Jan. 3, 1956 M. F. ZUKAS 2,729,504

SPRINKLER AND SEALING CONSTRUCTION

Filed July 2, 1951 2 Sheets-Sheet 1

Fig. 1

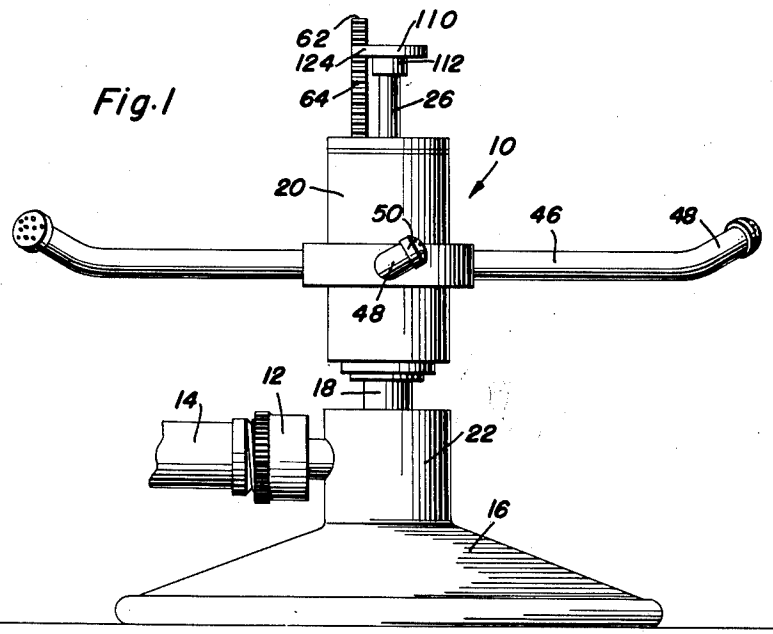


Fig. 6

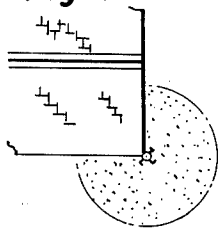


Fig. 7

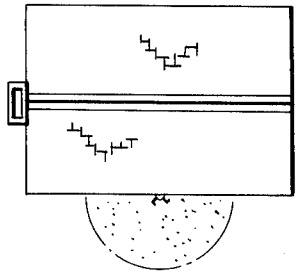


Fig. 8

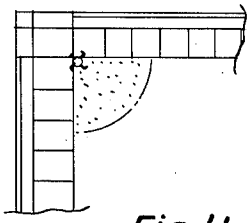


Fig. 9

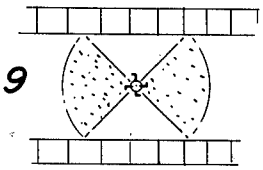


Fig. 10

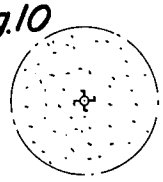


Fig. 11

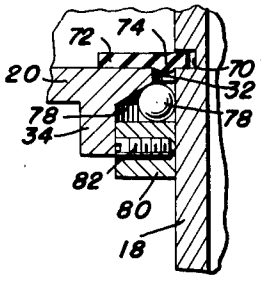
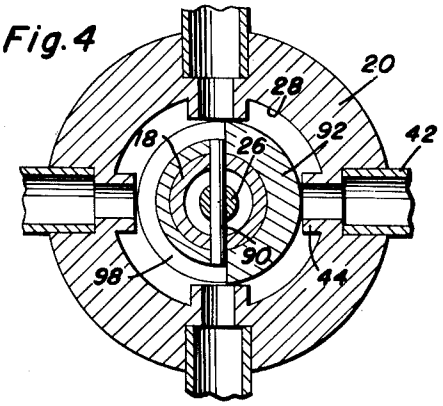


