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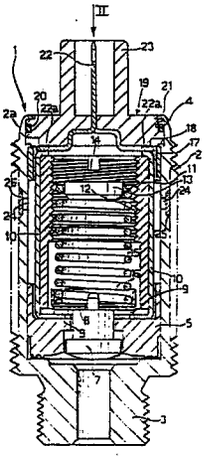
(54) Fluid-tight electrical pressure switch for hydraulic or pneumatic circuits.

(57) A fluid-tight electrical pressure switch for hydraulic or pneumatic circuits comprises a hollow body (2) having at one end a tubular connector (3) and at the other end (4) external electrical connection members (22) connected to a pair of fixed contacts (9) housed in the body and cooperating with a movable contact (8) carried by a push rod (7) slidable against the action of a biasing spring (15). The biasing spring reacts against an axially-adjustable stop (13) for calibrating the spring. The end (4) of the body opposite the tubular connector (3) is open and receives a closure stopper (19) carrying the external electrical connection members (22) and adapted to be sealed to the body (2) after the stop (13) for the biasing spring (15) has been adjusted.

FIG. 1



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Description

Fluid-tight electrical pressure switch for hydraulic or pneumatic circuits

The present invention relates in general to electrical pressure switches or pressostats for electrical or pneumatic circuits.

More particularly, the invention concerns a switch of the type including a substantially cylindrical hollow body having at one end a tubular connector for connection to a hydraulic or pneumatic circuit and carrying at its other end the external electrical connection members intended for connection to an electrical signalling circuit. The body houses a pair of fixed contacts connected to the external electrical connection members and cooperating with a movable contact carried by a slidable push rod located at the end with the tubular connector and movable axially to separate the movable contact from the fixed contacts against the action of a biasing spring which reacts against an abutment located at the end with the external electrical connection members and adjustable axially relative to the body by means of a threaded coupling for calibrating the spring.

In electrical switches of the type defined above, the body is normally closed at the end opposite the tubular connector by means of a base through which the external electrical connection members project. The adjustment of the abutment for the biasing spring to calibrate it consequently involves difficult and inconvenient operations in that it is necessary to enter the body through the openings for the passage of the external electrical connection members with a screwdriver or like tool for screwing or unscrewing the abutment for the biasing spring.

The object of the present invention is to avoid this disadvantage and to provide an electrical switch of the type defined at the beginning with a conformation such as to make the operations for adjusting the abutment for the biasing spring considerably easier and more convenient.

According to the invention, this object is achieved by virtue of the fact that the end of the body opposite the tubular connector is open and receives a closure stopper carrying the external electrical connection members and adapted to be sealed to the body after the adjustment of the abutment for the biasing spring.

By virtue of this characteristic, the calibration of the biasing spring may be carried out during assembly of the switch in an appreciably more convenient, easier and more precise manner, the abutment being reached through the open end of the body before the application of the closure stopper.

The closure stopper is conveniently fixed to the body by seaming.

To advantage, the body also has radial vent apertures opening into an annular groove in the outside of the body, within which is housed a resilient sealing ring which cooperates with the holes as a check valve.

Normally, the closure stopper is of plastics material and the external electrical connection members are integrated with the stopper by co-moulding.

Further characteristics of the invention will become apparent during the detailed description which follows, with reference to the appended drawings, provided purely by way of non-limiting example, in which:

Figure 1 is a schematic longitudinal section of an electrical pressure switch according to the invention.

Figure 2 is an elevational view taken on the arrow II of Figure 1.

Figure 3 shows a first variant of Figure 1, and

Figure 4 shows a second variant of Figure 4.

With reference initially to Figures 1 and 2, an electrical pressure switch or pressostat applicable to hydraulic or pneumatic circuits is generally indicated 1.

The switch 1 includes centrally a cylindrical hollow body 2, normally of metal, forming at one end a tubular connector 3 for connection to the hydraulic or pneumatic circuit and being open at its opposite end, indicated 4.

Within the body 2 is a tubular member 5 bearing against the base of the connector 3 with the interposition of a diaphragm 6 which sealingly isolates the cavity in the body 2 from the tubular connector 3.

A push rod 7 bearing against the diaphragm 6 is slidable axially through the member 5 and carries an annular movable contact 8.

The movable contact 8 cooperates with a pair of fixed contacts 9 carried by respective conductive bars 10 which extend axially within the cavity of the body 2.

