May 17, 1960 J. LONG 2,937,245

SWITCH

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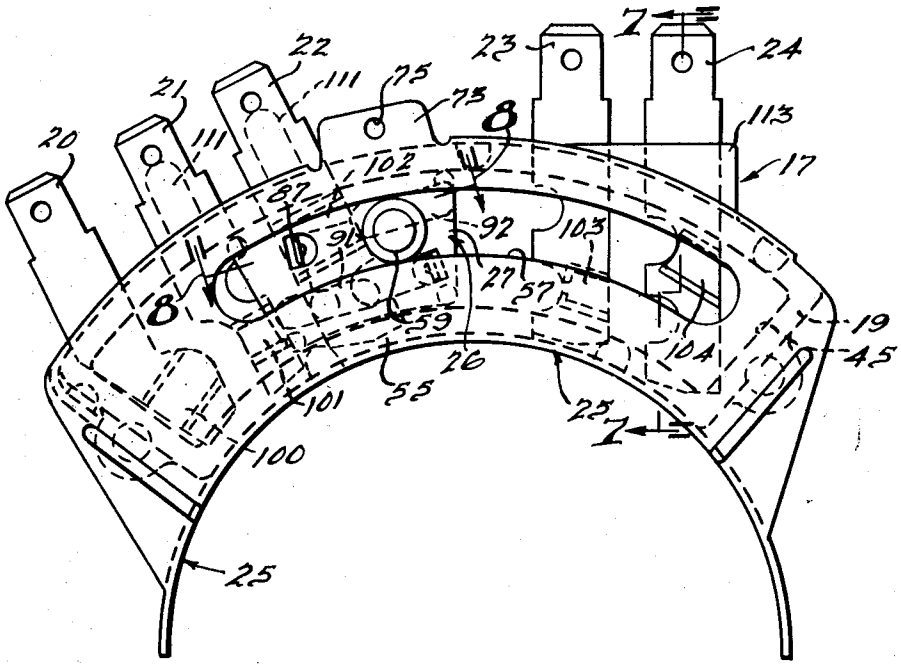


FIG. 1.

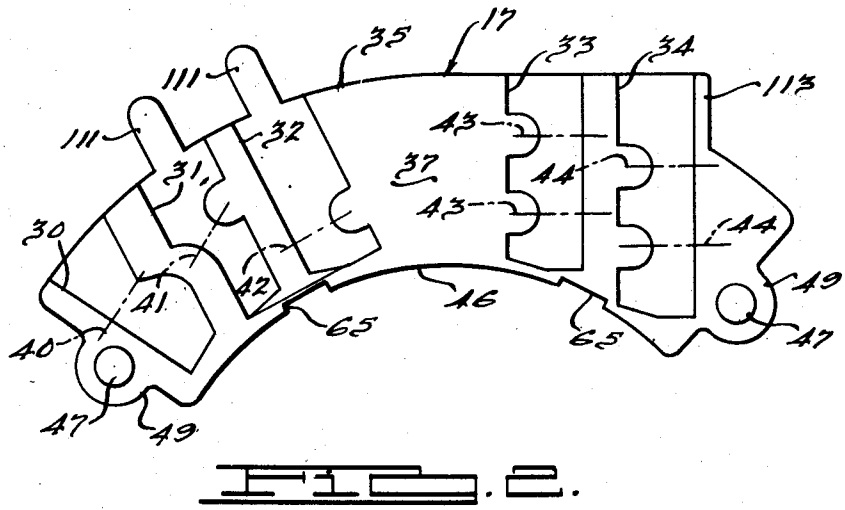


FIG. 2.

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SWITCH

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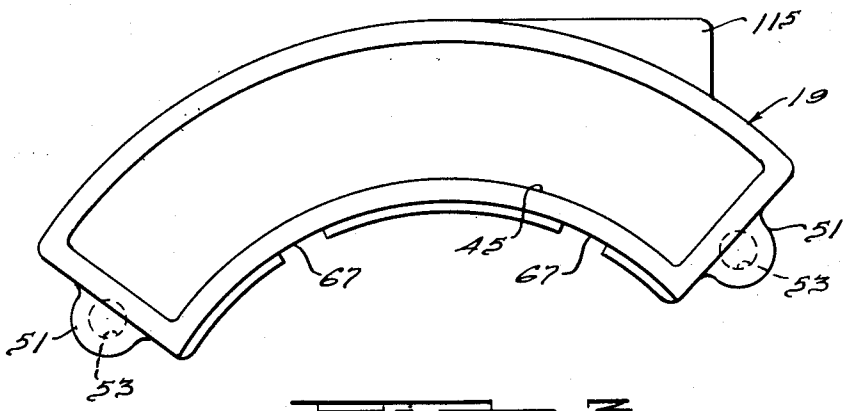


FIG. 3.

