Oct. 17, 1933. M. D. RUSSELL 1,930,983

ELECTRICALLY OPERATED SPRAYING APPARATUS

Filed Dec. 29, 1932 4 Sheets-Sheet 1

FIG. 1

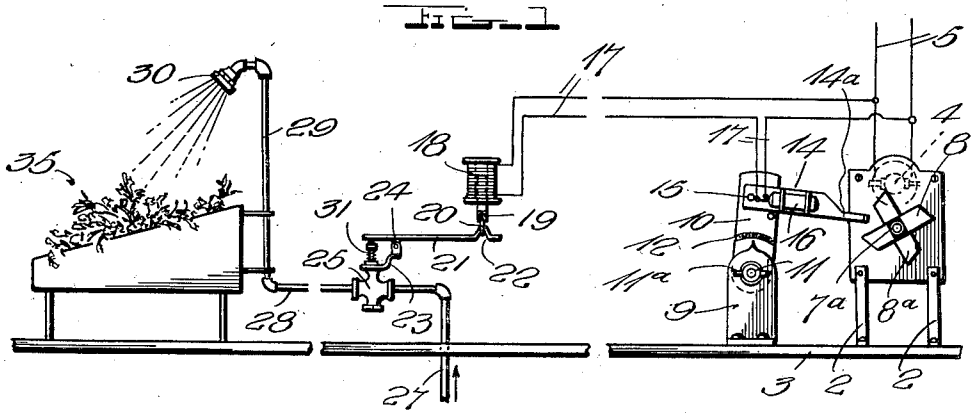


FIG. 2

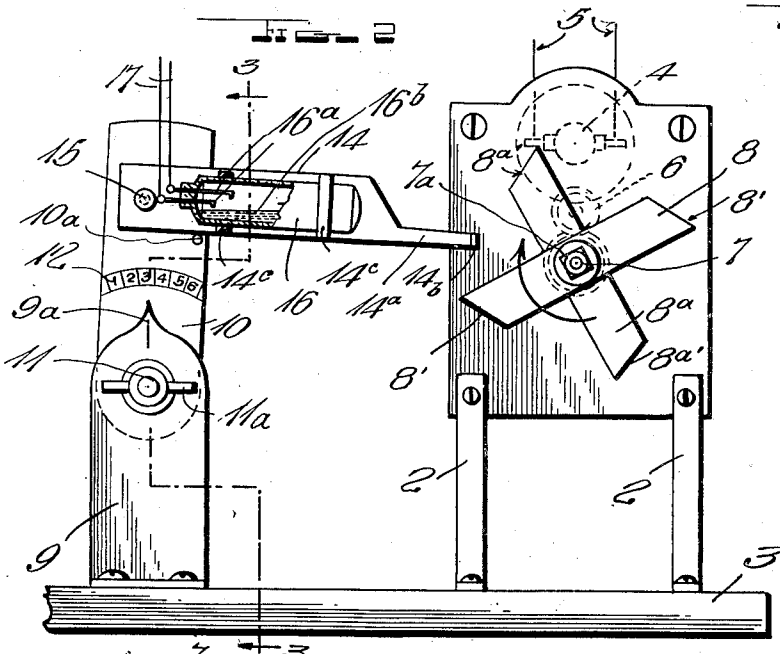


FIG. 3

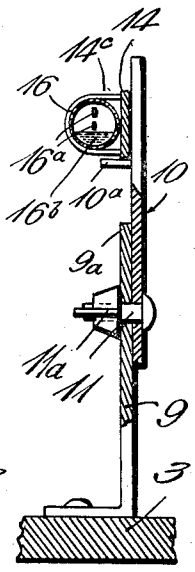
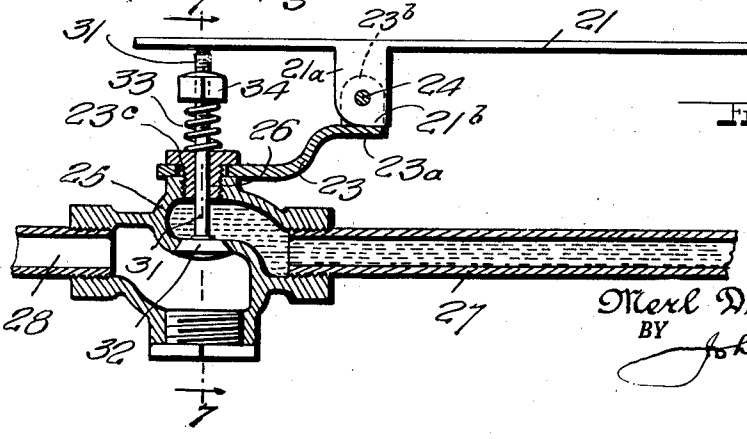


