Aug. 2, 1927. 1,637,413

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APPARATUS FOR WATERING AREAS OF LAND

Filed Jan. 5, 1922

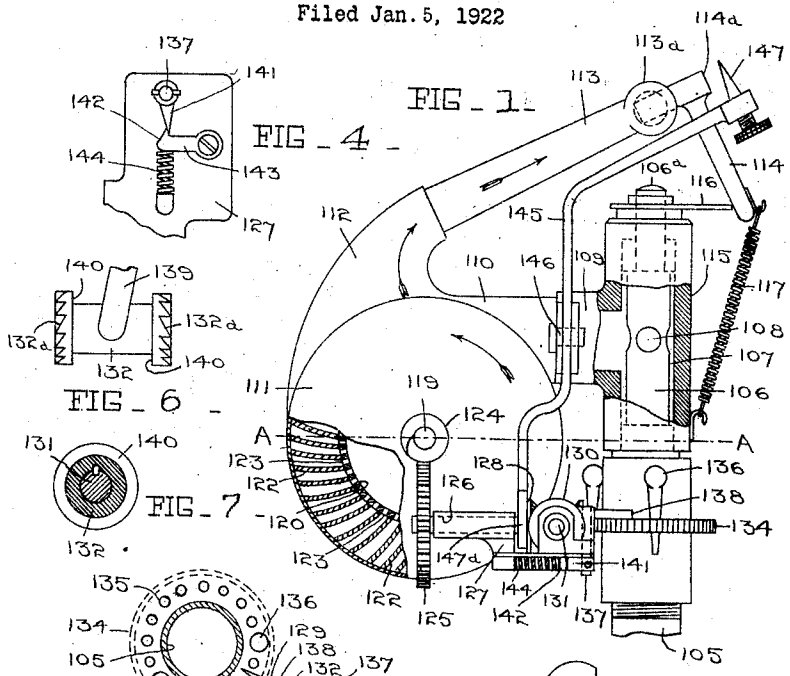


FIG. 1.

FIG. 4.

FIG. 6.

FIG. 7.

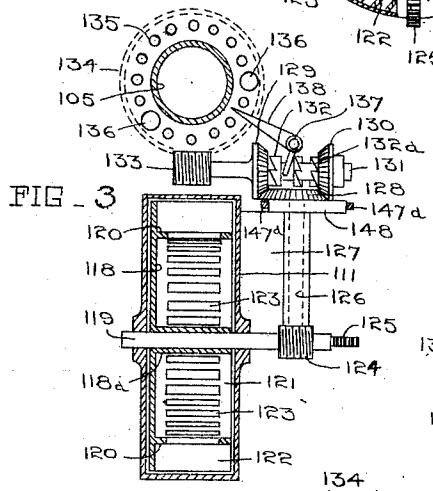


FIG. 3.

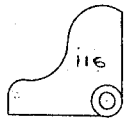


FIG. 8.

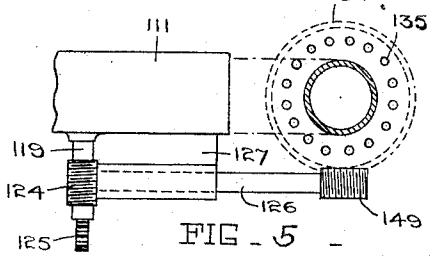


FIG. 5.

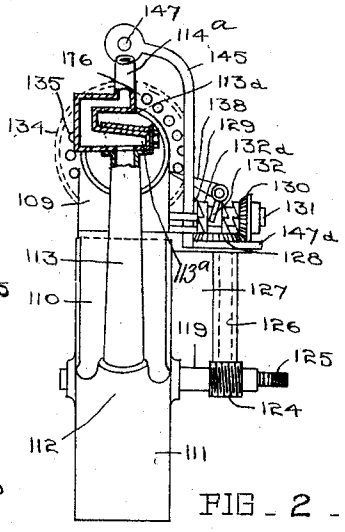


FIG. 2.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR WATERING AREAS OF LAND.

Application filed January 5, 1922, Serial No. 527,259, and in New Zealand November 8, 1920.

