Feb. 22, 1927. 1,618,537

O. A. KITTINGER

ROTATING SPRINKLER

Filed May 26, 1924 2 Sheets-Sheet 1

Fig. 1.

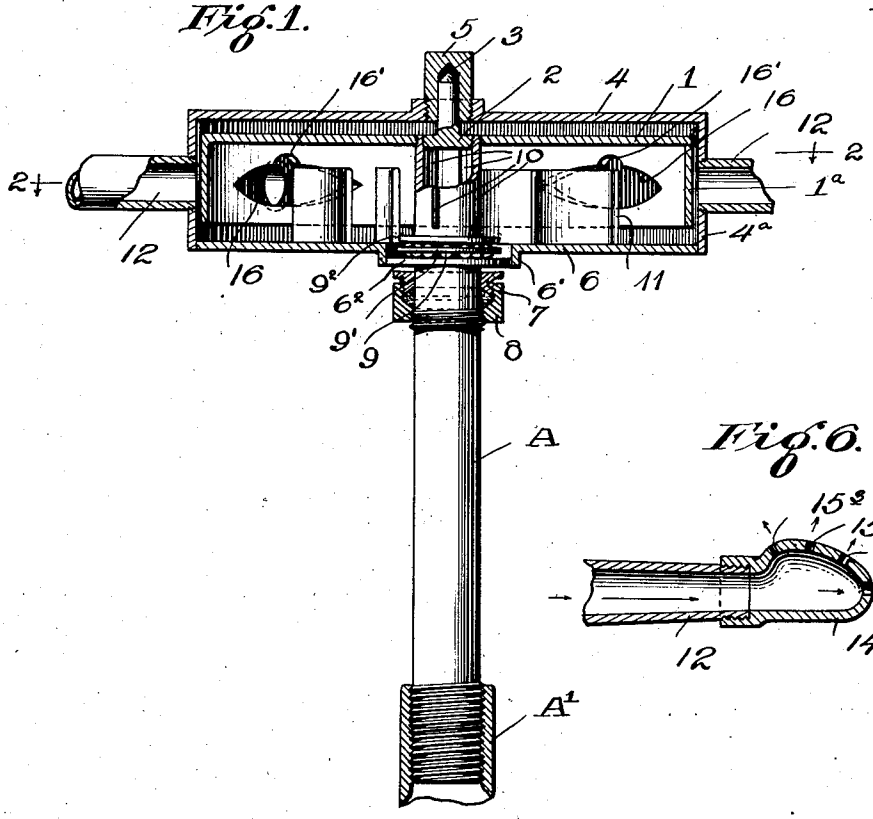
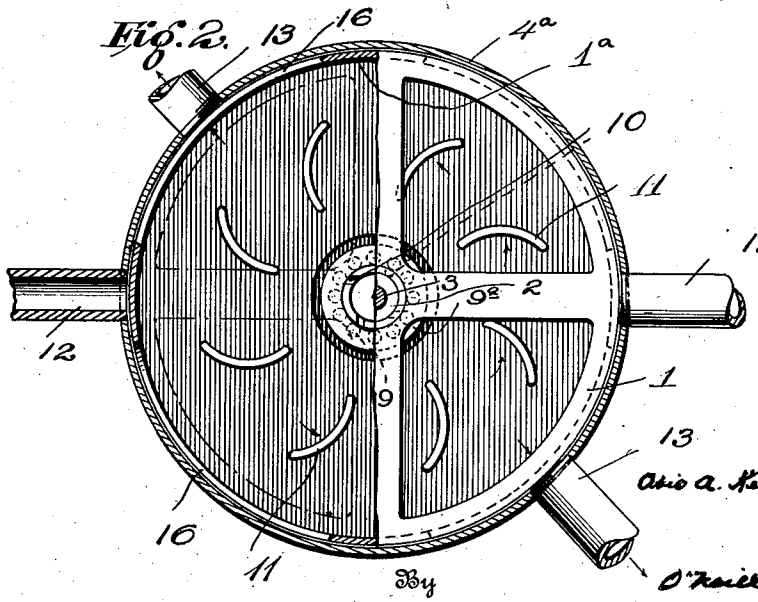


Fig. 6.

Fig. 2.



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Fig. 3.

