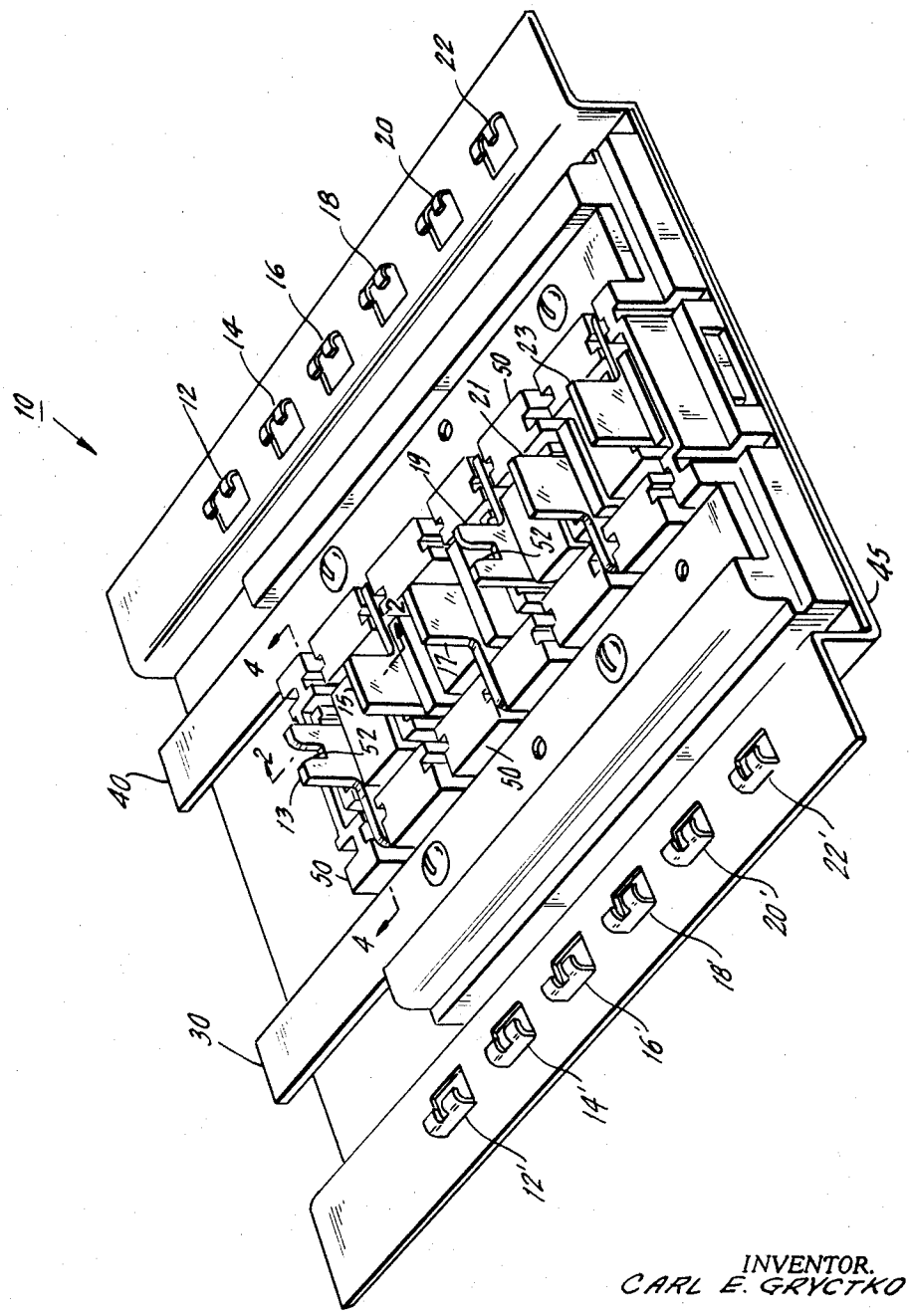
Sept. 17, 1968 C. E. GRYCTKO 3,402,328

SELECTIVE MOUNTING OF DIFFERENT CIRCUIT BREAKER TYPES WITHIN A SINGLE PANELBOARD

Filed May 1, 1967 4 Sheets-Sheet 1

FIG. 1.



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ATTORNEYS

FIG. 3.

