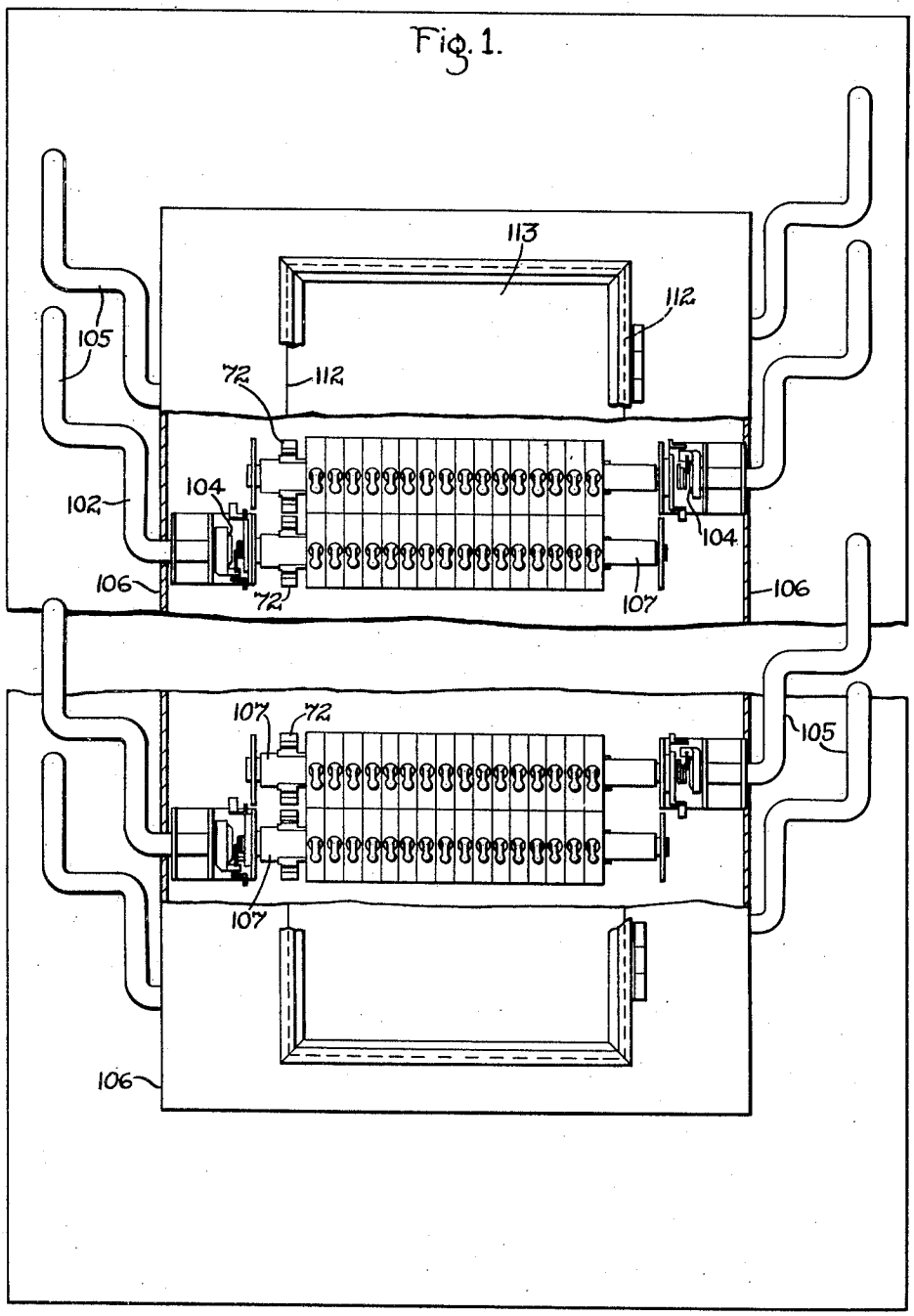
June 3, 1930. B. F. FULLER 1,760,943

THEATER SWITCH PANEL

Filed July 14, 1923 3 Sheets-Sheet 1

Fig. 1.



