Sept. 30, 1947. C. N. REAVIS 2,428,096

PRESSURE OPERATED SWITCH

Filed March 8, 1945

Fig. 2.

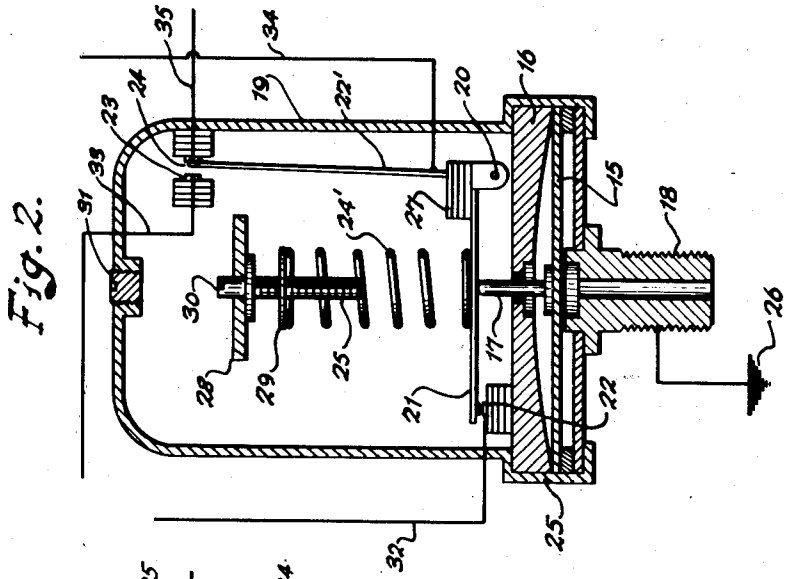
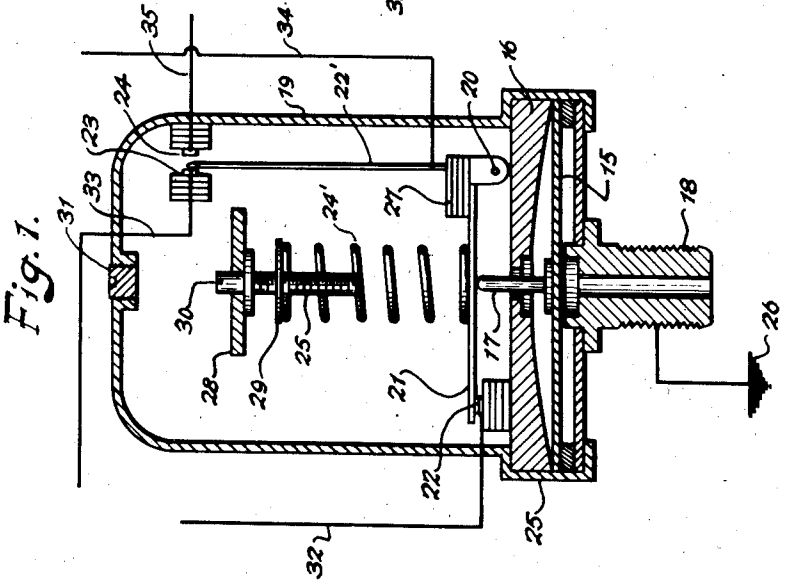


Fig. 1.



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PRESSURE OPERATED SWITCH

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4 Claims. (Cl. 200—83)

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This invention relates to pressure-operated switches, and the present application is a continuation, in part, of my copending application for U. S. Letters Patent, Serial No. 568,125, filed December 14, 1944, upon Engine protective system.

The primary object of the invention is to provide an improved pressure-operated switch particularly adapted for use in the system disclosed in my above-mentioned application, although capable of general use.

Broadly stated, the present invention contemplates the provision of a pressure-operated switch for automatically closing one circuit and opening another circuit when the pressure in a fluid pressure system lowers to a predetermined point, and for automatically opening the first-named circuit and closing the second-named circuit when the pressure in said system rises to a predetermined point.