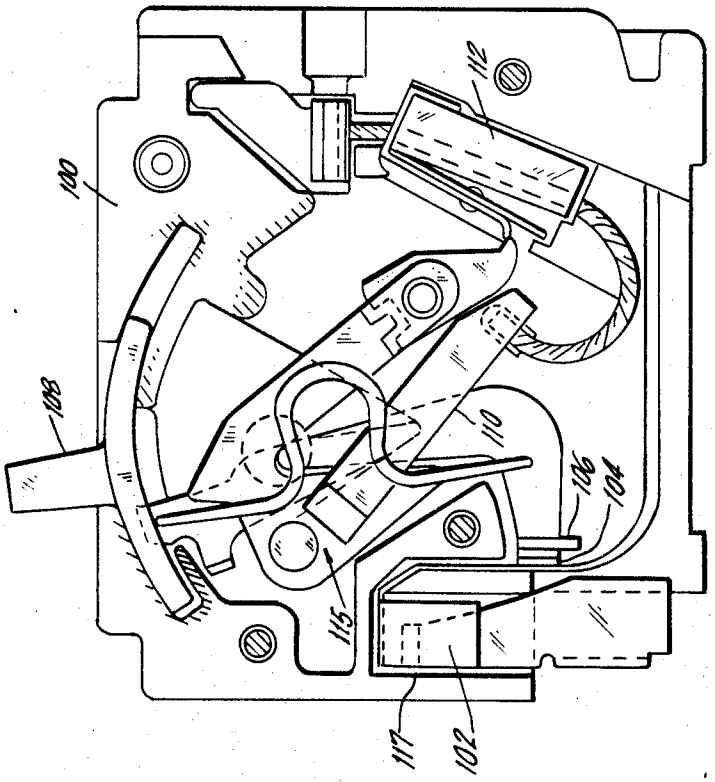
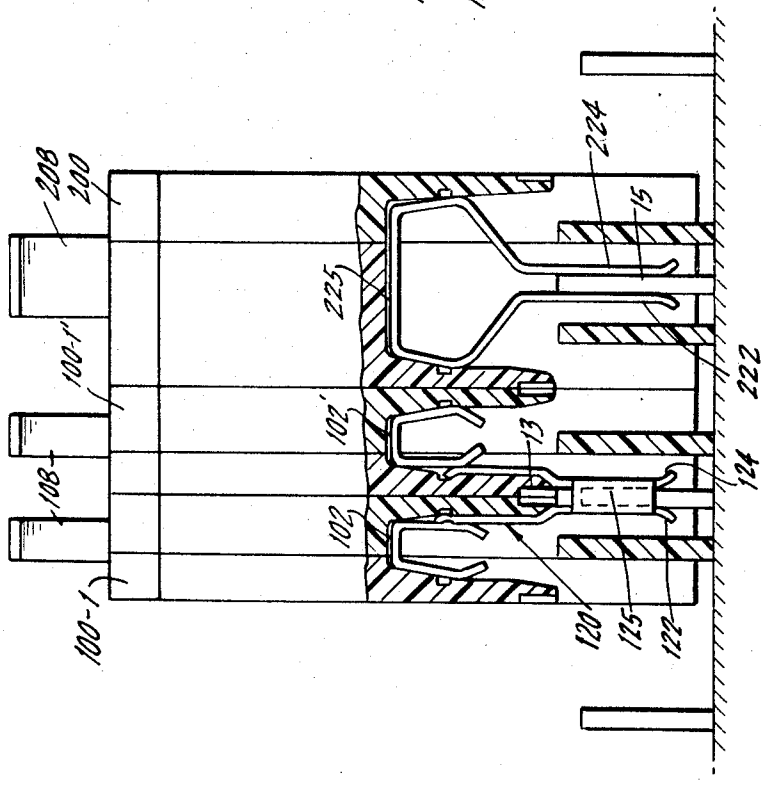

112
100
108
110
106
104
115
117
102

FIG. 2.


208
200
224
15
225
100-1'
222
102'
13
124
108
102
100-1
120
125
122

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SELECTIVE MOUNTING OF DIFFERENT CIRCUIT BREAKER TYPES WITHIN A SINGLE PANELBOARD

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FIG. 4.

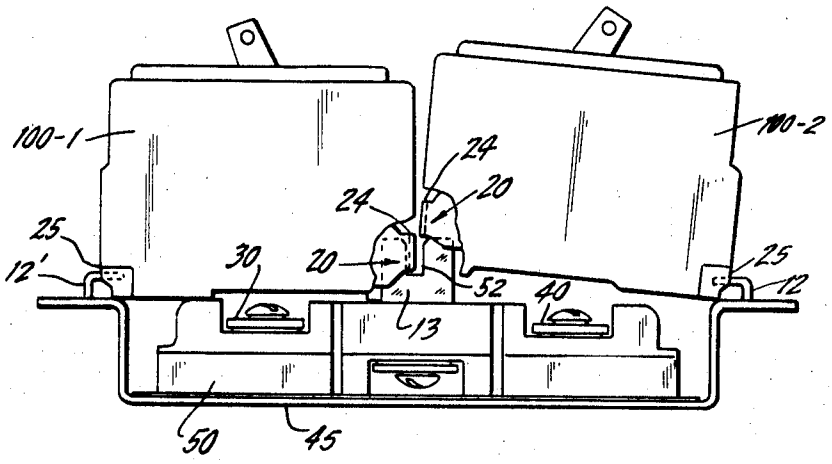
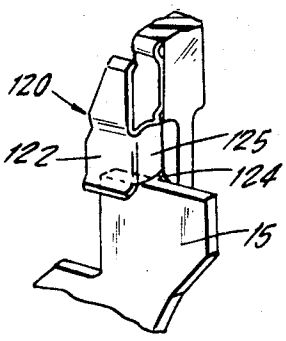


FIG. 5A.



