April 16, 1968 V. RUSSENBERGER 3,378,664

MOMENTARY ACTUATION PUSHBUTTON SWITCH

Filed Feb. 18, 1966

Fig.2.

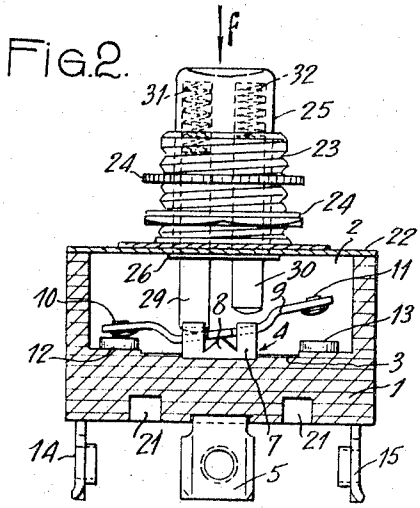
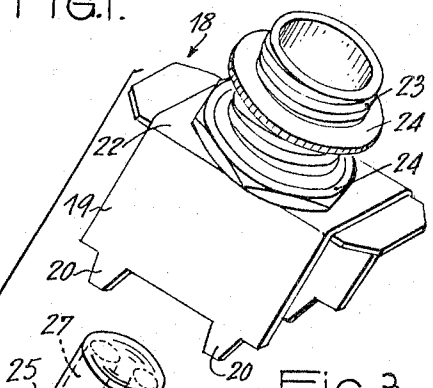


Fig.1.



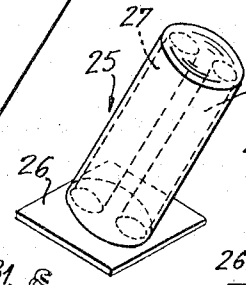


Fig.3.

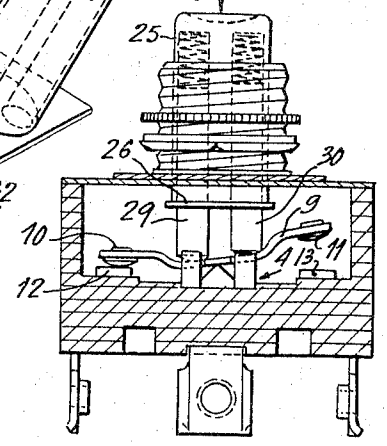


Fig.7.

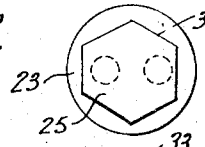
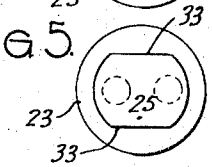
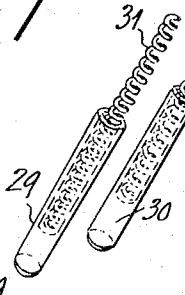


Fig.5.





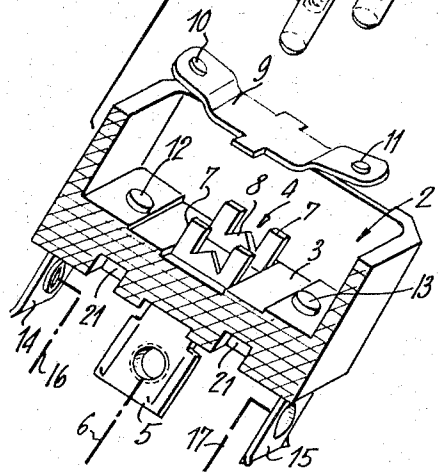
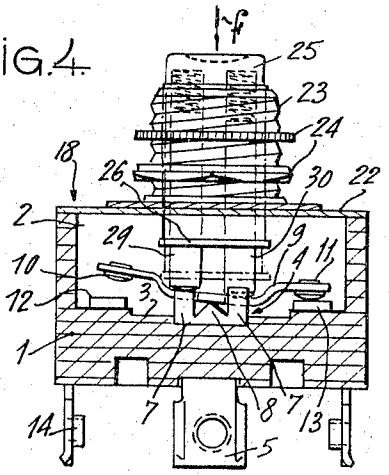


Fig.4.



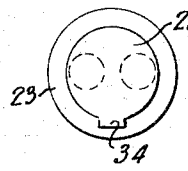


Fig.6

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MOMENTARY ACTUATION PUSH-BUTTON SWITCH

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2 Claims. (Cl. 200—160)

ABSTRACT OF THE DISCLOSURE

A momentary-contact pushbutton operated switch having a conductive rocker bar adapted to rotate about an axis to close contacts, a pushbutton carrying first and second springs to apply forces to the rocker bar on opposite sides of the axis, with one spring being longer to bias the rocker bar in one direction against one stationary contact during non-actuation of the pushbutton, and the other spring being shorter and stronger and adapted to engage the rocker bar during actuation of the pushbutton.

