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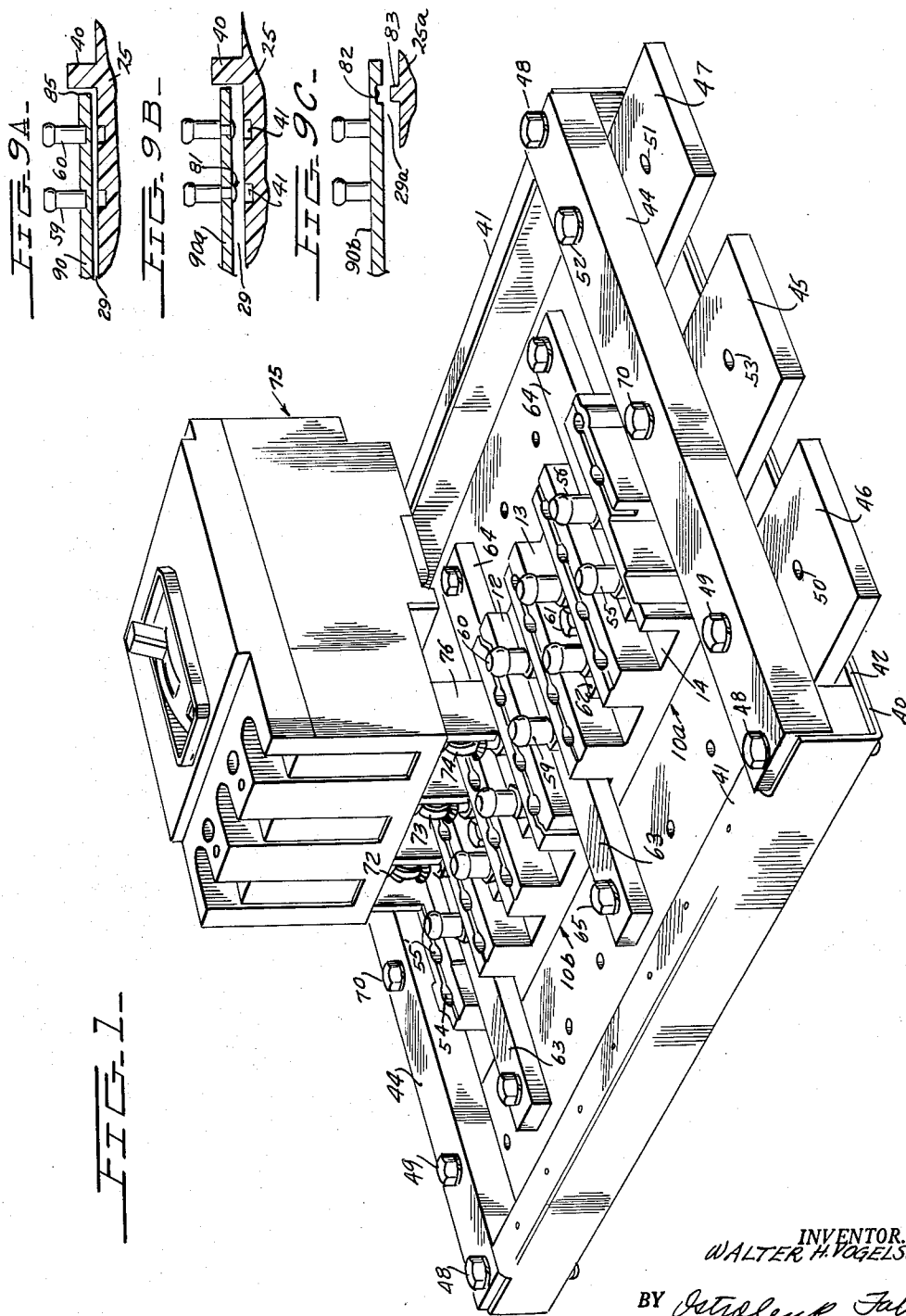
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3,005,934