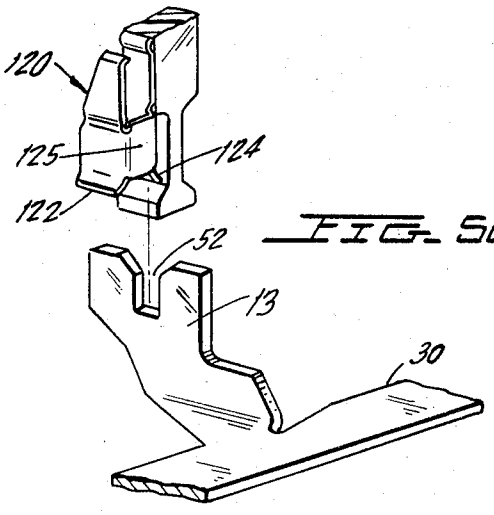


FIG. 5B.

FIG. 6.

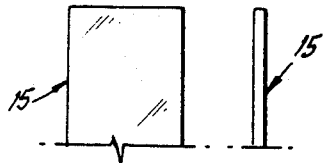


FIG. 6a.

FIG. 7.

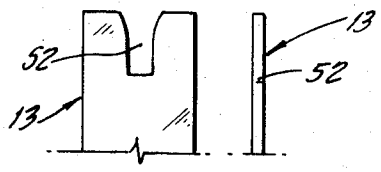


FIG. 7a

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SELECTIVE MOUNTING OF DIFFERENT CIRCUIT BREAKER TYPES WITHIN A SINGLE PANELBOARD

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FIG. 8.

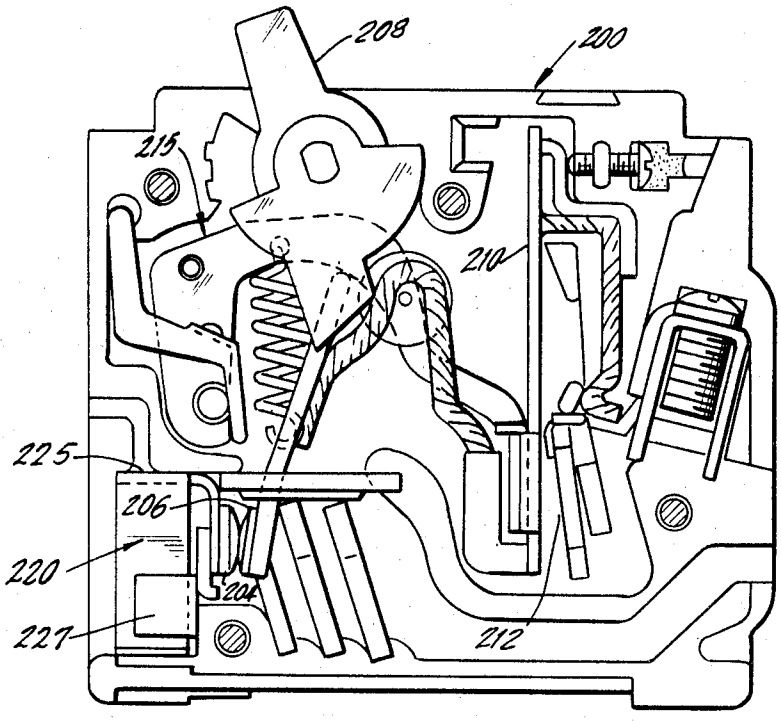


FIG. 9A.

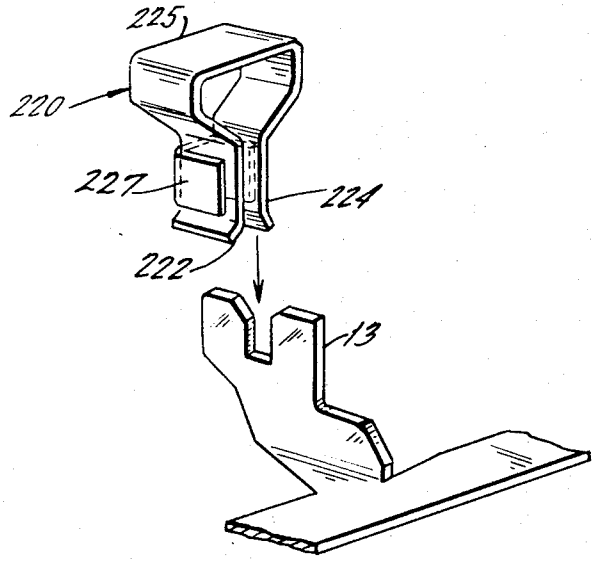
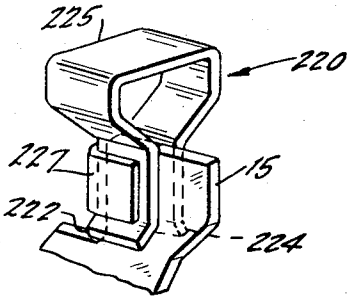


