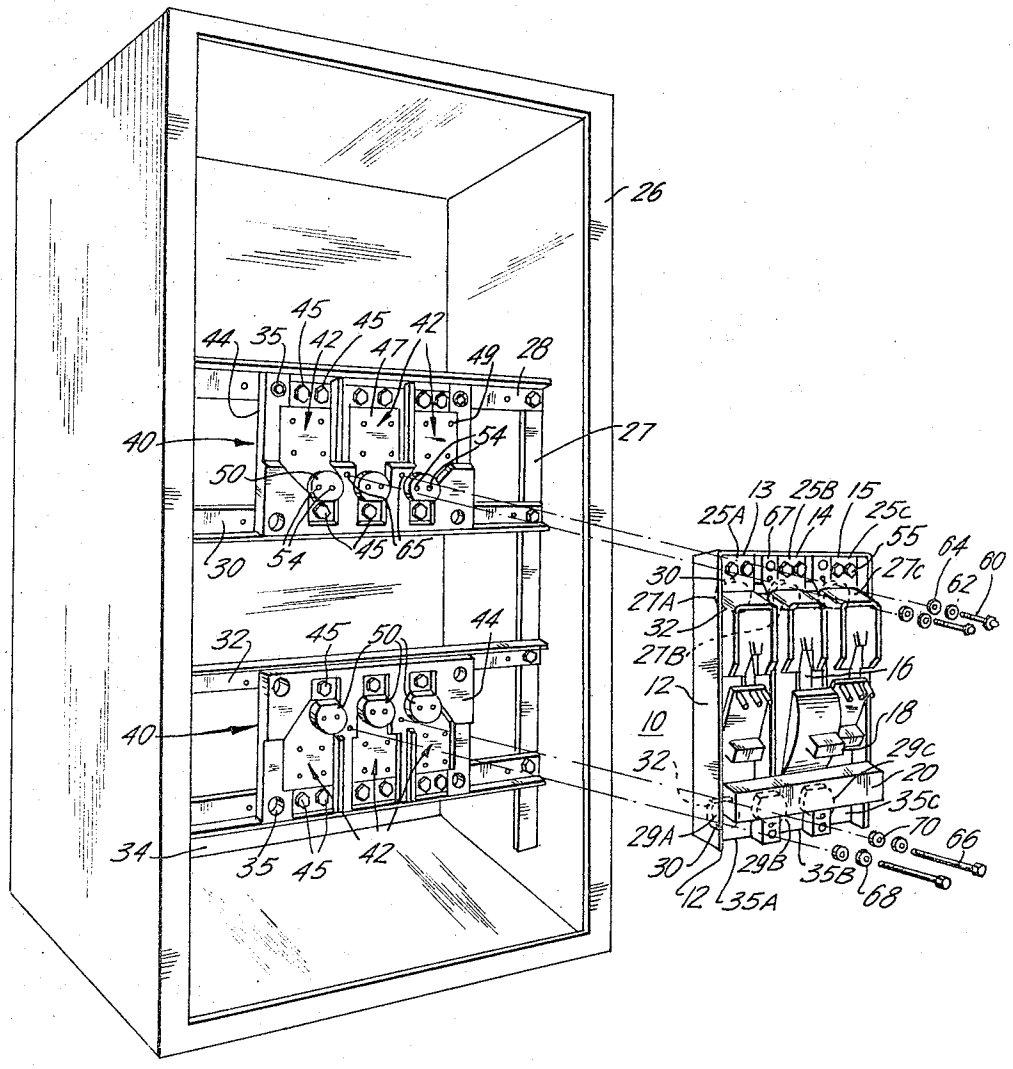
Aug. 1, 1967 A. STROBEL 3,334,277

CIRCUIT BREAKER MOUNTING ASSEMBLY INCLUDING MEANS FOR TEMPORARILY SUPPORTING THE CIRCUIT BREAKER DURING INITIAL SECUREMENT

Filed Oct. 23, 1965 3 Sheets-Sheet 1

FIG. 1.



