

Aug. 18, 1953

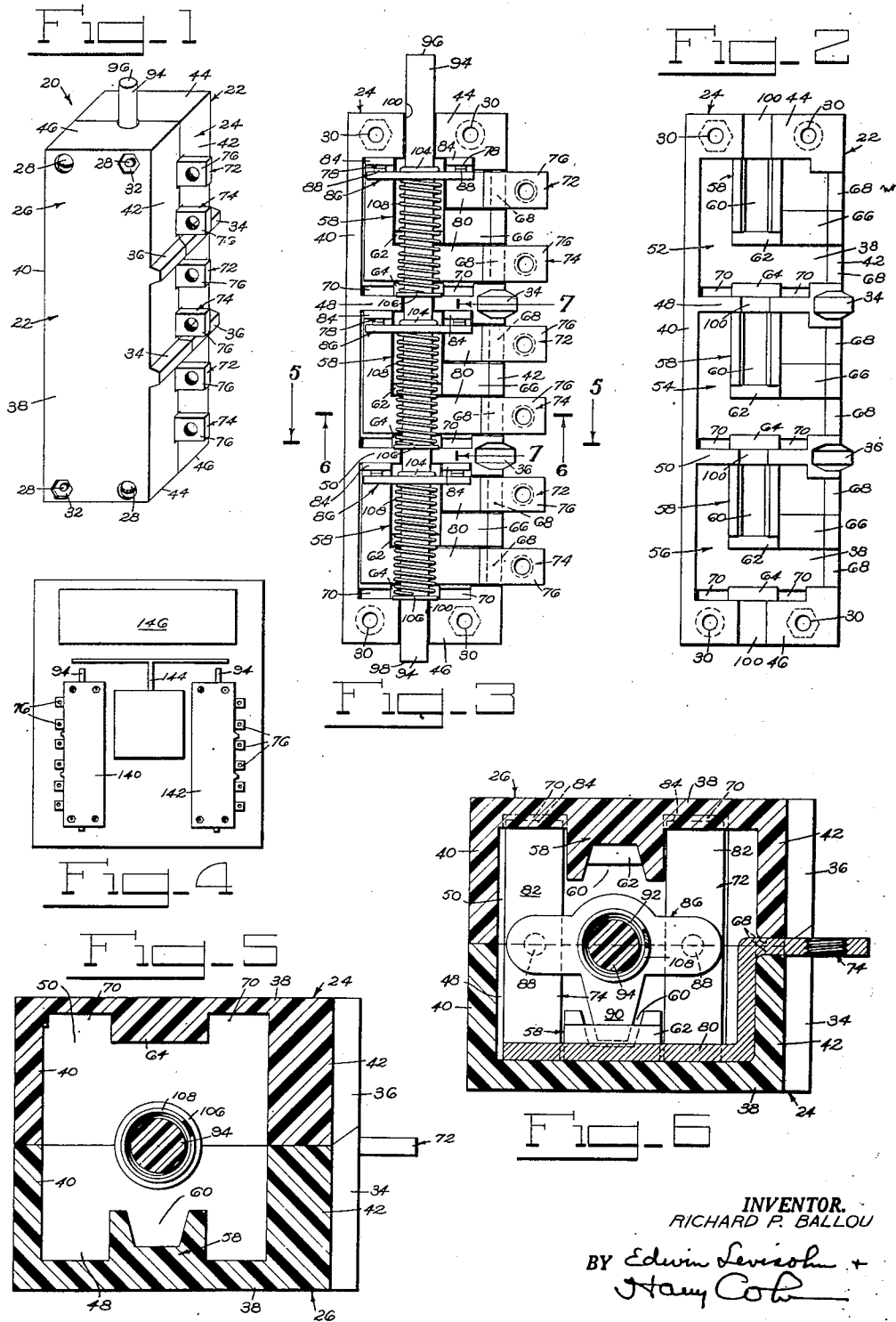
R. P. BALLOU

2,649,514

ELECTRIC SWITCH

Filed Aug. 17, 1949

2 Sheets-Sheet 1



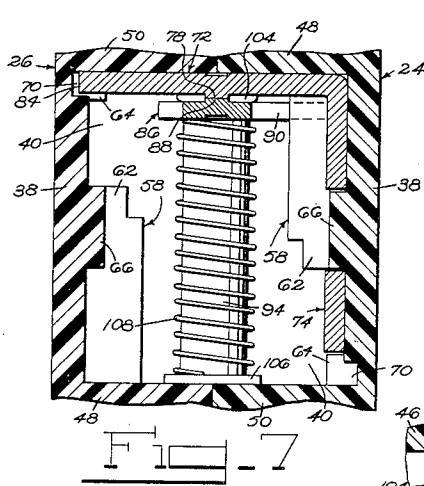
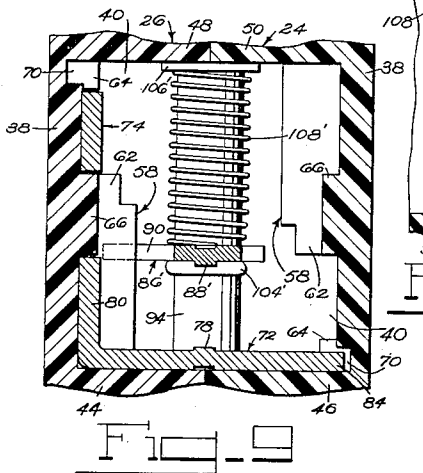
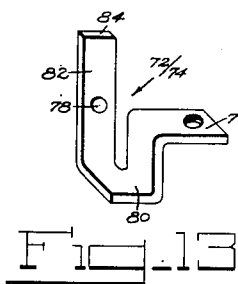
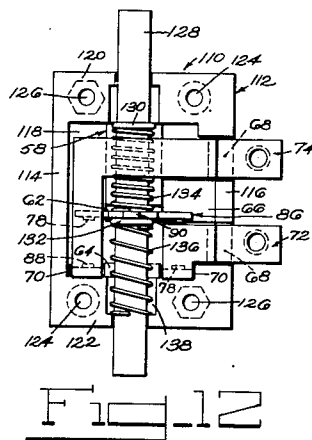
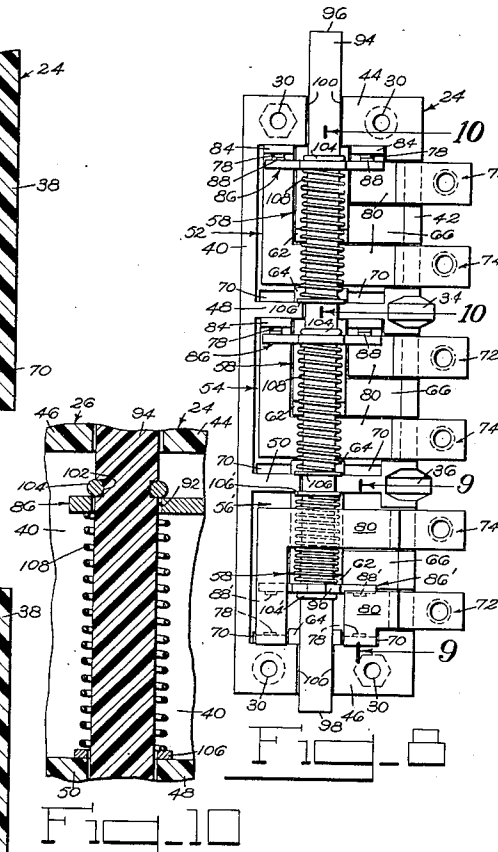
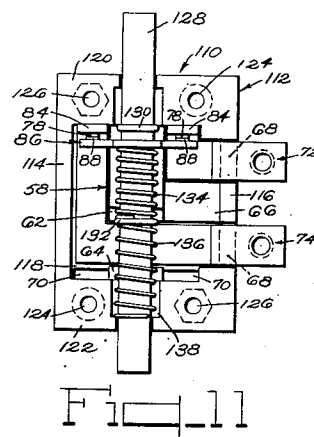
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2 Sheets-Sheet 2



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ELECTRIC SWITCH

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22 Claims. (Cl. 200—16)

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This invention relates in general to auxiliary electric switch contact units for use in connection with magnetic motor-starters, limit switches, door switches, etc., and more specifically to a self-contained contact unit provided with a plurality of contacts arranged in combinations of normally open and/or normally closed contacts.

One object of this invention is to provide a switch having a plurality of contacts readily arrangeable into various combinations of normally open or normally closed relatively movable companion contacts.

Another object of this invention is to provide a switch having stationary contacts which can be assembled as normally open or normally closed in the switch housing or casing and which can be mounted in either part of a two-part casing, for example, either in the base or the cover of the casing and which are securely retained therein without screws, rivets or other auxiliary means of attachment other than the fastening means for the casing parts.

A further object of this invention is to provide a switch having only one set of contacts which can be used as either normally open or normally closed contacts.

