

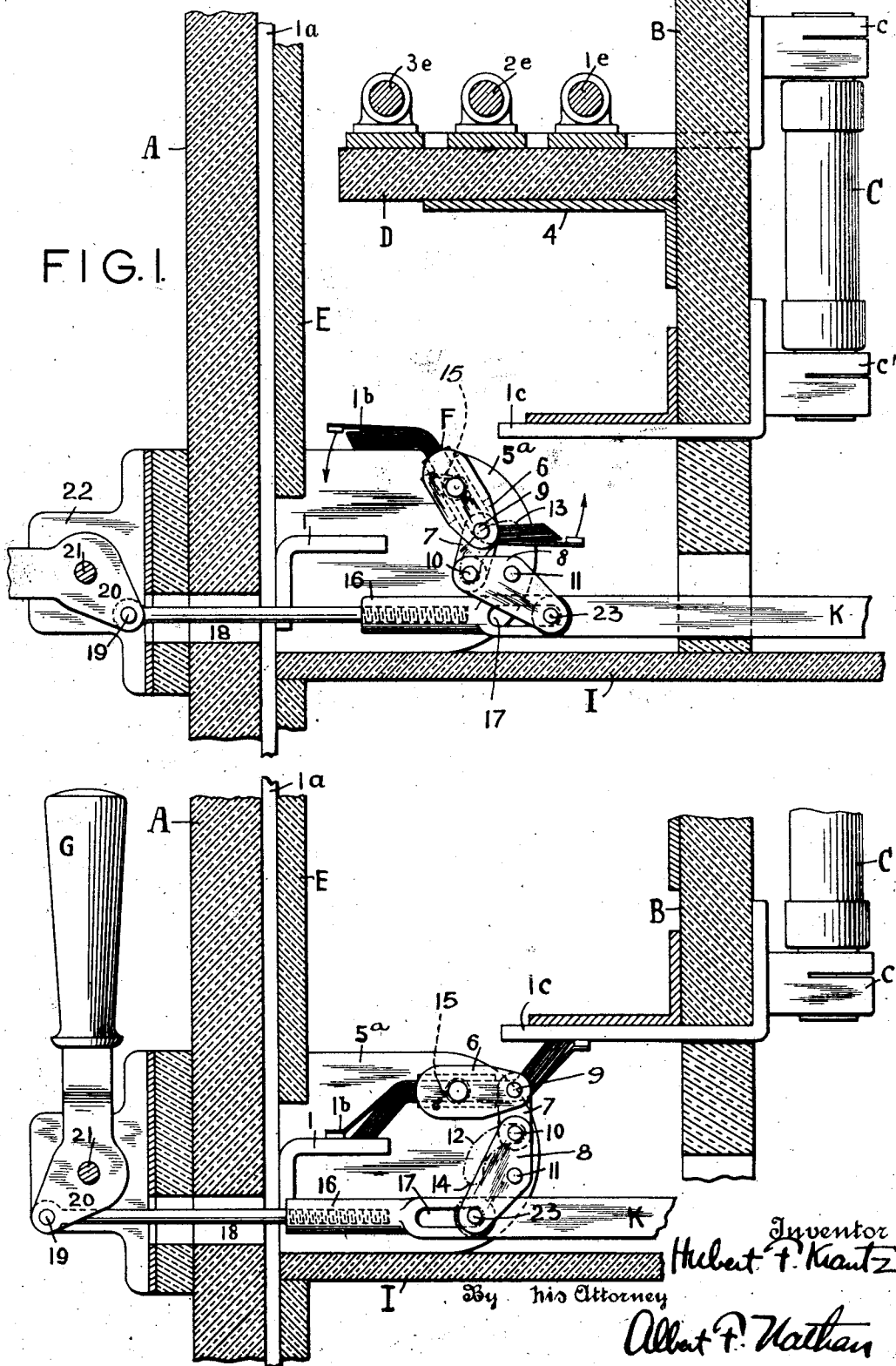
H. F. KRANTZ.
SAFETY SWITCHBOARD.

APPLICATION FILED MAR 22, 1916. RENEWED NOV. 25, 1918.

1,306,344.

Patented June 10, 1919.

4 SHEETS—SHEET 1.



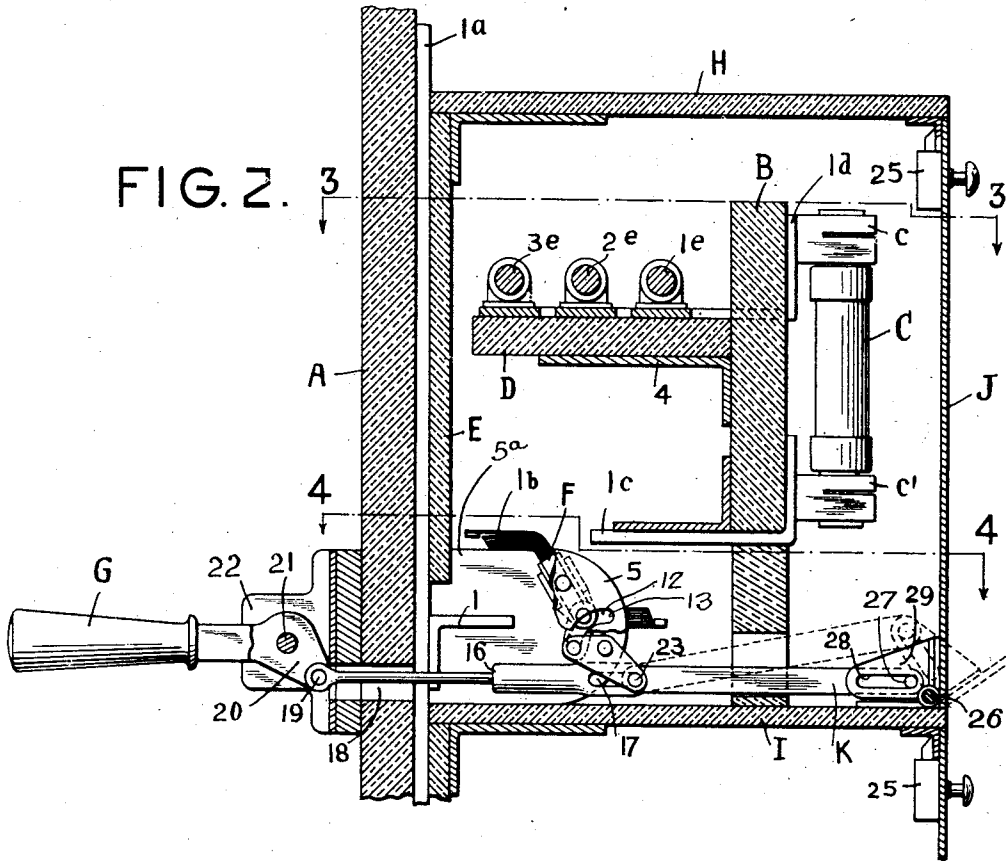
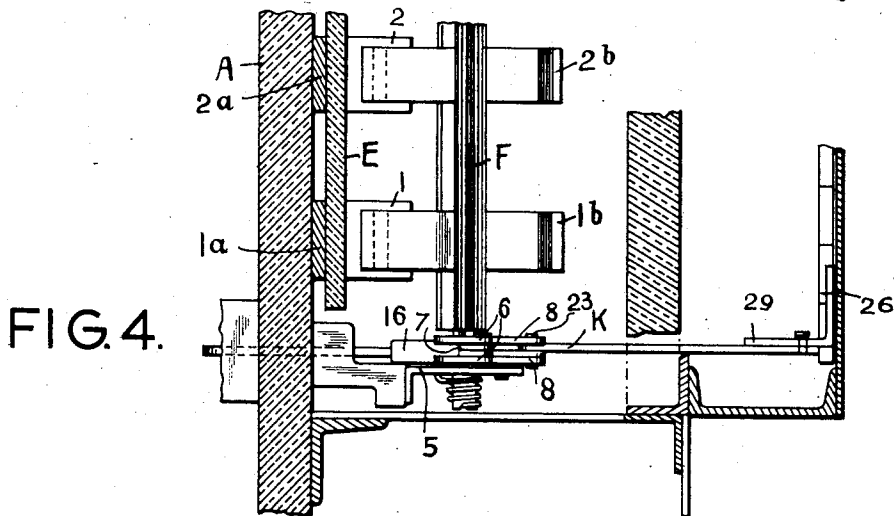
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4 SHEETS—SHEET 2.



