

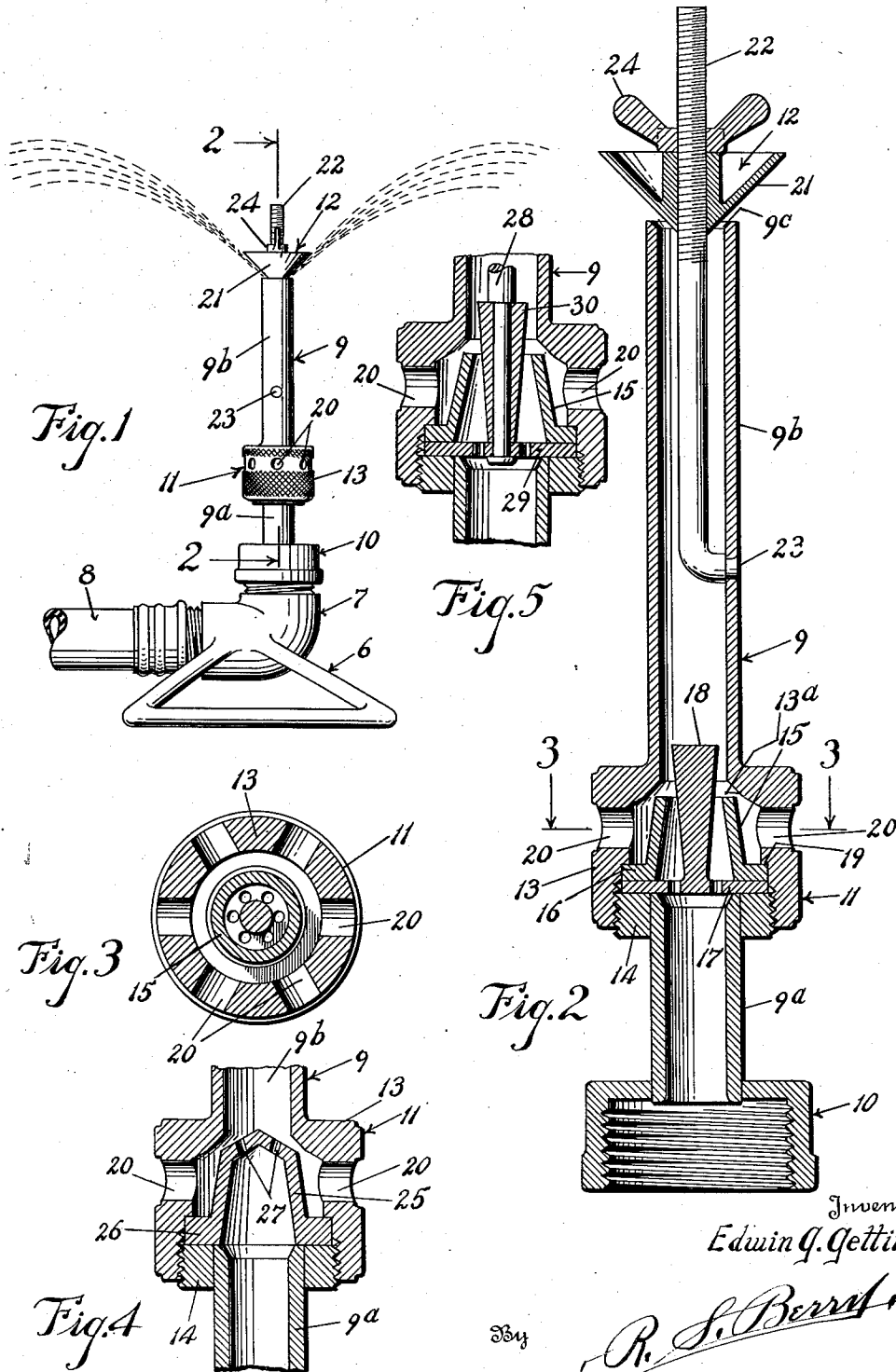
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E. G. GETTINS

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AERATION SPRINKLER

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Inventor,
Edwin G. Gettins

By *R. S. Berrett*
Attorney

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AERATION SPRINKLER

Edwin G. Gettins, Los Angeles, Calif.

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This invention relates to sprinklers or spray devices for irrigating lawns and other plant growth or for applying a spray of liquid for any other purposes.

