

Electrical switch

This invention relates to an electrical switch.

There is a need for an electrical switch which is cheap and simple to manufacture and which can be easily mounted on a substrate such as a printed circuit board to provide switching between conductors on the substrate.

Many forms of such switch are known but a disadvantage of known switches is that the component parts thereof are not secured together as a unitary structure prior to mounting of the switch on the substrate, but instead the component parts have to be manually assembled and held together while the switch is being mounted.

Known forms of such switches comprise an elongate housing of substantially U-shaped cross-section and adapted for mounting on a substrate with the open side of the housing facing the substrate; a slider received in the housing for axial sliding movement relative thereto; and a contact member carried by the slider and adapted and arranged to engage conductors on the substrate when the switch is mounted thereon.

According to this invention such a known switch is characterised in that the opposed side walls of the housing are each formed with a cantilever spring arm extending axially of the housing and obliquely inwardly of the side wall, the slider being formed with flanges which engage over the inner longitudinal edges of the spring arms thereby to retain the slider in the housing and the slider also being formed with scalloped surfaces engaged by the free ends of the spring arms thereby to provide a detent action on axial movement of the slider relative to the housing.

Thus in the switch of this invention the slider carrying the contact member, is secured in the housing prior to mounting of the switch on a substrate and thus only a unitary structure has to be mounted, this making mounting easy. Further, the means serving to retain the slider in the housing, that is the spring arms, also serves the advantageous additional function of providing a detent action for the switch.

Two electrical switches according to this invention will now be described by way of example with reference to the drawings, in which:—

Figure 1 is a perspective view of the first switch and a substrate on which the switch is to be mounted;

Figure 2 is an exploded perspective view showing the components of the first switch;

Figure 3 is a sectional view on the line III—III in Figure 1;

Figure 4 is a sectional view on the line IV—IV in Figure 1;

Figure 5 is a view similar to Figure 3 but showing the first switch mounted on the substrate;

Figure 6 is a perspective view of a strip of contact members for use in switches as shown in Figures 1 to 5;

Figure 7 is a perspective view showing part of a strip of housings for use in assembling switches according to the invention;

Figure 8 is a perspective view showing part of a strip of sliders for use with the housing strip of Figure 7;

Figure 9 is a perspective view of a strip of switches assembled from the housings and sliders of Figures 7 and 8;

Figure 10 is a sectional view on the line X—X in Figure 11;

Figure 11 is an underneath view of the second switch; and

Figure 12 is a perspective view of part of the switch of Figures 10 and 11, and showing how the contact members are secured to the slider thereof.

The switch shown in Figures 1 to 5 comprises an elongate housing 1 stamped and formed from sheet metal to have a substantially U-shaped cross-section as best seen in Figure 4. The free longitudinal edge of each of the opposed side walls 2 of the housing 1 is formed, at each end, with a projecting leg 3 adapted and arranged to pass through a hole 100 in the substrate 101 and then be bent to embrace the substrate 101, as shown in Figure 5, thereby to secure the switch to the substrate 101 with the open side of the housing 1 facing the substrate 101. The opposed side walls 2 of the housing 1 are each cut to form therein a cantilever spring arm 4 extending axially of the housing 1 and obliquely inwardly of the side wall 2, the two spring arms 4 have their roots 5 at opposite ends of the housing 1 and having inwardly arcuate free end portions 6. The base 7 of the housing 1 is formed with an elongate rectangular hole 8.

The switch also comprises a slider 9 moulded from electrically insulating plastics material, and received in the housing 1 for axially sliding movement relative thereto. The slider 9 has a projecting operating member 10 which projects out through the hole 8 in the base 7 of the housing 1 for manual engagement to effect such movement of the slider 9. The slider 9 is formed at each longitudinal edge with a flange 11 which, as best seen in Figure 4, engages over the inner longitudinal edge of the associated spring arm 4 thereby to retain the slider 9 in the housing 1, that is make the switch a unitary structure prior to mounting on the substrate 101. Each longitudinal edge of the slider 9 is also formed with a scalloped surface 12 (see Figure 2) providing a longitudinally undulating profile, which is engaged by the arcuate end portion 6 of the associated spring arm 4 thereby to provide a detent action on axial movement of the slider 9 relative to the

housing 1, thus providing a plurality of discrete positions for the slider 9 relative to the housing 1.