WITNESSES:

R. J. Butler.

J. H. Hendy

INVENTOR

Bert F. Fuller.

BY

Wesley G. Carr

ATTORNEY

June 3, 1930. B. F. FULLER 1,760,943

THEATER SWITCH PANEL

Filed July 14, 1923 3 Sheets-Sheet 2

Fig. 2.

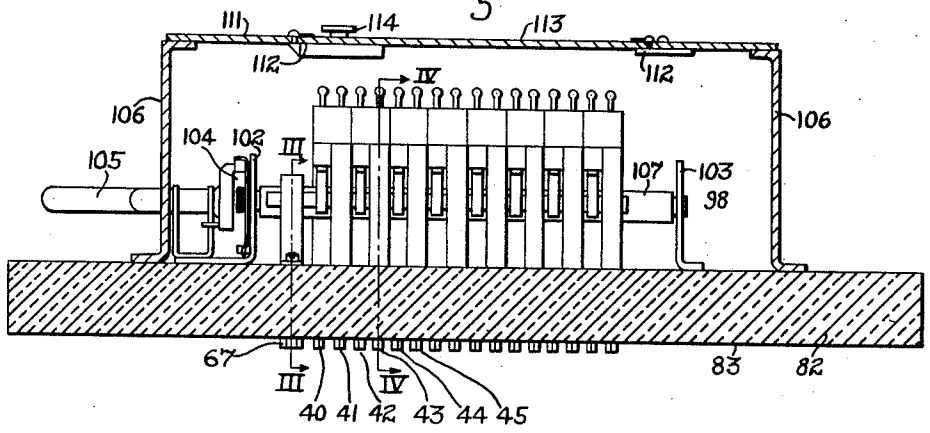


Fig. 4.

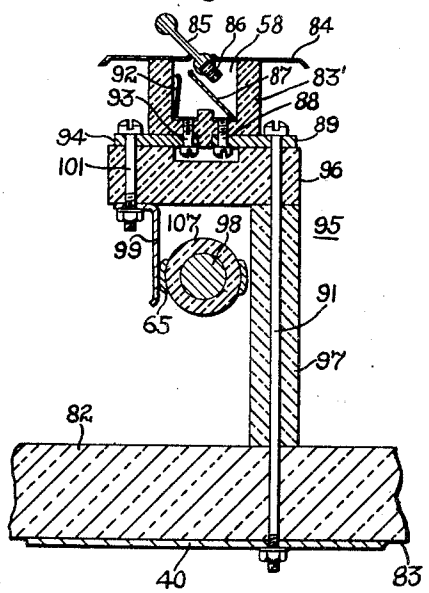
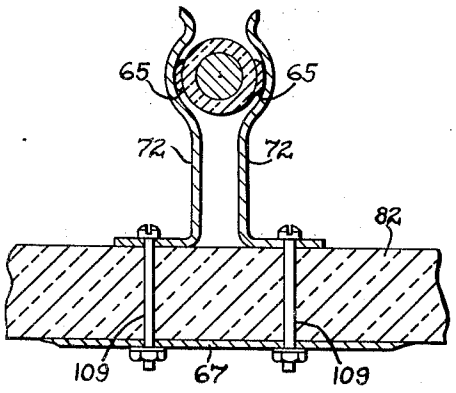


Fig. 3.



WITNESSES:

R. J. Butler.

INVENTOR

Bert F. Fuller.

