Nov. 15, 1938. E. MICHEL 2,136,858

CIRCUIT CHANGING SWITCH MECHANISM

Filed May 7, 1936

Fig. 1.

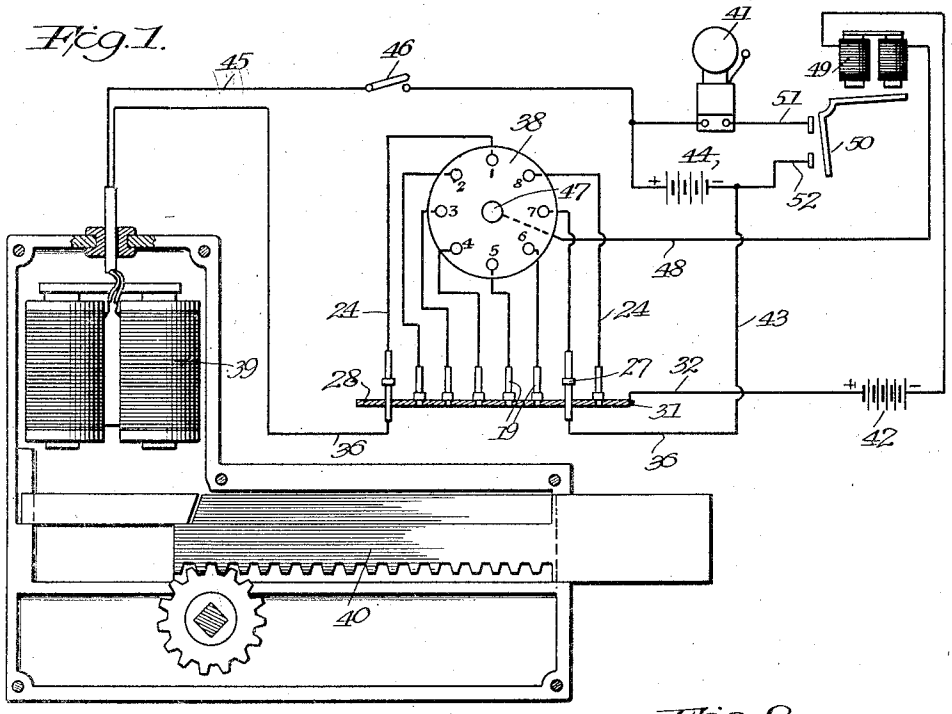


Fig. 2.

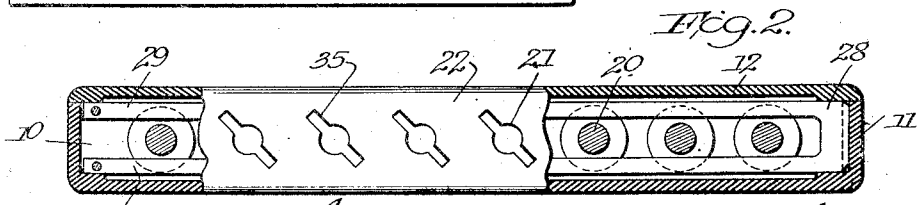


Fig. 3.

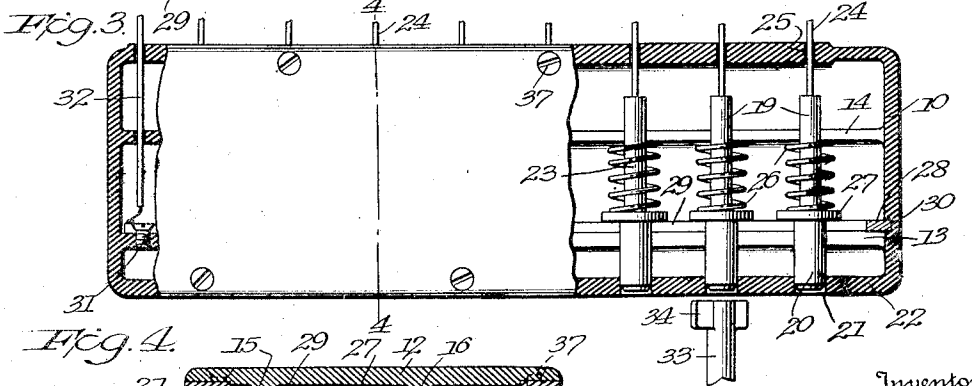
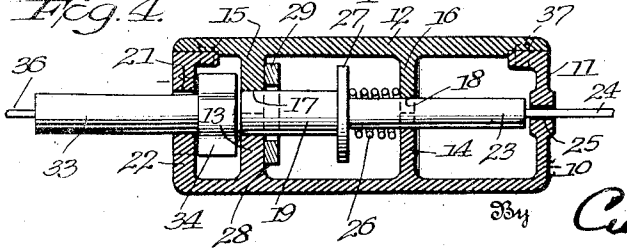


Fig. 4.



