E. L. THOMPSON & J. R. HAMILTON.

SPRINKLER ALARM DEVICE.

APPLICATION FILED FEB. 6, 1906.

1,022,446.

Patented Apr. 9, 1912.

2 SHEETS—SHEET 1.

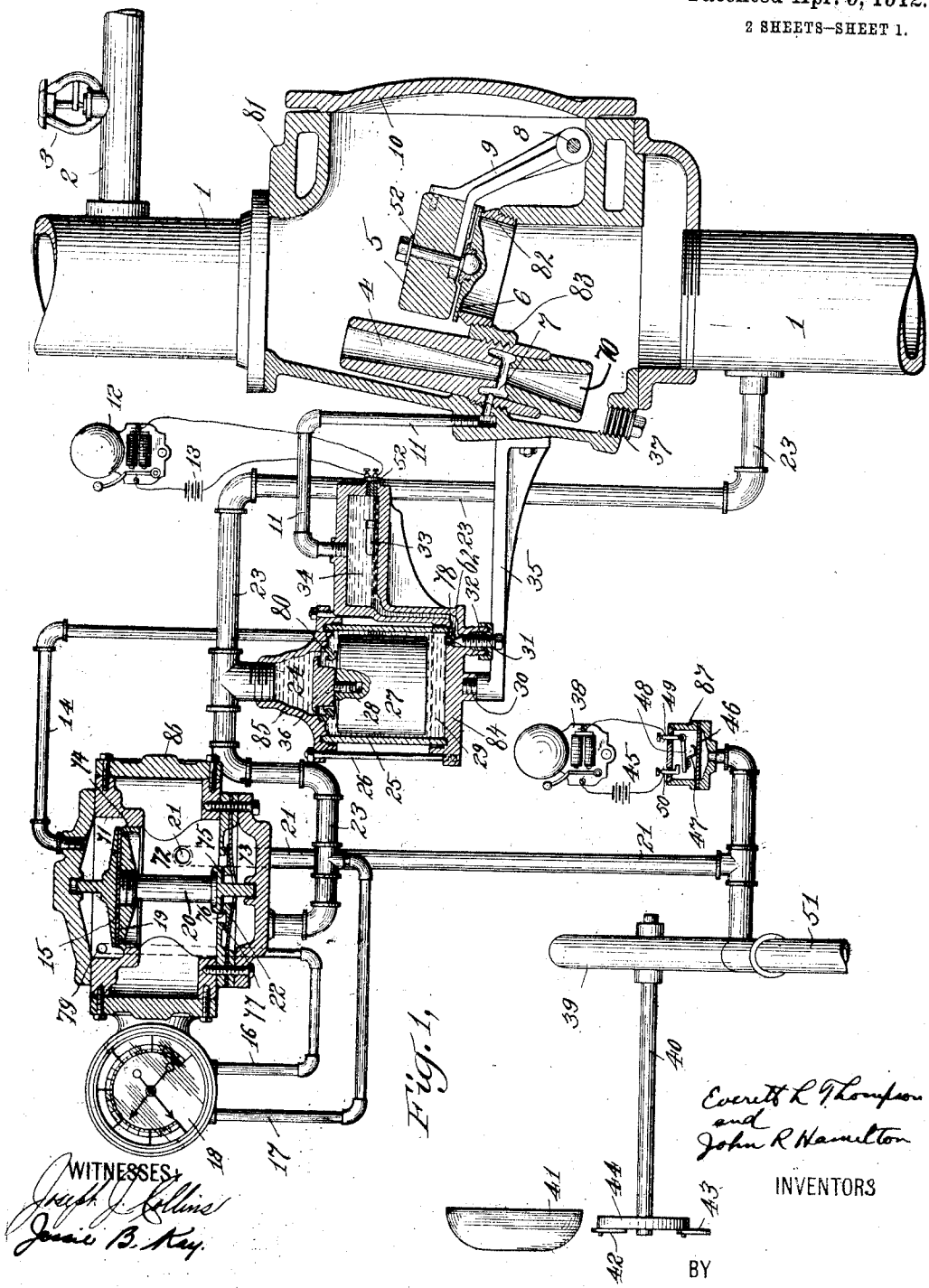

Fig. 1.

