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ELECTRIC CIRCUIT CONTROL DEVICE PANEL BOARD AND ASSEMBLY

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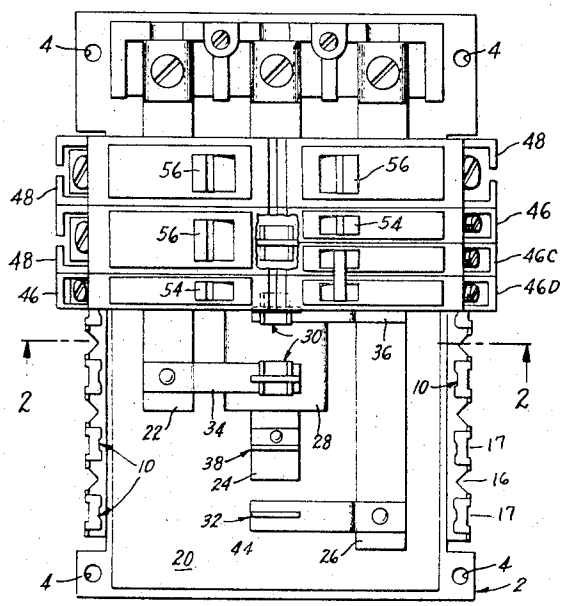


FIG. 1

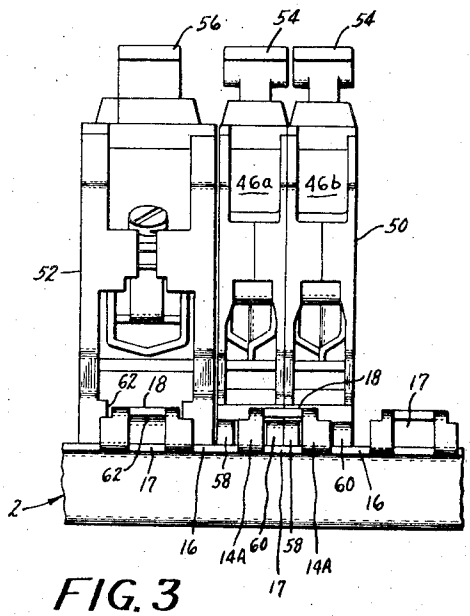
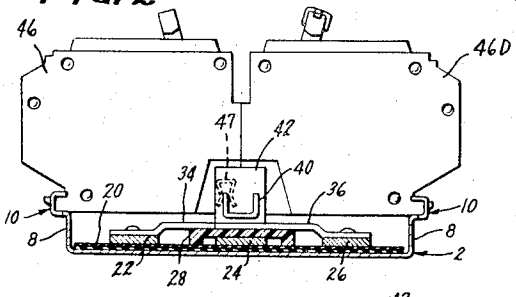