This invention relates to means employed in watering areas of land and has for its object the provision of improved sprayer whereby areas of land of any shape can be watered evenly and thoroughly.

The sprayer comprises a casing containing a turbine, carried by a hollow fitting and capable of revolving about a vertical pipe preferably fixed to a stand or base and adapted to be connected with the water discharge outlet of a regulator of the type disclosed in my co-pending application, Serial Number 577,266 filed July 24, 1922.

The water passes from the vertical pipe through the hollow fitting and the casing to an outlet provided with a nozzle. In passing through the casing, the water drives the turbine, the shaft of which is geared with a stationary worm wheel on the vertical pipe or on a fitting thereon, whereby the turbine is utilized to give rotary motion to the sprayer about the vertical pipe. The rotary motion can be continuous in the one direction or be such that the sprayer will make a full revolution first in one direction and then a full revolution in the reverse direction, or said sprayer can be caused to operate backwards and forwards through any desired portion of a circle.

In order to accommodate the sprayer or rather the jet of water from same to areas having irregular outlines or boundaries, a nozzle containing a cock is employed the discharge of said nozzle having projecting therefrom a rigid arm kept in contact with a stationary regulating plate on the upper end of the vertical pipe. This plate is given a shape or outline which corresponds with that of the area of land to be watered. As the sprayer rotates about the vertical pipe, the arm of the nozzle is dragged along the edge of the regulating plate and rides over the projections on and enters the depressions in the latter, whereby the discharge end of the nozzle is raised and lowered to regulate the throw of water to the outline of the area, and also to regulate the volume of water issuing from the nozzle.

The invention will now be more particularly described in conjunction with the accompanying drawings wherein:—

Figure 1 is an elevation (broken) of the sprayer.

Figure 2 is a plan view of same.

Figure 3 is a sectional plan view taken on the line A—A, Figure 1.

Figure 4 is an inverted plan view of portion of the reversing clutch actuating mechanism.

Figure 5 is a part plan view showing the sprayer constructed so as to rotate continuously in the one direction, while

Figures 6 and 7 are a plan view and a cross sectional view respectively of the reversing clutch.

Figure 8 illustrates a plate for regulating the volume of water and the altitude of the stream of water when watering an area having a shape similar to that of the plate.

Referring to the drawing in detail the vertical pipe 105 which preferably is fitted in a suitable stand or base and receives water from a regulator of the type disclosed in my copending application has screwed in its upper end a tube 106 closed at its upper end upon which is a vertical stud 106^a.

A hollow fitting 115 having in its upper end an opening which fits the stud 106^a, and in its lower end an opening which fits the tube 106 is rotatable about the latter, an annular space 107 being left around the tube 106.

The tube 106 contains one or more ports 108 which open into the annular space 107.

Water from the pipe 105 passes through the tube 106, ports 108, and annular space 107 into the branch 109 which is connected with the inlet 110 of the casing 111, so that the latter is rigidly supported and capable of being rotated about the pipe 105.

The casing 111 has an outlet 112 to which is fitted a nozzle 113 containing a plug cock 113^a, directly over the vertical pipe 105, the portion 114^a of said cock providing the mouth piece of the nozzle.

The mouth piece 114^a is provided with a rigid and downwardly projecting arm 114, held by means of a spring 117 attached at one end to said arm 114 and at the other end to the fitting 115 in contact with the edge of the regulating plate 116, held stationary on the stud 106^a at the upper end of the tube 106.

The plate 116 has an outline shaped to correspond with the outline of the area or the portion thereof to be watered and as the sprayer is rotated about the pipe 105, the arm 114 is forced by the spring 117 into any depressions or recesses there may be in the edge of the plate 116, the result of which is that the mouthpiece 114^a of the nozzle 113 is depressed and causes the cock

to reduce the volume of water issuing from the mouthpiece and at the same time to shorten the throw of the water from the nozzle.

As the arm 114 rides over any projection on the plate edge the mouthpiece 114ª of the nozzle 113 is elevated which allows the volume of water to be increased and causes the throw of the water to be lengthened.

By these means both the volume and the throw of water from the nozzle 113 are regulated at all times to keep within the limit of the area being treated and to evenly water the whole area providing that a plate 116 having an outline corresponding with that of the area being treated is provided for the arm 114 to work against.

