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F. C. ORR

1,751,879

WATER SPRINKLER

Filed April 1, 1926

Fig. 1.

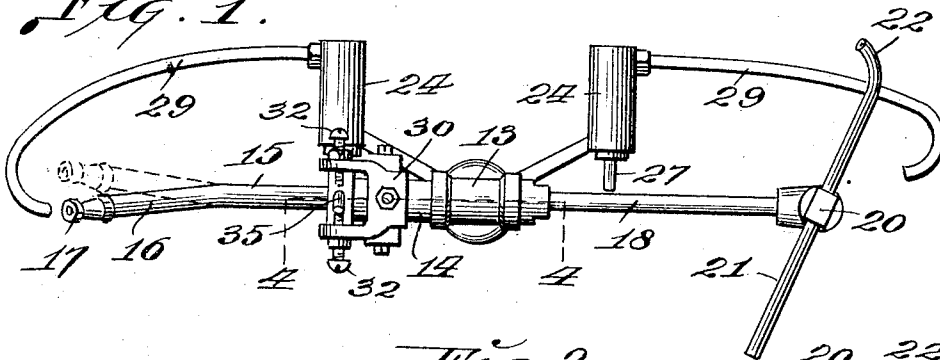


Fig. 2.

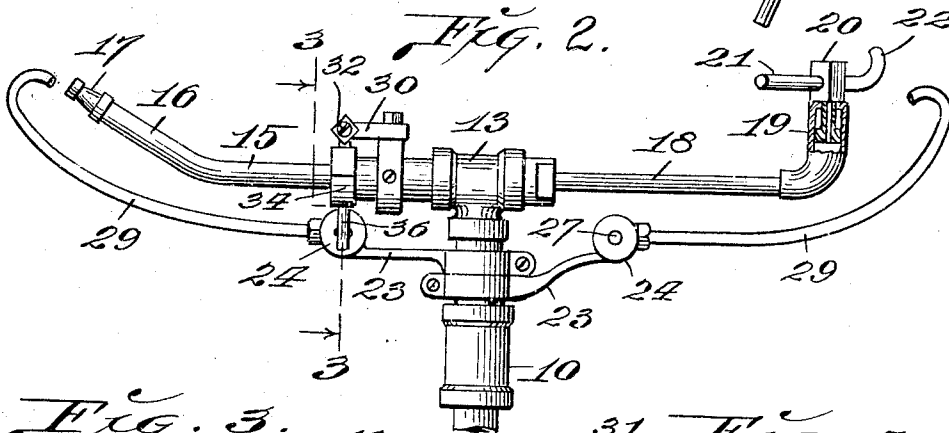


Fig. 3.

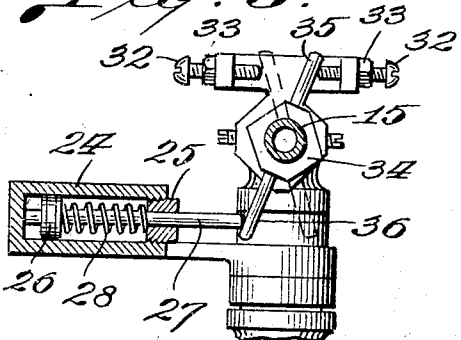


Fig. 4.

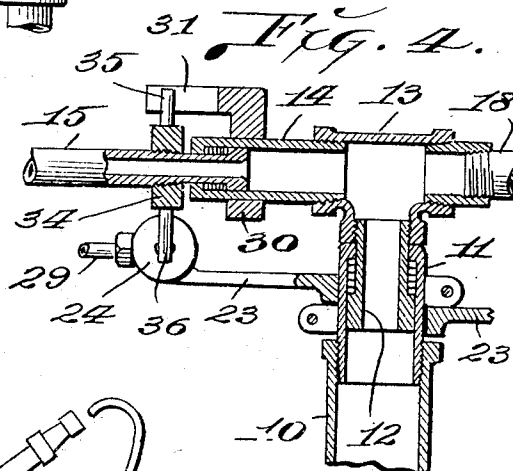
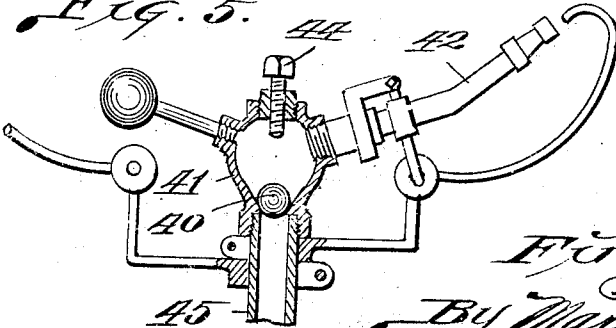


Fig. 5.



