Oct. 31, 1933. C. P. HOWARD ET AL 1,932,784

ALARM MECHANISM FOR SPRINKLER SYSTEMS

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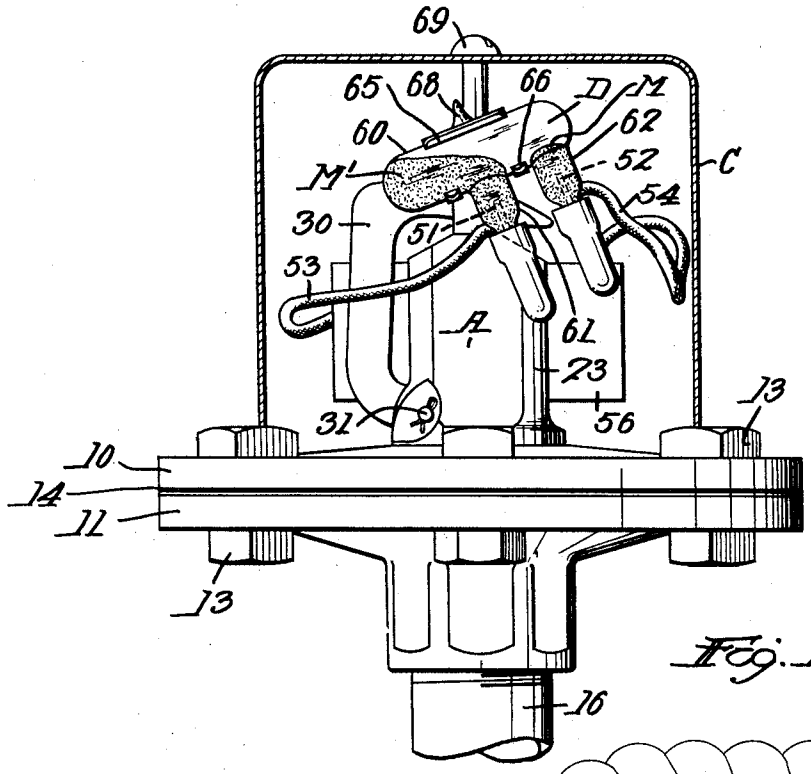


Fig. 1.

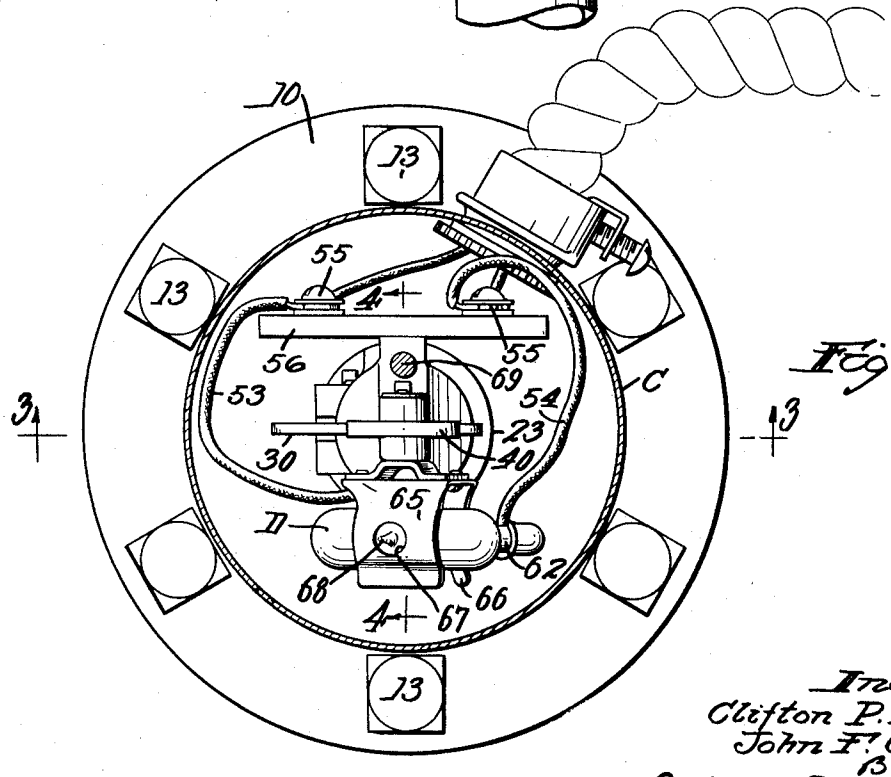


Fig. 2.

