Oct. 1, 1968 L. W. JACOBS ET AL 3,404,315

PANEL BOARD CONTACT ASSEMBLY

Filed June 1, 1967 2 Sheets-Sheet 1

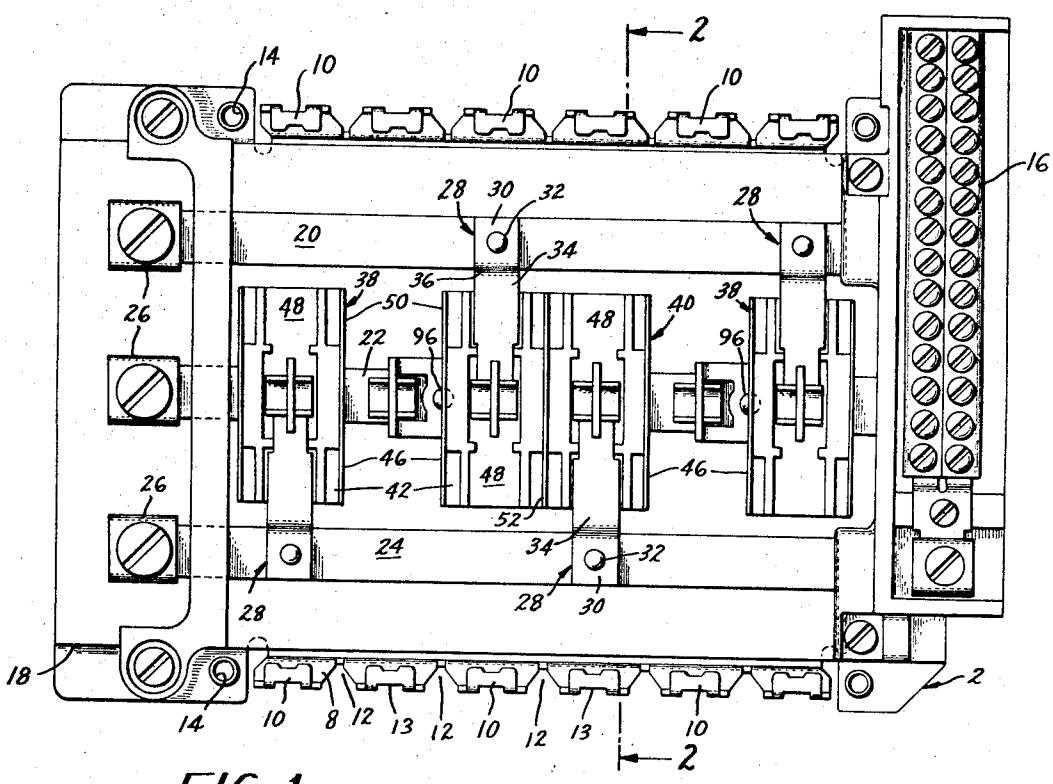

FIG. 1

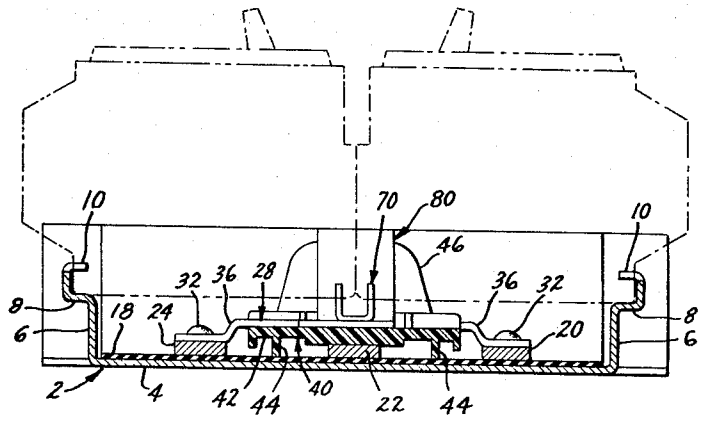

FIG. 2

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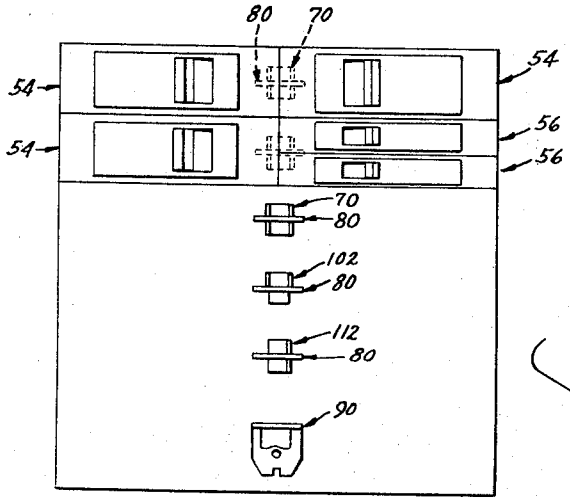


