



(11) Publication number : **0 542 695 A2**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number : **92830549.9**

(51) Int. Cl.⁵ : **H01H 1/00**

(22) Date of filing : **01.10.92**

(30) Priority : **15.11.91 IT MI913049**

(43) Date of publication of application :
19.05.93 Bulletin 93/20

(84) Designated Contracting States :
AT CH DE ES FR GB LI NL SE

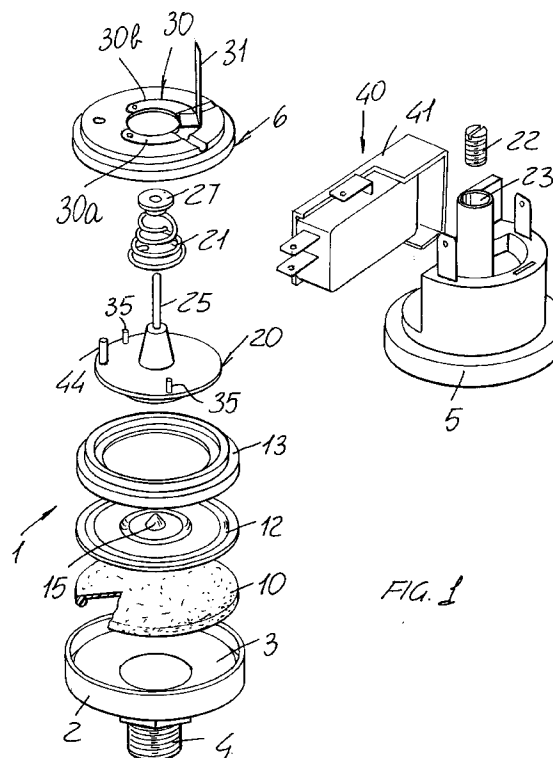
(71) Applicant : **MA-TER S.r.l.**
Via Torricelli, 14
I-20060 Pessano con Bornago, (Milano) (IT)

(72) Inventor : **Omati, Ennio, c/o MA-TER S.r.l.**
Via Torricelli, 14
I-20060 Pessano Con Bornago (Milano) (IT)
Inventor : **Omati, Marco, c/o MA-TER S.r.l.**
Via Torricelli, 14
I-20060 Pessano Con Bornago (Milano) (IT)

(74) Representative : **Cicogna, Franco**
Ufficio Internazionale Brevetti Dott.Prof.
Franco Cicogna Via Visconti di Modrone, 14/A
I-20122 Milano (IT)

(54) **Touch pressure switch including a manually operated safety microswitch.**

(57) The present invention relates to a touch pressure switch, including a manually operated safety microswitch, characterized in that it comprises a bottom body defining a chamber, in communication with a fluid to be controlled, and being associated, through a blade contact bearing ring element, with a top cap. The chamber is closed by a membrane provided with an O-ring and coupled to a steel membrane, provided with a driving tappet assembly directly formed on this membrane and operating on a washer element, which is counter-biased by a first biasing spring and being adapted to operate on at least a blade contact which is supported by the contact bearing ring element, a safety microswitch being moreover provided, which can be manually operated or rearmed, and which cooperates with a pin element extending from the washer.



BACKGROUND OF THE INVENTION

The present invention relates to a touch pressure switch including a manually operated safety switch.

As is known, in order to measure pressure variations in fluids, there are used the so-called pressure switches, which include a metal membrane which, in order to provide a proper tightness, is hot sealed, circumferentially, about the annular edge of a cap.

This hot sealing of the metal membrane causes, consequently, variations of the membrane mechanical properties, with a consequent variation of the resiliency characteristics thereof, which will cause the operating threshold of the membrane to change.

Another drawback derives from the fact that the tappet assembly provided for operating the contacts is also affixed to the membrane by heat sealing operations, which will cause a further variations of the mechanical characteristics of the assembly with a further decrease of the accuracy and responsivity speed of the pressure switch.

Yet another drawback of prior art pressure switches of the above mentioned type, is that these prior art pressure switches are not flexible in operation, that is they do not allow to quickly and easily change the operation threshold values, thereby an user must hold in inventory a great range of pressure switches.

SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to overcome the above mentioned problems, by providing a touch pressure switch, including a manually operated safety microswitch, which allows a perfect tightness of the membrane without performing any hot sealing operations, so as not to undesirably change the resilient characteristics of the membrane, while providing a very high accuracy and evenness of operation.

Within the scope of the above mentioned aim, a main object of the present invention is to provide such a touch pressure switch, in which the driving tappet assembly is directly formed on the membrane, without using additional elements susceptible to alter the membrane resiliency.

Yet another object of the present invention is to provide such a touch pressure switch the operation threshold values of which can be quickly and simply changed and which, accordingly, can be used in a very broad range of applications, while providing a very safe and reliable operation.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a touch pressure switch including a manually operated microswitch, characterized in that it comprises a bottom body defining a

chamber communicating with a fluid to be controlled, and associated, through a blade or reed contact bearing ring element, with a top cap, said chamber being closed by a membrane provided with a sealing O-ring element and connected to a steel membrane, with a driving tappet assembly directly formed on this latter membrane and operating on a washer element, counterbiased by a first counterbiasing spring and affecting at least a blade or reed-like contact, supported by said contact bearing ring element, a safety manually operated microswitch being moreover provided which cooperates with a pin element extending from said washer.

DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the present invention will become more apparent herein-after from the following detailed disclosure of a preferred, though not exclusive, embodiment thereof, which is illustrated, by way of an indicative, but not limitative example, in the figures of the accompanying drawing where:

Figure 1 is an exploded schematic perspective view illustrating the touch pressure switch, including a manually operated microswitch, according to the present invention;

Figure 2 shows the pressure switch as cross-sectioned along a vertical plane; and

Figure 3 is an elevation side view illustrating the subject pressure switch.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the number references of the figures of the accompanying drawings, the touch pressure switch, including a manually operated or re-armed microswitch, according to the present invention, which has been generally indicated at the reference number 1, comprises a bottom body 2, which, in its inside, defines a chamber 3 communicating with an inlet duct 4 in turn connected to a region therein a fluid the pressure of which is to be controlled is held.

To the bottom body 2 there is coupled a top cap 5, through the interposition of a blade or reed contact bearing ring element 6, said cap being restrained, with respect to said bottom body 2, by means of an outer metal edged portion 7.

More specifically, the chamber 3 is closed by a rubber membrane 10 which is provided, on its periphery, with an O-ring element 11 providing fluid tightness. The rubber or silicone rubber membrane 10, is coupled to a metal membrane 12, in particular a stainless steel membrane, which is held in its set position by means of a safe ring element 13, arranged between the reed contact bearing ring element 6 and said membrane, so as to provide a perimetrical clamp-

ing force.

That same safety ring element 13, moreover, will prevent the membrane 12 from being deformed or broken, as the pressure switch must be adjusted by operating the dowel element 32.

As shown, the metal membrane 12 is provided, at a central portion thereof, with a driving tappet assembly 15, which is directly provided as a single piece with said membrane 12, for example by means of mechanical pressing operations, and axially operates on or affects a washer element 20 which is slidably guided inside the cap 5.

As further shown, the washer element 20 is pushed or counterbiased by a first counterbiasing spring 21, operating between said washer element and an adjusting screw 22, which latter rotatably engages in a threaded hole 23 formed in the cap.

Moreover, a stem element 25 is provided, extending from the washer element and engaging in a guide hole 26, axially formed through said adjusting screw 22, and between this adjusting screw and the spring 21 a sliding element 27 is interposed.

The washer element 20 operates on the reed contacts 30 provided on the contact bearing discs 6 (see figures 1 and 2) and which has a C-shape configuration, therefrom a fixed contact 31 projects, which projects outwardly from the cap, whereas on the two resiliently movable arms 30a and 30b operate pin elements 35 provided on the washer 20 and engaging with said contacts.

In this connection it should be apparent that by changing the operation point of the pin elements 35 on the contacts 30a and 30b, it will be possible to obtain a different displacement degree of the reed contacts, with a consequent possibility of reversing these contacts.

More specifically, the reed contacts are cut to a desired shape about a contact pad, so as to provide the reed element with a desired flexibility property, at the push point, and, moreover, they can be moved towards one another by means of screws.

