March 17, 1931. F. M. POTTENGER, JR 1,796,941

SPRINKLER SYSTEM

Filed May 31, 1928

Fig. 1.

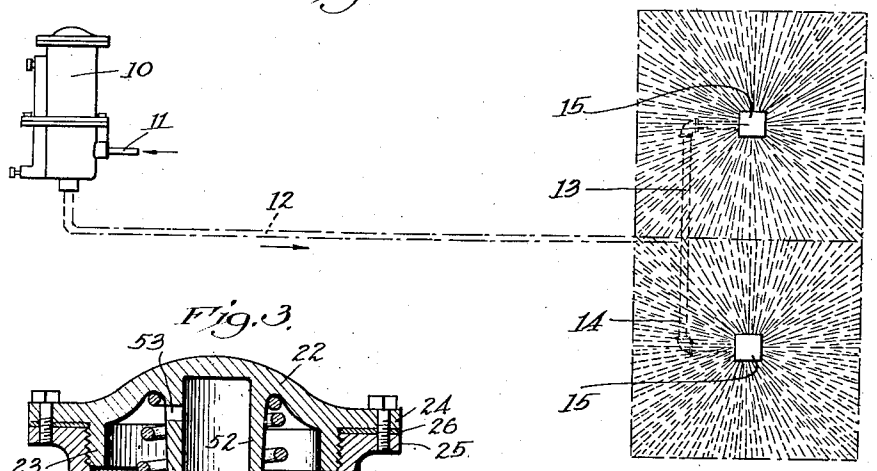


Fig. 3.

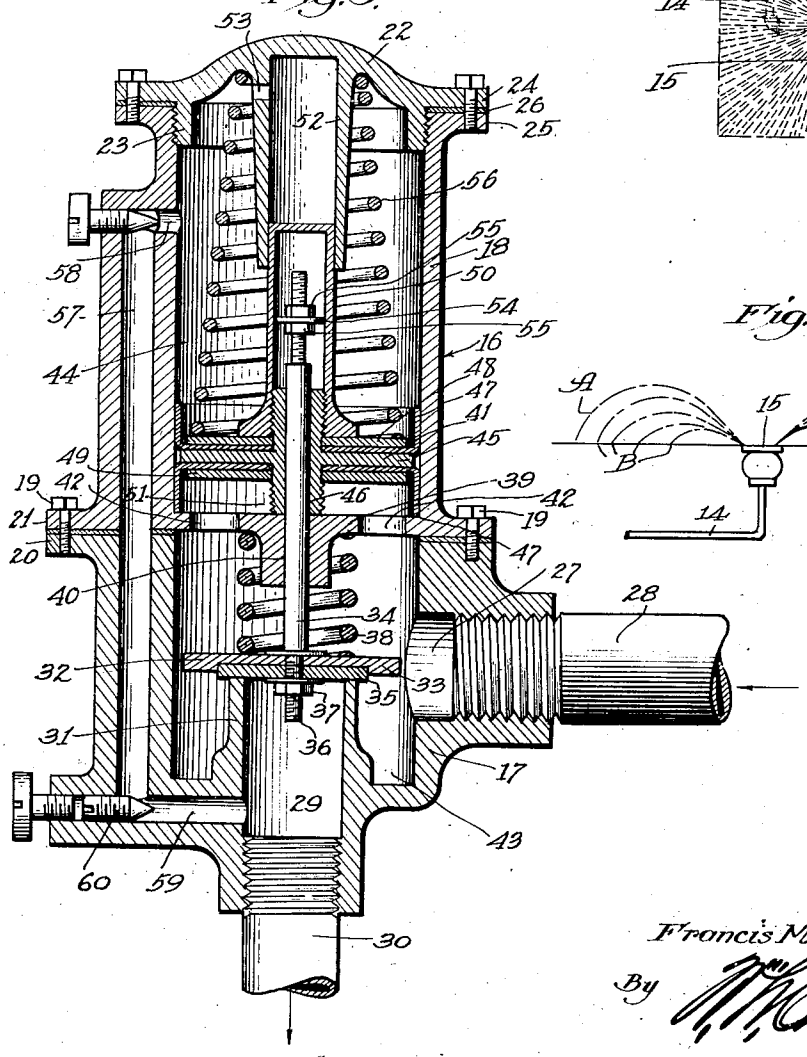


Fig. 2.

