

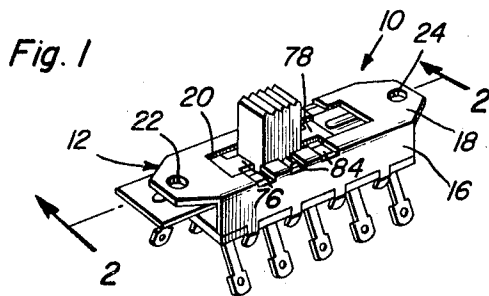
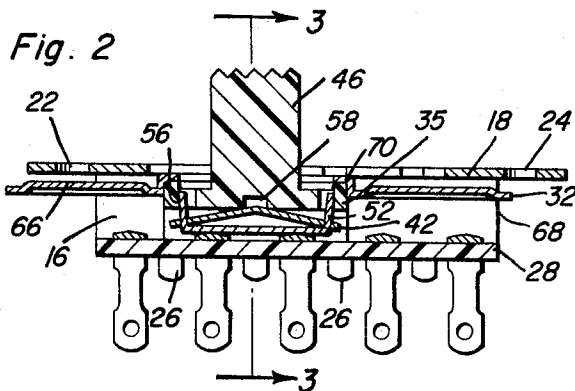
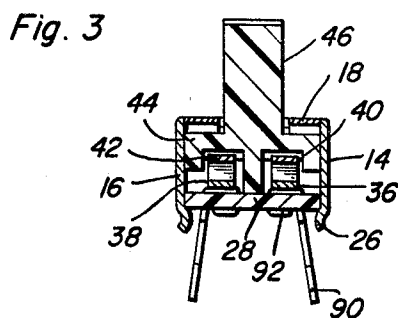
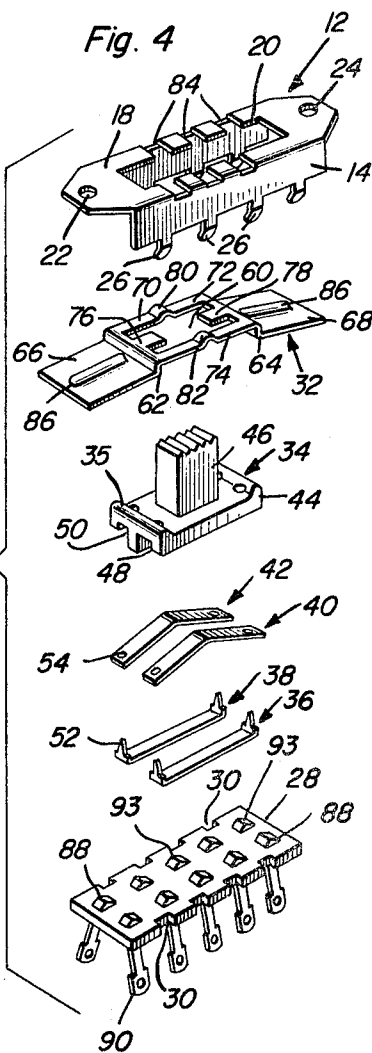
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3,271,535

SWITCH DEVICE WITH IMPROVED DETENT STRUCTURE

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3,271,535

SWITCH DEVICE WITH IMPROVED DETENT STRUCTURE

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This invention relates to electric switches and more particularly to detent controlled bridging switches having a slidable member for selectively bridging contacts.

Previously known switches of the slidable detent bridging type have utilized the bridging contacting members to provide means for releasably holding the contacting members in a plurality of positions. This has been accomplished in a variety of ways, including the use of resilient contacting members with downwardly projecting detent portions which slide between upwardly projecting electrical contacts and are thereby retained therebetween. However, the use of the contacting members themselves to provide detents for indexing or positioning the contacting members has been generally unsatisfactory as the contacting members gradually lose their resiliency and the contact surfaces become excessively worn. Where detent structures independent of the contact members have been utilized, the resulting arrangement is often bulky and expensive.

Accordingly, it is an object of the present invention to provide a switch assembly which has contacting members for circuit connection purposes and separate detent means for positioning such actuator within the switch housing and maintaining a proper contact pressure between the contacting members.

It is a further object of the present invention to provide a sliding contact electrical switch of simple and economical construction, which is easy to assemble and install and which is relatively maintenance free.

An additional object of the invention is to provide detent facilities for a sliding switch which is structurally independent of the contact elements and does not require enlargement of the size or bulk of the switch assembly.

