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APPARATUS FOR OPERATING ALARMS AND OTHER DEVICES.

APPLICATION FILED DEC. 3, 1909.

989,052.

Patented Apr. 11, 1911.

2 SHEETS—SHEET 1.

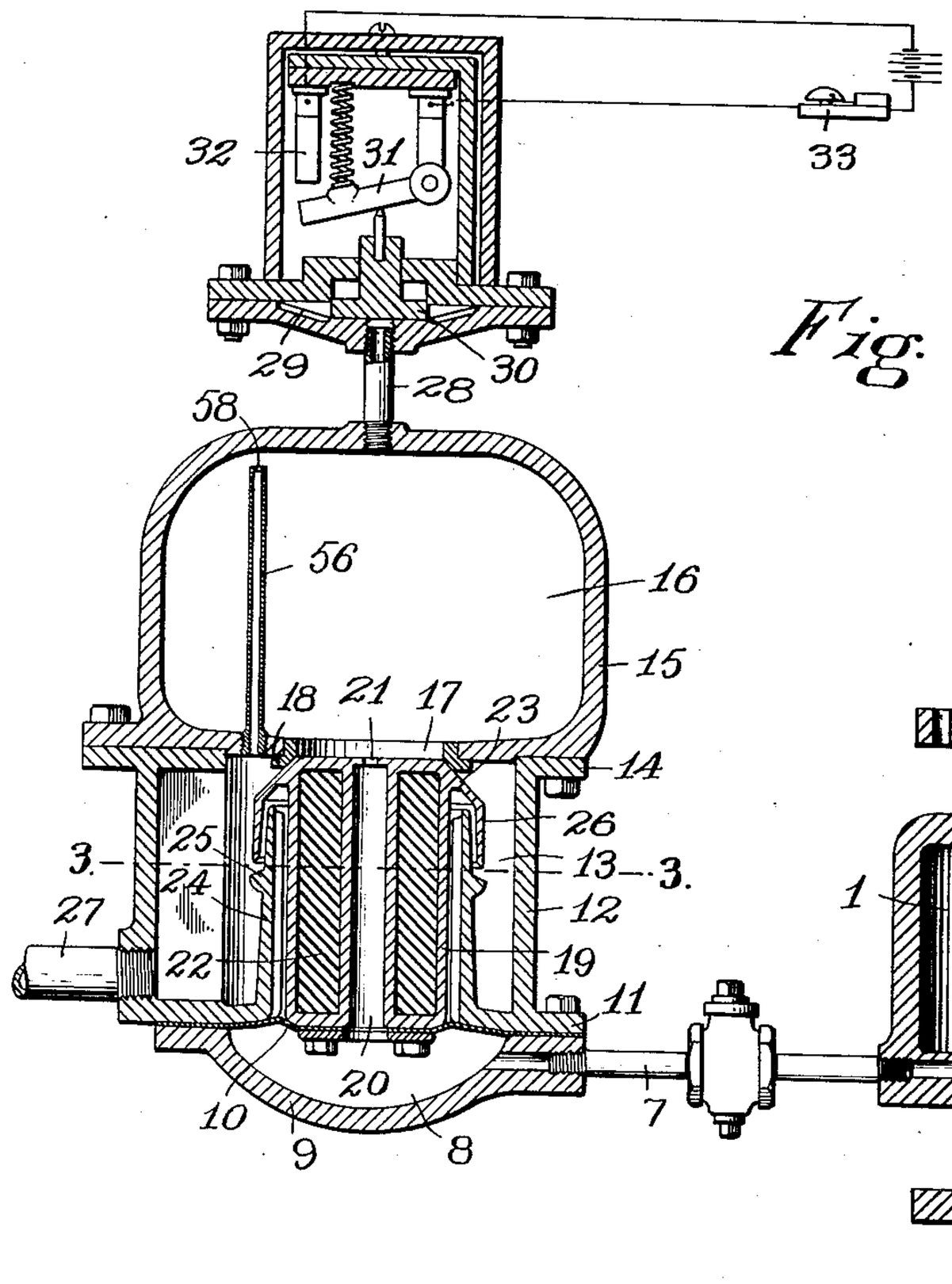
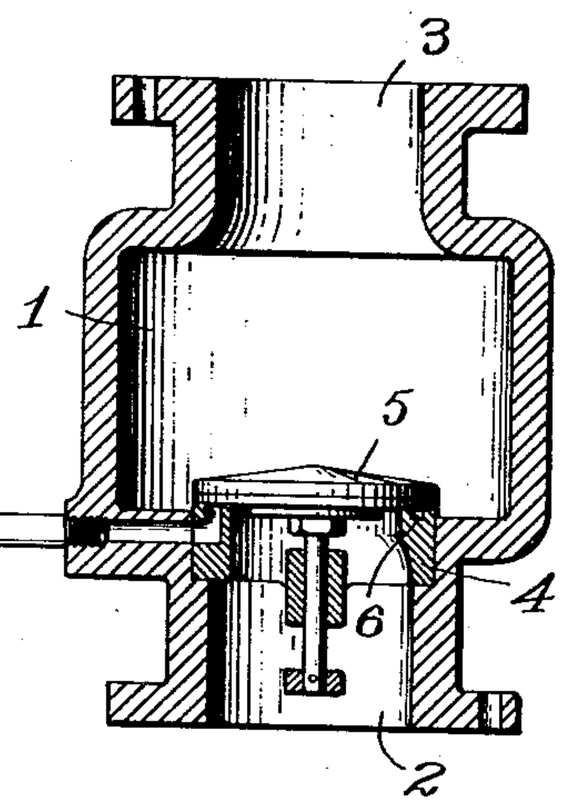


