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ADJUSTABLE RISER FOR SPRINKLER SYSTEMS

Filed Oct. 22, 1965

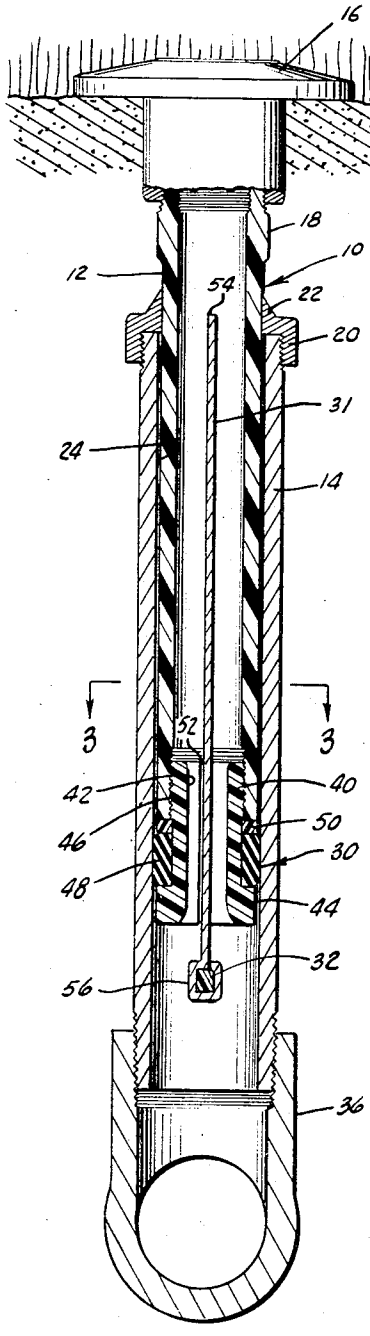


FIG. 1

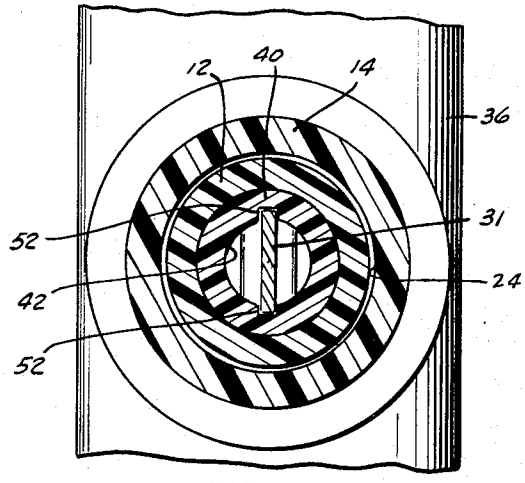


FIG. 3

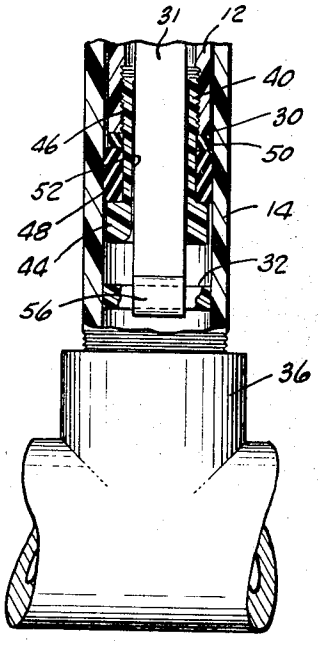


FIG. 2

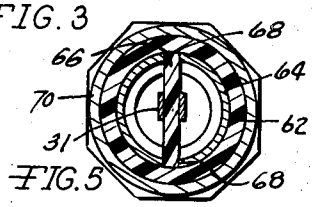


FIG. 5

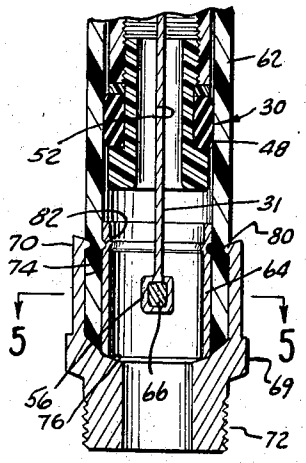


FIG. 4

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ADJUSTABLE RISER FOR SPRINKLER SYSTEMS

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ABSTRACT OF THE DISCLOSURE

A riser apparatus for connecting a sprinkler head to an underground water supply pipe of a sprinkler system. The riser has two conduit sections which are telescoped together for vertical adjustment when installed in the ground, and an expansible ring assembly is provided for securing or releasing the sections in response to rotation of the upper section relative to the lower section. For the purpose of restraining the ring assembly from rotating when the upper section is rotated, a key and keyway arrangement is provided between the assemblies and the lower section which is constructed and arranged so that the upper section can be formed from conventional circular pipe or conduit material.