Inventor

Edmond Michel

By Cushman, Darby & Cushman

Attorneys

Patented Nov. 15, 1938 2,136,858

UNITED STATES PATENT OFFICE

2,136,858

CIRCUIT CHANGING SWITCH MECHANISM

Edmond Michel, New Orleans, La., assignor to Larmloc Corporation, New Orleans, La.

Application May 7, 1936, Serial No. 78,504

23 Claims. (Cl. 200—5)

The present invention relates to an improved circuit changing switch mechanism and has as an object the provision of simple, efficient and foolproof switch means for normally closing a predetermined electrical circuit, and for automatically establishing another circuit while simultaneously opening the previously closed circuit, thus providing positive means for eliminating the dangerous consequences which might result from the failure properly to disconnect a certain circuit before closing another circuit.

A further object consists in constructing a circuit changing switch in which a relatively fixed contact has operatively associated therewith a reciprocating contact for the purpose of normally establishing a predetermined electrical circuit, said reciprocating contact in turn being operatively associated with a removable contact whereby upon the engagement of the movable contact with the reciprocating contact to cause the disconnection of the fixed contact from the reciprocating contact and simultaneously to establish a circuit between the movable contact and the reciprocating contact. Additionally, means are provided for automatically returning the reciprocating contact into engagement with the fixed contact upon the withdrawal of the movable contact from engagement with the reciprocating contact.

A further object comprehends the provision of a circuit changing switch mechanism which may be readily associated with various types of electrical devices or systems and which is particularly applicable for use with electrical combination switches to change the combination of the electrical circuits connected to the operable members such as disclosed in my copending application Serial No. 40,844, filed September 16, 1935, now Patent No. 2,082,806, patented June 8, 1937.

Other objects and advantages of the invention will become apparent from the following description when taken in conjunction with the accompanying claims and drawing.

Referring to the drawing in which is shown several preferred embodiments:—

Figure 1 is a diagrammatic view with parts in section showing my improved circuit changing switch mechanism associated with a two push button contact combination switch for actuating an electro-magnetic and an alarm device;

Figure 2 is an end view of the switch casing with parts in section;

Figure 3 is a plan view of Figure 2 with portions of the cover cut away for clearness of illustration; and

Figure 4 is a sectional view taken substantially along the line 4—4 of Figure 3.

Referring to the drawings in which like numerals indicate like parts in the several views, 10 designates a casing which is shown as of elongated form but which obviously may be of any desired shape. The casing 10 is made of any suitable insulated material such as Bakelite, hard rubber or any other suitable composition, and preferably comprises a recessed section 11 and a removable top or closure 12 for permitting ready access to the interior of the section 11. The inside of the section 11 is formed with the upwardly extending spaced partitions 13 and 14 (Figure 4) which align with complementary formed partition members 15 and 16 extending downwardly from the inner wall of the cover 12. The free ends of the aligned partitions are spaced from each other to form a series of longitudinally disposed openings 17 and 18. Each of the registering openings 17 and 18 constitute a support for an electric conductive cylindrical member or rod 19 which is reciprocably mounted in the casing 10. Each of the rods 19 preferably comprises an enlarged portion or sleeve 20 arranged normally to extend into an aligned opening 21 in the front face plate 22 (Figure 3) and a reduced portion or stem 23 which projects through the opening 18 and is connected to the wire 24 which extends through the opening 25 in the rear face of the casing so as to be electrically connected to any suitable operable member. A coil spring 26 encircles the stem 23 and is confined between the annular flange or shoulder 27 on the sleeve 20 and the partitions 14 and 16 so as normally to urge each rod 19 to assume the position as shown in Figure 3. A fixed contact or conductive bar 28 preferably of U-shape (Figure 2) has its parallel arms 29 extending substantially the length of the interior of the casing so as to straddle the reciprocating rods 19 in order that these arms may be engaged by the shoulders 27. One side of the casing 10 may have a recess or groove 30 in the inner wall thereof for receiving the connecting arm of the U-shaped contact 28 so as to maintain the same in a fixed position within the casing 10. The arms 29, it will be observed, are arranged to be engaged by opposite portions of each of the shoulders 27 so that when these shoulders are urged into engagement with the fixed contacts by the springs 26, means are provided for insuring a positive and uniform contact between these parts.