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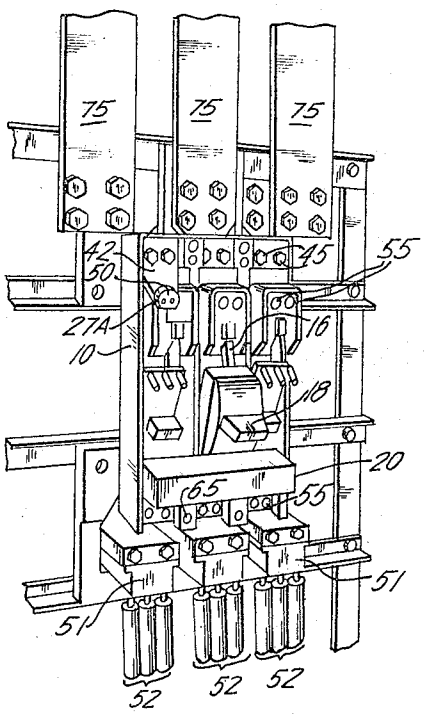
OSTROLENK, FABER, GERB & SOFFEN
ATTORNEYS

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CIRCUIT BREAKER MOUNTING ASSEMBLY INCLUDING MEANS FOR TEMPORARILY SUPPORTING THE CIRCUIT BREAKER DURING INITIAL SECUREMENT

Filed Oct. 23, 1965 3 Sheets-Sheet 2

FIG. 2.



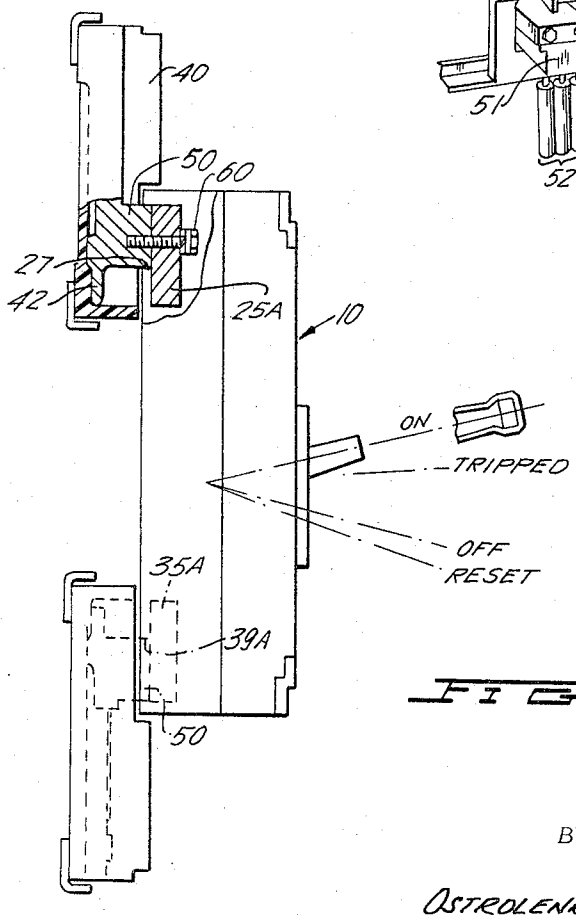


FIG. 3.

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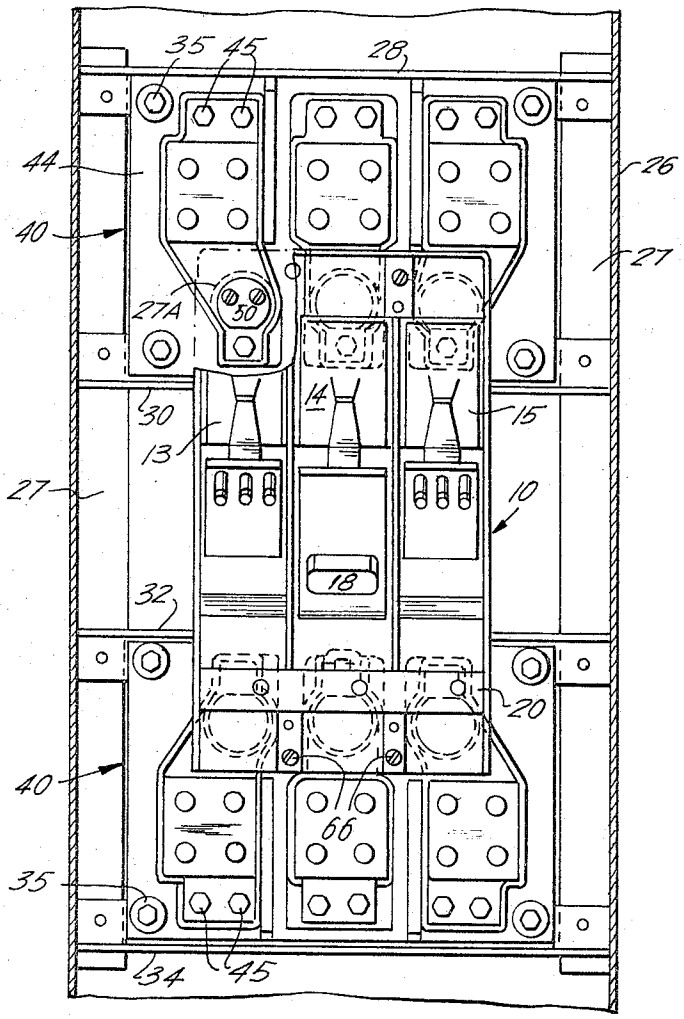
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CIRCUIT BREAKER MOUNTING ASSEMBLY INCLUDING MEANS FOR TEMPORARILY SUPPORTING THE CIRCUIT BREAKER DURING INITIAL SECUREMENT

