Jan. 3, 1950 N. M. RIEGER 2,493,595

ROTATABLE SPRAY HEAD

Filed Dec. 30, 1944

Fig. 1

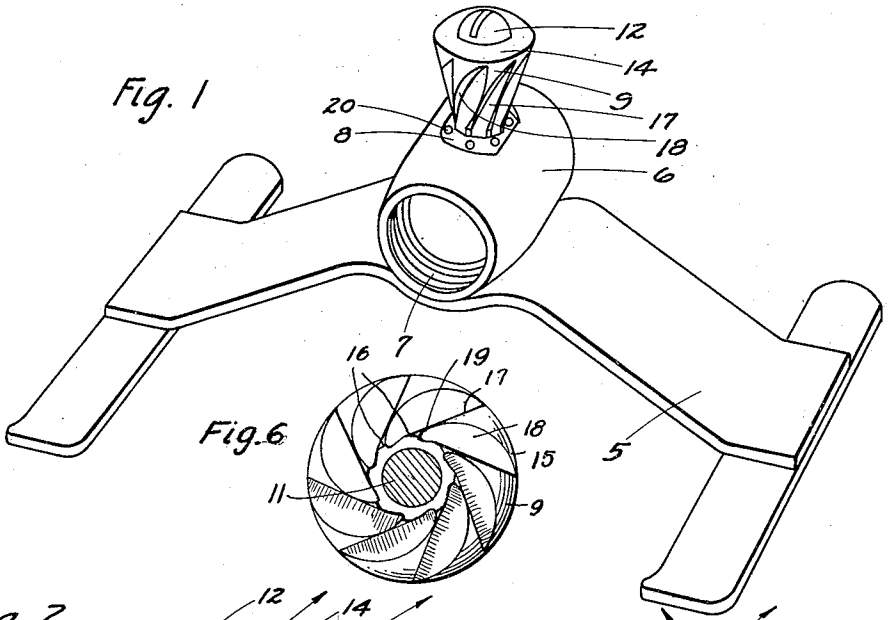


Fig. 6

Fig. 2

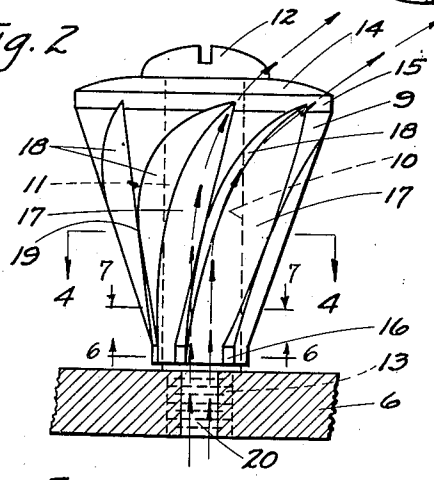


Fig. 3

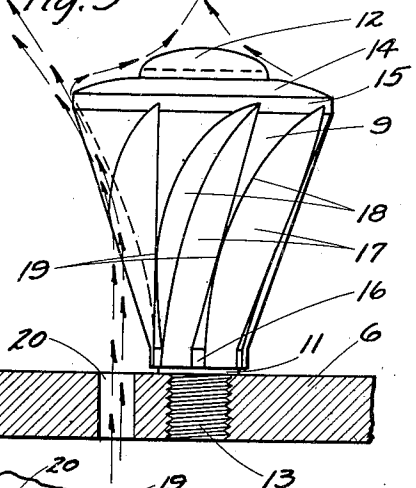


Fig. 5

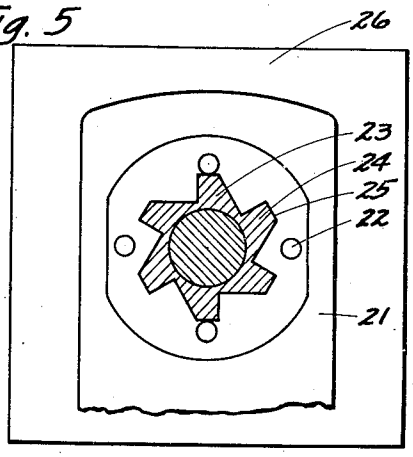


Fig. 4

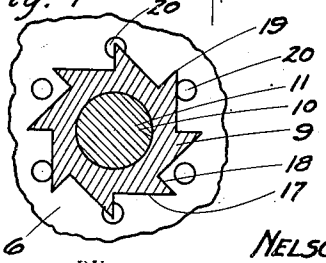
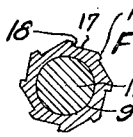


