Nov. 22, 1966 L. W. JACOBS ETAL 3,287,607

PANELBOARD AND CIRCUIT BREAKER

Filed Dec. 24, 1964 2 Sheets-Sheet 1

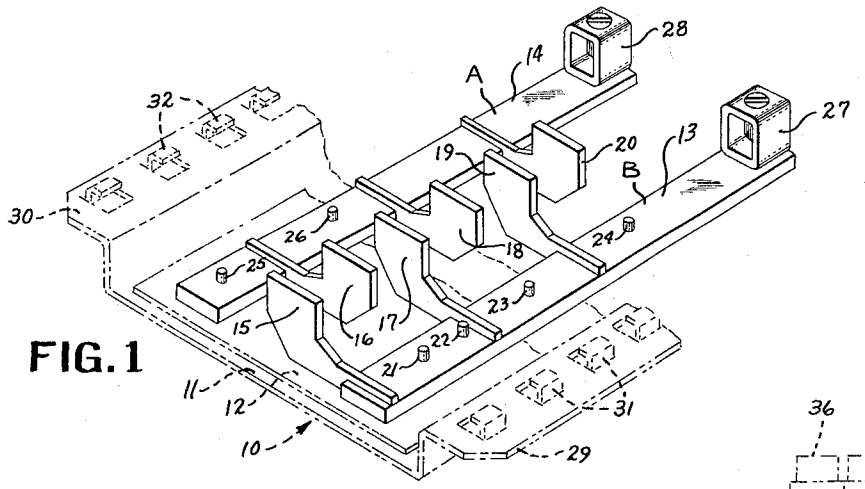


FIG. 1

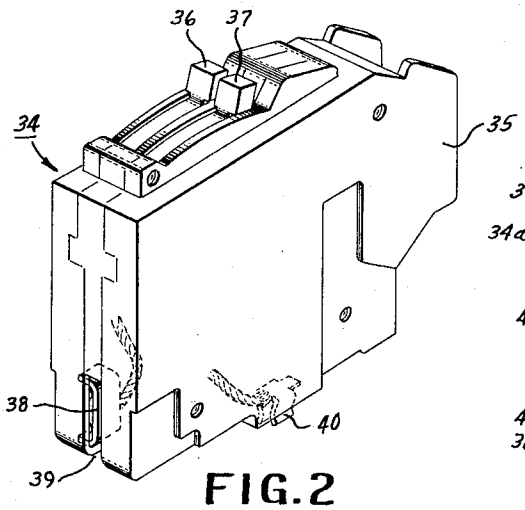


FIG. 2

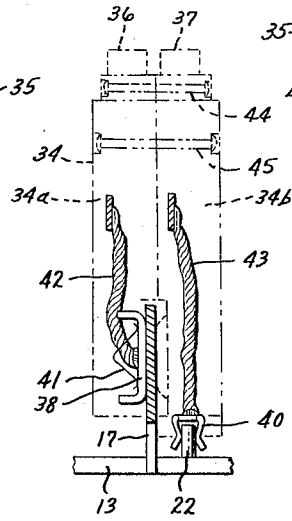


FIG. 4

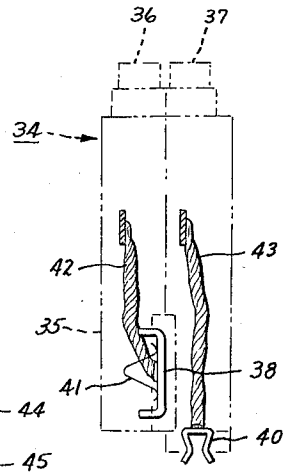


FIG. 3

INVENTORS
LEWIS W. JACOBS,
ROBERT J. SABATELLA
BY Robert T. Casey
ATTORNEY

Nov. 22, 1966 L. W. JACOBS ETAL 3,287,607

PANELBOARD AND CIRCUIT BREAKER

Filed Dec. 24, 1964 2 Sheets-Sheet 2

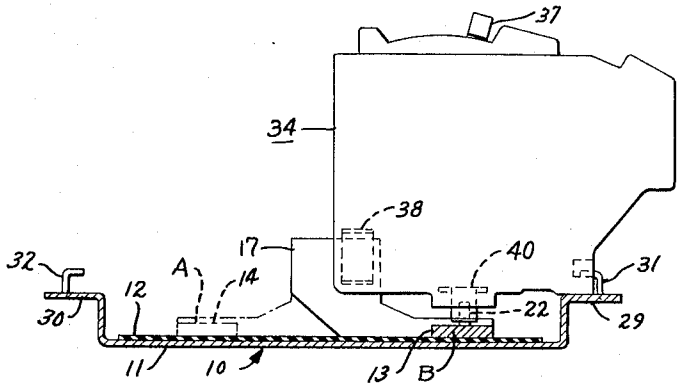


FIG.5

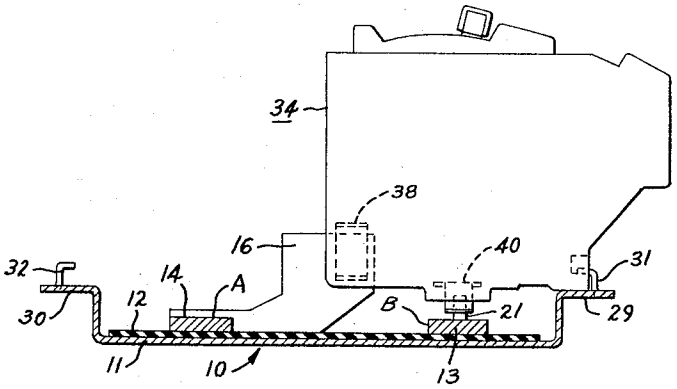


FIG.6

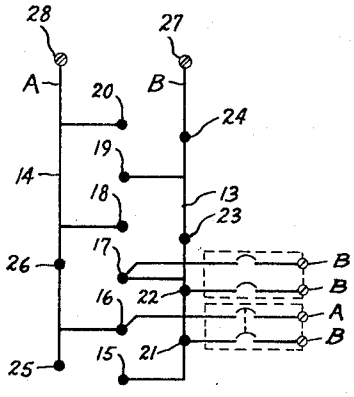


FIG.7

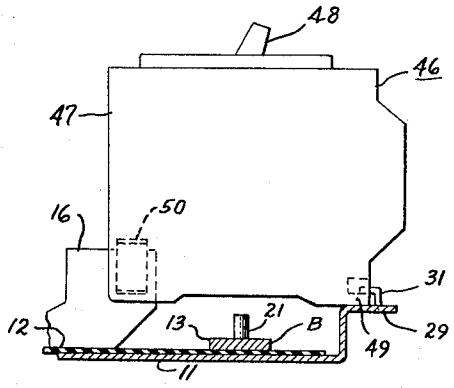


FIG.8

INVENTORS
LEWIS W. JACOBS,
ROBERT J. SABATELLA
BY Robert F. Casey
ATTORNEY

United States Patent Office 3,287,607 Patented Nov. 22, 1966

3,287,607

PANELBOARD AND CIRCUIT BREAKER

Lewis W. Jacobs, West Hartford, and Robert J. Sabatella, Southington, Conn., assignors to General Electric Company, a corporation of New York

Filed Dec. 24, 1964, Ser. No. 420,882
3 Claims. (Cl. 317—119)

This invention relates to circuit breaker panel board load centers and to circuit breakers adapted to plug-in connection on such panel board load centers. More particularly the present invention is directed to an arrangement of panel board load center and a unique two pole circuit breaker designed for connection on such a panel board within one full module width of space.

