Dec. 21, 1943. J. W. HOBBS 2,337,195

PRESSURE ACTUATED SWITCH MECHANISM

Original Filed Aug. 29, 1940

Fig. 1

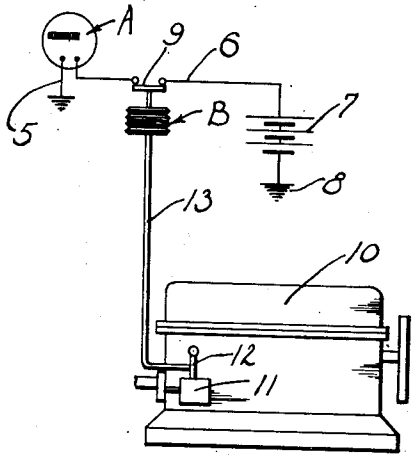


Fig. 2

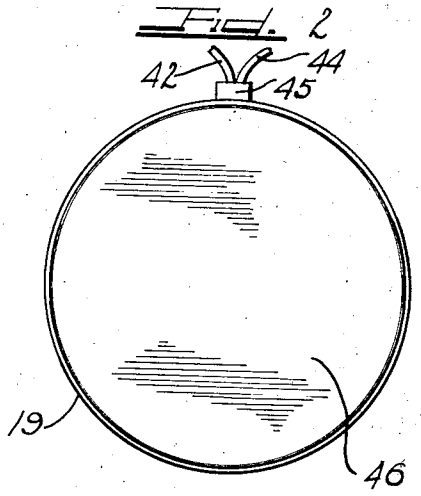
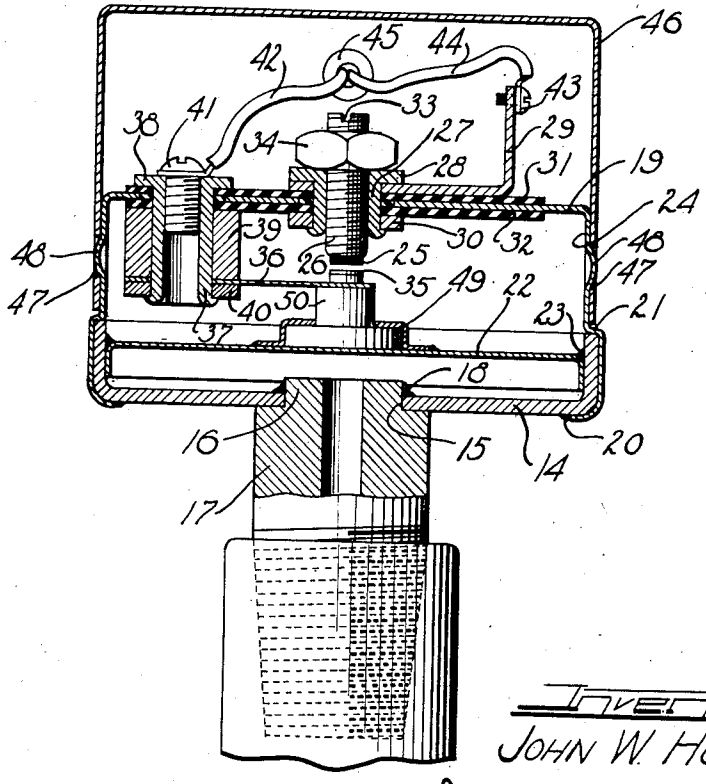


Fig. 3



Inventor

JOHN W. HOBBS

By Charles Bell Atty.

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PRESSURE ACTUATED SWITCH MECHANISM

John W. Hobbs, Springfield, Ill., assignor to John W. Hobbs Corporation, Springfield, Ill., a corporation of Delaware

Original application August 29, 1940, Serial No. 354,718. Divided and this application September 11, 1941, Serial No. 410,402

1 Claim. (Cl. 200—83)

This invention relates to improvements in pressure actuated switch mechanisms, and more particularly to a pressure switch operable by substantially any form of pressure, including all fluid pressures, such as liquid, gas, vapor, etc., although the invention may have other uses and purposes, as will be apparent to one skilled in the art.

This application is a division of a copending John W. Hobbs and John A. Miner application entitled Engine operation recorder, filed August 29, 1940, Serial No. 354,718.

In the past, many and various types of pressure actuated switch mechanisms have been developed, and while many of them would effectively close an electrical circuit in response to some form of pressure, they were not readily adaptable for various types of pressure, nor was there sufficient protection for the switch mechanism itself during operation.