Fig. 7



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ROTATABLE SPRAY HEAD

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4 Claims. (Cl. 299—126)

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This invention relates to a spray head which is designed more particularly for use in a lawn sprinkler, but is not limited to such use.

One object of the invention is to provide a lawn sprinkler of the rotatable type which will distribute the water over a large lawn area surrounding the same and will adequately sprinkle all parts of that area.

A further object of the invention is to provide a spray head of the rotatable type comprising a single movable element which will distribute the water substantially uniformly over a large area surrounding the same.

A further object of the invention is to provide a rotary spray head which will impart to the water discharged therefrom in a predetermined spray pattern.

A further object of the invention is to provide such a spray head which is of simple construction, which can be produced at relatively low cost and which is of a durable character.

Other objects of the invention may appear as the device is described in detail.

In the accompanying drawings Fig. 1 is a perspective view of a lawn sprinkler embodying the invention; Fig. 2 is a side elevation of the spray head with the top wall of the supporting member in section and partly broken away; Fig. 3 is a similar view with the section of the top wall taken on a different line; Fig. 4 is a transverse section taken on the line 4—4 of Fig. 2; Fig. 5 is a section similar to Fig. 4 showing a slight modification of the rotatable element; Fig. 6 is a section taken on the line 6—6 of Fig. 2 looking in the direction of the arrows; and Fig. 7 is a section taken on the line 7—7 of Fig. 2.

In these drawings I have illustrated the invention as embodied in a lawn sprinkler comprising a portable supporting structure 5 on which is mounted a spray head comprising a hollow supporting member or base 6 which constitutes the inlet chamber of the spray head. The base is here shown as a horizontal tubular member having one end closed and the other end open to form an inlet passage, which is provided with internal screw threads 7 to receive the male member of the hose coupling. The upper surface of the base has a flat portion 8 on which a fluted distributing element 9 is mounted for rotation about a vertical axis. The flat portion of the base is provided with a series of ports or jet openings 20 arranged about the rotatable element to discharge jets of water into the flutes and impart rotation to the rotatable element and cause the water to be finely divided and distributed,

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or sprayed, over a relatively large area surrounding the spray head. It is to be understood, however, that the inlet chamber may be of any suitable character and may be mounted on either a movable support or a stationary support, and that the jet openings may be either at an angle to the inlet passage or in alinement therewith.

The rotatable distributing element is preferably substantially in the form of a frustum of a cone supported with its smaller end lowermost and may be connected with the base 5 in any suitable manner which will permit of its free rotation about its longitudinal axis. In the form shown the rotatable element is provided with an axial bore 10 forming a bearing through which extends a cylindrical supporting member or pin 11 having at its upper end a relatively large head 12 to engage the top surface of the rotatable element and having its lower end screw threaded at 13 and mounted in the top wall of the base. The threaded portion of the pin is of a slightly reduced diameter to form on the pin a shoulder to engage the top of the base, and the length of the bearing portion of the pin, between the shoulder and the head, is slightly greater than the length of the bearing in the rotatable element, thus permitting the latter to be lifted out of contact with the base by the impact of the jets and thereby eliminate friction between the rotatable element and the base. The upper end surface of the rotatable element has a flat central portion to engage the head of the pin and a curved or dome shaped outer portion 14, this dome shaped surface being separated from the conical surface by a narrow substantially cylindrical surface 15. It is also preferable that the rotatable element shall have a narrow cylindrical portion at its lower end, as shown at 16.