A further object of this invention is to provide a switch in which the relative position of the contact terminals can be changed by rotating the switch about its vertical axis.

A further object of this invention is to provide a switch having one molding which serves as both the base and the cover block.

The above and other objects, features and advantages of the invention will be fully understood from the following description, considered in connection with the accompanying illustrative drawings.

In the drawings:

Fig. 1 is a perspective view of an assembled switch embodying the invention;

Fig. 2 is a plan view of one part of the casing, the latter being composed of two such parts;

Fig. 3 is a view similar to Fig. 2 showing the various switch elements in position in the casing part;

Fig. 4 is a diagrammatic view illustrating an operational disposition of a pair of the present invention associated with a motor-starter;

Fig. 5 is a sectional view taken on line 5—5 of Fig. 3 and showing, also, the companion part of the casing in position;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 3 and showing, also, the companion part of the casing in position;

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Fig. 7 is a sectional view taken on line 7—7 of Fig. 3, and showing, also, the companion part of the casing in position;

Fig. 8 is a view similar to Fig. 3 illustrating another arrangement of the contacts;

Fig. 9 is a sectional view taken on the line 9—9 of Fig. 8 and showing, also, the companion part of the casing in position;

Fig. 10 is a partial sectional view taken on the line 10—10 of Fig. 8;

Fig. 11 illustrates a switch embodying the invention and provided with a pair of normally closed contacts;

Fig. 12 illustrates the switch of Fig. 11 arranged with normally open contacts; and

Fig. 13 illustrates a fixed contact of the invention.