Fig. 1.



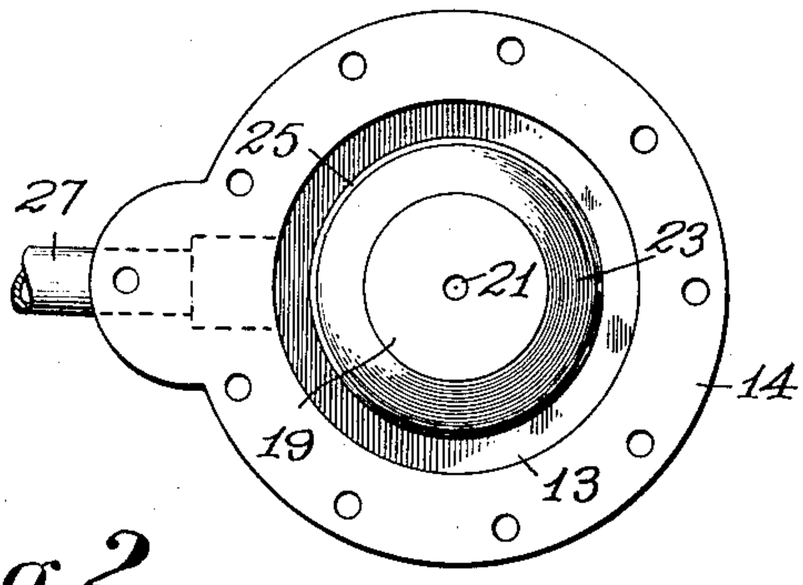


Fig. 2.

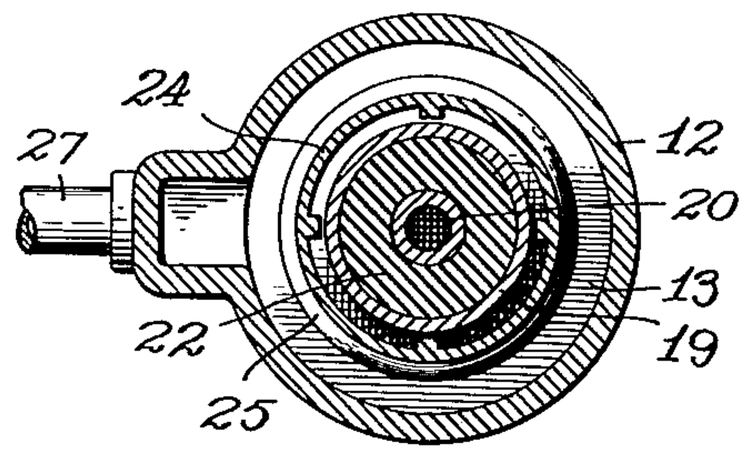


Fig. 3.

Witnesses.

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2 SHEETS—SHEET 2.

