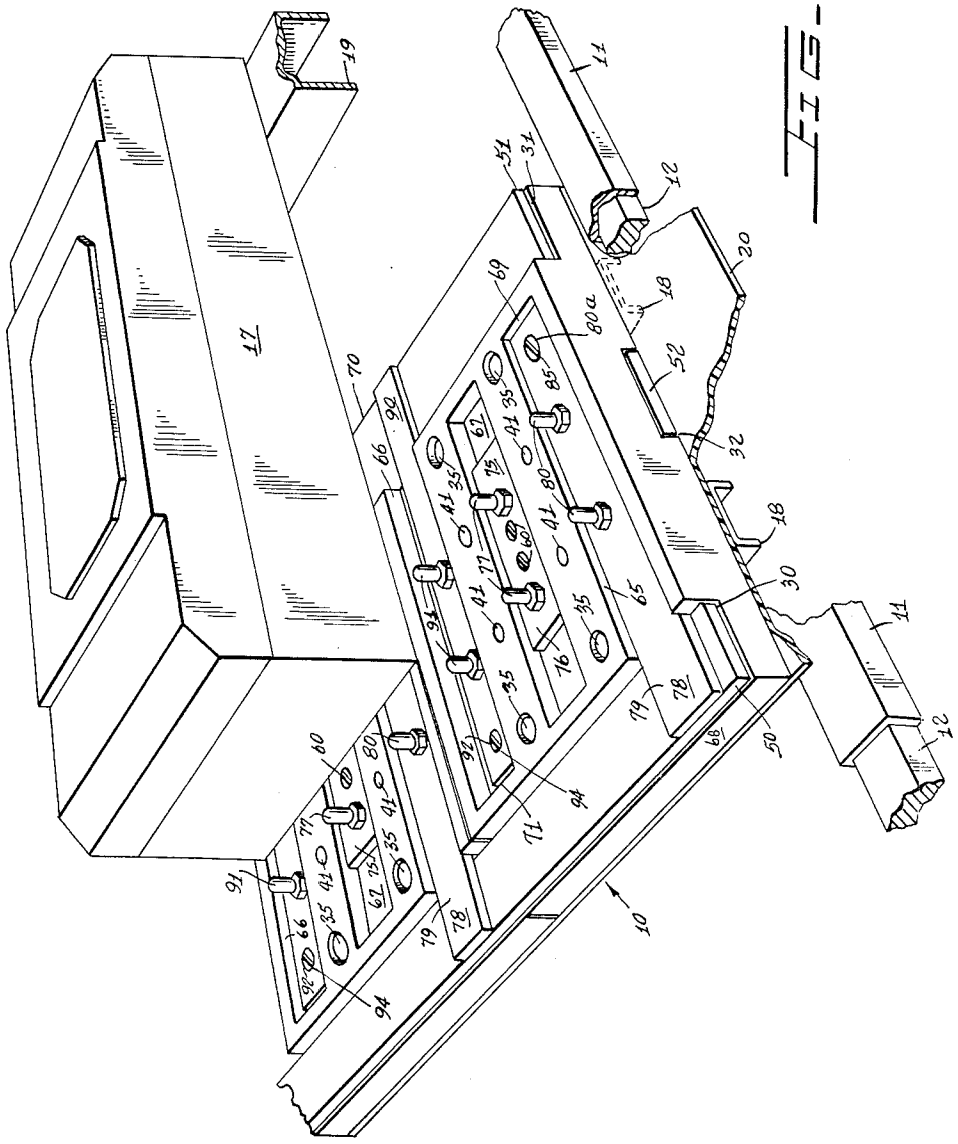
March 6, 1956 M. A. MORRIS 2,737,613

PANEL BOARD TERMINAL MOUNTING BLOCKS

Filed April 13, 1951 4 Sheets-Sheet 1

FIG. 1



INVENTOR.
MARVIN A. MORRIS

BY
Ostrolenk & Faber
ATTORNEYS

March 6, 1956 M. A. MORRIS 2,737,613

PANEL BOARD TERMINAL MOUNTING BLOCKS

