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## (54) Switch mechanism.

(57) A switch mechanism is described in which a first contact carrier (12) having a first contact member (15), is movable between an inoperative position (Figure 1) and an operative position (Figure 3). A latch mechanism (16, 25) retains the first contact carrier (12) in the operative position (Figure 3) when moved thereto but a spring (14) urges the first contact carrier (12) towards the inoperative position. A second contact carrier (17) having a second contact member (23) and movable between first and second positions is biased by a spring (18) towards the first position (Figure 1) where the first contact carrier (12) engages an abutment (21) on the second carrier (17). Movement of the second carrier (17) towards the second (lower) position causes the first carrier (12) to be moved into its operative position and the subsequent return of the second carrier (17) towards the first position is accompanied by the engagement of the first and second contact members (15, 23).

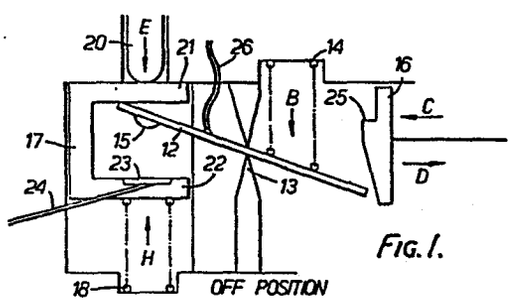


FIG. 1.

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# SWITCH MECHANISM

This invention relates to switch mechanisms and particularly, but not exclusively, to a so-called trip-free switch mechanism, i.e. a switch mechanism, which cannot be permanently closed or reclosed while a fault exists.

A first aspect of the invention resides in a switch mechanism having a contact carrier movable between an inoperative position (Figure 1) and a latched operative position (Figure 3) and an actuator for moving the carrier to the operative position where a circuit to contact on the carrier is completed, characterised in that the actuator, when actuated with the contact carrier in the inoperative position, first moves the contact carrier into the operative position (Figure 3) and then completes a circuit to a contact on the contact carrier.

A switch mechanism, according to a second aspect of the invention, comprises a first contact carrier having a first contact member and movable between an inoperative position and an operative position; a latch mechanism for retaining the first contact carrier in the operative position when moved thereto; first bias means urging the first contact carrier towards the inoperative position; a second contact carrier having a second contact member and movable between first and second positions; second bias means urging the second carrier towards the first position; and an abutment on the second carrier engaged by the first carrier when in its inoperative position; the arrangement being such that movement of the second carrier towards the second position causes the first carrier to be moved into its

operative position and the subsequent return of the second carrier towards its first position is accompanied by the engagement of the first and second contact members.

Preferably, the first carrier is a pivoted lever one end of which is located between the abutment and the second contact member and is urged against the abutment by the first bias means.

The latch mechanism may be moved, as by a solenoid, between a latching location and a free location. When the latch mechanism is moved into the free position, resulting for example from the occurence of a fault, the first carrier is released and is moved into its inoperative position under the action of its bias means. The engagement of the contact members is broken and the second contact member returns to its first position.

The latch mechanism may for example be spring biased into the latching position and be moved into the free position by a solenoid which is energised when a fault occurs in the circuit. After release of the first carrier and opening of the switch, reactivation of the second carrier while the fault persists causes momentary re-engagement of the contact members and consequential operation of the solenoid to open the switch immediately.

The invention will be more readily understood by way of example from the following description of a trip-free switch mechanism in accordance therewith, reference being made to the accompanying drawings in which

Figures 1, 2 and 3 show the mechansim in the OFF, INTERMEDIATE and ON position respectively.

As shown in the drawings, the switch mechanism has a first contact carrier in the form of a lever 12, which is pivoted centrally about knife edge 13. Carrier

12 is biased clockwise by a compression spring 14 and carries at one end a contact member 15. A latch mechanism 16 is located adjacent the other end of carrier 12 and is spring biased to the latched position shown in the drawing. Latch mechanism 16 is coupled to a solenoid (not shown), which when energised moves the latch mechanism in the direction D to a free position in which the carrier is released. The solenoid is so connected that it is energised when a fault condition occurs in the circuit.

A second contact carrier 17 is movable against the bias provided by a second compression spring 18 between a first position, shown in Figure 1, and a second position, which is lower than that shown in Figure 2; movement of the second carrier 17 downwardly towards the second position is effected by a push-button 20 and the return of the second carrier, on release of the push-button 20, is performed by spring 18. The second carrier is as shown of C-form with two spaced abutment-forming members 21, 22 between which is located the end of carrier 12 having the contact member 15. Second carrier 17 carries a second contact member 23 which can be connected to the circuit through a flexible connection 24.