Fig. 4



Michael F. Zukas
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

Jan. 3, 1956 M. F. ZUKAS 2,729,504

SPRINKLER AND SEALING CONSTRUCTION

Filed July 2, 1951 2 Sheets-Sheet 2

Fig.5

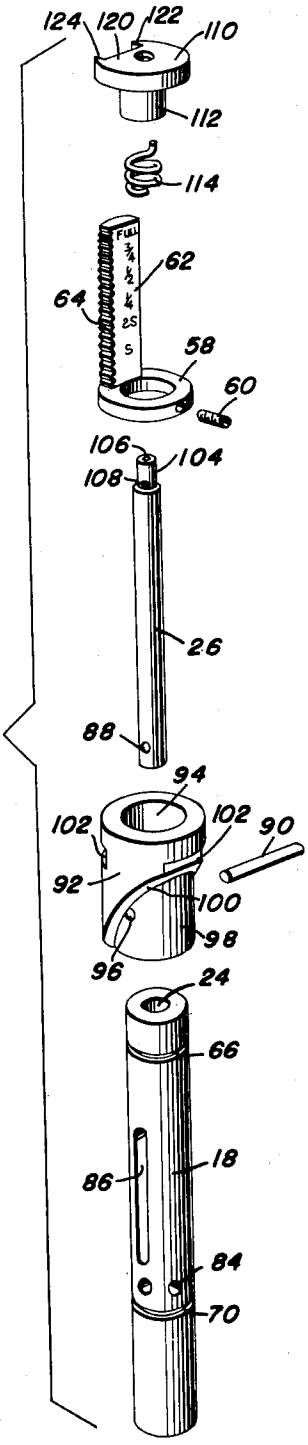


Fig.3

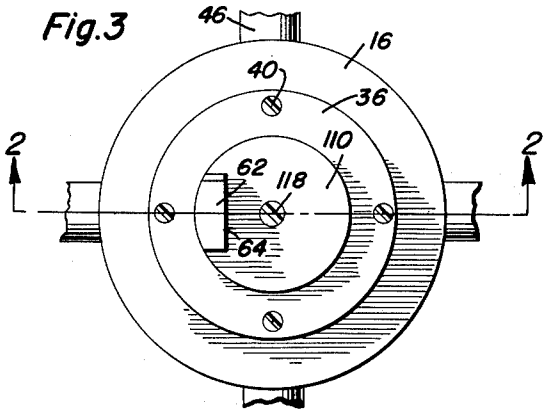
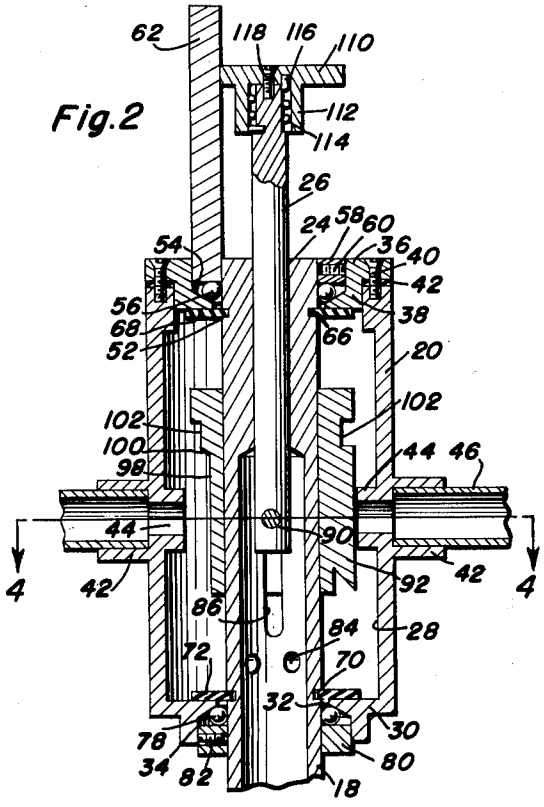


Fig.2



Michael F. Zukas
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

United States Patent Office 2,729,504 Patented Jan. 3, 1956

2,729,504

SPRINKLER AND SEALING CONSTRUCTION

Michael F. Zukas, Southold, N. Y.

