June 24, 1958 J. LONG 2,840,650

SWITCH

Filed Sept. 18, 1956 2 Sheets-Sheet 1

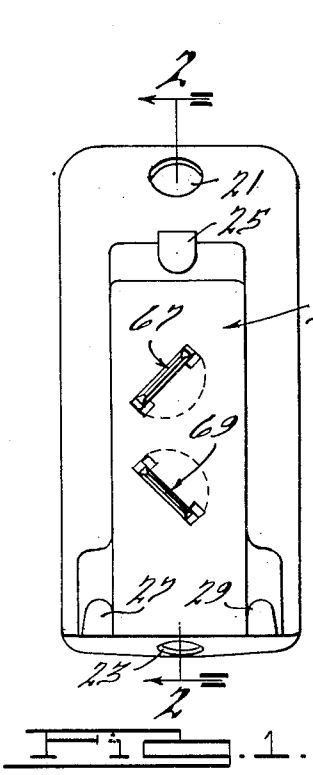


FIG. 1.

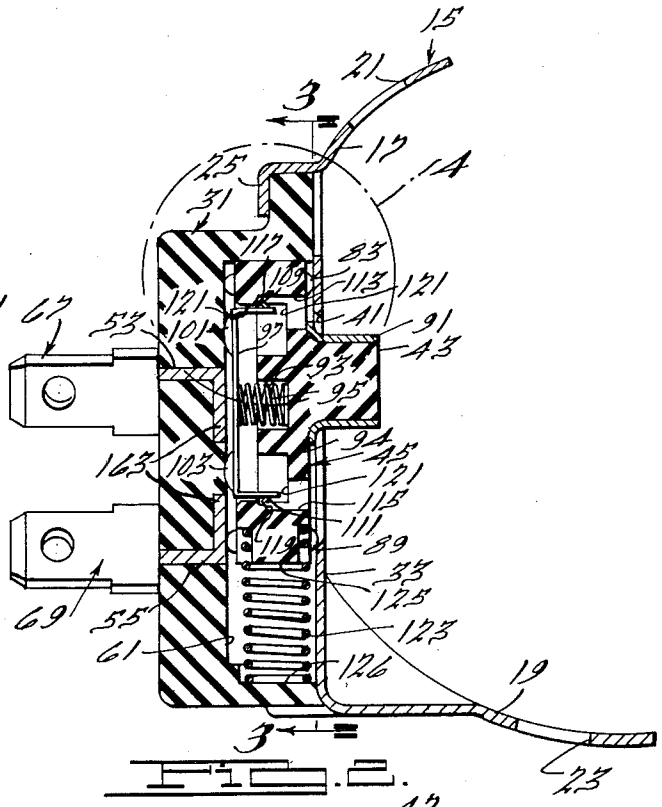


FIG. 2.

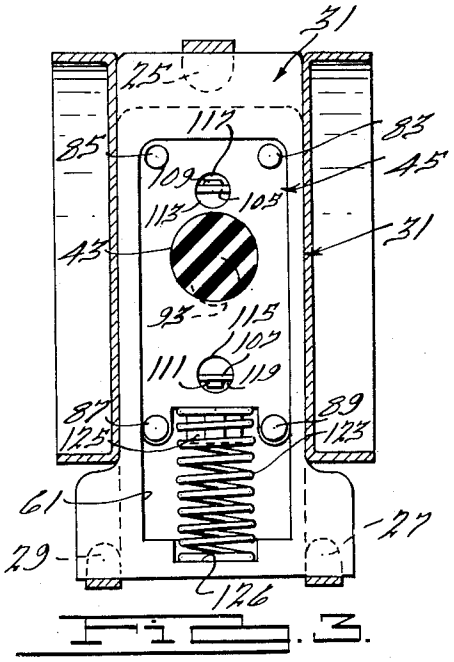


FIG. 3.