With the foregoing in mind, it is an important object of the present invention to provide a pressure switch which may be utilized with many and various types of pressures, with equal facility and effectiveness, the switch being highly desirable for use in connection with substantially any form of fluid pressure, including liquid, vapor, and gas or air.

Another object of the invention resides in the provision of a pressure switch which includes a diaphragm as the movable medium for establishing electrical connection between initially separated contacts, the switch being so constructed as to prevent any permanent distortion of the diaphragm as a result of excessive pressure on the mechanism.

Another object of the invention is to provide a pressure switch in which the mechanism is fully enclosed and sealed at the manufacturing point, so as to prevent leakage or tampering with the switch during its ultimate usage.

Still another feature of this invention is the provision of a pressure switch which is highly versatile in adaptation and use, and may be readily placed for operation under numerous circumstances, conditions and variations in types of pressure. For example, if the switch is used with an internal combustion engine, the switch might effectively be connected in the lubricating line of the engine to respond to oil pressure when the engine is in operation. Likewise, the device might, without any change in internal construction, be associated with the mechanism on an aeroplane and be positioned to respond to outside air pressure during flight. Similarly, the pressure switch may be mounted in any of numerous locations and function with equal facility and efficiency.

While some of the more salient features, characteristics and advantages of the present invention have been pointed out hereinabove, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawing, in which:

Figure 1 is a schematic diagram illustrating diagrammatically a pressure switch embodying principles of the present invention installed in the oil lubricating line of an internal combustion engine;

Figure 2 is a plan view of the pressure switch itself; and

Figure 3 is an enlarged central vertical sectional view, with parts in elevation, of the pressure switch mechanism.

As shown on the drawing:

In Figure 1 of the accompanying drawing a diagrammatic showing of one use of the pressure switch of the instant invention is presented.

In this instance, an electrically actuated timing device or meter A is shown in electrical circuit arrangement with a pressure switch diagrammatically illustrated and designated by B. One side of the meter A is grounded as indicated at 5, and a conductor 6 leads from the other side to a battery or other suitable source of electrical energy 7 which is in turn grounded as indicated at 8. The conductor 6 is open and is arranged to have the circuit closed therethrough as indicated at 9 by means of the pressure switch B. In this instance, the pressure switch is actuated by pressure in the lubricating system of an internal combustion engine 10 provided with a suitable oil or lubricant pump 11 which supplies lubricating oil under pressure through a suitable outlet pipe connection as indicated at 12. A conduit 13 leading from the pressure switch B may extend to any portion of the lubricating system, and in the illustrated instance this conduit is shown connected with the outlet 12 of the pump 11. Therefore, when pressure is established in the system, the pressure switch, in a manner more particularly explained later herein, functions in response to the lubricating oil pressure to close the circuit through conductor 6 and thus energize the meter A.

It will be appreciated that other and further uses of the instant invention will be apparent to one skilled in the art, and also that it is not necessary for the pressure switch to function in re-

sponse to liquid pressure, but it may function in response to any character of fluid pressure.

The mechanism of the pressure switch is clearly illustrated in Figure 3. With reference to this figure, it will be seen that the switch construction includes a substantially cup-shaped base member 14 provided with a central aperture 15 which is communicable with a source of pressure in substantially any suitable manner. In the illustrated instance, the contracted end portion 16 of a connection nipple 17 extends through the aperture and is welded or otherwise intimately secured to the base 14, as indicated at 18.

To complete the casing for the pressure switch, there is provided a second cup-shaped member 19 which is oppositely disposed relatively to the base member 14 and has its open end margin expanded to fit over the periphery of the base member. The open end edge of the cup member 19 is then folded over the bottom of the base member and preferably secured and sealed as by welding or some other suitable fashion, as indicated at 20. In expanding the open end margin of the member 19 there is effected a peripherally extending flange portion 21 which limits the sliding movement of the open end portion of the member 19 over the sides of the base member 14 and aids in effecting a tight seal between the body members of the casing.

Thus, the members 14 and 19 cooperate to form a sealed casing except for the opening 15, and the interior of this casing is separated or divided into two compartments by means of a diaphragm 22 which is secured at its periphery to the side wall of the base member 14 in any suitable manner, but preferably as by welding or the equivalent, as indicated at 23, so as to effect a complete seal of the compartment 24 above the diaphragm.

As stated above, the lowermost compartment, below the diaphragm, is in communication with a source of pressure by virtue of the aperture 15. The switch contact mechanism is preferably housed in the sealed compartment 24 above the diaphragm.