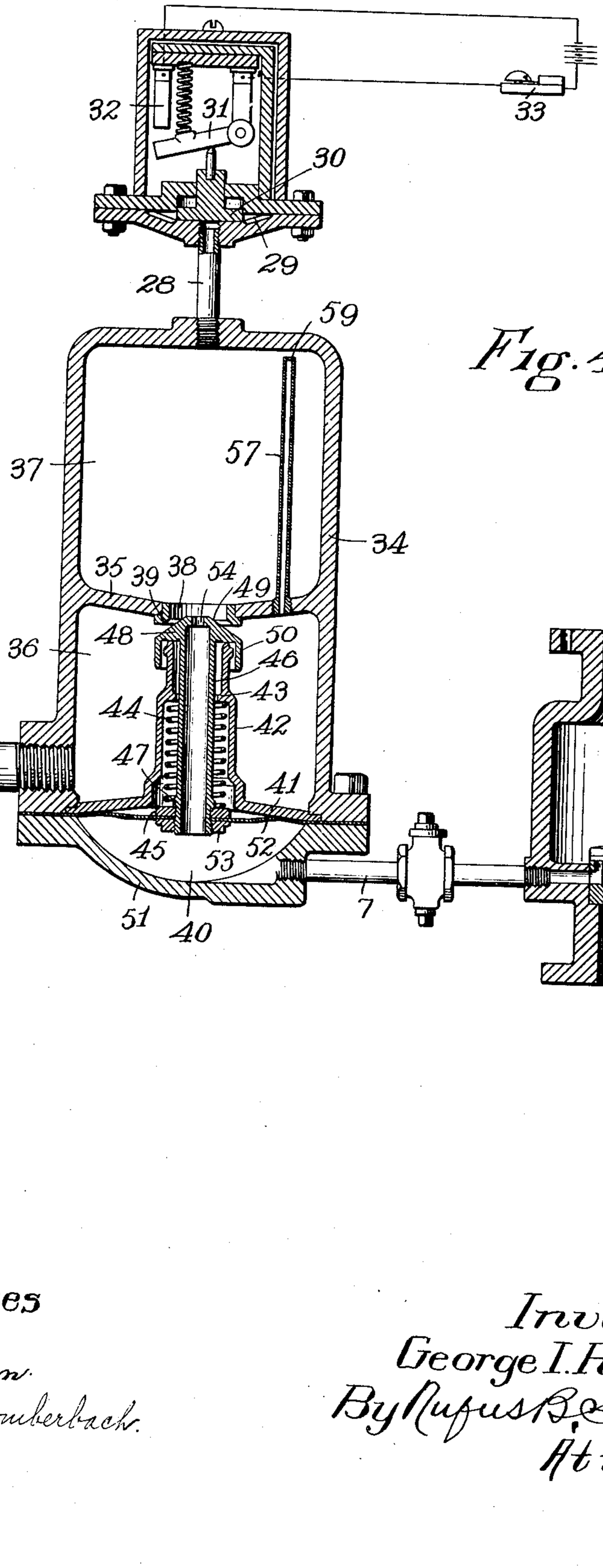

Fig. 4.

Witnesses

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR OPERATING ALARMS AND OTHER DEVICES.

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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 is a specification, accompanied by drawings, forming a part of the same, in which—

Figure 1 is a vertical central sectional view of the alarm controlling mechanism. Fig. 2 is a plan view of the weighted diaphragm with the upper water receiving chamber removed. Fig. 3 is a plan view in section on the plane of the broken line 3—3, Fig. 1. Fig. 4 is a vertical sectional view of the entire apparatus in a modified form.

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

My present invention relates to an apparatus for operating alarms especially designed to be used in connection with automatic fire sprinkler systems where the alarm is to be operated by the passage of liquid under pressure through a pipe, and is to be sounded by the continuous passage of liquid, but unaffected by the interrupted movement, or by changes of pressure, and it consists in the construction and arrangement of parts as hereinafter described and pointed out in the annexed claims.

Referring to the accompanying drawings, 1 denotes a chamber having an inlet passage 2 and an outlet passage 3, said chamber communicating through the passage 2 with a water supply under pressure and through the outlet passage 3 with the usual fire sprinkler system. When the sprinkler heads of the system are normally closed, the movement of water through the outlet passage 3 is checked. When, however, the sprinkler is released and water passes through the chamber 1 in an uninterrupted flow, an alarm is sounded through the controlling mechanism forming the subject of my present invention. If, however, a current of water under pressure is forced through the chamber 1 by the impulse of what is known as a "water-hammer" the alarm is not sounded, and it is the object of my present invention to provide a mechanism which shall so control the operation of the alarm mechanism that the alarm will be sounded by a continuous water flow through the chamber 1, but not be sounded by a temporary or intermittent entrance of water into the chamber 1.

The chamber 1 is provided with a valve seat 4 to receive a check valve 5 adapted to be raised and permit the passage of water through the inlet passage 2 into the chamber 1, whenever, for any cause, the pressure of water upon the under side of the check valve is in excess of the pressure of water upon the upper side. This difference in pressure between the two sides of the check valve 5 occurs during the temporary action of a water-hammer and also by the opening of a sprinkler head which allows a free passage of water from the chamber 1 through the outlet passage 3. It is desired, however, to permit the sound of the alarm only during the continuous movement of water through the outlet passage 3 as caused by the opening of one or more sprinkler heads but to prevent the sounding of the alarm when the increase in pressure in the chamber 1 is due only to the impulse of a water-hammer.