Assuming that the switch mechanism is open, as shown in Figure 1, and there is no fault condition so that the latch mechanism 16 is in the latching position, operation of push-button 20 forces carrier 17 downwardly and thereby causes movement of the carrier 12 towards its operative position (Figure 2). In doing so, the right hand end of carrier 12 moves over latch mechanism 5 and is retained in the operative position by shoulder 25; during the downward movement of carrier 17, spring 14 at all times retains the left-hand end of carrier 12 in contact with member 21 and there is no engagement between

contact members 15 and 23. On release of push-button 20, carrier 17 is returned upwardly by spring 18 and is brought to rest by the engagement of member 22 with the carrier 12, and with the contact members in engagement. The circuit from connection 24, contacts 23 and 15 and flexible connection 26 is thus made (Figure 3).

If a fault condition should arise in the circuit including the contacts 15 and 23, the solenoid is energised and causes the latch mechanism 16 to move in direction D to the free position. Carrier 12 is then released and moves clockwise to the inoperative position under the action of spring 14, thereby allowing carrier 17 to return to its first position so that the mechanism reverts to the open position shown in Figure 1.

On opening of the contacts 15 and 23, the solenoid is de-energised and the latch mechanism 16 reverts to the latching position shown in Figure 1. If the push-button 20 is operated while the fault persists, the first carrier 12 is again latched and the contacts momentarily closed to cause the solenoid to be re-energised and the switch to be re-opened.

In an alternative arrangement, the solenoid may be normally energised to retain the latch mechanism 16 in the latching position. On a fault being detected, the solenoid is de-energised and causes the latch mechanism to move into the free position with the result that the switch is opened as before.

CLAIMS:

1. A switch mechanism having a contact carrier (12) movable between an inoperative position (Figure 1) and a latched operative position (Figure 3) and an actuator (17, 20) for moving the carrier to the operative position where a circuit to contact (15) on the carrier is completed, characterised in that the actuator, when actuated with the contact carrier (12) in the inoperative position, first moves the contact carrier into the operative position (Figure 3) and then completes a circuit to a contact (15) on the contact carrier (12).

2. A switch mechanism comprising: a first contact carrier (12) having a first contact member (15) and movable between an inoperative position (Figure 1) and an operative position (Figure 2); a latch mechanism (16, 25) for retaining the first contact carrier (12) in the operative position (Figure 3) when moved thereto; first bias means (14) urging the first contact carrier (12) towards the inoperative position; a second contact carrier (17) having a second contact member (23) and movable between first and second positions; second bias means (18) and urging the second carrier (17) towards the first position; and an abutment (21) on the second carrier (17) engaged by the first carrier (12) when in the inoperative position; the arrangement being such that movement of the second carrier (17) towards the second position causes the first carrier (12) to be moved into its operative position and the subsequent return of the second carrier (17) towards the first position is accompanied by the engagement of the first and second contact members (15, 23).

3. A switch mechanism as claimed in claim 2,

wherein the first carrier (12) is a pivoted lever one end of which is located between the abutment (21) and the second contact member (23) and is urged against the abutment (21) by the first bias means (14).

4. A switch mechanism as claimed in claim 2 or 3, wherein there is means for moving the latch mechanism (16) between a latching location and a free location where the first carrier (12) is released from the operative position and is moved into the inoperative position under the action of the first bias means (14), whereby engagement of the contact members (15, 23) is broken.

5. A switch mechanism as claimed in claim 4, wherein the means for moving the latch mechanism to the free location is a solenoid which is energised by a fault occuring in the circuit of the switch.

6. A switch mechanism as claimed in one of claims 2 to 5, wherein the latch mechanism is spring biased into the latching position.

7. A switch mechanism as claimed in any one of claims 2 to 6, wherein the first biasing means (14) biases the first contact carrier (12) into engagement with an abutment (25) of the latch mechanism (16) when the first contact carrier (12) is in the operative position.

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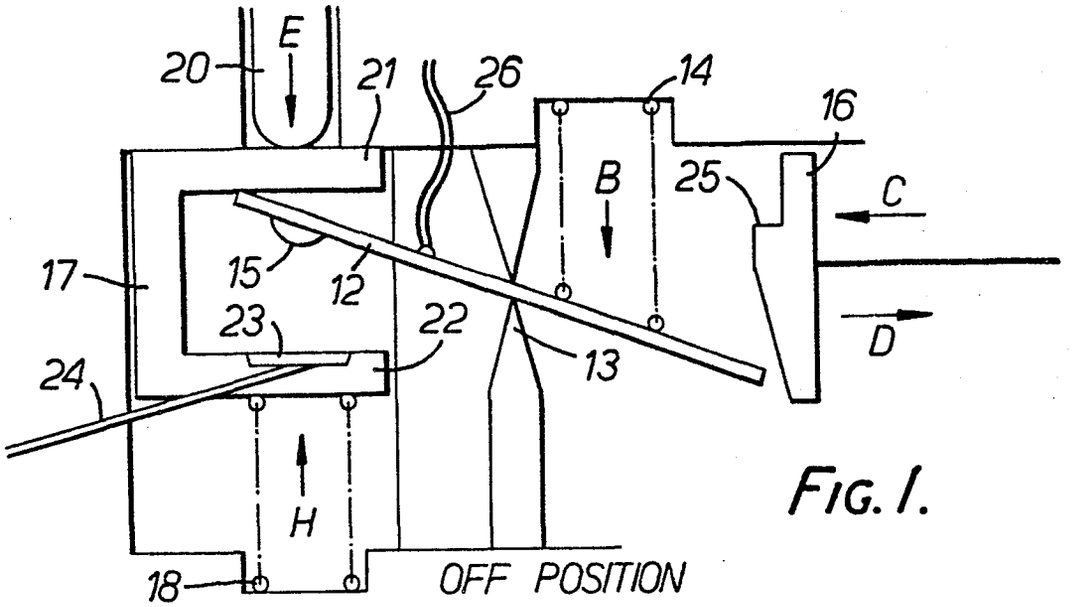


