United States Patent

[11] **3,625,429**

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[21] Appl. No. **73,899**
[22] Filed **Sept. 21, 1970**
[45] Patented **Dec. 7, 1971**

[54] **LAWN SPRINKLER HEAD**
6 Claims, 3 Drawing Figs.

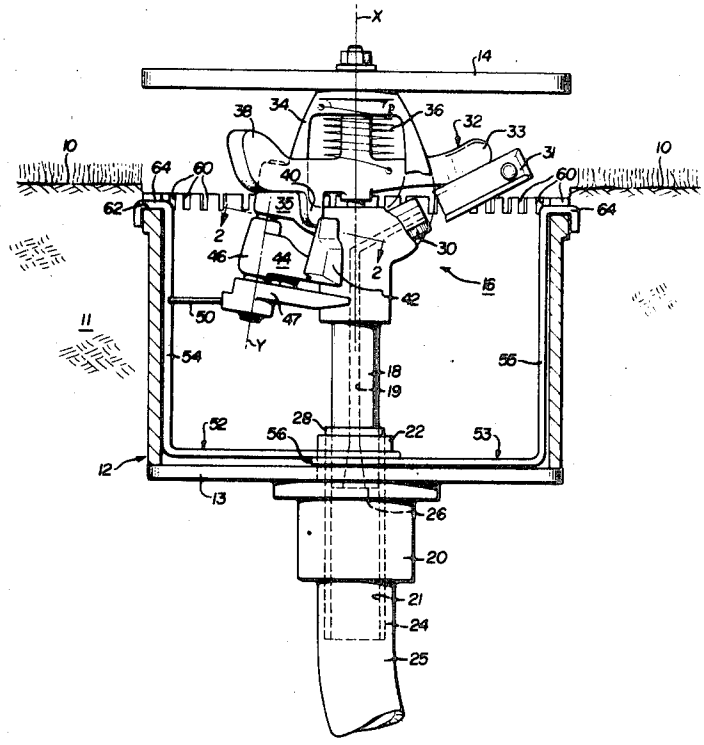
[52] **U.S. Cl.** **239/206,** 239/230, 239/232, 239/236
[51] **Int. Cl.** **B05b 3/08**
[50] **Field of Search** 239/203, 204, 206, 230, 231, 232, 233, 236

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ABSTRACT: A reversible short and long stroke impact sprinkler head of the popup type normally recessed in a housing set in the ground adapted to popup when water pressure is turned on; the improvement providing a rotatably adjustable cam member disposed laterally along the inner sprinkler housing wall, and a striker pin attached to a pivot member which extends radially outwardly to strike against the cam member.



