Dec. 9, 1930. H. N. POTTER 1,784,314

ROTARY SPRINKLER

Filed Aug. 1, 1928

Fig. 1.

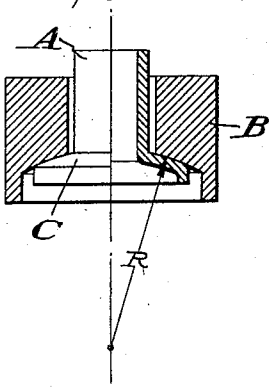


Fig. 2.

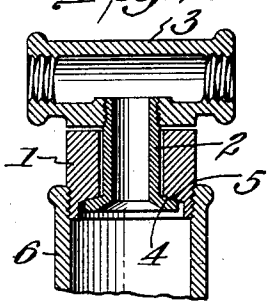


Fig. 3.

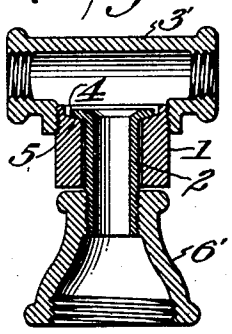


Fig. 4.

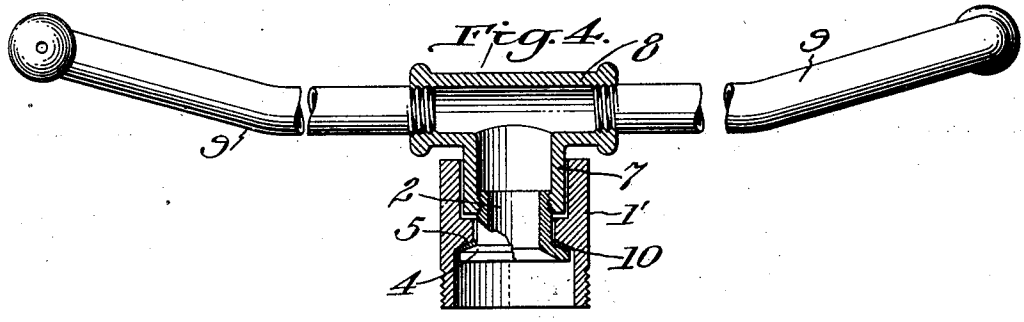


Fig. 5.

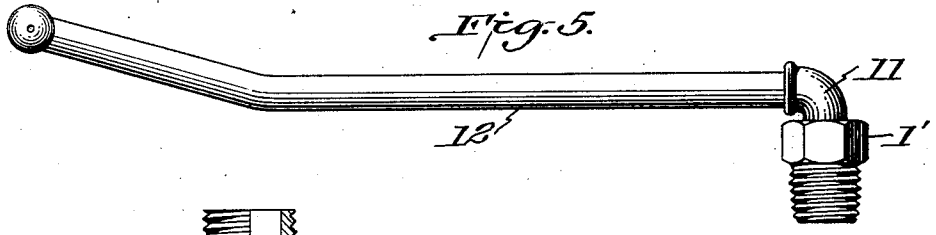
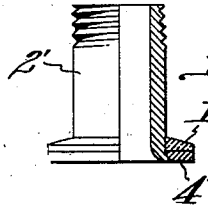


Fig. 6.



Inventor:

Henry Noel Potter

By Byron Investid & Brickenstein

Attorneys

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UNITED STATES PATENT OFFICE

HENRY NOEL POTTER, OF ENCINITAS, CALIFORNIA

ROTARY SPRINKLER

Application filed August 1, 1928. Serial No. 296,734.

This invention relates to rotary sprinklers, and particularly to sprinklers of the type in which rotation is effected by the reaction of the water discharged from the sprinkler.

In general, the automatically rotating devices of the type employed for the watering of lawns and similar irrigation work are either of relatively complicated and expensive construction, or they have not been entirely satisfactory in operation, due to serious leakage or to the binding of the rotary head. The forces available for rotating the sprinkler are relatively small and the conditions of use are such that the frictional resistance between the rotating parts tends to increase rapidly due to tarnishing or to the adherence of the films of foreign matter. The two requirements, freedom from leakage and a continuing low frictional resistance, have not been satisfied in the devices of the past.