FIG. 9B.



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United States Patent Office 3,402,328 Patented Sept. 17, 1968

3,402,328

SELECTIVE MOUNTING OF DIFFERENT CIRCUIT BREAKER TYPES WITHIN A SINGLE PANELBOARD

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Filed May 1, 1967, Ser. No. 635,179
8 Claims. (Cl. 317—119)

ABSTRACT OF THE DISCLOSURE

A circuit protective arrangement, in which a panelboard for receiving a plurality of different circuit breaker types is predeterminedly adapted in conjunction with the circuit breaker constructions, to estabilsh which of the circuit breaker types may be received at each of the panelboard locations.

My invention relates to a circuit protective arrangement, in which a load distribution panelboard is predeterminedly adapted to selectively receive different types of circuit breaker devices.

It is know to provide a load distribution panelboard, in which a plurality of adjacent circuit breaker receiving locations are provided for the reception of individual circuit breaker protective devices. Such panelboard constructions are typically shown in Edmunds U.S. Patent No. 2,914,708, entitled "Panel Board Construction" issued Nov. 24, 1959; and Edmunds U.S. Patent No. 3,120,628 entitled, "Selective Mounting for Circuit Interrupters," issued Feb. 4, 1964, both assigned to the assignee of the instant invention. In such panelboard constructions, a longitudinally extending common bus is provided, which has a number of electrical connecting means (typically in the form of forwardly projecting stab terminals), for receiving the line contacts of the circuit breaker devices. Each of the locations defined for the reception of a circuit breaker device also includes a retaining means, typically in the form of a projecting prong which pivotally engages a cooperative formation at the load end of the circuit breaker, such that the circuit breaker is rotated about the retaining prong into engagement with the panelboard stab terminal. The frictional engagement of the stab terminal in conjunction with the prong-type retaining means serves to fixedly maintain the circuit breaker on the panelboard.

Such panelboards, constructed for residential or light industrial applications, are typically designed to receive the particular width circuit breakers of the general type, which are fully described in U.S. Patent No. 2,996,589, issued to F. E. Myers, entitled "Pivoted Bimetal" issued Aug. 15, 1961. These circuit breakers may be termed full module width breakers. In recent years, it has been the practice to construct such panelboards to also receive a pair of half module width circuit breakers at a single panelboard location, or preferably a combination of full module width and half module width circuit breakers along the panelboard. Such half module width breakers are typically shown in Leonard U.S. Patent No. 3,201,550, entitled, "Circuit Breaker with Vent Opening," issued Aug. 17, 1965. The manner in which a pair of such half module width breakers may be interchangeably received at a panelboard location intended for a single full module width breaker is fully described in Leonard et al.

U.S. Patent No. 3,095,524 entitled, "Panelboard Adapter," issued June 25, 1963. All of the above-mentioned patents are assigned to the assignee of the instant invention.

In previous panelboard and circuit breaker constructions adapted to interchangeably receive the full module width and half module width breakers, it has been the general practice to permit all the panelboard locations to receive either type of circuit breaker device. This practice disadvantageously tends to subject the panelboard to an excess rating, or may require a higher rated panelboard than actually needed for the particular application. That is the rating of the panelboard usually determines the maximum number of external circuits that should be connected thereto. This, in turn, may require that only a certain number of the panelboard locations be permitted to receive a pair of half-inch module circuit breakers.

My invention achieves this result in an extremely simplified manner by modifying the panelboard stab terminal construction in conjunction with the line circuit terminal of the half module width circuit breaker, such that the panelboard may be programmed to receive a pair of such half or other fractional module circuit breakers at only certain ones of its circuit breaker receiving locations.

