

PUSH-BUTTON PROVIDING TACTILE AND AUDIBLE SIGNALS

The present invention relates to a pulse push-button comprising a tubular pusher housed coaxially in a cylindrical body and acting on electrical contacts, being guided in translation in the body and acted upon
5 by a return spring.

This type of push-button, also known as a single-push button, is well known. The user presses a finger on the pusher, which descends and commutes the electrical contacts; when the user's finger releases
10 the pressure on the pusher, the pusher rises under the influence of the return spring and the contacts return to their initial state and the pusher regains its initial position.

The absence in known slaved pulse push-buttons of
15 simple auditory and tactile signals indicating that the contacts have been correctly activated is disadvantageous. Moreover, quick-release push-buttons are known in the art that provide rapid commutation, for example by overrunning the dead center of springs.
20 Commuting in this type of quick-release push-button is accompanied by an audible and tactile signal, but this naturally requires the presence of a quick-release mechanism.

In known catching push-buttons, also known as push-push or double-push buttons, a cam with a catching zone that may, for example, be heart-shaped, is used in combination with a hairpin-shaped spring so that at the end of the downward movement of the pusher, the hairpin-shaped spring catches the catching zone of the cam and prevents the pusher from rising. The next time the pusher is activated the hairpin-shaped spring is freed from the catching zone during the downward movement of the pusher and the pusher is allowed to rise freely. However, this type of mechanism is dedicated to a specific catching mechanism of the type of button under consideration.

The aim of the invention is to use simple means to provide the user of a single-action slaved push-button with auditory and tactile feedback, i.e. without quick-release, said feedback indicating the correct operation of the push-button.

According to the invention, the push-button has a wall fitted with a cam that operates in conjunction with the active section, for example the tip, of a hairpin-shaped spring, said spring being embedded in the body and storing energy from being flexed by the cam. The edge of the cam has at least one reversing point; the entire edge of the cam is tracked without catching by the active section of the spring following an actuation cycle of the pusher, i.e. a movement in which the pusher descends then rises. The wall of the pusher is also fitted with a step associated with the reversing point to allow the active section of the spring to jump.

This combination of a loop-effect cam and a step is a simple way of providing the desired auditory and tactile sensations.

The end of the spring is preferably an elbow whose radial tip is capable of striking the bottom of the step when the elbow moves past the step.

5 The following description is of a non-limitative embodiment of the invention and refers to the attached figures.

Figure 1 shows a cross-section of a push-button according to the invention.

10 Figure 2 is an enlarged view of detail A of figure 1.

Figure 3 is a view along B of a detail of figure 2.

Figure 4 is a perspective view of the cam of the push-button.

15 Figures 5A to 5E show the various stages of movement of the cam relative to the spring during an actuation cycle of the push-button.

Figure 6 shows a variant embodiment of the cam.

20 The pulse push-button shown in figure 1 comprises a tubular body 10 that is generally cylindrical in shape and whose axis is shown as X. The push-button is fitted with a head 11 that is flared in relation to the barrel 12. Body 10 contains, coaxially disposed, a
25 pusher 20 that is generally cylindrical in shape and composed of an upper section 20a that is flared to fit into head 11 and a lower section 20b constructed as part of section 20a, and movable within barrel 12. The pusher moves inside body 10 so that it moves in translation along X when pressure is exerted on its
30 upper section 20a, acting against the effort exerted by coaxial helicoidal return spring 21 while being prevented from rotating around X. The pusher is stopped in the upper position in the body by stop means (not shown). The term "cylindrical" should be understood to
35 include prismatic or similar shapes.

The rotation of the pusher is retained and guided by means of suitable shaping such as that indicated by 13 and 22. The pusher 20 is fastened to the body by a leaktight seal 14 and comprises an inner chamber 23
 5 that may be used to house an indicator lamp.

The cylindrical perimeter of pusher 20 is composed of a wall 24 whose outer surface 25 bears a cam 30 that operates in conjunction with the active section 16, preferably the radially-elbowed tip towards axis X, of
 10 a spring 15 shaped like a hairpin or similar. Tip 16a located towards axis X of terminal section 16 presses against surface 25. The other terminal section 17 of spring 15 is embedded in housing 18 of the lower end of body 10.

15 It should be noted that spring 15 runs in a direction X1 parallel to X the length of the wall of the cylinder of barrel 12, preferably in a groove or slot 19 cut in the wall. As will be seen below, spring 15 is acted upon by the cam such that the resulting
 20 flexion causes storage of energy that provides the desired tactile and auditory effect together with a percussive effect due to the release of the tip of the spring striking suitably-shaped surface 25.

