

Feb. 11, 1958

R. E. LOCHER

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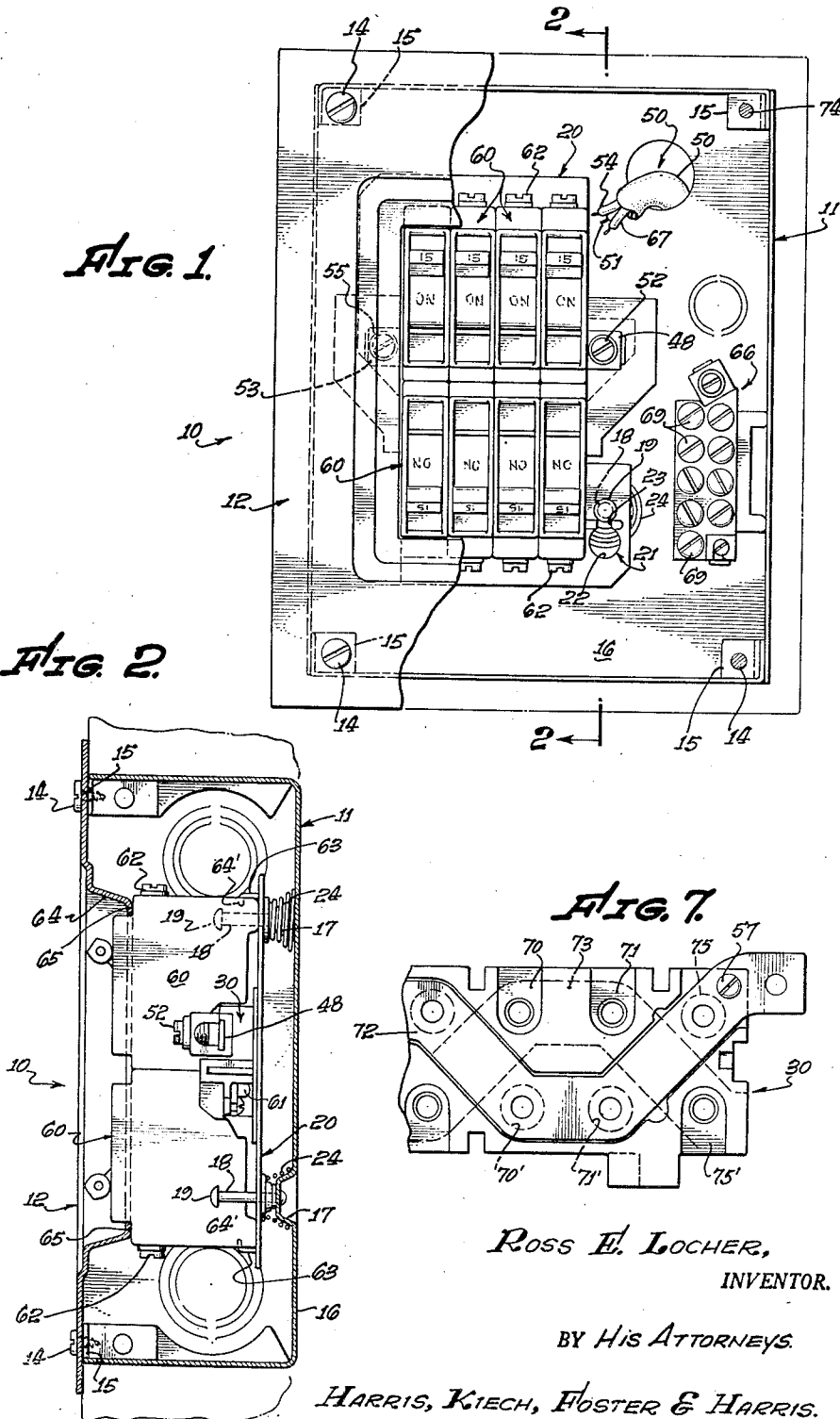
CIRCUIT BREAKER PANEL BOARD

Filed Aug. 23, 1954

2 Sheets-Sheet 1

FIG. 1.

FIG. 2.



ROSS E. LOCHER,
INVENTOR.

BY HIS ATTORNEYS.

HARRIS, KIECH, FOSTER & HARRIS.

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Fig. 3.