PANEL BOARD

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3 Sheets-Sheet 1



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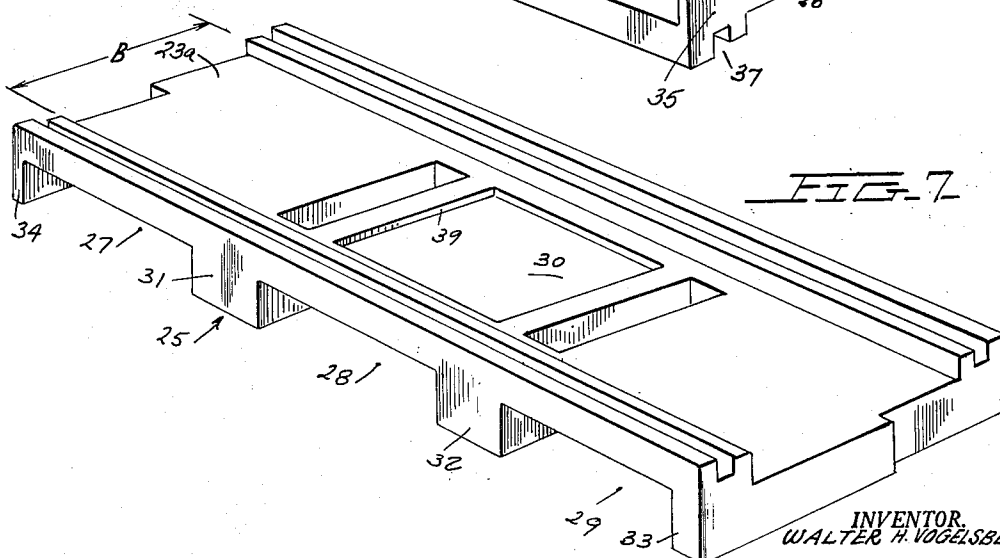
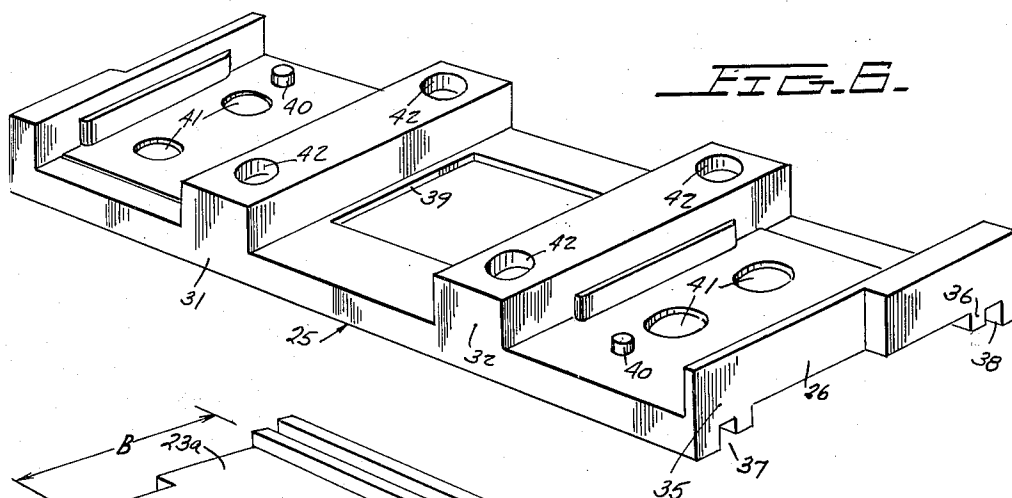
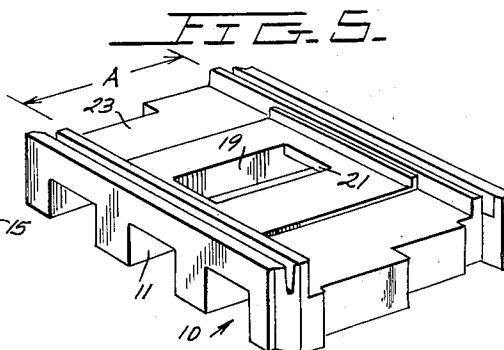
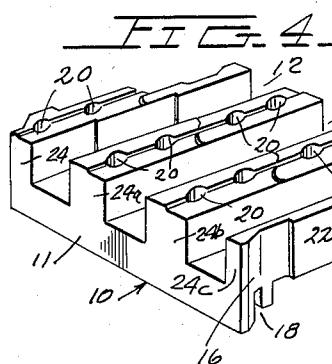
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PANEL BOARD

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3 Sheets-Sheet 3



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1

3,005,934

PANEL BOARD

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4 Claims. (Cl. 317—119)

My invention relates to a panel board assembly and more particularly is related to an arrangement wherein insulating blocks are supported by the bus structure.