Referring to the drawings, the casing of the switch unit 20, illustrated in Fig. 1, is preferably formed of two identical parts 22 molded of suitable insulating material. For convenience of description, one of said two parts 22 may be considered as the switch base, indicated at 24, and the other as the cover, indicated at 26 (Figs. 1 and 5), although as indicated said two parts are preferably of the same formation in all respects, so that only a single mold is needed for producing both of said housing parts. When the two parts are disposed in face-to-face relation, they define the complete casing or housing and are secured in said relation, being secured in said relation by countersunk bolts 28 retained in the aligned bores 30 by countersunk nuts 32. Each molding or part 22 is provided with a male part 34 and a female part 36 which interfit with part 36 and part 34, respectively, on the companion molding when the two parts are assembled to form the housing (Figs. 1, 5 and 6), serving to aid in registering the two casing parts and to hold them against relative displacement in their meeting plane. Molding 22 comprises a bottom wall 38, opposing lateral walls 40 and 42, opposing end walls 44 and 46, and the spaced transverse ribs 48 and 50, to form the separate switch contact chambers 52, 54 and 56, each provided with the centrally grooved portion 58 extending upwardly from the bottom wall to form a guideway 60 extending longitudinally of said bottom wall between the barrier, or stop, 62 extending upwardly from the bottom wall and end wall 44, in the case of chamber 52, and ribs 48 and 50, in the case of chambers 54 and 56, respectively. Each chamber is also provided with a portion 64, extending upwardly from the bottom wall, and co-operating with the companion barriers 62, as

will hereinafter be described, and with a contact spacing part 66 extending upwardly from the bottom wall and extending transversely of said chamber between lateral wall 42 and the grooved portion 58. Notches or seats 68 are provided in lateral wall 42 and recesses or slots 70 are provided in bottom wall 38, the function of both of which is hereinafter described.

Each chamber is provided with a pair of fixed contact elements 72 and 74, formed of suitable electrical conducting material, each being provided with the terminal portion 76 adapted to be connected to an external circuit and with the contact 78, preferably formed of silver or other suitable material. Both contact elements are similar in shape and design and differ only in the dimensions of the flat bottom or intermediate portion 80 (see Figs. 3 and 13), said portion being larger in element 74. In a block containing only normally closed contacts, as illustrated in Fig. 3, contact element 72 is disposed in the upper seat 68 in each chamber and contact element 74 is disposed in the lower seat 68 in each chamber. The depth of each seat is approximately half the thickness of the terminal portion 76 (see Fig. 6) and that part of said portion which extends above the seat in block 24 is received in the companion seat in cover 26 whereby the terminal portion is securely retained against both lateral and longitudinal displacement. Since contact element 72 is disposed in the upper right hand corner of each chamber, its bottom portion 80, which is disposed on the upper surface of bottom wall 38 is, of necessity, much smaller than the equivalent bottom portion of contact element 74 which must extend longitudinally of the bottom wall for substantially the entire length of the chamber whereby the portions 82 of each contact element, which portions are normal to the portions 80, are aligned in order to align the contacts 78. The upstanding portion 82 of each contact element extends above the lateral walls of block 24 (see Figs. 6 and 7) and its free end 84 is received in companion recesses 70 in the bottom wall of the overlying cover 26, whereby dislodgement of said end is prevented. The contact elements are separated by the spacing part 66 (see Fig. 7) and portion 80 of the contact element 74 is guided into position on wall 38 by the barrier 62 and the portion 64 between which the contact portion 80 is disposed (see Fig. 7) and which prevent the lateral displacement thereof. From the above, it will be apparent that both contact elements are readily positionable in block 24 and are retained, without any additional securement, by cooperating seats 68, recesses 70 in the cover, and portion 66, and that the larger contact element 74 is additionally retained by stop 62 and barrier 64.

The stationary contacts 78 are bridged by a movable contact member 86, preferably formed of bronze or other electrically conductive material, provided with contacts 88, which cooperate with the stationary contacts 78, and also provided with a guide part 90 which extends therefrom for movement longitudinally of guideway 60 and between the sides of grooved portion 58 (see Fig. 6) whereby rotation of the movable contact member is prevented. Said movable member is provided with a circular aperture 92 through which is disposed the circular rod or switch-operating member 94, preferably formed of Bakelite or other suitable electrical insulating material, said rod extending through the switch unit 20 and having end portions 96 and 98 projecting from the ends

thereof. The rod is movable longitudinally of the switch unit and is mounted in the semi-circular portions 100 (see Fig. 2) provided centrally of end walls 44 and 46, and of ribs 48 and 50 in both the block and the cover. The rod is provided with three spaced concentric grooves 102 (see Fig. 10) in each of which is mounted a pinch ring 104, and with three washers 106, preferably formed of steel, or other suitable material, two of which are disposed on the upper surface of ribs 48 and 50, respectively (see Fig. 3) and the other one being disposed on the upper surface of end wall 46. Three helical compression springs 108 are mounted on rod 94, each spring being disposed between a washer and the lower surface of the movable contact member whereby the latter is normally biased upwardly against the pinch ring in the relaxed condition of the spring and the movable contacts 88 engage the stationary contacts 78.