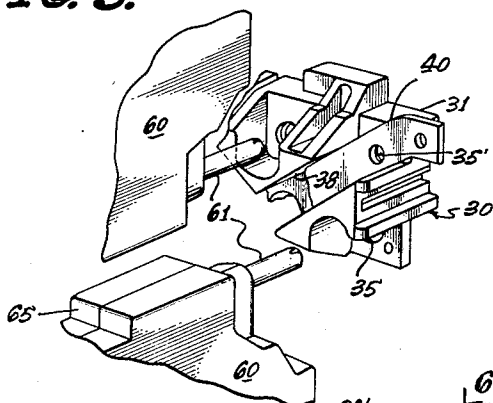


Fig. 4.

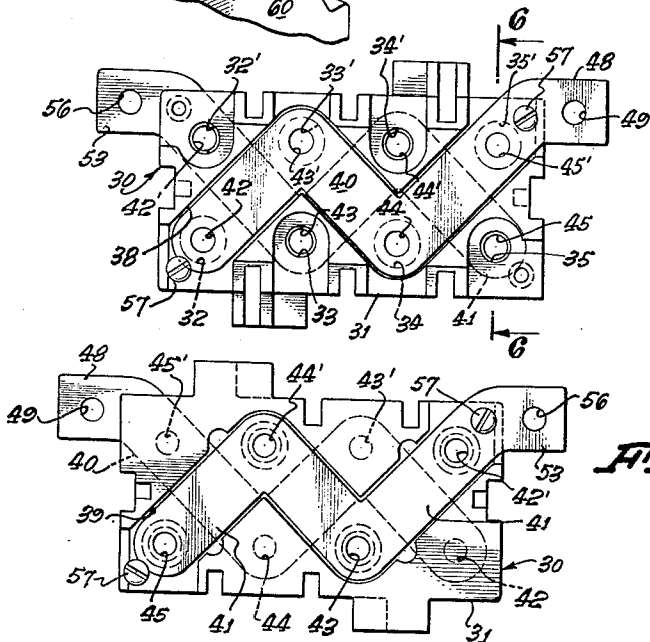
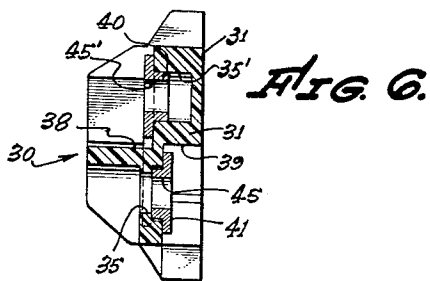


Fig. 5.



ROSS E. LOCHER,
INVENTOR.

BY HIS ATTORNEYS.

HARRIS, KIECH, FOSTER & HARRIS.

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CIRCUIT BREAKER PANEL BOARD

Ross E. Locher, San Marino, Calif., assignor to Zinsco Electrical Products, Los Angeles, Calif., a corporation of California

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10 Claims. (Cl. 317-119)

The present invention relates to a new and improved circuit breaker panel board.

Frequently, it is desired to distribute current from a three-wire alternating or direct power source through a number of individual load circuits where the voltage required may be either the maximum voltage obtainable from the power source or one-half of this voltage. Thus, for example, it is frequently desired to distribute current from a 220 volt, three-wire alternating electrical current source, through a number of individual circuits, some of which require 220 volts and others of which require 110 volts.

It is a broad object of the instant invention to provide a new and improved circuit breaker panel board which can be used with a minimum of difficulty in providing such a current distribution. A related object of the invention is to provide a new and improved panel board which is distinguished by the fact that it is comparatively simple in constructional details and requires no complicated wiring, bus bars, or other electrical connections.

A further object of the instant invention is to provide a panel board of the class described which utilizes a series of individual circuit breakers which may be easily replaced within such board with a minimum of difficulty. Another object of the invention is to provide a simple and efficient means of connecting such circuit breakers into a circuit breaker panel board of the class described.

