

Dec. 31, 1935.

W. J. COOPER

2,026,271

DEVICE FOR AUTOMATIC REMOTE CONTROL OF LIQUID DISCHARGE

Filed Nov. 7, 1932

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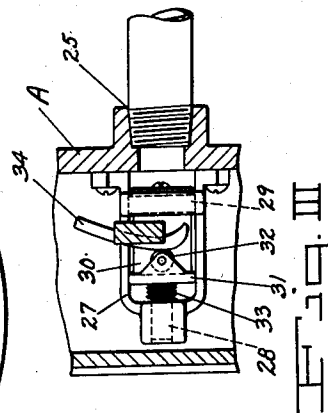
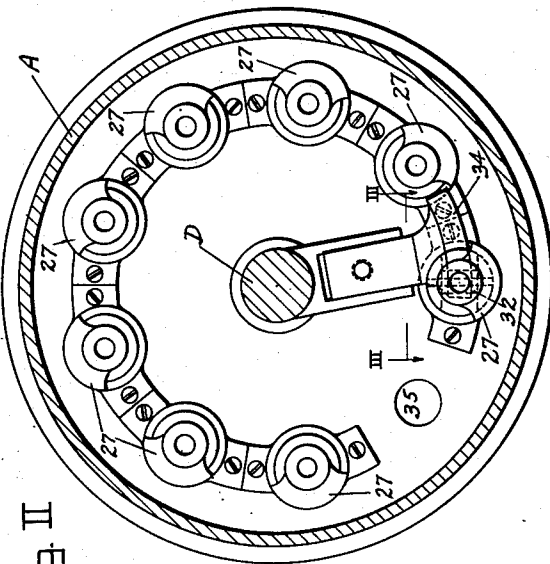
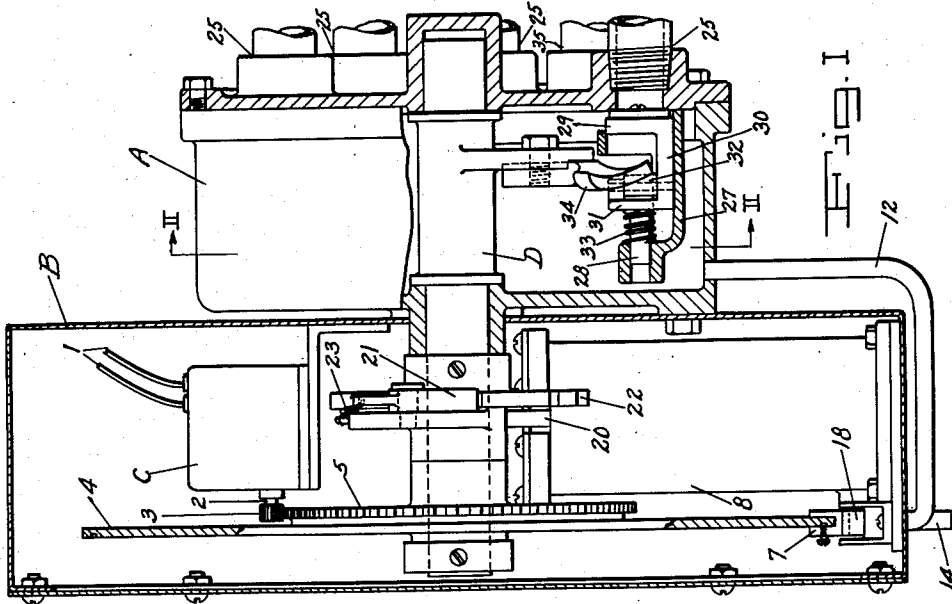


