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CONNECTION FOR BUS BAR PANEL BOARD

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2 Sheets-Sheet 1

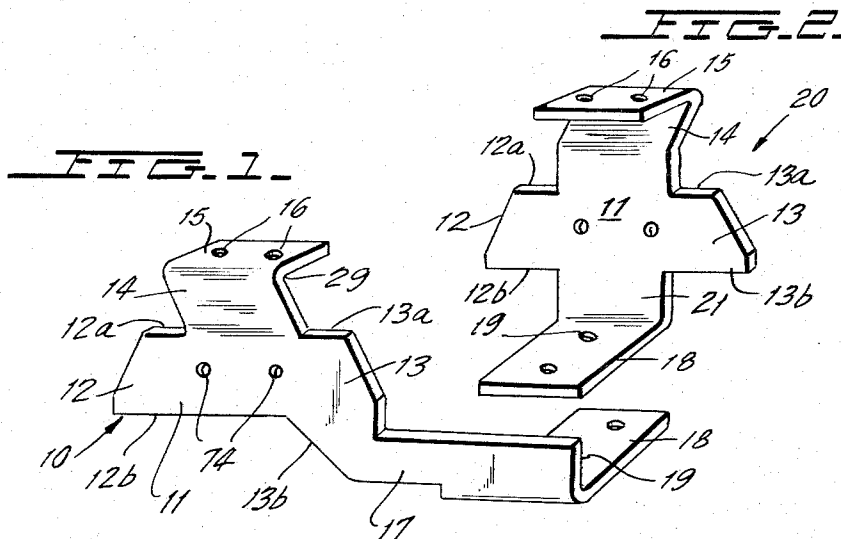


FIG. 3.

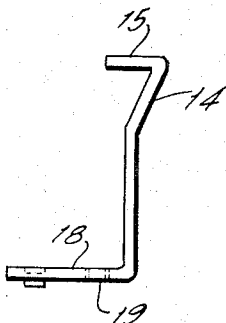


FIG. 6.

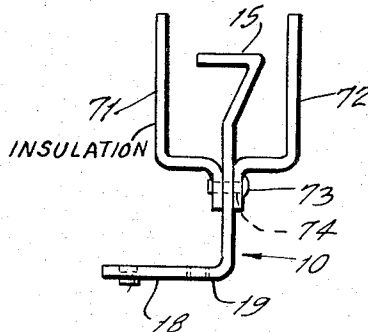


FIG. 7.

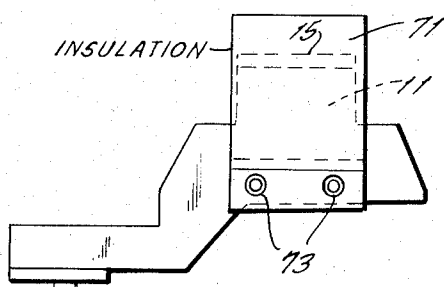
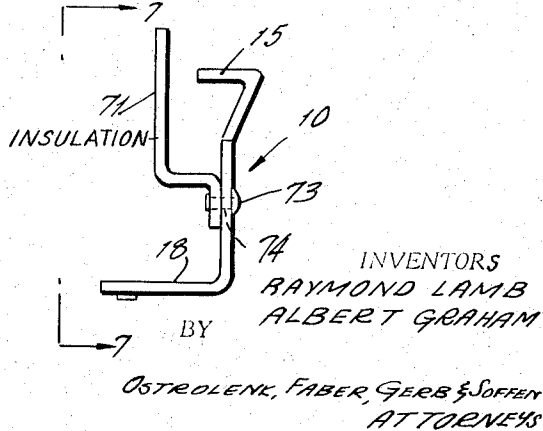


FIG. 5.



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CONNECTION FOR BUS BAR PANEL BOARD

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ABSTRACT OF THE DISCLOSURE

A single connector for connecting the line terminal of either a plug-in or a bolt-on circuit breaker to a bus bar; the connector having a central portion joined to a connector strap, which secures the connector to a bus bar; a horizontal platform above the central portion the platform having apertures therethrough for receiving bolts from a bolt-on circuit breaker; a vertical blade on one or both sides of the central portion of the connector for receiving the plug-in line terminal of a plug-in circuit breaker; the vertical blade or blades being located between the horizontal platform and the bus bar; the connectors being arrayed in a straight line; adjacent ones of the connectors being connected with different bus bars; panels of dielectric material extending between adjacent horizontal platforms of adjacent connectors for preventing arcing between adjacent connectors, each dielectric panel being secured to a central portion of one of the connectors.

