Aug. 11, 1970 T. RADECKI 3,523,647

PART CIRCLE WATER MOTOR DRIVEN SPRINKLER

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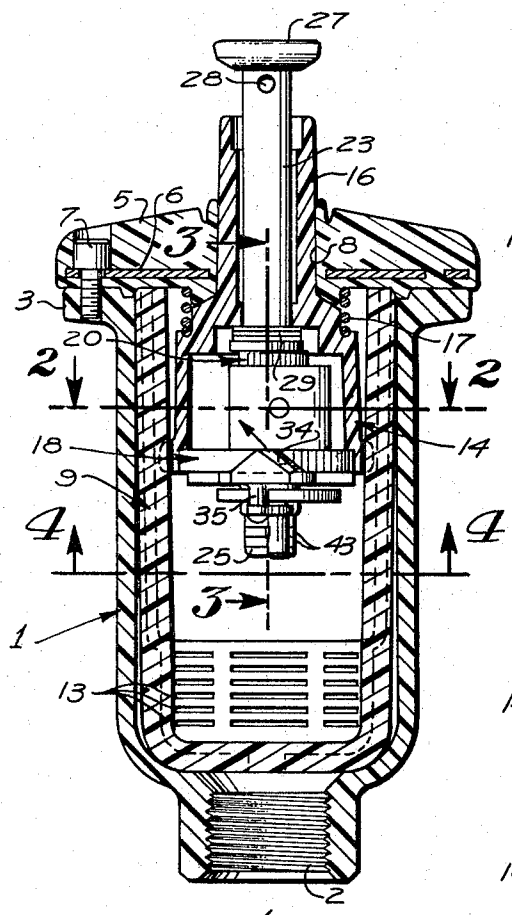