Fig. II

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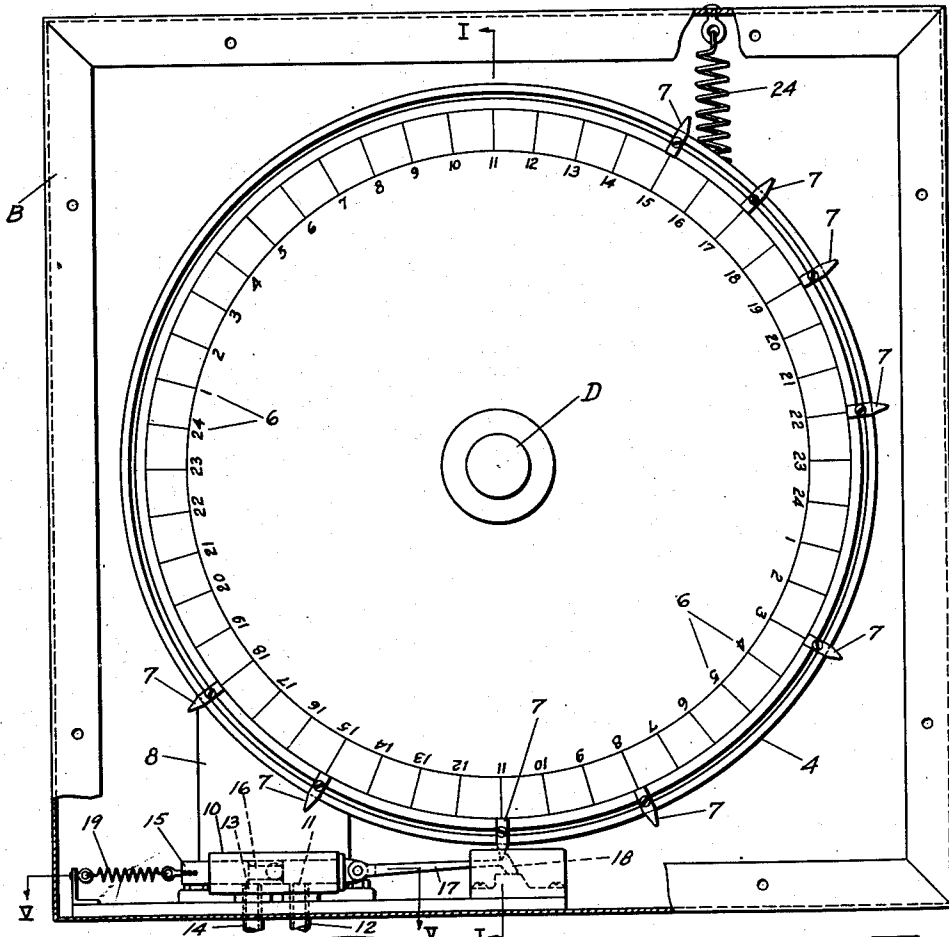