FIG. 4



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ELECTRICALLY OPERATED SPRAYING APPARATUS

Filed Dec. 29, 1932 4 Sheets-Sheet 2

FIG. 5

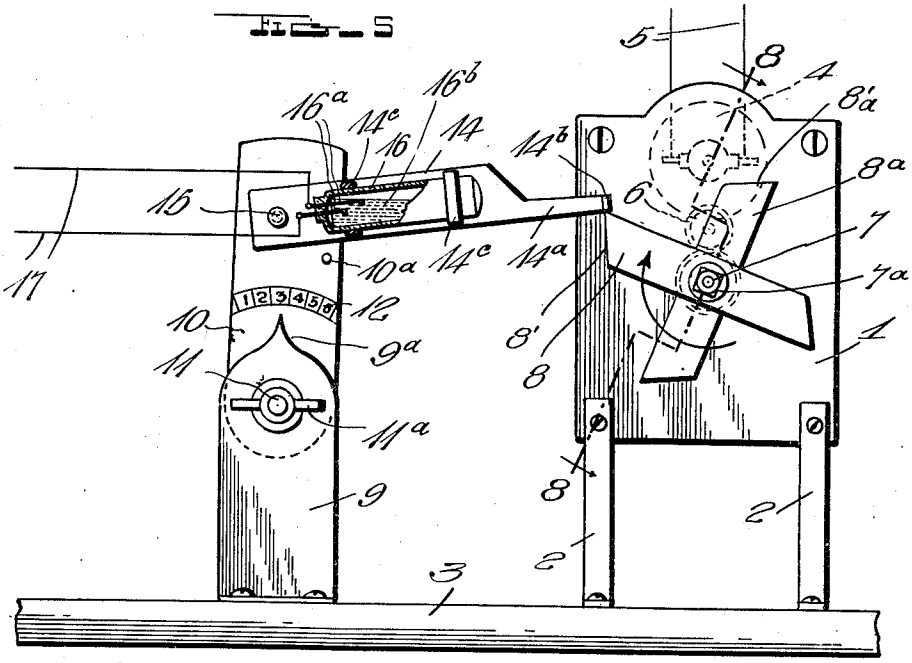


FIG. 7

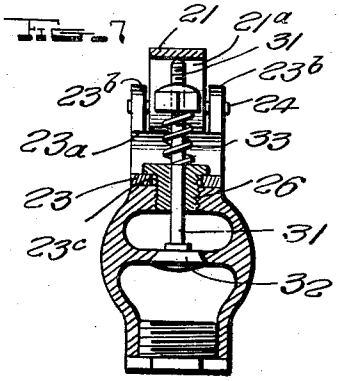


FIG. 8

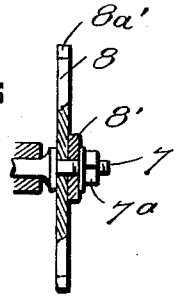
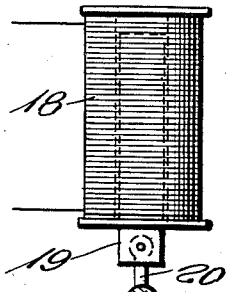
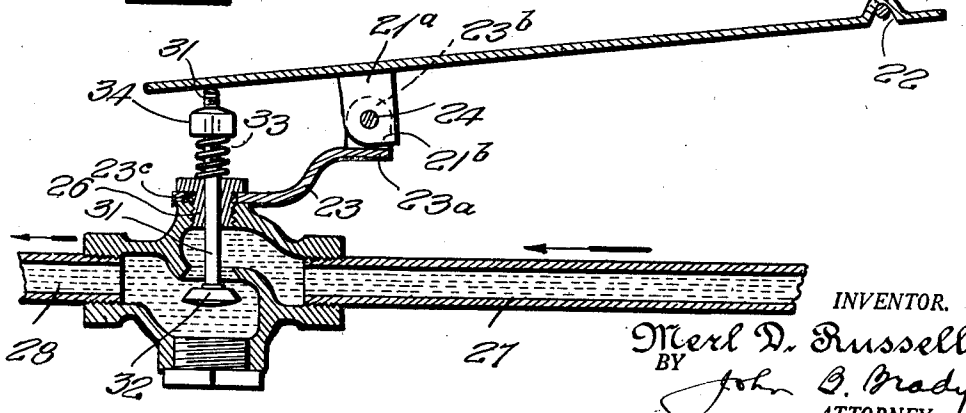


