disclosed and I contemplate the employment of any structures, arrangements or modes of operation that are properly within the scope of the appended claims.

DESCRIPTION OF THE DRAWINGS

Referring more particularly to the accompanying drawings, which are for illustrative purposes only:

FIG. 1 is a transverse view, partially in section, showing the sprinkler head in a non-activated position;

FIG. 2 is a sectional view similar to FIG. 1 and showing the sprinkler head in an extended operating position;

FIG. 3 is a sectional view taken on line 3—3 of FIG. 1;

FIG. 4 is a sectional view taken on line 4—4 of FIG. 2;

FIG. 5 is an exploded perspective view of the core assembly; and

FIG. 6 is a fragmentary view illustrating a modification of a portion of the sprinkler head.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to FIGS. 1 and 2, there is shown a spray device or sprinkler head, generally indicated at **10**. As illustrated, this type of sprinkler head is disposed in the ground **12** and is positioned level thereto. That is, the upper portion of the sprinkler **10** is positioned so that it is just above ground level where the general height thereof is less than the height of the surrounding growth, in order not to interfere with mowing operations which generaly include lawn mowers, grass cutting devices and the like. As shown, the sprinkler head comprises a hollow body indicated generally at **14**. The body **14** includes a lower, internally threaded part **16** from which there is a flaring portion **18** terminating in a cylindrical, internally-threaded top portion **20**. The portion **18** is intermediate the lower end portion **16** and the upper end portion **20** so that the intermediate portion **18** may be considered as being an inverted frustoconical part.

The sprinkler head includes a top or cap member, indicated generally at **22**. Cap **22** includes a centrally positioned opening **24** which is defined by six depending sides, indicated by reference character **26**, and each being co-axial with the cap or cover **22**. Said depending walls form an inwardly protruding flange member **28**, said flange being externally threaded and screwed into the upper threaded portion **20** of the body **14**.

The axial bore **24** of the cap **22** communicates therethrough at its lower portion with a chamber **30** which is peripherally defined by flange **32**, the upper end of said chamber being defined by the lower wall **34** of the central portion of the cap or cover **22**. From the central portion of the cap there extends an annular flange **36** thereabout, said flange **36** being provided with a peripheral rim **38**.

A disc **40**, adapted with external threads **42**, is secured into the lower portion **12** to a position whereat the upper surface of said disc is at the lower end of the intermediate portion **18**, said disc forming a bottom member for said intermediate portion. Annularly arranged about the disc **40** are a plurality of slots **44** which are all inclined in the same direction to cause water passing therethrough to swirl upwardly within the interior of the intermediate portion **18**, the direction of swirling motion of the water passing said slots being indicated by the arrows **45** in FIG. 2.

The disc **40** is also provided with a plurality of vertical openings **46** therethrough, the axes of which are parallel to the axis of the disc **40**. Flow of water or fluid through one of said openings **46** is controlled by a valve member **48** which comprises a flat piece of material which may be of metal, plastic or the like. The valve member is disposed between the head of a screw **49** and the underside of the disc **40** said screw **49** being adapted to be received in said disc.

There is provided a coil spring **50** which lines the interior walls of the intermediate portion **18** and is shaped to correspond thereto. The lower end of the spring **50** engages the annular flange **52** just above the disc **40** and, at this lower end, the coils of the spring **50** are normally in contact with each other. However, the upper part of the spring **50**, that is the part of said spring disposed in the upper portion of the body **18**, is loosely coiled so that the respective coils are spaced apart, as best shown in FIGS. 1 and 2. It is to be noted that the portions of the spring **50** disposed in the intermediate portion **18** of the body is frustoconical in shape but inverted so that the smaller end of said spring is at the bottom thereof. The upper portion of the spring **50** disposed within the top portion **20** of the body is cylindrical. When the spring **50** is within the body **14** and the cap or cover **22** is screwed into the upper portion **20** of said body, the upper coils of said spring are placed under compression so that, in effect, the entire spring is under compression. It is to be noted that the lower edge of the flange **32** of the cover engages the upper end of the spring **50** and provides a reaction shoulder for the upper end of said spring to resiliently hold spring **50** in the hollow body or housing **18**.

