Sept. 25, 1928. 1,685,165

J. H. KEYS

SPRINKLER

Filed Feb. 20, 1922

Fig. 1.

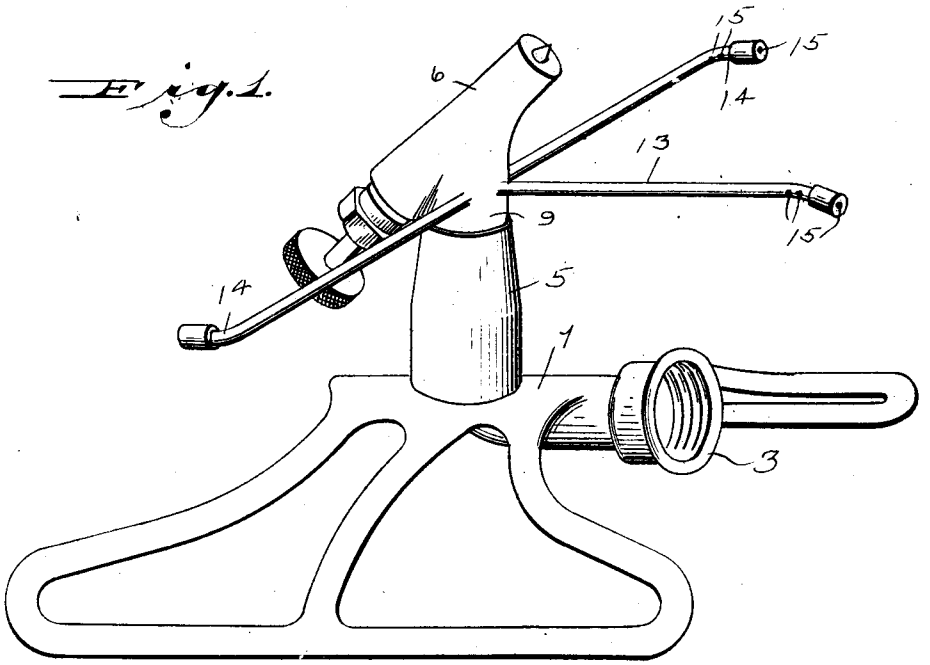


Fig. 2.

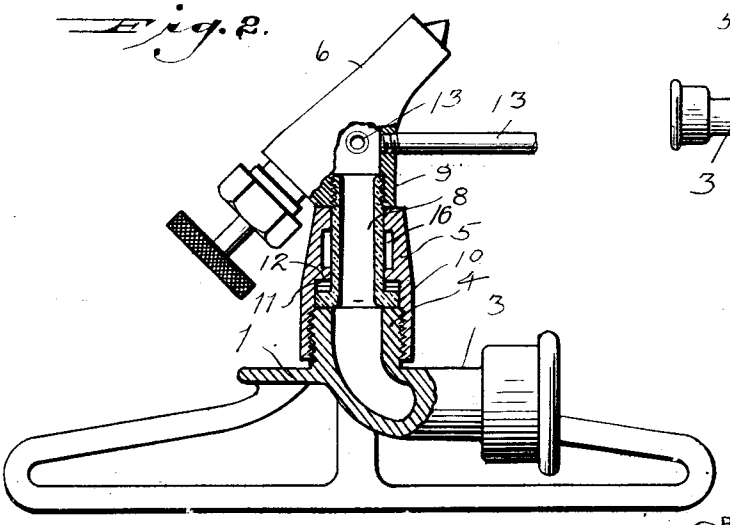
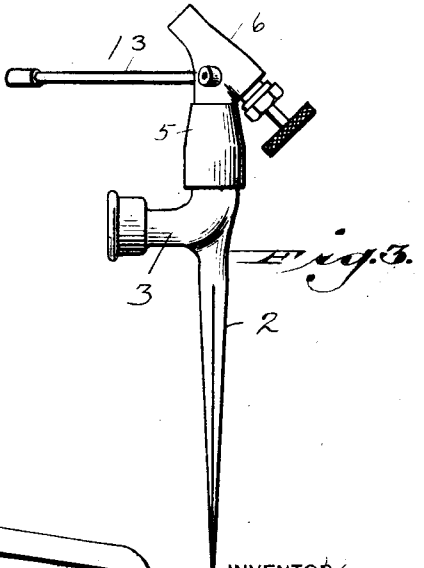


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN H. KEYS, OF DAYTON, OHIO, ASSIGNOR TO THE DAYTON IRRIGATION COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO.

SPRINKLER.

Application filed February 20, 1922. Serial No. 537,935.

My invention relates to water distribution and more particularly to a sprinkler head for irrigation purposes of the rotary or whirling spray type.

The invention contemplates an inclined main discharge nozzle capable of adjustment for various character of streams from a heavy solid stream thrown to considerable distance to a fine spray widely distributed, and rotatable about a vertical axis, the rotation being effected by jet propulsion by small jets discharged from radially disposed arms, the nozzle and jet propulsion arms being disposed toward a substantially balanced structure.

