Nov. 27, 1934. H. F. STARRETT 1,981,929

PANEL DISTRIBUTING BOARD

Filed Nov. 8, 1930 4 Sheets-Sheet 1

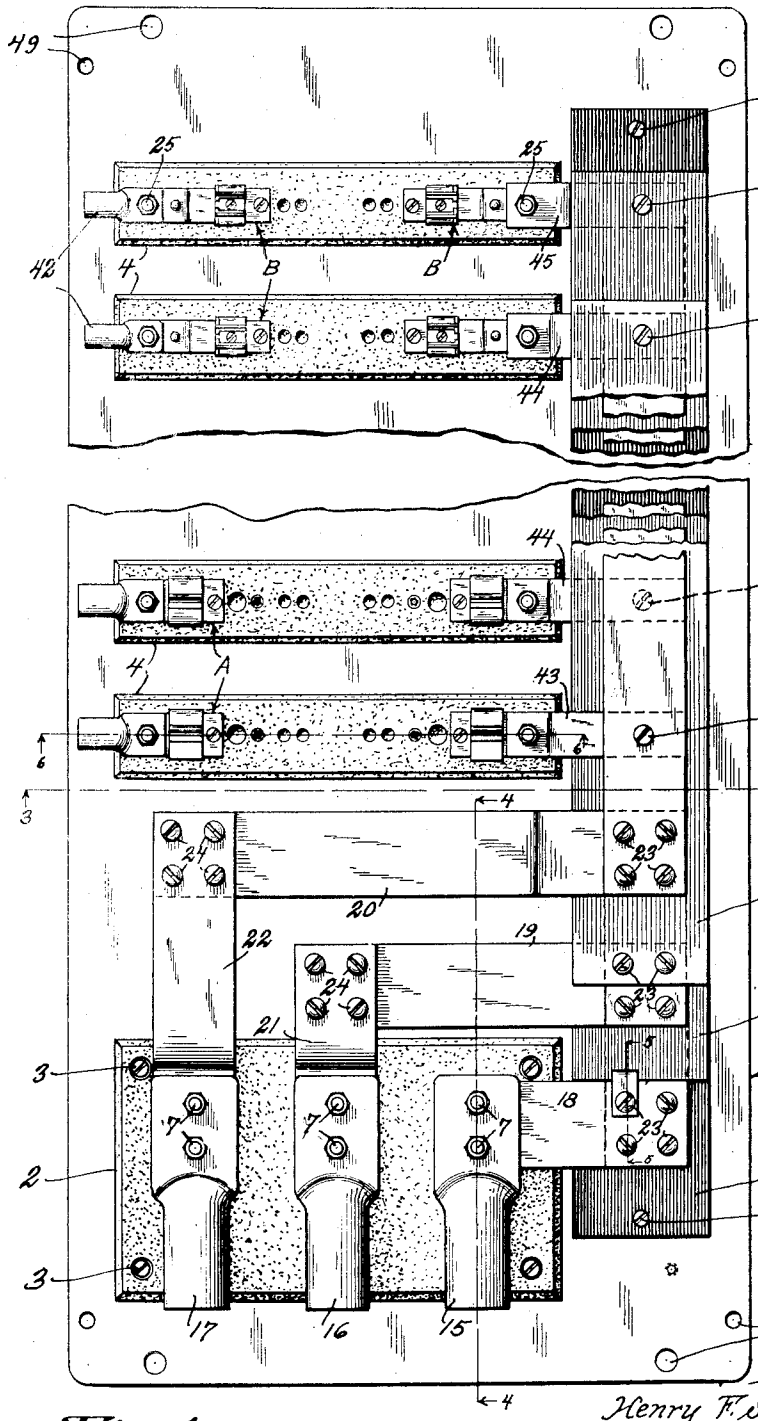


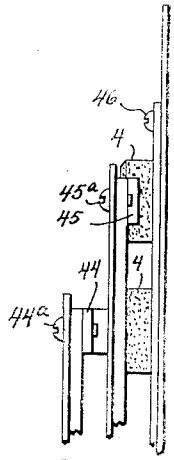
Fig. 1.

Inventor:
Henry F. Starrett,
By
Jones, Addington, Ames & Leibold.
Attorneys.

