

Nov. 9, 1926.

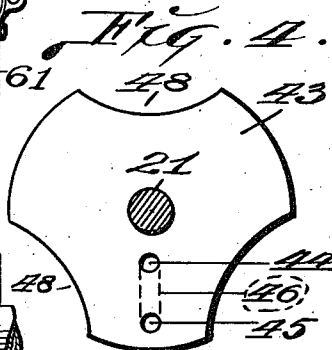
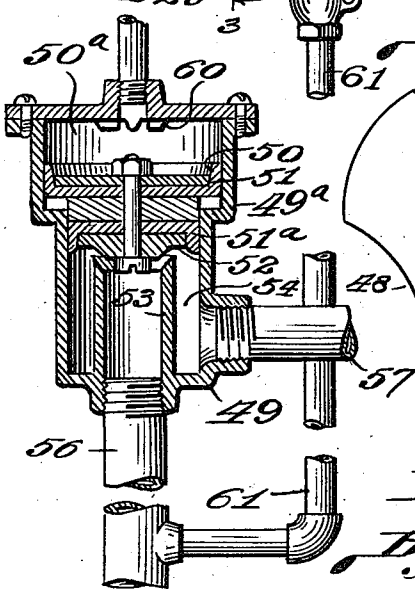
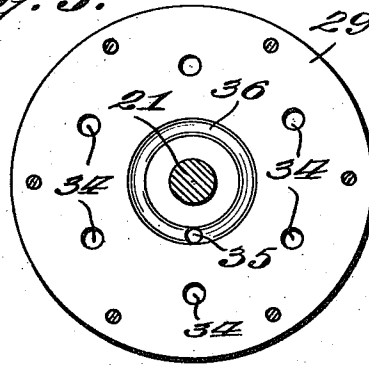
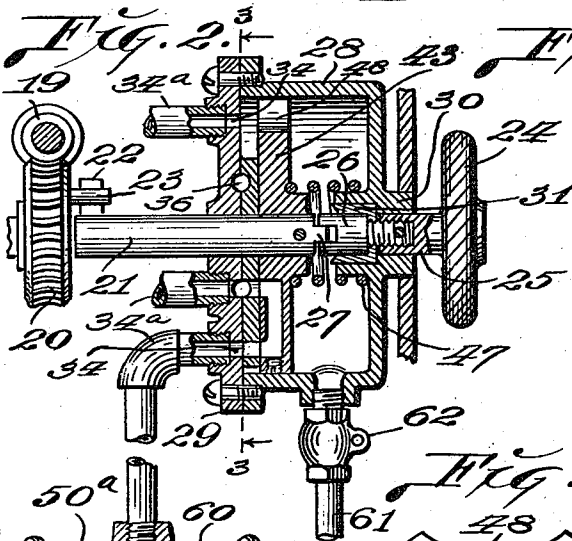
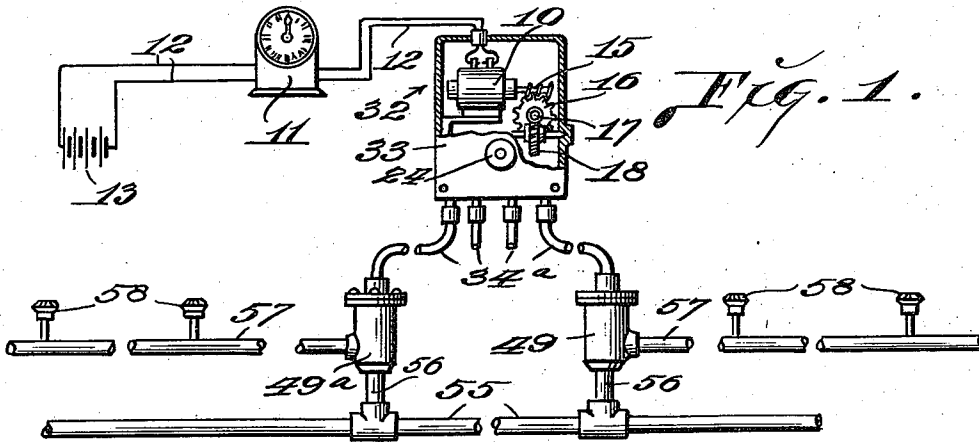
1,606,245

E. P. LANG

SPRINKLING SYSTEM

Filed July 7, 1925

2 Sheets-Sheet 1



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Nov. 9, 1926.

