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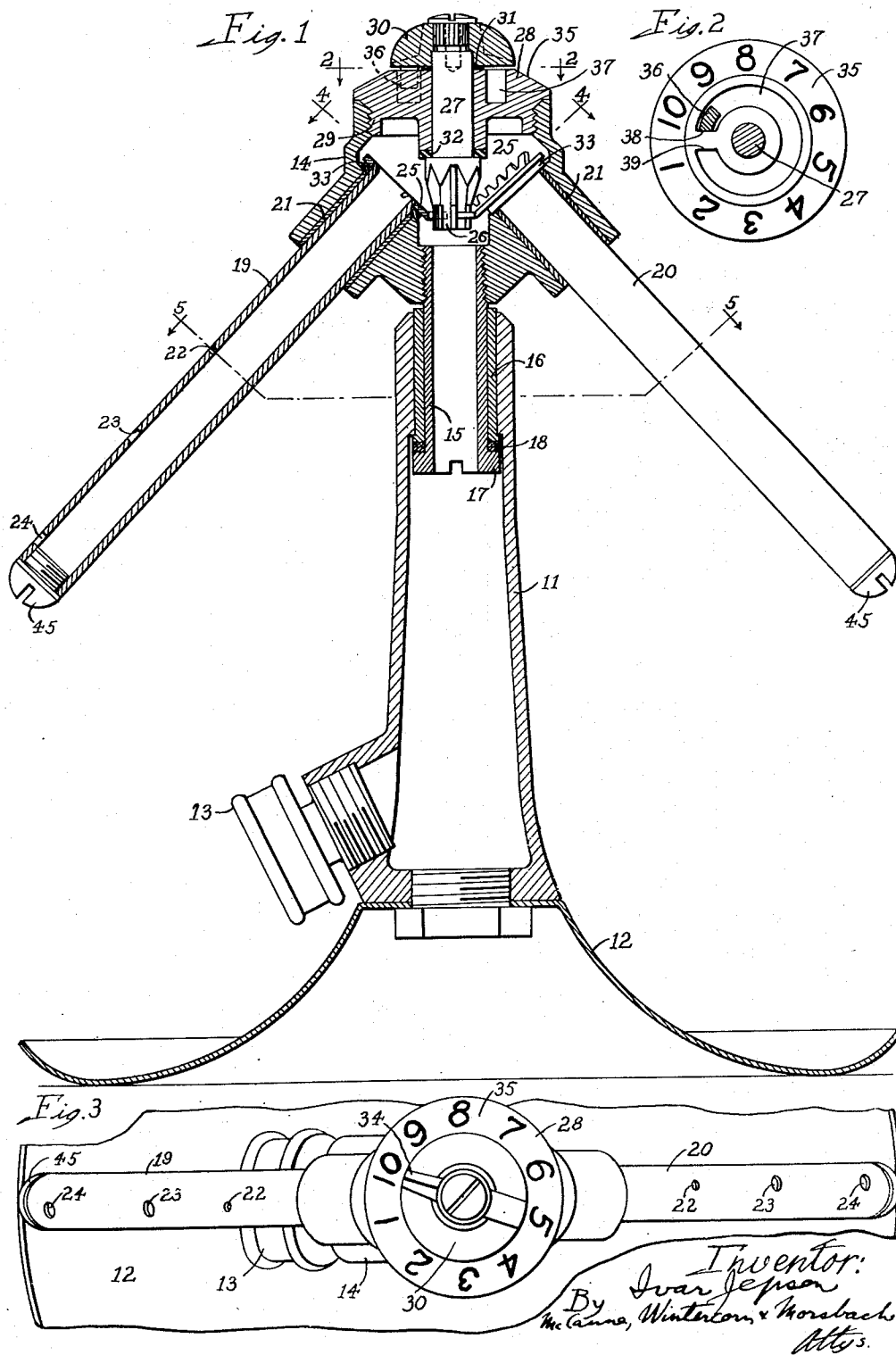
I. JEPSON

2,335,281

SPRINKLER

Filed Aug. 30, 1940

2 Sheets-Sheet 1



Nov. 30, 1943.