Nov. 27, 1934. H. F. STARRETT 1,981,929

PANEL DISTRIBUTING BOARD

Filed Nov. 8, 1930 4 Sheets-Sheet 2



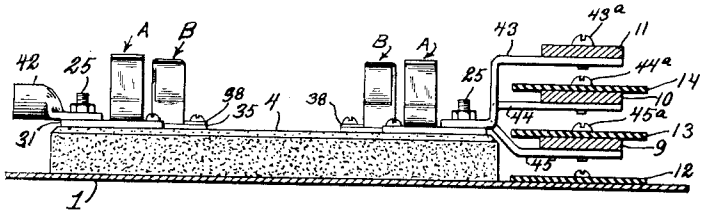


Fig. 3.

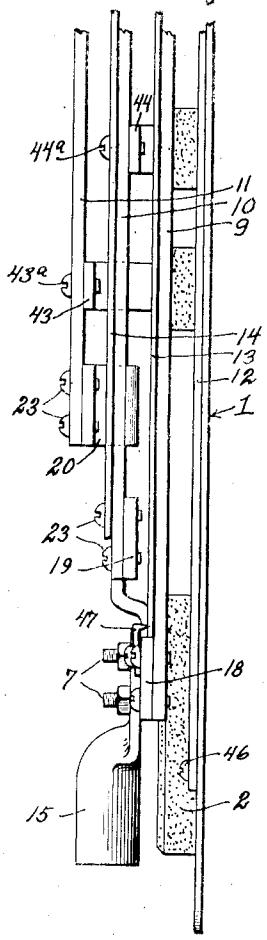


Fig. 2.

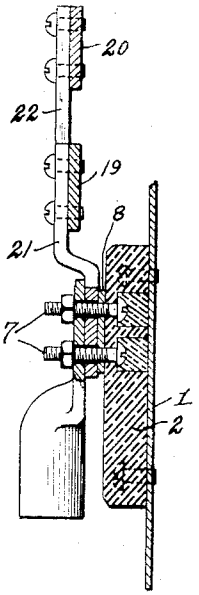


Fig. 4.

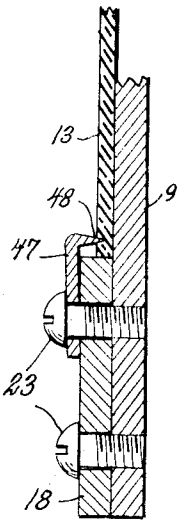


Fig. 5.

Inventor:
Henry F. Starrett,

By
Jones, Addington, Ames & Seibold,
Attorneys.

Nov. 27, 1934. H. F. STARRETT 1,981,929

PANEL DISTRIBUTING BOARD

Filed Nov. 8, 1930 4 Sheets-Sheet 3

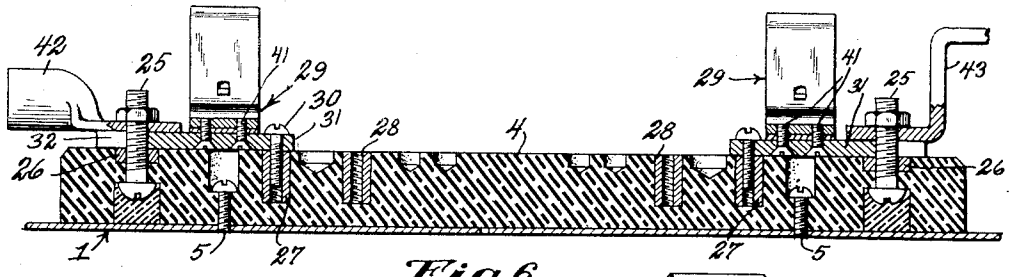


Fig. 6.

