United States Patent

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[54] **LINEAR SWITCH HOUSING ASSEMBLY WITH MULTIPLE REMOVABLE CONTACT UNITS**
13 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** ..... **200/16 R,** 200/168 S
[51] **Int. Cl.** **H01h 15/00**
[50] **Field of Search** ..... 200/16 R, 168 S

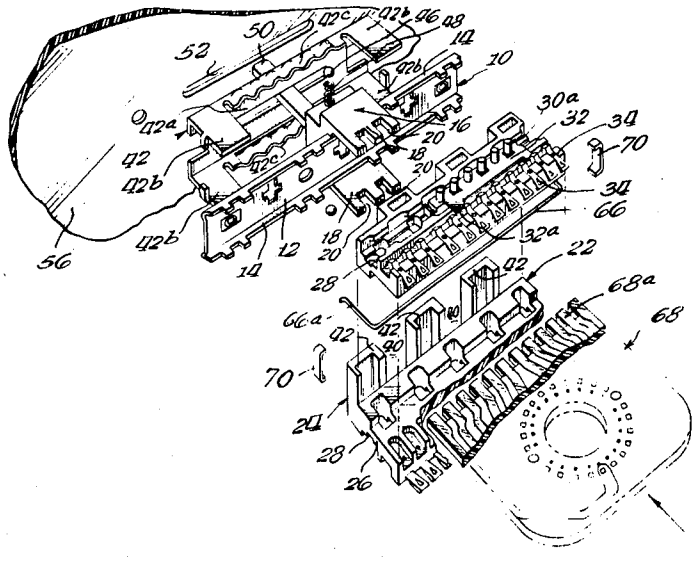
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Primary Examiner—J. R. Scott
Attorney—Parker, Carter and Markey

ABSTRACT: A slide switch for use in electrical circuits, including an elongated support member having a channel shape with parallel leg portions joined by a bight portion, and a plurality of elongated stator members having portions mounted within the channel of the support member between the leg portions. Each stator has a plurality of terminals mounted thereon and each has an independent switch carrier member for movement longitudinally along the stator. Each switch carrier member has switch means for operatively connecting selected pairs of terminals. An actuator member is seated on and moves longitudinally along the bight portion of the support member and has two arm portions overlying the leg portions of the support member and is operatively connected to the switch carrier members on the stators. Means are provided on the stators to interlock the stators in a back-to-back relationship or in an end-to-end relationship. An index mechanism is snap fit over the channel-shaped support, holds the actuator in position and has means for guiding the actuator member for movement longitudinally along the support member. The index mechanism includes a pair of opposed spring loaded detent balls operatively associated with detent surfaces on the sidewalls of a frame member extending longitudinally along the switch to maintain the switch carrier members in a preselected position.



