S W I T C H

This invention relates to switches, more particularly, although not so restricted, to switches to adjust the time indicated by digital timepieces.

One conventional switch used for adjusting the time indicated by digital timepieces comprises a forward button and a backward button, these buttons being mounted independently. Another known switch used for the same purpose comprises a see-saw switch to which a crown is connected so that when the time indication is to be adjusted, the crown is rotated.

The conventional switch having independent forward and backward buttons has poor operability. Further, the two buttons must be juxtaposed, thus occupying considerable space. Therefore, this type of switch is not suitable for miniaturisation. In the conventional switch employing a crown, if the crown is reduced in size to make the timepiece thinner, then it becomes more difficult to operate.

The present invention seeks to provide a relatively inexpensive switch which can be miniatursed, can be made thin, and is easy to operate.

According to one aspect of the present invention, there is provided a switch comprising: a casing having an opening at a lateral wall thereof; a support pole formed adjacent to said opening inside the casing; a substantially T-shaped member comprising a bar portion located in said opening and a leg portion extending inward from substantially a centre of the bar

portion, said leg portion being rotatably held on the support pole; a circuit board mounted in the casing and positioned substantially perpendicularly to said lateral wall; a contact element having a base portion connected to one side of the circuit board and a resiliently flexible switch element substantially at a right angle to the base portion and extending along the surface of the bar portion facing an end surface of the circuit board; and contacts provided on said end surface of the circuit board and with which the switch element makes and breaks contact when the T-shaped member is rotated about the support pole such that the resiliently flexible switch element is biassed apart from said contacts and rotation of the T-shaped member about the support pole brings the resiliently flexible switch element in contact with one of the contacts on the end surface of the circuit board.

The leg portion may be resiliently mountable on the support pole, preferably by means of resilient bifurcations provided on the leg portion. In addition, the resiliently flexible switch element may be integral with the base portion of the contact element.

According to another aspect of the present invention there is provided a digital timepiece having a switch as defined in the preceding paragraphs.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:-

Figure 1 is a plan view partially in cross-section of a switch according to the present invention;

Figure 2 is a cross-sectional view taken on line II-II of Figure 1; and

Figure 3 is a view similar to Figure 1 illustrating operation of the switch.

Referring to Figures 1 and 2, a switch according to the present invention comprises a casing 1 with an opening 1a at a lateral wall thereof. A cylindrical support pole 2 is formed integrally with the casing 1

adjacent to the opening 1a. A protrusion 3 is provided with the pole 2 to which a member 4 is pivoted. The member 4, which is shaped like the letter "T", comprises a bar portion 5 and a leg portion 6 extending inwardly of the casing 1 from substantially the centre of the bar portion 5. The bar portion 5 is situated inside the opening 1a, so that it can be depressed. Protrusions 5a which come into contact with a contact element 7 are formed on the surface of the bar portion 5 which faces the leg portion 6. The leg portion 6 is bifurcated so as to be resiliently deformable, and it is rotatable around the outer surface of the support pole 2. During assembly, the T-shaped member 4 is inserted from the opening 1a, and the leg portion 6 is resiliently deformed so that it is rotatably and resiliently mounted on the outer surface of the support pole 2. The contact element 7 comprises a base portion 8 and a switch element 9 bent at a right angle from the base portion 8, which is provided with holes 8a, 8b. The protrusion 3 and a protrusion 10 are fitted in the holes 8a, 8b respectively so as to place the contact element 7 in position. The base portion 8 is partially cut away, and has a bent portion 8c. The base portion 8 is in contact with a contact (not shown) formed on a circuit board 11. The switch element 9 extends along an inside surface of the bar portion 5. The switch element 9 bears against the protrusion 5a and can resiliently deform about the point at which it is coupled to the base portion 8. Both ends 9a, 9b of the switch element 9 can make and break contacts with contacts 11a, 11b respectively which are connected with a wiring pattern 11c (Figure 1) on the circuit board 11. Reference numerals 12, 13 indicate decorative plates, and reference numeral 14 is a steel plate which reinforces the casing 1.

The operation of the switch of Figures 1 and 2 will now be described. Usually, the T-shaped member 4 is placed in its neutral position by the switch element 9 as shown in Figure 1. In this state, the operable member 4 is spaced from the contact 11a. When the operable member 4 is depressed to the right as shown in Figure 3, it rotates about the pole 2. Then, the switch element 9 is pushed by the protrusion 5a and is resiliently deformed. This brings the end 9b into engagement with the contact 11b, closing the switch. When the depressing force is removed, the switch element 9 is resiliently restored to the condition shown in Figure 1, thus opening the switch. If the operable member 4 is pushed to the left, then the switch element 9 similarly deforms resiliently, causing the end 9a to bear against the contact 11a. As a result, the switch is closed.

The switch according to the present invention and described above is relatively inexpensive and is simple in structure, shows excellent operability, and takes up only small space to install. Furthermore, it is easy to assemble because the T-shaped member can be mounted finally. In this way, the switch has excellent practical advantages.

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1. A switch comprising: a casing having an opening at a lateral wall thereof; a support pole formed adjacent to said opening inside the casing; a substantially T-shaped member comprising a bar portion located in said opening and a leg portion extending inward from substantially a centre of the bar portion, said leg portion being rotatably held on the support pole; a circuit board mounted in the casing and positioned substantially perpendicularly to said lateral wall; a contact element having a base portion connected to one side of the circuit board and a resiliently flexible switch element substantially at a right angle to the base portion and extending along the surface of the bar portion facing an end surface of the circuit board; and contacts provided on said end surface of the circuit board and with which the switch element makes and breaks contact when the T-shaped member is rotated about the support pole such that the resiliently flexible switch element is biassed apart from said contacts and rotation of the T-shaped member about the support pole brings the resiliently flexible switch element in contact with one of the contacts on the end surface of the circuit board.

2. A switch as claimed in claim 1 in which the leg portion is resiliently mountable on the support pole.

3. A switch as claimed in claim 2 in which the leg portion is resiliently mountable on the support pole by means of resilient bifurcations provided on the leg portion.

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4. A switch as claimed in any preceding claim in which the resiliently flexible switch element is integral with the base portion of the contact element.

5. A switch substantially as herein described with reference to and as shown in the accompanying drawings.

6. A digital timepiece having a switch as claimed in any preceding claim.