FIG. 1

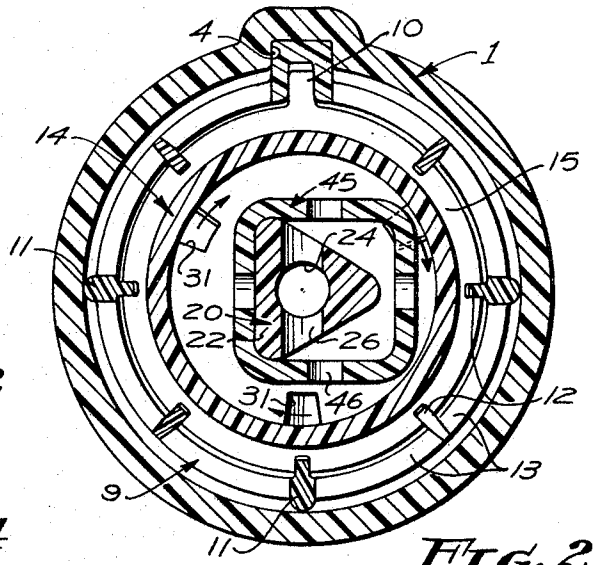


FIG. 2

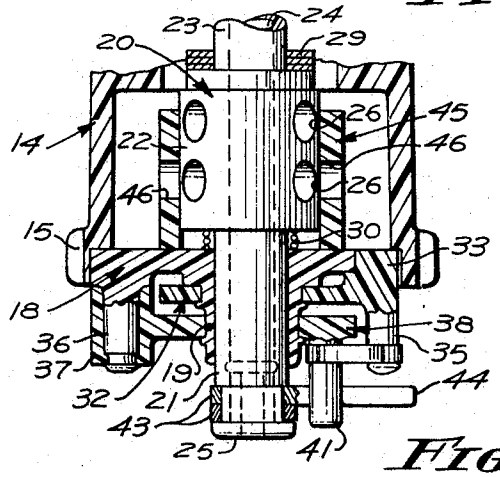


FIG. 3

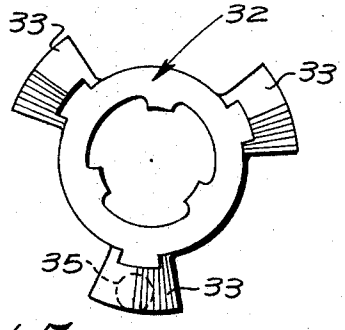


FIG. 5

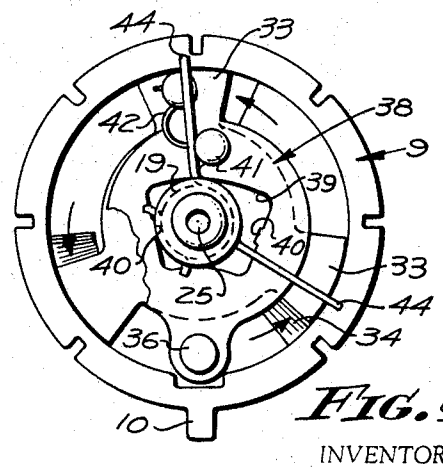


FIG. 4

INVENTOR.
TONY RADECKI
BY
Lyon & Lyon
ATTORNEYS

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PART CIRCLE WATER MOTOR DRIVEN SPRINKLER

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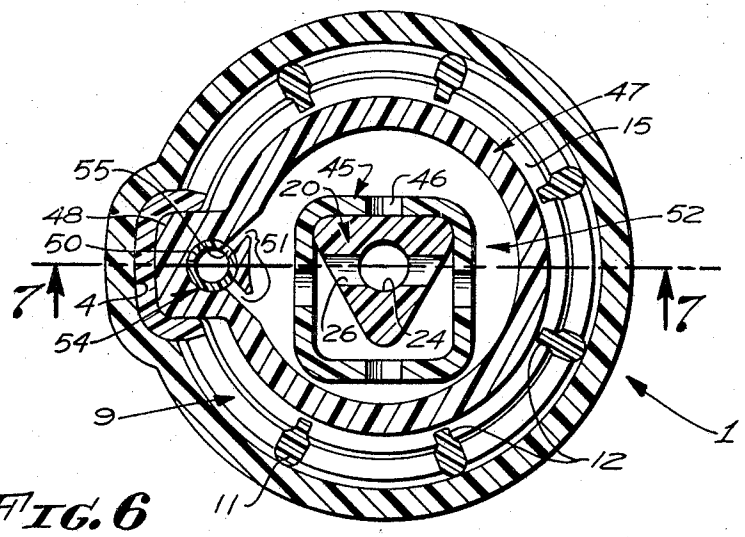