To operate the switch, the end 96 of actuating member 94 is depressed whereby pinch rings 104 are carried downwardly by said member to move the bridging member 88 downwardly against the tension of spring 108 whereby the movable contacts are disengaged from the fixed contacts. In its downward movement, the bridging member is guided by its guide part 90 which extends between the sides of the grooved portion 58 thereby preventing the rotation of said member about rod 94. This downward movement continues until the guide part abuts barrier 62 (see Fig. 6) which prevents further movement of the movable bridge member. During the downward movement, the spring is compressed, and upon the release of rod 94, it is apparent that the spring will expand to its relaxed or protracted condition and return the movable bridge member to its normal position wherein contacts 78 engage contacts 88.

The contact terminals 76 are all illustrated in Fig. 1 as projecting from the right side of the switch assembly 20. A definite advantage of the auxiliary contact unit of my invention is the fact that by rotating the unit about its longitudinal axis, the terminals can be displaced by any desired degree from the position shown, to facilitate attachment of the unit in a circuit without in any manner affecting the operation thereof and without requiring any physical or electrical changes in the unit except possibly to locate the terminal screws (not shown) for access at the front of the assembly.

While the unit described above comprises a three-section switch, each having normally closed contacts, it is apparent that the unit can be constructed to include any desired number of sections, and moreover, the illustrated arrangement of normally closed contacts can be changed to normally open contacts or to any desired combination of normally open and normally closed contacts. An arrangement of two normally closed switch sections and one normally open section is illustrated in Fig. 8 wherein all components and parts are the same as those in Fig. 3, switch chambers 52 and 54 having normally closed contacts, as do the same chambers in Fig. 3, but switch chamber 56' has normally open contacts in place of the normally closed contacts of chamber 56 in Fig. 3. The change is accomplished by reversing both the positions and the disposition of contact elements 72 and 74 from their respective positions and disposition in the normally closed position. It will be noted that in chamber 56' of Fig. 8, the shorter contact 72 is in the lower

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right hand corner and that instead of extending toward bottom wall 38 of base block 24, as in the other chambers, the shorter contact is reversed by 180 degrees so that the top surface of terminal portion 76 is positioned in seat 68 of the base block, but portion 80 extends outwardly from said block and is disposed on the bottom wall 38 of the cover block 26 (see Fig. 9) and portion 82 extends downwardly toward the bottom wall of the base block with end 84 inserted in recess 70 in the base block and fixed contact 78 faces into the unit. In the same manner, contact element 74 is reversed by 180 degrees and the upper surface of terminal 76 is disposed in the upper seat 68 in chamber 56' and said contact element extends outwardly of the base block, portion 80 thereof now overlying spring 108' and being disposed on the bottom wall of the cover block (see Fig. 9), the rear of portion 82 thereof abutting end wall 46 of the base block and end 84 thereof being positioned in the companion recess 70 in the base block. The positions of pinch ring 104' and washer 106' are also reversed in chamber 56', the washer being at the top of the chamber and the ring being positioned on the rod upwardly from end wall 46, in the normal position of the rod, whereby the movable contact member 86' is positioned above the ring, with its contacts 88' facing downwardly, and spring 108' is retained in compressed condition between the ring and the washer, it being understood that the tension of spring 108' is less than the combined tension of the springs 108 in the other chambers, whereby the rod is normally positioned as indicated in Fig. 8. It will be apparent that the guide 90 of the bridging member is now disposed between the sides of the grooved portion 58 in the cover block (see Fig. 9).

When rod 94, of the unit illustrated in Fig. 8, is depressed, the operation of the switch sections disposed in chambers 52 and 54 will be the same as described above, but since ring 104' is carried downwardly by rod 94, the spring 108' will expand from its compressed position to carry movable member 86' downwardly until its contacts 88' engage the fixed contacts 78. Upon the release of rod 94, the expansion of springs 108 will move the rod upwardly and cause the compression of spring 108', thereby returning movable member 86' to its normally disengaged position.

The switch unit illustrated in Fig. 8 may be modified by replacing either of the springs 108 with the companion springs 134 and 136, and the additional ring 132, as illustrated in Fig. 11, and hereinafter described. Such an arrangement would have the advantage of regulating the break action of movable contacts 88' from fixed contacts 78 in that spring 134 would compress as spring 136 expands in the return of rod 96 from its depressed to its normal position.

A switch unit embodying the invention and having one set of contacts only is illustrated in Figs. 11 and 12, Fig. 11 showing normally closed contacts and Fig. 12 showing normally open contacts. As in the case of the three unit switches, one molding 110 serves as both the base block 112 and the cover block (not separately shown), said molding being provided with the lateral opposing walls 114 and 116, the bottom wall 118, and the end walls 120 and 122, the latter being provided with bores 124 and 126 to receive a countersunk bolt and a countersunk nut for fastening the cover and block together. Lateral wall 116 is provided with seats 68 and bottom wall 118 is provided with the separating portion 66, the re-

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cesses 70, the grooved portion 58, the guideway 60 and the barrier 62 (all parts therein which are the same as those illustrated in Figs. 2, 3 and 5 through 10, bear the same identifying numerals).