The arms 29 are connected by the terminal screw 31 to a wire 32 which in turn is connected to any suitable source of electrical energy such as a battery or the like which will subsequently be described.

A removable contact key or plug 33 preferably has an enlarged head or shoulder 34 arranged to fit into a complementary keyhole slot or socket 35 in the face plate 22 of the casing. The key 33 is electrically connected to any suitable operable member by the wire 36. The key 33 is detachably connected to the casing upon the insertion of the shoulder 34 into the socket 35 and the subsequent turning of the key so as to bring the shoulder 34 into engagement with the inner wall of the casing. Manifestly, the shape and size of the key 33 and socket 35 may be varied depending upon the shape of the casing 10 and the form of the fixed and movable contacts 19 and 28, respectively.

Any number of reciprocating contacts 19 may be employed corresponding to the number of circuits with which the device is associated. It will be seen that normally when the key 33 is withdrawn from the casing 10, the spring 26 causes the axial movement of the reciprocating rod 19 to move the flange or collar 27 into engagement with the arms of the fixed contact 28 to close a predetermined electrical circuit. Upon the selective insertion of the key 33 in any one of the openings 21 (Figure 4), the outer end of the key abuts against the adjacent end of the movable contact 19 and forces the same inwardly against the tension of the spring 26 to disconnect the engagement of the collar 27 with the fixed contact 28 and simultaneously establishes a separate circuit between the contact key 33 and the reciprocating or movable rod 19. Upon turning the key 33 either in a clockwise or counter-clockwise direction, the shoulders or lugs 34 are moved out of registration with the slots 35 and abut against the inner wall of the face plate so as to detachably secure the key to the casing. When it is desired to break the circuit between the key 33 and the movable rod 19, it is merely necessary to withdraw the key 33 from the casing. Upon the withdrawal of the key 33, the spring 26 causes the rod 19 to be moved axially and thus brings the collar 27 into engagement with the fixed contact 28 to reestablish the circuit which had been previously disconnected by the insertion of the key within the casing.

It will be seen that by reason of the novel arrangement of parts a practical and foolproof switch mechanism is provided for normally closing a predetermined circuit and for automatically disconnecting this circuit and establishing another circuit upon the insertion of a contact member within the casing, the original circuit being immediately reestablished when the contact member is withdrawn. Thus, the dangerous and disastrous consequences which result from the failure to properly disconnect a circuit before connecting another circuit is avoided, since the mechanism insures the automatic disconnection of a predetermined circuit immediately upon the establishing of another circuit. Moreover the spring 26 acts to urge the movable contacts outwardly and in the direction of the sockets 21 in order to maintain the same normally in contact and in engagement with the fixed contact. This outward pressure serves a double purpose. When the key contact is inserted into the selected socket in order to disconnect the movable contact from the fixed contact, a slight pressure must be exerted against the normal position of spring 26 by the key contact, then the key contact is slightly turned in either direction, then the pressure induced by spring 26 is transmitted to the outer end of the movable contact, which pressure is transmitted outwardly to the key contact and holds transversal arms 34 securely tight against the inner wall of face plate 22, and prevents the accidental disconnection of the key contact from the selected movable contact.

The top or cover 12 is detachably secured to the casing by the screws 37 to permit convenient access into the interior of the casing 10 for the purpose of inspection or removal of the parts. While the casing has been described as preferably made of insulatable material, it will be manifest that by this is meant that the parts of the casing which constitute the supports for the movable contacts are of suitable insulatable material in order to separate the fixed contact and the movable contacts and thus insure the selective establishment of the separate circuits with each of the movable contacts.

While my improved circuit changing switch mechanism is adapted for use in changing the combination of various types of electrical devices, I have, for the purpose of illustration, shown the same associated with a two button combination switch for selectively controlling the flow of current to means for actuating a door lock or to a signalling device for indicating that the switch mechanism is being tampered with such as disclosed in my copending application Serial No. 40,844, filed September 16, 1935.