The panel board arrangement to which my invention is directed are shown generally in applications Serial No. 291,090, filed June 2, 1952, now Patent No. 2,766,405, and Serial No. 361,223, filed June 12, 1953, now Patent No. 2,914,708, and Patent No. 2,737,613, all assigned to the assignee of the instant invention.

In many of the prior art arrangements of panel board assemblies, molded elements, which are required to provide sufficient dielectric barrier between associated bus bars, serve to both support and position the plurality of bus bars. However, it has been found that as the rating of the protective equipment to be connected to the panel board increases, it is necessary to increase both the size of the bus as well as provide a greater spacing between adjacent buses. Thus, as the ratings increase, it has become necessary to make larger mounting elements to provide greater spacing and take care of the increased weight of the bus bars.

In some installations, the molded elements have become extremely cumbersome and expensive and also very difficult to manufacture in view of the mass involved in the single molding.

The insulating block of my invention merely insulates the connecting straps from each other and from the bus bars to which they are not connected but does not insulate the bus bars from one another. Nor does the insulating block serve to space or support the bus bars. Instead the bus structure is supported in a metal frame by means of suitable mounting blocks and the insulating block is in turn mechanically supported by the electrical or bus structure.

In the case of a 3 wire system, the insulating block is made to straddle the center conductor. The center conductor is disposed in a plane slightly below that of the two outside conductors. This arrangement permits the use of flat straps to connect the outside conductors to the insulating means rather than the shaped straps required by many of the prior art arrangements.

Thus, the insulating block may be considerably smaller than insulating means heretofore used and it may be constructed of material having relatively low mechanical strength.

Accordingly, the primary object of my invention is to provide a novel panel board assembly in which the insulating block is supported by the bus bars.

Another object of my invention is to provide a novel panel board assembly in which the insulating block serves only to insulate the connector straps from each other and the bus bars, and is not required to support or space the plurality of bus bars.

A further object of my invention is the provision of a panel board arrangement in which the insulating blocks are not required to support the heavy weight of the bus bars and serve only to provide dielectric strength between the bus bars and connecting straps and to provide uniform spacing for the connector straps extending from the bus bars.

Still another object of my invention is to provide a novel panel board assembly in which the insulating block may be constructed of a material having low mechanical strength.

Still another object of my invention is to provide a novel

2

panel board assembly in which the insulating block may be of compact construction.

Still another object of my invention is to provide a novel panel board assembly in which the mounting blocks need not extend the full length of the assembly but may support the bus bars at each end of the assembly.

Still another object of my invention is to provide a novel panel board assembly in which the straps extending from the bus bars to the insulating block may be flat.

Still another object of my invention is to provide a novel panel board assembly in which the insulating means may be positioned so that the assembly may accommodate a wide range of circuit breaker sizes.

Still another object of my invention is to provide a novel panel board assembly in which the insulating blocks and straps may be used interchangeably for either a two or three wire circuit.

Still another object is to provide a novel panel board assembly having means for electrically connecting and mechanically securing a circuit protecting device to the insulating block of the panel board assembly.

Another object is to provide a panel board arrangement in which the electrical terminals are in sequential alignment parallel to the bus bars to aid balancing of the loads between phases of the power source.

Another object is to provide means which will prevent arcing between phases as a circuit protecting device is being inserted on and removed from the panel board.

These and other objects of my invention will become apparent after reading the following description taken in connection with the drawings in which:

FIGURE 1 is a perspective view of my novel panel board assembly.

FIGURE 2 is a plan view of the panel board assembly.

FIGURE 3 is an end view of the panel board assembly.

FIGURE 4 is a top perspective view of one embodiment of the insulating block.

FIGURE 5 is a bottom perspective view of the insulating block of FIGURE 4.

FIGURE 6 is a top perspective view of a second embodiment of the insulating block.

FIGURE 7 is a bottom perspective view of the insulating block of FIGURE 6.

FIGURE 8 is a fragmentary end view of the panel board assembly illustrating the use of an adjusting rail.