More specifically, the line terminal contact member of the pair of half module width circuit breakers (which is the subject of aforementioned U.S. Patent No. 3,095,524) is repositioned in the circuit breaker pair, so as to provide an abutting portion for preventing the insertion of such circuit breakers to predetermined panelboard stabs. In such an arrangement, the circuit breaker line terminal contact member is of a generally U-shaped configuration, having space-separated spring fingers and an interconnecting body portion. The interconnecting body portion had previously been recessed within the circuit breaker pair, such that it did not interfere with the stab terminal. However, by reversing this contact member by 180°, the body portion will abuttingly engage the previous stab construction, and thereby prevent the insertion of a pair of half module width circuit breakers at such panelboard locations. At those panelboard locations wherein it is desired to receive a pair of half module width circuit breakers, I provide an intermediate cutout to permit the entry of the line terminal contact member body portion. Thus, those panelboard locations which have this modified stab terminal will be able to receive a pair of my modified half module width circuit breaker, and those panelboard locations having the previous stab structure, without the intermediate cutout, will reject such a pair of modified half module width circuit breaker modules.

The present commercial structure of the full module width circuit breaker, as shown in aforementioned U.S. Patent No. 2,996,589, includes a U-shaped line contact member, in which the body portion of the U is recessed internally of the circuit breaker and will not interfere with the stab terminal. Thus, the full module width circuit breaker may be installed at those panelboard locations having either the prior stab construction or the modified stab construction with the intermediate cutout. The fact that such a full module width circuit breaker is installed at a panelboard location predeterminedly programmed to receive a pair of half-module width circuit breakers is of no consequence. That is, the panelboard will usually be programmed, in accordance with the instant invention, to provide the maximum number of panelboard locations to receive circuit breaker pairs, in accordance with the

maximum rating of the panelboard. If it is desired to install a full module width breaker at such a panelboard location (which is adapted to also receive a pair of half module width breakers), this will serve to keep the number of circuits to the panelboard below the maximum panelboard rating.

Although the foregoing description shows a specific embodiment of the instant invention in conjunction with presently available commercial one-inch and half-inch circuit breakers, the basic concept of the invention is not limited to such particular circuit breaker dimensions. That is, the manner in which the terminals of the lesser physical size circuit breaker is coordinated in conjunction with the panelboard stab terminal construction permits the utilization of my invention in circuit protective arrangements utilizing other physical sizes of circuit breakers in which it is desired to install a variety of circuit breaker types in a single panelboard; and particularly where the widths of the circuit breakers are integral multiples of each other.

It is therefore seen that the basic concept of my invention resides in the coordinated design of the panelboard line terminal connecting means and circuit breaker terminals, such that the circuit breaker receiving locations of the panelboard may be predeterminedly programmed for the reception of different circuit breaker types.

Therefore, a primary object of my invention is to provide a circuit breaker protective arrangement, in which a distribution panelboard is predeterminedly programmed for the reception of various types of circuit breaker devices.

Another object of my invention is to provide such a circuit protective arrangement, for receiving both full module width and partial width circuit breakers, in which certain of the panelboard locations can only receive the full module width circuit breaker.

A further object of my invention is to provide a circuit protective arrangement, in which a panelboard is programmed, such that predetermined ones of its locations may receive either one of two types of a circuit protective device, and other predetermined panelboard locations may only receive one of such circuit breaker types.

An additional object of my invention is to provide a circuit protective arrangement, in which a panelboard is programmed, such that certain of its locations may receive either a single full-width circuit breaker, or a plurality of fractional width circuit breakers, while other locations will reject the pair of half-width circuit breakers.

Still another object of my invention is to provide such a circuit protective arrangement, wherein the number of panelboard locations receiving the plurality of fractional width circuit breakers is limited in accordance with the load rating of the panelboard.

Still a further object of my invention is to provide such a circuit protective arrangement, in which the line terminal connecting stab of the panelboard bus is modified in accordance with the circuit breaker line terminal constructions, to block the improper installation of a plurality of fractional width module circuit breakers at those panelboard locations which are predeterminedly adapted to receive only a lesser number of greater width circuit breakers.

Still an additional object of my invention is to accomplish the foregoing objectives, while requiring only a minor modification of the presently existing commercial panelboard and circuit breaker constructions.

These as well as other objects of my invention will immediately become apparent upon a consideration of the following description and drawings in which:

FIG. 1 is a perspective view showing a portion of a panelboard modified to accomplish the objectives of the instant invention.

FIG. 2 is a cross-sectional view along the line **2—2** of FIG. 1, with the intended circuit breaker types being installed in the panelboard, and showing the manner in which the circuit breaker line terminal contact members are interconnected to the panelboard bus stabs.

FIG. 3 is a cross-sectional view, showing the construction of one of the pair of half-width module circuit breakers, with the modified placement of line terminal contact members in accordance with my invention.

FIG. 4 is a cross-sectional view along line **4—4** of FIG. 1, with the additional of the intended circuit breakers, showing the manner in which pairs of half-width module circuit breakers are installed at those panelboard locations programmed to receive same.

FIG. 5A is a perspective view showing the line terminal contact member portion of the half-width module circuit breaker, and panelboard bus having a stab configuration, to receive only full-width module circuit breakers, and showing the manner in which the half-inch module circuit breaker contact member is rejected.