The slider 9 carries two resilient substantially W-shaped contact members 13 stamped and formed from sheet metal, the free ends of each contact member 13 being formed as inwardly directed hooks 14 which are received over shoulders 15 formed in recesses 16 in the slider 9 thereby to secure the contact members 13 to the slider 9, as shown in Figure 3. Each contact member 13 provides two spaced outwardly facing arcuate contact surfaces 17 which engage the surface of the substrate 101 when the switch is mounted thereon, as shown in Figure 5, with an intermediate support portion 18 which engages a rounded boss 19 on the slider 9 to stabilise the contact member 13 on the slider 9. As shown in Figure 5, when the switch is mounted on the substrate 101 the contact members 13 are stressed such that the contact surfaces 17 engage the substrate 101 while the hooked end portions 14 are lifted out of engagement with the shoulders 15 in the recesses 16 in the slider 9, and the support portion 18 is urged into engagement with the boss 19 to provide a back-up force, the contact force between the contact members 13 and the substrate 101 thus deriving solely from the resilience of the contact members 13.

As shown in Figure 1, the substrate 101 carries three pairs of conductors 102, 103 and 104, and when the switch is mounted on the substrate 101 the contact members 13 serve to connect either the conductors 102 or the conductors 103 to the conductors 104, in dependence upon the axial position of the slider 9 relative to the housing 1.

Although in the switch described above the operating member 10 projects through a hole 8 in the base 7 of the housing 1, switches according to the invention can otherwise be produced with the operating member 10 projecting sideways through a hole in a side wall 2 of the housing 1, or projecting downwards and through a hole formed in the substrate 101, without interfering with the manner in which the slider 9 is retained in the housing 1 and the additional detent action provided by the retaining means.

Figures 6, 7 and 8 show how contact members 13, housings 1 and sliders 9 for switches as shown in Figures 1 to 5, can be manufactured in strip form, in known manner, whereby switches can be assembled in strip form as shown in Figure 9, with the carrier strip 200 joining adjacent housings 1 being removed either before or possibly after the switches are mounted on a substrate 101.

Referring now to Figures 10 to 12, the switch here shown is basically similar to that shown in Figures 1 to 5, but with a different form of contact member 20 and with a modified form of slider 9 to receive the different contact members 20. The contact members 20 have

simple rounded contact free ends 21 extending from a central mounting portion 22 which is formed with a notch 23 at each edge. The opposed notches 23 on the two contact members 20 embrace a boss 24 on the slider 9, while the two outer notches 23 receive half-bosses 24 produced when cutting the slider 9 from a strip, as shown in Figure 8. After mounting of the contact members 20 on the slider 9 as shown in Figure 12, the bosses 24 are deformed by a heated tool 300 thereby to secure the contact members 20 to the slider 9, as shown in Figure 10.

Claims

1. An electrical switch comprising an elongate housing (1) of substantially U-shaped cross-section and adapted for mounting on a substrate (101) with the open side of the housing facing the substrate; a slider (9) received in the housing for axial sliding movement relative thereto; and a contact member (13) carried by the slider and adapted and arranged to engage conductors on the substrate when the switch is mounted thereon, characterised in that the opposed side walls (2) of the housing (1) are each formed with a cantilever spring arm (4) extending axially of the housing (1) and obliquely inwardly of the side wall (2), the slider (9) being formed with flanges (11) which engage over the inner longitudinal edges of the spring arms (4) thereby to retain the slider (9) in the housing (1), and the slider (9) also being formed with scalloped surfaces (12) engaged by the free ends (6) of the spring arms (4) thereby to provide a detent action on axial movement of the slider (9) relative to the housing (1).

2. A switch as claimed in Claim 1, characterised in that the spring arms (4) extend in mutually opposite directions from roots (5) at opposite ends of the housing (1).

3. A switch as claimed in Claim 1 or Claim 2 characterised in that the free longitudinal edge of each side wall (2) of the housing is formed with at least one mounting leg (3) adapted and arranged to pass through a hole (100) in a substrate (101) and then be bent to embrace the substrate (101) thereby to secure the switch to the substrate (101).

