

ROTARY SWITCH

This invention relates to a rotary switch and in particular to a rotary switch having a rotary shaft with deformable retaining means provided thereon.

Rotary switches are known in prior art. One common type of rotary switch consists of a rotary shaft having a threaded portion provided at the free end thereof and a nut threadably engaged to the threaded portion of the rotary shaft to hold a spring on the rotary shaft. One of the drawbacks encountered by this kind of rotary switch is that the screwing of the nut onto the shaft is a rather time consuming process. Furthermore, the screwing procedure may be incorrectly carried out. Since the nut is used to hold the spring in a suitable compressed state, incorrect placement of the nut with respect to the pin may render a drop in performance of the final product. Also, the rotary shaft and nuts are usually fabricated from metal and their production costs are high.

The present invention seeks to provide an improved rotary switch.

According to the present invention, there is provided a rotary switch adapted to frictionally hold a metal switch contact against a printed circuit board, said switch comprising a rotary shaft having a first end and a second end, engagement means provided on the first end of said shaft by way of which said shaft may be turned about the axis thereof; a deformable retaining means provided on the second end of said shaft, a spring means mounted around said shaft and a collar means having a collar aperture adapted to snap over said retaining means so as to be retained on said shaft and a switch contact mounted on said shaft to be rotatable therewith, the switch contact being biased into an operating position by said spring means which is compressed by said collar means, said retaining means normally having a retaining dimension exceeding the dimension of said collar aperture and being inwardly deformable to a dimension less than the dimension of said collar aperture.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawings wherein:-

Fig 1 is a side elevation of the rotary switch in accordance with the present invention;

Fig 2 is a perspective view of the rotary shaft and the collar as shown in Fig 1.

Referring now in more detail to the drawing, in which like reference numerals represent like parts throughout the several views, Fig 1 shows a side view of the rotary switch designated generally by reference numeral 10.

The rotary switch 10 consists of a rotary shaft 12 with a regulating knob member 14 integrally provided thereon at one end thereof. An elongate groove 20 is disposed on the upper surface of the knob member 14 to facilitate rotation of the rotary shaft 12 by means of a screwdriver or other sharp edged tool. The rotary shaft 12 is adapted to journal through an aperture 16 incorporated on a printed circuit board 18. A printed circuit (not shown) is provided on the bottom surface of the printed circuit board 18.

A piece of metal switch blade or switch contact 24 is mounted on the rotary shaft 12 for rotation therewith. Switch contact 24 is in operative relation to the circuit of the printed circuit board 18, whereby turning the switch contact 24 relative to the printed circuit board 18 at indicated intervals gives rise to various switch connections.

A spring 22 is mounted on the rotary shaft 12 and is adapted to urge the switch contact 24 against the printed circuit board 18 under the influence of the spring.

Provided on the other end of the rotary shaft 12 is a retaining means generally represented by reference numeral 26. The retaining means 26 is generally in the form of a spear member 28 having a slot 30 extending longitudinally and bisecting the spear member 28. The retaining means 26 is best illustrated in Fig 2.

Fig 2 depicts a perspective view of the rotary shaft 12 and the knob member 14 which are moulded in one piece of

plastic material. It can be seen that the tip of the spear member 28 is truncated to define a flat surface normal to the axis of the pivot pin 12.

Slot 30 is disposed generally along a longitudinal median line of the rotary shaft 12 and extends from the truncated end of the spear member 28 to a substantially central portion of the rotary shaft 12. The spear member 28 and the slot portion of the rotary shaft 12 together define two elongate members as indicated by reference numerals 36 and 38 in Fig 2. These two members 36 and 38 are normally in parallel spaced relationship with each other and are deformable inwardly towards each other.

A collar 44 having an aperture 46 is adapted to snap over the spear member 28 and is retained on rotary shaft 12 by retaining portions 28a and 28b defined by the spear member 28. When collar 44 is pressed against the spear member 28, it exerts a force on the slanted faces of the spear member 28 such that members 36 and 38 are deformed inwardly towards each other allowing the collar 44 to eventually pass through the retaining portions 28a and 28b.

It is appreciated that the retaining portions 28a and 28b normally have a retaining dimension exceeding the dimension of the collar aperture 46. On assembly, the elongated members 36 and 38 are pressed inwardly towards each other and deformed to a dimension less than the dimension of the collar aperture 46.

In the preferred embodiment, the rotary shaft 12 is provided bilaterally with two longitudinal extending cutaway portions which define two flat side surfaces 52 and 54 on the rotary shaft 12. The cutaway portions extend the entire length of the rotary shaft 12 and are in alignment with respective cutaway portions provided on the spear member 28. The collar aperture 46 conforms in shape to the sectional configuration of the rotary shaft 12 so that the collar 44 is capable of mounting on the rotary shaft 12 when snapped over the spear member 28.

Some conventional rotary switches have made use of

threaded rotary shafts and nuts threadably engaged to the rotary shaft to hold spring means on the rotary shafts. The disadvantages of this type of rotary switch is that the nuts have to be screwed onto the threaded rotary shafts during assembly and that such operation may vary from worker to worker depending on their judgement. Furthermore, the nuts are deemed to be loose retaining means. The rotary switch according to the present invention is a breakthrough from this tradition. Spring means are fixedly held by collar means which are retained on the rotary shaft by retaining means. The compressive force of the spring means may vary by selecting collars of different thickness.

Upon assembling the switch contact 24 and the spring 22, the collar 44 is simply snapped over the spear member 28 with resilient deformation of the members 36 and 38. This permits the rotary switch to be assembled in a very easy manner and thus reduces the amount of labour time required.

Also, due to the simplicity in structure and ease of manufacture, the rotary switch disclosed herein is well suited to mass production and the production cost is relatively low.

Although the retaining means has been described as being in the form of a spear, it is contemplated that the retaining means may take other possible forms without departing from the scope of the present invention. For example, the retaining means can take the form of a round head.

While the present invention has been shown and described with particular reference to a preferred embodiment thereof, it should be noted that various other changes or modifications may be made without departing from the scope of the present invention.



CLAIMS

1. A rotary switch adapted to frictionally hold a metal switch contact against a printed circuit board, said switch comprising a rotary shaft having a first end and a second end, engagement means provided on the first end of said shaft by way of which said shaft may be turned about the axis thereof; a deformable retaining means provided on the second end of said shaft, a spring means mounted around said shaft and a collar means having a collar aperture adapted to snap over said retaining means so as to be retained on said shaft and a switch contact mounted on said shaft to be rotatable therewith, the switch contact being biased into an operating position by said spring means which is compressed by said collar means, said retaining means normally having a retaining dimension exceeding the dimension of said collar aperture and being inwardly deformable to a dimension less than the dimension of said collar aperture.

2. A switch as claimed in claim 1, wherein said retaining means takes the form of a spear member having a slot extending longitudinally along a plane parallel to the axis of the rotary shaft.

3. A switch as claimed in claim 2, wherein said slot extends through the rotary shaft along a portion thereof contiguous with said spear member.

4. A switch as claimed in claim 3, wherein said retaining means and said slot portion of said rotary shaft define two elongated members deformable inwardly towards each other.

5. A switch as claimed in claim 2, wherein the peak of said spear member is truncated.

6. A switch as claimed in claim 1, wherein said rotary shaft is provided bilaterally with two longitudinally extending cutout portions which are in alignment with respective cutout portions incorporated on said retaining means.

7. A switch as claimed in any of the preceding



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claims, wherein said rotary shaft and said engagement means are of plastic material.

8. A rotary switch substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.
