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J. A. McELROY

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ALARM DEVICE

Filed May 7, 1928

Fig. 1.

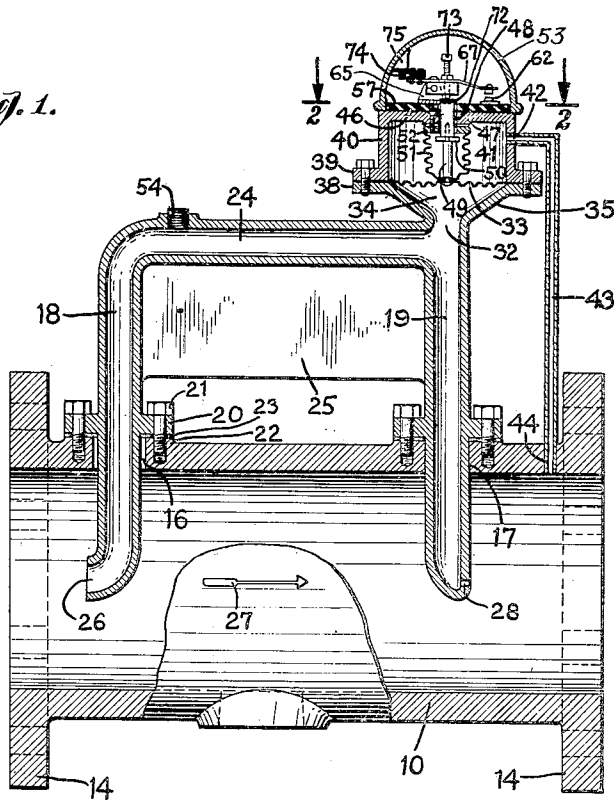


Fig. 2.

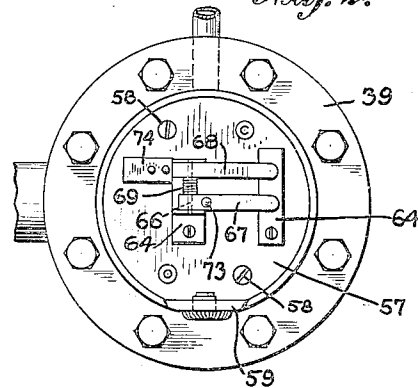
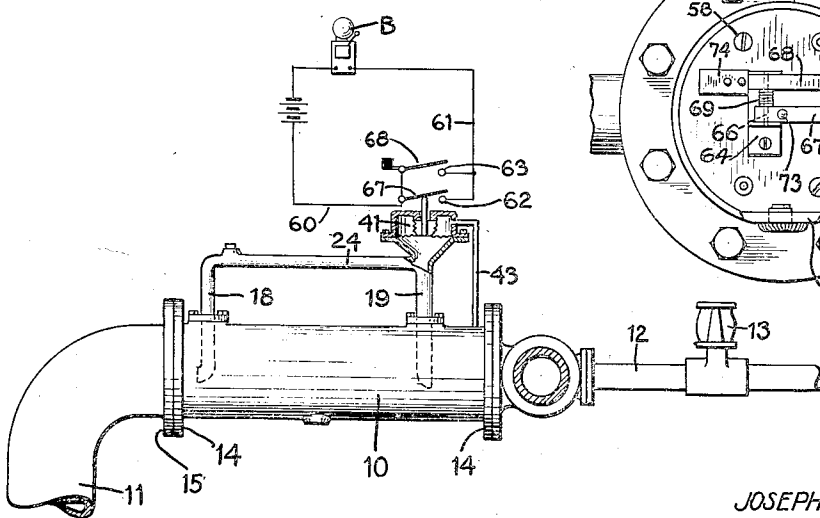


Fig. 3.



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ALARM DEVICE

Application filed May 7, 1928. Serial No. 275,582.

This invention relates to devices responsive to a variation in the condition of fluid within a conduit or the like. It has particular reference to an automatic alarm for sprinkler systems whereby a signal is given upon movement of the fire extinguishing fluid, as, for instance, when it is caused to flow through the pipes upon the opening of a sprinkler head or a leak in the system.

Heretofore, such alarm devices have taken the form of a valve included in the sprinkler system and adapted to be opened upon the flow of fluid therein. The opening of the valve permitted the divergence of fluid to an alarm actuating device which afforded an indication of the change in the condition of the fluid in the system.