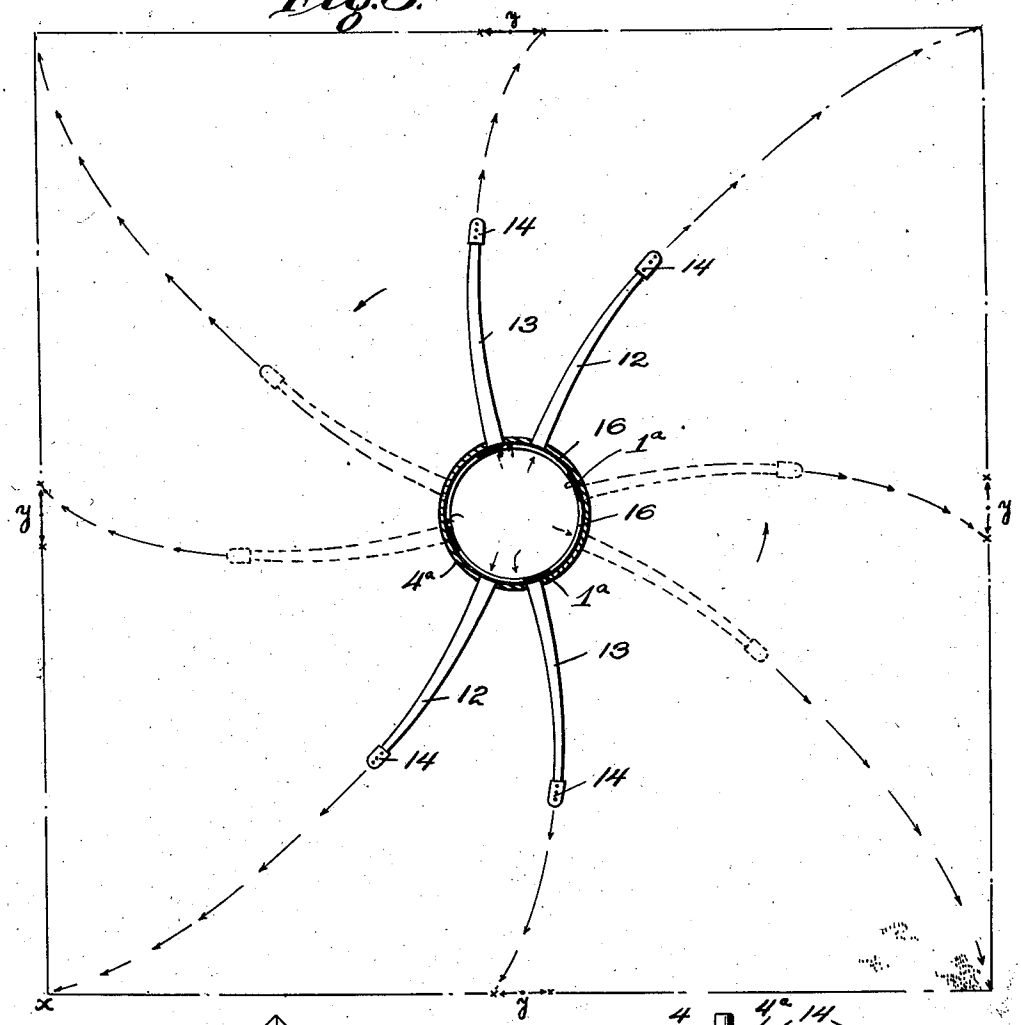


Fig. 4.

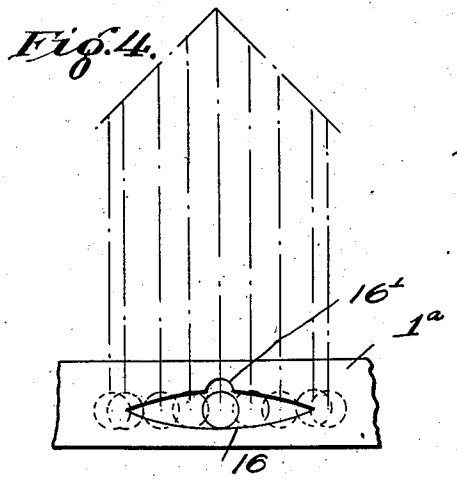
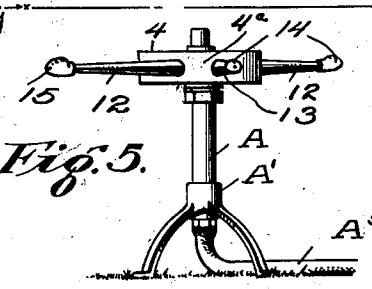


Fig. 5.



