

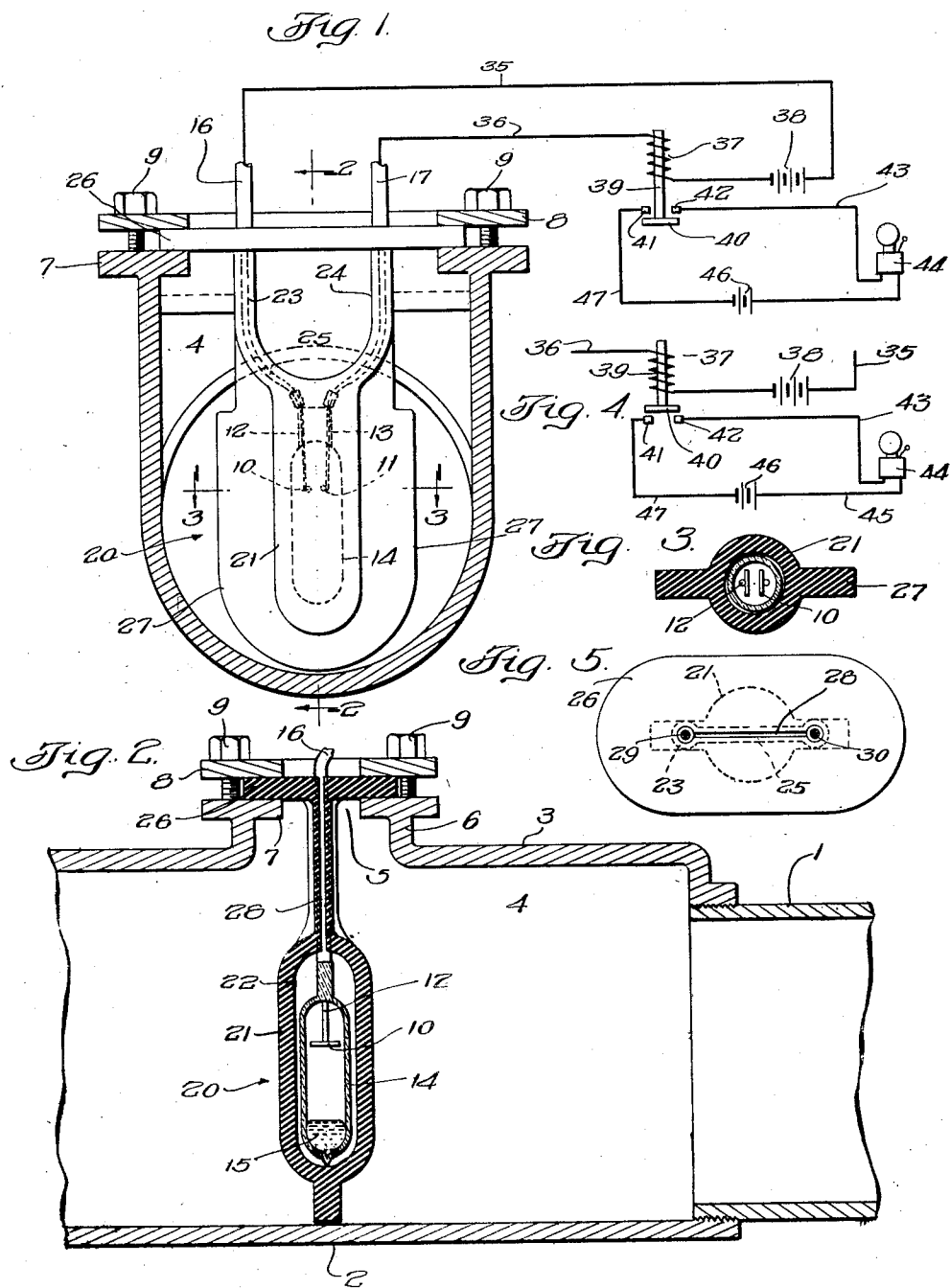
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FLOW INDICATOR SWITCH HOUSING

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FLOW INDICATOR SWITCH HOUSING

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The present invention relates generally to flow indicators and more particularly to that type adapted to be responsive to certain flow conditions within a fluid conduit.