FIG. 1.

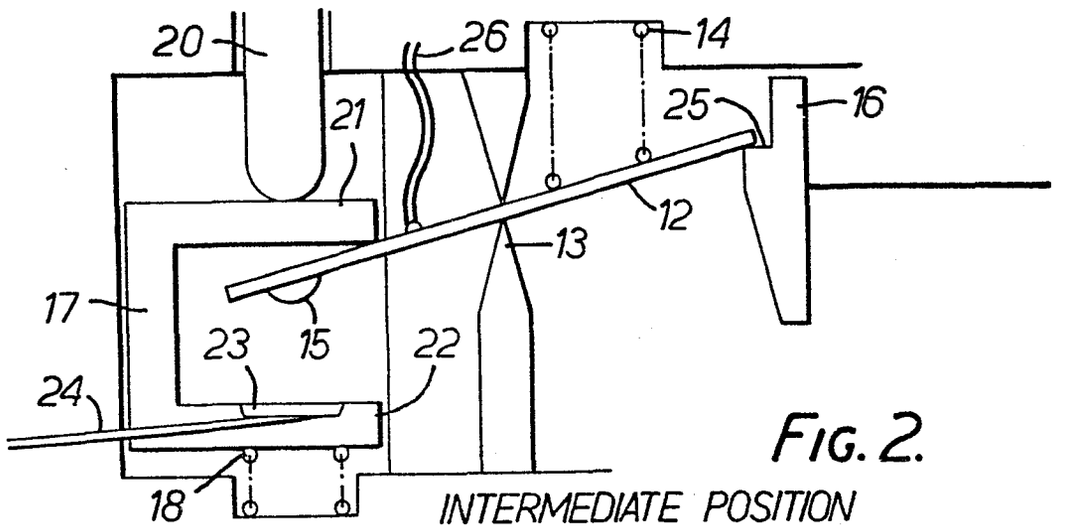


FIG. 2.

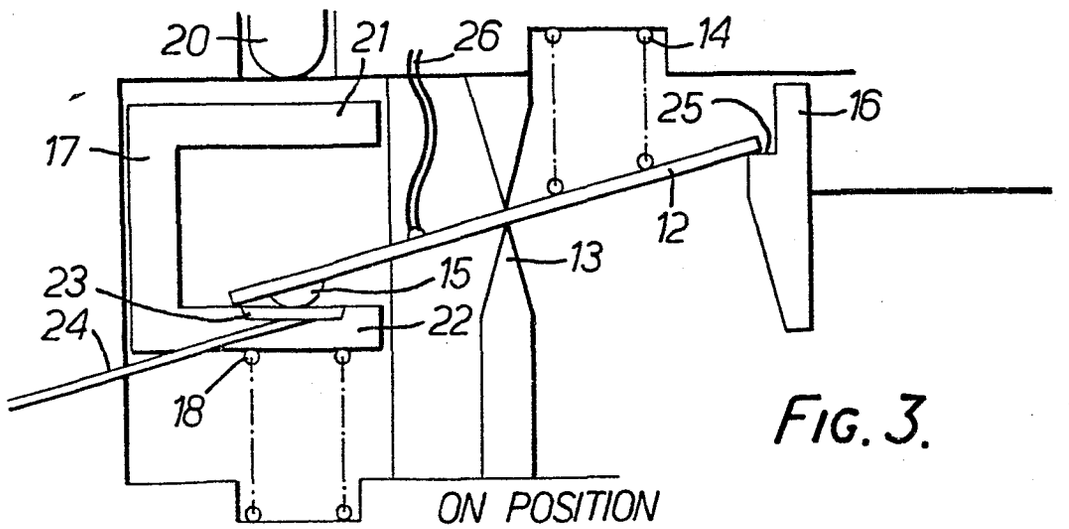


FIG. 3.