4. A switch as claimed in any preceding claim, characterised in that the contact member (13) is substantially W-shaped providing two contact surfaces (17) and having hooked free ends (14) which engage over shoulders (15) in recesses (16) in the slider (9) thereby to secure the contact member (13) to the slider (9).

5. A switch as claimed in Claim 4, characterised in that the contact member (13) has an intermediate support portion (18) which engages a boss (19) on the slider (9) to stabilise the contact member (13) on the slider (9).

6. A switch as claimed in any one of Claims 1 to 3, characterised in that the contact member

housing 1, thus providing a plurality of discrete positions for the slider 9 relative to the housing

1. The slider 9 carries two resilient substantially W-shaped contact members 13 stamped and formed from sheet metal, the free ends of each contact member 13 being formed as inwardly directed hooks 14 which are received over shoulders 15 formed in recesses 16 in the slider 9 thereby to secure the contact members 13 to the slider 9, as shown in Figure 3. Each contact member 13 provides two spaced outwardly facing arcuate contact surfaces 17 which engage the surface of the substrate 101 when the switch is mounted thereon, as shown in Figure 5, with an intermediate support portion 18 which engages a rounded boss 19 on the slider 9 to stabilise the contact member 13 on the slider 9. As shown in Figure 5, when the switch is mounted on the substrate 101 the contact members 13 are stressed such that the contact surfaces 17 engage the substrate 101 while the hooked end portions 14 are lifted out of engagement with the shoulders 15 in the recesses 16 in the slider 9, and the support portion 18 is urged into engagement with the boss 19 to provide a back-up force, the contact force between the contact members 13 and the substrate 101 thus deriving solely from the resilience of the contact members 13.

As shown in Figure 1, the substrate 101 carries three pairs of conductors 102, 103 and 104, and when the switch is mounted on the substrate 101 the contact members 13 serve to connect either the conductors 102 or the conductors 103 to the conductors 104, in dependence upon the axial position of the slider 9 relative to the housing 1.

Although in the switch described above the operating member 10 projects through a hole 8 in the base 7 of the housing 1, switches according to the invention can otherwise be produced with the operating member 10 projecting sideways through a hole in a side wall 2 of the housing 1, or projecting downwards and through a hole formed in the substrate 101, without interfering with the manner in which the slider 9 is retained in the housing 1 and the additional detent action provided by the retaining means.

Figures 6, 7 and 8 show how contact members 13, housings 1 and sliders 9 for switches as shown in Figures 1 to 5, can be manufactured in strip form, in known manner, whereby switches can be assembled in strip form as shown in Figure 9, with the carrier strip 200 joining adjacent housings 1 being removed either before or possibly after the switches are mounted on a substrate 101.

Referring now to Figures 10 to 12, the switch here shown is basically similar to that shown in Figures 1 to 5, but with a different form of contact member 20 and with a modified form of slider 9 to receive the different contact members 20. The contact members 20 have

simple rounded contact free ends 21 extending from a central mounting portion 22 which is formed with a notch 23 at each edge. The opposed notches 23 on the two contact members 20 embrace a boss 24 on the slider 9, while the two outer notches 23 receive half-bosses 24 produced when cutting the slider 9 from a strip, as shown in Figure 8. After mounting of the contact members 20 on the slider 9 as shown in Figure 12, the bosses 24 are deformed by a heated tool 300 thereby to secure the contact members 20 to the slider 9, as shown in Figure 10.

Claims

1. An electrical switch comprising an elongate housing (1) of substantially U-shaped cross-section and adapted for mounting on a substrate (101) with the open side of the housing facing the substrate; a slider (9) received in the housing for axial sliding movement relative thereto; and a contact member (13) carried by the slider and adapted and arranged to engage conductors on the substrate when the switch is mounted thereon, characterised in that the opposed side walls (2) of the housing (1) are each formed with a cantilever spring arm (4) extending axially of the housing (1) and obliquely inwardly of the side wall (2), the slider (9) being formed with flanges (11) which engage over the inner longitudinal edges of the spring arms (4) thereby to retain the slider (9) in the housing (1), and the slider (9) also being formed with scalloped surfaces (12) engaged by the free ends (6) of the spring arms (4) thereby to provide a detent action on axial movement of the slider (9) relative to the housing (1).