BY

Wesley G. Carr

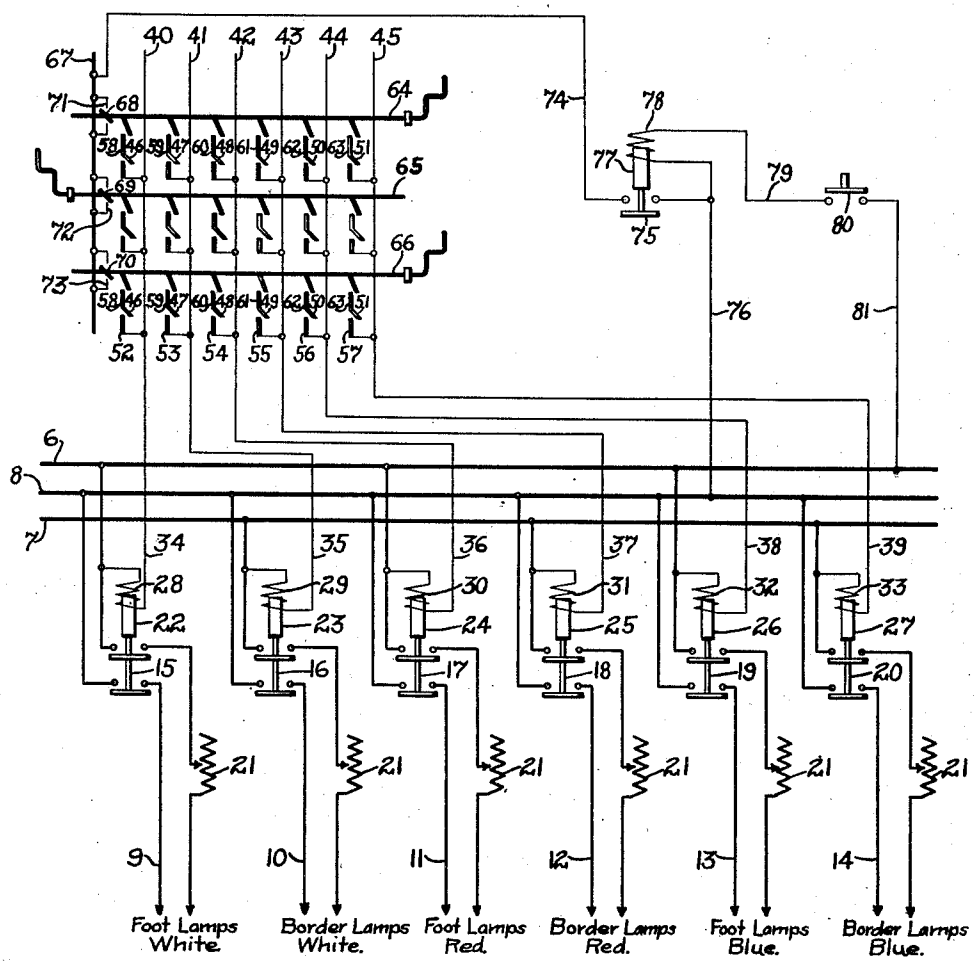
ATTORNEY

June 3, 1930. B. F. FULLER 1,760,943

THEATER SWITCH PANEL

Filed July 14, 1923 3 Sheets-Sheet 3

Fig. 5.



WITNESSES:

R. J. Butler.

J. H. Kendig Jr.

INVENTOR

Bert F. Fuller.

BY

Wesley G. Carr

ATTORNEY

Patented June 3, 1930 1,760,943

UNITED STATES PATENT OFFICE

BERT F. FULLER, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA

THEATER SWITCH PANEL

Application filed July 14, 1923. Serial No. 651,658.

My invention relates to circuit controlling apparatus and particularly to apparatus for controlling lighting circuits used in illuminating theater stages, auditoriums, etc.

In certain forms of circuit controlling apparatus for theater lighting, relays are used for controlling the various circuits about the stage. In the course of the performance, different circuits are energized for illuminating different parts of the stage. A separate circuit is used for different colored lamps and, consequently, a separate control switch is provided for each circuit.

In the usual circuit control panel, it has been the custom to employ certain forms of switch mechanism that may be adjusted or "set up" for each scene. The adjustment is usually made for the next succeeding scene while one scene is being enacted. This form of apparatus necessitates the presence of a skilled operator for selecting the mechanism that is to be energized for each change of scene.