FIG. 3

FIG. 2



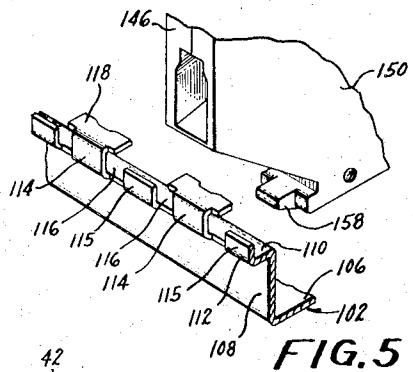


FIG. 5

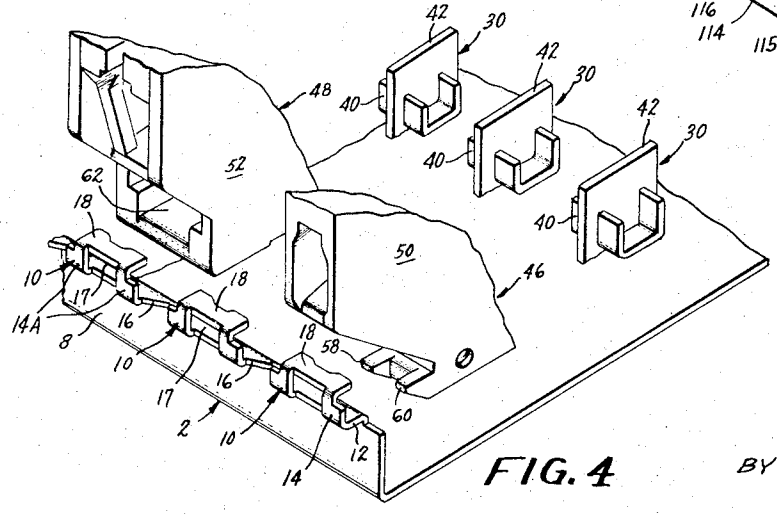


FIG. 4

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ELECTRIC CIRCUIT CONTROL DEVICE PANEL BOARD AND ASSEMBLY

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14 Claims. (Cl. 317—119)

ABSTRACT OF THE DISCLOSURE

There is disclosed an electric circuit control device panel board for use with circuit control devices of two different widths. The panel includes a base having a row of mounting hooks including portions fitting into recesses in the wider control devices. Each hook has an opening defining two spaced apart side portions. Each narrower control device has a pair of spaced projections arranged to straddle one of the side portions of the hook, so that two of the narrower control devices can be mounted in retained position by each of the hooks.

Background of the invention

The present invention relates to electric circuit control device panel board and more particularly to such panel boards which are adapted to receive control devices of two different widths or modules with means thereon for retaining the control devices in desired alignment and engagement.

In United States Patent No. 3,309,580, granted Mar. 14, 1967, to Lewis W. Jacobs and Robert J. Sabatella and assigned to the same assignee as the present invention, there is disclosed a panel board assembly utilizing electrical contacts providing contact blades extending generally normally to the side wall of the base or saddle of the panel board and contact blades which extend substantially parallel thereto. The normally extending contact blades are adapted to be electrically engaged by contact jaws of a circuit breaker or other control device extending generally parallel to the longitudinal axis of the control device whereas the parallel extending contact blades or wing portions as shown therein are adapted to be electrically engaged by contact jaws on a smaller module control device which extend normally to the longitudinal axis thereof.

In mounting control devices of various types into plug-in panel boards, it has been generally customary to employ a configuration for the base or saddle portion of the panel board and for the rear end of the control device which would permit interengagement thereof and then pivoting of the control device into electrical engagement with the contact blades. One form for such interengagement is shown in the aforementioned Jacobs et al. patent wherein hooks are provided upon the upstanding side wall which engage in a slot formed in the rear of the control devices. Although such retaining means are generally satisfactory, it is desirable to provide distinctive means for retaining the two modules of control devices so as to ensure proper alignment thereof in desired positions with respect to the various contact blades. In addition, it will be appreciated that use of the same form of mounting technique for two different modules of control devices will limit the opportunity for providing retention against lateral movement since the retaining means must accommodate both modules at various positions along the panel board.

It is an object of the present invention to provide a novel electrical control device panel board incorporating means for retaining control devices of two different modular sizes in predetermined positions with respect to the contact blades against undesired lateral movement.

It is also an object to provide such a panel board wherein the alignment of the contact blades and the retaining means will ensure proper positioning and disposition of the control devices of the two different modules.

Another object is to provide such a panel board which may be readily and economically fabricated and which provides positive positioning means for two modules of control devices while permitting facile insertion and disengagement of the control devices.

Summary of the invention

It has now been found that the foregoing and related objects can be readily obtained in an electrical circuit control device panel board for use with circuit control devices of different modular widths which has a base providing a generally planar center portion and at least one upstanding side wall thereon. A multiplicity of inwardly projecting hook portions are spaced apart along the upper end of the side wall so as to provide channels therebetween and conductor means is disposed above the center portions of the base. Upstanding contact blades on the conductor means are spaced from the side wall in predetermined alignment and directional orientation with respect to the hook portions and channels so as to permit electrical engagement thereon of control devices of different width or modules. The hook portions on the side wall are engageable in cooperatively dimensioned recesses in the rear surface of one modular width control device and the channels are dimensioned cooperatively to receive a tongue projecting from the rear surface of another modular width control device. The hook portions additionally provide means for retaining in the channels the second modular width control device with the result being that the control devices of two different widths or modules may be properly positioned and secured on the panel board.

