April 23, 1929. F. C. ORR 1,710,107

ROTARY SPRINKLER

Filed June 3, 1927 2 Sheets-Sheet 1

Fig. 1.

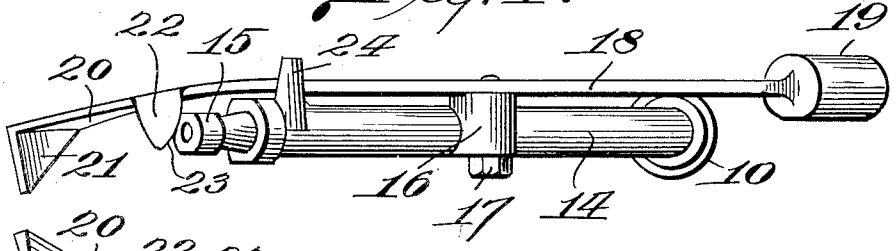


Fig. 2.

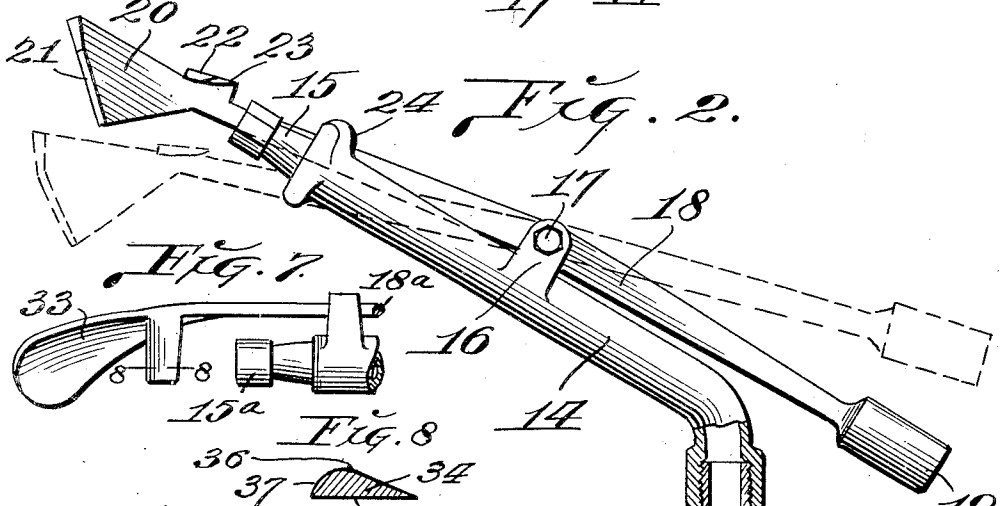


Fig. 7.

Fig. 8

Fig. 3.

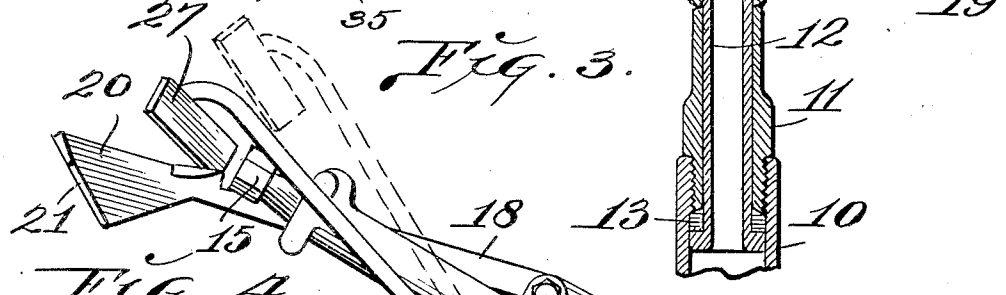


Fig. 4.