Fig. IV

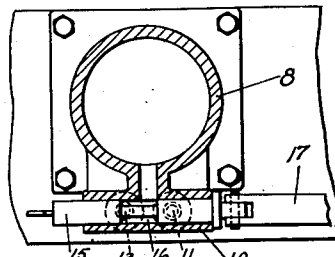


Fig. V

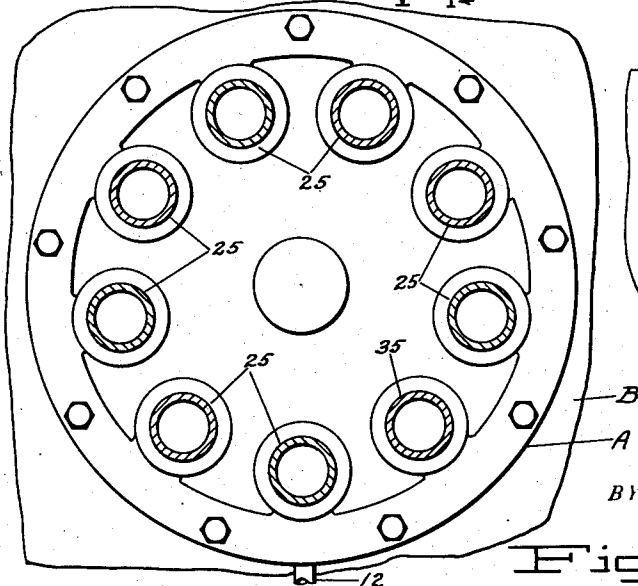


Fig. VI

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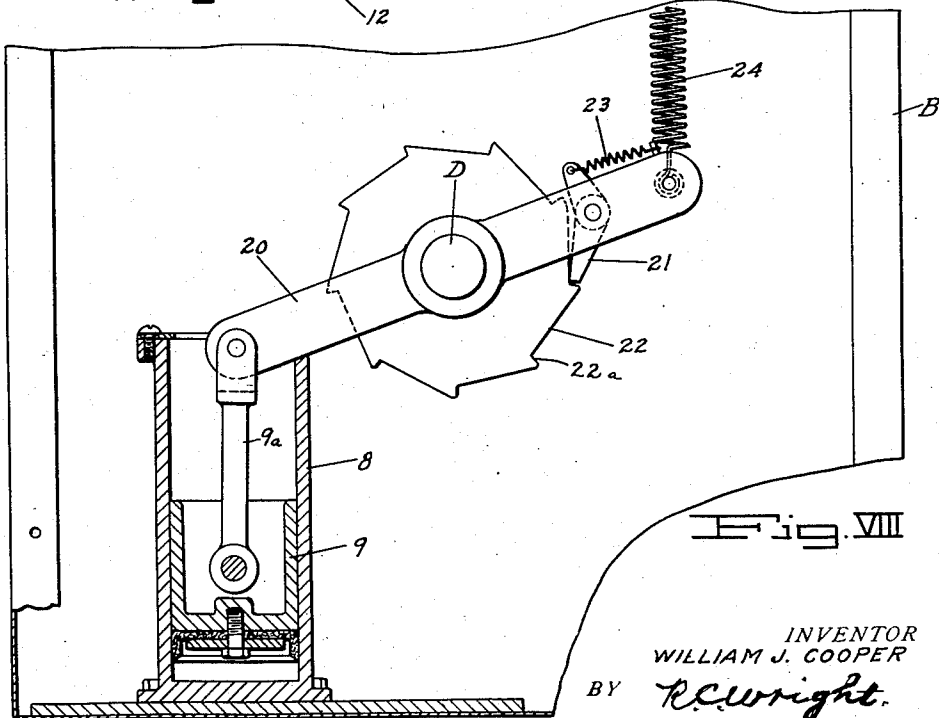
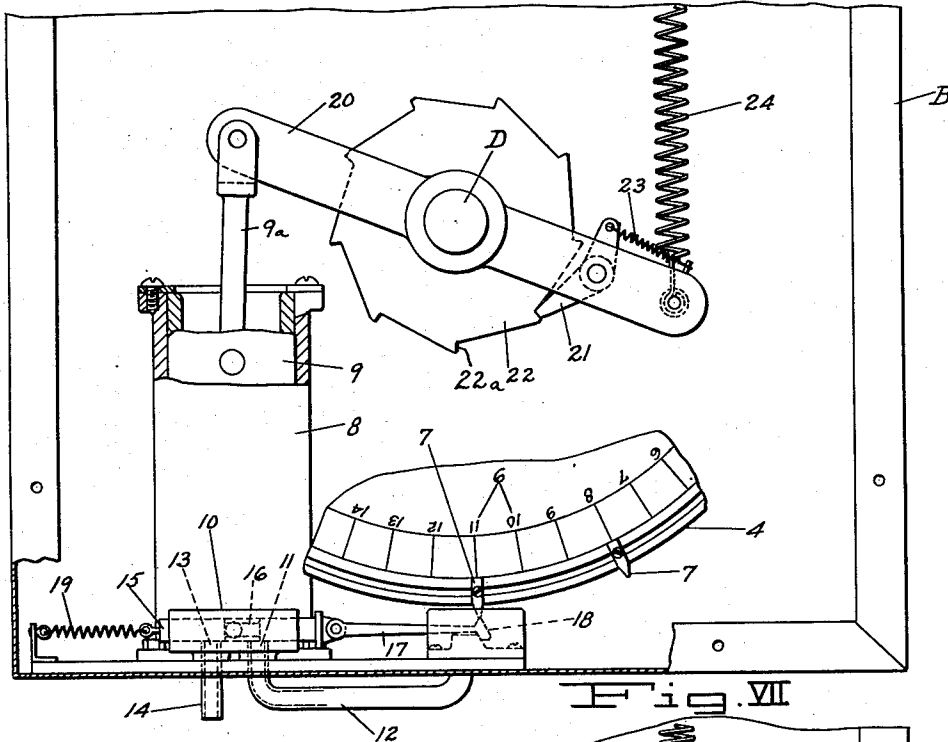
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DEVICE FOR AUTOMATIC REMOTE CONTROL OF LIQUID DISCHARGE

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3 Sheets-Sheet 3



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2,026,271

DEVICE FOR AUTOMATIC REMOTE CONTROL OF LIQUID DISCHARGE

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Application November 7, 1932, Serial No. 641,690

1 Claim. (Cl. 161—7)

My invention belongs in general to those embraced in devices for control of the transmission of liquids through pipes as a class. While it is herein shown as applied to the flow of water for irrigation, it is adaptable also for other liquids.