As shown, the reed contacts 30a and 30b cooperate with respective fixed contacts, indicated at the reference number 36, which connect with outer fixed contacts 37 projecting from the cap.

A safety microswitch, indicated at 40, is moreover provided, preferably of the manually operated or re-armed type, which is coupled to the cap by means of a supporting plate 41 made for example of ryton, and being provided with a small lever 42 operating on the push-button 43 of the microswitch, and with which a pin element 44 engages which is connected to the washer.

Also in this case, it is possible to obtain a broad adjusting range, that is a broad operation threshold range, for the safety microswitch, which can be obtained by providing a slot through the small plate allowing a clockwise displacement or, if desired, this

can be obtained by changing the operating position by means of a screw provided with a related counter-biasing spring.

It should moreover be pointed out that it is also possible to provide, on the manually operated or re-armed element, resilient counterbiasing springs, allowing to easily and quickly change the operating force exerted on the manually operated lever, as well as on the driving lever 42.

The above disclosed arrangement allows to adjust at will, within very broad ranges, all of the pressure switch operating threshold values, by operating the adjusting screws 22 affecting the position of the reed contacts and that of the driving pin elements.

Moreover it is further possible to provide a second counterbiasing spring, directly operating on the rubber membrane which can be arranged at the point indicated at 3.

From the above disclosure it should be apparent that the invention fully achieves the intended aim and objects.

In particular the fact is to be pointed out that a touch pressure switch construction has been provided, including a safety microswitch, which allows a perfect tightness to the fluid to be controlled, without using heat sealing operations and which, moreover, allows to change within very broad ranges, all of the calibrating values.

Obviously, the subject pressure switch can be also provided with a working or operating micro-switch.

In practicing the invention, the used materials, provided that they are compatible to the intended use, as well as the contingent size and shapes can be any according to requirements.

Claims

1. A touch pressure switch including a manually operated microswitch, characterized in that it comprises a bottom body defining a chamber communicating with a fluid to be controlled, and associated, through a blade or reed contact bearing ring element, with a top cap, said chamber being closed by a membrane provided with a sealing O-ring element and connected to a steel membrane, with a driving tappet assembly directly formed on this latter membrane and operating on a washer element, counterbiased by a first counterbiasing spring and affecting at least a blade or reed-like contact, supported by said contact bearing ring element, a safety manually operated microswitch being moreover provided which cooperates with a pin element extending from said washer.

2. A pressure switch, according to Claim 1, charac-

terized in that said switch comprises a safety ring element arranged between said blade or reed contact bearing ring element and the periphery of said steel membrane, in order to peripherally restrain said steel membrane.

3. A pressure switch, according to Claims 1 and 2, characterized in that said O-ring sealing element is formed as a single piece with said membrane. 5
4. A pressure switch, according to one or more of the preceding claims, characterized in that said contact bearing ring element supports a reed contact having a substantially C-shape, and provided with a fixed contact which projects outwardly and is connected to an intermediate portion of said reed contact elements. 10
5. A pressure switch, according to one or more of the preceding claims, characterized in that it further comprises pin elements projecting from said washers and adapted to operate with a preset portion of the resiliently movable arms of said reed contact elements. 15
6. A pressure switch, according to one or more of the preceding claims, characterized in that the contact point of a said pin element on said reed contact elements can be changed in order to change the displacement of the reed contact elements. 20
7. A pressure switch, according to one or more of the preceding claims, characterized in that said reed contact element is cut to a set shape about a contact pad, in order to provide the reed with a set flexibility at its pushing point. 25
8. A pressure switch, according to one or more of the preceding claims, characterized in that it further comprises, at said reed contact elements, fixed contact elements connected to further contacts projecting from said cap. 30
9. A pressure switch, according to one or more of the preceding claims, characterized in that said safety microswitch of the manually operated or re-armed type is a working type of microswitch. 35
10. A pressure switch, according to one or more of the preceding claims, characterized in that said safety microswitch is supported by a ryton plate connected by means of screws to said cap. 40
11. A pressure switch, according to one or more of the preceding claims, characterized in that said microswitch can be adjusted, by adjusting said plate through an angular displacement, which 45

can be obtained by providing a slot through said plate, for a clockwise displacement, or by means of a screw, provided with a counterbiasing spring or other equivalent element.