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SHEET 1 OF 2

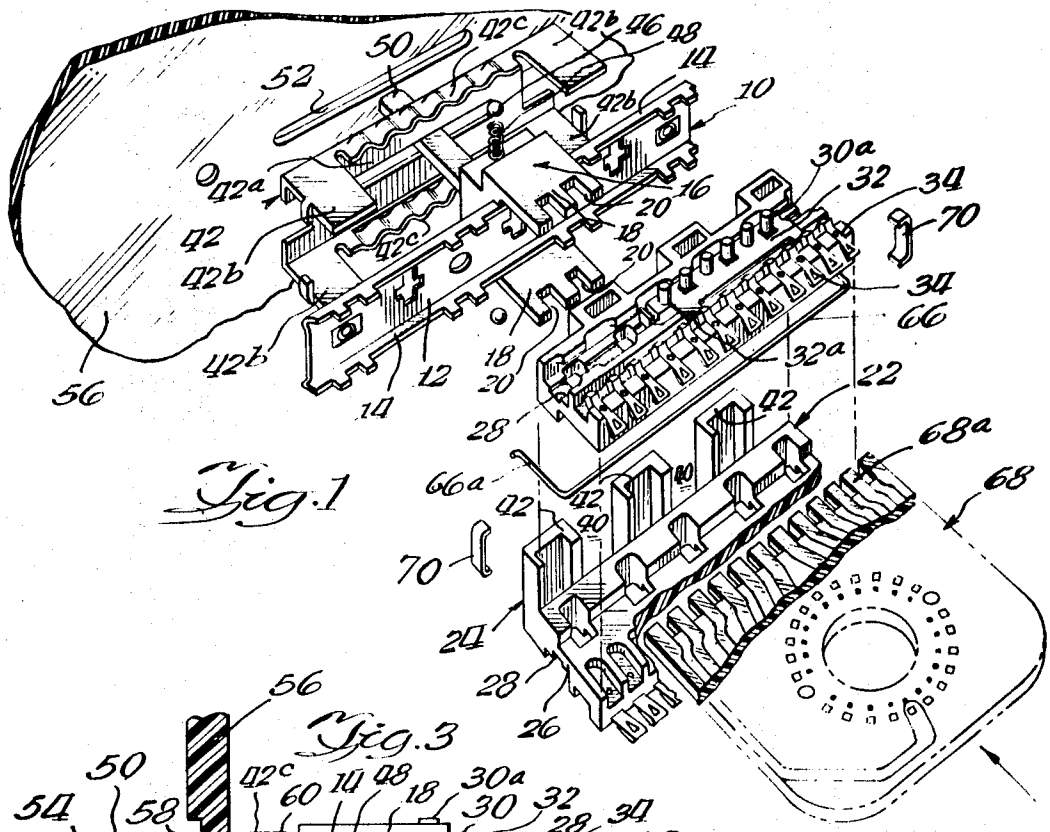


Fig. 1

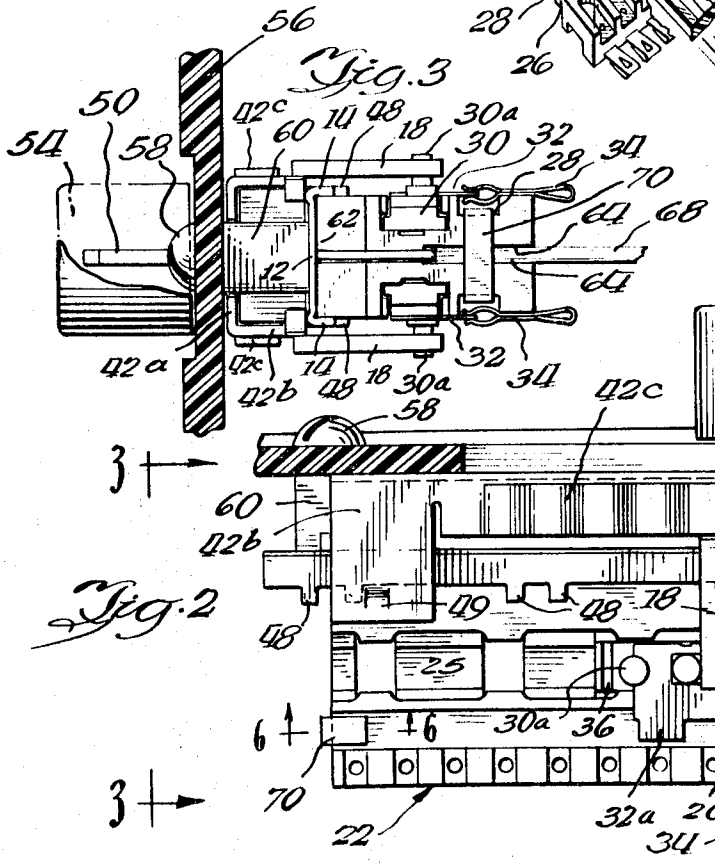


Fig. 3

Fig. 2

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Fig. 4

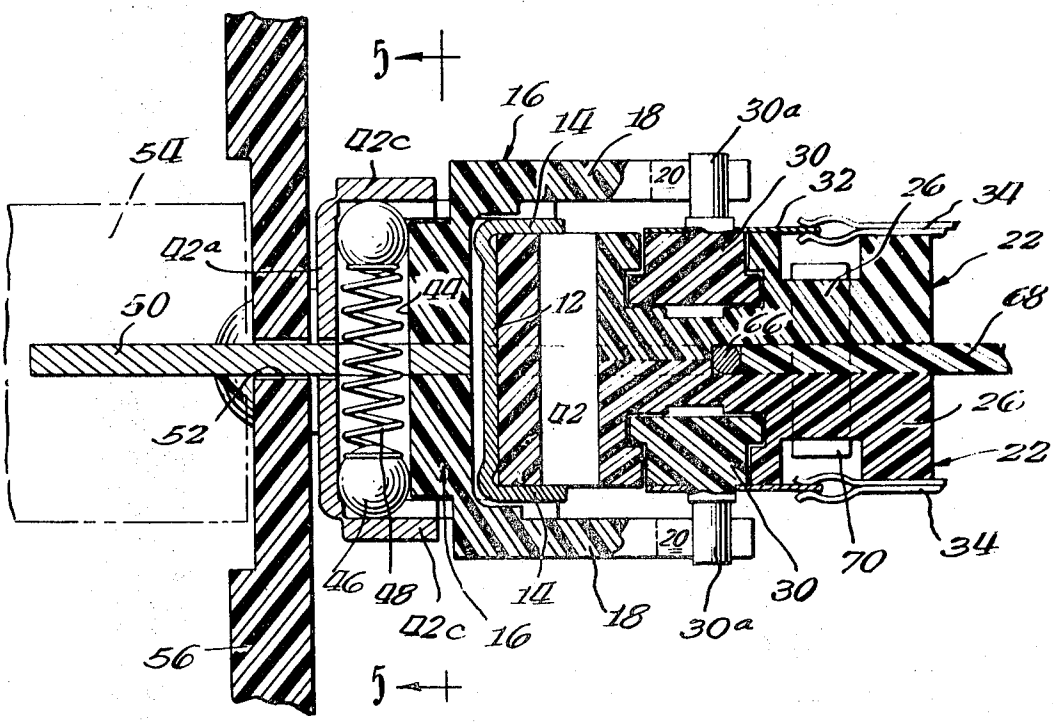
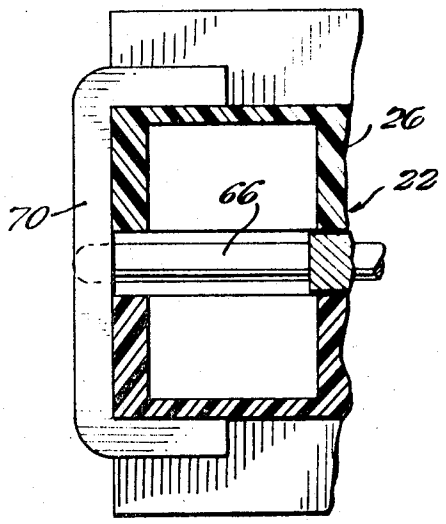


Fig. 6



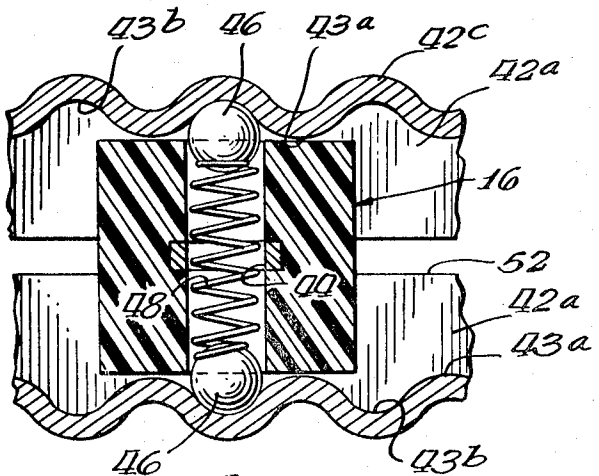


Fig. 5

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LINEAR SWITCH HOUSING ASSEMBLY WITH MULTIPLE REMOVABLE CONTACT UNITS

BACKGROUND OF THE INVENTION

The invention primarily is directed to two problems encountered with presently available slide switches. Heretofore, slide switches generally were manufactured in custom sizes depending upon the purposes to be served and the number of terminals and/or switch sections desired. The operative components of the assembly, as the stationary terminals, the switch carrying slide members, the support member, and so on, had to be assembled to a custom-sized framework, Not only are such structures expensive to manufacture because of the custom-made problem and the multiple parts comprising the assembly, but more important the custom-made aspect of the assemblies render them inflexible for the variety of uses for which they are intended. This invention is designed to solve such problems by providing a modular-type slide switch assembly having standardized components such as the support member, slide members, and stators.

Secondly, it is difficult, in slide switches, to provide an indexing mechanism which is sufficiently resilient to avoid binding, and yet has a balanced indexing force. This invention incorporates a new and improved index mechanism for a slide switch or the like.

SUMMARY OF THE INVENTION

An object of this invention is to provide a new and improved slide switch construction.

Another object of this invention is to provide a modular type slide switch assembly which includes a plurality of standardized operative components which may be built up to form slide switches having various numbers of terminals as well as various numbers of individual switch sections.

