March 31, 1964 E. N. REYNOLDS 3,127,110

SPRINKLER HEAD

Filed May 14, 1962

Fig. 1.

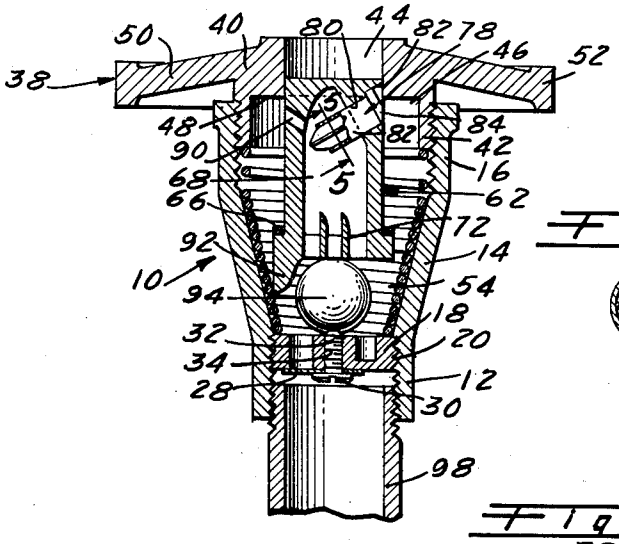


Fig. 5.

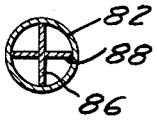


Fig. 3.

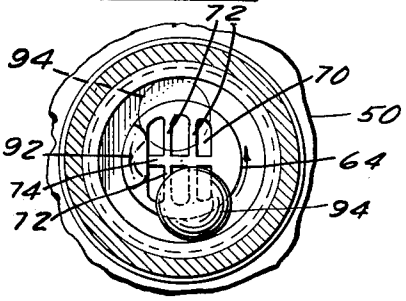


Fig. 2.

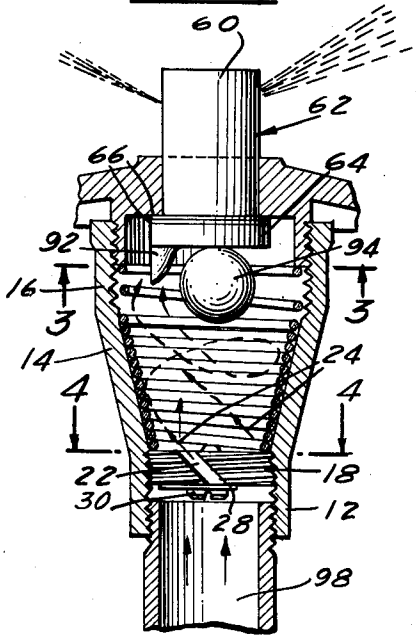
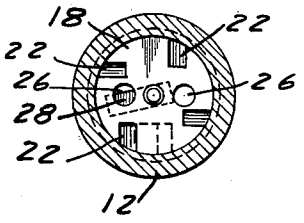


Fig. 4.



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SPRINKLER HEAD

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This invention relates generally to sprinkling devices and relates more particularly to rotary sprinkler heads.

While the invention has particular utility in connection with sprinkling heads, and is shown and described in such connection, it is to be understood that its utility is not confined thereto.

As is well known in the art, various problems and difficulties are encountered in the provision of suitable means for watering lawns and the like and it is an object of the present invention to provide means for apparatus that will solve these problems and overcome said difficulties.

It is another object of the invention to provide a sprinkler head that will normally be substantially level with the ground surface or even somewhat below such surface, but which has a member that is raised to an operating position when the water is turned on and into the head.

It is still another object of the invention to provide a sprinkling head of this character wherein the raised nozzle is moved in a rotary manner in a plurality of increments of rotation.

It is a further object of the invention to provide a nozzle of this character having greatly improved operation.

A still further object of the invention is to provide a nozzle of this character that is highly effective in operation.

