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(54) Switching devices.

(57) An alarm call point comprises a housing 4 and having a pivotably mounted window 6 for operation of the device. The window 6 carries a conductive track 10 along one edge which is in electrical contact with a pair of resilient contact members 12 when the call point is in the unoperated condition.

When the call point is activated the contact between the track 10 and contact members 12 is broken, activating the alarm. The contact members 12 are shaped to provide a tactile feel to the operation of the device and may allow a limited degree of movement to the window in the operated condition to provide a continued indication of the the device having been operated.

The call point enables a microswitch usually incorporated in such devices to be obviated and enables the device to be tested by actual operation rather than by a simulation technique.

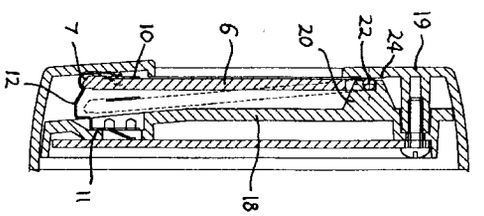

Fig.2

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The present invention relates to switching devices and in particular to alarm switches such as those used in fire alarm systems which are commonly known as call points.

A call point is a switch used to activate an alarm by operation of an operating element by a user. Known call points include a frangible window, usually of glass, which is broken in order to change manually to an alarm condition and remain in that condition. The frangible element must provide protection against unintentional operation and deterrent against misuse. However, for glass windows which are broken to activate the alarm, the window must be replaced after each activation. Furthermore, a microswitch is usually incorporated into the call point as the actual switching device, which adds significantly to the manufacturing cost of the call points.

A call point has been proposed which enables operation of the switching element whilst obviating the need to replace the frangible window after each operation, as described in US Patent 4857679. In the arrangement described in US 4857679 the frangible element has a number of frangible areas spaced in succession, one of which is broken off the frangible element each time the device is operated. In the example described, four frangible areas are provided so the frangible element must be replaced after every four operations of the call point. Furthermore, the frangible element is used to operate a separate switching element, with the attendant relatively high cost of providing the separate switching element within the device.

GB 2075265A describes a solid state call point which, as with previous designs, incorporates a frangible glass element, but the element is provided with an electrically conductive path. Resilient contact arms co-operate with the electrically conductive path and a solid state detector to energise an alarm upon activation of the device by breakage of the frangible glass element. To test the call point, one of the resilient arms can be moved away from the conductive path without requiring opening of the device or breaking the glass frangible element. However, such an arrangement is not considered satisfactory as the call point is tested without actual operation of the frangible element which is used to activate the device in a genuine emergency situation. Furthermore, when the device is operated in an emergency situation, the frangible element must be replaced to recommision the call point.

It is an object of the present invention to provide an improved switch or call point which enables activation of the device by displacement of a window element without actually breaking the window element, which provides a tactile feel upon operation, provides a permanent indication of device activation (until reset) and which obviates the need for a relatively expensive switching element within the call point.

Accordingly, there is provided a switch comprising a housing member, an operating member mounted therein and including a conductive element, the operating member being displaceable from a first position in which the conductive element is in electrical contact with contact means to a further position in which the conductive element is electrically isolated from the contact means for activation of the call point, and resilient detent means arranged to co-operate with the operating member to releasably retain the operating member in the first position.

Preferably, the operating member is accessible through an aperture in the housing so as to be manually operable to activate the switch. The operating member may be in the form of a flat plate, such as a transparent window.

Conveniently, the housing member also includes an aperture for receiving a key for engaging the operating member in order to reset it to the first position with the conductive track in electrical contact with the contact means.

The operating member is preferably pivotally mounted within the housing. For example, the operating member may include a pivot pin, and the housing member map comprise a cover portion and a chassis portion, each including mutually co-operating surfaces shaped so as to receive the pivot pin.

Preferably, the conductive element comprises a track and the contact means comprises a pair of spaced contact members for connecting to a circuit for detecting whether there is electrical conduction between the contact members.

