Jan. 20, 1942. J. D. LEWIS 2,270,595

LAWN SPRINKLER

Filed Jan. 6, 1939

Fig. 1.

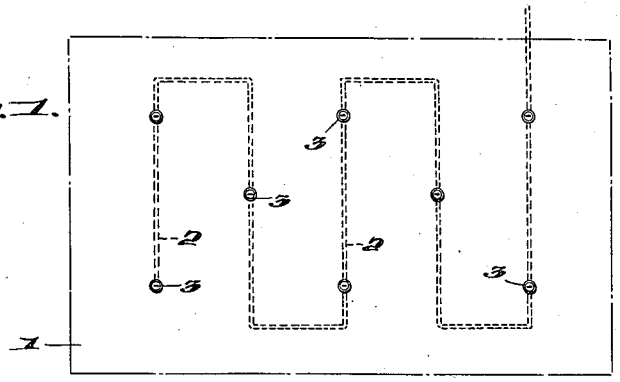


Fig. 2.

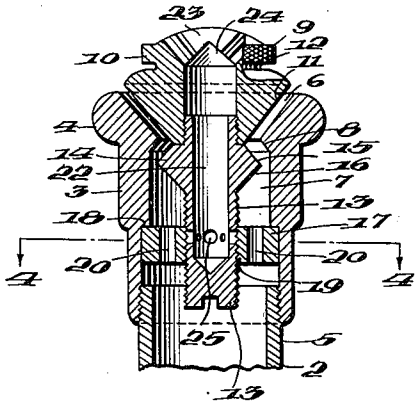


Fig. 3.

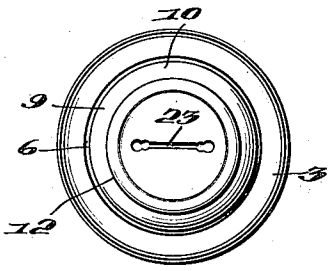


Fig. 4.

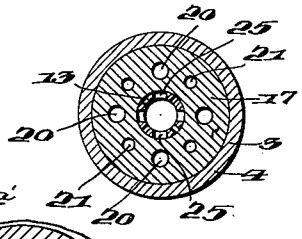


Fig. 5.

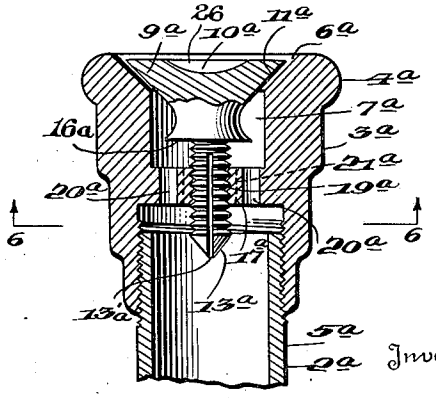
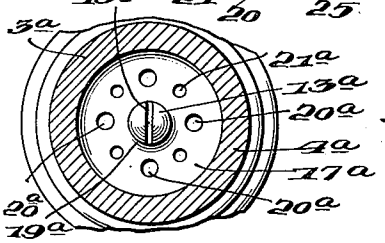


Fig. 6.



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UNITED STATES PATENT OFFICE

2,270,595

LAWN SPRINKLER

Joseph D. Lewis, Santa Barbara, Calif.

Application January 6, 1939, Serial No. 249,626

11 Claims. (Cl. 299—18)

This application is a continuation-in-part of my copending application for Lawn sprinkler, Serial No. 188,368, filed February 2, 1938.

This invention relates generally to lawn sprinklers and more particularly to the construction and arrangement of the nozzle portions thereof.

An object of the invention is to construct and arrange a nozzle whereby the quantity of water ejected therefrom in the form of a mist or spray may be definitely controlled and made to describe a selective predetermined path so as to form a pattern of particular configuration.

A feature of the invention is the provision of a nozzle in a sprinkling system having a casing adapted to be connected to a water supply pipe, means rotatably associated with the casing provided with an axial bore which is preferably closed at one end and communicates with an elongated discharge aperture to permit the formation of a substantially fan-shaped spray; the means being provided with an orifice positioned adjacent the closed end communicating with the bore for the free passage of water thereto and the entire structure being so arranged that upon a manipulation of the means in a rotative manner the quantity of water passing through the orifice may be definitely controlled.