The object of the invention is to simplify the structure as well as the means and mode of operation of such whirling sprinkler devices, whereby they will not only be cheapened in construction, but will be more efficient in use, positive and uniform in action, easily controlled and unlikely to get out of repair.

A further object of the invention is to provide an improved form of sprinkler head employing an adjustable hose nozzle by which a discharge or stream of different character may be effected.

A further object of the invention is to provide improved means for rotating a main discharge nozzle in order that the discharge may be distributed over a wide area.

A further object of the invention is to provide an improved form of mounting or rotary connection for such whirling sprinkler head.

A further object of the invention is to provide a sprinkler of type mentioned, which will be small, compact, light but efficient and variable as to its range of action or field of distribution of the discharged water, and the character of discharge.

With the above primary and other incidental objects in view as will more fully appear in the specification, the invention consists of the features of construction, the parts and combinations thereof and the mode of operation or their equivalents as hereinafter described and set forth in the claims.

Referring to the drawings, Fig. 1 is a perspective view of the assembled whirling sprinkler device forming the subject matter hereof. Fig. 2 is a vertical sectional view illustrating the swivel or rotary joint for the sprinkler head with its supporting base. Fig. 3 illustrates a modification wherein the sprinkler head is mounted upon a single standard to be thrust into the ground.

Like parts are indicated by similar characters of reference throughout the several views.

Referring to the accompanying drawings, wherein is shown the preferred, but obviously not necessarily the only form of embodiment of the invention, 1 is the base or support, in this instance shown of an arched skeleton form. It is obvious that any form of tripod or spider might be employed in lieu thereof, or any other suitable supporting base, and in fact this support may consist merely of a tine or spike 2, which may be thrust into the ground to temporarily hold the twirling sprinkler head in upright position. Formed upon the support is a threaded hose connection 3, in this instance of substantially elbow shape, terminating in a spud or nipple 4, projecting from the top of the support 1. Screw threaded upon this nipple or spud 4 is a counter-bored sleeve 5. The spray nozzle or sprinkler head 6 may be of any suitable or convenient construction, having adjustable means for varying the character of the discharge stream such as is quite common in hose nozzles. In the present instance the character of the discharge is controlled by means of a stem and adjusting wheel projecting from the rear or lower end of the inclined nozzle 6. While the nozzle 6, may be arranged at any suitable inclination to the vertical to meet different conditions of use, the most practical and more universally desirable position is one of approximately forty-five degrees in relation with its vertical axis of rotation. Interconnected with the nozzle 6 is a tubular stem 8, which for convenience of manufacturing and assembly is preferably screw threaded into the dependent hub 9 of the nozzle 6. This tubular stem 8 is flanged or formed with an integral peripheral collar 10 at its lower end. In assembling the device the tubular stem 8 is inserted through the sleeve 5 from the lower or larger end thereof before being engaged with the nozzle 6, which is mounted upon the protruding end of the tubular stem 8, above the sleeve 5. Before inserting the tubular stem within the sleeve 5, one or more collars or washers 11 of non-corrosive material are placed about the tubular stem 8 in proximity to its flanged head 10. In practice it has been found quite satisfactory to provide two such

washers or collars 11, preferably of German silver, or of other material having similar non-corrosive, non-rust and antifriction characteristics. In assembly these collars are interposed between the integral head of the stem 8, and the internal shoulder 12 of the sleeve 5, affording a free bearing surface between the parts. The sleeve 5 being then screwed upon the spud or nipple 4 of the mounting, the head 10 is interposed between the end of such spud or nipple 4 and and the internal shoulder 12. The water supply is then conducted through the elbow hose connection 3, and spud 4 to the hollow stem 8 and thence discharged through inclined discharge nozzle 6, which has the general character of the ordinary hose nozzle. However, this nozzle 6 is free to rotate about a vertical axis upon the bearing of the stem 8 within the sleeve 5, without interfering with the discharge. In order to automatically rotate the nozzle 6 the latter is provided with radially disposed jet arms 13, intersecting the hub 9 of the nozzle and communicating with the water passage therethrough. The extremities of these tubular jet arms 13 are deflected laterally as at 14 in a rearward direction in relation with the direction of rotation, and are not only preferably perforated at the extreme end of such jet arms, but also the arms are provided with one or more minute perforations 15, upon their rearward side, from which side jets of water are discharged under pressure, and which by their reaction serve to rotate the sprinkler head in the well known manner.