A tubular member 11 is clamped inside the two bars 10 and has internal threading 12 into which is screwed an externally-threaded abutment 13 having a notch 14 for a screwdriver in its outer face.

A helical compression spring 15 reacts at one end against the inner face of the abutment 13, while its opposite end reacts against a plate 16 adjacent the movable contact 8. The spring 15 urges the movable contact 8 to close against the fixed contacts 9, while the axial sliding of the push rod 7 inwardly of the body 2, under the action of the pressure coming from the connector 3 in use, causes the separation of the movable contact 8 from the fixed contact 9 against the action of the spring 15.

A retaining bush, indicated 17, bears on the end of the tubular member 11 opposite the tubular connector 3 and is locked axially to the body 2, by means of internal retaining appendages 18 of the body 2, which are upset radially.

Beyond these appendages 18, the body 2 has a portion 2a which terminates in correspondence with the open end 4 and in which is engaged a closure stopper 19 of moulded plastics material. The stopper 19 has an annular sealing ring 20 in hermetic contact with the surface of the portion 2a of the body 2 and is locked thereto by seaming, by means of the folding of the end edge 21 of the portion 2a.

Two electrical connection blades 22 are co-moulded in the body 19 and extend within a tubular connection portion 23 of the stopper 19 with their inner ends, indicated 22a, kept in contact with the two conductive bars 10. The blades 22 are intended for connection to an electrical signalling or control circuit in use.

The diaphragm 6 at one end and the seal 20 at the other close the cavity of the body 2 hermetically. The body conveniently has a series of radial vent holes 24 opening into an annular external groove 25 housing a resilient ring 26 which cooperates with these holes 24 as a check valve.

The configuration of the switch 1 described above enables the spring 15 to be calibrated conveniently and easily during assembly of the switch by the screwing and unscrewing of the abutment 13 relative to the tubular element 11. In fact, the calibration may be carried out before the stopper 19 is applied, a screwdriver or like tool being introduced through the open end 4 of the body 2 and used to rotate the abutment 13. After the abutment 13 has been adjusted, the stopper 19 is applied and clamped in place by the seaming of the edge 21.

Figures 3 and 4 show two constructional variants of the switch according to the invention: these variants are generally similar to the embodiment described above and only the differences will be described in detail, the same reference numerals being used for identical or similar parts.

In both cases, the portion 2a of the body 2 has a longer axial length than that of the embodiment of Figure 1. The stopper of the version of Figure 3, indicated 19a, has a correspondingly greater axial dimension and a substantially cylindrical general configuration, and is not provided with a sealing ring 20. In this case, the vent holes 24 with the resilient sealing ring 26 may consequently be omitted.

In the case of Figure 4, the stopper, indicated 19b, also has a generally cylindrical configuration without a sealing ring, and a connection clamp 27 is the connection of respective electrical cables 28 provided at the ends with sealed connectors of conventional type, one of which is indicated 29.

Again in this case, the presence of radial vent holes 24 and the resilient sealing ring 26 may not be necessary.