Application July 2, 1951, Serial No. 234,836

12 Claims. (Cl. 299—18)

This invention comprises novel and useful improvements in a sprinkler and sealing construction and more specifically pertains to an automatic water sprinkler of the rotating arm type having means for regulating the pattern or shape of the area sprayed by the sprinkler and having improved means for sealing the interior of the sprinkler against the egress or leakage of water.

The primary object of this invention is to provide an improved rotary sprinkler together with means for effectively determining the pattern or shape of the areas upon which the water is sprayed by the sprinkler.

A further object of the invention is to provide a sprinkler in conformity with the preceding object having improved means for controlling the shape of areas sprayed by the sprinkler.

Yet another object of the invention is to provide a sprinkling device as set forth in the foregoing objects having improved means for sealing the body of the sprinkler, during its rotation of the shaft of the same, against the leakage of water therefrom.

These, together with various ancillary features and objects of the invention, which will later become apparent as the following description proceeds, are attained by the present invention, a preferred embodiment of which has been illustrated by way of example only, in the accompanying drawings, wherein:

Figure 1 is a side elevational view of one embodiment of the automatic sprinkler incorporating therein the principles of this invention;

Figure 2 is a vertical central sectional view through a portion of the sprinkler of Figure 1, showing the internal construction of the same, and is taken substantially upon the plane indicated by the section line 2—2 of Figure 3;

Figure 3 is a fragmentary top plan view of the sprinkler of Figure 1;

Figure 4 is a horizontal sectional view, taken substantially upon the plane indicated by the section line 4—4 of Figure 2 through the rotatable body and arms of the sprinkler;

Figure 5 is an exploded perspective view of certain elements of the adjusting mechanism of the sprinkler;

Figures 6–10 are diagrammatic views illustrating the various types or patterns of areas which may be supplied with water by the sprinkler; and

Figure 11 is a fragmentary detail view, taken upon an enlarged scale, of a portion of Figure 4, showing a sealing construction employed therewith.

Reference is now made more specifically to the accompanying drawings, wherein like numerals designate similar parts throughout the various views, the numeral **10** indicating in its entirety the rotating sprinkler in accordance with this invention, and which is detachably connected, as by a coupling gland **12**, with a garden hose or the like **14** constituting any desired source of water with which the sprinkler is supplied. The sprinkler further includes the stationary standard or base **16** from which rises a stationary pipe **18** constituting a source of water for the rotating body **20** of the sprinkler as well as a support for the latter.

The pipe **18** may be secured in the neck portion **22** of the base **16** in any desired manner, and of course has its open lower end in free communication with the water supply hose or conduit **14** by means of the hollow interior of the base.

As shown in Figure 2, the upper end of the pipe **18** is closed, except for an axially disposed bore **24** in which is slidably received an adjusting rod **26** of a construction and for a purpose to be subsequently apparent.

The body **20** may conveniently be of a cylindrical form and having a hollow internal chamber **28** therein, the body having a bottom wall **30** which is centrally apertured at **32** to be loosely received upon and rotatable upon the shaft **18**, and which is further provided with a concentric annular flange or sleeve **34**.

Except for the opening **32** the bottom wall of the body may be considered to be closed, while there is provided a detachable top in the form of a plug **36** having a depending diametrically reduced portion **38** which is snugly received within the open upper end of the body **20**. The closure cap is removably secured to the body as by fastening screws **40** with the usual sealing gasket **42** being interposed between the closure plug and the body.

Intermediate its ends, the body is provided with a plurality of radially outwardly extending tubular bosses **42***a*, which communicate with the interior of the body by means of hollow inwardly extending sleeves or tubular projections **44**. Radially extending tubular arms **46** are received in each of the bosses **42** and can thus communicate with the interior of the body, these arms at their outer ends being provided with angularly disposed terminal portions **48** upon the ends of which are received spray nozzles **50** of any conventional design.

The angular inclination of the nozzles causes the water sprayed therefrom, through its reaction upon the arms to cause rotation of the arm and head assembly of the body.