To accomplish the above result by means of a simple and inexpensive mechanism which shall be durable and certain in its operation is the object of my present invention, an embodiment of which I have shown in the accompanying drawings.

The valve 5 is provided with an annular groove 6 which communicates through a pipe 7 with a chamber 8 which is inclosed between a cap 9 and a flexible diaphragm 10, said diaphragm being clamped by its edges between the cap 9 and the flange 11 of a casing 12, which incloses a chamber 13. The upper end of the casing 12 is provided with a flange 14 upon which rests a shell 15 inclosing a chamber 16, and having a central opening 17 leading from the chamber 16 to the chamber 13 and surrounded by an annular valve seat 18. Mounted upon the diaphragm 10 is a shell 19 having a central hole 20 from the upper end of which a restricted opening 21 leads to the chamber 16. The shell 19 is provided with an annular chamber surrounding the central hole 20, which is preferably filled with lead 22 in order to apply weight to the diaphragm. The upper end of the shell 19 is beveled as at 23 to correspond with the beveled surface of the valve seat 18. Concentrically with the chamber 13 is a vertical flange 24 con-

nected at its bottom edge with the lower edge of the surrounding casing 12. The interior flange 24 is provided with an outwardly projecting shoulder 25 adapted to contact with an outwardly depending flange 26 upon the shell 19 and limit the downward movement of the latter.

Whenever water under pressure is admitted to the chamber 8 the diaphragm 10 is raised to carry the beveled end of the shell 19 against the beveled surface of the valve seat 18, thereby closing the opening 17 between the two chambers 13 and 16 and causing the water admitted under pressure to the chamber 8 to be forced upwardly through the hole 20 and restricted opening 21 into the chamber 16. The movement of water through the restricted opening 21 will continue until the pressure beneath the diaphragm 10 is relieved sufficiently to allow the weighted shell 19 to depress the diaphragm, when the water already forced into the chamber 16 will descend through the passage 17 into the chamber 13 and flow off through a pipe 27. If, however, the check valve 5 is permanently raised as by the opening of a sprinkler head, water under pressure will flow into the chamber 8 and hold the diaphragm 10 permanently in a raised position. The flow of water through the opening 21 will then become continuous, and as the water rises in the chamber 16 it will finally exert a pressure through a pipe 28 upon a diaphragm 29, sufficient to raise a follower 30 and pivoted lever 31 to produce a contact between the free end of the lever 31 and a post 32 which constitute the terminals of an electric circuit, which, when completed, sets in operation a bell 33.

The above described apparatus contains no springs or complicated mechanism liable to render its operation uncertain. Its action in putting in operation the alarm bell or other suitable audible or visual signal depends upon the continued flow of water into the chamber 16 in sufficient amount to produce an effective pressure within the chamber 16.

While the valve passage 17 between the chambers 13 and 16 is represented in Fig. 1 as being closed by an existing water pressure beneath the diaphragm 10, it will be understood that in its normal position the diaphragm 10 is depressed maintaining a communication between the chambers 13 and 16.