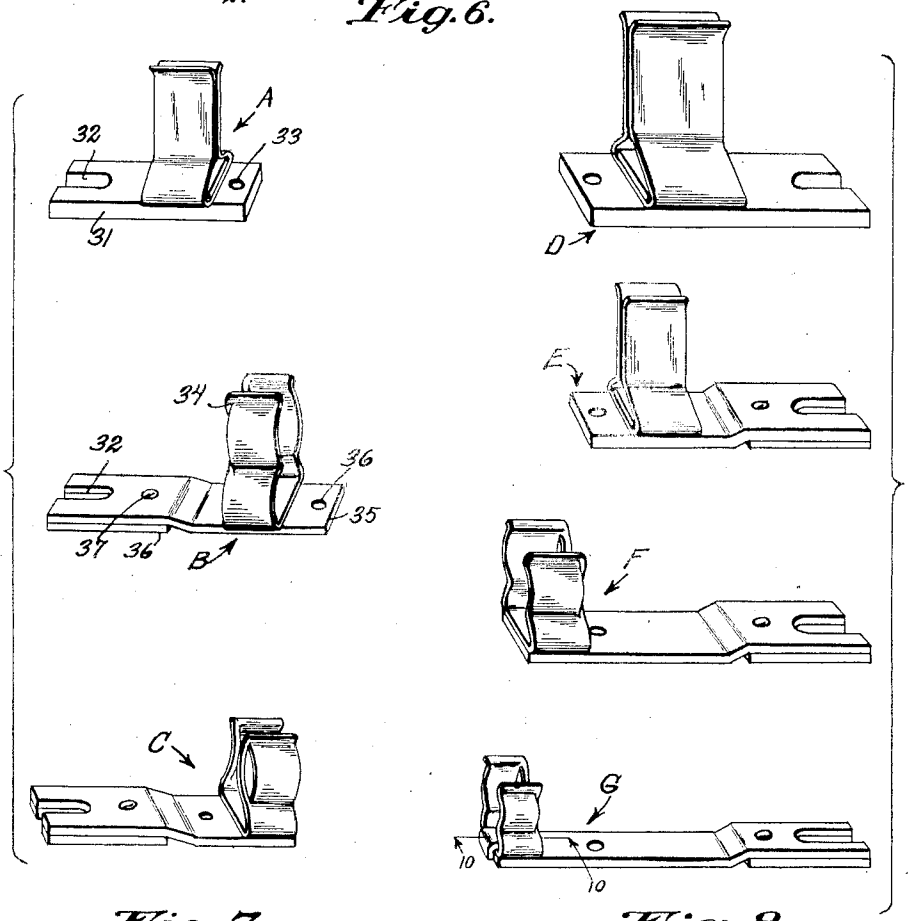


Fig. 7. Fig. 8.



Fig. 9.

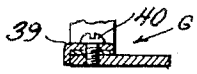


Fig. 10.

Inventor:
Henry F. Starrett.

By
Jones, Addington, Ames & Seibold.
Attorneys.

Nov. 27, 1934. H. F. STARRETT 1,981,929

PANEL DISTRIBUTING BOARD

Filed Nov. 8, 1930 4 Sheets-Sheet 4

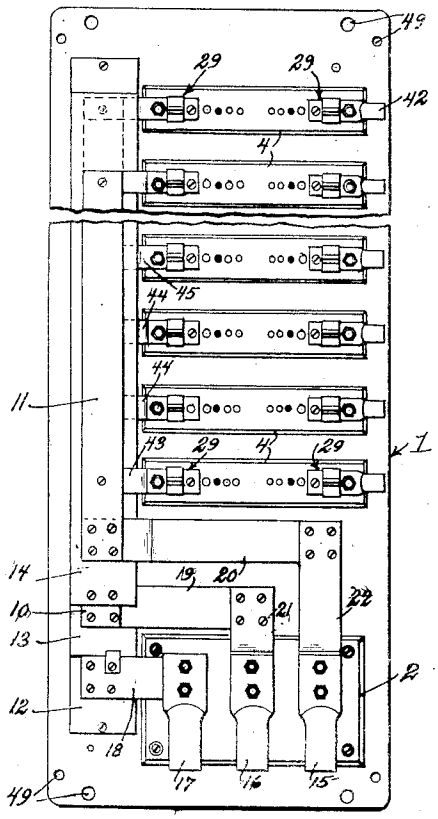


Fig. 11.