The present invention seeks to provide means for affording the necessary alarm upon a variation in the condition of fluid in the fire extinguishing system without recourse to valve mechanism. To this end suitable alarm devices are adapted to be actuated by a diaphragm disposed in a chamber separate from the conduit for the fire extinguishing fluid and communicating therewith by means of spaced ports directed in opposed relation in the conduit. More particularly, the chamber and connections are substantially of the same cross sectional area and the ports open into the axis of the conduit, the opposite side of the diaphragm being subjected, at all times, to the static pressure of the fluid in the conduit, preferably by a pipe leading from the periphery of the conduit to said opposite side of the diaphragm.

It is also an object of the invention to provide an indicating device of extreme sensitivity so as to afford an indication or alarm when the prescribed position of a control valve, such as is common in sprinkler systems, has been altered, that is, when the valve has been tampered with. On the other hand, it is also an object of the invention to provide an indicating device which is not susceptible to the actuation of valves in the same water system, but which are not included in the sprinkler system.

These and other objects of the invention, and the means for their attainment will be

more apparent from the following detailed description taken in connection with the accompanying drawings illustrating one embodiment by which the invention may be realized, and in which:

Figure 1 is a longitudinal sectional view showing, in detail, the alarm device for sprinkler systems, in accordance with this invention.

Figure 2 is a plan view taken in the plane indicated by the line 2—2 in view 1, looking in the direction of the arrows, and showing the devices for initiating indications of a variation in the condition of the fluid in the system, the cover of the device being removed.

Figure 3 is a view showing, somewhat schematically, the alarm device and the contacts and circuit whereby an indication may be afforded.

This application is a continuation in part of U. S. S. N. 718,227 filed June 6, 1924.

While the invention has been illustrated and will be described as applied to a sprinkler system for the extinguishment of fires, it will be apparent, as the description proceeds, that it is applicable in any situation in which variations in the condition of a fluid in a conduit are to be indicated at one or more points either adjacent to or remote from the system.

In the usual sprinkler systems a riser is adapted to conduct fire extinguishing fluid to a plurality of branches provided with sprinkler heads. In the riser there has heretofore been inserted an alarm valve adapted to effect an indication of when the sprinkler heads are in operation or in other words to cause a fire alarm to be sounded. Such alarm valves have heretofore been of the clapper type wherein the fire extinguishing fluid is diverted to alarm initiating devices upon the opening of the valve, which opening has been effected by the flow of fluid in the riser. Valves of this nature have been found objectionable in that they are complicated, comprise moving parts, continually get out of order and are subject to actuation to give an alarm when, for instance, a valve in the street is opened or closed. In consequence they gave many false alarms. In accordance with this invention an alarm

device is provided which has practically no moving parts and which is susceptible to the slightest variation in the condition of the fluid in the fire extinguishing system but is not susceptible to conditions outside of the system.

In accordance with the invention a casting or conduit 10 is inserted in the riser 11, and is adapted to be secured in any manner, as by the flanges 14 with cooperating flanges 15, carried with the riser 11.

The casting 10, which is preferably cylindrical and of a diameter commensurate with the riser 11, is preferably formed with a pair of spaced apertures 16, 17 in the wall or periphery thereof for the reception of the alarm actuating instrumentality according to this invention. In the illustrated embodiment, an inverted, generally U-shaped chamber 18, 19, 24 is provided whereof the respective branches 18 and 19 are adapted to enter the conduit 11 through the apertures 16 and 17, respectively, formed therein. The branches 18, 19 are conveniently formed with flanges 20 by which the chamber is secured in position by means of the screws 21 which draw the flanges 20 to seats 22 formed on the conduit 10, suitable gaskets 23 being interposed to seal the openings, as will be understood. To facilitate the insertion of the branches 18 and 19, one of the openings, say 16, may be of an increased diameter to permit the passage of the curved end of branch 18.

In the preferred embodiment, the branches 18 and 19 extend to the axis of the conduit 10 and the connecting portion, which will hereafter be referred to as the chamber 24, together with the two branches are of substantially the same interior diameter or cross-sectional area and are of substantially the same length. They thus form an inverted U-shaped chamber defined by the three sides of a square. The structure 18, 19, 24 may be reenforced by a web 25. The branch 18 is open, as at 26, at its lower end and is curved to face the direction of flow of the fire extinguishing fluid in the system, as indicated by the arrow 27. The center of the opening 26 preferably lies in the axis of the conduit 10. The other branch 19 is closed at its end and, in the side wall thereof, there is formed a small opening 28, very much smaller than the opening 26 and facing in the direction of flow of the fire extinguishing fluid as shown by the arrow 27.