This invention relates generally to water sprinkler systems and in particular to a riser assembly for such systems that is adjustable in height.

In sprinkler systems, water supply pipes are installed below the surface of the ground and are connected to sprinkler heads by a vertical riser. With various types of sprinkler heads as well as couplings into which the sprinkler head can be inserted, it is desirable that the sprinkler head or the coupling be disposed flush with the ground. One type of riser is vertically adjustable to simplify installing sprinkler heads where the depth of the supply pipe varies. Risers of this type are disclosed in United States Letters Patent No. 3,084,869, granted April 9, 1963, in the named of Fred A. Hutty et al. and in my copending United States patent application Ser. No. 452,695, entitled Adjustable Riser for Sprinkler Systems and filed on May 3, 1965. In the risers disclosed in the aforementioned patent and patent application the sprinkler head is attached to an upper tubular section which is telescopic in a lower tubular section connected to a water supply pipe. The lower end of the upper section carries a seal assembly having a packing ring that can be expanded radially against the lower section to lock the sections together in a selected position of vertical adjustment and also serve as a seal when the sections are locked together. The lower tubular section has an acircular cross section wall and the seal assembly includes a portion that has an acircular cross section that mates with the wall and keys the seal assembly against rotation in the lower section. When the upper section is screwed down on the seal assembly the packing ring expands radially into engagement with the lower section. Although these arrangements provide a very satisfactory riser, in certain commercial installations it may be necessary to use a large riser whose height can be adjusted over a relatively wide range, as for example, the rolling terrain of a golf course may require risers of large size that are adjustable over a range of 18 inches or more. With the risers disclosed in the aforementioned patent and patent application the inner wall of the lower section must be manufactured with the acircular cross section so that seal assembly is maintained non-rotatably in the lower section over the full range of adjustability. It is desirable to eliminate the necessity for forming the lower section within an acircular cross section so that risers can be manufactured more economically in various lengths and sizes.

The objects of the present invention are to provide an adjustable riser that can be manufactured economically in different sizes and with adjustability over a wide range for use at varying depths between the sprinkler head and the water pipe, that is rugged; that is constructed simply; and that can be assembled in a simple manner and installed in a sprinkling system in a simple manner in rough and rolling terrain where the grade of the water supply pipe does not follow the grade of the terrain.

Further objects, features and advantages of the present invention will become apparent in connection will the following description, the appended claims and the accompanying drawings in which:

FIGURE 1 is a view partly in vertical section of a riser of the present invention as it appears after installation in the ground with a seal on the lower end of the upper section expanded tightly into radial engagement with the lower section of the riser;

FIGURE 2 is a side view partly in section of the lower end of the riser shown in FIG. 1;

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

FIGURE 4 is a fragmentary vertical sectional view of another embodiment of the present invention; and

FIGURE 5 is a horizontal section taken on line 5—5 of FIG. 4.

Referring to the drawings in greater detail, one station in a sprinkler system is illustrated as comprising a vertical riser **10** having an upper pipe section **12** which is telescoped in a lower pipe section **14**. A sprinkler head **16** is threaded on the upper end of the pipe section **12** so as to be disposed flush to the ground. The pipe section **12** is circular in horizontal cross section throughout substantially its entire length except for an irregular boss **18** which is used to hold the section **12** with a wrench or the like while head **16** is screwed tightly in place. The upper section **12** extends downwardly from head **16** and projects through a cap **20** into the lower section **14**. The cap **20** is threaded on the upper end of section **14** and has an annular lip **22** which fits closely and slidably on the upper section **12** to wipe section **12** during vertical adjustment and thus minimize entry of dirt into the lower section **14**.