The turbine contained in the casing 111 comprises a vertical disc 118 having a boss or hub 118ª keyed on the shaft 119.

Projecting at right angles from the disc 118 and a short distance from the edge thereof is a circular wall 120 whereby an annular space 121 surrounding the boss or hub 118ª is provided.

The turbine blades 122 are fitted to the disc 118 and circular wall 120, outside the latter, said blades being curved to meet the water entering the casing 111 through the inlet 110.

Ports 123 through the wall 120, between the blades 122 open into the annular space 121 enabling water to enter the latter.

Water on entering the casing 111 through the inlet 110 fills the space 121 after which incoming water can only escape by way of the outlet 112, and in doing so acts on the blades 122 and drives the turbine in the direction indicated by the arrow in Figure 1.

On one end of the turbine shaft 119 is keyed a worm 124 which drives a worm wheel 125 in turn keyed on one end of a shaft 126 mounted in bearings on a bracket 127 carried by the casing 111.

On the other end of this shaft 126 is keyed a bevel wheel 128 which meshes with two bevel wheels 129, 130 loosely mounted on a shaft 131 supported in bearings on the bracket 127, at right angles to the shaft 126.

A clutch 132 feathered on the shaft 131 so as to be slidable thereon but always rotating therewith is provided at each end with teeth 132ª and is of such a length that when the teeth at one end are engaged in correspondingly formed teeth one of the wheels 129—130, the teeth at the other end are clear of similar teeth on the other of said wheels 129—130.

One end of the shaft 131 has keyed thereon a worm 133 which works in the teeth of a horizontal worm wheel 134 mounted on the pipe 105 or a fitting thereon so as to at all times remain stationary.

The stationary worm wheel 134 contains holes 135 arranged in a circle around the pipe 105 and in these holes, pins or pegs 136 are adapted to be inserted.

Also mounted on the bracket 127 carried by the casing 111 is a short vertical shaft 137, the latter having fixed on its upper end a horizontal arm 138 which projects across the circle of holes 135 in the wheel 134.

A second arm 139 on the upper end of the vertical shaft 137 projects between the enlarged ends 140, (Figure 6) of the clutch 132 on which are formed the teeth 132ª.

On the lower end of the vertical shaft 137 and below the bracket 127 is keyed a third arm 141. The latter arm tapers towards its outer end, and has the same amount or degree of taper on both sides.

This arm 141 is adapted when the vertical shaft 137 is rotated to come in contact with a pointed projection 142 also having the same amount or degree of taper on both sides at the outer end of an arm 143 pivoted to the lower side of the bracket 127, in such a manner that the arm 143 is forced back against the action of a spring 144, until the point of the arm 141 presses or clears the point of the projection 142, whereupon the latter is pushed forward by the spring 144, and owing to the contact made between the two inclined surfaces, causes further turning movement to be imparted to the vertical shaft 137.

The means for breaking the jet of water issuing from the nozzle into spray comprises a rocking lever 145 pivoted at 146 on either the casing 111, fitting 115 or part moving therewith and having its upper portion bent as shown in Figure 1, so that its upper end is located below and slightly in front of the mouthpiece 114ª.

A pointed screw 147 passing upwards through the upper end of the lever 145 is capable of being screwed upwards or downwards therein as desired.

The lower end 147ª of the lever 145 is forked to pass over a cam 148 mounted on and rotating with the shaft 126, whereby, the screw 147 when the sprayer is in operation is passed sideways to and fro through the issuing stream of water, and has the effect of breaking same into spray, and of causing the water to throw far and near.

If desired the sprayer can be constructed so as to be capable of rotating only in the one direction, in which case the clutch 132, shaft 131, and wheels 128, 129 and 130 are not needed, the shaft 126 being made longer and having keyed thereon a worm 149 to work in the worm wheel 124 (Figure 5).

The operation of the apparatus is as follows, the water used for spraying passes through the casing 111 to the nozzle 113, and drives the turbine, whereby the shaft 126 is rotated.