Advantageously, the resilient detent means also comprises the contact means. For example, the detent means may comprise a pair of resilient arms including a ramped portion for retaining the operating member, a contact portion for contacting the conductive track, and a foot portion for connecting to the circuit. The conductive track is conveniently located on a front surface of the operating member, and the contact portion comprises an extension portion of the resilient arms extending between the housing member and the operating member.

The present invention will now be described, by way of example only, with reference to the accompanying diagramatic drawings in which:-

Figure I is a front view of a switch in the form of a call point in accordance with the present invention;

Figure 2 is a cross sectional view of the call point taken along line II-II of Figure I;

Figure 3 is an enlarged view of the electrical contact in Figure 2;

Figure 4 is a cross sectional view of another embodiment of the invention; and

Figure 5 is a cross section view of yet another embodiment of the invention.

Referring to Figure I, a call point 2 comprises a

housing 4, which may be of moulded plastics arterial. The housing 4 is, typically, mounted to a wall within easy access to personnel wishing to raise an alarm in an emergency situation, such as a fire. The call point is a manually operated device the operating member being in the form of a window 6 mounted behind an aperture 5 in the housing 4. The window 6 is activated by applying pressure or striking an indicated position on the window 6, the position usually being indicated by suitable indicia such as arrows 8.

The window 6 is provided with a conductive track I0 on its front surface and near to one edge 7, which may be formed by any suitable conductor, such as a conductive ink, a hot foil stamped strip or a copper track. In Figure 2 the window 6 is shown in a first or unoperated position held by a pair of resilient contact arms I2 which, typically, may be formed from nickel plated spring steel having a corrosion resistant coating such as copper, nickel and tin plating.

The resilient arms I2 each include a pair of extension portions I4 which extend around the edge 7 of the window 6 and are resiliently biased towards the window into electrical contact with the conductive track I0 as shown in Figure 3. The resilient arms I2 also include ramped portions I6 which serve as detents to retain the window 6 in positive engagement with the extension portions I4. Foot portions II of the resilient arms I2 are located in position on pins I3 and include connecting portions I5 which are resiliently biased into contact with a printed circuit board I7.

The resilient arms serve, therefore, two purposes. Firstly, their shape and resilient nature ensures that a positive tactile feel is provided to the window member for operation of the device, thereby minimising the risk of inadvertent operation of the device by accidental pressure applied to the window. Secondly, the resilient arms I2, in conjunction with the conductive track I0, form the switching device within the call point which, when the electrical contact between the extension portion I4 and conductive track I0 is broken, is used to activate the alarm. Furthermore, the working order of the call point may be checked by passing a small current between the contact members.

As can be seen from Figure 2, the housing 4 includes an outer cover I9 and a chassis member I8. The chassis I8 is provided with a pair of projections 20 each having shaped recesses 2I for receiving a pivot pin 22 integrally formed at either end of an edge 23 of the window 6 opposite the edge 7 carrying the conductive track I0. A small protuberance 24 formed on the cover I9 cooperates with each projection 20 to retain the pivot pins 22. The window 6 may be fabricated as a transparent plastics moulding as, by the provision of the pivotal mount, and the tactile response provided by the resilient contact members, there is no requirement actually to break the window 6 to operate the call point and raise an alarm.

In an alternative embodiment shown in Figure 4, the tactile response of the window 6 is provided by, or enhanced by, a further resilient member 32, such as of plastics material, arranged within the housing 4.

The resilient member 32 includes an upstanding end portion having a ramp faced end 36 which engages a ramped edge 38 provided on the window 6. The resilience in the member 32 can be arranged to bias the end 36 into engagement with the ramped edge 38, causing the window to be retained in the unoperated position.