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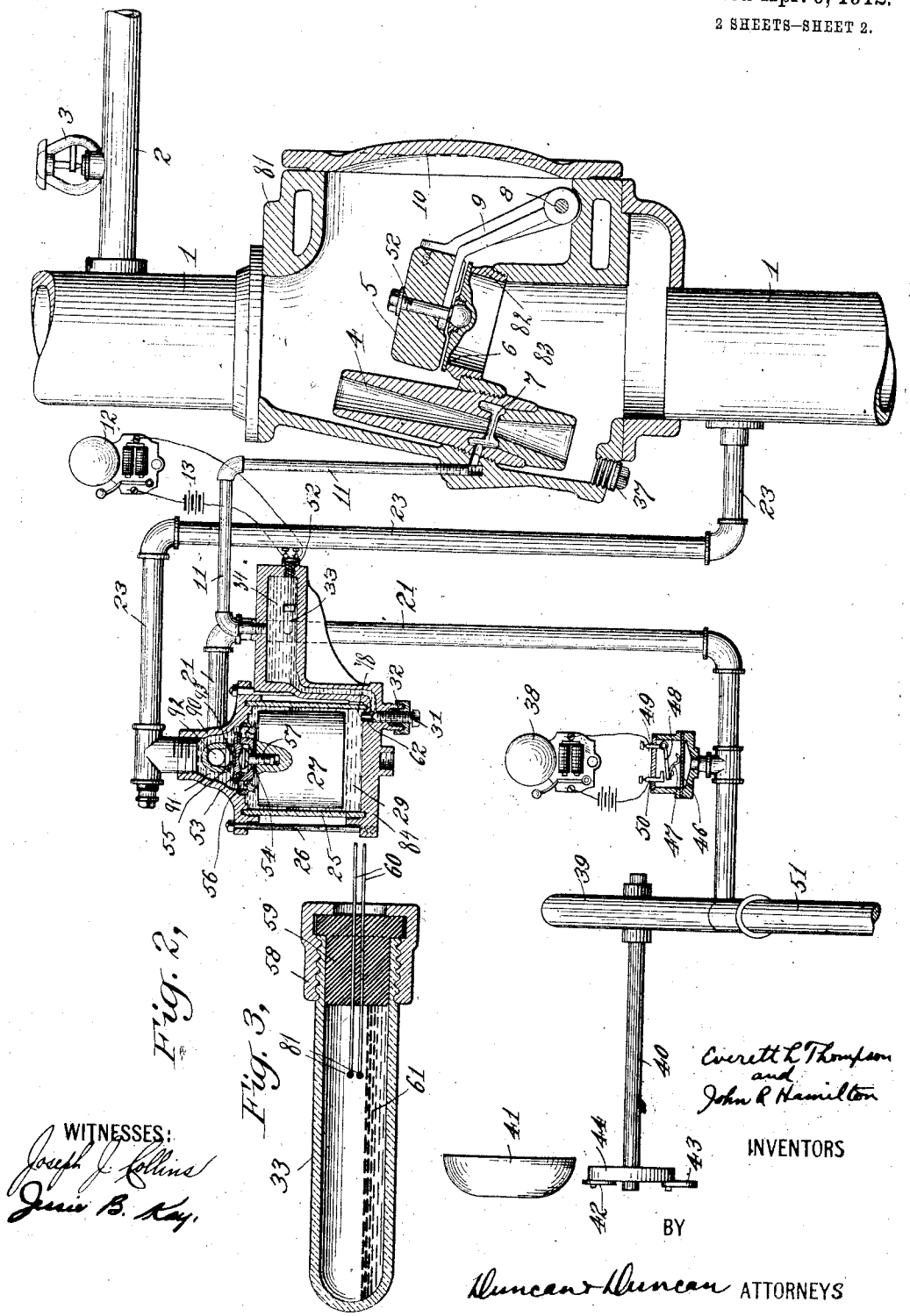

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

EVERETT L. THOMPSON, OF NEW YORK, AND JOHN R. HAMILTON, OF MOUNT KISCO, NEW YORK, ASSIGNORS TO VENTURI ALARM COMPANY, OF DOVER, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SPRINKLER-ALARM DEVICE.

1,022,446. Specification of Letters Patent. Patented Apr. 9, 1912.

Application filed February 6, 1906. Serial No. 299,798.