An object of the present invention is to provide an automatic rotary sprinkler which includes a water-tight rotary connection of continuing low frictional resistance. A further object is to provide a rotary sprinkler in which the rotary element turns upon an end thrust bearing and is restrained against excess lateral displacement by a loose radial guide. More specifically, an object is to provide a rotary sprinkler in which the bearing surface between the relatively movable parts has the form of a zone of a spherical surface, the parts being permitted slight departure from coaxial alinement by loosely-fitting guide elements.

These and other objects of the invention will be apparent from the following specification when taken with the accompanying drawings, in which

Fig. 1 is a central section through two relatively rotatable elements which exemplify features of my invention,

Fig. 2 is a vertical section through a sprinkler in which the head is carried on the inner member of relatively rotatable elements,

Fig. 3 is a similar vertical section through the central part of a sprinkler in which the head is carried by the outer element,

Fig. 4 is a fragmentary side elevation, with parts shown in section, of a double arm sprinkler embodying the invention,

Fig. 5 is a side elevation of a single arm sprinkler, and

Fig. 6 is a side elevation, with parts shown in section, of a modified form of spindle.

In the somewhat diagrammatic illustration of Fig. 1, the reference characters A, B identify, respectively, a hollow spindle and a sleeve between which a water-tight rotary connection is desired. From a theoretical standpoint, a satisfactory construction would result if the spindle had a snug fit within the bore of the sleeve, and some means, such as a flat or conical end flange of the spindle A, were provided to prevent axial displacement of the parts. In practice, however, such a bearing would be unsatisfactory as some play must be introduced to allow motion under service conditions. In sprinkler constructions of the type under consideration, the water serves as the lubricant for the bearing, and, aside from the tarnishing which may be expected when the usual materials are employed, films of calcareous or other foreign matter may form on the bearing surfaces. The forces available for rotating the sprinkler head are relatively small and therefore a comparatively small increase in the frictional resistance will prevent rotation. It has heretofore been customary to provide so little play between the cylindrical bearing surfaces (that leakage might be avoided with a new sprinkler), that injurious friction was certain to develop and/or increase when the sprinkler went into use.

I have found that both leakage and injurious increase of friction may be prevented when the inner face of flange C and the cooperating face of sleeve B are given the form of zones of a spherical surface which preferably has its center located in the axis of sleeve B. When the surface of the thrust bearing has this spherical form, the parts may slide, as well as rotate, upon each other without destroying the full surface contact which provides the water seal. Since the effectiveness of the joint is not dependent upon a coaxial arrangement of the cylindrical surfaces of the

spindle and sleeve, I can, and preferably do, provide so much play between these surfaces that the sleeve acts only as a limiting guide for the spindle and not as a bearing, to maintain co-axial relations.

Rotary sprinklers having a combined bearing and water seal such as shown in Fig. 1, may take various forms in accordance with the shape and arrangement of the auxiliary elements which are associated with the spindle and sleeve.

As shown in Fig. 2, the sleeve element 1 is the stationary member, the spindle element 2 being tapped into the center of the coupling 3 which receives the discharge arms. The inner face of the flange 4 of spindle 2 and the cooperating surface 5 at the counterbored end of the sleeve 1 are zones of the same spherical surface. It is to be noted that there is considerable axial as well as radial play between the spindle and sleeve, the axial play being taken up by hydraulic pressure when the sprinkler is in use.

The sleeve 1 is shown as threaded into the end of a fitting 6, but the exact construction of the support for the stationary member of the sprinkler is not involved in the present invention.

The spindle 2 may be used as the stationary member by fixing the same to an appropriate pipe end or support 6′ and connecting the T coupling 3′ to the sleeve 1.

In Fig. 4, I have illustrated a sprinkler which is of the same general construction as that shown in Fig. 2. The sleeve 1′ is counterbored from its inner end to space the zonal bearing surface 5 within the sleeve, and it is also counterbored from its outer end to receive the boss or leg 7 of the T-fitting 8 to which the distributing arms 9 are attached. The T-fitting is threaded upon the outer end of the spindle 2 and, at its inner end, the spindle carries a washer 10 which rests upon the upper zonal surface of the flange 4. The washer 10 may be of leather, Babbitt metal, phenolic resins or other suitable material that is waterproof and wear-resisting, when wet.