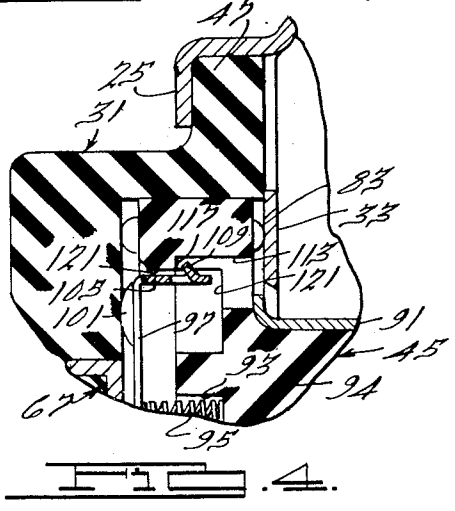


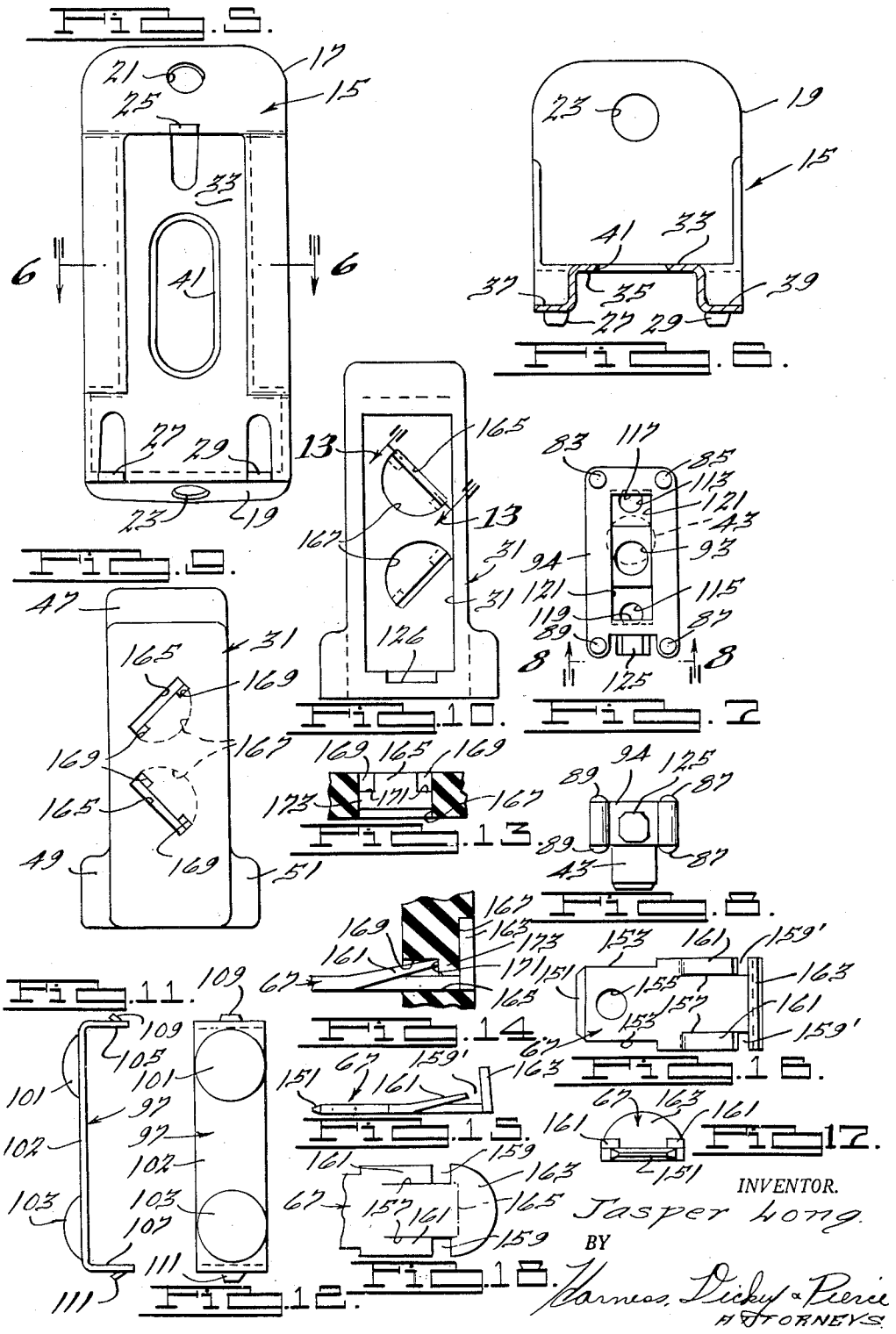
FIG. 4.