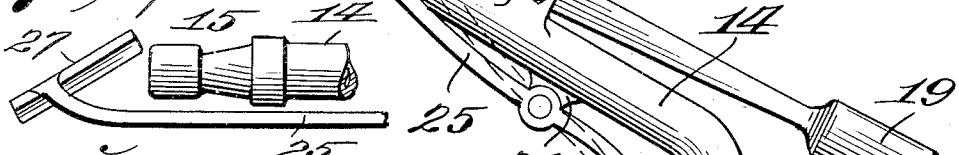


Fig. 5.

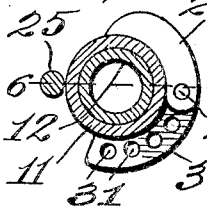
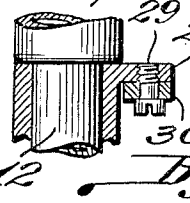


Fig. 6.



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April 23, 1929. F. C. ORR 1,710,107

ROTARY SPRINKLER

Filed June 3, 1927 2 Sheets-Sheet 2

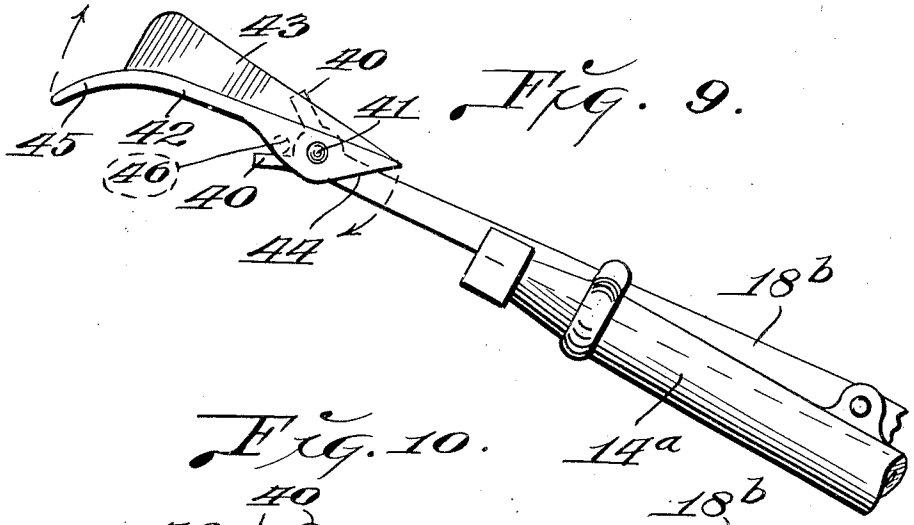
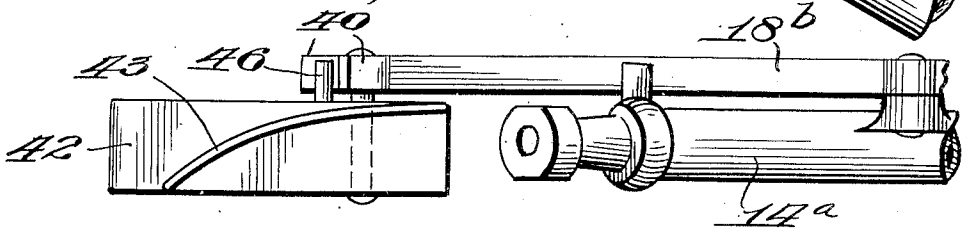


Fig. 9.

Fig. 10.