A further object of this invention is to provide a novel slide switch construction, including an elongated support member, an actuator member mounted on the support member for sliding movement longitudinally along the support member and extending therealong at least the extent of movement of the actuator member and having a plurality of terminals mounted thereon, a switch carrier member mounted on the stator member for movement longitudinally along the stator member and having switch means for operatively connecting selected pairs of terminals, and means operatively connecting the actuator member to the switch carrier member to move the carrier member in response to sliding movement of the actuator member.

Still another object of this invention is to provide a slide switch as set forth in the preceding paragraph wherein the support member is channel shaped with a bight portion and a pair of parallel leg portions, a plurality of elongated stator members each having portions mounted within the channel of the support member between the leg portions, each having a plurality of terminals mounted thereon and each having an independent switch carrier member. Means are provided for interlocking the stator members in a back-to-back relationship, and the actuator member is seated on and moves longitudinally along the bight portion of the support member. The actuator has two arm portions, one overlying each of the leg portions of the support member and operatively connected to one of the switch carrier members on the stator members.

Yet a further object of the invention is to provide a slide switch as set forth in the preceding paragraph including at least two elongated stator members mounted on the support member and interlocked in an end-to-end relationship, at least a third elongated stator member mounted on the support member in back-to-back relationship with at least a portion of each of the other two stator members, means for interlocking the third stator member with the two end-to-end stator members, and each of the stator members having a plurality of terminals and an independent switch carrier member operatively connected to the actuator and connecting selected pairs of terminals.

Another object of this invention is to provide an index mechanism snap fit over the support member and having means for positioning the actuator member and for guiding the actuator member for movement longitudinally along the support member. The index mechanism includes a frame member extending longitudinally along the slide switch and which has means defining a pair of generally parallel opposed surfaces extending in the direction of the linear travel of the actuator and carrier members, a pair of detent balls resiliently mounted in the actuator member, one detent ball facing each of the opposed surfaces, and detent surfaces being disposed along the opposed surfaces in position for cooperating with the detent balls to maintain the switch carrier members in a preselected position.

Other objects, features and advantages of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded, perspective view of a slide switch embodying the invention, with portions cut away to facilitate the illustration;

FIG. 2 is a side elevational view of the slide switch of this invention, with the printed circuit board portion thereof removed;

FIG. 3 is an end elevational view rotated 90° from looking generally in the direction of line 3—3 in FIG. 2;

FIG. 4 is a section, on an enlarged scale taken generally along the line 4—4 of FIG. 3;

FIG. 5 is a fragmentary section taken generally along the line 5—5 of FIG. 4; and

FIG. 6 is a fragmentary section, on an enlarged scale, taken generally along the line 6—6 of FIG. 2.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings in greater detail, the modular slide switch assembly of this invention includes a channel-shaped support member, generally designated **10**, having a bight portion **12** and a pair of generally parallel leg portions **14**. The channel support member is a key structural member in that, as will be set forth in greater detail hereinafter, it locates an indexing mechanism and also holds interlocked stator members in position. The channel support member is elongated and may be of any suitable length depending upon the number of stator members to be assembled thereto.

An actuator member, generally designated **16**, is seated on top of the bight portion **12** of the channel support member **10** and has two arm portions **18**, one arm portion overlying each of the leg portions **14** of the channel support member. A pair of notches **20** are cut into the lower edge of each of the arm portions **18** of the actuator to provide a forklike means for operatively connecting the actuator to one or more switch carrier members, to be described hereinafter. It can be seen that with the actuator member seated on top of the channel support member **10**, the actuator moves in a linear path longitudinally of the support member.

One or more stator members, generally designated **22**, are provided in the electrical portion of the slide switch, the number depending upon the desired number of switch sections to be actuated The stators **22** are generally L-shaped with the short leg, generally designated **24**, of the L being of a lateral dimension to nest into and provide an interference fit with the underside of the channel support **10**. The long leg **26** of the L-shaped stator has an undercut groove **28** extending longitudinally in the direction of the channel support **10** and thus in the direction of the linear travel of the actuator **16**. Within this undercut groove **28** is positioned a sliding switch carrier member **30** which, therefore, moves longitudinally along the stator **22**. The switch carrier member **30** is made of insulating material and carries a thin platelike switch means **32** which has a plurality of blades **32*a*** which connect selected pairs of terminals **34** mounted on the long leg **26** of the stator

22. The terminals 34 are of the conventional double wipe clip type through which the blades 32*a* pass and make contact. The switch carrier members 30 have complementary tongue and groove means, generally designated 36, formed in the ends thereof to permit interlocking in an end-to-end relationship of a plurality of carrier members, for a purpose to be described hereinafter. A plurality of bosses 30*a* project outwardly from the outer face of the switch carrier member 30 and fit into the notches 20 formed in the arms 18 of the actuator 16. By providing a plurality of projecting bosses 30*a* at selected intervals along the switch carrier member 30 for engagement with the notches 20 of the actuator 16, the switch carrier member may be oriented in increments corresponding to the distance between the bosses 30*a* along the stator and cooperate with the index mechanism, to be described hereinafter, to permit highly customized assemblies while using standardized components.