In the normally closed unit illustrated in Fig. 11, contact elements 72 and 74 are disposed in the same manner as in Fig. 3. The actuating rod 128 is shorter than rod 94, since it accommodates only one set of contacts. Rod 128 is provided with a pair of spaced pinch rings 130 and 132 which are the same as rings 104 on rods 94 and are mounted in the same manner. A helical compression spring 134 is mounted on rod 128 and bears against ring 132 and the under surface of the movable contact member 86 to maintain the movable contacts 88 in engagement with the fixed contacts 78, said spring being slightly compressed in the normal position of the rod. A second helical compression spring 136 is mounted on the rod and bears against ring 132 and wall 122 in the cut-out 138 provided to receive said spring. When the rod is depressed the contacts do not disengage immediately due to the compression of spring 134 and due to the fact that ring 130 is spaced from the movable member, but when the ring abuts the latter, the latter is carried downwardly against the tension of spring 136 which begins to compress, guide part 90 thereof riding in guideway 60 in block 112. On the release of the rod, spring 136 returns to its expanded condition and carries the rod upwardly to return the contacts to their normally closed position. To prevent any injury to the bridging member on its re-engagement with the fixed contacts, the rod is permitted to overtravel since the ring 130 does not normally abut the movable contact member. The overtravel is limited by the expansion of spring 136 against the compression of spring 134 between ring 132 and the movable member.

The construction illustrated in Fig. 11 may be modified by replacing springs 134 and 136, and pinch ring 132, with a single spring such as spring 108 illustrated in Fig. 3. In the modified construction the spring 108 is mounted on rod 128, one end thereof bearing against the under surface of the movable contact member 86 to maintain the movable contacts 88 in engagement with the fixed contacts 78, and the other spring end bearing against wall 122 in the cut-out 138, the spring being slightly compressed in the normal position of the ring. The modified unit will operate in the same manner as in Fig. 11, the contacts disengaging on the depression of rod 128, and re-engaging on the return of the rod to its normal position.

To convert the single unit into a normally open contact switch, the contact elements 72 and 74 change positions and are reversed in the same manner as described with reference to chamber 56' of Fig. 8, and it will be understood that they are now disposed on the bottom wall of the cover block (not illustrated) and the bridging member rides in the guideway thereof. Referring now to Fig. 12, during the depression of rod 128, ring 132, on which the movable member is retained by the compression of spring 134, moves downwardly against the tension of spring 136 which is compressed thereby and the movable member engages the fixed contacts. Again, to prevent injury to the movable member and to avoid the necessity for precisely controlling the extent of downward travel of the rod, provision is made to permit the overtravel thereof against the tension of spring 136 which compresses between

wall 122 and ring 132, spring 134 beginning to contract after the contacts engage. On the release of the rod, spring 136 will return to its relaxed position and disengage the contacts.

One arrangement of the auxiliary contact units of my invention is illustrated diagrammatically in Fig. 4. Two units 140 and 142, each of which may be the same as unit 20 or each having any desired arrangement of normally open and normally closed contacts, and each connected to external circuits (not shown) by the terminals 76, are provided with actuating rods 94 which are operated by the member 144 which constitutes the armature of the relay 146. With the relay unenergized, it will be understood that armature 144, which is provided with means well known in the art, will bear against rods 94 to retain the rods in their depressed condition. Upon the energization of the relay, the armature is carried out of engagement with the rods which will be carried to their protracted positions by the spring members in the units, thereby causing the concomitant opening and/or closing of a plurality of external circuits, in various relations, as desired.

While there has been illustrated and described a one-section and a three-section switch control unit, it will be understood that the unit may have any desired number of sections, the contacts of each of which can be arranged as required to control the related circuits.

It will be understood that the terms "normal" or "normally," as used in the appended claims, refer to the unenergized condition of the switch units, and, more specifically, to the position of the movable contact elements and operating member when the latter is not depressed.

While I have shown and described the presently preferred embodiment of my invention, it will be understood that various changes in the details of construction and in the form and arrangement of parts may be made without departing from the underlying idea or principles of this invention within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent, is:

1. A housing for a switch having companion fixed and movable contact elements, said housing comprising a base member and a cover member, said members being interchangeable and each having a bottom wall and opposed lateral walls upstanding therefrom, said bottom wall being provided with recessed portions for insertably receiving the ends of the fixed contact elements and with a guideway forming portion for guiding said movable contact element, said guideway portion being intermediate said lateral walls and parallel thereto, one of said lateral walls being provided with spaced portions for receiving the terminal ends of said fixed contact elements, and means releasably retaining the corresponding walls of both of said members in abutment.

2. A housing for a switch having companion fixed and movable contact elements, said housing comprising a base member and a cover member, said members being interchangeable and each having a bottom wall and opposed lateral walls upstanding therefrom, said bottom wall being provided with recessed portions for insertably receiving the ends of the fixed contact elements and with a guideway forming portion for guiding the movable contact element, and one of said lateral walls being provided with spaced portions

for receiving the terminal ends of said fixed contact elements, said one wall also having a male and a female part, the male and female parts of said cover member interfitting with the female and male parts, respectively, of said base member.

3. A housing for a switch having companion fixed and movable contact elements, said housing comprising a base member and a cover member, said members being interchangeable and each having a bottom wall and opposed lateral walls upstanding therefrom, transverse rib portions extending between said lateral walls and forming a plurality of chambers in said members, each chamber having a guideway forming part in the bottom wall portion therein for guiding a movable contact element therein and slotted portions defined in the inner surface of said bottom wall portion for insertably receiving the ends of the fixed contact elements, and one of said lateral walls being provided with spaced seats formed therein in each of said chambers for receiving the terminal ends of said fixed contact elements, said one wall also having a male and a female part, the male and female parts of said cover member interfitting with the female and male parts, respectively, of said base member.