Panel board load centers presently in general use may be adapted to accept modularly sized circuit breakers such as one-half inch width and one inch width which circuit breakers are enclosed in insulating casings having substantially identical outside dimensions except for their modularly related widths. Many panel board load centers currently in general use include upstanding blade contact members arranged generally centrally on the panel board and disposed in parallel relationship for engagement with the electrical contact means of circuit breakers designed to be used with such panel boards. Circuit breakers so conceived and designed, usually have an electrical contact means disposed within the insulating casing at or near one end of its bottom wall to receive and electrically engage the electrical blade contact member of such a panel board therebetween. Panel boards of the type described may include upstanding parallel disposed contact blade members which are alternately connected and supported by two different bus bars capable of being energized by different sources of electrical energy, such as two different phases, for instance.

Accordingly, it is an object of the present invention to provide a panel board load center which is adapted to accommodate and receive in electrical engagement circuit breakers of the prior art type having a centrally disposed contact means for single pole connection as previously described.

Another object of the present invention is to provide two one-half module size circuit breakers in assembly for connection to the same source to function as two single pole circuit breakers.

Yet another object of the present invention is to provide two one-half module width circuit breakers combined in an assembly to function as a two pole circuit breaker connected to two different sources of electrical energy.

A still further object of the present invention is to provide an arrangement of panel board load center adapted to be connectable to two different sources of electrical energy and to receive in electrical engagement assemblies of two one-half module width circuit breakers functioning as two single pole circuit breakers and as one two-pole circuit breaker as well as full module size circuit breakers of the prior art type.

The invention in one form comprises an electric circuit control device panel board including a generally planar base and two bus bars supported in insulated relation on the base in parallel spaced disposition. A plurality of electrical blade contacts are supported upon and in electrical connection with each of the bus bars so as to be alternately spaced in parallel central alignment and disposed generally normal to the plane of the base. The parallel centrally positioned plurality of electrical blade contacts are equally spaced so as to have substantially the width of one full modular size circuit breaker between adjacent blades. Additionally a plurality of upstanding secondary electrical contacts are supported on at least one of the bus bars and laterally disposed in alignment relative

to the plurality of centrally aligned electrical blade contact. Each of the bus bars of the panel board is provided with a suitable connector so that each bus bar may be connected to a different source of electrical energy. The circuit breakers as conceived for use with the panel board of the present invention include a generally rectangular insulating casing having one electrical contact means centrally disposed near one end of its bottom wall to receive an upstanding centrally aligned electrical blade contact of the panel board and a second contact means disposed at the bottom wall of the insulating casing and offset with respect to the central axis of its bottom wall to receive one of the secondary upstanding contacts of the panel board. These and other aspects and objects of the invention will be more fully understood from the following detailed description and its scope will be pointed out in the appended claims.

In the drawings:

FIGURE 1 is a perspective partial view of a panel board arrangement of the present invention;

FIGURE 2 is a perspective view of a dual circuit breaker as conceived for use with the panel board of FIGURE 1;

FIGURE 3 is a partially phantom, internal end view showing the connections of the electrical contacts of the circuit breaker of FIGURE 2;

FIGURE 4 is a partially phantom end view of the circuit breaker of FIGURES 2 and 3 showing the engagement of its electrical contacts with the electrical contact means of the panel board of FIGURE 1;

FIGURE 5 is a partially cross-sectional view of the panel board of FIGURE 1 showing a circuit breaker of the type of FIGURES 2, 3 and 4 in electrical engagement as two single pole circuit breakers;

FIGURE 6 is a partially cross-sectional view of the panel board of FIGURE 1 showing a circuit breaker of the type illustrated in FIGURES 2, 3 and 4 in electrical engagement as a two-pole circuit breaker;

FIGURE 7 is a schematic wiring diagram representation of the electrical connections effected by the arrangement and engagement of circuit breakers as shown in FIGURES 5 and 6 on the panel board of FIGURE 1 and;

FIGURE 8 is a partially cross-sectional view showing a circuit breaker of the prior art type in connection with the panel board of the present invention as a single pole, full module size circuit breaker.

