Dec. 4, 1951 K. P. LANCASTER 2,577,337

SPRINKLER CONTROL

Filed July 24, 1947

FIG. 1.

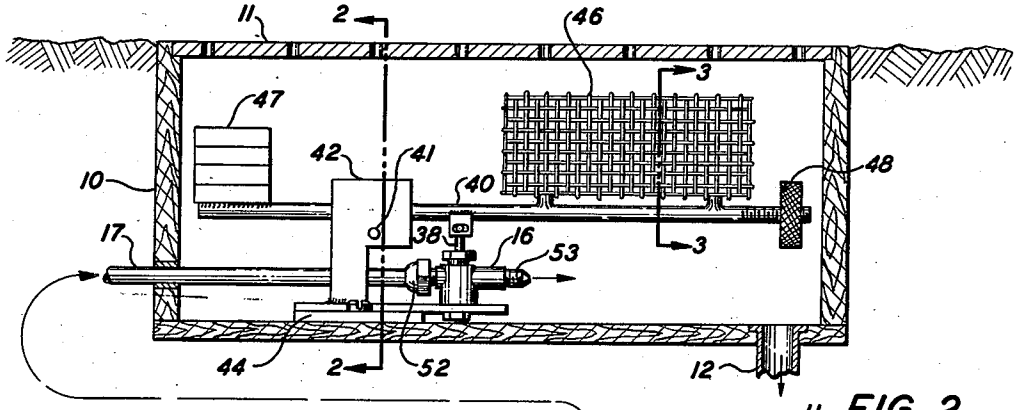
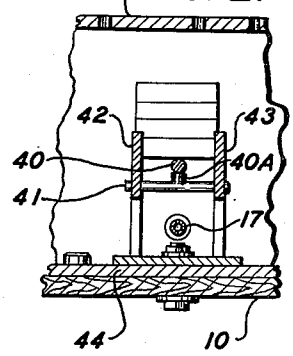


FIG. 2.



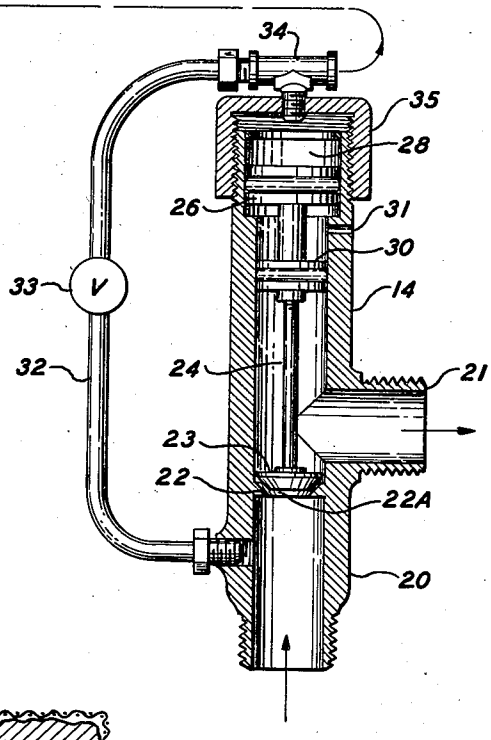
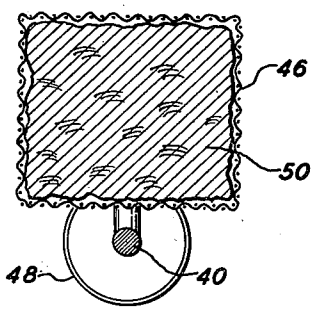


FIG. 3.



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SPRINKLER CONTROL

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4 Claims. (Cl. 299—25)

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This invention relates to sprinkling systems and more particularly to a device for automatically controlling sprinkling systems responsive to atmospheric conditions.

Most sprinkling systems used in lawns, or orchards, gardens, etc., must be manually operated and therefore possess the inherent disadvantage of being dependent upon human judgment and inclination for their operation. To eliminate this element of uncertainty sprinkler systems may be operated by control mechanisms adapted to operate the sprinklers responsive to the passage of time. Although possessed of the advantage of certainty of operation, such time responsive control means suffer the disadvantage of being insensitive to the atmospheric conditions which are, in effect, the criteria for determining when watering in required. Thus if the time interval between operating periods is set so as to insure sufficient water under all humidity conditions, such a system will be wasteful of water when the humidity is high.

It is an object of the present invention to provide a simple and economical sprinkler controller operable responsive to the same atmospheric conditions which are in the last analysis determinative of the moisture needs of the plants to be watered.