Other objects of the present invention are to provide circuit breaker panel boards of the class described which are simple in construction, and are economical to manufacture and maintain. Another object of the invention is to provide a panel board which is capable of use by individuals who are relatively unskilled or untrained in working with electrical components. Further objects of the invention, as well as the advantages of it, will be more fully apparent from the balance of this specification, the appended claims, and the accompanying drawings, in which:

Fig. 1 shows a front fragmentary view of a circuit breaker panel board of the invention;

Fig. 2 shows a view of this board taken at line 2-2 of Fig. 1;

Fig. 3 is an expanded isometric view illustrating means of attaching circuit breakers within the panel board of the invention;

Fig. 4 is a front view of a member employed with the invention;

Fig. 5 is a rear view of the member shown in Fig. 4;

Fig. 6 is a cross-sectional view taken at line 6-6 of Fig. 4; and

Fig. 7 is a partial view showing a member of similar construction to the member shown in Fig. 4 of the drawings.

In all views of the drawings like numerals are used to designate like parts.

The invention is best described by direct reference to the drawings where a circuit breaker panel board 10 of the invention is shown as comprising a receptacle-like

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casing 11 having a top 12 which is secured to the casing 11 by means of corner screws 14 projecting into threaded ears 15 formed on the casing 11. Within the bottom 16 of this casing 11 there are provided internal bosses 17 carrying upstanding pins 18 having enlarged heads 19. These pins 18 carry a backing board 20 which has mounting openings 21 consisting of holes 22 of larger diameter than the heads 19 connected to slots 23 of smaller diameter than the heads 19. This mounting board 20 is positioned in the pins 18 by passing the heads 19 through the holes 22 and then sliding the board so that the pins 18 pass through the slots 23. The board 20 is manually urged towards the top 12 by means of springs 24 positioned around the bosses 17.

Secured to the board 20 on the side away from the bottom 16 is a circuit breaker base 30 as is best shown in Figs. 4, 5 and 6 of the drawings. This base 30 has a centrally disposed body 31 formed of an insulating material which is provided with holes 32, 33, 34 and 35, disposed in a straight row and with holes 32', 33', 34', and 35', disposed in a second straight row with the holes 32 and 32', 33 and 33', etc. being located adjacent to one another in a line at right angles to said straight rows, as shown. A first channel 38 is located within the side of the body 31 removed from the board 20 connecting the holes 32, 33', 34, and 35' and a second channel 39 is located within the other side of the body 31 connecting the holes 32', 33, 34', and 35. The channel 38 contains a bus bar 40 having holes 42, 43', 44, and 45 aligned with the holes 32, 33', 34 and 35', and terminating in a terminal tab 48 having a hole 49 which is designed to be secured to a wire 51 of a power source 50 by means of a screw 52 (Fig. 1). The channel 39 contains a bus bar 41 having holes 42', 43, 44', and 45 aligned with the holes 32', 33, 34', 35 and terminating in a terminal tab 53 which is designed to be secured to a wire 54 of the power source 50 by means of a screw 55 (Fig. 1) projecting through an aperture 56. The bus bars 40 and 41 are held in place by screws 57 as indicated.

The various aligned holes in the base 30 are adapted to be secured to individual circuit breakers 60 by means of projecting terminals 61 being placed within these aligned holes as diagrammatically illustrated in Fig. 3 of the drawings. Thus, each of the terminals 61 is in contact with one of the bus bars 40 and 41. The particular circuit breakers shown are as described in my copending application, Serial No. 346,359, and contain secondary terminals 62 adapted to be connected to a load circuit. Other individual circuit breakers may, however, be employed with the invention. These circuit breakers are held in position by means of lower lugs 63 mounted on the board 20 projecting into apertures 64' within the circuit breakers 60 and by means of internal shoulders 64 on the top 12 bearing against shoulders 65 on the circuit breakers. In the particular construction shown these circuit breakers are positioned immediately adjacent to one another as illustrated, but this is not essential. Neither is it essential that the particular means shown be used in holding the circuit breakers 60 in position although equivalent means must be employed.