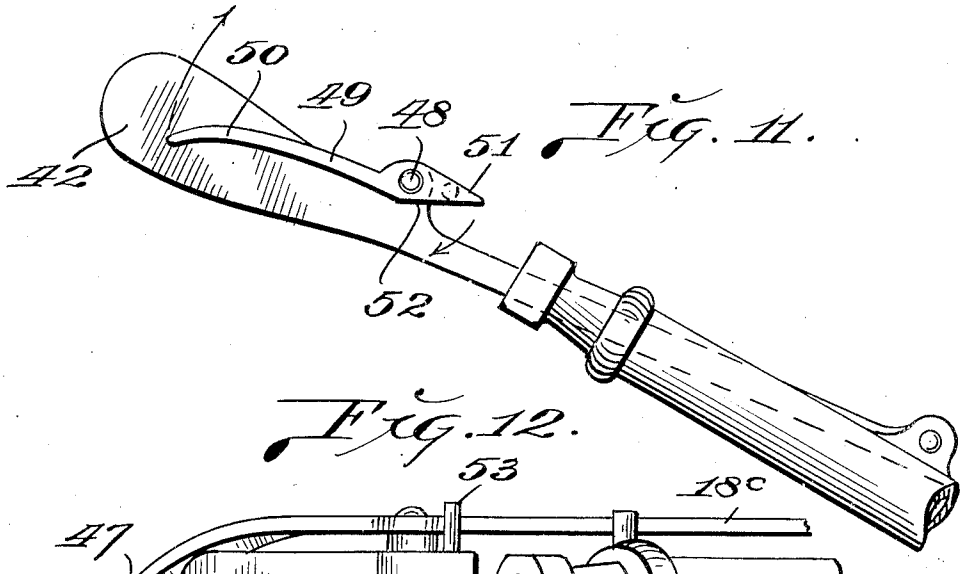
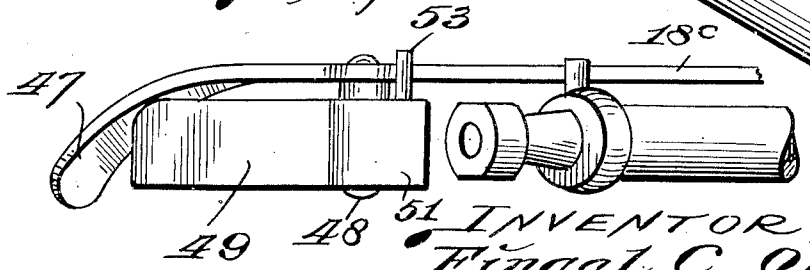


Fig. 11.

Fig. 12.



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Patented Apr. 23, 1929. 1,710,107

UNITED STATES PATENT OFFICE.

FINGAL C. ORR, OF LOS ANGELES, CALIFORNIA.

ROTARY SPRINKLER.

Application filed June 3, 1927. Serial No. 196,208.

My invention relates to a sprinkler or water distributing device of the rotary arm type, such as is disclosed in my copending application for U. S. Letters Patent filed November 18, 1926, Serial No. 149,068, the principal objects of my present invention being to generally improve upon and simplify the construction of the sprinkling device disclosed in my aforesaid patent application, as well as other existing forms of rotary sprinklers, and to provide simple and efficient means whereby the rotary arm and the jet nozzle carried thereby will rotate or move with intermittent movement as distinguished from a continuous rotary movement.

Further objects of my invention are to provide a sprinkling device of the character referred to that may be advantageously used on lawns, golf courses, orchards, gardens, or wherever a thorough distribution of water is desired over a relatively large area, and to provide a sprinkler wherein the forces developed by the impingement of a jet of water against inclined surfaces is utilized for imparting to the rotary arm and its jet nozzle the desired intermittent or step by step movement.

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 side elevational view of the sprinkling device with the rotary bearing thereof in vertical section.

Fig. 3 is an elevational view of a modified form of the sprinkler.

Fig. 4 is a plan view of the nozzle at the end of the rotating arm in the modified form of the sprinkler illustrated in Fig. 3 and showing a portion of one of the vibrating arms that is associated with the rotary arm and also showing an inclined plate that is carried by the forward end of said vibrating arm.

Fig. 5 is a horizontal section taken on the line 5—5 of Fig. 3.

Fig. 6 is a section taken on the line 6—6 of Fig. 5.

Fig. 7 is a plan view of a modified form of that portion of the sprinkler that is engaged by the jet of water that issues from the nozzle.

Fig. 8 is an enlarged cross section taken on the line 8—8 of Fig. 7.

Fig. 9 is a side elevational view of a modified form of my improved sprinkler.

Fig. 10 is a plan view of the modification illustrated in Fig. 9.