Another feature of the invention is the provision of an incined wall adjacent the juncture of the bore and discharge aperture so as to assist in creating a turbulence in the water and thereby cause the water to leave the discharge aperture in the form of a spray.

A further object of the invention is the provision of a nozzle in a sprinkler system comprising a casing having a frusto-conical flaring opening, frusto-conical means positioned in and partially closing the opening, a diaphragm interposed between the ends of the casing being either movably or rigidly associated therewith and adjustably associated with the frusto-conical means to determine the quantity or amount of water passing through the restricted opening; the diaphragm having a plurality of apertures of different dimensions to thereby control the configuration of the pattern formed by the water discharged from the restricted opening.

Numerous other objects and features will, of course, become apparent from the succeeding detailed description of the invention and from an inspection of the accompanying drawing which illustrates exemplified forms of the invention and wherein:

Figure 1 illustrates a plan view of a plot of ground having a stationary sprinkler system associated therewith and comprising a water supply pipe or conduit beneath the surface of the ground and provided with intermittently spaced nozzles of the instant invention.

Figure 2 is a vertical substantially cross sectional view of one form of the nozzles illustrated in Figure 1 and embodying the present invention, a portion thereof being illustrated in elevation to more clearly disclose the structure.

Figure 3 is a plan view of the nozzle shown in Figure 2.

Figure 4 is a horizontal cross sectional view, taken along the lines 4—4 of Figure 2, looking in the direction of the arrows.

Figure 5 is a vertical cross sectional view of a modification of the nozzle illustrated in Figure 2, a portion thereof being shown in elevation to more clearly illustrate the associated parts.

Figure 6 is a horizontal sectional view, taken along the lines 6—6 of Figure 5, looking in the direction of the arrows.

Referring now in detail to the drawing, wherein like reference characters designate like parts, and initially considering the construction illustrated in Figures 1 to 4, inclusive, a plot or section of ground 1, arranged to be sprayed or watered, has, imbedded or positioned beneath the surface thereof, a water feed or supply pipe or conduit 2 of a permanent sprinkler system which is in direct communication with a source of water supply. The supply pipe is illustrated as being convoluted in configuration, but it may be, if desired, formed to follow any predetermined path.

Intermittently spaced or positioned at intervals along the supply pipe and in direct communication therewith is a plurality of sprayer heads or nozzles 3 which are preferably positioned in staggered relation with one another so as to be, by this particular arrangement, capable of thoroughly spraying or watering the entire area subjected thereto. Each sprayer head or nozzle 3 desirably comprises a body member, housing or casing 4 preferably of circular configuration in horizontal cross section and having one or the lower extremity thereof interiorly threaded to accommodate an exteriorly threaded associated end or outlet 5 of the supply pipe 2. The upper or free end of the casing is provided with a frusto-conical or outwardly flaring opening 6 forming the discharge opening of the casing or one of the discharge openings of the nozzle, the housing or casing having an axially disposed bore 7 which is desirably of greater extent horizontally than the inner extremity of the dis-

charge opening 6 so as to present an inwardly facing inclined or frusto-conical intermediate wall or seat 8. The wall 8 serves several purposes one of which is to present a deflecting wall to be engaged by the water passing thereover and, in this manner, assist in setting up turbulence in or agitate the water in order to permit it to be ejected from the discharge opening in the form of a spray.

Disposed axially of the casing is a movable means or tubular member 9 comprising a head portion 10 formed with a frusto-conical outwardly facing surface 11 positioned in the casing opening 6. The tubular member surface 11 is, in the position illustrated, spaced from the associated frusto-conical casing surface to provide a restricted water outlet or discharge opening therebetween, and by reason of this arrangement the water passing through the restricted opening is deflected outwardly and away from the nozzle. The tubular member head is provided adjacent the upper or outer extremity thereof with a milled circumambient protuberance 12 which presents a means whereby the tubular member may be manipulated to govern or control the size of the restricted discharge opening as well as perform other functions which will be hereinafter more fully described.

