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(54) **SWITCH**

SCHALTER

INTERRUPTEUR

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Description

[0001] The present invention relates to an electro-mechanical switch.

[0002] One type of electro-mechanical switch as defined in the preamble of claim 1, typically used in industrial manufacturing machinery, has two states, one in which it forms an open circuit and the other in which it forms a closed circuit; the switch can have either state as its initial mode, the other state being its mode once actuated by a mechanical force.

[0003] The switch has two light-emitting diodes, namely a green LED which is illuminated when the switch is connected to a power supply, and a yellow LED which is illuminated only while a switching operation is occurring. When installing such a switch, wire connections are made between the LED terminals and the switch terminals for powering of the LEDs. If the initial mode of the switch is to be changed, then the wire connections have to be rearranged, this being fiddly work and causing disruption to the other terminal connections.

[0004] DE-U-8602553.8 describes a cylindrical proximity switch having one or more LEDs and a rotary switch, actuable by a setscrew or a screw-driver, and connected to a flexible printed circuit board.

[0005] The present invention provides an electro-mechanical switch as defined in Claim 1 hereinafter.

[0006] In this way, the switch incorporates set means being a mode selector so that the switch can be installed in the appropriate mode (or its mode can be changed after installation) quickly and easily compared to the prior art, and without disruption to the other terminal connections.

[0007] The switch may comprise any one or more of the features as set out in dependent Claims 2 to 5 hereinafter

[0008] In order that the invention may be more readily understood, a description is now given, by way of example, reference being made to the accompanying drawings in which:

Figure 1 is a perspective view of a limit switch embodying the present invention;

Figure 2 is a plan view, partly sectioned, of the switch of Figure 1;

Figure 3 is a circuit diagram of part of the limit switch of Figure 1;

Figure 4 is a view of the terminal of the limit switch of Figure 1.

[0009] Figures 1 and 2 shows a limit switch 1 of the type having a green LED 2 to indicate when the switch is powered and a yellow LED 3 to indicate whenever the switch is actuated (the LED's not being visible in Figures 1 or 2). Switch 1 has a mode selector 4 with two electro-mechanical microswitches 5 and 6 and a slider 7 with cam surfaces 8 and 9 engageable against the levers 10

and 11 of microswitches 5 and 6.

[0010] LEDs 2, 3 and microswitches 5 and 6 are connected to a pcb circuit as shown in Figure 3, the circuit including protection diodes 12 and 13 to prevent the LEDs being damaged if the limit switch is wired up incorrectly, circuit terminals CT₁, CT₂, CT₃, CT₄ and CT_A being linked in use to switch terminals ST₁, ST₂, ST₃, ST₄ and ST_A in a manner to be described later, with Figure 4 showing how switch terminals ST₁, ST₂, ST₃, ST₄, and ST_A of limit switch 1 are wired up to the external circuit in which switch 1 operates.

[0011] The limit switch 1 must be connected so that terminals ST₁ and ST₃ are the live side of the switch (i.e. input) and terminals ST₂ and ST₄ are the isolated side (i.e. output).

[0012] The switch terminals are hard wired to the two microswitches 5 and 6, one microswitch for the input terminals ST₁ and ST₃ and the second for the output terminals ST₂ and ST₄. These microswitches are operated by bias cams 8 and 10, to allow their outputs to be connected to either the "normally open" terminals ST₁, ST₂ or "normally closed" terminals ST₃, ST₄ of the limit switch 1.

[0013] Microswitches 5 and 6 connect the LED's diagonally across the limit switch 1 with the green LED 2 always being connected to the input side, and the yellow LED 3 always to the output. When the mode selector 4 is such that the switch in the initial position is "normally open" i.e. microswitches 5, 6 are set up as shown in Figure 3, the green LED 2 is connected via CT₁ to terminal ST₁ and is hence live with green LED 2 illuminated, while the yellow LED 3 is connected via CT₄ to terminal ST₄ and hence the yellow LED 3 is not illuminated.