FIG. 5B is a view similar to FIG. 5A, but illustrating the panelboard stab terminal which is program-adapted to receive either type of circuit breaker, and showing the manner in which the line terminal contact member of the pair of half-width module circuit breakers may be received thereby.

FIGS. 6 and 6A are front elevation and side views respectively of the panelboard stab terminal constructed to receive only the full-width module circuit breaker devices.

FIGS. 7 and 7A are front elevation and end views respectively of the modified panelboard stab terminal, which may receive either a full-width circuit breaker or a pair of half-width circuit breakers.

FIG. 8 is a cross-sectional view of a commercial available type of full-width module circuit breaker, which may be used in conjunction with my circuit protective arrangement.

FIG. 9A shows the manner in which the line terminal contact of the circuit breaker shown in FIG. 8 may be received by one of the stab terminal configurations of my panelboard arrangement.

FIG. 9B shows the manner in which the line terminal contact of the circuit breaker shown in FIG. 8 may be received by the other type of stab terminal configuration of my panelboard arrangement.

Referring initially to FIG. 1, panelboard **10** has the general constructional features of prior art panelboards of the type more fully described in aforementioned Edmunds U.S. Patents Nos. 2,914,708 and 3,120,628. Such panelboards are generally found in residential and light industrial installations, and are characterized as readily permitting the insertion of circuit breaker assemblies in transverse pairs along the longitudinal extent thereof. The panelboard includes a plurality of longitudinally adjacent circuit breaker receiving locations, each of which is defined by a prong-type circuit breaker retaining means, indicated as **12**, **14**, **16**, **18**, **20**, and **22**, along one side of the panelboard. The circuit breaker (as shown in FIG. 4) includes a cooperative mounting means **25** at the load end which receives the panelboard retaining means and provides a pivotal engagement for moving the line end of the circuit breaker into engagement with the panelboard stab. A single stab is provided at each of the circuit breaker receiving locations, with the successive stabs being identified as **13**, **15**, **17**, **19**, **21** and **23**. The stabs are connected in alternate arrangement to line bus **30**, **40**. The panelboard also includes a complementary arrangement of prong-type retaining means **12′**, **14′**, **16′**, **18′**, **20′** and **22′**, in transverse alignment with the above-discussed retaining means **12–22**, at each of the circuit breaker receiving locations. Thus, at each of such locations, such as that provided by circuit breaker retaining means **12–12′**, a transverse pair of circuit breaker devices may be received by the panelboard, in conjunction with a single

bus stab **13**. Such a transverse pair of circuit breaker devices **100–1, 100–2** is shown in FIG. 4.

The line terminal bus **30, 40** and associated stab terminals are mounted to the housing pan **45** of the panelboard by appropriate insulated means generally shown as **50**, with the line buses **30, 40** being connected to the power source in accordance with conventional practice.

In accordance with my invention, certain of the panelboard line stabs, such as **13** and **19**, include a cut-out **52** at their intermediate region. As will be subsequently described, these stabs have the cut-out configuration constructed, in accordance with the circuit breaker line terminal contacts, such that each of the circuit breaker locations associated with stabs **13** and **19** may receive either a pair of half-width module circuit breakers (such as **100** of FIGS. 3, 4 and 5B); while those panelboard stab terminals which do not include the intermediate cut-out (**15, 17, 21** and **23**) will receive the full-width module circuit breaker (such as **200** shown in FIGS. 8 and 9B), while rejecting the pair of half-width module circuit breakers, as shown in FIG. 5A. It will also be shown that the stab terminals **13** and **19**, which include the intermediate cutout regions, may receive the full-width circuit breaker **200** (as shown in FIG. 9A).

Reference is now made to FIG. 3, which shows the constructional details of a commercial type of half-width module circuit breaker, insertable in pairs at each panelboard location. Circuit breaker **100** is of the type fully described in aforementioned Leonard Patent No. 3,201,-550, to which reference may be made for a detailed description of its operating components. For purposes of the instant application, it is sufficient to understand that the circuit breaker includes a line terminal **102**, a stationary contact **104** and movable contact **106**. The contacts are moved between the operative circuit breaker positions either by manual operating member **108**, or the automatic trip mechanism provided by the actuation of thermal member **110**, or electromagnetic means **112**, with such actuation being transferred to the movable contact member **106** via the operating means generally shown as **115**.

As shown in FIG. 2, and is the subject of Leonard et al. U.S. Patent No. 3,095,524, two of such half-width circuit breaker devices, such as **100–1, 100–1'**, are interconnected together, with their line terminals **102, 102'** being electrically connected to a single U-shaped contact member **120**. U-shaped contact member **120** includes space separated fingers **122, 124** connected together by body portion **125**. The spacing between the contact fingers **122, 124** and their resiliency is designed to make good electrical contact with the sides of the circuit breaker panelboard stab, such as **13**.