FIG. 3

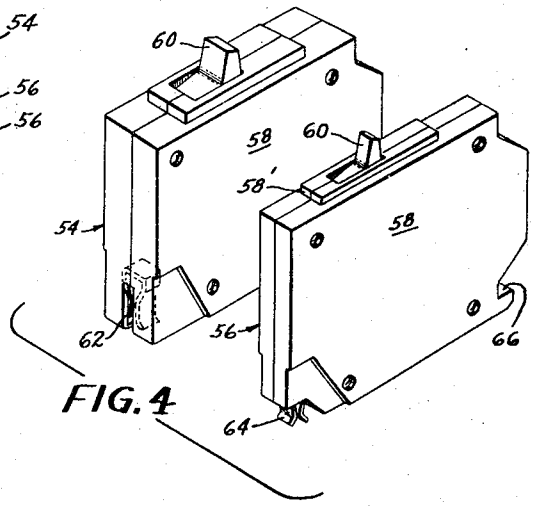


FIG. 4

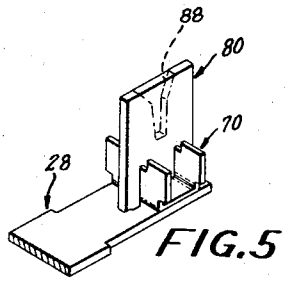


FIG. 5

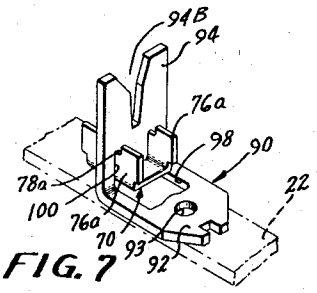


FIG. 7

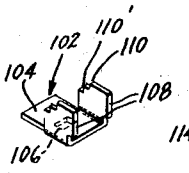


FIG. 8

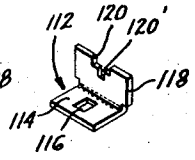


FIG. 9

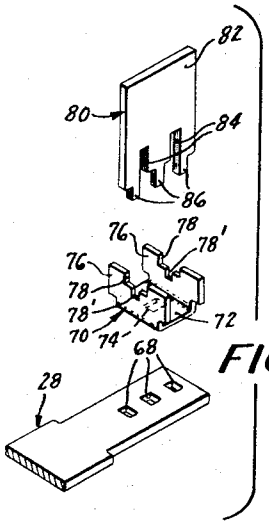


FIG. 6

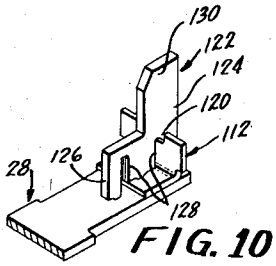


FIG. 10

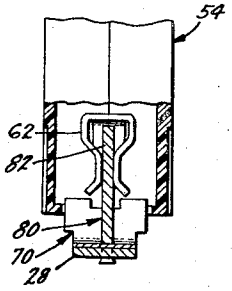
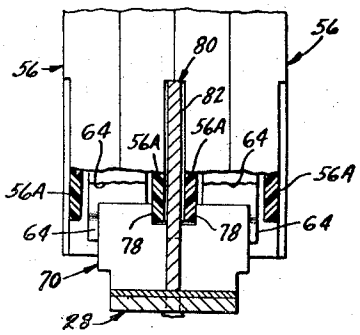


FIG. 11

FIG. 12



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3,404,315

PANEL BOARD CONTACT ASSEMBLY

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Filed June 1, 1967, Ser. No. 642,852
14 Claims. (Cl. 317—119)

ABSTRACT OF THE DISCLOSURE

There is disclosed an electrical control device panel board including a base member providing a generally planar center portion and multipart contact means secured on the busbars and a plurality of parallel extending busbars above the center portion.