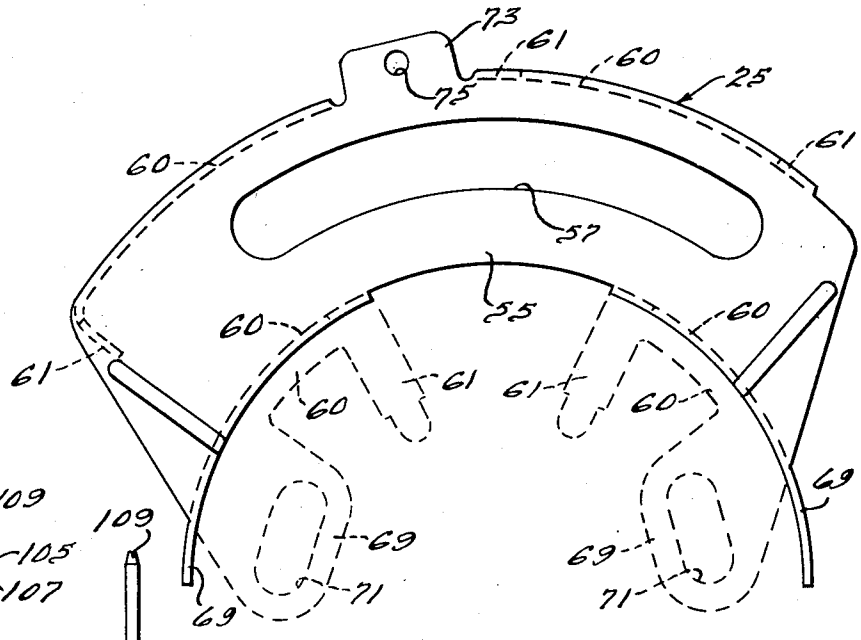


FIG. 4.

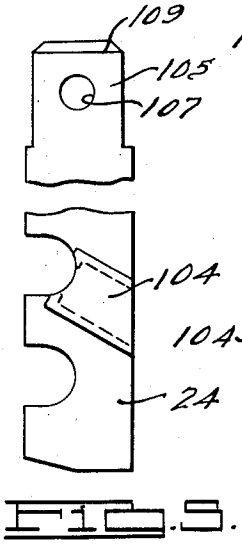


FIG. 5.

FIG. 6.

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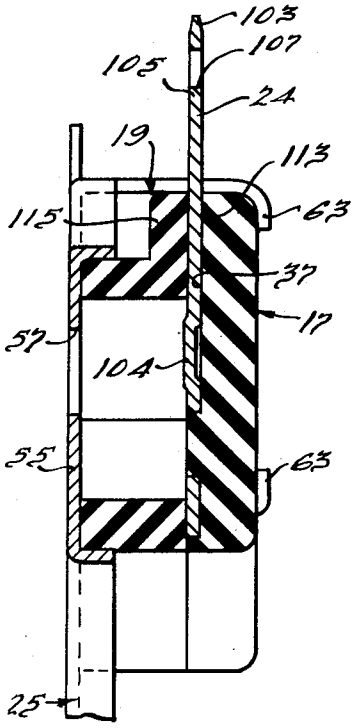


FIG. 7.

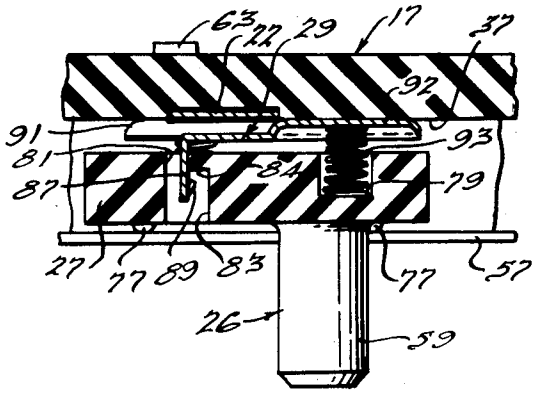


FIG. 8.

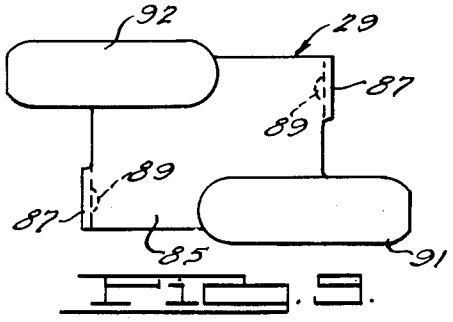


FIG. 9.

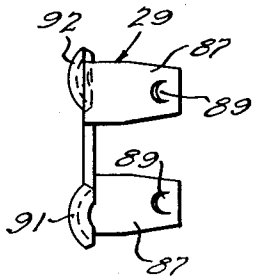


FIG. 11.

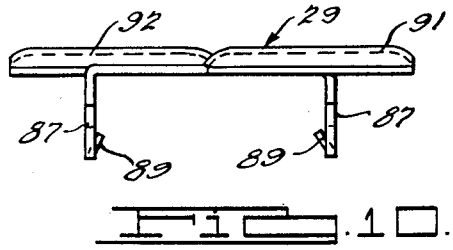


FIG. 10.