5 There are many situations wherein it is desirable to know if there is or there is not a fluid flow. For example, in the usual sprinkler system there is normally, of course, no flow of water, or other fire extinguishing fluid. 10 These systems are usually so arranged that if there occurs an abnormal rise of temperature valves are actuated to cause a flow of fire extinguishing fluid to the point of high temperature. It is desirable, in the use of such 15 systems, to know immediately when a fire breaks out, and one way is to ascertain the instant a flow in the system occurs, as by some form of flow responsive device adapted to give an alarm or signal when flow occurs.

20 Other situations arise where it is desirable to know when a fluid flow is initiated. Certain electrical machinery, such as generators, is sometimes provided with apparatus adapted, upon an abnormal rise of temperature 25 within the generator, to force carbon dioxide to points within the generator whereby a fire therein is smothered.

It may also be desirable to ascertain when a fluid flow exceeds a maximum rate or volume, 30 as in storm drains and water supply systems, or other hydraulic apparatus.

In refrigerating and cooling apparatus, on the other hand, it may be desirable to know if the flow of the refrigerant or cooling medium is substantially adequate and continuous, inasmuch as a failure may cause a part of the apparatus to become overheated or otherwise disabled. In this case, therefore, it becomes desirable to know when the flow stops 40 or falls below a certain desired minimum.

I am aware that various types of circuit breakers, circuit closers, and mechanical alarms, and other devices have been made in an effort to provide an efficient accurate and 45 never failing flow indicator. One difficulty is always present in installations of the types mentioned above, namely, such alarms and signals are seldom used. There are long periods of time between operations, yet in order 50 to afford protection and serve the purpose

for which they are designed, such devices must be instantly responsive and completely operative. Those employing journaled shafts and packing glands often stick, in which case no alarm would be given. Those employing 55 exposed electrical contacts are subject to similar disadvantages, namely, due to exposure or long disuse such contacts become fouled or corroded, with a similar failure.

It is the aim, therefore, of my present invention to provide a simple and reliable instrument of this class, and one which does not possess any of the disadvantages referred to above. According to my invention, I employ a set of contacts, adapted to control an alarm 65 circuit, which are sealed in a permanently closed chamber whereby the tendency to corrode or become inoperative due to atmospheric conditions is thus obviated.

Preferably I use a small glass bulb having a pair of contacts therein together with 70 a globule of mercury, whereby when the bulb is moved to a certain position the mercury will be moved by gravity to form an electrical conductor between the contacts so that the 75 circuit is closed. The contacts may also be arranged so that if the bulb is moved to a given position the mercury will be moved away from the contacts, thereby opening the circuit. Contacts of the type disclosed in the 80 patent to A. Herz, 1,653,177, issued December 20, 1927, may be employed, or any form of sealed contact mechanism which employs a movable contact operated by gravity for changes in the position of the bulb may be 85 used instead.

In all the flow indicator devices of the prior art with which I am familiar and which employ movable contact means, it is generally 90 the case that the leads or conductors from the contacts are brought to contact posts or similar elements mounted on the conduit and which were thus exposed to the fluid in the conduits. In some cases, such as those wherein direct current was utilized, serious difficulties arose due to electrolysis, producing corrosion of the parts thus exposed. I propose 95 to overcome such defects by providing a novel mounting or housing for the bulb and leads of the contact mechanism which effectually 100

seals the same from contact with the fluid of the conduit and, in addition, to dispense with all shafts, bushings, and other moving parts likely to bind or deteriorate.

