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MINIATURE ELECTRICAL SWITCH APPARATUS OR THE LIKE

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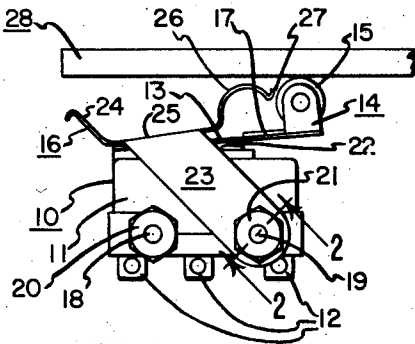


FIG. 1

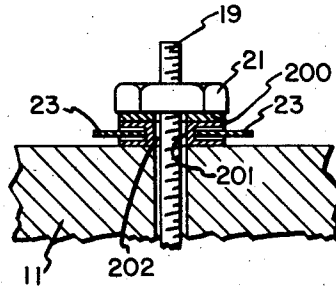


FIG. 2

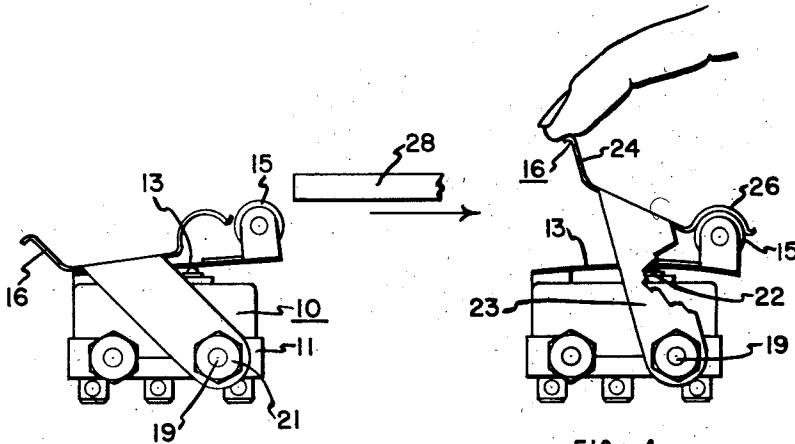


FIG. 3

FIG. 4

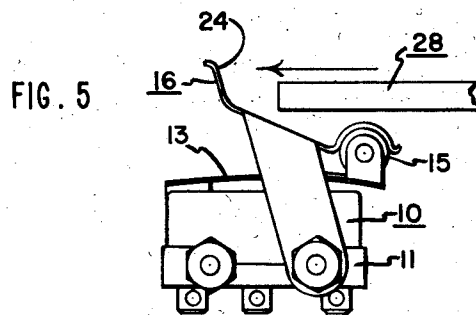


FIG. 5

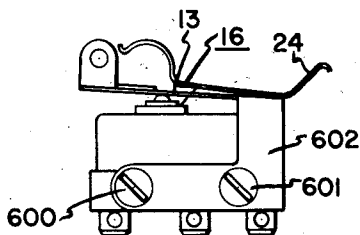


FIG. 6

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MINIATURE ELECTRICAL SWITCH APPARATUS OR THE LIKE

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8 Claims. (Cl. 200—153)

This invention is related to electrical switches of the miniature variety, and more particularly to a new and improved miniature electrical switch which incorporates a manually actuatable detent means for selectively retaining the switch in closed circuit condition.

In the past, there have been many types of miniature electrical switches developed. The type of miniature switch to which the present invention makes reference is that normally incorporating a resilient arm member, a roller bearing affixed to but mounted above the arm member, and a selectively depressable button mounted on the switch immediately beneath said resilient arm. Such switches are conventionally employed at inter-lock devices which are mounted upon electrical chassis. When a cover or exterior housing is disposed so as to enclose the electrical chassis, the housing will forcibly depress the aforementioned roller bearing and resilient arm so as to depress the switch button and render closed the electrical circuit associated therewith. Upon removal of the chassis housing, the resiliency of the switch arm will cause the arm to achieve a disengaging relationship with respect to the switch button so that the electrical circuit associated with the switch will be caused to open, by virtue of the fact that the spring-biased button will be caused to protrude outwardly from the switch, thereby disconnecting the electrical contacts enclosed therewith.

With the chassis housing or cover removed, the electrical circuit will be in open condition, as has been heretofore indicated. Frequently, for electrical testing purposes, it will be desirable for engineering and technical personnel that the electrical circuits associated with the subject switch be closed. The manual accomplishment of this closed condition of the switch, of course, involves the re-depression, selectively, of the roller bearing and resilient arm associated with the switch so as to depress physically the switch button. It is believed that the present invention provides an extremely useful and novel means for accomplishing switch closing so that engineering and other technical personnel will not be obliged to depress either with their fingers or with other parts of their body the resilient arm and roller bearing of the switch while testing for electrical operation of the circuits and apparatus involved.