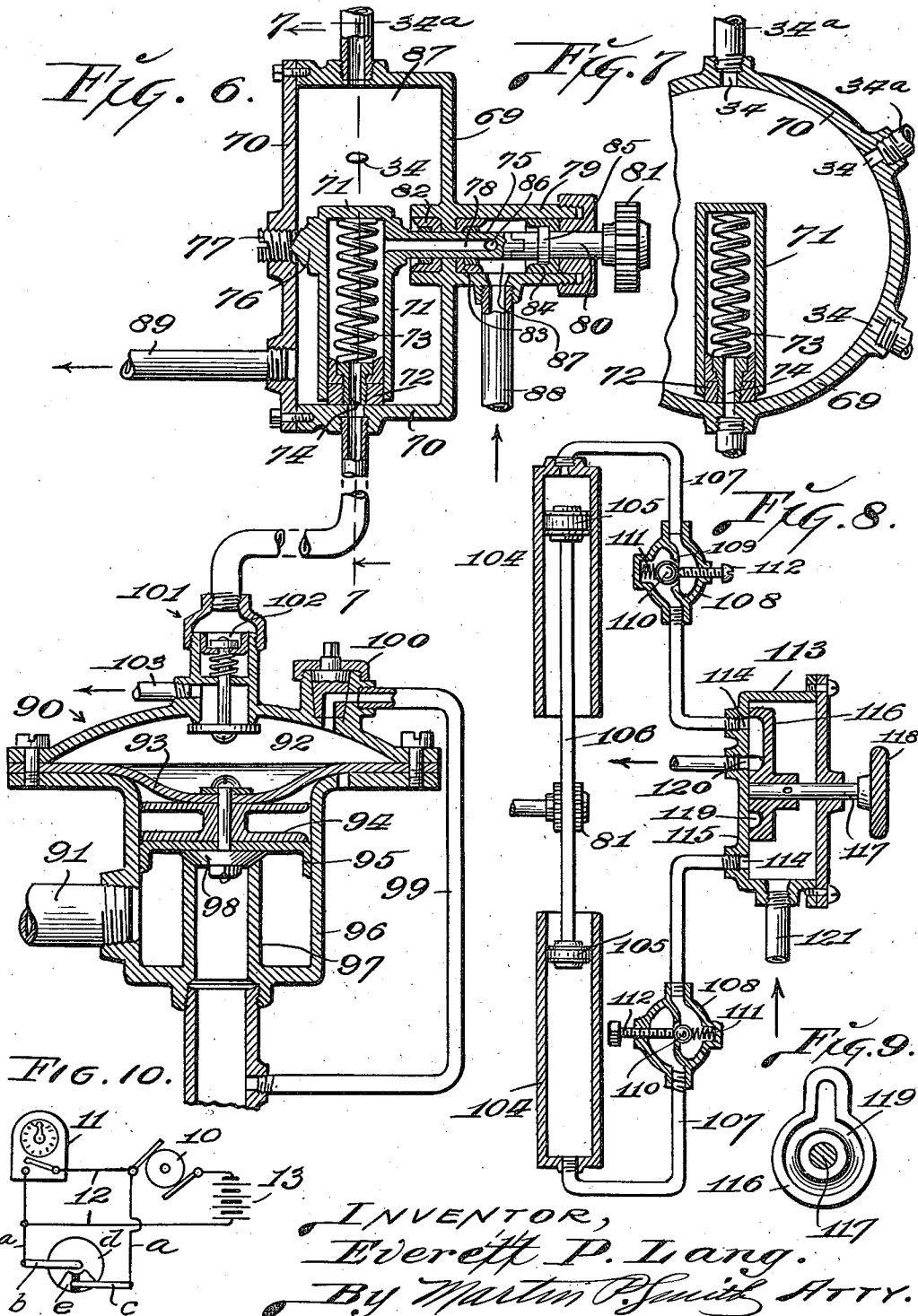
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE.