2. A switch as claimed in Claim 1, characterised in that the spring arms (4) extend in mutually opposite directions from roots (5) at opposite ends of the housing (1).

3. A switch as claimed in Claim 1 or Claim 2 characterised in that the free longitudinal edge of each side wall (2) of the housing is formed with at least one mounting leg (3) adapted and arranged to pass through a hole (100) in a substrate (101) and then be bent to embrace the substrate (101) thereby to secure the switch to the substrate (101).

4. A switch as claimed in any preceding claim, characterised in that the contact member (13) is substantially W-shaped providing two contact surfaces (17) and having hooked free ends (14) which engage over shoulders (15) in recesses (16) in the slider (9) thereby to secure the contact member (13) to the slider (9).

5. A switch as claimed in Claim 4, characterised in that the contact member (13) has an intermediate support portion (18) which engages a boss (19) on the slider (9) to stabilise the contact member (13) on the slider (9).

6. A switch as claimed in any one of Claims 1 to 3, characterised in that the contact member



(13) has a mounting portion (22) which is formed with a notch (23) at each of two opposed edges, the notches (23) receiving bosses (24) on the slider (9) with the bosses (24) being deformed to secure the contact member (20) to the slider (9).

7. A switch as claimed in any preceding claim, characterised in that the slider (9) has an integrally formed operating member (10) which extends through a hole (8) in the base (7) of the housing (1) for manual engagement.

8. A switch as claimed in any preceding claim, characterised by two contact members (13, 20) carried in parallel by the slider (9).

Revendications

1. Commutateur électrique comprenant un boîtier allongé (1) de section sensiblement en U et conçu pour être monté sur un substrat (101), le côté ouvert du boîtier faisant face au substrat; un curseur (9) logé dans le boîtier afin de pouvoir effectuer un mouvement axial de coulissement par rapport à lui; et un élément (13) de contact porté par le curseur et conçu et agencé pour porter contre des conducteurs du substrat lorsque le commutateur est monté sur celui-ci, caractérisé en ce que les parois latérales opposées (2) du boîtier (1) sont réalisées chacune avec un bras à ressort à porte-à-faux (4) s'étendant axialement au boîtier (1) et obliquement vers l'intérieur de la paroi latérale (2), le curseur (9) étant réalisé avec des rebords (11) qui s'engagent sur les bords longitudinaux intérieurs des bras à ressort (4) afin de retenir le curseur (9) dans le boîtier (1), et le curseur (9) étant également foré avec des surfaces festonnées (12) contre lesquelles sont engagées les extrémités libres (6) des bras à ressort (4) afin de produire une action d'encliquetage loids d'un mouvement axial du curseur (9) par rapport au boîtier (1).

2. Commutateur selon la revendication 1, caractérisé en ce que les bras à ressort (4) s'étendent dans des directions mutuellement opposées à partir de pieds (5) situés aux extrémités opposées du boîtier (1).

3. Commutateur selon la revendication 1 ou la revendication 2, caractérisé en ce que le bord longitudinal libre de chaque paroi latérale (2) du boîtier est formé avec au moins une patte (3) de montage conçue et agencée pour passer dans un trou (100) d'un substrat (101) et pour être ensuite pliée afin d'enserrer le substrat (101) pour fixer ainsi le commutateur sur le substrat (101).

4. Commutateur selon l'une quelconque des revendications précédentes, caractérisé en ce que l'élément (13) de contact est de forme sensiblement en W présentant deux surfaces de contact (17) et ayant des extrémités libres (14) en forme de crochets qui s'engagent sur des épaulements (15) situés dans des évidements (16) du curseur (9) afin d'assujettir l'élément (13) de contact au curseur (9).

5. Commutateur selon la revendication 4, caractérisé en ce que l'élément (13) de contact comporte une partie intermédiaire (18) de support qui porte contre un bossage (19) du curseur (9) pour stabiliser l'élément (13) de contact sur le curseur (9).

