June 27, 1950 F. E. GRAY 2,512,830

ELECTRICAL SWITCH

Filed Feb. 19, 1947 2 Sheets-Sheet 1

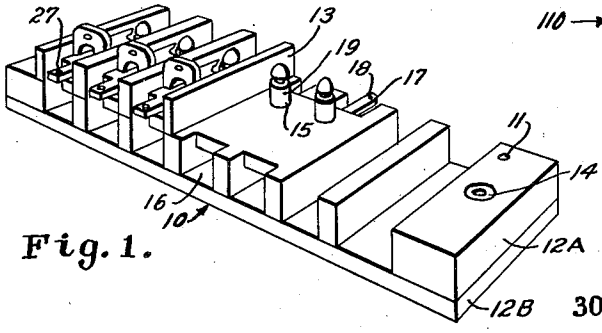


Fig. 1.

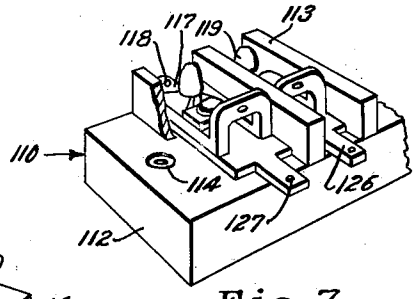


Fig. 7.

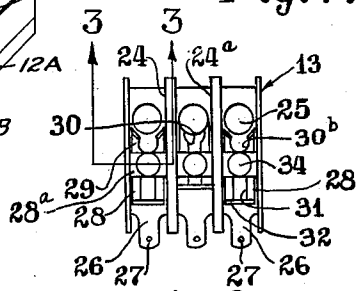


Fig. 2.

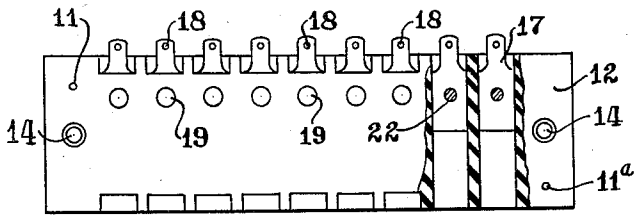


Fig. 4.

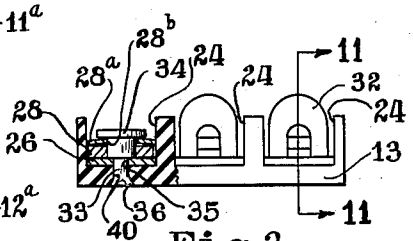


Fig. 3.

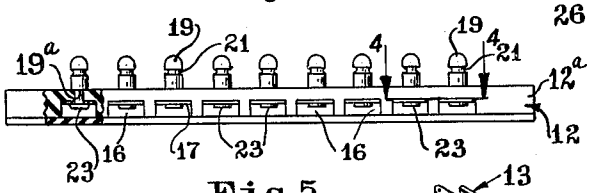


Fig. 5.

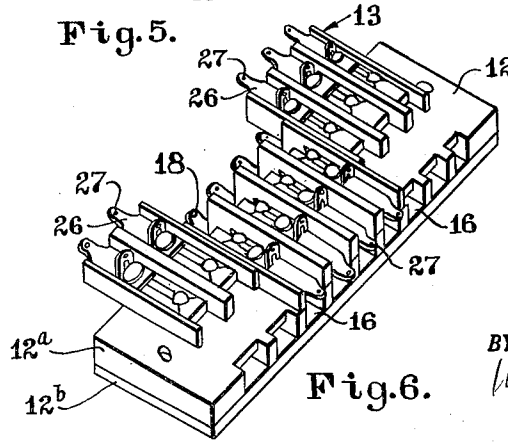


Fig. 6.

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June 27, 1950 F. E. GRAY 2,512,830

ELECTRICAL SWITCH

Filed Feb. 19, 1947 2 Sheets-Sheet 2

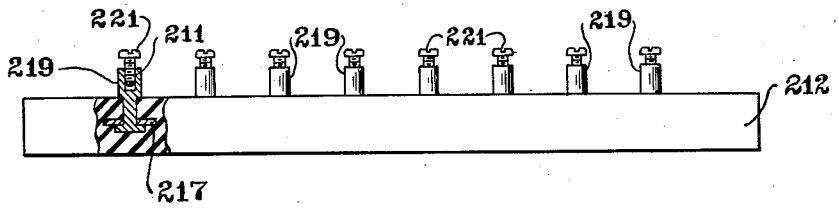


Fig.8.