EVERETT P. LANG, OF LOS ANGELES, CALIFORNIA.

SPRINKLING SYSTEM.

Application filed July 7, 1925. Serial No. 42,003.

This invention relates generally to lawn, garden or orchard sprinkling systems and pertains more particularly to automatic and time-controlled apparatus for periodically and successively putting into operation, individual groups of sprinklers.

It will be understood that in the consideration of the invention that lawns, gardens, orchards and the like are frequently equipped with a complete system of piping leading to a multiplicity of sprinkler nozzles or heads. Said nozzles are arranged in groups of a given number, the number being limited by the size and capacity of the water-main feeding the system. Too many heads in a given group, or operation of too many heads at one time, will cause too great a pressure diminution. For each group of sprinklers, there is provided an individual supply pipe leading from the main. For each group-supply pipe, there is usually a manual shut-off valve so that one group only, at a time may be in operation.

It is the principal object of the invention to provide an automatic and time-controlled apparatus for periodically putting successive groups of sprinkler heads into operation, and for shutting off each successive group after a given lapse of time.

Another object of the invention is to provide for manually controlling such a system, particularly without the need of a multiplicity of hand valves, and incidentally it is another object of the invention to provide manual means for controlling a system, of the above described type, from a single point with valvular control means.

Another object is the provision of an improved fluid distributor capable of serving a plurality of pipes.

Still other objects include simplicity of construction, self-adjusting packing means to keep all parts filled without need for frequent adjustments, together with other necessary means to prevent waste or inefficient distribution of water.

My invention contemplates the use of a clock-controlled distributor and it is another object of the invention to provide for using water pressure to open and close control valves, so that the load on the distributor is lessened, rendering the distributor more compact and less costly.

Still other objects and advantages will appear hereinafter.

I have illustrated my invention by the accompanying drawings, in which:

Fig. 1 is a diagrammatic view of a system and control apparatus conforming with my invention.

Fig. 2 is a detail vertical section on a larger scale, of a part of the apparatus, which part is hereinafter known as the distributor.

Fig. 3 is a section on a line 3—3 of Fig. 2, looking in the direction indicated by the arrows.

Fig. 4 is a view in elevation of a part hereinafter known as the distributing disc.

Fig. 5 is a face elevation of a part hereinafter known as the fluid directing disc.

Fig. 6 is a vertical section of a modified form of distributor.

Fig. 7 is a view in section thereof seen on a line 7—7 of Fig. 6.

Fig. 8 is a longitudinal mid-section of a hydraulic manually-controlled prime mover for the distributor shown in Figs. 6 and 7.

Fig. 9 is a view in elevation of a part of the prime mover, which part is hereinafter known as the control-valve disc.

Fig. 10 is a diagrammatic view of a modified arrangement for rendering the operation of the sprinkling system positive and accurate.

In carrying out my invention in the embodiment in Figs. 1 to 5 inclusive, I employ a prime mover 10, in the form of an electric motor, which is controlled by a time clock 11. The time clock and motor are connected by wires 12 to a source of electric current 13.

Clock-controlled motor installations are well understood and need no description herein, the object in this installation being to cause the motor to be energized at given times each day for a predetermined interval of time.

The motor is provided with suitable reduction gearing which in the present case embodies a worm 15, a worm wheel 16 driven thereby, a second worm fixed to rotate with the worm wheel 16 and driving a second worm wheel 18. Also there is provided still another worm 19, driving a third worm wheel 20. Thus, great reduction is effected between the motor and a distributing shaft 21. The distributor shaft carries a lug 22 engaged by a pin 23, carried by the last named worm wheel. Thus, the distributor shaft is driven in one direction by the worm

wheel, but the said shaft may be advanced almost a full revolution by manually turning a hand wheel 24. Said hand wheel embodies an integral shaft 25 carrying an attached notched member 26, coacting with a lug 27 carried by shaft 21.

The distributor shaft is a part of the distributor shown in Fig. 2, and said distributor includes a circular casing 28 having a removable rear plate 29. The distributor has an integral coaxial sleeve 30 through which shaft 25 passes, and in which said shaft is revoluble.

A leather washer 31 prevents water leaking along shaft 26.

