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MEANS FOR AUTOMATICALLY CONTROLLING THE
FLOW OF LIQUID IN PIPES
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By
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This invention relates to means for automatically controlling the flow of liquid in pipes. It will be explained in connection with automatic sprinkling, fire extinguishing, systems.

One of the objects of the invention is the provision of means responsive to flow of liquid or fluid through a pipe for controlling a means by which the initial flow may be increased and accelerated and continued until manually stopped.

Another object is the provision of means, responsive to flow of water, and to drop of pressure in a pipe, whereby to control a source of water supply to raise the pressure to normal and which will continue uninterruptedly to supply water to the pipe until the flow movement thereof, through the pipe ceases.

Another object is to provide an electric current controlling switch, or other starting device, for starting an engine, electric motor, or the like, by means automatically responsive to flow of water thru a pipe, whereby to operate a booster pump as an auxiliary to another source of water supply for passing water thru the pipe to accelerate the flow and to increase the quantity thereof.

Other objects and advantages of the invention will hereinafter appear from a consideration of the following description when taken in conjunction with the drawings, wherein:

Fig. 1 is a more or less schematic arrangement of device and circuits constituting one system for supplying water to a water distributing pipe.

Fig. 2 is an elevation of the opposite side of the check valve shown in section in Fig. 1.

Fig. 3 is an enlarged view of the circuit closing lever attached to the valve stem, which is also shown in Figs. 1 and 2.

In the drawings chosen to exemplify my invention 5 is a water distributing pipe normally maintained at a pressure within a certain range. Connected to the pipe 5 are a plurality of sprinkler heads 6 held closed by a fuse element 7 and adapted to be opened upon the occurrence of fire.

8 is a check valve casing having a swinging check valves therein, as at 9, pivoted on a valve stem 10. Secured to the valve stem is a lever 11 carrying one element 13 of an electric switch. When the valve 9 is open, as by flow of water thru the pipe 5, the lever 11, connected to the valve stem 10, will be oscillated or moved to a point determined by the extent to which the valve is open. At the end of the lever 11 is connected a piston rod 13 connected to a piston 14 in the dash pot 15, the object being to prevent spasmodic movement of the valve 9 by a "water-hammer" or the like.

The dash pot 15 is oscillatable upon a pivot 16. A water supply pipe 17 is connected to the pipe 5 and may be connected to a suitable source of water supply such as a pressure tank, or tank elevated upon the roof of the building in which the system is employed for protection.

Another water supply pipe 18 is in line with connected to the pipe 5 and is also connected to a centrifugal pump 19. A water supply pipe 20 may be connected to the same or to another source of water supply. The pipes 17 and 20 both contribute to supply water to the distribution pipe 5. The pump 19 may be operated by an engine of any character or by an electric motor 21, the armature of which is directly connected to the rotor of the pump.

An electric starter 22 for a direct current motor consists of the coil 23, the core 24 which is movable axially thereof and which is connected to a lever 25, pivoted at 26, and bearing on a starting rheostat commutator 27. A dash pot 28 is provided with a piston 29, and piston rod 30, which is pivoted to the lever 25, as at 31, and to a link 32 which is pivoted at 33 to the core 24.

The main or live wires, 35 and 36, are connected to any suitable source of current supply. The wire 35 is connected to the binding post 37 of the motor 21 and the binding post 38 of the motor is connected by a wire 39 to the lever 25, as at 26.

The end of the rheostat commutator 27 is connected by a wire 39 to the wire 38, so that when the lever 25 moves over, the commutator circuit is thus closed thru the motor 21 which is properly started into operation, the rotation of the armature of which rotates the rotor of the pump 19 and causes water to flow thru the pipes 18 and 20 into the pipe 5.

Water in the pipe 17 usually maintains normal pressure that obtains in the pipe 5, so that normally the valve 9 in the casing 8 is substantially balanced but closed, as shown in Fig. 1. Should the pipe 5 leak or have a slow drip, then the diaphragm 40, closing the casing 41, is moved inwardly of the casing.
and a contact lever 42 which is pivoted at 43 is drawn downwardly by the diaphragm until the end of the lever 42 connects with the contact 44, which closes the circuit thru the wire 45, thru the solenoid 23, thru the wire 46 and then thru the wire 47. The wire 46 is connected to the casing 2 of the check valve; and when the circuit is thus closed thru the solenoid 23 the core 24 thereof will be lifted and the lever 25 will gradually cut resistance out of the rheostat 27, and the motor will start and operate the auxiliary pump 19, thus forcing additional water into the pipe 5 and raising the pressure therein to the normal predetermined extent.

If water is not leaving the pipe 5 rapidly, then the diaphragm 40 will be bulged outwardly as the pressure in pipe 5 increases and the circuit between the contact lever 42 and contact 44 will be opened and the motor will stop provided, however, that the check valve 9, as a result of the cessation of water flow will be closed and also open the circuit.

If water flows thru the pipe 5 sufficiently to unseat the check valve 9, then the lever 12 will make contact with the plate 46 and the circuit will be closed as before thru the solenoid coil 23, and the motor again starts. The motor will then continue to supply water to the pipe 5, from the pipe 20 thru the instrumentality of the pump 19, so long as the check valve 9 remains open, because during this time the lever 12 is in contact with the plate 46 and the circuit is maintained closed thru the solenoid coil 23, and the motor is therefore in condition to continue its motion to operate the pump.