The present invention relates to a new momentary actuation pushbutton switch whose particular design enables a simple but strong appliance to be made to work reliably. Furthermore, the invention affords an important advantage in that various of its parts may be mass produced, thus substantially reducing the unit cost price of these appliances. Moreover, this cost price is still further lowered owing to the fact that the switch has only a few independent moving parts and does not require any particularly delicate mounting arrangement.

According to the invention, the switch comprises a tubular casing for the axial guiding and angular fixing of a sliding insulating pushbutton provided with at least one pair of telescopic plungers. The plungers are controlled by two springs of different lengths and strengths which form recoil members for said pushbutton and alternately act on at least one rigid conductive rocking blade. The blade is mounted on a central connection terminal carried by an insulating casing, the terminal parts of said blade being provided with contact pads provided to cooperate alternately with complementary pads fixed to said casing and connected to two independent external connection terminals.

Various other characteristics of the invention will moreover be revealed by the detailed description which follows.

Illustrative embodiments of the invention are shown, by way of non-restrictive example, in the attached drawing.

FIG. 1 is an exploded view of the switch according to the invention.

FIG. 2 is a longitudinal elevation-section of the switch.

FIGS. 3 and 4 are longitudinal elevation-sections showing certain characteristic positions of parts of the switch during its working.

FIGS. 5 to 7 are plan views diagrammatically showing alternative embodiments of one of the parts of the switch.

According to the form of embodiment shown in FIGS. 1 to 4, the switch according to the invention comprises a casing 1, advantageously made of insulating material, defining a cavity 2, parallel epipedic, for example. The bottom 3 of this cavity in its middle area supports a yoke 4 connected by an internal electric link (not shown) to a central connection terminal 5 to which is connected a current conveying lead 6, shown by dotted lines. The wings 7 of the yoke 4, which extend parallel to the longitudinal

faces defining the cavity 2, are cut out for forming blades 8 provided for supporting a rigid rocking blade 9, which is conductive, wedged in the longitudinal axis of the cavity by the wings 7 and whose terminal parts are provided with contact pads 10, 11. The tips of portions 8 will be seen to define an axis about which rocker bar 9 may rotate. Depending on the position occupied by the blade 9, pads 10, 11 respectively are intended to cooperate with two stationary contacts 12, 13 supported by the bottom 3 on either side of the yoke 4, and similarly connected to two external connection terminals 14, 15 to which are connected two independent conductors 16 and 17 also shown by dotted lines.

The casing 1 normally is covered by a U-shaped cap 18 whose sides 19 terminate in curved lugs 20 which engage notches 21 formed in the external face of the bottom of the casing. This cap, made to totally close the cavity 2, from its base 22, comprises a tubular cylindrical cover 23 having an axial bore entrant into the cavity 2. This cover 23 is externally threaded for receiving one or more nuts 24 intended to ensure its holding to a wall. The cover 23 also forms a guiding element for a sliding or reciprocating cylindrical pushbutton 25 made of insulating material. This pushbutton, at one of its end faces, comprises a shoe 26 extending between the longitudinal edges of the casing 1 defining the cavity 2, for ensuring the angular orientation of said pushbutton. Such shoe 26 also forms a member capable of bearing against the base 22 of the cap 18 for limiting the maximum extension of the pushbutton 25 in relation to the cover 23.

The pushbutton 25 is formed so as to axially have parallel bores 27 and 28 extending through shoe 26 and opening in the cavity 2. These bores are made to receive two telescopic plungers 29 and 30 engaged with interposition of the spiral compression springs 31 and 32. Plunger 28 is fitted with a long spring 31, having low resistance against compression, whereas plunger or piston 30 is associated with a more resistive shorter spring 32. The length of the spring 31 is provided so that when the cap 18 previously fitted with the pushbutton 25 is positioned on the casing 1, the corresponding piston 29 is held as seen in FIG. 2, in permanent contact with the rocking blade 9 which, for example, occupies such a position that one pad contact on rocker bar 9 electrically contacts stationary contact 12. In order that the contact force between the two contacts be obtained positively, it is obvious that the length of the spring 31 also is chosen so that, in such position, said spring is kept slightly compressed. On the contrary, the length of the spring 32 is provided so that in this position, said spring is completely slack and keeps the corresponding piston 30 away from the rocking blade 9. It will be seen that springs 31 and 32 acting through their respective plungers 29 and 30, act on rocker bar 9 at two locations which are on opposite sides of the pivot axis defined by points 8, 8.