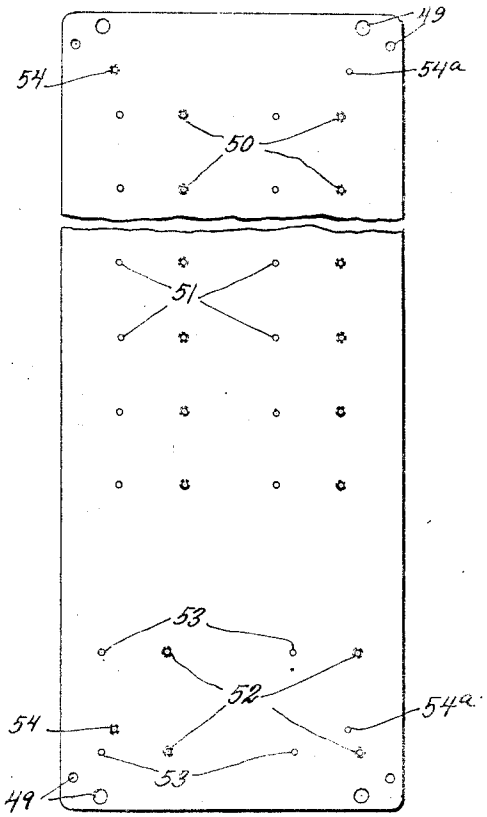


Fig. 12.

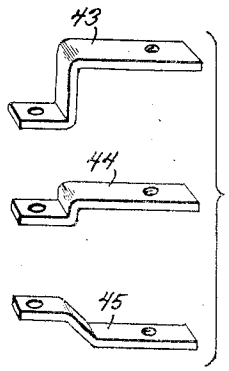


Fig. 13.

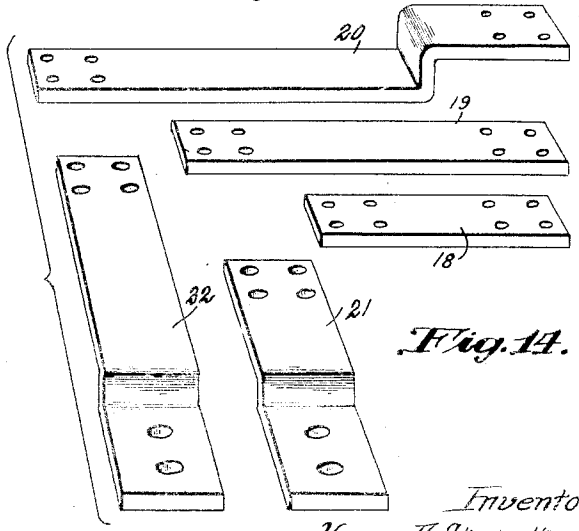


Fig. 14.

Inventor:
Henry F. Starrett,
By
Jones, Addington, Ames & Seibold,
Attorneys.

Patented Nov. 27, 1934 1,981,929

UNITED STATES PATENT OFFICE

1,981,929

PANEL DISTRIBUTING BOARD

Henry F. Starrett, Chicago, Ill.

Application November 8, 1930, Serial No. 494,213

9 Claims. (Cl. 175—369)

My invention relates to panel boards and more particularly to panel boards used in electric lighting and power distributing systems.

The present invention relates especially to what may be termed a knock-down construction wherein all of the component parts may be manufactured and shipped to the jobber or contractor, where the complete board may be assembled without the necessity for engineering skill or knowledge.

It is an object of my invention to provide a practical and improved knock-down panel board construction which will avoid the difficulties and objections of the usual distributing methods of the prior commercial art and to reduce the same to a stock basis requiring practically no assembly at the factory and wherein a maximum number of the same stock parts may be interchangeably used in assembling panel boards of various capacities. In this construction it is possible to carry in stock a number of standardized parts such as metallic bases, standardized insulating blocks, standardized bus-bars, connecting links and fuse holders. These parts, together with suitable terminal lugs, may be later assembled in any desired combination to fit commercial requirements.

The present construction is intended for use where a plurality of bus-bars are used and from which latter the current is distributed through branch-circuits having suitable fuses therein. These branch-circuits may be of several different capacities on the same board, and it is necessary that the fuse holder should be of a suitable carrying capacity and with centers spaced to take care of the necessary voltage requirements.

While it is possible, with slight modifications, to adapt my invention for the use of any suitable commercial type of fuse, it is particularly adapted for the use of cartridge fuses of either the knife-blade or ferrule type.

In carrying out my invention, I provide standard metal bases having a plurality of standardized, punched holes therein, certain of which holes are tapped to receive the particular equipment for a definite order. These tapped holes are to receive screws which will secure standardized insulating blocks for the bus-bars terminal equipment to the metallic base. Other holes are also tapped to receive branch-circuit insulating bases on which are to be mounted fuse clips of a desired capacity together with bus-bar connecting links and branch-circuit terminal lugs.