When the device is activated, the window 6 pivots about the pivot pin 22, thus being displaced from the first or unoperated position, as shown in solid lines in Figure 2, to an active or operated position, as shown in broken lines in Figure 2. This pivotal movement of the window 6 causes the electrical contact between resilient arms I2 and the conductive track I0 to be broken, raising the alarm. As the window 6 is displaced from the unoperated position the edge 7 thereof will engage against the ramped portion I6 of the arms I2, causing the arms to flex against the natural bias and to snap back into position after the window 6 has passed into the gap between the ramped portion I6 and the chassis I8, thereby to providing tactile response of the window 6. Similarly, if the resilient members 32 are provided in addition or as an alternative to the resilient arms, the movement of the window 6 in the direction of arrow A from the unoperated position will cause the resilient member 32 to flex outwardly in the direction of arrow B, as shown in Figure 4, as the end 38 of the window 6 ramps over the end face 36 of the member 32.

When the window 6 disengages the ramped portions I6, the resilient arms I2 snap back over the window 6, as shown in dotted lines in Figure 3, and retain the window within a restricted area defined by the ramped portions I6 and the chassis I8. It will be realised that the width of this restricted area may be controlled by defining the length of straight portions 40 of the contact arms I2 so that, in the operated condition, the window 6 may be allowed a restricted degree of 'free' pivotal movement, or may be held more positively in the operated position to provide a clear indication until reset that the call point has been activated. In either arrangement the indication of an alarm having been raised may be enhanced by the provision of a light emitting member, such as an LED. Such a member may be positioned behind a membrane portion provided on the chassis I8, or may be surface mounted on the printed circuit board beneath a light pipe.

In a similar manner, it will be realised that the end portion 36 of the resilient member 32 may be appropriately dimensioned to positively hold or provide a restricted degree of movement to the window 6 in the operated condition.

It can be seen from Figure 3 that, in the operated condition, the conductive track I0 cannot contact the

contact portion 14 of the resilient arms 12 unless the window 6 is positively reset to force the edge of the window back over the ramped portion 16.

To enable the call point to be reset without having to dismantle the housing, as is required in current call point designs to replace the broken glass window, an aperture may be provided on the housing 4 which is shaped so as to receive a resetting key. As shown in Figure 5, the key 44 includes a shank portion 46 having a shaped end face 48 which may engage a co-operating face or lug 50 provided on the window 6 to force the window back over the ramped portion 16 of the resilient arms 12 to reset the call point. Alternatively, the key may be shaped such that pushing and turning the key forces the window back over the ramped portion of the resilient arms to reset the call point. The aperture may be shaped so as not to allow direct access to the mechanism of the switch, so that if an obstruction is pushed into the aperture, operation of the call point will not be prevented.

It will be appreciated from the above description that a call point according to the present invention enables the necessary electrical switching to be achieved without the use of a relatively expensive microswitch usually incorporated into the call point. Furthermore, the call point may be tested by actual operation rather than by a simulation technique of moving a glass window away from a microswitch. Additionally, once operated, either for testing or by raising an actual alarm, the call point may be easily and readily reset by operation of a key device without having to open the call point housing.

Although the present invention has been described with respect to specific embodiments, it will be realised that modification may be effected whilst remaining within the scope of the invention. For example, other pivot arrangements may be used to mount the window member. Additionally, other materials may be used to provide the resilient contact members, such as resilient plastic arms with appropriate electrically conductive tips and tracks to provide the switching path to the conductive track 10 on the window 6.

Claims

1. A switch comprising a housing member, an operating member mounted therein and including a conductive element, the operating member being displaceable from a first position in which the conductive element is in electrical contact with contact means to a further position in which the conductive element is electrically isolated from the contact means for activation of the call point, and resilient detent means arranged to co-operate with the operating member to releasably retain the operating member in the first position.

2. A switch as claimed in Claim 1, in which the operating member is accessible through an aperture in the housing so as to be manually operable to activate the switch.

3. A switch as claimed in Claim 1 or 2, in which the operating member is in the form of a flat plate member.

4. A switch as claimed in Claim 1, 2 or 3, in which the housing member also includes an aperture for receiving a key for engaging cooperating means provided on the operating member in order to reset the operating member to the first position.