Claims

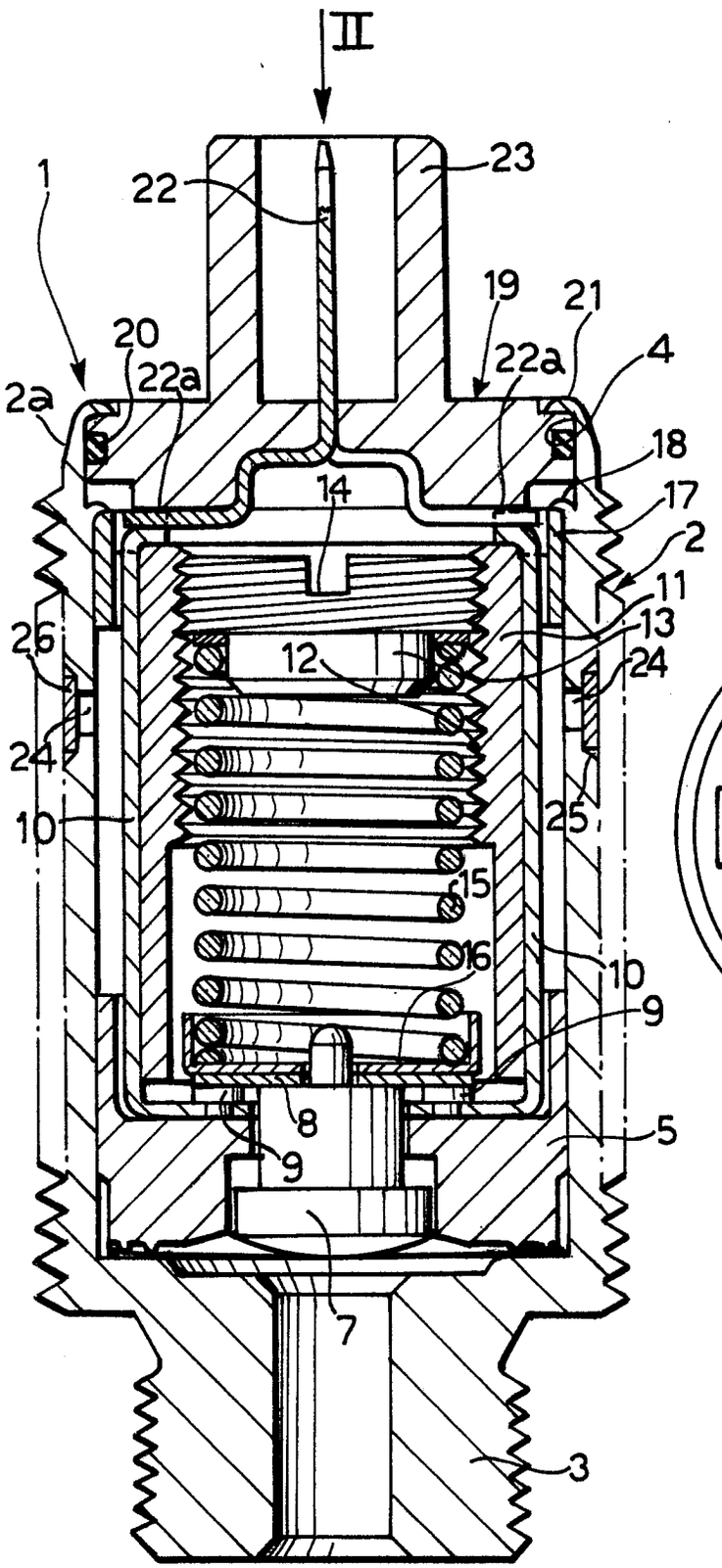
1. A fluid-tight electrical pressure switch for hydraulic or pneumatic circuits, comprising a substantially cylindrical hollow body having at one end a tubular connector for connection to the hydraulic or pneumatic circuit and carrying at its other end external electrical connection members intended to be connected to an electrical signalling circuit, the body housing a pair of fixed contacts connected to the external electrical connection members and cooperating with a movable contact carried by a slidable push rod located at the end with the tubular connector and movable axially to separate the movable contact from the fixed contacts against the action of a biasing spring which reacts against an abutment located at the end with the external electrical connection members and adjustable axially relative to the body by means of a threaded coupling for calibrating the biasing spring, characterised in that the end (4) of the body (2) opposite the tubular connector (3) is open and receives a closure stopper (19,19a,19b) carrying the external electrical connection members (22,27) and adapted to be locked to the body (2) after the adjustment of the abutment (13) for the biasing spring (15).

2. A switch according to Claim 1, characterised in that the stopper (19,19a,19b) is fixed to the body by seaming.

3. A switch according to Claim 2, characterised in that the stopper (19) has an annular seal (20) for hermetically closing the said end (4) of the body (2), and in that the body (2) has radial vent apertures (24) opening into an external annular groove (25) in the body (2), in which is housed a resilient sealing ring (26) which cooperates with the vent holes (24) as a check valve.

4. A switch according to one or more of the preceding claims, characterised in that the stopper (19,19a,19b) is of moulded plastics material and the external electrical connection members (22, 27) are integrated in the stopper (19,19a,19b) by co-moulding.