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SWITCH

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SWITCH

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Application September 18, 1956, Serial No. 610,582

17 Claims. (Cl. 200—16)

This invention relates to improvements in electrical switches and more particularly to electrical switches of the type having a slide block carrying bridging means for controlling electrical circuits on automotive vehicles.

It is an important object of this invention to provide an electrical switch embodying improved means for connecting the several parts in order to simplify and facilitate manufacture of the switch assembly.

It is another object of the invention to provide an electrical switch having an improved moving contact construction.

It is another object of the invention to provide an improved stationary terminal construction for switches or the like.

It is still another important object of the invention to provide an improved switch which is rugged in construction, reliable in operation and which may be economically manufactured and assembled on a production basis.

The above and other objects and advantages of the present invention will be apparent during the course of the following description, reference being had to the accompanying drawings, wherein a preferred embodiment of one form of the present invention, which is an automotive switch for controlling the back-up lights, is clearly shown.

In the drawings:

Figure 1 is a front view of a switch embodying the present invention taken from the terminal side;

Fig. 2 is an enlarged vertical section taken on the line 2—2 of Fig. 1;

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 2, viewed in the direction of the arrow;

Fig. 4 is an enlarged view of certain parts of the structure in circle 4 shown in Fig. 2;

Fig. 5 is a front view of the mounting bracket with the housing and associated parts removed;

Fig. 6 is a horizontal section taken on the line 6—6 of Fig. 5;

Fig. 7 is a front view of the slide with the bridging means removed;

Fig. 8 is a side view of the slide;

Fig. 9 is a front view of the insulative housing with the stationary contacts or terminals removed;

Fig. 10 is a back view of the insulative housing of Fig. 9;

Fig. 11 is a side elevation of the contact bridging means;

Fig. 12 is a view taken from the left of the structure shown in Fig. 11;

Fig. 13 is a section on line 13—13 of Fig. 10;

Fig. 14 is a partial section showing how the terminal is snapped into the housing;

Fig. 15 is a side elevation of the terminal;

Fig. 16 is a plan view of the terminal;

Fig. 17 is a view taken taken from the left of Fig. 16; and

Fig. 18 is a partial plan view of the blank from which the terminal of Figs. 15–17 is formed.

In accordance with the present invention there is provided an electrical switch which is particularly suited for mounting on the steering column of an automotive vehicle and adapted to be actuated by the transmission gear shifting assembly for controlling the back-up lights on such vehicles. The switch generally comprises a housing carrying stationary contacts or terminals, a mounting bracket for the housing, a slide movable in the housing, and conductive bridging means or contacts carried by the slide adapted to interconnect or disconnect the stationary contacts. An example of the type of actuating mechanism with which the switch assembly of the present invention may be employed is shown and described in the copending application of Harley M. Newcomb, Serial No. 475,430, filed December 15, 1954, assigned to the assignee hereof.