Inventor:
Francis M. Pottenger.
By
his Attorney.

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UNITED STATES PATENT OFFICE

FRANCIS M. POTTENGER, JR., OF MONROVIA, CALIFORNIA

SPRINKLER SYSTEM

Application filed May 31, 1928. Serial No. 281,624.

This invention pertains to sprinkling systems for lawns, or other vegetation, and is particularly applicable to systems in which sprinkler heads are utilized in fixed positions and arranged to sprinkle areas of definite size and shape. In its broader aspects it is similar to my invention shown and described in two co-pending applications, Serial No. 281,623, filed May 31, 1928, and Serial No. 281,625, filed May 31, 1928, although in the instant case the specific means for accomplishing my purposes is different from either of these.

The principal object of my invention is to provide a means operable in connection with a system of sprinklers and a supply of definite head and pressure, whereby the volume and pressure of the water supplied to the sprinklers may be alternately increased and diminished to effect its even diffusion over the entire areas.

I have conceived and perfected this invention particularly for use in connection with sprinkler heads like, or similar to, that shown and described in my co-pending application filed March 9th, 1923, Serial No. 623,960; although it is to be understood that it may be utilized in connection with other types of sprinkler heads where applicable.

Sprinkler heads, like that shown in my aforesaid co-pending application, have been devised for sprinkling areas of definite size and shape and these have been found very effective; but in many cases they are primarily arranged for sprinkling only the outer portions of the areas without any particular regard for sprinkling the portions adjacent the sprinkler head, except as this may be accomplished by the light spray or drops falling from the streams directed to the outer portions; or if they are arranged to indiscriminately direct streams to different portions of the area, these always fall in substantially the same place.

As it is always a desideratum to conserve water supply and minimize the amount used for sprinkling lawns, and the like, and at the same time provide an adequate irrigation, it is my foremost object to provide this means whereby an equal and adequate distribution of water over any particular area may be effectively accomplished with a minimum of waste. My present invention accomplishes this in a very efficient manner and is adaptable to all sprinkling or irrigating systems and may be adapted to water supplies of various heads and pressures.

The salient features of my invention are more fully set forth in the following specification, reference being made therein to the accompanying drawings for purposes of illustration.

In these drawings:

Fig. 1 is a diagrammatic view showing the use of my invention in connection with a lawn sprinkling system;

Fig. 2 is a diagrammatic view illustrating how a variable current accomplishes the entire sprinkling of a definite area; and

Fig. 3 is an enlarged sectional view through one form of mechanism I have designed for effecting a variable current in connection with a water supply of definite head and pressure.

Referring now to these drawings the numeral 10 designates generally my improved variable control means; 11 indicates a water supply pipe connected to the mechanism 10 and 12 a discharge pipe connected, as by means of laterals 13 and 14, to any number of sprinkler heads 15.

While heads 15 of any type may be utilized in this system, it may, for the purpose of disclosing the principles of my invention, be assumed that these are of a type similar to that shown in my aforementioned copending applications for sprinkling areas of definite size and shape. With sprinkler heads of this type ordinarily the outer portions of the areas get the most water while those portions adjacent the sprinkler head get the least; consequently, either the outer portions get too much water or the inner portions do not get enough, within a given period of time, unless some means is devised for varying the force of the water supply and thereby altering the trajectories of the streams to throw them to points at different distances from the head. This I accomplish by the mechanism 10.

Referring now particularly to Fig. 3 the numeral 16 designates generally a housing containing the mechanism by which I vary the pressure and amount of water delivered to the sprinklers 15. For convenience and economy of manufacture I show this to be made in two parts, viz., a lower portion or base 17 and a cylinder 18 mounted thereon, and secured in place as by means of screws 19 extending through complementary flanges 20 and 21; however, the entire housing 16 may be made in the form of a single cylinder, if desired. The upper end of the cylinder 18 is closed by removable cap 22, which is preferably secured in place by a screw threaded connection between flange 23 and the cylinder wall. Flanges 24 and 25 may be provided on the cap and cylinder, respectively, between which a gasket 26 may be placed to insure a water tight connection.