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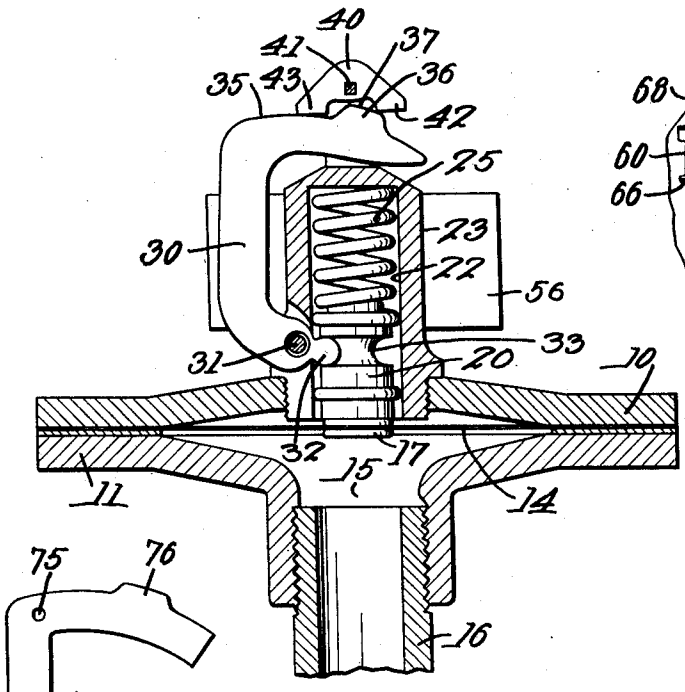


Fig. 3.

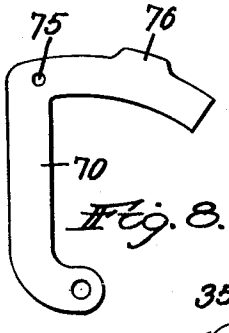


Fig. 8.

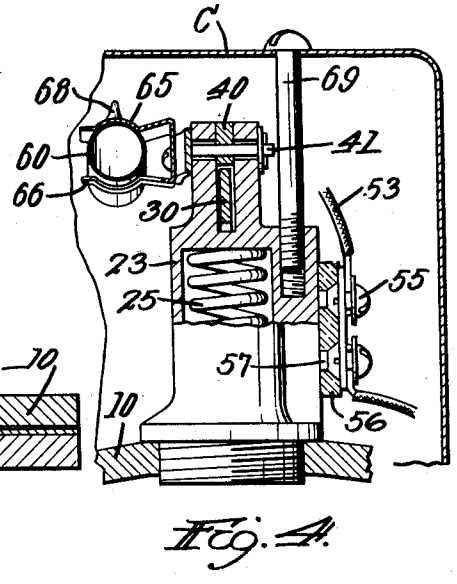


Fig. 4.

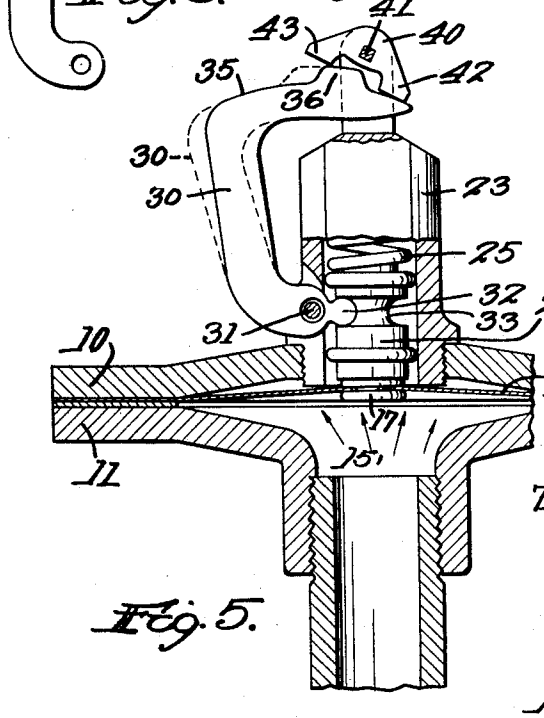


Fig. 5.

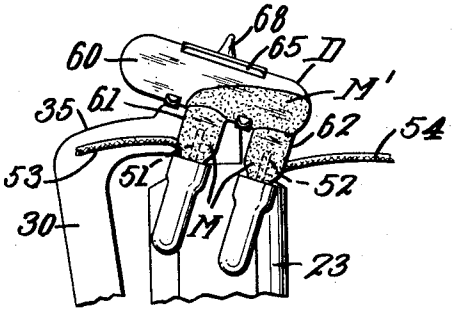


Fig. 6.