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FIG. 4

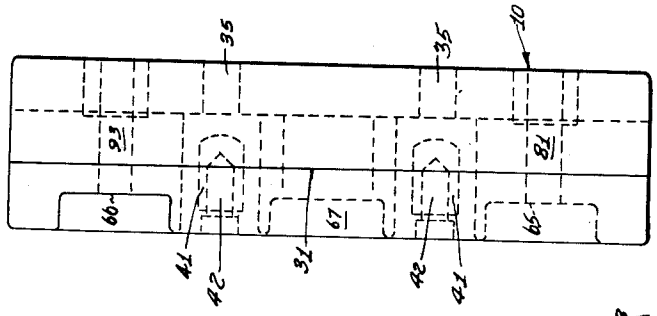


FIG. 3

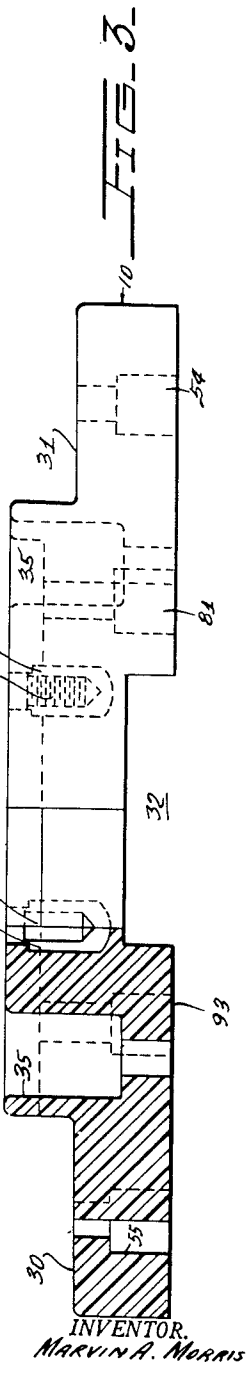
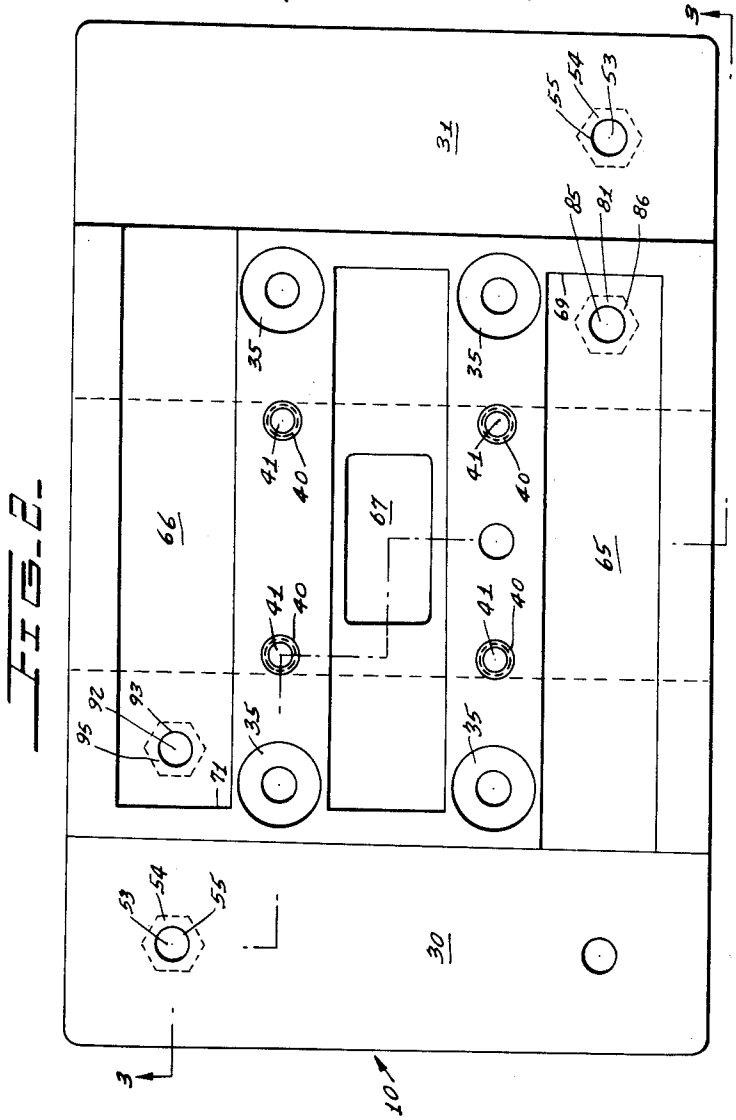


FIG. 2



INVENTOR.
MARVIN A. MORRIS

BY
Ostrolenk & Faber
ATTORNEYS.

