

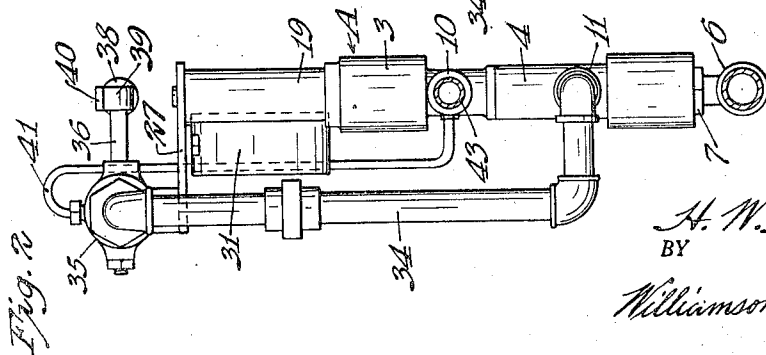
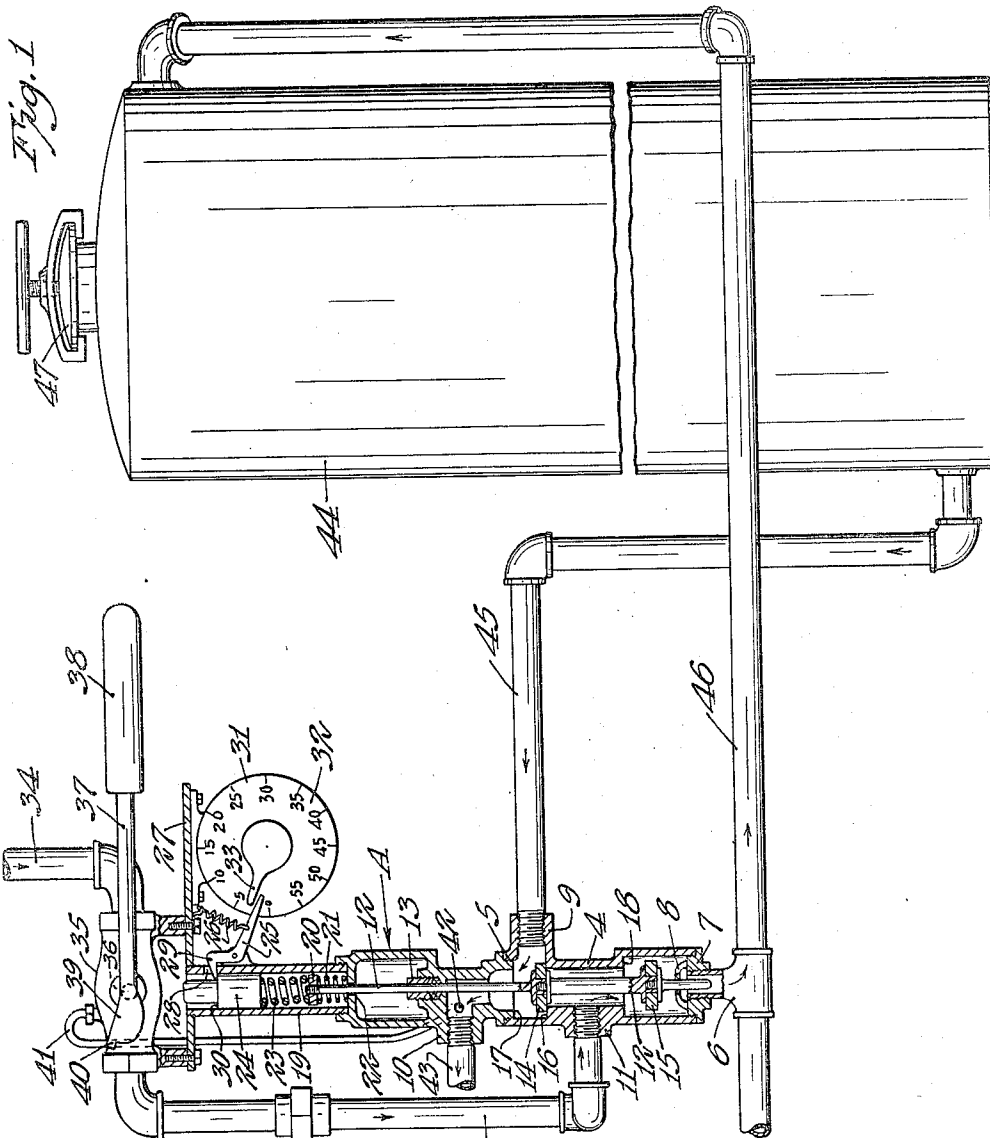
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H. W. ADDISON

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CONTROL VALVE

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INVENTOR.

H. W. Addison

BY

Williamson & Williamson
ATTORNEYS

UNITED STATES PATENT OFFICE

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CONTROL VALVE

Harry W. Addison, Marshall, Minn.