In accordance with my invention, the U-shaped connecting member **120** is so positioned in the circuit breaker assembly, such that its body portion **125** is at the outward end of the circuit breaker line terminal recess opening **117**. By referring to aforementioned Leonard Patent No. 3,095,524 (and particularly FIG. 3 thereof), it should be noted that this represents a 180° reversal of the placement of contact member **120**. That is, in the prior art, half-width module construction, this U-shaped member was located in the circuit breaker pair, such that its body portion **125** was located in the innermost region of the line terminal slot **117**, with the free opening of the U-shaped contact being provided where I now provide the body portion. Thus, the pair of half-width module circuit breakers, constructed in accordance with the protection system of my invention, differs from the prior art constructions merely in requiring that the U-shaped contact member be moved about 180°. A minor modification of the width of contact member **120** may also be required, such that it may be conveniently accommodated within the existing slotted opening **117** of the circuit breaker molding.

With the body portion **125** positioned at the outward extension of the circuit breaker line terminal recess **117**, it serves the function of abutting the intermediate region of the solid line terminal panelboard stab. Thus, as shown in FIG. 5A, this abutting relationship will prevent the insertion of a pair of half-width circuit breakers, such as **100–1, 100–1'**, at a panelboard location, which includes a stab, such as stab **15**. However, as in FIG. 5B, where the intermediate region of the stab is removed, as provided by intermediate cutout **52** of stab **32**, such half-width circuit breakers may be received, as is shown in FIG. 4.

Considering now the full-width module circuit breaker **400**, as shown in FIG. 8, reference is made to aforementioned Myers Patent No. 2,996,589, for a complete description thereof. For purposes of the instant discussion, it is sufficient to recognize that this circuit breaker includes a line terminal **220**, stationary contact **204**, and movable contact **206**. The circuit breaker contacts are moved between their operative positions, either by manual operating member **208** or an automatic trip mechanism actuated by thermally responsive element **210** or magnetic means **212**. The circuit breaker line contact **220** includes a generally U-shaped portion, having a pair of space-separated spring fingers **222, 224**, interconnected by upper body portion **225** and resilient clip-on body portion **227**. The region between the spring fingers is completely opened at the entrance of the circuit breaker line terminal slot, as contrasted to the disposition of body portion **125** (of the one-half width module circuit breaker). Thus, as shown in FIGS. 9A and 9B, line terminal contact **220** may be accommodated at both the stab configurations of stab **13** and **15**.

Thus, it is therefore seen that those circuit breaker locations which include the modified stab terminal **13** having the internal region cut away, may receive either the full-width module circuit breakers **220** or a pair of half-width module circuit breakers, such as **100–1, 100–1'**, at each of the circuit breaker panelboard locations, with such circuit breakers being installed in side-by-side transverse arrangement, along the length of the panelboard.

Hence, by limiting the amount of stabs having the internal cut-out **52**, the number of locations adapted to receive the pairs of half-width module circuit breakers is correspondingly limited, thereby preventing the installation of more circuits in the panelboard than it was originally designed for and approved.

It is thus seen that my invention provides a novel arrangement between the circuit breaker line terminals and associated panelboard stabs to predeterminedly provide which panelboard locations may receive pairs of half-width module circuit breakers. Further, these advantageous results are achieved while requiring only a minor modification of existing devices and associated manufacturing tooling; namely, predetermined ones of the desired stabs differ from the existing stabs by the provision of the intermediate cutout **52**, and the line terminal contact member **120** of the half-width module pairs is rotated 180° from its previous disposition.

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

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

1. In a circuit protective arrangement, the combination of a panelboard and a plurality of circuit breakers to be received by said panelboard;

said panelboard defining a plurality of circuit breaker receiving locations, each of said locations including retaining means for retaining the circuit breaker at said location, and connecting means for electrically connecting the circuit breaker line terminals to a common panelboard bus;

said circuit breakers being of at least a first and second type;

said second type of a lesser physical size than said first type, such that a greater number of said second type may be accommodated at a panelboard location than the number of said first type;

said first type of circuit breaker including a first type of line terminal and said second type of circuit breaker including a second type of line terminal;

said panelboard connecting means of a first and second type;

said first type of panelboard connecting means adapted to receive said first type of line terminal and reject said second type of line terminal, such that only said first type of circuit breaker may be received at the panelboard locations having said first type of panelboard connecting means;

said second type of panelboard connecting means adapted to receive either of said first and second types of line terminal, such that either said first or second type of circuit breaker may be received at the panelboard locations having said second type of panelboard connecting means;

whereby the predetermined location of said first and second types of panelboard connecting means establishes predetermined ones of the circuit breaker receiving locations to receive either of said first or second type of circuit breaker, and predetermined others of the circuit breaker receiving locations receive only said first type of circuit breaker.

