Dec. 28, 1937. W. R. HAMILTON ET AL 2,103,747

FLOW CONTROLLED SWITCH

Filed Feb. 26, 1936 2 Sheets-Sheet 1

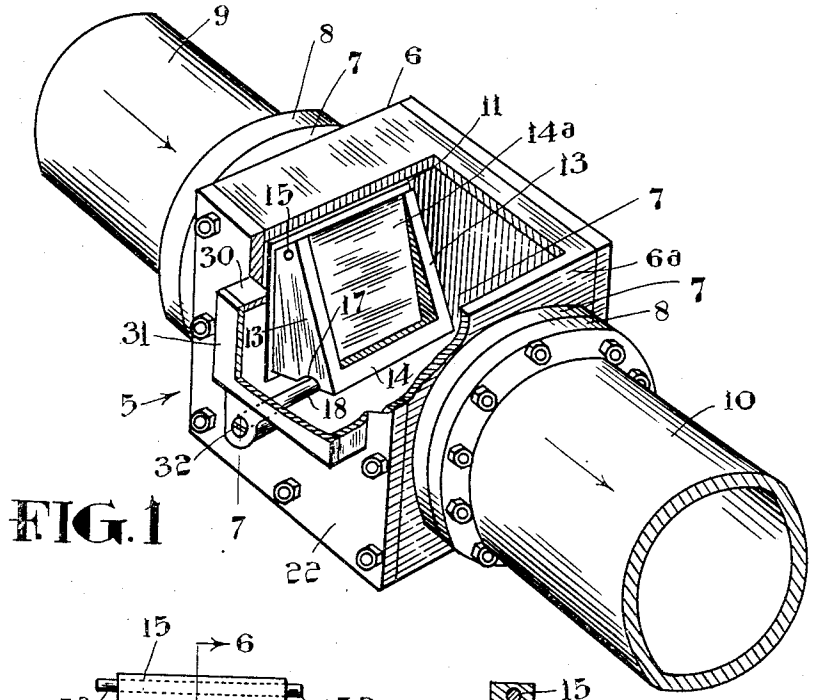


FIG. 1

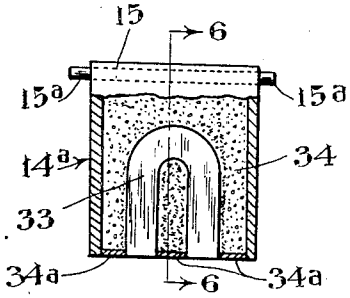


FIG. 5

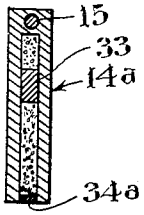


FIG. 6

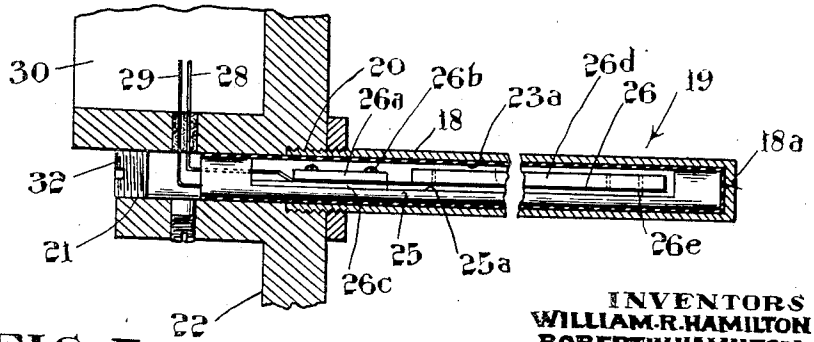


FIG. 7

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FLOW CONTROLLED SWITCH

Filed Feb. 26, 1936 2 Sheets-Sheet 2

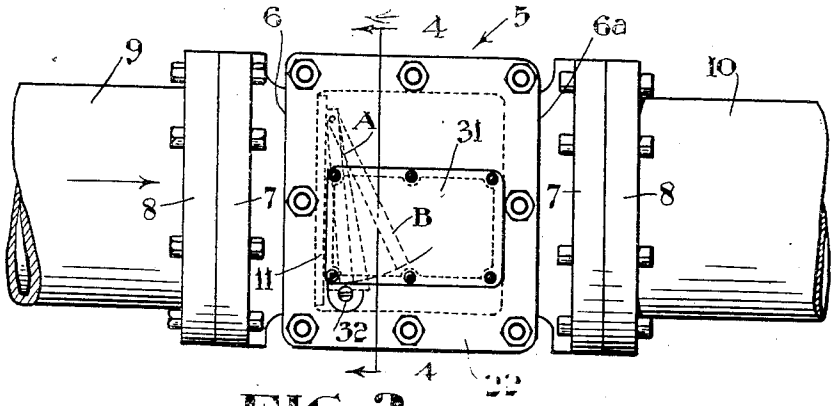


FIG. 2

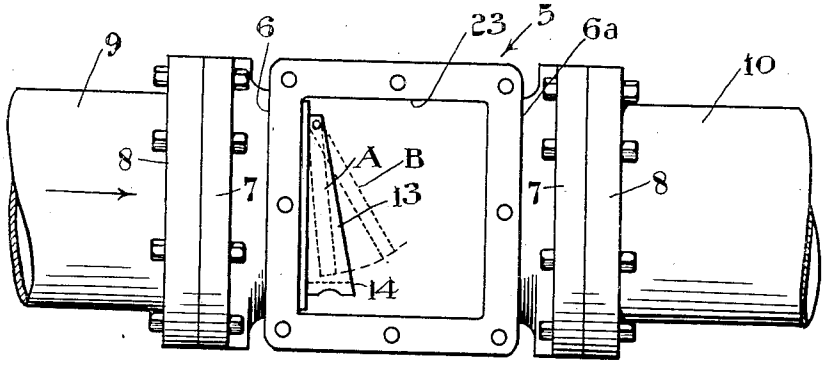


FIG. 3

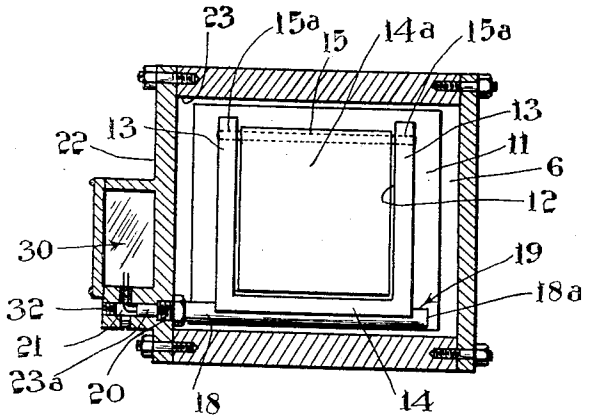


FIG. 4

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FLOW CONTROLLED SWITCH

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Application February 26, 1936, Serial No. 65,760

5 Claims. (Cl. 200—81)

This invention relates to fire extinguishing sprinkler systems and particularly to improved means for operating a signal or alarm whenever the flow of fluid in a pipe line of the system exceeds a predetermined rate, due to excessive leakage or to the opening of a sprinkler head.

According to the present invention the operation of the signal or alarm is made dependent upon the relative positioning of a magnet and a contact device which, in turn, is controlled by conditions existing within a pipe line of the sprinkler system. Under normal conditions the relative positioning of the magnet and contact device is such that the latter is prevented by the attraction of the magnet from effecting operation of the signal or alarm. When, due to leakage or to the opening of a sprinkler head, the rate of flow in the pipe line exceeds a predetermined value, the relative positioning of the magnet and contact device is automatically varied in response to this condition to permit the contact device to effect operation of the signal or alarm.

Proceeding now to a more detailed description reference will be had to the accompanying drawings in which,

Fig. 1 is a perspective view of the invention as embodied in a pipe line of the sprinkler system. In this view part of the construction is broken away to disclose interior elements that would otherwise be concealed from view.