Therefore, it is an object of the present invention to provide a new and useful miniature electrical switch.

It is a further object of the present invention to provide a new and useful electrical switch apparatus which incorporates a simple yet highly useful, manually actuatable detent member for maintaining switches of the inter-lock variety in closed circuit condition during periods of electrical testing.

It is an additional object of the present invention to provide manually actuatable detent means for miniature electrical switches of the inter-lock variety, in which such detent means is automatically disengaged from the roller bearing associated with such switches upon replacement of chassis housings or covers upon their respective electrical chassis.

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According to the present invention, a miniature electrical switch apparatus incorporates a conventional switch mechanism having electrical contacts, a depressable button, a resilient arm, and a roller bearing mounted to but extending above said resilient arm, and includes additionally a manually actuatable detent means selectively engageable, and disengageable, with said roller bearing, and pivotally mounted with respect to said switch. The aforementioned detent means preferably includes an inclined cam surface portion selectively cooperable with the aforementioned roller bearing and also a trip portion actuatable upon the replacement of chassis housings or covers so as to disengage automatically the detent means from the aforementioned roller bearing of the switch.

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The present invention, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description, taken in connection with the accompanying drawings, in which:

Figure 1 is a front elevational view of a miniature electrical switch apparatus according to the present invention.

Figure 2 is a view, partly in cross-section, taken along the line 2—2 in Figure 1.

Figure 3 is a front elevational view of the apparatus in Figure 1, showing the switch in open condition when the electrical chassis housing or cover is removed.

Figure 4 is a front elevational view of the apparatus of Figure 1, showing the manner and means by which selective depression of the switch button is accomplished.

Figure 5 is a front elevational view of the miniature electrical switch apparatus of the present invention, showing in part the manner and means by which the detent means is tripped by the engagement therewith of an electrical chassis cover returned to its initial disposition, so as to accomplish the disengagement, automatically, of the switch roller bearing and the detent means.

Figure 6 is a rear elevational view of the apparatus of Figure 1, in which the switch is shown in its open condition.

In Figure 1, switch 10 includes housing 11, electrical contacts 12, resilient arm 13, U-shaped element 14 (affixed to arm 13), roller bearing 15 (rotatably mounted within U-shaped element 14), and detent member 16. U-shaped element 14 conventionally includes a tongue portion 17 which is spot welded to resilient arm 13. Resilient arm 13 has a portion which loops around the back of the switch (as shown subsequently in Figure 6) and is attached to the switch housing proper by means of attachment screws 18 and 19 and nuts 20 and 21.

Also associated with the switch shown in Figure 1 is depressable, spring-biased button 22. Detent member 16 includes pivot arm 23, trip portion 24, central portion 25, and detent portion 26. Detent portion 26 is provided preferably with an inclined cam surface portion 27 adapted to cooperate with roller bearing 15, as shown. As is seen in Figure 1, pivot arm 23 is disposed in a plane which is normal to the plane of central portion 25, for example. As shall be hereinafter shown and described, pivot arm 23 of detent member 16 is pivotally mounted to switch housing 11 so as to rotate freely, save for the detent action of the switch.

The operation of the apparatus shown in Figure 1 is as follows. Consider that member 28 is an electrical chassis housing or cover. As is shown in Figure 1, detent means 16 is in disengaging relationship with respect to roller bearing 15. The detent member 16 is designed so that trip portion 24 is separated physically from member 28, when member 28 is mounted to the associated electrical chassis including switch 10. It thus appears that roller bearing 15 will be in engaging relationship with member

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28 so as to accomplish the depression of switch button 22 and thereby close the electrical circuit associated therewith

Figure 2, a view partly in cross-section taken along the line 2-2 in Figure 1, illustrates the manner of attachment of pivot arm 23 of detent member 16 to switch housing 11. As is shown in Figure 2, there is included additionally as an attachment means a washer 200 and also an eyelet member 201. Eyelet member 201 may take the form of an eyelet rivet and is disposed largely within aperture 202 of pivot arm 23. It is to be noted, however, that eyelet rivet 201 is in loosely engaging relationship with pivot arm 23. This is for the purpose of enabling nut 21 to be cinched tightly against washer 200 and eyelet 201, and yet allow the pivot arm 23 to rotate freely, or at least relatively so.

In Figure 3, it is seen that when member 28, such as the chassis cover, is removed by the engineer or technician (in either the direction shown or 90° removed, for example), the resiliency of arm 13 causes arm 13 to spring away from the vicinity of button 22 so as to permit the spring-bias of button 22 to accomplish electrical circuit disconnection within the switch proper. Thus, for safety inter-lock features, and otherwise, the electrical circuit associated with switch 10 is open.