The bus-bars are of an amperage capacity sufficient to take care of the ultimate capacity of the board, and each individual distributing circuit comprising the necessary fuse clips, connecting links, and terminal lugs, is provided with copper sufficient to take care of its particular branch-circuit carrying capacity, and with the fuse clips spaced to take care of the necessary voltage requirements. The same standardized insulating bases are used for all voltages, but the standardized copper equipment is provided in two sizes, one size being rated for 250 volts, which will take care of 110 and 220 volt systems, and the other having copper sufficient to be rated at 600 volts, which takes care of 440 volt systems. The amperage varies from 30 to 200 amperes on the 250 volt systems and from 30 to 100 on the 440 volt systems. The usual type of panel board is required to be made up on order at the factory, to meet the requirements of the particular installation, with each board presenting its particular engineering problem, all of the parts being cut to the size required for a definite number and capacity of branch-circuits, and the bus-bars arranged for the particular circuit layout. The demands vary so greatly as to the required capacity of these distributing centers, that it is not feasible for either the manufacturer, jobber or contractor to carry in stock panel boards of the usual type to meet the varying requirements. These panels are, therefore, built by the manufacturer on order, according to specifications based upon the requirements of the particular installation. Thus each panel board presents a definite engineering problem.

By the use of my invention, the manufacturer may make stock parts in quantities very cheaply with practically no assembly cost; the manufacturer, jobber or contractor may carry the component parts in stock and be in a position to assemble and fill orders for any size board desired by a customer, and as there are a minimum number of parts and most of them are interchangeable for use on boards of various capacities, it is unnecessary to carry a slow moving stock of the less frequently used sizes of panel boards.

I have removed the individual panel board construction entirely from the domain of engineering and have produced a device with component parts suitable for quantity production whereby a contractor or jobber may be in a position to furnish a panel board of any desired capacity from a small and inexpensive stock, and with a minimum labor cost.

A further desirable feature of the invention is to provide a standardization whereby the com-

ponent parts are shiftable either a right or left-hand board to fit the particular requirements of the installation.

Other objects and advantages will be apparent from the accompanying description setting forth in more detail such objects and advantages and the manner in which they are realized; and also from the accompanying drawings illustrating an embodiment of the invention.

In the drawings—

Figure 1 is a front elevation of an assembled panel board embodying my invention;

Fig. 2 is a side elevation of the panel board as shown in Fig. 1;

Fig. 3 is a transverse sectional view taken on a line corresponding to line 3—3 of Fig. 1;

Fig. 4 is a detail sectional view through the bus-bar terminal connections and insulating base and taken on a line corresponding to line 4—4 of Fig. 1;

Fig. 5 is an enlarged detail sectional view through the insulator holding device and taken on a line corresponding to line 5—5 of Fig. 1;

Fig. 6 is a transverse sectional view through one of the branch-circuit insulating bases and fuse connections and taken on a line corresponding to line 6—6 of Fig. 1;

Fig. 7 comprises individual perspective views of the fuse clips used with the 600 volt equipment for 440 volt systems;

Fig. 8 comprises individual perspective views of the fuse clips used on 250 volt equipment to take care of 110 and 220 volt systems;

Fig. 9 is a perspective view of a fuse clip aligning plate;

Fig. 10 is a detail sectional view taken on a line corresponding to line 10—10 of Fig. 8 and illustrates the means used to retain the fuse clip in aligned position when the aligning plate illustrated in Fig. 9 is not used;

Fig. 11 is a front elevation of a panel board similar to that shown in Fig. 1, the direction of the branch-circuits and the position of the bus-bars being reversed;

Fig. 12 is a front elevation of the supporting base, certain of the standardized holes being tapped for use when the board is assembled as shown in Fig. 11;

Fig. 13 comprises perspective views of the standardized links used for connecting the branch-circuits to the bus-bars; and

Fig. 14 comprises perspective views of the main terminal bus-bar connecting links and extensions.

Referring to the drawings in detail, the embodiment illustrated comprises a sheet metal base plate 1, which is of a standard width and on which is mounted the component parts of the device. These base plates are made of various standardized lengths corresponding to the number of branch-circuits required. Panel boards are usually made with from 4 to 30 branch-circuits, according to the requirements of the particular installation.