The switch contact mechanism includes a stationary contact 25 which is carried on the inner end of a threaded screw 26 which is adjustably mounted in an internally threaded bushing 27 extending through a central opening in the bottom of the cup-shaped member 19. The outermost end of this bushing is provided with a flange 28 which is arranged to bear against one leg of an angle bracket 29 having a suitable opening to accommodate the bushing. The innermost end of the bushing is beaded over a washer 30, and suitable strips of insulating material, as indicated at 31 and 32, are interposed on opposite sides of the bottom of the cup-shaped member 19 to electrically insulate the washer 30 and the bracket 29 therefrom.

The outermost end of the screw 26 is provided with an end groove 33 which may receive a suitable tool for rotating the screw and thus adjusting the stationary contact 25 within the casing. Once the screw is properly adjusted, its position may be secured by a suitable lock nut 34.

On one side of the stationary contact 25 there is provided a supporting structure for a movable contact 35 which is disposed immediately below and opposite to the stationary contact 25. The movable contact is carried at one end of a contact spring 36 the opposite end of which is apertured to receive therethrough a bushing 37 of similar construction to the aforesaid bushing 27. This bushing 37 has at its outermost end a flange 38 which bears against the outer surface of the insulating strip 31 through which it passes. Surrounding the bushing between the spring member 36 and the outer face of insulating material 32 is a spacer block 39 through which the bushing passes. The innermost end of the bushing is beaded over against a retaining washer 40 which bears against the underside of the contact spring 36. This structure securely anchors the associated end of the contact strip, and by providing internal threads in the bushing 37 a terminal screw 41 may be provided for making an electrical connection from the movable contact, through the bushing 37 to a conductor 42, which may be electrically connected to any device under the control of the pressure switch mechanism such, for example, as the meter A of Figure 1.

The bracket 29 is in electrical connection with the stationary contact 25 and may be connected by means of a terminal screw 43 to a conductor 44 which may lead to a suitable source of electric energy. The conductors 42 and 44 may be passed through a suitable entrance grommet 45 supported in the wall of a dust cap 46 which is arranged to have its open end slide over the casing member 19 and abut the flange portion 21 thereof.

The dust cap 46 may be retained in position by any suitable means such as wall openings 47 which receive therein struck-out portions 48 of the wall of the casing member 19, and the cap 46 may be sealed in any well known manner against unauthorized opening, if so desired.

Centrally carried by the diaphragm 22 is a bracket or support 49 which carries thereon an upstanding member 50 of any suitable insulating material, preferably such as an alcoholic or phenolic condensation product, one such product being commonly known as "Bakelite." The upper end of the member 50 normally bears against the undersurface of the contact spring 36 directly below stationary contact 25.

With the arrangement described, it will be apparent that upon upward flexing of the diaphragm due to an increase in fluid pressure in the lower compartment of the casing, the movable contact 35 will be carried into engagement with the stationary contact 25 to thus close or complete a circuit through the device. The construction is of further advantage in that the stationary contact and its support form an abutment, which is rigid and unyielding and which prevents abnormal flexing of the diaphragm under excessive pressure to such an extent as to result in permanent distortion of the diaphragm or otherwise damaging the device.

From the foregoing, it will be apparent that I have provided a pressure switch mechanism which is highly efficient and positive in operation, which may be actuated by substantially any fluid, or even other pressures, disposed in substantially any location without change in the internal structure of the switch, which is self-protecting, constructed so as to prevent leakage or tampering therewith, and which may be economically manufactured and used.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon otherwise than is necessitated by the prior art.

I claim as my invention:

A fluid pressure switch including a sealed casing, a diaphragm forming a sealed partition within the casing and dividing the casing into separate compartments, a fluid pressure connection opening into one of said compartments, a terminal extending substantially centrally through the casing wall into the other compartment and carrying a contact end, an insulation element carried by said diaphragm below the contact end on said terminal, another terminal supported by said casing wall and extending farther into said other compartment than does the first terminal, a yieldable contact in the nature of a flat spring carried by the last said terminal and having its free end resting against said insulation element spaced from the contact end of the first terminal, a contact member on the free end of said yieldable contact opposite the contact end of the first terminal which contact end is sufficiently close to said contact member to act as an abutment to prevent excess distortion of said diaphragm, and insulation means so arranged as to maintain said casing out of circuit with said terminals.

JOHN W. HOBBS.