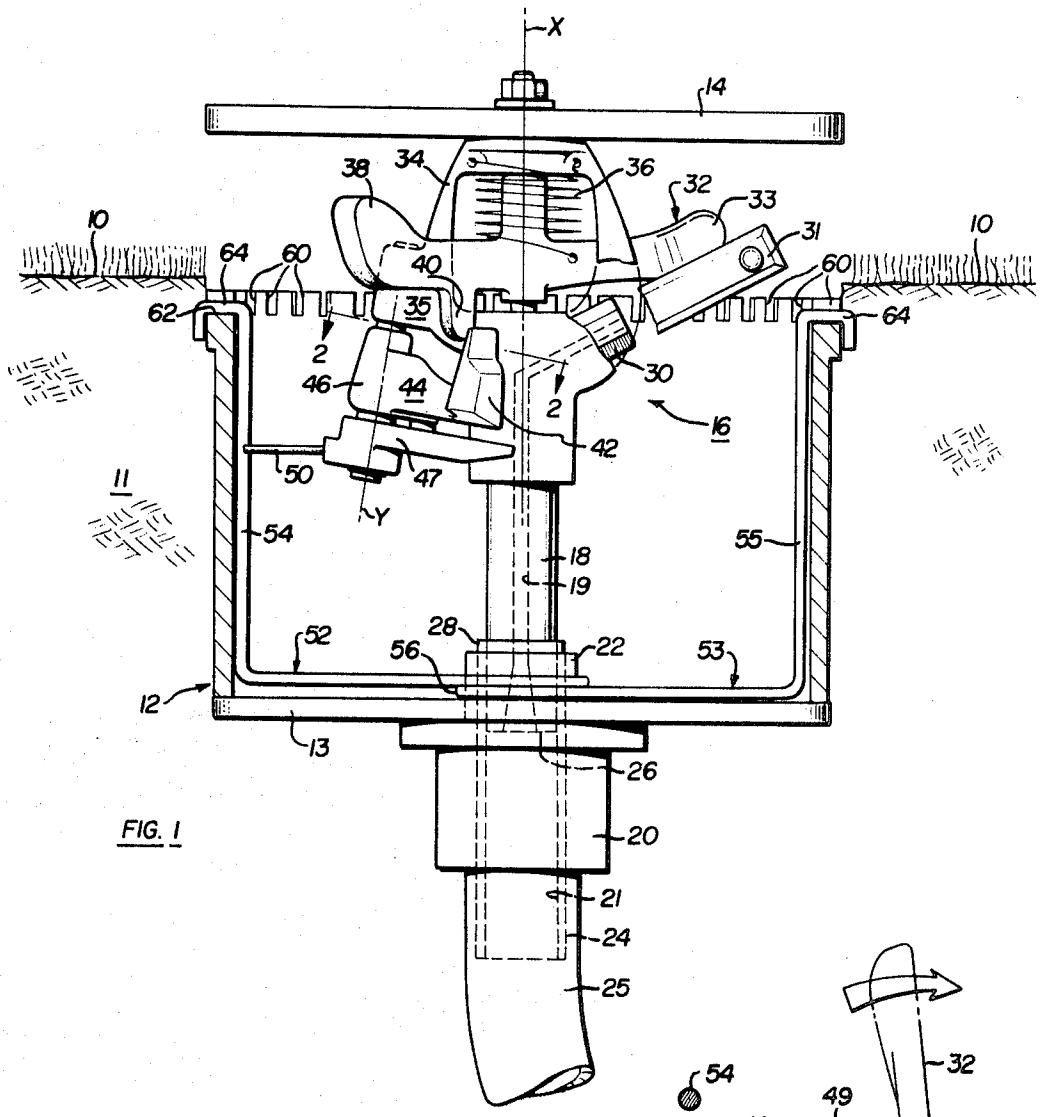


FIG. 1

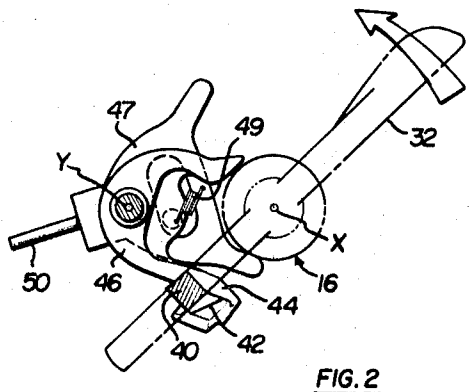


FIG. 2

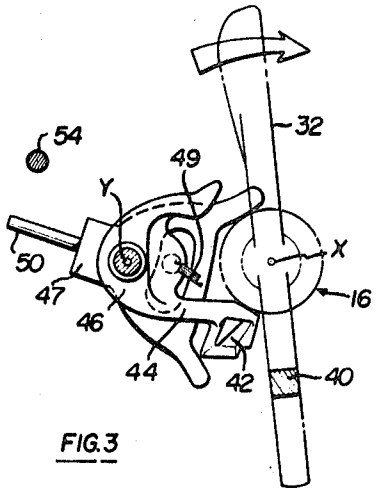


FIG. 3

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LAWN SPRINKLER HEAD

BACKGROUND AND SUMMARY OF INVENTION

It is known to support and insert impact lawn or turf sprinkler heads within a usually cylindrical well or housing, set in the ground. The sprinkler head is rotatable on a spindle supported in the bottom of the housing and its upper end is attached to a cover which, when the sprinkler head is recessed in the housing, causes the housing to be flush with the ground surface.