Fig. 2 is a side view of the assembly shown in Fig. 1.

Fig. 3 is a view similiar to Fig. 2 with certain parts omitted.

Fig. 4 is a transverse sectional view taken substantially along the line 4—4 of Fig. 2.

Fig. 5 is a detail view, partly in section, of a control vane which carries the permanent magnet.

Fig. 6 is a sectional view taken substantially along the line 6—6 of Fig. 5.

Fig. 7 is a sectional view taken substantially along the line 7—7 of Fig. 1.

Referring more particularly to the drawings, 5 designates a casing inserted in the pipe line of a fire sprinkler system, as illustrated in Figs. 1, 2 and 3. As here shown, the end walls 6 and 6a of the casing are provided with coupling flanges 7 bolted to the coupling flanges 8 of the pipe sections 9 and 10. These end walls of the casing are provided with suitable flow openings (not shown) placing the interior of the casing in communication with the bores of the pipe sections 9 and 10.

A plate 11 is welded or otherwise secured to the inner surface of the end wall 6 over the flow opening formed therein. This plate (see Fig. 4) is provided with a square opening 12 bounded at its side and lower edges by the side and bottom flanges 13 and 14. The opening 12 is blocked by a swinging rectangular vane 14a which is hung on a pivot shaft 15 having its terminals 15a fitted in suitable openings formed in the upper portions of the side flanges 13. This vane normally occupies the dotted line position shown at A in Figs. 2 and 3 and is of such size that only a relatively small clearance is reserved between the side and lower edges thereof and the adjacent surfaces of the flanges 13 and 14. Due to this arrangement it will be apparent that, when fluid is flowing through the pipe line in the direction of the arrow, due to excessive leakage or to the opening of a sprinkler head, considerable pressure will be exerted against the vane 14a. This provides a very sensitive arrangement, in that the vane will immediately move from the dotted line position A to the dotted line position B when the rate of flow in the pipe line exceeds a predetermined value.