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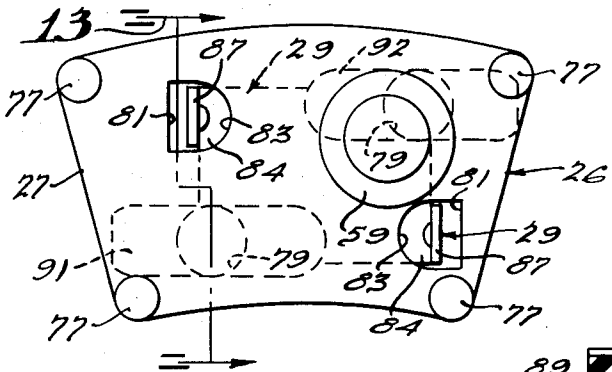


FIG. 12.

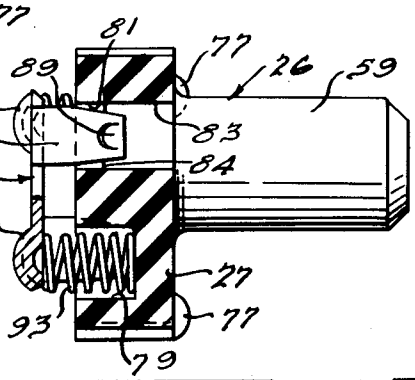


FIG. 13.

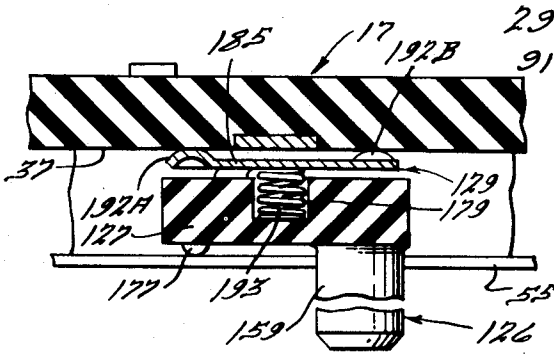


FIG. 14.

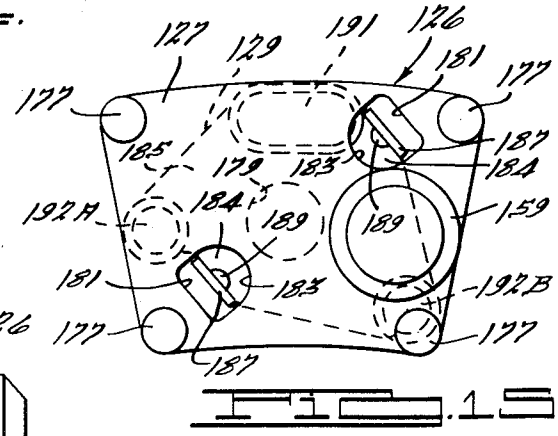


FIG. 15.

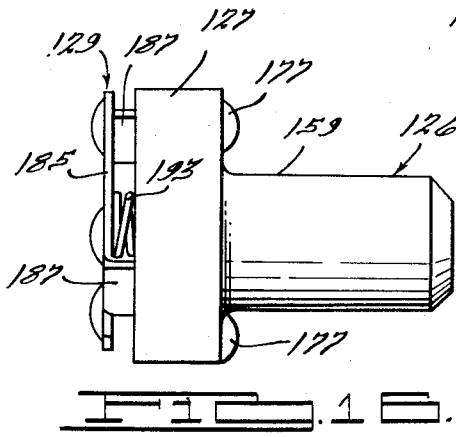


FIG. 16.

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United States Patent Office 2,937,245 Patented May 17, 1960

2,937,245

SWITCH

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Application August 16, 1957, Serial No. 678,588

7 Claims. (Cl. 200—16)

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

It is an important object of the present invention to provide an electrical switch of the type specified embodying improved means for connecting the several parts thereof, particularly the means for carrying the stationary contacts in the housing, in order to simplify and facilitate manufacture of the switch assembly.

It is another important object of the invention to provide improved stationary metal contact means and cooperating insulator housing structure for switches of the character indicated.

It is still another important object of the invention to provide an electrical switch having in combination with the foregoing construction of stationary contact means and housing therefor an improved moving contact mechanism.

It is a still further object of the invention to provide an improved switch particularly adapted for controlling the neutral safety and backup circuits on automotive vehicles and which is rugged in construction, reliable in operation and which may be economically manufactured and assembled on a production basis.

The above and related objects of the present invention will appear more fully during the course of the following description taken in conjunction with the accompanying drawings.

In the drawings:

Fig. 1 is a plan view of a switch embodying the present invention;

Figs. 2 and 3 are plan views of parts of the switch housing;

Fig. 4 is a plan view of a metal mounting bracket for securing together the housing parts shown in Figs. 2 and 3;

Figs. 5 and 6 are plan and side elevational views respectively of one of the stationary contacts employed in the switch of the present invention;

Fig. 7 is a transverse vertical sectional view of the structure of Fig. 1 taken on the line 7—7 thereof;

Fig. 8 is a fragmentary longitudinal vertical sectional view of a portion of the structure of Fig. 1 taken along the line 8—8 thereof and showing one form of moving contact mechanism employed in the switch of the present invention.