It is another object of the invention to provide a device of this character having means for controlling the speed of rotation of the nozzle.

It is still another object of the invention to provide a device of this character having means for controlling the effective discharge of water from the device.

It is a further object of the invention to provide a discharge nozzle having stable characteristics.

It is a still further object of the invention to provide a device of this character having a nozzle with a novel discharge orifice insert.

It is another object of the invention to provide a device of this character that is simple and rugged in construction.

It is still another object of the invention to provide a device of this character having a relatively long life.

It is a further object of the invention to provide a device of this character having relatively few operating parts.

It is a still further object of the invention to provide a device of this character that is easy to service and maintain.

It is another object of the invention to provide a device of this character requiring little repairing or servicing and which will operate effectively over relatively long periods of time.

It is still another object of the invention to provide a device of this character that is relatively inexpensive to manufacture.

The characteristics and advantages of the invention are further sufficiently referred to in connection with the following detailed description of the accompanying drawings, which represent one embodiment. After considering this example, skilled persons will understand that variations may be made without departing from the principles disclosed and I contemplate the employment of any structures, arrangements or modes of operation that are properly within the scope of the appended claims.

Referring to the drawings, which are for illustrative purposes only:

FIG. 1 is a vertical section through a sprinkling device or head embodying the present invention, the nozzle being in the retracted position;

FIG. 2 is a similar view showing the device with the parts thereof in the operative position;

FIG. 3 is a sectional view taken on line 3—3 of FIG. 2;

FIG. 4 is a sectional view taken on line 4—4 of FIG. 2; and

FIG. 5 is a sectional view taken on line 5—5 of FIG. 1.

Referring more particularly to the drawings, there is shown a spray device or sprinkler head comprising a hollow body, indicated generally at 10. The body 10 includes a lower internally threaded or tapped part 12 from which there is a flaring portion 14 terminating in a cylindrical internally threaded top portion 16. The portion 14 is intermediate the lower end portion 12 and the upper end portion 16 so that the intermediate portion 14 may be considered as being an inverted frusto-conical part.

A disc 18, having external threads 20, is screwed into the lower portion 12 to a position whereat the upper surface of said disc is at the lower end of the intermediate portion 14, said disc forming a bottom member for said intermediate portion. Annularly arranged about the disc 18 are a plurality of slots 22 which are all inclined in the same direction to cause water passing therethrough to swirl upwardly within the interior of the intermediate portion 14, the direction of swirling motion of the water passing through said slots being indicated by the arrows 24 in FIG. 2.

The disc 18 is also provided with a plurality of vertical openings 26 therethrough, the axes of which are parallel to the axis of the disc 18. Flow of water or fluid through one of said openings 26 is controlled by a valve member 28 which comprises a flat piece of material which may be of metal, plastic, or the like. The valve 28 is disposed between the head 30 of a screw 32 and the underside of the disc 18, said screw 32 being screwed into a tapped, axial opening 34 in said disc.

The sprinkler head includes a top or cap, indicated generally at 38. Cap 38 includes a central portion 40 having a depending flange 42 which is coaxial with the cap or cover 38, said flange being externally threaded and screwed into the upper portion 16 of the body 10.

Central portion 40 has an axial bore 44 therethrough which communicates at its lower end with a chamber 46 peripherally defined by flange 42, the upper end of said chamber being defined by the lower wall 48 of the central portion 40 of the cap or cover. From the central portion 40 of the cap or cover there extends an annular flange 50 thereabout, said flange 50 being inclined downwardly and being provided with a peripheral rim 52.