FIGURES 9a, 9b, 9c are sections taken through the center line of one of the end grooves showing various embodiments that enable the insulating block to be used for single phase connections.

Referring to FIGURE 1, bus bars 45—47 are shown mounted in metal U-frame 40 by means of mounting blocks 44. Straddling center bus bar 45 are identical insulating blocks 10a and 10b illustrated in more detail in FIGURES 4 and 5. Insulating blocks 10a and 10b are connected to bus bar 45 by means of short straps 62 and studs 61 located in the center grooves 13 of insulating means 10a and 10b.

Straps 64 are electrically connected to bus bar 47 and project into grooves 14 while straps 63 are electrically connected to bus bar 46 and project into grooves 12. Circuit breaker 75 or other suitable means is then connected by means of jacks 72—74 to plugs 56, 58, 60. This completes the electrical path between the bus bars 45—47 and the circuit breaker 75 or other circuit protecting device.

Now in greater detail, referring to FIGURES 1—3, the assembly is held and maintained within a substantially U-shaped metal frame 40 having inwardly projecting ears 41. A sheet of insulation 42 is positioned against the flat surface of the frame 40. Mounting blocks 44 made of insulating materials, are positioned in undercut

sections at the ends of insulating mounting members 43 and are secured thereto by means of studs 48. Members 43 and mounting blocks 44 are in turn secured in frame 40 by means of ears 41 which overlap members 43 and abut mounting blocks 44. Studs 52 pass through appropriate clearance holes in mounting blocks 44 and are received by tapped holes 51 of bus bar 47. By taking up on studs 52 bus bar 47 is drawn up against the under surfaces of mounting blocks 44. In a like manner studs 49 mate with tapped holes 50 to draw bus bar 46 against the under surfaces of insulators 44. In this manner bus bars 46 and 47 are oriented in the same plane.

Bus bar 45 is positioned in a plane parallel to and lower than the plane of bus bars 46 and 47. This is achieved by using spacers 71, which prevent studs 70, that have mated with holes 53, from drawing bus bar 45 against the under surfaces of mounting blocks 44. Spacers 71 may either be an integral part of mounting blocks 44 or be separate components.

FIGURES 4 and 5 illustrate my novel insulating blocks 10 which consists of a body 11 made of insulating material preferably molded to shape. The bottom surface of the body 11 has a substantially U-shaped channel 23 whose width A is at least equal to the width of the center bus bar 45. The width of the parallel legs 15 and 16 forming channel 23 must be narrower than the spacing between bus bars 45, 46 and 45, 47 and the overall width of insulating means 10 must be less than the distance between bus bars 46 and 47.

The top surface of the insulating block 10 contains grooves 12, 13 and 14 which extend in a direction substantially perpendicular to channel 23. The protrusions 24, 24a, 24b and 24c which form the sides of grooves 12, 13 and 14 provide the necessary uniform spacing and dielectric strength between the conducting members that will be positioned within the grooves 12, 13 and 14.

Referring to FIGURES 1-3, insulating blocks 10a and 10b, each identical to insulating means 10 of FIGURES 4 and 5, are positioned on the center bus bar 45 so that the U-channel 23 straddles the bus bar 45 with legs 16 and 15 extending in the space between adjacent bus bars 45-46 and 45-47 respectively.

Each of the bus bars 45, 46, 47 are provided with connector straps. Straps 64 are secured to bus bar 47 by means of studs 68 and 67 which mate with tapped holes 51 and 51a in the bus bar 47. In a like manner straps 63 are secured to bus bar 46 by means of studs 65 and 66 which mate with tapped holes 50 and 50a in bus bar 46. It is preferable but not essential that the straps be mounted to the bus bars with two studs since using only one stud would permit a slight rotation of the strap about the stud. Strap 64 extends into groove 14 of insulating means 10a and strap 63 extends into groove 12.

An electrical connection from the center bus bar 45 is brought to the top side of insulating block 10a by means of stud 61 that passes through a clearance hole in connector straps 62 and mates with tapped hole 53 of bus bar 45, with conducting strap 62 straddling opening 19 in groove 13. The thickness 21 of the bottom section of grooves 12 and 14 provides the insulation between the straps 63, 64 and bus bar 45. This thickness 21 also brings the level of the bottom surface of grooves 12 and 14 flush with the top surfaces of bus bars 46 and 47 so that flat straps 63 and 64 rather than bent or formed straps may be used.