5 Now in order to acquaint those skilled in the art with the manner of constructing and operating a device embodying my invention, I shall describe a specific embodiment of the same in connection with the accompanying
10 drawings, in which:

Fig. 1 is a section through a conduit showing my device in place together with one form of an alarm circuit;

Fig. 2 is a sectional view of my device taken
15 on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 shows a modified form of alarm circuit which may take the place of that
20 shown in Fig. 1; and

Fig. 5 is a top plan view of my novel mounting.

In the drawings, 1 indicates a conduit or pipe line adapted to direct a fluid flow, and
25 2 is a fitting formed to receive my device. The fitting 2 threadedly receives the pipe line 1 and is provided with an extended upper portion 3 providing a chamber or recess 4, which actually forms an enlargement in the
30 pipe line whereby the presence of my device in the conduit line does not in any way impede the flow of fluid therethrough. The central or intermediate portion of the fitting 2 is provided at the top part with a transverse
35 opening or slot 5 surrounded by an upstanding neck 6 having its upper edge flanged as at 7 in Figs. 1 and 2. A clamping plate 8 is secured to the flange 7, as by stud bolts 9.

The contact mechanism is seen from Figs. 1
40 and 2 to consist of two electrodes 10 and 11 carried by lead-in conductors 12 and 13 sealed in a glass bulb or capsule 14, which also encloses a globule of mercury 15. The electrodes 10 and 11 extend transversely of the bulb 14
45 and are secured, as by soldering or the like, at their middle portion to the conductors 12 and 13, as is clear from Fig. 2. Thus it is that, regardless as to whether the bulb 14 is tilted to the right or to the left, the mercury
50 will close the connection between the electrodes. The lead-in conductors 12 and 13 are connected to flexible wires or leads 16 and 17 and which are preferably insulated with the usual rubber and cotton covered insulation.
55 These leads 16 and 17 are connected to an alarm circuit hereinafter described.

As stated above, I dispense with all bearings, shafts, bushings, and the like, in mounting the tiltable glass bulb, and I accomplish
60 this by the following means. The numeral 20 indicates as a whole my novel mounting means. The body portion 21 of the mounting 20 is formed preferably of rubber and is bulged or thickened to form a recess or internal chamber, as at 22, to receive the bulb

14 in the manner shown in Fig. 2, while the leads 16 and 17 extend upwardly from the recess and pass out from the interior of the mounting through the hollow ribs 23 and 24
70 extending from the body portion 21 to the top of the mounting 20. These ribs 23 and 24 are spaced a substantial distance apart and, as shown, are provided at the opposite edges of a relatively thin web portion 25
75 which serves to join the body member with a relatively thick and wide sealing flange 26 which is adapted to be received upon the flange 7 and clamped in fluid tight relation thereto by the clamping plate 8 and bolts 9. The body member 21 is provided with transversely extending wings 27 to be acted on by the flow through the conduit 1. It will be
80 observed that, due to the extreme flexibility of the thin web portion 25 and the small ribs 23 and 24, the body portion carrying the bulb can easily swing upwardly under the influence of fluid flow.
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Fig. 2 clearly shows how my device is mounted. The mounting 20 with the contact mechanism in place is passed through
90 the opening 5 and the sealing flange 26 seated upon the flange 7 of the neck portion 6. The clamping plate is now passed over the contacts 16 and 17 and bolted to flange 7 whereby the conduit is made fluid tight.
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At the same time the contact mechanism including the glass bulb is sealed from exposure to the contents of the pipe line 1. All of the contact mechanism is thus insulated electrically and protected mechanically, such as from debris transported by the fluid stream, from the fluid in the conduit.
100