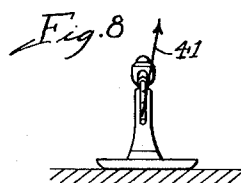
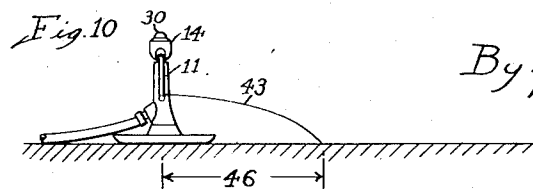
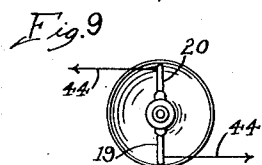
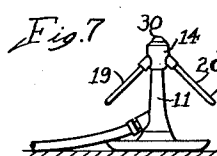
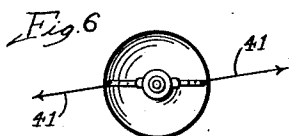
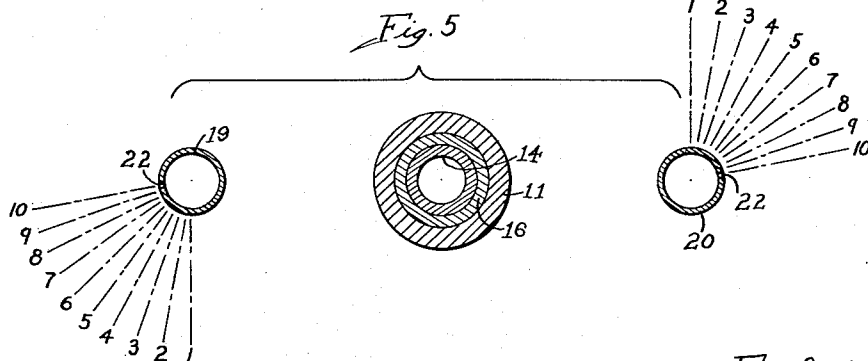
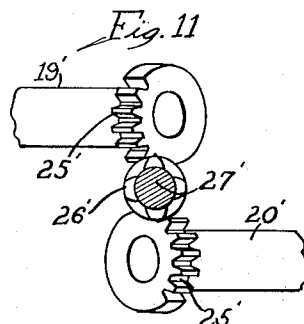
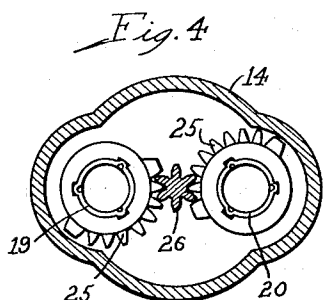
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SPRINKLER

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,335,281

SPRINKLER

Ivar Jepson, Chicago, Ill., assignor to Chicago Flexible Shaft Company, Chicago, Ill., a corporation of Illinois

Application August 30, 1940, Serial No. 354,797

15 Claims. (Cl. 299—69)

This invention relates to sprinklers particularly adapted for watering lawns, gardens, golf courses, and the like; but my invention in its broader concept is applicable to sprinklers for all purposes.

Heretofore, in the rotary reaction type of sprinklers it was customary to provide a plurality of discharge nozzles or jet delivery devices arranged in spaced relation on a rotary head, usually in substantially balanced relation at opposite sides of the axis about which the nozzles revolve, and to so construct the nozzles that they were individually adjustable to change the character of the watering delivery according to the particular nature of the nozzle structures. The making of adjustments of this kind was troublesome and difficult and usually required many individual settings and trials to obtain the optimum delivery within the capabilities of the particular sprinkler.

The difficulties are overcome by my invention which has for one of its objects the provision of a novel sprinkler structure whereby a plurality of nozzles may be adjusted from one point, that is, by a single adjustment, to effect changes in the character of the multiple jet deliveries from the several nozzles.