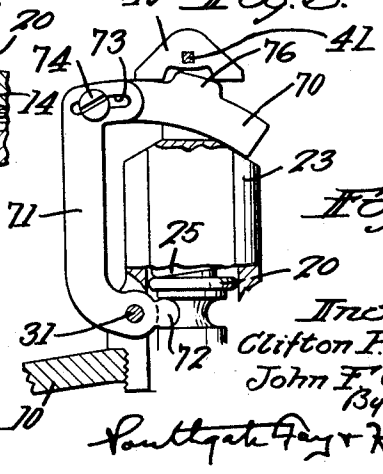


Fig. 7.

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UNITED STATES PATENT OFFICE

1,932,784

ALARM MECHANISM FOR SPRINKLER SYSTEMS

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Application February 20, 1931. Serial No. 517,255

3 Claims. (Cl. 200—83)

This invention relates to mechanism for closing an electric circuit and thereby sounding an alarm when a head is opened in a sprinkler system and for thereafter disconnecting the alarm when the sprinkler system is drained.

It is the general object of our invention to provide improved mechanism for closing and opening an alarm circuit in response to changes in pressure in some usual part of a sprinkler system.

A further object is to provide a cam-actuated circuit-closing mechanism for such purposes, by the use of which a delayed action may be obtained.

Our invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention is shown in the drawings, in which

Fig. 1 is a side elevation of our improved alarm mechanism, with the cover shown in section;

Fig. 2 is a plan view of the parts shown in Fig. 1, with the cover again shown in section;

Figs. 3 and 4 are sectional elevations, taken respectively along the lines 3—3 and 4—4 in Fig. 2;

Fig. 5 is a view similar to Fig. 3 but showing the parts in a different position;

Fig. 6 is a detail side elevation showing the operation of a contact-making device;

Fig. 7 is a front elevation of a slight modification, and

Fig. 8 is a detail front elevation of a cam member used in the modified construction.

Referring to the drawings, we have shown an alarm mechanism A mounted on a casing comprising upper and lower casing members 10 and 11, secured together in any convenient manner as by bolts 13 and providing a flattened inner recess. A thin flexible diaphragm 14 (Fig. 3) is clamped between the casing members 10 and 11 and extends across the upper part of the recess in the casing to partition off a pressure chamber 15.

The pressure chamber 15 is connected by a pipe 16 to the usual intermediate chamber of a sprinkler system or to some other part of the system which is normally at atmospheric pressure but in which the pressure increases as soon as a sprinkler head is opened. For the purposes of this application, it is sufficient to state that the chamber 15 is so connected to the sprinkler system that it is normally at atmospheric pressure but that the pressure builds up rapidly in the chamber 15 when a sprinkler head is opened. This increased pressure is then maintained in the chamber 15 until the water supply is shut off and the system is allowed to drain.

We will now describe our improved mechanism for closing an electric circuit when pressure is thus increased in the chamber 15. The diaphragm 14 is provided with a button 17 at its center, which engages the lower end of a plunger 20, slidable in a cylindrical opening 22 in a cap 23 which is threaded into a central opening in the upper casing member 10.

A spring 25 mounted in the opening 22 of the cap 23 presses the plunger 20 yieldingly downward against the button 17 in the diaphragm 14. When pressure increases in the chamber 15 beyond a predetermined point, the pressure on the diaphragm overcomes the spring 25 and raises the plunger 20.

A cam lever 30 (Fig. 3) is pivoted at 31 on the cap 23 and is provided with a rounded head or extension 32 which extends into an annular groove or recess 33 of semi-circular cross section, in the neck of the plunger 20.

At its upper end, the lever 30 is provided with a segmental convex surface 35, centered about the axis 31 and having a cam projection 36 between its end portions. The outer convex surface 37 of the projection 36 is also centered about the axis 31.

A rocking member 40 is mounted on a rock shaft 41 and is provided with spaced end portions 42 and 43, positioned for engagement by the cam projection 36. When the lever 30 is moved from the position shown in Fig. 3 to the position shown in Fig. 5, the rocking member 40 and the rock shaft 41 will be moved from the position shown in Fig. 3 to that shown in Fig. 5.

In Fig. 3, the end portion 43 engages the convex surface 35 and the end portion 42 rests upon the convex surface 37 of the projection 36. As the lever 30 moves to the left, the cam projection 36 moves from underneath the end portion 42 and engages the inner side surface of the end portion 43, rocking the member 40 to the position shown in Fig. 5, with the end portion 43 then resting on the surface 37 of the projection 36 and with the end portion 42 engaging the segmental convex surface 35.

Reference to Fig. 5 will show that after the parts have reached the position shown in full lines in Fig. 5, the movement of the lever 30 may be continued to the dotted line position in Fig. 5, without further change in the position of the member 40 or shaft 41.

For the purpose of utilizing the angular or rock-

ing movement of the rock shaft 41 for opening and closing an electric circuit, we make use of a commercial circuit-closing device D (Fig. 1) having terminals 51 and 52 connected by wires 53 and 54 to binding screws 55 on a plate 56 of insulating material secured to the side of the cap 23 by screws 57 (Fig. 4).

