

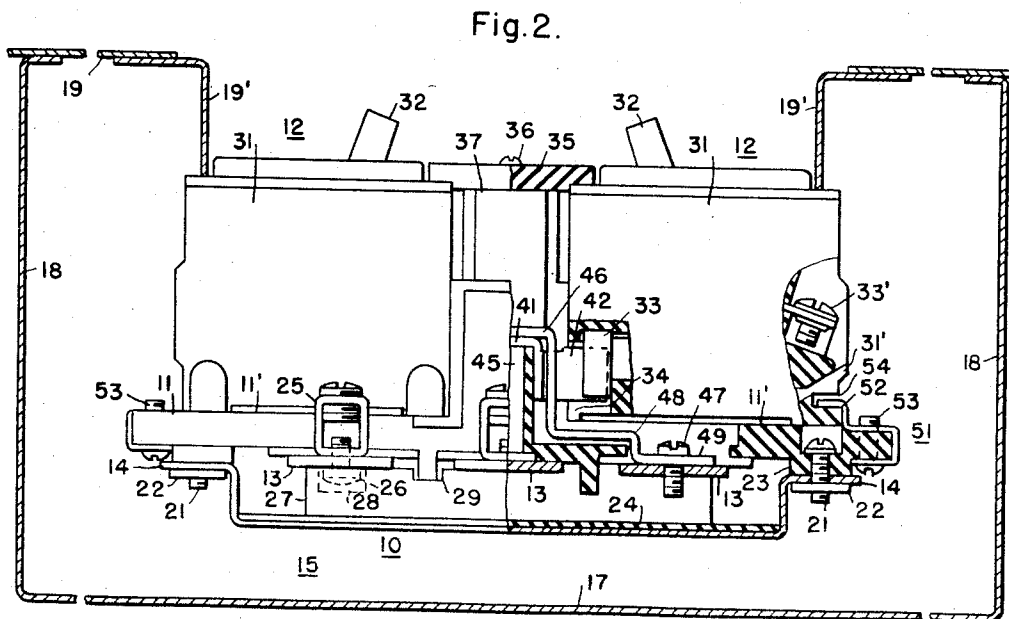
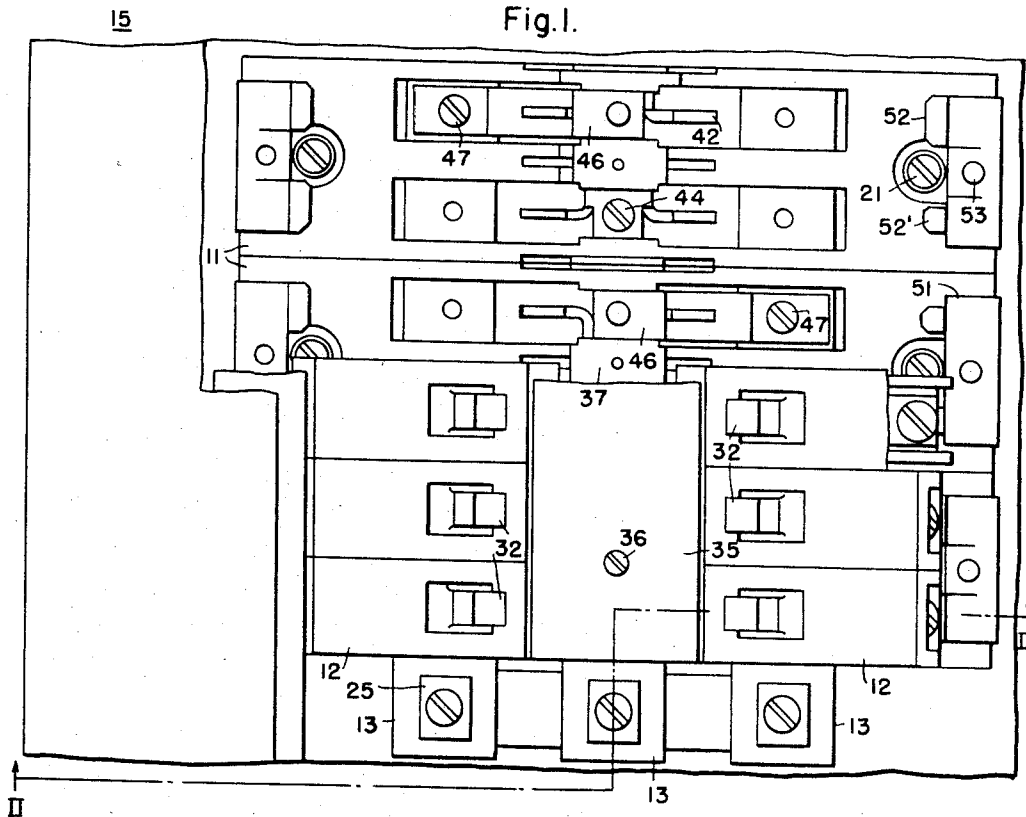
April 21, 1959