While I contemplate molding the rubber mounting 20 around the glass bulb and its leads 16 and 17 whereby the whole forms one
105 compact unit, I preferably provide a slit 28 in the web 25 and which joins the recess 22 and the bores 29 and 30 of the hollow ribs in such a manner that the glass bulb and leads may be removably inserted in the mounting 20. Thus, the contact mechanism if it should become broken, or otherwise out of order, can easily be replaced. The effect of clamping the plate 8 is to cause the slot
110 28 to close at the top, thus effectively sealing off the contact mechanism from the atmosphere as well as from the fluid of the line 1.
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In Figs. 1 and 4 I have shown two forms of circuits in which my invention may be employed, although it will be evident to those skilled in the art that it may be used in many other kinds of circuits. As shown, the leads 16 and 17 are connected by wires 35 and 36, respectively, to a solenoid 37 and a battery
120 or other source of electrical energy 38. The solenoid 37 is provided with a plunger 39 carrying a switch 40 adapted to close the connection between the contacts 41 and 42 which are respectively connected to wires 47 and
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43 forming a part of the circuit which includes the bell 44 and battery 46.

It will be observed that in the circuit shown in Fig. 1 the switch 40 is adapted to be closed only when the plunger 39 is raised against the action of gravity by the pull of the solenoid actuated by the mercury 15 closing the connection between the electrodes 10 and 11. The mercury 15, of course, remains in the bottom of the bulb 14 until a flow occurs sufficient to tilt the mounting 20 so that the mercury can move to the end of the bulb containing the electrodes and close the circuit.

Fig. 4 shows a modified form of circuit in which the alarm is closed whenever there is no current flowing through the solenoid 37. Thus, when arranged in such a circuit my device would be adapted to be positioned in a conduit in which the flow is continuous, in which case the bulb 14 would be held in a substantially horizontal position by virtue of the impact of the fluid on the wings 27, thus keeping closed the circuit comprising electrode 10, lead 12, conductor 16, wire 35, battery 38, solenoid 37, wire 36, conductor 17, lead 13, and electrode 11, and therefore maintaining plunger 39 elevated and the switch arm 40 out of contact with the contact points 41 and 42. At any interruption of flow, however, the bulb 14 would tilt downwardly breaking the circuit at 10—11, whereupon plunger 39 would fall, closing the circuit at 41—42, which circuit is seen in Fig. 4 to comprise the contact point 42, wire 43, bell 44, wire 45, battery 46, wire 47, and contact 41, thus sounding an alarm.

The wide spacing of the conductors 16 and 17, by virtue of the spaced ribs 23 and 24 is advantageous in that these conductors, immediately after leaving the glass bulb 14, are separated thus effectually obviating any likelihood of their becoming shorted due to continued flexing.

While I have shown, as one embodiment of my invention, a construction employing a mercury switch enclosed within a glass bulb, like those in the patent referred to above for example, it is obvious that a container of hard rubber, a phenol condensation product, or of any other desirable insulating material may replace the glass bulb 14. Further, the glass bulb may be entirely dispensed with by extending the conductors 12 and 13 directly into the chamber 22 and placing in the chamber a globule of mercury, a steel ball or other gravity operated contactor, as by passing the same through an opening extending into the chamber and then sealing the latter.

It will be understood by those skilled in the art that many modifications of my invention may be constructed without a departure therefrom. For example, I have shown the wings 27 as substantially obstructing the

passage of the pipe line, but it is clear that the size and shape of the wings 27 relative to the pipe line 1 may be varied between wide limits. If arranged in a pipe line of large dimensions, such as a large storm sewer, my device might be arranged at the top so that it would be actuated when the pipe was running full and therefore at maximum capacity. Also, the mounting 20 might be weighted at the bottom so that the device would be tilted only by a flow of a given or greater velocity. The rubber mounting 20 may, itself, be given different degrees of flexibility whereby it would be responsive to different rates of flow.

I claim:

1. In combination, a conduit for fluid, said conduit having an aperture therein, a gravity operated switch mechanism, means closing said aperture and providing a depending chamber portion extending into the conduit and adapted to receive and support said switch mechanism and maintain the same out of contact with said fluid, said closure means having a flexible portion whereby the depending chamber may swing in response to fluid flow.

2. A flow responsive device comprising the combination of a conduit for fluid, means providing a gravity operated contactor, and a cooperating fixed contact, and a flexible member enclosing said contact and contactor and supporting them for swinging movement in said conduit.