Inventor
Hubert F. Krantz
By his Attorney,
Albert F. Nathan

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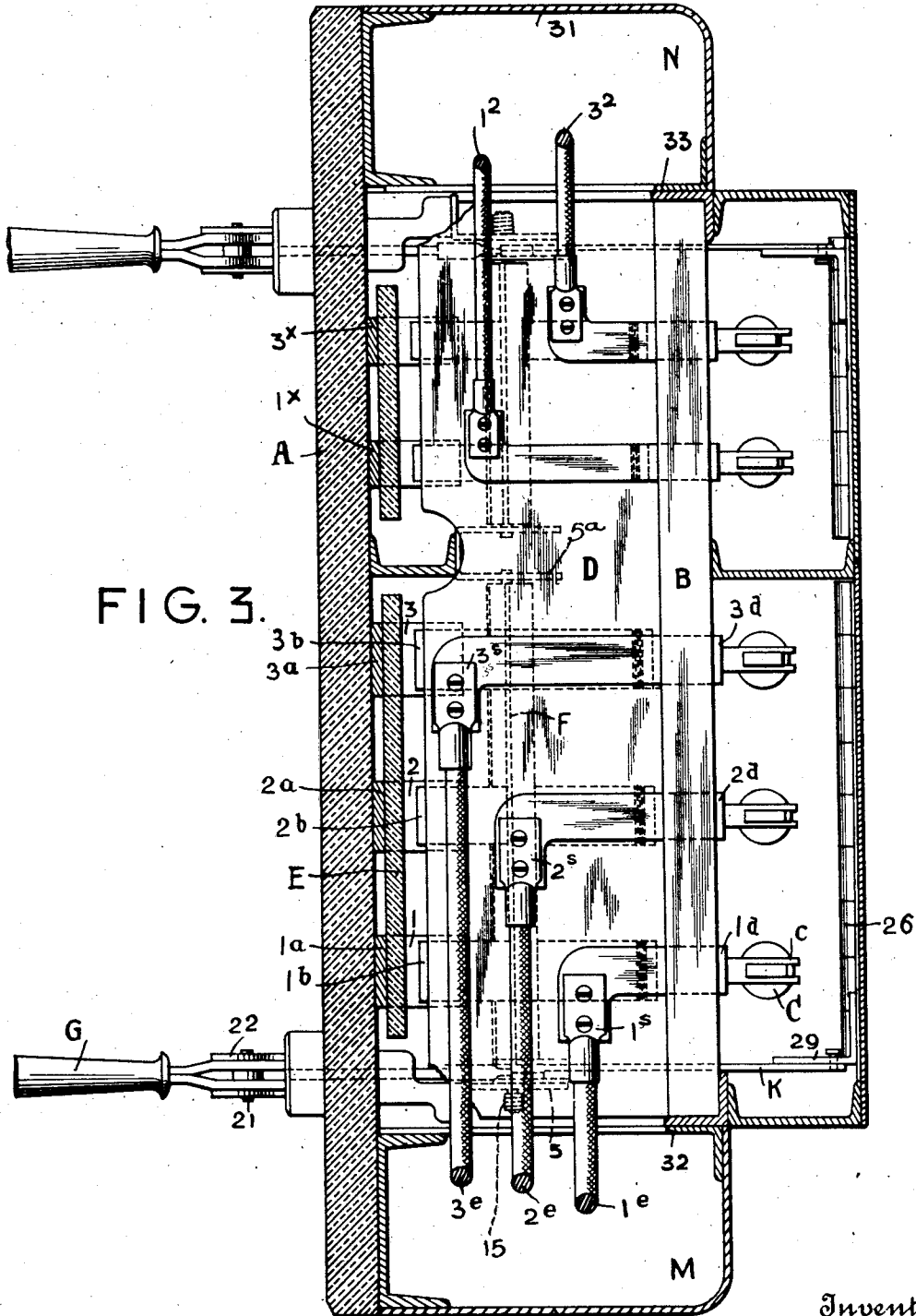