As shown more clearly in Figure 2, the upper end of the pipe **18** is closed and may extend above the upper surface of the closure plug **36**. The closure plug is provided with a central aperture **52** through which the pipe **18** loosely extends, and the upper surface of this plug is provided with an annular socket or recess **54** which constitutes a bearing seat for the reception of a plurality of bearing elements or balls **56** constituting anti-friction means by which the body has its upper end journaled upon the pipe **18**. These balls are retained in the bearing seat by a combined bearing retainer and adjustment lock device.

As shown more clearly in Figure 5, this latter element includes an annular collar or ring **58** adapted to snugly encircle the upper end of the pipe **18** and which is provided with any convenient locking means such as a set screw or the like **60** whereby the ring **58** may be clamped upon the pipe and retain the bearings in the bearing seat. Integrally rising from the ring **58** is a standard **62**, having a flat side **64** upon which suitable indicia are provided for determining the extent of the adjustment device as set forth hereinafter, and having a notched or serrated edge **64** upon one side thereof.

Spaced inwardly from its upper closed end, the pipe **18** is provided with an annular groove **66** and a flexible sealing washer **68** which may be of rubber, a suitable plastic or any other desired material, is seated in this groove and closely underlies and engages the undersurface of the plug sleeve **38** to form a closure for the aperture **52** thereof. Obviously, the water pressure within the body will urge the sealing means upwardly into a tight sealing engagement with the plug **38**, during rotation of the body **20** about the stationary pipe **18**.

A similar sealing construction for the bottom wall

30 is provided as shown in Figures 2 and 11. This sealing construction likewise includes a circumferential annular groove 70 in the pipe 18 together with a flexible sealing washer 72 therein. This washer overlies the clearance between the rim of the aperture 32 and the pipe 18 to establish a fluid tight sealing means therebetween. As shown in Figure 11, in an exaggerated manner, a portion of the washer is adapted to be deformed as at 74 downwardly into the aperture 32 to effectively seal the same against the egress of water therefrom.

Within the depending cylindrical sleeve or flange 34, the bottom wall 30 is provided with a beveled bearing race or surface 76 and suitable anti-friction bearing balls or elements 78 are received therein. These balls are retained in place by means of a collar 80 which encircles the pipe 18 and which collar is in turn secured in place as by set screw or the like 82.

By the arrangement as so far described, it will now be apparent that the rotatable body is journaled upon the stationary pipe 18 for free rotation thereon by the two bearing assemblies at its opposite ends, and is prevented from upward movement with respect to the pipe by the upper bearing assembly and the bearing locking means 58, and is prevented against downward movement by the lower bearing assembly together with the bearing locking means 80. Further, water supplied by the conduit 14 into the pipe 18 will be discharged by apertures 84 from this pipe into the interior of the chamber 28, and from the latter will flow by means of the internal and external bosses 42*a*, 44, the arms 46 and the nozzle ends 48 to the spray nozzles 50 and to be discharged therefrom, the inclination of the terminal points 48 producing by a back thrust upon the arms a continuous rotation of the body, thus causing the spray to cover a generally circular area as shown in Figure 10.

The upper portion of the pipe 18 within the body 20, above the apertures 84, but below the closed end of the pipe is provided with a pair of longitudinally, diametrically oppositely disposed guide slots 86. The lower end of the adjusting rod 26, which is slidably received in the bore 24, is provided with a diametrically disposed aperture 88 for the reception of an adjusting pin 90. It will thus be apparent that by means of the pin 90, the adjusting rod 26 is prevented from rotation relative to the stationary sleeve 18, but is free to move axially thereof.

The valve member 92 in the form of a sleeve provided with an axial bore 94 is slidably received upon the pipe 18, this valve sleeve being provided with diametrically disposed apertures 96 by means of which the adjusting member is secured to the adjusting rod 26 by the pin 90. It will now be apparent that by means of this construction, the adjusting member 92 is shifted axially of the shaft 18. The exterior surface of the adjusting member is disposed very closely adjacent to the inner extremities of the inwardly extending bosses 44 and is intended to constitute a valve means therefor.

For this purpose, a portion of the exterior portion of the sleeve 92 is diametrically reduced to provide a cut-away portion 98 which merges with the unrelieved exterior surface of the adjusting member with a curved shouldered portion 100.