6. Commutateur selon l'une quelconque des revendications 1 à 3, caractérisé en ce que l'élément (13) de contact comporte un partie (22) de montage qui est formée avec une encoche (23) dans chacun de deux bords opposés, les encoches (23) recevant des bossages (24) du curseur (9), les bossages (24) étant déformés pour assujettir l'élément (20) de contact au curseur (9).

7. Commutateur selon l'une quelconque des revendications précédentes, caractérisé en ce que le curseur (9) est réalisé d'une seule pièce avec un élément (10) de manœuvre qui s'étend à travers un trou (8) de la base (7) du boîtier (1) pour être pris à la main.

8. Commutateur selon l'une quelconque des revendications précédentes, caractérisé par deux éléments de contact (13, 20) portés en parallèle par le curseur (9).

Patentansprüche

1. Elektrischer Schalter mit einem länglichen Gehäuse (1) mit im wesentlichen U-förmigen Querschnitt, das zur Montage auf einem Substrat (101) ausgebildet ist, wobei die offene Seite des Gehäuses dem Substrat zugewandt ist, mit einem in dem Gehäuse zur axialen Gleitbewegung relativ hierzu aufgenommenen Schieber (9), und mit einem von dem Schieber getragenen Kontaktelement (13), das derart ausgebildet und angeordnet ist, daß es mit Leitern auf dem Substrat in Eingriff tritt, wenn der Schalter darauf montiert ist, dadurch gekennzeichnet, daß die gegenüberliegenden Seitenwände (2) des Gehäuses (1) jeweils mit einem freikragenden Federarm (4) geformt sind, der sich axial zum Gehäuse (1) und schräg einwärts von der Seitenwand (2) erstreckt, daß der Schieber (9) mit Flanschen (11) versehen ist, welche über die inneren Längskanten der Federarme (4) greifen, so daß der Schieber (9) in dem Gehäuse (1) gehalten ist, und daß der Schieber (9) auch mit zinnenförmig ausgebogenen Flächen (12) versehen ist, die mit den freien Enden (6) der Federarme (4) im Eingriff stehen, so daß eine Rastwirkung der Axialbewegung des Schiebers (9) relative zum Gehäuse (1) geschaffen wird.

2. Schalter nach Anspruch 1, dadurch gekennzeichnet, daß die Federarme (4) sich zueinander entgegengesetzten Richtungen von Wurzeln (5) an entgegengesetzten Enden des Gehäuses (1) weg erstrecken.

3. Schalter nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die freie Längskante jeder Seitenwand (2) des Gehäuses mit wenigstens einem Montagefuß (3) versehen ist, der derart ausgebildet und angeordnet ist, daß er



durch ein Loch (100) in einem Substrat (101) hindurch verläuft und dann umgebogen ist, um das Substrat (101) zu umgreifen, so daß der Schalter am Substrat (101) befestigt ist.

4. Schalter nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Kontaktelement (13) im wesentlichen W-förmig ist, zwei Kontaktflächen (17) aufweist und hakenförmige freie Enden (14), welche über Schultern (15) in Ausnehmungen (16) im Schieber (9) greifen, so daß das Kontaktelement (13) am Schieber (9) befestigt ist.

5. Schalter nach Anspruch 4, dadurch gekennzeichnet, daß das Kontaktelement (13) einen mittleren Stützabschnitt (18) aufweist, der mit einem Vorsprung (19) am Schieber (9) im Eingriff steht, um das Kontaktelement (13) am Schieber (9) zu stabilisieren.

6. Schalter nach einem der Ansprüche 1 bis

3, dadurch gekennzeichnet, daß das Kontaktelement (13) einen Montageabschnitt (22) aufweist, welcher mit einer Kerbe (23) an beiden entgegengesetzten Rändern versehen ist, und daß die Kerben (23) Vorsprünge (24) am Schieber (9) aufnehmen, wobei die Vorsprünge (24) deformiert sind, um das Kontaktelement (20) am Schieber (9) festzulegen.

7. Schalter nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Schieber (9) ein einstückig geformtes Betätigungselement (10) aufweist, welches sich durch ein Lock (8) in der Basis (7) des Gehäuses (1) für die manuelle Betätigung hindurch erstreckt.

8. Schalter nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß zwei Kontaktelemente (13, 20) parallel zueinander vom Schieber (9) getragen sind.

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