[0014] As long as power is connected, then the green LED 2 is lit. The "normally closed" circuit should be used for a signal supply. Only when the switch has been activated or switched will terminal CT₄ (and hence the yellow LED 3) be connected to the signal supply and therefore yellow LED 3 be lit. Thus the green LED 2 is lit permanently and the yellow LED 3 goes on and off as the switch is operated and then returned to the initial position.

[0015] If the mode selector 4 is altered so that the initial position of the switch is a "normally closed" situation, then the microswitches are set up in the opposite way from that shown by in Figure 3, green LED 2 is connected via CT₃ to ST₃ which is live so that green LED 2 is illuminated, while yellow LED is connected, via CT₂, to ST₂ which is isolated so that yellow LED 3 is not illuminated. Only when the switch has been activated or switched will terminal CT₂ (and hence the yellow LED 3) be connected to the signal supply and therefore yellow LED 3 be lit.

[0016] By connecting the outputs of the two LED's to a fifth terminal CTA which acts as a return or ground, then the LED's still operate even if somewhere downstream of the limit switch there is a break in the circuit. This prevents users assuming the supply to the limit

switch 1 is off and being electrocuted.

Claims

1. An electro-mechanical switch (1) having two stable positions, one of which is the initial position of the switch and the other is the position of the switch when actuated, the switch having LED means (2) to indicate that there is a connection to a power supply and LED means (3) to indicate when the switch (1) is being actuated, the switch characterised by:

means (4-9) to set, by a single manual operation, a pair of electro-mechanical microswitches (5, 6) whereby the switch (1) is in either of the stable positions as the initial position of the switch (1).

2. A switch according to Claim 1, characterised in that the set means (4-9), in operation, effects a change of the electrical connection(s) of the supply-indicator means (2) and/or the actuation-indicator means (3) within the switch (1).

3. A switch according to Claim 1 or 2, characterised in that the set means (4-9) comprises cam means (8, 9) movable between one location, in which one of the stable positions constitutes the initial position of the switch, and another location, in which the other of the stable positions constitutes the initial position of the switch (1).

4. A switch according to any preceding Claim, characterised in that the set means (4-9) operates the pair of electro-mechanical microswitches (5,6) located between the terminals of the electro-mechanical switch (1) and the indicator means (2, 3).

5. A switch according to any preceding Claim, characterised in that an output of at least one of the indicator means (2, 3) is connected to a return or a ground terminal (CT_A).

6. A switch according to any preceding Claim, characterised in that the set means (4-9) comprises a slider (7) operable adjacent and in a direction parallel, to one exterior side of the switch (1).

Patentansprüche

1. Elektromechanischer Schalter (1) mit zwei stabilen Positionen, von denen eine die Ausgangsposition des Schalters ist und die andere die Position des Schalters im betätigten Zustand ist, wobei der Schalter eine LED-Einrichtung (2) besitzt zur Anzeige, daß eine Verbindung zu einer Spannungsver-

sorgung besteht, und eine LED-Einrichtung (3) besitzt zur Anzeige, daß der Schalter betätigt ist, wobei der Schalter **gekennzeichnet ist durch**

eine Einrichtung (4-9) zur Einstellung durch eine einzige Handbetätigung eines Paares von elektromechanischen Mikroschaltern (5,6), wobei der Schalter (1) sich in irgendeiner der stabilen Positionen als der Ausgangsposition des Schalters (1) befindet.

2. Schalter nach Anspruch 1, **dadurch gekennzeichnet**, daß die Einstelleinrichtung (4-9) im Betrieb eine Änderung der elektrischen Verbindung(en) der Spannungsversorgungs-Anzeigeeinrichtung (2) und/oder der Betätigungs-Anzeigeeinrichtung (3) innerhalb des Schalters (1) bewirkt.

3. Schalter nach Anspruch 1 oder 2, **dadurch gekennzeichnet**, daß die Einstelleinrichtung (4-9) eine Nockeneinrichtung (8,9) umfaßt, die zwischen einem Ort, an welchem eine der stabilen Positionen die Ausgangsposition des Schalters bildet und einem anderen Ort, an welchem der andere der stabilen Positionen die Ausgangsposition des Schalters (1) bildet, beweglich ist.