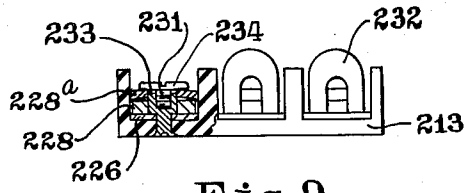


Fig.9.

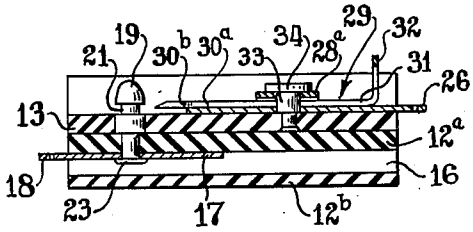


Fig.11.

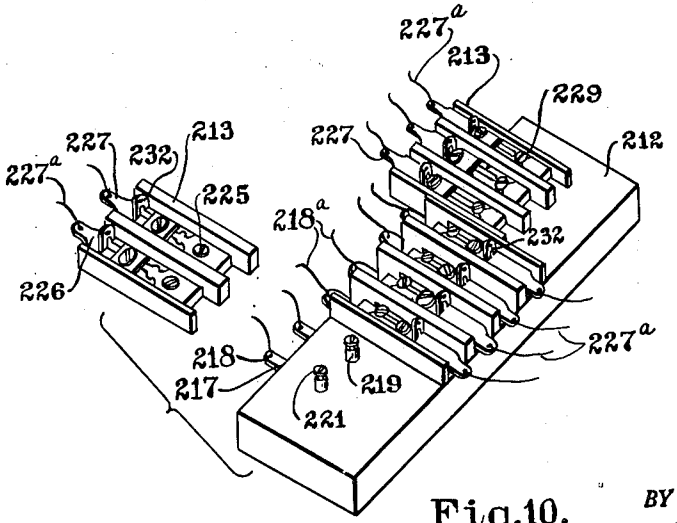


Fig.10.

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ELECTRICAL SWITCH

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10 Claims. (Cl. 200—51.04)

1

The present invention relates to an electrical device and is more specifically directed to a combination switch and terminal block.

An object of this invention is to provide a terminal block in which a conducting and terminal member of a stationary dielectric plate is associated with a conducting and terminal member of a removable dielectric plate.

A further object of this invention is to provide a combination switch and terminal block in which a conducting and terminal member of a stationary dielectric plate is associated with a conducting and terminal member of a removable dielectric plate, the latter being provided with a sliding switch which, when moved to switch closing position, resiliently urges, respectively, the terminal members and the plates toward one another.

Another object of this invention is to provide a combination switch and terminal block in which any desired removable dielectric plate having a plurality of terminal tabs may be removed from contact with the stationary dielectric plate so that any desired series of electrical circuits may be easily interrupted without interrupting the adjacent circuits.

A further object of this invention is to provide a combination switch and terminal block in which a removed removable dielectric plate may be replaced in its original position in contact with the stationary dielectric plate without the laborious sorting of wires which usually accompanies this operation on conventional terminal strips.

A still further object is to provide a combination switch and terminal block in which each of the stationary and removable insulating members carry at least a pair of latching and switch members, each latching switch member of one insulating member being independently co-operable with a latching and switch member of the other insulating member to provide a plurality of sets of latching members whereby a cooperating set of latching switch members can secure the insulating members together independently of the other set or sets of co-operable latch-switch members.

A feature of this invention is the provision of a removable dielectric plate (having a conducting and terminal member) that may be mounted on a stationary dielectric plate (also having a conducting and terminal member) in such a manner that the terminal tabs of the removable and stationary dielectric plates may be either on the same or on opposite sides; and

The provision in combination with a stationary

2

dielectric plate having conducting and terminal members of a plurality of removable dielectric plates each having conducting and terminal members and each capable of being mounted on the stationary dielectric plate in such a manner that the terminal tabs of some of the removable dielectric plates are on the same side as those of the stationary dielectric plates while others are on opposite sides or in such manner that the terminal tabs of the removable dielectric plates may all be on the same side or all on the opposite side as those of the stationary plate.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred forms of embodiments of the invention are clearly shown.

