March 18, 1924. 1,487,369

G. W. BERTHOLD

PANEL BOARD

Original Filed Jan. 2, 1917 3 Sheets-Sheet 1

Fig. 1.

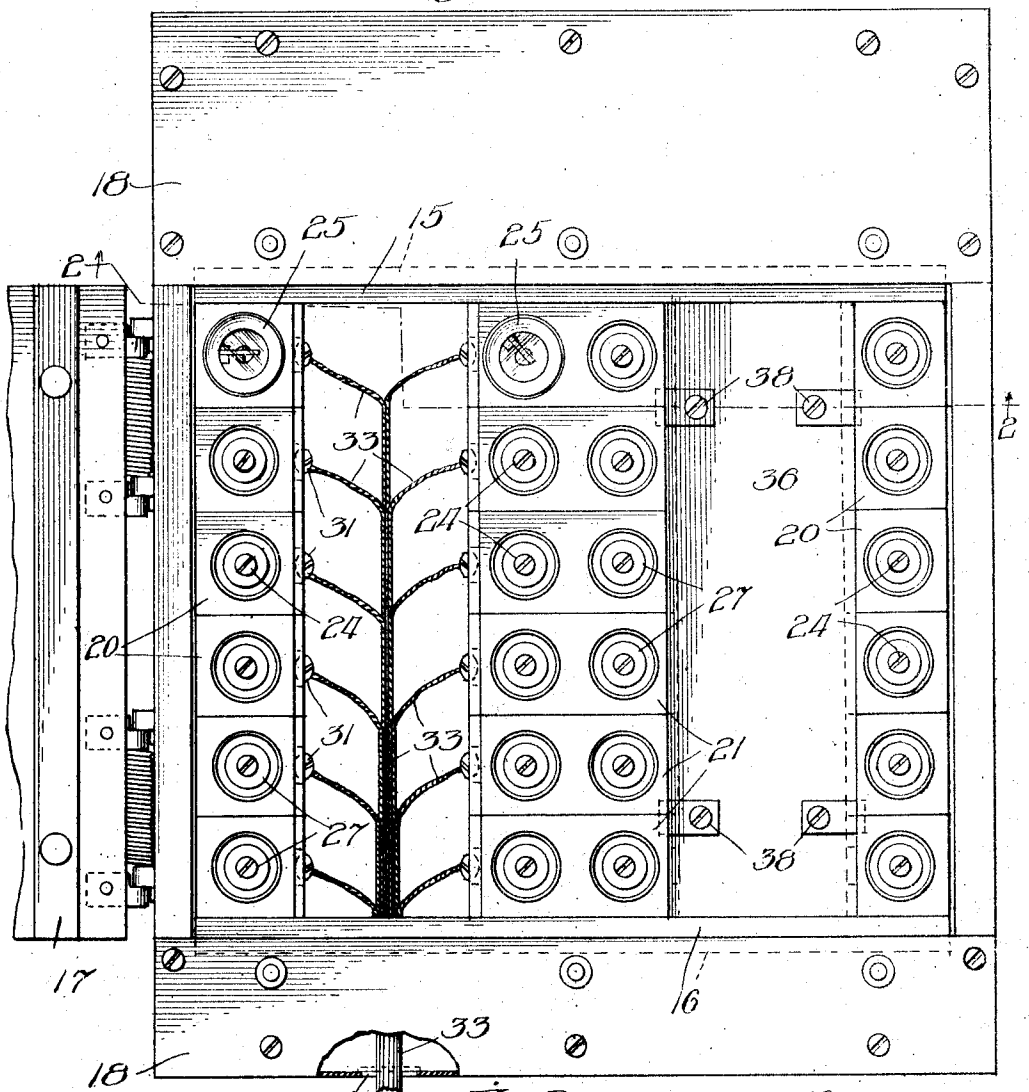
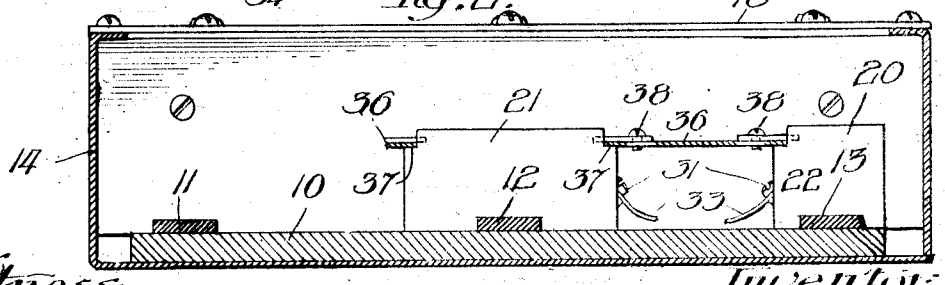


