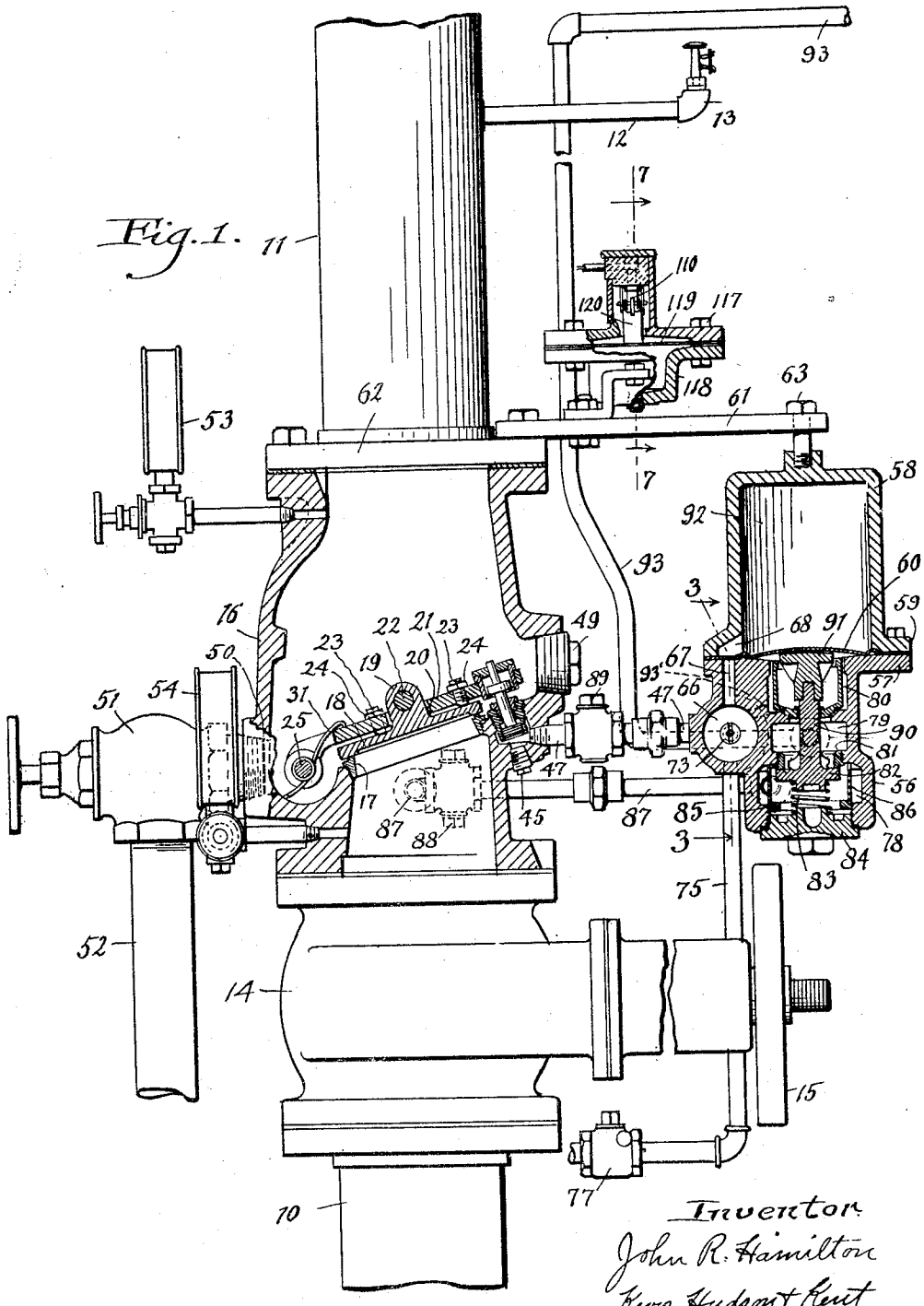
Sept. 8, 1931. J. R. HAMILTON 1,822,654

ALARM FOR SPRINKLER SYSTEMS

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Fig. 1.