FIG. 6



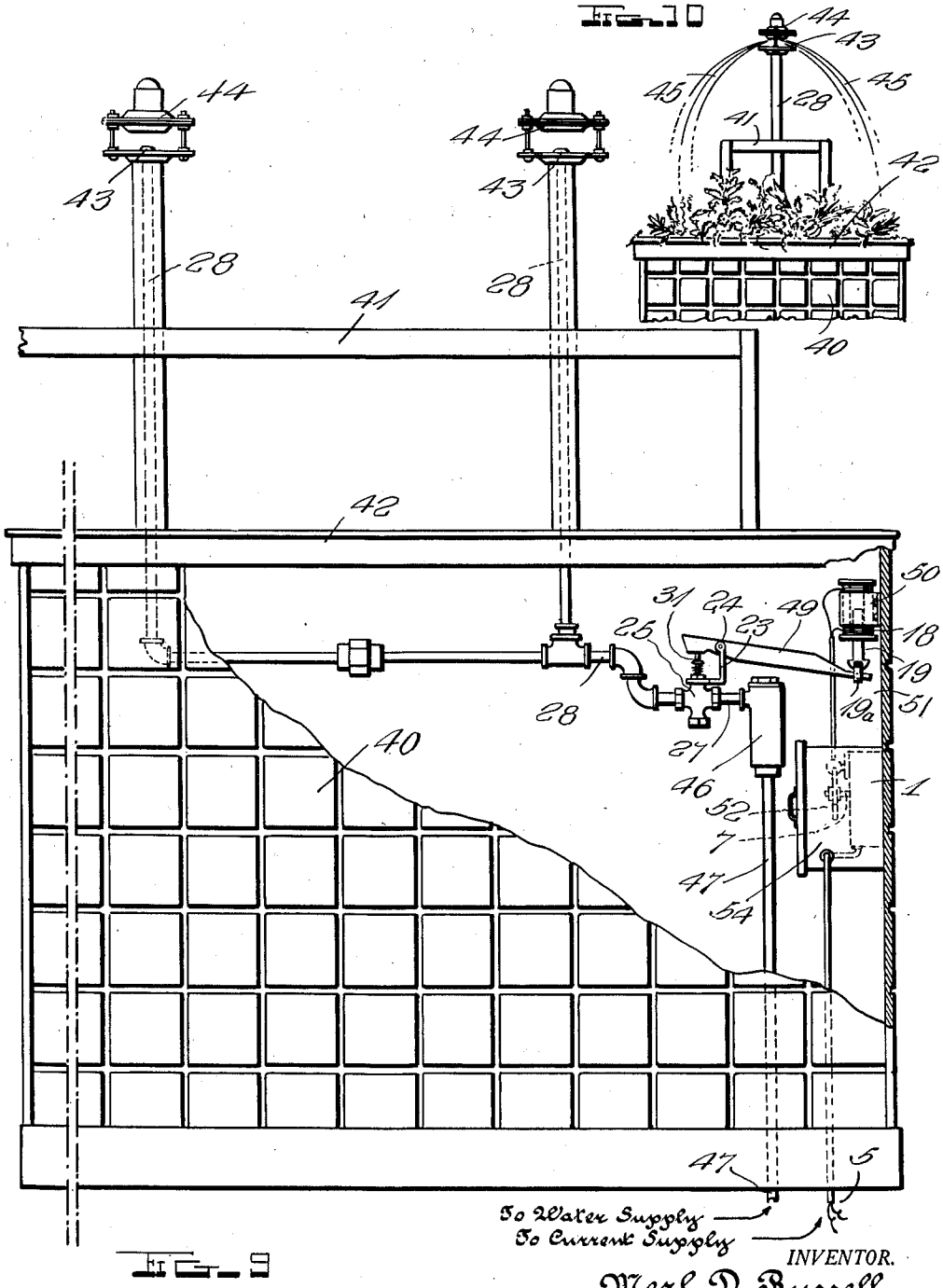


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ELECTRICALLY OPERATED SPRAYING APPARATUS

Filed Dec. 29, 1932 4 Sheets-Sheet 3

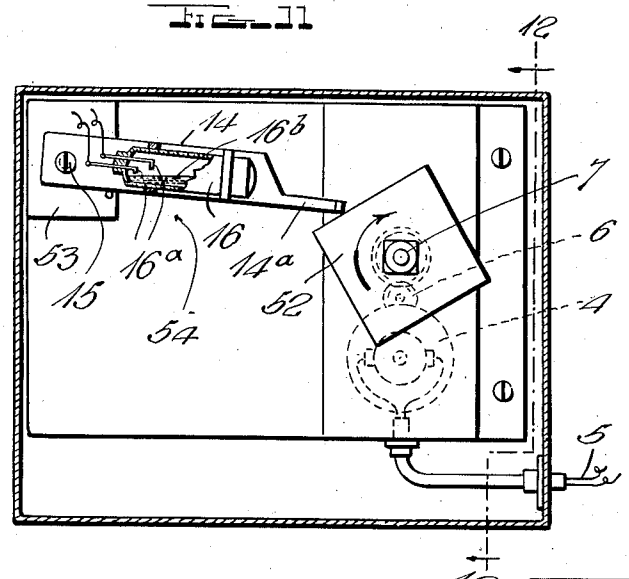


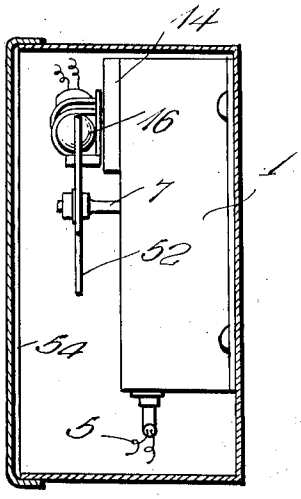
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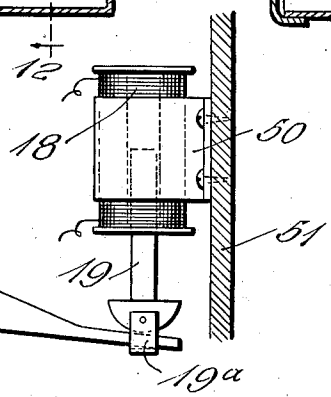