Referring now to the structure in more detail, there is shown a metal mounting bracket generally designated 15 having end portions 17 and 19 which are bent into an arcuate shape so as to adapt the switch for mounting on the steering column of an automobile. The bracket 15 is especially suited for forming from a blank of sheet metal. Holes 21, 23 in the end portions 17, 19 respectively, are punched in the bracket 15 so as to provide means for mounting the bracket to the supporting structure where the switch is to be used. The bracket has tangs 25, 27, 29 partially punched through the metal blank for bending over and holding a switch housing 31 of insulating material to the bracket. The body portion 33 of the mounting bracket securely retains the housing 31 by means of the bent-over tangs 25, 27, 29. The body portion 33 is recessed as at 35 (Fig. 6) and has outwardly turned side walls 37, 39 to snugly retain the housing 31. The body portion 33 of the mounting bracket has a longitudinally extending slot 41 for receiving the operating means in the form of a switch arm or button 43.

The housing 31 is molded from a suitable plastic material and is shown with associated parts removed in Figs. 9 and 10. The housing 31 has tab portions 47, 49, 51 molded integral with the housing to receive the bent-over tangs 25, 27, 29, respectively, of the mounting bracket for the purpose described. The switch housing 31 has a longitudinally extending recess 61 for slidably carrying the slide mechanism or actuated means generally designated 45 and has stationary contacts or terminals 67 and 69 which are connected in a known manner into an electrical circuit, the manner in which the terminals 67 and 69 are mounted in the housing 31 being discussed hereinafter.

The slide mechanism 45 includes a slide block 94 which carries the coil spring 95 and the contact bridging means 97 which provide the movable contacts. The slide block 94 has four pins or embossments 83, 85, 87, 89 which are molded integral with the slide block and present round bottom bosses on each side of the slide block at substantially the corners to enable it to slide within the housing 31 with a minimum of friction and to prevent tilting of the slide during its movement in recess 61 within the housing 31. The switch arm 43 is molded integral with the slide block 94 and has a metal casing 91 surrounding the same so that it can be operatively connected in a durable manner to a suitable operating member such as that shown in the copending case or known to those familiar with present day automobiles. The slide block 94 has formed therein a cavity 93 for receiving the spring 95 which forces the slide block 94 against the mounting bracket 15 and the contact bridge 97 against the stationary contacts or terminals. The contact bridge has rounded contacting bosses 101, 103 formed thereon which ride on the bottom of recess 61 and when in a predetermined position serve to electrically connect the stationary terminals or contacts 69, 67; in other positions (e. g. the position of

Fig. 2) they do not contact the contacts and the switch is open. As indicated, the bosses **101** and **103** function to keep the flat surface **102** of the bridge **97** away from the stationary contacts **67** and **69** and project out from it by a distance which is preferably slightly greater than the thickness of the stock from which contacts **67** and **69** are formed.

The bridge **97** has end portions **105, 107** bent outwardly from the contact bosses **101, 103** and formed on these end portions are sheared-out tangs or lugs **109, 111**, respectively, which serve to retain the bridge in the slide block **94** in a novel manner to be presently described. The slide block **94** has molded therein apertures **113, 115** for receiving the end portions **105, 107** of the bridging means **97**. The apertures **113, 115** in the slide block **94** have shoulder portions **117, 119** formed at the entrance or forward end of these apertures. The shoulder portions are defined by the intersection of rectangular recesses **121** and the bottoms of holes **113** and **115** all of which are formed simultaneously in the molding process by means of a simple mold using axially extending core pins. The end portions **105, 107** of the bridging means **97** project into the apertures **113, 115** and the tangs **109, 111** snap over and engage the shoulder portions **117, 119**, respectively, and serve to retain the bridging means **97** in place on the slide block **94**. The tangs **109** and **111** and the shoulders **117** and **119** are so located that when the tangs are seated on the shoulders the bosses **101** and **103** project a substantial distance beyond the bosses **83, 85, 87**, and **89** so that when the slide mechanism **45** is in place in the housing and all the bosses are sliding on the bottom of recess **61** the tangs will be spaced from the shoulders **117** and **119**. The tangs and sides **105** and **107** are also spaced from the walls of the holes in which they project and it will be seen that this feature plus the unseating of tangs **109** and **111** permits the bridge **97** to rock a slight amount about the spring **95** as a sort of pivot, thus providing good contact and make and break action.