Extending inwardly of the nozzle from the tubular member head is a stem 13 having spaced exteriorly threaded end portions, the one or upper of which is turned into an interiorly threaded portion of the head to thereby permit the head and stem to move or be moved as a unitary member. Another object in forming the head and stem of the tubular member as separate elements or pieces is to afford the assembly of the nozzle, as it will be noted, by referring most particularly to Figure 2, that the stem is provided with an outstanding convolution 14 formed as a double cone-shaped shoulder which is of greater extent than the inner and associated extremity of the frusto-concal opening 6 of the casing. The convolution 14 has oppositely facing inclined surfaces 15 and 16 formed thereon, the former of which is oppositely disposed and spaced from the seat 8 to form a passageway therebetween communicating with the restricted opening for the egress of the water. It will be observed that upon a manipulation of the tubular member in a rotary fashion the inclined surface 15 will approach and ultimately engage the seat 8 to positively arrest the passage of water therebetween. The inclined surface 16 also presents a deflecting wall to assist in agitating the water and directing it toward the wall or seat 8 to be further agitated before passing through the restricted discharge opening.

Positioned within the casing is a disk or diaphragm 17 bearing against or seated upon a peripheral shoulder 18 formed in the casing adjacent the lower extremity thereof. Additional means to retain the diaphragm in bearing relation with the shoulder is preferably excluded from the structure as this function is performed by the force of the water acting in a vertical direction against the disk. The diaphragm is preferably rotatably associated with respect to the tubular member stem so as to provide a limiting or stop means to retain the tubular member in a predetermined position vertically of the structure. To this end, therefore, the diaphragm has an axially disposed threaded hole 19 accommodating the lower extremity of the stem. Positioned circumferentially of the diaphragm is a plurality of pairs of circular apertures 20 and 21 forming communications between the water supply and casing bore 7. Both of the apertures 20 and 21 are arranged in angular relation with respect to one another and preferably spaced apart ninety degrees, with the former apertures being of greater diameter than and positioned between the latter. The result attained by thus positioning and forming the apertures of various diameters is a square or substantially square pattern ultimately formed on the ground by the water issuing from the restricted opening.

The tubular member has, intermediate its ends, an axially disposed bore 22 which terminates in or communicates with an elongated diametrically formed secondary discharge opening 23 provided in the tubular portion head. Conically shaped deflecting walls 24 are formed at the juncture of the bore 22 and the elongated opening so as to present a wall to be struck by the water before it enters the elongated opening to thereby set up a spray-like effect of the ejected water. When the tubular member is in the position illustrated no water can enter the bore 22, and all of the water passing through the nozzle is exhausted through the restricted discharge opening. However, if it is found desirable to completely change the substantially square pattern formed by the water passing through the restricted discharge opening the tubular member is manipulated until the inclined surface 15 bears against the seat 8 at which time orifices 25, positioned adjacent the lower extremity of the bore 22 and communicating therewith, will be moved out of the horizontal plane of the diaphragm to be positioned in a plane spaced thereabove. With the tubular member in its last recited position the stream of water will be arrested from passing through the restricted discharge opening and will then enter the orifices 25, pass through the bore 22, strike the deflecting wall 24, and be forced through the elongated opening 23 fan-shaped to form a rectangular pattern. It will, of course, be clearly understood that the tubular member may be so positioned to permit the water to pass through both the restricted discharge opening and the elongated opening to effect a substantially square and a rectangular pattern and, in this manner, assure a thorough dampening of the ground immediately adjacent the nozzle as well as that portion of the ground removed therefrom.

Considering now the modification illustrated in Figures 5 and 6 of the drawing, wherein a simplified form of the nozzle is shown which retains some of the advantages and features of the previously described structure, the nozzle is indicated generally by means of the reference character 3^a and comprises, in the main, a housing or casing 4^a having adjacent the lower extremity thereof an interiorly threaded portion to accommodate and engage an associated end or outlet 5^a of a water supply pipe or conduit 2^a. It will, of course, be clearly understood that the nozzle 3^a may be, if found desirable, substituted for any or all of the nozzles 3 in the arrangement illustrated in Figure 1. The upper extremity of the casing has a frusto-conical or outwardly flaring or discharge opening 6^a communicating with an axial bore 7^a extending partway inwardly of the casing. Positioned intermediate the ends of the casing is an integrally formed disk, wall or diaphragm 17^a defining the

inner extremity of the bore 7a. Circumferentially positioned pairs of circular apertures 20a and 21a form communications between the feed or water supply pipe 2a and the bore 7a; the apertures 20a being desirably spaced ninety degrees apart and being of greater diameter than the apertures 21a which are positioned between the apertures 20a, reference being had to Figure 6 of the drawing. This nozzle likewise is arranged and constructed to distribute or control the water passing therethrough to have the water ultimately form a pattern of square or substantially square configuration upon the adjacent ground.