In order to interlock a plurality of stators 22 in a back-to-back relationship or in an end-to-end relationship, the short leg 24 of each of the L-shaped stators has a plurality of slots 40 spaced at constant intervals to provide a "tongue and groove means" to permit the stators to be interlocked in a back-to-back relationship as shown in the drawings or to be interlocked end-to-end by positioning a tongue 42 on one end of one stator within the endmost groove 40 of an adjacent stator. Each stator has a plurality of the double wipe terminals 34 mounted in a line thereon and each has an independent switch carrier member 30 slidably mounted thereon. When the stators are mounted in a back-to-back relationship as shown in the drawings, each arm 18 of the actuator 16 is operatively connected to a switch carrier member 30 on opposite sides of the switch assembly. When the stators 22 are arranged in an end-to-end relationship, the adjacent endmost projecting bosses 32*b* of adjacent switch carrier members 30 are positioned in the two notches 20 of the actuator 16. Thus, it can be seen that a single actuator 16 could operate a plurality of individual switch sections. The actuator may be connected directly to four carrier members 30. However, a plurality of carrier members may be interlocked end-to-end by utilizing the complementary tongue and groove means 36 on the ends of the carrier members.

The index mechanism of this invention includes a channel-shaped frame member, generally designated 42, mounted on the support member 10. The frame member has a bight portion 42*a*, four parallel depending arm portions 42*b* for engaging the support member, and a pair of generally parallel sidewalls 42*c* which define opposed surfaces on the interior of the frame member extending in the direction of the linear travel of the actuator member 16 and the switch carrier members 30. The inner, opposed surfaces of the side walls 42*c* are formed with hills and valleys 43*a* and 43*b*, respectively, which define detent surfaces facing inwardly, as best seen in FIGS. 1 and 5. Referring to FIGS. 4 and 5, either a recess or groove 44 (as shown) or a bore is formed through the actuator 16 transverse to its linear path of travel. A detent ball 46 is positioned at each end of the groove 44 and a coil spring 48 is disposed in the groove and urges the detent balls 46 outwardly against the side walls 42*c* of the frame member 42. The hills and valleys 43*a* and 43*b*, respectively, are positioned with the valleys oriented so that the actuator 16 will position the switch carrier member 30 so that the blades 32*a* of the switch plate 32 engage pairs of terminals 34, as best seen in FIG. 2, so that the switch carrier members 30 are locked in selected positions with the terminals 34 and blades 32*a* in engagement. With such a detent structure, a balanced force index is provided to prevent binding of the actuator 16 as well as to permit free and easy movement of the switch carrier members. Location of the index mechanism longitudinally of the support member 10 is provided by a plurality of tabs 48 formed on the legs 14 of the support member and a pair of stamped inner projections 49 on the arm portions 42*b* of the frame member 42. The tabs 48 are spaced along the support member at selected intervals thereby permitting the index mechanism to be snapped onto the support member in a plurality of incremental positions corresponding to the intervals.

An actuator rod 50 extends upwardly from the actuator 16 through a slot 52 in the bight portion 42*a* of the index mechanism frame member 42. An actuator button 54 is mounted on the actuator rod 50 for easy manipulation.

The switch assembly is shown in the drawings as mounted on a control panel 56 by means of a pair of bolts 58 (FIG. 2) extending into a block 60 (FIG. 3) mounted on the bight portion 12 of the channel support 10 by means of hollow rivet means 62.

As seen best in FIGS. 3 and 4, the long leg 26 of each stator member 22 is formed with a recess 64 which defines a slot when a pair of stators are mounted in a back-to-back relationship. This slot performs a twofold function. First, a spring wire 66, as best seen in FIG. 1, is disposed in the slot with hook portions 66*a* extending upwardly and protruding within the hollow rivet means 62 to aid in holding the stators against the underside of the channel support member 10. Second, a printed circuit board, generally designated 68 in FIG. 1, is press fit into the slot and has a plurality of printed circuit leads 68*a* which engage the body portions of the double wipe terminal clips 34.

