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SPRINKLER HEAD

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This invention relates to sprinkler heads, and, with regard to certain more specific features, to disappearing lawn sprinkler heads.

Among the several objects of the invention may be noted the provision of an improved sprinkler head of the class described which is adapted to project arcuate sprays over a greater area, and adequately to spray the area intermediate the sprinkler and the outermost sprayed region; the provision of a sprinkler head of the class described which is adapted to project a plurality of arcuate sprays at different levels on the head, and at different angles of projection; the provision of a sprinkler head of the class described which includes a number of telescoping elements greater than two, whereby at least two telescoping elements are separately forced into progressively more extended positions under water pressure, and thereby adapted to project a plurality of sprays at different levels; and the provision of a sprinkler head of the class described which is relatively simple and economical in construction. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing, in which are illustrated several of various possible embodiments of the invention,

Fig. 1 is a front elevation of a sprinkler head involving the present invention, in retracted position;

Fig. 2 is a front elevation of the head of Fig. 1 in extended position;

Fig. 3 is a top plan view of the head of Fig. 1;

Fig. 4 is a vertical, axial section of the head of Fig. 1, in retracted position;

Fig. 5 is a vertical, axial section of the head of Fig. 1, in extended position, taken at right-angles to Fig. 4; and,

Figures 6 and 7 are cross sections taken substantially along lines 6—6 and 7—7 of Fig. 5.

Similar reference characters indicate corresponding parts throughout the several views of the drawing.

Referring now more particularly to Fig. 1, there is illustrated at numeral 1 an outside body portion threaded at the bottom to be attached to a stand pipe such as 3 which pipe connects with a sprinkling system or the like. The body 1 is provided with flats 5 to which a wrench may be applied for attaching purposes.

Interiorly the body 1 is provided with vertical grooves 7 (Figures 5 and 6) for slidably accommodating a pair of ears 9 on a slidable outlet nozzle 11. The outlet or water ejecting nozzle 11 slidably cooperates at its upper end with a collar 13 threaded to the body 1 so that it is adapted to be moved telescopingly within the body 1. The slidable outlet 11 has inlet portions 15 at the lower end thereof for receiving water from the pipe 3. The lower end 17 of the nozzle 11 is closed, and threadedly receives the threaded lower end of a stem 19, thereby positioning said stem 19 rigidly in the center of nozzle 11, in spaced relation to the walls thereof. The upper end of the stem 19, which projects above the upper end of the nozzle 11, is also threaded, as indicated at numeral 21. Numerals 22 and 23 indicate a pair of spray-directing, collar-like elements later to be described, that are threaded on the portion 21. An inverted conical head or top 25 is threaded onto the portion 21 at the end thereof, above the elements 22 and 23.

The collar 13 is provided with an upper, interior conical seat 27, conforming generally to the conical portion of the head 25. In its lower portion the collar 13 has a second inner conical seat 29, which is adapted to engage the reverse-conical surface 31 of an annular shoulder 33 on the nozzle 11. It will be noted that the heretofore mentioned ears 9 extend from this shoulder 33.

A central bore 35 of the collar 13 receives the nozzle 11 with sufficient clearance only to permit extending and retracting of said nozzle as described hereinafter, thus serving to hold said nozzle 11 in vertical position. A number of grooves 37 (nine in the present embodiment, see Fig. 7) are broached or otherwise formed in the inner surface of bore 35. These grooves function as follows:

When the nozzle is in its extended, Fig. 2 position, and spraying water, there is manifestly a tendency for some water to wash back from the surrounding soil, carrying with it sand, dirt particles, and the like. With old forms of sprinklers, such sand and dirt particles wedged into the mechanism and frequently, when the water was turned off, caused the sprinkler to remain in extended position. This led to frequent breakage of both lawn mowers and sprinklers. However, the grooves 37, in combination with the other features of the invention, effectively reduce or completely eliminate this tendency of the sprinklers to remain in extended position. This is be-

cause (1) the area of contact between the nozzle and collar is greatly reduced, (2) channels are provided into which the drainage water, with its content, quickly flows, and (3) channels are provided for a non-harmful leakage of seepage of water from the body 1, thus establishing a countercurrent to the incoming drainage water and thereby effectively stopping the influx of sand, dirt, etc.

A recess 39 is provided in the collar 13 for permitting the application of a spanner wrench to tighten the collar on the body 1.

The elements 22 and 23 hereinbefore referred to each comprise a central collar portion 41, threaded to fit on the threaded portion 21 of the stem 19. The collars 41 support webs 43, which webs 43 are provided with a plurality of water passages or holes 45. The webs 43 support upstanding cylindrical portions 47.

The lower surface of the webs 43 and cylindrical portions 47 of each of the elements 22 and 23 are conical in form, with the apex of the cone pointing downwardly, as is clearly indicated in Fig. 4. The apex angles of the cone forms of such surfaces are so established that the lower surface of the element 22 has the most obtuse angle, while the lower surface of the element 23 has an apex angle intermediate the apex angle of the lower surface of element 22 and the apex angle of the lower surface of head 25.