Fig. 2.



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PANEL BOARD

Original Filed Jan. 2, 1917 3 Sheets-Sheet 2

Fig. 3.

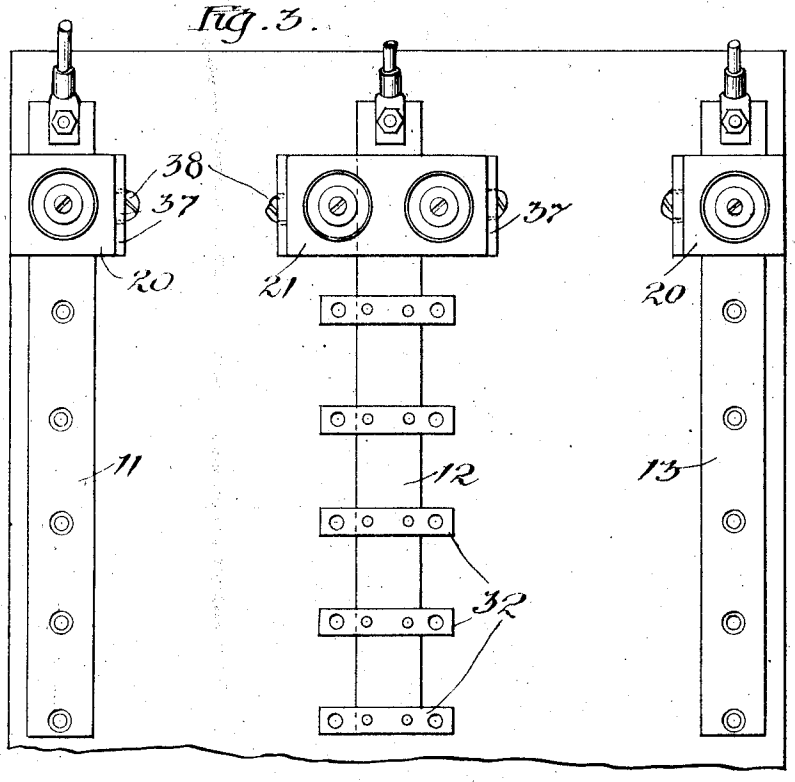


Fig. 4.

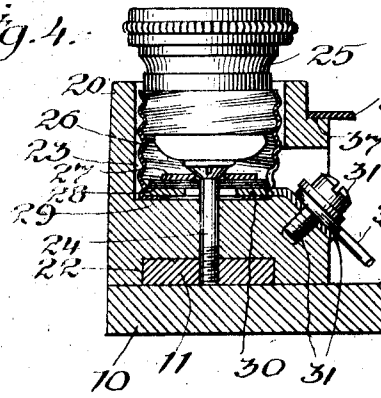
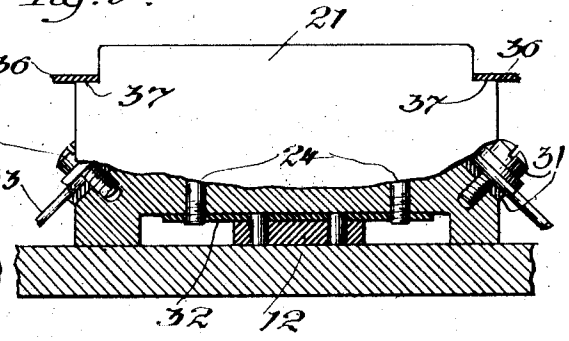


Fig. 5.