Oct. 17, 1933. M. D. RUSSELL 1,930,983

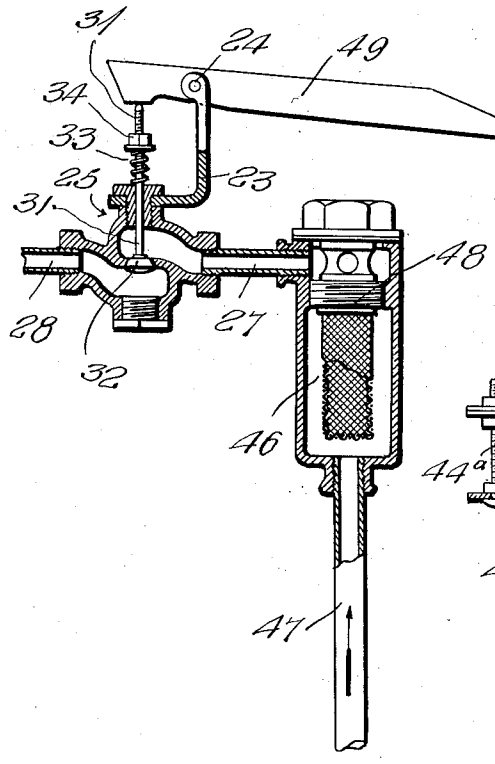
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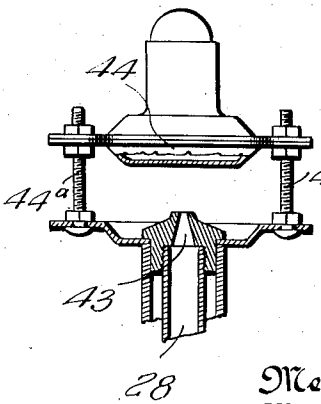
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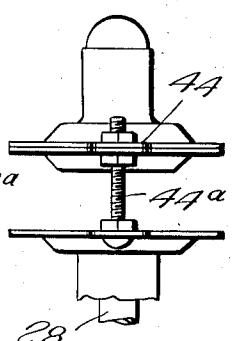