Filed Oct. 23, 1965 3 Sheets-Sheet 3

FIG. 4.



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United States Patent Office

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3,334,277

CIRCUIT BREAKER MOUNTING ASSEMBLY INCLUDING MEANS FOR TEMPORARILY SUPPORTING THE CIRCUIT BREAKER DURING INITIAL SECUREMENT

Albert Strobel, Cherry Hill, N.J., assignor to I-T-E Circuit Breaker Company, Philadelphia, Pa., a corporation of Pennsylvania

Filed Oct. 23, 1965, Ser. No. 503,186
10 Claims. (Cl. 317—119)

ABSTRACT OF THE DISCLOSURE

A circuit breaker mounting assembly for mechanically supporting the breaker and providing the electrical connection to the external circuitry, which further includes provision for temporarily supporting the weight of the breaker during initial securement.

My invention relates to a novel mounting assembly for receiving a circuit breaker unit, and more particularly to such a mounting assembly which includes electrical bus of a suitable configuration to temporarily support the weight of the circuit breaker during the initial stages of securement.

Molded case circuit breakers of the larger frame sizes, as for example, of the type which is the subject of copending U.S. patent application entitled, "Circuit Breaker Contact Mounting," filed Feb. 5, 1965, Ser. No. 430,549, now U.S. Patent No. 3,268,702, in the name of Carl E. Gryctko, and assigned to the assignee of the instant invention, are oftentimes quite heavy. Typically, such units may weigh between 25 and 50 pounds, and sometimes even in excess of 100 pounds. Such units are usually mounted to their associated enclosure, panel board or other mounting structure in a generally vertical orientation. Hence, during the initial stages of circuit breaker securement it becomes necessary to provide a means for supporting the circuit breaker unit prior to the actual bolting of the unit to the associated support structure. In the past this has required two persons; one to hold the breaker and the other to make the necessary connections. This problem has been eased somewhat by the provision of additional ledge like protrusions on the mounting structure onto which the breaker is positioned while the mounting bolts are inserted and tightened, so as to avoid the need for additional personnel. These prior art support ledges were typically either additional or integral parts of the insulative mounting blocks or structural mounting members. Hence, their use has required additional material, and/or additional operations and space, thereby adding to the cost, size and complexity of the mounting structure.

In my invention, the need for such additional material or parts is avoided by forming the electrical bus work itself of suitable configuration to provide temporary support of the breaker during its initial placement against the mounting structure. More specifically, the bus work which interconnects the circuit breaker terminals to the external circuit includes a first portion which is secured to an insulative base support member and a second portion which is of a suitable configuration for mechanical and electrical securement to the circuit breaker terminal. The second portion includes a substantial cross-sectional area of conductive material which freely projects outward from the base support and is shaped to cooperatively enter a reentrant recess of the circuit breaker housing. When the circuit breaker is initially placed on the support structure, these forwardly projecting portions of the individual terminal connectors abut a sufficient depth and area of the circuit breaker housing wall surfaces about their respective terminal openings, to provide suitable support of the circuit breaker prior to the actual bolting thereof to such support structure.

This support is at least provided at the uppermost end of the breaker, but may advantageously be employed at both the line and load ends for additional support, as well as symmetry of support structure. Further, where a multi-phase circuit breaker unit is to be received, the adjacent connector means forwardly projecting support portions are laterally spaced an amount corresponding to the adjacent pole spacing of the circuit breaker terminals.