My invention further aims to provide an improved means for sprinkling or distributing water so that a small or a large area may be covered by the joint action of a plurality of rotating nozzles controlled in response to the setting of a single adjustment member.

Another object of my invention is to provide an improved nozzle structure having a plurality of adjustable nozzles controlled by means of a dial and indicator whereby instantaneous adjustments may be made in accordance with the dial settings.

Another object is to provide an improved sprinkler characterized by the provision of a rotary water supplying head having a plurality of tubular nozzles each mounted for rotative adjustments about a longitudinal axis arranged to extend preferably downwardly and away from the axis about which the head rotates so as to effect a unique and beneficial distribution of water over small or large areas, according to the settings of the nozzles rotatively about their respective axes.

Another object of my invention is to provide an improved sprinkler having a novel means and method of changing the adjustment of the nozzle deliveries so that a large or a small area may be covered, as required, and whereby the adjust-

ment for this purpose is made from a single point to change the angle of nozzle elevations and to change relative speed of rotation of the sprinkler head.

5 Another object is to provide a sprinkler of the rotary reaction type having a novel principle of operation whereby distribution of water over a relatively wide range, including small and large areas, may be obtained.

10 Another object is to provide a sprinkler of the character described constructed in such simple and novel manner as to enable manufacture thereof at a comparatively low cost and to serve in a satisfactory manner the purposes intended.

15 Other objects and attendant advantages will be appreciated by those skilled in this art as the invention becomes better understood by reference to the following description when considered in connection with the accompanying drawings, in which—

Figure 1 is a vertical section through a lawn sprinkler embodying my invention with one of the tubular nozzles shown in elevation;

25 Fig. 2 is a detail section taken substantially on the section line 2—2 of Fig. 1;

Fig. 3 is a fragmentary plan view of the sprinkler;

Fig. 4 is a section taken substantially on the section line 4—4 of Fig. 1;

30 Fig. 5 is a diagrammatic view with the parts in section as taken substantially on the section line 5—5 of Fig. 1;

Figs. 6, 7 and 8 are plan and side views of the sprinkler on a reduced scale with the nozzles set for long range delivery;

35 Figs. 9 and 10 are similar views with the nozzles set for short range delivery; and

Fig. 11 is a fragmentary view showing a modified arrangement of the tubular nozzles.

40 The drawings show my invention as embodied in a sprinkler especially designed for sprinkling lawns, but it should be understood that my invention is capable of application in other forms, some of which will be here described. Figure 1 shows in full size an embodiment adapted for covering areas up to approximately 50 feet in diameter. In this form a hollow upright designated generally by 11 supported on a suitable base 12 is equipped with a conventional hose coupling 13 by means of which water under pressure is supplied to the interior of the support. On the upper end of the support 11 a nozzle-carrying head designated generally by 14 is mounted for rotation about a vertical axis. In this instance the head is hollow and threaded

onto the upper end of a hollow bearing stud 15 which is journaled in a bearing bushing 16 fixed in the support. The bearing stud has an enlarged lower end 17 which when the water pressure is on seats against a combined packing and thrust washer 18. Water is delivered under pressure through the bearing stud into the hollow head and from there to the nozzles which are carried on the head.