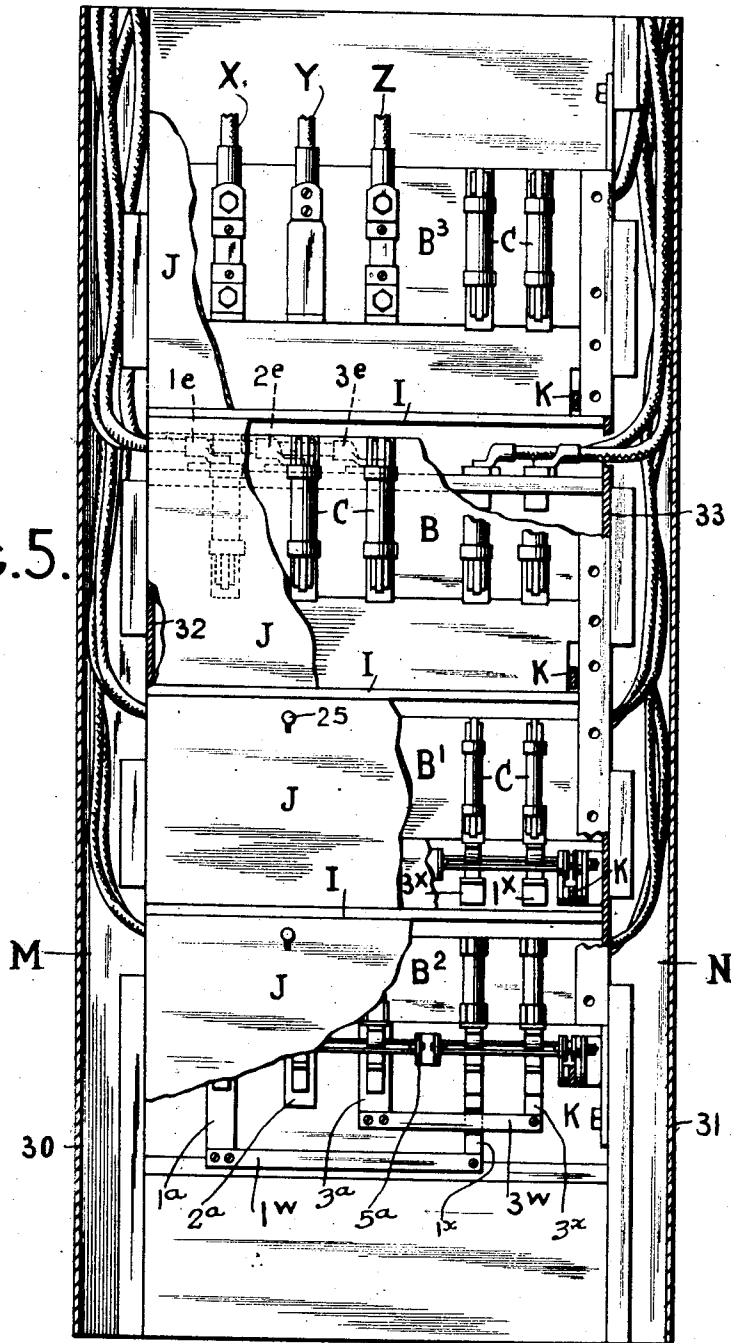
FIG. 3.

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By His Attorney
Albert F. Nathan

APPLICATION FILED MAR. 22, 1916. RENEWED NOV. 25, 1918.

Patented June 10, 1919

FIG.5.



By *Hubert F. Kiantz* ^{Inventor}
his Attorney *Albert F. Nathan*

UNITED STATES PATENT OFFICE.

HUBERT F. KRANTZ, OF BROOKLYN, NEW YORK, ASSIGNOR TO KRANTZ MANUFACTURING COMPANY, INC., OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

SAFETY-SWITCHBOARD.

1,306,344.

Specification of Letters Patent.

Patented June 10, 1919.

Application filed March 22, 1916, Serial No. 85,853. Renewed November 25, 1918. Serial No. 264,128.

To all whom it may concern:

Be it known that I, HUBERT F. KRANTZ, a citizen of the United States, and residing at Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Safety-Switchboard, of which the following specification is a full disclosure.

This invention deals with switch-mechanisms more especially of the type known as switch boards, and its primary purpose is to enhance the safety thereof, and thereby reduce in number accidents incidental to the use of electrical circuits.

One object is to provide an upstanding switch board which is thoroughly protected both front and rear whereby persons will not accidentally come in contact with live parts and thereby get a severe shock, by providing covers at the rear side and establishing a connection between the covers and the operating features, such that access will not be had to the fuses when the switches are in closed circuit position.

A further object is to provide a switch board in which bus bars and switch mechanisms are arranged at the same side of the board, and in which guard means is arranged to cover and protect substantially all portions of the bus bars except at those restricted points where the switch mechanisms make their electrical connection.

A further object is to provide barrier means disposed between the covers and the live parts of the device arranged so as to shield all live parts within when the covers are open.

A further object is to so arrange the parts of the device that the several covers referred to each guard and protect a given compartment or section of the whole switch board structure.

A further object is to provide a board in which continuous bus bars traverse all of the compartments or sections, and to arrange the switch mechanisms in the respective compartments so as to make electrical connection with the portions of the bus bars which traverse the respective compartments.

A further object is to provide guard means associated with the respective compartments so as to cover and conceal the

traversing bus bars except at a restricted point where the switch mechanism of the compartment makes its electrical connection.

A further object is to provide means whereby to safely support the branch line conductors which extend into the respective compartments.

Another object is to effect a general simplification of the switch board whereby the fuse-holders will be most accessible without compelling the hands to come near live conductors and whereby the other elements, such as the switch-blades, the bus-bars and the branch-line conductors, will be located out of ordinary reach.

A further object is to adapt the barrier referred to so as to carry the fuses and so as to support branch line contacts in proper coöperative relation to the moving elements of the switch mechanism.

Other objects will be in part obvious from the annexed drawings and in part indicated in connection therewith by the following analysis of this invention.

This invention accordingly consists in the features of construction, combination of parts, and in the unique relations of the members and in the relative proportioning and disposition thereof; all as more completely outlined herein.

To enable others skilled in the art so fully to comprehend the underlying features thereof that they may embody the same by the numerous modifications in structure and relation contemplated by this invention, drawings depicting a preferred form have been annexed as a part of this disclosure, and in such drawings, like characters of reference denote corresponding parts throughout all the views of which:—

Figure 1 is an enlarged fragmentary section showing one of the switches of the upper tier or compartment in open circuit position and showing a similar switch of the lower tier or compartment in closed circuit position. Fig. 2 is a reduced section similar to that of Fig. 1 but showing in addition the protecting elements at the rear of the switch-board and the connections between the same and the device for actuating the switch blades.

Fig. 3 is a horizontal sectional view taken substantially upon the plane of line 3 of Fig. 2.

Fig. 4 is a fragmentary sectional view illustrating the switch operating connections, and being taken substantially upon the plane of line 4 of Fig. 2.

Fig. 5 is a rear elevational view of the switch board, parts being broken away and shown in section in order to better disclose the structural arrangement.