Fig. 11 is an elevational view of a further modified form of the sprinkler.

Fig. 12 is a plan view of the modification illustrated in Fig. 11.

Referring by numerals to the accompanying drawings, 10 designates an upright pipe that is connected to a source of water under pressure and seated in and projecting upwardly from said pipe 10, is a short tubular bearing member 11 within which is journaled for rotation a tubular member 12. A suitable packing ring or gasket 13 is arranged between the lower end of the tubular members 11 and 12 and secured to the upper end of the rotating tubular member 12, is the lower end of an upwardly and outwardly projecting tubular arm 14. The greater portion of this tubular arm occupies an angle of approximately 15° or 20° relative to a horizontal plane and seated in the outer upper end of said tubular arm, is a jet nozzle 15.

Formed on the intermediate portion of arm 14, is a lug 16 in which is journaled a horizontally disposed pin or bolt 17, one end of which is secured to an arm 18 that lies approximately parallel with the tubular arm 14. The lower rear end of this swinging arm 18 carries a counterbalancing weight 19.

The forward portion of arm 18 terminates adjacent to the forward end of the jet nozzle 15 and formed integral with or fixed to the forward end of arm 18 is a substantially triangular plate 20 that is slightly inclined with respect to a vertical plane and said plate is also inclined with respect to the plane occupied by arm 18.

Thus the outer portion of plate 20 lies in the path of travel of the jet of water that issues from nozzle 15 and formed integral with the forward portion of the inclined plate 20, is a substantially triangular plate 21 that is disposed substantially at right angles to said plate 20, and which occupies an inclined position relative to a vertical plane.

Formed integral with the upper edge of

the rear portion of plate 20, is a laterally projecting plate 22 that is approximately triangular in shape and which is slightly inclined with respect to the plane occupied by the straight upper edge of said plate 20. The forward edge 23 of the laterally projecting inclined plate 22, or that edge that is immediately adjacent to the jet nozzle 15, is relatively thin so that it will offer very little resistance to the jet of water that issues from nozzle 15.

Projecting laterally from the forward end of tubular member 16, is a pin 24 that functions as a stop to limit the upward swinging movement of the forward portion of arm 18.

The weight of counterbalancing member 19 is such that, under normal conditions, the forward portion of arm 18 and parts carried thereby are at their upper limit of movement with arm 18 bearing against stop 24 and with the parts in such position, the laterally projecting member 23 occupies a position just above the line of travel of a jet of water issuing from nozzle 15 and the inclined plates 20 and 21 lie in the path of travel of the jet of water.

While the sprinkler is in operation, the jet of water issuing from the nozzle 15 strikes against the inclined plate 20 a fraction of a second before it strikes against the inclined plate 21 and the pressure of the jet on said inclined plate 20 exerts lateral thrust which rotates the arm 14 to a slight degree and immediately after this action, the impact of the jet on the inclined plate 21 will exert downward pressure thereupon and consequently move the forward end of arm 18 downwardly and correspondingly elevate the counterbalanced rear end of said arm.

After the pivoted arm has thus been swung upon its axis, which is the pin or bolt 17, the weight of member 19 will cause the forward end of the arm to move upward and as the relatively narrow forward edge 23 of plate 22 enters the jet of water issuing from nozzle 15, the pressure of the water on the curved or inclined under face of said plate 22 will tend to move said plate upward with a quick movement, with the result that the inclined plates 20 and 21 are brought into position where they are successively re-engaged by the jet of water and following such re-engagement, the arm 16 will be rotated to a very slight degree, after which the arm 18 will be swung on its axis and, during the time the plate 21 is out of the path of travel of the jet of water issuing from nozzle 15, the rotary arm will remain stationary and the jet of water issuing from nozzle 15 will flow unrestricted until the pivoted arm swings back to normal position under the influence of counterbalancing weight 19.

