Nov. 14, 1967 3,352,980

G. M. C. DU TEMPLE DE ROUGEMONT ET AL

SLIDABLE SWITCH ACTUATOR CONTACTS AND STRUCTURE ASSOCIATED THEREWITH

Filed Oct. 11, 1965

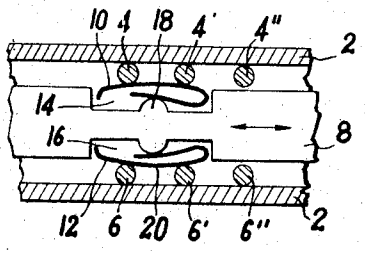


FIG.1

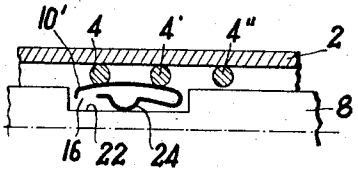


FIG.2

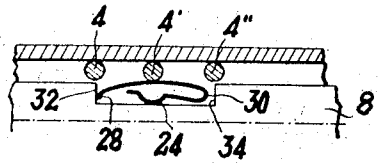


FIG.3

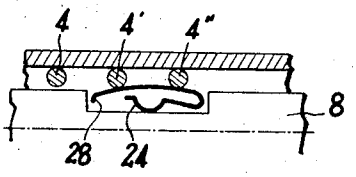


FIG.4

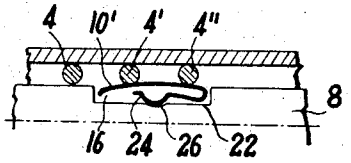


FIG.5

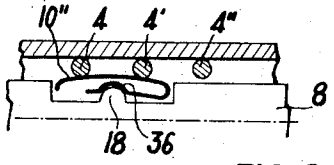


FIG.6

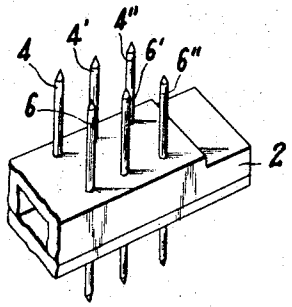


FIG.7

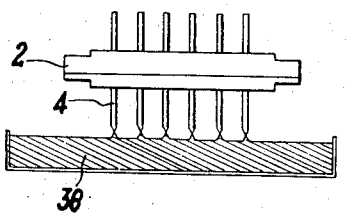


FIG.8

United States Patent Office 3,352,980
Patented Nov. 14, 1967

3,352,980

SLIDABLE SWITCH ACTUATOR CONTACTS AND STRUCTURE ASSOCIATED THEREWITH

Godefroy Marie Christian du Temple de Rougemont, 46 Rue de la Faisanderie, Paris, and Max M. Stapfer, 35 Ave. de Guyenne, Antony, France

Filed Oct. 11, 1965, Ser. No. 494,401
Claims priority, application France, Oct. 14, 1964, 991,333
4 Claims. (Cl. 200—16)

ABSTRACT OF THE DISCLOSURE

The switch comprises an elongated housing with contacts disposed therein. The actuator, which is disposed in the housing, has a J-shaped spring contact with an arcuate portion disposed in a corresponding recess or boss.

This invention relates to manually controlled switches.

In our United States Patent No. 3,259,728 switches are described, especially multiple-contact switches, for use in high or low tension circuits, such as those of radio or television sets.

The requirements especially sought after for such switches are, mainly, very low electrical resistance of the contacts and temporal stability of that resistance throughout a very high number of switching operations.

The present invention is an electric switch comprising an insulated casing in several parts carrying fixed contacts and a slide member displaceable within said casing and carrying movable contacts designed to cooperate with the fixed contacts, and in which said fixed contacts assume the form of straight lengths of conductor wire of circular cross-section inserted into holes bored in opposite pairs in two parts of said casing, and in that each of said movable contacts assumes the form of a spring conductor strip bent substantially to J-shape which is accommodated in a longitudinal recess provided in the slide opposite the fixed contacts, the shorter arm of said spring strip bearing with a rocking action against the base of said recess and the longer arm engaging the successive pairs of fixed contacts opposite to form an electrical connection.

In the above-mentioned patent an embodiment is described in which each spring conductor strip forming a movable contact is supported by its shorter arm, that is the arm opposite to that engaging the fixed contacts, upon a boss located substantially at the center of the base of said recess. By this arrangement, during each switch operation, the movable contacts perform a rocking action relative to the boss. This rocker mounting, together with the form of the movable contacts, ensures extremely well-balanced contact between each movable contact and the fixed contacts with which it engages.

The present invention relates to certain further embodiments of the movable contacts which likewise ensure perfect balance of contact pressures between fixed and movable contacts and also provide smoother functioning of such switches. This invention also relates to certain further improvements brought to the switches described in the above patent especially concerning the fixed contacts.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawing, in which:

FIG. 1 is a part-view in section of a switch, showing an arrangement of the fixed and movable contacts described in the above patent.

FIG. 2, 3 and 4 illustrate a further embodiment of the movable contacts, showing three different positions of the slide carrying these contacts.

FIG. 5 shows a modified form of the movable contacts shown in FIGS. 2, 3 and 4.

FIG. 6 relates to a further embodiment in which, as already described in the above patent, the movable contact rocks upon a boss provided on the slide.

FIGS. 7 and 8 are a perspective view and an elevation view respectively of an improvement in the fixed contacts of a switch according to the invention.