Continuing now by way of a more detailed description, in this embodiment, A indicates the main base-board which may be formed of ornamental insulating material, such as marble or slate, and which in this instance is shown to stand in a vertical position. On its front face it carries the various operating handles, and at its rear face are located the working elements and connections. This board is designed on the unit principle; that is to say, it provides a number of independent sections or compartments arranged in tiers each having one or more operating handles, and each controlling one or more branch-line circuits, as the case may be. Since these parts are symmetrically arranged throughout it will suffice to describe one.

At some distance from what will be called the rear face of the base-board is arranged a shelf or strip of insulating material B, preferably having a narrow elongated form and arranged substantially parallel with the base-board A. The rear face of this member is utilized for carrying the fuse-holders or clips *c* and *c'*, which may have any conventional form so as to receive conventional fuses such as C. In this instance the clips *c* and *c'* extend from the branch-line terminals 1^a, 2^a and 3^a on the one hand and the contact element 1^c on the other hand. The contact elements 1^c are each in the form of a strip of copper which is bent to extend through the member B and forwardly toward the base-board A. Each terminates some distance from the base board so as to lie within the plane of its appropriate bus-bar, as will be explained.

In order to most conveniently and compactly establish connection between the various branch-line conductors and the various fuse clips, a shelf D, also in the form of a narrow elongated strip of insulating material, is arranged edgewise between the base-board and the member B, as by being secured to the latter by means of a bracket 4. The upper surface of this strip D carries a number of parallel branch line conductors 1^e, 2^e and 3^e, which at their ends are connected to the various branch-line fuse clip terminals 1^d, 2^d and 3^d.

Horizontally arranged partition or wall members, as H and I, project outwardly from the rear face of the base board at

spaced points in the height of the base board so as to divide the rear surface of the board into a plurality of superposed compartments within each of which is arranged one of the members B with its fuse clips, branch line wires, and other associated parts which will later be more fully described. The rear opening of each compartment is guarded by an independent door J.

The bus bars, as 1^a, 2^a and 3^a extend vertically along the rear surface of the base board A and thus traverse each of the several superposed compartments. These bus bars are spaced apart in substantially parallel relation and in each compartment one contact element 1^c is provided for each bus bar, these contact elements being substantially aligned with the respective bus bars and being in connection with the fuse clips and branch line terminals as above described.

In order to further protect the bus-bars against being accidentally contacted, plates or guard members E of insulating material are also provided. These guard members are arranged one within each of the compartments, so as to cover and conceal the bus bars throughout except at restricted points where portions of the guard members are omitted sufficient to enable electrical connection to be made with the respective bus bars.

Switch blades 1^b, 2^b and 3^b are arranged within each compartment operable to complete electrical communication between the bus bars and the respective adjacent contact elements 1^c as will now be described:—

A switch blade carrier F is pivotally supported at its ends by brackets 5 and 5^a, and it has clamped thereto in spaced relation the blades 1^b, 2^b, 3^b, etc. Each brush consists of a number of laminae and is bent near each end, as shown more clearly by Fig. 1 so as to produce beveled extremities which may swing directly into contact with the branch line contact elements 1^c and the contact elements 1 which are connected with the bus bars. The carrier is arranged to be rocked back and forth so as to move the switch-blades into open and closed circuit positions, and the operating mechanism therefor consists of an arm 6 extending from the carrier, which arm is in turn actuated by a toggle formed of the links 7 and 8; the link 7 being connected thereto by means of the pivots 9 and 10, and the link 8 being arranged to rock about the fixed pivot 11 secured to the bracket 5. The latter bracket in turn is provided with a slot 12, the upper end of which constitutes a stop 13 for limiting movement of the toggle in one direction; and the lower end of which constitutes a stop 14 for limiting movement of the toggle in the opposite direction enabling the spring 15 to hold the switch-blades in the intermediate position

shown by Fig. 2 whenever the toggle is broken. The link 8 of the toggle is in the form of a small bell-crank and carries at the end of its free arm a pin 23.

For the purpose of making and breaking the toggle a link 16 has a slot 17 elongated so as to provide for lost motion and this link extends forwardly through an opening 18 in the base-board, and is pivoted at 19 to the arm 20 of a hand lever G, which in turn is pivoted at 21 in a suitable bracket 22 arranged at the front face of the base-board A. By swinging the lever G upwardly, the pin 23 of the bell-crank lever 8 is engaged by the rear end wall of the slot 17 and this causes the lever to turn so as to erect the toggle and force the switch-blade into closed circuit position, as at the bottom of Fig. 1. Now, if the handle G be swung downwardly, the other end of the slot 17 will be brought against the pin 23 and will break the toggle and enable the spring 15 to snap the carrier F with its switch blades, into its open circuit position as at the top of Fig. 1.

There is, of course, at least one switch-blade carrier, an operating link and handle for each compartment.

The cover members J are preferably in the form of hinged panels. Each is adapted normally to be held in closed position by the latch 25 and the hinge 26, and yet preferably capable of being freely opened by operating the latch 25. A suitable connection is arranged between each cover J and the adjacent switch-mechanism, or any operating element thereof, whereby it will not be possible for the switch blades to stand in closed circuit position while the cover is open.

In this embodiment, this connection takes the form of a link K which is pivotally connected by its forward end to the pin 23, and which carries a pin 27 at its rear end. The pin 27 rides in an elongated slot 28 which is formed in a part 29 carried by the cover. This slot 28 provides sufficient lost motion so that the switch may be freely opened and closed so long as the cover is closed. When the switch is in closed circuit position then the lost motion is taken up. An opening movement of the cover then will throw the switch automatically into open position and render all the parts safe.

It is to be particularly noted that the members B are arranged within the respective compartments so as to divide the compartment into a forward chamber and a rear chamber. The forward chamber contains the switch contacts, switch blades, bus bars, branch-line wires and other live parts of the device, while the rear chamber contains only the fuse clips and fuses. The rear chamber may be reached by opening the cover but the member B constitutes a barrier or wall shutting off access to the forward chamber.

Since the door may not be open except while the switch is "off," then the fuse clips are necessarily dead whenever the door is open and the fuses may therefore, be inserted or removed at will without danger. At such times the barrier B serves as an efficient means to prevent the operator from coming accidentally into engagement with any of the live parts or with the bus bars. Owing to the presence of the guard member E a wire or tool accidentally inserted past the barrier B even would not be likely to engage the bus bars.

The position of the branch line wires behind the barrier B affords a desirable protection to said branch wires at all times.