The form of sprinkler illustrated in Figs. 3 to 6, inclusive, is designed to operate with a relatively slow intermittent or step by step movement throughout a portion of the complete rotation of the tubular arm 14 and to move quickly through the remaining portion of the complete revolution. Such arrangement is particularly desirable where a semi-circular portion or area is to be sprinkled immediately adjacent to a fence or boundary line.

In this form of sprinkler, an arm 25 is arranged on the opposite side of tubular member 14 from the swinging arm 18 and said arm 25 is pivoted on a lug 26 that depends from tubular arm 14. The forward end of arm 25 is curved laterally to a slight degree and carried thereby is an inclined plate 27.

The lower end of arm 25 terminates at a point immediately adjacent to the upper end of the tubular bearing member 11. Formed integral with the upper portion of bearing member 11, is a horizontally disposed arcuate flange 28 and detachably and adjustably connected thereto by means of a screw 29, is an arcuate plate 30 having a series of aperatures 31, any one of which may receive the set screw 29. This arcuate plate combines with flange 28 to form a cam lobe that is adapted to be engaged by the depending lower end of arm 25 as the tubular member 14 rotates and following the engagement of said arm 25 with the parts 28 and 30, arm 25 is swung on its axis so that the inclined plate 27 is elevated and moved out of the path of travel of the jet of water issuing from nozzle 15.

In the operation of this form of sprinkler, the inclined plate 27, while elevated, is out of the path of travel of the jet of water issuing from nozzle 15 and, under such conditions, the rotary arm 14 will operate as hereinbefore described with a relatively slow intermittent or step by step movement, but as the lower end of arm 25 rides off the end of arcuate member 30, said arm will swing on its pivot so that the inclined plate moves downward into position where it is engaged by the jet of water issuing from nozzle 15 and the pressure following the impingement of the water against the inclined plate will act to quickly rotate the tubular arm 14 until the lower end of arm 25 rides onto the rounded end of flange 28, whereupon plate 27 will be elevated out of the path of travel of the jet of water issuing from the nozzle 15, whereupon the rotary arm will resume its slow or step by step intermittent movement.

In the modified form illustrated in Figs. 7 and 8, the forward end of the vertically swinging arm 18^a terminates in a curved plate 33 that is shaped somewhat similar to the blade of a propeller wheel and this curved blade or plate is positioned so that when it is at its upper limit of movement, it is directly in the path of travel of the jet of water issuing from nozzle 15^a.

Formed integral with the arm 18[a] at the rear or inner end of the curved blade 33, is a laterally projecting lug 34 having a substantially flat under face 35 and a curved or rounded upper face 36, the rear portion of the latter being curved abruptly downward as designated by 37.

Where this form of device is used, the force of the jet of water from the nozzle striking curved plate 33 forces the same downward with a quick movement and, due to the curvature of said plate and the force of impingement of the jet thereon, said swinging arm and the tubular arm will be slightly rotated. As the forward end of the swinging arm moves upward, the curved upper face 36 of lug 34 will first engage the lower portion of the jet of water issuing from the nozzle, but the vacuum produced immediately adjacent the downwardly curved rear end 37 of the lug 34 will tend to draw said lug upwardly into the jet of water until the sharp forward edge of lug 34 enters said jet, whereupon the force of impingement of the jet against the flat under face 35 of the lug will quickly move the forward end of the swinging arm upward to its limit of movement, whereupon the full force of the jet impinges against the curved blade 33 to quickly force the same downward, out of the path of travel of said jet.

In the modified construction illustrated in Figs. 9 and 10, the forward end of the vertically swinging arm 18[b] is provided with a pair of spaced stop lugs 40 and mounted to swing vertically on a horizontal axis 41, that is positioned immediately to the rear of and between the stop lugs 40, is a plate 42, that is provided on its upper surface with a longitudinally disposed inclined or curved web 43. Plate 42 occupies a position immediately in front of the jet nozzle carried by the sprinkler arm 14[a] and the forward end of said plate 42 is adjacent to said nozzle, is provided on its under side with an inclined face 44. The opposite or rear end of plate 42 is curved downward, as designated by 45. The curved or inclined web 43 on top of plate 42 extends from the forward inner corner of said plate 42 to a point near the outer rear corner of said plate and the said web gradually increases in height toward its end.

