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VALVE

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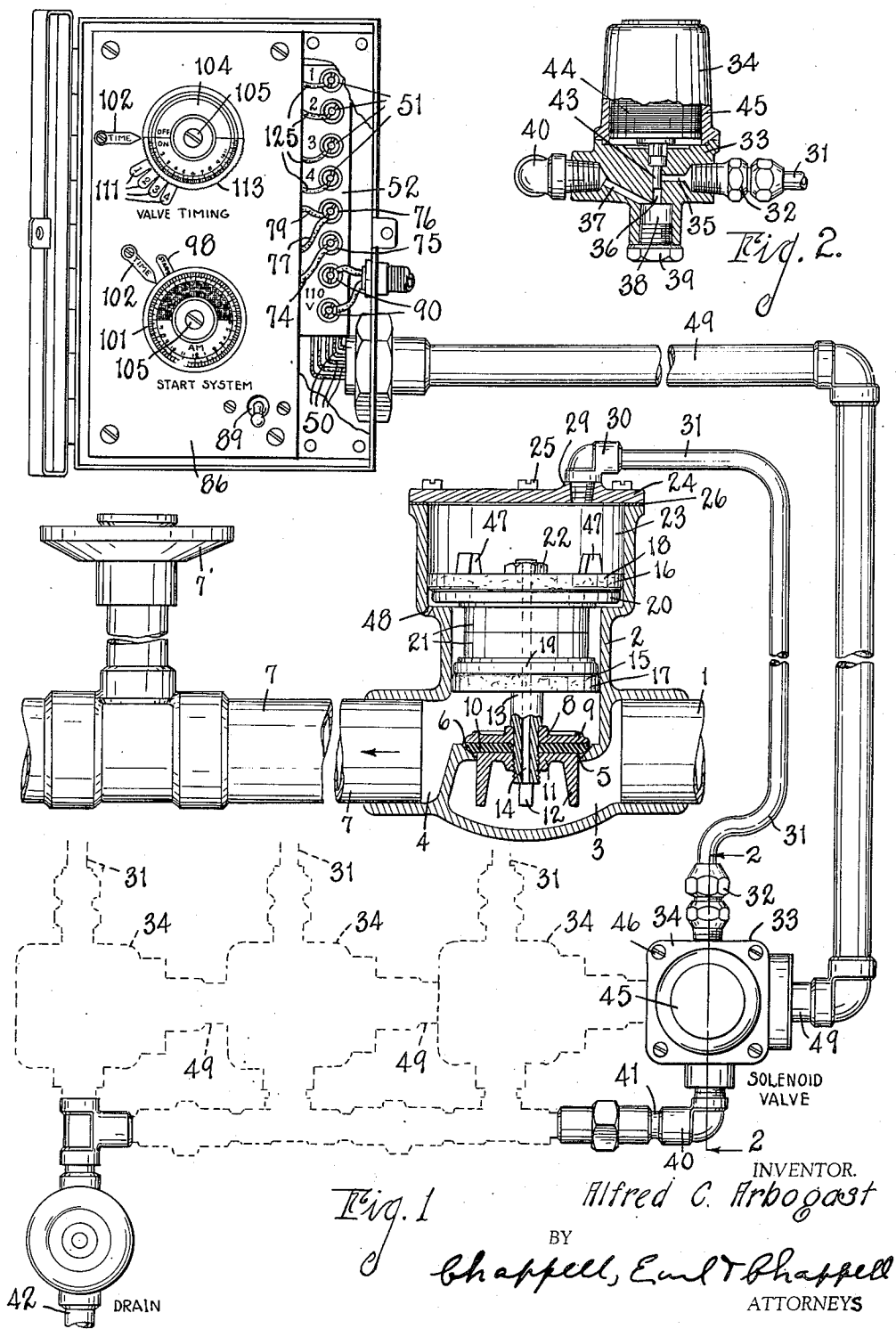


Fig. 2.

Fig. 1

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VALVE

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2 Claims. (Cl. 137—139)

The main objects of my invention are:

First, to provide improved valve means for a sprinkler system.

Second, to provide a novel automatically actuated valve.

Objects relating to details and economies of my invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A structure which is a preferred embodiment of my invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a diagrammatic view of a sprinkler system embodying my invention, a single sprinkler unit valve being illustrated, parts being broken away and sectioned for convenience in illustration.

Fig. 2 is a sectional view along the line 2—2 of Fig. 1, illustrating one of the solenoid actuated controlling valves.