The sprinkler head spindle is telescoped within a tube and fitting extension disposed in a coaxial housing extension which progresses farther into the ground.

In the conventional full and part circle sprinkler heads the lower tube and fitting extensions which rotatably and telescopically supports the sprinkler head, also supports the tripping cam assembly adapted to be engaged intermittently by a striker pin which is attached to a direction and stroke reversing pivot member for extension in axial direction downwardly along the spindle of the sprinkler head and into the confines of the tripping cams.

This conventional arrangement of the tripping cam assembly and striker pin is objectionable in that the axial arrangement of these members requires an excessive tube and housing extension into the ground and thus a corresponding deep location of the water supply pipes. Thus, installation and maintenance of these known sprinkler head assemblies is excessively time consuming and expensive.

Accordingly, the improved sprinkler head of the present invention provides an installation which avoids the above-mentioned shortcomings of conventional sprinkler heads of this type, by considerably shortening the installation depth of the sprinkler assembly.

In the improved construction, the tripping cam assembly has been relocated to the walls of the enclosing sprinkler housing and the striker pin has been relocated for extension radially outwardly from the pivot member for cooperation with the laterally outwardly positioned cam assembly, thereby obtaining an improved structure for in-ground installation at considerably lesser depth by eliminating any excessive tube and housing extensions.

The present invention will be best understood by reference to the following detailed description of a preferred embodiment thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings form a part of the following description and illustrate in detail the novel features of the present improved impact sprinkler head in which:

FIG. 1 is a cross section through the sprinkler head well or housing enclosing the present improved sprinkler head, shown in the popup position;

FIG. 2 is an enlarged fractional cross section through a portion of the sprinkler head showing the improved trip mechanism more in detail; and

FIG. 3 is a view similar to FIG. 2 showing the trip mechanism in its alternate position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With particular reference to FIG. 1, the numeral 20 indicates a lawn or turf surface and the numeral 11 indicates the ground beneath the surface.

A well or housing 12 is set within the ground 11 having a top edge disposed slightly below the ground surface 10 to accommodate a cover 14 which, when in place over the well or housing 12, covers the housing so as to be substantially flush with the ground surface 10, to permit unobstructive walking thereover and passing of turf or lawn maintenance machinery over the sprinkler well, as is well understood.

The well or housing 14 is of generally cylindrical cross section (for convenience of manufacture, although not necessarily needs to be, but could be in rectangular or any other shape)

and contains the improved impact sprinkler head assembly 16 of the present invention, which in conventional manner, is normally concealed within the well 12 when not in operation and the cover 14 is shut upon the well. The sprinkler head including the cover 14 is adapted to popup to the operational position shown in FIG. 1, upon application of fluid pressure through the sprinkler head, in a well-known manner.

With further particular reference to FIG. 1 the present improved sprinkler head assembly 16 is rotatably supported on a spindle 18 which is telescopically inserted within a tubular extension 20 secured to the bottom wall 13 of the well or housing 12. The tubular extension 20 has a radial flange 22 disposed within the housing 12 and positioned a distance above the bottom wall 13 for a purpose to appear.

As will be understood, the spindle 18 is axially bored at 19 for communication with the axial bore 21 of the tubular extension 20 which has a threaded end portion 24 for attachment to a respective fluid outlet fitting 25 of the water supply system disposed underneath the ground surface as is common practice.