In Fig. 4 I have shown a modified form of construction of that portion of the apparatus included between the pipes 7 and 28. The casing 12 and shell 15, which are separable in Fig. 1, in Fig. 4 constitute a single integral casing 34 provided with a transverse partition 35, separating it into two chambers 36 and 37 and having a central passage 38 provided with a valve seat 39. The chamber 36 is also separated from a chamber 40 by means of a partition 41, having a central sleeve 42 open at its upper and lower ends and provided with an internal shoulder 43 to receive the thrust of the upper end of a spiral spring 44, having its lower end resting upon a collar 45 which is held upon the lower end of a tubular sleeve 46 and bears against a shoulder 47 on the sleeve 46. The upper end of the sleeve 46 is provided with a cap 48 having its upper surface beveled, as at 49, to fit the beveled valve seat 39. The cap 48 is provided at its edges with a depending flange 50 which overlaps the upper end of the sleeve 42. The chamber 40 is inclosed between the partition 41 and a cap 51. Between the cap 51 and the flanged lower end of the casing 34 is clamped a flexible diaphragm 52. The diaphragm 52 is clamped to the collar 45 by means of a nut 53 held upon the screw threaded lower end of the sleeve 46, so that a rising motion of the diaphragm 52 will be communicated to the conical cap 48 to carry the latter against the valve seat 39 and close the passage 38 between the two chambers 36 and 37. The closure of the passage 38 will occur whenever water under pressure is admitted to the chamber 40 in the manner already described with reference to the device illustrated in Fig. 1. The pressure of water in the chamber 40 serves to lift the diaphragm 52 and close the passage 38, causing any excess of water in the chamber 40 to flow upward through the tubular sleeve 46 and restricted opening 54 into the chamber 37. As soon as the diaphragm 52 is relieved from the water pressure in the chamber 40, the diaphragm is forced downward by the pressure of the spiral spring 44, thereby opening the passage 38 and allowing water to flow from the chamber 37 into the chamber 36. The portion of the device illustrated in Fig. 4 is like that shown in Fig. 1 with the exception that the spring 44 is used to depress the diaphragm 52 in place of the weighted shell 19. The depression of the diaphragm 52 allows the cap 48 to strike the upper end of the sleeve 42, thereby closing the sleeve 42 which, aided by the depending flange 50, prevents the admission of water to the chamber containing the spring 44. The chamber 36 is, preferably, considerably larger than any volume of water which would ordinarily be forced into the chamber 37 by the action of a water hammer, and the opening of the passage 38 allows the water accumulated in the chamber 37 to fall at once to the bottom of the chamber 36 and flow out through the outlet pipe 55. In order to prevent an accumulation of air pressure in the chambers 16 and 37 when water is admitted thereto, a vent pipe 56 is provided for the chamber 16 and a similar vent pipe 57 for the chamber 37. The upper end of the vent pipe 56 has a restricted opening 58 and the upper end of the vent pipe 57 has a similar restricted

opening 59, while the lower ends of the vent pipes 56 and 57 communicate with the chambers 13 and 36 respectively.

Referring to Fig. 4, which shows the preferred embodiment of my invention, the operation of the apparatus is as follows:— A temporary lifting of the check valve 5 as, for example, by a water hammer, admits a limited quantity of water to the pressure chamber 40, causing the diaphragm 52 to be raised and closing the passage 38. The surplus water is forced slowly through the restricted opening 54 into the upper or compression chamber 37. When the valve 5 closes, the spring 44 forces the diaphragm 52 downward, opening the passage 38 and allowing the water accumulated in the compression chamber 37 to fall into the outlet chamber 36 and pass through the pipe 55. If, however, the valve 5 remains open, as would occur upon the opening of a sprinkler head, water will continue to flow into the compression chamber, forcing the air therefrom through the vent pipe 57 until the upper end of the vent pipe is covered. The escape of water through the restricted opening 59 in the upper end of the vent pipe is so small relatively to the inflow under pressure through the opening 54 that the compression chamber soon fills and exerts a pressure against the under side of the diaphragm 29, causing the alarm to operate.

I claim,

1. In an apparatus of the class described, a pressure chamber containing a flexible diaphragm, a compression chamber having a restricted communication with said pressure chamber, an outlet chamber below said compression chamber and having an opening communicating therewith, a valve closing said opening operatively connected with said diaphragm, and a spring with its tension applied to hold said valve normally open.

2. In an apparatus of the class described, a casing comprising three chambers, one above the other, a diaphragm in the lowermost chamber, an opening between the upper and middle chambers, a valve closing said opening and operatively connected with said diaphragm, a restricted opening between the lower and upper chambers, and means for holding said valve normally open.

3. In an apparatus of the class described, a pressure chamber having a diaphragm, a compression chamber having a communication with said pressure chamber, an outlet chamber having an opening communicating with said compression chamber, a valve closing said opening operatively connected with said diaphragm, and means for holding said valve normally open.

4. In an apparatus of the class described, a compression chamber, means for admitting water thereto under pressure, an outlet opening for said chamber, a pressure chamber having a diaphragm, a valve operatively connected with said diaphragm arranged to close said opening, and separate means for depressing said diaphragm and thereby opening said valve.

5. In an apparatus of the class described, a compression chamber, an alarm apparatus operated by water pressure in said chamber, means for admitting water under pressure in a restricted flow into said chamber, an outlet opening for said chamber, a valve for closing said opening, a flexible diaphragm supporting said valve, means for applying a water pressure to said diaphragm to close said valve, a spring chamber, a spring contained in said chamber and operating to normally open said valve, and means for closing said spring chamber by the opening movement of said valve.

6. In an apparatus of the class described, a compression chamber, means for admitting water thereto under pressure, an alarm apparatus connected with the upper part of said chamber and arranged to be operated by water pressure in said chamber, an outlet chamber separate from said compression chamber, and a vent pipe for the escape of air leading from the upper part of said compression chamber to said outlet chamber.

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