In the drawings:

Fig. 1 is a view in perspective of a combination switch and terminal block having portions of one of the removable plates broken away to illustrate the stationary plate construction;

Fig. 2 is a top plan view of one of the removable dielectric plate members;

Fig. 3 is an enlarged view of the removable dielectric plate of Fig. 2 shown partially in elevation and partially as a vertical sectional view taken as on the line 3—3 of Fig. 2;

Fig. 4 is a view in top plan of the stationary terminal plate 12 of Fig. 1 showing the conducting and terminal members thereof, a top portion of the plate being broken away to show two of the conducting and terminal members 17 in elevation and the partitioning wall construction on each side thereof in horizontal cross section as seen on line 4—4 of Fig. 5;

Fig. 5 is a view in front elevation of the stationary dielectric plate showing the notched studs on and by which the removable dielectric plates are held and having a small portion shown in vertical section to show the securing of the studs;

Fig. 6 is a view similar to Fig. 1 showing a switch and terminal block but showing two of the removable members in reversed position;

Fig. 7 is a fragmentary perspective view illustrating a preferred alternative construction of the stationary dielectric plate of the switch block;

Fig. 8 is a view of a stationary dielectric plate shown mainly in front elevation but having a small portion shown in vertical section and showing a preferred manner of forming the upper part of the retaining studs and of securing the studs and conducting plates;

Fig. 9 is an enlarged view of a preferred alter-

native form of a removable dielectric plate shown partially in section and partially in elevation;

Fig. 10 is a perspective view of a combination switch and terminal block showing one of the removable dielectric plates removed and the remaining plates reversed with respect to each other; and

Fig. 11 is a sectional view taken on line 11—11 of Fig. 3, showing also the terminal plates in cooperative position but showing the switch mechanism in disconnecting position.

Referring to the drawings, in Fig. 1 is shown a combination switch and terminal block 10 comprising a stationary insulating member or dielectric plate 12 formed of an upper section or plate 12*a* and a lower section or plate 12*b* held together by means of rivets 11 and 11*a* and a plurality of removable dielectric plates or insulating members 13. Adjacent each end of the plate 12 there are provided substantially vertically extending holes 14 through which screws, nails or some other holding means may be inserted to secure the dielectric plate 12 to any desired support. The dielectric plate 12*a* is also formed on its under side with a plurality of laterally extending grooves 16 which form laterally extending passageways through the composite plate 12. Each of the passageways formed by the grooves 16 is rectangular in cross section, extends through the plate and connects with one of a plurality of upwardly extending holes 15 which extend through the plate 12*a* to the top thereof. Located in and associated with each of the grooves 16 is a metallic conducting plate or member 17 having a terminal tab 18 which extends laterally beyond the groove 16. Extending upward through each of the holes 15 is a stud 19 which also extends downward through a hold 22 (see Fig. 4) formed in the associated conducting plate 17 and is thus secured to its plate 17. Each stud 19 has near its upper end a notch 21 forming a downwardly facing shoulder and has below said notch a shoulder 19*a* which through contact with the upper face of the plate 12*a* limits downward movement of the stud relative to the plate. Each stud is secured to the associated conducting plate 17 by flaring the lower end of the stud 19, as is indicated at 23 in Fig. 5. Each of the conducting plates 17 is thus held in the top of the associated lateral groove 16 in immediate contact with the dielectric plate 12*a*.

Each removable dielectric plate 13, as shown in Figs. 2 and 3, has on its upper face a plurality of lateral grooves 24. Each of the grooves is separated by means of an upwardly projecting partition 24*a* as shown in the drawings. Associated with each groove 24 and extending downward through the plate 13 from said grooves are openings 25 which receive the slotted studs 19. Provided within each groove 24 is a conducting plate 26 having a terminal tab 27 which extends laterally beyond the end of said groove 24. Also provided in each groove 24 above the associated conducting plate 26 is a sliding switch member 28. Each sliding member 28 is formed of resilient metal and is bifurcated throughout its entire horizontal length to form tines 29. The forepart end of each tine 29 is formed at an angle and is beveled downwardly (see Fig. 11) to form a knife edge at the bottom of the front end of the tine. Each tine includes a neck portion 30 at the outer end thereof and a neck portion 30*a* (Fig. 11) spaced rearwardly from portion 30. Neck portions 30 of a member 28 confront one another and portions 30*a* confront one another.