As shown in Figure 1, the circuit changing switch mechanism is provided with eight reciprocating contacts 19 corresponding in number to the number of push button contacts carried by the combination switch 38. Assuming that in the two button combination switch the contacts 1 and 7 have been selected to be the contacts necessary to be actuated in order to cause the operation of the electro-magnetic means 39, which controls the movement of the lock or bolt 40, and that the remaining contacts 2, 3, 4, 5, 6 and 8 are arranged to be electrically connected to the alarm 41. In such an event, each of the wires 24 leading from the reciprocating or movable contacts 19 is connected separately to one of the fixed contacts of the double switch 38, and the fixed contact 28 is connected by the wire 32 to the positive side of the battery 42. One of the contact plugs arranged to be connected to the electromagnetic means 39 such as the contact 1 is connected by its wire 24 and wire 36 with the magnet 39, while the other of the contact plugs 7 is connected by its wire 36 and wire 43 to the negative side of the battery 44, thus completing a circuit with the magnet 39 through the wire 24, wire 36, wire 45, battery 44, wires 43 and wire 36. A switch 46 may be interposed in the circuit for controlling the same at a remote point. The remaining contacts 2, 3, 4, 5, 6 and 8 are connectible with the fixed contact 47 which in turn is connected by the wire 48 to the magnet 49 which energizes the relay 50 to close the contacts 51 and 52 for the purpose of energizing the alarm 41.

It will be seen that when my circuit changing switch is associated with a combination switch such as 38 for selectively controlling the supply of current to two or more operable members such as the magnet 39 and the alarm 41, that the two selected contacts establish a circuit with one of the operable members such as 39 while the re-

maining contacts are in circuit with the other operable members. Further, the combinations may be easily changed by pulling out the plugs **33** from the sockets **1** and **7** and reinserting them in other selected sockets. Manifestly, the number of contacts employed may be varied depending upon the purpose for which the circuit changing switch is to be used.

Moreover, the circuit changing switch is equally adapted for use with a single button combination or a dual control combination. Thus, assuming that the push button contact **1** has been selected to control the actuation of the lock **40**, the plug **33** in the casing in circuit with the contact **7** is withdrawn so that the reciprocating rod **19** of the latter engages the fixed contact **28**. The wires **36** and **43** associated with the contact **7** are dispensed with and the negative side of the battery **44** is connected with the wire **48** so that a circuit is established leading from the fixed contact **1** through the wire **36** to the magnet **39** then to the wire **45**, battery **44**, wire **48** and fixed contact **47**. The remaining contacts **2** to **8** inclusively are connected to the alarm **41** in the same manner as previously described.

It will therefore be seen that when the circuit changing switch mechanism is associated with an electric combination switch, the selected combination for controlling the operable members may be readily changed by withdrawing the plug **33** from its socket **35** and inserting the same in any one of the other sockets so as to effect a change of the combination necessary to actuate the operable members **39** and **40** respectively.

Manifestly, the circuit changing switch mechanism may be operatively associated with various types of electrical devices for closing a predetermined electrical circuit and automatically opening said circuit and establishing another circuit while disconnecting the previously connected circuit. The insulated casing **10** and its associated parts are very compact and may be conveniently positioned at any desired point to effect the change of the circuits by the selective insertion of the plugs **33** into the sockets **35**.

It is to be understood that the forms of the invention shown and described are merely illustrative of preferred embodiments and that such changes may be made as fall within the purview of one skilled in the art without departing from the spirit of the invention and the scope of the oppended claims.

I claim:

1. A circuit changing switch of the class described including a plurality of axially movable transversely disposed spaced contacts, each of said contacts being adapted to be individually connected to a single selected circuit, but not connectible in series with any other movable contacts, a fixed contact common to all of the movable contacts, said fixed contact adapted to be individually connected to a circuit independent of the movable contacts, means for normally maintaining the movable contacts in engagement with fixed contact, and a key contact arranged for selective connection with the movable contacts so as to establish an independent circuit therewith and simultaneously disconnect the circuit established between the fixed contact and the selected movable contact.

2. A circuit changing switch of the class described including a casing having spaced slotted sockets in one side thereof, a plurality of axially movable transversely disposed spaced contacts within the casing, said movable contacts having their outer ends in alignment with the adjacent sockets, a fixed contact common to all the movable contacts, yieldable means for urging the movable contacts outwardly toward the adjacent sockets and also normally maintaining the movable contacts in engagement with the fixed contact, and a plurality of key contacts, each of said key contacts having means protruding therefrom shaped to fit through the slotted sockets and arranged to be held securely between the inner wall of the casing and the outer ends of the movable contacts, said key contacts arranged to be inserted selectively into any one of the sockets and into engagement with a movable contact whereby to move the latter axially away from its socket to disconnect the movable contact from the fixed contact and simultaneously to establish a circuit connection of the key contact with the movable contact.