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CIRCUIT BREAKER PANELS

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2 Sheets-Sheet 1



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Fig. 3.

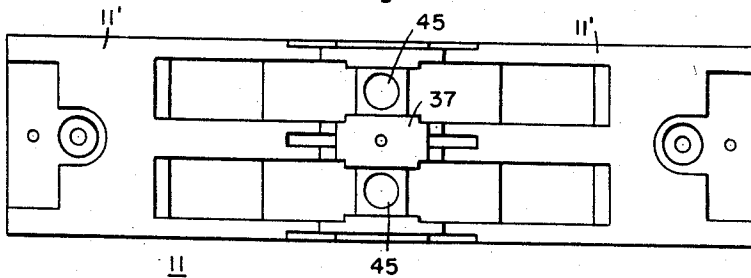


Fig. 4.

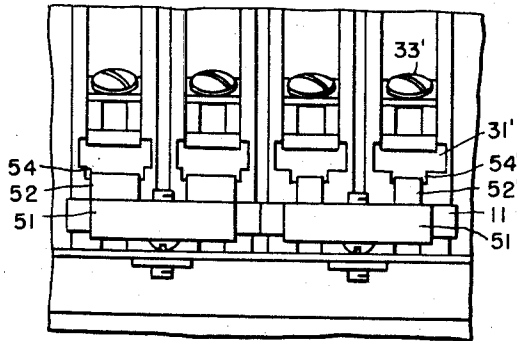
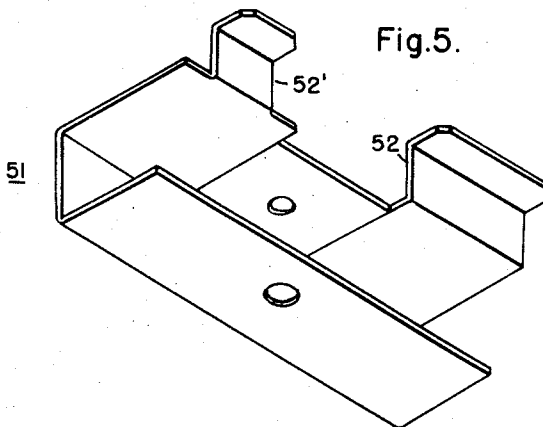


Fig. 5.



WITNESSES:

E. A. M. Blakey
Leon M. Garman

INVENTORS

Hiller D. Dorfman &
Francis L. Gelzheiser.

BY

[Signature]

ATTORNEY

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CIRCUIT BREAKER PANELS

Hiller D. Dorfman and Francis L. Gelzheiser, Beaver, Pa., assignors to Westinghouse Electric Corporation, East Pittsburgh, Pa., a corporation of Pennsylvania

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12 Claims. (Cl. 317-119)

Our invention relates, generally, to panelboards or load centers and, more particularly, to such panels in which a plurality of automatic circuit breakers are removably mounted in a cabinet suitable for installation in or on the wall of a building.

The problem of over-fusing of electric circuits which are protected by fuse plugs has been considered and there have been provided special fuse plugs, known as type "S" fuses, and adapters which are inserted in the fuse receptacles to prevent the installation of fuse plugs above a predetermined rating. One of the advantages of automatic circuit breakers over fuses is that the current rating of a circuit breaker cannot readily be changed. However, circuit breakers of different ratings can be interchanged in a panelboard or other installation, thereby making it possible to substitute a breaker having a high current rating for one having a low current rating. Such a substitution may result in overloading the wiring in the circuit normally protected by the breaker having a low current rating.

Accordingly, an object of our invention is to prevent circuit breakers above a predetermined current rating from being installed in locations originally intended for breakers having a lower current rating.