4. Schalter nach irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet**, daß die Einstelleinrichtung (4-9) das Paar von elektromechanischen Mikroschaltern (5,6) betätigt, die zwischen den Anschlüssen des elektromagnetischen Schalters (1) und den Anzeigeeinrichtungen (2,3) angeordnet sind.

5. Schalter nach irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet**, daß ein Ausgang von wenigstens einer der Anzeigeeinrichtungen (2,3) mit einem Rückführungs- oder Masseanschluß (CT_A) verbunden ist.

6. Schalter nach irgendeinem vorhergehenden Anspruch, **dadurch gekennzeichnet**, daß die Einstelleinrichtung (4-9) einen Schieber (7) umfaßt, der in Nachbarschaft und in einer Richtung parallel zu einer Außenseite des Schalters (1) betätigbar ist.

Revendications

1. Interrupteur électromécanique (1) présentant deux positions stables, dont une première est la position initiale de l'interrupteur et l'autre est la position de l'interrupteur lorsqu'il est actionné, l'interrupteur comportant un moyen de diode LED (2) destiné à indiquer qu'il existe une connexion avec une alimentation et un moyen de diode LED (3) destiné à indiquer lorsque l'interrupteur (1) est actionné, l'in-

interrupteur étant caractérisé par:

un moyen (4 à 9) destiné à régler, par une seule opération manuelle, une paire de micro-interrupteurs électromécaniques (5, 6), d'où il résulte que l'interrupteur (1) est dans l'une ou l'autre des positions stables, en tant que position initiale de l'interrupteur (1). 5

2. Interrupteur selon la revendication 1, caractérisé en ce que le moyen de réglage (4 à 9), en fonctionnement, réalise un changement de la ou des connexions électriques du moyen d'indicateur d'alimentation (2) et/ou du moyen d'indicateur d'actionnement (3) à l'intérieur de l'interrupteur (1). 10 15

3. Interrupteur selon la revendication 1 ou 2, caractérisé en ce que le moyen de réglage (4 à 9) comprend des moyens de cames (8, 9) mobiles entre un premier emplacement, dans lequel l'une des positions stables constitue la position initiale de l'interrupteur, et un autre emplacement, dans lequel l'autre des positions stables constitue la position initiale de l'interrupteur (1). 20 25

4. Interrupteur selon l'une quelconque des revendications précédentes, caractérisé en ce que le moyen de réglage (4 à 9) actionne la paire de micro-interrupteurs électromécaniques (5, 6) située entre les bornes de l'interrupteur électromécanique (1) et les moyens d'indicateur (2, 3). 30

5. Interrupteur selon l'une quelconque des revendications précédentes, caractérisé en ce qu'une sortie d'au moins l'un des moyens d'indicateur (2, 3) est reliée à une borne de retour ou de masse (CT_A). 35

6. Interrupteur selon l'une quelconque des revendications précédentes, caractérisé en ce que le moyen de réglage (4 à 9) comprend un curseur (7) qui peut être actionné à proximité d'une face extérieure de l'interrupteur (1) et suivant une direction parallèle à celle-ci. 40 45

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Fig.1.