Projecting laterally from plate 42, immediately to the rear of the axis 41, is a pin 46, that occupies a position between stop lugs 40.

In the operation of this form of sprinkler, the under portion of the jet of water issuing from the nozzle, strikes against the inclined face 44 and a fraction of a second later the lower portion of the water jet strikes against the down turned forward end 45 of plate 40, thereby swinging the plate on its axis so that the pointed rear end of the plate passes downward through the jet of water and the force of the jet is now directed against the front face of the curved web 43, thereby imparting pressure to said web and to the forward end of the arm 18[b] and such pressure causes the sprinkler arm to rotate a slight distance on its vertical axis and during such rotation, the force of the jet of water on the curved web 43 and on the upper surface of plate 42, forces the forward end of swinging arm 18[b] downwardly out of the path of travel of the jet and as soon as this action takes place, the sprinkler arm 14[a] will cease to rotate.

Upon the return of arm 18[b] to its normal position, as a result of the gravity of the weight on the rear end of the swinging arm, the pointed forward end of plate 42 will cut through the jet of water issuing from the nozzle and a recurrence of the operations just set forth will take place and the sprinkler arm will again be rotated for a short distance so that the jet of water issuing from the nozzle will fall on to a different portion of the ground. The pin 46 cooperating with the lugs 40 limits the vertical swinging movement of plate 42.

In the modified construction illustrated in Figs. 11 and 12, the forward end of the vertically swinging arm 18[c] terminates in a laterally curved portion 47 which, when the swinging arm is at rest, occupies a position a short distance in front of the forward end of the jet nozzle carried by the sprinkler arm. Mounted to swing vertically upon a horizontal axis 48 on the forward portion of arm 18[c], is a plate 49, having a downwardly curved rear end 50, the inner corner of which, normally rests on the inner face of curved member 47.

The forward end of plate 49 terminates in a wedge-shaped member 51, having an inclined under face 52 and projecting laterally from the wedge-shaped portion 51, is a pin 53 that is adapted, when swung downwardly, to engage on top of arm 18[c] and serves to limit the upward swinging movement of the forward portion of plate 49.

The operation of this modified form of the device is very similar to that of the device illustrated in Figs. 9 and 10. The jet of water issuing from the nozzle first strikes the inclined under face 52 of plate 49 and then strikes the inner face of the curved member 47, thus causing the forward end of the swinging arm to move laterally a short distance, thereby imparting rotary movement to the sprinkler arm and at the same time causing the forward end of the swinging arm 18[c] to move downward out of the path of travel of the jet of water and upon the return of the swinging arm to its normal position, the operations just described are repeated.

Thus it will be seen that I have provided

a rotary water sprinkler that is relatively simple in construction, inexpensive of manufacture, very effective in performing the functions for which it is intended and the operation of which sprinkler is wholly dependent upon forces developed by the flow of water under pressure through the sprinkler and its nozzle.

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 spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. A rotary sprinkler comprising a jet nozzle mounted to rotate on a vertical axis and arranged to discharge a jet of water at an angle relative to its axis of rotation, an arm pivotally mounted on said nozzle and adapted to swing in a vertical plane, the forward end of which arm is curved laterally, and an inclined plate carried by and projecting at right angles from the forward end of the curved forward portion of said arm and normally occupying a position in the path of travel of the jet of water issuing from said nozzle.

2. A rotary sprinkler comprising a jet nozzle mounted to rotate on a vertical axis and arranged to discharge a jet of water at an angle relative to its axis of rotation, an arm pivotally mounted on said nozzle and adapted to swing in a vertical plane, a pair of inclined plates carried by the forward end of said arm and normally occupying positions in the path of travel of the jet of water issuing from said nozzle and which inclined plates are spaced apart lengthwise of said swinging arm.