As an example of one specific embodiment by which the invention may be realized, it may be considered that the riser 11 is a pipe of 6" in diameter. The U-shaped chamber 18, 19, 24 may then be formed of pipe 3/4" in diameter, while the distance from center to center between the branches 18 and 19 may be 9" and the distance from the axis of the chamber 24 to the axis of the openings 26 and 28 and hence to the axis of the conduit 10 also may be 9". The mouth 26 is, of course, also

3/4" in diameter but the opening 28 may be 1/8" in diameter.

Opening out of the chamber 24 and preferably, for the sake of convenience, on the axis of the branch 19, is a mouth 32 adapted to be closed by a diaphragm 33. In the illustrated embodiment the mouth 32 is shown as flaring to form a supplemental chamber 34 defined by the conical walls 35. Obviously, the supplemental chamber 34 may take any convenient form, it being intended that the diaphragm 33 be acted upon by the pressure of the fluid in the chamber 24.

The flaring walls 35 terminate in a flange 38 upon which the diaphragm 33 rests and against which it is clamped by the flanges 39 of a casing 40 forming a diaphragm chamber or static pressure chamber 41. This casing 40 is tapped, as at 42, to receive a pipe 43 communicating with the inner periphery of the conduit 10. As illustrated, the hole 44 for the pipe 43 is tapped in the conduit 10 in the same longitudinally extending vertical plane which includes the openings 16 and 17, but it will be obvious, since its object is to maintain the static pressure of the conduit 10 in the chamber 41, that the hole 44 may be tapped anywhere in the conduit 10, the only requirement being that the pipe 43 shall open into the conduit 10 at its inner periphery.

In the top 46 of the static pressure chamber 40, inwardly thereof, is a seat 47 and, axially of the chamber, the top 46 is formed with an aperture 48 through which passes a plunger 49. This plunger 49 is freely reciprocable in the aperture 48 but its upward movement is limited by the stop or flange 50 which it carries. At its lower end, the plunger 49 is secured to the midpoint of the diaphragm so that as the diaphragm is depressed or elevated the rod 49 is similarly moved. To prevent the fluid in the chamber 41 from leaking through the passage 48, a boot or bellows 51 surrounds the plunger 49 and is secured at its upper end to a disc or washer 52 which is secured as by a screw to the seat 47.

It will be readily apparent that the chamber 29 and branches 18 and 19 will all be filled with fire-extinguishing fluid when the riser and system contain fluid. The chamber 41 and the pipe 43 will also contain the fluid. When no sprinkler head is open or no leak occurs the fluid on both sides of the diaphragm 33 will be in a static condition. The diaphragm will then be in its mid position or unflexed. When, however, a sprinkler head opens or a leak occurs, there is a flow of fluid in the system in the direction of the arrow 27. The pressure in the chamber 41 still remains the static pressure of the fluid in the system, as will be obvious. The pressure in the chamber 34, however, is reduced, it is believed, due to a siphoning action of the fluid in the branch 19 through the opening 28. This reduction in pressure may readily be measured by a

gauge mounted in the threaded hole 54 which is illustrated as closed by a plug and is apparent by a depression of the diaphragm 33 and consequent lowering of the plunger 49.

5 The downward movement of plunger 49 is utilized to effect the operation of alarm giving devices.

Upon the top 46 of the chamber 40 is a support 57 of insulating material of a diameter 10 slightly less than the diameter of housing 40 to which it may be secured as by the screws 58 so as to permit a removable and preferably dome-like cover 53 to fit over the same and be positioned thereby and rest on the bottom 46. At one side the cover is cut away to 15 fit over a raised boss 59 through which the electrical conductors 60, 61 may enter beneath the cover for connection with suitable circuit closing devices. One of these conductors, 20 say 61, may be led to twin contacts 62, 63 carried with a bar 64 while the other conductor may be electrically connected with a bracket 64 having ears 65 between which a shaft 66 is extended. On this shaft 66 are 25 mounted a pair of leaf contacts 67, 68 normally held out of engagement with the contacts 62, 63 respectively by a coil spring 69.

The plunger 49 is provided with insulation 72 at its upper end and contacts with an adjusting screw 73 carried by the contact 67 so 30 that when the diaphragm is not depressed and the plunger is in its upper position it will hold the contacts 62, 67 apart and no signal will be given. When, however, the diaphragm is depressed as the result of a change 35 in the condition of the fluid in the conduit 10, and the plunger 49 is drawn downwardly, the spring 69 will cause the contacts 67 and 62 to close and initiate an alarm by the ringing of 40 the bell B included in the circuit 60, 61.