The sleeve and spindle may be formed of brass, but other and more corrosion-resistant materials may be employed, such, for example, as bronze, nickel-silver or nickel, or, if desired, the sleeve 2 may be of die-cast composition, or a molded plastic such as phenolic resin. The distributing arms and other auxiliary parts may be of brass or other suitable material such as galvanized iron, or cadmium or chromium plated steel.

The counterboring of one or both ends of the sleeve is desirable since it permits the use of a shorter spindle, thus reducing the resistance to flow of water therethrough and materially reducing the cost when formed of the relatively expensive corrosion-resistant metals or alloys. When a washer is employed, the recessing of the zonal bearing surface 5 affords protection for the washer.

A further modification illustrating the wide limits within which the construction may be varied is shown in Fig. 5. The sleeve 1′ may be of the form shown in Fig. 4, but the rotating head 11 which is carried on the spindle (not shown), has the general form of an L-fitting as it carries but one distributing arm 12.

In the modified spindle construction which is shown in Fig. 6, the spindle 2′ is simply a short length of pipe having secured thereto a threaded ring or end flange 4′ upon which the washer 10′ is seated. The exposed surface of washer 10′ is of zonal form and the washer is preferably not fixed either to the end flange or to the spindle to permit relative rotation between the zonal surface of washer 10′ and either the zonal surface 5 of the sleeve, or 4 of the spindle.

It is to be noted that the invention distinguishes from prior sprinkler constructions designed to provide a water seal and bearing between elements such as a spindle and sleeve, by employing an end thrust bearing and a loose radial guide, the surface of the thrust bearing having the form of a zone of a spherical surface. In the prior devices, a relatively tight bearing was provided by the cooperating cylindrical surfaces of the spindle and sleeve, and in those devices which employed a flanged spindle, the flanges were never so shaped that they would maintain an effective water seal in operation, since even a slight radial play between spindle and sleeve prevents a full surface contact between spindle flange and sleeve.

It will be understood that the rotary sprinklers embodying the present invention may be of widely varying construction and general appearance, since various changes may be made in the several parts, their relative size, shape and location without departure from the spirit of my invention as set forth in the following claims.

I claim:

1. In a sprinkler, a pair of relatively rotatable elements comprising a hollow spindle within and loosely guided for rotation by a sleeve, and means on said elements providing an end thrust bearing, the contact surface of said bearing having the form of a zone of a spherical surface, whereby within the range of relative movement permitted by the loose guiding action of said sleeve, a tight water seal is provided by the spherical surfaces of said thrust bearing when water is supplied to said sprinkler.

2. In a sprinkler, a pair of relatively rotatable elements comprising a hollow spindle within and loosely guided for rotation by a sleeve, an end flange on said spindle cooperating with a seat on said sleeve to provide a thrust bearing, the cooperating surfaces

of said flange and seat having the form of zones of spherical surfaces.

3. A sprinkler as set forth in claim 2, in combination with a wear-resistant washer between and having opposite faces conforming to the adjacent spherical surfaces of said end flange and seat.

4. In a rotary sprinkler, a hollow spindle having a flange whose inner face has the form of a zone of a spherical surface whose center lies on the axis of said spindle, a sleeve surrounding and loosely guiding said spindle, the end of said sleeve being counterbored to provide a recessed seat conforming to and concentric with the inner face of said spindle flange.

5. In a rotary sprinkler, a sleeve having means for connecting the same to a water supply, the opposite ends of said sleeve being counterbored, a hollow spindle passing loosely through said sleeve and having a flange cooperating with the inner counterbore of said sleeve to provide an end thrust bearing, the cooperating surfaces of said spindle flange and said sleeve being zones of concentric spherical surfaces, a head secured to the upper end of said spindle and having a depending cylindrical boss loosely received within the outer counterbore of said sleeve, and a nozzle carried by said head.

6. In a rotary sprinkler, a sleeve having means for connecting the same to a water supply, the outer end of said sleeve being counterbored, a hollow spindle passing loosely through said sleeve and having a flange cooperating with said sleeve to provide an end thrust bearing, the cooperating surfaces of said spindle flange and said sleeve being zones of concentric spherical surfaces, a T-fitting having the leg thereof threaded upon the outer end of said spindle and loosely received within the counterbore of said sleeve, and discharge arms connected to the branches of said T-fitting.

In testimony whereof, I affix my signature.

HENRY NOEL POTTER.