3. A circuit changing switch of the class described including a casing having spaced sockets in one side thereof, a plurality of axially movable transversely disposed spaced contacts within the casing, said movable contacts having their outer ends arranged in alignment with adjacent sockets, a fixed contact common to all the movable contacts, yieldable means for normally maintaining the movable contacts in engagement with the fixed contact, and a key contact arranged to be inserted selectively into any one of the sockets and into engagement with a movable contact whereby to move the latter axially away from its socket to disconnect the movable contact from the fixed contact and simultaneously to establish a circuit connection of the key contact with the movable contact.

4. A circuit changing switch of the class described including a casing having spaced sockets in one side thereof, a plurality of axially movable transversely disposed spaced contacts within the casing, said movable contacts having their outer ends arranged in alignment with adjacent sockets, a fixed contact common to all the movable contacts, yieldable means for normally maintaining the movable contacts in engagement with the fixed contact, a key contact arranged to be inserted selectively into any one of the sockets and into engagement with a movable contact whereby to move the latter axially away from its socket to disconnect the movable contact from the fixed contact and simultaneously to establish a circuit connection of the key contact with the movable contact, and means for detachably connecting the key contact to the casing to permit the interchangeable connection of the key contact with any one of the movable contacts.

5. A circuit changing switch of the class described including a casing having spaced sockets at one side thereof, a plurality of axially movable transversely disposed spaced contacts within the casing, said movable contacts having their outer ends arranged in alignment with adjacent sockets, a fixed contact common to all the movable contacts, yieldable means for normally maintaining the movable contacts in engagement with the fixed contact, a plurality of key contacts detachably arranged for selective connection with the movable contacts to establish an independent circuit therewith and simultaneously disconnect the circuit established between the fixed contact and the selected movable contacts, and means for detachably connecting the key contacts to the casing to permit the interchangeable connection of the key contacts with any one of the movable contacts.

6. A circuit changing switch of the class described including a casing having spaced slotted sockets in one side thereof, a plurality of axially movable transversely disposed contacts within the casing, said movable contacts having their outer ends in alignment with the adjacent sockets, a fixed contact common to all the movable contacts, yieldable means for urging the movable contacts outwardly toward the adjacent sockets and also normally maintaining the movable contacts in engagement with the fixed contact, and a plurality of key contacts, each of said key contacts having means protruding therefrom shaped to fit through the slotted sockets and arranged to be held securely between the inner wall of the casing and the outer ends of the movable contacts, said key contacts arranged to be inserted selectively into any one of the sockets and into engagement with a movable contact whereby to move the latter axially away from its socket to disconnect the movable contact from the fixed contact and simultaneously to establish a circuit connection of the key contact with the movable contact.

7. A circuit changing switch of the class described including a casing having spaced sockets in its outer wall, spaced transversely disposed supporting members within the casing, said members having aligned openings registering with the sockets, a fixed contact adjacent one of the members and extending substantially the length thereof, a series of movable contacts extending through said openings and having their outer ends in alignment with said sockets, each of said movable contacts having a shoulder, a spring confined between said shoulder and one of the partition members for normally urging the shoulder into engagement with the fixed contact and for maintaining the outer end of the movable contact adjacent its socket, a key contact arranged to be selectively inserted in any one of the sockets for establishing a connection with the movable contact and for simultaneously disconnecting the movable contact from the fixed contact.

8. A circuit changing switch of the class described including a casing having spaced sockets in one side thereof, a plurality of axially movable transversely disposed contacts within the casing, each of said movable contacts having a shoulder and having their outer ends in alignment with the adjacent sockets, a fixed contact common to all the movable contacts, yieldable means for urging the movable contacts outwardly toward the adjacent sockets and also normally maintaining the shoulder of the movable contacts in engagement with the fixed contact, a plurality of key contacts shaped to fit through the sockets of the casing and means to attach said key contacts to the casing to withstand the outward pressure of the movable contacts, said key contacts arranged to be inserted selectively into any one of the sockets and into engagement with a movable contact whereby to move the latter axially away from its socket to disconnect the movable contact from the fixed contact and simultaneously to establish a circuit connection of the key contact with the movable contact, and means for detachably inserting the key contacts through the selected sockets to permit the interchangeable connection of the key contacts with any one of the selected movable contacts.

9. A circuit changing switch of the class described including a casing having spaced sockets in its outer wall, spaced transversely disposed partition members within the casing, said members having aligned openings registering with the sockets, a fixed contact adjacent one of the members and extending substantially the length thereof, a series of movable contacts extending through said openings and having their outer ends in alignment with said sockets, each of said movable contacts having a shoulder, a spring confined between said shoulder and one of the partition members for normally urging the shoulder into engagement with the fixed contact and for maintaining the outer end of the movable contact adjacent its socket, and a plurality of key contacts each arranged to be selectively inserted into one of the sockets for moving the adjacent movable contact away from its fixed contact and for establishing a separate connection of the key contact with the movable contact.