My invention contemplates the provision of a plurality of separate nozzles mounted on the head, of a type adapted for causing rotation of the head by reaction forces of the water jet deliveries and adapted to be individually adjustable for changing the character of the jet deliveries. In the present embodiment this adjustment is made by changing the angle of the nozzle elevation with respect to the horizontal and at the same time adjusting the direction of delivery angularly about each nozzle axis. To this end I have provided tubular nozzles each mounted on the head with its longitudinal axis in acute angular relation to the vertical axis about which the head rotates and each adapted for rotative movement about its said longitudinal axis to change the character of its jet deliveries. This angular relation is preferably with the nozzle axes inclined downwardly from the vertical axis about which the nozzles revolve, but the nozzle axes may, instead, be inclined upwardly and outwardly from said vertical axis, as noted herein-after. In a sprinkler for the purpose here shown I prefer to employ a pair of tubular nozzles 19 and 20 each supported in a bearing bushing 21 in the head and each having a plurality of discharge orifices 22, 23 and 24 spaced apart lengthwise thereof. In this embodiment the nozzles are fixed at an acute angle of 43° with respect to the vertical axis about which they revolve. The outer end of each nozzle is closed by a screw cap 45 which is removable for cleaning purposes. To the inner end of each nozzle is fixed a gear segment 25. These gear segments mesh with a pinion 26 fixed to the lower end of a stud 27 which is mounted for rotative movement in a cover 28 which in turn has a portion 29 threaded into the open top end of the head 14. An indicator knob 30 suitably fastened to the upper end of the stud 27 provides a manually operable means for imparting rotative movement to the stud and pinion and consequently imparting simultaneous rotative movement to the nozzles. A spring washer 31 interposed between the knob 30 and the top of the cover 28 normally holds the pinion shoulder seated against a packing washer 32, thereby providing an effective water seal against leakage and keeping these parts free from unnecessary play. A similar packing washer 33 is interposed between the hub of each segment gear 25 and the head. The knob 30 has an indicator finger or pointer 34 (Fig. 3) which coacts with a dial 35 formed on the top of the cover 28. The dial has indicia thereon serving to show relatively the different nozzle settings, in this instance comprising the numerals 1 to 10, inclusive. The indicia may, however, be in terms for feet, such as from 5 to 50 feet graduations, conforming substantially with the diameters of the areas covered at the particular settings. The knob 30 has a limited rotative adjustment back and forth between the No. 1 and No. 10 positions, determined by a stop lug 36 on the underside of the knob movable in a groove 37 in the top of the cover and limited at the ends of

its movement by the abutments 38 and 39 at the ends of said groove.

From the foregoing it will be apparent that I have provided a unique nozzle structure characterized by a plurality of individual jet delivery nozzles together with a unique means for simultaneously adjusting the nozzles from a single point. In the present form of my invention it will be observed that the jet orifices 22, 23 and 24 for each nozzle are arranged substantially in a common plane lengthwise of the tube and that the orifice 22 nearest to the upper end is smaller than the orifices 23 and 24. It will now be observed that when the parts are in the No. 10 position shown in Figs. 1 to 8, inclusive, the jet orifices are in the uppermost position with respect to a vertical plane but directed slightly at an angle to one side thereof with the result that jets of water will be discharged in a relatively high projection substantially as indicated by 40 (Fig. 7). By reason of the slight tilting of the jets away from the vertical as shown by the lines 41 in Figs. 6 and 8, the head will be caused to rotate in a clockwise direction viewing Fig. 6. In view of the slight angle of these jets with respect to the vertical the reaction effect of the water will cause the head to revolve at the slowest rate and the water will be spread over the largest area indicated by the dimension 42, Fig. 7. By adjustment of the knob 30 to any of the lower numbered positions the tubular nozzles will be rotatively moved to change the angle of the jet delivery elevation, successively lowering the elevation until when the No. 1 position is reached the jet delivery will be approximately in the projection 43, Fig. 10, and at right angles to the longitudinal axes of the nozzles as shown by 44 in Fig. 9. This No. 1 setting results in rotation of the sprinkler head at the highest speed and covers the smallest area, substantially as indicated by 46, Fig. 10. It will also be observed that in the present embodiment the angle of the water streams or jets in relation to the horizontal plane (ground) is changed from approximately 0° in the No. 1 dial setting (Fig. 10) to approximately 40° at the No. 10 dial setting, Fig. 8. Considering this range of adjustment it will be manifest that the driving torque (the reaction force times the distance of the force from the center of rotation) is changed from a maximum at No. 1 dial setting to near 0 at No. 10 setting. This change in the driving torque results in a high speed of rotation at the No. 1 setting and very slow rotation at the No. 10 setting. If the jets could be adjusted to a true vertical delivery the head would not rotate. Because of the angularity of the jet deliveries and their revolution about the center axis, the streams will be broken up and distributed over areas corresponding with the dial settings. Also, the smaller jet openings 22 serve to shorten the inner jet deliveries and to more finely distribute the water over the inner area. In all positions the jets of each nozzle deliver at right angles to the longitudinal axis of the nozzle.