March 6, 1956 M. A. MORRIS 2,737,613

PANEL BOARD TERMINAL MOUNTING BLOCKS

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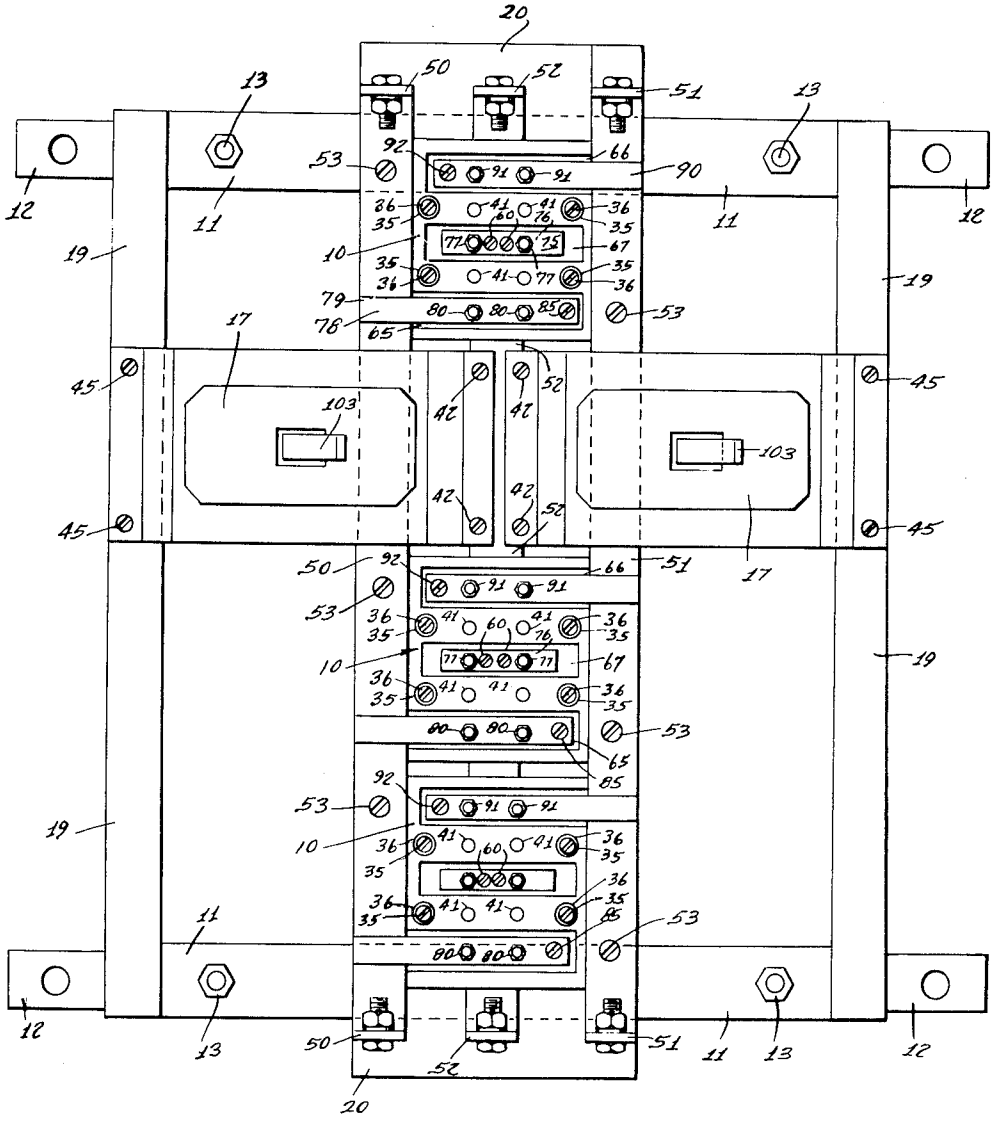


FIG. 5.