The portions 30*b* of the tines between neck portions 30 and 30*a* are arcuate and generally conform to the circular shape of the notch 21 in stud 19. The space between the tines 29 forms a slot 31. The rear ends of the tines 29 extend upwardly and are connected by a yoke 32 which forms a handle for moving the sliding member horizontally. A pin extends through the slot 31 between the neck portions 30*a* and the rear of member 28. The pin 33 passes through a hole 28*b* in the spring washer 28*a*, through the slot 31, through an opening 35 provided in the conducting member 26 and through an opening 40 formed in the dielectric member 13. It is flared at its lower end, as shown at 36 in Fig. 3 so that it is secured firmly in the removable dielectric plate 13. Each sliding swtich member 28 is guided by its position in the groove 24 and also guided and resiliently held in contact with the associated plate 26 by spring washer 28*a*, which is interposed between the bottom of the head of pin 34 and the top of the tines 29 for yieldingly holding the sliding member in contact with plate 28.

In placing a removable dielectric plate such as the plate 13 in operative position, and in a predetermined alignment as shown in the drawings, relative to an associated stationary dielectric plate 12, the studs 19 of the stationary dielectric plate 12 are inserted in the openings 25 of the removable plate 13. To provide an electrical connection between the associated terminal tabs 18 and 27, the selected sliding switch member 28 is brought into engagement with its associated stud 19 by pushing the lip 32 of the switch member 28 forward.

It will be seen from Fig. 11 that the tines 29 overhang the conducting plate 26 and that the horizontal plane of the top side of notch 21 of stud 19 is slightly below the plane of the top side of the tines. However, since the forepart of the tines are beveled, said forepart can be readily started into the notch 21 by merely pushing forwardly on the handle 32 of the sliding member 28. When so doing, the plate 13 will be forced downwardly into tight engagement with the plate 12; the tines, although flexible, are sufficiently stable for firmly clamping the plates 12 and 13 together. The rearwardly, inwardly angling foreparts of the tines 29 provide cams for spreading the tines when the member 28 is pushed forwardly. The slot portion between the neck portions 30 and 30*a* is slightly narrower than the diameter of the stud 19 at the groove 21 so that the tines not only resiliently press upwardly on the underside of the downwardly facing shoulder of the notch but they also resiliently embrace the neck of the notch portion. Thus by reason of this construction the plates are held in firm position and sufficient pressure is insured between the tines 29 and stud 19 to provide adequate electrical connection. The neck portions 30 of tines 29 not only provide an extended contacting surface with the stud 19 but also prevent the accidental rearward displacement of the sliding member 28. The forepart of the neck portions 30*a* also forms an enlarged electrical contacting surface with the stud 19 and the rear part engages the forward part of pin 33, when the sliding member 28 is withdrawn from stud 19, to prevent withdrawing of the sliding member from its assembled relation with the pin 33 and plate 13.

From the foregoing it will be seen that a stud 19 and a sliding member 28 form a set of latching switch members and any set of the plurality of sets hold or secure the insulating member 12

and 13 together and simultaneously close a circuit. In this manner, the switches of the sets can be independently opened by moving the sliding member 28 of the set, yet the insulating members will be held together by one or more of the other sets of latching switch members.

When member 28 is pushed inwardly as far as possible, an electric current is thereby established with the current passing from the terminal tab 18 through the conducting plate 17 on through the notched stud 19 of the stationary dielectric plate 12 to the sliding switch member 28 and on to the conducting plate 26 both directly and by way of the pin 33 and then to the terminal tab 27 of the removable dielectric plate 13. To break the contact or to interrupt the flow of electric current in any individual circuit the sliding switch member 28 is moved rearwardly thereby removing the tines 29 from the stud 18.

The removable dielectric plates 13 can be positioned on the stationary dielectric plate 12 as they are shown in Fig. 1 so that the terminal tabs 18 and 27 of the conducting plates 17 and 26 are on opposite sides of the switch block 10. If desired, however, one or more or all of the dielectric plates may be reversed as two of them are shown in Fig. 6 so that the tabs 27 are on the same side as the tabs 18. In each case, the studs 19 are received by the openings 25.

In Fig. 7 I have shown a preferred form of switch block 110 consisting of a stationary dielectric plate 112 and removable dielectric plates such as 113. The conducting plates 117 and the posts 119 are molded in the plate 112 when it is cast. The plate 112 is, as shown, cast in one piece with the posts 119 and the plates 117 molded therein. The removable plate 113 is shown as manufactured in the same way as are removable dielectric plates 13. However, if desired, some of the conducting members could be molded in such removable dielectric plates.

In Fig. 8 there is shown a stationary dielectric plate 212 having a preferred form of studs 219 molded in the plate 212 and serving as holding means for the removable dielectric plate 213 shown in Fig. 9. The conducting plates 217 and the studs 219 are molded in the plate 212 when it is cast. The studs 219 are provided with threaded openings 211 in which are inserted binder head screws 221.