Disposed axially of the casing is a movable means 9a comprising a head portion 10a of substantially frusto-conical formation positioned in the correspondingly formed portion or frusto-conical discharge 6a of the casing. The head portion 10a, by its particular formation, has an outer substantially conical surface 11a in spaced relation to the correspondingly formed surface of the discharge opening to thereby restrict the clear opening of the discharge opening 6a and also to direct the water passing therebetween in an upward and outward path, the extent of which is governed by the distance between the inclined surfaces. The lower extremity of the movable means head is flared downwardly and outwardly to present a deflecting wall 16a positioned in spaced relation to and partially overlying or extending through the vertical plane of the apertures 20a and 21a. By this arrangement, therefore, the water passing through the apertures 20a and 21a will strike the wall 16a to create a turbulence or disturbance therein and continue upwardly through the bore 7a and ultimately through the restricted discharge opening in the form of a spray or mist. In order to maintain the movable means 9a in a predetermined position vertically of the nozzle, the head portion is provided with a downwardly extending stem exteriorly threaded and projecting through a correspondingly threaded axially disposed hole 19a in the diaphragm. By manipulating the movable means in a rotative direction either clockwise or counter-clockwise, as viewed from the top, the extent of the restricted discharge opening may be definitely governed. An outwardly facing moon-shaped indenture 26 is provided in the movable means head for the application or accommodation of a screw driver or some such implement to thereby provide a means whereby the movable means may be rotated. The stem 13a is desirably formed with a vertically disposed or extending slot 13a' which substantially divides the stem into counterpart segmental members, semi-circular in horizontal cross section. Before the movable means is introduced into the nozzle casing bore an instrument is introduced in the slot 13a' and the segmental members of the stem are spread apart a slight distance so that, upon application of the movable means, a radial force will be exerted by the segmental members against the diaphragm to prevent an accidental movement of the movable means with respect to the casing.

It will be, of course, clearly understood that merely exemplified forms of the invention have been considered and that various changes and alterations may be made to the illustrated and described species without departing from within the spirit and scope of the appended claims.

I claim:

1. A sprinkler head comprising a casing adapted to be connected at one end to a supply pipe and having at its opposite end a frusto-conical flaring opening, frusto-conical means for partially closing said opening, a diaphragm interposed between the ends of said casing, and a plurality of openings of different dimensions formed in said diaphragm for determining the shape of the pattern of the water discharged through said restricted opening in said casing, said restricted opening being angularly disposed to the direction of the jets issuing from the openings in said diaphragm.

2. A sprinkler head comprising a casing adapted to be connected at one end to a supply pipe and having at its opposite end a frusto-conical flaring opening, means for partially closing said opening, a diaphragm interposed between the ends of said casing, and a plurality of holes formed in said diaphragm, certain of said holes being of larger diameter than others, the holes of larger diameter being arranged in a square pattern whereby a pattern of water of substantially the same shape will be discharged from the restricted end of the casing.

3. A sprinkler head comprising a casing adapted to be connected at one end to a supply pipe and having at its opposite end a frusto-conical flaring opening, frusto-conical means for partially closing said opening, a diaphragm disposed between the ends of said casing, and a plurality of pairs of apertures formed in said diaphragm, certain of said apertures being of larger diameter than the others and intermittently spaced ninety degrees apart with the smaller of the apertures spaced therebetween, the apertures being thus arranged to have a stream of water pass therethrough and be ejected from the sprinkler head to ultimately form a pattern of substantially square configuration.

4. A sprinkler nozzle comprising a casing adapted to be connected at one end to a supply pipe and having at its other end a frusto-conical flaring opening, frusto-conical means for partially closing said opening, a diaphragm interposed between the ends of said casing, said frusto-conical means being connected and axially adjustable relative to said diaphragm to determine the amount of water passing through the opening between said means and said casing, and a plurality of apertures of different dimensions in said diaphragm for determining the configuration of the pattern formed by the water discharged through said restricted opening, said restricted opening being angularly disposed to the direction of the jets issuing from the apertures in said diaphragm.