The object of my invention in particular is to provide an automatic remote timed control of the flow of water through a series or group of water pipes extending from the device to different areas of soil intended to be irrigated. My apparatus may be connected with the feed pipe supplying water from public mains to the adjacent premises where it is to be installed. The apparatus has means for employing electric energy current for time control of a secondary hydraulic means, operated from a source of water supply, to automatically control in sequence the flow of water through the device into the units of said series or groups of pipes connected with it. Also to divide the time of flow into each pipe in a predetermined synchronized sequence. I attain these objects, as well as other advantages, by the construction, combination and arrangement of parts illustrated in the accompanying drawings which form a part hereof.

Fig. I is a sectional view of the device on the line I—I in Fig. IV and showing the pump outlet valve closed.

Fig. II is a sectional view of parts, substantially on line II—II in Fig. I, and showing cam engaging valve to open it.

Fig. III is a sectional view of parts on line III—III in Fig. II, and showing cam engaging valve in its open position.

Fig. IV is a rear elevation of the device with the cover plate of casing B removed and parts of casing broken away.

Fig. V is a sectional view of parts on line V—V in Fig. IV.

Fig. VI is a front elevation of the water compartment A.

Fig. VII is an elevation similar to that shown in Fig. IV, with larger portion of dial 4 broken away, exposing in the view the mechanism of the secondary hydraulic control of outlet valves.

Fig. VIII is a view of parts as in Fig. VII, with pump in section, and the pawl and ratchet in an inoperative position relative to the pump.

Like characters refer to like parts in all views. The casing A is a water compartment and the casing B is a container for control mechanism. C represents a synchronous motor of common type, having wires 1 extending to a power source of electric energy having a synchronized alternating frequency current. The motor C has a shaft

2, on the outer end of which is a gear pinion 3.

A shaft D extends transversely within the casings A—B, and is rotatably mounted in bearings therein. A circular dial plate 4 is rotatably positioned upon the shaft D within the casing B. The dial 4 has rigidly secured to its rear face a gear 5, positioned to mesh with the pinion 3. Diagram characters 6 are placed upon the opposite face of the dial, denoting the 48 hours, and spaces between for subdivision of hours. A series of attachable dogs 7 are placed along the rim of the dial 4 in pre-determined positions relative to the time characters so as to allow the dogs to engage a pump valve arm in synchronized time. The number of dogs to be attached equals the number of discharge ports of casing A, including also the inlet. A hydraulic pump 8 is positioned in the casing B, with a vertical piston 9 having a pivoted arm 9a. In the bottom of the pump cylinder is a transverse valve tube 10, having a port 11 into an inlet pipe 12 extending to a source of hydraulic power, also a port 13 into an exhaust pipe 14, extending to a drain. A valve spindle 15 is slidably positioned in the tube 10 and has near its center a port 16, adapted to connect alternately with the tube ports. A pivoted arm 17 extends from one end of the spindle 15. The free end of the arm is provided with a catch 18 aligned to allow the dogs 7 to engage it at pre-determined times and moves the spindle 15 so as to position its port 16 over the inlet port 11 and allow an upper thrust of the pump piston 9. The dog passes the catch and releases the spring 19 so as to allow it to draw the spindle port to the exhaust port 13, which leaves the piston inoperative as before. In Fig. IV the valve is shown in exhaust, and in Fig. VII it is shown in receiving position. A bellcrank lever 20 is pivoted at one of its ends in the upper end of the connecting rod 9a of pump piston 9. It is also rotatably mounted near its center on the shaft D, within casing B. Between its free end and shaft mounting it has a pivoted pawl 21 positioned to engage a ratchet 22 rigidly secured upon the shaft D. The ratchet has teeth 22a equal in number to discharge ports 25 and the inlet port 35 of the casing A. A spring 23 retains the pawl in sliding engagement over the periphery of the ratchet. A larger spring 24, attached to a casing wall at one end and at its other end to the free end of the bellcrank lever 20, is positioned so as to allow it to actuate the bellcrank lever to move the piston 9 back to repose, and the pump valve to be set for exhaust.

The outer face of plate of the water compartment 55

A has a series of circularly positioned threaded outlets 25, adapted to connect with a series of pipes extending to convenient places of discharge. Within compartment A, side-face cams are positioned in alignment with a seat in each outlet 25. This valve has a rigid bracket frame 27, within which the valve spindle 28 is positioned in sliding engagement. The spindle has a valve disc 29 at one end, provided with packing and positioned to engage the outlet seat. An integral bracket arm 30 extends inwardly from a part of the inner periphery of the disc 29 in sliding engagement with the inner surface of the bracket frame 27.