Now it may be desirable, if the engineer or technician who is testing the electrical equipment including the miniature switch apparatus so desirous, that the electrical circuits associated with switch 10 be closed. Hence, by means of his thumb or finger, the engineer need merely depress to the right of the viewer trip portion 24 of detent member 16 so that by means of the rotation of pivot arm 23 about threaded shank or screw 19, detent portion 26 will come into engagement with roller bearing 15. The engagement of detent portion 26 with roller bearing 15 will, of course, accomplish the depression of resilient arm 13 and hence of button 22 so as to close the electrical circuit associated with the switch. By means of the detent action of the detent member, the operator's thumb or finger may be removed from trip portion 24 during the testing procedure.

As is shown in Figure 5, the operator need not relieve the detent action of the switch himself, but may rely upon the engagement of housing member 28, when replaced, with trip portion 24 for accomplishing the disengagement of the detent member with roller bearing 15. This automatic disengagement operation is ensured provided the trip portion 24 extends slightly into the path of travel of member 28, i. e. beyond roller bearing 15. It is to be noted, however, that while there will be a slight outward protrusion of roller bearing 15, still the contact of roller bearing 15 with member 28, as shown in Figure 1, will ensure the depression by resilient arm 13 of button 22.

Purely for illustrative purposes, Figure 6 is purposely included so as to illustrate the rear view of the switch apparatus of Figure 1. The disengaging disposition of detent member 16 with respect to roller bearing 15 in Figure 1 is retained in Figure 6. Screw heads 600 and 601 are associated with screws 19 and 18 in Figure 1. L-shaped portion 602 is provided with mounting apertures to cooperate with screws 18 and 19 of Figure 1 and is also related integrally with resilient arm 13.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspects, and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

I claim:

1. In combination, a miniature electrical switch provided with a plurality of electrical contacts, a housing, a spring-biased depressable button disposed on said hous-

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ing, resilient arm member means affixed to said housing and disposed over said depressable button to depress selectively said button, a roller bearing having an axis of rotation, means affixed to said arm for mounting said roller bearing above said arm in such manner that said axis of rotation of said roller bearing is transverse with respect to said arm; and manually actuatable detent means pivotally affixed to said housing for selectively engaging and thereby depressing and maintaining depression of said roller bearing and said resilient arm member means so as to actuate selectively said button, said detent means being provided with a detent portion having an inclined cam surface portion for engaging said roller bearing, a central portion integral with said detent portion, and a freely rotatable pivot arm integral with and disposed normally to said central portion.

2. In combination, a miniature electrical switch provided with a plurality of electrical contacts, a housing, a spring-biased depressable button disposed on said housing, resilient arm member means affixed to said housing, and disposed over said depressable button to depress selectively said button, a roller bearing having an axis of rotation, means affixed to said arm for mounting said roller bearing above said arm in such manner that said axis of rotation of said roller bearing is transverse with respect to said arm; and manually actuatable detent means pivotally affixed to said housing for selectively engaging and thereby depressing said roller bearing and said resilient arm member means so as to actuate selectively said button, said detent means being provided with a trip portion extending beyond said roller bearing when said detent means is in engaging relationship with said roller bearing.

3. In combination, a miniature electrical switch provided with a plurality of electrical contacts, a housing, a spring-biased depressable button disposed on said housing, resilient arm member means affixed to said housing and disposed over said depressable button to depress selectively said button, a roller bearing having an axis of rotation, means affixed to said arm for mounting said roller bearing above said arm in such manner that said axis of rotation of said roller bearing is transverse with respect to said arm; and manually actuatable detent means pivotally affixed to said housing for selectively engaging and thereby depressing said roller bearing and said resilient arm member means so as to actuate selectively said button, said detent means being provided with trip portion, a detent portion having an inclined cam surface portion for engaging said roller bearing, a central portion disposed between said trip and detent portion, and a pivot arm integral with and disposed normally to said central portion.

4. Apparatus according to claim 3 in which said housing is provided with a threaded shank, attachment means cooperable with said shank, and in which said pivot arm pivotally cooperates with said threaded shank and is provided with a mounting aperture and an eyelet member loosely cooperating with said pivot arm in the region of said aperture.

5. Apparatus according to claim 3 in which said trip portion extends outwardly a distance less than said roller bearing when said detent means is in disengaging relationship with respect to said roller bearing and when external means is in engaging relationship with said roller bearing.

6. As a means for selectively depressing a roller bearing normally associated with a miniature electrical switch, said switch being provided with resilient arm means, means rotatably mounting said roller bearing to said arm means and a depressable actuating button disposed beneath said arm means: a manually actuatable detent having a pivot arm pivotally mounted to said switch, a trip portion, a detent portion cooperable with said roller bearing, and a central portion interposed between said trip portion and said detent portion, said pivot arm being

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integral with said central portion and disposed normally thereto.

7. Apparatus according to claim 6 in which said detent portion is provided with an inclined cam surface portion adapted for cooperation with said roller bearing.

8. Apparatus according to claim 6 in which said pivot arm is provided with a mounting aperture, and an eyelet member cooperating with said pivot arm in loosely engaging relationship in the region of said aperture.

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