10. A circuit changing switch of the class described including a casing having spaced sockets in its outer wall, a pair of transversely disposed partition members within the casing, said members having aligned openings registering with adjacent sockets in the casing, a fixed contact associated with one of the partition members and extending the length thereof, a series of spaced movable contacts within the casing and extending through the openings in the partition members, each of said movable contacts having a collar, a coil spring confined between the collar and one of the members for normally maintaining the collar in engagement with the fixed contact, a key contact arranged to be inserted selectively in any one of the sockets so as to be brought into abutting engagement with a movable contact, whereby to move the movable contact axially away from its socket to disconnect the movable contact from the fixed contact and to simultaneously establish a circuit connection of the key contact with the movable contact.

11. A circuit changing switch of the class described including an insulated casing having spaced members extending upwardly from the bottom thereof, a removable cover having complementary formed depending members arranged to register with the members in the casing to provide spaced transversely disposed partitions, said members being provided with aligned openings, said casing having its front wall provided with a series of spaced sockets registering with the opening in said members, a fixed contact adjacent one of the members and extending substantially the length thereof, a series of spaced movable contacts within the casing and extending through the openings in said members, each of said movable contacts having a collar arranged to engage the fixed contact, a coil spring confined between the collar and one of said members for normally maintaining the collar in engagement with the fixed contact, and a key contact arranged to be inserted selectively into any one of the sockets and into engagement with a movable contact whereby to move the movable contact from the fixed contact and simultaneously to establish a circuit connection of the key contact with the movable contact.

12. A circuit changing switch of the class described including an insulated casing having spaced members extending upwardly from the bottom thereof, a removable cover having complementary formed depending members arranged to register with the members in the casing to provide spaced transversely disposed partitions, said members being provided with aligned

openings, said casing having its front wall provided with a series of spaced sockets registering with the openings in said members, a fixed contact adjacent one of the members and extending substantially the length thereof, a series of spaced movable contacts within the casing and extending through the openings in said members, each of said movable contacts having a collar arranged to engage the fixed contact, a coil spring confined between the collar and one of said members for normally maintaining the collar in engagement with the fixed contact, a plurality of key contacts each arranged to be inserted selectively into any one of the sockets and into abutting engagement with a movable contact whereby to move the latter axially away from its socket to disconnect the movable contact from the fixed contact and to establish a circuit connection of the key contact with the movable contact, and means on each of the key contacts for detachably connecting the same to the casing to permit the interchangeable connection of the key contacts with the movable contacts.

13. A circuit changing switch of the class described including a casing having spaced slotted sockets in its outer wall, spaced transversely disposed supporting members within the casing, said members having aligned insulated openings registering with the sockets, a fixed contact adjacent one of the members, a plurality of movable contacts extending through said openings, each of said movable contacts having a shoulder, a spring confined between the said shoulder and one of the partition members for normally urging the shoulder into engagement with the fixed contact, said fixed contact being common to the shoulders of all the movable contacts, and a key contact shaped to fit through the slotted sockets and having a retaining shoulder arranged to be held firmly between the inner wall of the casing and the outer end of the movable contacts, said key contact arranged to be selectively inserted through any one of the slotted sockets for establishing a connection with a selected movable contact and simultaneously disconnecting the movable contact from the fixed contact without affecting the connection of the other movable contacts.

14. A circuit changing switch of the class described including a casing having spaced slotted sockets in its outer wall, spaced transversely disposed supporting members within the casing, said members having aligned insulated openings registering with the sockets, a fixed contact adjacent one of the members, a plurality of movable contacts extending through said openings, each of said movable contacts having a shoulder, a spring confined between the said shoulder and one of the supporting members for normally urging the shoulder into engagement with the fixed contact, said fixed contact being common to the shoulders of all the movable contacts, a plurality of key contacts shaped to fit through the slotted sockets and having a retaining shoulder arranged to be held firmly between the inner wall of the casing and the outer end of the movable contacts, said key contacts arranged to be selectively inserted through any one of the slotted sockets for establishing a connection with a selected movable contact and simultaneously disconnecting the movable contact from the fixed contact without affecting the connection of the other movable contacts, and means for detachably connecting the key contacts through the sockets to permit the interchangeable connection of the key contacts with any of the movable contacts.

