

REVERSING PUSH BUTTON

This invention relates to a push button of the type which has a body containing a button and a recess, at the bottom of which are located a first fixed opening contact, a second fixed closing contact and a third fixed common contact, the button being able to move
5 between the two positions in a sliding axis and acting on a washer which can move around a thrust line substantially perpendicular to the sliding axis.

In such a reversing push button, actuating the
10 button moves the washer from a first stable position, where it touches the first and third contacts, to a second stable position, where it touches the second and third contacts, and vice-versa, so as to obtain a reversing action with the push button.

15 Patent FR-2 478 366 describes a push button of this type. There are several disadvantages that may be noticed, especially when switching, as there is arcing on the common contact, which acts as a pivot, and a phenomenon of fretting-corrosion on the area where this
20 contact pivots, which reduces the working life of the push button.

The purpose of the invention is to avoid these disadvantages in a reversing push button of the type described to increase its working life in particular.

25 In the invention, the thrust axis is defined by two electrically insulated pivots with relation to the three contacts, and the third contact has two distinct contact points situated on either side of the thrust line, each next to one of these pivots and each only
30 operated in one of the stable positions of the washer.

Preferably, the third contact is U shaped, its ends form the above-mentioned distinct contacts and its core

acts as the contact zone with the common terminal. It is even more advantageous if the first and second contacts have the same U shape as the third contact.

The description will be made below, with regard to
5 the appended figures, of a non-restrictive embodiment of this invention.

Figure 1 shows an exploded perspective view of a push button in conformity with the invention.

Figure 2 shows a view of the underside of the push
10 button.

Figure 3 shows a top view of the bottom of the recess of the push button.

Figure 4 shows a cross sectional view of the push button in plane P.

15 Figures 5 to 7 are elevation views, with a partial section of the push button in the two stable conditions and in a transitory state of operation.

Figures 8 to 10 show a top view of the bottom of the recess of the push button in the states of
20 operation corresponding to figures 5 to 7.

Figure 11 shows a perspective view of a contact.

The push button shown in the Figures is of the solid state type, which is to say that in a same body A
25 are housed a button B and the fixed and moving contacts actuated by this button. The outside of the body A is cylindrical and inside it has a recess 10 which is also cylindrical, at the bottom 11 of which are located three fixed contacts C1, C2 and C3. The button B is of
30 the type which has two stable positions; it moves in a sliding axis X1 and acts, by means of two thrust elements R1 and R2, which are springs of different lengths and forces, on a pivoting washer D.

The washer D is a thin, electrically conductive
35 part which forms a kind of mobile contact bridge, pivoting between two pivots 14 and 15, tracing a thrust

line X2, which is substantially orthogonal to the axis X1 and contained within a plane P which passes through the axis X1; the pivots 14, 15 are electrically insulated with respect to the contacts C1 - C3, preferably by being formed by insulated projections from the body A. The height of the pivots 14, 15 in relation to the contacts C1 - C3 and/or the shape of the thrust zones of the washer D on the contacts C1 - C3 are such that the washer may briefly not touch any of the contacts when pivoting. In particular, the pivot 14 situated close to the contacts C1, C2, may be higher than them and the pivot 15, situated close to the contact C3, may be higher than it; the washer may also be convex towards the bottom 11 of the recess of the body A. The pivot 14 is slightly higher than the pivot 15.

The washer D offers two stable positions which are correlative to those of the button B so as to ensure, in the "out" position of the button B, the connection between the contacts C1, C3 and, in the "in" position of the button B, the connection between the contacts C2, C3. The washer D switches from one stable position to another by means of the two springs R1, R2 in the manner described in the patent FR-2 478 366. In particular, it should be noted that the long, weaker spring R1, is applied at its lower end onto a zone D1 of the washer D, whereas the short, stiffer spring R2, is applied onto a zone D2 of the washer. The D1 and D2 zones are situated on either side of the plane P, respectively on the side of the contacts C1 and C2.

The C1 contact is, for example, an opening contact (normally closed), the C2 contact is a closing contact (normally open) and the C3 contact a common potential, the C1 - C3 contacts being connected respectively to the screw terminals E1, E2, E3. Each screw terminal E has a screw 21 with a clamp plate 22. Depending on the

situation, the screws may be accessed from the bottom 16 of the push button and the conductors are inserted by means of lateral openings 17 on the body A, or the screws may be accessed by the openings provided on the side of the body and the conductors inserted by the bottom 16.