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PANEL BOARD

Original Filed Jan. 2, 1917 3 Sheets-Sheet 3

Fig. 6.

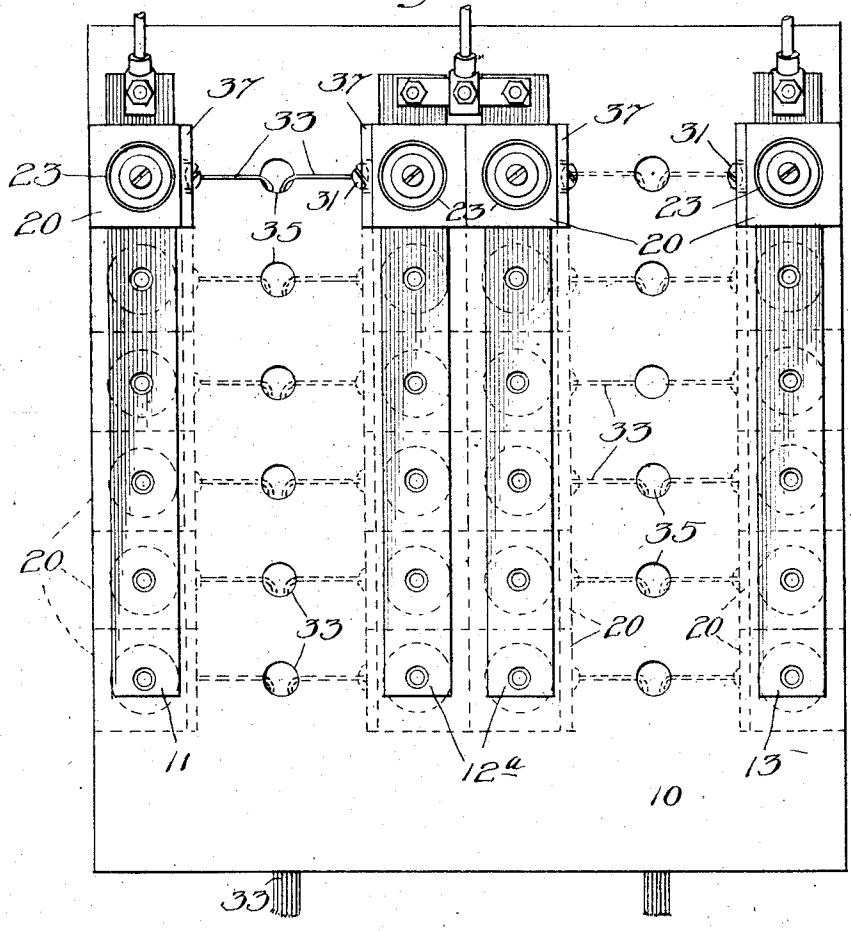
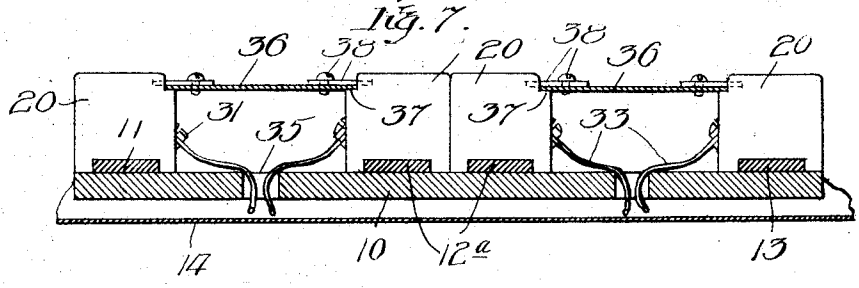


Fig. 7.



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Patented Mar. 18, 1924. 1,487,369

UNITED STATES PATENT OFFICE.

GUSTAVE W. BERTHOLD, OF CHICAGO, ILLINOIS.

PANEL BOARD.

Application filed January 2, 1917, Serial No. 140,144. Renewed September 1, 1922. Serial No. 585,833.

To all whom it may concern:

Be it known that I, GUSTAVE W. BERTHOLD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Panel Boards, of which the following is a specification.