One of the objects of my invention is to provide an aerator in the form of a sprinkler or spray device which will eject an aerated spray containing fresh atmospheric air whereby the soil or other medium which sustains plant life when irrigated with such a spray will be benefited as to fertility by the presence of the oxygen and other components of the atmospheric air carried thereto in the spray and, any matter or substance which is subject to beneficial treatment by such an aerated spray may be so treated in a particularly efficacious manner with the sprinkler or spray device hereof.

Another object of this invention is to provide an aeration sprinkler in which a novel and simply constructed jet pump means is actuated by the water stream passing through the sprinkler to induce into the stream a considerable amount of fresh atmospheric air which due to the construction and arrangement of the sprinkler aerates the stream and causes a finely divided aerated spray to be discharged so that the components of the air will aerate the soil which is being irrigated with the sprinkler to increase the fertility of the soil.

A further object is to provide an aeration sprinkler such as described in which a novel adjustable spray producing means and the jet pump means for inducting atmospheric air into the sprinkler are constructed and arranged to cooperate for producing a spray which is heavily saturated with air so that optimum amounts of the beneficial components of the air will be entrained in the spray.

Another object is to provide a sprinkler of the character described which is small, compact, consists of comparatively few parts and may be readily and inexpensively manufactured.

A further object is to provide an aeration sprinkler of the character described which will provide the benefits of aeration as hereinbefore noted with a minimum amount of water or other liquid which forms the aerated spray issuing from the sprinkler.

With the foregoing objects in view, together with such other objects and advantages as may subsequently appear, the invention resides in the parts and in the combination, construction and arrangement of parts hereinafter described and claimed, and illustrated by way of example in the accompanying drawing, in which:

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Fig. 1 is a side elevation of a sprinkler embodying the present invention,

Fig. 2 is an enlarged vertical sectional view taken on the line 2—2 of Fig. 1,

Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 2,

Fig. 4 is a fragmentary vertical sectional view of a modified form of this invention, and

Fig. 5 is a fragmentary sectional view of another modified form of this invention.

Referring to the drawing more specifically, 6 indicates a sprinkler base member having an elbow fitting 7 thereon affording a connection with a garden hose or like conduit 8 which is connected to a source of supply of water under pressure in a usual manner. The invention embodies a cylindrical sectional stand pipe 9 comprising an open ended intake pipe section 9a and an open ended elongated discharge pipe section 9b. The intake section 9a is fitted with a coupling 10 adapted to be detachably screwed into engagement with the elbow 7. The pipe sections 9a and 9b have bores which are arranged in axial alignment and interposed between the pipe sections is a jet pump means 11 comprising a construction adapted to induct fresh atmospheric air into a stream of water passing therethrough from the pipe section 9a into and through the pipe section 9b. The invention also embodies an adjustable spray producing means 12 at the outer or discharge end of the pipe section 9b arranged to convert the stream of water discharged from such outer end into a spray and for setting up a back pressure interiorly of the pipe section 9b.

The base member 6 may be of any suitable construction which will support the stand pipe in upright position and afford connection of the sprinkler stand pipe with a source of supply of water under pressure as by means of the garden hose 8 here shown.

The lower section 9a of the stand pipe is press fitted, welded or otherwise connected with the screw threaded coupling 10 so that a leak-proof joint therewith is provided with the stand pipe as a whole may be detachably connected as here shown with the elbow 7 on the base 6.

As here shown the jet pump means 11 embodies an integral housing 13 on the lower end of the discharge pipe section 9b, which housing is formed with a side wall encircling a cylindrical chamber having a diameter exceeding that of the internal diameters or bores of the pipe sections 9a and 9b. The housing 13 has an internally threaded open lower end which is detach-

ably screwed into engagement with a screw threaded annulus 14 threaded or otherwise tightly fixed on the upper end of the pipe section 9a. Arranged within the housing 13 is a jet pump nozzle 15 which is frustro-conical and has an outwardly projecting flange 16 at its lower or base end which seats on a perforated metering disk 17 resting on the annulus 14 and extending over the open upper end of the pipe section 9a; the disk 17 being formed with an annular row of perforations leading between the bore of the pipe section 9a and the interior of the conical nozzle 15, which perforations form a restricted intake to the nozzle for determining the volume of liquid flowing from the pipe section 9a to the nozzle during a given length of time under a given pressure.