To all whom it may concern:

Be it known that we, EVERETT L. THOMPSON, a resident of the borough of Brooklyn, county of Kings, city and State of New York, and JOHN R. HAMILTON, a resident of Mount Kisco, in the county of Westchester and State of New York, citizens of the United States, have invented certain new and useful Improvements in Sprinkler-Alarm Devices, of which the following is a specification, taken in connection with the accompanying drawings, which form a part of the same.

This invention relates to sprinkler alarm devices and relates especially to devices which are adapted to act in connection with an automatic sprinkler system to give an alarm when the sprinklers operate.

In the accompanying drawings showing illustrative embodiments of this invention, Figure 1 is a vertical sectional view of one form. Fig. 2 is a similar view of another modification. Fig. 3 is a detail of the closer bulb.

In the illustrative embodiment of this invention shown in Fig. 1, the supply pipe 1 is connected with the usual distributing pipes 2 on which sprinkler heads 3 or other distributing devices are arranged to form a distributing system. The valve casing 81 may be arranged as indicated in this supply pipe and provided with a detachable face plate 10. Within the casing a valve seat 82 may be arranged substantially in line with the supply pipe and a suitable check valve 6 or other pressure-producing device arranged to create a difference of pressure on the commencement of flow through the supply pipe. As indicated the valve 6 may be swivelly connected with the stem 52 in the weight 5, this weight being secured on the arm 9 pivoted about the pin 8. The arrangement of these parts is such that the valve is angularly supported so as to bear against its seat with substantially the same force, whether the casing is in the vertical position shown, or in a horizontal position with the plate 10 uppermost, as may be desirable in some cases. The casing is also preferably provided with a suitable jet device which may be of the Venturi type indicated and comprises the opposed contracting passages or nozzles shown. The nozzle 4 is shown as screwed into the diaphragm 83 extending across the valve chamber and the opposed nozzle 70 screwed or otherwise secured to the nozzle 4 to form a Venturi device, the throats of the contracted passages being in line and communicating with the exhaust passage 7 between them. The exhaust passage connects with the exhaust pipe 11, as indicated, and a suitable plug 37 may be removed from the casing to give an inspection opening. A suitable retarder is preferably used so that the alarm operates a certain time after the first decrease of pressure is caused in the exhaust passage of the jet device on the commencement of flow through the supply pipe, this occurring, of course, when the first sprinkler heads open and before the check-valve, if one is used in the casing, opens. The retarder, preferably operating on the liquid flow principle, may comprise a float chamber 25 preferably formed of glass to observe the operation of the internal parts, and having the heads 84, 85, secured thereto by suitable bolts 26. A float 27 of suitable material may be mounted within the chamber, this float being preferably of iron where mercury is used. The float valve 36 may be rigidly secured to the float by suitable stem 28, this valve coöperating with the seat 80 so as to separate the pressure chamber 24 in the head from the float chamber beneath. A choke passage is preferably provided between the float chamber and the exhaust chamber 34, this passage 78 being formed as indicated in a suitable plug 62 in the bottom of the chamber as illustrated and its effective area being regulated by a check valve 31 passing through a suitable stuffing box 32. A certain quantity of mercury 29 or other fluid sufficiently dense to raise the float is placed in the float chamber and reaches substantially the level indicated in the float chamber and connected exhaust chamber when the device is set. This exhaust chamber is connected by the exhaust or suction pipe 11 with the exhaust passage 7 in the jet device and the pressure chamber 24 may be connected through the pressure pipe 23 with the supply pipe adjacent the jet device. A suitable balanced valve may also be employed where desired