In Fig. 1, a so-called left-hand assembly is illustrated, only two of the circuits being shown, the rest of the board being broken away for purposes of illustration. Standardized holes are punched in the plate 1, certain of these holes being tapped to receive the screws by which the component parts of the device are secured thereto. One set of holes is tapped for a left-hand assembly, as shown in Fig. 1, and another set of holes is tapped when a right-hand assembly is desired, as shown in Fig. 11.

It will be noted that all of the parts are especially designed for quantity production, and there is very little forming or unit assembly required. The final assembly illustrated in Fig. 1 comprises a standard insulating terminal block 2 secured to the base by means of screws 3, and branch-circuit insulating blocks 4, which are secured to the base by means of screws 5, illustrated in detail in Fig. 6. Upwardly extending bolts 7 are mounted in the terminal block 2 and secured rigidly therein by being threaded into locking plates 8 (see Fig. 4).

For purposes of illustration, the construction shown in Fig. 1 is intended for use with a three-wire system. However, it will be obvious that a two-wire system may be used if desired. A superimposed set of standardized bus-bars 9, 10, and 11 is longitudinally disposed adjacent one edge of the base plate 1 and a suitable air spacing is provided therebetween and from the plate 1 by insulating strips 12, 13 and 14, which latter are preferably of sheet fibre. The bus-bars are of standardized sizes and lengths suitable for the particular installation and are connected to suitable main terminal lugs 15, 16 and 17 by means of bus-bar connecting links 18, 19 and 20, and terminal extensions 21 and 22. The lugs and extensions are secured to the terminal insulating base 2 and securely clamped in electrical relation by means of the bolts 7. The bus-bars are provided with clearance holes to receive the screws 23 by which they are secured to the connecting links, and the screw holes in the lug extensions 21 and 22 are also clearance holes to receive the screws 24 and the bolts 7, the connecting links only being tapped to receive the screws. This provides a construction in which all of the tapping operations are confined to a minimum number of comparatively small parts.

The branch-circuit bases 4 are reversible and interchangeable and are provided with upwardly extending bolts 25 secured adjacent the ends of the base by lock nuts 26. A plurality of threaded bushings are moulded into the insulating bases 4 and consist of an outer pair of bushings 27 and an inner pair of bushings 28. These bushings are to receive the screws by which suitable standardized fuse holders are secured to the bases. The fuse holders, which are indicated generally as 29, may be of any desired capacity, the standardized construction for different capacities and centers being illustrated in Figs. 7 and 8.

Fig. 7 illustrates the standardized fuse holders used in assembling various branch-circuit bases having a capacity of 600 volts to take care of 400-volt systems, the construction of the holders and the position of the clips thereon providing the necessary center spacing to take care of the required voltage. It will be understood that in practice all of the metal parts are marked to indicate their capacity.

Fig. 7 further illustrates the fuse-holders rated at 600 volts, the holder A being for 100 amperes, holder B for 60 amperes, and the holder C, 30 amperes. Fig. 7 also illustrates the fuse holders rated at 250 volts, the holders D, E, F and G being rated at 200, 100, 60 and 30 amperes, respectively.

These fuse holders comprise fuse clips of the ordinary type suitable for knife-blade and ferrule type cartridge fuses corresponding to the capacity of the branch-circuit. The fuse clips are mounted on suitable straps having slots for engaging the branch-circuit base bolts 25 and

clearance holes to receive the screws 30 whereby they are secured to the bases.

The assembly illustrated in Fig. 1 is rated at 600 volts, in which the holders A and B are illustrated. The clip A is secured to a strap 31 having a slot 32 for engaging the bolt 25 and a clearance hole 33 to receive the screw 30, the position of the clip on the strap being such as to provide the proper voltage spacing and the cross-sectional area of the strap 31 is sufficient for a 100 ampere rating. Clip B comprises a ferrule type fuse holder 34 secured to a strap 35 of a 60 ampere rating, a clearance hole 36 being provided in such a position that the clip may be secured by means of the screws 30 in the bushings 28. These straps are also provided with the slots 32 and as less copper is required in the straps 35 of lower ampere rating, they are considerably thinner and are reinforced to a standardized thickness by means of a block 36 secured thereto by a rivet 37. The other standardized holders shown in Figs. 7 and 8 provide a means for assembling a branch-circuit fuse holding means for the usual standard ratings. The holder C is similar to that previously described except that the screw clearance hole is in a position to allow the clip to be secured in the outer bushings 27, thereby allowing the clip to be mounted on the strap in position to provide the required fuse clip spacing. The fuse holders illustrated in Fig. 8 are rated at 250 volts and all of the clearance holes are in such a position that the clips are secured to the threaded bushings 28, the clips being mounted on the straps in a position to provide the necessary spacing.