Hence, I provide a suitable, cooperative configuration of the circuit breaker terminal connector means and housing opening, such that the support of the breaker is provided within the confines of the breaker housing with the connector that is employed to carry the line and/or load current between the circuit breaker terminals and external circuitry. This advantageously avoids the prior art utilization of additional ledges or other projecting members for temporarily supporting a circuit breaker during the initial securement thereof.

It is therefore seen that a principal object of my invention is to provide an improved circuit breaker mounting structure.

A further object of my invention is to provide a circuit breaker mounting arrangement wherein temporary support of the circuit breaker, prior to bolting thereof to the support structure, is provided by a suitable configuration of the electrically conductive connector means.

Another object of my invention is to provide a temporary means for supporting a circuit breaker, in a generally vertical orientation, which includes the cooperative engagement of a substantial cross-sectional area of the terminal connector conductive material in conjunction with a similarly cross-sectioned reentrant opening of the circuit breaker housing about its terminal connector.

An additional object of my invention is to provide a mounting support arrangement for receiving a multiphase circuit breaker unit wherein at least some of the individual terminals thereof are recessed within a reentrant housing opening, of a suitable configuration to mate with a forwardly projecting portion of the support structure connector means, such that abutment of the connector means forwardly projecting portion against the wall surface of the circuit breaker housing reentrant openings will provide temporary support of the circuit breaker unit prior to the bolt mounting thereof to the support structure.

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

FIGURE 1 is an exploded perspective view showing the manner in which a typical multiphase circuit breaker unit may be mounted to the support structure in accordance with the novel concepts of the invention.

FIGURE 2 is a perspective view partially cut away showing the manner in which the circuit breaker unit is initially supported in accordance with my invention.

FIGURE 3 is a longitudinal view partially in cross-section of the mounted circuit breaker, showing the manner in which the mating engagement of the support structure connector means and circuit breaker housing about its respective terminals provides support of the breaker in accordance with the novel concept herein disclosed.

FIGURE 4 is a plan view showing the manner in which the circuit breaker unit is positioned and supported in accordance with my invention.

Referring to the figures, circuit breaker unit **10** which is adapted to be supported in accordance with the instant invention is shown as a three-pole unit constructed in the manner more fully discussed in aforementioned U.S. Patent No. 3,268,702. It should, however, be recognized that the particular circuit breaker unit shown is only for illustrative purposes and the novel concept of the instant invention may be utilized in conjunction with numerous other circuit breaker designs of the single or multipole variety, with, however, its most advantageous aspects being achieved where such units are of a substantial weight. Such a unit **10**, which may typically be designed to have a continuous current rating of 1600 amps and an interrupting rating of 75,000 amperes at 600 volts, requires substantial and rugged current carrying members and operating components. Such substantial members, as well as the sturdily constructed housing **12** of the unit, constructed to safely withstand the mechanical and thermal shock loading to which it is to be subjected, increase the overall circuit breaker weight, such that breakers of the frame size oftentimes weigh in the order of 50 pounds and sometimes over 100 pounds.

Circuit breaker unit **10** is generally enclosed within a housing **12** having laterally adjacent compartments, generally indicated as **13**, **14** and **15** for the respective phase components. The center phase **14** includes an operating mechanism generally shown as **16** which operates in the well-known conventional manner to automatically trip the circuit breaker responsive to the sensing of an overload condition by trip unit assembly **20**, as well as operating handle **18** for manual opening or closing of the circuit breaker unit **10**. For the sake of brevity, the operation thereof will not be discussed. However, reference is made to U.S. Patent No. 3,268,702. for a fully detailed description. The circuit breaker includes individual pole, line terminal conducting straps indicated as **25–A**, **25–B** and **25–C**, respectively, as well as corresponding load terminal conducting straps **35–A**, **35–B** and **35–C** at the opposite end of the circuit breaker housing.

Circuit breaker **10** is illustratively shown as mounted to an enclosure generally indicated as **26**. Enclosure **26** includes upstanding angle members **27** and laterally extending transverse support angle members **28**, **30**, **32**, **34**, respectively, which angle members have bolted thereto (as by bolts **35**) a pair of support assemblies generally shown as **40**, which are of the type described and claimed in copending U.S. patent application entitled "Circuit Breaker Mounting Arrangement," filed on even date herewith, Ser. No. 503,185, in the name of John C. Brumfield, and assigned to the assignee of the instant invention. Although such support assemblies **40** are shown to demonstrate the novel concepts of the instant invention, it should be understood that this is done for illustrative purposes only, with the broad aspects of the support arrangement of my invention being likewise adaptable to other circuit breaker mounting support structures.

