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 APPARATUS FOR OPERATING ALARMS OR OTHER DEVICES.
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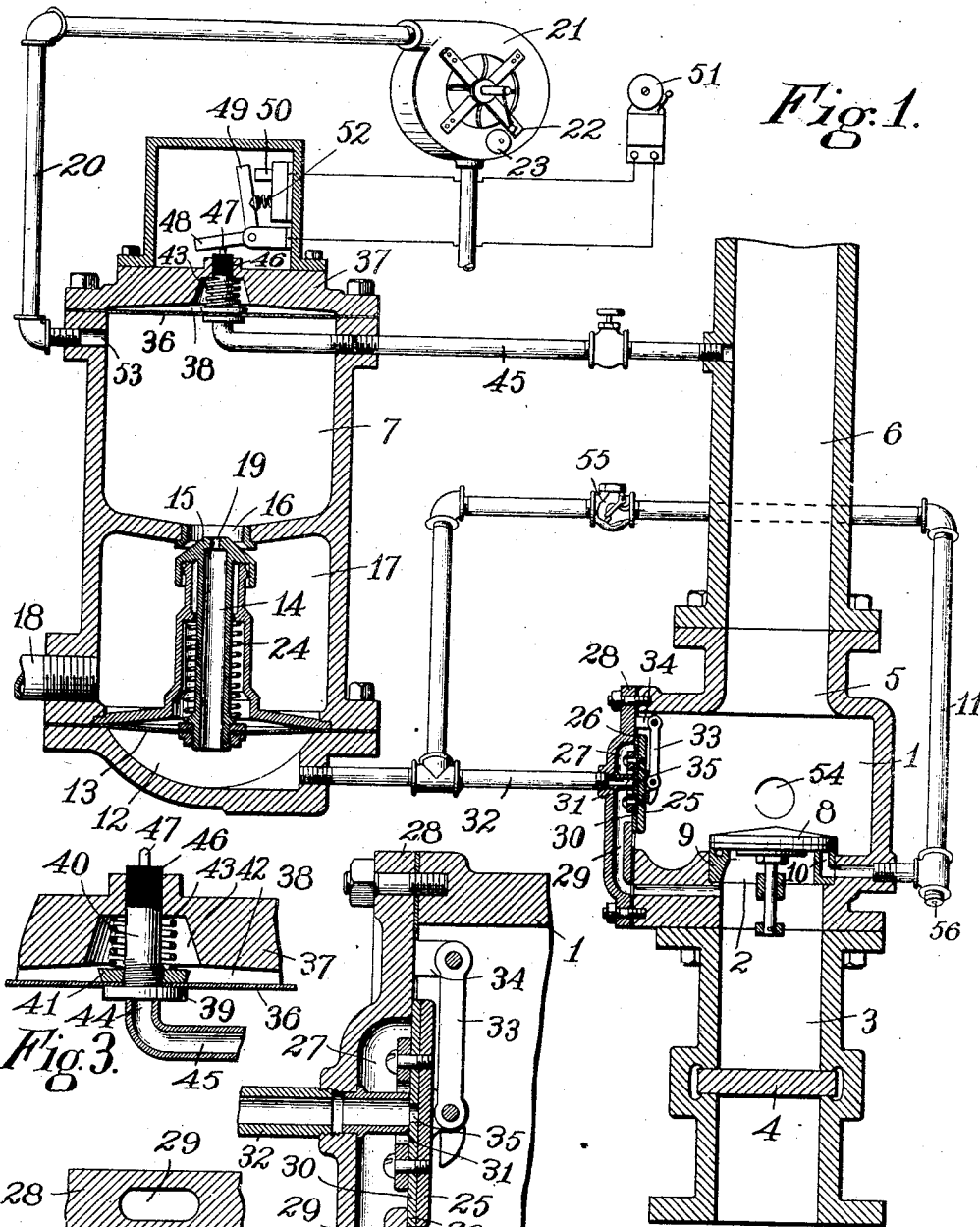


Fig. 3.