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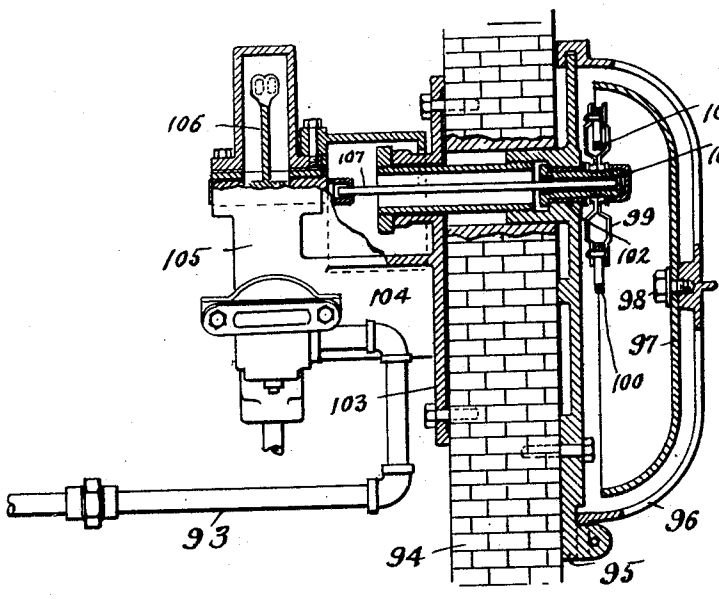


Fig. 2.

Fig. 3.

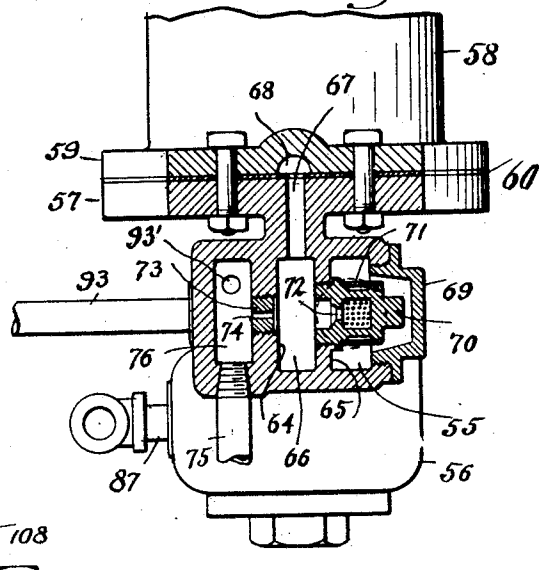
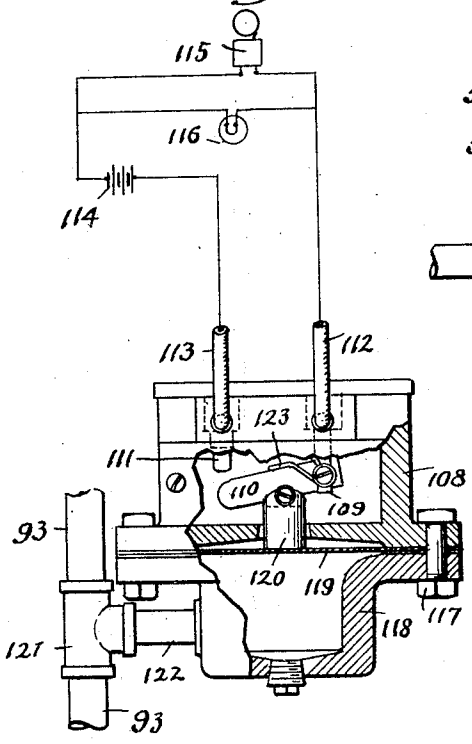


Fig. 7.



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Fig. 5.