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WATER SPRINKLER

Application filed April 1, 1926. Serial No. 98,964.

My invention relates to a sprinkler or water distributing device that is especially designed for use on lawns, golf courses, gardens, orchards and the like, or in connection with fire protection systems that are installed in and around buildings.

The principal objects of my invention are to generally improve upon and simplify the construction of the existing forms of sprinkling devices that employ a semi-rotary or movable arm; to provide a sprinkling device wherein the force or pressure of the water that passes through the sprinkler is utilized for changing the direction of travel of the swinging tubular arm from which the jet of water issues; further, to provide a sprinkling device of the character referred to that is capable of ready adjustment to suit different conditions; and further, to provide a sprinkler that may be economically produced and installed, wholly automatic in its operation, and very effective in performing the functions for which it is intended.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will hereinafter be more fully described and claimed and illustrated in the accompanying drawing, in which—

Fig. 1 is a top plan view of a sprinkling device embodying the principles of my invention.

Fig. 2 is a front elevational view of the sprinkler.

Fig. 3 is an enlarged cross section taken on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged vertical section taken approximately on the line 4—4 of Fig. 1.

Fig. 5 is a sectional view lengthwise through the center of a modified form of the sprinkler.

Referring by numerals to the accompanying drawings which illustrate a practical embodiment of my invention, 10 designates a vertically disposed water supply pipe in the upper end of which is seated a short tubular member 11 within which is arranged for rotary movement on a vertical axis a nipple 12 to the upper end of which is connected a T-union 13 and connected to one of the hori-

zontal legs of the latter is a short horizontally disposed tubular member 14.

Mounted for rotary movement in the outer portion of member 14 is the inner end of a tubular arm 15 and the outer portion 16 of the latter is bent so as to occupy an angular plane of 20° or 30° relative to a horizontal plane and the end of this bent outer portion carries a jet nozzle 17.

Secured to the opposite end of the horizontal portion of T-union 13 is the inner end of a horizontally disposed tubular arm 18 to the outer end of which is connected the lower end of an upwardly projecting tubular elbow 19 and mounted for rotary movement in the upper portion of said elbow 19 is a short upwardly projecting member 20. Carried by the upper portion of this tubular member 20 is a short horizontally disposed tubular arm 21, one end of which is bent upwardly and laterally so as to form a reactive jet nozzle 22. The end of tubular arm 21 opposite the end that is formed into a jet nozzle is closed.

Clamped in any suitable manner on tubular member 11 are the inner ends of a pair of oppositely disposed arms 23 and carried by the outer end of each arm is a small cylinder 24, the rear end of which is permanently closed and screw-seated in the forward end of each cylinder is a tubular plug 25. Arranged within each cylinder 24 is a piston 26, the same being mounted on a stem 27 that passes through the tubular plug 25 and arranged on said stem between the plug and piston is a comparatively light or weak expansive coil spring 28. Connected to the rear end of each cylinder 24 is the inner end of a small tube 29 that projects outwardly and upwardly and the free end of said tube being curved inwardly so as to occupy a position in the path of travel of the jet of water that issues from nozzle 17.

Secured in any suitable manner on tubular member 14 is a collar 30 and projecting outwardly from the upper portion of said collar is a pair of spaced fingers 31 and passing horizontally through the outer portions of said fingers are screws 32 that carry lock nuts 33.

Secured on the inner portion of tubular

arm 15 adjacent to tubular member 14 is a collar 34 and projecting upwardly therefrom is a pin 35 that occupies a position between the inner ends of the screws 32. Depending from collar 34 is a pin 36 that is positioned so that it will make contact with the outer ends of the stems 27 that carry the pistons 26 and which stems project outwardly from the cylinders 24.