It can be seen that the slide block by the construction described can be cheaply made because each of the apertures and recesses in the slide block can be formed from core members which project from the front and back into the mold cavity during the molding of the slide block and can be readily withdrawn after the molding of the slide block is completed. Attention is also directed to the fact that this improved manner of affixing the bridge to the slide block greatly simplifies assembly as it only needs to be snapped into place and the spring **95** cannot escape even though it is under compression. Heretofore, it has been a very difficult and annoying task to retain the several parts together especially where small springs are involved and usually several attempts and several lost springs were required for each assembly of bridge and block. With the present construction a unitary subassembly can be formed consisting of the bridge, the slide block, and the spring.

A second resilient means in the form of a compression spring **123** operates within one end of the recess **61** of the housing **31** to bias slide **94** and is slipped over a flat sided depending guide post portion **125** molded integral with the slide block **94**, the other end fitting in cavity **126** in the housing **31**. The post **125** is very helpful in keeping the spring **123** in place in the recess **61** during assembly and in preventing it from flying out before assembly is completed.

The stationary contacts **67** and **69** are secured in housing **31** in a novel manner which substantially reduces the cost of manufacture. It will be understood that they are disposed on the particular angles shown in order to fit in the connector socket provided for them in the electrical system of the automobile on which the switch is to be used and that other arrangements can be used. The contacts **67** and **69** are identical and the snap-in connection of each with the housing **31** is the same so that only one need be described in detail. Referring then to contact **67** and the manner of connecting it to housing **31**, the contact is formed from a flat blank of suitable conductive metal such as .032" brass. The free end is provided with whatever shape is desired such as the bevel **151**, the cutouts **153**, and the detent receiving hole **155**. In accordance with this invention the metal is sheared along lines **157** and side cutouts **159** are made in the blank (see Fig. 18). The tabs or side tongues **161** defined by the shear lines **157** are coined on a taper to about one half thickness at the free end as clearly shown in Figs. 14 and 15 and bent up at an angle to the plane of the terminal so that the free end thereof is spaced above the blank by about the thickness of the metal. The semi-circular end portion **163** is also bent up in the same direction along line **165** so that it makes an angle of about 85° with the plane of the blank as also seen in Figs. 14 and 15, there being a gap **159'** between the ends of tongues **161** and the heel or flange **163**. It will be appreciated that in coining the tongues **161** will elongate so that cutouts **159** are made large enough to result in the final gap **159'** of predetermined length. Also, if there is a tendency for the tongues to widen, the blank will be formed with inwardly tapered sides so that after coining the outside edges of the tongues will be in line with the sides of the spade portion. The contact **67** is inserted, bevel end **151** first, from the back (recess **61** side) of housing **31** into a slot-like opening **165**, the coined spring tongues **161** being cammed back down substantially into the plane of the contact during this insertion as the slot **165** is only slightly (approximately .005") wider than the thickness of the metal. Around the slot **165** as a diameter is formed a semi-circular counterbore **167** in which flange **163** fits, the depth of the counterbore being the same as the thickness of the contact metal. Coming in from the outside or front of the housing are two side apertures **169** which terminate from the bottom of counterbore **169** by a distance substantially the same as the length of gap **159'** and provide shoulders **171** over which the coined tongues **161** snap when the flange **163** is home in recess **167**. In order to snap the tongues **161** behind the shoulders **171** the flange **163** will bend toward or to 90° from its original 85° position and the contact will therefore tightly grip the housing sections **173** to hold the contact snugly in place. Thus, the contact **67** is quickly put in place but firmly held in position. Coining of tongues **161** is important as it work hardens them so that they will spring back and seat tightly in apertures **169**. It will be appreciated that the flange **163** can also be coined if needed to improve its resiliency and avoid permanent set. It is also to be noted that the slot **165**, counterbore **167**, and apertures **169** are all arranged so that they can be molded readily permitting the housing **31** to be formed in a simple mold with axially extending core pins.