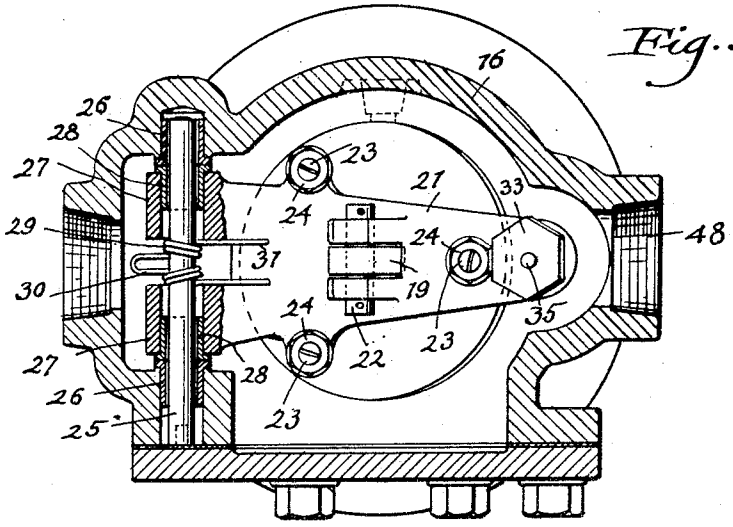


Fig. 4.

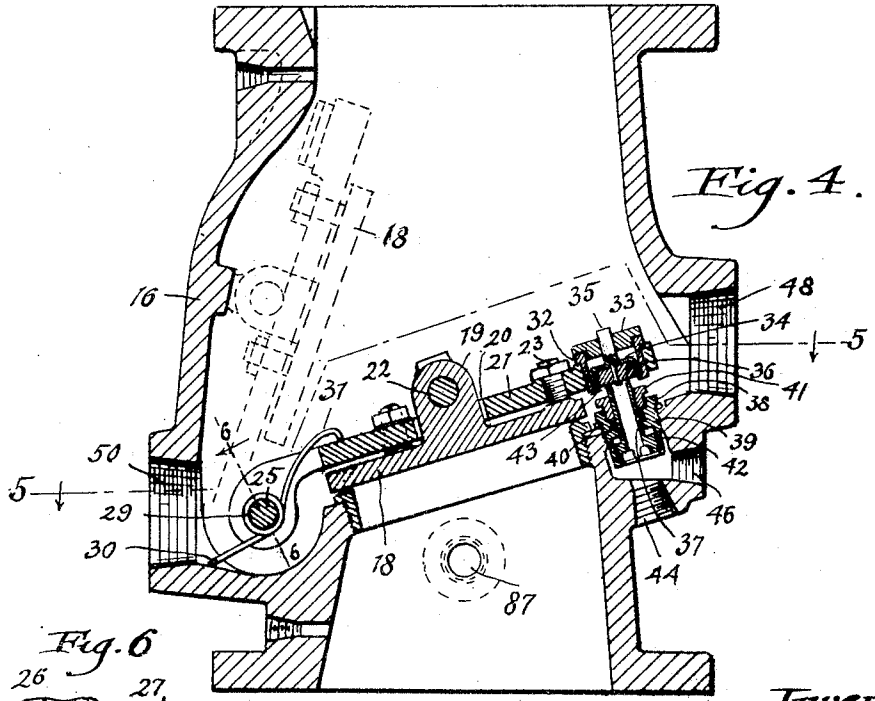
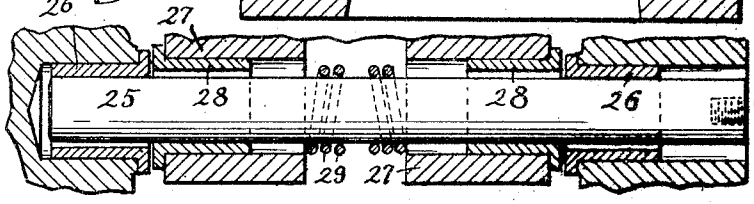


Fig. 6



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1,822,654

UNITED STATES PATENT OFFICE

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ALARM FOR SPRINKLER SYSTEMS

Application filed March 7, 1927. Serial No. 173,232.

This invention relates to sprinkler systems and more particularly to alarm mechanisms employed in connection therewith. The purpose of an alarm mechanism, in connection with a sprinkler system, is to automatically sound an alarm or give a signal at a desired point whenever a sprinkler head is opened and the flow of water through the riser pipe, which supplies the system, equals that which would be discharged by one or more open sprinkler heads.

The clapper valve and its associated mounting means which are disclosed but not claimed herein, are covered by the claims of my copending application, Serial No. 244,176, filed January 3, 1928, as a division of this application.

It is an object of the present invention to provide an alarm mechanism embodying an automatic control that will sound the alarm or give the desired signal whenever one or more of the sprinkler heads open but which will not be affected by momentary openings of the main water valve due to momentary increases in pressure in the water supply main, such as might result from surges or water hammers therein.