The aforegoing and other objects are accomplished according to the invention by the provision of a flow control valve and a pilot valve; the pilot valve being adapted to open and close the flow control valve responsive to atmospheric conditions. In order to accomplish this feature the pilot valve is actuated by a water reservoir preferably in the form of a body of absorbent material which is suspended so as to permit movement thereof and is so balanced that the absorption and and desorption of water therein and therefrom will induce such movement. The vertical motion of this body of absorbent material is used to actuate the pilot valve through a connecting plunger.

In one embodiment of the invention the body of absorbent material is mounted on one end of a lever which is counter-weighted at its opposite end to provide the aforementioned balance. The plunger is depended from the lever arm and is raised and lowered thereby so as to open and close the pilot valve. Any means of providing this balanced suspension of the absorbent body may be employed. Thus the absorbent body may be mounted directly on the plunger and a proper balance may be obtained by spring loading the plunger. In short the pilot valve is actuated by

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movement of a suspended body of absorbent which is so balanced that variations in weight thereof due to the absorption and desorption of water will induce this movement. Any means of suspending and balancing the absorbent body is therefore within the contemplation of the invention.

The invention may be more clearly understood by reference to the following detailed description of a specific embodiment thereof which description is taken in reference to the accompanying drawing in which:

Fig. 1 is a diagram of the apparatus showing the control valve in sectional elevation;

Fig. 2 is a sectional elevation taken on the line 2—2 of Fig. 1; and,

Fig. 3 is a sectional elevation taken on the line 3—3 of Fig. 1.

The device is adapted to be mounted in a pit or box on a lawn within range of one of the sprinklers of the lawn sprinking system. For example, it may be mounted in a box 10 having a perforated cover 11 more or less flush with the surface of the ground The box 10 is provided with a drain 12 and moisture entering the box either through the perforated cover or the pilot valve, as hereinafter described, passes off through the drain. The control valve 14 although removed from the box 10 in the diagrammatic view of Fig. 1 may likewise be mounted therein if desired. However, the control valve 14 communicates with the pilot valve 16 through a pipe or tube 17 and may therefore be either remote from or close to the pilot valve. The operation of the device is independent of the distance separating the pilot and control valve.

The control valve 14 has an inlet 20 joinable to a water main and an outlet 21 which is connected to the sprinklers of the sprinkling system. Separating the inlet 20 and the outlet 21 is an orifice plate 22 chamfered as shown to provide a seat 22A for the similarly chamfered plug 23. The plug 23 is mounted on the piston shaft 24 which is connected to the piston 26 riding in the chamber 28 in the upper part of the valve 14. It will be seen that the cross-section of the chamber 28 and of the piston 26 riding therein is greater than the cross-section of the inlet 21. Water flowing into the valve body from the inlet 20 is prevented from flowing into the chamber 28 by the sealing ring 30 mounted on the piston shaft 24. A breather hole 31 is provided in the wall of the valve 14. A by-pass 32 provided with the valve 33 connects the inlet 20, i. e. the pressure side of the water main with the chamber 28

through the T nipple 34 mounted in the top 35 of the chamber 28. The line 17 communicates between the nipple 34 and the pilot valve 16 providing fluid flow means between the water main and the pilot valve 16.

When the pilot valve is closed and the valve 33 is open water pressure developed in the chamber 28 will exert a force on the piston 26 in excess of that exerted on the bottom of the plug 23 by the water pressure in the inlet 20. This differential in force exerted on the piston 26 and the plug 23 is due to the greater cross-sectional area of the piston 26 and will cause the piston 26 to move downwardly seating the plug 23 in the seat 22A. In this condition the sprinklers will be shut off.

When the pilot valve is open in the manner hereinafter described the pressure in the chamber 28 will be relieved through the line 17 and the water passing through the line 17 and the pilot valve 16 will flow out of the box 10 through the drain 12. The valve 33 in line 32 is used to hold the water flow through the bypass and pilot valve to a maximum when the pilot valve is open.

When the pressure is thus relieved in the chamber 28 the force of the water against the bottom of the plug 23 will unseat the plug to permit water flow from the main through the outlet 21 to the sprinkler. In this manner the operation of the control valve 14 is determined by the pilot valve 16.

The pilot valve 16 is a conventional plunger type valve having the plunger 38 pivotally mounted at its upper end to the lever 40. The lever 40 is suspended on the fulcrum 41 which is pivotally mounted to the brackets 42 and 43. The brackets 42 and 43 are mounted to a base plate 44 which also supports the pilot valve 16.