INVENTOR.
MARVIN A. MORRIS

BY
Ostrolenk & Faber
ATTORNEYS

March 6, 1956 M. A. MORRIS 2,737,613

PANEL BOARD TERMINAL MOUNTING BLOCKS

Filed April 13, 1951 4 Sheets-Sheet 4

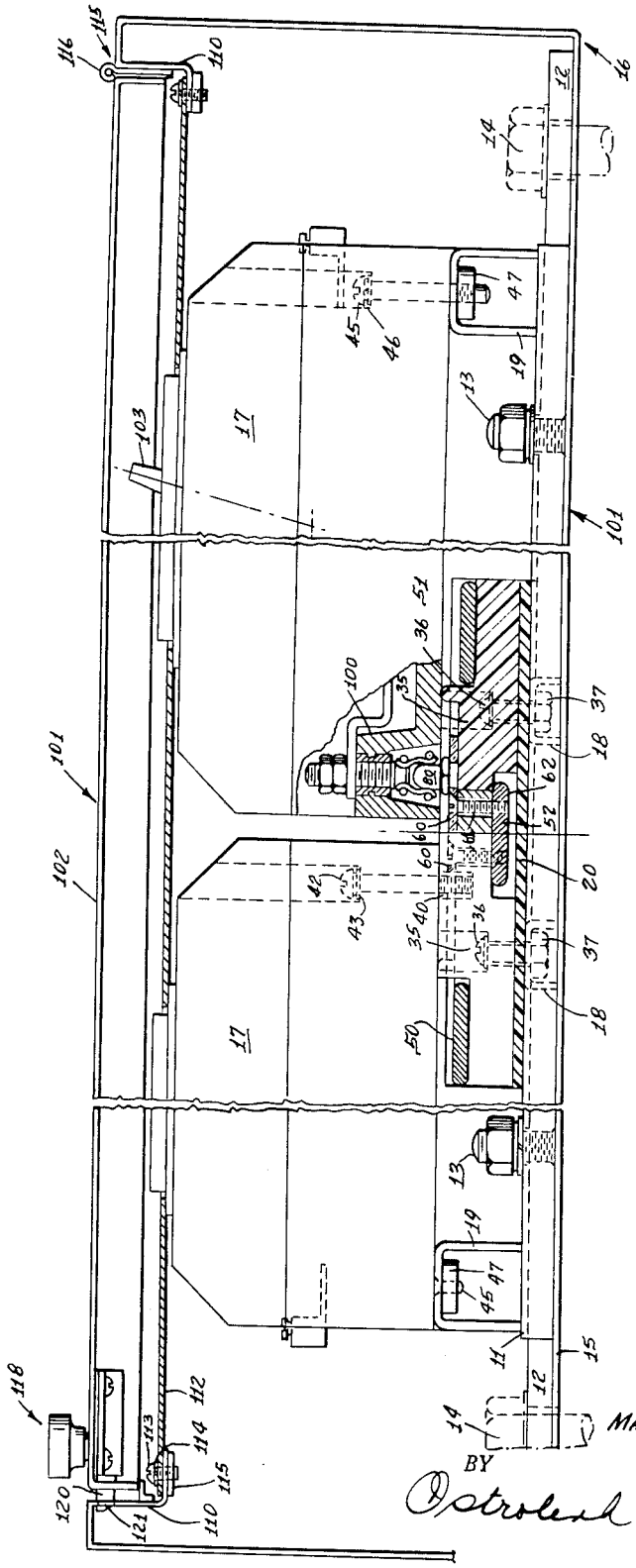


FIG. 6.

INVENTOR.
MARVIN A. MORRIS
BY
Ostrolenk & Faber
ATTORNEYS

United States Patent Office 2,737,613 Patented Mar. 6, 1956

2,737,613

PANEL BOARD TERMINAL MOUNTING BLOCKS

Marvin A. Morris, Philadelphia, Pa., assignor to I-T-E Circuit Breaker Company, Philadelphia, Pa., a corporation of Pennsylvania

Application April 13, 1951, Serial No. 220,893

7 Claims. (Cl. 317—119)

My present invention relates to circuit breaker plug-type mounting means and more particularly to means for mounting and supporting both plug-type circuit breakers and their immediate associated buses.