A further object of the invention is to provide an alarm mechanism and automatic control therefor that will embody a minimum number of moving parts so as to insure reliability of operation.

Other objects of the invention and the features of novelty will be apparent from the following description taken in connection with the accompanying drawings, of which:

Fig. 1 is an elevation of the riser pipe of a sprinkler system having arranged therein an automatic alarm valve, the latter and some of the associated parts being shown in section;

Fig. 2 is a section through the gong and its operating mechanism, certain parts being shown in elevation;

Fig. 3 is an enlarged section on the line 3—3 of Fig. 1;

Fig. 4 is an enlargement of the portion of Fig. 1 showing the alarm valve;

Fig. 5 is a transverse section on the line 5—5 of Fig. 4;

Fig. 6 is a detail section on the line 6—6 of Fig. 4; and

Fig. 7 is an enlarged section on the line 7—7 of Fig. 1.

Referring to the drawings, 10 and 11 indicate aligned sections of the riser pipe of a sprinkler system, one of the branch lines, supplied thereby, being indicated at 12 and having a sprinkler head 13 thereon. A gate valve 14, of ordinary construction and operated by the hand wheel 15, is arranged between the riser pipe section 10 and the alarm valve casing 16, the latter being directly connected to the riser pipe section 11.

A valve seat 17 is arranged in the casing 16 and a clapper valve 18 cooperates with the seat 17. The valve 18 has a lug 19 on its upper surface which projects through an opening 20 in an arm 21, there being a pivot pin 22 for connecting the lug 19 to the arm 21 so that the valve 18 may be swung on the pivot 22 for the purpose of properly aligning the valve with the seat 17. The arm 21 carries a plurality of set screws 23, preferably three in number, which are symmetrically arranged to engage the upper surface of the valve 18, on opposite sides of the pivot 22 and rigidly secure the valve to the arm 21. The set screws 23 may be locked in any position to which they are adjusted by means of the nuts 24.

The arm 21 is loosely mounted on a pivot pin 25 that is mounted in the casing 16, the ends of the pin 25 having arranged in the bushings 26 that are rigidly held in the casing, and the openings through these bushings being considerably larger than the diameter of the pin 25 so that there will be no likelihood of the pin becoming "frozen" in the bushings due to the accumulation of corrosion or other foreign substances. The arm 21 is provided with the aligned ears 27 in which there are bushings 28, the internal diameter of these bushings being materially larger than the diameter of the pin 25 so that the pin will be perfectly free at all times in the bushings. A spring 29 is coiled around the middle portion of the pin 25 and has one end 30 in engagement with the inner surface of the casing 16 and the other end 31 engag-

ing with the upper surface of the arm 21. The spring 29 is so tensioned that it holds the pin 25 in contact with the upper part of the bores of the bushings 26 (see Fig. 6). By proper adjustment of the screws 23, the arm 21 is so positioned, when the valve 18 is seated, that the lower sides of the bores of the bushings 28 are in contact with the pin 25. By this arrangement, the pin 25 is normally in eccentric relation to all of the bushings 26 and 28 and there is no lost motion between the arm 21 and the pin 25 when the valve 18 is lifted from its seat. The purpose and advantage of this arrangement will be hereinafter set forth.

A sleeve 32 is firmly secured in the upper end of the arm 21 and a cap 33 is screwed into the upper end of this sleeve. A valve 34 is loosely arranged within the sleeve 32 and has a guiding stem 35 which projects through the cap 33. The valve 34 comprises a disk 36 which cooperates with the upper end of a tubular seat member 37 which is carried by a bushing 38 which, in turn, is secured in a threaded opening 39 in the wall of the casing 16. A stuffing box is formed on the interior of the bushing 38 and comprises the packing 40 and the gland 41, so as to prevent leakage along the outer side of the seat member 37. The enlarged lower end of the seat member 37 is threaded into the bushing 38, as indicated at 42, so that the seat member may be adjusted in a vertical direction for the purpose of adjusting the valve 34. At the lower end of the sleeve 32, there is an internal lip 43 which serves to prevent the valve 34 from dropping out of the sleeve 32 when the valve 18 is opened or moved to the dotted-line position shown in Fig. 4.