Intermediate portion 14 and the lower part of the upper portion 16 is provided with a coil spring 54 the outside of which corresponds in shape to the interior shape of the intermediate portion 14 and the lower part of the upper portion 16. The lower end of the spring 54 engages or is adjacent to the upper side of the disc 18 and the coils of that portion of spring 54 disposed within the intermediate portion 14 of the body normally are in contact with each other. The upper part of the spring 54, that is, the part of said spring disposed within the lower part of portion 16 of the body, is loosely coiled so that the respective coils are spaced apart, as best shown in FIGS. 1 and 2. It is to be noted that the portion of the spring 54 disposed in the intermediate portion 14 of the body is frusto-conical in shape but inverted, so that the smaller end of said spring is at the bottom. The upper portion of the spring 54 disposed within the top portion 16 of the body, is cylindrical. When the spring 54 is within the body 10 and the cap or cover 38 screwed into the upper portion 16 of said body, the upper coils of said spring are placed under compression so that, in effect, the

entire spring is under compression. It is to be noted that the lower edge of the flange 42 of the cover 38 engages the upper end of spring 54 and provides a reaction shoulder for the upper end of said spring to resiliently hold spring 54 in body or housing 10.

Within the bore 44 of the cap or cover 38 is rotatably and slidably disposed the upper cylindrical part 60 of a nozzle indicated generally at 62. At its lower end nozzle part 60 has an outwardly extending annular flange 64 and there is a pair of washers 66 on the lower end of the cylindrical part 60 and supported by the flange 64. Washers 66 serve as friction reducing bearings between the flange 64 of the nozzle and the upper wall 48 of the chamber 46, as best shown in FIG. 2.

Cylindrical part 60 of the nozzle 62 is provided with an interior chamber 68 which is closed at its upper end, as best shown in FIG. 1. Adjacent the lower end of nozzle part 60 there is a grille having openings 70 therein, the vertical walls 72 extending upwardly in spaced parallel relationship to each other, there being cross walls 74 interconnecting said walls 72 and defining the inner end of the openings 70. The walls 72 and 74 serve to direct the water or fluid upwardly into the chamber 68 and prevent swirling of the water in said chamber.

While the main function of the grille is to disperse the suction tending to suck the ball up into the nozzle 62, it also functions to physically prevent the ball from going up into said nozzle so that said ball will revolve about in the upper end of body of the device.

Nozzle 62 is provided with a primary discharge jet comprising an insert 78 which is press-fitted or otherwise suitably secured in a bore 80 which extends from the chamber 68 at an upwardly and outwardly inclined angle. The outer portion of the bore 80 is countersunk, as at 82. Insert 78 comprises a cylindrical tubular body 82 and an enlarged head 84, the body portion of the insert being disposed in the bore 80 and the head being disposed in the counterbore 82.

Brazed, welded or otherwise secured within the tubular body 82, are crossed veins 86 and 88, which provide four longitudinally extending passages through the body 82 and prevent swirling of fluid or water passing through said insert and discharged from the discharge orifice at the outer end thereof. It is to be noted that at the inner ends said veins are tapered and project into the chamber 68 beyond the inner end of the insert body 82.

Diametrically opposite the principal discharge opening of the nozzle is a secondary discharge opening or orifice 90, which is inclined from chamber 68 upwardly and outwardly, discharge orifice 90 being of substantially smaller diameter than the primary discharge orifice at the outer end of the insert 78, so that there are two streams or jets of water discharged by the nozzle 62 when in its upper operative position, as shown in FIG. 2.

At one side of the nozzle there is a lug 92 which depends from the flange 64. Lug 92 is curved from its inner upper end downwardly and outwardly and is also curved arcuately outwardly in opposite directions from an inner central region. Within that portion of the body 10 between the disc 18 and the cover 38 is disposed a ball 94 which may be of any suitable character, said ball being shown, however, as a steel ball, such as a ball bearing, which may be plated with rust or corrosion-resistant material, such as chromium, or any other suitable material. The diameter of ball 94 is smaller than the diameter of the lower end of the intermediate body portion 14, and said ball is adapted to be forced upwardly and circularly within the body 10 by the water flowing through the slots 22.

Fluid or water is supplied to the sprinkler head by a conduit or pipe 98 which is vertically disposed and provided at its upper end with an externally threaded end portion which is threadably received within the lower end portion of the lower body portion 12.