The distributor casing, the reduction gearing, and the motor are all disposed in a box 32 having a front wall 33 removable for inspection. The sleeve 30 passes outward through the wall 33 of the box so that the hand wheel 24 is operable exteriorly thereof.

The wall or plate 29, is provided with a plurality of equally spaced outlet ports 34, arranged in a circular series, each port registering with a pipe 34^a, there being one pipe for each separate port 34. The plate also includes a single drain port 35 spaced inwardly of the said circular series, and is disposed in the path of an annular groove 36 which is provided on one face of the plate. Secured contiguously to the plate, on the inside of the distributor casing there is provided the fluid-directing disc 37, said disc is also provided with a groove 38, aligned with groove 36 to provide a complete circular course, said disc is also provided with a port 39 disposed in the path of the groove 38. By means of the grooves 36 and 38, the port 35 and the port 39 are always in communication with each other.

Disc 37 is preferably made of leather or other pliant material adapted to remain in fluid-tight contiguity with the metal plate 29. Said disc includes a depending tongue 41, provided with an elongated aperture 42.

The distributor disc 43 shown in Fig. 4 carries the disc 37 and is provided with two vertically spaced apertures 44 and 45 respectively. Said apertures are connected to each other by a fluid passage 46. The disc is carried by the shaft 21, to rotate therewith, and consequently turning movement of the shaft moves both discs together. The discs are assembled in the distributor casing so that the apertures 44 and 45, and apertures 42 and 39 coact with one another to bring a port 34 into communication with the drain outlet 35. The discs are held toward the wall 29 by means of a spring 47, and the distributor disc is cut away at various points as at 48. Disc 37 is of smaller diameter than disc 43 so that water may find its way to all of the ports 34 which are not covered by the tongue of disc 37.

My improved apparatus includes a plurality of valves 49, one for each group of sprinkler heads. The valve is shown particularly in Fig. 2, and includes a differential piston 50, in a differential cylinder 49^a. An upturned larger cup 51 and an inverted smaller cup 51^a aiding to make the piston fluid-tight in the cylinder. The piston is provided with a valve disc 52 arranged to seat on the upper end of a standing tube 53, which is spaced internally of the smaller part of the differential cylinder, an annular fluid course 54. The standing tube is connected to a main 55 by a short line 56, and the course 54 is connected with an outlet pipe 57 going to the sprinkler heads 58. The upper chamber 50^a of the cylinder is connected to a corresponding one of pipes 34^a.

In operation, the discs are rotated very slowly by the motor. Aperture 42 is therefore periodically aligned with successive ports 34. When in such alignment, the corresponding one of pipes 34^a is in communication with the drain outlet 35, by way of apertures 42, 45, 44 and 39 respectively.

The pressure of fluid in the main and in line 56 raises the valve disc 52 and the piston until the piston is stopped by lugs 60. Any water which may have existed in space 50^a is displaced through pipe 34 and the drain outlet.

With the valve disc raised from the seat, water flows from the main through pipe 57 to the group of sprinkler heads supplied by that pipe. While said group is being supplied, pressure is maintained interiorly of the distributor casing by a by-pass line 61, fitted with a non-return valve 62. All the remaining ports 34, which are uncovered are open to the water in the casing so that all of the pistons in valves 49 are held down firmly by the hydraulic pressure conveyed through pipes 34^a. It will be apparent now that only one valve is open at a time, the water pressure itself acting to keep all other valves closed. As the aperture 42 moves out of alignment with a port, then that port conveys fluid to the corresponding pipe 34^a and the corresponding piston is acted on to seat the valve and shut off the water supply. As the discs continue to rotate the next port becomes aligned with aperture 42, and consequently the corresponding chamber 50^a is opened to the atmosphere (see Fig. 2) allowing the corresponding valve disc to be unseated by the pressure. Certain groups of sprinklers may be omitted, or the device may be started at any given point by proper turning or setting of the discs by the hand wheel 24.