Fig. 9 is an underside view of the bridging means for the form of moving contact mechanism shown in Fig. 8;

Figs. 10 and 11 are front and right side elevational views respectively of the structure of Fig. 9;

Fig. 12 is a plan view of the moving contact mechanism shown in Fig. 8;

Fig. 13 is a vertical transverse sectional view of the structure of Fig. 12 taken substantially along the line 13—13 thereof;

Fig. 14 is a sectional view similar to Fig. 10 showing a different form of moving contact mechanism; and

Figs. 15 and 16 are plan and left side elevational views respectively of the form of moving contact mechanism shown in Fig. 14.

In accordance with the present invention there is provided an electrical switch which is suitable for mounting on the steering column of an automotive vehicle and adapted to be actuated by the transmission gear shifting assembly for controlling the neutral safety and backup circuits on such vehicles. The switch is shown assembled in Fig. 1 and generally comprises an insulator housing which is especially constructed in two parts 17 and 19 which together carry novel laid-in type stationary metal contacts 20–24, a mounting bracket 25 for the housing parts, a moving contact mechanism generally designated 26 consisting of a slide block 27 movable in the housing and conductive bridging means 29 carried by the slide block 27 and adapted to interconnect or disconnect two or more of the stationary contacts 20–24. An example of the type of actuating means for the moving contact mechanism of the switch assembly of the present invention is shown and described in the copending application of Harley M. Newcombe, S.N. 475,430, filed December 15, 1954 assigned to the assignee hereof. Briefly the actuating means therein shown includes a rotatable transmission control tube which is concentrically disposed about the steering shaft of a vehicle steering column and actuable in response to the manually operable transmission control lever on the vehicle. Suitable means are provided for interconnecting the transmission control tube and the backup control switch for converting the rotary motion of the former into reciprocating motion for actuating the latter which means may be adapted for actuating the moving contact mechanism of the switch of the present invention.

Referring now to the structure in greater detail the housing parts 17 and 19 are shown separately in Figs. 2 and 3 respectively and each is preferably molded of phenolic and formed into an arcuate shape for reception in the bracket 25 to be described for mounting on the steering column of an automobile. The housing part 17 is flat over its length and is provided with a plurality of spaced open faced slots 30–34 which open from the long side 35 of the part 17 and are recessed from its upper face 37. The slots 30–34 interlock with the contacts 20–24 respectively and each slot has a re-entrant cross-section which conforms to the cross-sectional shape of the inner end of its respective contact. By a re-entrant cross-section is meant that the cross-sectional width of each slot at one point over its length is in inverse relationship to the cross-sectional width of the slot at a point on each side of the said one point so that there is interposed side wall portions of the slot and contact preventing relative movement in the plane of the contact between the latter and the housing part 17. In the instance shown each of the slots 30–34 at at least one point over its length has a cross-sectional width which is smaller than the cross-sectional width at a point on each side of the said one point and for each of the slots 30–34 this one point is located intermediate its ends and indicated in Fig. 2 by the lines 40–44 respectively which pass through the said one points. It will be noted that at the point of narrowest width of the slot 30 an L-shaped projection is formed which cooperatively engages a similarly shaped cut-away section on the contact 20 and that for each of the slots 31–34 at least one rounded projection is formed which engage rounded cutaway sections on the contacts 21–24. The slots 33 and 34 have each two such rounded projections which cooperate with two rounded cut-away sections on the contacts 23 and 24 respectively. By the construction thus described for the slots 30–34 and the inner ends of the contacts 20–24, the latter may each be simply laid onto the face 37 and deposited in its re-

spective slot thereby facilitating assembly. While the contacts are each secure against movement in their respective planes, they may be freely lifted from the face 37 unless the part 19 is laid over the part 17.

The part 19 is an annular member provided with a central arcuate opening 45 as shown in Fig. 3 and has a mating lower face which engages the face 37 on the part 17 over the perimeter of the latter. The walls of the part 19 stand upright from the face 37 and bridge each of the slots 30–34 at its respective open end on the side 35 of the part 17 and at its blind end on the opposite side 46 of the part 17. The portion of the walls of the part 19 which bridges each slot engages the respective contact when the latter is disposed in the slot and completes securement of each contact in all planes. For preventing relative movement between the parts 17 and 19 in the plane of the face 37 the part 17 is provided with upright pins 47 formed on ears 49 which project from the ends of the part 17 and the part 19 has correspondingly located ears 51 in which slots 53 are formed for engaging the pins 47. The side walls of the part 19 and its opening 45 define a chamber in which operates the slide mechanism to be described and the part 17 together with the contacts 20–24 collectively define a floor for the chamber over which the slide mechanism travels. The ceiling for the chamber is provided by the arcuately shaped mounting bracket 25 the details of which are best shown in Fig. 4.