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Patented Oct. 17, 1933

1,930,983

UNITED STATES PATENT OFFICE

1,930,983

ELECTRICALLY OPERATED SPRAYING APPARATUS

Merl D. Russell, New Philadelphia, Ohio

Application December 29, 1932
Serial No. 649,431

4 Claims. (Cl. 200—33)

My invention relates broadly to electrically operated spraying apparatus and more particularly to a simplified construction of electrically operated control mechanism for insuring the periodic operation of a spray.

One of the objects of my invention is to provide a construction of electrically operated control device adapted to be attached to a valve in a mist spray system and associated with means for periodically activating the control for predetermined time intervals for operating a spray for predetermined periods of time.

Another object of my invention is to provide a simplified construction of valve actuator adapted to be attached to the control valve of a mist spray system for electromagnetically controlling the operation of the valve at predetermined time intervals for effecting a spraying operation at periodic intervals.

Still another object of my invention is to provide a construction of control switch for periodically closing an electrical circuit having means for adjusting the total time period over which the switch remains closed for correspondingly controlling the time interval over which a spraying operation is effected.

A further object of my invention is to provide an adjustable mounting device for a mercury switch in an electrical control system by which the relative time periods over which the mercury switch remains open or closed may be controlled.

Other and further objects of my invention reside in the arrangement of time controlled electric switch operated spray devices as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

Figure 1 is a schematic view illustrating the assembly of the spray valve system and the electrical control for actuating the valve at periodic intervals in accordance with my invention; Fig. 2 is an elevational view of the electrical control switch in open circuit position and the time actuated mechanism which is associated therewith; Fig. 3 is an elevational view partially in cross section, taken on line 3—3 of Fig. 2; Fig. 4 is a vertical sectional view taken through the spray control valve and illustrating the attachment device and valve actuator of my invention; Fig. 5 is an elevational view showing the circuit controller shifted to closed circuit position for a time interval governed by the operation of the timing motor; Fig. 6 is a longitudinal sectional view taken through the spray valve and the valve actuating mechanism and showing the electromagnetic actuator in actuated position for opening the spray valve; Fig. 7 is a transverse sectional view through the spray valve on line 7—7 of Fig. 4; Fig. 8 is a cross sectional view taken through the adjustable arms carried by the timing mechanism in the apparatus of my invention on line 8—8 of Fig. 5; Fig. 9 is a side elevation with parts broken away showing a modified arrangement of my improved vegetable sprayer; Fig. 10 is a fragmentary end elevation of the upper portion thereof; Fig. 11 is a front elevation, showing the mercury switch and the associated driving motor for periodically closing and opening the automatic water valve, the casing enclosing these parts being shown in section; Fig. 12 is a transverse vertical sectional view taken on line 12—12 of Fig. 11; Fig. 13 is a sectional view on an enlarged scale showing the relationship existing between the automatic water valve, the water filter and the solenoid actuating the water valve; Fig. 14 is a side elevation partly in section showing my improved baffle plate spray nozzle; and Fig. 15 is an end elevation thereof.

I have developed my fluid spray control system with a view of simplifying the mechanism and rendering the cost of installation of such mechanism relatively inexpensive. The attachment of my invention may be applied to a standard water supply system for controlling a spray at periodic intervals. By use of my invention, it becomes unnecessary to employ complicated forms of valve mechanisms for effecting periodic sprays. I install a small timing motor and mercury switch device adjacent a spray valve installed in the usual water supply system. I provide an electromagnetic control for the spray valve which is energized by the electric circuit controller over periodic time intervals for controlling the operation of the spray valve and correspondingly controlling the distribution of fluid in a spray for predetermined time intervals. The spray system of my invention may be used for a variety of purposes such as the application of moisture in a fine mist to green vegetables on display in retail stores or markets for the purpose of keeping such vegetables crisp and fresh and in a salable condition. Numerous applications of my invention will suggest themselves and by illustrating my invention in association with a vegetable spray system, I do not intend to limit uses to which my invention may be put.