A tapered outwardly diverging deflector member 18 is carried by the disk 17 as an integral part thereof or may be otherwise fixed thereto, which deflector member extends through the nozzle 15 and into the lower or inner end portion of the pipe section 9b. The outer end of the deflector member 18 terminates in a flat transverse end wall having a circular margin extending concentric to and in spaced relation to the annular inner face of the pipe section 9b at a point contiguous to but spaced from the inner end of the pipe section 9a to form an annular jet orifice at this point.

The flange 16 on the nozzle 15 is engaged by a shoulder 19 interiorly of the side wall of the housing 13 whereby when the internally screw threaded lower end of the housing 13 is screwed onto the annulus 14 in assembling the sprinkler, the shoulder 19 will collectively clamp the nozzle and the disk 17 in place. It is to be noted that the perforated metering disk 17 is separable from the annulus 14 and nozzle 15 on detaching the housing 13 from the annulus 14; the outer end of the deflector member 18 being of a diameter slightly less than the internal diameter of the reduced end of the nozzle 15 so that it may be passed therethrough either in assembling or disassembling the nozzle and disk. By this arrangement the disk 17 is removable to permit interchange of disks 17 having different sizes of perforations therein to accommodate the sprinkler for use under various water pressures.

The housing 13 has an end wall connecting with the pipe section 9b which is formed at the juncture of the interior of the housing 13 and the bore of the pipe section 9b with an opening; the portion of the end wall constituting the margins of the opening being beveled as indicated at 13a relative to which beveled portion the upper end of the nozzle 15 terminates in adjacent but spaced relation to define an annular converging space between the upper end of the nozzle and the end wall of the housing. As an annular jet of water is discharged from the nozzle 15 and deflected by the tapered member 18 against the inner surface of and passing longitudinally through the bore of the elongated pipe section 19, a sub-atmospheric pressure will be created interiorly of the housing 13. The cylindrical wall of the housing 13 is provided with a series of air intake openings 20 through which atmospheric air will be inducted into the housing by and into the stream of water ejected from the nozzle 15 and passing through the bore of pipe section 9b. The tapered deflector 18 as here shown is spaced circumferentially from the upper edge of the nozzle and acts to deflect the annular stream of water issuing from the nozzle angularly

outwardly against the wall of the bore of the pipe 9b so as to cause the atmospheric air drawn into the pipe 9b to be thoroughly intermingled with the stream so as to saturate it and thereby effect a heavy aeration of the water while flowing to discharge through the elongated pipe 9b. For this purpose the flat outer end of the deflector 18 and the angular jet orifice formed thereby is spaced remote from the discharge end of the pipe section 9b.

As here shown the adjustable spray producing means 12 comprises a deflecting cone 21 axially adjustably screw threaded on a screw threaded supporting rod 22 fixed to the pipe section. Fig. 2 shows how the rod 22 is centered in the pipe section 9 with its lower end bent right angularly and riveted as at 23 to the pipe section 9b at a point spaced above the jet pump means. The cone deflector 21 has its apical portion adapted to extend into the beveled upper end 9c of the pipe 9b so that an annular outlet orifice is defined between the cone and the said beveled edge whereby an effective spray in a circular pattern will be discharged from the sprinkler. The cone may be adjusted toward or away from the edge 9c as desired to regulate the spray and the action of the jet pump means 11 and also set up a desired back pressure which with the annular jet impinging on the wall of the bore of the pipe 9b prevents air from passing out through the pipe without being mixed with the jet stream. A wing nut 24 is employed to releasably hold the cone 21 in adjusted position.

In the use of the sprinkler, after turning on the water, the operator may regulate the jet pump action and the spray best to intake through the openings 20 a maximum amount of atmospheric air and produce a richly aerated spray. This adjustment is effected by screwing the cone 21 inwardly until the water runs out through the air intake openings 20 as caused by the water being backed up by the resistance to discharge afforded by the "screwed in" cone. The operator now backs up, that is, screws out the cone until the flow of water through the openings 20 stops and then tightens the wing nut 24 to set the cone at this point whereby a maximum suction effect of the jet pump takes place and a maximum amount of atmospheric air will be inducted in the stream passing through the sprinkler thereby producing a richly aerated spray. The amount of air induced may be regulated by further adjustment of the cone 21 which therefore controls the action of the jet pump means as well as provides for regulating the characteristics of the spray.

It should be noted that the spray is discharged outwardly from the sprinkler so that no water will cascade or drop around the pipe and interfere with a free intake of fresh atmospheric air through the openings 20.

Since it has been well established that aeration of the soil is an important factor in soil fertility it is now apparent that the sprinkler of this invention will provide for an effective aeration of the soil thereby promoting the growth of plant life.