The spindle 18 is telescoped within the bore 21 of the tubular extension 20 and radially supports therein by means of a flange 26 so that, when no fluid pressure is present in an upward direction through the bore 21, the sprinkler head is maintained in downwardly retracted position due to its own gravity, but will be forced upwardly by fluid pressure acting on the flange 26 to pop the sprinkler head above the ground surface as shown in FIG. 1.

Inwardly of the well or housing 12 the spindle 18 is supported for rotation within a corrosion resistant bearing member 28 which is supported in a counterbore at the inner end of the bore 21 in the tubular extension 20.

The sprinkler head assembly 16 itself comprises a nozzle 30 which is in communication with the bore 19 of the spindle 18. At the upper end the sprinkler head assembly supports an independently rotatable, resiliently depressable drive arm 32 which has a fluid deflecting surface 33 normally biased into the path of the stream of fluid exiting from the nozzle 30, by means of a coil spring 36.

The drive arm 32 is rotatably resiliently supported along a pivot axis "X" between a U-shaped bracket 34 at the top of the sprinkler head which supports an expansion coil spring 36 having one end attached to the bracket 34 and its opposite lower end attached to the drive arm 32. The spring 36 continuously urges the drive arm 32 in a clockwise direction (as viewed from above) toward an impact member 31 projecting from bracket 34. Fluid pressure acting against the deflecting surface 33 of the drive arm when the arm is abutting impact member 31 tends to move the drive arm in a direction against the force of the spring 36 and out of the path of the fluid stream, thereby winding up the spring and causing the drive arm to be moved back into its initial position against impact member 31.

The drive arm 32, when subjected to fluid pressure exiting from the nozzle 30, is caused to oscillate rapidly across the nozzle opening, as explained above, causing rotation of the sprinkler head in either the clockwise or counterclockwise direction, depending upon the action of a direction-reversing tripping mechanism to be described hereafter.

The drive arm 32 has a portion 38 extending through the U-shaped bracket 34, which, at its lower end, is provided with an abutment 40 adapted to be intermittently engaged by a stop 42 normally disposed in the path of the abutment 40.

The stop 42 is provided for upward extension from an arm 44 of a forked pivot member 46 which is rockably supported along a pivot axis "Y" from an extension 35 of the bracket 34, for selective rocking movement and conjoint rotation with the sprinkler head around the center axis "X" of the sprinkler head.

In a first position (see FIG. 2) of forked pivot member 46, stop 42 lies in the path of abutment 40 as drive arm 32 is swung in a counterclockwise direction by the force of the fluid stream, producing only a short stroke or swing of drive arm 32

prior to its striking stop 42. In a second position (see FIG. 3) of pivot member 46, stop 42 is removed from the path of abutment 40, enabling drive arm 32 to swing through a long arc or stroke against the compression of spring 36.

In accordance with the present invention, to cause pivoting of the pivot member 46 to reverse the direction of rotation and alter the angular degree of rotational movement of the sprinkler head, a second pivot member 47 is provided which is likewise supported for rocking movement along the pivot axis "Y" underneath the pivot member 46. As best seen in FIGS. 2 and 3, the pivot members 46 and 47 are operatively interconnected by means of a tension spring 49 in such fashion that rocking movement of one pivot member causes a like rocking movement of the other pivot members but in opposite direction.

The second pivot member 47 is provided with a striker pin 50 attached to the apex of the second pivot member for extension radially outwardly towards the lateral inner surface of the well 12. According to the present invention, two trip members 52, 53 are provided for extension along the lateral inner surface of the well 12. Each of the trip members is composed of a length of spring wire formed into a L-shaped configuration to provide parallel side arms 54 and 55, respectively for extension in substantially parallel alignment along the inner surface of the well 12. The arms 54, 55 each terminate inwardly towards the central axis "X" of the sprinkler head into a coil formation 56 disposed around the inner end of the support tube 20 between the radial flange 22 and the bottom portion 13 of the well.