15. A circuit changing switch of the class described including a casing having spaced sockets in its outer wall, spaced parallel supporting members within the casing, said members having aligned insulated openings registering with the sockets, a fixed contact adjacent one of the members, a plurality of movable contacts slidably extending through said openings, each of said movable contacts having a shoulder, a spring confined between the said shoulder and one of the supporting members for normally urging the movable contacts outwardly toward the adjacent sockets and normally maintaining the shoulder into engagement with the fixed contact, said fixed contact being common to the shoulders of the movable contacts, a plurality of key contacts shaped to fit through the sockets, means to secure the said key contacts to the casing to resist the pressure induced by the movable contacts while establishing a connection between the said key contacts and the selected movable contacts, said key contacts arranged to be selectively inserted through any one of the sockets for establishing a connection with the selected movable contacts and simultaneously disconnecting the movable contacts from the fixed contact without affecting the connection of the other movable contacts and means for detachably connecting the key contacts through the sockets to permit the interchangeable connection of the key contacts with any of the movable contacts.

16. A circuit changing switch of the class described including a casing having spaced sockets, a plurality of axially movable transversely disposed contacts within the casing, said contacts having their inner ends in alignment with adjacent sockets, a fixed contact common to the movable contacts, yieldable means for normally maintaining the movable contacts in engagement with the fixed contact, and a key contact arranged to be selectively inserted into any one of the sockets to engage and establish an electrical connection with a selected movable contact and simultaneously to disconnect the selected movable contact from the fixed contact, said key contact having retaining means arranged to engage the inner wall of the casing, said yieldable means acting to oppose the insertion of the key contact into a selected socket and to maintain firmly the retaining means in engagement with the casing when the key contact is inserted and turned within a selected socket.

17. A circuit changing switch of the class described including a casing having spaced slotted sockets, a plurality of axially movable transversely disposed contacts within the casing, said contacts having their inner ends in alignment with adjacent sockets, a fixed contact common to all the movable contacts, yieldable means for normally maintaining the movable contacts in engagement with the fixed contact, and a plurality of key contacts, each of said key contacts arranged to be selectively inserted into any one of the sockets to engage and establish an electrical connection with a selected movable contact and simultaneously disconnect the selected movable contact from the fixed contact, each of said key contacts having retaining means arranged to engage the inner wall of the casing, said yieldable means acting to oppose the inward movement of a key contact into a selected socket and to maintain the retaining means in engagement with the casing when the key contact is inserted and turned within the selected socket whereby to pre-

vent the accidental disconnection of the key contact from its selected movable contact.

18. A circuit changing switch of the class described including a casing having spaced slotted sockets in its outer wall, spaced transversely disposed supporting members within the casing, said members having aligned insulated openings registering with the sockets, a fixed contact adjacent one of the members, a plurality of axially movable transversely disposed contacts extending through said openings, each of said movable contacts having a shoulder, a spring confined between said shoulder and one of the partition members for normally urging the shoulder into engagement with the fixed contact, said fixed contact being common to the shoulders of all the movable contacts, a plurality of key contacts arranged to be inserted into said sockets, each of said key contacts having retaining lugs arranged to engage the inner wall of the casing, said key contact when inserted into a selected socket arranged to engage an adjacent movable contact to establish an electrical connection therewith and simultaneously to disconnect the movable contact from the fixed contact without affecting the connection of the other movable contacts, said spring acting to oppose the insertion of a key contact into a selected socket and to maintain firmly the lugs therein in engagement with the casing when the key contact is properly positioned within the socket so as to prevent accidental disconnection of the key contact from the selected movable contact.

19. A circuit changing switch of the class described including a casing having a plurality of spaced sockets on one side thereof, a plurality of spaced transversely disposed reciprocating contacts, means to individually connect each of said contacts to a separate circuit, a stationary contact adjacent to all of the reciprocating contacts, each of said reciprocating contacts having their outer end in alignment with the adjacent socket and having a shoulder arranged to engage the stationary contact, yieldable means for urging each of the reciprocating contacts outwardly toward the adjacent socket to normally maintain the shoulder of the reciprocating contacts in engagement with the stationary contact and thereby establish a circuit connection through the stationary contact and each of said reciprocating contacts, a detachable key contact, means to connect the key contact to a separate circuit, said key contact arranged to be inserted selectively into any one of the sockets to engage the reciprocating contact and close a circuit connection through the said key contact and the selected reciprocating contact while disconnecting the circuit connection previously established through the selected reciprocating contact and the stationary contact.