As shown in FIGS. 1 and 2, a sleeve member **54** is positioned within the opening or bore **24** and is adapted for axial slidable movement therein. The sleeve member **54** includes outer flat wall **56**, corresponding to the walls **26** of the bore **24**, and at least one wall thereof is provided with a longitudinal key member **58** which cooperates slidably with a key way **59** within one wall of the bore **24**. Thus, it can be seen that the sleeve member **54** is limited to an upward and downward movement within the bore **24** and is held against any rotation. The sleeve member **54** includes a bore **60** at its upper end and an enlarged bore **62** adjacent the lower end, said enlarged bore having internal threads therein.

The upper end of the sleeve includes an end wall having a central conical opening **65** therein. A transverse slot **66** is provided in the sleeve member adjacent the walls **64**.

A core assembly indicated generally at **68**, is positioned for rotatable movement within the sleeve member **54** and is shown in detail in FIGS. 2 and 5. The core assembly **68** has a tubular portion or nozzle **70** with a closed upper end wall **71**, there being provided a pair of annularly, upwardly-directed holes or passages **72** through the walls of the tubular portion or nozzle **70** and positioned adjacent the end wall **71** thereof. The passages **72** communicate with the interior bore **74** of the core assembly. The lower end of the tubular portion **70** removed from the end wall **71** has a collar **76** threadably secured thereto, thus forming a flange in the nozzle **70**.

At one side of the nozzle there is a string base portion of the collar **76**. In FIGS. 1, 2 and 5 the striking base portion comprises a depending lug **78** which is curved from its inner upper end downwardly and outwardly, and is also curved arcuately outwardly in opposite directions from the inner central region.

As illustrated in the drawings, the core assembly **68** is adapted for deposition with the sleeve member **54** with the passages **72** being in horizontal alignment with the slot **66**. The horizontal alignment with the passages **72** is maintained by a frictional clutch assembly, generally indicated at **80**. The clutch assembly **80** comprises a threaded bushing **82** having a central opening to receive the tubular nozzle **70** and is provided with an annular flange **83** for supporting a gasket **84**. The threaded portion of the bushing **82** is screwed into the threads **63** of the sleeve member **54** and thereby holds the gasket **84** in place therebetween, and serves to provide a seal between the flange **83** and the base of the opening **24**, as shown in FIG. 2. A plurality of spacers **86** are positioned between the underside of the bushing **82** and the upper face of th collar **76** to provide, not only free movement therebetween, but, also, means for adjusting the position of the passages **72** relative to the slot **66**. In order to accomplish a frictional engagement between the spacers **86** and the stationary bushing **82**, there is provided a biasing means shown as a coil spring **88** superimposed about the nozzle **70** having its lower portion supported against the upper rim of the bushing **82** and its upper portion biased against a retaining ring **90**. The ring **90** is removably secured to the nozzle **70** by means of an annular groove **92**. The tension of spring **88** is adjustable by the number of spacers **86**. Additionally, a segmented deflector **87** is press-fitted within the lower portion of the nozzle bore **74**.

Within that portion of the body **14** between the disc **40** and the cover **22**, there is disposed a striking means, such as ball **94**, which may be of any suitable character, said ball being shown, however, as a steel ball, such as a ball bearing, which may be plated with rust or corrosion-resistant material, such as chrome or any suitable material. The diameter of the ball **94** is smaller than the diameter of the lower end of the intermediate body portion **18**, and said ball is adapted to be forced upwardly and circularly within the body **14** by the water flowing through the slots **44**.

Fluid or water is supplied to the sprinkler head by a conduit or pipe **98** which is vertically disposed and is provided at its upper end with an externally-threaded end portion which is threadably received within the lower end portion of the lower body portion **16**.

When the water is turned off and the device is inoperative, the parts are in the position shown in FIG. 1, the sleeve member in the nozzle being telescoped into the interior of the body **14** with the lower end of the lug **78** and deflector **87** resting on the ball **94** which, in turn, rests on the disc **40**.