In operation of the circuit breaker panel board 10 the individual components are assembled as indicated and an appropriate load circuit (not indicated) is attached to each of the circuit breakers 60 by means of the terminals 62. These load circuits can terminate in a terminal panel 66 which is adapted to be connected to a third wire 67 of the current source 50. Appropriate screws 69 are provided upon this panel 66 for use in attachment of both the wire 67 and the load circuits. This panel 66 is mounted upon, but insulated from, the bottom 16 by appropriate conventional insulating mounting means not shown. The load circuits can terminate

with a terminal 62 of a second circuit breaker 60 provided the two circuit breakers within the circuit are attached to different bus bars. If the latter means of connection is utilized, the voltage across the load circuit obtained will be the maximum possible for the power source 50; if the former means of connection is utilized, it will be one-half this amount. This discussion is predicated upon the assumption that the wires 51 and 54, are the "hot" wires of the current source 50 and that the wire 67 is the neutral or "center" wire of this source. For example, between either wire 51 or 54 and wire 67 may be a 110-volt potential, and between wires 51 and 54 there will be a 220-volt potential.

The circuit breakers 60 each act as a single-pole interrupter disconnecting one side of a load circuit, the other side of the load circuit being connected to a common terminal 66 which is connected by the wire 67 to the neutral or common wire of the circuit. In other words, a wire for one side of each load circuit is brought into the casing and connected to a circuit breaker terminal 62 and the other wire for the other side of the load circuit is brought into the common terminal 69 to which the neutral or central wire 67 is also connected. Each of the bus bars is connected at 52 or 55 with one side of the power circuit and in a 220-volt three-wire system there will be 220 volts between the bus bars 40 and 41 and 110 volts will be impressed on each load circuit.

In Fig. 7 of the drawings, a modified construction of a base 30 is indicated in which apertures 70, 71 and 75' are connected to one another by bus bar 73 and apertures 70', 71' and 75 are connected to one another by bus bar 72. Other constructional details of this construction are substantially as indicated in the discussion of the other figures of the drawing. This modification is so similar to the principal construction illustrated that it is not considered necessary to discuss it in detail. Its operation and use are essentially the same as described above.

The advantage of the invention will now become more apparent to persons skilled in the art of electrical power distribution. From the configuration of the elements illustrated in Figs. 4 and 5 it will be observed that a plurality of circuit breakers 60 may be connected in side-by-side position on one side of the circuit breaker base 30 and will be alternately connected to bus bars 40, 41. Similarly will a plurality of circuit breakers on the other side of the base 30 be alternately connected to bus bars 41, 40. Thus if each of the loads respectively is connected to the circuit breakers, and accordingly drawing current, a portion of the over-all or total current will be supplied from wire 51 and the remainder of the current will be supplied from the wire 54.

Effectively therefore each of the "hot" wires is providing an aliquot part of the power being consumed. This is a most desirable condition from the viewpoint of the power-supplying entity or utility for each power line is contributing a part of the total power being consumed by the loads. In power-transmission parlance, the load is distributed between the two potential sources. Further, if it is desired to secure a polarity reversal as to an individual load, it is not necessary to move the load line to some other distant position in the bore 10. Therefore the load line may be disconnected and then connected to the next adjacent circuit breaker, or the two adjacent breakers may be interchanged in position.

It will now be apparent that if a community of residential homes employs the structure of the present invention, on the over-all average each power line will contribute approximately fifty percent of the total power, which is a most desirable and efficient condition in power generation and transmission.

Of course under prevailing conditions of general operation all the electrical loads of a residence will not be operating at the same time. But by employing the panel board herein it is relatively improbable that only one

power line will be providing the total power consumed. In this event, however, at a maximum only one half of the loads will be operated. The cumulative effect of a large number of residences consuming power under normal conditions will result in a nearly even distribution of total load upon each power line.

It will also now be apparent that for a new power panel board installation the number of circuit breakers necessary will be predetermined. Thus, the over-all length of the circuit breaker base 30 and its connections to the breakers is limited thereby necessitating connecting of the various loads to both power-line sources.

The configuration of the structures of Figs. 4 and 7 provides the convenience above referred to when the loads require no more than, in the example referred to, 110 volts. However, certain installations require 220 volts to supply a particular load, as well as various 110-volt loads. Appropriate connections to circuit breakers employed with either of the structures of Figs. 4 and 7 provide a means whereby the panel board structure may conveniently provide a potential of 220 volts for any particular load.