FIG. 6

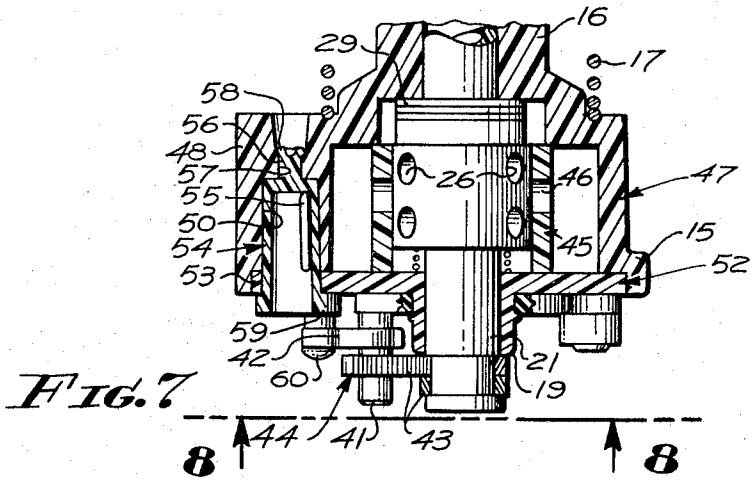


FIG. 7

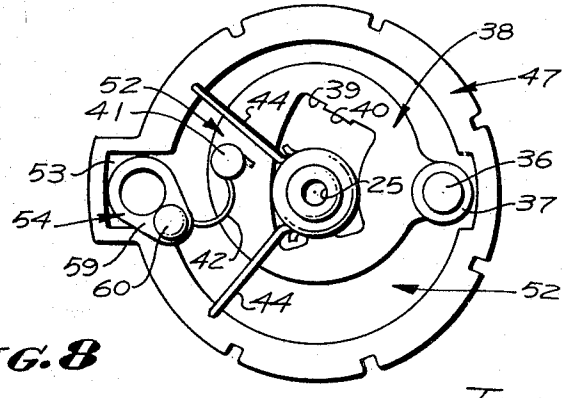


FIG. 8

INVENTOR.
TONY RADECKI
BY
Lyon & Lyon
ATTORNEYS

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3,523,647

PART CIRCLE WATER MOTOR DRIVEN SPRINKLER

Tony Radecki, West Covina, Calif., assignor to Rain Bird Sprinkler Mfg. Corporation, Glendora, Calif., a corporation of California

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Int. Cl. B05b 3/02
U.S. Cl. 239—206 12 Claims

ABSTRACT OF THE DISCLOSURE

A part circle sprinkler of the type utilizing a water motor drive such as shown in Patent No. 3,315,898, in which the motivating jet is alternately directed in opposite directions by a reversing mechanism on engagement with circumferentially adjustable stops.

BACKGROUND OF THE INVENTION

Water motor driven sprinklers, such as that shown in Pat. No. 3,315,898, have proven of practical value; however, heretofore they have been limited to full circle operation as distinguished from part circle operation.

Other types of part circle sprinklers, such as that illustrated in Pat. No. 2,256,737, have been employed for many years and have utilized over center mechanisms which engage circumferentially adjustable stops to effect reversal of movement, thereby to confine the area watered to a predetermined arc.

Thus, while a reversing mechanism to effect part circle operation has been recognized as desirable, the problem of incorporation in a water motor type sprinkler so as to cause reversal of a water stream has not been feasible.

SUMMARY OF THE INVENTION

A primary object of this invention is to provide a rotating sprinkler of the internal motor type which incorporates a novelly arranged means for reversing the direction of movement at any selected point so as to sprinkle any selected arc of a circle.

A further object is to provide a sprinkler of this type in which the reversing means is disposed within the sprinkler body adjacent the motor, and the motor is mounted for ready removal as a unit with a cover plate; thus, the reversing means may be preset and the sprinkler assembled so that the reversing means is protected against accidental change in adjustment.

A further object is to provide a reversing mechanism for a sprinkler of this type in which one embodiment produces one or more upwardly and tangentially directed jets for peripheral flow on contact with the walls of the motor chamber so as to effect rotation of the motor.

A further object is to provide a reversing mechanism for a sprinkler of this type in which another embodiment involves one or more oscillating nozzles mounted at the periphery of the motor chamber for directing water horizontally and tangential for peripheral flow on contact with the motor chamber walls for rotation of the motor.

DESCRIPTION OF THE FIGURES

FIG. 1 is a longitudinal, sectional view of the part circle water motor driven sprinkler.

FIG. 2 is an enlarged, transverse, sectional view, taken through 2—2 of FIG. 1.

FIG. 3 is an enlarged, fragmentary, sectional view, with portions in elevation, taken through 3—3 of FIG. 1, showing particularly the water motor with the surrounding housing and screen omitted.

FIG. 4 is a bottom view of the water motor, taken from 4—4 of FIG. 1, with the surrounding housing and the screen omitted.

FIG. 5 is a plan view of the jet control plate and the diverter blades carried thereby.

FIG. 6 is an enlarged, transverse, sectional view, corresponding to FIG. 2, showing a modified form of the reversing mechanism.

FIG. 7 is an enlarged, fragmentary, longitudinal, sectional view thereof, taken through 7—7 of FIG. 6.

FIG. 8 is a bottom view thereof, taken from 8—8 of FIG. 7.

SPECIFICATION

Reference is directed first to FIGS. 1 through 5. The construction herein illustrated includes an elongated, cylindrical housing 1, having an inlet 2 at its lower end for connection to a riser, not shown, forming a part of the springler system. The upper end of the housing is provided with an external flange 3. Internally, the housing is provided with a key channel 4.