To further hold the stators 22 in their back-to-back relationship, a pair of spring clips 70 (FIGS. 1 and 3) may be employed and snapped into the grooves 28 to hold the stators together.

The foregoing detailed description has been given for clearness of understanding only and no unnecessary limitations should be understood therefrom as some modifications will be obvious to those skilled in the art.

I claim:

1. A slide switch, comprising:
   - an elongated support member;
   - an actuator member mounted on said support member for sliding movement longitudinally along the support member;
   - a plurality of elongated stator members mounted on the support member in back-to-back relationship and extending along the support member at least the extent of movement of said actuator member and each having a plurality of terminals mounted thereon;
   - an independent switch carrier member mounted on each of said stator members for movement longitudinally along the stator members and connecting selected pairs of terminals on the respective stator; and
   - means operatively connecting said actuator member to said switch carrier members to move the switch carrier members simultaneously in response to sliding movement of the actuator.

2. The slide switch of claim 1 including means for interlocking the stator members in the back-to-back relationship.

3. The slide switch of claim 1 including at least two elongated stator members mounted on the support member in end-to-end relationship, at least a third elongated stator member mounted on the support member in back-to-back relationship with at least a portion of at least one of said two stator members, and each of said stator members having a plurality of terminals and an independent switch carrier member operatively connected to said actuator for simultaneous movement and connecting selected pairs of terminals on the respective stator.

4. The slide switch of claim 3 including means for interlocking the third stator member with said one stator member.

5. The slide switch of claim 1 including means defining a slot between the stator members, and a printed circuit board received in the slot with printed circuit leads in engagement with the terminals.

6. A slide switch, comprising;
   - an elongated support member;
   - an actuator member mounted on said support member for sliding movement longitudinally along the support member;

a plurality of elongated stator members mounted on the support member in end-to-end relationship and extending along the support member at least the extent of movement of said actuator member and having a plurality of terminals mounted thereon;

an independent switch carrier member mounted on each of said stator members for movement longitudinally along the stator members and connecting selected pairs of terminals on the respected stator; and

means operatively connecting said actuator member to said switch carrier members to move the switch carrier members simultaneously in response to sliding movement of the actuator member.

7. The slide switch of claim **6** including means for interlocking the stator members in the end-to-end relationship.

8. A slide switch, comprising:

an elongated channel shaped support member with a bight portion and two leg portions;

an actuator member seated on and movable longitudinally along the bight portion of said support member and having an arm portion overlying one of the leg portions of the support member;

a stator member having a portion mounted within the channel of the support member between the leg portions and extending along the support member at least the extent of movement of said actuator member and having a plurality of terminals mounted thereon; and

a switch carrier member mounted on said stator member for movement longitudinally along the stator member said switch carrier member being operatively connected to the arm portion of said actuator member and having switch means for operatively connecting selected pairs of terminals.

9. The slide switch of claim **8** including an index mechanism snap fit over said support member and operatively associated with said actuator member to maintain the switch carrier member in a preselected position said index mechanism having means for guiding the actuator member for movement longitudinally along the support member.

10. The slide switch of claim **9** including means on the index mechanism for holding the actuator in position seated on the bight portion of the support member.

11. The slide switch of claim **8** including a plurality of elongated stator members having portions mounted within the channel of the support member between the leg portions and each having a plurality of terminals mounted thereon and each having an independent switch carrier member, means for interlocking the stator members in a back-to-back relationship, said actuator member having two arm portions, one overlying each of the leg portions of said support member and operatively connected to the switch carrier member for simultaneous movement.

12. The slide switch of claim **11** including an index mechanism snap fit over said support member and operatively associated with said actuator member to maintain the switch carrier member in a preselected position, said index mechanism having means for guiding the actuator member for movement longitudinally along the support member.

13. A slide switch, comprising:

an elongated support member;

an actuator member mounted on said support member for sliding movement longitudinally along the support member;

a stator member mounted on the support member and extending along the support member at least the extent of movement of said actuator member and having a plurality of terminals mounted thereon;

a switch carrier member mounted on said stator member for movement longitudinally along the stator member and having switch means for operatively connecting selected pairs of terminals; and

means operatively connecting said actuator member to said switch carrier member to move the switch carrier member in response to sliding movement of the actuator member, including means for orienting the switch carrier member in a plurality of positions longitudinally of the support member for connection to the actuator member.