One object of my invention is to provide a circuit controlling apparatus for theater lighting in which a simple form of switch mechanism is used for controlling the different lamps upon the stage or other sections of the theater and in which a predetermined "set up" may be arranged for each and every scene that is to be enacted, so that it is only necessary to close the proper circuits successively as the scenes are being enacted.

Another object of my invention is to provide a circuit controlling apparatus for theater lighting in which a portable switchboard of simple construction may be connected for controlling the lighting circuits of the stage or any part of the theater from a remote point.

Another object of my invention is to provide a circuit controlling apparatus for theater lighting in which each lamp circuit may be controlled by an electromagnetic switch and wherein the circuits through the magnetic switches are controlled by a switch mechanism of simple construction that is inexpensive to manufacture and which occupies a minimum of space.

In my co-pending application. Serial No. 577,830, filed July 27, 1922, now Patent No. 1,640,542, issued August 30, 1927, I have disclosed a circuit controlling apparatus having characteristics similar to those outlined above and it is a further object of my invention to provide a circuit controlling apparatus particularly adapted for theater lighting having characteristics in general like those of the apparatus disclosed in the said co-pending application, but wherein selective switches are provided for each control circuit that may be set for any given scene and wherein a single control lever or handle is provided with a conductor for simultaneously energizing the circuit selected and wherein the operating handle causes the circuits to be simultaneously opened or closed with a snap action, thereby eliminating difficulties incident to slow operation of the switch and any tendency to burn the contacts.

Another object of my invention is to provide a theater control panel that is compact and which may be enclosed within a metal cabinet and wherein the selective switches are accessible through an opening in the cover that is closed by a door which may be sealed or locked after a desired set up has been made, thereby insuring that the set up cannot be altered by anyone except an authorized person.

Another object of my invention is to provide a theater control panel wherein all of the switch mechanism is enclosed within a metal casing in such manner that only the operating handles for controlling a set up for each separate scene is accessible, the arrangement being such that the handles may be successively and progressively opened and closed as the play progresses.

These and other objects that will be made apparent throughout the further description of my invention are attained by means of the apparatus herein described and illustrated in the accompanying drawings wherein

Figure 1 is a fragmental front elevation of a theater panel with portions of the enclosing housing cut away.

Fig. 2 is a transverse section through the switch mechanism shown in Fig. 1.

Fig. 3 is a transverse section through the

switch apparatus taken on the line 3—3 of Fig. 2.

Fig. 4 is a transverse section through switch mechanism taken on the line 4—4 of Fig. 2, and

Fig. 5 is a wiring diagram showing the connections between the switch apparatus and the feed and load circuits.

Referring first to the diagram shown in Fig. 5, the control system comprises a three-wire feed circuit having conductors 6, 7 and 8 to which load circuits 9, 10, 11, 12, 13 and 14 are connected through the medium of electromagnetic double pole switches 15, 16, 17, 18, 19 and 20 respectively. Each load circuit is provided with a dimmer 21, by means of which the intensity of the illumination in each circuit may be separately varied.

For the purpose of illustration the lamp circuits 9 and 10 are for illuminating respectively foot and border lamps with white light, the lamp circuits 11 and 12 are for illuminating respectively the foot and border lamps with red light and the lamp circuits 13 and 14 are for illuminating the foot and border lamps with blue light.

The switches 15 to 20, inclusive, are actuated respectively by electromagnets 22 to 27, inclusive, each having magnetic coils 28 to 33 respectively that are connected in separate control circuits including conductors 34 to 39, respectively, which are connected respectively to vertically disposed busbars 40 to 45, that are mounted within control panels in a manner to be hereinafter described.

The control circuit is completed through a plurality of groups of selective switches 46 to 51, inclusive, that selectively engage stationary contacts 52 to 57, respectively, that are connected to the conductors 34 to 39, respectively. The switches 46 to 51, inclusive, are respectively connected to contact members 58 to 63, inclusive, that are adapted to be engaged simultaneously by movable busbars 64, 65 and 66, which are provided for controlling the circuits connected to the contact members 58 to 63, inclusive, of each group of contact members.