The sprinkler may also be advantageously used to apply an aerated spray to substances or matter which is subject to purification or other benefit by the components of the air in the spray or which may otherwise be desirably effected by the presence of the oxygen and other components of the aerated spray.

As shown in Fig. 4 I may use in the sprinkler

a modified form of nozzle 25 which is the form of an inverted cup and has a flange 26 which corresponds to the flange 16 on the nozzle 15. All of the parts shown in Fig. 4 except the nozzle 25 are of the same construction and arrangement as the corresponding parts in Figs. 1, 2 and 3 and are identified by the same reference characters. Jet orifices 27 are formed in the top of the nozzle 25 so as to direct jets angularly upwardly and outwardly into the pipe section 9b to produce the suction effect for inducing flow of air through the openings 20. This form of nozzle consists of fewer parts than the nozzle shown in Fig. 2 and may in some instances be preferred.

Another modified form of my invention is shown in Fig. 5 and deals only with the manner of supporting the rod for the spray deflecting cone. In this modification, the rod 28 extends through the upper pipe section 9b and supports the cone (not here shown) in the same manner as shown in Fig. 2, but is anchored to the perforated disk 29 by being riveted or otherwise fixed thereto. This makes it unnecessary to fasten the lower end of the rod to the pipe section 9b as shown at 23 at Fig. 2. Moreover this mounting of the rod 28 makes it possible to support a conical deflector 30 thereon within the nozzle 15 to serve the same purpose as the deflector 18.

It should be noted that the coupling 10 makes it possible to detach the sprinkler from the base and couple it to a hose for use as a conventional hose nozzle.

While I have shown and described a specific embodiment of my invention I do not limit myself to the exact details of construction set forth, and the invention embraces such changes, modifications and equivalents of the parts and their formation and arrangement as come within the purview of the appended claims.

I claim:

1. In a sprinkler, an open ended intake pipe section having inner and outer ends, an open ended elongated discharge pipe section having inner and outer ends, said pipe sections having bores arranged in axial alignment, a jet pump housing interposed between said pipe sections and connected thereto, said housing having a side wall formed with a series of air intake openings opening to atmosphere and having an end wall formed with an opening leading to the bore of the elongated discharge pipe section at the inner end thereof, a tapered open ended nozzle in said housing having a reduced discharge end presented to the bore of the discharge pipe section and spaced therefrom and defining an annular space communicating with the interior of said housing around said nozzle, a diverging deflector member projecting outwardly through the discharge end of said nozzle into the open inner end of said discharge pipe section and terminating at a point within the bore of said discharge pipe close to but spaced inwardly from the inner end of the latter and remote from the outer end thereof, said deflector member being spaced throughout from the discharge pipe section, and controllable spray producing means on the outer end of said pipe arranged to develop back pressure in said discharge pipe.

2. The structure called for in claim 1, together with a removeable perforated metering disk clamped between the open inner end of said intake pipe section and said nozzle and held in place together with said nozzle by the connection between said housing and said intake pipe.

3. The structure called for in claim 1, together with a removeable perforated metering disk interposed between the open inner end of said intake pipe section and said nozzle; the connection between said housing and said intake pipe section comprising a screw threaded connection and a shoulder interiorly of said housing for clamping said nozzle and disk in place.

4. A sprinkler comprising an elongated discharge pipe section having inner and outer ends and a bore encompassed by a cylindrical wall, a housing formed on the inner end of said pipe section having a side wall formed with air inlet openings and having an end wall formed with an opening leading to the bore of said discharge pipe section at the inner end thereof, an intake pipe section having an end portion screwed into engagement with said housing in axial alignment with said discharge pipe section, a demountable perforated disk overlying said end portion of said intake pipe, a diverging deflector member on said plate having an outer end portion extending through the opening in said housing end wall and terminating within the bore of said discharge pipe section in remote spaced relation to the outer end of said discharge pipe section, said end wall of said deflector member having a circular margin spaced from and concentric with the cylindrical wall of the bore of said discharge pipe section, a frustro-conical nozzle in said housing through which said deflector member extends, said nozzle having an outlet presented to the opening in said housing end wall in close spaced relation thereto and having an inside diameter slightly exceeding the outside diameter of the outer end of said deflector member, and said nozzle having an inlet end extending over said perforated disk in abutting relation thereto; and an adjustable spray producing means at the outer end of said discharge pipe.

EDWIN G. GETTINS.

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