Another object of our invention is to provide a combined retaining and restricting clip for circuit breakers installed in a panelboard or similar apparatus.

A further object of our invention is to provide means on the mounting base for a plurality of circuit breakers which cooperates with means on the circuit breakers to preclude undesirable interchangeability of the circuit breakers in a panelboard.

Other objects of our invention will be explained fully hereinafter or will be apparent to those skilled in the art.

In accordance with one embodiment of our invention, circuit breakers of different current ratings have openings therein of different sizes for receiving retaining clips of corresponding sizes which hold the breakers in position on a mounting base in a distribution panel. Thus, a breaker having a high current rating cannot readily be substituted for a breaker having a low current rating.

For a better understanding of the nature and objects of the invention, reference may be had to the following detailed description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a view, in plan, of a portion of a panelboard structure embodying the principal features of the invention, certain parts being broken away for clearness;

Fig. 2 is a view, partly in section and partly in elevation, the section being taken along the line II-II in Fig. 1, certain parts being broken away to show details of construction;

Fig. 3 is a view, in plan, of one of the insulating bases utilized in the panelboard structure;

Fig. 4 is a view, in side elevation, of a portion of the structure shown in Fig. 1; and

Fig. 5 is an enlarged view, in isometric projection, of

one of the spring clips utilized for retaining circuit breakers on the insulating base.

Referring to the drawings, and particularly to Figs. 1 and 2, the structure shown therein comprises a mounting plate or pan 10, a plurality of insulating bases 11 on which are mounted a plurality of circuit interrupter units 12 and a plurality of bus bars 13 for conducting current to the interrupter units 12. The interrupter units 12 may be automatic circuit breakers, preferably of the plug-in type. However, circuit breakers of other types may be utilized if desired.

As shown, the mounting pan 10 may be of a channel shape having outwardly extending flanges 14. The pan 10 may be adjustably mounted in a cabinet 15 in a manner well known in the art. The cabinet 15 comprises a back wall 17 having integrally formed flanged side walls 18 and a detachable cover or panel trim 19 having an inwardly or downwardly extending flange 19' for engaging the outer edges of the circuit interrupter units 12. The trim 19 may be attached to the flange on the side wall 18 by screws (not shown) and may be provided with a hinged door over the circuit breaker handles if desired.

As shown most clearly in Figs. 1 and 2, each base 11 may be removably attached to the flanges 14 of the pan 10 by means of screws or bolts 21 which are threaded into square nuts 22 underneath the flanges. The square nuts 22 engage the side of the pan to prevent them from turning. The screws 21 extend through downwardly extending lugs 23 on the bottom of the base which, together with the upwardly extending sides of the pan 10, provide a predetermined clearance between the bus bars 13 and the bottom of the pan 10. If desired, an insulating sheet 24 may be provided on the bottom of the pan to prevent arcing between the bus bars and the pan 10.

The bus bars 13 are mounted on the bottom side of the insulating bases 11 and are secured to the bases in a manner which will be described more fully hereinafter. A line terminal lug or connector 25 is attached to each bus bar 13 near one end by a screw 26. The connectors are provided for connecting power supply conductors to the bus bars 13.

In order to support the ends of the bus bars 13 to prevent them from being bent downwardly when pressure is applied while making connections to the terminal connectors 25, a generally rectangular insulating member 27 is disposed between the bus bars and the pan 10 underneath the connectors 25 and transversely of the bus bars. The member 27 is retained in position by the heads of the screws 26 which are disposed in recesses 28 provided in the member 27. Transverse grooves 29 are provided in the member 27 to increase the creepage distance along the surface of the member between the bus bars 13.

In the present modification of the invention each base 11 supports four branch circuit breaker units 12. The breaker units are each mounted on main surface portions 11' of the base 11 at opposite sides thereof. As shown most clearly in Fig. 2, each one of the circuit breaker units is individually enclosed by a housing 31 having overload responsive means therein for automatically opening the circuit, and is provided with an operating handle 32 which projects from an opening in the top of the housing 31.

As shown, the breaker units are of the plug-in type, each unit having plug-in contact jaws 33 for frictionally engaging a contact blade on a connector to connect the breaker unit to a bus bar, as will be explained more fully hereinafter. The contact jaws 33 are recessed in the housing 31 which has an opening 34 in one corner to provide access to the contact jaws. The opening 34 extends part way along the bottom and part way along one end of the housing. The side walls of the breaker units thus form barriers between the jaws 33, and the ends of the contact

plates therein, of adjacent breakers which may be of different polarity.