One of the objects of this invention is to produce an improved panel board which requires a minimum amount of space for installation and a minimum amount of copper (that is to say, bus-bars and the like) for a given number of circuits to be taken care of.

Another object is to provide a panel board of extremely simple construction which may be cheaply manufactured.

In panel boards as usually constructed, the terminals for the load circuits have been located side by side in vertical rows extending along the side edges of the board with the two terminals of each socket located one above the other, and cross bars have been necessarily provided to connect one terminal of each circuit to the distant power bus-bar of the board. I aim to entirely eliminate such cross bars and to reduce the length of the main power bus-bars by approximately one-half, thereby effecting a marked decrease in the size of the board and in the cost of manufacture both as to the amount of copper and the amount of labor required in making a board for a given number of circuits.

A further object of the invention is to produce an improved board in which all of the bus-bars and conductors may be completely covered or insulated so as to provide what is known in the art as a "dead front" board.

In connection with the last mentioned object, it is a special object of the invention to arrange the fuse mountings or receptacles upon the bus-bars on the board so that the said receptacles will constitute the covering or insulating means for the bus-bars; and the invention also aims to provide special fuse mountings in the form of sockets adapted to receive standard fuse plugs.

Another object is to provide fuse-mounting and load-terminal devices in the form of individual units which may be mounted on the board as required.

Further objects and advantages of the invention, and improvements relating to details of construction will be fully understood from the following description.

In the accompanying drawings. Figure 1 is a front elevation of a panel board embodying the features of my invention, the view showing the board in a junction box or casing of which the door is open, and one of the channel-covering plates being shown removed to illustrate the details beneath. Fig. 2 is a transverse section in the plane of line 2—2 of Fig. 1. Fig. 3 is a partial elevational view of the panel board removed from the casing and showing all but one transverse row of the fuse plug sockets removed from the board. Fig. 4 is an enlarged detail sectional view illustrating one of the single fuse plug sockets and the manner of mounting the same on the board. Fig. 5 is a detail view, partially in elevation and partially in section, illustrating one of the double socket members. Fig. 6 is an elevational view of a board of alternative construction, and Fig. 7 is a transverse section through this latter board.

My invention is susceptible of embodiment in various forms, and while I have shown in the drawings two specific embodiments and will describe them in detail, I wish to have it understood that no limitation of the invention is thereby intended. The embodiments herein disclosed are panel boards intended for use in three-wire distribution systems, but the essential ideas of my invention may be embodied in a board for a two-wire system, there being in such a case two main power bus-bars instead of the three shown in the drawings. The scope of the invention will be pointed out in the appended claims.

Referring to Figs. 1 and 2, 10 indicates the usual insulating base board upon which the bus-bars 11, 12, 13 are mounted, said bars in the present instance lying flat upon the board and being suitably fixed thereto. The board as a whole is removably mounted in a box or cabinet 14 which may be of any common or preferred construction. Two insulating walls 15 and 16 positioned at right angles to the board 10 constitute partitions separating the interior of the casing into three sections. A door 17 is shown as hinged to one side of the casing for closing the middle compartment in which the load circuit terminals of the board are contained. The upper end compartment may contain

the usual power switch (not shown) which controls the connection between the source of power and the bus-bars on the board. Access may be had to this compartment and to the opposite end compartment by removing the top plates 18. The entire panel board may be withdrawn from the casing, if desired.

Mounted directly upon each of the bus-bars is a longitudinal row of fuse-mounting and load-terminal devices which are preferably in the form of sockets adapted to receive standard fuse plugs. The sockets are also alined in rows extending transversely of the bus-bars and board, and each transverse row comprises two single sockets 20 mounted respectively on the plus and minus bus-bars 11, 13, and two sockets mounted on the neutral bus-bar 12. In the embodiment illustrated in Figs. 1 to 5, the two neutral sockets are contained in a unitary double socket member 21 as shown in Fig. 5, while in the embodiment shown in Figs. 6 and 7 the two sockets are separate from each other and are identical in construction with the plus and minus sockets 20.