to actuate the alarm, the valve casing 86 being formed with an exhaust chamber 71 at its upper part and intermediate neutral chamber 72 and a pressure chamber 73 on the other side of the neutral chamber. The balanced valve comprises the stem 20 to which the upper portion 15 of the valve is secured, the facing 19 being held in place by a suitable washer, as indicated, and cooperating with the upper valve seat 74 between the neutral and exhaust chambers. The lower part of this valve has a similar facing 75 which is shown as engaging the movable valve seat 76 mounted on the diaphragm 22, the upper limit of the movement of this valve seat being limited by the stop 77. When in the closed position indicated this balanced valve closes connection between the neutral chamber 72 and the exhaust and pressure chambers 71 and 73 and the yielding way in which one of the valve seats is mounted insures an accurate closure in both instances. The pressure pipe 23 communicates with the pressure chamber 73, the exhaust pipe 14 which communicates with the interior of the float chamber 25 connects with the exhaust chamber 71, these two chambers being also connected by the pipes 16 and 17 with a suitable differential gage 18 so that the operation of the device may be indicated. The alarm devices may be connected with the alarm pipe 21 leading, as indicated, into the neutral chamber 72 of the balanced valve. An electrical alarm may be used comprising a flexible diaphragm 46 mounted within a suitable chamber 87, a contact lever 48 being indicated as secured to one terminal 49 and having an arm 47 bearing on the diaphragm 46 so that pressure below the diaphragm raises this arm and lever to make electrical connection with the other contact or terminal 50 which is insulated in any desired way. In this manner the circuit through the electric bell 38 and battery 45 is completed and an alarm signal given at any desired place. A mechanical alarm may also be used and a suitable water motor 39 is indicated as connected with the alarm pipe 21, so that when water passes through this pipe and out through the discharge pipe 51 the shaft 40 of the motor is rotated, turning the disk 44 and throwing the hammers 42 into contact with the bell 41. Another alarm may also be employed comprising a closer bulb within the exhaust chamber 34, which is indicated in detail in Fig. 3. This closer bulb may be given the form of a bulb 33 of glass or other material within which a quantity of mercury 61 may be placed or other conducting means arranged. The two contacts 60 enter the head 59 of insulating material and their bare ends 81 extend within the bulb adjacent the level of the mercury when in the horizontal position indicated in Fig. 3. This head may be kept in place by a screw cap 58 engaging the bulb. The contacts 60, which are preferably of steel or other resilient material, enameled or otherwise covered with insulating substance, extend from the bulb through a suitable insulating plug 52 in the side of the exhaust chamber and the contacts are in circuit with the electric bell 12 and battery 13 so that when the closer bulb is raised by a rise in the level of the mercury within the exhaust chamber, a sufficient tilting takes place to make electric connection between the bare ends 81 of the contacts 60, close the bell circuit and ring the alarm. The operation of this form of device illustrated in Fig. 1 as will be apparent from the foregoing description is that in the position indicated there is a direct open connection through the Venturi or jet device around the check valve in the supply pipe. Water hammer and other accidental variations in pressure can thus be neutralized and will not affect the alarm. If, however, there is a flow of water from the distributing system the steady flow through the jet device causes a diminution of pressure in the exhaust passage 7 and suction pipe 11, so that the pressure in the exhaust chamber 34 is less than that in the pressure pipe 23, pressure chamber 24 and float chamber 25. This causes a flow of the mercury or other fluid out of the float chamber through the choke passage 78 and into the exhaust chamber. This causes the contact bulb to float up, the flexible contact 60 allowing this action, and when a sufficient tilting of the bulb has taken place electrical connection is made through the contacts and bell circuit ringing the alarm, the alarm being retarded to the extent desired by the delayed flow of the liquid through the choke passage of the retarder. About this time also the level of mercury in the float chamber has dropped to such an extent that the valve 36 has seated itself on the valve 80, thus closing connection between the pressure chamber 24 and the float chamber below. The further action of the jet device causes a considerable diminution of pressure in the exhaust and float chambers, and also in the exhaust pipe 14 which connects with the exhaust chamber 71. This lifts the balanced valve from its seat since the pressure chamber 73 is under the full head existing in the supply pipe 1; also as soon as the balanced valve lifts, this water pressure in the supply pipe is at once communicated to the diaphragm 46, ringing the electric bell 38 and the water passing through the alarm pipe 21 also operates the mechanical alarm, as has been described.

It is not necessary in all cases to employ the balanced valve in this system. The device indicated in Fig. 2 has the same con-