Since the adjustable valve member is not rotatably mounted upon the pipe 18, it will be evident that upon rotation of the body 20 that the inwardly extending bosses 44 thereof will pass across the exterior surface of the adjuster member which will thus function as a valve to controllably throttle the flow of water from the chamber 28 into the arms of the sprinkler head assembly. Obviously, the curved shoulder portion 100 may be given such a contour and the surface of the recesses portion 98 may be so shaped as to permit substantially unrestricted flow through the sprinkler arms. Thus, as shown in Figure 2, when the unrelieved portion is in registry with one of the bosses 42 as shown at the right hand side of Figure 2, flow through the corresponding sprinkler arm 46 will substantially cease, while when the relief portion 98 is disposed adjacent one of the bosses, as shown at the left hand side of Figure 2, uninterrupted flow of water through that sprinkler arm will be permitted.

By raising and lowering the body 92 relative to the position of the bosses 44, it will be evident that each of the arms may be closed off from the water in the interior of the chamber 28 for varying proportions of the extent and period of rotation. Thus, when the unrelieved portion of the member 92 extends throughout substantially one-fourth of the rotation of the body, it is evident that each of the arms would cease to deliver water for one-fourth of its rotation, thus producing a spray pattern such as that shown in Figure 6. Similarly, when the adjuster 92 is appropriately positioned so as to close off the numbers 44 for one-half of the rotation, the spray pattern of Figure 7 would be achieved. When the flow is cut off of three-fourths of the rotation, the pattern in Figure 8 will be realized. Finally, by appropriately shaping the surface, any desired pattern, such as that of Figure 9, may likewise be obtained.

As above set forth, it will be evident that these varying patterns may be realized by sliding the adjuster member 92 axially of the stationary shaft and relative to the rotating bosses 44.

It may be here noted that the body 92, above the shouldered portion 100, may be provided with diametrically oppositely disposed notches or cut-away portions 102, each of which may extend through any desired portion, such as ninety degrees, of the circumference of the adjuster body, so that when these notches register with the bosses 44, communication will be established with the sprinkler arms for ninety degree intervals or at any other desired duration of periods and intervals. In order to facilitate the easy adjustment of the valve member for obtaining the desired pattern or spray, the upper end of the adjusting rod 26 is diametrically reduced to provide a shouldered portion 104, the upper end of which is internally screw threaded as at 106, and the lower end of which is provided with a lateral socket 108. An adjusting cap 110 is provided having a depending sleeve-like cylindrical portion 112 which loosely embraces the portion 104 of the adjusting rod. A coiled torsion spring 114 is received within the sleeve 112 and has its lower end seated in the socket 108 in the portion 104, and its upper end is seated in a corresponding socket 116 in the cap 110. The sleeve-like portion 112 of the cap 110 thus houses and retains the torsion spring, this cap in turn being rotatably retained upon the adjusting rod as by a screw 118. As shown best in Figure 5, one side of the cap 110 is provided with a notched portion 120 having sides 122 and 124. This notch is adapted to loosely engage the standard 62, and one of the sides such as 124 is provided with an edge selectively engaged in one of the serrations 64. The spring yieldingly urges the cap in such a direction upon its axle formed by the retaining screw 118, as to cause the side 124 to seat and engage one of the serrations 64, thereby preventing axial movement of the adjusting rod relative to the standard and the pipe 18.

The unrelieved portion of valve 92 above the notches 102, when brought into alignment with the ports 44, cuts off all flow through the sprinkler. This permits the sprinkler to be readily stopped temporarily, as when it is desired to move the same to a new location.

From the foregoing, it will now be apparent that by merely rotating the cap 110 against the resistance of the spring 114, the cap will be caused to disengage the serrated edge 64, whereby the cap and adjusting rod may be axially adjusted to vary the valve setting as desired. The indicia upon the standard 62 will facilitate the placing of the adjusting valve in the desired position to obtain the desired pattern of spray.