4. A casing molding for a switch having companion fixed and movable contact elements, said molding comprising a bottom wall and opposed lateral walls upstanding therefrom, said bottom wall being provided with slotted portions defined in the inner surface thereof for insertably receiving the ends of the fixed contact elements and with a guideway forming portion for guiding the movable contact element, one of said lateral walls being provided with spaced seats formed therein and adapted to receive the terminal ends of said fixed contact elements.

5. A casing molding for a switch having companion fixed and movable contact elements, said molding comprising a bottom wall and opposed lateral walls upstanding therefrom, said bottom wall being provided with slotted portions defined in the inner surface thereof for insertably receiving the ends of the fixed contact elements and with a guideway forming portion for guiding the movable contact element, and one of said lateral walls being provided with spaced seats formed therein for receiving the terminal ends of said fixed contact elements and with male and female portions adapted to engage with cooperating portions in a similar molding.

6. A switch comprising a housing formed of similar interchangeable portions, each of said portions being adapted to form the cover or the base of said housing and each having a bottom wall provided with recessed portions and with a guideway forming portion, opposed lateral walls upstanding from said bottom wall, one of said lateral walls being provided with spaced seat portions, a movable contact member mounted for movement axially of said housing and provided with a portion extending into the guideway forming portion of one of said interchangeable portions, and a pair of fixed contact members each having a terminal part disposed within cooperating seat portions of said interchangeable portions, an intermediate part of said fixed contact members being disposed on the bottom wall of said one interchangeable portion and an end part of said fixed contact members being disposed in a recessed portion of the other of said interchangeable portions, and means for maintaining said movable contact member in normal releas-

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able engagement with said fixed contact members.

7. A switch comprising a housing formed of similar interchangeable portions, each of said portions being adapted to form the cover or the base of said housing and each having a bottom wall provided with recessed portions and with a guideway forming portion, opposed lateral walls upstanding from said bottom wall, one of said lateral walls being provided with spaced seat portions, a movable contact member mounted for movement axially of said housing and provided with a portion extending into the guideway forming portion of one of said interchangeable portions, and a pair of fixed contact members each having a terminal part disposed within cooperating seat portions of said one interchangeable portion, an intermediate part of said fixed contact members being disposed on the bottom of said one interchangeable portion and an end part of said fixed contact members being disposed in a recessed portion of the other of said interchangeable portions, and means for maintaining said movable contact member in normal releasable engagement with said fixed contact member comprising an operating member on which said movable contact member is movably mounted and a compression member disposed about said operating member in engagement with said movable contact member, said compression member resiliently biasing said movable contact member into engagement with said fixed contact members, and a part carried by said operating member for disengaging said movable contact member against the bias of said compression member.

8. A switch comprising a housing formed of similar interchangeable portions, each of said portions being adapted to form the cover or the base of said housing and each having a bottom wall provided with recessed portions and with a guideway forming portion, opposed lateral walls upstanding from said bottom wall, one of said lateral walls being provided with spaced seat portions, a movable contact member mounted for movement axially of said housing and provided with a portion extending into the guideway forming portion of one of said interchangeable portions, and a pair of fixed contact members each having a terminal part disposed within cooperating seat portions of said interchangeable portions, an intermediate part of said fixed contact members being disposed on the bottom wall of said one interchangeable portion and an end part of said fixed contact members being disposed in a recessed portion of the other of said interchangeable portions, and means for maintaining said movable contact member in normal disengagement with said fixed contact members.

9. A switch comprising a housing formed of similar interchangeable portions, each of said portions being adapted to form the cover or the base of said housing and each having a bottom wall provided with recessed portions and with a guideway forming portion, opposed lateral walls upstanding from said bottom wall, one of said lateral walls being provided with spaced seat portions, a movable contact member mounted for movement axially of said housing and provided with a portion extending into the guideway forming portion of one of said interchangeable portions, and a pair of fixed contact members each having a terminal part disposed within cooperating seat portions of said interchangeable portions, an intermediate part of said fixed contact

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members being disposed on the bottom wall of said one interchangeable portion and an end part of said fixed contact members being disposed in a recessed portion of the other of said interchangeable portions, and means for maintaining said movable contact member in normal disengagement with said fixed contact members comprising an operating member on which said movable contact member is movably mounted, a compression member disposed about said operating member and bearing against one surface of said movable contact member, and a part fixedly mounted on said operating member and spaced from said fixed contact members in the normal position of said operating member, said part abutting the opposite surface of said movable contact member, said movable contact member being resiliently biased against said fixedly mounted part by said compression member.

10. A switch comprising a housing formed of similar interchangeable portions, each of said portions being adapted to form the cover or the base of said housing and each having a bottom wall and opposed lateral walls upstanding therefrom, transverse rib portions extending between said lateral walls and forming a plurality of chambers in each of said portions, each chamber having a guideway forming part on the bottom wall portion therein and recessed portions in said bottom wall portion, one of said lateral walls being provided with spaced seat portions in each of said chambers, the chambers of said base portion cooperating with companion chambers of said cover portion to form a plurality of contact chambers, an operating member extending through said contact chambers and movable axially thereof, each contact chamber being provided with a pair of fixed contact elements each having a terminal part mounted in cooperating seat portions of said chamber and extending outwardly from said housing, intermediate portions of said contact elements being disposed on the bottom wall of one of said interchangeable portions and the inner end parts of said elements being disposed in the recessed portions in the other of said interchangeable portions, and a companion movable contact element in each contact member chamber movably mounted on said operating member and having a portion extending into a guideway forming part in each contact chamber and being disposed on said operating member for normal engagement with its companion fixed contact elements.