The fuse clips used for ferrule type fuses are usually secured to the straps by a single screw, and an aligning plate or washer 38 (see Figs. 3 and 9) is secured under the screws 30 and bearing against the clips to hold them in alignment.

In Fig. 8 is illustrated the clip used with 250-volt, 30 ampere rating, and in which the short fuse clip centers prevent the use of the aligning plate 38. The clip is therefore held in alignment by means of an angle plate 39 secured underneath the screw 40.

In the assembly illustrated, the knife-blade clips 29 are secured to the straps 31 by means of screws 41. Suitable branch-circuit terminal lugs 42 are secured in electrical relation to the clips by means of the bolts 25, and the bus-bars are electrically connected to the opposite clips and supported by means of links 43, 44 and 45, which latter are connected to the bus-bars 9, 10 and 11, respectively, by means of the screws 43*a*, 44*a* and 45*a* and are formed to support the bus-bars in parallel superimposed relation. The insulating strip 12, preferably of fiber, is secured to the base plate 1 by means of screws 46 to provide a standard insulated spacing between metallic parts, and the similar insulating strips 13 and 14 are secured to the bus-bars 9 and 10, respectively, by means of the screws 23 and the screws 44*a* and 45*a*, which latter also secure the bus-bars to the branch-circuit connecting links.

One end of the insulating strap 13 is held in position by means of a clip 47, which is clamped under one of the screws 23 and provided with a downturned knife edge 48 whereby the insulating strip 13 is clamped against the bus-bars 9 and held securely in place.

Fig. 12 illustrates one of the standard metallic base plates, having standardized holes punched therein. The holes 49 are standard mounting holes by which the assembly may be mounted in the usual panel board cabinet. The plate is illustrated as being tapped for the right-hand assembly shown in Fig. 11, holes 50 being tapped for the branch-circuit insulating bases when a right-hand assembly is desired, and the standardized holes 51 are tapped for the branch-circuits where a left-hand assembly is used. The holes 52 are the tapped holes for the insulating terminal lug base for a right-hand assembly, and the holes 53 are the standardized holes to be tapped for the left-hand assembly. The holes 54 are for the screws 46 used for securing the insulating strip 12 to the base for a right-hand assembly, and holes 54*a* are to be tapped for the same purpose for a left-hand assembly.

It should be noted that when a definite order is received it is only necessary to draw a base from stock of a size corresponding to the number of branch-circuits required, and the other component parts of a capacity corresponding to the voltage requirements. According to present practice only the 600-volt and 250-volt capacities are required.

In assembling it is only necessary to tap the standardized holes in the base plate for either a right or left-hand assembly and the parts may then be screwed in place by the use of only a screw driver and wrench. The assembly is accomplished easily and expeditiously at an extremely low cost and without the necessity of engineering skill or knowledge.

The arrangement of bus-bars is especially advantageous in that the construction is easily adaptable to right or left-hand assembly without a change of parts and only three types of standardized branch-circuit connecting links are required for any number of circuits of any voltage capacity.

Obviously, the invention is not limited to the specific embodiment herein illustrated and described but is capable of variations and other applications within the spirit and scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A panel board construction comprising a set of standardized bases each having standardized holes therein to be tapped to receive and support the unassembled component parts of said board including insulators in a plurality of assembled relations, to provide a desired predetermined directional arrangement, and a plurality of unassembled component sets of current-carrying parts of different capacities arranged to be interchangeably assembled on said base in a plurality of positions to form boards of desired capacities and of the desired directional arrangements.

2. In a panel board system, a plurality of base plates arranged to receive the component parts of a panel board in either right or left-hand arrangement, said component parts comprising an insulating terminal base, branch circuit insulating bases interchangeable and reversible in and for either directional arrangement, a set of standardized interchangeable fuse holders of different capacities, sets of standardized bus-bars, main terminal lugs, branch terminal lugs, a common means for securing and supporting said bus-bars and fuse holders on said branch circuit bases, a common means for securing and supporting said bus-bars and said main terminal lugs on said terminal base, and a common means for supporting said branch circuit lugs and fuse holders on said branch circuit base.