It will be here observed that the various patterns of spray are particularly useful where it is desired to position the sprinkler adjacent one corner of a building or walk as in Figure 5, where it is desired to water the lawn through 270 degrees of rotation; or against one side of a walk or building as in Figure 7 where 180 degrees of sprinkling area are desired. Similarly, the device may be placed within the corner formed by two walks or building walls as in Figure 8 where 90 degrees of spraying is desired, may be positioned as in Figure 1 where the area between two parallel walks only is desired to be sprayed, or may have the full 360 degrees of rotation of the sprinkler as in Figure 10.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. An adjustable sprinkler comprising a hollow body having sprinkler arms, a water supply pipe communicating with the interior of the body, means mounting said body for rotation upon said supply pipe, ports on the interior of said body communicating with said sprinkler arms, a sleeve valve member in said body adjacent said ports and axially slidable upon said supply pipe, adjusting means mounted in said pipe for axial movement and connected with said valve member, control means for said adjusting means exteriorly of said body, said pipe having a longitudinal slot therein, a pin on said adjusting means extending through said slot and secured to said valve member to slidably and non-rotatably secure the valve member and the adjusting means to the pipe.

2. An adjustable sprinkler comprising a hollow body having sprinkler arms, a water supply pipe communicating with the interior of the body, means mounting said body for rotation upon said supply pipe, ports on the interior of said body communicating with said sprinkler arms, a sleeve valve member in said body adjacent said ports and axially slidable upon said supply pipe, adjusting means mounted in said pipe for axial movement and connected with said valve member, control means for said adjusting means exteriorly of said body, said mounting means comprising a bearing seat in said body, bearing elements mounted in said seat and engaging said pipe to permit rotation of the body about the pipe, a bearing retainer collar releasably secured to said pipe and holding said bearing elements in said seat.

3. An adjustable sprinkler comprising a hollow body having sprinkler arms, a water supply pipe communicating with the interior of the body, means mounting said body for rotation upon said supply pipe, ports on the interior of said body communicating with said sprinkler arms, a sleeve valve member in said body adjacent said ports and axially slidable upon said supply pipe, adjusting means mounted in said pipe for axial movement and connected with said valve member, control means for said adjusting means exteriorly of said body, said mounting means comprising a bearing seat in said body, bearing elements mounted in said seat and engaging said pipe to permit rotation of the body about the pipe, a bearing retainer collar releasably secured to said pipe and holding said bearing elements in said seat, said bearing retainer including an element of said control means.

4. An adjustable sprinkler comprising a hollow body having sprinkler arms, a water supply pipe communicating with the interior of the body, means mounting said body for rotation upon said supply pipe, ports on the interior of said body communicating with said sprinkler arms, a sleeve valve member in said body adjacent said ports and axially slidable upon said supply pipe, adjusting means mounted in said pipe for axial movement and connected with said valve member, control means for said adjusting means exteriorly of said body, said mounting means comprising a bearing seat in said body, bearing elements mounted in said seat and engaging said pipe to permit rotation of the body about the pipe, a bearing retainer collar releasably secured to said pipe and holding said bearing elements in said seat, said bearing retainer including an element of said control means, said control means further including a catch rotatable upon said adjusting means and yielding means urging said catch into engagement with said element.

5. An adjustable sprinkler comprising a hollow body having sprinkler arms, a water supply pipe communicating with the interior of the body, means mounting said body for rotation upon said supply pipe, ports on the interior of said body communicating with said sprinkler arms, a sleeve valve member in said body adjacent said ports and axially slidable upon said supply pipe, adjusting means mounted in said pipe for axial movement and connected with said valve member, control means for said adjusting means exteriorly of said body, said adjusting means having a knob rotatably secured thereto for push and pull motion, a standard on said pipe, locking surfaces on said knob and standard, resilient means urging said surfaces into engagement whereby axial movement of the adjusting means within the pipe will be prevented.