In the form of the invention shown in Figs. 6 to 9 inclusive, the pipes 34^a are connected to a distributor casing 69 which embodies a circumferential wall 70. Said wall

is provided with the ports 34, the pipes extending radially outward. Within the casing, there is provided a tubular radially disposed member 71 having a movable end wall 72 adapted to ride on the inner circumference of the wall 70. A spring 73, within the tubular member 71 keeps the end wall in fluid-tight contact with wall 70. Said end wall is provided with an aperture 74 adapted to register successively with apertures 34, as the member is advanced. To member 71 is connected a shaft 75 which is disposed coaxially of the distributor casing. Said shaft supports the member 71 at one side while an integral pointed end 76 rides on a bearing 77 to support the other side.

The shaft 75 is provided with a fluid course 78 communicating with the interior of the tubular member 71. Said shaft projects from the casing into a bearing sleeve 79, which is an integral part of the casing. The shaft is provided with a continuation 80 extending to points exteriorly of the sleeve and carrying a pinion 81. Leather cups 82, 83 and 84 together with rings 85, one in each cup, serve jointly as packers and bearings for the shaft and its continuation. An aperture 86 in the shaft establishes fluid communication with the latter fluid-tight space 87, provided by and enclosed in the sleeve. From said space, a pressure pipe 88 leads to the main.

It will be apparent now that with the parts in the position shown in Fig. 6, pressure will exist in that one of the pipes 34^a which is aligned with the aperture in the end wall 72 of the member 71.

An outlet pipe 89 vents the interior of the casing so that all other pipes 34^a that are not in communication with apertures 74 in wall 72 are relieved. Each pipe 34^a leads to an individual valve 90 controlling a supply pipe 91, which leads to a plurality of sprinkler heads (not shown in these figures). Each valve provides a large diaphragm chamber 92, in which is fitted diaphragm 93. The diaphragm carries below it a plunger 94 having a leather cup 95. Said cup has a fluid-tight running fit in a cylindrical part 96 of the valve.

Spaced internally of the cylinder 96 is a standing tube 97, the interior of which is directly connected to a water main. The plunger carries a valve disc 98 adapted to seat on the upper end of the standing tube to prevent water from flowing from the main to the supply pipe. A by-pass line 99 leads from the main through a throttle valve 100 to the diaphragm space so that normally, the valve disc 98 is held on its seat by pressure from the main acting through the diaphragm. The diaphragm chamber is arranged to be vented by an outwardly opening hydraulically actuated valve generally

indicated by the numeral 101 and embodying a leather cup piston 102. Pipe 34^a is connected to said hydraulically actuated valve so that when pressure exists in pipe 34^a, the valve is operated to vent the diaphragm chamber. When the said chamber is vented, water entering from the by-pass escapes through the valve and a vent pipe 103 without setting up sufficient back pressure in the diaphragm chamber to hold the valve disc on the standing tube. As a consequence water raises the valve disc and is free to flow through the supply line, to the corresponding group of sprinkler heads.

In the operation of the device just described the shaft is rotated slowly. When member 72 is not aligned with ports 34, all valves 90 are held by the hydraulic pressure exerted on the corresponding diaphragm. As said member aligns with a port 34, the corresponding hydraulically actuated valve is operated to relieve the pressure on the underlying diaphragm. Thus, as the member 71 rotates, successive valves 90 are opened, maintained in that position for a period of time, and subsequently closed.

The shaft and pinion of the above described embodiment may be driven slowly by any suitable means, and one such means is shown in Fig. 8. Said means includes a pair of opposed open end cylinders 104, each having a piston 105. The pistons are connected to each other by a rack 106 which meshes with the pinion. Each cylinder is provided with a pressure line 107, fitted with a throttle valve 108. Said valve includes a seat 109, a ball 110 yieldably held thereon by a spring 111, and an adjustable screw 112 for holding the ball from its seat. The device further includes a casing 113 having a pair of diametrically opposed outlet ports 114. Contiguous to the wall 115 in which the ports are provided, there is a fluid directing disc 116. Said disc is carried by a shaft 117, turned by a hand wheel 118. Said disc is provided with a groove 119. The wall 115, is provided with an outlet port 120 and the groove in the disc is so arranged as to bring one of the ports 114 into communication with the outlet port. The interior of the casing is kept under pressure by a line 121 conveying water, which flows through the unobstructed port and forces one piston outwardly. As one piston travels outward, the other is forced inwardly; the movement of the rack rotating the distributor. The valves are very slightly opened so that the flow of water is throttled to a minimum, and thus one stroke of the device may be extended over a period of time. When the end of a stroke is reached, the entire device becomes inoperative until the hand wheel is turned to reverse the travel of the rack and pistons. The pistons may be so adjusted relative to the distributor, as to

cause the distributor to stop in such position that all of ports 34 are closed.