Generally, the panel board will have conductor means providing some contact blades which extend parallel to the side wall and other contact blades which extend normally thereto with the normally extending contact blades being aligned with the centers of the hook portions of the side wall. The parallel extending contact blades extend in alignment with at least a portion of the channels between the hook portions. In accordance with the preferred embodiment, the conductor means includes contact elements having a first blade portion extending parallel to the side wall and a second blade portion intersecting the first blade portion and extending normally to the side wall so as to permit mounting of control devices having contact jaws extending parallel or normal to the longitudinal axis thereof. One type of contact of the preferred type is illustrated in the aforementioned Jacobs et al. Patent No. 3,309,580 wherein the first blade portions extending parallel to the side wall provide wings to either side of the second blade portion for mounting thereon a pair of the smaller module circuit breakers. As seen therein, the contact elements may include two blade portions extending parallel to the side wall so as to permit mounting of a pair of circuit breakers extending from each side of the panel board or a total of four circuit breakers.

However, the specific construction of the conductor means may vary depending upon the nature of the control devices employed therewith and the type and number of devices desired to be positionable at any point in the panel board. The essential feature of the conductor means is that it provides the upstanding contact blades in predetermined alignment and directional orientation with respect to the hook portions and with respect to the channels therebetween.

In one embodiment of the present invention, the side

wall has an outwardly extending flange from which the hook portions project so as to form a shelf for seating the rear edges of the control devices. However, it will also be appreciated that a suitable base support for the rear edges of the control devices may be provided by a separate element cooperating with the side wall. Moreover, the hook portions may be formed integrally with the side wall or they may be formed of a separate element mounted thereon or closely adjacent thereto so as to provide the requisite construction.

In one embodiment of the present invention, the outwardly extending flange about the side wall has a multiplicity of arms spaced along the length thereof to provide channels therebetween with alternate arms having inwardly extending fingers to provide the hook portions. This form of construction is advantageously employed with control devices of the type having a single tongue projecting rearwardly therefrom adjacent the center thereof with the tongue seating in the channel between a pair of arms one of which has a finger extending inwardly therefrom to provide the hook. To ensure retention of the control device in the channel, the fingers are of greater dimension in the direction of the side wall axis than their cooperating arms so as to extend partially over the channels adjacent thereto and provide means for retaining the tongues in the channels against vertical movement. In the preferred embodiment, the hook portions again include arms extending upwardly from the flange and fingers extending inwardly from the arms; however, each of the arms has an aperture therein adapted to receive one tongue of a control device having a pair of spaced-apart tongues adjacent the side surfaces thereof. Accordingly, one tongue of such devices fits within the aperture of the arm whereas the other tongue extends into the channel between the hook portions with the unapertured portion or strap portion of the arm being disposed in the channel between the spaced-apart tongues. By proper dimensioning of the apertures in the arms and the channels, each will receive a pair of tongues so that a pair of control devices may be positioned side by side with the adjacent tongues fitting into the channels or apertures in the arms as the case may be. In either instance it will be appreciated that the engagement of the tongue within the aperture of the arms will restrict vertical movement of the control device and provide means for retaining the control devices in the channels and in assembly with the panel board.

As will be appreciated from the description of the preferred embodiment of construction for the conductor means and the reference to the aforementioned Jacobs et al. patent, the control devices for which the present invention is particularly adapted are modules wherein the one type is approximately one-half the width of the other. The larger module control device has its contact jaws extending parallel to the longitudinal axis thereof and accordingly normally to the side wall of the base or saddle of the panel board. The large module device has a recess formed therein which is dimensioned to receive the finger on the hook portion so as to limit both vertical and horiozntal movement of the device.