The present invention relates to a connector for a bus bar panel board, and more particularly to a connector for a bus bar panel board adapted to connect both plug-in and bolt-on circuit breakers with bus bars.

A circuit breaker mounted on a panel board must be electrically connected to a bus bar. Connecting means are either of the plug-in or bolt-on variety. See, for example, U.S. Patent No. 2,790,113, issued on Apr. 23, 1957, to P. F. Brown, entitled, "Panel Boards"; U.S. Patent No. 3,041,505, issued on June 26, 1962, to A. R. Norden, entitled, "Sequence Phase Panel Boards"; U.S. Patent No. 3,144,588, issued on Aug. 11, 1964, to E. P. Platz et al., entitled, "Bolted Connection for Plug-In Device"; and U.S. Patent No. 3,201,657, issued on Aug. 17, 1965, to J. F. Meacham, entitled, "Panel Board for Bolted and Plugged-In Circuit Breaker." Each of these patents show connecting means adapted for either a plug-in or a bolt-on circuit breaker. No connecting means illustrated in these patents suggests a unitary connector adapted to receive both plug-in and bolt-on circuit breakers.

Because prior art connectors are adapted for use only with one of the two types of circuit breakers, two kinds of panel boards, differing only in the type of connectors thereon mounted, have had to be manufactured. Some prior art connectors are made detachable from their panel boards and freely interchangeable so that one panel board can hold separate connectors for both plug-in and bolt-on circuit breakers. However, in order to replace a bolt-on circuit breaker with a plug-in type or vice versa, it is still necessary to remove the circuit breaker, unbolt the connector, locate and bolt on the alternate type of connector and finally mount the other type of circuit breaker.

In addition, in order to provide two varieties of interchangeable circuit breaker connectors for a three-phase bus bar system four distinct types of connector units must be manufactured, a plug-in unit to be connected into the central bus bar, a bolt-on connector to be connected to the central bus bar at least one bolt-on and one plug-in connector to be connected to either one of the outer bars. It was to obviate the need for manufacturing alternate

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types of panel boards and a large number of alternate sets of interchangeable panel board connectors that the present invention was made.

The present invention comprises a panel board connector electrically connected to a bus bar and having a central portion on two opposite sides of which are attached blades adapted to receive the clip-on contact of a plug-in circuit breaker. Atop the central portion is mounted a horizontal platform, having apertures therethrough to receive a bolt from a bolt-on circuit breaker. Affixed also to the central portions of some of the novel circuit breaker connectors are dielectric insulating members which are stationed between each set of bolt-on breaker receiving platforms.

Each connector made in accordance with the teachings of the instant invention can receive either a plug-in or a bolt-on circuit breaker. Thus at most two types of connectors must be manufactured in order to connect any type of circuit breaker to any one of the three phases of a three-phase bus bar. This is to be compared with the minimum of four units which must be manufactured for use with prior art devices. All that is needed in the instant device is one connector for the central bus bar and one connector which can interchangeably be connected to either of the outside bars. Further, with respect to panel boards not having interchangeable connectors, using the instant invention reduces from two to one the varieties of panel boards that must be manufactured.

Use of the connectors herein disclosed will, therefore, make more economical and easier the manufacturing process and will reduce the inventory investment which has to be made by both the manufacturer and the distributor of circuit breaker panel boards.

Accordingly, it is a primary object of the present invention to provide a connector for a bus bar panel board, which connector is adapted to receive either a plug-in or a bolt-on circuit breaker.

It is a second object of the present invention to reduce from two to one the number of types of commercially available panel boards which must be manufactured in order to receive the two types of circuit breakers presently available.

It is a third object of the present invention to reduce the number of types of connectors which have to be manufactured in order to make panel boards adaptable to receive both plug-in and the bolt-on circuit breakers.

It is another object of the present invention to make panel boards more economical and easier to manufacture and to make lower the inventory investment which must be made by manufacturers and distributors of circuit breaker panel boards.

These and other objects of the instant invention will become readily apparent after reading the following description of the accompanying drawings in which:

FIGURE 1 is a perspective of a connector according to the instant invention designed to be connected to either of the outer two phases of a three-phase bus bar system.

FIGURE 2 is a perspective of a connector in accordance with the instant invention designed to be connected with the center bus bar of a three-phase bus bar system.

FIGURE 3 is a side view of the connectors in both FIGURES 1 and 2.

FIGURE 4 is a side view of a connector in accordance with the instant invention connected to a bus bar and having attached thereto a circuit breaker of the plug-in and a circuit breaker of the bolt-on varieties.

FIGURE 5 is a side view of a connector in accordance with the instant invention having a single dielectric insulating member thereto attached.