In Fig. 10 I have shown a shunt circuit comprising conductors *a, a*; one leading from one of the clock switch points and the other from one of the brushes of motor 10, to brushes *b* and *c* that ride on the surface of a circuit breaker *e* and the latter being suitably mounted on shaft 21.

Brush *b* is constantly in contact with the metal surface of rotary member *d*, while brush *c* is arranged to ride onto an insulated segment *e* on said rotary member, and when this latter condition exists, the shunt circuit is broken.

This arrangement insures positive operation of the system, takes care of any inaccuracies in the clock and insures properly timed registration of aperture 42 with apertures 34.

Even though the clock switch be open, the motor 10 will continue to be driven, thereby rotating shaft 21 and disc *d* until brush *c* passes onto the insulated segment *e*.

While I have shown and described two specific embodiments of my invention, I do not limit myself to any specific embodiment or construction or arrangements of parts, and may employ any construction or arrangement of parts, without enlarging the scope of my invention, coming within the appended claims.

I claim as my invention:

1. In apparatus of the class described, a plurality of supply valves arranged to be opened by the pressure of the fluid which they control, individual hydraulic means for each valve capable of opposing such fluid pressure, to hold the corresponding valves in closed position, and means for periodically rendering each individual hydraulic means inoperative, said last means including a fluid-tight distributor casing embodying plate having a plurality of ports, one for each supply valve, a pipe leading from each port to the corresponding hydraulic means, another pipe connecting the interior of the casing with fluid supply under pressure, whereby the hydraulic means are subject to hydraulic pressure, the casing being provided with an outlet port, and means for bringing the first named ports successively into communication with the outlet port, without diminishing the pressure in the casing below that required.

2. In a fluid distributor for the purpose described, a fluid-tight casing having a disc-like wall provided with a plurality of ports arranged in a circular series, and further, provided with an outlet port not in said series, a rotary member coaxially revoluble within the series and embodying

means for covering one port only at a time, said means having a fluid course always in communication with said outlet port, and further having an aperture in communication with the said fluid course, said aperture so disposed as to align successively with the port in the said series, and a pipe supplying fluid under pressure to the interior of said casing.

3. In a fluid distributor for the purpose described, a fluid-tight casing having a disc-like wall provided with a plurality of ports arranged in a circular series, and further, provided with an outlet port not in said series, a rotary member coaxially revoluble within the series and embodying means for covering one port only at a time, said means having a fluid course always in communication with said outlet port, and further having an aperture in communication with said fluid course, said aperture so disposed as to align successively with the port in the said series, and a pipe supplying fluid under pressure to the interior of said casing, a supply main from which said pipe leads, a plurality of supply valves corresponding in number to the ports connected to said main, a supply pipe for each valve, and hydraulic pressure lines, one leading from each of the ports in the annular series to a corresponding supply valve.

4. In a sprinkling device, a main, a plurality of service pipes leading therefrom, a control valve for each service pipe, a housing to which all of the service pipe control valves are connected, a connection from the main to said housing and a rotary member arranged for operation within said housing for successively relieving the pressure on the control valves through their connections to said housing and permitting the escape of said pressure so that said control valves may open in succession and permit water from the main, to flow in succession to the service pipes.

5. In a sprinkling device, a main, a plurality of service pipes leading therefrom, a control valve for each service pipe, a housing to which all of the service pipe control valves are connected, a connection from the main to said housing, a rotary member arranged for operation within said housing for successively relieving the pressure on the control valves through their connections to said housing and permitting the escape of said pressure so that said control valves may open in succession and permit water from the main, to flow in succession to the service pipes and a motor for driving said rotary member.

In testimony whereof I affix my signature.
EVERETT P. LANG.