11. A switch comprising a housing formed of similar interchangeable portions, each of said portions being adapted to form the cover or the base of said housing and each having a bottom wall and opposed lateral walls upstanding therefrom, transverse rib portions extending between said lateral walls and forming a plurality of chambers in each of said portions, each chamber having a guideway forming part on the bottom wall portion therein and recessed portions in said bottom wall portion, one of said lateral walls being provided with spaced seat portions in each of said chambers, the chambers of said base portion cooperating with the companion chambers of said cover portion to form a plurality of contact chambers, an operating member extending through said contact chambers and movable axially thereof, each contact chamber being provided with a pair of fixed contact elements each having a terminal part mounted in cooperating seat portions of said chamber and extending outwardly from said housing, intermediate

portions of said contact elements being disposed on the bottom wall of one of said interchangeable portions and the inner end parts of said elements being disposed in the recessed portions in the other of said interchangeable portions, and a companion movable contact element in each contact chamber movably mounted on said operating member and having a portion extending into a guideway forming part in each contact chamber, the movable contact element in at least one of said chambers being disposed on said operating member for normal engagement with its companion fixed contact elements, the movable contact element in at least another chamber being disposed on said operating member for normal disengagement with its companion fixed contact elements, said operating member being provided in each contact chamber with a part fixedly mounted thereon and with a compression member disposed thereabout, said fixed part in said one chamber being proximate said inner end parts therein for said normal engagement of said contact elements and said fixed part in said other chamber being spaced from said inner end parts therein for normal disengagement of said contact elements, said movable contact element in said one chamber being maintained in abutment with said fixed part therein for said normal engagement by said compression member therein in its relaxed condition, and said movable contact element in said other chamber being maintained in abutment with said fixed part therein for said normal disengagement by said compression member therein in its compressed condition.

12. A switch comprising a housing having front and rear walls, opposing end walls and opposing lateral walls, a pair of fixed contact members having terminal parts extending from one of said lateral walls and having intermediate portions disposed on the inner surface of said rear wall, the inner ends of said contact members being disposed in cooperating recessed portions provided in the inner surface of said front wall, an operating member mounted in said housing for movement axially thereof, said member being provided with a pair of parts fixedly mounted in spaced relation thereon and with a pair of compression members disposed thereabout, one of said compression members bearing against said lower end wall and one of said fixedly mounted parts, and a movable contact member movably mounted on said operating member, said movable member being maintained in normal engagement with said fixed contact members by said other compression member, said latter compression member bearing against said movable contact member and said one fixedly mounted part, said movable member being spaced from the other of said fixedly mounted parts when maintained in said normal engagement.

13. A switch comprising a housing having front and rear walls, opposing end walls and opposing lateral walls, a pair of fixed contact members having terminal parts extending from one of said lateral walls and having intermediate portions disposed on the inner surface of said front wall, the inner ends of said contact members being disposed in cooperating recessed portions provided in the inner surface of said rear wall, an operating member mounted in said housing for movement axially thereof, said member being provided with a pair of parts fixedly mounted in spaced relation thereon and with a pair of

compression members disposed thereabout, one of said compression members bearing against the lower end wall and one of said fixedly mounted parts, and a movable contact member movably mounted on said operating member and maintained in normal disengagement with said fixed contact members, said movable member abutting said one fixedly mounted part, the other of said compression members bearing against said movable member and the other of said fixedly mounted parts to maintain said movable member in said abutment.

14. A switch housing element comprising a member provided with a bottom wall and with opposing lateral walls extending upwardly therefrom, said bottom wall being provided with a guideway forming part for a movable contact member, said part being intermediate said lateral walls and parallel thereto and being provided with a stop portion for limiting the movement of said contact member, and a part on said bottom wall spaced from said stop portion and cooperating therewith to define a guideway on said bottom wall for receiving a fixed contact member.

15. A switch contact member having a terminal portion adapted to extend from a switch housing, an intermediate portion spaced therefrom and adapted to engage a switch housing surface, said portions being disposed in parallel planes, a portion disposed angularly relative to said planes and joining together said first mentioned portions, and an end portion spaced upwardly from said intermediate portion and provided with a contact part.

16. Companion switch contact members each having a terminal portion adapted to extend from a switch housing, an intermediate portion spaced downwardly from the respective terminal portions and adapted to engage a switch housing surface, said portions being disposed in parallel planes, a portion disposed angularly relative to said planes and joining together said first mentioned portions, and an end portion spaced upwardly from the respective intermediate portions and provided with a contact part, said intermediate portions being dimensioned to engage space differently dimensioned areas of said housing surface whereby said contact parts are disposed in spaced alignment upwardly from said surface.

17. A switch comprising an insulation casing formed of two similar, interchangeable parts, each of said parts being adapted to form the cover or the base of said casing and each having internal integral formations to position and hold a plurality of sets of companion relatively movable contacts, respectively, in co-operative relation, said casing parts also having a plurality of sets of complementary confronting recesses which extend between the interior and exterior of the casing at one side thereof and certain of said contacts having terminal members which are disposed in said complementary recesses, respectively, and project externally of the casing at said side thereof in laterally spaced relation, and actuating means mounted in said casing and accessible externally thereof for moving the companion contacts in relation to each other.