Fig. 4.

Fig. 2.

Witnesses

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APPARATUS FOR OPERATING ALARMS OR OTHER DEVICES.

1,051,266.

Specification of Letters Patent.

Patented Jan. 21, 1913.

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To all whom it may concern:

Be it known that I, GEORGE I. ROCKWOOD, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in Apparatus for Operating Alarms or other Devices, of which the following, with the accompanying drawings, is a specification.

My present invention relates to that class of alarm operating devices which are employed in connection with automatic fire extinguisher systems, for the purpose of operating an alarm whenever a continuous discharge of water occurs, due to the opening of one or more of the sprinkler heads. The apparatus in which my invention is embodied causes an alarm to be sounded whenever one or more sprinkler heads have been released, but remains ineffectual to operate the alarm during intermittent passages of water through the supply pipe, such as are caused by what are known as water hammers.

The objects of my present invention are to secure a certain and positive operation of the alarm whenever a slight reduction in the pressure of water in the supply pipe occurs, such as might be caused, for example, by the release of a single sprinkler head, and also to insure a continuous operation of the alarm after it has once been put in action.

Other objects of my invention are to provide for the certain drainage of the sprinkler supply pipes whenever the source of water supply is cut off, and also to provide a secondary alarm whose action is controlled by a predetermined static pressure in the apparatus.

These objects, among others, are accomplished by the construction and arrangement of parts as described in the following specification and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved alarm apparatus, the principal parts being shown in vertical central sectional view. Fig. 2 is a vertical central sectional view on an enlarged scale of the second or sensitive controlling valve. Fig. 3 is an elevation, partly in sectional view, of a portion of the apparatus for producing a secondary alarm. Fig. 4 is a sectional view on the plane of the broken line 4—4, Fig. 2, showing the shape in cross section of the

water passage leading to the sensitive controlling valve.

Similar reference characters refer to similar parts in the different figures.

Referring to the accompanying drawings 1 denotes a chamber having an inlet opening 2 communicating with a pipe 3 leading to a source of water supply under pressure, and provided with a valve 4 by which the water supply may be cut off when desired. The chamber 1 is also provided with an outlet passage 5 communicating with a sprinkler supply pipe 6. When the sprinkler heads are closed as in the normal condition of the sprinkler system the flow of water through the pipes 3 and 6 is checked and maintained under pressure. Whenever one or more sprinkler heads, however, are released, water will pass through the pipes 3 and 6 and the chamber 1 in an uninterrupted flow, and under this condition it is desirable to sound an alarm, and this is accomplished by diverting a current of water from the water supply to an auxiliary chamber 7. If the flow of water into the chamber 7 is continued, as would occur whenever one or more sprinkler heads were released an alarm is operated. If, however, the flow of water into the chamber 7 is not continued, but should occur intermittently, due to a sudden influx of water into the chamber 1, such as would be produced by a water hammer, for example, the alarm is not sounded, but each intermittent inflow of water to the chamber 7 is allowed to flow out and empty the chamber.

It has been proposed to control the flow of water into the chamber 7 by closing the inlet 2 by a check valve 8 resting upon an annular valve seat 9, having in its face a groove or channel 10 communicating by a pipe 11 with an inclosed chamber 12, having a flexible diaphragm 13 which carries a hollow spindle 14, having its upper end beveled at 15 and adapted, whenever the spindle is raised, to close a passage 16 between the chamber 7 and a chamber 17 which is provided with a drip or exhaust pipe 18.