In line with the seat member 37, the casing 16 has an opening 44 through which a screwdriver or other tool may be inserted for the purpose of adjusting this seat member 37. The opening 44 is normally closed by a plug 45. Another opening 46 is provided in the wall of the casing 16 and a pipe 47 is screwed into this opening and water which is discharged through the seat member 37, when the valve 34 is unseated, will be conveyed to another portion of the apparatus, to be hereinafter described, by the pipe 47. For the purpose of making the valve 34 and its associated parts accessible from the exterior, there is a relatively large opening 48 in the wall of the casing 16 which is normally closed by a plug 49.

For the purpose of draining the sprinkler pipe system, whenever desired, there is an opening 50 in the wall of the casing 16 into which there is screwed a valve 51 from which a discharge pipe 52 leads to a sewer or other desired point. A pressure gauge 53 may be mounted on the casing 16 for showing the pressure in the sprinkler system above the valve 18, and another gauge 54 may be provided for the purpose of showing the pressure below the valve 18.

The pipe 47 connects with a chamber 55 in a casing 56. The casing 56, at its upper end, has a flange 57 on which there is secured a dome-like casting 58, the latter having a flange 59 which cooperates with the flange 57. A flexible diaphragm 60 is clamped between the flanges 57 and 59. A bracket 61 may be secured to a flange 62 on the pipe section 11 and the casing 56 and casting 58 may be supported from the bracket 61 by means of a bolt 63.

The casing 56 is provided with the spaced partitions 64 and 65, the latter forming one side of the chamber 55. The chamber 66, between the partitions 64 and 65, communicates with the interior of the casting 58 by means of ports 67 and 68.

The outer side of the chamber 55 is closed by a screw cap 69 and there is secured in the partition 65 a cage 70 having a wire screen 71 surrounding it and a relatively restricted port 72 through which water may be discharged from the chamber 55 into the chamber 66. A plug 73 is screwed into the partition 64 and has a port 74, extending therethrough, which is materially smaller in size than the port 72. A drain pipe 75 communicates with the chamber 76 for the purpose of draining off any water that is discharged through the port 74 and, in case the pipe 75 is connected to any drainage system in which there is a liability for water to back up into the pipe 75, the latter is provided with a check valve 77 to prevent this.

The casing 56 is also provided with the vertically aligned chambers 78, 79 and 80 below the diaphragm 60. In the wall between the chambers 78 and 79, there is secured a valve seat 81 with which a valve 82 cooperates, this valve being normally held in its closed position by means of a spring 83, which is arranged between the valve 82 and a plug 84 for closing an opening in the lower wall of the chamber 78. A ring 85 is screwed into the opening for the plug 84, and positioned above the latter, and carries a cylindrical screen 86 through which water is compelled to pass in order to reach the valve 82. A pipe 87 is connected with the casing 16, below the valve 18, and delivers water to the chamber 78 outside of the screen 86. The pipe 87 should, for convenience, be provided with a stop cock 88 and, a similar stop cock 89 may be arranged in the pipe 47.

The valve 82 has an upwardly extending stem 90 on which there is sleeved a member 91 which engages the underside of the diaphragm 60 so that pressure in the chamber 92, of the casting 58, will force the valve 82 downward and permit water to flow from the chamber 78 to the chamber 79. A pipe 93 is connected with the chamber 79 for the purpose of conducting water therefrom to

the alarm devices. A port 93′ connects chamber 80 with chamber 76 and serves to drain the water from the pipe 93 after the alarm mechanism has operated and the valve 82 has been closed.

Referring to Fig. 2, the wall of a building containing the sprinkler system is indicated at 94 and has secured on the outer side thereof a housing comprising the plate 95 and a skeleton cover 96. A gong 97 is secured to the cover 96 by a bolt 98 and is rung by a wheel 99, carrying weights 100 which are adapted to strike the gong as the wheel is rotated. The wheel 99 is mounted on a hollow stub shaft 101 which is supported in a bearing 102 in the plate 95. A plate 103 is secured on the inner side of the wall 94, opposite the plate 95 and has a bracket 104 which carries the housing 105 of a water wheel 106, preferably of the impact type, such as is commonly used in the art. The pipe 93 connects with the nozzle (not shown), which directs the water against the wheel 106 and the movement of the wheel is transmitted to the stub shaft 101 by means of a shaft 107.