In Fig. 11 I have shown a modified operative connection between the nozzle tubes 19'-20' and the manually operable member 27' to which the control knob is attached. Here, the nozzle tubes are in parallel planes offset from the center of the head and to each tubing is fixed a segmented gear 25' meshing with a worm gear 26' corresponding in function with the pinion 26. The nozzle tubes 19' and 20' are otherwise same

in construction and function as the first described tube nozzles.

In a modification the nozzles 19 and 20 may be arranged to diverge upwardly from the head 14 instead of downwardly, although this arrangement is not as satisfactory because the jet deliveries are apt to interfere one with the other at certain speed settings. Also, the range is slightly restricted because the jets are delivered from the opposite side of the center.

My invention contemplates broadly the provision of a rotary reaction type sprinkler in which the distance or range covered by the delivery from a plurality of nozzles is controlled and adjusted from a single point on the sprinkler. I obtain distance and spray control from a single setting. So far as I am aware this is new in the art of lawn sprinklers. The new results are highly desirable. It will be manifest that quick, easy and accurate adjustments may be made by means of a single control member at a single point, thus avoiding the troubles and uncertainties incidental to the making of adjustments with prior constructions. Also, the character and distribution of the spray are changed by the changes in elevation of the jet deliveries to accommodate small and large areas. The dial control is particularly advantageous because it accurately shows the relative distances and the operator may set or re-set this control without the uncertainties invariably connected with the adjusting of prior lawn sprinklers. Another advantageous feature is the ease with which the nozzles may be cleaned, simply by removing the screw plugs 45 and allowing the water to flow through the nozzle tubes to flush out any sediment.

Another advantage of my invention is that a wide range of delivery is obtained with minimum velocity of the water in relation to the ground at the smaller areas. In the embodiment shown in the drawings the range is from about 5 to 50 feet and the jet deliveries are at such angles as to produce improved reaction effects. This will be apparent when it is considered that with the jet delivery in its upright position it serves to cause rotation of the discharge nozzles at the lowest speed and distribution of the water over the largest area and when in its horizontally disposed position it serves to cause rotation of said nozzles at the highest speed and distribution of the water over the smallest area. In none of these positions is the jet delivery directed downwardly toward the ground. When the adjusting means is set for the smallest area, which is the most severe condition, the nozzles travel at such speed as to produce practically zero water velocity at the point of discharge with relation to the ground.

While I have shown several embodiments of my invention, it will be understood that I do not wish to be limited thereto since many modifications may be made, and I therefore contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

I claim:

1. A sprinkler of the rotary reaction type having nozzles revolving about a vertical axis, each nozzle having a jet delivery adjustable about an axis inclined downwardly and away from said vertical axis with the jet delivery substantially at right angles to said inclined axis to change the elevation of delivery to cover small and large areas, and a control knob connected to the

nozzles and operable through such connection for adjusting each jet delivery about its respective inclined axis to simultaneously change the elevation of the respective jet deliveries.

2. A sprinkler having a water supply head rotatable about a vertical axis, jet delivery means on the head adjustable for changing the elevation of the jet delivery to cover relatively small and large areas, a dial member on the head coaxial with said axis and having circumferentially spaced indicia indicating different areas of delivery, an indicator member in conjunction with said dial member, one of said members being manually adjustable about said axis to a selective setting indicating any of said areas, and means connecting said manually adjustable member to said jet adjusting means and operable for adjusting the latter to change the elevation of the jet delivery in accordance with said setting.