The smaller module device has its contact jaws extending normally to the longitudinal axis thereof and accordingly parallel to the side walls of the base or saddle of the panel board. It may have one or two tongues projecting rearwardly thereof depending upon the particular means selected for the construction of the hook portions to provide retention of the control devices in the several channels. With a device employing a pair of tongues, the hook portion desirably has an aperture therein receiving one of the pair of tongues; in its preferred form, the aperture is sufficiently large so as to receive a pair of tongues situated in side-by-side relationship on two adjacent small module circuit breakers thus permitting their mounting upon contact blades of a single contact.

By suitable selection of the configuration of the conductor means and the contact blades thereof as well as their disposition with respect to the hook portions and the channels therebetween, various arrangements of the small and large module control devices may be permitted at various locations along the length of the panel board. Two large module breakers may be seated on a contact blade with their front ends in abutment or a large module breaker may be opposed by a pair of smaller module breakers or smaller module breakers may be located in opposition to each other. In addition, two smaller module breakers may be mounted adjacent to each other with one of the breakers in contact with a contact blade of one current phase, and the other breaker in contact with a contact blade of a second current phase.

Brief description of the drawings

FIGURE 1 is a plan view of an electrical circuit control device panel board embodying the present invention showing two different modules of circuit breakers mounted thereon and with a portion of several circuit breakers broken away for clarity of illustration;

FIGURE 2 is a sectional view of the panel board of FIGURE 1 along the line **2**—**2** of FIGURE 1 with a portion of one circuit breaker housing broken away to show the contact clamping jaws;

FIGURE 3 is a fragmentary elevational view of the panel board to the left side as seen in FIGURE 1;

FIGURE 4 is a fragmentary exploded perspective view of the panel board of FIGURE 1; and

FIGURE 5 is a fragmentary exploded perspective view of the panel board utilizing another embodiment of the present invention.

Detailed description of the illustrated embodiments

Turning now to FIGURES 1–4 in detail, a panel board load center has a base or saddle generally designated by the numeral **2** adapted to be mounted in a suitable enclosure (not shown) by fasteners (not shown) extending through the apertures **4** therein. The base **2** has a generally planar center portion and upstanding parallel side wall portions **8** each having a series of hook-shaped elements **10**. Each of the hook-shaped elements **10** includes a base portion **12** and an upstanding portion **14**. Each of the portions **14** has an aperture **17** formed therein and carries an inwardly extending finger **18** at its upper end. The hook-shaped elements **10** are spaced apart to provide spaces **16** therebetween for a purpose to be described. The spaces **16** are equal in length to the length of the apertures **17**.

On the center of the base **2** are sheets **20** of insulation and three spaced busbars **22**, **24** and **26** which extend substantially parallel to the side wall portions **8**. Additional insulating means **28** is provided over the busbar **24** as seen in FIGURES 1 and 2. Supported on the busbars **22**, **26** are a plurality of contacts generally designated by the numerals **30**, **32** which have arm portions **34**, **36** extending inwardly in substantially parallel relationship over the center busbar **24**. In addition, the busbar **24** has an upstanding contact blade **38** thereon which extends normal to the busbar **24**.

The contacts **30** have a generally U-shaped contact blade **40** upstanding at the end of the arm portions **34** with the legs thereon extending parallel to the several busbars **22**, **24** and **26** as well as to the side wall portions **8**. In addition, a central contact blade **42** of greater heighth than the legs of the U-shaped contact blade **40** is mounted thereon and bisects the U-shaped contact blade **40** so as to extend normally to the several busbars **22**, **24** and **26** as well as to the side wall portions **8**. The contact **32** has a single contact blade **44** upstanding from its arm portion **36** and extending normally to the busbars **22**, **24** and **26** and to the side wall portions **8**.

Mounted on the panel board load center are circuit breakers of two different widths designated generally by the numerals **46**, **48** and having insulating casings or housings **50**, **52** respectively and operating handles **54**, **56**

respectively. Generally, the circuit breakers **46**, **48** employ conventional construction except as pointed out hereinafter.