Each connector strap 62, 63, 64 is provided with connector means which in this case takes the form of appropriately shaped plugs. Plugs 55 and 56 are secured to strap 64, plugs 59 and 60 to strap 63, and plugs 57 and 58 to strap 62. The connector means provides a convenient connector for circuit protective equipment which in this case is illustrated as a circuit breaker 75.

Tulip connectors 72, 73, 74 of breaker 75 engage 75

plugs 60, 58, and 56 respectively to electrically connect the circuit breaker 75 to the bus bars 45, 46, 47. A second breaker may be installed with the use of a single insulating block 10 by mating tulips 72, 73 and 74 with plugs 55, 57 and 59 respectively. The plugs and tulip connectors cooperate to form disconnect contacts.

Threaded inserts 54, 55' are provided in recesses 20 to permit fastening of the circuit breaker 75 to the insulating block 10 by means of screws (not shown). In the case of small circuit breakers, the mating of the plugs and tulip connectors will in themselves usually provide a sufficient mechanical connection. Secondary grooves 22 in barriers or protrusions 24, 24a, 24b, 24c of the insulating block 10 accommodate extensions 76 of the circuit breaker 75 to prevent arcing between connectors of adjacent phases while the circuit breaker is being installed or removed from the panel board assembly.

Thus, it will be noted that my novel insulating block 10 serves to space and insulate the straps 62, 63 and 64 from each other and to insulate straps 63 and 64 from the center bus bar 45. However, insulating block 10 does not serve to space or support the bus bars 45, 46 and 47 and for this reason the insulating block 10 is of small size and it may be constructed of material having low mechanical strength.

It will be noted that with my novel arrangement any number of insulating blocks 10 may be positioned in alignment depending upon the number of circuit breaker terminal connections that are required. In the illustrated views of FIGURES 1 and 2, I have shown two insulating blocks 10a and 10b positioned in alignment, thereby providing an arrangement of four sets of three terminals for the connection of circuit protective devices.

In order for the panel board assembly to accommodate small circuit breakers it may be necessary to raise the insulating block 10 so that it does not rest on the center bus bar 45. This is done by placing appropriate elevating rails 80 (FIG. 8) in channels 17 and 18 cut in parallel legs 15 and 16 of block 10. These rails 80 will rest on the insulation 42 on the flat surface of frame 40 and raise the height of the top surface of the insulating block 10. It will then be desirable but not essential to use spacers (not shown) between the straps 63 and 64 and the bus bars 46 and 47.

FIGURES 6 and 7 illustrate insulating block 25 which is another embodiment of the invention. Insulating block 25 is used to feed circuits having greater current requirements than the circuits fed through insulating block 10.

The width B of channel 23a is only slightly larger than width A and channel 23. But, perpendicular grooves 27, 28, and 29 are much wider than grooves 12, 13 and 14 in order to accommodate the larger straps required to handle greater amounts of current. The other dimensions of the insulating blocks 25 and 10 are approximately equal since the voltages handled are the same and heating is not a major problem.

Insulating block 25 consists of channel 23a in the underside of the body 26 formed by parallel legs 35 and 36 with channels 37 and 38 to accommodate elevating rails cut in these legs 35, 36. Perpendicular grooves 27, 28 and 29 are formed in the top side by protrusions 31, 32, 33 and 34, with insert recesses 42 in protrusions 31 and 32. Thickness 39 insulates the connecting straps from the center bus bar.

Depressions 41 and boss 40 are located in grooves 27 and 29 to serve as a positioning means when the insulating block 25 is used for single phase connections.

For single phase connection it is desirable that the insulating block 25 be prevented from moving laterally once the straps are in place. FIGURES 9A, 9B and 9C illustrate appropriate methods of accomplishing this end.

In FIG. 9A, strap 90 is made long enough so that

5

its end 85 will abut boss 40 in groove 27 thus preventing insulating block 25 from moving to the left. In a like manner the strap located in groove 29 will abut boss 40 in groove 29 from the opposite direction and prevent movement to the right.