As an alternative to operating a mechanical gong, or in conjunction therewith, I may utilize the pressure in the pipe 93 for the purpose of closing an electric circuit to ring an electric bell or to light a signal lamp or actuate some other form of signal located at a distant point. This may be accomplished by apparatus illustrated in Figs. 1 and 7 comprising a casing 108 within which there is located a post 109 having pivoted thereto a switch blade 110, which is adapted to engage with a contact member 111 for the purpose of closing an electrical circuit comprising the wires 112 and 113. A wiring diagram is associated with Fig. 7 and illustrates a source of current 114, an electric bell 115 and a signal lamp 116, the connection being such that when the blade 110 engages the contact member 111, the bell 115 will be sounded and the lamp 116 lighted. The casing 108 has secured thereto, by bolts 117, a dome 118 between which and the casing 108 there is a flexible diaphragm 119 having a button 120 thereon which operatively engages with the switch blade 110. The pipe 93 is provided with a T 121 from which a branch 122 leads to the dome 118 so that the underside of the diaphragm 119 will be subjected to the pressure in the pipe 93. A spring 123 cooperates with the switch blade 110 for the purpose of disengaging the latter from the contact member 111 whenever the pressure on the underside of the diaphragm 119 is relieved.

The operation of the apparatus is as follows: The water valve 18 is normally closed and when this valve is closed, the pilot valve 34 is also closed against the tubular seat member 37. It will be noted that when the valve 34 is unseated, water will be discharged through the seat member 37 from the space above the valve 18. The seat member 37 is adjusted so that the valve 34 is positioned slightly away from the lip 43, thereby permitting a slight unseating of the valve 18 without unseating the pilot valve 34. Since the parts are so arranged, as previously described, so that there will be no lost motion at the pivot 25, accompanying the slight unseating movements of the valve 18, all such movements of the valve 18 will be accompanied by corresponding movements of the arm 21 about the pivot 25 and, since the pilot valve 34 is located at the outer end of the arm 21, it will be unseated by any substantial unseating of the valve 18 as might result from the opening of one or more of the sprinkler heads 13. The adjustment of the seat member 37 may be such that any slight momentary unseating of the valve 18, due to surges in pressure of the water main 10 or water hammers therein, will not unseat the valve 34 and, therefore, not cause the alarm mechanism to function.

When the valve 34 is unseated, by the opening of the valve 18, as the result of the opening of one or more of the sprinkler heads, water will be discharged through the seat member 37 and the pipe 47 to the chamber 55, whence it will pass through the screen 71 and the orifice or port 72 into the chamber 66. As water accumulates in the chamber 66, a portion of it will be discharged through the orifice or port 74 to the chamber 76 and drained off through the pipe 75. Since the orifice 74 is of considerably smaller area than the orifice 72, it is evident that if the valve 34 remains unseated, pressure will be built up in the chamber 66 and within the dome 58 and act upon the diaphragm 60. Since the chamber 78 is normally filled with water from the space below the valve 18, by means of the pipe 87, the pressure in the chamber 78, together with the pressure of the spring 83, holds the valve 82 against its seat. However, when sufficient pressure accumulates in the chamber 92, the load on the diaphragm 60 will be sufficient to overcome the load on the underside of the valve 82 and open the latter, thereby admitting water to the chamber 79, whence it flows through the pipe 93, to the water wheel 106, thereby sounding the gong 97 and also flows into the dome 118 and exerts upward pressure on the diaphragm 119 so that when this pressure becomes sufficient, the switch blade 110 will be actuated to engage with the contact member 111 and cause the bell 115 to be actuated or the signal lamp 116 to be illuminated.

The provision of the orifice 74 insures that the actuation of the alarm devices will be delayed sufficiently to prevent a momentary unseating of the valve 34 to cause these devices to function, for the reason that any water which reaches the chamber 66, due to the momentary unseating of the valve 34, will be

drained off through the orifice 74 and thus a building up of pressure within the dome 58 will be prevented. Also, in case the valve 34 is unseated, because of the opening of one or more of the sprinkler heads, the actuation of the alarm devices will be retarded because of the diversion, through the orifice 74, of a portion of the water which reaches the chamber 66 and the extent to which the actuation of the alarm devices will be retarded may be regulated by varying the relative sizes of the orifices 72 and 74. The cage 70 may be readily removed, by removing the cap 69 and this permits access to the plug 73 so that the latter may be removed by a screw-driver for cleaning or replacement. This permits the cage 70 and plug 73 to be readily changed at any time for the purpose of substituting a cage and plug having different sizes of orifices so as to produce the desired retarding effect on the actuation of the alarm devices.