A load terminal connector 33' for each breaker is recessed in the outer end of the breaker so that the side walls of the breakers act as barriers and give ample electrical clearance between adjacent breakers of different polarity even though the breakers are so narrow that there would not be adequate insulation if the connectors were not so recessed.

There is a vent opening 31' at the outer end of each breaker beneath the terminal connector 33'. Ionized arc gases generated when overloads or short circuits are interrupted may be safely exhausted through the vent 31' into the wiring gutter of the panelboard without coming in contact with the live bus bars or connectors, hereinafter described, as might be the case if the vents were in the inner ends or bottoms of the breakers.

As shown most clearly in Fig. 2, the inner ends of the breaker units are held in position by cover plates 35 which overlap the inner ends of the breaker housings 31. The cover plates are attached to the bases 11 by screws 36 threaded into extensions 37, one of which is provided on each base.

In order to provide for so connecting the circuit breaker units to the bus bars that the connections may be readily changed without removing the pan 10 or the bases 11, special connectors are provided for connecting oppositely disposed pairs of breakers units to a bus bar 13. These connectors are fully described in a co-pending application of T. F. Brown, Serial No. 290,943, filed May 31, 1952.

As shown most clearly in Fig. 2, one of these connectors comprises a generally U-shaped member 41 having a plug-in contact blade 42 formed integrally with each leg of the U. The blade 42 is disposed at right angles to the leg of the U and it extends transversely of the bus bar 13. The blades 42 are also disposed perpendicularly to the bus bars 13 so that they may be engaged by the contact jaws 33 on the breaker units 12. The U-shaped member 41 may be connected to the middle bus bar 13 by means of a screw 44 (see Fig. 1) which extends through an opening 45 (see Fig. 3) in the base 11.

In order to connect circuit breakers to the outer bus bars 13, a generally Z-shaped member 46 is attached to one of the U-shaped members 41. The leg of the Z member 46 has an opening therein for one of the contact blades 42. As previously explained, one arm of the Z member is attached to the U-shaped member 41. The other arm may be attached to one or the other of the outer bus bars 13 by a screw 47. The arm is bent at 48 to provide an offset portion 49 for connecting to the bus bar. In this manner the circuit breakers may be selectively connected to any one of the three bus bars and the bus bars are supported by the connectors to which they are attached.

The outer end of each one of the circuit breaker housings 31 is held in position on a base 11 by means of retaining means which may be a spring clip 51. As shown most clearly in Fig. 5, the clip 51 is generally of a U shape with L-shaped extensions formed integrally therewith. As shown, each clip is provided with two projections or extensions 52 and 52'. While it is preferred that the clips 51 be of resilient material, other constructions of rigid material providing a plurality of projections 52 or 52' may be used. Each clip 51 extends around the end of the base and may be attached to the base 11 by means of a screw 53 which may be of the self-tapping type. As shown in Fig. 2, the screw 53 extends upwardly through the base 11 with the head of the screw disposed at the lower side of the base.

One projecting portion 52 engages a mounting portion which may be a slot 54 in the outer end of the breaker housing 31 when the breaker is installed on the base 11. As shown in Fig. 5, the projection or arm 52' is narrower in width than the projection 52. As shown in Fig. 4,

the slot 54' is narrower in width than the slot 54. Thus, a wide arm 52 will enter a wide slot 54 and a narrow arm 52' will enter a narrow slot 54', but a wide arm 52 will not enter a narrow slot 54'.

Therefore, by providing the housings 31 for breaker units of a high current rating, for example 30 amperes, with narrow slots 54', and providing the housings 31 for breaker units of a low current rating, for example 15 amperes, with wide slots 54 the breakers having a high current rating cannot be installed in the spaces intended for breakers having a low current rating. The wide portions 52 provided in the spaces for the low current breakers will not enter the narrow slots 54' in the housings for the breakers having a high current rating.

In this manner, it is made extremely difficult to substitute a breaker having a high current rating for a breaker having a low current rating since a clip 51 cannot be removed from a base 11 without removing the trim 19 from the panelboard and then removing the base 11 from the pan 10 to provide access to the head of the screw 53 which, as explained hereinbefore, is located at the underneath side of the base 11.