The present invention relates to an automatically actuated valve particularly devised for a sprinkler system having clock means for determining the time in which valves controlling a plurality of sprinkler units are actuated, such a clock controlled system being illustrated in my copending application, Serial No. 218,317, filed July 9, 1938, which is a division of the present application. The system comprises a plurality of control valves actuated by solenoids to govern the fluid pressure acting on a valve according to the present invention forming a part of the unit, the solenoids being successively actuated by the clock means referred to, whereby a plurality of sprinkler units may be successively placed in or cut out of operation. A single sprinkler unit is illustrated and only one sprinkler head of that unit, however a series of solenoid actuated controlled valves are indicated in dotted lines in Fig. 1.

Referring to the drawing, a supply pipe from a main header is indicated by the reference numeral 1. It will be understood that a main header supplies water to a plurality of unit supply pipes, the number thereof being dependent upon the number of sprinkler units included in the system. Pipe 1 is connected to a valve casing 2 to deliver water to the intake chamber 3 thereof. Connecting the intake chamber with a discharge chamber 4 is a valve opening or port 5 having a beveled seat 6. The discharge or spray unit pipe 7 is connected to casing 2 at the chamber 4 and communicates in turn with sprinkling heads 7'. Coacting with the valve seat 6 is a valve 8 made up of a disk 9, a facing 10 carried thereby, and a retaining member 11 having depending guide lugs 12 for a purpose to be described. The valve is carried on a plunger rod 13, being secured thereto by retaining member 11 which is threaded on the lower end of the rod. Plunger rod 13 has a by-pass bore or passage 14 therein, as indicated in dotted lines in Fig. 1, for a purpose to be hereinafter described.

Fixedly mounted on rod 13 above valve 8 and cooperating with the side walls of casing 2, I provide a pair of plungers 15 and 16 comprising respectively the circular cup leathers 17, 18 and retaining plates 19, 20. Spacer rings 21 separate the two plungers, and a nut 22 threaded to the upper end of plunger rod 13 holds the plungers thereon. As indicated in Fig. 1, the upper plunger 16 is larger in diameter than lower plunger 15 for a purpose to be described. To close the end of upper cylinder 23 in casing 2, I provide a head 24 secured to the casing by screws or threads 25 and a suitable gasket 26 is interposed between the head and the casing. Head 24 has a boss 29 which is bored and tapped to receive a pipe fitting 30 connected to a pressure relief or exhaust pipe 31.

The exhaust pressure relief pipe carries at its opposite end a fitting 32 which is tapped into the valve body 33 of the solenoid controlled valve actuating device 34. The valve body 33, as indicated in Fig. 2 is bored to provide passages 35, 36 and 37 communicating respectively with fitting 32, with a clean-out opening 38 having a closure plug 39, and with an exhaust elbow fitting 40 connected to a pipe 41 leading to a drain 42. A plunger valve 43 is arranged to slide in valve body 33 to govern the flow of water through passages 35, 36 and 37, depending upon the position of the valve. Valve 43 is actuated by a solenoid 44 mounted in a casing 45 above valve body 33 and secured thereto by screws 46.

In the position of parts indicated in Fig. 2, the valve 43 is in its closed position, so that communication of passage 35 with passages 36 and 37 is cut off. Hence, water flowing from supply pipe 1 through by-pass 14 in plunger rod 13 into cylinder 23 and pipe 31 will build up a back pressure in cylinder 23. Inasmuch as the diameter of upper plunger 16 is greater than that of lower plunger 15, the force tending to close valve 8 will be greater than the force tending to open the same which is exerted against plunger 15 by the water under supply pressure in discharge chamber 4. Therefore, the plunger rod and plungers carried thereby will be thrust downwardly to close valve 8 and cut off the dis-

charge of water through pipe 7 to the sprinkling unit.

At such a time, governed by the timing mechanism to be hereinafter referred to, as the solenoid may raise plunger valve 43 to place passages 35, 36 and 37 in communication, the flow of water passing through by-pass 14, cylinder 23 and pipe 31 will be unimpeded by plunger valve 43, with the result that the by-pass flow will be exhausted through passages 35, 36, 37 into pipe 41 and out through drain 42. With this arrangement, no back pressure will be created in cylinder 23 and water from supply pipe 1 will pass through valve opening 5 into discharge chamber 4 and out through discharge pipe 7 to the sprinkling head, valve 8 being elevated during this time.