Each busbar 64, 65 and 66 controls the illumination for a separate scene and for the purpose of illustration three busbars are shown for controlling three separate scenes and it will be understood that a busbar may be provided extending transversely of the busbars 40 to 45 inclusive for each additional scene required for an entire play. The busbars 64, 65 and 66 are connected to a main busbar 67 by means of contact members 71, 72 and 73 which respectively engage the bars when the latter are rotated through an angle of substantially 90°. However, it will be understood that the bars 64, 65 and 66 may be arranged to be moved into engagement with the contact members in any preferred manner. The busbar 67 is connected to the neutral conductor 8 by a conductor 74, single-pole switch 75, and conductor 76. The switch 75 is actuated by an electromagnet 77 that is energized by a coil 78 that is connected to the feed conductor 6 through a conductor 79, master switch 80 and conductor 81.

When it is desired to make a particular set up for a performance, the selector switches 46 to 51 of each group, associated with busbars 64, 65 and 66, are positioned to obtain the desired light for a given scene. For instance, in the first scene, the lighting is controlled by the movable busbar 64. If it is desired to have white lights burning in the foot and border lamp circuits, red lights in the foot lamp circuit and blue lights in the border lamp circuit, the switches 46, 47, 48 and 51 are moved to closed positions, the remaining switches 49 and 50 being maintained in open position. In similar manner, the selector switches 46 to 51 associated with the other bus bars 65 and 66 are positioned for the desired light "set up" for each successive scene. It must be understood that at the beginning of a performance and before the curtain is raised, all of the busbars 64 to 66 are disconnected from the main busbar 67 and consequently the control circuits are dead. At the beginning of the play, the master control switch 80 is closed, thereby causing the control switch 75 to close the control circuit. When the busbar 64 which controls the illumination of the first scene is moved into engagement with the contacts 71 on the busbar 67, current will flow in the control circuit through conductor 76, control switch 75, conductor 74, busbar 67, switch 68, busbar 64, contacts 58, 59, 60 and 63, selector switches 46, 47, 48 and 51, and thence to busbars 40, 41, 42 and 45 through the magnetic coils 28, 29, 30 and 33 to the feed conductors 6 and 7. The circuits containing the white lamps in the foot and border circuits, the red lamps in the foot circuits and the blue lamps in the border circuits will be illuminated by closing the switch 68 of the busbar 64. At the conclusion of the first scene, the busbar switch 68 is opened by rotating the busbar 64, and the busbar switch 69 of the busbar 65 is moved to closed position.

Assuming that a certain selection of circuits had previously been made by the proper positioning of the selector switches, the predetermined lighting for the second scene will be obtained. The predetermined lighting for the third scene will be obtained by opening the switch 69 and closing the busbar switch 70 of the busbar 66. In this manner, the lighting of an entire performance may be accomplished by simply progressively opening and closing the busbars for controlling the lighting of each successive scene. It is not necessary that a skilled operator be present during the performance in order to provide proper selection of the circuits, and that com-

plicated lighting control incident to a large number of scenes is reduced to the simple opening and closing of a row of switches that may be progressively operated. It will be observed from the diagram, the drawing and the apparatus shown in Fig. 1 that the operating handles for adjacent busbars 64, 65 and 66 are disposed alternately on opposite sides of the housing for preventing interference of one operating handle with the other and thereby reducing the distance between the busbars and rendering the entire switch apparatus compact.

By reason of the contact nature of the selector switches illustrated in Figs. 1 to 4, it is possible to provide control apparatus for a great variety of circuits and for a great number of scenes that may be contained and confined within relatively small limits, thus making the apparatus ideal for installation in theater stages or in remote moving picture booths. By reason of the simplicity of the arrangement, it is apparent that the apparatus can be arranged for remote control, and that the lighting apparatus of an entire production may be controlled from a moving picture booth located at the rear of the auditorium.