The trip members 52, 53 are independently circumferentially adjustable along the inner sidewall of the sprinkler well or housing by means of a plurality of closely spaced notches 60 disposed along the upper circumferential rim 62 of the well or housing 12 adapted to be engaged by the respective crimped over hook portions 64 at the ends of the arms 54 and 55. Thus, the trip members can be rotatably angularly adjusted around the sprinkler head 16 at substantially infinite angular positions to thereby extend or reduce the angular degree of the rotational cycle of the sprinkler head.

With more particular reference to FIG. 3, which illustrates the long stroke cycle of the present improved sprinkler head assembly, when fluid pressure is turned on, the fluid pressure is conveyed through the conduit 21 of the tube 20 and into the axial passage 19 of the sprinkler head spindle 18 for exit through the nozzle 30. The fluid pressure acts on the flange 26 of the spindle 18 moving the sprinkler head assembly upwardly out of the well or housing 12 to the position shown in FIG. 1.

As the pressurized fluid exits from the nozzle 30, it hits the deflection surface 33 of the pivoted and resiliently biased drive arm 32 causing the drive arm to be pivoted in a direction away from the nozzle 30 against the force of the spring 44 while the spring 44 is being wound up. Drive arm 32 pivots through a long stroke or arc, since abutment 40 clears stop 42. The unloading force of the greatly compressed spring 44 causes the drive arm 32 to be rotated again in opposite direction towards the nozzle 30 again into the stream of pressurized fluid by simultaneously abutting against the impact member 31, which is secured to the bracket 34 forming a part of the sprinkler head assembly. The spring forced impact of the drive arm 32 against the impact member 31 is great enough to cause partial rotation of the sprinkler head assembly in the clockwise direction around the spindle 18. Since the drive arm 32 is now again disposed in the path of the pressurized fluid, the action repeats itself, with the drive arm 32 being rapidly pivoted back and forth by means of the opposite acting forces of the fluid pressure exiting from nozzle 30 and the stored energy of the spring 34 to thereby rapidly and intermittently exert an impact force on the impact member 31, driving the sprinkler head assembly 16 in increments around the spindle axis "X."

Sprinkler head assembly 16 continues to rotate incrementally in a clockwise direction until striker pin 50 engages one of the prepositioned arms 54,55. FIG. 3 shows pin 50 approaching arm 54, when pin 50 engages arm 54 at the end of the long stroke cycle, the second pivot member 47 is rocked counterclockwise around the axis "Y," thereby tensioning and twisting the spring 49. The unloading reaction of the spring 49 causes the first pivot member 46 to be rocked clockwise around pivot axis "Y." This action moves the stop 42 into the path of the abutment 40 at the rear end of the drive arm 32, thus initiating the short stroke cycle of the sprinkler head assembly 16 in reverse, counterclockwise direction. This position of the direction and stroke reversing pivot members 46 and 47 is illustrated in FIG. 2.

In the short stroke cycle, the short travel of drive arm 32 only produces a small amount of compression of spring 36, with the result that the impact against member 31 is insufficient to cause incremental rotation of the sprinkler head. Rather, the impact of abutment 40 against stop 42 causes incremental rotation in the counterclockwise direction.

It will be obvious from the foregoing description and detailed illustration in the accompanying drawings that the present invention provides an improved impact sprinkler head of the popup type by which unneccessary tube or housing extensions, to accommodate the trip or cam mechanism, have been effectively eliminated to thereby permit a considerable shortening of the sprinkler well and tube extension into the ground, permitting the disposal of the water supply piping system at a lesser depth than hitherto possible.

This arrangement considerably improves the effectiveness and greatly facilitates installation and maintenance of the present popup type, impact sprinkler head assembly.

Although the present invention has been described and shown by means of a preferred embodiment, it will be obvious to anyone skilled in the art to which the invention pertains, that various changes in arrangement and structural details may be asserted to without departing from the spirit and essential characteristic of the invention as defined by the scope of the appended claims.