Heretofore most panel board constructions have been so arranged that two supporting means were necessary, one for the bus and the other for the circuit breaker itself. With the use of this invention, the supporting means for both the circuit breaker and its bus is in one piece. With the use of this support there is less steel construction within the panel board box or enclosure. The enclosure can, therefore, be made more shallow. This gives an overall saving in weight and space.

This invention also contemplates a method of panel board construction so that it makes the assembly job easy.

My invention further contemplates an arrangement of the circuit breaker mounting means in such a manner that the individual circuit breakers contained in a panel board group may readily be attached or removed from the switchboard from the front thereof with complete safety for the operator and in the simplest possible manner.

Essentially the panel board mounting of my invention is a single moulding with a number of inserts and counterbored holes. The inserts are engaged by bolts which thus secure the circuit breakers to the moulded mounting while the counterbored holes house screw and nut means to secure the moulded mounting to a supporting frame with the panel board enclosure. The moulding has also a set of circuit connections with projecting lugs which are engaged by suitable connections of the plug-in front removable circuit breakers. The moulding has the appropriate recesses to receive the buses so that the buses can make direct contact with the circuit connections. The moulded mounting may be supported by an orthogonal system of metallic U-shaped channels.

The primary object of my invention is to provide an improved means for mounting electrical apparatus, such as plug-in front removable circuit breakers, on panel board structures.

A more specific object of my invention is a panel board terminal block supporting both breakers and buses.

A further object of my invention is to provide panel board mounting means which may be economically manufactured and installed.

Another object of my invention is the provision of means whereby less steel is used in the construction of the panel board box, thus giving an overall saving in weight.

A further object of my invention is the provision of means whereby the panel board box can be made more shallow, thus giving an overall saving in space.

Still another object of my invention is the provision of simplified mounting means to make the assembly easier.

Another object of my invention is to provide a panel board structure in which the three-phase buses are substantially isolated from each other.

These and many other objects of this invention will become apparent in the following description and drawings in which:

Figure 1 is a perspective view of the panel board mounting of this invention showing a mounted circuit breaker.

Figure 2 is a plan view of the circuit breaker support moulding of this invention.

Figure 3 is a cross-sectional view taken on line 3—3 of Figure 2 looking in the direction of the arrows.

Figure 4 is an end view of the circuit breaker support moulding of Figure 2.

Figure 5 is a top view of the panel board showing four circuit breakers mounted on two mounting blocks of my invention.

Figure 6 is an end view of the panel board mounting showing the panel board depth, method of mounting the support and the circuit breaker.

Referring first to Figure 1, I have here shown my novel circuit breaker support moulding for a three-phase system. My novel circuit breaker support is comprised of support moulding **10** and horizontal U-shaped supporting posts **11** of structural steel arranged with their flanges running perpendicular to the front of the moulding **10**. U-shaped supporting posts **11** are secured on and enclose steel posts **12** of rectangular cross-section. Rectangular steel posts **12** (Figure 6) are secured to U-shaped post **11** in any suitable way, for example, by bolts and nuts **13**. Furthermore, steel posts **12** are secured by means of bolts **14** to the rear sheet **15** of enclosure **16** which completely encloses support moulding **10** and circuit breakers **17**.

Vertical connecting members **18** and **19** (Figure 1), also U-shaped and of structural steel, interconnect the horizontal posts **11** to form a complete framework. A pair of connecting members **18** further connect support moulding **10** to horizontal posts **11** while connecting members **19** support the individual circuit breakers **17**.

A layer of insulating material **20**, for example melamine, is interposed between the support moulding **10** and the steel framework, thus insulating the current carrying portion of the moulding from the steel framework.

The support moulding **10** (Figures 2, 3, 4, and 6) consists of a rectangular shaped plastic moulding having two lateral recesses **30**, **31** and one centrally located recess **32**. All three recesses **30**, **31** and **32** extend transversely from one end to the other of support moulding **10**. The support moulding **10** is provided with appropriately shaped counterbored mounting holes **35** through which bolts **36** can engage corresponding nuts **37** located inside U-shaped vertical member **18**. These bolt and nut means **36**, **37** thus secure support moulding **10** on the U-shaped vertical members **18** and, therefore, also on the main framework.

Inserts **40** (Figures 2 and 6) are placed inside another series of appropriately shaped holes **41** in support moulding **10**. Circuit breakers **17** are provided on one side with screws **42** and washers **43**. Screws **42** extend beyond the back of circuit breaker **17**, thus permitting their engagement with inserts **40** in support moulding **10**.