Referring now to FIGURE 1 there is shown a panel board indicated generally at 10 which comprises a base **11** of planar configuration and supporting thereon suitable insulation as indicated at **12**. Two bus bars **13** and **14** support a plurality of upstanding parallel aligned and centrally disposed blade contacts **15**, **17** and **19**, and **16**, **18** and **20**, respectively. Also supported on the bus bars **13** and **14** are a plurality of secondary upstanding contacts **21**, **22**, **23**, **24**, **25** and **26** which are laterally disposed with respect to the central blade contacts **15**, **16**, **17**, **18**, **19** and **20** and generally arranged in offset alignment therewith. The bus bars **13** and **14** carry suitable electrical connectors so as to be connectable to two different sources of electrical energy such as two different phases, for example. The panel board base **11** also includes two flanges **29** and **30** each of which carries a plurality of bent-up, hook-like retaining members **31** and **32** which are adapted to receive a lug portion of the insulating casing of a circuit breaker so that the circuit breaker may be rotated about that point of engagement to bring its contact means into electrical engagement with one of the centrally disposed upstanding blade contact members such as **15**, **16**, **17**, **18**, **19** or **20**. FIGURE 2 illustrates a dual type circuit breaker **34** having a substantially rectangular insulating casing shown generally at **35** and including two externally projecting reciprocally operable handle members **36** and

37 extending from its top wall. A first electrical contact means 38 is disposed near one end of the bottom wall of the circuit breaker 34 in a recess 39 therein. A second electrical contact 40 is also disposed in the bottom wall of the circuit breaker 34 and is positioned in an offset manner which may be better seen from the illustration of FIGURE 3 wherein like members bear the same numerical designations. The electrical contact member 38 is seen to be centrally disposed in a recess 39 within the insulating casing 35 of the circuit breaker 34 and is spring-biased by an appropriate resilient means such as that shown at 41 to assure good electrical contact of member 38 with a panel board electrical contact member. The circuit breaker contact means 38 is electrically connected through a stranded wire connector 42 to one of the two operable portions of the circuit breaker 34, each of which is responsive to predetermined overload conditions to interrupt the flow of current therethrough. The second electrical connector 40 of the circuit breaker 34 is comprised of opposed resilient jaws extending from the bottom wall of the insulating casing 35 of the circuit breaker 34 to engage a secondary electrical contact upstanding from and disposed on the bus bar as illustrated in FIGURE 1. The second electrical contact 40 is similarly electrically connected through a stranded flexible connector 43 to the second electrically operative portion of the circuit breaker 34 which is responsive to predetermined overload conditions to interrupt the flow of current therethrough. As seen in FIGURE 4 the circuit breaker 34 of FIGURES 2 and 3 may be comprised of two similar circuit breaker units 34*a* and 34*b* affixed to each other by suitable means such as the rivets shown at 44 and 45.

As illustrated in FIGURE 4 the two contacts 40 and 38 of the circuit breaker 34 both are connected to the same source or phase of electrical energy such as might be achieved by connecting a dual circuit breaker as conceived by the present invention into electrical engagement with the contacts 22 and 17 which are both supported and electrically energized by the same bus bar 13. This arrangement is perhaps more clearly seen from the partially cross-sectional view of FIGURE 5 wherein like members of both FIGURES 1 2, 3, and 4, respectively, bear the same numerical designations. The panel board 10 shown in FIGURE 5 comprises a generally planar base 11 which supports two bus bars 13 and 14 in insulated relation thereto by means of appropriate insulating material positioned as shown at 12. An upstanding centrally disposed blade contact member 17 is shown as being supported by the bus bar 13 as is the secondary contact member 22 which is laterally disposed with respect to the central portion of the panel board 10. Thus, both the centrally disposed blade member 17 and the secondary laterally disposed contact member 22 are both energized by the same electrical source, being in electrical connection with the same bus bar 13. Accordingly, circuit breaker 34 is connected as two side-by-side circuit breakers by reason of the engagement of the circuit breaker electrical contact 38 with the upstanding blade member 17 which energizes one circuit breaker portion of the dual circuit breaker and the electrical connection of the secondary circuit breaker contact means 40 with the secondary panel board contact member 22 which energizes the second portion of the dual circuit breaker 34.