12. A pressure switch, according to one or more of the preceding claims, characterized in that the first counterbiasing or reaction spring operates on an adjusting screw, engaging in a threaded hole formed in said cap. 50
13. A pressure switch, according to one or more of the preceding claims, characterized in that it comprises a sliding element arranged between the first reaction or counterbiasing spring and the end of the adjusting screw. 55
14. A pressure switch, according to one or more of the preceding claims, characterized in that it further comprises a second reaction or counterbiasing spring, operating on the O-ring element membrane.
15. A pressure switch, according to one or more of the preceding claims, characterized in that said safety microswitch, of the manually re-armed or operated type, is provided with resilient means for adjusting the trip arm of said safety microswitch.

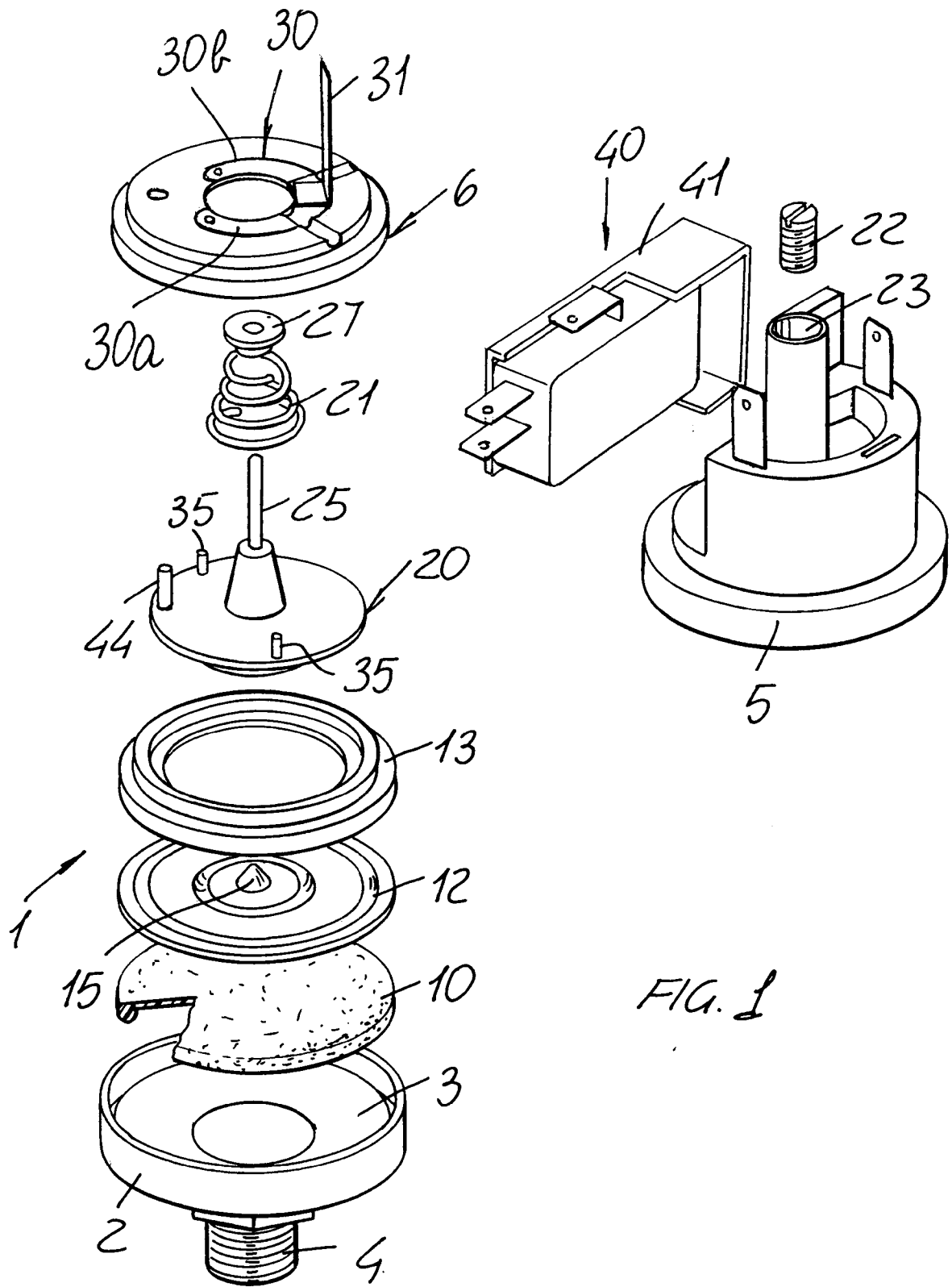
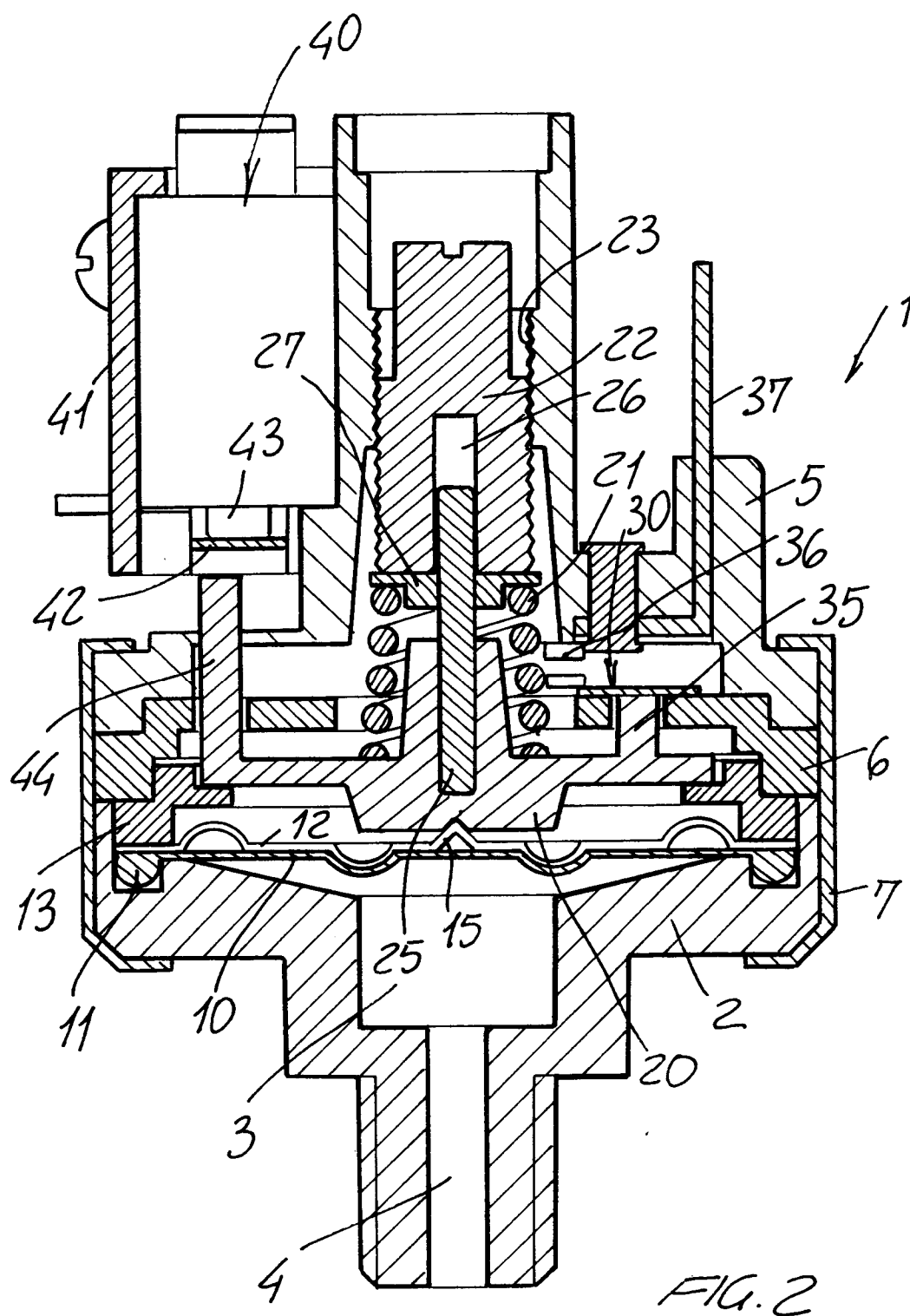