Support assembly **40** includes an insulative housing support **44**, divided into laterally adjacent compartments, with an individual conductive strap **42**, corresponding to each of the line and load terminals of the circuit breaker to be received, being located within each compartment. Conducting strap **42** is appropriately mounted to the insulative housing **44** as by bolt means **45**. Conducting strap **42** includes a portion **47**, adapted to receive the external circuit connections. These may be directly bolted to openings **49** thereof, as shown by line bus **75**, or an intermediate cable conductor **51** may be used of the type which is the subject of copending U.S. patent application Ser. No. 503,320, filed on even date herewith, in the name of John R. Chamberlin, Jr., entitled Reversible Connector Arrangement, and assigned to the assignee of the instant invention, for connecting the load end to cables **52**.

In accordance with my invention, a reentrant opening is located at the underside of the circuit breaker housing, inwardly extending from the bottom surface of circuit

breaker housing **12** to the location of its respective terminal conducting strap. As for example, openings **27A**, **27B** and **27C** are located immediately adjacent their respective line terminal straps **25A** through **25C**, respectively; and similar openings **29A**, **29B** and **29C** are located immediately adjacent the load terminal conducting straps **35A** through **35C**, respectively. These reentrant openings are of a predetermined configuration, illustratively shown as partially circular circumferential region **30** joined by a flat region **32** to complete the perimeter thereof.

The individual terminal conducting strap **42** includes a further portion **50** which freely projects outward from the base **44** of the support structure and is of substantial cross-sectional area with an outer peripheral wall of a suitable configuration and depth to abutingly mate with and be received within the respective housing reentrant openings **27** and **29**. It should be naturally recognized that the lateral spacing between forwardly projecting portions **50** of the adjacent terminal strap **42** corresponds to the lateral spacing between the respective circuit breaker line and load terminals (e.g. **25A**, **25B**, **25C**; **35A**, **35B**, **35C**), such that the forwardly projecting portions **50** are simultaneously located within their respective reentrant openings **27A**, **27B**, **27C** or **29A**, **29B**, **29C** about the adjacent circuit breaker line or load terminals. The forward portion **50** of the connector means **42** also includes tapped openings **54** which are suitably located to mate with clearance openings **55** of the circuit breaker terminal conducting straps **25**, **35**, such that firm, mechanical and electrical securement of the circuit breaker terminal to their respective strap forward portion **50** is achieved by bolts **60** in conjunction with flat washer **62** and lock washer **64**, such that the substantial cross-sectional areas of forwardly projecting portions **50** are drawn into closely confronting engagement with their respective circuit breaker terminals **25**, **35**. This provides an intimate electrical connection of the type required for larger frame size breakers designed to handle appreciable currents. Also the mounting support base means **40** includes laterally spaced threaded inserts **65** which mate with mounting openings **67** of the circuit breaker unit **10**, such that the circuit breaker unit may be rigidly mounted to the insulative support means **40** by the provision of fastening bolt **66**, flat washer **68** and lock washer **70**.

In accordance with my invention, during the initial placement of the circuit breaker unit **10** to line and load support assemblies **40**, it will be noted that forward portions **50** of the respective conducting straps **42** enter their associated reentrant openings **27A**, **27B**, **27C** and **29A**, **29B**, **29C**, such that the peripheral portions of the forwardly projecting conductive sections **50** abut the adjacent wall surfaces of their respective circuit breaker reentrant housing openings in a manner providing suitable support of the circuit breaker unit **10**. This advantageously avoids the need for additional mounting ledges or other projecting portions, or the requirement of additional personnel to hold the circuit breaker prior to the actual bolting thereof. As for example, note in FIGURES 2 and 3 the manner in which the forwardly projecting portion **50** of the conducting strap **42** is abuttingly resting on the adjacent wall surface of the housing reentrant opening **27A**. It should be similarly recognized that the forwardly projecting substantial cross-sectional portion **50** of the adjacent pole conducting means **42** similarly extend into reentrant openings **27B**, **27C** and abut the wall surfaces about such reentrant openings for supporting and positioning the circuit breaker unit. Advantageously, such support is also provided at the lower orientated load end of the breaker by the terminal engagement of load connector means **50** and the wall surfaces of housing openings **29A**, **29B** and **29C**. Hence, with the circuit breaker resting on such integrally formed forwardly projecting portions **50** of the external circuit bus, the circuit breaker may then be bolted to the support structure as by the provision of bolt **66** and

associated lock washer and flat washer, with the individual terminals then being electrically connected to the individual terminal straps as by the provision of bolt **60** and its associated flat washer and lock washer.