Referring to Fig. 4, each of the single sockets in the preferred form shown comprises a base of insulating material which is shaped to fit over its bus-bar preferably by providing a notch 22 in the bottom of said base so that the base may seat over the bar and cover the top and two side edges thereof and abut against or close to the face of the board 10. The outer end of the base has a socket proper 23 therein. The socket member is secured to the bus-bar preferably by means of a screw 24 which passes centrally through the socket and is threaded into the bus-bar. The head of the screw constitutes the central terminal of the socket which is adapted to be contacted by the central terminal of a fuse plug 25 when screwed into the socket. The other terminal of the socket is in the form of a threaded annular sheet metal shell 26 to receive the correspondingly threaded shell on the fuse plug. In the exemplary construction shown in the drawing the screw 24 passes through a metallic washer 27 beneath which is placed a disk 28 of insulating material such as a number of sheets of mica. The lower end of the shell 26 of the socket has an inturned flange 29 and between the flange and the insulating disc 28 is a metallic plate 30 having a large central aperture through which the screw 24 passes without touching. The plate 30 is provided with a wire-attaching device 31 which comprises a lug on the plate passing out laterally through an opening in the insulating wall of the socket and a screw threaded in said lug for clamping a wire. The central screw 24 clamps the socket parts together so that the wire attaching device 31 is in electrical communication with the outer terminal 26 of the socket but is insulated from the central terminal or screw 24. Other socket structures may be used if desired.

The double socket member 21 shown in Fig. 5 may be similar to that just described, except that the insulating base portion of the socket member is of double the size to accommodate the two sockets. The wire-attaching devices 31 preferably project from opposite ends of this double socket member. While the neutral bus-bar 12 may be made of any desired width to accommodate the attaching screws 24 of the double socket member, it is preferable to use a branched or composite construction, as by making the bar relatively narrow and securing transverse strips 32 to the bar, the strips having threaded openings in their ends to receive the screws.

The bases of the socket members 20 and 21 are preferably rectangular in shape and the socket members of each row are arranged to abut close together so that each row completely covers one of the bus-bars. A "dead front" board may therefore be provided, that is to say, a board in which all of the conducting elements on the board are covered or insulated, so that there is no metal exposed on the face of the board.

The load circuit wires 33 which run to the lighting or other circuits to be supplied with current are attached in pairs to the fastening devices 31 of the sockets. One socket on the neutral bus-bar and a transversely opposed socket on either a plus or minus bar constitute a pair of load circuit terminals for attachment to a pair of the wires 33. The wire attaching devices of each pair preferably face each other. The wires may be carried along the channel provided by the opposed rows of sockets and the board, and out through an opening 34 in the end of the casing, as shown in Fig. 1, or, if desired, each pair of the wires may be passed through a hole 35 (see Fig. 6) in the board located directly between each two of the sockets and the wires then carried out from the casing behind the panel board. If desired, this channel may be completely covered by suitable means which is preferably in the form of a plate 36 adapted to rest upon the outer corners of the two rows of socket members. If desired, shoulders 37 may be provided to receive the edges of this plate. The plate may be removably secured in place by any suitable fastening devices 38. When the plate is in place, no part of the conducting members of the panel board is exposed on the front of the board.

In the alternative construction illustrated in Figs. 6 and 7, the neutral bus-bar is of branched or composite construction and comprises two parallel bars 12^a electrically connected at one end. Said bars are of the

same size as the plus and minus bars 11 and 13 so that the same fuse sockets 20 may be used upon any one of the bars, two of the sockets being set back to back upon the two branches of the neutral bus-bar and being secured to the respective branches. This construction is advantageous in that uniformity of all the parts of the board is attained.

In panel boards of this character as commonly constructed, the load circuit terminals are arranged in vertical rows along the side edges of the board with the two terminals of each pair located one above the other. One terminal of each pair is connected to an adjacent bus-bar and, in order to provide connection between the other terminal and the remote bus-bar, it has been necessary to provide a crossing bus-bar, that is, one running transversely to the main power bus-bars. By my construction I entirely eliminate the necessity for such cross bus-bars, and furthermore by reason of the fact that the two terminals of each pair are located in transversely opposed relation on two bus-bars I am able to cut down by one-half the length of the vertical power bus-bars. An enormous saving in the space required for installation of the board and in the cost of the board both as to amount of copper and labor required is effected, and a panel board which will take care of the maximum number of load circuits with the minimum space and cost is provided. A further saving in the original cost of installing my panel board may oftentimes be effected by reason of the fact that the fuse-mounting and terminal devices are in the nature of individual units which may be mounted on the board only as required. Therefore if a panel board be installed which is capable of taking care of a certain number of circuits and it is found necessary to use less than that number of circuits, only a sufficient number of terminal units to take care of the actual circuits in use need be mounted on the board.