The bracket 25 is suited for forming from a blank sheet of metal and has a flat body portion 55 which engages the top face of the housing part 19 and closes off the opening 45 in the latter except for the longitudinally extending arcuate slot 57 in the body portion 55 which receives the operating means of the slide mechanism which is in the form of a switch arm or button 59 (Fig. 8). At suitable intervals over the sides of the body portion 55 short extensions 60 are formed which are downwardly turned to snugly receive the housing part 17 and from such extensions depend a plurality of suitably spaced tangs 61 for holding the parts 17 and 19 together. The tangs 61 bear against the side walls of the parts 17 and 19 and their free ends are staked over the bottom surface of the part 17 as shown and indicated at 63 in the sectional view of Fig. 7. The side wall of the part 17 may be recessed as at 65 (Fig. 2) on its side 46 and the part 19 may be recessed as at 67 (Fig. 3) on its corresponding side. The recesses 65 and 67 accommodate the tangs on the corresponding side of the bracket and prevent endwise movement of the housing parts relative to the mounting bracket. The ends of the bracket extend beyond the housing parts and on the last-mentioned side of its body portion 55 each end is provided with a depending lug 69 in which is formed a slot 71. Another lug 73 which is flush with the body portion 55 and located on the side thereof opposite the lugs 69 has an aperture 75 and the latter together with the slots 71 provide means for mounting the bracket to supporting structure where the switch is to be used.

Before the mounting bracket is assembled to the housing parts the slide mechanism is inserted into the switch chamber which may be either of the forms shown and to be described. The form of slide mechanism 26 shown in Figs. 8–13 includes the slide block 27 and the bridging means 29 previously referred to and provides the movable contacts for the switch. The slide block 27 is molded of insulating material the same as the housing parts 17 and 19 and is formed into an arcuate shape to closely fit the inside surfaces of the side walls of the part 19. At the four corners of the slide block on its top face rounded bosses 77 are formed for bearing against the inside surface of the body portion of the mounting bracket for reducing friction therewith and for stability during movement of the slide mechanism. Adjacent its bottom face the slide block carries the conductive bridging means 29 of the slide mechanism and for this purpose is provided with a pair of blind end cavities 79 which are recessed from the bottom face of the slide block and spaced approximately at opposite corners thereof as can be seen in Fig. 12. Located on a diagonal with respect to the cavities 79 are a pair of open-ended apertures each of which is formed in the slide block 27 by counterbored holes 81 and 83. The hole 81 for each aperture is rectangular in shape and extends inwardly from the bottom face of the slide block. The respective hole 83 is both rectangular and semicircular in shape and extends inwardly from the top face of the slide block, its rectangular portion being concentric with the hole 81 so that at the intersection of the two holes 81 and 83 a shoulder 84 is formed which faces toward the top face of the slide block. Each open-ended aperture and its respective shoulder are capable of being formed in a simple mold using axially extending core pins which may be readily withdrawn at the completion of the molding operation.

The conductive bridging means shown separately in Figs. 9–11 is in the form of a one-piece metal bridge contact provided with a body portion 85 from the inner face of which project upturned arms 87 located at diagonal corners of the body portion 85. Inwardly projecting detents 89 which are struck out from the arms 87 cooperate with the shoulders 84 when the bridge contact is assembled on the slide block. A pair of metal contact bosses 91 and 92 in the form of elongated depressions are formed as an integral part of the body portion 85 and project from opposite ends thereof at diagonal corners. Before the bridge contact is assembled on the slide block a pair of coil compression springs 93 are inserted one in each of the cavities 79 and the bridge contact is disposed adjacent the bottom face of the slide block so that the ends of the springs 93 which project beyond the bottom face of the slide block bear against the inside surfaces of the contact bosses 91 and 92. In this relative position of the slide block and the bridge contact the arms 87 on the latter are disposed one in each of the holes 81. The bridge contact is then forced inwardly with respect to the bottom face of the slide block so that the detents 89 which are resilient pass through the holes 81 and override the shoulders 84. The cooperative action of the shoulders 84 and the detents 89 prevent withdrawal of the bridge contact from the slide block in a direction away from the bottom face of the latter. The bridge contact of course is free to move inwardly toward the bottom face of the slide block against the urging of the pair of springs 93. By virtue of this construction employing a pair of springs each bearing on one of the contact bosses of the bridge undue tilting of the latter in its sliding movement is prevented and a more positive connect and disconnect action is effected.

It will be noted that the switch arm 59 previously mentioned is molded integral with the slide block so as to upstand from its top face and is eccentrically located thereon closer to one end than the other. When the slide mechanism is assembled it is disposed in the switch chamber of the switch assembly so that the switch arm 59 projects through the slot 57 in the mounting bracket in which position it is accessible to operating means such as that mentioned above. With the slide mechanism disposed in the switch chamber the pair of springs 93 yieldably urge the rounded bosses 79 on the top face of the slide block against the inside surface of the body portion 55 of the mounting bracket and the bridge contact against the face 37 of the housing part 17 and the stationary contacts 20–24 carried therein. The slide mechanism is free to move within the switch chamber endwise of the housing parts and the contact bosses 91 and 92 move over the face 37 and the inner ends of the contacts 20–24 in two concentric arcuate paths with the contact boss 92 riding closer to the side 37 of the housing part 17 and with the contact boss 91 closer to the opposite side 46 thereof.