It is therefore seen that my invention achieves a substantial simplification in a manner in which a circuit breaker of a substantial weight is supported prior to the bolting to its mounting support structure, with such simplification arising by suitably shaping the external circuit conducting means to cooperatively enter a housing recess, such that the support thereof does not require any extra parts or assemblies and is completely confined within the volume of the circuit breaker housing.

Although there has been described a preferred embodiment 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 appending claims.

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

1. A mounting assembly for receiving at least one circuit breaker unit, said mounting assembly comprising a base support member and at least one electrically conductive connector, said connector including integrally formed first and second portions, said conductive connector secured to said base support member, said second portion adapted to provide mechanical and electrical securement to a circuit breaker terminal, said second portion freely projecting outward from said base support member and including a substantial cross-sectional area of conductive material, the internal region of said cross-sectional area including aperture means for receiving at least one connecting bolt, such that said substantial cross-sectional area is drawn into confronting engagement with the circuit breaker terminal, said freely projecting portion about said aperture means having an outer peripheral wall of a predetermined configuration closely corresponding to a recess of a circuit breaker, about the circuit breaker terminal, said outer peripheral wall having a predetermined depth selected to abut wall surfaces of the circuit breaker recess in a manner providing support of the circuit breaker during bolted securement of its terminals to said first portion.

2. A mounting assembly for receiving at least one circuit breaker unit, and mounting said circuit breaker unit in a generally vertical orientation, a base support member and at least one electrically conductive connector, said connector including integrally formed first and second portions, said conductive connector secured to said base support member, said second portion adapted to provide mechanical and electrical securement to a circuit breaker terminal, said second portion freely projecting outward from said base support member in a generally horizontal direction, and including a substantial cross-sectional area of conductive material, the internal region of said cross-sectional area including aperture means for receiving at least one connecting bolt, such that said substantial cross-sectional area is drawn into confronting engagement with the circuit breaker terminal, said freely projecting portion about said aperture means having an outer peripheral wall of a predetermined configuration closely corresponding to a recess of a circuit breaker, about the circuit breaker terminal, said outer peripheral wall having a predetermined depth selected to abut wall surfaces of the circuit breaker recess in a manner providing support of the circuit breaker during bolted securement of its terminals to said first portion.

3. A mounting assembly for receiving a multi-phase circuit breaker unit and mounting said circuit breaker unit in a generally vertical orientation, said mounting assembly comprising insulative base support means and an individual electrically conductive connector means for each of the circuit breaker phases, rigidly mounted thereto, said connector means including integrally formed first and second portions, said first portion including means for mechanical securement to said base support means, said second portion including means for mechanical and electrical securement to its respective circuit breaker terminal, said second portion freely projecting outward from said base support member in a generally horizontal direction, and including a substantial cross-sectional area of conductive material, the internal region of said cross-sectional area including aperture means for receiving at least one connecting bolt, such that said substantial cross-sectional area is drawn into confronting engagement wtih the circuit breaker terminal, said freely projecting portion about said aperture means having an outer peripheral wall of a predetermined configuration closely corresponding to a recess of a circuit breaker, about the circuit breaker terminal, said outer peripheral wall having a predetermined depth selected to abut wall surfaces of the circuit breaker recess in a manner providing support of the circuit breaker during bolted securement of its terminals to said first portion.