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UNITED STATES PATENT OFFICE.

OTIS A. KITTINGER, OF PEARL CITY, TERRITORY OF HAWAII.

ROTATING SPRINKLER.

Application filed May 26, 1924. Serial No. 715,947.

This invention relates to sprinkling devices, and more particularly to lawn sprinklers of the revolving type adapted to utilize the water pressure to throw the water radially of the support. In such devices the water is usually thrown in a circular path, the outermost limit of throw being the circumference of a circle circumscribed about the axis of the support as a center, it being assumed that the rotor is parallel to the space being sprinkled.

Many lawns, flower beds, gardens, etc., are of rectangular formation and, if sprinklers such as above referred to are utilized in such formations, the extreme corners of the plots will not be reached by the water, when the power is only sufficient to project the latter to the sides of the plot. If greater power is applied the corners may be reached, but the water will be thrown beyond the sides of the rectangular formation, resulting in needless waste, as will be readily understood.

The object of this invention therefore is the provision of a sprinkler of the general rotating type referred to, and adapted to distribute the water over a surface of rectangular formation.

Other objects of the invention will be made apparent in the following specifications, when read in connection with the accompanying drawings.

In said drawings;

Fig. 1 is a fragmentary vertical section taken through my improved revolving sprinkler, showing the device in operation.

Fig. 2 is a fragmentary top plan view of the sprinkler on the line 2—2 of Fig. 1.

Fig. 3 is a diagrammatic top plan view of the sprinkler in operation, the arrows indicating the maximum and minimum throw of the water.

Fig. 4 is a schematic detail illustrating the valve control which regulates the distance of the water throw, and,

Fig. 5 is a side elevation of my sprinkler mounted for operation, and,

Fig. 6 is a section taken longitudinally of the nozzle of a sprinkler arm.

Now referring specifically to the drawing A, Fig. 1, is a supply pipe adapted to deliver water under pressure, said pipe being mounted upon a standard A′, the lower end being in communication with a hose A^3, or otherwise connected to the water supply, see Fig. 5.

To the top of the pipe A is rigidly and non-rotatively secured a reservoir 1, having a depending peripheral flange 1^a, said reservoir being provided at its top with a central aperture to receive the end of the pipe A. The top periphery of the pipe A extends into said aperture, and may be rigidly secured thereto by screw-threads, as shown in Fig. 1. A plug 2 extends into the aperture in the reservoir, closing the end of the pipe A, and may be rigidly secured in position by a screw-threaded connection, as illustrated. The plug 2 is provided with a conically shaped top 3.

Concentrically mounted with respect to the reservoir 1, and slightly spaced therefrom, is a revolvable shell 4, having a depending peripheral flange 4^a, and carrying a cap 5 at its axial center, said cap being adapted to fit over the plug 2, and providing a socket adapted to the top 3 of said plug. The cap may be screwed into the shell 4 as indicated in Fig. 1, or may otherwise be secured thereto, as will be understood. The lower plate 6 of the shell is centrally provided with an annular downturned flange 6′, to which is rigidly secured a ring 6^2, resting upon the male portion 7 of a stuffing box, which portion closely fits around the water supply pipe A, the outer periphery of the portion 7 being screw-threaded for connection to the complementary portion 8 of the stuffing box. The ring 6^2 is in the form of a raceway for anti-friction members 9, which rest thereupon, surrounding the pipe A, and said members are held against lateral movement by an enclosing ring 9′, another ring 9^2 being soldered to the pipe A, and limiting upward movement of the members 9.

The top of the pipe A, within the shell 4, is provided with four equally-spaced slots 10, Fig. 2, which extend through the wall of the pipe at an angle to the longitudinal axis of the latter. Upon the upper surface of the bottom plate 6 of the shell 4, is soldered or otherwise secured a plurality of vertically extending, curved deflector blades 11, positioned for contact by the water passing through the slots 10, whereby to rotate the shell 4. It will be understood that the water passes through the slots 10 and contacts the concaved faces of the blades 11, thereby exerting its influence to turn the shell.