Each contact C1 - C3 is a conductor 24 bent into a U shape, fixed in place when the push button is assembled; the ends of the arms 25, 26 of these parts form the contact points C11, C12; C21, C22; C31, C32 and the core 27 of these parts has a tapped hole 28 which co-operates with the thread of the screw to form a connection zone for the external conductor which is to be connected. As we will see further on, the two contact arms C3 are of use electrically, whereas a single arm of each contact C1, C2 is of use electrically. Alternatively, the contacts C1, C2 may of course be shaped so that they only have a single point of contact. However, the indicated configuration of C1 and C2 provides the advantage of being the same as that of C3 and of allowing all of the contacts to be held satisfactorily by the positioning of their two arms, 25, 26 in adapted passages 29, 30, in the bottom 11 of the recess 10.

The operation of the push button will now be explained with regard to figures 6 to 8.

As the push button is supposed to be initially in the rest position, the button B is in its "out" stable position indicated in figures 5 and 8. The long, weaker spring R1 is applied by its lower end onto the zone D1 of the washer, whereas the short, stiffer spring R2 is not applied or only weakly onto the zone D2 of the washer. The washer D therefore presses against the pivot 14 next to C1, C2, on the contact point C31 situated at the free end 26 of the common contact C3

and on the contact point C12 at the free end of the arm 25 of the opening contact C1.

The washer D is not in contact with the closing contact C2; furthermore, it does not press against the pivot 15, as its zone D3 is slightly away from it. The connection is therefore made between the terminals E1, E3 and broken between the terminals E2, E3.

When the button B is pressed, the lower end of the spring R2 presses against the zone D2 of the washer and the force of R2 is greater, which causes the washer to pivot to the stable position shown in figures 7 and 10, passing by the intermediate position shown in figures 6 and 9. In this transitory intermediate position, the washer which has remained pressed against the pivot 14 presses against the pivot 15 situated next to the common contact C3, whilst at the same time breaking all contact with the contacts C1, C2 and C3. Then the washer leaves the thrust axis X2, which is to say that it pivots so that it no longer touches the pivot 15 and, whilst remaining pressed against the pivot 14, comes into contact with the contact points C32 of the arm 25 of the contact C3 and C21 of the C1 closing contact. The connection is thus made between the terminals E2, E3 and broken between the terminals E1, E3. The return to the initial position is carried out in the same way by pivoting in the other direction when the button is returned to its initial position.

It should be noted that on the one hand, the switching is in a way a double break, as first of all a connection is broken (e.g. C1, C3) before another connection is made (e.g. C2, C3), by disconnecting the common contact C3 briefly, and on the other hand, the pivoting function is clearly separated from the electrical conduction function at the common contact.

CLAIMS

1. Reversing push button, of the type which has a body containing a button and a recess, at the bottom of which are located a first fixed opening contact (C1), a second fixed closing contact (C2) and a third fixed common contact (C3), the button being able to move between two positions in a sliding axis (X1) and acting on a washer (D) which can move on pivots tracing a thrust line substantially perpendicular to the sliding axis, so that actuating the button moves the washer from a first stable position, where it touches the first and third contacts, to a second stable position, where it touches the second and third contacts, and vice-versa,

characterized in that:

- the pivots (14, 15) of the washer (D) are electrically insulated from the three contacts (C1-C3),
- the third contact (C3) has two distinct contact points (C31, C32) situated on either side of the thrust line, so that each is only operated in one of the stable positions of the washer.

2. Push button of Claim 1, characterized in that the washer (D) is, in each of its stable positions, applied onto one of the pivots (14) and freed from the other pivot (15) and, in an intermediate transitory position between the stable positions, applied onto the two pivots (14, 15).

3. Push button of Claim 1, characterized in that the third contact (C3) is U shaped and the ends of its arms (25, 26) are contact points (C31, C32), and its core (27) acts as a connection zone with the common terminal (23).



4. Push button of Claim 3, characterized in that the first and second contacts (C1, C2) have the same U shape as the third contact (C3).

5. Push button of Claim 3, characterized in that the arms (25, 26) of the U shaped contact are placed in respective passages (29, 30) of the bottom (11) of the recess (10).