The housing receives a cover 5, preferably formed of plastic material, and containing a reinforcing plate 6. The cover is held in place by screws 7, which extend into the flange 3. The cover is provided with a central bore 8.

Fitted within the housing is a strainer 9 in the form of an elongated, cylindrical basket, closed at its lower end. The strainer is provided with an external key rib 10, as well as external spacer ribs 11 which serve to space the strainer from the walls of the housing. Internally, the strainer is provided with a set of longitudinally extending guide ribs 12. The bottom of the strainer and the sides of the strainer between the ribs are provided with horizontally extending strainer slots 13. These slots are illustrated in the lower portion only of the srtainer in order that the presence of the slots will not interfere with the illustration of the contents of the strainer.

Fitted within the strainer is a motor shell 14 in the form of an inverted, essentially cylindrical, cup. The lower margin of the motor shell is provided with a peripheral flange 15 which is notched so that the motor shell is guided vertically by the internal ribs 12. The motor shell is provided with an upwardly extending tubular stem 16, adapted to protrude through the bore 8 of the cover 5. For purposes of illustration, the motor shell and stem are shown in their upwardly extended position. A retracting spring 17 urges the motor shell towards its lower position, whereas water pressure urges the motor shell towards its extended position. The lower end of the motor shell is closed by a base plate 18 which is cemented or otherwise secured in place. The base plate is provided with a central depending journal boss 19.

Mounted within the motor shell is a rotor 20, having a depending stem 21 extending through the journal boss 19. Within the motor shell, the rotor forms an impact body 22, preferably of triangular cross section. The rotor also includes an upper stem 23, which extends through the tubular stem 16 of the motor shell. The rotor is provided with a bore 24, partially closed at its lower end by a metering ring 25. Side ports 26 extend through the impact body 22. The upper end of the rotor is closed by a cap 27, and a nozzle 28 is directed laterally and upwardly from the rotor near the upper end of the stem 23. At the base of the upper stem 23, the rotor is provided with a set of seal and friction rings 29 and a spring 30 which is located under the impact body 22 to provide a bearing load on the seal rings 29.

The periphery of the base plate 18 is provided with a set of notches 31; in the construction illustrated, three notches are provided. Each notch extends circumferentially and the circumferential extremities of the notches converge upwardly. Positioned under the base plate 18, and journalled externally on the boss 19, is a jet control plate 32, having a set of three diverter blades 33. Each diverter blade is triangular in radial aspect and fits within a corresponding notch 31. The circumferential dimension

of each diverter blade 33 is less than its corresponding notch 31, so that by oscillating the diverter blade within the confines of the notch 31, a jet slot 34 may be formed one or the other side of the diverter blade so that water may be diretced upwardly and circumferentially in a clockwise or counter-clockwise direction, as desired. One of the diverter blades is provided with a depending pin 35.

At one side, the base plate 18 is provided with a depending journal pin 36, which receives a bearing 37, forming an integral part of an oscillatable reversing plate 38, disposed horizontally below the jet control plate 32. The reversing plate 38 is provided with a clearance aperture 39 to receive the journal boss 19, and is provided with stops 40, which engage the journal boss to limit the oscillating movement of the reversing plate.

The reversing plate 38 is provided with a depending pin 41 disposed in confronting relation with the depending pin 35, and connected theret by a leaf spring 42 in such a manner that the leaf spring tends to force the pin 41 and reversing plate 38 to either of its extreme positions, in which the depending pin 41 is offset clockwise or counterclockwise with respect to a line passing through the depending pin 35 and the depending pin 36. As a consequence, the diverter control blades 33 occupy either one or the other extreme position.

The depending stem 21 of the rotor projects below the journal boss 19 and receives a pair of clamp loops 43, from which extend essentially radially, a pair of stop arms 44 positioned to engage the depending pin 41. The clamp loops are adjustable circumferentially so as to locate the stop arms in preselected positions.

Mounted within the motor chamber formed around the impact body 22, and within the shell 14, is a drive ring 45, which in the construction illustrated, is square in cross section with rounded corners. The impact body 22 of the rotor is triangular in cross section, also with rounded corners. The three sides of the impact body have the same width as each of the four sides of the drive ring. The drive ring is provided with perforations 46.