FIG. 1


II
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22a
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2a
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FIG. 2

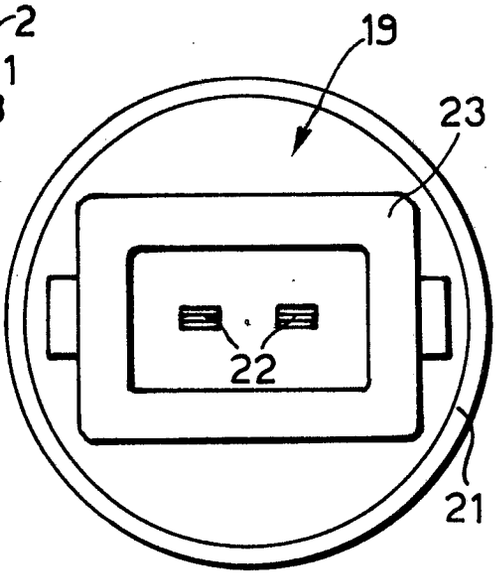
19
23
22
21

FIG. 3

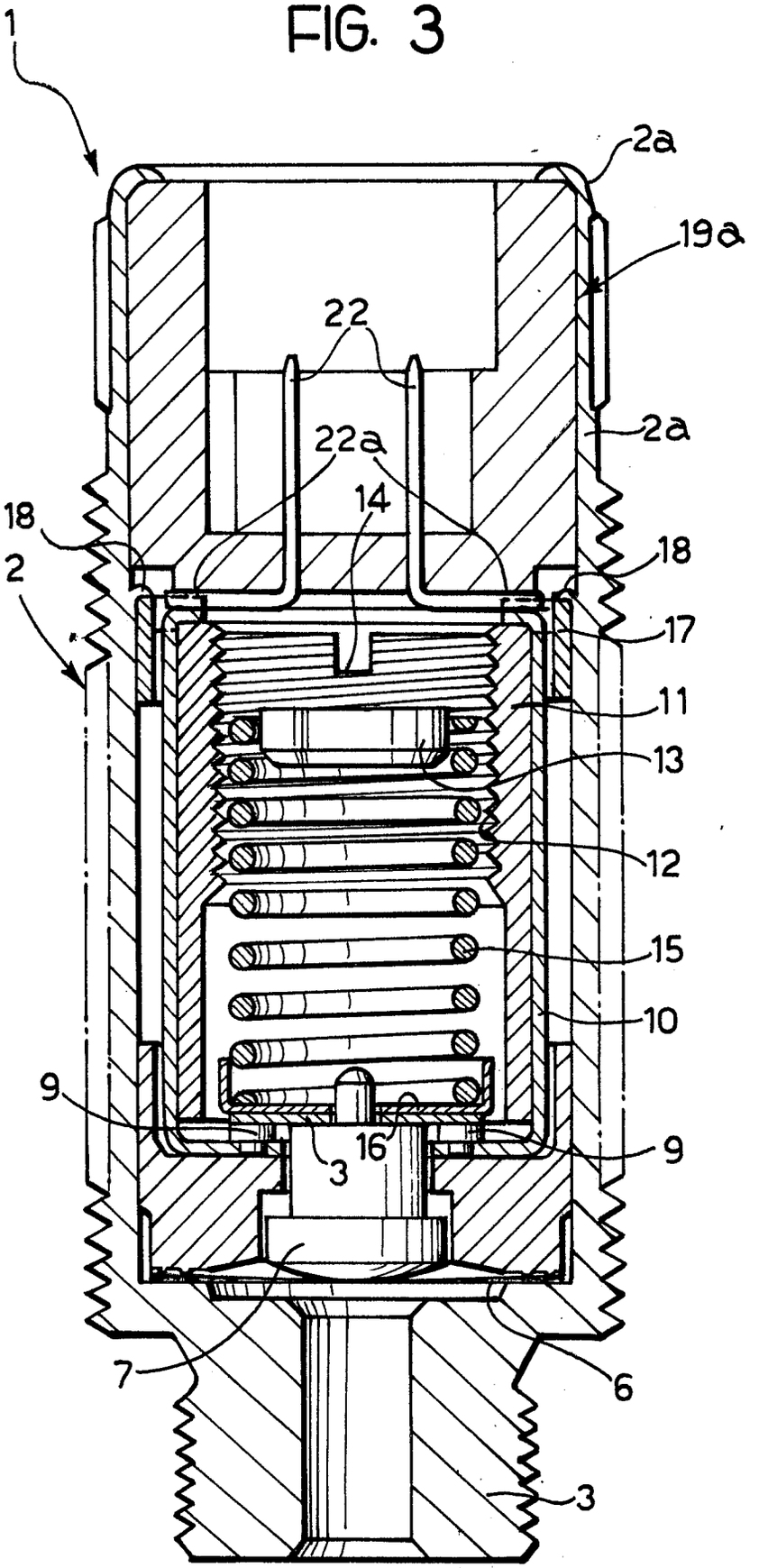

FIG. 4