As hereinbefore explained, a potential of 220 volts appears across bus bars 40 and 41 of Fig. 4. In like manner a 220-volt potential appears across bus bars 72 and 73 of Fig. 7. Referring particularly to Fig. 7, a 220-volt load may be conveniently supplied by employment of two adjacent circuit breakers 60 connected, for example, to bus bars 72 and 73 at the apertures 71 and 75. In this instance the load is connected across the respective terminals 62 of the adjacent circuit breakers. Accordingly, the load is connected across the bus bars 72 and 73, across 220 volts, each side of the load having in series one of the circuit breakers. The convenience and utility of this arrangement provides a positioning of the circuit breakers side by side, and as such the toggles or switch arms may be manually grasped together for simultaneous operation, or preferably ganged together by a suitable bridge connecting the same. Upon interruption under the latter condition of ganging the toggles, the 220-volt load will be disconnected and isolated simultaneously from both power sources connected to the bus bars 72 and 73. Such simultaneous isolation is highly desirable for in the absence thereof it is possible that the 110-volt potential of either bus bar may be communicated to either side of the load.

As well as providing a means for securing adequate load distribution as above set forth, the present invention also provides a convenience for what is commonly referred to as polarity reversal. In certain types of installations it is desirable, and at times mandatory, that a load be connected to a particular one of the two power-supplying bus bars. Further, it may be desirable to change, from time to time, the connection of the load to the other bus bar. Prior means of accomplishing such changes included a physical moving of the breaker to the other side of the panel board where it may be connected to the other bus bar. This is inconvenient and unpractical for it necessitates the movement of the load line connected to the breaker, or more often, a rewiring in the box. Other prior means comprised a modification of the breaker itself whereby the stab to be plugged into the bus bar may be moved relative to the breaker case so as to be capable of engaging either bus bar.

In the present construction it is only necessary to unplug the circuit breaker and move it one position away and re-plug it into the panel board in order to connect the load to the other bus bar.

The configuration of Fig. 7 provides a convenience whereby two circuit breakers may be placed side by side, having their switch arms ganged together, for supplying a single load. For example, the stab of the breakers may be engaged with apertures 70 and 71, and a load connected in common to the terminals 62 of the breaker.

Thus, there is an equal distribution of current through the paralleled circuit breakers which supply an individual load.

It is evident that the bus bars employed are preferably of singular and symmetrical construction lending simplicity to and corresponding economy of fabrication and manufacture.

Those skilled in the art will realize that other modifications of the invention may be made within the scope of this disclosure. Such modifications are to be considered as part of the invention insofar as they are defined by the appended claims.

I claim as my invention:

1. A circuit breaker base comprising: a body member formed of dielectric material, said body member having a plurality of openings therein, said openings being disposed in two rows; a first path formed on one side of said body member, said path connecting the odd-numbered openings in one row to the even-numbered openings in the other row; a second path formed on the opposite side of said body member connecting the remaining openings; and an electrically conducting bus bar disposed in each of said paths, said bus bars being each of single construction and electrically insulated from each other, and being adapted to be connected to two wires of a source of electrical supply, said body member being adapted to receive and hold a plurality of circuit breakers, each of said circuit breakers having a terminal adapted to be inserted in one of said openings for engagement with one of said bus bars.

2. A circuit breaker base comprising: a body member formed of dielectric material, said body member having a plurality of openings therein, said openings being disposed in two rows; a first path formed on one side of said body member; a second path formed on the opposite side of said body member, each of said paths connecting at least one opening in one of said rows with at least one diagonally located opening in the other row to form at least one cross connection between said rows; and an electrically conducting bus bar disposed in each of said paths, said bus bars being of symmetrical construction and electrically insulated from each other, and said bus bars being adapted to be connected to two wires of a three-wire electrical source of supply, said body member being adapted to receive and hold a plurality of circuit breakers, each of said circuit breakers having a terminal adapted to be inserted in one of said openings for engagement with one of said bus bars.

3. A circuit breaker base comprising: a body member, said body member having a plurality of openings therein, said openings being disposed in two rows, said body member having a pair of paths thereon, each of said paths connecting predetermined openings in one of said rows with predetermined openings in the other row to form symmetrical cross connections between said rows; and an electrical conductor disposed in each of said paths, said conductors being of symmetrical construction and adapted to be connected to two wires of a three-wire electrical source of supply, and said conductors being electrically insulated from each other, said body member being adapted to receive and hold a plurality of circuit breakers, each of said circuit breakers having a terminal adapted to be inserted in one of said openings.