18. A switch comprising an insulation casing formed of two similar parts, each of said parts having internal integral formations to position and hold a plurality of sets of companion relatively movable contacts, respectively, in co-

operative relation, said casing parts also having a plurality of sets of complemental confronting recesses which extend between the interior and exterior of the casing at one side thereof and certain of said contacts having terminal members which are disposed in said complemental recesses, respectively, and project externally of the casing at said side thereof in laterally spaced relation, and actuating means mounted in said casing and accessible externally thereof for moving the companion contacts in relation to each other, said casing parts having complemental integral formations for guiding said actuating means for movement in said casing, and means for holding said two parts of the casing in casing defining relation.

19. A switch comprising a housing formed of similar interchangeable portions, each of said portions being adapted to form the cover or the base of said housing and each having a bottom wall and opposed lateral walls upstanding therefrom, transverse rib portions extending between said lateral walls and forming a plurality of chambers in each of said portions, each chamber having a guideway forming part on the bottom wall portion therein and recessed portions in said bottom wall portion, one of said lateral walls being provided with spaced seat portions in each of said chambers, the chambers of said base portion cooperating with companion chambers of said cover portion to form a plurality of contact chambers, an operating member extending through said contact chambers and movable axially thereof, each contact chamber being provided with a pair of fixed contact elements each having a terminal part mounted in cooperating seat portions of said chamber and extending outwardly from said housing, intermediate portions of said contact elements being disposed on the bottom wall of one of said interchangeable portions and the inner end parts of said elements being disposed in the recessed portions in the other of said interchangeable portions, and a companion movable contact element in each contact chamber movably mounted on said operating member and having a portion extending into a guideway forming part in each contact chamber and being disposed on said operating member for normal disengagement with its companion fixed contact elements.

20. A switch comprising a housing formed of similar interchangeable portions, each of said portions being adapted to form the cover or the base of said housing and each having a bottom wall and opposed lateral walls upstanding therefrom, transverse rib portions extending between said lateral walls and forming a plurality of chambers in each of said portions, each chamber having a guideway forming part on the bottom wall portion therein and recessed portions in said bottom wall portion, one of said lateral walls being provided with spaced seat portions in each of said chambers, the chambers of said base portion cooperating with companion chambers of said cover portion to form a plurality of contact chambers, an operating member extending through said contact chambers and movable axially thereof, each contact chamber being provided with a pair of fixed contact elements each having a terminal part mounted in cooperating seat portions of said chamber and extending outwardly from said housing, intermediate portions of said contact elements being disposed on the bottom wall of one of said interchangeable portions and the in-

ner end parts of said elements being disposed in the recessed portions in the other of said interchangeable portions, and a companion movable contact element in each contact chamber movably mounted on said operating member and having a portion extending into a guideway forming part in each contact chamber, at least one of said movable contact elements being disposed on said operating member for normal engagement with its companion fixed contact elements.

21. A switch comprising a housing formed of similar interchangeable portions, each of said portions being adapted to form the cover or the base of said housing and each having a bottom wall and opposed lateral walls upstanding therefrom, transverse rib portions extending between said lateral walls and forming a plurality of chambers in each of said portions, each chamber having a guideway forming part on the bottom wall portion therein and recessed portions in said bottom wall portion, one of said lateral walls being provided with spaced seat portions in each of said chambers, the chambers of said base portion cooperating with companion chambers of said cover portion to form a plurality of contact chambers, an operating member extending through said contact chambers and movable axially thereof, each contact chamber being provided with a pair of fixed contact elements each having a terminal part mounted in cooperating seat portions of said chamber and extending outwardly from said housing, intermediate portions of said contact elements being disposed on the bottom wall of one of said interchangeable portions and the inner end parts of said elements being disposed in the recessed portions in the other of said interchangeable portions, and a companion movable contact element in each contact chamber movably mounted on said operating member and having a portion extending into a guideway forming part in each contact chamber, at least one of said movable contact elements being disposed on said operating member for normal disengagement with its companion fixed contact elements.

22. A switch comprising a housing formed of similar interchangeable portions, each of said portions being adapted to form the cover or the base of said housing and each having a bottom wall and opposed lateral walls upstanding therefrom, transverse rib portions extending between said lateral walls and forming a plurality of chambers in each of said portions, each chamber having a guideway forming part on the bottom wall portion therein and recessed portions in said bottom wall portion, one of said lateral walls being provided with spaced seat portions in each of said chambers, the chambers of said base portion cooperating with companion chambers of said cover portion to form a plurality of contact chambers, an operating member extending through said contact chambers and movable axially thereof, each contact chamber being provided with a pair of fixed contact elements each having a terminal part mounted in cooperating seat portions of said chamber and extending outwardly from said housing, intermediate portions of said contact elements being disposed on the bottom wall of one of said interchangeable portions and the inner end parts of said elements being disposed in the recessed portions in the other of said interchangeable portions, and a companion movable contact element in each contact chamber movably mounted on said operat-

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ing member and having a portion extending into a guideway forming part in each contact chamber, at least one of said movable contact elements being disposed on said operating member for normal engagement with its companion fixed contact elements, and at least another of said movable contact elements being disposed on said operating member for normal disengagement with its companion fixed contact elements.

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