The reference in the foregoing description to exact details of construction has been given for the sake of lucidity but without any intention of limiting the invention to the structure disclosed. I realize that various modifications and equivalent structures falling within the spirit and scope of my invention will occur to persons skilled in the art.

I claim as my invention:

1. A panel board having, in combination, an insulating base, a pair of power bus-bars of opposite polarity mounted thereon in parallel relation, each bus-bar having mounted thereon a row of fuse plug sockets which abut against each other closely so as to completely cover the bar, one terminal of each socket being in electrical communication with the bar and the other terminal having wire-attaching means facing the sockets on the opposite bar, each two sockets on the two bars located directly opposite each other constituting a pair, the terminals of which are adapted to be connected to two wires for a load circuit.

2. A panel board having, in combination power bus-bars extending in parallel spaced relation, and lead wires to a plurality of load circuits, said lead wires extending parallel to and between said bus-bars and at their ends diverging in pairs toward said bus-bars.

3. A panel board having, in combination, three bus-bars extending in parallel spaced relation, and a plurality of lead wires to load circuits extending in each of the spaces between said bus-bars parallel to said bus-bars and at their ends diverging in pairs for connection to said bus-bars.

4. A panel board having, in combination, an insulating board, a bus-bar thereon, a fuse plug socket device comprising a rectangular insulating base notched to fit down over said bar and completely cover three sides of a section of said bar the longer dimension of said base extending transversely to the bar, the base having two plug recesses each provided with terminal devices including a screw passing down through the socket and threaded in the bar for securing the socket to the bar, said screw providing an electrical connection between the central terminal of the socket and the bar, the other terminal of the socket having a laterally extending means for attaching a wire to the socket the latter terminals projecting from opposite ends of said base.

5. A panel board having, in combination, an insulating board, a pair of power bus-bars of opposite polarity mounted thereon, two rows of individual fuse plug sockets, each row mounted directly upon one of said bars, each socket comprising an insulating base shaped to fit down over the bar, screw means for securing the socket to the bar and providing electrical connection between one terminal of the socket and the bar, wire-attaching means associated with the other terminal of each socket, the sockets of each row abutting close together and completely covering the bars, the transversely opposite sockets on the bars constituting pairs of which the wire-attaching devices face each other, and the rows of sockets providing a channel for the wires, and a lid cooperating with the rows of sockets for closing the top of said channel.

6. A panel board having, in combination, an insulating board, a pair of bus-bars of opposite polarity mounted thereon, two rows of fuse plug sockets, each row mounted directly upon one of said bars and completely covering the bar, each socket being

provided with a wire-attaching device, the two sockets located directly opposite each other on the two bars constituting a pair, the wire-attaching devices of which face each other, and means for closing the top of the channel provided by the two rows of sockets.

7. A panel board having, in combination, an insulating board, a pair of bus-bars of opposite polarity mounted thereon, two rows of fuse plug sockets, each row mounted directly upon one of said bars and completely covering the bar, each socket being provided with a wire-attaching device, the two sockets located directly opposite each other on the two bars constituting a pair, the wire-attaching devices of which face each other, and a plate bearing upon the outer portions of the sockets for closing the channel provided by the sockets.

8. A panel board having, in combination, an insulating board, three power bus-bars mounted thereon with the neutral bus-bar between the plus and minus bars, rows of fuse plug sockets mounted directly upon said bars, there being two sockets on the neutral bar opposite to each socket on the plus or minus bar, the sockets of each row abutting close together so as to completely cover the bars, one terminal of each socket being provided with a wire-attaching device, one socket of each two on the neutral bus-bar being paired with an opposed socket on one of the other bars, and the paired sockets being adapted to be attached to wires leading to a load circuit.