FIGURE 6 shows the connector of FIGURE 5 having two dielectric insulating members thereto attached.

FIGURE 7 is a view of the connector in FIGURE 5 viewed in direction 7—7.

FIGURE 8 shows a typical placement of connectors built in accordance with the teachings of the instant invention, some connectors having dielectric insulating members thereto attached.

Referring to FIGURE 1, connector 10 is an integral unit stamped and folded into the shape shown in FIGURES 1 and 3. At the option of the manufacturer, connector 10 might be comprised of separable units affixed to one another. Connector 10 has a central portion 11 with blade extensions 12 and 13 integrally thereto attached. The blades receive the plug-in circuit breaker. Blades 12 and 13 have upper edges 12a and 13a respectively and lower edges 12b and 13b respectively. Blade 13 has connector strap 17 thereto attached leading to connector shoe 18 which is attachable to a bus bar.

Shoe 18 has aperture 19 therethrough for receiving a bolt to attach connector 10 to a bus bar 24 or 26 (FIG. 8).

Central portion 11 has support means 14 extending upward therefrom at an inclined angle (see FIGURE 3). Platform 15 rests atop support means 14 and is in a plane perpendicular to the plane of blades 12 and 13. Platform 15 has apertures 16 therethrough for receiving bolts from a bolt-on circuit breaker.

Apertures 16 in platform 15 are coplanar with blades 12 and 13 to permit plug-in and bolt-on circuit breakers to be interchangeably used with the same connector.

Connector 20 in FIGURE 2 is similar to connector 10 except that it has no connector strap 17. Instead connector strap 21 extending beneath central portion 11 is attached to shoe 18. Connector 20 is suitable for connecting a circuit breaker only to the central bus bar 25 (FIG. 8) of a three-phase bus bar system.

Connectors 10 and 20 are the only connecting means it is necessary to manufacture in order to provide connectors attachable to any one phase of a three-phase bus bar system and to provide connectors which can receive either a plug-in or a bolt-on circuit breaker.

Refer to FIGURE 4. Connector 10 is mounted by mounting screw 23 which passes through shoe 18 into bus bar 24. Bolt-on breaker 40 is hooked at one end 41 thereof to circuit breaker panel board base plate assembly 50 by means of hook 51 which engages an aperture in end 41 of breaker 40. Circuit breaker 40 has tab 42 which is electrically connected to the circuit breaking mechanism. Through an aperture 43 in tab 42 extends bolt 44. Bolt 44 is screwed into threaded aperture 16 of connector platform 15 thereby providing electrical contact between circuit breaker 40 and bus bar 24.

Circuit breaker 40 has a slot 45 in its casing into which blade 13 of connector 10 comfortably slides. Slot 45 has no electrical contact means within it and is merely provided to accommodate the protruding blade 13.

Plug-in circuit breaker 60 is hooked by means of hook 52 to the panel board base plate assembly 50. Blade 12 of connector 10 fits into slot 61 of circuit breaker 60. Slot 61 contains resilient grip-on contact means, known in the circuit breaker art for gripping blade 12 and making electrical contact therewith. By means of the resilient gripping contact, circuit breaker 60 is electrically connected to bus bar 24. Note that side 62 of circuit breaker 60 is set back from platform 15 of connector 10 so that the only point of connection between connector 10 and circuit breaker 60 is at blade 12.

FIGURE 4 clearly illustrates how a connector made in accordance with the instant invention interchangeably permits a plug-in or a bolt-on circuit breaker to be electrically connected with a bus bar without the necessity of using different panel boards or of changing connectors on a panel board.

FIGURE 5 illustrates a side view of a connector 10 having a single dielectric insulating member 71 affixed to

its central portion 11 by means of rivets 73 which pass through apertures 74 in connector 10 (see FIGURE 7).

FIGURE 6 shows a connector 10 having two dielectric insulating members 71 and 72 thereto affixed by means of rivet 75, which also pass through apertures 74 in connector 10.

Note that insulating members 71 and 72 are attached not to the panel board but are rather affixed to individual connector 10; thus the insulating members 71 and 72 can be affixed during the initial connector manufacturing process.

The dielectric insulating members 71 and 72 extend upward from central portion 11 past platform 15 to a position slightly above it. Further, they extend sideways slightly beyond the sides of platform 15. Dielectric members 71 and 72 so block platform 15 of connector 10 that if connectors 10 and 20 are placed in the positions shown in FIGURE 8, which is the suggested pattern for the mounting of connectors 10 and 20, no straight line could be drawn between any part of any two platforms 15 without that line intersecting either of members 71 or 72.