The operation of my improved sprinkler is as follows:

Water under pressure from the mains or source of supply passes upward through pipe 10 and the rotary bearing to the tubular arms 15 and 18 and the greater portion of this water will discharge through jet nozzle 17 that is mounted on the bent end portion 16 of arm 15. Inasmuch as the bent portion 16 of arm 15 occupies an angular position to one side of the vertical plane occupied by the axis of said arm 15, there will be a certain amount of reactive force developed by the jet issuing from the nozzle 17 and this force will cause the arm 15, arm 18 and parts connecting said arms, to slowly rotate about the vertical axis provided by the parts 10, 11 and 12, and thus the main jet of water issuing from nozzle 17 will be delivered over a relatively wide, substantially semi-circular area.

That portion of the ground adjacent to the sprinkler, or that portion not covered by the main portion of the jet issuing from nozzle 17, will be covered by the jet of water issuing from the nozzle of the auxiliary sprinkler arm 21, and which latter rotates rapidly on its vertical bearing on the end of arm 18 due to the reactive force of the water that issues from the curved end 22 of said arm 21.

At the end of the semi-circular sweep or travel of the arm 15, depending pin or finger 36 will engage the corresponding piston rod 27, thereby temporarily halting the movement of the main arm of the sprinkler, and at this time the jet nozzle 17 occupies a position immediately adjacent to the open end of the corresponding one of the tubes 29 so that a portion of the main jet issuing from nozzle 17 will enter said tube 29 and pass there-through to the rear end of the corresponding cylinder 24. As the water continues to enter this cylinder and build up a certain amount of pressure therein, the corresponding piston 26 will be moved forwardly through the cylinder, thereby moving the corresponding rod 27 forwardly and bearing on the depending pin 36 so as to move the same a short distance and correspondingly rock the collar 34 and tubular arm 15 (see dotted lines Figs. 1 and 3).

As arm 15 is thus rocked its upwardly bent end 16 carrying the nozzle 17 will be shifted to the opposite side of the vertical plane occupied by the axis of arm 16 and thus the reaction from the jet issuing from nozzle 17 will cause the arm to reverse its direction of

movement so that it will gradually swing through an arc of approximately 180° or until the depending pin 36 engages the piston rod 27 of the opposite cylinder, whereupon the nozzle 17 will discharge water into the corresponding one of the tubes 29, thereby bringing about a repetition of the reversing movements just described.

It will be understood that, as soon as the pressure of the water discharged into tube 29 and cylinder 24 behind piston 26, is relieved, the corresponding spring 28 will act to return the piston to its rearward limit of movement within its cylinder and thus said piston and its rod will be positioned for the succeeding forward travel when the water under pressure enters the rear end of the cylinder. Screws 32 may be adjusted to serve as stops to limit the rotary motion imparted to the tubular arm 15 and said adjusting screws may be locked in their adjusted positions by the nuts 33. Obviously the arms 23 may be adjusted upon tubular member 11 so as to position the cylinders 24 in order that the arms 15 and 18 may swing through arcs greater or less than 180° .

In Fig. 5 I have shown the automatic reversing mechanism applied to a type of sprinkler wherein the tubular arm that carries the jet nozzle moves with an intermittent or hesitating movement and which latter is accomplished by arranging a ball such as 40 within a housing 41, which latter is mounted for rotary movement on the upper end of a supply pipe, and said housing carrying a tubular arm 42 and a counterbalancing arm 43.

Seated in the upper end of housing 41 is a screw 44, the lower end of which serves as an anvil against which the ball 40 engages when thrown upwardly by the force of the water that enters the housing through supply pipe 45. In this form of sprinkler the vibration produced by the impact of the ball 40 against the screw 44 is sufficient to overcome the friction that holds the housing against rotary movement on its bearing, thus permitting said housing to rotate for a short period of time and then come to rest with the result that said housing and the arm 42 that carries a jet nozzle is caused to rotate intermittently or with a hesitating movement. This particular type of sprinkler is more fully disclosed in my co-pending application for U. S. Letters Patent filed July 16, 1925, Serial No. 43,975.