When the water is turned off and the device is inoperative the parts are in the position shown in FIG. 1, the nozzle being telescoped into the interior of the body 10 with the lower grilled end resting on the ball 94 which, in turn, rests on the disc 18.

When water is turned into the sprinkler head the water from the pipe 98 flows upwardly through the slots 22 into the interior of the body between the disc 18 and cap 38. There is also an upward flow of water through the openings 26 in the disc 18. The water flowing into the interior of the body forces the nozzle upwardly to the position shown in FIG. 2 and causes the ball 94 to move in an upward spiral path on the interior of the spring 54. The swirling action of the water causes the ball to whirl around in the spring 54 and when the ball reaches its upper position, as shown in FIG. 2, it will strike the lug 54 and cause the nozzle to rotate a limited amount. Because of the curved inner surface of the lug 92, the ball will pass over said surface and beyond the lug. The ball will continue to move around on the interior surfaces of the coils of the spring 54 and will engage the underside of the flange 64 of the nozzle.

When the ball has moved in its circular path until it reaches the lug 92 it will again strike said lug and rotate the nozzle another increment of movement. This operation will continue as long as there is water supplied to the device.

It is to be noted that the water flowing through the openings 26 is directed into the interior of the body 10 generally parallel to the axis thereof and the streams of water from said openings 26 will reduce the swirling action of the water entering the interior of the body through the slots 22.

While there may be any desired number of openings 26, it has been found that two such openings are satisfactory and by varying the effective size of one of said openings 26 by means of the valve 28, the effective swirling action on the ball 94 may be varied to meet any particular requirements of an installation.

Water which has entered the interior of the body flows through the opening 70 of the grille at the lower end of the nozzle 62 and enters the chamber 68. From this chamber the primary discharge is through the insert 78 which has the primary discharge opening at its outer end. The secondary spray of water is delivered through the orifice 90 and the jets or sprays of water from the primary and secondary discharge orifices moves in a circular path as the nozzle 62 is moved in rotary increments by ball 94.

The invention and its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts of the invention without departing from the spirit and scope thereof or sacrificing its material advantages, the embodiment hereinbefore described being merely for purposes of illustration.

I claim:

1. A sprinkler head, comprising:

(A) a hollow body having

(*a*) an intermediate portion flaring from the lower to the upper end thereof,

(*b*) a depending internally threaded tubular nipple portion for attachment to a fluid supply conduit, said nipple portion being of approximately the same diameter as the lower end of the intermediate portion,

(*c*) and an internally threaded upper portion of substantially the same diameter as the diameter of the upper end of said intermediate portion;

(B) an externally threaded disc threadably disposed in the upper end of the nipple portion, said disc having a plurality of annularly spaced slots inclined from the vertical in the same direction and a plurality of openings therethrough having axes parallel to the axis of said disc, said disc having an axially arranged tapped opening therein,

(a) a screw threadably disposed in said tapped opening,

(b) and a flat valve member pivotally disposed on said screw and movable relative to one of said openings to vary the effective size thereof, said valve member being secured in adjusted position by said screw;

(c) a coil spring having a frusto-conical portion adapted to be received in the intermediate portion of said body and the upper portion of said body, the portion of the spring in the intermediate portion having its coils in contact with each other while the upper portion of said spring has its coils spaced apart;

(D) a cover comprising a central portion with an externally threaded depending flange threadably disposed in the upper part of the upper portion of the body, said central portion having a relatively large axial bore therethrough, the upper end of said spring reacting against the lower edge of said flange;

(E) a nozzle having

(a) a cylindrical part with a chamber therein closed at the top, said cylindrical part being slidably disposed in said bore in the central portion of the cover,

(b) an annular outwardly extending flange on the lower end of said cylindrical part,

(c) a grille at the lower end of said chamber having fluid openings from the lower end of said cylindrical part into said chamber, said grille including upstanding vanes,