The smaller module circuit breakers **46** are one-half the width of the larger breakers **48** and have contact jaws **47** at their inner or front ends which extends normally to their longitudinal axis and thus parallel to the side portions **8** and the legs of the U-shaped contact blades **40**. At their rear ends, the breakers **46** having projecting in the longitudinal axis a pair of spaced tongues or tangs **58**, **60** situated adjacent the side surfaces thereof so as to provide a slot therebetween dimensioned to receive one of the sections **14A** of the upstanding portions **14** of the hook-shaped elements **10**.

The larger module circuit breakers **48** have contact jaws (not shown) at their inner or front ends which extend parallel to their longitudinal axis and thus normally to the side wall portions **8** and parallel to the central contact blades **42** and contact blade **44**. At their rear ends, the breakers **48** have a recess **62** formed in their rear surfaces dimensioned to receive the fingers **18** of the hook-shaped elements **10**.

By the present invention, the contacts **30**, **32** and **33** may be situated with respect to the hook-shaped elements **10** to provide for mounting of the two types of circuit breakers in predetermined positions only. As can be seen best in FIGURES 3–4, the large module breaker **48** is mounted with the finger **18** engaged in its recess **62** to lock it onto the hook-shaped element **10** and is then pivoted downwardly so that its contact jaws (not shown) engage about opposite surfaces of the central contact blade **42** of a contact **30** to provide electrical engagement with its associated busbar.

However, the configuration of the hook-shaped elements **10** frustrates efforts to insert a smaller module breaker **46** in precisely the same position since the tongues **58**, **60** will abut against the sections **14A** of the upstanding portions **14**. By displacing the breaker **46** slightly along the longitudinal axis of the busbars **22**, **24** and **26**, the two tongues **58**, **60** will now bridge or straddle the section **14A** by reason of the spacing therebetween with one tongue extending through the aperture **17** and the other through the space **16** as best seen in FIGURE 3. When the breaker **46** is now pivoted downwardly, its contact jaws **47** engage opposite surfaces of the nearest leg of the U-shaped contact blade **40**.

As seen in FIGURES 1 and 3, two of the smaller module breakers **46** may be positioned side by side in electrical engagement with a single contact **30** in the space which would be occupied by a single large module breaker **48**. The tongue **58** of one breaker **46A** seats in the space **16** to one side of the section **14A** while its tongue **60** as well as the tongue **58** of the companion breaker **46B** seat in the aperture **17** of the upstanding portion **14**. The tongue **60** of the breaker **46***b* seats in the space **16** to the other side of the portion **14**. Thus, the two breakers are locked in position on the hook-shaped element **10** by virtue of the engagement of their respective tongues **58**, **60** in the aperture **17** of the portion **14**. As will be appreciated from FIGURE 1, their contact jaws **47** engage opposite surfaces of the adjacent leg of the U-shaped contact blade **40** to opposite sides of the central contact blade **42**.

Although the contacts **30** permit mounting of both modules of circuit breakers **46**, **48**, the contact **32** and the contact blade **38** of the busbar **24** permit mounting of only the larger module breaker **48** since there is no provision for receiving contact jaws extending parallel to the busbars. Thus, by selection of the types of contacts and their disposition with respect to the portions **14** and spaces **16**, it is possible to ensure proper alignment of the breakers **46**, **48** or to prevent utilization of a given module in a particular location.

In addition, by proper dimensioning of the length of the finger **18** and the cooperating dimension of the recess **62** in the breaker **48**, the fingers **18** not only firmly position the breaker **48** but also serve to reject placement of the breaker **48** between two fingers **18** since the spacing therebetween will be less than the width of the breaker.

Turning now to FIGURE 5, there is illustrated another embodiment of the present invention wherein a smaller module circuit breaker designated generally by the numeral **146** has a single tongue **156** of lesser width than the casing **150** and disposed centrally thereof. The base generally designated by the numeral **102** has a center portion **106** and side wall portion **108** as in the previous embodiment, but the shelf portion generally designated by the numeral **110** is of modified construction. Projecting upwardly from the flange **112** are arms **114** and arms **115** which alternate with each other and are spaced apart to provide channels **116** therebetween. The fingers **118** project inwardly from the upper ends of the arms **114** and are of greater width so as to partially project over the channels **116**.