The vertically extending flange 4^a of the shell 4 is provided with two sets of hollow

sprinkling arms, 12, 12 and 13, 13, each arm being screw-threaded into an aperture through said flange, and the two arms 12 and 12 being diametrically opposite, each to each, as are also the arms 13 and 13, all as shown in Fig. 2. The arms 12 and 13 are slightly curved to assist in the rotation of the shell 4, and are provided at their outer ends with a nozzle 14, having four or more orifices arranged in a row, said orifices 15, 15′, 15^2, 15^3 being arranged as shown in Fig. 6. Each arm 12 is spaced from the adjacent arm 13 a distance which is approximately one-eighth of the circumference of the vertical flange 4^a of the shell 4.

The fixed reservoir 1 is provided with a vertically extending circumferential flange 1^a, and four equally-spaced, circumferentially-elongated openings or vents 16, are cut through the wall of the flange 1^a, and extend longitudinally of the circumference of said flange, as clearly shown in Figs. 1 and 4. The openings 16 are so formed that the defining walls thereof gradually diverge circumferentially of the shell, the minimum divergence being at each end and gradually increasing to maximum at the center. Such openings or vents 16 permit access, to the arms 12 and 13, of the water otherwise confined in the reservoir 1. Each of the vents 16 are of a longitudinal dimension equal to approximately three-sixteenths of the circumference of the flange 1^a, and the greatest height, at center, about $\frac{3}{8}$ of an inch. These dimensions may obviously be varied to meet the requirements however.

In the operation of the device as so far described, the water under pressure, from the pipe A, enters the reservoir 1 through the slots 10, strikes the blades 11, and initiates rotation of the shell 4, at the same time raising the shell 4 so that the top 3 of the plug 2 enters the socket in the cap 5, and the balls 9, are lifted by the ring 6^2 and engage the ring 9^2. If it were not for the provision of the vents 16, the water would remain under pressure, in the reservoir 1, but revolution of the shell 4 successively brings the open ends of the arms 12 and 13 into register with the vents 16, and the water under pressure passes between the flange 1^a of the reservoir 1, and the flange 4^a of the shell 4 and into said arms, subject to such pressure, which ejects it through the orifices 15, 15′, 15^2, 15^3 projecting the water through said orifices a distance which is directly proportionate to the amount of pressure upon the water in the arms. Manifestly the amount of water in each arm governs the pressure therein, and the volume of water allowed to enter each arm is dependent upon the extent to which the inner or receiving end of each arm is in register with a vent 16.

In Fig. 4 is a schematic showing of the receiving end of an arm passing across a vent 16. Before the arms comes into register with the vent the pressure in the arm is zero; as the very acute end of the vent registers with the segment of the receiving end of the arm, a certain amount of water enters the arm and is thrown out a certain distance through the orifice 15 at the extreme end of the arm. As the arm passes over the vent 16 obviously the volume of water entering the arm, and consequently the distance thrown from the orifice 15 increases up to the maximum at center, whereafter it gradually decreases to zero as the receiving end of the arm passes out of register with the vent. This principle of operation is utilized in the employment of all of the arms 12 and 13 to throw the water evenly within the confines of a rectangular formation, as indicated in Fig. 3, the arrows indicating the minimum and maximum throw of the water. It is of course to be understood that the space to be covered is many times larger, in proportion to the spread of the arms, than is illustrated in Fig. 3.

In Fig. 3 the vents 16 are shown as spaced apart by the black portions of the flange 1^a, the vents being so positioned that the arms 12 and 13 will rotatively present their receiving ends at the center of the vents, at the instant when the curvature of the arm directs the nozzle 14 directly towards the extreme corner x, of the rectangle. As the arm passes to the right towards the point y, which is at the center of the side of the rectangle, the throw of the water gradually diminishes, because the volume of water entering the arm is gradually cut off, and the pressure upon the orifice 15 is gradually diminished, resulting in a minimum throw to the point y, immediately prior to the moment that the receiving end of the arm passes out of register with the vent 16, to zero pressure. Because of the curvature of the arm at the right of the arm just referred to, and because of the formation and disposition of the vents 16, one arm approaches its point of minimum throw as the adjacent arm approaches its point of maximum throw, and, conversely, when one arm is at maximum, the other is at zero, the second arm coming into operation at minimum however, at the front end of one vent 16, as the other approaches minimum at the rear end of the adjacent vent. In order to impart an additional impulse to the water which is directed at the extreme corner x of the rectangle, I provide a cut-out portion 16′ at the top and bottom central portions of the vents 16.