The lower section **14** has an interior wall surface **24** that is also circular in horizontal cross section throughout substantially its entire length and is slightly greater in diameter than the section **12** so that section **12** is free to slide vertically and rotate relative to section **14**. Threaded on the lower end of the upper section **12** is a seal assembly designated generally by numeral **30** and illustrated in an assembled position tightly engaging the lower section **14** to lock the sections **12, 14** in an adjusted position and also serve as a fluid seal. In accordance with one important aspect of the present invention, a flat strip **31** keys the seal assembly **30** against rotation about a vertical axis but permits the seal assembly to move vertically relative to the lower section **14**. Strip **31** is fastened at its lower end on a pin **32** that has a rectangular transverse cross section. The strip **31** is made of rigid material so that in normal use of riser **10** the strip will not distort permanently due to twisting. In preferred embodiment strip **31** is metal. The section **14** in the preferred embodiment is injection molded of a suitable plastic and the pin **32** is molded integrally with the section **14**. The lower end of the section **14** is threaded in a T fitting **36** to which hoses (not shown) are connected to supply water to riser **10** and to other risers in the sprinkling system.

More particularly the seal assembly **30** comprises a tubular post **40** having a longitudinal passageway **42** which extends vertically between sections **12** and **14** to allow water to pass from the fitting **36** through the seal assembly **30** and on to the sprinkling head **16**. Post **40** has an integral

radial flange 44 at its lower end and at its upper end has male threads 46 engaged in the threaded lower end of section 12. Flange 44 is generally circular and its diameter is slightly less than the diameter of the wall surface 24 so that the flange 44 does not restrain rotation or vertical movement of post 40 in section 14. An annular packing ring 48 is disposed on post 44 abutting the upper face of flange 44 and a snap ring 50 is fastened on post 40 between threads 46 and the packing ring 48. The packing ring 48 is formed of resilient rubberlike material such as neoprene so as to be radially expandible in response to axial compression. Ring 48 may have an axial dimension such that it must be compressed slightly in order to fit ring 50 over post 40 below threads 46 and thus eliminate play between the parts of the seal assembly 30. With ring 50 and ring 48 assembled on post 40, before axial compression by section 12 the packing ring 48 may engage the wall surface 24 slightly, if at all, but the ring 48 does not appreciably restrain axial movement of the seal assembly 30 in the lower section.

The post 40 also has a pair of vertical slots 52 which extend longitudinally of passageway 42 from the top to the bottom of post 40 and radially outwardly of passageway 42 at opposite sides of the post 40. Slots 52 are dimensioned to receive longitudinal edges of strip 31 and serve as a keyway for the strip. The strip 31 thus extends upwardly through the keyway formed by slots 52 into the upper section 12 with the upper end 54 of strip 32 disposed slightly above the top of the section 14 to be received in the slots 52 when the seal assembly 30 is first inserted into the lower section 14. The strip 31 extends downwardly from the seal assembly 30 and is return bent at its lower end 56 tightly about the pin 32 to conform to the rectangular cross section of the pin. The rectangular cross section on pin 32 and the end portion 56 maintain the strip 31 in an upright position when the seal assembly 30 and the upper section 12 are removed from the lower section 14. It should be noted that the pin 32 is disposed closely adjacent the lower open end of the section 14 so that the pin and the end 56 are accessible from the lower end of the section 14 to facilitate securing the strip on the pin as by means of pliers with special jaws to clinch the strip about the pin. Strip 31 may be manufactured in one length and cut to a desired length when assembled on a section 14 of a particular length.

With the seal assembly 30 loosely engaged on the upper section 12 and the upper section nested in the lower section 14 with strip 31 disposed in slots 52 to prevent rotation of the post 40, when the upper section 12 is screwed further onto post 40 the lower end of section 12 engages ring 50 which moves downwardly on post 40 compressing ring 48 axially and expanding the ring radially into tight engagement with wall 24. Thus the vertical height of section 12 relative to section 14 may be adjusted by loosening section 12 to release the ring 48 from the wall 24. Section 12 may then be adjusted telescopically to any desired height and re-tightened on post 40 to lock the upper section firmly in place on the lower section 14. As the section 12 is tightened and loosened on post 40 there is no direct frictional contact between section 12 and the packing ring 48. Radial expansion of the ring 48 does not directly restrain rotation of the upper section 12 since the lower end of section 12 slides on ring 50 and the ring 48 expands against post 40 which is non-rotatable. Moreover as ring 48 expands against the post 40, the ring 48 restrains rotation of post 40 to assist the keying action of the strip 31 and thus decrease the likelihood of twisting the strip. One advantage of the device disclosed herein is that the lower section 14 can be manufactured in various lengths as by injection molding by using available dies and adding a simple insert to form the pin 32. Alternately the lower sections 14 can be manufactured in one length and then cut off to a desired length and rethreaded at their upper end.