Operation of the sprinkler illustrated in FIGS. 1 through 5 is as follows:

While the water motor contained within the motor shell 14 and the reversing mechanism is shown in conjunction with a pop-up type sprinkler, the water motor and the reversing mechanism is equally applicable to a construction in which the water motor is fixed in position except for rotation of its parts.

The water motor illustrated in FIGS. 1 through 5 is essentially the type of water motor shown in Pat. No. 3,315,898. Water swirling within the motor shell 14 causes the drive ring to rotate in the same direction as water flow. In doing so, the corners of the drive ring impact against the apeces of the impact body 22, producing an intermittent rotation in the same direction. If the direction of water flow is reversed, then the drive ring 45 rotates in the opposite direction and produces a corresponding rotary movement of the impact body 22. When the diverter blades 33 are in one extreme position, water is directed through the jet slots in an upward and peripheral direction, producing a swirling movement which may, for example, be clockwise. This condition obtains until the appropriate stop arm 44 engages the depending pin 41 to force the pin to its opposite extreme position, causing the diverter blades to snap to their opposite position, so that the water now flows upwardly and circumferentially in the opposite direction, with the result that the rotor 20 changes its direction of rotation.

At the time of installation, the cover 5 and the water motor contained within the shell 14 are removed. The reversing or stop arms 44 are then adjusted circumferentially so as to confine movement of the rotor within the prescribed arc, whereupon the motor shell and cover are reassembled. While it may be necessary to test the movement of the sprinkler, once or twice and possibly readjust, it is usually possible with a little practice to make the proper adjustment without need of readjustment. In either case, once the proper adjustment has been made. the sprinkler reassembled, the stop arms are concealed and protected against tampering.

Reference is now directed to the construction shown in FIGS. 6, 7 and 8. The construction here shown is essentially the same as the first described structure except for the reversable means for injecting water into the motor chamber.

A motor shell 47 which differs from the motor shell 14 by provision of a side rib 48 is used. The side rib 49 is provided with a socket 50 extending upwardly from its lower end which communicates with the motor chamber through two tangentially opposed nozzle slits 51. The lower end of the shell 47 is closed by a base plate 52 corresponding to the base plate 18. The base plate 52 is provided with a perforated radial projection 53 underlying the side rib 49.

An essentially cylindrical valve member 54, closed at its upper end, and having in one side an orifice slit 55, is received in the socket 50 and the perforated projection 53. The valve member is provided with a stem 56 extending upwardly through a small bore 57 and terminating in a retainer lip 58. The valve member is provided with a bottom flange 59 having a depending pin 60 corresponding in function to the pin 35 of the first described structure.

The water motor and the mechanism for oscillating the valve member is essentially the same as in the first described structure. Reversal of the water motor is accomplished by changing the flow from one nozzle slit 54 to the other.

While particular embodiments of this invention have been shown and described, it is not intended to limit the same to the details of the constructions set forth, but instead, the invention embraces such changes, modifications and equivalents of the various parts and their relationships as come within the purview of the appended claims.

I claim:

1. A reversible sprinkler, comprising:
(a) means defining a water motor chamber having an opening at its upper end;
(b) means for admitting water into said chamber for circular flow therein, including means for reversing the direction of the flow;
(c) a tubular rotor mounted within said motor chamber and projecting through said opening, said rotor having an inlet for water within said motor chamber and a discharge nozzle above said chamber;
(d) and means responsive to the circular flowing water in said motor chamber for causing rotation of said rotor in the direction of water flow.

2. A reversible sprinkler, as defined in claim 1, wherein:
(a) said rotor includes a stem extending from said motor chamber;
(b) circumferentially adjustable stops are carried by said stem;
(c) and an over-center operating mechanism interconnects said stops and reversing means to effect reversal of rotation of said rotor.

3. A reversible sprinkler, as defined in claim 1, wherein:
(a) said water admitting means defines essentially helical passageways extending in opposite directions and said reversing means selectively activates said passageways to cause water entering said chamber to flow in a circular path in either direction.