struction of valve casing and jet device which has been described and the exhaust or suction pipe 11 also connects the exhaust passage of the jet device with the suction or exhaust chamber 34. The pressure pipe 23 in this case connects with the head 90 secured on top of the float chamber by the bolts 26 as described so as to form a pressure chamber 91 within this head. An alarm chamber 92 is also formed within this head, this chamber having a suitable valve seat 55 secured to its lower portion for coöperation with the alarm valve 93. The float valve 53 secured to the alarm valve coöperates with a seat 56 between the pressure chamber and the float chamber below. In this instance the float 27 has secured to it the stem 57 and the head 54 within the alarm and float valves, this head having a considerable play with respect to the valves, as indicated. With this form of device indicated in Fig. 2 a regular flow through the supply pipe and jet device causes a diminution of pressure in the exhaust passage 7 and exhaust pipe 11 which is communicated to the exhaust chamber 34 and operates to withdraw the mercury or other fluid from the float chamber through the choke passage 78. This reduces the upward pressure of the float 27 against the alarm valve which in the position indicated holds it firmly seated so as to close the alarm chamber 92 and after this pressure has been withdrawn and the float moved downward until it engages the lower portion of the valves, the alarm valve tends to be drawn away from its seat. The upward pressure within this pressure chamber and float chamber, which by reason of the pressure pipe is equal to that within the supply pipe, holds this alarm valve closed for a time and then when it is finally released it comes open at once and the parts move quickly to such an extent that the float valve 53 immediately falls against its seat 56 so as to tightly close the communication between the pressure chamber 91 and the float chamber 25. Under these circumstances, water under pressure passes through the pressure pipe 23 into the alarm chamber 92 and through the alarm pipe so as to operate the electric bell through the flexible diaphragm 46 and connections indicated and also the mechanical alarm through the water motor 39. The rise of the mercury in the exhaust chamber 34 also operates to tilt the contact bulb and make electrical connection between the ends 81 of the contacts 60 so as to close the circuit operating the bell 12. It is, of course, apparent that by properly adjusting the size of the choke passage, which may be done by moving the choke valve or otherwise the delay in action which this retarder causes may be suitably varied.

Having described this invention in connection with said illustrative embodiments thereof, to the details of which we do not desire to be limited, what is claimed as new and what we desire to secure by Letters Patent is set forth in the appended claims.

1. In sprinkler alarm devices, a supply pipe connected with a distributing system, a valve casing, a check-valve angularly supported within said casing and substantially in line with said supply pipe, a jet device within said casing, a retarder comprising a float chamber, a suction chamber communicating with said float chamber through a choke passage, a float in said float chamber, a float valve operated by said float, said jet device being connected with said suction chamber to cause a diminution of pressure therein on the commencement of flow in said distributing system, a balanced valve having an exhaust chamber, a pressure chamber and an intermediate neutral chamber, a pressure pipe connecting said supply pipe and the pressure chambers of said balanced valve and retarder, an alarm and an alarm pipe connecting said alarm with said neutral chamber.

2. In sprinkler alarm devices, a supply pipe, a distributing system connected therewith, means to maintain a difference of pressure in said pipe on the commencement of flow therethrough, a jet device comprising a contracting passage having a direct open connection with said supply pipe adjacent said means, a retarder comprising a float chamber, a suction chamber connected therewith through a choke passage, a float having a float valve connected therewith in said float chamber, a suction pipe connecting said suction chamber with said jet device, a balanced valve comprising an exhaust chamber, a pressure chamber and an intermediate neutral chamber, an exhaust pipe connecting said exhaust chamber with said float chamber, an alarm and an alarm pipe connecting said alarm with said neutral chamber and a pressure pipe connecting said supply pipe with said pressure chamber and with said retarder.

3. In sprinkler alarm devices, a supply pipe, a distributing system connected therewith, means to maintain a difference of pressure in said pipe on the commencement of flow therethrough, a jet device having direct open connection with said supply pipe adjacent said means, a retarder comprising a float chamber, an exhaust chamber connected with said float chamber through a choke passage, a float valve in said chamber, a balanced valve having an exhaust chamber connected with said float chamber, a pressure chamber connected with said float chamber and with said supply pipe and a neutral chamber connected with an alarm pipe and an alarm operated from said alarm pipe.

4. In sprinkler alarm devices, a jet device to be connected to a supply pipe, a retarder comprising a float chamber, communicating with a suction passage of said jet device through a choke passage, a float, and float valve in said float chamber, a pressure pipe to be connected with a supply pipe and with said float chamber, an alarm, and means to operate said alarm by the reduction in pressure in said float chamber.

5. In sprinkler alarm devices, a jet device to be connected with a supply pipe, a retarder comprising a float chamber, a float within said chamber, a float valve operated by said float, a suction pipe, communicating with said float chamber and said jet device, an alarm, and means to operate said alarm from the reduction in pressure in said float chamber.