The embodiment of a riser 60 illustrated in FIGS. 4 and 5 is substantially similar to the riser 10 (FIGS. 1–3) with like elements being designated by like reference numerals, except for the manner in which the keying strip 31 is fastened in the riser. The riser 60 includes a pipe 62 which corresponds to the lower section 14 (FIGS. 1–3). The pipe 62 is a length of standard plastic pipe that has a circular cross section and has been threaded at its upper end (not shown) to engage with an end cap such as the cap 20. Inserted in the lower end of pipe 62 is a metal sleeve 64 which also has a circular transverse cross section and an outer diameter such that the sleeve fits snugly in the pipe 62. A pin 66 is mounted on sleeve 64 to extend transversely across the sleeve in a horizontal direction. Pin 66 has its outer ends disposed in diametrically opposed holes 68 in the sleeve 64 and is retained in the sleeve when the sleeve is assembled in the pipe 62. The keying strip 31 is fastened at its lower end on the pin 66 and the pin and the strip have mating rectangular cross sections to maintain the strip in an upright position in the manner described in connection with FIGS. 1–3. A hollow fitting 69 fastened on the lower end of pipe 62 has a cylindrical sleeve portion 70 which receives the lower end of pipe 62. Fitting 69 also has a lower threaded end portion 72 for engaging in a fitting such as the T fitting 36 (FIG. 1). The sleeve portion 70 has a circular internal wall surface 74 whose diameter is such that the sleeve fits snugly over the lower end of pipe 62. The lower ends of pipe 62 and sleeve 64 are wedged against an annular seat 76 which is inclined downwardly and radially inwardly from the surface 74. The height of sleeve 64 is such that the sleeve extends above the top of the sleeve portion 70 when sleeve 64 bottoms on seat 76. The pipe 62 and the fitting 69 are secured together by wedging 62 and sleeve 64 against seat 76 and then spinning the top edge of the sleeve portion 70 while sleeve 64 is supported on a mandrel or the like to upset a circular ridge 80 radially inwardly into pipe 62. The mandrel supporting sleeve 64 is shaped so that the sleeve 64 deforms during spinning as illustrated by the circumferential depression 82.

The ridge 80 firmly clinches the pipe 32 to form a watertight seal and a rigid mechanical lock between the fitting 69 and the pipe 62 and lock the sleeve 64 firmly in place. The locking function of the seal assembly 30 is identical to that described in connection with FIGS. 1–3 with strip 31 keying the post 40 against rotation. With the modification of FIGS. 4 and 5 risers of different heights can be manufactured economically since the lower riser section can be made with commercially available plastic pipe cut to a desired length.

It will be understood that the adjustable risers for sprinkler systems which are herein described and disclosed are presented for purposes of explanation and illustration and are not intended to indicate limits of the present invention, the scope of which is defined by the following claims.

What is claimed is:

1. A vertical riser for use in an underground sprinkler system comprising a lower tubular section, an upward tubular section telescoped in said lower section for vertical and rotatable movement relative thereto, a seal assembly carried by said upper tubular section and having a radially expansible packing ring and a vertical passageway therethrough providing communication between the upper and lower tubular sections for passage of liquid, said passageway also defining a keyway extending vertically through the seal assembly, means for effecting radial expansion of said ring into engagement with said lower section when said upper section is rotated relative to said seal assembly, and an elongated key fastened to said lower section so as to be non-rotatable relative to said lower section, said key extending vertically through said keyway so as to restrain rotation of said seal assembly relative to said lower section.

2. The riser set forth in claim 1 wherein said seal assembly comprises a post and said passageway extends vertically through said post with an upper end of said pas-

sageway communicating with said upper section and a lower end of said passageway communicating with said lower section, and said keyway comprises a pair of opposed vertical slots extending radially outwardly of said passageway in said post.