Since the space between the flange 1^a of the reservoir 1, and the flange 4^a of the shell 4, is always filled with water under pressure, the water is at no time completely cut off from the arms 12 and 13, and the words "zero", "minimum" and "maximum" as above used, are to be understood to indi-

cate the varying supplies of water which passes directly to the arms from the vents 16. Before the vents are in registration with the arms this quantity of water is of course zero; when the apex of a vent first registers, the quantity is minimum, thence gradually increasing to maximum at the point 16′ of the vent, thence gradually decreasing to minimum as the rear apex of the vent is approached, and then to zero, as the arm passes out of registration with the vent.

In Fig. 3 it will be noted that the receiving end of the arm 13, at the bottom of the figure is just about to pass out of registration with the vent 16, and it is therefore making its direct throw to a point just to the left of the point y. Upon further passage of the arm to the right, the direct throw will cease, and the straight line on each side of the point y is covered by the water indirectly delivered to the arm from the space between the flange 1^a on the reservoir 1, and the flange 4^a, on the shell 4. Upon still further passage of the arm to the right, the receiving end of the arm passes into registration with the next vent 16, and the direct throw of water is resumed. It is to be noted therefore that the area covered by the indirect throw spans the space left unsprinkled by the direct throw, or that the indirect throw is effective to cover the space not touched by the direct flow during the period which ensues while the receiving ends of the arms are passing from registration with one vent into registration with the next vent. From the foregoing therefore it is obvious that the arms may sprinkle in a straight line area.

As shown in Fig. 6, the nozzle fitting 14 at the end of each arm, is provided with a row of orifices 15, $15'$ 15^2 and 15^3, arranged in a row extending in separated vertical planes, and that the orifices are of gradually diminishing dimensions, from front to rear. The orifice 15 is the largest, and throws to the outermost limits of the rectangular formation. The adjacent orifice $15'$ is directed upwardly, and is of smaller dimensions than the front orifice 15. The orifice 15^2 is still smaller and throws vertically, while the smallest orifice 15^3 directs the water backwardly towards the sprinkler. By this construction it will be obvious that the entire surface of the rectangular formation may be covered while all the arms are revolving.

Modifications of the structure herein disclosed, such as vents or arms of various configurations, may be suggested to those skilled in the art, but my invention covers all embodiments falling fairly within the scope of the appended claims.

What I claim is:

1. A sprinkler comprising a circular reservoir in communication with a supply of water under pressure, a circular shell rotatably mounted concentrically of and adjacent the outer side of said reservoir to form a restricted well, a plurality of sprinkler arms communicating with said shell, and a plurality of circumferentially elongated apertures extending through the wall defining said reservoir, each of said apertures gradually increasing in width from each end towards its center, substantially as described.

2. A sprinkler comprising a circular reservoir in communication with a supply of water under pressure, a circular shell spaced from said reservoir and rotatable concentrically therewith and adjacent thereto to form a restricted well, a plurality of sprinkler arms arranged in pairs in communication with said shell, and a plurality of circumferentially elongated apertures extending through the wall of said reservoir, each of said apertures gradually increasing in width from each end toward its center.

3. A rotating sprinkler comprising a circular reservoir adapted to receive water under pressure, a rotatable shell mounted outside of and adjacent and encircling said reservoir to form a restricted well, sprinkler arms extending through the wall of said shell, a circumferentially-elongated opening extending through each quadrant of the circular wall defining said reservoir, each opening diverging from each end towards its center and permitting the passage of water to said arms in quantities varying from minimum to maximum and thence to minimum, whereby the sprinkler may throw water over a rectangular formation, substantially as described.

4. A rotary sprinkler comprising a support, a circular reservoir fixed thereto and in communication with water under pressure, a shell spaced from and concentric with said reservoir and rotatable adjacent thereto to form a restricted well, and a plurality of sprinkler arms carried by said shell, said reservoir being provided around its periphery with a plurality of circumferentially-elongated openings each diverging from each end toward its center, and under rotation of the shell, being adapted to register with an arm and to deliver water thereto in quantities gradually varying from minimum to maximum and thence gradually decreasing from maximum to minimum, during the passage of said arm across said opening, substantially as described and for the purposes set forth.

In testimony whereof I affix my signature.

OTIS A. KITTINGER.