Circuit breakers **17** are further provided on the side opposite the above-mentioned side with screws **45** and washers **46**. Screws **45** engage suitable fixed nut plates **47** inside U-shaped vertical member **19**.

Circuit breakers **17** are thus secured to the main framework, having one side connected through screws **42** to the support moulding **10** and the other secured to U-shaped vertical members **19** through bolt **45** and nut means **47**.

The three-phase system locally consists of buses **50**, **51** and **52** (Figure 1). Buses **50** and **51** are supported by support moulding **10** in recesses **30** and **31**, respectively, and are secured to support moulding **10** by bolt and nut means **53** and **54** (Figure 2).

More precisely, bolts **53** engage the counterbored holes **54** in support moulding **10**, appropriate holes (not shown) in the buses **50** and **51** and nuts **54** on the other side of buses **50** and **51**.

Bus **52** instead is carried by support moulding **10** in

recess 32 and is secured thereon by means of screws 60 peened over after engagement with holes 61 in support moulding 10 and appropriate holes 62 in bus 52.

Moulding 10 (Figure 1) is also provided with three recesses 65, 66, 67 perpendicular to the above-mentioned recesses 30, 31 and 32. Recess 65 extends from the side 68 of support moulding 10 to shoulder 69 of the other end of support moulding 10 but before reaching recess 31. Recess 66 extends from the side 70 of support moulding 10 upward to shoulder 71 but before reaching recess 30.

Recess 67 located between recesses 65 and 66 extends for a suitable length but does not extend to recesses 30 and 31. A connecting bar 75, consisting of a rectangular conducting bar 76 with two projecting lugs 77, is placed in recess 67 of support moulding 10 and secured to it by means of screws 60. Thus, screws 60 not only secure bus 52 to support moulding 10 but also secure connecting bar 75 in recess 67 of support moulding 10 and serve as electrical connection between bus bar 52 and connecting bar 75.

A connecting bar 78 consisting of a rectangular bar 79 and two projecting lugs 80 extends in recess 65 from the top side of support moulding 10 to shoulder 69 of the bottom end of support moulding 10. Near shoulder 69 (Figures 1 and 2) connecting bar 78 has a bore 80*a* aligned with another bore 81 in support moulding 10. A bolt 85 in bores 80*a* and 81 secures connecting bar 78 to support moulding 10 by engaging a nut 86.

A third connecting bar 90 similar to connecting bar 78 and having two projecting lugs 91 extends in recess 66 from the other side of support moulding 10 to shoulder 71. Near shoulder 71 a bolt 92 in appropriate aligned bores 93 and 94 in the support moulding 10 and connecting bar 90, respectively, engages a nut 95, thus securing connecting bar 90 to support moulding 10.

Transverse recesses 30, 31 and longitudinal recesses 65 and 66 have such depth that when appropriate bus bars are placed in recesses 30 and 31, connecting bars 78 and 90 bear against them, thus producing a region of electrical contact.

Furthermore, lugs 77, 80 and 91 of connecting bars 75, 78 and 90, respectively, are each engaged by separable contacts 100 of circuit breakers 17 (Figures 1 and 6).

Thus, electric currents go from the bus bars 50, 51, 52 to separable contacts 100 of circuit breakers 17 through connecting bars 75, 78 and 90 and lugs 77, 80 and 91, respectively.

Referring now to Figures 1 and 6, it is seen that support moulding 10 and circuit breakers 17 mounted on the framework consisting of U-shaped posts 11, 18 and 19 and rectangular shaped rods 12 are enclosed by enclosure 16 consisting of a rectangular box having the front side 102 removable to give access to operating levers 103 of circuit breaker 17. Support moulding 10 is secured to the rear side of housing 16 by means of bolts 14 which extend beyond the back side of housing 16 to eventually engage a framework (not shown), thus securing housing 16 with support shoulder 10 and circuit breakers 17 to the framework in a position where they can be easily reached.

Rectangular box 16 has also angle extensions 110 provided with appropriate holes 111 so that a metallic sheet 112 can be bolted thereon by means of bolts 113, washers 114 and nuts 115. Since metallic sheet 112 is connected to enclosure 16 and enclosure 16 is grounded to the framework (not shown), metallic sheet 112 is also grounded, thus providing a dead or grounded front which will serve as a low resistance by-pass, protecting the operator from any fault which may occur at any one circuit breaker 17.