3. A flow responsive device comprising the combination of a conduit having a lateral opening, a flexible hollow vane having an integral flange sealed to the edges of the opening and closing said opening, electrical contacts carried in the hollow vane, and a movable gravity operated contactor carried in said vane and cooperating with said contacts.

4. A flow responsive device comprising the combination of a conduit for fluid flow, a fitting adapted to be interposed in said conduit, a gravity operated switch mechanism, and a flexible member for enclosing and supporting said switch mechanism, said member being carried by said fitting and adapted to be swung by a flow of fluid through the conduit.

5. A flow responsive device comprising the combination of a conduit for fluid flow, a fitting adapted to be interposed in said conduit, said fitting having an opening at its upper part and a flange surrounding the opening, a gravity operated switch mechanism, a flexible member for enclosing and supporting said mechanism and having a supporting flange adapted to be sealed on the flange of the fitting, and a clamping plate secured to said fitting and adapted to clamp the flexible member in position.

6. A gravity operated switch mechanism

- comprising a sealed bulb containing a movable gravity operated contactor and a fixed contact, a pair of leads extending from said bulb, and a flexible housing adapted to enclose said bulb and leads, said housing having means whereby it may be swingingly supported in a fluid conduit. 70
7. A supporting and enclosing member for a gravity operated switch, said member having a flexible portion whereby it may be supported in a swinging position, and a chamber on the interior thereof to receive the switch. 75
8. A supporting and enclosing housing for a gravity operated switch, said housing comprising a recessed portion adapted to receive and protect the switch, a flexible portion adapted to allow swinging movement of the switch receiving portion, and a supporting portion adapted to support the housing and switch in proper position. 80
9. A supporting and enclosing housing for the gravity operated switch of a flow indicator, said housing having an interior recess to receive the switch, a flexible portion, and a transverse supporting flange whereby the housing may be supported in flow responsive position. 85
10. A supporting and enclosing housing for the gravity operated switch of a flow indicator, said housing having an interior recess to receive the switch, a flexible portion, a transverse supporting flange whereby the housing may be swingingly supported in flow responsive position, and wing portions carried by the housing. 90
11. A supporting and enclosing member for a switch mechanism adapted to be mounted in a fluid conduit and to be actuated by a change of position in said conduit, said member comprising flexible mounting means disposed partly within said conduit and sealing said switch mechanism from contact with said fluid, said switch mechanism including cooperating sealed-in fixed contacts. 95
12. A supporting and enclosing member for a switch mechanism adapted to be mounted in a fluid conduit and to be actuated by a change of position in said conduit, said member comprising flexible mounting means disposed partly within said conduit and sealing said switch mechanism from contact with said fluid in the conduit and fluid outside the conduit. 100
13. A supporting and enclosing member for a switch mechanism adapted to be mounted in a fluid conduit and including a pair of leads, said member comprising flexible mounting means swingingly supporting said switch in flow responsive position, and means sealing off said switch mechanism and the leads from contact with said fluid. 105
14. A supporting and enclosing member for a switch mechanism including a pair of fixed contacts, a gravity operated contactor, and a pair of leads, said member comprising a supporting housing of flexible material for swingingly supporting and enclosing said contacts and contactor and separately enclosing and supporting said leads. 110
15. In combination, a conduit for fluid, said conduit having an aperture therein, means closing said aperture and providing a depending chamber portion extending into the conduit and adapted to receive and support a device and maintain the same out of contact with the fluid in the conduit. 115
16. In combination, a fluid conduit having an opening, means adapted to close and seal said opening and to extend inwardly of the conduit, said means comprising a flexible member having a portion secured to the conduit and adapted to contain a device, said device being thereby supported and sealed from contact with the fluid in the conduit. 120
- In witness whereof, I hereunto subscribe my name this 19th day of August, 1929.
HARRY E. NOREN. 125
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