Another object of the present invention is to provide a detent controlled bridging switch in which a top mounted detent plate coacts with spaced recesses in the switch housing to position the switch within the housing.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of the detent switch device comprising the present invention;

FIGURE 2 is an enlarged vertical sectional view taken substantially along the plane of the line 2—2 of FIGURE 1;

FIGURE 3 is a vertical sectional view taken substantially along the plane of the line 3—3 of FIGURE 2; and

FIGURE 4 is a perspective view of the various elements of the detent switch device exploded apart to better show the relationship therebetween.

Referring now specifically to the drawings, reference numeral 10 generally refers to one form of detent switch device constructed in accordance with the present invention as best seen in FIGURE 1. The detent switch device includes a housing member 12 having side walls 14 and 16 and an exposed top wall 18. The top wall 18 includes an elongated guide slot 20 therein as well as mounting holes 22 and 24 for mounting the switch device 10 in a suitable manner.

The walls 14 and 16 include depending tabs 26 which are formed integrally therewith and which are used to retain a bottom wall or base member 28 therein. The bottom wall or base member 28 is preferably of any suitable non-conducting material, and includes recesses or slots 30 positioned along opposite longitudinal edges thereof for receiving the tabs 26. The tabs are bent into the slots and folded under the member 28 to retain the member 28 as a base for the housing.

The housing mounts therewithin a detent plate 32, a switch actuator 34, contact elements 36 and 38 and substantially V-shaped retaining members 40 and 42. The switch actuator 34 has a base portion 44 and a knob portion 46 both of which are made from insulating material. The knob portion 46 extends through the slot 20 and is slidable therealong. The base portion 44 of switch actuator 34 includes upstanding end bearing portion 35 and substantially parallel channels 48 and 50 in the bottom thereof. The contact elements 36 and 38 include upstanding end portions 52 which come to a point and fit through the mounting holes 54 in retaining members 40 and 42. Thus, it may be observed that when the retaining members 40 and 42 are positioned on contact elements 36 and 38, each retaining member and contact element forms a unit which is retained within the channels 48 and 50 when the switch device is assembled. The channels 48 and 50 include end walls 56 against which the upstanding end portions 52 are positioned when the switch device is assembled, and the upper surface of the channels have recesses 58 into which the apices of the retaining members are seated when the switch device is assembled. The retaining members 40 and 42 as well as the contact elements 36 and 38 are formed from an electrical conducting material such as brass or other non-ferrous alloys and thus conduct the flow of electricity therethrough as well as being resilient in order to exert contact pressure downwardly against the base member 28 for a purpose to be described hereinafter. The contact elements are held assembled on the actuator 34 between the base member and the top wall 18 of the housing by the detent plate 32 which includes an opening 60 substantially in the middle thereof through which the knob portion 46 of switch actuator 34 extends. Thus, it may be observed that the detent plate 32 lies between the lower surface of the upper wall 18 of housing 12 and the upper surface of the base portion 44 of switch actuator 34 when the switch device is assembled.

The detent plate 32 is preferably constructed of resilient spring non-ferrous material and is held in a stressed condition between the end bearing portions 35 of the base 44 and upper wall 18. The plate 32 is bent as at 62 and 64 to provide legs 66 and 68 and a central engaging portion 70. The opening 60 is included in the central portion 70 thereby leaving only narrow side strips 72 and 74 bridging the legs 66 and 68. Also, longitudinal extensions 76 and 78 project into the opening 60 and into abutment with the handle portion 46 of switch actuator 34. These extensions 76 and 78 fit tightly against the knob portion 46 and thus eliminate any play between the knob portion 46 and the detent plate 32 when the switch actuator is moved within the slot 20. Formed in the bridging portions 72 and 74 are raised detent projections or formations 80 and 82 which are useful for a purpose to be described hereinafter. The detent plate 32 in its unstressed condition is slightly V-shaped; that is, the engaging portion 70 rises upwardly to an apex at the detents 80 and 82. Thus, it will be apparent that the detent plate when positioned between the base 44 and top wall 18 will be stressed into contact with the top wall to thereby exert pressure on the contact elements through the actuator and the retaining members 40 and 42.

The recesses 84 are formed in the top wall spaced longitudinally along the guide slot 20 into which they open. Thus, it is apparent that the detents 80 and 82 will be engageable in the recesses 84 as the switch actuator 34 and the detent plate 32 are moved along the slot 20. The engaging portion 70 will therefore flex downwardly between the end bearing portions 35 on the actuator 34 to accommodate displacement of the detent projections. In the embodiment described herein, there are three recesses 84 on each side of the slot 20, but it will be apparent that any number of recesses may be used depending upon the number of positions associated with the switch device. In this embodiment the switch device has four positions with the recesses 84 offset along each side of slot 20, thus providing four separate and distinct positions at which the detents 80 and 82 may be engaged in at least one recess 84. The detent plate 32 also includes the raised ribs 86 in leg portions 66 and 68 in order to increase the stiffness of these portions.