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5 Claims. (Cl. 161-7)

This invention relates to a flow control valve unit.

It is an object of the invention to provide a flow control valve device which can be set to provide for fluid flow in one direction, and which, upon the expiration of a predetermined time interval, will automatically be actuated to reverse or otherwise change the direction of flow of fluid through the valve and through any suitable system to which the valve may be connected.

In a more specific application thereof, it is an object of the invention to provide flow control means for a water system such as a water softening system, water cooling or heating system and the like wherein the valve is set for normal operation, and wherein it can be automatically actuated after a predetermined time interval to reverse or otherwise change the flow of fluid through the system.

A further object of the invention is to provide a flow control valve unit which is adapted for use in a water softening system wherein simplified means is provided for setting the control valve to permit drainage of the system in preparation for flushing or cleaning of the system.

These and other objects and advantages of the invention will more fully appear from the following description made in connection with the accompanying drawing, wherein like reference characters refer to the same parts throughout the views, and, in which:

Figure 1 is a view partially in side elevation and partially in vertical section of the control valve assembly incorporated in a system such as a water softener system; and

Figure 2 is an end elevation of the control valve unit.

In the drawing there is shown a valve casing A made up of upper and lower sections 3 and 4, which may be threadedly connected as at 5. Mounted in the lower end of the lower casing section 4 is a T connection 6 which is threaded into an apertured plug 7 having an open cage 8 formed on its upper and inner side. The lower casing section 4 is provided with a port assembly 9 and the upper casing section 3 is provided with a port assembly 10. Intermediate the T connection 6 and the port assembly 9 in the lower casing section 4 is a port assembly 11.

A valve rod 12 is guided by a packing gland 13 in the upper casing section 3 and the lower end thereof is guided by the spider 8 on the apertured plug 7 in the lower end of the lower casing portion 4. The valve rod 12 carries a pair of valve members 14 and 15. The valve member 14 is adapted

to alternately engage a seat 16 in the lower casing portion 4 and a seat 17 at the lower end of the upper casing portion 3. The lower valve member 15 is adapted to engage a seat 18 formed in the lower casing portion 4 and such engagement is simultaneous with the engagement of the upper valve member 14 with its upper seat 17.

The upper end of the valve stem 12 extends into a tubular guide 19 and is provided with a nut 20 on its upper end. A spring 21 is interposed between the underside of the nut 20 and the upper end portion 22 of the upper casing section 3 through which the stem 12 passes. A second spring 23 rests upon the nut 20 on the valve stem 12 and a slidable plug 24 rests upon the upper end of the spring 23. Mounted on the side of the tubular guide 19 is a pivoted catch 25 having a tension spring 26 connected thereto, said spring being also connected to a bracket 27 on the upper end of the tubular guide 19. The guide 19 is provided with an aperture 28 to receive the end 29 of the catch 25, which is adapted to be movably received over a shoulder 30 on the slidable plug 24.

Suspended from the bracket 27 is a time controlled unit 31 of any suitable construction. It is provided with a graduated dial 32 and with a rotary pointer 33 which can be wound or reset by turning it in a clockwise direction, and which when released will rotate under the influence of a spring or the like in a counterclockwise direction as indicated by the arrow 32. The pointer 33 is aligned with and adapted to engage the end of the catch 25 when said pointer reaches a position just beyond that shown in Figure 1 thereby releasing said catch 25 from the slidable plug 24 and permitting the valve stem 12 to move upwardly under the influence of the spring 21. Connected to the port casting 11 in the lower casing section 4 is a pipe 34 in which is located a valve unit 35 having a horizontally disposed valve stem 36. An operating arm 37 having a handle 38 is connected to the valve stem 36 at right angles thereto and the left hand end of said lever 37, as viewed in Figure 1, is provided with a cam shaped portion 39 and a stop 40. The cam portion 39 is aligned vertically with the upper end of the slidable plug 24 and when the lever 37 is swung to a generally vertical position (the plug 24 being released and pushed upwardly by the spring 31) it will engage the upper end of the plug 24 and press it downwardly against the action of springs 21 and 23 until the catch 25 again engages the shoulder 30 on the plug 24. While the interior of the valve unit 35 is not shown it should be understood that it is a simple tapered

plug type of valve which is in its open position in Figure 1 with the lever 37 horizontal and which is closed when the lever 37 is swung upwardly to a generally vertical position.

A small tube 41 connects with the interior of the casing of the valve 35 on the left hand side of the valve as viewed in Figure 1, and said tube extends into the interior of the upper section 3 of the main valve casing A communicating with a port 42 in said casing section closely adjacent the port casting or assembly 10. A portion of a pipe 43 is also shown threaded into the port casting 10.