The conical surface of the rotatable element is provided with a plurality of spiral flutes, each flute extending from the lower end of the element to a point near the upper end thereof. The flutes may take various forms but very satisfactory results have been achieved with flutes of the form here shown. In this form one wall 17 of each flute is flat and extends in a straight line from the lower edge of the conical surface to a point slightly above the upper edge of that surface. The other wall 18 of the flute extends in a curved line from the lower edge of the conical surface and the upper portion thereof converges toward the straight wall until it meets the upper end of the latter near the top of the rotatable element, in the present instance in the upper cylindrical surface 15. The depth of the

flute gradually decreases from an intermediate point toward the upper end of the flute and substantially vanishes at the meeting point of the two walls, so that the flute terminates in a substantially sharp point. An intermediate portion of the curved wall of each flute merges at its outer edge with the straight wall of the next adjacent flute, so as to provide the partition or fillet between the two flutes with a sharp edge portion 19 which is preferably located, at least partially, below the transverse center line of the rotatable element.

The jet openings 20 in the top wall of the base or inlet chamber, are arranged in a circular series about the axis of rotation of the rotatable element and are preferably parallel with that axis. The jet openings are spaced from the lower end of the rotatable element such a distance that each jet will contact the rotatable element a substantial distance above the lower end thereof, as shown by the single jet in Fig. 3. In the present arrangement each jet contacts the sharp edge portions 20 of the successive partitions as the rotatable element rotates and the jet is divided so that separate parts thereof enter the flutes on the opposite sides of the respective partitions. To illustrate this division there is shown in Fig. 2 a single jet contacting and divided by the sharp edge of one of the partitions. The jet openings are different in number from the flutes so that successive jets will be in different relation to the flutes as the rotatable element rotates and at least one jet opening will always be in line with a flute when the rotatable element is stationary. In the construction here shown there are eight flutes and six jet openings spaced equal distances one from the other.

When the rotatable element is at rest and water, or other fluid, under pressure is admitted to the inlet chamber the jets from one or more of the jet openings will enter a flute or flutes and act on the curved wall or walls thereof to rotate the rotatable element in a clockwise direction, when viewed from above. As the element rotates each jet enters the several flutes successively and the rotatable element attains high speed. Each jet is more or less broken up by its contact with the wall of the flute and is further broken up as it leaves the pointed end of the flute, due to the shape of the flute and the speed of rotation of the rotatable element. The pressure of the water and the centrifugal force of the rotatable element causes the water to be distributed in the form of spray over a circular area of large diameter. However, the shape of the spray pattern is determined in part by the character of the outer surfaces of the partitions between adjacent flutes and when those surfaces are of appreciable width throughout their length the pattern of the spray will not be truly circular but will have substantially straight sides corresponding in number to the number of jet openings. By providing each partition with a relatively sharp edge portion at the point of contact of the jet therewith and thus dividing the jet between two flutes as each partition moves past the same a truly circular spray pattern is obtained.

It is sometimes desirable to provide a non-circular spray pattern, more particularly a square pattern, to avoid the overlapping of adjacent sprinkled areas which is essential to complete coverage of the lawn when the spray pattern is circular, and the spray head shown in Fig. 5 will produce a substantially square spray pattern. As there shown, the base 21 is provided with four

jet openings 22 spaced apart substantially equal distances about the axis of the fluted rotatable element 23. The rotatable element 23 is identical with the rotatable element 9 except that the partitions 24 between adjacent flutes are provided with substantially flat outer edge portions, or surfaces, 25 at the points of contact of the jets therewith, instead of the sharp edges of the rotatable element 9. A jet of water contacting the relatively broad outer edge surface 25 of one of the partitions is broken up and spread into an outwardly diverging sheet of spray, the outer edge portion of which is substantially parallel with the position occupied by the edge portion of the partition at the instant of contact. When the partition has moved past the jet opening the jet engages the side walls of the following flute and is distributed over an area of less radial extent than the spray from the outer surface of the partition, so that the straight outer edge of the latter forms a boundary of the sprinkled area. When the spray head is rotating the partitions pass each jet opening in such rapid succession that the straight edged sheet of spray from each jet opening is substantially continuous and with the jet openings arranged as shown the outer edges of the spray sheets from the four jet openings are at approximately right angles one to the other and define a substantially square area. By mounting the spray head on a rectangular portable supporting structure 26 and locating the four jet openings in radial lines intersecting the respective edges of that structure, at the centers thereof, said edges will be substantially parallel with the corresponding edges of the sprayed area, thus enabling the position of that area to be determined in advance.