(d) a lug depending from said flange at one side thereof and having its inner side curved downwardly and outwardly from the flange and also having a horizontal curvature,

(e) a pair of washers on said cylindrical part resting on the upper side of said flange,

(f) a pair of passages extending from the chamber in the cylindrical part upwardly and outwardly, one of said passages being substantially larger than the other, said other passage providing a secondary spray orifice, there being a counterbore at the outer end of the larger passage,

(g) an insert comprising a tubular part having an outwardly extending annular flange at the outer end, said tubular part being received in the larger passage and the flange thereof being disposed in the counterbore, there being a primary fluid discharge orifice at the outer end of said insert, and crossed vanes in the tubular part, the inner ends of said vanes being rounded and extending outwardly of the inner end of said tubular part;

(F) and a ball disposed in the intercediate part of the body between the disc and the lower end of said nozzle, said ball being of smaller diameter than the inside diameter of the lower end of the spring.

2. A sprinkler head, comprising:

(A) a hollow body having an intermediate portion flaring from the lower to the upper end thereof, and an internally threaded upper portion of substantially the same diameter as the diameter of the upper end of said intermediate portion;

(B) an externally threaded disc threadably disposed at the lower end of said intermediate portion, said disc having a plurality of annularly spaced slots inclined from the vertical in the same direction and an opening therethrough having its axis parallel to the axis of said disc,

(a) a flat valve member adjustable relative to said opening to vary the effective size thereof;

(C) a coil spring having a frusto-conical portion adapted to be received in the intermediate portion of said body and the upper portion of said body, the portion of the spring in the intermediate portion having its coils in contact with each other while the upper portion of said spring has its coils spaced apart;

(D) a cover comprising a central portion with an externally threaded depending flange threadably disposed in the upper part of the upper portion of the body and compressing said spring, said central portion having a relatively large axial bore therethrough;

(E) a nozzle having

(a) a cylindrical part with a chamber therein closed at the top, said cylindrical part being slidably disposed in said bore in the central portion of the cover.

(b) an annular outwardly extending flange on the lower end of said cylindrical part,

(c) a grille at the lower end of said chamber having fluid openings from the lower end of said cylindrical part into said chamber,

(d) a lug depending from said flange at one side thereof and having its inner side horizontally,

(e) a pair of washers on said cylindrical part resting on the upper side of said flange,

(f) a pair of passages extending from the chamber in the cylindrical part upwardly and outwardly, one of said passages being substantially larger than the other,

(g) a tubular insert secured in the larger passage and having a primary fluid discharge orifice at the outer end, and crossed vanes in said tubular insert;

(F) and a ball disposed inside said spring between the disc and the lower end of said nozzle.

3. In a sprinkler head:

(A) a hollow body including

(a) a portion flaring from the lower to the upper end thereof,

(b) and an upper portion of substantially the same diameter as the diameter of the upper end of said flaring portion;

(B) a disc operably disposed at the lower end of said flaring portion, said disc having a plurality of annularly spaced slots inclined from the vertical in the same direction,

(C) a coil spring having a flaring portion adapted to be received in the intermediate portion of said body, the portion having its coils in contact with each other while the upper portion of said spring has its coils spaced apart;

(D) a cover comprising

(a) a central portion with a depending flange secured in the upper portion of the body and engaging the upper end of said spring, said central portion of the cover having a relatively large axial bore therethrough;

(E) a nozzle having

(a) a cylindrical part with a chamber therein closed at the top and having discharge means adjacent the top thereof, there being openings in the lower end of said nozzle communicating with said chamber, said cylindrical part being slidably disposed in said bore in the central portion of the cover,

(b) an annular outwardly extending flange on the lower end of said cylindrical part,

(c) a depending lug at the lower end of said nozzle, said cylindrical part also having a pair of discharge orifices extending from the chamber in the cylindrical part upwardly and outwardly; one of said passages being substantially larger than the other,

(F) and a ball disposed inside the spring between the disc and the lower end of said nozzle.