In Figure 1 there is shown a tank 44, which for the purpose of illustrating the invention may be the tank of a water softener. A pipe 45 is connected between the main valve casing port 9 and the lower end of the tank 44. A pipe 46 extends from the upper end of the tank 44 through the T 6 at the lower end of the main valve casing A and thence beyond where it may be connected to the piping system of a home or other building.

The softener tank 44 may be provided with a removable cap 47 as is customary in water softener constructions.

If the control valve assembly is used in a water softener system it would be arranged in the manner shown in the drawing, the pipe 34 constituting a hard water inlet pipe. Normally the valve rod 12 would be released so that the spring 21 would move it to its upper position with the valve member 14 on the stem 12 contacting its upper seat 17 and the valve member 15 contacting its seat 18. As a result water would flow from the pipe 34 into the lower section 4 of the valve casing A and thence through the pipe 45 to the lower portion of the softener tank 44. The water would then pass up through the tank and the softening crystals or other material therein and leave the tank through the pipe 46 which constitutes the softened water supply.

When it is necessary to regenerate the water softening material in the tank 44 this is done in the conventional types of softeners by reversing the flow of water through the softener tank and its crystals. After initially installing the apparatus in a particular water line it may be necessary to determine by trial and error just how long the reverse flow of water should be continued before regeneration is completed. This can be done in the first instance by testing the water which issues from the softener in its reverse flow to determine whether the salt used in the cleaning operation has been completely dissolved and washed away. When this interval of time necessary to remove all of a certain quantity of salt from the tank 44 has been ascertained, the system can be repeatedly regenerated by merely setting the time pointer 33 to the desired time interval indicated by the graduated dial 32.

When regenerating the unit the handle 38 of the lever 37 on the valve 35 is raised to a generally vertical position thereby shutting off the fresh water supply in the pipe 34 and depressing the slidable plug 24 until it is retained by the catch 25. In this position the valve member 14 on the arm 12 is seated against the seat 16 and the valve member 15 is spaced from its seat 18. When the hard water supply pipe is closed by the valve 35 the softener system is relieved of pressure by means of the bypass tube 41 which communicates with the interior of the main valve casing A at the inlet of the drain or waste pipe 43. The salt is then placed in the tank 44

and the valve lever 37 is returned to the horizontal position indicated permitting water to flow from the pipe 34 through the lower valve casing section 4, the right hand side of the T connection 6 and the lower end of the casing section 4, and thence downwardly through the tank 44. The water then flows from the lower portion of the tank 44 through the pipe 45 from right to left as viewed in the drawing, through the intermediate portion of the valve casing A, and thence outwardly through the drain pipe 43. This condition continues until the previously set timer pointer 33 moves in a counterclockwise direction throughout its predetermined time interval and engages the catch 25 to release the slidable plug 24 and springs 21 and 23, thereby causing the valve stem 12 and valve members 14 and 15 to move upwardly and reverse the flow through the tank 44 in its normal operating condition.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of my invention.

What I claim is:

1. In a control valve, a casing having a pair of ports therein, a valve member movable in said casing to selectively control flow through either of said ports, releasable means for moving said valve member from one position to another to vary the flow relationship of said member and said ports, and time controlled mechanism operatively associated with said valve member moving means to permit movement of said valve member relative to said ports.

2. In a control valve, a casing having a pair of ports therein, a valve member movable in said casing to selectively control flow through either of said ports, means for moving said valve member from one position to another to vary the flow relationship of said member and said ports, means for releasably securing said valve member and its moving means, and time controlled mechanism movable to release said releasable securing means.

3. In a control valve, a casing having a pair of ports therein, a valve member movable in said casing to selectively control flow through either of said ports, spring means for moving said valve member from one position to another to vary the flow relationship of said member and said ports, means for releasably securing said valve member in one position thereof against the action of said spring means, and time controlled mechanism operatively associated with said releasable securing means to permit movement of said valve member relative to said ports under the influence of said spring means.

4. In a control valve, a casing having ports therein, a flow line communicating with said casing independently of said ports, a valve member movable in said casing to selectively control flow relative to said flow line through either of said ports, releasable means for moving said valve member from one position thereof to another to vary the flow relationship of said valve member and said ports, a second valve located in said flow line, time controlled release mechanism operatively associated with said first mentioned valve member, and combined means for simultaneously actuating said second valve and resetting said time controlled release mechanism and said first mentioned valve member.

5. In a control valve unit, a valve casing, an inlet conduit connected to said casing, a pair of ports in said casing, a valve member movable in said casing to reverse the flow relationship between said inlet conduit and said ports, valve member actuating means normally maintaining said valve member in a first flow control position relative to said ports, means releasably re-

taining said valve member actuating means and member in a second and reverse flow control position, and time controlled mechanism operatively associated with said releasable retaining means to permit movement of said valve member from said second to said first control position after a predetermined time interval.

HARRY W. ADDISON.