The lower surface of the flange 14 is provided with a groove 17 to accommodate a metal tube 18 forming part of a circuit controller or contact device generally indicated at 19. One end of tube 18 is closed as indicated at 18a. The other end, which is open, is screwed into the enlarged end 20 of a bore 21 formed in a cover plate 22 which is secured over a side opening 23 of casing 5. Tube 18 houses an inner tube 23a which is also closed at its inner end and open at its outer end. The open end of tube 23a projects beyond the corresponding end of tube 18 and is received in the restricted portion of the bore 21. Tube 23a is made of insulating material and contains two contacts designated 25 and 26. As here shown, contact 25 comprises a cylindrical brass rod having a portion thereof cut away to provide a recess 25a in which the contact 26 is mounted. Contact 26 is shown as a thin flat strip of spring steel having one end clamped to contact 25 by means of the clamping plate 26a and screws 26b. The clamped end of contact 26 is insulated from the contact 25. To this end the clamping plate 26a is made of insulating material and an insulating strip 26c is interposed between the contact 25 and the clamped end of the contact 26. The portions of the screws 26b which pass through the contact 26 are insulated therefrom by means of suitable insulating washers (not shown). Contact 26 carries a relatively heavy armature 26d and is also provided with a

contact tip 26e. The free end of the contact 26 normally tends to assume a position such that the contact tip 26e engages the contact 25. The clamped end of the contact 26 and the corresponding end of the contact 25 are connected, by leads 28 and 29, to a suitable terminal block (not shown) which is housed within a casing 30 cast integral with the cover 22, said casing being provided with a removable lid 31. After fitting the tubes 18 and 23a to the cover 22 the outer end of bore 21 is closed by a threaded plug 32.

The vane 14a is a hollow vane in which a permanent magnet 33 is secured by means of a suitable cementitious material as indicated at 34 in Figs. 5 and 6. The cementitious material 34 is preferably protected by lead facings 34a applied so as to leave the poles of the magnet exposed at the lower edge of the vane.

When the parts are in the position shown in Fig. 1, the contact 25 is held away from the contact 26 by the attraction of the magnet 33. This separation of the contacts provides a break in the circuit connections to the signal or alarm which prevents operation of the latter. When, through excessive leakage or the opening of a sprinkler head, the fluid is caused to exceed a predetermined rate of flow in the direction indicated by the arrow, the pressure exerted against the vane 14a causes the vane to swing to the position B indicated in Figs. 2 and 3. In this position of the vane the contact 25 is no longer attracted by the magnet 33 and therefore springs into engagement with the contact 26 to complete circuit connections which result in operation of the signal or alarm.

Having thus fully described what we now consider to be the preferred embodiment of our invention it will be understood that various modifications may be resorted to within the scope and spirit of the appended claims. The essential feature of the invention is the control of the signal or alarm by a change in the relative position of the magnet and contact device in response to changing conditions of flow in the sprinkler system and it is obvious that various arrangements of the magnet and contact devices may be resorted to with this end in view.

Having thus described our invention what we claim is:—

1. A flow signal or alarm controlling means for sprinkler systems and the like comprising a conduit, a magnet, a circuit controller, and means whereby the relative positioning of the magnet and circuit controller is automatically varied in accordance with hydraulic conditions prevailing in the conduit to control operation of the signal or alarm, the normal relative positioning of the magnet and circuit controller being such that the latter is prevented by the attraction of the magnet from effecting operation of the signal.

2. A flow signal or alarm controlling means for sprinkler systems and the like comprising a conduit, a movable vane mounted therein, a magnet carried by said vane, a circuit controller including cooperating contacts adapted, in one position thereof, to prevent operation of the flow signal or alarm and, in another position thereof, to effect operation of said signal or alarm, one of said contacts being attracted by the magnet to a position preventing operation of the signal or alarm when the magnet and controller occupy a normal predetermined relative position and means whereby the normal relative positioning of the magnet and controller is changed in response to a predetermined flow through the pipe line so that the controller contact, normally attracted by the magnet, is moved beyond the attraction of the magnet and permitted to cooperate with the companion contact to effect operation of the signal or alarm.

3. A flow signal or alarm controlling means for sprinkler systems and the like comprising a conduit, a vane pivotally mounted therein, a magnet carried by the vane, a circuit controller including cooperating contacts adapted, when engaged with each other, to complete circuit connections for effecting operation of the signal or alarm, said circuit controller and vane being normally positioned so that one of the controller contacts is held away from the other by the attraction of said magnet to prevent operation of the signal or alarm, the arrangement being such that movement of the vane, in response to a predetermined rate of flow through the conduit, shifts the magnet to a position where it no longer attracts the aforesaid controller contact, the latter being then free to engage the cooperating contact to effect operation of the signal or alarm.

4. A flow signal or alarm controlling means as set forth in claim 3 in which the controller contacts are housed in a casing which is in close proximity to the poles of the magnet carrying vane when the latter is in its normal position.

5. Controlling means as set forth in claim 2 characterized in that said vane comprises a hollow casing containing said magnet.

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