9. A panel board having, in combination, an insulating board, three power bus-bars mounted thereon, the middle bar being of branched construction and located between the plus and minus bars, a row of sockets mounted directly upon each of the plus and minus bars, two rows of sockets mounted directly upon the neutral bar, the sockets abutting close together so as to completely cover the bars, one terminal of each socket having a wire-attaching device, one of the sockets on the neutral bar and the opposed one of the sockets on a plus or minus bar constituting a pair to which a load circuit is arranged to be connected.

10. A panel board having, in combination, an insulating board, three bus-bars mounted thereon, the neutral bus-bar being located between the plus and minus bars, rows of fuse plug sockets mounted directly upon said bars and completely covering the latter, there being two sockets for the neutral bar transversely alined with two sockets on the plus and minus bars respectively, one terminal of each socket being adapted to be connected to a load circuit, one socket on the neutral bar and the transversely opposed socket on the plus or minus bar constituting a pair from which a load circuit is arranged to lead.

11. A panel board having, in combination, an insulating board, three power bus-bars mounted thereon, longitudinal rows of fuse plug sockets mounted directly upon said bars and completely covering the same, the sockets being arranged in transverse rows each of which rows comprises two sockets mounted on the neutral bus-bar and one each on the plus and minus bars, a socket on the neutral bar and the opposed socket on either a plus or minus bar constituting a pair to which a load circuit is adapted to be attached.

12. A panel board having, in combination, an insulating board, three power bus-bars mounted thereon, rows of fuse plug sockets mounted directly upon the respective bars and completely covering the same, the sockets being arranged with two sockets on the neutral bar arranged in the same transverse line with two sockets on the plus and minus bars respectively, one terminal of each socket being in contact with its bar and the other terminal having a wire-attaching device, the devices of one socket on the neutral bar and an opposed socket on a plus or minus bar constituting a pair for attachment to a load circuit.

13. A three-wire panel board having, in combination, three power bus-bars and rows of fuse plug sockets connected to the bars, there being in each transverse row two sockets for the neutral bar and one each for the plus and minus bars, one neutral socket of each row being paired with the opposite plus or minus socket for connection to a load circuit.

14. A three-wire panel board having, in combination, three power bus-bars, fuse mounting devices mounted in rows directly upon said bus-bars, each transverse row of said devices comprising two devices mounted on the neutral bar and one each on the plus and minus bars, one device of the neutral bar being paired with the opposed device on a plus or minus bar for connection to a load circuit.

15. A three-wire panel board having, in combination, three power bus-bars, longitudinal rows of separate fuse plug sockets mounted directly upon said bus-bars, the individual sockets abutting against each other closely to completely cover the bars, there being in every transverse row two sockets on the neutral bar and one each on the plus and minus bars, one terminal of each socket being in electrical communication with its bar and the other terminal being paired with a transversely opposed socket terminal for connection to a load circuit.

16. A three-wire panel board comprising an insulating board, three bus-bars thereon, rows of fuse plug sockets mounted directly upon the bars with the individual

sockets abutting against each other closely to completely cover the bars, there being two sockets on the neutral bus-bar transversely opposed to and alined with each two sockets on the plus and minus bars respectively, one terminal of each socket being adapted to be connected to a load circuit, each pair of sockets for a load circuit comprising one socket on the neutral bus-bar and a transversely opposed socket on a plus or minus bar.

17. A three-wire panel board having, in combination, three power bus-bars, and fuse mounting and terminal devices mounted directly upon said bars, there being transverse rows of said devices each comprising two devices on the neutral bus-bar and one device each on the plus and minus bars.

18. A three-wire panel board having, in combination, three power bus-bars, and devices connected to said bars and each providing a fuse plug socket and a terminal, there being transverse rows of said devices each comprising two devices for the neutral bus-bar and one device each for the plus and minus bars, each transverse row comprising two pairs of said devices adapted to be attached to two load circuits.

19. A panel board having, in combination, a bus-bar and a series of structurally separate terminal units mounted thereon and having straight sides abutting close together so as to completely cover the bar.