Leaf contact 68 carries an arm or block of insulating material 74 which is normally 45 maintained by a rib 75 on the removable cover in such position that the contacts 68 and 63 are separated. If, however, any one attempts to tamper with the device and removes the cover the release of the arm 75 permits the contacts to close and ring bell B, as will be understood.

50 This alarm device is extremely sensitive to changes in the condition of the fire extinguishing fluid in the system. Thus, when the usual outside screw and yoke valve, required on all sprinkler systems, is tampered with, 55 the change in the condition of the fluid in the system caused by the movement of the valve is sufficient to cause this device to initiate an alarm. On the other hand, the operation of other outlets in the water system on the street 60 side of the alarm device, such as the opening or closing of a fire hydrant outside of the building containing the fire extinguishing system will not affect the device nor cause it to give an alarm.

65 Various modifications will occur to those

skilled in the art in the relation and configuration of the component elements going to make up the invention as a whole and no limitation is intended by the phraseology of the foregoing description or illustrations in the 70 accompanying drawings except as indicated in the appended claims.

What I claim is:—

1. A device for indicating changes between static and kinetic conditions of fluid in a 75 sprinkler system having a conduit for the fluid, comprising a chamber having an opening in one wall thereof, a diaphragm across the opening having means adapted to actuate an alarm giving device when the diaphragm 80 is deflected towards the inside of the chamber, a housing enclosing the opposite side of the diaphragm, spaced fluid conductors between the chamber and the conduit and extending to the axis thereof, the end of one of 85 said conductors being open and turned to face away from the direction of flow of fluid in the conduit, the end of the other conductor being closed and said conductor being formed adjacent the end with an orifice of materially 90 less diameter than the said one conductor and facing in the direction of flow of the fluid in the conduit, and a fluid conductor extending from the housing to the fluid adjacent the wall of the conduit.

2. In a device for indicating changes between static and kinetic conditions of fluid in a 95 sprinkler system, in combination, a conduit for the fluid offering free flow thereto, a chamber having an opening in one wall thereof, a diaphragm across the opening and having means adapted to actuate an alarm giving device, upon movement of the diaphragm, 100 toward the inside of the chamber, a housing enclosing the diaphragm on the side opposite to the chamber, spaced fluid conductors between the chamber and the conduit and extending thereinto, the end of one of said conductors being open and lying substantially in 105 the axis of the conduit and being turned to face away from the direction of flow of fluid in the conduit, the end of the other conductor being closed and said conductor being formed in the axis of the conduit and adjacent the end 110 thereof with an orifice of materially less diameter than the said one conductor and facing in the direction of flow of the fluid in the conduit, and a fluid conductor extending from the housing to the fluid at the inner 115 periphery of the conduit.

3. A device for indicating changes between static and kinetic conditions of fluid in a 120 sprinkler system having a conduit for the fluid, comprising a chamber having an opening in one wall thereof, a diaphragm across the opening and having means adapted to actuate an alarm giving device, a housing enclosing the opposite side of the diaphragm, 125 when the diaphragm is deflected towards the inside of the chamber, spaced fluid conduc-

tors between the chamber and the conduit and extending therinto, the end of one of said conductors lying in the axis of the conduit and being open and turned to face away from the direction of flow of fluid in the conduit, the end of the other conductor being closed and said conductor being formed in the axis of the conduit and adjacent the end thereof with an orifice of materially less diameter than the conductor and facing in the direction of flow of the fluid in the conduit, and a fluid conductor extending from the housing to the fluid at the inner periphery of the conduit.

4. A device for indicating changes between static and kinetic conditions of fluid in a sprinkler system having a conduit for the fluid, comprising a chamber having an opening in one wall thereof, a diaphragm across the opening having means adapted to actuate an alarm giving device when the diaphragm is deflected towards the inside of the chamber, a housing enclosing the opposite side of the diaphragm, spaced fluid conductors between the chamber and the conduit and extending to the axis thereof, said chamber and conductors being of equal volumetric capacity, the end of one of said conductors being open and turned to face away from the direction of flow of fluid in the conduit, the end of the other conductor being closed and said conductor being formed adjacent the end with an orifice of materially less diameter than the conductor and facing in the direction of flow of the fluid in the conduit, and a fluid conductor extending from the housing to the fluid adjacent the wall of the conduit.