Referring now to FIGURE 6 the same circuit breaker 34 is shown in electrical engagement with a different portion of the panel board of FIGURE 1. In the same manner as FIGURE 5, FIGURE 6 shows the secondary contact member 40 of the circuit breaker 34 in contact with an upstanding secondary contact member 21 which is supported and in electrical connection with the bus bar 13. However, the centrally aligned circuit breaker contact member 38 is in electrical engagement with the upstanding centrally disposed blade contact member 16 which is supported upon and in electrical connection with bus bar 14. As was previously pointed out, the bus bars 13 and 14 may be energized by different sources of electrical energy such as two phases of electricity, for instance. Therefore the circuit breaker 34 connected in electrical engagement with a portion of a panel board 10 arranged and disposed in accordance with the concept of the present invention will function as a single two pole circuit breaker connected to two different sources of electrical energy, yet occupying a space which is substantially equal to a one modular width circuit breaker. The arrangement of the electrical connections of the panel board and the circuit breakers of the present invention as illustrated in FIGURES 5 and 6 may perhaps be more clearly understood from the schematic electrical circuit diagram of FIGURE 7, wherein like points of electrical connection bear the same numerical designation as in FIGURES 1, 5 and 6, respectively. As shown in FIGURE 7, a bus bar 14 is arranged generally to be connectable to a source of electrical energy through an electrical connector 28 such as, for instance, phase A of an electrical source. In like manner a second bus bar 13 is arranged to be connectable to a different source of electrical energy such as phase B of an electrical source by connection through an electrical connector 27. As in FIGURE 1, the upstanding, centrally disposed blade contact members 16, 18 and 20 are in electrical connection with bus bar 14 and therefore energized by phase A of the electrical source. Secondary contacts 25 and 26 are disposed laterally and supported in electrical connection with bus bar 14 so as to be similary energized by phase A of the electrical source. The remaining centrally disposed upstanding contact blade members 15, 17 and 19 are in electrical connection with and energized through bus bar 13 which is connected to phase B of the electrical source. As illustrated in perspective in FIGURE 1, FIGURE 8 also shows the electrical connection of secondary contacts 21, 22, 23 and 24 to the bus bar 13 so that they are similarly energized by phase B of the electrical source. Thus, when the circuit breaker 34 is connected into electrical engagement with both the upstanding centrally disposed contact blade member 17 and the secondary laterally disposed contact member 22, both panel board contacts are energized from the same bus bar and therefore both electrical engagements by the circuit breaker 34 are supplied with phase B of the electrical source. However, when the circuit breaker 34 is connected into engagement with the centrally disposed blade contact member 16 and the laterally disposed secondary contact member 21, the two separate operable portions of the circuit breaker 34 are energized by different phases of an electrical source so that effectively circuit breaker 34 operates as a two pole circuit breaker rather than as a dual single pole circuit breaker in its previously described position of connection.

Those skilled in the art will appreciate the versatility and highly desirable features of the present invention inasmuch as it affords the use of a dual type one-full modular size circuit breaker as either two single pole side-by-side one-half modular width circuit breakers or as a single two pole circuit breaker of one full modular width. Typically such full modular width may be nomially one inch, while the one-half modular width may be nominally one-half inch.