Referring to the drawings in detail, reference character 1 designates the casing of a timing motor. This motor may be of the induction type

as generally employed in electrically driven clocks, I have indicated the casing 1 as supported on standards 2 mounted on the base 3. The electrically driven motor has been designated at 4 energized from the line wire circuit 5. A system of reduction gears is represented at 6 geared to drive the shaft 7. A pair of arms 8 and 8*a* are mounted on shaft 7 as shown. These arms are angularly adjustable to selected positions and may be locked in position by an adjusting nut 7*a* for maintaining the arms in a particular angular relation. The arms 8 and 8*a* are each provided with cam faces on the extremities thereof which I have designated at 8′ and 8*a*′. The arms are driven by shaft 7 at a rate such that the arms make a complete revolution once every hour. The four arms which have been selected for illustration of the principles of my invention are shown set at 90° with respect to each other which will result in spraying operations at 15 minute intervals by the actuation of mechanism which will be hereinafter explained. The control mechanism which affects the periodic operation of the spray includes an electric circuit controller and a solenoid attachment for a spray valve. The circuit controller is mounted on a standard 9 attached to base 3. Standard 9 carries an angularly adjustable bracket 10 which is pivotally connected to standard 9 by means of the bolt member 11 and adjustable thumb nut 11*a*. The angularly adjustable bracket 10 carries a scale 12 having calibrations thereon adapted to coact with the indicator 9*a* at the upper extremity of standard 9. By loosening thumb nut 11*a*, the angularly adjustable bracket 10 may be shifted to selected angular positions for purposes which will be clear by reference to the mechanism carried by the angularly adjustable bracket 10. A pivotally mounted arm 14 is carried by the angularly adjustable bracket 10. The arm 14 is pivoted at 15 to the angularly adjustable bracket 10 and is limited in movement in one direction by a pin 10*a* while being free for movement in the opposite direction. The arm 14 has an extension 14*a* thereon extending in the path of the adjustable arms 8 and 8*a*. The extremity 14*a* is provided with a lateral extending foot 14*b* to insure contact with the arms 8 and 8*a* in the course of rotative movement of the arms under control of the timing motor. The arm 14 carries a mercury tube 16 which is supported on arm 14 by members 14*c* which encircle the tube 16 and secure tube 16 in a position on the arm 14. The tube 16 has a pair of electrodes 16*a* sealed in the end thereof, which electrodes are adapted to be shunted by the spool of mercury 16*b* when the arm 14 is angularly shifted. The electrodes 16*a* sealed in the end of tube 16 are electrically connected through conductors 17 with the solenoid 18 in series with the power supply line 5. The solenoid winding 18 operates upon a magnetic core member 19 which is connected through a link 20 to the lever 21. In order to provide a pivotal connection between lever 21 and link 20, I provide a substantially V-shaped notch 22 adjacent the end of the lever 21.

The lever 21 is provided with a downwardly disposed central lug, pivotally mounted as at 24, to the upstanding lugs 23*b* on the bracket member 23. The lug 21*a* on lever 21 terminates in an abutting edge face indicated at 21*b* adapted to abut with the portion 23*a* of strip 23 to prevent the lever 21 from dropping under the weight of the core 19 when the solenoid is deenergized. The bracket 23 is secured to the body structure of the valve 25 by means of the bushing 26 which is screw threaded into the body structure of the valve 25. The bracket 23 is apertured at 23*c* to permit the passage of the bushing 26 into the body structure of the valve 25. The bushing 26 is apertured for the passage of the valve stem 31. Head 32 of valve stem 31 serves to close the passage through the spray valve under the action of spring 33 as illustrated in Fig. 4. Spring 33 is concentrically disposed about valve stem 31 and bears against adjusting nut 34. The end of the valve stem 31 provides an abutment for the end of lever 21 which, in the position shown in Fig. 4, does not exert pressure upon the valve stem 31 so that the fluid which is led from the fluid supply line through pipe 27 and through valve 25 to pipe 28, and through pipe 29 to sprayer head 30 is shut off from the sprayer head 30. Fig. 1 illustrates the sprayer head 30 mounted adjacent a vegetable display stand. While I have shown the sprayer head 30 immediately over the vegetable display stand 35 it will be understood that the sprayer head 30 may be mounted adjacent a lawn, flower garden or green vegetable garden and utilized for periodically emitting a spray.