Referring to Figs. 1 to 4, the control apparatus includes an insulating panel or base member 82 that is adapted to be secured to a wall of the stage or a moving picture booth.

In Fig. 5, I have diagrammatically shown a system having six control circuits, but in the apparatus illustrated in Fig. 2, it will be apparent that provision is made for 16 control circuits in a relatively compact limit of space. The circuit control busbars 40 to 45 are mounted upon the rear face 83 of the panel, and for the purpose of illustration the selector switch 58 that is connected to the busbar 40 will be described, for the reason that the apparatus connected to the switch 58 and busbar 40 is typical of the switches and apparatus connected to the other corresponding busbars and for the same reason the apparatus connected to the transverse busbar 65 will be described as illustrative of the construction of the other transverse busbars, which may be termed scene-controlling busbars.

The selector switch 58 is mounted within an insulating shell 83′ that is closed by a metal cover 84 which carries a pivoted handle 85 having an insulating cam 86 secured thereto for engaging a contact member 87 that is secured within the shell 83′ by means of a screw 88 that serves to attach a terminal member 89 to the switch shell 83′. The terminal member 89 is connected to the busbar 40 by means of a conductive bolt 91, as indicated in Fig. 4. The contact member 87 is adapted to be moved by the cam 86 into conductive engagement with a contact member 92 that is secured within the shell 83′ by means of a screw 93 that serves to secure a terminal member 94 to the shell. The switch shell 83′ is mounted upon an insulating support or base 95 that is made of flat insulating plates 96 and 97 that are secured together by means of the conductive bolt 91 and constitute a support of L-shape, having one leg 96 thereof overhanging the busbar 65, which as it will hereinafter appear, is mounted upon a rotatable switch shaft 98. The contact member 99 is secured to the underside of the leg 96 of the support by means of a conductive bolt 101 that serves to connect the terminal 94 with a contact member 99.

As indicated in Fig. 2, each separate unit 95 is positioned in such manner that the legs 97 thereof are alternately disposed on opposite sides of the busbar 65, thereby constituting a shield and enclosure for protecting the busbar 65. The construction of the switch support 95 is as indicated in the drawings, of such compact nature that a great number of control circuits may be mounted upon a relatively narrow board or panel and that the scene control busbars may be disposed relatively close together, thus reducing the overall length of the control apparatus in such manner that it necessitates but a relatively limited space for its installation.

The busbar 65 comprises a metal operating rod or bar 98 that is rotatably mounted in supporting brackets 102 and 103 that are secured to the base member 82. The end of the bar 98 projects beyond the bracket 102 into engagement with a quick make-and-break switch mechanism 104 that may be of any preferred standard construction, the details of which form no part of my invention and will not be described in detail herein. The quick make-and-break mechanism 104 is connected by an operating crank 105 that is adapted to extend exteriorly of the housing 106 that enclosed the entire control switch apparatus.

An insulating sleeve or bushing 107 is mounted upon the rod 98 between the brackets 102 and 103 and supports two busbars 65 on diametrically opposite sides of the bushing as indicated in Figs. 3 and 4. The busbars 65 are simultaneously energized by means of contact clips 72 that are mounted upon the base 82 and which are connected to the busbar 67 by means of conductive bolts 109 which serve to attach the slips 72 to the panel 82. The clips 72 are adapted to conductively engage the busbar 65 when the busbar is in the position indicated in Figs. 2, 3 and 4, at which time it will be seen that the busbars 65 engage the contact members 99 that are connected to the selector switches 58 to 63. When the rod 98 is rotated 90°, the bars 65 are moved out of engagement with the contact members 99 and contact clips 72 and, consequently, interrupt the circuit through the main control busbar 67 and the

control circuit busbars 41 to 45. By reason of the quick make-and-break switch mechanism for rotating the bar 98 with a snap action, injurious arcing of the contacts is prevented when the bars are moved out of engagement with the contact members 99.