5. A device for indicating changes between static and kinetic conditions of fluid in a sprinkler system having a conduit for the fluid, comprising a chamber having an opening in one wall thereof, a diaphragm across the opening and having means adapted to actuate an alarm giving device upon the movement of the diaphragm towards the inside of the chamber, a housing enclosing the opposite side of the diaphragm, spaced fluid conductors of the same cross-sectional area as the chamber between the chamber and the conduit and extending therinto, the end of one of said conductors being open and lying in the axis of the conduit and being turned to face away from the direction of flow of fluid in the conduit, the end of the other conductor being closed and said conductor being formed in the axis of the conduit and adjacent the end thereof with an orifice of materially less diameter than the conductor and facing in the direction of flow of the fluid in the conduit, the distance between the axis of the chamber and the axis of the conduit being equal to the distance between the axis of the conductors, and a third fluid conductor extending from the housing to the fluid at the inner periphery of the conduit.

6. In a device for indicating changes be-

tween static and kinetic conditions of fluid, the combination with a conduit of constant cross-sectional area for the fluid, of a chamber, a fluid conducting means between one end of the chamber and the interior of the conduit, the end of the fluid conducting means within the conduit being open and facing away from the direction of flow of fluid in the conduit, a second fluid conducting means having a restricted passage relatively to the first fluid conducting means between the other end of the chamber and the interior of the conduit, the end within the conduit of the second fluid conducting means being open and facing in the direction of the flow of the fluid in the conduit, and pressure means responsive to the difference in pressure in the chamber and in the conduit.

7. In a device for indicating changes between static and kinetic conditions of fluid, the combination with a conduit of a constant cross-sectional area for the fluid, of a chamber, fluid conducting means between spaced portions of the chamber and the conduit, one of said fluid conducting means having an open end turned to face away from the direction of flow of fluid in the conduit, the other of said fluid conducting means having its end closed but having an orifice of materially less diameter than the conductor and facing in the direction of flow of the fluid in the conduit, and a pressure means responsive to the difference in pressure in the chamber and in the conduit.

8. In a device for indicating changes between static and kinetic conditions of fluid in a sprinkler system, in combination, a conduit for the fluid offering free flow thereto, a chamber having an opening in one wall thereof, a diaphragm across the opening and having means adapted to actuate an alarm giving device upon movement of the diaphragm towards the inside of the chamber, a housing enclosing the diaphragm on the side opposite to the chamber, spaced fluid conductors between the chamber and the conduit and extending therinto, the end of one of said conductors being open and lying substantially in the axis of the conduit and being turned to face away from the direction of flow of fluid in the conduit, the end of the other conductor being closed and said conductor being formed in the axis of the conduit and adjacent the end thereof with an orifice of materially less diameter than the said one conductor and facing in the direction of flow of the fluid in the conduit, and means to apply pressure on the opposite side of the diaphragm equivalent to the static pressure of the fluid in the conduit.

9. In a device for indicating changes between static and kinetic conditions of fluid, the combination with a conduit of constant cross-sectional area for the fluid, of a chamber, fluid conducting means between spaced

portions of the chamber and the conduit, one of said fluid conducting means having a mouth turned to face away from the direction of flow of fluid in the conduit, the other
5 of said fluid conducting means having a mouth directed in the direction of flow of fluid in the conduit, the distance from the axis of the chamber to the open ends of said fluid conducting means being equal to the distance between the axes of the respective fluid
10 conducting means, and a pressure means responsive to the difference in pressure in the chamber and in the conduit.

10. In a device for indicating changes between static and kinetic conditions of fluid,
15 the combination with a conduit of constant cross-sectional area for the fluid, of a chamber, a fluid conducting means between one end of the chamber and the interior of the conduit, a second fluid conducting means
20 having a restricted passage relative to the first fluid conducting means between the other end of the chamber and the interior of the conduit, the wall of the chamber being formed
25 with an opening in axial alignment with the second fluid conducting means, and means movable towards the inside of the chamber and responsive to the difference in pressure between the chamber and the conduit, and
30 susceptible to the fluid in the chamber through the opening.

In testimony whereof I affix my signature.
JOSEPH A. McELROY.

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CERTIFICATE OF CORRECTION.

Patent No. 1,745,859.

Granted February 4, 1930, to

JOSEPH A. McELROY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, line 97, claim 2, for the word "or" read "of"; same page, line 127, claim 3, after the word "device" and before the comma insert the words "when the diaphragm is deflected towards the inside of the chamber", and lines 129 and 130, same claim, strike out the words and comma "when the diaphragm is deflected towards the inside of the chamber,"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of March, A. D. 1930.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.