Note that there is no dielectric insulating member interposed between blades 12 and 13 of adjacent connectors 10 and 20 when they are positioned as shown in FIGURE 8. Blades on adjacent connectors 10 and 20 are far enough apart so that the air gap between them serves as a sufficient dielectric insulator. However, since platforms 15 are all horizontal, two of the edges of each platform 15 come very close to edges of adjacent platforms 15. The air gap would not be a sufficient insulator to prevent arcing between adjacent platforms. Instead of separating connectors 10 and 20 further from each other along their axis of spacing which would waste panel board front space, dielectric members 71 and 72 are interposed between platforms 15 providing sufficient insulation to prevent arcing.

FIGURE 8 shows a three-phase bus bar panel board assembly with connectors designed in accordance with the instant invention arranged for optimum utilization of the present invention. Connector 10a with fold 29 pointing in the direction B has dielectric insulating member 71 opposite fold 29. When a connector 10 faces in the direction that connector 10a is facing, its shoe 18 is bolted to outer bus bar 26.

Connector 10b faces in the opposite direction from connector 10a. The fold 29 of connector 10b points in direction A. When a connector 10 is facing in the direction that connector 10b faces, its shoe 18 is attached to outer bus bar 24 and it has two dielectric insulating members 71 and 72 affixed to it.

A connector 20 may have its fold 29 face in either direction A or B. Its shoe 18 is connected to the central bus bar 25. No dielectric insulating members are affixed to any connector 20.

By arranging the connectors in the order of 10a, 20, 10b looking along direction A, each connector has a dielectric insulating member disposed between its platform and the two platforms adjacent to it. Naturally, other arrangements of connectors and insulating members can be made which will accomplish the same end.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now be apparent to those skilled in the art. Therefore, this invention is to be limited, not by the specific disclosure here, but only by the appended claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. A connector for electrically connecting a circuit breaker to a bus bar; said connector comprising
 - a central portion having a plurality of sides;
 - a first connecting means on said central portion for receiving a plug-in circuit breaker; said first connecting means comprising a first blade on a side of said central portion;
 - a second connecting means for receiving a bolt-on circuit breaker; a support for said second connecting

means supporting said second connecting means away from a side of said central portion; said second connecting means comprising a platform; at least one aperture in said platform for receiving bolts;

a connector strap device connected to said central portion for connecting said central portion to a bus bar;

said first connecting means being between said platform and said connector strap device in such manner that said first connecting means is closer to a bus bar to which said connector is adapted to be connected than said platform;

said first and said second connecting means being positioned and adapted to be connected with a plug-in and a bolt-on circuit breaker from the same side of said connector.

2. The connector of claim 1, in which said first and said second connecting means are fixedly and non-removably attached to said central portion.

3. The connector of claim 1, in which said first connecting means further comprises a second blade attached to a side of said central portion opposite said first blade; said second connecting means being intermediate said first and said second blades.

4. The connector of claim 3, in which said platform is flat; and said first and said second blades are each in a plane perpendicular to said platform.

5. The plurality of connectors of claim 4 in which each of said dielectric insulating members extends (1) above each of the said adjacent second connecting means it is between, (2) below each of the said adjacent second connecting means it is between, (3) beyond a first side of each of the adjacent second connecting means it is between, and (4) beyond the side opposite the first side of each of said second connecting means it is between.

6. A plurality of connectors, each connector for electrically connecting one of a plurality of circuit breakers to one of a plurality of bus bars;

each of said connectors being the connector of claim 1; said connectors being arrayed in a line in spaced relationship;

dielectric insulating members interposed between adjacent ones of said second connecting means for preventing electric arcing between adjacent second-connecting means; each of said dielectric insulating

members being connected to and supported upon a said central portion of one of said connectors; said second connecting means being intermediate said first and said second blades of each of said connectors.

7. The plurality of connectors of claim 6, in which said first and second blades both extend sideways beyond said dielectric insulating members.

8. The plurality of connectors of claim 6, in which each of said first connecting means comprises a second blade, each of said second blades being attached to a side of said central portion of each of said connectors opposite each of said first blades.

9. The combination of claim 8, in which each of said dielectric insulating members extends:

(1) above each of the said second connecting means it is between;

(2) below each of the said second connecting means it is between;

(3) beyond a first side of each of the said second connecting means it is between; and

(4) beyond the second side of each of the said second connecting means it is between; said first and said second blades both extending sideways beyond said dielectric insulating members.

10. In combination, the plurality of connectors of claim 6 and a circuit breaker panel board;

said panel board having a plurality of bus bars attached thereto;

said connector strap device of each of said connectors being connected to one of said plurality of bus bars; adjacent ones of said connector strap devices being connected to different bus bars.

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