An inlet port 27 is placed in the wall of the base 17 into which a water supply pipe 28 is secured, preferably by a screw threaded connection; and an outlet port 29 is also arranged in its bottom, preferably co-axial with the cylinder 18, and into which a discharge pipe 30 is likewise secured.

A flange 31 surrounds the outlet port 29 and extends a short distance inwardly from the wall of the base, upon which a valve 32 seats. This valve may be of any of the usual constructions, consisting of a metal plate or disk 33, mounted upon a stem 34 which extends into the cylinder 18. If desired this valve may have a facing 35, of leather or the like, and the two retained in place on the screw threaded end 36, of the stem 34, by means of a nut 37. The valve 32 is held normally seated upon the flange or seat 31 by the action of an expansile helical spring 38, confined between the plate 33 and a transversely disposed partition 39. The partition 39 not only serves this purpose but also provides a guide bearing 40 for the stem 34 and also acts as a stop for a piston 41 in cylinder 18. Apertures 42 are arranged in the partition 39 so that water may freely pass from the chamber 43, in the base 17, into the piston chamber 44 to actuate the piston 41.

Piston 41 consists of a plate or disk 45 having a central tubular bearing portion 46 bored out to slide freely upon the valve stem 34. Cup shaped packing washers 47, of leather or similar material, are secured on opposite faces of the disk 45 by means of plates 48 and 49, the former retained by a tubular guide member 50 screw threadedly joined to the upper end of the bearing 46 and the latter by a nut 51 similarly secured on its lower end.

The guide member 50 slidably engages in a guide sleeve 52, preferably formed integral with and depending from the cap 22; this sleeve having a small orifice 53 therein, adjacent its top, to permit free axial movement of the member 50 therein. A collar or washer 54 is adjustably secured on the upper end of the stem 34—as by means of locknuts 55—which is engaged by the upper end of the bearing 46 upon upward movement of the piston 41. The washer 54 is preferably normally spaced from the upper end of the bearing portion 46, when the piston is in its lowermost position, as illustrated. The piston 41 is normally held downward, in its position adjacent the partition 39, by the action of an expansile spiral spring 56, confined between its upper face and cap 22.

A by-pass 57 connects at one end to the cylinder 18, through a port 58 placed above the uppermost position to which the piston 41 moves, and at its lower end, through a port 59, to the outlet port 31, below the valve seat. Or, if desired, it may be connected to the discharge pipe 30. An adjusting screw 60 is provided in the port 59, in the form of a needle valve, which regulates the passage of water through the by-pass.

In the operation of this device the parts are always normally in the positions illustrated in Fig. 3, with the piston 41 held downwardly against the partition 39 by the action of spring 56, and the valve 32 held seated over the port 29 by the action of spring 38. Water supplied under pressure from any suitable source enters the chamber 43 through the supply pipe 28 and port 27, filling it and passing through the apertures 42 to contact with the piston 41. This raises the piston against the action of spring 56, which, after traveling a short distance, raises the valve 32 off its seat, against the action of spring 38, by the upper end of the bearing 46 engaging the washer 54 on stem 34. This permits the water to pass outwardly through port 29 and pipe 30 to the sprinklers 15. As soon as the line to the sprinklers is filled the pressure therein backs up until it is the same as that of the supply pipe 28 and chamber 43 when it passes through the by-pass 57 into the cylinder 18 on the upper side of piston 41. As soon as the water pressure in cylinder 18 is equal to that of the chamber 43 the action of spring 56 moves the piston 41 downwardly, which also permits valve 32 to be lowered by the action of its spring 38. As the valve 32 nears its seat and diminishes the supply of water entering the discharge pipe 30, the pressure therein is reduced which correspondingly reduces the pressure in cylinder 18 through the by-pass 57. As the pressure in chamber 43 will then overbalance the pressure in cylinder 18 the piston 41 will be again raised against the action of its spring 56, opening the valve 32 wider and again supplying the full pressure to pipe 30. From this it will be seen that as long as there is water pressure on the supply pipe 28, the valve 32 will never be entirely closed or seated, and that the alternate increase and decrease of pressure in