A screen box 46 containing an absorbent material 50 is mounted on one end of the lever 40 and a counter-weight 47 is mounted on the opposite end to balance the screen box 46. A second weight 48 is threaded on the same end of the lever 40 as the box 46 and serves to permit fine adjustment of the balance between the counter-weight 47 and the box 46. The adjustment weight 47 may be threaded on the opposite end of the lever or anywhere throughout the length of the lever if desired. In the preferred form of the invention the lever is mounted to the pivot by means of the riser 40A in order to impart an eccentric action thereto. This eccentric action serves to induce a sudden and exaggerated displacement when the balance is destroyed. This feature is desirable in order to cause rapid actuation of the pilot valve 16 rather than a gradual opening or closing.

The screen box 46 is filled with a water absorbent material 50; peat moss constituting the preferred absorbent material. Although in Figs. 1 and 3 the box is shown to be made of screen such is not a necessary feature of the invention inasmuch as the absorbent material 50 may be enclosed within any type of container which permits the ingress and egress of moisture. Thus a perforated metal container would be equally satisfactory. Further if the absorbent material possesses sufficient structural strength it may be mounted directly on the lever eliminating the container 46.

As above described the plunger 38 of the pilot valve 16 is depended from the lever 40 so that rotation of the lever about the fulcrum 41 will raise and lower the plunger 38 opening and closing the pilot valve 16. The pilot valve 16 has the inlet 52 to which line 17 is attached and the outlet 53 which may open into the bottom of the box 10, as shown, or may be directly connected to the drain.

Although the plunger 38 is shown to be dependent from the lever 40 intermediate the fulcrum 41 and the box 46, such is not a necessary feature of the invention as the pilot valve will work with equal satisfaction if the plunger 38 is dependent from the lever on the opposite side of the fulcrum 41. If this latter type of assembly is employed it is necessary to use a reverse acting pilot valve to compensate for the opposite stroke of the plunger.

The action of the device is as follows: When the sprinklers of the sprinkling system are on, water drops through the perforated cover 11 and wets the absorbent material 50 in the box 46. When a predetermined quantity of water is absorbed by the material 50 to destroy the lever balance, the lever will rotate clockwise, with reference to Fig. 1, depressing the plunger 38 and closing the pilot valve 16. When this happens pressure builds up in the chamber 28 forcing the plug 23 against the seat 22A so as to shut off the water to the sprinklers. When water in sufficient quantity has evaporated from the absorbent material in the box 46 the counter-weight 47 causes the rotation of the lever 40 in a counter-clockwise direction, raising the plunger 38 and opening the pilot valve 16. When the pilot valve 16 is opened in this manner the pressure in the cylinder 28 is relieved through the line 17 and the pilot valve 16 and the water pressure developed in the inlet 20 raises the plug 23 thereby opening the valve and turning the sprinklers back on.

The water needs of a lawn or other types of vegetation are of course dependent upon the evaporation rate therefrom. By the provision of a sprinkler controlling system which is likewise dependent upon evaporation rate the sprinkling system may be controlled responsive to the water requirements of the vegetation. Further the controlling system of the invention is provided with means of adjustment, i. e. the balance 48 so that the particular point at which the sprinklers are turned on, with reference to the moisture content of the ground, may be varied in conformity with the moisture requirements of particular types of vegetation.

Many modifications in the controller of the invention may occur to those skilled in the art without departure from the scope of the invention. Thus although the control valve 14 has been shown outside of the box it may, if desired, be placed within the box 10. Similarly, the apparatus may be mounted on the surface of the ground as well as counter-sunk therein without changing its operation. These and other modifications of similar nature are included within the contemplation of the invention as set forth in the foregoing description and the following claims.

I claim:

1. In a sprinkler system including a pressure control valve and a pilot valve operable to actuate the pressure control valve, means for operating the pilot valve comprising a body of water absorbent material disposed to receive water directly from the sprinklers and vertically displaceable as a function of the water content of the body and means interconnecting the body and pilot valve to actuate said pilot valve responsive to vertical displacement of the body.

2. An apparatus according to claim 1 wherein

the structure of water absorbent material comprises peet moss.

3. In a sprinkler system including a pressure control valve and a pilot valve operable to actuate the pressure control valve, means for operating the pilot valve comprising a lever pivotally mounted about the pilot valve, a structure of water absorbent material mounted on one end of the lever and disposed to receive water directly from the sprinklers, a plunger pivotally depending from the lever and adapted to open and close the pilot valve responsive to motion of the lever, and means balancing the lever so that motion thereof will be dependent upon the quantity of water in the material.

4. An apparatus according to claim 3 wherein the lever is so pivoted as to include a sudden and exaggerated displacement when the balance is destroyed.

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