As shown in Fig. 6 the solenoid winding 18 is energized, as a result of which core 19 is drawn inwardly thus drawing up link 20 and lever 21 and depressing the valve stem 31, thus opening valve head 32 with respect to the valve seat and allowing fluid from pipe line 27 to pass through pipe valve 25 and through pipe line 28 and pipe line 29 to sprayer head 30. The energization of solenoid 18 is controlled by the movement of the tubular member 16 to a position wherein the mercury 16*b* closes the contacts 16*a*, thus closing the circuit from power source 5 to solenoid winding 18. The time interval over which the circuit to solenoid 18 remains closed depends upon the angular position of the angularly adjustable bracket 10 with respect to the position of the cam members 8 and 8*a*. That is to say, if the angularly adjustable bracket 10 is moved toward the timing motor the extremity 14*b* of arm 14 will be engaged for a longer time interval upon the cam faced extremities of the arms 8 and 8*a*. The arms 8 and 8*a* rotate in a clockwise direction so that the end of each arm successively engages the extremity 14*b* of arm 14. If the angularly adjustable bracket 10 is shifted toward the timing motor there is a greater overlapping of the extremity 14*b* of arm 14 with the successive arms and a longer time period will be consumed in elevating arm 14 and maintaining arm 14 in an elevated position for closing and maintaining closed the circuit through electrodes 16*a*. If however the angularly adjustable bracket 10 is shifted in a direction away from the timing motor, the time expended in elevating arm 14 and closing the circuit through electrodes 16*a* is shorter and the total time period during which the circuit is made complete through electrodes 16*a* is shorter. By accurately fixing the position of the angularly adjustable bracket 10 with respect to stand 9, the time interval during which the circuit remains closed compared to the time during which the circuit remains open can be accurately controlled. The rate at which the spray periods follow each other in succession is controlled by selectively fixing the angular position of arms 8 and 8*a* by properly setting the nut 7*a*.

The structure of the bracket which I provide is such that when the solenoid is deenergized, lever 21 will not fall below a horizontal position by

reason of the abutment between the edges of the depending lugs at 21*b* and the horizontal portion 23*a* of bracket 23. The fact that the operating arms 8 and 8*a* are adjustable permits control of the spray to be effected at two time periods at relatively close intervals, separated by a relatively long non-operating period and then followed by two spray periods at time intervals equal to the first mentioned spraying intervals. The fact that the circuit closer is mounted on a pivoted arm secured to an angularly movable bracket member permits an accurate selection of the length of time of the spraying and non-spraying intervals in order to more effectively carry out the process of maintaining green vegetables or other green products in a moist condition.

Figs. 9–15 show a modified arrangement of parts of the vegetable sprayer embodying my invention. The apparatus may be housed within an artistic frame structure shown at 40 in Fig. 9 above which, supports are provided at 41 and 42 for the mounting of trays of vegetables subject to spray of a mist emitted from nozzles 43 and deflected by baffle plates 44 for delivery as represented at 45 in Fig. 10 to the vegetables which are on display. The elevation of baffle plates 44 above nozzles 43 is adjustable on screw threaded members 44*a* as represented more clearly in Figs. 14 and 15. The nozzles 43 are supplied from the fluid delivery line represented at 28 which includes the control valve 25 similar to the valve heretofore described in Figs. 1, 4, 6 and 7. The valve 25 has an inlet pipe 27 connected thereto through a water filter unit represented at 46 in Fig. 13. The fluid supply line leaving the filter 46 is shown at 47 leading from a source of fluid supply under pressure. The filter 46 contains a removable filter unit represented generally at 48, the filter unit being readily removable after becoming clogged with solid matter screened from the fluid in the course of the passage thereof through the fluid supply system. A bracket 23, similar to the correspondingly numbered bracket in Figs. 1, 4 and 6 is provided on valve 25 illustrated in Fig. 13 and provides a fulcrum 24 for the lever 49 which engages the stem 31 of the valve for actuating the valve under control of the solenoid represented at 18. In the modified form of my invention, I have represented the solenoid 18 as supported from a suitable bracket mounting 50 on the vertical supporting surface 51 which may form a part of the ornamental housing 40. The yoke 19*a* is pivotally connected to armature 19 and engages the end of lever 49 for shifting lever 49 to a position actuating valve stem 31. The timing device illustrated in Figs. 9, 11 and 12 embodies a driving motor designated generally at 4 similar to the motor illustrated in Figs. 1, 2 and 5 and energized from power line 5. The driving motor operates a gear train represented generally at 6 for imparting rotative movement to the shaft 7 on which there is mounted, in this instance, the cam device 52. The cam device 52 engages the end 14*a* of the pivotally mounted lever 14 which is constructed in the manner illustrated in Figs. 1–3 and Fig. 5, that is to say, lever 14 is pivotally mounted at 15 on supporting member 53 housed within the cabinet structure 54. The switch contacts 16*a* are either shunted or disconnected by movement of lever 14 by the shifting of the pool of mercury 16*b* to a position where electrodes 16*a* are either submerged or left free. The electric motor operates the cam 52 to successively close and open the mercury switch. The apparatus functions to establish four contacts per hour through the mercury switch. In this form of the invention, the time that the spray is on depends upon how close the mercury switch is set to the cam 52 as it revolves. This can be adjusted so that a contact is established for a period of one minute, two or three minutes or any other predetermined length of time over which the spraying operation is designed. I have shown the apparatus assembled in a compact manner with leads 47 extending to the water spray line and leads 5 extending to the electric power. The maintenance of the apparatus is very simple and the installation does not require more than the usual skill of a mechanic.