A very advantageous result accomplished by this spray head is the adequate sprinkling of that portion of the lawn area which is closely adjacent to the spray head. With the usual rotating sprinklers the water is spread in an annular pattern and the area close to the sprinkler receives much less water than do the outer portions of that area. The better distribution of the water by the present spray head is due in part to the flat rear walls of the flutes which permit portions of each jet to escape from the flute at points spaced varying distances from the upper ends of the flutes, and the shorter radii of the arcs through which these portions of the water move, together with the lesser centrifugal force at these lower points, cause these portions of water to be projected shorter distances than the water is projected from the upper ends of the flutes. However, a large part of the water discharged through these short radii arcs is projected a substantial distance from the spray head and additional means are provided to increase the amount of water delivered to those portions of the area which are close to the spray head and thus more adequately sprinkle the same. As has been stated the upper end of the rotatable element is dome shaped and the enlarged head of the pivot pin projects above the center of this dome shaped head. As the water is discharged from the pointed ends of the flutes, close to the outer edge of the dome shaped top, portions thereof are deflected inwardly over the top into contact with the head of the pin, which deflects the same upwardly, and the rapid movement of the rotatable element throws the deflected portions outwardly, somewhat in the manner indicated by the arrows in Fig. 3. The water thus deflected has little velocity and therefore

falls, through and between the outwardly directed jets from the flutes, to the ground close to the spray head.

As will be apparent from the foregoing description the device is very simple in construction, has only one moving part, can be produced at relatively low cost, distributes water over a large area of predetermined contour and adequately sprinkles all parts of that area.

While I have shown and described one embodiment of my invention, together with a minor modification thereof, I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A spray head comprising a supporting member having an inlet chamber and a substantially frustoconical element mounted on said supporting member with its smaller end adjacent thereto and rotatable about an axis substantially perpendicular to said supporting member, said element having in its conical surface a plurality of relatively narrow spiral flutes, the side walls of each flute extending from the lower end of said element and converging longitudinally to a common point adjacent the upper end thereof, said supporting member having jet openings arranged to discharge water into said flutes to rotate said element.

2. A spray head comprising a supporting member having an inlet chamber and a substantially frustoconical element mounted on said supporting member with its smaller end adjacent thereto and rotatable about an axis substantially perpendicular to said supporting member, said element having in its conical surface a plurality of relatively narrow spiral flutes, each flute extending from the lower end of said element substantially to the upper end thereof, the side walls of each flute decreasing in depth and converging upwardly substantially to a point on the surface of said element close to the upper end thereof, said supporting member having jet openings arranged to discharge water into said flutes to rotate said element.

3. A spray head comprising a supporting member having an inlet chamber, a substantially frustoconical element mounted on said supporting member for rotation about a substantially vertical axis, said element having its larger end uppermost and provided with a dome shaped top surface, a circular dome shaped part of smaller diameter than said top surface projecting upwardly from the central portion of said top surface, said element having in its conical surface a plurality of spiral flutes extending from the lower portion thereof to points adjacent the outer edge of said top surface, and said supporting member having jet openings arranged to discharge jets of liquid into said flutes, portions of said jets being deflected inwardly over said dome shaped top surface into contact with said central dome shaped part and thrown outwardly by said part.

4. A spray head comprising a supporting member having an inlet chamber, a substantially frustoconical member supported by said supporting member with its larger end uppermost, said element having a dome shaped top surface spaced from the conical surface thereof by a narrow cylindrical surface, said element also having in said conical surface a plurality of spiral flutes, the walls of each flute convering substantially to a point in said cylindrical surface, said element also having an axial bore, a bearing pin extending through said bore, having its lower end secured to said supporting member and having at its upper end a head to engage and project above said top surface, and said supporting member having a series of jet openings to discharge water into said flutes and rotate said element about said bearing pin, a portion of the water discharged from the upper end of each flute being deflected inwardly over the dome shaped top surface into contact with the head of said pin and being thrown outwardly by said head.

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