6. An adjustable sprinkler comprising a hollow body having sprinkler arms, a water supply pipe communicatig with the interior of the body, means mounting said body for rotation upon said supply pipe, ports on the interior of said body communicating with said sprinkler arms, a sleeve valve member in said body adjacent said ports and axially slidable upon said supply pipe, adjusting means mounted in said pipe for axial movement and connected with said valve member, control means for said adjusting means exteriorly of said body, said adjusting means having a knob rotatably secured thereto for push and pull motion, a standard on said pipe, locking surfaces on said knob and standard, resilient means urging said surfaces into engagement whereby axial movement of the adjusting means within the pipe will be prevented, said knob having a peripheral notch loosely receiving said standard for limited relative rotation to disengage the locking surfaces.

7. An adjustable sprinkler comprising a hollow body having sprinkler arms, a water supply pipe communicating with the interior of the body, means mounting said body for rotation upon said supply pipe, ports on the interior of said body communicating with said sprinkler arms, a sleeve valve member in said body adjacent said ports and axially slidable upon said supply pipe, adjusting means mounted in said pipe for axial movement and connected with said valve member, control means for said adjusting means exteriorly of said body, said valve having a relieved portion defined by a curved edge inclined to the axis of said body.

8. A rotating sprinkler comprising a vertical stationary water supply pipe, a hollow sprinkler body having radiating sprinkler arms, means journaling said body upon said pipe, a sealing means within said body and overlying said last means and preventing egress of water from between said body and pipe, said pipe having a circumferential groove, said sealing means including a flexible ring loosely seated in said groove and deformable into the space between said body and pipe.

9. An adjustable sprinkler comprising a hollow body having sprinkler arms, a water supply pipe communicating with the interior of the body and extending through said body, means mounting said body for rotation upon said supply pipe, ports on the interior of said body

communicating with said sprinkler arms, a sleeved valve member in said body adjacent said ports and axially slidable upon said supply pipe, adjusting means mounted in said pipe for axial movement and connected with said valve, control means for said adjusting member exteriorly of said body, means within said body establishing a fluid tight seal between said body and said supply pipe, said pipe having a circumferential groove, said means within said body establishing a fluid tight seal including a flexible ring loosely seated in said groove and deformable into the space between said body and pipe.

10. An adjustable sprinkler comprising a hollow body having sprinkler arms, a water supply pipe communicating with the interior of said body and extending through said body, means sealingly and rotatably mounting said body on said supply pipe, said supply pipe having outlet ports opening into said hollow body, a sleeve valve member axially and non-rotatably, slidably disposed on the portion of said supply pipe disposed within said body, said body having radially inwardly projecting tubular projections forming inlet ports for said sprinkler arms within said body, said valve having a relieved portion defined by a curved edge inclined to the axis thereof, means selectively adjustably sliding said valve on said pipe, said ports engaging the unrelieved portions of said valve in varying degrees in accordance with the sliding adjustment of said valve.

11. In a rotatable sprinkler construction, a water supply pipe, a hollow sprinkler body mounted on said pipe, said pipe extending axially through said sprinkler body, stop means on said pipe above and below said body

preventing axial movement of said body on said pipe, said pipe having circumferential grooves therein on the portion of the pipe disposed within said body adjacent the ends of said body, sealing rings in said grooves sealingly contacting the ends of said body surrounding the supply pipe to prevent egress of water from said body.

12. In a rotatable sprinkler construction, a water supply pipe, a hollow sprinkler body mounted on said pipe, said pipe extending axially through said sprinkler body, stop means on said pipe above and below said body preventing axial movement of said body on said pipe, said pipe having circumferential grooves therein on the portion of the pipe disposed within said body, adjacent the ends of said body, sealing rings in said grooves sealingly contacting the ends of said body surrounding the supply pipe to prevent egress of water from said body, and outwardly opening bearing seats formed on the ends of said body, bearing elements on said seats interposed between said stop means and said body.

References Cited in the file of this patent

UNITED STATES PATENTS

2,034,607	Coles	Mar. 17, 1936
2,184,901	Spurlock	Dec. 26, 1939
2,400,658	Shepherd	May 21, 1946
2,459,244	Sellars	Jan. 18, 1949
2,459,643	Hartley	Jan. 18, 1949
2,532,356	Brown	Dec. 5, 1950
2,560,662	Rieger	July 17, 1951
2,571,763	Robbins	Oct. 16, 1951