I claim:

1. In combination with an impact sprinkler head of the popup type normally retained in a well below the ground for rotation around a spindle and having a nozzle in communication with a source of fluid under pressure through said spindle; a drive arm resiliently pivotally supported on said sprinkler head for movement around a first pivot axis; said drive arm having a first portion normally extending in the path of the fluid exiting from said nozzle and a second portion extending in opposite direction from said first axis; the lower end of said second portion being provided with an abutment member; a second pivot axis disposed in adjoining relationship to said first pivot axis; a first pivot member pivotally supporting for rocking movement around said second pivot axis having forked arm extensions; one of said arm extensions being provided with a stop member normally extending into the path of said abutment member so that, in response to the relative position of said pivot member said abutment member in one position abuts said stop member and said abutment member in the other position clears said stop member; the improvement comprising; cam means adjustably disposed laterally along the inside of said well; a second pivot member conjointly supported for rocking movement around said second pivot axis; a striker pin attached to said second pivot member for extension radially outwardly towards the insides of said well adapted for intermittent abutment against said cam means upon rotation of said sprinkler head in either direction of rotation; means resiliently operably connecting said first and said second pivot member such that said means will be tensioned upon rocking movement of said second pivot member to cause rocking movement of said first pivot member in a direction opposite from the direction of rocking movement of said second pivot member; to thereby reverse the direction of rotation of said sprinkler head as well as alter the angular degree of rotation.

2. In the combination as defined in claim 1, the further improvement of said cam means comprising a pair of resilient

members each having opposite substantially parallel arm portions connected to a transverse portion disposed along the bottom of said well to locate said parallel arm portions in juxtaposed lateral position relative to said inner sides of said well; each of said arm portions being provided with a bentover hook portion adapted for engagement over the edge of said well to adjustably individually position said resilient members relative to said striker pin.

3. In the combination as defined in claim 2, each of said resilient members composed of a length of steel spring wire bent to form a substantial L-shape and said transverse portion terminating in a coiled end; said coiled end being disposed around said spindle within said well adjacent said bottom portion of said well.

4. In the combination as defined in claim 1, said means resiliently operably connecting said first and second pivot members comprising a coiled spring.

5. A popup sprinkler head assembly including a well surrounding and rotatably supporting said sprinkler head for alternate short and long stroke rotation in opposite directions; said sprinkler head having a nozzle for communication with a source of fluid under pressure and a drive arm resiliently supported for rocking movement around a first pivot axis independent of the rotational movement of said sprinkler head; said drive arm having a portion at one side of said first axis partly overlying said nozzle; said drive arm having an extension prolonging in the opposite direction from said first axis which is provided with an abutment; a second pivot axis located on said sprinkler head and disposed in a direction substantially parallel to said first pivot axis; first and second pivot members supported for rocking movement around said second pivot axis in opposite direction to each other; one of said pivot members having a stop adapted for alternate engagement with said abutment on said drive arm; said pivot members being adapted upon rocking movement in opposite directions to intermittently reposition said stop relative to said abutment for alternate short or long stroke rotation of said sprinkler head; the improvement comprising: the other of said pivot members being provided with a striker pin extending radially outwardly from said second pivot axis and; cam means adjustably disposed laterally along the inner side surface of said well and within the path of said striker pin when said sprinkler head is rotating to cause abutment of said striker pin against said cam means to rock said other pivot member into an alternate position causing a similar rocking movement of said one pivot member in the oppOsite direction to thereby change the rotational direction of said sprinkler head as well as the angular degree of rotational movement.

6. In the sprinkle head assembly as defined in claim 5, said cam means comprising a length of spring wire bent into a substantially L-shaped configuration providing an arm for vertical extension laterally along the inner side surface of said well; said arm at its lower end terminating into a coil for support around the spindle of said sprinkler head and the upper end of said arm being provided with a crimped-over portion for rotational adjustable support of said L-shaped cam means along the upper rim of said well.

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