As in the preceding embodiment, the fingers **118** seat in the recess **62** of the larger module circuit breaker **48**, and the spacing therebetween will prevent misassembly of such a breaker by rejecting it. However, the single tongue **158** of the smaller module circuit breaker **146** is receivable only in the channels **116** between the arms **114** and **115** and the finger **118** of the arm **114** will overlie a portion thereof to retain it securely in position. Two smaller module breakers **146** may be assembled in side-by-side position by inserting the tongue **158** of another such breaker in the next adjacent channel **16**. Again, by proper selection of the type of contacts and their alignment relative to the arms **114**, the impermissible assembly of the two types of breakers may be avoided and desirable alignment and retention may be effected.

In the assembly shown in FIGURE 1, the two smaller module breakers **46C** and **46D** are electrically connected to two different sationary contacts and thereby to two different bus bars. These breakers may therefore be operated simultaneously, such for example as by having their handles tied together, and can serve as a "two-pole" circuit breaker. In practice, these circuit breakers would also be permanently fastened together and provided with means for causing automatic opening of either breaker upon automatic opening of the other breaker.

Thus, it can be seen that the present invention provides a novel and highly effective circuit contact device panelboard for use with circuit control devices of different widths or modules. The modules may be firmly secured in position in desired alignment with the contact blades, and undesired positioning of any given module may be avoided by selection of the type of contact arm or by its alignment relative to the securing flange on the side wall portion of the base or saddle.

While the invention has been illustrated in only one embodiment, it will be readily apparent that many modifications thereof may be made, and we therefore intend by the appended claims to cover all such modification 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. In an electrical circuit control device panel board for use with circuit control devices of different widths, the combination comprising:

(a) a base having a generally planar center portion and at least one upstanding side wall thereon, said side wall having a multiplicity of spaced apart inwardly projecting hook portions at the upper end thereof providing channels therebetween; and

(b) conductor means above said center portion of said base having upstanding contact blades spaced from said side wall in predetermined alignment and directional orientation with respect to said hook portions, said hook portions being engageable in cooperatively dimensioned recesses, the rear surface of one width of circuit control device and said channels

being adapted to receive a tongue projecting from the rear surface of another width of circuit control device, said hook portions also providing means for retaining in said channels the control device of another width, whereby the control devices of different widths may be properly positioned and received on said panel board.

2. The panel board of claim 1 wherein at least some of said contact blades extend parallel to said side wall and the other contact blades extend normally thereto, said normally extending contact blades being aligned with the centers of said hook portions of said side wall and portions of said parallel extending contact blades extending in alignment with said channels between said hook portions, whereby control devices having a recess in their rear surface and employing contact jaws extending parallel to their longitudinal axis may engage the contact blades extending normally to said side wall and control devices having a tongue projecting therefrom and employing contact jaws extending normally to their longitudinal axis may engage the contact blades extending parallel to said side wall.

3. The panel bard of claim 1 wherein said side wall has an outwardly extending flange from which said hook portions project so as to form a shelf for seating the rear edges of the control devices.

4. The panel board of claim 3 wherein said hook portions are comprised of arms extending upwardly from said flange and fingers extending inwardly from said arms, said arms having an aperture therein adapted to receive one tongue of a control device having a pair of spaced apart tongues with the unapertured portion of the arm being disposed between the tongues to provide the means for retaining in said channels the control device of another width.

5. The panel board of claim 3 wherein said flange has a multiplicity of arms spaced apart along the length thereof to provide channels therebetween with alternate arms having inwardly extending fingers to provide said hook portions.

6. The panel board of claim 5 wherein said fingers are of greater dimension in the direction of the side wall axis than their cooperating arms so as to extend partially over the channels adjacent thereto and to provide the means for retaining the tongues against vertical movement in said channels and thereby the control devices of another width.

7. The panel board of claim 2 wherein said conductor means includes contacts having a first blade portion extending parallel to said side wall and a second blade portion intersecting said first blade portion and extending normally to said side wall so as to permit mounting of both types of control devices thereon.