By this construction the entire rear of the panel is protected and accidents are rendered practically impossible. The branch-line cables are insulated and extend down along the sides of the board to the end edges of the shelves D, D', D'', etc., and thence along said shelves. All of these parts are, of course, dead when the main switch is open. On the other hand, the only live part in such circumstances is the extension 1, which is quite inaccessible and is blocked by the switch itself.

The positive and negative of the three-wire bus bars are connected with the bus bars 1^x and 3^x by means of connector strips 1^w and 3^w.

Although the drawing illustrates a set of three-wire bus bars and a set of two-wire bus bars, it will be understood this is merely for illustrative purposes and that two-wire bus bars or three-wire bus bars may be used in either set, as desired, or even that one set may be used alone and the other be entirely omitted.

The main line wires may be connected to the bus bars at any appropriate point, as for instance at the points x, y and z in Fig. 5.

In order to illustrate the compartment formation of the switch-board structure Fig. 5 has been drawn to show four compartments. It will be understood, however, that any desired number of compartments may be arranged along the length of the bus bars.

Also, it will be understood, the bus bars may be arranged to extend in a horizontal direction if desired, instead of in a vertical direction as illustrated.

The construction is moreover such as to provide gutters M and N arranged transversely to the ends of the compartments. These gutters may be formed of out side strips 30 and 31 and inner side strips 32 and 33 which may be formed with openings adjacent the shelves D to provide for entry of the branch line wires 1^e, 2^e, and 3^e, 1² and 3².

Without further analysis, the foregoing

will so fully reveal the gist of this invention that others can by applying current knowledge readily adapt it for various applications without omitting certain features that, from the standpoint of the prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention; and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations of elements, or equivalents thereof, by Letters Patent of the United States:—

1. A switch-board combining a base-board; a first shelf arranged edgewise to said base-board; branch-line conductors carried by said first shelf; a second shelf arranged parallel with said base-board; fuse-holders mounted on the face of said second shelf most remote from said base-board; an elongated bus-bar extending transversely to said shelves between the same and said base-board; and switch mechanism for establishing connection between the bus-bar and a fuse-holder terminal.

2. A switch-mechanism combining an elongated common carrier pivoted to swing about its longitudinal axis; a number of switch blades spaced along said carrier; a base-board at one side of said carrier, a wall member arranged substantially parallel with said base-board at the other side of said carrier; a corresponding number of parallel bus-bars extending between said base-board and said carrier and transversely to the axis of the carrier; a corresponding number of fuse-holders mounted on the face of said wall member most remote from said base-board; and means for swinging said carrier to establish electrical connection between the bus-bars and the fuse-holders.

3. A base-board; a first shelf extending parallel therewith and spaced away therefrom; a second shelf arranged edgewise between said base-board and said first shelf; a bus-bar extending between the base-board and said shelves; a fuse-holder carried by the first shelf and connected with a branch-line conductor carried by the second shelf; and switch-mechanism for electrically connecting the fuse-holder with the bus-bar.

4. A base-board; a first shelf extending parallel therewith and spaced away therefrom; a second shelf arranged edgewise between said base-board and said first shelf; a bus-bar extending between the base-board and said shelves; a fuse-holder carried by the first shelf and connected with a branch-line conductor carried by the second shelf; switch-mechanism for electrically connecting the fuse-holder with the bus-bar; and a cover connected with said switch-mechanism

for inhibiting access to the fuse-holder whenever said switch is in its open circuit position.

5. A switch-board combining an upstanding base-board; a tier of superimposed shelves of insulating material spaced apart and arranged horizontally edgewise to the base-board; a plurality of fuse holders arranged rearward of said shelves and connected with terminals thereon; a plurality of main bus bars extending vertically between the base board and said shelves, switches movable in vertical planes adapted to establish connection between the bus bars and the fuse holders; and means for operating said switches from the front face of said base-board.

6. A switch-board combining an upstanding base-board, a plurality of strips of insulating material spaced apart in the same vertical plane and distanced rearwardly from said base-board; a plurality of parallel bus bars extending vertically between the base-board and said strips; a plurality of fuse-holders arranged on the rear vertical face of each strip and having contact portions extending to the forward vertical face of said strips; switches for connecting said contact portions with said bus bars; and means for operating said switches.

7. A switch-mechanism combining a base-board, a wall member distanced from one face of the base-board, a bus-bar extending along said face of the base-board between the base-board and the wall member, a branch-line contact extending from said wall member toward said base-board, a contact projecting from said bus-bar toward said wall member, a switch-blade, and means to operate the switch-blade for controlling a circuit between said two contacts.

8. A switch mechanism combining a base board, a strip of insulating material distanced from one face of the base board, a bus bar extending along the mentioned face of the base board between the base board and said strip of insulating material, a branch line contact extending from said strip toward said bus bar, a contact extending from said bus bar, a switch blade, and means at the opposite face of the base board having a part extending through the base board to operate said switch blade for controlling a circuit between said contacts.

9. A switch mechanism combining a base board, a wall member distanced from one face of the base board, a bus bar extending along said face of the base board between the base board and the wall member, a branch line conductor member projecting from said wall member toward said base board and providing a branch line contact portion in proximity with said bus bar, a switch blade arranged within the space between the base board and said wall member, and means to

operate said switch blade for controlling a circuit between the bus bar and the contact portion of said branch line conductor member.

5 10. A switch mechanism combining a first, a second, and a third wall arranged side by side but spaced apart to provide a switch chamber between the first and the second walls and a fuse chamber between the second and third walls, the third wall comprising a door displaceable to afford access to the fuse chamber, a fuse holder arranged within the fuse chamber, a switch arranged within the switch chamber, and a switch 10 operating member arranged beyond the first wall connected through said first wall with the switch mechanism to operate the switch mechanism.