A more specific object of the invention is to provide a switch of the above kind which is comparatively simple in construction, efficient in operation, and readily adjustable to operate satisfactorily under varying pressures.

Other objects and features of the invention will become apparent from the following description when considered in connection with the accompanying drawings, and the invention consists in the novel form, combination and arrangemet of parts hereinafter more fully described, shown in the drawings and claimed.

In the drawings, wherein like reference characters indicate corresponding parts in both of the views:

Figure 1 is a central vertical sectional view of a pressure-operated switch constructed in accordance with the present invention, the multiple contact of the switch being in the position it assumes when the pressure in the fluid pressure system lowers to a predetermined point.

Figure 2 is a view similar to Figure 1, but with the multiple contact in the position which it assumes when the pressure in the fluid pressure system rises to a predetermined point.

Referring in detail to the drawings, the present switch includes a diaphragm 15 mounted in a casing 16 and having a pin 17 that projects upwardly through the top of said casing 16. The casing 16 has an inlet nipple 18 by means of which the lower portion of casing 16 is placed in communication with the engine lubricating system or other fluid pressure system so as to subject the under side of the diaphragm 15 to the pressure within said system.

Carried by the casing 16 is a shell 19 within

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which a multiple contact of bell crank form is pivoted, as at 20. One arm 21 of the multiple contact is arranged to engage a fixed contact 22 carried by and insulated from the casing 16. The other arm 22' of the multiple contact extends between and is arranged to alternately engage spaced fixed contacts 23 and 24 mounted at opposite sides thereof. These contacts 23 and 24 are carried by the shell 19 and insulated from the latter. Movement of diaphragm 15 and the multiple contact 21, 22' is yieldingly resisted by a helical compression spring 24' whose strength may be adjusted by means of an adjusting screw 25. The spring 24' is arranged so that it acts in opposition to the pressure of the oil against the diaphragm 15, and such pressure of the oil actuates the multiple contact 21, 22' in a direction to disengage contact 21 from contact 22 and contact 22' from contact 23 and into engagement with contact 24. The arrangement is such that when the pressure in the lubricating system is below proper operating pressure, contact 21 will engage contact 22 and the contact 22' will engage the contact 23. On the other hand, when the pressure in the lubricating system is sufficiently high for proper operating conditions, diaphragm 15 will be flexed so as to disengage the contact 21 from the contact 22 and to simultaneously disengage contact 22' from contact 23 and engage said contact 22' with contact 24.

As shown, casing 16 may be composed of half-sections between which the margin of diaphragm 15 is securely clamped by spinning the bottom of shell 19 around the margins of said casing sections, as indicated at 25. The pivot 20 of contact arm 21 is in electrical connection with the shell 19 and casing 16, the latter being grounded at 26. It will be further noted that contact arm 21 is insulated from contact arm 22', as at 27.

A suitable cross piece 28 is rigidly mounted in the shell 19 and has the upper end of screw 25 journaled therein. Screw 25 is threaded through a disc-like nut member 29 secured to the upper end of spring 24'. Spring 24' may be restrained against turning by attaching it to the contact arm 21, and it will thus be seen that rotation of screw 25 will cause adjustment of nut member 29 longitudinally of screw 25 so as to vary the tension of spring 24'. In this way, the pressure necessary to overcome spring 24' and move the multiple contact from the position of Figure 1 to the position of Figure 2 may be properly regulated in accordance with requirements of the system in which the switch is employed.

To facilitate adjustment of screw 25, it prefer-

ably has a screw driver kerf 30 in its upper end, and a removable plug 31 is preferably provided in the top of the shell 9 for closing an opening of the latter through which a screw driver may be inserted for engagement with and actuation of the screw 25.

Contacts 21 and 22 control a circuit including wire 32 and ground 26. Contacts 22' and 23 control a circuit including wires 33 and 34, and contacts 22' and 24 control a circuit including a wire 35 and the wire 34.