When water is turned into the sprinkler head the water from the pipe **98** flows upwardly through the slots **44** into the interior of the body between the disc **40** and cap **22**. There is, also, an upward flow of water through the openings **46** in the disc **40**. The water flowing into the interior of the body forces the sleeve and nozzle upwardly

to the position shown in FIG. 2 and causes the ball **94** to move in an upward spiral path on the interior of the spring **50**. The swirling action of the water causes the ball to twirl around in the spring **50** and, when the ball reaches its upper position, as shown in FIG. 2, it will strike the lug **78** and cause the nozzle to rotate a limited amount. Because of the curved inner surface of the lug **78**, the ball will pass over said surface and beyond the lug.

The ball will continue to move around the interior surfaces of the coils of spring **50** and will engage the underside of the flange **64** of the nozzle.

When the ball has moved in its circular path until it reaches the lug **78**, it will again strike said lug and rotate the nozzle another increment of movement. This operation will continue as long as there is water supplied to the device. At this point it should be noted that, due to the frictional clutch assembly, the movement of the sprinkler nozzle **70** is stable and smooth, allowing the water to spray in a more even and direct manner. However, the same stable and smooth rotation of nozzle **70** will occur when the alternative arrangement thereof, as shown in FIG. 6, is adopted. The striking base portion of the collar **76** is formed with a recess **79** having striking shoulders **79***a* spaced about the circumferential area. There are other means for receiving the striking force of the striking means for effecting intermittent rotary movement of the nozzle **70**.

It is to be noted that the water flowing through the openings **46** is directed into the interior of the body **14**, generally parallel to the axis thereof and the streams of water from the openings **46** will reduce the swirling action of the water entering the interior of the body through the slots **44**. While there may be any desired number of openings **46**, it has been found that two such openings are satisfactory and, by varying the effective sizes of one of said openings **46** by means of the valve **48**, the effective swirling action on the ball **94** may be varied to meet any particular requirements of an installation.

The invention and its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction and arrangement of the parts of the invention without departing from the spirit and scope thereof or sacrificing its material advantages, the arrangement hereinbefore described being merely by way of example, and I do not wish to be restricted to the specific form shown or uses mentioned, except as defined in the accompanying claims.

I claim:

1. A rotary nozzle assembly for a sprinkler head wherein the sprinkler head is disposed at ground level and wherein the improvement of said nozzle comprises:

a sleeve member slidably disposed within said sprinkler head;

means for limiting rotation of said sleeve member;

a nozzle core rotatably secured within said sleeve member and having laterally directed ports adjacent the upper end thereof, and an annular flange disposed at the opposite free end thereof, said flange adapted with a striking base thereon;

a striking means for engaging said striking base, causing rotation of said nozzle;

means for limiting upward movement of said sleeve and said nozzle core; and

a frictional clutch means for controlling the rotational movement of said nozzle core, said frictional clutch means includes:

a bushing threadably secured to said sleeve member;

a lock ring removably secured to the upper portion of said nozzle core; and

a biasing means comprising a coil spring superimposed over said nozzle core and biased between said bushing and said lock ring.

2. A rotary nozzle assembly according to claim **1**, wherein said frictional clutch means includes means for adjusting said biasing means, said adjusting means being positioned between said lower portion of said bushing and said annular flange of said nozzle core.

3. A rotary nozzle assembly according to claim **2**, wherein said sleeve member includes a transverse slot in the upper portion thereof to be positioned to overlie said ports of said nozzle core.

4. A rotary nozzle assembly according to claim **2**, wherein said means for adjusting said biasing means comprises a plurality of spacers.

5. A rotary nozzle assembly according to claim **4**, wherein said striking base comprises a lug depending downwardly from said flange of said nozzle core.

6. A rotary nozzle assembly according to claim **4**, wherein said striking base comprises a recess having a striking shoulder disposed within said flange of said nozzle core.

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U.S. Cl. X.R.

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