In addition to the advantages afforded by the particular configuration of the panel board of the present invention and the circuit breakers which are adapted and designed to be connected into an electrical engagement therewith, the concept of the present invention is such as to accommodate prior art type circuit breakers of full module width for engagement with the upstanding centrally disposed blade contact member of the panel board load center. This arrangement is illustrated by FIGURE 8 which is a partially cross-sectional end view of such a prior art circuit breaker 46 in engagement with a portion of the panel board illustrated in FIGURE 1. The circuit breaker 46 is seen to have an insulating casing 47 of generally rectangular shape and includes a

lug portion **49** at the corner of its bottom wall and one of its end walls. In positioning the circuit breaker **46** for engagement in the panel board of the present invention, the lug portion **49** of its insulating casing **46** is inserted into the bent-up, hook-like member **31** of the flange **29** of the panel board base **11** and rotated about that point of insertion for engagement of its contact means **50** with the upstanding centrally disposed contact blade member **17**. The circuit breaker contact means **50** may be comprised of centrally disposed resilient opposed jaw members which electrically engage an upstanding blade contact member therebetween and the circuit breaker **46** may be of the dual type comprising two current responsive circuit breaker mechanisms energized from the same electrical contact member **50**. Typically such a circuit breaker may be of one full module width.

Though such a prior art circuit breaker engaged in electrical contact with the panel board of the present invention affords an electrical connection comparable to that illustrated and described in conjunction with FIGURE 5, it cannot provide the arrangement which is the equivalent of a single full module width two pole circuit breaker as illustrated and described in connection with FIGURE 6. As will be noted from FIGURE 8 the upstanding secondary contact **21**, though supported and energized by bus bar **13** as contrasted to the centrally disposed upstanding contact blade member **16** which is supported and energized by bus bar **14**, is not electrically connectable with a circuit breaker of the prior art such as that shown at **46**. Accordingly, the present invention in addition to providing highly desirable versatility of connection with circuit breakers arranged and disposed in accordance with its concept and also accommodating connection with prior art-type circuit breakers, nonetheless is so conceived and arranged as to prevent the inadvertent or indiscriminate connection of a prior art-type circuit breaker across two electrical contacts of the panel board of the present invention which may be energized by different phases of electrical energy.

Further, in accordance with the concept of the present invention the laterally disposed upstanding secondary contact members may be eliminated from certain positions thereby segregating that portion of the panel board load center of the present invention by limiting that portion of the panel board to connection with single pole circuit breakers.

While we have disclosed only certain embodiments of the invention, it will be readily appreciated that many modifications thereof may be made. We therefore intend by the appended claims to cover all such modifications as fall within the true spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An electric circuit control device panel board comprising a generally planar base, two bus bars supported in insulated relation on said base and connectable to different sources of electrical energy, a plurality of electrical blade contacts supported on said bus bars and disposed in parallel central alignment on said panel board generally normal to the plane of said base, a plurality of upstanding secondary electrical contacts supported on said bus bars and laterally disposed relative to said blade contacts in regularly spaced alignment, and a plurality of circuit breakers enclosed in insulating casings having side walls of substantially the same outside dimensions and including at least one two-pole circuit breaker having first resilient contact means disposed near one end of the bottom wall of its insulating casing to receive a blade contact supported in electrical connection with one of said bus bars and having second resilient contact means disposed within the bottom wall of its insulating casing to receive an upstanding secondary contact in electrical connection with the other of said bus bars.

2. An electric circuit control device panelboard as set forth in claim **1** wherein said secondary contacts are each positioned substantially directly over one of said bus bars and substantially directly behind one of said circuit breakers intermediate the ends of the casing thereof.

3. An electric circuit control device panelboard as set forth in claim **1** wherein said secondary contacts each comprise a cylindrical pin extending normal to said other of said bus bars short of the general plane of the back wall of said circuit breaker casing.

References Cited by the Examiner

UNITED STATES PATENTS

3,172,015	3/1965	Darlow	317—120 X
3,198,992	8/1965	Norden	317—119
3,200,228	8/1965	Locker	317—119 X

ROBERT K. SCHAEFER, *Primary Examiner.*

W. C. GARVERT, *Assistant Examiner.*