The upper end of the nozzle 11 is shaped to be complementary to the apex angle of the lower surface of the element 22. The upper end of the cylindrical portion 47 of the element 22 is shaped to be complementary to the lower surface of the element 23. The upper edge of the cylindrical portion 47 of the element 23 is shaped to be complementary to the conical lower surface of the head 25.

Preferably, although not necessarily, the outer diameter of the cylindrical portion 47 of the element 23 is somewhat greater than the outer diameter of the cylindrical portion 47 of the element 22.

The upper edge of the nozzle 11, in addition to being formed so as to be complementary to the lower surface of the element 22, is provided with a large number of radial notches or serrations 51. Similar radial serrations 51 are provided in the upper edge of cylindrical portion 47 of element 22 and the upper edge of cylindrical portion 47 of element 23. If a spray is desired over an entire circle of 360°, the notches or serrations 51 are continued entirely around the nozzle 51 and elements 22 and 23, in the manner shown in the drawing, but if it is desired to omit the projection of a spray through any particular angle, then this is accomplished by omitting the serrations 51 in that angle.

In assembling the device as thus described, the stem 19 is first threaded into position in the nozzle 11. Then the element 22 is threaded down on the portion 21 of stem 19, until it fits tightly against the upper edge of nozzle 11. Then the element 23 is similarly threaded down tightly on the element 22. Finally, the head 25 is threaded down tightly on the element 23. In order to facilitate threading the head 25 into position, it is preferably provided with a screw-driver-receiving slot 53.

The operation of the sprinkler head as thus constructed and assembled is as follows:

In normal installation, as indicated in Fig. 1, the top of the collar 13 is mounted flush with the ground, the sprinkler thus constituting a so-called sub-surface installation. Gravity normally holds the nozzle 11, and all associated elements, in the retracted position shown in Figures 1 and 4. However, when water under pressure is admitted to the head from the pipe 3, the pressure of the water forces the nozzle 11 upwardly in the head, to the extended position shown in Figures 2 and 5. Upward movement of the nozzle is limited by the engagement of the face 31 of nozzle 11 with the face 29 of collar 13. Water flows into the interior of the nozzle 11 through the opening 15, and rises upwardly through said nozzle. The water then passes out of the nozzle 11, or is projected, in three separate levels of sprays. The uppermost level of spray is projected through the notches or serrations 51 at the top of element 23, and is guided by the cooperating surfaces of element 23 and head 25. By reason of the angular arrangement heretofore described, this upper level spray is projected at, relatively, the greatest angle to the horizontal position, and hence said spray will have a trajectory causing it to hit the ground level at a greatest distance from the head.

The intermediate level spray is projected through the notches or serrations 51 of element 22, and is guided by the cooperating surfaces of elements 22 and 23. This angle of projection is an intermediate one, somewhat less than the angle of projection of the upper level spray. Hence in its trajectory it will hit the ground level at an intermediate distance, somewhat closer to the head than the upper level spray. The lower level spray is projected through the notches or serrations 51 in the upper edge of nozzle 11, and is guided by the cooperating surfaces of nozzle 11 and element 22. This lower level spray is at relatively the least angle of projection; hence, in its trajectory it will hit the ground level at relatively the closest position to the head.

It is thus seen that three separate sprays are projected from the head of the present invention, each of which extends through an arc of 360° or less, and each of which is guided to hit the ground at a different distance from the head. By properly designing the angles of the three sprays, it will be found that all of the ground from the sprinkler head out to the outermost limits of projections will receive water in the manner desired. In previous sprinkler heads of this general class, where but one spray was projected from a sprinkler head, trouble was frequently encountered in that no water or at least insufficient water reached the region between the sprinkler head itself and the innermost limits of the spray.

If it is desired to sprinkle a circle of larger radius, the number of sprays may be increased; in other words, instead of three levels of sprays as in the present embodiment, the sprinkler head may be constructed of four or five or even more levels of sprays, in accordance with the principles disclosed.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. In a sprinkler head, a body, a nozzle telescopingly received in said body, said nozzle comprising a cylindrical portion and a stem rigidly mounted centrally in said cylindrical portion, at least one collar-like element mounted on said stem and engaging the upper end of said cylindrical portion, and a head mounted on said stem and engaging the upper end of said collar-like portion, said nozzle having water discharge openings at the upper end thereof, bounded at one side by the lower surface of said collar-like portion, and said collar-like portion having water ejecting openings at the upper end thereof, said last-named openings being bounded at one side by the under surface of said head.

2. In a sprinkler head, a body, a nozzle telescopingly received in said body, said nozzle comprising a cylindrical portion and a stem rigidly mounted centrally in said cylindrical portion, at least one collar-like element mounted on said stem and engaging the upper end of said cylindrical portion, and a head mounted on said stem and engaging the upper end of said collar-like portion, said nozzle having water discharge openings at the upper end thereof, bounded at one side by the lower surface of said collar-like portion, and said collar-like portion having water ejecting openings at the upper end thereof, said last-named openings being bounded at one side by the under surface of said head, the water ejecting openings in the said collar-like portion being adapted to project water at an angle of projection greater than the angle of projection of water from the said openings in the upper end of said nozzle.

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