The inner ends of the contacts 20–24 may be specially

constructed to cooperate with the contact bosses on the bridge contact and in the instance shown have formed thereon arched contact surfaces **100–104** respectively. Each arched contact surface is formed by coining a portion of the inner end of the respective contact so that the metal thereof which may be of brass is reduced in thickness and cold flows. Each arched contact surface is spaced from the face **37** of the housing part **17** as shown for the contact surface **104** on the contact **24** in Fig. 7 which also shows the extent of the thickness reduction of the portion of the contact defining its arched contact surface. The cold working of this portion of the contact hardens it somewhat and makes it more resilient. The continual movement of the bridge contact over the inner ends of the contacts ordinarily produces considerable wear and the hardened arched contact surfaces of the metal contacts resist this wear and increase the life of the contacts. The arched surfaces may be formed straight across the stationary contact, i.e. approximately perpendicular to their longitudinal axes, as shown in Fig. 2 for the contact surfaces **101** and **102** on the contacts **21** and **22**, respectively, or may be formed at a decided angle to the longitudinal axes of the contacts as shown for the contact surfaces **100**, **103** and **104** on the contacts **20**, **23** and **24**, respectively. Figs. 5 and 6 are separate views of one of the latter contacts, viz., contact **24**, wherein it can be seen that the arched contact surface **104** thereon extends downwardly and outwardly from the outermost rounded cut-away section on the contact.

Also from Figs. 5 and 6 the particular construction of the outer end of the contact **104** is most clearly shown which is identical to that of the other contacts and it can be seen that a blade portion **105** is formed on this end which has a width slightly narrower than the over-all width of the inner end of the contact. A detent aperture **107** is formed in the blade portion **105** for engaging a detent on a socket terminal, not shown, with which the contact is adapted to interlock. The tip of the blade end of the contact is coined into a taper as at **109** to facilitate entry thereof into its respective socket terminal. The outer ends of the contacts which project beyond the side **37** of the housing part **17** may be supported from beneath as shown for the contacts **21** and **22** in Fig. 1. For this purpose arms **111** are integrally formed on the housing part **17** to project from the side **37** and provide a surface flush with the bottom surface of the slots **31** and **32** which carry these contacts. The outer ends of the contacts may also be supported from above as well as from below beyond the normal width of the housing part **19** as shown for the contacts **23** and **24**. For this purpose an integral abutment **113** is formed on the housing part **17** as an extension of the side **37** in the vicinity of the slots **33** and **34** which carry these contacts and a similarly shaped cooperating abutment **115** is formed as an extension of the lower part of the corresponding side of the housing part **37**. Fig. 7 shows the extended support for the contact **104** derived by this construction.

Returning to a description of the construction of the inner ends of the stationary metal contacts and to the arched contact surfaces thereon, the latter are suitably located as shown in Fig. 1 so that they engage one or the other of the contacts bosses **91** and **92** in the sliding movement of the bridge contact to keep the main body portion **85** of the latter elevated from the remaining portions of the inner ends of the stationary contacts. In the embodiment shown the arched contact surfaces on the contacts **22** and **24** are in the path of the contact boss **92** and the contact surfaces on the contacts **20**, **21** and **23** are in the path of the contact boss **91**. Thus in the extreme position of the slide mechanism on the right side of the switch assembly as viewed in Fig. 1, the contact boss **92** rests on the arched contact surface **104** of the contact **24** while the contact boss **91** rests on the arched contact surface **103** of the contact **23**. The contacts **23** and **24** are thus electrically connected or bridged in this position of the slide mechanism even though the main body portion **85** of the bridge contact is raised from the remaining portions of these contacts. Similarly in the extreme lefthand position of the slide mechanism the contact boss **92** rests on the arched contact surface **102** on the contact **22** and contact boss **91** rests commonly on each of the arched contact surfaces **100** and **101** on the contacts **20** and **21**, respectively. The three contacts **20–22** are thus electrically interconnected or bridged in this position of the slide mechanism. In the position of the slide mechanism immediately adjacent its extreme lefthand position the pair of contacts **21** and **22** are bridged by the contact boss **92** which rests on the contact surface **102** on the contact **22** and by the contact boss **91** which rests on the contact surface **101** on the contact **21**. The contact **20** is electrically disconnected from the contacts **21** and **22** in this position of the slide mechanism.

Before passing to a description of the operation of the switch assembly of the present invention the construction of the form of slide mechanism shown in Figs. 14–16 and generally designated **126** should be noted as it is also usable therein. The slide block for the slide mechanism **126** is indicated at **127** and the bridge contact therefor at **129**. The slide block **127** is provided with an eccentrically located switch arm **159** and rounded bosses **177** which project from the top face of the slide block as in the previous form of slide mechanism. A pair of open-ended apertures are formed through the body of the slide block **127** and spaced thereon as shown in the plan view of Fig. 15. The open-ended apertures are formed by counterbored holes **181** and **183** which intersect to form shoulders **184** similar to the shoulders **84** previously described. Inwardly projecting detents **189** are formed on arms **187** which are inturned from the main body portion **184** of the bridge contact **129**. The shoulders **184** cooperate with the detents **189** for retaining the bridge contact assembled on the slide block. The slide block **127** in this form is provided with a single centrally located cavity **179** in which operates a coil spring **193** for biasing the slide block against the inside surface of the body portion **55** of the mounting bracket and the bridge contact **129** against the face **37** of the housing part **17** and against the stationary contacts 20–24. The bridge contact **129** has a shape in plan as shown in Fig. 15 and at approximately three corners of the same there are formed contact bosses **191** in the form of an elongated depression and **192A** and **192B** each in the form of a rounded depression. The contact bosses **191** and **192A—192B** define three separate paths over the face **37** of the housing part **17** and the inner ends of the contacts **20–24** during the sliding movement of the slide mechanism **126** within the switch chamber. The inner ends of the contacts **20–24** may be modified as would be obvious to one familiar with what is taught herein so that the same sets of contacts as are bridged by the bridge contact **29** are also bridged by the bridge contact **129** in corresponding positions of the latter.