Heretofore it has not been unusual to employ a whirling sprinkler head which consists of the radially disposed jet arms only, the distribution of the water being dependent solely upon the discharge from these arms in their rotary movement. Such a device has but a limited range or field of operation and moreover, the range of the discharge cannot be readily controlled. In such instances, it is only by variation of the supply pressure that the discharge can be regulated. In the present instance, these jet arms are not depended upon for distribution purposes, but the distribution is primarily effected by the main hose discharge nozzle and the jet arms function primarily as actuators or for propulsion means, and not for distribution means. Of course the discharge from these jet arms will afford an irrigation of the inner or center field, while the main stream and main discharge from the hose nozzle 6, in its rotary movement under the influence of the jet arm will irrigate the outer concentric field, over a diameter very much greater than can possibly be covered by the jet arms. Moreover, the adjustment of the nozzle 6 enables the range or field covered to be varied to a very wide extent, and particularly enables the character of the discharge to be changed at will without changing the pressure of the supply. Thus the nozzle may be made to discharge in a spray in varying degrees of fineness or it may discharge in a substantially solid stream or partially subdivided as would be the case with an ordinary hand hose nozzle. The type of bearing illustrated while quite cheaply made, is highly efficient and quite durable. The water under pressure will supply a film of water between the bearing surfaces at all times, thereby keeping the bearing cool and reducing wear. The pressure of the discharge stream tends to press the head 10 of the stem 8 upwardly against the internal shoulder 12 of the sleeve 5. The frictional resistance here is taken by the interposed collars or washers 11, by providing these washers or collars in multiple, that is two or more superposed one on the other, if one of these collars should stick or meet with frictional resistance upon either the head 10 or shoulder 12, a free bearing would be afforded between the succeeding collars. Thus the device is seen to be entirely automatic and capable of a wide range of operation and necessitating little or no skilled attention.

Inasmuch as the nozzle 6 is subjected to a very rapid rate of rotation under the influence of the jet arms 13, special provision is made for reducing the wear upon journal bearings of the nozzle. To this end the sleeve 5 is preferably though not necessarily made of Babbitt metal. In practice this sleeve is die cast from Babbitt or bearing metal of the usual composition. However, it is obvious that in lieu of this the sleeve 5 may be of brass, cast iron or other material, and provided with a suitable bushing. An annular groove or recess 16 is provided within the bore of the sleeve 5, and surrounding the stem 8. This recess 16 is charged with lubricant. The adjustment of the nozzle 6 upon the screw threaded upper end of the stem 8 and the adjustment of the sleeve 5 upon the nipple 4 of the mounting is preferably such as to afford a limited amount of clearance in a longitudinal direction whereby the trunnion stem 8 of the nozzle is capable of a to and fro movement in a longitudinal direction. Under the influence of the water pressure when in use, the nozzle is elevated upwardly until limited by the engagement of the peripheral shoulder 10 with the collars or washers 11 and internal shoulder 12. When not in use the weight of the nozzle 6 will depress the trunnion stem 8 until the head 10 rests upon the end of the nipple 4 or the hub 9 of the nozzle rests upon the end of the sleeve 5, depending upon the relative screw threaded adjustment of the parts. Inasmuch as the sleeve 5 and stem 8 have bearing surfaces at opposite sides of the lubricant reservoir 16, this limited longitudinal movement of the trunnion stem 8 very mate-

rially assists in distributing the lubricant from the reservoir 16, between the bearing surfaces.

From the above description it will be apparent that there is thus provided a device of the character described, possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific details shown, but that the means and construction herein disclosed comprises the preferred form of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim.

1. A rotary sprinkler comprising an upwardly inclined nozzle an adjusting stem projecting from its lower end by which the character of the discharged stream may be varied, a vertically disposed conduit portion communicating with the inclined nozzle at a substantially mid-length point whereby the nozzle extends in substantially balanced relation on opposite sides of said vertical conduit, jet arms communicating with said vertical conduit portion and extending radially therefrom below the inclined nozzle, a trunnion bearing formed on the vertical hollow conduit upon which the nozzle rotates, a peripheral flange at the end of said trunnion, a counterbored sleeve in which said trunnion is mounted, a mounting having a supply conduit therethrough terminating in a screw threaded boss on which said sleeve is engaged with the peripheral flange of the trunnion interposed between the internal shoulder of the counterbored sleeve and the end of said boss.

2. In a rotary sprinkler an upwardly inclined nozzle, means for regulating the discharge stream accessible at the lower end of said inclined nozzle, said nozzle being revoluble about a vertical axis intersecting said inclined nozzle at a mid-length point whereby the nozzle extends in opposite directions beyond said axis of rotation, a plurality of propulsion jet arms extending in a horizontal plane and in radial relation with the axis of rotation, said arms being connected with the inclined nozzle for unison rotation about said vertical intersecting axis, a mounting for the nozzle and a supply conduit simultaneously supplying water to said inclined nozzle and to the radially disposed jet arms.

3. In a rotary sprinkler, an upwardly inclined nozzle mounted for rotation about a vertical axis intersecting the inclined nozzle at a mid-length point beyond which the nozzle extends in opposite directions, a plurality of radially disposed propulsion jet arms operatively connected with the nozzle for imparting unison rotary motion thereto, means for regulating the discharge from said inclined nozzle, and means for supplying water simultaneously to the inclined nozzle and to the jet arms.

In testimony whereof, I have hereunto set my hand this 13th day of February, A. D. 1922.

JOHN H. KEYS.