3. A rotary sprinkler comprising a jet nozzle mounted to rotate on a vertical axis and arranged to discharge a jet of water at an angle relative to its axis of rotation, an arm pivotally mounted on said nozzle and adapted to swing in a vertical plane, a pair of inclined plates arranged at right angles to each other on the forward end of said arm and normally occupying positions in the path of travel of the jet of water issuing from said nozzle and a third inclined plate carried by said arm to the rear of said pair of plates and normally occupying a position above the path of travel of the jet of water issuing from said nozzle.

4. A rotary sprinkler comprising a jet nozzle mounted to rotate on a vertical axis and arranged to discharge a jet of water at an angle relative to its axis of rotation, an arm pivotally mounted on said nozzle and adapted to swing in a vertical plane and the forward end of which arm terminates in a laterally curved plate and a substantially triangular plate projecting laterally at right angles from the forward end of said laterally curved plate which is inclined with respect to a vertical plane and with respect to the axis of the jet of water that issues from said nozzle, both of which plates are normally in the path of travel of the jet of water that issues from the nozzle.

5. A rotary sprinkler comprising a jet nozzle mounted to rotate on a vertical axis and arranged to discharge a jet of water at an angle relative to its axis of rotation, an arm pivotally mounted on said nozzle and adapted to swing in a vertical plane, the forward end of which arm terminates in a laterally curved plate that is inclined with respect to a vertical plane and with respect to the axis of the jet of water that issues from said nozzle and a second inclined plate projecting at right angles from the forward portion of the plate at the forward end of said arm, both of which plates are normally in the path of travel of the jet of water that issues from the nozzle.

6. A rotary sprinkler comprising a jet nozzle mounted to rotate on a vertical axis and arranged to discharge a jet of water at an angle relative to its axis of rotation, an arm pivotally mounted on said nozzle and adapted to swing in a vertical plane, the forward end of which arm terminates in a laterally curved plate that is inclined with respect to a vertical plane and with respect to the axis of the jet of water that issues from said nozzle, a second inclined plate projecting at right angles from the forward portion of the plate at the forward end of said arm, both of which inclined plates are normally in the path of travel of the jet of water that issues from the nozzle and a third inclined plate carried by the forward portion of said arm and normally occupying a position above the path of travel of the jet of water issuing from said nozzle.

7. In a rotary sprinkler comprising a jet nozzle mounted to rotate on a vertical axis and arranged to discharge a jet of water at an angle relative to its axis of rotation, an arm pivoted on said nozzle and adapted to swing in a vertical plane, a weight carried by the rear end of said arm, a plate on the forward end of said arm, which plate is inclined relative to a vertical plane and relative to the axis of the jet of water issuing from said nozzle, an inclined plate projecting at right angles from the forward portion of the first mentioned plate, both of which plates are normally in the path of travel of the body of water that issues from the nozzle and a third plate projecting laterally from the forward portion of said arm to the rear of and above the pair of inclined plates and normally positioned above the path of travel of the jet of water issuing from said nozzle.

8. In a rotary sprinkler, a jet nozzle

mounted to rotate on a vertical axis and arranged to discharge a jet of water at an angle relative to its axis of rotation, an arm pivoted on said nozzle and adapted to swing in a vertical plane, a plate on the forward end of said arm, which plate is adapted to be engaged by the jet of water issuing from the nozzle and a lug projecting laterally from said swinging arm to the rear of and above said plate, which lug is adapted to be impinged by the jet of water issuing from the nozzle and cause the forward end of the arm to swing to its upper limit of movement.

9. In a rotary sprinkler, a jet nozzle mounted to rotate on a vertical axis and arranged to discharge a jet of water at an angle relative to its axis of rotation, an arm pivoted on said nozzle and adapted to swing in a vertical plane, a plate on the forward end of said arm, which plate is adapted to be engaged by the jet of water issuing from the nozzle and a plate projecting laterally from said arm to the rear of the plate on the forward end of said arm for causing the forward end of the latter to swing to its upper limit of movement.

In testimony whereof I affix my signature.

FINGAL C. ORR.