4. In a sprinkler head:

(A) a hollow body having its interior flaring upwardly;

(B) a resilient spring resiliently secured in said body,

said spring fitting the flaring interior of said body and having at least a portion of the upper end thereof resiliently yieldably laterally;

(C) a nozzle slidably and rotatably mounted in the upper end of said body, and moved to an upper operative position by fluid pressure in said housing, said nozzle having a primary and secondary discharge orifice;

(D) means limiting outward sliding movement of said nozzle;

(E) a lug on the lower end of said nozzle and at one side thereof;

(F) a ball operably disposed within the spring;

(G) and means for introducing fluid into the lower end of said body and effecting swirling of said fluid within said spring to cause said ball to circulate upwardly for intermittent engagement with said lug.

5. In a sprinkler head:

(A) a housing having a hollow interior flaring toward one end, said housing having obliquely arranged inlet means at the smaller end;

(B) a coil spring of substantially the same shape as the flaring housing interior and providing a resilient lining for same;

(C) a nozzle operably mounted at the larger end of said housing for longitudinal movement by fluid pressure in said housing and for rotatable movement, said nozzle having a fluid inlet and fluid discharge means open when said nozzle is moved to an extended position, said nozzle having a projection at the inner end;

(D) and a spherical element within said spring and movable upwardly and circularly by fluid introduced through said inlet.

6. A nozzle for sprinkler heads, comprising:

(A) a hollow cylindrical part with a chamber therein closed at one end;

(B) an annular outwardly extending flange on the end of said cylindrical part opposite the closed end;

(C) a lug extending longitudinally from said flange and at one side thereof;

(D) said cylindrical part having a pair of passages extending outwardly from the chamber in the cylindrical part, one of said passages being substantially larger than the other, said other passage providing a secondary spray orifice, there being a counterbore at the outer end of the larger passage;

(E) and an insert comprising a tubular part having an outwardly extending annular flange at the outer end, said tubular part being received in the larger passage and the flange thereof being disposed in the counterbore, there being a primary fluid discharge orifice at the outer end of said insert, and crossed vanes in the tubular part.

7. In a sprinkler head:

(A) a hollow body having its interior flaring upwardly and its top partially closed by an apertured cap;

(B) a nozzle having a cylindrical part with a chamber therein, closed at one end and having at least one discharge opening;

(C) an annularly outwardly extending flange on the end of said cylindrical part opposite the closed end of said chamber;

(D) a lug extending longitudinally from said flange and at one side thereof and having its inner side curved outwardly from the flange and toward the free end and also having a lateral curvature,

(E) said nozzle being rotatably mounted in said cap;

(F) a ball operably disposed within the body;

(G) and means for introducing fluid into the lower end of said body and effecting swirling of said fluid within said body to cause said ball to circulate upwardly for intermittent engagement with said lug.

8. In a sprinkler head:

(A) a housing having a hollow interior;

(B) a coil spring resiliently lining at least a portion of the interior of said housing, said spring flaring from the lower toward the upper end;

(C) a nozzle operably mounted at said upper end of said housing for longitudinal movement outwardly thereof and for rotatable movement, said nozzle having fluid inlet, and fluid discharge means open when said nozzle is moved to an extended position, said nozzle having a projection at the inner end;

(D) and a movable element within said housing, movable upwardly and circularly by fluid introduced into said housing for intermittent engagement with said projection.

9. In a sprinkler head:

(A) a hollow body, the interior of which flares upwardly, said body having an inlet at the lower end;

(B) a resilient spring in said body of substantially the shape of the interior thereof and resiliently secured therein;

(C) a nozzle operably mounted at the upper end of said body for rotational movement, said nozzle having an inlet and at least one discharge orifice;

(D) a projection at the lower end of said nozzle offset from the axis thereof;

(E) and means for swirling fluid introduced into said body.

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