By connecting the pipe 47 to the casing 16, independently of the seat member 37, the latter may be readily adjusted at any time without rendering the system inoperative, it only being necessary to remove the plug 45 and to screw the seat member 37 in or out by means of a screw-driver or suitable wrench. The stop cocks 88 and 89 permit the alarm mechanism to be rendered inoperative whenever desired, without interfering with the operation of the sprinkler system itself.

While I have described in detail what I now consider to be the preferred form of apparatus for carrying out the principles of my invention, it is to be understood that many changes in the details of construction may be made without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, what I claim is:

1. In an automatic alarm apparatus for sprinkler systems, the combination with an automatically operated water valve in a water supply pipe of the system, comprising a casing and a valve carrying arm hinged therein, of a pilot valve, for controlling the flow of water to the alarm mechanism, carried by said arm, an adjustable seat member with which said pilot valve cooperates, a pipe for conveying water from said pilot valve to the alarm mechanism secured to said casing independently of said seat member, a passage through the wall of said casing for adjusting said seat member without rendering said system inoperative, and means removably closing said passage.

2. In an automatic alarm apparatus for sprinkler systems, the combination with an automatically operated water valve in a water supply pipe of the system, comprising a casing and a valve carrying arm hinged therein, of a pilot valve, for controlling the flow of water to the alarm mechanism, carried by said arm, a hollow seat member with which said pilot valve cooperates adjustably mounted in said casing, a pipe attached to said casing independently of said seat member for conveying water discharged through the latter to the alarm mechanism, a passage through the wall of said casing for adjusting said seat member without rendering said system inoperative, and means removably closing said passage.

3. In an automatic alarm apparatus for sprinkler systems, the combination with an automatically operated water valve in a water supply pipe of the system, comprising a casing and a valve carrying arm hinged therein, of a pilot valve for controlling the flow of water to the alarm mechanism loosely mounted on said arm but movable with the arm after said water valve has opened a predetermined extent, a seat member with which said pilot valve cooperates adjustably mounted in said casing so as to permit the extent of opening of said water valve prior to the pilot valve to be varied, a pipe for conveying water from said pilot valve to the alarm mechanism secured to said casing independently of said seat member, a passage through the wall of said casing for adjusting said seat member without rendering said system inoperative, and means removably closing said passage.

4. In an automatic alarm apparatus for sprinkler systems, the combination with an automatically operated water valve in a water supply pipe of the system, comprising a casing and a valve carrying arm hinged therein, a pilot valve for controlling the flow of water to the alarm mechanism loosely mounted on said arm but movable with the arm after said water valve has opened a predetermined extent, a hollow seat member with which said pilot valve cooperates adjustably mounted in said casing, a pipe attached to said casing independently of said seat member for conveying water discharged through the latter to the alarm mechanism, and means whereby said seat member may be adjusted from the exterior of said casing without affecting the operation of said water valve.

5. In sprinkler systems, the combination of an automatically operating water valve for normally closing the sprinkler pipe system from the main water supply line, an adjustable pilot valve seat, a pilot valve associated with said water valve and cooperating with said seat for controlling the diversion of a portion of the water supplied by said main line, a passage through the wall of said casing permitting adjustment of said pilot valve seat without affecting the operation of said water valve, and means for closing said passage.

6. In a sprinkler system, the combination of a casing, a valve in said casing, fluid pres-

sures in said casing on opposite sides of said valve and normally maintained separated by the latter, a pilot valve seat adjustably mounted in said casing, a pilot valve associated with the first mentioned valve and cooperating with said seat, a discharge passage leading from said pilot valve seat, and means whereby said valve seat may be adjusted through said passage from the exterior of said casing without releasing said pressures.

In testimony whereof, I hereunto affix my signature.

JOHN R. HAMILTON.