The teeth 132ª at one end of the clutch 132 being engaged in the teeth of one of the

wheels 129—130, the engaged wheel is locked on and drives the shaft 131, the effect of which is that the worm 133 working in the stationary worm wheel 134 causes the casing 111 and fitting 115 with the parts carried thereon to travel around the pipe 105. If it is desired that the sprayer shall make a full turn in one direction, and then a full turn in the opposite direction, only one pin or peg 136 is placed in the wheel 134. When the clutch arm 138 strikes the pin or peg 136 the vertical shaft 137 is given a partial turning movement and the clutch engaging arm 139 is moved towards the opposite end of the clutch 132 until it comes in contact with an enlarged end 140 and moves the clutch from engagement with which ever of the wheels 129—130 it was engaged with.

The same partial turning movement of the vertical shaft 127 causes the lower pointed arm 141 to press back the pivoted arm 143.

Shortly following the disengagement of the clutch 132 from the wheel 129 or the wheel 130 the point of the arm 141 clears the point of the projection 142 whereupon the latter springs forward and acting against the side of the arm 141 gives further turning movement to the vertical shaft 137, which results in the upper arm 139 forcing the clutch 132 into engagement with the opposite of the wheels 129—130 from which it was withdrawn, whereby the shaft 131 is caused to rotate in the reverse direction and the sprayer is caused to travel about the pipe in the reverse direction to which it did just previously.

When however the sprayer is required to operate backwards and forwards through a given portion of a circle, two pins or pegs 136 are used. These are placed in the wheel 134 the necessary distance apart and each time the arm 138 strikes a pin or peg 136, a reversal of the travel of the sprayer about the pipe 105 is effected.

The sprayer constructed as shown in the drawing can be caused to rotate continuously in the one direction by locking the clutch 132 in whichever of the wheels 129—130 it is desired and not inserting any pins or pegs 136 in the wheel 134.

During the whole of the spraying operations the altitude of the mouthpiece 114a of the nozzle 113 is being adjusted to lengthen or shorten the throw of the water according to the outline of the area by the arm 114 rising to pass over projections on and being lowered by entering depressions in the plate 116, said depressions being provided at points corresponding with portions projecting from hollows in the outline of the area being watered.

The screw 147 moves continuously to and fro in the jet of water, no matter in what direction the sprayer is travelling.

Where areas having regular outlines or boundaries are to be watered, a jointed nozzle need not be used, as an ordinary rigid nozzle will serve as well.

What I do claim and desire to secure by Letters Patent of the United States is:—

1. In apparatus for watering land, a supply pipe, a sprayer communicating with said supply pipe and comprising a hollow fitting mounted so as to be rotatable about said supply pipe and carrying a turbine provided with a nozzle; gearing between the turbine shaft and said pipe whereby the water passing to the nozzle operates said turbine; means for raising and lowering the mouth of the nozzle during the rotary motion of the sprayer; and means for reversing the travel of the turbine about the supply pipe.

2. An apparatus for watering land, a supply pipe, a sprayer rotatably mounted on said supply pipe and communicating therewith, said sprayer comprising a turbine carrying a discharge nozzle, a stationary worm wheel on said pipe and a worm drive on the turbine shaft; and gearing between said worm wheel and the worm drive on the turbine shaft, whereby the turbine is revolved about the pipe on water passing through the turbine.

3. A water sprayer, according to claim 2, wherein a reversing clutch is placed in the gearing between the worm drive on the turbine shaft and the worm wheel on the water pipe.

4. In a water sprayer of the kind described, a vertical water pipe; a tube fitted in the upper end of said pipe and having ports therein, a stud on said tube, a turbine, and a hollow fitting carrying the turbine enclosing and rotatable about said tube.

5. In a water sprayer, a water pipe, a turbine mounted to turn about the pipe, turning gear connecting the turbine with the water pipe, said turning gear including a movable clutch member controlling the direction of turning movement of the turbine, a shaft supporting said clutch member, an arm carried by said shaft, adjustable means carried by the water pipe adapted to engage the arm to actuate the shaft and clutch member, and means associated with said shaft to maintain the clutch member in adjusted position against accidental displacement.