Removable door 102 completely covers dead front sheet 112. Removable door 102 is pivoted at 115 by means of pin 116, while on the upper side it is provided with a suitable locking device 118 to lock the door 102 on housing 16. For example, the lock 118 could just be a sliding extension 120 engageable with an appropriate hole 121 in upper extension 110 of housing 16.

From the above description it is now apparent that the assembly of my invention would follow approximately these steps (Figure 6). First U-shaped posts 11, 18, 19 are secured to the rear side of housing 16 and the housing 16 to the framework (not shown) by means of bolts 14. Then support moulding 10 having on its rear side insulating sheet 20 is slid between U-shaped posts 11 and 18 and bus bars 50, 51 and 52 so that bus bars 50, 51 and 52 occupy their respective recesses 30, 31 and 32.

Connecting bars 75, 78 and 90 are then secured in their recesses 65, 66 and 67, respectively, as above-described in connection with Figures 1 and 2.

Finally circuit breakers 17 are placed in appropriate position over support moulding 10 so that circuit breaker contacts 100 engage lugs 80, 77 and 91 of bus bars 50, 52 and 51, respectively.

Circuit breakers 17 are further secured to U-shaped posts 19 by means of bolt and nut means 45, 57. When the circuit breakers 17 have been secured to the support molding 10, grounding sheet 112 is placed on their front. Sheet 112 is provided with appropriate holes around operating levers 103 of circuit breakers 17, thus allowing the operators to operate circuit breakers 17 once door 102 has been opened.

The last assembly step would thus be the placement of door 102 on enclosure 16 to completely enclose circuit breakers 17 and their support moulding 10.

The disassembly is performed in steps which are the reverse of the above-mentioned. It is to be noted that circuit breakers 17 can be easily removed from the housing by first disengaging bolts and nuts 45, 47 and pulling them toward the operator, that is, away from enclosure 16, thus separating circuit breaker contacts 100 from lugs 77, 80 and 91 of support moulding 10.

In the foregoing I have described my invention solely in connection with specific illustrative embodiments thereof. Since many variations and modifications of my invention will now be obvious to those skilled in the art, I prefer to be bound not by the specific disclosures herein contained but only by the appended claims.

I claim:

1. In a panel board mounting for a plurality of circuit interrupters comprising an insulating mounting block having passageways therein, a support thereof; insulating mounting inserts secured to said mounting block; screws engaging said inserts and securing said interrupters to said mounting block; means securing said mounting block to said support; said mounting block having an equal number of transverse and longitudinal recesses, two of said longitudinal recesses lying in one plane and communicating with the upper surface of said mounting block, a third said longitudinal recess communicating with the lower surface of said mounting block, a current carrying connection comprising a number of buses and an equal number of rectangular connecting bars, said buses being carried by said mounting block in said longitudinal recesses, means securing said buses to said mounting block; each of said connecting bars having projections, said connecting bars being housed in said transverse recesses, said connecting bars being secured to said buses and forming the said current carrying connection, said projections extending above said mounting block, said projections forming disconnect contacts for said circuit interrupters; a housing, said switchboard mounting and said interrupters being completely enclosed by said housing; said housing comprising a removable door; a metallic sheet between said door and the front of said interrupters, an opening in said sheet, said interrupters being controlled through said opening.

2. A panel board comprising a unitary moulding for a

plurality of removable circuit breakers, parallel passageways in said moulding, two of said passageways lying in the same plane and communicating with the top surface of said moulding, a third passageway communicating with the lower surface of said moulding, a plurality of buses imbedded one in each of the passageways in said moulding, a connecting bar individual to and electrically a part of each of said buses, projecting lugs electrically connected to said connecting bars and extending beyond the surface of said moulding, lugs from different connecting bars being positioned in alignment along said panel in the direction of said buses for engaging with the back connection studs of said circuit breaker, said moulding and buses for a plurality of circuit breakers forming a unitary structure.

