United States Patent

Bellmann

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[54] CONTACT SPRING ASSEMBLY FOR RELAYS AND SIMILAR SWITCHES

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[51] **Int. Cl.** **H01h 1/00**

[58] **Field of Search** ..... 200/166 J

[56] **References Cited**

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[57] **ABSTRACT**

A contact spring assembly is held together by a body of insulating material provided with guide slots into which the contact spring sheets are inserted individually. A cut-out projection portion of the sheets engages the block but does not always guarantee a reliable and firm seating. An eccentric bolt is passed through boreholes in both the sheets and the body of insulating material, and is turned therein for providing a firm assembly therebetween.

5 Claims, 4 Drawing Figures

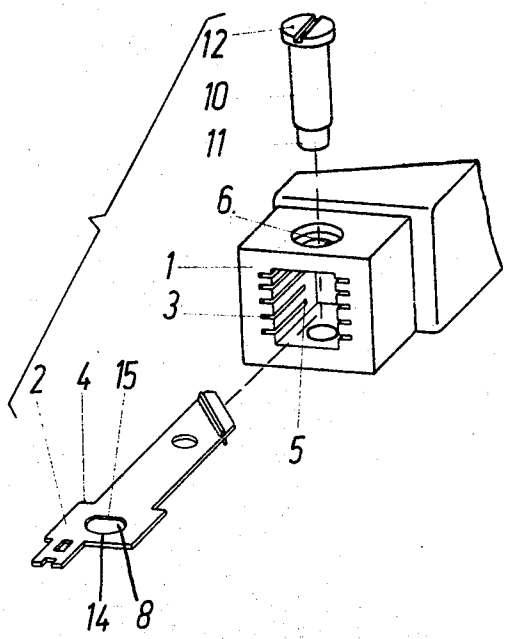


Fig.1

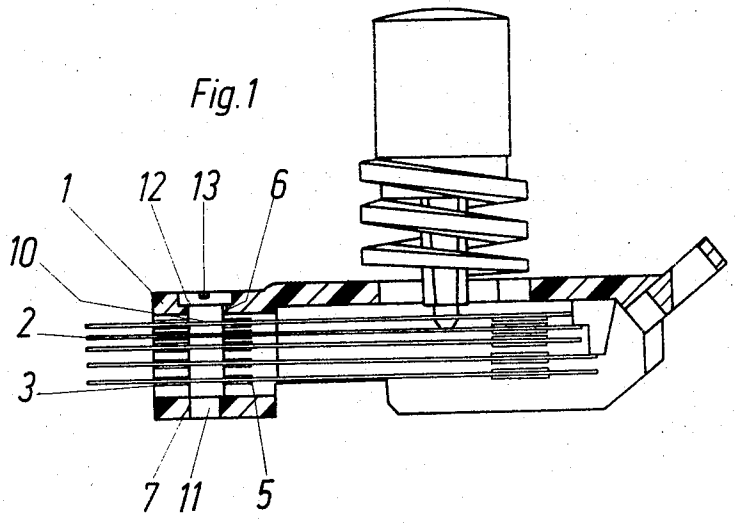


Fig.2

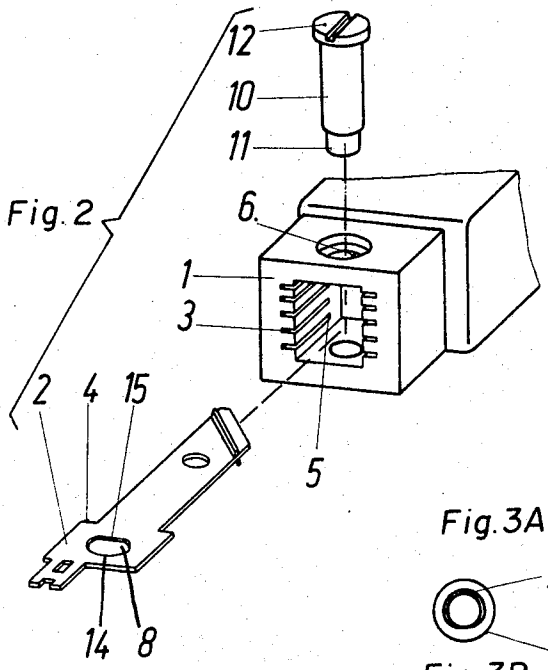


Fig.3A

Fig.3B



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CONTACT SPRING ASSEMBLY FOR RELAYS AND SIMILAR SWITCHES

Relays and similar electro-magnetically or mechanically actuated switches used in control engineering, and more particularly in telecommunications engineering, comprise the contact spring assembly as a substantial component part. This contact spring assembly consists of oblong contact spring sheets or strips, with the one end carrying the contacts, and the other end being mounted. In earlier types of embodiments, this mounting is effected by means of screws passing through holes in the contact spring sheets at the respective ends, with the individual strips of sheet metal being insulated from one another by intermediate layers and sleeves of an insulating material. In more recent designs, these contact spring sheets are slipped into guides provided in a body of insulating material, with the sheets being provided with slightly bent resilient nose portions engaging corresponding recesses in the body of insulating material, thus retaining the individual sheets in their operating position. Contact spring assemblies of this type are substantially more inexpensive to manufacture, because of requiring less individual parts, and a shorter assembly time. They have the disadvantage, however, that in the case of small manufacturing tolerances at both the sheets and the guides in the body of insulating material, the individual sheets do not always attain the necessary safe and irremovable seating, which might become the cause of faulty contact operations of the finished switch.