In the position shown in FIG. 2, in which the pushbutton 25 is not being urged, the position of the rocking blade 9 has the effect of setting up an electric link between the central terminal 5 and the lateral terminal 14. When a user wishes to alter the fixed electric link thus established, he presses on the push-button 25 to lower it in relation to the cover 23, also further compressing the spring 31. This has the effect of bringing the piston 30 into contact with the blade 9 (FIG. 3) up to the point where the force of spring 32 becomes greater than that of the spring 31. The pushing in of the pushbutton 25 thus acts through the piston 30 directly on the blade 9 and makes it to rock (FIG. 4), during which rocking the spring 31 of low resistance is subjected to a supplemen-

tary load. The rocking of the blade 9 cuts out the electric link between the terminal 5 and the terminal 14 and sets up, by putting the contacts 11 and 13 into contact, the connection between the terminal 5 and the terminal 15.

This link is maintained up to the moment when the user stops his action on the push-button 25. Actually, the spring 32 restores the work stored up and thrusts the pushbutton 25, in cooperation with the spring 31. The piston 30 thus is disengaged from the blade 9, and urged only by the piston 29 and the spring 31, rocks in reverse direction to assume its original position in which again it sets up the initial link.

It is obvious that a pushbutton of this kind can be operated for various purposes requiring the momentary cutting out of a permanent electric link, the momentary closing of a normally open circuit or else the momentary reversing for the supply of two independently working circuits.

In addition to the simplicity in construction, the efficiency in operation and the reliability of the switch described above, it should be noticed, as can be seen from FIG. 4, that the depression of the pushbutton 25 can be increased beyond the distance required to cause the rocking of the blade 9, by an extent corresponding with the maximum compression that can simultaneously be applied to the springs 31 and 32. The supplementary push-in distance, shown by dotted lines in FIG. 4, advantageously is provided for ensuring a relatively gentle actuating of the push-button, so as to lessen the stresses ordinarily applied to the moving parts in the switch when the effective travel of actuating of the pushbutton is limited by a rigid stop. Such an advantage also is appreciated most particularly when the switch is intended automatically to control the opening and the closing of any kind of circuit as a function of the position occupied, for example, by a mobile panel or else a sliding independent part. Actually the determining of the original control position can approximately be ascertained without effecting a precise and delicate adjustment as the accidental displacement of the movable part beyond the extent necessary for rocking the blade can be absorbed, without risk of damaging the various constitutive elements in the switch, by the elastic end of travel of the push-button.

FIGS. 5 to 7 show that the angular fixing of the push-button 25 to maintain proper alignment between plungers 29 and 30 and the rocking blade 9 can be made in several different ways, by flat parts 33 provided on the push-button 25 and on the cover 23 (FIG. 5), by an axial heel 34 cooperating with a corresponding groove made in the cover (FIG. 6) or by a polygonal cross structure 35 of said pushbutton (FIG. 7).

In the foregoing, it is shown that the pushbutton 25 acts on a rocking blade but it is quite obvious that a single pushbutton also can act on several blades whose respective rocking is simultaneously or consecutively effected. Actually, by way of example, we can provide a pushbutton 25 comprising at least two pairs of pistons 29 and 30 associated with comparatively identical or different springs, to act together or successively on two independent blades able to be rocked each in the same direction or else opposedly relative to each other.

The invention is not restricted to the examples of the specific embodiment shown and described in detail for various modifications can be applied to it without exceeding its scope.

What I claim is:

1. A momentary-actuation pushbutton switch comprising, in combination: an insulating base; a cover having a first axial bore, said cover being attached to said base; an insulating pushbutton reciprocably mounted within said bore, said pushbutton containing at least two further bores each parallel to the axis of said first bore; yoke means mounted on said insulating base and provided with a pivot edge and an external connection terminal, the axes of said two further bores being located on opposite sides of said pivot edge; a conductive rigid rocker bar having contact pads on opposite ends and a midportion adapted to engage said pivot edge; a pair of stationary contacts mounted on said insulating base, connected to external connection terminals and adapted to be engaged alternately by respective ones of said contact pads on said rocker beam; a first compression spring situated within a first of said two further bores; a second compression spring situated within a second of said two further bores; a first plunger reciprocally mounted within said first of said two further bores and urged by said first compression spring against a portion of said rocker bar on one side of said pivot edge; a second plunger reciprocally mounted within said second of said two further bores and urged by said second compression spring toward a portion of said rocker bar on the opposite side of said pivot edge, said first and second compression springs being of different lengths whereby only said first plunger engages said rocker bar during nonactuation of said pushbutton and whereby actuation of said pushbutton urges said second plunger against said rocker bar to pivot said rocker bar about said pivot edge.

2. A switch according to claim 1 in which said pushbutton includes a portion of non-cylindrical shape to angularly orient said pushbutton within said axial bore in said cover and stop means to limit outward reciprocation of said pushbutton relative to said cover.

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