2. In a circuit protective arrangement, as set forth in claim 1:

said second type of circuit breaker having a width one-half the width of said first type of circuit breaker, such that two of said second type of circuit breakers, interconnected in side-by-side arrangement, have the same physical extent as one of said first type of circuit breaker;

said second type of line terminal connecting two of such interconnected second type of circuit breakers to a single second type of panelboard connecting means, at a single circuit breaker receiving location;

said first type of line terminal connecting a single one of said first type of circuit breaker to a single one of said first or second types of panelboard connecting means, at a single circuit breaker receiving location;

such that said predetermined ones of the circuit breaker receiving locations accommodate either a single full-width circuit breaker or a pair of half-width circuit breakers; and said predetermined others of the circuit breaker receiving locations accommodate only a single full-width circuit breaker.

3. In a circuit protective arrangement, as set forth in claim 1:

both of said first and second types of circuit breakers including mounting means at one end thereof for receiving said panelboard retaining means and providing a pivotal engagement for moving the opposite end thereof, including said line terminal, into engagement with said panelboard connecting means;

said second type of line terminal including an abutting portion operatively positioned to abut a blocking region of said first type of panelboard connecting means and thereby prevent the full movement of said second type of circuit breaker into engagement with said first type of panelboard connecting means;

said second type of panelboard connecting means being devoid of said blocking region, thereby permitting the full movement of said second type of circuit breaker in engagement with said second type of panelboard connecting means.

4. In a circuit protective arrangement, as set forth in claim 1:

both of said first and second types of circuit breakers including mounting means at one end thereof for receiving said panelboard retaining means and providing a pivotal engagement for moving the opposite end thereof, including said line terminal, into engagement with said panelboard connecting means;

said second type of line terminal including an abutting portion operatively positioned to abut a blocking region of said first type of panelboard connecting means, and thereby prevent the full movement of said second type of circuit breaker into engagement with said first type of panelboard connecting means;

said first type of line terminal devoid of said abutting portion, thereby permitting the full movement of said first type of circuit breaker in engagement with both said first and second type of panelboard connecting means.

5. In a circuit protective arrangement, as set forth in claim 4:

said first type of line terminal devoid of said abutting portion, thereby permitting the full movement of said first type of circuit breaker in engagement with both said first and second type of panelboard connecting means.

6. In a circuit protective arrangement, as set forth in claim 1:

both of said first and second types of circuit breakers including mounting means at one end thereof for receiving said panelboard retaining means and providing a pivotal engagement for moving the opposite end thereof, including said line terminal, into engagement with said panelboard connecting means;

said second type of line terminal including an abutting portion operatively positioned to abut a blocking region of said first type of panelboard connecting means, and thereby prevent the full movement of said second type of circuit breaker into engagement with said first type of panelboard connecting means;

each of said panelboard connecting means being a generally planar, forwardly projecting stab;

each of said line terminals including a generally U-shaped contact member, having space-separated spring fingers and an interconnecting body portion;

said circuit breakers operatively installed in their panelboard locations, such that said spring fingers are on opposite sides of the respective stab;

said body portion of said first type of line terminal being displaced from the stab;

said body portion of said second type of line terminal being at said intermediate region of the stab;

said body portion of said second type of line terminal being said abutting portion, and said intermediate stab portion being said blocking portion, to prevent insertion of said second type of line terminal contact member;

said second type of panelboard stab including a cut-out at said intermediate region to permit the entry of said body portion of said second type of line terminal contact member.

7. In a circuit protective arrangement, as set forth in claim 6:

said second type of circuit breaker having a width one-half the width of said first type of circuit breaker, such that two of said second type of circuit breakers, interconnected in side-by-side arrangement, have the same physical extent as one of said first type of circuit breaker;

said second type of line terminal connecting two of such interconnected second type of circuit breakers to a single second type of panelboard connecting means, at a single circuit breaker receiving location;

said first type of line terminal connecting a single one of said first type of circuit breaker to a single one of said first or second types of panelboard connecting means, at a single circuit breaker receiving location;

such that said predetermined ones of the circuit breaker receiving locations accommodate either a single full-width circuit breaker or a pair of half-width circuit breakers; and said predtermined others of the circuit breaker receiving locations accommodate only a single full-width circuit breaker.

8. In a circuit protective arrangement, as set forth in claim 6:

said circuit breaker receiving locations being in side-by-side relationship along the longitudinal direction of said panelboard, with said predetermined ones of the locations having a panelboard stab with an intermediate cut-out, and said predetermined others of the locations having a panelboard stab with a solid intermediate region.

References Cited

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3,095,524	6/1963	Leonard et al.	317—117

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