Referring now to FIG. 1 which is intended by way of a reminder, there is shown the insulated casing **2** of a switch in which are inserted straight lengths of cylindrical wire grouped, for example, in two rows of **4–4′–4″** and **6–6′–6″**. The slide member **8** of insulating material is displaceable within the casing **2** between the two rows of wires. The slide is actuated by a key or push-button control (not illustrated) and carries the movable contacts **10–12**.

It is manifest that one slide may carry a greater number of moveable contacts, thus providing, for example, switches with 6, 4 or 2 reversers.

In the case of the embodiment shown in FIG. 1, as described in the above patent, each movable contact is accommodated in a recess **14–16** in the slide **8** and assumes the form of a strip of spring metal which is silver-plated on its working surface. This metal strip is bent into J-shape and its shorter arm is supported upon a boss **18–20** provided in the base of the recess **14–16**, so as to perform a rocking motion.

According to the new embodiment illustrated in FIGS. 2, 3 and 4, the rocket mounting of the contact **10′** upon the rectilinear base **22** of the recess **16** is provided by an arc-shaped portion **24** of that arm of the movable contact which is opposite to the fixed contacts.

In FIGS. 2 and 4 the slide **8** is shown in its two terminal positions in which the movable contact **10′** makes contact between the fixed contacts **4–4′** and **4′–4″** respectively. It will be seen that, in the mid-position illustrated in FIG. 3, the movable contact rocks slightly upon its curved portion **24** when the curved portion is passing at right-angles to the central fixed contact **4′**, so that friction between the movable contact and the terminal contacts **4′–4″** occurs only when the slide reaches its end position, thus reducing considerably the total working friction produced in the switch.

In the modification shown in FIG. 5, the curved portion **24** of the movable contact **10′** cooperates with a correspondingly shaped hollow **26** provided in the base **22** of the recess **16**. In this arrangement, the contact **10′**, during travel of the slide, is maintained in its longitudinal position, not by its extremities **28** or **30** (FIG. 3) abutting against the walls **32–34** of the recess, but by the provision of the hollow **26** in the slide.

In the embodiment illustrated in FIG. 6, the boss **18** in the slide is retained and the shorter arm of the contact **10″** provided with a portion of corresponding curvature **36** which pivots around the boss **18** as the movable contact rocks, thus fixing the longitudinal position of the spring strip in the recess **16**.

Switches according to the present invention find a particularly useful application in radio or television sets, especially those in which assembling is done with printed circuits.

Such switches may have on each face a large number of fixed contact points (FIG. 7), for example 12 or 18, which must be inserted in the corresponding holes provided in the printed circuits.

The present invention also relates to an improvement in fixed contacts enabling the switches to be positioned more quickly on printed circuits. According to this improved arrangement, the fixed contact terminals assume the form of wires with pointed extremities, as shown at **4–4′–4″** and **6–6′–6″** in FIG. 7. Such an arrangement facilitates considerably the insertion of the cylindrical

wires forming the fixed contacts into the holes of the printed circuits.

The method of forming points in one single operation upon all extremities of the switch contact wires (the extremities being normally severed at right-angles) consists in dipping the extremities in a bath of solder **36** (see FIG. 8) and then withdrawing the switch in a vertical direction so as to leave on each fixed contact a tiny drop of solder terminating in a point. The operation is carried out extremely quickly and may be carried out either when the switch is fully assembled or when the casing **2** alone is assembled and is fitted with its fixed contacts. When the switch wires are soldered on the printed circuits, after having threaded all the wires simultaneously into the corresponding holes, the solder points melt and disappear.

It is manifest that the invention is not limited to the embodiments herein described and illustrated, but that a great number of modifications would suggest themselves to the technician from the applications put forward above, without thereby departing from the framework of the invention.

What we claim is:

1. An electric push-button switch comprising an elongated casing of insulating material having a lengthwise passageway therethrough, a plurality of fixed contacts extending into said passageway and spaced therealong, a selector slidably mounted in said passageway and having at least one recess having a bottom and an opening toward said contacts, a flexible J-shaped movable contact element disposed in said recess with its longer arm adapted to wipe over said fixed contacts and to bridge two adjacent ones of said fixed contacts, its shorter arm adapted to bear against said bottom of said recess, and means including an arcuate portion of said shorter arm forming a pivot whereby said element will rock as its longer arm moves past one or the other of said two adjacent fixed contacts, said arcuate portion of the shorter arm of said element being formed substantially at the center of said J-shaped element and bearing on the bottom surface of said recess.

2. A switch according to claim **1** in which said arcuate length portion of the shorter contact arm bears with its concave side on a convex supporting surface of a boss protruding from said bottom surface of the recess substantially at the center thereof.

3. An electric switch as claimed in claim **1**, in which the bottom surface of said recess is provided, substantially at its center, with a slight arc-shaped hollow designed to receive and to maintain in position said arcuate portion of the shorter arm of the movable contact element.

4. An electric switch as claimed in claim **1**, in which the free ends of the connecting wires of the fixed contacts are each prolonged by a pointed tip made of solder material.

References Cited

UNITED STATES PATENTS

3,019,323	1/1962	Daniels	200—164
3,072,757	1/1963	Gluck	200—16
3,198,896	8/1965	Clavel	200—16
3,225,149	12/1965	Shlesinger	200—16
3,259,728	7/1966	De Rougemont et al.	200—16

ROBERT K. SCHAEFER, *Primary Examiner.*

J. R. SCOTT, *Assistant Examiner.*