Stop lugs 47 are formed on the upper side of plunger 16 for the purpose of preventing the upper end of the plunger rod from contacting cylinder head 24 and restricting the flow of water through by-pass 14. If desired, the upper and lower ends of the plunger rod may carry screens (not shown) whereby solid matter may be excluded from the by-pass.

I have found that unless provision is made to counteract it, the force of the water from supply pipe 1 tends to urge plungers 15, 16 askew or out of a vertical line of action, causing uneven wear thereon, so that after a period of time leakage occurs past the plungers with poor operation as the result. The depending guide lugs 12 eliminate this tendency by coacting with valve opening 5 during the sliding movement to guide the valve.

Adjacent the bottom of upper cylinder 23 in casing 2, I drill or otherwise provide an opening 48 for the purpose of draining water which may have leaked past plungers 15 or 16 and become trapped therebetween. On each upstroke of plunger 15, any water so trapped is expelled through opening 48. The possibility of water accumulating between the plungers, freezing in cold weather and bursting the casing is therefore eliminated.

It will be understood that each sprinkling unit will be composed of a set of sprinkling heads and control devices therefor including solenoid actuated plunger valve 43, casing 2 containing plungers 15 and 16, valve 8 and a supply pipe 1. I have shown the elements making up one unit only, for the purpose of simplicity of illustration. In Fig. 1, I have indicated by dotted lines a plurality of the control valve units.

The reference numeral 49 indicates a suitable conduit carrying therein a plurality of electrical conductors 50 which are appropriately connected to the solenoid terminals. At their opposite ends, conductors 50 are connected to terminals 51 marked 1, 2, 3, 4 on panel 52 of a clock controlled mechanism similar to that shown and described in my copending divisional application, Serial No. 218,317.

This clock controlled mechanism has a dial panel 86 provided with valve timing and starting dials 104, 101, respectively, each of which is connected to a shaft (not shown) by means of a screw 105. Dial 104 is rotatably adjustable relative to an orienting pointer 102 and the shaft therefor has a plurality of actuating cams controlled by the setting of the clips 111 relative to the dial 104, these clips coacting with notches 113 formed in the dial. As described in detail in the above copending application, it is possible to arrange the timing and periods of actuation of the various solenoid controlled valve actuating devices 34 by appropriate setting of dial 104 relative to the pointer 102 and of the clips 111 relative to the dial and one another.

The starting dial 101 also has an orienting pointer 102 associated therewith, as well as a clip 98 coacting with the dial for determining the time of starting operation of the clock controlled mechanism, as described in the copending application. The dials are driven by suitable synchronous motors (not shown) and appropriate wires 74, 77, 79 are connected to terminals 75, 76 on the panel 52 for completing the various actuating and timing circuits of the mechanism. The line terminals 90 on the control panel are under the control of a manually actuated switch 89 and the leads 125 connect the solenoid terminals 51 with the circuit making timing instrumentalities of the mechanism.

The solenoids are successively actuated at predetermined times and for predetermined intervals by means of the above referred to clock controlled mechanism and the actuation of the respective fluid pressure controlled valves 8 constituting the subject matter of this application ensues immediately following the energization of the corresponding solenoid. The said fluid controlled valves are simple and rugged in construction and are not likely to get out of order or to require frequent inspection or seasonal adjustment or cleaning.

I have illustrated and described my improvements in an embodiment which I consider very practical. I have not attempted to illustrate or describe other embodiments or adaptations as it is believed this disclosure will enable those skilled in the art to embody or adapt my improvements as may be desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination, a differential plunger valve device comprising a casing having an upper cylinder portion, a lower cylinder portion of smaller diameter and a valve opening surrounded by a valve seat beneath said portions, plungers in said cylinders, and a valve adapted to coact with said seat, a plunger rod on which said plungers and valve are mounted, said rod having a longitudinal by-pass therethrough, and depending guide lugs carried by said valve cooperating with said valve opening to guide said plungers and valve for reciprocating movement in said casing, said casing having a drain aperture therein adjacent the point of meeting of said upper and lower cylinder portions.

2. In combination, a differential plunger valve device comprising a casing having cylinder portions of different diameters, and a valve opening surrounded by a valve seat, plungers in said cylinders, and a valve adapted to coact with said seat, a plunger rod on which said plungers and valve are mounted, said rod having a longitudinal by-pass therethrough, and depending guide lugs carried by said valve and cooperating with said valve opening to guide said plungers and valve for reciprocating movement in the casing.

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