11. A switch mechanism combining a first, a second, and a third wall arranged side by side but spaced apart to provide a switch chamber between the first and the second walls and a fuse chamber between the second and third walls, the third wall comprising a door displaceable to afford access to the fuse chamber, a fuse holder arranged within the fuse chamber, a switch arranged within the switch chamber, a switch operating member arranged beyond the first wall being connected through said first wall with the switch mechanism to operate the switch mechanism, and connections between the switch operating member and the door of the third wall to retain the door closed when the switch is "on". 35

12. A switch mechanism combining a first, a second, and a third wall arranged side by side but spaced apart to provide a switch chamber between the first and the second walls and a fuse chamber between the second and third walls, the third wall comprising a door displaceable to afford access to the fuse chamber, a fuse holder arranged within the fuse chamber being supported at one surface of the second wall, a switch blade arranged within the switch chamber, a main line conductor entering the switch chamber, a branch line conductor arranged within the switch chamber being also carried by the second wall and being electrically connected with the fuse holder, and a switch operating member arranged beyond the first wall being connected through said first wall with the switch blade to operate said switch blade for controlling a circuit between said main line conductor and said branch line conductor. 50

13. A switch mechanism combining a base board, a fuse supporting plate spaced from one surface of the base board, a bus bar extending along the mentioned surface of the base board between the base board and said plate, a branch line wire supporting member at the same side of the base board extending transversely of said bus bar, a fuse 65

holder carried by said plate having one terminal disposed adjacent the branch line wire supporting member and having its other terminal disposed adjacent the bus bar, and switch mechanism arranged between the base board and said plate operable to control a circuit between the bus bar and the last mentioned fuse terminal. 70

14. A switch mechanism combining a base board, a fuse supporting member spaced from one surface of the base board, a bus bar extending along the mentioned surface of the base board between the base board and said fuse supporting member, a branch line wire supporting member at the same side of the base board extending transversely of said bus bar, connecting means connecting the branch line wire supporting member with the fuse supporting member whereby to support one of said members from the other, a fuse holder carried by said fuse supporting member having one terminal disposed adjacent the branch line wire supporting member and having its other terminal disposed adjacent the bus bar, and switch mechanism arranged between the base board and said fuse supporting member operable to control a circuit between the bus bar and the last mentioned fuse terminal. 85

15. A safety switch comprising a base board, a set of bus bars arranged in the rear face of said base board, a plate of insulating material arranged parallel to said base board, fuse holders carried by said plate spaced from said bus bars, and a switch comprising a set of rotary laminated blades arranged within the space formed between the base board and the plate with means extending through the base board for rotating said switch blades to cause each of them to make contact between a bus bar and a fuse holder. 90

16. A safety switch board comprising first a base board, second a wall member arranged approximately parallel to the base board and spaced therefrom, and third a shelf arranged edgewise between the base board and the wall member, said base board, wall member and shelf being arranged so as to collectively define a partially inclosed space between them, bus bars within said space at the inner face of the base board, fuse holders carried by said wall member having contact terminals arranged within said space, terminal conductors carried by said shelf for connection with the fuse holders, a switch device also within said space, and means extending through the base board whereby to operate the switch device to make and break contact between said bus bars and said fuse terminals. 115

17. In a safety switch board, a base board, a plate of insulating material arranged approximately parallel to and spaced from the base board, fuse holders mounted upon the 130

surface of said plate remote from the base board but having terminal parts extending through said plate to the surface thereof adjacent the base board, bus bars mounted upon the surface of the base board facing said plate, and a switch device arranged within the space between the base board and said plate capable of being operated through the base board to make and break contact between the bus bars and the fuse terminals.

18. A switch board comprising a base board, a bus bar extending along one surface of the base board, a plurality of switches arranged along the length of the bus bar each having a blade operable to make and break contact with the bus bar at spaced points in the length of the bus bar, means to operate the switches, and a guard member arranged to cover and guard the bus bar substantially throughout its length except in the restricted localities where the switch blades require to make contact therewith.

19. A switch board comprising a base board, a plurality of bus bars extending along one surface of the base board, a plurality of switch mechanisms spaced apart along the length of the bus bars each having blades operable to make and break contact with the bus bars at spaced points in the length of the bus bars, supporting means for said switch mechanisms arranged to support the switch mechanisms from the base board, means extending through the base board to operate the switch mechanisms from the opposite side of the base board, and a guard member arranged to cover and guard the bus bars substantially throughout their length except in the restricted localities where the switch blades require to make contact therewith.

20. A switch board comprising a base board, a bus bar extending along one surface of the base board, a plurality of switches arranged along the length of the bus bar each having a blade operable to make and break contact with the bus bar at spaced points in the length of the bus bar, means to operate the switches, and a guard member arranged to cover and guard the bus bar substantially throughout its length except in the restricted localities where the switch blades require to make contact therewith, together with a plurality of branch line contacts and means to support the same from the base board and in cooperative relation with said switch blades.

21. A safety switch board comprising a base board, a plurality of switch mechanisms arranged at the rear side of said base board, a plurality of switch operating elements arranged at the forward side of the base board one for each switch mechanism, means extending through the base board to connect the operating elements with the respective

switch mechanisms, and means arranged at the rear side of the board defining a plurality of separate compartments upon the rear face of the board one for each of said switch mechanisms.

22. A safety switch board comprising a base board, a plurality of switch mechanisms arranged at the rear side of said base board, a plurality of switch operating elements arranged at the forward side of the base board one for each switch mechanism, means extending through the base board to connect the operating elements with the respective switch mechanisms, means arranged at the rear side of the board defining a plurality of separate closed compartments upon the rear face of the board one for each of said switch mechanisms, and said last mentioned means including a displaceable door whereby to afford independent access to the respective compartments.

23. A safety switch board comprising a base board, a plurality of switch mechanisms arranged at the rear side of said base board, a plurality of switch operating elements arranged at the forward side of the base board one for each switch mechanism, means extending through the base board to connect the operating elements with the respective switch mechanisms, means arranged at the rear side of the board defining a plurality of separate closed compartments upon the rear face of the board one for each of said switch mechanisms, said last mentioned means including a displaceable door whereby to afford independent access to the respective compartments, and means to retain the door of any compartment closed except when the switch mechanism of that compartment is "off".

24. A safety switch board comprising a base board, means at one side of said base board defining a plurality of separate compartments upon said side of the base board, a bus bar traversing all of said compartments, a plurality of switch mechanisms one within each of said compartments operable to make and break contact with the traversing portion of the bus bar, and means extending to the opposite side of the base board to operate said switch mechanisms.

25. A safety switch board comprising a base board, means at one side of said base board defining a plurality of separate compartments upon said side of the base board, a bus bar traversing all of said compartments, a plurality of switch mechanisms one within each of said compartments operable to make and break contact with the traversing portion of the bus bar, each compartment having a displaceable door for giving access thereto, and means extending to the opposite side of the base board to control both said switch mechanisms and said doors.

26. A safety switch board comprising a

base board, a switch mechanism at one side of the base board, means at the same side of the base board defining an inclosure for said switch mechanism and having a displaceable door to give access to the switch mechanism, and means extending to the opposite side of the base board to control both said switch mechanism and said door.