Whenever the check valve 8 is raised by an influx of water into the chamber 1 due to a water hammer or by a continued flow through the pipes 3 and 6, due to the release of a sprinkler head, the annular channel 10 is exposed and water flows into the chamber 12 through the pipe 11 until its pressure

raises the diaphragm 13 and hollow spindle 14 to close the passage 16. An excess of water flowing into the chamber 12 will, however, be forced upward through the hollow spindle 14 and restricted opening 19 into the chamber 7. If the flow of water is continued long enough the chamber 7 becomes filled and water is conducted through the pipe 20 to any suitable mechanical device for operating an alarm contained in the case 21, in the present instance consisting of a water operating wheel carrying the hammer 22 which, in its revolutions is made to contact with a bell 23. An intermittent flow of water, insufficient to fill the chamber 7 will be withdrawn from the chamber 7 by the depression of the diaphragm 13 and the hollow spindle 14 as soon as the flow has ceased by means of a spiral spring 24, thereby opening the passage 16 and allowing the chamber 7 to empty into the chamber 17 which is exhausted through the pipe 18.

The above described apparatus for operating an alarm as controlled by the movement of the check valve 8 forms no part of my present invention, as substantially the same device has been shown and illustrated in my copending application for Letters Patent of the United States, Serial No. 541,631.

As the area exposed to water pressure upon the upper side of the check valve 8 is considerably greater than the area exposed to water pressure upon the under side of the valve, a considerable difference in the pressures for any given area is required in order to lift the check valve from its seat.

In order to render the operation of the alarm apparatus sensitive to slight differences in pressure between the chamber 1 and the pipe 3, I place a secondary or sensitive valve 25, resting upon an annular valve seat 26, surrounding a recess 27 in a plate 28 attached to an open side of the chamber 1. Between the recess 27 and the inlet opening 2 is a water passage 29 elongated in cross section, as shown in Fig. 4, in order to increase its area. The valve 25 has attached to its under side an elastic disk 30 which, when the valve is closed, rests upon the valve seat 26 and also serves to close the end 31 of a pipe 32, communicating at its opposite end with a chamber 12. The valve 25 is pivotally connected at its center to one end of a link 33 having its opposite end pivoted to a stud 34 projecting from the inner side of the plate 28. When the valve 25 is in its closed position the end 31 of the pipe 32 is closed and also the communication between the chamber 1 and the recess 27.

A slight reduction in the water pressure in the chamber 1 below that in the pipe 3, such as might occur by the release of a single sprinkler head is sufficient to cause the

valve 25 to be lifted from its seat, thereby opening the pipe 32 and allowing water under pressure to flow into the chamber 12, and if this condition exists for a sufficient length of time it will cause the chamber 7 to become filled and water to pass through the pipe 20 to the alarm mechanism inclosed in the case 21. As some water is liable to work between the valve 25 and the elastic disk 30, I provide a small opening 35 in the elastic disk directly over the opening in the pipe 32 to provide for its escape. The valve 25 is therefore adapted to be opened by a very slight reduction in pressure between the chamber 1 and the pipe 3, causing the alarm to be operated even in some instances before the check valve 8 is lifted from its seat.

Across the top of the chamber 7 I place a flexible diaphragm 36 having its edges clamped between the vertical walls of the chamber and the cap 37, a space 38 being provided beneath the cap for the upward movement of the diaphragm. The diaphragm 36 is clamped between the head 39 of a screw threaded bolt 40 and a clamping nut 41 carried by the bolt 40. The cap 37 is provided with a recess 42 which incloses a spiral spring 43 interposed between the end wall of the recess and the nut 41; the tension of the spring being applied to hold the diaphragm in a depressed position, with the head 39 bearing against the open end 44 of a pipe 45 which communicates with the sprinkler supply pipe 6. The head 39 therefore serves as a valve to normally close the passage through the pipe 45. Mounted upon the bolt 40 is a cylindrical block 46 of insulating material, carrying a spur 47 which bears against an arm 48 of a two armed switch lever, the opposite arm 49 being arranged to contact with a switch block 50 and complete an electric circuit which includes an alarm bell 51. The electric circuit is normally held broken by means of a spiral spring 52. Whenever a continued flow of water fills the chamber 7 above the opening 53, a small body of air becomes imprisoned between the water and the under side of the diaphragm 36. As the pipe 20 fills a vertical column of water is finally produced whose static pressure causes the diaphragm 36 to be lifted against the tension of the spiral spring 43, rocking the two armed switch lever until its arm 49 contacts with the switch block 50, thereby completing the electric circuit and ringing the alarm 51.