The equipment of my invention is relatively inexpensive in manufacture and production and may be assembled in a domestic installation at small cost. The results achieved are highly desirable in that spraying operations at predetermined time intervals are controlled without the employment of complicated valve gear, heretofore required in the art.

While I have described my invention in one of its preferred embodiments, I desire that it be understood that modifications may be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A circuit controller comprising a support, a bracket pivoted to said support and extending upwardly therefrom, said bracket having calibrations thereon and the support being provided with a pointer for indicating the angular position of the bracket, means to secure said bracket in an adjusted position, an arm pivotally mounted on said bracket transversely thereof and having one extremity projecting from a side of the bracket, a limiting stop on said bracket providing a low abutment for said arm and preventing the arm from gravitating below a substantially horizontal position, means to intermittently move said arm upwardly, and a circuit maker and breaker carried by said arm and adapted to close an electric circuit when the arm is moved to an elevated position and open the circuit when the arm returns to its lowered position upon the abutment.

2. A circuit controller comprising a support, a bracket pivoted to said support for movement transversely thereof to adjusted positions, means for releasably securing the bracket in adjusted positions, an arm pivoted to said bracket and extending transversely thereof with one end portion projecting from a side of the bracket, means to limit downward movement of the arm beyond a substantially horizontal position, a circuit maker and breaker open when said arm is in its lowered position and closed when the arm is swung upwardly to an elevated position, and actuating means for said arm including a rotary shaft and abutment means turning with the shaft and intermittently engaging the extended end of the arm to elevate the arm and cause closing of the circuit during rotation of the shaft, the adjustment of the bracket towards and away from the actuating means serving to control the time the arm remains in an elevated position.

3. A circuit controller comprising a support, a bracket pivoted to said support for movement transversely thereof to adjusted positions, an arm pivoted to said bracket and extending transversely thereof with one end portion projecting from one side of the bracket, means to limit downward

movement of said arm beyond a substantially horizontal position, a mercury tube carried by said arm and having contacts therein interconnected to close a circuit when the arm is shifted upwardly to an elevated position, and actuating means for said arm including a rotary shaft parallel to the pivot of said arm and a bar carried by said shaft in crossed relation thereto and adapted to have its ends engage the extended end of said arm and intermittently shift the arm to an elevated position during rotation of the shaft.

4. A circuit controller comprising a support, a bracket carried by said support and adjustable transversely thereof, an arm pivoted to said bracket and extending transversely thereof with an end portion projecting from a side of the bracket, a mercury tube carried by said arm and having contacts therein interconnected to close a circuit when the arm is shifted upwardly to an elevated position, and actuating means for said arm including a rotary shaft paralleling the pivot of the arm and cross-bars fitted upon the shaft and movable about the shaft into predetermined crossed relation to each other, means to retain said bars in set positions upon said shaft, the ends of the said bars being adapted to engage the extended end of the arm and intermittently shift the arm to an elevated position during rotation of the shaft.

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