6. In sprinkler alarm devices, a jet device to be connected with a supply pipe, a float chamber, a float within said chamber, a float valve operated by said float, a suction pipe communicating with said jet device and with said float chamber to exhaust material therefrom, an alarm, and means to operate said alarm on the closing of said float valve by the reduction in pressure in said float chamber.

7. In sprinkler alarm devices, a chamber containing a non-corrosive liquid, means to move said liquid on the beginning of flow through the supply pipe of the connected system, a buoyant closer bulb resiliently mounted within said chamber to float in the liquid therein and tilt as said liquid moves, an electrical contact within said bulb to be connected to an alarm and electrical conducting means within said bulb to complete said alarm circuit.

8. In sprinkler alarm devices, a chamber having liquid mercury therein, means to cause a movement in said liquid on the beginning of flow through the connected sprinkler system, an electrical alarm, a closer bulb movably mounted within said chamber and floating in the liquid therein and an electrical contact in said bulb connected to said alarm to complete said alarm circuit on movement of said liquid to the desired extent.

9. In sprinkler alarm devices, a jet device to be connected with the supply pipe, a retarder connected with and operated by said jet device, a balanced valve comprising an exhaust chamber, a neutral chamber, and a pressure chamber, an alarm, an alarm pipe connecting said alarm with said neutral chamber, a pressure pipe connecting said pressure chamber with said supply pipe and an exhaust pipe connected through said retarder with said jet device.

10. In sprinkler alarm devices, a jet device to be operated by a supply pipe, a balanced valve comprising an exhaust chamber, a neutral chamber and a pressure chamber, an alarm connected with and operated by pressure in said neutral chamber and a liquid flow retarder between said balanced valve and said jet device.

11. In sprinkler alarm devices, a jet device to be operated by a supply pipe, a balanced valve comprising an exhaust chamber, a neutral chamber and a pressure chamber, an alarm connected with and operated by pressure in said neutral chamber and a retarder between said balanced valve and said jet device.

12. In sprinkler alarm devices, means to create a difference of pressure on the commencement of flow through the distributing system, a balanced valve having an exhaust chamber, a neutral chamber and a pressure chamber, an alarm connected with and operated from said balanced valve and a liquid flow retarder between said balanced valve and said means.

13. In sprinkler alarm devices, means to create a difference of pressure on the commencement of flow through the distributing system, a balanced valve having an exhaust chamber, a neutral chamber and a pressure chamber, an alarm connected with and operated from said balanced valve and a retarder between said balanced valve and said means.

14. In sprinkler alarm devices, means to cause a difference of pressure on the commencement of flow through the distributing system during its emergency operation, an alarm and a liquid flow retarder comprising a float interposed between said alarm and said means and operating to delay the action of said alarm.

15. In sprinkler alarm devices, a float chamber having mercury therein, there being a passage formed with a constricted portion adjacent its lower end and communicating with said float chamber, a float having a connected float valve freely mounted in said float chamber, an alarm controlled by said float valve and means to withdraw mercury from said float chamber through said passage on the commencement of flow in a sprinkler system.

16. In sprinkler alarm devices, a retarder having a chamber connected with a sprinkler system, liquid in said chamber to move through a restricted passage on the commencement of flow through said system, a closer bulb floating in the liquid in said chamber, an electrical contact within said bulb to be connected to an alarm and electrical conducting means within said bulb to complete the circuit of said alarm on movement of said liquid to the desired extent.

17. In sprinkler alarm devices, means to

cause a difference of pressure by the flow of fluid from the distributing system, a retarder having a chamber connected with said means, a closer bulb in said chamber, resilient spring contacts connected with and supporting said closer bulb and with an alarm circuit and a conducting fluid within said closer bulb to make the electrical connection with said contacts on the tilting of said bulb.

18. In sprinkler alarm devices, a chamber to be connected with a supply pipe and experience a difference of pressure on the beginning of flow through said supply pipe, an electrical alarm, a buoyant closer bulb normally floating within said chamber, an electrical contact within said bulb connected to said alarm and electrical conducting means within said bulb to complete said alarm circuit on the change of level of liquid within said chamber.

19. In sprinkler alarm devices, a supply pipe and connected distributing system, means to maintain a difference of pressure in said pipe on the commencement of flow therethrough, a jet device having direct open connection with said supply pipe adjacent said means, a retarder comprising a float chamber containing mercury, an exhaust chamber connected with said float chamber through a choke passage, a float valve in said float chamber, a balanced valve having an exhaust chamber connected with said float chamber, a pressure chamber connected with said float chamber and with said supply pipe and a neutral chamber connected with an alarm pipe and an alarm.