5. A switch as claimed in any one of the preceding claims, in which the operating member is pivotally mounted within the housing.

6. A switch as claimed in any one of the preceding claims, in which the resilient detent means also comprises the contact means.

7. A switch as claimed in Claim 6, in which the detent means comprises at least one resilient arm including a ramped portion for retaining the operating member and a contact portion for contacting the conductive track.

8. A switch as claimed in any one of the preceding claims, in which the conductive element comprises a track and the contact means comprises a pair of spaced contact members for connecting to a circuit for detecting whether there is electrical conduction between the contact members.

9. A switch as claimed in Claim 7 or 8, in which the conductive track is located on a front surface of the operating member, and the contact portion comprises an extension portion of the resilient arms extending between the housing member and the operating member.

10. A switch as claimed in any one of the preceding claims, including a light emitting member for providing an indication that the switch has been operated.

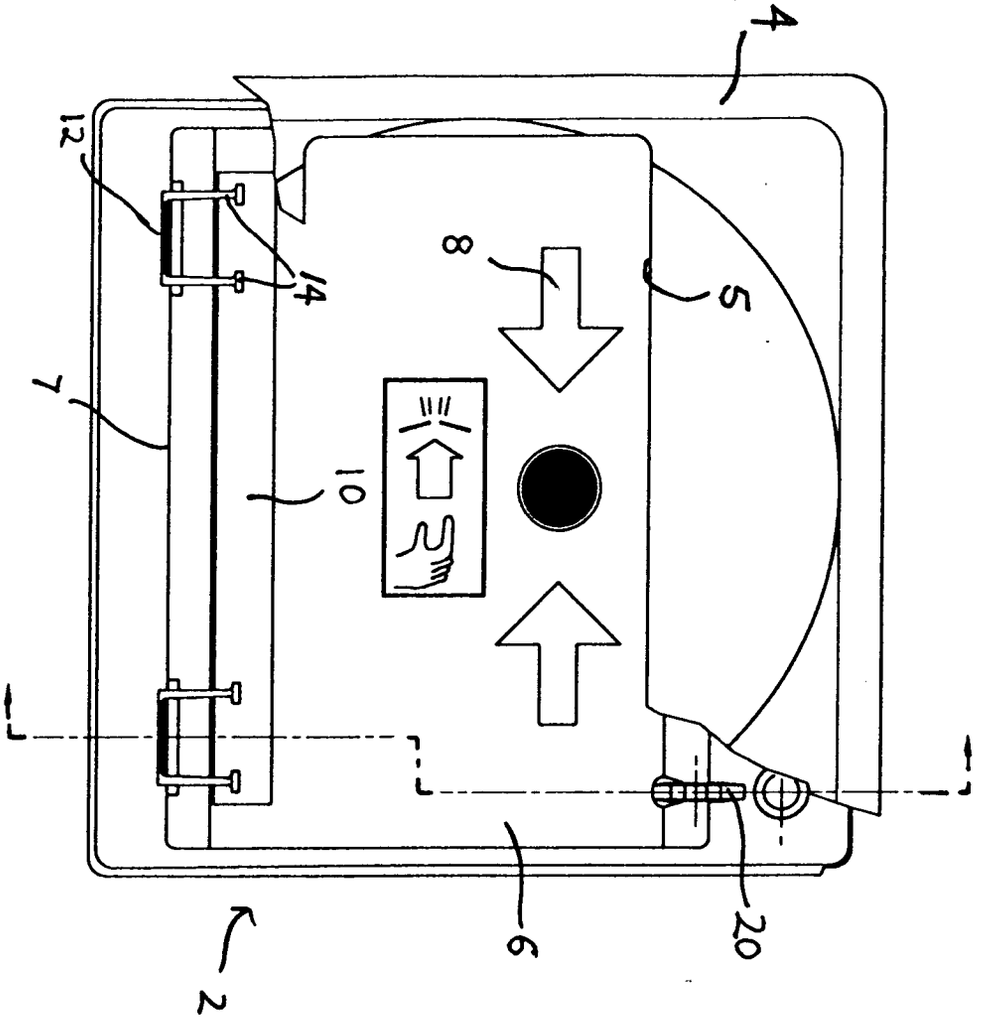

Fig.1

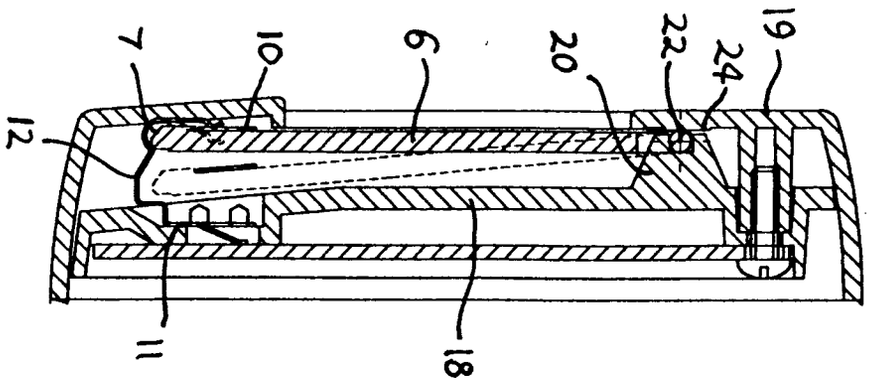

Fig.2

Fig.5

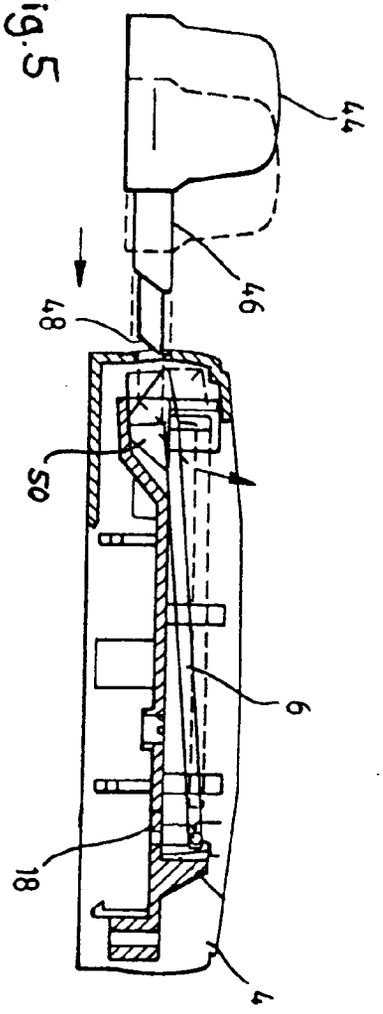

Fig.3

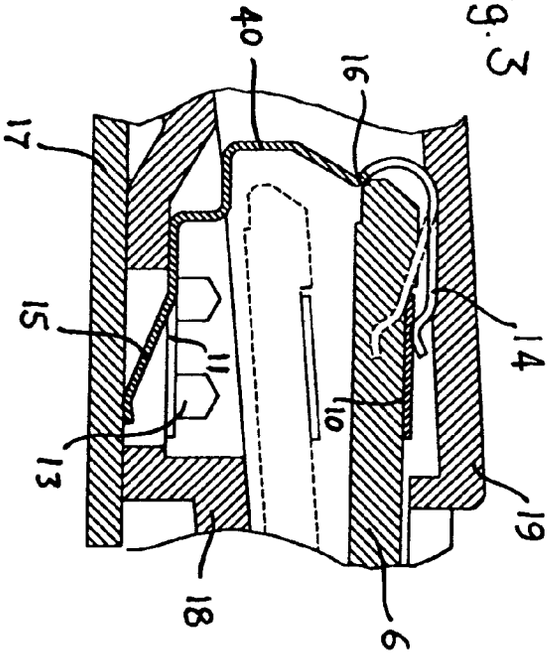

Fig.4