3. A panel board system comprising sets of standardized panel base plates having a plurality of sets of holes therein corresponding to standardized branch circuit requirements, standardized sets of bus-bars of standardized rating and of a length corresponding to the standardized branch circuit requirements, a single main terminal insulating base common to all of said standard parts, a single branch circuit base common to all branch circuits, standardized fuse holders interchangeably mountable on said branch circuits bases, means for supporting said bus-bars on said branch circuit bases and maintaining electrical connection with said fuse holders, and means for electrically connecting said bus-bars with terminal lugs on said terminal bases, whereby one of said standardized sets of holes in said panel base plate may be tapped to allow either a right or left-hand assembly of the component parts corresponding to the installation requirements.

4. In the panel board art the combination with a sheet metal base plate having standardized holes therein for different directional panel board assemblies, a main terminal insulating base and standardized interchangeable and reversible branch circuit insulating bases mounted on said base plate in a predetermined directional arrangement in a relation determined by the location of the holes, standard terminal lugs on said terminal base, standardized fuse holders on said branch circuit bases, parallel spaced standardized and superimposed bus-bars mounted adjacent the ends of said insulating bases and substantially at right angles thereto and standardized links supporting said bus-bars from said bases and electrically connected to said fuse holders, other standardized links of a capacity equal to said bus-bars connecting said bus-bars to said terminal lugs and secured to said terminal lugs, and means for connecting said bus-bars in either directional arrangement.

5. In the panel board art the combination with a base plate having standardized holes therein to support standard insulating bases in either right or left-hand relation thereon, standardized bus-bars arranged to be supported in superimposed relation adjacent a corresponding left or right-hand end of said insulating bases, insulating strips between said bus-bars, standardized bus-bar terminals, standardized links for supporting one end of said bus-bars from one of said bases and in electrical relation to said bus-bar terminals, standardized sets of branch circuit fuse holders of different capacities arranged to be interchangeably mounted in spaced relation on the remaining insulating bases, and standardized links for electrically connecting a fuse holder on each base to one of said bus-bars and to support the bus-bars thereon.

6. A system of standardized panel board construction, comprising a set of base plates of standardized lengths corresponding to definite numbers of branch circuits, a single branch circuit fuse holder insulating base common to all of the base plates and all of the branch circuits, a plurality of interchangeable sets of fuse holders of standardized capacities arranged to be interchangeably mounted on said branch circuit bases, each pair of fuse clips on each branch circuit base also being interchangeable, bus-bars adjacent one end of said fuse holder bases and connected to said fuse holders, said fuse holder bases being transversely shiftable on said base plates for a desired branch circuit directional arrangement.

7. A system of standardized panel board construction, comprising a set of base plates of standardized lengths corresponding to definite numbers of branch circuits, a single branch circuit fuse holder insulating base common to all of the base plates and all of the branch circuits, a plurality of interchangeable sets of fuse holders of standardized capacities arranged to be interchangeably mounted on said branch circuit bases, means for interchangeably mounting any fuse holder adjacent either end of any of said bases, bus-bars adjacent one end of said fuse holder bases and connected to said fuse holders, said fuse holder bases and said bus-bars being tranversely shiftable in opposite directions to provide a desired branch circuit directional arrangement.

8. A panel board system comprising a plurality of standardized insulating bases and sets of component conducting parts, each set of a different capacity and each part of each set being arranged to be interchangeably mountable on said standardized insulating bases to provide panel boards of different predetermined capacities and predetermined numbers of branch circuits, said conducting parts comprising fuse holders interchangeably mounted on said bases, connectors interchangeably connected to said fuse holders, and bus bars interchangeably supported by said connectors in substantially superimposed relation and adjacent either end of said bases.

9. A panel board system comprising standardized supporting plates, a plurality of standardized insulating bases interchangeably mountable on said plates, a plurality of standardized sets of component conducting fuse holding parts each of a different capacity and each part of each set being interchangeably mountable on said insulating bases, a plurality of superimposed bus bars, insulating members between said bus bars and supported thereby, and interchangeable connectors arranged to connect any of said bus bars with any of said fuse holding parts and thereby support the bus bars and insulating members in transverse substantially superimposed relation adjacent either end of said insulating bases.

HENRY F. STARRETT.