It, therefore, is the object of the present invention to provide a contact spring assembly avoiding this disadvantage.

The invention relates to a contact spring assembly for the use in relays or similar switches capable of being actuated electromagnetically or mechanically, consisting of several oblong contact spring sheets carrying at one end contacts, with the other end, by being insulated from one another, being slipped into individual guides specially provided for each contact spring sheet, provided in a common body of insulating material. The invention resides in the fact that the contact spring sheets are retained in the body of insulating material with the aid of one common bolt of insulating material passing vertically in relation to the longitudinal direction of the contact spring sheets, through a bore hole in the body of insulating material, and also through corresponding holes provided in the contact spring sheets themselves, thus being protected against dropping out.

Mounting of the contact spring sheets in the body of insulating material with the aid of bolts of insulating material, is appropriately effected in the holes in the sheets are not made round, but to have a not completely circular shape, and that the bolt of insulating material, in its center part, and with respect to its cylindrical end parts, is eccentrically shaped and rotatably supported in the bore holes provided in the body of insulating material. By turning the bolt, its eccentric part is pressed so strongly against the walls of the holes in the contact spring sheets, that the latter are incapable of moving in the holding arrangement. In this way also the bolt is clamped and prevented from falling out. When using a semi-hard plastics material for manufacturing the bolt, the edges of the sheets may cut into it in the holes, thus achieving a further improvement in the firm seating.

A still further improvement as regards the seating and a facilitation of the assembly can be achieved in that the contact spring sheets, at their ends serving the mounting purpose, and towards the one or both sides, is provided with one enlarged or widened extension each meeting against the one or each time one corresponding inwardly directed projecting portion as provided in the guides on the body of insulating material. The oblong hole in The body of insulating material serving to receive the contact spring sheets is of a square shaped design and is provided at its side walls with slots which, however, only extend over one portion of the length of the hole, thus providing limiting stops for the extensions provided at the contact spring sheets.

For explaining the invention, one example of embodiment will now be described with reference to FIGS. 1 to 3 of the accompanying drawing, in which:

FIG. 1 shows a section taken through a key switch or telephone apparatus utilizing the contact spring assembly according to the invention,

FIG. 2 shows an exploded perspective representation of the individual parts of the contact spring set prior to the assembly and,

FIGS. 3*a* and 3*b* show both the top and side view of the bolt of insulating material.

The body of insulating material 1 which, simultaneously, is also provided with holding arrangements for mounting it, and with a pushbutton knob, comprises a square oblong hole for receiving the contact spring sheets 2. In the side walls slots 3 are provided from the inside which, however, do not extend over the entire length of the body 1. In this way limiting stops 5 remain, meeting against the cut away projections 4 of the contact spring sheets 2 when pushed into the slots 3. Moreover, the body of insulating material comprises bore holes extending vertically in relation to the longitudinal direction, of which the upper one 6 has a larger diameter than the lower one 7. The contact spring sheets 2 are provided with a hole 8 corresponding to the bore hole in the body 1, but not having a completely circular surface, so that there will result an arc-shaped edge 14 and one straight-lined edge 15. At its upper and lower end, the bolt is of circular design, thus capable of rotating in the corresponding bore holes 6 and 7 as provided in the body of insulating material. Its central part 10, however, is shaped eccentrically towards its cylindrical ends 11 and 12, thus adapted to the shape of the hole 8 in the contact spring sheets 2, and after the sheets have been inserted in the body 1, it is passed through the bore holes 6 and 7 as well as through the holes 8 in the individual sheets 2 and, by means of a tool inserted in the slot provided on its top side 12, is turned to such an extent that the edges (14, 15) of the sheets will cut into it in the hole 8. In this way the bolt is firmly seated, and the contact spring set is readily assembled.

For manufacturing the body of insulating material it is possible to use any suitable insulating material, although a suitable artificial resin should be given preference. The material for the bolt is appropriately likewise a suitable artificial resin.

What is Claimed Is:

1. A contact spring assembly for relays and other switches capable of being actuated electro-magnetically and mechanically, comprising a plurality of oblong contact spring sheets carrying contacts at one end, a body of insulating material incorporating individual guide slots for the contact spring sheets, a common bolt of insulating material storing the contact spring sheets in the body of insulating material, said bolt extending perpendicularly in relation to the longitudinal direction of said contact spring sheets through a borehole provided in said body of insulating material as well as through corresponding holes provided in said contact spring sheets to protect the contact spring sheets against dropping out.

2. A contact spring assembly according to claim 1, in which said holes in said contact spring sheets has one edge which is not completely circular, and said bolt around its central part and with respect to its cylindrical end parts, is shaped eccentrically, and is rotatably supported in said bore holes as provided in said body of insulating material.

3. A contact spring assembly according to claim 2, in which said bolt is made from a semi-hard material and, during assembly of the contact spring sheets, is turned in such a way that the edges of said contact spring sheets will cut into the eccentric center part.

4. A contact spring assembly according to claim 1, in which each contact spring sheet, at the end thereof serving the mounting is provided with at least one extension for meeting against a corresponding inwardly directed limit stop arranged in the associated guide slot provided in said body of insulating material.

5. A contact spring assembly according to claim 4, in which said body of insulating material comprises a square-shaped longitudinal hole in which, throughout part of its length, guide slots are arranged for receiving and guiding the projecting portions as provided on said contact spring sheets.

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