Although other actuating means may be employed, the present switch is particularly adapted for actuation by the automatic transmission gear shifting assembly of a vehicle and certain parts of the transmission gear shifting assembly are disposed so as to actuate the switch arm **43** attached to the slide mechanism **45** and to move it toward one end of the recess **61** of the switch housing **31** against the resistance of the spring **123**. The slide **94** moves with a minimum of friction and without danger of tilting by virtue of the plurality of rounded bosses against the resistance of the firmly secured spring **123**. The bridge **97** is biased toward the stationary contacts **67** and **69** so that the contacting bosses **101, 103** thereon bridge and connect the stationary contacts **69, 67** when the transmission shifting assembly is in the reverse position to energize the back-up lights on the vehicle. In other positions of the automatic transmission gear shifting assembly the stationary contacts are not bridged and the back-up lights are not energized.

While the preferred embodiment of the invention has been shown and described, it is to be understood that various modifications, changes in size, shape and arrangement of parts may be resorted to without departing from the spirit of the invention.

What is claimed is:

1. An electrical switch including a housing, contact means connected to said housing, actuated means including a slide block of insulating material slidably carried by said housing and having recesses therein, yieldably mounted bridging means carried by said slide block so as to slidably engage said contact means, said bridging means having snap-in detent means protruding into said recesses, shoulder means on said slide block for cooperating with said detent means to insure retention of said bridging means on said slide block, and a coil spring carried by said block and pressing against said bridging means in opposition to said detent means to bias the detent means toward engagement with the shoulder means.

2. An electrical switch comprising a housing, contact means in said housing, a slide block of insulating material slidably carried by said housing having open-ended recesses including shoulder portions therein in line with said recesses, bridging means carried by said slide block so as to slidably engage said contact means, said bridging means having snap-in means including inturned side portions and transversely projecting tangs on said side portions, said side portions protruding into said recesses, and resilient means carried by said slide block biasing said bridging means so that said projecting tangs seat on said shoulder portions to insure retention of said bridging means on said slide block.

3. An electrical switch comprising a housing with contact means, a slide block of insulating material disposed in said housing and arranged to move back and forth therein, said slide block having a pair of open-ended apertures with the bottoms thereof providing shoulder portions, bridging means carried by said slide block so as to slidably engage said contact means, said bridging means having snap-in means including a pair of inturned side portions and transversely projecting tangs on said side portions, said side portions protruding into said apertures so that said tangs cooperate with said shoulder portions to insure retention of said bridging means on said slide block, resilient means disposed in said slide block biasing said bridging means toward said contact means and said slide block away from said contact means, and spring means in said housing fitting on a post on said slide block and biasing said slide block toward one end of said housing.

4. An electrical switch including a housing with contact means, actuated means including a slide block of insulating material slidably carried by said housing and having open-ended recesses therein, bridging means carried by said slide block so as to slidably engage said contact means, said bridging means having snap-in means including struck out tangs protruding into said recesses, a coil spring seated in said slide block and engaging said bridging means and biasing said bridging means away from said slide block in opposition to said snap-in means, and shoulder means on said slide block cooperating with said snap-in means to retain said bridging means affixed to said slide block, in operation said tangs being unseated from said shoulder means whereby said bridging means can rock on said slide.

5. An electrical switch including a housing having a wall defining a chamber, a mounting bracket affixed to said housing having a body portion forming another wall of said chamber, contact means in said housing, a slide block of insulating material slidably carried in said chamber, a plurality of rounded bosses on said slide block disposed to slidably contact said housing walls and said bracket body portion, said slide block having apertures forming shoulder portions, a metal bridge carried by said slide block so as to slidably engage said contact means, said bridging means having snap-in means protruding into said apertures, resilient means carried by said slide block biasing said bridge and said snap-in means away from said slide block, said snap-in means and said shoulder portions cooperating to insure retention of said bridging means on said slide block, spring means in said chamber mounted on a post on said slide biasing said slide block toward one end of said chamber, and means operative to move said slide block against the resistance of said spring means toward the other end of said chamber.