3. The riser set forth in claim 1 wherein said key comprises a strip of rigid material fastened at its lower end immediately adjacent the lower end of said lower section and said strip extends upwardly through said seal assembly and into said upper section with the upper end of said strip being disposed closely adjacent the upper end of said lower section.

4. The riser set forth in claim 1 wherein a pin is secured in the lower end of said lower section so as to be non-rotatable about a vertical axis and fixed against vertical movement relative to said lower section, said pin extending horizontally across said lower section in a direction transversely of said lower section, and said key comprises a flat strip of rigid material fastened at its lower end on said pin so as to restrain relative rotation of said strip about said vertical axis relative to said lower section and restrain vertical movement of said strip in said lower section.

5. The riser set forth in claim 4 wherein said pin has an acircular vertical cross section and the lower end of said strip is return bent around said pin in an acircular configuration to mate with said pin and maintain said strip in an upright position.

6. The riser set forth in claim 4 wherein said lower section in molded of a plastic material and said pin is molded integrally with said lower section.

7. The riser set forth in claim 4 wherein said lower section comprises a pipe made of deformable material and a fitting fastened on the lower end of said pipe, said fitting having an outer sleeve portion nested snugly over said lower end of said pipe, and an inner sleeve nested snugly within the lower end of said pipe with the top of said inner sleeve being disposed above the top of said outer sleeve portion, said pin being secured in said inner sleeve so as to extend in a horizontal direction transversely across said inner sleeve and be fixed against rotation about a vertical axis and against vertical movement relative to said inner sleeve, and said outer sleeve portion has a peripheral ridge upset in a direction radially inwardly into said pipe so as to secure said fitting to said pipe and secure said inner sleeve in said lower end of said pipe.

8. A vertical riser for use in an underground sprinkler system comprising a lower tubular section, an upper tubular section telescoped in said lower section for vertical and rotatable movement relative thereto, means for sealing said upper section in said lower section and for interengaging said upper and said lower sections to restrain relative axial movement between said sections comprising a hollow post having a lower radial flange, a resilient packing ring fitting closely in said lower section and being disposed on said post above said flange, thread means on an upper portion of said post above said packing ring, said threaded portion of said post being engaged in a lower threaded end of said upper section, a retaining ring on said post above said packing ring and below

said upper section, a keyway in said hollow post extending vertically through said sealing assembly, and an elongated key fastened at its lower end to said lower section below said radial flange so as to be fixed against rotation and axial movement relative to said lower section, said key extending upwardly in said lower section through said keyway and into said upper section to restrain rotation of said post relative to said lower section while permitting vertical movement of said post and said upper section relative to said lower section.

9. The riser set forth in claim 8 wherein said lower section has a circular inner wall and said flange, said packing ring and said retaining ring have radial dimensions relative to said inner wall that permit rotation of said post relative to said lower section, and said key and said keyway restrain rotation of said post relative to said lower section when said post is threaded on said upper section and said upper section is rotated relative to said lower section.

10. The riser set forth in claim 8 wherein said key comprises a flat strip of rigid material fastened at its lower end to said lower section closely adjacent a lower end of said lower section, said strip extends upwardly in said lower section through said keyway and into said upper section and terminates at its upper end closely adjacent the upper end of said lower section.

11. The riser set forth in claim 8 wherein said post has a passageway extending vertically through said post and said keyway comprises a pair of opposed vertical slots extending radially outwardly of said passageway in said post.

12. The riser set forth in claim 8 wherein said lower section includes an integral pin which extends in a horizontal direction transversely across said lower section and said key is fastened on said pin so as to be non-rotatable about a vertical axis and fixed against vertical movement relative to said lower section.

13. The riser set forth in claim 8 wherein said lower section comprises a pipe made of deformable material, a fitting fastened on the lower end of said pipe, said fitting having an outer sleeve portion nested snugly over said lower end of said pipe, an inner sleeve nested snugly within the lower end of said pipe with the top of said inner sleeve being disposed above the top of said outer sleeve portion, and a pin secured in said inner sleeve so as to extend in a horizontal direction transversely across said inner sleeve and be fixed against rotation about a vertical axis and against vertical movement relative to said inner sleeve, and said outer sleeve portion has a peripheral ridge upset in a direction radially inwardly into said pipe so as to secure said fitting to said pipe and secure said inner sleeve in the lower end of said pipe.

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