27. A safety switch board comprising a base board, means at one side of said base board defining a plurality of separate compartments upon said side of the base board, a bus bar traversing all of said compartments, a plurality of switch mechanisms one within each of said compartments operable to make and break contact with a part of the traversing portion of the bus bar, an insulated guard member within each compartment covering and guarding the remaining part of the traversing portion of the bus bar, and means to operate said switch mechanisms.

28. A switch board comprising a base board, a bus bar extending along one side of the base board, a plurality of switch mechanisms arranged at the same side of the base board spaced apart along the length of the bus bar, means to operate said switch mechanisms, a plurality of displaceable guard members also at the same side of the base board one for each of said switch mechanisms, and means to retain said guard members against movement out of guarding position when the respective switch mechanism is "on".

29. A safety switch board comprising a base board, a bus bar extending along one side of the base board, a plurality of switch mechanisms arranged at the same side of the base board spaced apart along the length of the bus bar, a plurality of displaceable guard members also at the same side of the base board one for each of said switch mechanisms, and means extending to the opposite side of the base board being connected with said switch mechanisms and with said guard members to operate said switch mechanisms and to retain said guard members in guarding position when the switch mechanisms of the respective guard members are "on".

30. A safety switch board comprising a base board, means at one side of the base board to define a plurality of compartments upon said side of the base board, a bus bar traversing said compartments, a switch blade in each compartment, a branch-line terminal also in each compartment, a branch-line wire supporting member also in each compartment adapted to support a branch-line wire which may extend into each compartment for electrical connection with said branch-line contact, and a switch-operating handle for each compartment being arranged at the opposite side of the base-board and

being connected through the base-board to operate the switch-blade of the respective compartment for making and breaking a circuit between the bus-bar and the branch-line contact of that compartment.

31. A switch mechanism combining a base-board, a partition arranged at one surface of the base-board dividing said surface so as to define a wire-receiving space at one side of said partition and a switch-receiving space at the other side of said partition, a wall member arranged within the switch-receiving space spaced from the mentioned surface of the base-board, main-line contacts also arranged within said switch-receiving space, fuse-clips arranged in a position of accessibility being carried by said wall member upon the face thereof remote from said base-board, a switch arranged in a protected position of relative inaccessibility in the space between said wall member and the base-board, means whereby the switch may control a circuit between said main-line contacts and said fuse-clips, and said wire-receiving space being adapted to receive wires extending therealong and through said partition into connection with said fuse-clips.

32. A switch mechanism combining a base-board, a bus bar extending along one face of the base-board, a plurality of double-ended switch blades spaced apart along the length of the bus bar, a pair of contact members for each switch blade disposed to receive pressure in opposite directions from the switch blade, and one of each pair of said contacts comprising a part which projects laterally from the bus bar and which has a surface portion disposed at an angle to the adjacent surface of the bus bar for receiving pressure from the switch blade.

33. A switch mechanism comprising a casing having a wall part pivotally connected to form a door opening into the interior of the casing, the combination therewith of a quick break type switch mechanism arranged within the casing, and connections extending between the switch mechanism and the door operable to effect quick break movement of the switch mechanism by opening of the door, said connections including a part having a slot therein, and a member having a pin slidable along said slot, said part being movable by movement of the door to cause the end wall of the slot to engage said pin for starting the "off" movement of the switch mechanism when the door is opened, and said slot being arranged to accommodate continued movement of said pin as said switch mechanism continues its quick break action.

34. A switch mechanism comprising a casing having a wall part pivotally connected to form a door opening into the interior of the casing, the combination there-

with of a switch blade arranged within the casing movable into "on" and "off" positions, means urging the switch blade into "off" position, toggle parts arranged to stand in a "straightened" position for holding the switch blade "on" and to permit movement of the switch blade "off" when the toggle is broken, and connections extending between said toggle parts and the door operable to break the toggle by opening movement of the door, said connections including a member movable with the door and having a surface portion disposed to engage a part movable with the toggle to break the toggle by the initial opening movement of the door, and said connections providing an unobstructed space whereby to permit full broken movement of the toggle without further opening movement of the door.

35. A safety switch board comprising a plurality of switch mechanisms, one protecting wall member extending common to all of said switch mechanisms, a plurality of independent wall sections one for each of said switch mechanisms arranged to complete a protecting wall for the switch mechanisms at the side opposite said mentioned wall member, independent operating means for each of the switch mechanisms, means whereby said mentioned wall sections are independently displaceable, and means for preventing displacement of said displaceable wall sections except when the respective switch mechanisms are "off."

36. A safety switch board comprising a plurality of fuse clip supporting plates, fuse clips carried by said plates at one side thereof, switch contacts electrically connected with said fuse clips, a plurality of switches one for each of said plates operable to move into and out of engagement with the switch contacts, bus bars extending common to said switches, means to operate said switches, and a guard wall standing to guard said fuse clips collectively, said guard wall comprising a plurality of displaceable doors one for each of said fuse clip supporting plates.

37. A safety switch board comprising a plurality of fuse clip supporting plates, fuse clips carried by said plates at one side thereof, switch contacts electrically connected with said fuse clips, a plurality of switches one for each of said plates operable to move into and out of engagement with the switch contacts, bus bars extending common to said switches, means to operate said switches, a guard wall standing to guard said fuse clips collectively, said guard wall comprising a plurality of displaceable doors one for each of said fuse clip supporting plates, and means to prevent displacement of said doors when the respective switches are "on."

38. A safety switch board comprising a plurality of fuse clip supporting plates, fuse clips carried by said plates at one side thereof, switch contacts electrically connected with said fuse clips, a plurality of switches one for each of said plates operable to move into and out of engagement with the switch contacts of the respective plates, said switches being arranged at the opposite side of the fuse clip supporting plates, means to operate said switches, a guard wall standing to guard said switches collectively, and a second guard wall standing to guard said fuse clips collectively, said second guard wall comprising a plurality of displaceable doors one for each of said fuse clip supporting plates.

39. A safety switch board comprising a plurality of fuse clips supporting plates, fuse clips carried by said plates at one side thereof, switch contacts electrically connected with said fuse clips, a plurality of switches one for each of said plates operable to move into and out of engagement with the switch contacts of the respective plates, said switches being arranged at the opposite side of the fuse clip supporting plates, means to operate said switches, a guard wall standing to guard said switches collectively, a second guard wall standing to guard said fuse clips collectively, said second guard wall comprising a plurality of displaceable doors one for each of said fuse clip supporting plates, and connections between the switches and the doors of a character to prevent opening of the doors while the respective switches are "on."