In the operation of the switch of the present invention stationary contacts **20–22** on one side of the switch may be connected in series with the conventional push-button starter switch and the starter motor for the automotive vehicle on which the switch is mounted and the contacts **23** and **24** may be connected in series between the backup lights and the power source therefor. More specifically the terminals **20** and **21** may be commonly connected through socket terminals and lead-in wires, not shown, to one side of the push-button starter switch and the contact **22** may be similarly connected through a socket terminal and lead-in wire not shown to one side of the starter motor. Similarly one of the terminals **23** and **24** may be connected to one side of the backup lights circuit and the other connected to power source therefor. With the switch arm of the slide mechanism disposed so as to be actuated by certain parts of the transmission gear shifting assembly of the vehicle the slide mechanism will

move within the switch chamber in accordance with the position of the manually operated transmission shift lever. Suitable means may be provided external of the switch assembly described by one familiar with present day automobiles for biasing the slide mechanism toward one end of the switch chamber in a direction to yieldably oppose the actuating means on the transmission gear shifting assembly. When the manually operated shift lever is in reverse position the slide mechanism is in its extreme position on the right side of the switch assembly bridging the contacts 23 and 24 and thus energizing the backup lights for the vehicle. In this position and in all other positions of the slide mechanism except the extreme position on the lefthand side of the switch assembly corresponding to the Neutral position of the shift lever and the one immediately adjacent thereto corresponding to the Park position of the shift lever the starter switch is rendered inoperative. When the slide mechanism is actuated through the shift lever to the left in positions corresponding to Low and Drive positions the contact bosses on the bridge contact leave the contacts 23 and 24 and de-energize the backup lights. In these positions the bridge contact of the slide mechanism rides on the insulator face 37 of the housing part 17 between the sets of contacts on each side thereof. Continued movement of the slide mechanism to the left causes the bridge contact on the slide mechanism through its contact bosses to electrically interconnect the terminals 21 and 22 and thus complete the circuit between the starter switch and the starter motor. In this position which corresponds to the Park position of the shift lever the starter switch is rendered inoperative so that the starter motor can be energized upon depression of the push-button starter switch. Further movement of the slide mechanism to its extreme left position corresponding to the Neutral position of the shift lever interconnects the three contacts 20–22 retaining the starter switch operative.

While preferred embodiments of the invention have been shown and described it is to be understood that various modifications and changes may be made without departing from the spirit thereof or from the scope of the appended claims.

What is claimed is:

1. In an electrical switch, an insulator housing for carrying stationary metal contacts comprising a member having a plurality of spaced slots each opening from one side and recessed from one face thereof, a metal contact having its inner end engaged in each slot and its outer end projecting beyond said one side, each slot having a re-entrant cross section conforming to the cross section of the inner end of its respective contact so as to prevent relative movement in the plane of the contact between the latter and said member but permitting the contact to be lifted from said face and another member laid over the first-mentioned member and having portions engaging said face and bridging each of said slots at spaced points adjacent both its open and blind end so as to prevent the contacts from being lifted from said face and to expose the portion of each contact between said spaced points so that electrical contact can be made therewith.

2. In an electrical switch, an insulator housing comprising a member having a plurality of spaced slots each opening from one side and recessed from one face thereof, stationary metal contacts corresponding to the number of slots each having its inner end disposed in one of said slots and its outer end projecting from said one side, each slot having a re-entrant cross section and the inner end of its respective contact conforming to its slot cross section so that relative movement in the plane of the contacts between the latter and said first member is prevented by the cooperative structure on the side walls of the slots and the contacts, means for preventing the contacts from being lifted from said face and means defining a chamber with said member, a slide block of insulating material slidably carried in said chamber, the face of said member and the contacts collectively defining a floor for said chamber over which the slide block moves, a metal bridge carried by said slide block so as to slidably engage said contacts, a coil spring carried in the slide block having one end bearing against said bridge and yieldably urging it in one direction against the chamber floor, shoulders on the slide block and detents on the bridge cooperatively preventing withdrawal of the bridge from the slide block in said one direction, and means for guiding the movement of the slide block within said chamber.