As the diaphragm 36 is raised, the passage through the pipe 45 is opened to allow water to flow from the sprinkler pipe 6 into the chamber 7, thereby hastening the operation of the alarm supported by the case 21. When the pipe 45 has once been opened it will furnish a water supply sufficient to

maintain the pressure beneath the diaphragm 36 and prevent the closing of the pipe, thereby rendering it certain that the operation of both alarms 21 and 51 will be continued as long as a water pressure exists in the pipe 6 independently of the operation of the sensitive valve 25 or of the check valve 8.

Whenever it is desired to check the flow of water through the sprinklers the gate valve 4 is closed, shutting off the source of water supply, and a valve controlled passage 54, leading from the chamber 1 is opened, allowing the sprinkler supply pipes to drain.

The pipe 11 contains a check valve 55 for preventing a return flow of water through the pipe, but in order to provide for the escape of any water which may leak through the check valve and which would otherwise accumulate in the annular groove or channel 10, I provide a drip opening 56 below the level of the annular channel 10.

In the normal condition of water pressures in the sprinkler system the pressure in the chamber 1 is equal to or slightly greater than the water pressure in the pipe 3, causing the check valve 8 and the sensitive valve 25 to be held closed, thereby preventing any flow of water through the chamber 12 and hollow spindle 14 into the chamber 7. The chamber 7 serves as a measuring chamber and is of such size that the flow of water during the period of a water hammer will be insufficient to fill the chamber. If the duration of the flow into the chamber 7 be continued for a longer period, such as would occur by the release of one or more sprinkler heads, water will rise in the chamber 7 until it flows into the pipe 20 through the opening 53. As water rises in the pipe 20 its static pressure will lift the diaphragm 36, thereby opening the pipe 45 so that a flow of water will be continued into the chamber 7, causing the pressure to be maintained against the under side of both diaphragms 36 and 13. The pressure against the diaphragm 36 secures the continued flow of water through the pipe 45 and also the continued operation of the alarms 21 and 51, while the pressure against the under side of the diaphragm 13 holds the spindle 14 in a raised position and closes the passage 16 to prevent the downward escape of water from the chamber 7. While both valves 8 and 25 are differential valves, or valves having different areas of water pressure upon opposite sides, the differential pressure required to open the valve 25 is much less than that necessary to raise the valve 8. The valve 25 will, therefore, be opened at an earlier period than the valve 8 when a single sprinkler head is released.

I claim,

1. In an alarm apparatus, a main water

passage from a source of water supply under pressure to water distributing means, a check valve interposed in said main water passage operable under differential pressures, a pressure controlled mechanism for operating an alarm, comprising a measuring chamber, two water passages between said measuring chamber and said main water passage, one of said passages being controlled by said check valve, and a secondary valve operable under a less differential pressure than said check valve for controlling the second of said water passages.

2. In an alarm apparatus, a main water passage between a source of water supply under pressure and water distributing means, a pressure controlled mechanism for operating an alarm, water passages connecting said main passage with said pressure controlled mechanism, and independent valves controlling said connecting water passages operable under differential pressures.

3. In an alarm apparatus, a main water passage between a source of water supply under pressure and water distributing means, a pressure controlled apparatus for bringing an alarm into operation, comprising a measuring chamber, a check valve in said main water passage, two water passages connecting said measuring chamber and said main water passage on opposite sides of said check valve, and independent valves for controlling said connecting water passages operable under differential pressures.