In FIG. 9B, pin 81 extends from the bottom surface of strap 90a. The pin 81 mates with depressions 41 in groove 29 and prevents movement of insulating block 25 to the left or right.

In FIG. 9C the strap 90b has a slot or keyway 82 cut in its bottom surface. This keyway mates with projection or key 83 in groove 29a of insulating block 25a and thus prevents movement of the insulating means to the left or right.

In the foregoing, I have described my invention only in connection with preferred embodiments thereof. Many variations and modifications of the principles of my invention within the scope of the description herein are obvious. Accordingly, I prefer to be bound not by the specific disclosure herein but only by the appending claims.

I claim:

1. A panelboard assembly being comprised of a first, second and third bus bar, a pair of mounting blocks and an insulating block; said first and third bus bars being mounted and secured in spaced relationship in substantially in a first plane with said second bus bar being positioned between said first and third bus bar in a plane substantially parallel to said first plane, said insulating block having two legs on one surface thereof forming a substantially U-shaped channel extending in substantially the same direction as said bus bars; said insulating block being positioned on only said second bus bar so that said legs extend respectively between said first and second bus bar and said second and third bus bar; said U-shaped channel comprising the sole channel of said block having a bus bar disposed therein; said insulating block having grooves in the surface parallel to and opposite the surface containing the U-shaped channel; said grooves extending in a direction substantially perpendicular to the direction of said U-shaped channel; each of said said grooves extending in a direction substantially perpendicular to the direction of said U-shaped channel; each of said grooves receiving a connector strap secured to each of said bus bars; said connector straps having means by which circuit protective equipment can be electrically connected to said bus bars; said grooves serving to insulate and space said connector straps from each other; said insulating block serving to insulate each strap from the bus bars to which it is not secured; said insulating block having means whereby said circuit protective equipment may be mechanically secured to said insulating block.

2. A panelboard assembly being comprised of a plurality of bus bars extending in a substantially parallel direction and positioned in spaced relationship; a pair of mounting blocks to position and maintain said plurality of bus bars in said spaced relationship; an insulating block having a substantially U-shaped channel in a first surface; said insulating block having a plurality of grooves in a second surface; said first surface being opposite and parallel to said second surface; said grooves extending in a direction substantially perpendicular to said U-shaped channel; said insulating block positioned between said pair of mounting blocks with said U-shaped channel surrounding one of said bus bars; said U-shaped channel

6

comprising the sole channel of said block having a bus bar disposed therein; said insulating block being positioned entirely between the outermost of said plurality of bus bars; said grooves receiving connecting straps from said bus bars and providing a uniform spacing and insulation for said connector straps.

3. A panelboard arrangement being comprised of a frame, an electrical means, a first insulating means, a second insulating means, an elevating means; said electrical means comprising a plurality of bus bars and a plurality of connector straps secured to said plurality of bus bars; said second insulating means secured to said frame and positioning said bus bars in spaced relationship within said frame; said first insulating means being positioned by said electrical means between the outermost bus bars of said electrical means; said first insulating means being barriers on a first surface to form a plurality of grooves positioned laterally to said bus bars; each said connector straps extending into separate grooves of said second insulating means to thereby be insulated from each other and insulated from the bus bars to which they are not connected; said first insulating means having channels cut in a surface opposite said first surface and running transverse to said grooves; said channels engaging said elevating means to raise said insulating block so that it does not rest on any of said bus bars.

4. A panelboard arrangement being comprised of a frame, an electrical means, a first insulating means, a second insulating means, said electrical means comprising a plurality of bus bars and a plurality of connector straps secured to said plurality of bus bars; said second insulating means secured to said frame and positioning said bus bars in spaced relationship within said frame; said first insulating means being positioned by said electrical means between the outermost bus bars of said electrical means; said first insulating means having barriers on a first surface to form a plurality of grooves positioned laterally to said bus bars; each of said connector straps extending into separate grooves of said second insulating means to thereby be insulated from each other and insulated from the bus bars to which they are not connected; said connector straps having connector means by which circuit protective equipment may be electrically connected to said straps; said connector means being comprised of a plurality of plugs mounted on said plurality of connector straps; said barriers having secondary grooves cut therein to receive insulating extensions of the circuit protective equipment to thereby prevent arcing between the connector means as the circuit protective equipment is being mounted to or removed from the panelboard.

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