40. A safety switch board comprising a plurality of fuse clip supporting plates, fuse clips carried by said plates at one side thereof, switch contacts electrically connected with said fuse clips, a plurality of switches one for each of said plates operable to move into and out of engagement with the switch contacts of the respective plates, said switches being arranged at the opposite side of the fuse clip supporting plates, a guard wall standing to guard said switches collectively, a second guard wall standing to guard said fuse clips collectively, said second guard wall comprising a plurality of displaceable doors one for each of said fuse clip supporting plates; and a plurality of independently operable switch operating elements one for each of said switches, said switch operating elements extending to a position of accessibility beyond the first mentioned guard wall.

41. A safety switch board mechanism comprising a switch blade movable into "on" and "off" positions, and toggle parts of a character to stand in a "straightened" position for holding the switch blade "on" and to permit movement of the switch blade "off" when the toggle is "broken," a guard wall

standing to guard said switch mechanism and having an opening therethrough, an operating handle for the switch mechanism in a position of accessibility beyond said guard wall, a connecting member longitudinally slidable within said opening engaging the operating handle and engaging one of the toggle parts and being slidable by said handle to "straighten" or "break" the toggle, a second guard wall spaced from the first guard wall, and the switch blade and toggle parts being arranged between the two guard walls.

42. A safety switch board mechanism comprising a plurality of switches, a protecting wall standing to protect all of said switches at one side thereof, each of said switches including toggle parts movable into "straightened" and "broken" positions, operating means for the toggles extending through openings in one of said walls for independent manual operation of the switches from beyond said mentioned wall, a plurality of other guard members one for each of said switches, said last mentioned guard members being independently displaceable, and means to prevent displacement of said last mentioned guard members while the respective switches are "on."

43. A safety switch board mechanism comprising a plurality of switches, means forming a pair of conductor-carrying gutters spaced apart one at each side of said switches so as to provide a protected area within which the switches are arranged, each of said switches having a part associated therewith requiring to be protected and to which access is desired, independently displaceable guard members for said mentioned switch parts, and means to prevent displacement of said guard members while the respective switches are "on."

44. A safety switch board mechanism comprising a pair of wall members spaced apart, a plurality of switches arranged between said wall members, means also arranged between said wall members upon which said switches are mounted, each of said switches having a part associated therewith requiring to be protected and to which access is desired, a plurality of separately displaceable guard members one for each of said mentioned switch parts, and means to retain the guard members against displacement when the respective switches are "on."

45. A safety switch board mechanism including a plurality of switches, a protecting wall for said switches comprising a plurality of independently displaceable doors one for each of said switches, fuse retaining parts associated with said switches, supporting means for said fuse retaining parts spaced behind said doors and arranged to support said fuse retaining parts in a position of accessibility when the respective

doors are open, and said supporting means being arranged intermediate the fuse retaining parts and the respective switches and being of a character to guard the switches when the doors are displaced. 70

46. A safety switch board mechanism including a plurality of switches, a protecting wall for said switches comprising a plurality of independently displaceable doors one for each of said switches, fuse retaining parts associated with said switches, supporting means for said fuse retaining parts spaced behind said doors and arranged to support said fuse retaining parts in a position of accessibility when the respective doors are open, said supporting means being arranged intermediate the fuse retaining parts and the respective switches and being of a character to guard the switches when the doors are displaced, and means to prevent displacement of the doors while the respective switches are "on". 75 80 85

47. A safety switch board mechanism including a plurality of switches, a protecting wall for said switches comprising a plurality of independently displaceable doors one for each of said switches, fuse retaining parts associated with said switches, supporting means for said fuse retaining parts spaced behind said doors and arranged to support said fuse retaining parts in a position of accessibility when the respective doors are open, said supporting means being arranged intermediate the fuse retaining parts and the respective switches and being of a character to guard the switches when the doors are displaced, independent operating means for the switches, and each of said doors having parts thereof disposed to engage the switch operating means so that opening movement of the doors will insure "off" movement of the respective switches. 90 95 100 10

48. A safety switch board mechanism including a plurality of switches, a protecting wall for said switches comprising a plurality of independently displaceable doors one for each of said switches, conductors extending common to said switches, fuse retaining parts and branch line contacts associated with said switches, and supporting means for said fuse retaining parts and branch line contacts spaced intermediate said doors and said switches and supporting said fuse retaining parts at its side adjacent the door and supporting said branch line contacts at its side remote from the door, said supporting means constituting barriers between said doors and said switches. 110 115 120

49. A safety switch board including a plurality of switches, a container for inclosing said switches collectively, means whereby the switches are independently operable, one wall of said container comprising a plurality of independently displaceable sections one for each of said switches, and means to insure "off" movement of the 125 130

switches when the respective wall sections are displaced.

50. A safety switch board comprising a plurality of switch mechanisms, one protecting wall member extending common to all of said switch mechanisms and upon which said switch mechanisms are mounted, means also mounted upon said wall member independent of the switch mountings forming a plurality of independent compartments one for each switch mechanism and having doors for giving independent access to said compartments, and unitary means for controlling both said doors and said switch mechanisms.

51. A safety switch board comprising a base board, a bus bar extending along one side of the base board, means defining a plurality of separate closable compartments at said side of the base board arranged with the bus bar traversing all of said compartments, a plurality of switch mechanisms one within each of said compartments arranged to engage and disengage the traversing portion of the bus bar, and means to operate said switch mechanisms when the compartments are closed.

52. A safety switch board comprising a base board, a bus bar extending along one side of the base board, means defining a plurality of separate closable compartments at said side of the base board, the bus bar being arranged to traverse said compartments, a plurality of switch mechanism one within each of said compartments arranged to engage and disengage the traversing portion of the bus bar, and means for operating the re-

spective switch mechanisms when the compartments are closed, said operating means being arranged within the compartments, and operable from the exterior of the compartments.

53. A safety switch board mechanism including a plurality of switches, a pair of protecting wall members one at each side of said switches collectively, means whereby said switches are independently operable, one of said protecting wall members comprising a plurality of independently displaceable sections one for each of said switches, and means to prevent operation of said switches when the respective wall sections are displaced.

54. A safety switch board comprising a base board, a plurality of switch mechanisms at one side of the base board, operating means for said switch mechanisms, means forming separate containers for the respective switch mechanisms, and means forming a gutter adjacent said containers for the reception of lead wires, the last mentioned means comprising a portion of said container forming means, there being openings communicating between said containers and said gutter for the passage of lead wires to the respective switch mechanisms.

In witness whereof I hereunto subscribe my name as attested by the two subscribing witnesses.

HUBERT F. KRANTZ.

Witnesses:

J. A. NEWTON,
S. L. WHITLOCK.