Cam 30 is more or less in the shape of a
 25 parallelogram, having two sides 32, 34 that are roughly parallel to axis X of the body and two other oblique sides 31, 33. Oblique side 33, located towards the head 11 of the push-button, is a continuous flat or convex surface and oblique side 31 of the cam, located on the
 30 other side from the head, may also have a continuous surface (see figures 5A-5E) or a discontinuous surface that offers tactile resistance (see figure 6). The cam has a reversing point 35 (an acute angle of the parallelogram) at the juncture of sides 32, 33 and
 35 another reversing point 36 at the juncture of sides 34, 31.

The outer surface 25 of wall 24 comprises a ramp 26a that rises slightly to guide the tip 16a of elbow 16 of spring 15 along side 31 and a dished area or similar indentation 26b adjacent to ramp 26a that provides a step 27 in the region of reversing point 35. Similarly, a ramp 28a that rises slightly to guide the tip 16a of elbow 16 along side 34 and an indentation 28b adjacent to ramp 28a that provides a step 29 in the region of reversing point 36.

10 The push-button described above operates as follows:

 The initial position is shown in figure 1 and 5A. In this position, the pusher 20 presses against part of the body while the upper surface of elbow 16 is located in the immediate region of lower side 31 of cam 30 or is applied to this side, the spring being at rest.

 When a user actuates the push-button by pressing the upper section 20a with a finger, the pusher 20 descends, and with it cam 30 (figure 5B) so that side 31 of the cam pushes elbow 16 of spring 15 to the left. The spring is flexed and remains flexed while elbow 16 slides along side 32 of the cam as far as reversing point 35 (see figure 5C). When it moves past step 27 associated with point 35, the end 16a of elbow 16 releases the stored energy and strikes the bottom of indentation 26b. The user then hears a sound indicating that the required action has been carried out; at the same time the user's finger feels a reaction transmitted by the cam and the pusher. Chamber 23 inside the pusher amplifies the sound.

 As it rises, the pusher causes the spring to flex towards the right (see figure 5D) following the sliding of side 33 of the cam against the elbow 16. Finally, tip 16a of elbow 16 travels up ramp 28a and, when the elbow passes beyond reversing point 36 and the associated indentation 29 (figure 5E), it strikes

surface 25 in indentation 28b so that the user hears a sound and feels a tactile sensation as before. It will be clear that the measurements of the reversing points, ramps and indentations may be calculated, for example, so as to stress the first indication (indentation 27). Similarly only a single indentation may be provided.

Figure 6 shows a variant in which a discontinuity 37 is provided in side 31 of cam 30 to provide tactile resistance at the beginning of the actuation cycle. The cams given as examples may, naturally, be differently shaped.

CLAIMS

1. Pulse push-button comprising a tubular pusher (20) having a wall (24) that is housed coaxially in a tubular body (10) to act on electrical contacts, guided in translation in the body and acted upon by a return spring, *characterized by the fact that:*

- the wall (24) of the pusher is fitted with a cam (30) that operates in conjunction with the active section (16) of a hairpin-shaped spring (15), said spring being embedded in the body and storing energy from being flexed by the cam.
- the edge of the cam (30) has at least one reversing point (35), said edge being entirely tracked without catching by the active section of the spring during an actuation cycle of the pusher, and the outer surface (25) of the wall (24) is fitted with a step (27) associated with a reversing point.

2. Push-button of claim 1 characterized by the fact that the active section (16) of the spring is a terminal section in the shape of an elbow whose end (16a) is capable of striking the bottom of the step (27) when the elbow moves past the step.

3. Push-button of claim 1 characterized by the fact that the edge of the cam (30) comprises two reversing points (35, 36) and the outer surface (25) of the wall (24) respectively two steps (27, 29) to cause sudden release of one end (16a) of the active section (16) of the spring at each reversing point.

4. Push-button of claim 1 characterized by the fact that cam (30) is more or less in the shape of a parallelogram, having two sides (32, 34) that are roughly parallel to axis (X) of the body (10) and two other oblique sides (31, 33), oblique side (33) being



located towards the head (11) of the push-button and having an unbroken flat or convex surface.

5 5. Push-button of claim 4 characterized by the fact that oblique side (31) of the cam (30), located on the opposite side from the head (11), is provided with a discontinuity (37), designed to give tactile resistance.

10 6. Push-button of claim 1 characterized by the fact that the spring (15) runs in a direction parallel to the axis (X) of body (10) in a groove or slot (19) cut in the body.