4. In an alarm apparatus, a measuring chamber, means for admitting water to said chamber, an exhaust from said measuring chamber, a valve for closing said exhaust, means for closing said valve by water pressure, an admission pipe for admitting water direct to said measuring chamber, a normally closed inlet valve between said admission pipe and the measuring chamber, and means for holding said inlet valve permanently open by a predetermined pressure in said measuring chamber.

5. In an alarm apparatus, a water passage between a source of water supply and water distributing means, a check valve dividing said water passage into upper and lower sections, an alarm operating mechanism arranged to be controlled by a flow of water from said water passage, and comprising a measuring chamber, a pipe leading from said water passage to the alarm operating mechanism, a valve normally closing said pipe and arranged to be opened by a differential water pressure between the upper and the lower sections of the water passage, a second pipe leading from said water passage direct to said measuring chamber, and yielding means for normally closing said second pipe.

6. In an alarm apparatus, a water passage between a source of water supply and water distributing means, a check valve dividing said water passage into upper and lower sections, an alarm operating mechanism arranged to be controlled by a flow of water from said water passage, and comprising a measuring chamber, a pipe leading from the upper section of the water passage to the alarm operating mechanism, a valve normally closing said pipe and arranged to be opened by a differential water pressure between the upper and lower sections of the water passage, a second pipe leading from the upper section of the water passage direct to said measuring chamber, and yielding means for normally closing said pipe adapted to be opened by pressure in the measuring chamber.
7. In an alarm apparatus, a measuring chamber having an exhaust opening, a valve for closing said exhaust opening, means for holding said valve normally open, a diaphragm chamber containing a pressure diaphragm connected with said valve for closing the same, a water passage through said valve between said diaphragm chamber and said measuring chamber, a pipe for supplying water to said measuring chamber, a valve for normally closing said pipe, and a diaphragm operated by pressure in said measuring chamber for opening said valve.
8. In an alarm apparatus, a water passage between a source of water supply and water distributing means, a check valve dividing said water passage into upper and lower sections, an alarm operating mechanism arranged to be controlled by a flow of water from said water passage and comprising a measuring chamber, a pipe leading from the water passage to the alarm operating mechanism, a valve normally closing said pipe and arranged to be opened by a differential water pressure between the upper and lower sections of the water passage, a second pipe leading from the water passage direct to said measuring chamber, yielding means for normally closing said pipe and means for opening said pipe by a predetermined water pressure in said measuring chamber.
9. In an alarm apparatus, for a water distributing system, mechanism for controlling the operation of an alarm determined by a flow of water from the water distributing system, a pipe connecting said controlling mechanism with the water distributing system, a valve normally closing the inlet end of said pipe and subject to opposing pressures in the water distributing system, and a check valve for producing a differential pressure on opposite sides of said valve.
10. In an alarm apparatus for a water distributing system, a casing comprising a pressure chamber and a measuring chamber having an exhaust outlet, a pressure controlled valve arranged to close the exhaust outlet of said measuring chamber by pressure in the pressure chamber, a restricted passage through said valve between the pressure and measuring chambers, means for controlling a flow of water from the water distributing system to said pressure chamber by the differential pressures in the water distributing system, and means for maintaining the pressure in said pressure chamber when a predetermined pressure has been reached in said measuring chamber.
11. In an alarm apparatus for a water distributing system, a pipe leading from a source of water supply under pressure to water distributing means, a check valve for producing a differential pressure in said pipe, an alarm controlling mechanism comprising a chamber having two valve controlled means of communication with said supply pipe, one of said means being controlled by the differential pressure in said supply pipe and the other by the pressure in said chamber.
12. In an alarm apparatus, for a water distributing system, a water supply pipe for said system, a main check valve for producing a differential pressure in said supply pipe, an alarm controlling mechanism, a connecting pipe leading from said supply pipe to said alarm controlling mechanism, a valve for closing said water supply pipe and exposed to the differential pressure in said water supply pipe, a pipe between said valve closed connecting pipe and the water supply pipe, with the passage therethrough controlled by said main check valve, and provided with a check valve and a drip opening.
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