It will be understood that when a panelboard is assembled, retaining means 51 having projecting portions of different widths may be utilized to provide for the installation of circuit breakers having a current rating affording the proper protection for the circuits to be controlled by the breakers. Once the panelboard is installed with circuit breakers having the proper current ratings, it will be difficult to substitute a breaker having a high current rating for a breaker having a low current rating.

As previously explained, the current rating of a circuit breaker cannot be readily changed after it is manufactured and adjusted. Therefore, the proper protection of the various circuits controlled by the circuit breakers in a panelboard is assured.

We have illustrated a clip having two spring arms thereon. It will be understood that clips or retaining members having, one, two, three, or more projections may be utilized if desired. Also, the retaining means may be mounted in any manner to engage the breaker housings.

From the foregoing description, it is apparent that we have provided a panelboard construction which assures the proper protection of the circuits controlled by the panelboard. However, the panelboard retains the flexibility of construction necessary to permit circuits of various current ratings to be controlled by the circuit breakers installed in the panelboard. Furthermore, the panelboard retains the simplicity of structure which enables it to be readily and economically manufactured and installed.

Since numerous changes may be made in the above-described construction, and different embodiments of the invention may be made without departing from the spirit and scope thereof, it is intended that all matter contained in the foregoing description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

We claim as our invention:

1. In a circuit breaker panel, in combination, a mounting base for supporting a plurality of circuit breaker units, said breaker units having individual housings removably mounted on top of said base, each of said housings having a slot at one end thereof, combined retaining and restricting means disposed at the ends of the housings and having portions for insertion into the slots in adjacent housings to retain the housings on the base, the width of the slot in each housing being in accordance with the current rating of the breaker unit in said housing, the width of said retaining and restricting portions corresponding to the width of said slots, and the width of said retaining and restricting portions being readily changeable only by removing said retaining and restricting means from the panel.

2. In a panelboard, in combination, a plurality of in-

ulating bases for supporting a plurality of circuit breaker units, said breaker units having individual housings removably mounted on top of said bases, each of said housings having a slot in one end thereof, generally U-shaped metal clips extending around the ends of the bases and having integrally formed L-shaped retaining and restricting portions for insertion into the slots in the housings to retain the housings on the bases, the width of the slot in each housing being determined by the current rating of the breaker unit in the housing, the width of said L-shaped retaining and restricting portions corresponding to the width of said slots, and one of said metal clips being removable from its base only by removing the base from the panelboard.

3. In an electric panel, in combination, a mounting base for supporting a plurality of circuit breaker units, a plurality of breaker units having individual housings removably mounted on top of said base, some of said breaker units having higher current ratings than others, each of said housings having a mounting portion, combined retaining and restricting means attached to the base and having portions engaging the mounting portions of the housings to retain the housings on the base, one dimension of the mounting portion of each housing of the higher rated breaker units being different from the said dimension of the lower rated breaker units, the dimensions of said retaining and restricting portions corresponding to the dimensions of said mounting portions and preventing substitution of a higher rated breaker for a lower rated breaker, and said retaining and restricting means being removable from the base only by removing the base from the panel.

4. In a circuit breaker panel, in combination, a base having thereon a plurality of circuit breaker units some of which are of different ratings than others, said breaker units having individual housings removably mounted on top of said base, each of said housings having a slot at one end thereof, a metal retaining and restricting member attached to the base and having portions inserted into the slots in adjacent housings to retain the housings on the base, at least one dimension of the slot in the housing of the breaker units having the different ratings being different from the corresponding dimensions of the other breaker units in the housing, the dimensions of said retaining and restricting portions corresponding to said dimensions of the slots, and said retaining and restricting member being removable from the base only by removing the base from the panel.

5. A base for supporting a plurality of circuit breaker units having individual housings removably mounted on top of the base, each of said housings having an opening in one end thereof, a retaining and restricting member attached to the base and having portions for insertion into the openings in adjacent housings to retain the housings on the base, the size of the opening in each housing being determined by the current rating of the breaker unit in the housing, the size of the retaining and restricting portions corresponding to the size of said openings, and the size of said retaining and restricting portions being readily changeable only by removing said retaining and restricting member from the base.