the cylinder 18 will cause a variable current to be supplied to the pipe 30. This has the effect of sprinkling the area as illustrated diagrammatically in Fig. 2. That is, when the valve 32 is full open the water pressure of supply pipe 28 is supplied to pipe 30 which will cause the water to be thrown to the outermost portions of the area, as illustrated by the lines A, and as it is decreased by the action of this device the trajectories of the streams will fall correspondingly closer to the heads 15, as designated by the lines B. This results in an even dispersion of water over the entire area.

When the water is first turned on and enters the chamber 43 through pipe 28, the pressure in the chamber builds up to that of the line 28, which effects an upward movement of piston 41, and which then opens valve 32. It can be readily seen that as soon as valve 32 opens the pressure in chamber 43 will be immediately reduced, owing to the discharge of water through the port 29, which will first result in a partial closure of the valve, but will not entirely close it. Just as soon as the pipe 30 is filled the action of the device will be even and smooth and will result in supplying the variable current to pipe 30 alternately increasing and decreasing in pressure to effect the desired result.

In this preferred form I have made the connection between valve 32 and piston 41 adjustable, by means of the nuts 55 and washer 54 on the upper screw threaded end of stem 34, so the distance which valve 32 will be raised may be varied to suit particular circumstances. I have also spaced the washer 54 a short distance above the upper end of bearing 46, when the piston 41 is in its normal inoperative position, to permit piston 41 to get away from the partition 39, or any stop, provided, before having any action on the valve 32. This provides a certain flexibility and conduces to even and smooth operation of the device.

While the above described mechanism is my preferred form certain of the parts may be eliminated if desired and the device further simplified. For instance, it may consist of a single cylinder in which the piston 41 is slidably mounted and rigidly connected to the valve 32, these two members being held in position to normally seat the valve by the action of a single spring such as 56. Springs 38 and 56 are provided to insure proper action of piston 41 and valve 32, but these may be dispensed with and these members actuated only by the water pressure and gravity, without departing from the spirit of my invention. In this connection I may state I reserve the right to make such other changes or modifications in structure as will be permissible within the scope of the appended claims.

Having described a preferred form of my invention, I claim:

1. A device of the character described, comprising a cylinder, a piston in the cylinder, inlet and outlet ports in the cylinder positioned on one side of the piston, a valve for the outlet port, an operative connection between said valve and piston, means to yieldingly hold the valve normally closed, means to yieldingly hold the piston towards the inlet port so the fluid pressure on the port side of the piston will cause it to open the valve against the action of said springs, and a passage connecting the outlet outside the valve with the cylinder on the opposite side of the piston.

2. A device of the character described, comprising a cylinder, a piston in the cylinder, an inlet port in the cylinder always open to a source of fluid pressure, an outlet port in the cylinder on the same side of the piston as the inlet port, a discharge pipe connected to the outlet port, a valve for the outlet port, having a stem slidably extending through the piston, a spring for holding the valve seated, a spring for holding the piston towards the valve and inlet port, a collar on the end of the valve stem, normally spaced from the piston and adapted to be engaged thereby to open the valve, and a passage connecting the discharge pipe with the cylinder on the opposite side of the piston.

3. A device of the character described, comprising a cylinder, a piston in the cylinder, inlet and outlet ports in the cylinder on one side of the piston, a valve for the outlet port, means to limit movement of the piston towards the outlet port, means to yieldingly hold said piston against said limiting means, means to yieldingly hold said outlet port valve seated, a passage connecting the cylinder above the valve with the outlet port, and a delayed movement lifting connection between the outlet valve and the piston.

In witness that I claim the foregoing I have hereunto subscribed my name this 13th day of October, 1924.

FRANCIS M. POTTENGER, JR.