3. In an electrical switch, an insulator housing comprising a member having a plurality of spaced slots each opening from one side and recessed from one face thereof, stationary metal contacts corresponding to the number of slots each having its inner end disposed in one of said slots and its outer end projecting from said one side, each slot having a re-entrant cross section and the inner end of its respective contact conforming to its slot cross section so that relative movement in the plane of the contacts between the latter and said first member is prevented by the cooperative structure on the side walls of the slots and the contacts, means for preventing the contacts from being lifted from said face, and means defining a chamber with said member, a slide block of insulating material slidably carried in said chamber, the face of said member and the contacts collectively defining a floor for said chamber over which the slide block moves, a metal bridge carried by said slide block so as to slidably engage said contacts, a pair of spaced depressed contact bosses on the bridge, a pair of coil springs each having one end bearing against one of said contact bosses and yieldably urging the bridge in one direction against the chamber floor, shoulders on the slide block and detents on the bridge cooperatively preventing withdrawal of the bridge from the slide block in said one direction, and means for guiding the movement of the slide block within said chamber.

4. In an electrical switch, an insulator housing comprising a member having a plurality of spaced slots each opening from one side and recessed from one face thereof, stationary metal contacts corresponding to the number of slots each having its inner end disposed in one of said slots and its outer end projecting from said one side, each slot having a re-entrant cross section and the inner end of its respective contact conforming to its slot cross section so that relative movement in the plane of the contacts between the latter and said first member is prevented by the cooperative structure on the side walls of the slots and the contacts, means for preventing the contacts from being lifted from said face, and means defining a chamber with said member, a slide block of insulating material slidably carried in said chamber, the face of said member and the contacts collectively defining a floor for said chamber over which the slide block moves, a metal bridge carried by said slide block so as to slidably engage said contacts, a depressed contact boss on the bridge at approximately each of three corners thereof, a coil spring having one end bearing against the bridge centrally of said contact bosses and yieldably urging said bridge in one direction against the chamber floor, shoulders on the slide block and detents on the bridge cooperatively preventing withdrawal of the bridge from the slide block in said one direction, and means for guiding the movement of the slide block within said chamber.

5. In an electrical switch, an insulator housing comprising a first member having a plurality of spaced slots each opening from one side and recessed from one face thereof, flat one-piece stationary metal contacts corresponding to the number of slots each having its inner end disposed in one of said slots and its outer end projecting from said one side, each slot having a re-entrant cross section and the inner end of its respective contact conforming to its slot cross section so that relative movement in the plane of the contacts between the latter and said first member is prevented by the cooperative struc-

ture on the side walls of the slots and the contacts, a second member laid over the first member and having wall portions engaging said face and bridging each of said slots at their open and blind ends so as to prevent the contacts from being lifted from said face, said second member being an annular member disposed about the perimeter of said first member and defining therewith a chamber, a slide block of insulating material slidably carried in said chamber, the face of the first member and the contacts collectively defining a floor for said chamber over which the slide block moves, a metal bridge carried by said slide block so as to slidably engage said contacts, a coil spring carried in the slide block having one end bearing against said bridge and yieldably urging it in one direction against the chamber floor, shoulders on the slide block and detents on the bridge cooperatively preventing withdrawal of the bridge from the slide block in said one direction, and means forming a top wall for said chamber and securing the first and second housing members together, said last-mentioned means having an opening through which actuated means on the slide block extends for moving the slide block within said chamber.

6. In an electrical switch, an insulator housing comprising an arcuately shaped first member having a plurality of spaced slots each opening from one side and recessed from one face thereof, flat one-piece stationary metal contacts corresponding to the number of slots each having its inner end disposed in one of said slots and its outer end projecting from said one side, each slot having a re-entrant cross section and the inner end of its respective contact conforming to its slot cross section so that relative movement in the plane of the contacts between the latter and said first member is prevented by the cooperative structure on the side walls of the slots and the slots and the contacts, an arcuately shaped second member laid over the first member and having wall portions engaging said face and bridging each of said slots at their open and blind ends so as to prevent the contacts from being lifted from said face, said second member being an annular member disposed about the perimeter of said first member and defining therewith a chamber, a slide block of insulating material slidably carried in said

chamber, the face of the first member and the contacts collectively defining a floor for said chamber over which the slide block moves, a metal bridge carried by said slide block so as to slidably engage said contacts, a coil spring carried in the slide block having one end bearing against said bridge and yieldably urging it in one direction against the chamber floor, shoulders on the slide block and detents on the bridge cooperatively preventing withdrawal of the bridge from the slide block in said one direction, a metal mounting bracket having a body portion forming a top wall for said chamber and securing the first and second housing members together, the body portion of the bracket having an opening through which actuated means on the slide block extend for moving the slide block within said chamber.

7. In an electrical switch, an insulator housing comprising a member having a plurality of spaced slots each opening from one side and recessed from one face thereof, stationary metal contacts corresponding to the number of slots each having its inner end disposed in one of said slots and its outer end projecting from said one side, each slot having a re-entrant cross section and the inner end of its respective contact conforming to its slot cross section so that relative movement in the plane of the contacts between the latter and said first member is prevented by the cooperative structure on the side walls of the slots and the contacts, and bridging means extending across each of the slots at spaced points adjacent each end thereof to prevent the contacts from being lifted from said face whereby the portion of each contact between said spaced points is exposed so that electrical connection can be made therewith.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,937,245 May 17, 1960

Jasper Long

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 9, lines 34 and 35, strike out "and the slots".

Signed and sealed this 27th day of December 1960.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents

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