20. A circuit changing switch of the class described including a casing having a plurality of spaced sockets on one side thereof, a plurality of spaced transversely disposed reciprocating contacts, means to individually connect each of said contacts to a separate circuit, a stationary contact adjacent to all of the reciprocating contacts, each of said reciprocating contacts having their outer end in alignment with the adjacent socket and having a shoulder arranged to engage the stationary contact, yieldable means for urging each of the reciprocating contacts outwardly toward the adjacent socket to normally maintain the shoulder of the reciprocating contacts in engagement with the stationary contact and thereby establish a circuit connection through the stationary contact and each of said reciprocating contacts, a pair of detachable key contacts, means to individually connect each of the key contacts to a separate circuit, said key contacts arranged to be inserted selectively into any one of the sockets to engage the adjacent reciprocating contact and close a circuit connection through each of the said key contacts and the selected reciprocating contacts while disconnecting the circuit connections previously established through the selected reciprocating contacts and the stationary contact.

21. A circuit changing switch of the class described including a casing having a plurality of spaced slotted sockets on one side thereof, a plurality of spaced transversely disposed reciprocating contacts, means to individually connect each of said contacts to a separate circuit, a stationary contact adjacent to all of the reciprocating contacts, each of said reciprocating contacts having their outer end in alignment with the adjacent socket and having a shoulder arranged to engage the stationary contact, yieldable means for urging each of the reciprocating contacts outwardly toward the adjacent socket to normally maintain the shoulder of the reciprocating contacts in engagement with the stationary contact and thereby establish a circuit connection through the stationary contact and each of said reciprocating contacts, a pair of detachable key contacts shaped to fit through the slotted sockets and having a retaining shoulder arranged to be held firmly against the inner wall of the casing by the outward pressure of the reciprocating contacts to prevent the accidental disconnection of said key contacts, means to individually connect each of the key contacts to a separate circuit, said key contacts arranged to be inserted selectively into any one of the sockets to engage the adjacent reciprocating contact and close a circuit connection through each of the said key contacts and the selected reciprocating contacts while disconnecting the circuit connections previously established through the selected reciprocating contacts and the stationary contact.

22. A circuit changing switch of the class described including a stationary contact, a plurality of individually operative reciprocating contacts, means to connect the stationary contact to an independent single electrical circuit, means to permanently connect each of the reciprocating contacts to a single electrical circuit different from the circuits connected to the other reciprocating contacts, each of said reciprocating contacts being electrically independent of the other reciprocating contacts, each of said reciprocating contacts having a shoulder arranged to engage the stationary contact, said stationary contact being adjacent to the shoulder of each of the reciprocating contacts, yieldable means to normally urge each of the reciprocating contacts outwardly into engagement with the stationary contact in order to separatively establish a complete circuit connection between the circuit connected to the stationary contact and individually each of the circuits connected to the reciprocating contacts, a detachable key contact, means to connect said key contact to an independent electrical circuit, said key contact arranged for selective connection with any one of the reciprocating contacts in order to separatively engage only one of the said reciprocating contacts and establish a circuit connection between the circuit

connected to the key contact and the separate circuit permanently connected to the selected reciprocating contact without affecting the normal circuit connection between the other reciprocating contacts and the stationary contact.

23. A circuit changing switch of the class described including a stationary contact, a plurality of individually operative reciprocating contacts, means to connect the stationary contact to an independent single electrical circuit, means to permanently connect each of the reciprocating contacts to a single electrical circuit different from the circuits connected to the other reciprocating contacts, each of said reciprocating contacts being electrically independent of the other reciprocating contacts, each of said reciprocating contacts having a shoulder arranged to engage the stationary contact, said stationary contact being adjacent to the shoulder of each of the reciprocating contacts, yieldable means to normally urge each of the reciprocating contacts outwardly into engagement with the stationary contact in order to separatively establish a complete circuit connection between the circuit connected to the stationary contact and individually each of the circuits connected to the reciprocating contacts, two separate individually operative detachable key contacts, means to individually connect each of the said key contacts to a different electrical circuit, each of the said key contacts arranged for selective connection with any one of the reciprocating contacts in order to separatively engage only one of the said reciprocating contacts and establish a circuit connection between the circuit connected to one of the key contacts and the separate circuit permanently connected to the selected reciprocating contact engaged by it and also establish another circuit connection between the circuit connected to the second key contact and the separate circuit permanently connected to the selected reciprocating contact engaged by the second key contact without affecting the normal circuit connection between the other reciprocating contacts and the stationary contact.

EDMOND MICHEL.