6. In an electrical switch, a stationary contact means, actuated means comprising a slide block of insulating material having recesses including shoulder portions, bridging means carried by said slide block so as to slidably engage said stationary contact means, said bridging means having inturned side portions, and transversely projecting resilient snap-in lugs on said side portions, said side portions protruding into said recesses, resilient means carried by said slide block biasing said bridging means so that said outwardly projecting lugs cooperate with said shoulder portions to insure retention of said bridging means on said slide block, in operative position of said bridging means said lugs being spaced from said shoulder portions and said inturned side portions being transversely movable in said recesses whereby said bridging means can rock relative to said slide block, and means for moving said actuated means.

7. In an electrical connection, a housing formed of insulating material and having a slot extending through it, an aperture opening along its length into said slot and opening at one end out of one side of the housing, the other end of said aperture terminating within the housing and providing a shoulder extending transversely to the slot, a contact disposed in said slot and having a resilient integral tongue extending at an angle to the slot and engaging said shoulder, and a flange on the contact engaging the side of said housing opposite to said one side.

8. The invention set forth in claim 7 wherein the flange is formed on an angle less than 90° with respect to the plane of the contact lying in said slot.

9. The invention set forth in claim 7 wherein said tongue is coined to a taper so that the free end thereof is approximately half the thickness of the metal from which the contact is formed.

10. The invention set forth in claim 7 wherein the spacing between the free end of the tongue and the flange is less than the distance between said shoulder and the other side of the housing.

11. The invention set forth in claim 10 wherein said flange is formed on an angle less than 90°.

12. The invention set forth in claim 11 wherein said tongue is coined to a taper toward the free end thereof.

13. The invention set forth in claim 12 wherein said slot and aperture have openings in the side of the housing which are of no less size than any cross section thereof.

14. The invention set forth in claim 13 including a counterbore formed in the other side of the housing and said flange fitting in said counterbore.

15. In an electrical switch, a housing, a pair of spaced slots in said housing provided with transverse shoulders, a pair of contacts mounted in said housing having tongues snapped over said shoulders and flanges engaging the bottom of a recess in the housing and cooperating with the tongues to hold the contacts firmly in position, a slide movable in said recess, a contact bridge carried by said slide and comprising a U-shaped member having the legs thereof fitting in a recess in the slide and tongues thereon snapped over shoulders formed in the slide, and a coil spring in the slide engaging said bridge to urge the bridge to move in a direction to cause the tongues thereof to engage said shoulders, a non-circular retainer post on the slide, a coil spring supported on said post at one end

and having its other end engaging a side wall of the recess, said contact bridge being adapted to interconnect the fixed contacts but being urged to a non-connecting position by said spring.

16. In an electrical connection, a metal contact including a body portion, a cantilever tongue bent down from said body portion and coined on a taper so that the free end thereof is substantially less in thickness than the contact metal, a molded plastic housing having an aperture opening out of a side thereof which is no greater in cross section at any point along its length than at said opening whereby said aperture may be molded by means of an axially extending core pin, said aperture having a transverse shoulder formed at an intermediate point along the length thereof for engagement with the free end of said tongue.

17. In an electrical device, an insulator housing having a thin slot through it and a pair of oppositely facing shoulder opening into the slot and spaced from each other along the length of the slot, a metal spade terminal in said slot having a sheared out tongue engaging one of said shoulders and a bent over flange engaging the other whereby said spade is firmly held in place by the side walls of the slot and by said shoulders but may be inserted through said slot for assembly to said insulator.

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