In Fig. 9 there is shown a removable dielectric plate 213 that is similar to the removable dielectric plate 13 shown in Fig. 3 but which has associated therewith a preferred and a more positive holding and contact means. The conducting plate 226 is secured beneath a shoulder formed on a stud 233. The stud 233 is formed with a threaded opening 231 in which is inserted a binder head screw 234, the screw securing the switch member 228 and the spring strap 228*a* in proper position so that the member 228 bears positively on the plate 226. Electrical connections 218*a* and 227*a* are secured to the terminal tabs 218 and 227. In Figs. 8, 9 and 10 other parts corresponding to parts of Figs. 1 to 5, inclusive, are designated by the same numerals increased by 200.

In placing a removable plate such as the plate 213 in position to cooperate with the stationary dielectric plate 212, the studs 219 and the associated binder head screws 221 of the stationary dielectric plate 212 are inserted upward in the openings 225. To provide an electrical connection between the associated terminal tabs 218 and 227, the selected sliding switch member 228 is brought into engagement with upper portion of the associated screw 214 by pressing the handle or lip 232 of the switch member 228 forward. The neck portion 229 of the switch member 228 embraces the threaded portion of the screw 221 immediately below the head thereof. The binder head screw 221 is then tightened, establishing a positive contact between the switch member 228 of the removable dielectric plate and the stud 219 of the stationary plate 212. An unbroken circuit for electric current is thereby established with the current passing from the terminal tab 218 through the conducting plate 217 on through the stud 219 of the stationary dielectric plate 212 to the switch member 228, then on to the conducting plate 226 by direct contact and by way of the stud 233 and thence to the terminal tab 227 of the removable dielectric plate 213. To further insure a positive contact between the switch member 228 and the conducting plate 226, the screw 234 is tightened. When it is desired that any one removable dielectric plate 213 be removed, both of the associated binder head screws 221 and 234 are loosened and the sliding switch member 228 moved rearwardly.

Any desired removable dielectric plate having a plurality of terminal tabs may be removed from the stationary dielectric plate without disturbing adjacent circuits and may be replaced in its original position without involving the usual sorting of wires which accompanies this operation on conventional terminal strips.

While the forms of embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

I claim:

1. An electrical device comprising a pair of separable insulating members; a terminal electrical conducting connection associated with each of said insulating members; a positioning stud formed on one of said insulating members, the other said member having an opening formed therein to receive said stud, said stud and opening providing means arranged to position the insulating members in alignment with respect to each other, and a slidable connection element, capable of conducting electricity, secured to one of said insulating members, at all times electrically connected with one of said terminal members, and movable from a position in which it is electrically connected with the other terminal connection to a position in which it is out of electrical connection with said other terminal connection, said connection element including gripping means adapted to engage with said stud and hold said pair of insulating members together.

2. An electrical device comprising a first insulating member; a second insulating member having an opening; a terminal electrical conducting connection secured to the first insulating member and having a stud extending through the opening in the said second insulating member and having a shoulder on the ending portion thereof; a second terminal electrical conducting connection secured to the second insulating member; and a slidable connection element, capable of conducting electricity, secured to the second insulating members, at all times contacting with said second terminal member, said slidable element having a resilient portion and being movable from a position in which the resilient portion resiliently contacts with the shoul-

der on the stud of the first terminal connection to a position in which it is out of contact with said stud.

3. A combined terminal and insulating assembly comprising a pair of insulating members formed of dielectric material, each of said members being provided with a conducting element for forming a terminal connection, a plurality of positioning studs formed on one of said insulating members, the other said member having a plurality of openings formed therein to receive said studs, said studs and openings providing means arranged to position the insulating members in a predetermined alignment with respect to each other, and one of said members being provided with a plurality of slidable conductors contacting the conducting element thereon, said conductors having resilient portions arranged to be moved into contact with the studs to provide an electrical connection with the conducting element secured to the other insulating member, and said resilient portions when engaging the studs providing connections for securing said pair of insulating members together.

4. For use in connection with a fixed conducting member having one or more mounting studs projecting therefrom, an electrical device comprising an interchangeable and removably mounted dielectric plate formed with at least one opening therein adapted to register with a selected mounting stud on the fixed member to position the dielectric plate and fixed member together in a predetermined alignment, a fixed conducting plate secured to the dielectric plate, a pin extending into the dielectric plate and connected with the conducting plate, and a sliding conducting element secured by said pin to said dielectric plate and in continuous contact with said conducting plate and movable into and out of contact with one of the oppositely disposed mounting studs on the fixed conducting member to provide for holding the dielectric plate and fixed member together.