The insulating base member 28 includes a plurality of electrical contacts spaced therealong, corresponding to the desired number of positions and poles for the switch device. In the embodiment disclosed in this application, there are five contacts 88 spaced in two rows longitudinally along the base member 28 thus providing a 2-pole, 4-position bridging switch. The electrical contacts 88 include terminal extensions 90 which are adapted to be connected to the wires of an electric circuit and a lug portion 92 which extends through the insulating base member 28 and is wrapped thereabout to lock the terminal in place, as shown in FIGURE 3. Each contact 88 includes a portion 93 exposed above the base member 28 shaped to establish line contact between the contact elements 36 and 38 and the electrical contacts 88.

The operation of this switch device is as follows. The contact members 36 and 38 electrically bridge adjacent electrical contacts 88 thus completing an electric circuit in the respective operative positions of the switch actuator 34. The detent plate 32 cooperates with the housing to define the operative positions at which various circuits are completed by the contact elements 36 and 38. The flat configuration of the contact elements 36 and 38 as well as the configuration of the lugs 92 and the downward pressure exerted through the retaining members 40 and 42 ensure proper contact with the terminals or electrical contacts 88. Due to the length of the contact elements 36 and 38 no more than two adjacent terminals 88 can be bridged in any one position of the switch actuator, and the ends of the slot 20 limit the longitudinal movement of the switch actuator within the slot. Thus, it will be apparent that when the switch actuator is moved along the slot 20, the detent plate 32, the switch actuator 34, the remaining members 40 and 42 and the contact elements 36 and 38 are moved between housing 12 and base member 28 and may be yieldably held in four separate positions by the detents 80 and 82 being received in recesses 84. The resiliency of detent plate 32 and the assembly of retaining members and contacting members insure firm and uniform electrical contact with both terminals being bridged by avoiding any variation in the flexure of the retaining members and the contact elements in order to establish the position holding force. Further, because of the formation of the detent notches 84 in the top wall of the housing itself and the use of a relatively thin detent plate 32 disposed in close spaced relation below the top wall, substantially no enlargement of the switch assembly is involved in order to house the detent facilities.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. In an electrical switch assembly having a rectilinearly slidable switch actuator, electrical contact members held captive by and movable with said actuator, an insulating support underlying said contact members and having paired contact terminals respectively adapted to be bridged by said contact member upon shifting movement of said switch actuation relatively to said support and an enclosing casing for said switch assembly having a substantially flat top wall part overlying the top of said switch actuator and opposed depending side wall parts secured to said insulating support to embrace therebetween said switch actuator, said contact members and said insulated contact terminals, said casing having an elongated slot in its said top wall part extending lengthwise of said casing in parallel relation to said opposite side wall parts thereof, and said switch actuator having an upwardly projecting part integral therewith extending through said slot for shifting movement within the limits of said slot, the improvement comprising a detent plate formed of resilient sheet material disposed in intervening relation between the top wall part of the casing and the top of said switch actuator, said detent plate being centrally apertured to non-rotatably captivate the upwardly projecting part of said switch actuator for shifting movement of the plate with said actuator, said detent plate being provided with laterally spaced relatively narrow parallel coplanar side strips respectively disposed at opposite sides of the central aperture of the plate and extending lengthwise along opposite sides of the upwardly projecting part of the actuator in respective parallel relation to the casing side wall parts, each of said narrow strips of the detent plate substantially mid-point of its length having an integrally formed detent of generally inverted U-shape as viewed from a side edge of said strip, each said detent extending transversely across the full width of its associated strip to provide in the latter a pair of substantially parallel flex lines spaced longitudinally along and extending transversely of the strip to permit flexing of the strip and corresponding movement of the detent orthogonally with respect to the plane of said detent plate.

2. A detent plate for an electrical switch assembly as defined in claim 1 in which said plate is provided with opposite end extensions respectively disposed in a substantial common plane spaced below the plane of the apertured portion of said plate.

3. A detent plate for an electrical switch assembly as defined in claim 1 in which said plate is provided with opposite end extensions respectively disposed in a substantial common plane spaced below the plane of the apertured portion of said plate, said extensions being each provided with a reinforcing and rigidifying rib extending lengthwise thereof.

4. In an electrical switch assembly as defined in claim 3 wherein said top wall of the enclosing casing for the switch assembly is notched along opposite sides of the elongated slot therein at spaced points along the length of said slot to provide recesses in which said detents may be seated to hold said actuator in a selected position, said detents being arcuately shaped lengthwise of their respective strips to provide convex surfaces favoring camming of said detents into and out of said plate recesses.

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