The metal housing 106 is provided with a cover 111 having an opening 112 therein that is closed by a hinged door 113 having a latch 114 that may, if preferred, be key controlled in order to seal the selector switches, which are exposed through the opening in the cover, against manipulation by unauthorized persons. Before a performance is to be given, the lighting of the entire performance may be selected by proper positioning of the selector switches and the door 113 then locked. As the scenes are changed the control handles 105 may be operated as required. It will be seen that where the same performance is to be repeatedly produced in the same theater, with this system of control it will not be necessary to rearrange the circuits for each performance as has been heretofore customary in stage controlling systems wherein it was possible to set up but one scene in advance of the other.

While I have shown but one embodiment of my invention, it will be apparent to those skilled in the art that various changes, modifications, substitutions, additions and omissions may be made in the apparatus illustrated without departing from the spirit and scope of my invention, as set forth in the appended claims.

I claim as my invention:

1. In an electrical system, a main feed circuit, a plurality of load circuits connected thereto, control circuits for the load circuits comprising two groups of conductors, there being one conductor of one group for each load circuit and the conductors of the other group being commonly connected to a supply circuit, a plurality of contact members for each conductor of the first group, a switch for each contact member of the said group for selectively connecting the said contact members to the conductors of that group and means for selectively moving the conductors of the second group into and out of engagement with the said contact members.

2. In an electrical system, a main feed circuit, a plurality of load circuits connected thereto, control circuits for the load circuits comprising two groups of conductors, there being one conductor of one group for each load circuit, a plurality of contact members for each conductor of the first group, a switch for each contact member of the said group for selectively connecting the said contact members to the conductors of that group and means for selectively moving the conductors of the second group into and out of engagement with the said contact members.

3. In an electrical system, a main feed circuit, a plurality of load circuits connected thereto, control circuits for the load circuits comprising two groups of conductors, there being one conductor of one group for each load circuit, a plurality of contact members for each conductor of the first group, a switch for each contact member of the said group for selectively connecting the said contact members to the conductors of that group and means whereby the conductors of the second group may be connected to or disconnected from the said contact member.

4. In an electrical system, a main feed circuit, a plurality of load circuits connected thereto, control circuits for the load circuits comprising two groups of conductors, there being one conductor of one group for each load circuit, means on the conductors of one group for simultaneously engaging the other conductors and a separate switch for each means.

5. In an electrical system, a main feed circuit, a plurality of load circuits connected thereto, control circuits for the load circuits comprising two groups of conductors, there being one conductor of one group for each load circuit, means on the conductors of one group for engaging the other conductors and a separate switch for each means.

6. In an electrical system, a main feed circuit, a plurality of load circuits connected thereto, control circuits for the load circuits comprising two groups of conductors, there being one conductor of one group for each load circuit, and the conductors of the other group being connected to a common conductor and operable separately into engagement with the conductors of the first group, and separate switches for each of the conductors of the first group for selectively completing the circuit through their respective control circuits when the said conductors of the control circuit are in engagement.

7. In an electrical system, a main feed circuit, a plurality of load circuits connected thereto, a control system for the load circuits comprising a control circuit for each load circuit, a plurality of sets of separately operable presettable switches, the switches of each set being connected to a common conductor of the control system, a separate conductor connected to each switch, the last said conductors being divided into predetermined groups, each group containing conductors each connected, respectively, to a separately operable switch of a different control circuit, and a plurality of means, one for each of said groups for connecting the conductors of a selected group concurrently to a second common conductor of the control system.

8. In a theater lighting system, a feed circuit comprising two feed buses, a plurality of conductors each having a translating device in circuit therewith, and connected to one of the said feed buses, a plurality of sets

of separately operable presettable switches, the switches of each set being connected in common to one of the said conductors, a separate conductor connected to each switch, the last said conductors being divided into predetermined groups, each group containing conductors each connected, respectively, to a separately operable switch of a different one of the first said conductors, and a plurality of means, one for each of said groups for connecting the last said conductors of a selected group concurrently to the other feed bus.

In testimony whereof, I have hereunto subscribed my name this 11th day of July, 1923.

BERT F. FULLER.