5. For use in connection with a fixed conducting member having a row of mounting studs projecting therefrom, an electrical device comprising an interchangeable and removably mounted dielectric plate formed with a plurality of grooves, each groove separated by partitions of dielectric material and having an opening formed therein adapted to register with one of said studs to provide for mounting said fixed conducting member and dielectric plates in a predetermined alignment with respect to each other, a fixed conducting plate secured in each of said grooves by a pin, and a sliding conducting element secured by said pin in each of said grooves in continuous contact with said conducting plate and individually movable into and out of contact with one of the oppositely disposed mounting studs on the fixed conducting member, said conducting element having resilient means mounted at one end thereof for gripping the oppositely disposed mounting stud when moved into contact therewith and providing for holding said fixed member and dielectric plate together.

6. An electrical device comprising a first insulating member having a plurality of mounting studs formed thereon; a second insulating member having a plurality of openings therein to receive said studs and provide for positioning the second insulating member in a predetermined alignment with respect to the first insulating member; a terminal electrical conducting connection secured to the first insulating member

and to each of said studs; a second terminal electrical conducting connection secured to the second insulating member; and a plurality of slidable connection elements, capable of conducting electricity, secured to the second insulating member, at all times contacting with said second terminal member and movable from a position in which they contact with the studs to a position in which they are out of contact with said studs, said connection elements each having means formed thereon to individually grip said studs when moved into contact therewith.

7. A combination switch and terminal block comprising, a stationary insulating member, a pair of positioning studs carried by the insulating member and each being connectable with an electrical conductor and forming a contact of a switch; and a movable insulating member adapted to be positioned with respect to said stationary member by said studs, a pair of latching members carried by said movable insulating member and each being connectable with an electrical conductor and forming a contact of a switch, one of the latching members being movable and cooperating with one of the studs for securing the insulating members together and for forming an electrical connection between said stud and latching member, the other of the two latching members being movable and cooperating with the other of said studs for securing the insulating members together independently of said first mentioned cooperating latching members and for forming an electrical connection between the same.

8. A combined terminal and insulating assembly comprising an insulating plate formed of dielectric material adapted to be mounted in a stationary position and having a plurality of terminal tabs for connection with electric circuits, each of said tabs having a positioning stud connected therewith, a plurality of insulating plates each adapted to be individually removably mounted on said stationary plate and having terminal tabs for connection with electric circuits, each said removable plate having openings formed therein to receive said studs and provide for positioning the removable plates with respect to said stationary plate, and a plurality of switching members carried on said removable plates each individually operable to connect electrically certain selected terminal tabs on the stationary plate with corresponding terminal tabs on said removable plates, said switching members being formed with gripping means constructed for movement into contact with said studs to grip the same and hold said stationary plate and removably mounted plates together.

9. A combined terminal and insulating assembly comprising a pair of insulating members formed of dielectric material, each member being provided with a plurality of conducting elements for forming terminal connections, one of said members having a plurality of mounting studs projecting from one side thereof, each stud being electrically connected to one of the conducting elements of the latter said member, the other of said members having a plurality of holes arranged to register with said studs to removably position said members together and provide for reversing their respective positions as desired, the latter said member also having a pair of individually operated and slidably mounted latching members, each of said latching members being electrically connected to one of the conducting elements of said other members, said

latching members each being arranged for separate movement into and out of contact with one of said studs to provide for controlling the electrical flow between said insulating members, and each of said latching members having resilient gripping means formed at one end thereof to grip one of said studs when moved into contact therewith to provide for biasing said insulating members together.

10. A combined terminal and insulating assembly comprising a pair of insulating members formed of dielectric material, each member being provided with a plurality of conducting elements for forming terminal connections, one of said members having a plurality of mounting studs projecting from one side thereof, each stud being electrically connected to one of the conducting elements of the latter said members, the other of said members having a plurality of holes arranged to register with said studs to removably position said members together and provide for reversing their respective positions as desired, the latter said member also having a pair of individually operated and slidably mounted latching members, each of said latching members being electrically connected to one of the conducting elements of said other members, said latching members each being arranged for separate

movement into and out of contact with one of said studs to provide for controlling the electrical flow between said insulating members, and each of said latching members being formed with gripping means comprising tines having bevelled edge portions adapted to be received within a notch provided in each of said studs when moved into contact therewith to bias said insulating members toward one another.

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