3. In a panel board mounting for a plurality of circuit interrupters comprising a unitary molding for a plurality of removable circuit breakers; a first, second and third passageway in said moulding for each of a plurality of bus bars, said first and said third passageways extending along the upper outer edge of said unitary molding, said second passageway extending along the bottom center of said unitary molding; said first, second and third passageway being parallel to each other; said first and third passageways being in a first plane and said second passageway being in a second plane; buses supported in each of said first, second and third passageways and positioned substantially parallel to each other; said buses supported in said first and third passageway being in said first plane and said bus supported in said second passageway being in said second plane; grooves extending inwardly from said first and third passageway toward the other outer passageway, conductors electrically connected to said bus bars imbedded in said first and third passageways extending inwardly toward the center of said unitary molding and imbedded in said inwardly extending grooves, an upwardly extending opening in said unitary molding from said second passageway, conductors electrically secured to said bus bar imbedded in said second passageway and seated in said upwardly extending opening, projecting lugs electrically connected to said conductors and extending beyond the upper surface of said unitary molding, said lugs from different bus bars being positioned in alignment along said unitary molding in the direction of said bus bars for engagement with the back connection studs of said circuit breakers, said unitary molding and said bus bars for a plurality of circuit breakers forming a unitary structure for all the phases of a polyphase system.

4. A panelboard comprising a unitary molding for a plurality of removable circuit breakers, three parallel grooves in said molding, two of said grooves extending along the outer edges of said unitary molding and communicating with the top surface thereof, the other groove extending along the middle of said unitary molding and communicating with the bottom surface thereof, a bus mounting in each of said grooves, a conductor individual to and electrically a part of each of said buses, each of said conductors extending substantially at right angles from its individual bus bar, at least one projecting lug electrically connected to each of said conductors and extending beyond the surface of said molding, said projecting lugs being positioned in alignment along said panel in the direction of said buses for engaging with the back connecting studs of said circuit breakers, said molding and buses for a plurality of circuit breakers forming a unitary structure.

5. In a panelboard mounting for a plurality of circuit interrupters comprising an insulation mounting block having a first, second and third passageway therein, there being a passageway for each of a plurality of phases and the passageways extending parallel with each other, buses supported in each of said passageways and extending substantially parallel to each other, said first and third passageways extending along the outer portions of said

mounting block and communicating with the top surface thereof, said second passageway extending along the central portion of said mounting block and communicating with the bottom surface thereof, transverse passageways extending from and perpendicular to said first and third passageways, conductors extending from said buses supported in said first and third passageways, said conductors extending inwardly toward each other and toward said second passageway, said conductors being mounted individually in said transverse passageways and each being electrically connected to an individual bus in said first and third passageways, projections electrically connected to said bus in said second passageway, projections electrically connected individually to said conductors, said projections protruding above said insulating block, said plurality of projections being in alignment in the direction of said bus bars, said projections forming disconnect contacts for said circuit interrupters.

6. A panelboard comprising a unitary molding for a plurality of removable circuit breakers, a plurality of bus bars supported by and within the surface of said molding, two of said bus bars communicating with the top surface of said unitary molding and one of said remaining bus bars communicating with the bottom surface of said unitary molding, said buses being spaced from each other transversely across said molding and extending parallel to each other, a plurality of conductors mounted within the surface of said molding, each of said conductors being connected to individual bus bars and extending in a direction normal to said bus bars, and terminal means connected to individual conductors, said terminal means being in alignment in a direction parallel to said bus bars and extending normal thereto in a plane normal to the surface of said molding, said terminal means extending above the surface of said molding so that the base of a circuit breaker rests on the surface of said molding when the circuit breaker engages said terminal means.

7. A panelboard comprising a unitary molding for a plurality of removable circuit breakers, a plurality of bus bars supported by and within the surface of said molding, two of said bus bars lying in the same plane and communicating with the upper surface of said unitary molding, a third said bus bar lying in another plane and communicating with the lower surface of said unitary molding, said buses being spaced from each other transversely across said molding and extending parallel to each other, a plurality of conductors mounted within the surface of said molding, each of said conducors being connected to individual bus bars, and terminal means connected to individual conductors, said terminal means being in alignment in a direction parallel to said bus bars and extending normal thereto in a plane normal to the surface of said molding and having a length such that it protrudes above the surface of said molding such that when a circuit breaker engages said terminal means, the base of the circuit breaker rests on the surface of said molding.

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