The pressure responsive device 41 will initiate the operation of the motor 21 independently of the movement of the valve 9, but after the water has begun to pass into the pipe 5 from either of the pipes 17 or 20, the valve 9 will be opened and so long as the valve 9 remains open the motor will continue to run. I have, however, provided a manually operable switch 47 which may be opened and which will have the effect of stopping the operation of the motor.

The pressure-responsive device 41 will initiate the operation of the flow-responsive device including the check valve 9 and the circuit controlled thereby, but the pressure-responsive device will have no further modifying effect upon the flow-responsive device so long as the water thru the pipe 5 is in motion.

The object of using the safeguarding effect of the pressure-responsive device 41 is to provide against leak from the pipe 5 and depreciation of the pressure therein which will not have sufficient effect to open the valve 9 by flow of water from the pipe 17 into the pipe 5.

Any sort of remote alarm initiated by flow of water or by movement of a part of the pressure-responsive device or the flow-responsive device may be included in the system.

I have shown one such alarm consisting of the bell 48 energized by a local battery 49 when the electro-magnet 50 is energized. The electro-magnet 50 is placed in series with the coil 23 to close contacts 51 and 52 when coil 23 is energized. This closes the local circuit thru wires 53 and 54 and the battery 49. The alarm bell 48 will therefore ring when the pressure in pipe 5 is below normal or when water begins to flow in pipe 5. This does away with the necessity of an additional alarm valve or other means for establishing an alarm remote from the apparatus shown.

My invention is susceptible to considerable modifications and variations and disposition of the parts within the scope of the appended claims.

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

1. In a fire extinguishing system a pipe for conducting a fire extinguishing liquid; a source of supply of said liquid; another source of supply of fire extinguishing liquid; means responsive to decrease of pressure in said pipe and means responsive to the movement of liquid in said pipe, due to its flow, either of which responsive devices being operable to cause liquid from said second source to flow into said pipe.

2. In a fire extinguishing system a pipe for conducting a fire extinguishing liquid; a source of supply of said liquid; another source of supply of fire extinguishing liquid; means responsive directly to the movement of liquid in its flow from said first source to cause liquid from the second source to flow into said pipe with liquid flowing from the first source and means responsive to fall of pressure in said pipe to initiate the operation of said first mentioned means.

3. In a sprinkler system, a liquid distributing pipe, a liquid supply source, means connected to said distributing pipe and a separate liquid supply source, means connected to said distributing pipe and a separate liquid supply source for augmenting the flow of liquid in said distributing pipe, means responsive to the flow of liquid through said distributing pipe for initiating the operation of said first mentioned means, and means responsive to pressure in said distributing pipe for initiating the operation of said first mentioned means when said pressure drops below a predetermined value.

4. In a sprinkler system, a liquid distributing pipe, a casing connected thereto, a check valve in said casing, means for forcing liquid to said distributing pipe from a source of supply, switch means actuated by movement of said check valve for initiating the operation of said means, a second casing in communication with said first mentioned casing, a diaphragm in said second casing responsive to pressure therein, switch means acti-
ated by the movement of said diaphragm for initiating the operation of said first mentioned means when the pressure in said second casing drops below a predetermined value, and means for supplying liquid to said distributing pipe at a point to the rear of said first mentioned casing from a second source of supply.

5. In a sprinkler system, a liquid distributing pipe, means to cause liquid to flow into said pipe, auxiliary means to cause liquid to flow into said pipe, flow responsive means connected to said pipe in advance of said first mentioned means and said auxiliary means for initiating the operation of the latter, and pressure responsive means in communication with said pipe in advance of said first mentioned means and said auxiliary means for initiating the operation of the latter when the pressure in said pipe falls below a predetermined value.

6. In a sprinkler system, a liquid distributing pipe, supply means to cause liquid to flow into said pipe, auxiliary means to cause an additional flow of liquid to said pipe, flow responsive means in communication with said pipe in advance of said supply means and said auxiliary means for initiating the operation of the latter, pressure responsive means in communication with said pipe in advance of said supply means and said auxiliary means for initiating the operation of the latter when the pressure in said pipe falls below a predetermined value, and alarm means initiated by either of said responsive means.

7. In a sprinkler system, a liquid distributing pipe, means to cause water to flow in said pipe, signal means, flow-responsive means in communication with said pipe for initiating the operation of said signal means, and pressure responsive means in communication with said pipe for initiating the operation of said signal means when the pressure in said pipe falls below a predetermined value.

8. In an automatic sprinkler system, the combination with a water distributing pipe, of water flow-responsive means and pressure-responsive means; means to cause water to flow in said pipe and auxiliary means to cause additional flow of water in said pipe; said auxiliary means being controlled independently by said responsive means.

9. An automatic sprinkler system comprising a water distributing pipe; means to supply water thereto from a given source, and other means to supply additional water thereto from another source to augment the flow of water supplied by the first mentioned source; a pressure-responsive means and a flow-responsive means in said pipe independently operable to control the water supply augmenting means.

In testimony whereof I hereunto subscribe my name.

JOHN H. BRUMBAUGH.