When the pressure in the fluid pressure system lowers to a predetermined point, spring 24' actuates the multiple contact so as to engage contact arm 21 with contact 22 and contact arm 22' with contact 23. At this time, contact arm 22' is out of engagement with contact 24 so that two circuits are closed and one is open, as shown in Figure 1. On the other hand, when the pressure in the fluid pressure system rises to a predetermined point, it overcomes spring 24' and flexes diaphragm 15 upwardly so as to shift the multiple contact from the position of Figure 1 to the position of Figure 2. When this occurs, contact arm 21 is moved out of engagement with contact 22 and contact 22' is moved out of engagement with contact 23 and into engagement with contact 24. This results in opening the two first-mentioned circuits and closing the third circuit. In the use of the switch disclosed in my above-mentioned copending application, engagement of contact arm 21 with contact 22 closes the circuit of a heater forming part of a thermal device which controls the operation of a contact actuator of a time delay switch. Also, the engagement of a contact arm 22' with contact 23 closes the circuit of a generator, while the engagement of contact arm 22' with contact 24 and simultaneous disengagement of said contact arm 22' from contact 23 opens the circuit of the generator and closes a battery circuit. The purposes of such operation are explained in the copending application, but it is evident that the switch may have other uses and is therefore capable of general application. Also, it will be apparent that the switch is susceptible of modification and may be used to control less than three circuits.

From the foregoing description, it is believed that the construction, operation and advantages of the present invention will be readily understood and appreciated by those skilled in the art.

What I claim is:

1. A pressure-operated switch comprising a horizontal casing having a bottom connection for placing the same in communication with a fluid pressure system, a flexible diaphragm in the casing, a pin vertically movable by the diaphragm and projecting upwardly through the casing, a vertically swinging contact arm mounted above the casing and resting on said pin, a fixed contact mounted on the casing and engageable by the contact arm upon downward movement of the latter, and a compression spring exerting downward pressure on the contact arm so that a predetermined pressure in the system is required to flex the diaphragm and swing the contact arm upwardly out of engagement with the fixed contact, a shell mounted on the casing, a cross piece

mounted in the shell above said contact arm, an adjusting screw journaled in said cross piece, said spring being of helical form and attached to the contact arm, a nut member attached to the upper end of said spring, said adjusting screw having threaded engagement in said nut member so that rotation of the screw will adjust the nut member to regulate the compression of the spring.

2. A pressure-operated switch comprising a horizontal casing having a bottom connection for placing the same in communication with a fluid pressure system, a flexible diaphragm in the casing, a pin vertically movable by the diaphragm and projecting upwardly through the casing, a vertically swinging contact arm mounted above the casing and resting on said pin, a fixed contact mounted on the casing and engageable by the contact arm upon downward movement of the latter, and a compression spring exerting downward pressure on the contact arm so that a predetermined pressure in the system is required to flex the diaphragm and swing the contact arm upwardly out of engagement with the fixed contact, a pair of spaced fixed contacts mounted above the casing, a second contact arm rigid with and insulated from the first-named contact arm, said second-named contact arm projecting upwardly from the pivoted end of the first named contact arm to a point between the pair of fixed contacts for engagement with one of the latter when the first contact arm is lowered and for engagement with the other of the same when the first-named contact arm is raised.

3. A pressure-operated switch comprising a horizontal casing having a bottom connection for placing the same in communication with a fluid pressure system, a flexible diaphragm in the casing, a pin movable vertically by the diaphragm and projecting upwardly through the casing, a substantially horizontal arm pivoted above the casing and resting on said pin, a compression spring exerting downward pressure on said arm, a pair of spaced contacts mounted above the casing, and a second contact arm rigid with and insulated from the first-named arm and projecting upwardly from the pivoted end of said first named arm to a point between said contacts for engagement with one of the latter when the first-named arm is lowered and with the other of the same when said first-named arm is raised.

4. The construction defined in claim 1, wherein the shell has an opening in the top thereof aligned with said screw and adapted to permit the introduction of a tool for actuating the latter, and a removable plug closing said opening.

CHARLES N. REAVIS.

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