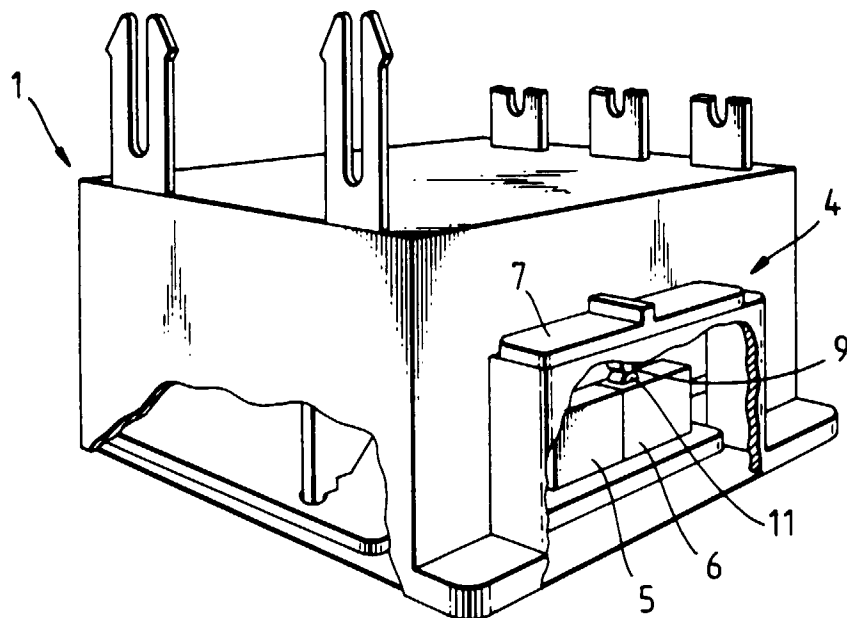


Fig.2.

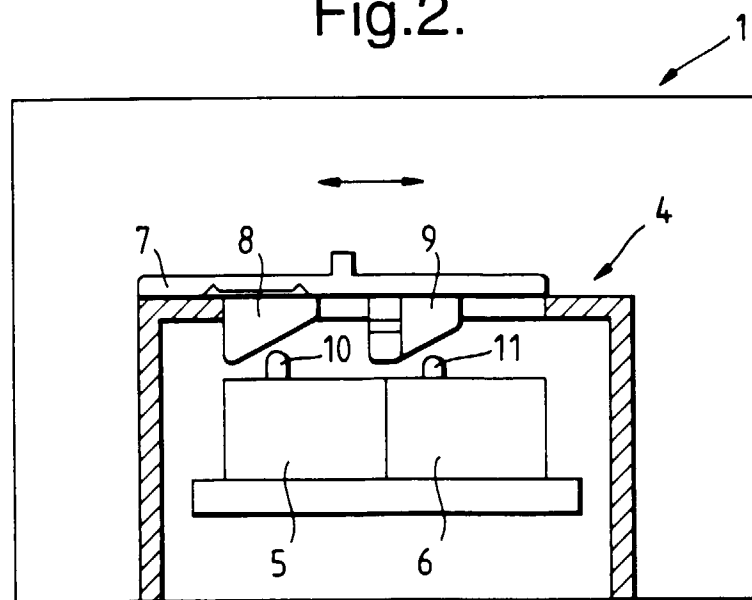


Fig.3.

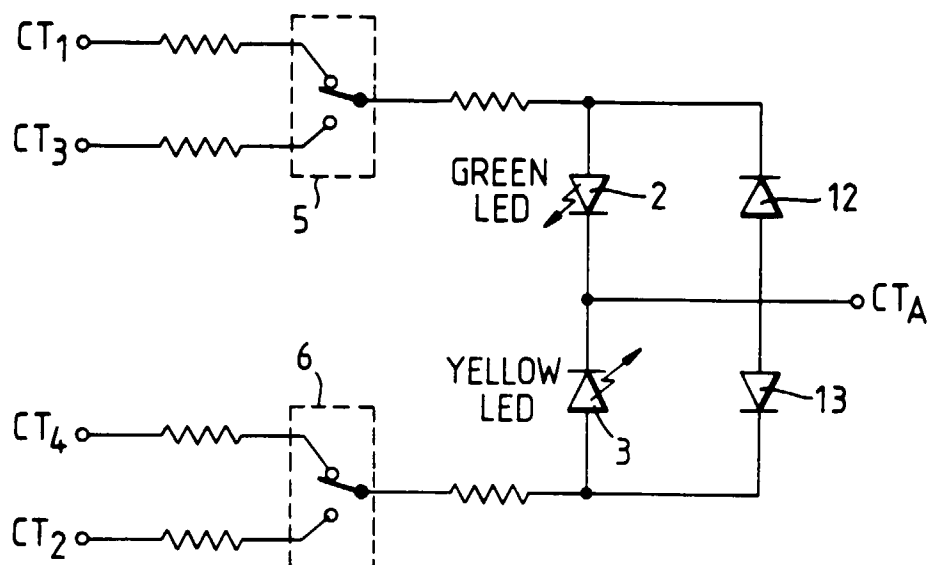


Fig.4.