8. In an electrical circuit control device panel board for use with circuit control devices of two different widths where the larger width device has a recess in the rear surface thereof and the smaller width device has at least one tongue projecting rearwardly therefrom, the combination comprising:

(a) a base having a generally planar center portion and a pair of upstanding, parallel side walls each having outwardly projecting flanges and upstanding arms spaced apart along the length of said flanges to provide channels therebetween, at least alternate arms having inwardly projecting fingers to provide hook portions cooperating with said flange to receive and retain therebetween a control device of the type having a recess in the rear surface thereof dimensioned to receive said fingers, said channels being adapted to receive tongues of control devices of the type having such tongues, said hook portions also providing means for retaining in said channels the control devices; and

(b) conductor means above said center portion of said base including contacts each having a first upstanding contact blade extending parallel to said side walls and a second upstanding center blade extending normally to said side walls and normally to and intersecting said first contact blade, at least some of said contacts being aligned with their center blades in substantial alignment with the center of said fingers whereby a contact device of the first-mentioned type having contact jaws extending parallel to its longitudinal axis may clamp opposite surfaces of a center blade and whereby a control device of the second-mentioned type having contact jaws extending normal to its longitudinal axis may clamp opposite surfaces of a first contact blade.

9. The panel board of claim 8 wherein substantially all of said arms have apertures therein to receive tongues on control devices and inwardly extending fingers so as to receive one tongue of a control device having a pair of spaced-apart tongues on its rear surface with the unapertured portion of the arm being disposed between the tongues and thereby provide the means for retaining in said channels the control devices.

10. The panel board of claim 8 wherein only alternate arms have inwardly extending fingers and wherein said fingers are of greater dimension longitudinally of the side wall than said arms so as to overlap said channels and provide means for locking the tongues against vertical movement in said channels and thereby retaining in said channels the control devices.

11. An electrical control device panel board assembly including:

(a) a base having a generally planar center portion and at least one upstanding side wall thereon, said side wall having a multiplicity of spaced-apart, inwardly projecting hook portions at the upper end thereof providing channels therebetween;

(b) conductor means above said center portion of said base having upstanding contact blades spaced from said side wall in predetermined alignment and directional orientation with respect to said hook portions;

(c) a first electric circuit control device having a pair of contact jaws adjacent its front end engaged with one of said contact blades and a recess in its rear surface receiving one of said fingers so as to be retained in assembly; and

(d) a second electric circuit control device of another width having a pair of contact jaws adjacent its front end engaged with another of said contact blades and a tongue on its rear surface projecting through one of said channels so as to be retained in assembly therein, said hook portions providing means engaging said second control device to retain it in said channel.

12. The assembly of claim 11 wherein said conductor means includes contacts having a first blade portion extending parallel to said side wall and a second blade portion extending normally to said first blade portion and said side wall and intersecting said first blade portion, said second blade portion being aligned substantially with the center of a cooperating hook portion and wherein said first control device has its contact jaws extending parallel to its longitudinal axis and in clamped electrical engagement with the opposite surfaces of a second blade portion aligned with its cooperating hook portion, said first blade portions extending into parallel alignment with a portion of said channels between said hook portions and wherein said second circuit control device has its contact jaws extending normally to its longitudinal axis and in clamped electrical engagement with opposite surfaces of one of said first blade portions.

13. The assembly of claim 11 wherein said side wall has an outwardly extending flange from which said hook portions project so as to form a shelf for seating the rear edges of the control devices.

14. The assembly of claim 13 wherein said hook por-

tions are comprised of arms extending upwardly from said flange and fingers extending inwardly from said arms, said arms having apertures therein and unapertured strap portions at the sides thereof, and wherein said second electric circuit control device has a pair of tongues spaced to the opposite sides thereof and providing a slot therebetween, one of said tongues being received in said apertures in the arm and the other of said tongues being received in the adjacent channel between said hook portions with the strap portion of the arm being received in the slot between the tongues.

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