20. A panel board having, in combination, a bus-bar and structurally separate devices mounted directly thereon and each providing a fuse-mounting and a wire-attaching means, the devices having straight faces abutting close together so as to completely cover the bar.

21. A panel board having, in combination, a plurality of bus bars extending in parallel spaced relationship, power leads extending into said panel from one direction and connected to said bus bars, and leads to a plurality of load circuits converging in pairs from adjacent bus bars and extending between said bus bars and parallel thereto and out from said panel board in a direction opposite to the direction of said power leads.

22. A panel board having, in combination, power bus-bars of opposite polarity, two rows of fuse-mounting or terminal devices, each row directly mounted upon one of said bars, two transversely opposite devices on the two bars constituting a pair adapted to be connected to a load circuit, the two rows of devices providing a channel along which the load circuit wires may extend.

23. A panel board having, in combination, power bus-bars of opposite polarity, two rows of fuse-mounting or terminal devices, each row directly mounted upon one of said bars, two transversely opposite devices on the two bars constituting a pair adapted to be connected to a load circuit, the two rows of devices providing a channel along which the load circuit wires may extend, and means for closing said channel.

24. A panel board having, in combination, an insulating board, power bus-bars of opposite polarity mounted thereon, rows of fuse plug sockets, each row directly mounted on one of said bars, each socket having wire-attaching means, the two rows of sockets providing a channel adapted to receive the wires of a load circuit, which wires are to be connected to the sockets, the two sockets mounted on different bars in transversely opposed positions constituting a pair for connection to the wires of a load circuit.

25. A panel board having, in combination, bus bars extending in parallel spaced relationship, a plurality of blocks of insulating material mounted on and completely covering each of said bus bars, each block providing a fuse plug socket and a laterally extending terminal, and lead wires to a plurality of load circuits extending between and parallel to said bus bars and at their ends diverging in pairs for connection to the lateral terminals on said blocks.

26. A panel board having, in combination, three power bus bars extending in parallel spaced relation, lead wires to a plurality of load circuits extending in each of the spaces between said bus bars and parallel thereto and at their ends diverging in pairs toward said bus bars, and an individual readily detachable terminal block for the end of each lead wire.

27. The combination recited in claim 26 in which said terminal blocks are mounted upon said bus bars and arranged adjacent each other to completely cover and insulate said bus bars.

28. A panel board having, in combination, an insulating base, two parallel rows of socket and terminal devices mounted thereon and spaced apart to provide a channel between them, said devices being structurally independent and separately attachable to and detachable from said base, each of said devices comprising an insulating block having a fuse plug socket provided with a wire attaching terminal which is located at the side of the block adjacent to said channel, said channel providing a way for receiving lead wires to be attached to said terminals.

29. A panel board having, in combination, an insulating base, two parallel rows of socket and terminal devices mounted thereon, and spaced apart to provide a channel between them, said devices being structurally independent and separately attachable to and detachable from said base, each of said devices comprising an insulating block

having a fuse plug socket and a wire attaching terminal connected to said socket and located at the side of the block adjacent to said channel, said channel providing a way for receiving lead wires to be attached to said terminals, and a cover plate for said channel having its side edges mounted upon the adjacent upper corners of said two rows of blocks.

30. A panel board having, in combination, an insulating base, a plurality of approximately parallel bus bars on one face thereof, and a plurality of separate and independent fuse receptacles mounted in two rows directly upon said bars, each receptacle comprising an insulating block having a socket for a fuse plug and a terminal for attachment of a lead wire, the adjacent faces of the blocks being straight and abutting close together so that each row of blocks completely covers its bus bar, said bus bars and said rows of blocks being spaced apart to provide between them a channel for the lead wires which are connected to said wire attaching terminals of said sockets.

31. A panel board having, in combination, an insulating board, a pair of power bus bars of opposite polarity mounted thereon and two rows of structurally separate plug sockets mounted directly upon said bars and abutting close together so as to completely cover the bars and to constitute the sides of a channel, the two sockets located directly opposite each other on the two bars constituting a pair and each pair of sockets having means for connection to the wires of the same load circuit.

In testimony whereof, I have hereunto set my hand.

GUSTAVE W. BERTHOLD