3. A lawn sprinkler having a water supply head rotatable about a vertical axis, means on the head for delivering jets of water from opposite sides of said axis and for causing rotation of the head by reason of the reaction effect of the jet deliveries, means for changing the elevation angle of each jet delivery, and a dial-indicator control mounted on the head, said control having a manually operable control member connected to said jet adjusting means for operating the same to effect said changes in elevation angles of the jet deliveries, and said control having indicia showing relatively the areas covered by the jet deliveries at the different settings of said control member.

4. A sprinkler having a tubular nozzle mounted to revolve about a vertical axis and arranged with its longitudinal axis in acute angle relation to said vertical axis, the nozzle having discharge orifices spaced lengthwise of its longitudinal axis and discharging substantially at right angles to said axis, and means for adjusting the nozzle rotatively about its longitudinal axis to change the direction of delivery of said orifices angularly about said longitudinal axis while maintaining said delivery in said right angle relation to said longitudinal axis to effect different ranges of delivery covering small and large areas, the nozzle adjusting means comprising a gear segment on the tubular nozzle, a range indicator having gear teeth meshing with said segment and being operable to adjust the setting of the nozzle, and indicia coacting with said indicator to show the relative range of delivery for each setting.

5. A sprinkler comprising a hollow upright support, means for supplying water under pressure to the interior of the support, a hollow bearing stud mounted in the upper end of the support for rotation about a vertical axis, a hollow open top head fixed to the upper end of the bearing stud, a plurality of tubular nozzles mounted in the head each for rotative movement about an axis angular with respect to said vertical axis and each having discharge orifices spaced longitudinally of its said axis, a cover enclosing the open top of the head, a pinion disposed within the hollow head and mounted on the cover for rotative movement, a gear segment fixed to the inner end of each tubular nozzle and meshing with said pinion, and means accessible from the exterior of the cover for rotatively adjusting said pinion.

6. A sprinkler as set forth in claim 5, in which said adjusting means comprises a knob having an indicator, and indicia on the cover in cooperative relation with the indicator for designating dif-

ferent delivery ranges according to the setting of the indicator.

7. A lawn sprinkler of the rotary reaction type having downwardly diverging tubular nozzles each with its longitudinal axis in acute angle relation to a vertical axis about which the nozzle rotates, each nozzle having means for delivering a stream of water approximately at right angles to its longitudinal axis, each said means being rotatively adjustable about the longitudinal axis of its respective tubular nozzle to change the elevation angle of its said stream delivery, and a control member connected to said means and operable from a single point remote from the nozzles for simultaneously adjusting the elevation angle of said stream deliveries.

8. A sprinkler having water distributing means mounted for rotation about a fixed vertical axis and being in approximate dynamic balance, said means including a nozzle having a jet delivery approximately at right angles to an axis in fixed acute angle relation to said vertical axis, the nozzle revolving about said vertical axis by the reaction effect of the jet delivery while maintained in said acute angle relation with said vertical axis, and means for adjusting said jet delivery to different positions in an arc about said acute angle axis while maintaining the jet delivery in said right angle relation to said acute angle axis, said adjustments being confined to an arc at the lower limit of which the jet delivery is approximately horizontal and at the upper limit it is short of the vertical.

9. A sprinkler having jet delivery means adjustable to deliver a stream of water at any of a number of different arcuately spaced positions in a given plane from approximately a horizontal delivery position to an upright delivery position, said plane being approximately at right angles to a given axis, said axis being in acute angle relation to a given vertical axis, said jet delivery means being mounted to revolve about said vertical axis, the relation between said acute angle axis and said vertical axis being fixed and the relation between said given plane and said acute angle axis being fixed, said jet delivery in its horizontally disposed position serving to cause rotation of said jet delivery means at the highest speed and distribution of the water over the smallest area and serving when in its upright position to cause rotation of said means at the lowest speed and distribution of the water over the largest area, and means for adjusting said jet delivery means to any of said arcuately spaced positions.