4. In combination, a circuit breaker unit and a mounting assembly therefor, said circuit breaker including a housing, having line terminal means at one end thereof, and load terminal means at the other end thereof, said housing including a reentrant opening about the individual terminal means, including an inner wall region substantially contained within the volume defined by said housing, said mounting assembly comprising an insulative base support means and individual electrically conductive connector means positioned to mate with said circuit breaker line and load terminal means, said connector means including integrally formed first and second portions, said first portion including means for mechanical securement to said base support means, said second portion including means for mechanical and electrical securement to its respective circuit breaker terminal, said second portion freely projecting outward from said base support means and including a substantial cross-sectional area of conductive material, the cross-sectional area of said freely projecting portion having a configuration closing conforming to the cross-sectional area of the reentrant opening about its respective circuit breaker terminal, said forwardly projecting portions abutting the wall surfaces of their respective reentrant openings in a manner providing support of the circuit breaker during securement of its terminals to said first portions.

5. In combination, a circuit breaker unit and a mounting assembly therefor, said circuit breaker including a housing, having line terminal means at one end thereof, and load terminal means at the other end thereof, said housing including a reentrant opening about at least some of the individual terminal means, including an inner wall region substantially contained within the volume defined by said housing, said mounting assembly comprising an insulative base support means and individual electrically conductive connector means positioned to mate with said circuit breaker line and load terminal means, said connector means including integrally formed first and second portions, said first portion including means for mechanical securement to said base support means, said second portion including means for mechanical and electrical securement to its respective circuit breaker terminal, the second portion of those connector means for securement to the circuit breaker terminals having associated reentrant openings, freely projecting outward from said base support means and including a substantial cross-sectional area of predetermined configuration, the cross-sectional area of said freely projecting portion having a configuration closely conforming to the cross-sectional area of the reentrant opening about tis respective circuit breaker terminal, said forwardly projecting portions abutting the wall surfaces of their respective reentrant openings in a manner providing support of the circuit breaker during securement of its terminals to said first portions.

6. In combination, a circuit breaker unit and a mounting assembly therefor, for mounting said circuit breaker unit in a generally vertical orientation, said circuit breaker including a housing, having line terminal means at one

end thereof, and load terminal means at the other end thereof, said housing including a reentrant opening about at least some of the individual terminal means, including an inner, generally horizontally extending, wall region substantially contained within the volume defined by said housing, said mounting assembly comprising an insulative base support means and individual electrically conductive connector means positioned to mate with said circuit breaker line and load terminal means, said connector means including integrally formed first and second portions, said first portion including means for mechanical securement to said base support means, said second portion including means for mechanical and electrical securement to its respective circuit breaker terminal, the second portions of those connector means for securement to the circuit breaker terminals having associated reentrant openings, freely projecting outward from said base support means in a generally horizontal direction, and including a substantial cross-sectional area of predetermined configuration, the cross-sectional area of said freely projecting portion having a configuration closely conforming to the cross-sectional area of the reentrant opening about its respective circuit breaker terminal, said forwardly projecting portions abutting the wall surfaces of their respective reentrant openings in a manner providing support of the circuit breaker during securement of its terminals to said first portions, and said circuit breaker is in its generally vertical orientation.

7. The combination as set forth in claim **6**, wherein said circuit breaker weighs at least in the order of fifty pounds.

8. The circuit breaker unit and mounting assembly therefor, as set forth in claim **6**, said circuit breaker weighs in excess of twenty-five pounds.

9. A mounting assembly as set forth in claim **2**, wherein said freely projecting portion when received within said circuit breaker recess is adapted to support a circuit breaker in excess of twenty-five pounds.

10. In combination, a three-phase circuit breaker unit and a mounting assembly therefor for mounting said circuit breaker in a generally vertical orientation, said circuit breaker including a housing, having first, second and third line terminal means at one end thereof, and first, second and third load terminal means at the other end thereof, said housing including a reentrant opening about the individual terminal means, including an inner generally horizontally extending wall region substantially contained within the volume defined by said housing, said mounting assembly comprising an insulative base support means and individual electrically conductive connector means positioned to mate with said circuit breaker line and load terminal means, each of said connector means including integrally formed first and second portions, said first portion including means for mechanical securement to said base support means, said second portion including means for mechanical and electrical securement to its respective circuit breaker terminal, said second portions freely projecting outward from said base support means in a generally horizontal direction and including a substantial cross-sectional area of predetermined configuration, the cross-sectional area of said freely projecting portion having a configuration closely conforming to the cross-sectional area or the reentrant opening about its respective circuit breaker terminal, said forwardly projecting portions abutting the wall surfaces of their respective reentrant openings in a manner providing support of the circuit breaker during securement of its terminals to said first portions, and said circuit breaker is in its generally vertical orientation.

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