5. A sprinkler nozzle comprising a casing adapted to be connected at one end to a supply pipe and having at its other end a frusto-conical opening, frusto-conical means extending through and restricting said opening and having an axially disposed bore communicating with a discharge opening in said means, a diaphragm positioned between the ends of said casing, said frusto-conical means being associated with and axially adjustable relative to said diaphragm to determine the amount of water passing through said restricted opening, a plurality of apertures in said diaphragm permitting the passage of water therethrough and through said restricted opening to form a particular pattern, said restricted opening being angularly disposed to the direction of the jets issuing from said diaphragm, and ports in said means adjacent one end of said bore said ports being so positioned as to nor-

mally lie in the plane of said diaphragm and to be moved therefrom on closing of said restricted opening, whereby, upon direct manipulation of said means, said restricted opening will be closed and said ports will be moved out of the plane of said diaphragm to permit the water to enter said bore and be ejected through said discharge opening in said means to form a pattern of different configuration.

6. A sprinkler nozzle comprising a casing adapted to be connected at one end thereof to a water supply pipe and having at its other end a flared discharge opening, means associated with said casing having a deflector head positioned in and partially closing said discharge opening, a diaphragm interposed between the ends of said casing, said means being connected and axially adjustable relative to said diaphragm to determine the amount of water ejected from said discharge opening, and a plurality of apertures of different dimensions in said diaphragm for determining the configuration of the pattern formed by the water.

7. A sprinkler nozzle comprising a casing adapted to be connected at one end thereof to a water supply pipe and having at its other end a flared discharge opening, means associated with said casing having a deflector head positioned in and partially closing said discharge opening, a diaphragm interposed between the ends of said casing, said means being connected and axially adjustable relative to said diaphragm to determine the amount of water ejected from said opening, and a plurality of apertures of different dimensions in said diaphragm for determining the configuration of the pattern formed by the water; the larger of said apertures being spaced apart ninety degrees and the smaller of said apertures being interposed between said larger apertures to thereby permit the formation of a substantially square pattern.

8. A sprinkler nozzle comprising a casing adapted to be connected at one end to a supply pipe and having at its other end a frusto-conical opening, frusto-conical means extending through and restricting said opening and having an axially disposed bore, said bore being closed at one end and communicating with an elongated discharge opening, a diaphragm positioned between the ends of said casing, said frusto-conical means being associated with and axially adjustable relative to said diaphragm to determine the amount of water passing through said restricted opening, a plurality of apertures in said diaphragm permitting the passage of water therethrough and through said restricted opening to form a particular pattern, said restricted opening being angularly disposed to the direction of the jets issuing from the aperture in said diaphragm and ports in said means adjacent one end of said bore said jets being so positioned as to normally lie in the plane of said diaphragm and to be moved therefrom on closing of said restricted opening, whereby, upon direct manipulation of said means, said restricted opening will be closed and said ports will be moved out of the plane of said diaphragm to permit the water to enter said bore and be ejected from said elongated discharge opening to form a pattern of different configuration.

9. A sprinkler nozzle comprising a casing adapted to be connected at one end thereof to a water supply pipe and having at its other end a flared water discharge opening, means associated with said casing having a deflector head positioned in and partially closing said discharge opening, a diaphragm interposed between the ends of said casing, said means being connected and axially adjustable relative to said diaphragm to determine the quantity of water ejected from said opening, and a deflector wall formed on said means between said diaphragm and deflector head being of greater extent than the normally clear opening of said discharge opening, said diaphragm having intermittently spaced openings of different dimensions for determining the configuration of the pattern formed by the water.

10. A sprinkler nozzle comprising a casing adapted to be connected at one end thereof to a water supply pipe, means rotatably associated with and longitudinally movable relative to said casing and having an axial bore closed at one end and communicating with an elongated discharge aperture intersecting the opposite end of said bore, a deflector wall formed in said means at the juncture of said bore and discharge aperture, a port in said means adjacent the inner end thereof and communicating with said bore and means so cooperating with said port that upon longitudinal movement of said first named means in respect of said casing, the quantity of water entering said port from said casing will be controlled.

11. A sprinkler nozzle comprising a casing adapted to be connected at one end thereof to a water supply pipe, a tubular member comprising a head and a stem portion rotatably associated with and longitudinally movable relative to said casing, said tubular member having its axial bore closed at an inner extremity and communicating with an elongated discharge slot formed in said head and intersecting the outer extremity of said bore, a tapered deflector wall formed in said head and surrounding the juncture of said bore and discharge slot, a port communicating with said bore adjacent said closed end means so cooperating with said port that upon longitudinal movement of said tubular member, the water entering said port from said casing may be controlled.

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