A convenient distance from the disc 29 the arm 30 has a transverse member 31 integrally connected with the pin portion of the spindle 28. A small roller 32 is mounted transversely on the inward side of the member 31. On its opposing side auxiliary spring 33 is positioned to accelerate the movement of the disc to close the valve, after which it is retained thus snugly by pressure of water in the chamber A. Within the compartment A is a cam member 34, rigidly secured upon the shaft D. The cam 34 is shaped and adapted to be positioned within the space between the disc 29 and roller 32, so as to allow it to engage the roller 32, move the spindle and disc 29 outwardly, to open the opposing outlet, retaining it thus until the control mechanism moves the cam onward to the next valve, whereupon the last valve automatically closes as mentioned. The outlets, valves and cam are arranged to correspond relatively with the synchronized intervening mechanism governed by the electric control thereof as mentioned. An inlet 35 for supply of water from a power source is also provided in the face plate of compartment A. The pressure of water in the compartment remains the same as in the inlet pipe.

The arrangement shown is for eight outlets, but may be more or less by adding or subtracting multiples of dogs 7. Repeated irrigation through outlets 25 may be obtained up to at least twelve per day of 24 hours, each multiple giving various lengths of time of flow through each opening according to the time space interval between the tips of said dogs. Other combinations may be obtained by changing the cyclic period of dial 4. The dogs can also be placed to vary the period of discharge as to different outlets according as the amount of irrigation required differs in various places to be supplied.

When the mechanism has operated for that period, the disc 4 ceases to open valves until it rotates its dogs to the selected night hour period, when the mechanism automatically resumes its operating period as before. It will be seen that by positioning the dogs the liquid discharge can be regulated in a number of various ways. To clarify further, the particular setup of the apparatus as herein illustrated, is described. The dial 4 has 24 time characters designating positions in which here nine detachable dogs are attached to the rim for automatic control of the valves in a 24 hour period, repeatable in sequences of 24 hours during each 48 hours. The nine dogs shown, are positioned to actuate the pump and it in turn to actuate the main shaft to open and close valves in relation to each dial dog at pre-determined times in the period. It will be noted

that the dogs can be so positioned, automatically to perform this operation for varying lengths of time related to each other, in the same period and for discharge to different locations as pre-determined, during a 48 hour cycle.

A like group of dogs can be positioned on the same dial for a similar pre-determined automatic control timing of the valves independently of the one mentioned, to serve independent locations in the same manner. Such sequences of groups can be increased, limited only by the space upon the dial to receive the dogs. Obviously the discharge openings and valves would be increased correspondingly.

For cost of operation, a common cup of water will produce under the pressure an operative impulse of the pump, and a minimum unit of electric energy such as required in a telechrone clock, is sufficient to actuate the dial and its dogs in turn to actuate the pump. Thus the flexibility of flow through each pipe is easily and correctly arranged for.

The electric control and equipment shown, is a simple mechanism, corresponding with the synchronized electric control systems now in common use for clocks. In place thereof a control may be made by an eight-day clock mechanism, hydraulically wound, or a synchronized mechanism operated by water power may be adapted for the flow control. These other methods may be substituted without departing from the principle of my invention.

The operation of the device is very simple and can easily be understood by the foregoing description and explanation of parts and their functions. The motor C, while operative, keeps the timer dial 4 in continuous synchronized movement which actuates the subsequent mechanism to function in the same manner.

The device has been reduced to practice and has perfectly demonstrated that its operation coincides precisely as to all parts and functions herein described. It is new and its usefulness is clearly apparent. It saves the labor, time and attention required to supervise irrigation or flow of liquids according to common custom. It can be manufactured at a moderate cost and sold to users for a reasonable price.

I claim:

In a device of the character described, a rotatable disc with time graduations around the edge thereof, time controlled means for rotating said disc at a constant speed, adjustable dogs with means for attaching same to said disc coincident with said time graduations, a valve casing positioned adjacent said disc and comprising tube ports, a valve spindle in said casing slidable in the plane of said disc between two extreme positions for variously connecting said tube ports, a spring for normally maintaining said spindle in one extreme position, means for moving said spindle to the other extreme position comprising an arm pivoted to said spindle and having a catch cooperating with said dogs for movement thereby, means for positioning said catch in the path of said dogs when said spindle is in one extreme position and permitting movement of said catch out of said path when said spindle is in the other extreme position.

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