10. A sprinkler having a plurality of jet delivery means mounted to revolve about a vertical axis in approximate dynamic balance, each jet delivery means being adjustable to deliver a stream of water at any of a number of different arcuately spaced positions in a given plane from approximately a horizontal delivery position to an upright delivery position short of the vertical, said plane being approximately at right angles to a given axis, said axis being in acute angle relation to said vertical axis, said jet delivery means being mounted to revolve about said vertical axis, the relation between said acute angle axis and said vertical axis being fixed and said relation between said given plane and said acute angle axis being fixed, said jet delivery in its horizontally disposed position serving to cause rotation of said means at the highest speed and distribution of the water over the smallest area and serving when in the upright position to cause

rotation of said means at the lowest speed and distribution of the water over the largest area, and a dial-indicator control having a manually operable control member connected with the adjustable jet delivery means and operable for effecting simultaneous adjustment of the said jet deliveries.

11. A sprinkler of the rotary reaction type having a distributing head rotatable about a vertical axis and having a jet delivery means to deliver a stream of water, said jet delivery being adjustable to any of a number of different positions in a plane disposed at an acute angle with respect to said vertical axis, the jet delivery being adjustable in said plane in an arc limited to approximately 90° between a horizontally disposed delivery position and an upright delivery position, said jet delivery in its horizontally disposed position serving to cause rotation of said jet delivery means at the highest speed and distribution of the water over the smallest area and serving when in its upright position to cause rotation of said means at the lowest speed and distribution of water over the largest area, and means for adjusting said jet delivery means to any of said different positions.

12. In a reaction type sprinkler, a plurality of individual nozzles rotatable about a vertical axis, each nozzle having a jet delivery orifice adjustable to change the delivery range to cover relatively large and small areas according to the adjustment, and a control member connected with the nozzles, respectively, the control member and said connection being constructed and arranged so that the control member is operable to simultaneously set the jet delivery orifices at any of a number of different jet delivery positions to thereby control the delivery range of the sprinkler covering said large and small areas.

13. A sprinkler having a hollow head mounted to rotate about a vertical axis, a plurality of nozzles each mounted on the head with capacity for rotative movement therein about an axis inclined downwardly and away from said vertical axis in acute angle relation therewith and each having means for discharging water in a jet substantially at right angles to its longitudinal axis, said nozzles being supplied by water under pressure from the interior of the head, and means for adjusting the nozzles about their longitudinal axes to change the angular delivery of said jets comprising a manually operable member, a pinion operated by the said member, and a gear segment fixed to each nozzle and meshing with said pinion.

14. A sprinkler having a hollow head mounted to rotate about a vertical axis, a plurality of nozzles each mounted on the head with capacity for rotative movement therein about an axis inclined downwardly and away from said vertical axis in acute angle relation therewith and each having means for discharging water in a jet substantially at right angles to its longitudinal axis, said nozzles being supplied by water under pressure from the interior of the head, and means for adjusting the nozzles about their longitudinal axes to change the angular delivery of said jets comprising an indicator knob mounted on the head in position for manual setting from the exterior thereof, and means operable between said knob and said nozzles for effecting said rotative changes in the jet deliveries.

15. A sprinkler comprising a hollow upright support, means for supplying water under pressure to the interior of the support, a hollow head structure mounted on said upright support for

rotation about a vertical axis and receiving water under pressure from the support, a plurality of tubular nozzles mounted on the head with the longitudinal axis of each nozzle in acute angle relation to said vertical axis, the nozzles and the head structure being in approximate dynamic balance, each nozzle having a part rotatively adjustable about its longitudinal axis, each said nozzle part having means for delivering a jet of water from the nozzle at approximately a right angle to its said longitudinal axis, and means for adjusting the position of the delivery stream from a substantially horizontal delivery to one just

short of the vertical while maintaining said right angle relation between said delivery and said longitudinal axis, said means including a dial-indicator control having a manually operable control member connected with said rotatively adjustable part for operating the same to effect simultaneous adjustments for the respective nozzles, and said control having indicia showing relatively the areas covered by the stream deliveries at the different settings of said control member.

IVAR JEPSON.