4. A reversible sprinkler, as defined in claim 1, wherein:
(a) said water admitting means includes at least one circumferentially extending slot in the bottomside of said motor chamber having converging walls at its circumferential extremities;
(b) and said reversing means includes a selector member tapered in correspondence to said walls and movable into engagement with either wall to form

with the other wall an upwardly and circumferentially directed flow passage.

5. A reversible sprinkler, as defined in claim 1, wherein:

(a) said water admitting means includes an upwardly directed port at the periphery of said motor chamber;

(b) and said reversing means includes a valve capping said port and having an orifice in its side wall, said valve being oscillatable to direct said orifice essentially tangential to said motor chamber in either direction.

6. A reversible sprinkler, comprising:

(a) means defining a cylindrical water motor cham-

(a) means defining a cylindrical water motor cham-

(b) means for admitting water into said chamber for circular flow therein, including means for reversing the direction of the flow;

(c) a tubular rotor mounted within said motor chamber projecting through said opening and having a discharge nozzle; said rotor having an impact receiving portion of polygonal cross section within said motor chamber, and ports communicating between said motor chamber and said discharge nozzle;

(d) a drive shell of polygonal cross section within said motor chamber responsive to circular flowing water therein for impact engagement with the polygonal portion of said rotor in the direction of water flow.

7. A reversible sprinkler, as defined in claim 6, wherein:

(a) said motor chamber defining means includes a journal sleeve;

(b) said rotor includes a tubular stem protruding beyond said sleeve;

(c) circumferentially adjustable stops are carried by said stem;

(d) and an over-center operating mechanism interconnects said stops and reversing means to effect reversal of rotation of said rotor.

8. A reversible sprinkler, as defined in claim 6, wherein:

(a) said water admitting means includes at least one circumferentially extending slot in one axial side of said motor chamber defining means, said slot having converging walls at its circumferential extremities;

(b) said reversing means includes an oscillatable plate disposed adjacent said slotted axial side and a selector member carried thereby and extending into said slot therein, said selector member having circumferentially spaced end walls sloping in correspondence with the end walls of said slot to form at least one pair of circumferential and essentially helically directed passageways for directing water entering said motor chamber into a circular path;

(c) and over-center actuating means to cause said selector member to close either of said passageways

thereby to reverse the direction of water flow in said motor chamber.

9. A reversing sprinkler, as defined in claim 6, wherein:

(a) said water admitting means includes at least two passageways for discharging water in opposite circular directions;

(b) and said reversing means selects either of said passageways.

10. A reversible sprinkler, as defined in claim 6, wherein:

(a) said water admitting means includes at least one axially directed port in an end of said motor chamber defining means at the periphery thereof;

(b) said reversing means includes at least one cylindrical valve chamber overlying said port; a pair of essentially tangentially directed inlet slots; and a cylindrical valve oscillatable in said valve chamber, capping said axially directed port and having a side slot alternately registerable with said inlet slots.

11. A reversible sprinkler, as defined in claim 9, wherein said reversing means further comprises:

(a) a reversing disk oscillatably mounted adjacent said motor chamber defining means;

(b) an over-center spring interconnecting said plate and disk to urge said plate and disk in opposite direction, thereby to reverse the direction of water flow into said motor chamber;

(c) and circumferentially adjustable stops carried by said rotor engageable with one of said pins to cause over-center operation of said spring.

12. A reversible sprinkler, as defined in claim 10, wherein said reversing means further comprises:

(a) a reversing disk oscillatably mounted at one end of said motor chamber defining means;

(b) an over-center spring interconnecting said valve and said reversing disk to urge said disk and valve in opposite directions thereby to reverse the direction of water flow into said motor chamber;

(c) and circumferentially adjustable stops carried by said rotor engageable with one of said pins to cause over-center operation of said spring.

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M. HENSON WOOD, JR., Primary Examiner

G. A. CHURCH, Assistant Examiner

U.S. Cl. X.R.

239—241