4. A circuit breaker base comprising: a body member having a plurality of contacts, said contacts being disposed in two longitudinal rows; and a pair of symmetrical electrical conductors connecting at least one contact in one of said rows with at least one contact in the other of said rows to form at least one cross connection between said rows, said conductors being electrically insulated from each other, said cross connected contacts being longitudinally displaced from each other; and a terminal tab for each said conductors being adapted to be connected to two wires of a three-wire source of electrical supply, said body member being adapted to receive a plurality of cir-

cuit breakers, each of said circuit breakers having a terminal adapted to be connected to one of said contacts.

5. A new and improved circuit breaker panel board, which comprises: an insulating body provided with a plurality of pairs of apertures; a first conducting bar provided with apertures, disposed along one side of said body, with said apertures in said bar aligned with one of the apertures in each of said pairs of apertures in said body; a second conducting bar provided with apertures, disposed on the other side of said body, with said apertures in said second conducting bar aligned with the apertures in said body which are not aligned with said apertures in said first conducting bar; means for connecting one wire of a three-wire current source to each of said bars; and a plurality of individual circuit breakers having projecting terminals positioned with each of said terminals projecting through one of said apertures in said body in electrical contact with a conducting bar having an aperture aligned with an aperture in said body.

6. A new and improved circuit breaker base, which comprises: an insulating body provided with a plurality of pairs of apertures; a first conducting bar provided with apertures, disposed along one side of said body, with said apertures in said bar aligned with one of the apertures in each of said pairs of apertures in said body; a second conducting bar symmetrical to said first conducting bar and provided with apertures, disposed on said other side of said body, with the apertures in said second conducting bar aligned with the apertures of said body which are not aligned with said apertures in said first conducting bar; and means for connecting one wire of a three-wire current source to each of said bars.

7. A new and improved circuit breaker panel board, which comprises: a body member formed of a dielectric material, said body member having a plurality of openings therein, said openings being disposed in two rows; a first path formed on one side of said body member, said path connecting the odd-numbered openings in one row to the even-numbered openings in the other row; a second path formed on the opposite side of said body member connecting the remaining openings; an electrically conducting bus bar disposed in each of said paths, said bus bars being electrically insulated from one another and being provided with openings aligned with openings in said body member; a plurality of individual circuit breakers having projecting terminals positioned with each of said terminals projecting through one of said openings in said body member so as to be in electrical contact with one of said bus bars; and means for connecting one wire of a three-wire current source to each of said bus bars.

8. A new and improved circuit breaker panel board, which comprises: a body member of dielectric material having a plurality of openings therein, said openings being disposed in two rows; a first continuous channel formed on one side of said body member, said first channel defining a zig-zag path and connecting with alternate openings of both rows of said body member; a second continuous channel formed on the other side of said body member, said second channel defining a zig-zag path and connecting with the remaining alternate openings of said body member; a conducting bus bar disposed in each of said channels, each said bus bar having apertures therethrough in alignment with at least a plurality of said body member openings, said bus bars being symmetrical in construction and electrically insulated from each other by said body member; means including tab extensions for said bus bars for connecting one wire of a three-wire current source to each of said bus bars; and a plurality of circuit breakers each having a projecting terminal, each of said projecting terminals projecting through one of said aligned openings and apertures and in electrical engagement with one of said bus bars.

9. A circuit breaker panel board as in claim 8 wherein said first channel defines a crossover path relative to said rows and connects with alternate pluralities of openings

of both rows of said body member, and wherein said second channel defines a crossover path connecting with the remaining openings of said body member.

10. A circuit breaker base comprising: a body member formed of dielectric material, said body member having a plurality of openings therein, said openings being disposed in two rows; a first path formed on one side of said body member, said path connecting two adjacent openings in one row with two nonopposite, adjacent openings in the other row; a second path formed on the opposite side of said body member connecting the remaining openings; and an electrically conducting bus bar disposed in each of said paths, said bus bars being each of single construction and electrically insulated from each other and being adapted to be connected to two wires of a source of electrical supply, said body member being adapted to receive

and hold a plurality of circuit breakers, each of said circuit breakers having a terminal adapted to be inserted in one of said openings for engagement with one of said bus bars.

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