20. In sprinkler alarm devices, a jet device to be connected with a sprinkler supply pipe, a float chamber containing mercury, a float within said chamber, a float valve operated by said float, an alarm controlled by said float valve, and a pipe connected with said float chamber and with said jet device.

21. In sprinkler alarm devices, a jet device to be connected with a sprinkler system, a mercury retarder connected with and operated by said jet device, a balanced valve comprising an exhaust chamber, a neutral chamber and a pressure chamber, a connected alarm communicating with said neutral chamber, a pressure pipe connecting said pressure chamber with said supply pipe and a pipe connecting said jet device and said retarder.

22. In sprinkler alarm devices, a jet device to be connected with and operated by a sprinkler system, a balanced valve comprising an exhaust chamber, a neutral chamber and a pressure chamber, said neutral chamber to be connected with and operate an alarm and a mercury retarder between said balanced valve and said jet device.

23. In sprinkler alarm devices, a float chamber containing mercury, there being a passage comprising an adjustable constricted part adjacent its lower portion communicating with said chamber, a float having a float valve connected thereto freely mounted in said chamber and normally floating in said mercury, an alarm controlled by said float valve and means to move said mercury through said passage on the beginning of flow through the connected sprinkler system.

24. In sprinkler alarm devices, a float chamber containing mercury, there being a passage having a reduced part adjacent its lower portion connected with said float chamber, a float in said chamber and normally floating in said mercury, a connected alarm control device and an alarm governed by said alarm control device.

25. In sprinkler alarm devices, a chamber containing mercury to be connected with a sprinkler system and actuated on the beginning of flow through the sprinkler system during its emergency operation, a float in said chamber and normally floating in said mercury and an operatively connected alarm control device to be connected with and govern an alarm actuated on the emergency operation of said sprinkler system.

26. In sprinkler alarm devices, a chamber containing mercury and connected with another chamber by a passage having a constricted part adjacent its lower portion, means to cause a movement of said mercury on the beginning of flow through the connected sprinkler system and alarm controlling means floating in said mercury to govern the operation of an alarm.

27. In sprinkler alarm devices, a float chamber containing mercury communicating with a passage provided with a constricted portion, a float having a connected alarm controlling device in said chamber and floating in said mercury and means to cause the movement of said mercury through said passage on the commencement of flow through a sprinkler system.

28. In sprinkler alarm devices, a jet device to be connected with a supply pipe, a float chamber containing mercury, a float having a connected float valve and mounted in said chamber, an alarm controlled by said float valve and a suction pipe communicating with said float chamber and said jet device.

29. In sprinkler alarm devices, a float chamber containing mercury, a jet device to be connected with a supply pipe and having a suction passage connected with said float chamber, a float and connected alarm controlling devices in said float chamber to control the operation of an alarm.

30. In sprinkler alarm devices, a float chamber containing non-oxidizing neutral liquid, there being a passage provided with a constricted part adjacent its lower portion communicating with said float chamber to be connected with a sprinkler system, a float and connected alarm controlling device in said chamber and normally floating in the liquid therein to actuate an alarm on the commencement of flow in said sprinkler system.

31. In sprinkler alarm devices, a float chamber containing substantially non-oxidizing neutral liquid, there being a passage communicating with said float chamber to normally be in open connection with a sprinkler system, a float and connected alarm controlling device in said chamber and normally floating in the neutral liquid therein to actuate an alarm on the commencement of flow in said sprinkler system during its emergency operation.

32. In sprinkler alarm devices, a float chamber containing substantially non-aqueous neutral liquid, there being a passage communicating with said float chamber to normally be in open connection with a sprinkler system, a float and connected alarm controlling device in said float chamber and normally floating in said neutral liquid therein to actuate an alarm on the commencement of flow in said sprinkler system during its emergency operation.

33. In sprinkler alarm devices, a float chamber containing a substantially non-oxidizing neutral liquid, there being a passage forming a normally open connection between said float chamber and the sprinkler system and alarm controlling means in said chamber normally floating in said neutral liquid to actuate an alarm on the commencement of flow in said sprinkler system during its emergency operation.

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