6. In a circuit breaker panel, a housing, a base mounted in said housing, a plurality of circuit breaker units each having a handle for manually opening and closing the circuit and overload responsive means for automatically opening the circuit, means on said base in said housing engaged by said circuit breaker units and including a plurality of plug-in contacts from which the circuit breaker units may be readily removed, a plurality of said circuit breaker units having substantially the same general over-all dimensions but having different current ratings, retaining means carried on said base and having portions of one dimension engaging the circuit breaker units of one rating and portions of another dimension engaging the circuit breaker units of another rating and not fitting the

circuit breakers having the first said rating, securing means for holding said retaining means on the base, and said securing means being removable only from the rear of the base whereby it may not be readily removed till the base is removed from the housing.

7. In an electric device, an enclosure for a plurality of circuit breaker units each having a handle for manually opening and closing the circuit and overload responsive means for automatically opening the circuit, said breaker units having individual housings removably mounted in the enclosure, each breaker unit having quick detachable means thereon of a different dimension for higher current ratings than for lower current ratings, combined retaining and restricting means in the enclosure engageable by the quick detachable means on the breaker unit, one or more of said retaining and restricting means in the enclosure having a different dimension than others of said means, whereby a breaker unit of a higher current rating cannot be properly installed in the place for a breaker unit of a lower current rating, and the dimensions of said retaining and restricting means being readily changeable only by removing said means from the enclosure.

8. In an electric device, a mounting base for supporting a plurality of circuit breaker units, said circuit breaker unit having individual housings removably mounted on top of the base, some of said housings having the same over-all dimensions even though the current ratings of the breaker units are different, each of said housings having a mounting portion thereon of a size determined by the current rating of the breaker unit, combined retaining and restricting means in the device engaging said mounting portions to retain the housings on the base, said retaining and restricting means having dimensions corresponding to the size of said mounting portions to prevent a higher rated breaker unit from being substituted for a lower rated breaker unit, and the dimensions of said retaining and restricting means being readily changeable only by removing said means from the device.

9. In an electric device, in combination, an enclosure, removable mounting means in the enclosure, a plurality of circuit breaker housings removably mounted on said mounting means, said housings having automatic breaker mechanisms therein, each housing having recessed means therein of a size corresponding to the current rating of the breaker mechanism within the housing, combined retaining and restricting means on said mounting means and having projections for entering said recessed means to retain the housings on the mounting means, said projections having dimensions corresponding to the size of said recessed means to prevent a higher rated breaker from being substituted for a lower rated breaker, and said retaining and restricting means being readily removable from the mounting means only by removing the mounting means from the enclosure.

10. In an electric device, in combination, an enclosure, removable mounting means in the enclosure for supporting a plurality of circuit breaker housings having automatic breaker mechanisms therein, each housing having recessed means therein of a size corresponding to the current rating of the breaker mechanism within the housing, combined retaining and restricting means on said mounting means for cooperating with said recessed means to retain the housings on the mounting means, said retaining and restricting means having dimensions corresponding to the size of said recessed means to prevent a higher rated breaker from being substituted for a lower rated breaker, said retaining and restricting means having a portion engageable to release the retaining and restricting means from the mounting means, and said engageable portion being positioned under the mounting means.

11. In an electric device, in combination, an enclosure, a plurality of circuit breaker housings removably mounted in the enclosure, said housings having automatic breaker mechanisms therein, each housing having recessed means therein of a size corresponding to the current rating of

the breaker mechanism within the housing, combined retaining and restricting means cooperating with said recessed means to retain the housings in the enclosure, said retaining and restricting means having dimensions corresponding to the size of said recessed means to prevent a higher rated breaker from being substituted for a lower rated breaker, fastening means securing said combined retaining and restricting means in said enclosure, and said fastening means being disposed underneath said combined retaining and restricting means in said enclosure.

12. In an electric device, in combination, an enclosure, bus bars mounted in the enclosure, contact members detachably attached to the bus bars and extending transversely of the bus bars, an insulating member having integrally formed portions separating said contact members, a plurality of circuit breaker housings removably mounted in the enclosure and having contact means frictionally engaging said contact members, said housings having auto-

matic breaker mechanisms therein, each housing having a restricting portion of a size related to the current rating of the breaker mechanism within the housing, and restricting means removably attached to said insulating member and having dimensions corresponding to the size of said restricting portions to prevent a higher rated breaker from being substituted for a lower rated breaker.

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