FIG. 1



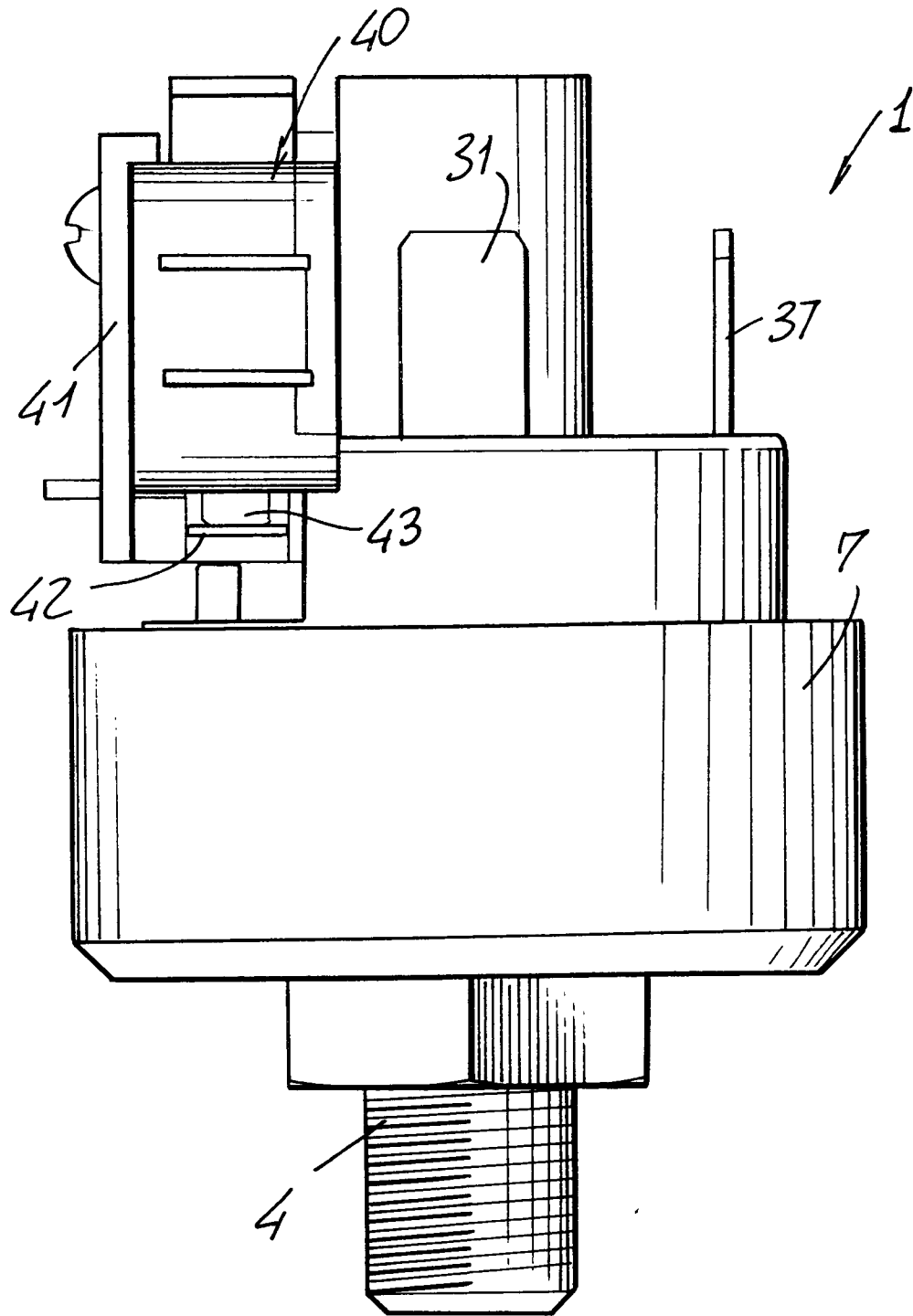


FIG. 3