6. In a sprayer, a supply pipe, a nozzle, a turbine interposed between and conducting water from the supply pipe to the nozzle, means supporting the turbine on the supply pipe whereby it may turn about the supply pipe and move the nozzle therewith, and gearing connected with said turbine whereby the latter is turned about the supply pipe during the passage of water therethrough.

7. In a sprayer, a supply pipe, a nozzle, a turbine interposed between and conducting water from the supply pipe to the nozzle,

said turbine being arranged to turn about the supply pipe and to carry the nozzle therewith, and gearing carried partly by the supply pipe and partly by the turbine and connecting the supply pipe with the turbine whereby the latter is turned about the supply pipe during passage of water therethrough.

8. In a sprayer, a supply pipe, a nozzle, a turbine interposed between and conducting water from the supply pipe to the nozzle, said turbine being arranged to turn about the supply pipe and to carry the nozzle therewith, said nozzle having a jointed discharge end, gearing connected with the turbine whereby the latter is turned about the supply pipe during the passage of water therethrough, means responsive to the turning movement of the nozzle to vary the inclination of the discharge end thereof, and means actuated by the gearing to periodically intercept water issuing from the discharge end of the nozzle.

9. In a water sprayer, a two-part nozzle, a cock movably connecting the parts of said nozzle, and fluid actuated means for shifting one part of the nozzle relatively to the other part whereby to vary the adjustment of the cock and the flow of the water therethrough.

10. In a sprayer, a supply pipe, a two-part nozzle, a cock movably connecting the parts of the nozzle, a turbine interposed between and conducting water from the supply pipe to the nozzle, said turbine being arranged to turn about the supply pipe and to carry the nozzle therewith, gearing connected with said turbine whereby the latter is turned about the supply pipe during passage of the water therethrough, and means responsive to the turning movement of said nozzle for shifting one part of the latter relatively to the other part whereby to vary the adjustment of the cock and the flow of water therethrough.

11. In a sprayer, a water pipe, a two-part nozzle, one part of the nozzle constituting the discharge end thereof and being arranged to turn about the other part, means acting in response to variations in the angular position of the nozzle parts for regulating the flow of fluid therethrough, a cam plate, and means carried by the first mentioned part of the nozzle engaging with the cam plate whereby, during movement of the nozzle about the wate pipe, the angular position of the first mentioned part of the nozzle is varied.

12. In a water sprayer, a two-part nozzle, a cock movably connecting the parts of the nozzle, a water pipe, a turbine mounted to turn about the water pipe and connected with and supporting the nozzle, a fixed plate carried by the water pipe having a portion of its edge shaped to correspond with the outline of the area to be watered, an arm carried by the movable part of the nozzle, and means normally maintaining said arm in engagement with the shaped edge of the fixed plate whereby the position of the movable part of the nozzle is varied during turning movement of said nozzle.

13. In a sprayer, a water supply pipe, a turbine mounted for turning movement thereon and in fluid communication therewith, a nozzle connected with the turbine, gearing connected with the turbine whereby the latter is turned about the supply pipe during the passage of water therethrough, a lever, an adjustable pointed deflecting member carried by the lever arranged to intercept the column of water issuing from the discharge end of the nozzle, a cam actuated by said gearing, means connecting said lever with said cam whereby said lever is periodically moved across the column of water issuing from the nozzle.

14. In a sprayer, a water pipe, a nozzle rotatably mounted on said water pipe, having a discharge end movable about an axis disposed in angular relation to the axis of rotation of the nozzle, fluid actuated means simultaneously effecting rotation of the nozzle and turning movement of the discharge end of the latter, and means also actuated by the fluid actuated means for periodically intercepting the jet of water issuing from said discharge end of the nozzle.

15. In a sprayer, a water pipe, a nozzle rotatably mounted on said water pipe, having a discharge end movable about an axis disposed in angular relation to the axis of rotation of the nozzle, fluid actuated means simultaneously effecting rotation of the nozzle and turning movement of the discharge end of the latter, means also actuated by the fluid actuated means for periodically intercepting the jet of water issuing from said discharge end of the nozzle, said last mentioned means including a movable lever, and an adjustable water deflecting member carried by the extremity of said lever.

In testimony whereof he has affixed his signature.

DONALD ELDER.