Where my improved pressure actuated mechanism is applied to the type of sprinkler illustrated in Fig. 5, the jet nozzle carrying arm 42 is not reversely rotated at the end of its swinging movement a sufficient distance to cause the reaction of the jet of water issuing from the nozzle to impart rotary motion to the arm and housing, but when the friction in the bearing for the housing is overcome or

broken by the vibrations developed as a result of the impact of the ball 40 against the screw 44, said arm 42 and the housing will be rotated for a short distance and then hesitate or stop until the friction in the bearing is again broken or overcome by the vibratory action developed by ball 40.

Thus it will be seen that I have provided a semi-rotary type of sprinkler that is entirely automatic in its operation and in which the reversal of the direction of travel of the tubular arm is brought about through the pressure of the jet of water that issues from the main arm of the sprinkler.

While my improved sprinkler is in operation, arm 15—18 rotates slowly. As a matter of fact, to achieve best results, this arm should not make more than two complete strokes per minute, and this speed can be materially lowered to advantage. Obviously, such low speed will not produce an appreciable degree of inertia, and therefore when the depending pin 36 engages piston rod 27 at the end of its relatively slow movement the sprinkler arm 15 and 18 will be brought to a stop, and the pressure of the water discharging from nozzle 17 into and through tube 29, will very quickly build up behind piston 26 sufficient pressure to quickly force said piston and its rod upward, said parts making a full stroke and rotating tube 15 so as to change the position of the bent end portion 16 thereof.

It will be understood that minor changes in the size, form and construction of the various parts of my improved sprinkler may be made and substituted for those herein shown and described without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. In a sprinkler, a supply pipe, a tubular arm mounted to rotate on a vertical axis on said supply pipe and having communication with the latter, an angularly disposed jet nozzle carried by said tubular arm and mounted for limited rotary movement thereon; a pair of cylinders adjustably mounted on the supply pipe, pistons arranged for operation within said cylinders, piston rods projecting from said pistons, an arm depending from the rotatably mounted tubular arm in position to engage the piston rods on oscillation of said arm thru the arc spacing said rods, tubes leading from said cylinders to a point in the path of travel of the jet nozzle on said vertical axis, said tubes having their open outer ends positioned to receive water discharged from said nozzle at the respective ends of its horizontal path of movement, whereby to actuate the respective piston rods in one direction and thereby cause rotation of said jet nozzle about its means of support, and means to return each said piston to its original position.

2. In a sprinkler, a supply pipe, a tubular

arm mounted to rotate on a vertical axis on said supply pipe and having communication with the latter, an angularly disposed jet nozzle carried by said tubular arm and mounted for limited rotary movement thereon, a pair of cylinders adjustably mounted on the supply pipe, pistons arranged for operation within said cylinders, piston rods projecting from said pistons, an arm depending from the rotatably mounted tubular arm in position to engage the piston rods on oscillation of said arm thru the arc spacing said rods, tubes leading from said cylinders to a point in the path of travel of the jet nozzle on said vertical axis, said tubes having their open outer ends positioned to receive water discharged from said nozzle at the respective ends of its horizontal path of movement, whereby to actuate the respective piston rods in one direction and thereby cause rotation of said jet nozzle about its means of support, means to return each said piston to its original position, and an auxiliary sprinkling member mounted for rotary movement upon said tubular arm on the opposite side of its axis from said jet nozzle.

3. In a sprinkler, a supply pipe, a tubular arm mounted to rotate on a vertical axis on said supply pipe and having communication with the latter, an angularly disposed jet nozzle carried by said tubular arm and mounted for limited rotary movement thereon, a pair of cylinders adjustably mounted on the supply pipe, pistons arranged for operation within said cylinders, piston rods projecting from said pistons, an arm depending from the rotatably mounted tubular arm in position to engage the piston rods on oscillation of said arm thru the arc spacing said rods, tubes leading from said cylinders to a point in the path of travel of the jet nozzle on said vertical axis, said tubes having their open outer ends positioned to receive water discharged from said nozzle at the respective ends of its horizontal path of movement, whereby to actuate the respective piston rods in one direction and thereby cause rotation of said jet nozzle about its means of support, means to return each said piston to its original position, and means for limiting the rotary movement of the tubular arm on both directions.

In testimony whereof I affix my signature.

FINGAL C. ORR.