The device D is in the form of a sealed glass tube 60 having depending tubular projections 61 and 62 in which the terminals 51 and 52 are sealed, with their upper ends substantially below the upper open ends of the depending tubular projections 61 and 62. These tubular projections are at all times filled with mercury M and an additional portion of mercury M' is contained in the main tube 60 of the device D.

The contact device D is mounted on the rock shaft 41 between an upper spring plate 65 (Fig. 4) and lower spring arms 66. The plate 65 (Fig. 2) has an opening 67 to receive the sealing tip 68 of the glass tube 60.

When the lever 30, member 40 and rock shaft 41 are in the position shown in Fig. 3, the contact device D will be in the position shown in Fig. 1, with the additional mercury M' collected at the left hand lower end of the tube 60, out of contact with the mercury M in the tubular extension 62.

When the parts are moved to the postion shown in Fig. 5, the contact device D is rocked to the position shown in Fig. 6 and the mass of mercury M' moves to the right hand end of the tube 60, engaging the mercury M in both tubular projections 61 and 62 thus completing the circuit between the terminals 51 and 52 and causing the alarm to sound.

It will appear therefore that we have provided extremely simple and reliable mechanism by which an alarm circuit may be opened and closed. There are no exposed contacts in the apparatus or switch blades to be opened or closed, and the rocking of the contact device D may be accomplished with very slight effort.

It is desirable in such alarm mechanism that the circuit be closed and the alarm begin to sound at a certain minimum pressure, such as four pounds, and that the circuit be broken when this pressure drops to some lower predetermined pressure, such as three and a half pounds. Furthermore, the device must be capable of resisting full water main pressure during the operation of the sprinkler system.

It has been previously pointed out that the lever 30 may receive increased movement to the left, as viewed in Fig. 5, without changing the setting of the rock shaft 41. It should be further noted that a slight additional upward movement of the diaphragm 14 beyond the position shown in Fig. 5 will cause the diaphragm 14 to engage the lower threaded end portion of the cap 22, thus providing a positive stop against further movement by any further increase in water pressure. A cover C is provided for the alarm mechanism A, which may be secured in place by a screw 69.

Ordinarily, by testing and suitably grading the springs 25 in proportion to the area of the diaphragm 14, the alarm mechanism A may be readily assembled to respond to a predetermined minimum pressure, without the necessity of providing adjustments which might be altered or destroyed by an unauthorized person. If, however, it is desired to provide such adjustment, this may be conveniently accomplished by using the construction shown in Fig. 7, in which a cam lever comprising two parts 70 and 71 is substituted for the single lever 30 shown in the preferred form.

The part 70, as shown in Fig. 8, is substantially similar to the lever 30 previously described, except that it lacks the rounded end portion for engagement by the plunger 20. This rounded end portion 72 is provided on the second cam lever part 71, which also has an elongated segmental slot 73 at its upper end. A screw 74 extends through the slot 73 and is threaded into the lever part 70 at 75 (Fig. 8).

By relatively adjusting the parts 70 and 71, the position of the cam projection 76 may be varied for a given position of the plunger 20 and a given compression of the spring 25.

In some cases, the mechanism is used in a normally closed instead of a normally open system. In this case, the contact device D is merely reversed, end-for-end, in the holding parts 65 and 66.

Having thus described our invention and the advantages thereof, we do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what we claim is:—

1. In a circuit maker and breaker, a pressure chamber and a diaphragm forming a part thereof, an electric contact device, a rock shaft supporting said device, a rocker plate on said rock shaft having spaced end portions, and a cam lever having a convex surface centered about its axis and having a cam portion projecting beyond said convex surface, said cam lever and rocker plate being relatively formed and centered so that one end portion of said rocker plate will rest on said projecting cam portion when the other end portion rests on said convex surface of said cam lever during excess movement of said cam lever after the position of the rocker plate has been reversed thereby.

2. The combination in a sprinkler alarm mechanism as set forth in claim 1, in which the rocker plate has a recess between its spaced end portions to receive the projecting cam portion as the convex surface of the cam lever is moved under said rocker plate, said cam portion engaging a side wall of said recess to reverse the angular position of said plate and change the operative condition of said contact device.

3. In a circuit maker and breaker, a member movable by increase of pressure thereon, a self-contained electric contact device, a support for said device, a cam lever operatively connected to said member and having a convex surface centered about its axis and having a cam portion projecting beyond said convex surface, and a cam follower on said support engageable with said cam portion and through which movement of said member causes movement of said support and reversal of the operating condition of said contact device, said convex surface and cam portion being also effective to lock said support in a predetermined position during excess movement of said cam lever after the position of said support has been reversed thereby.

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