Various forms are disclosed comprising two contact members so as to provide a wide variety of configurations for the contact means resulting from the combination of the two. In one form the contact means includes a contact arm extending inwardly of the panel board from busbars located adjacent the side margins thereof. In another form the contact means is directly engaged to a center busbar.

Background of the invention

The present invention relates to electric circuit control device panel boards and more particularly to such panel boards which have contact blades extending in right angular relationship to each other so as to receive electric circuit control devices having contact jaws of different orientation with respect to their longitudinal axis.

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 extended normally to the longitudinal axis thereof.

A similarly operating contact structure is shown in United States Patent No. 3,309,581 granted to Keith W. Kline on Mar. 14, 1967, and assigned to the same assignee as the present invention. In the specific embodiment disclosed therein, the contact surfaces or blades extending parallel to the side walls of the base or saddle are provided by pins.

In copending application Ser. No. 476,015, now Patent No. 3,333,157, filed July 30, 1965, by Kenneth J. Stokes and assigned to the same assignee as the present invention, there is disclosed an adapter engageable on a main or center contact blade so as to provide wing portions extending normally to the center contact blade and parallel to the side walls of the base or saddle. By such an adapter member, means is provided for varying the disposition of one type of contact blade at various points throughout the panel board.

It is an object of the present invention to provide a novel electric control device panel board wherein there may be mounted control devices having contact jaws or surfaces extending parallel to the longitudinal axis of the device as well as devices having contact jaws or surfaces extending normally thereto and wherein the disposition of the contact blades for receiving the two types of control devices may be readily and economically varied.

It is also an object to provide such a panel board which may be fabricated by an assembler in the field or by an assembler in the factory from a stock of but a few component parts designed to provide a wide variety of contact arrangements.

Another object is to provide such a panel board wherein the assembler utilizes components forming a contact structure providing the utmost latitude in the number and types of control devices which may be assembled at a given location or whereby he can limit the types and numbers of control devices that may be utilized at any given point.

A further object is to provide such a panel board which may be readily and economically assembled from but a few component parts to provide custom assemblies.

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 for circuit control devices of different modular widths which has a base providing a generally planar center portion and a plurality of parallel extending busbars above the center portion. A plurality of contact means is mounted on the busbars and includes a first contact member having a generally planar base with an aperture therein and an upstanding contact blade extending substantially normally to the base and substantially parallel to the busbars. A second contact member has a contact blade portion of greater height than the contact blade of the first contact member with a slot extending upwardly from adjacent the lower end thereof and a tongue depending therefrom. The contact blade of the first contact member is disposed in the slot of the second contact member with the tongue projecting through the aperture in the base of the first contact member and secured therein. Accordingly the contact blade of the first contact member and the contact portion of the second contact member extend at right angles to each other and perpendicular to the planar portion of the base member. Additional means is provided for securing the contact means on the busbars.

In one embodiment the first contact member has a pair of contact blades providing a generally U-shaped cross-section and the second contact member has a pair of slots in its contact blade portion receiving the pair of contact blades of the first member. The contact blade portion of the second contact member may intersect the contact blades of the first member so as to provide wing portions at either side thereof or may be located at one end of the contact blade portions so as to provide wings at only one side thereof.

For optimum positioning and retention of the two members in assembly, the first contact member has a notch in the upper edge of its contact blade which seats the second contact member blade portion. When the notch is located in the center portion of the contact blade, it will be seen that the wings or contact blade surfaces extend to opposite sides of the contact blade portion of the second contact member.

When the contact means is to be disposed upon busbars located adjacent the sides of the panel board but displaced therefrom to the center thereof, contact arms are mounted on one end upon the busbars and extend inwardly therefrom generally normally to the busbars. The contact members are then secured adjacent the free end of the contact arms. In a preferred form of construction, the second contact member has a plurality of tongues depending upon the lower end of its contact blade portion

and the means for securing the contact means on the busbars is provided by extension of the several tongues through apertures in the contact arm with the tongues being secured therein by deformation or other suitable means. When the contact means is to be disposed upon a central busbar, the second contact member utilizes a base portion extending normally to its contact blade portion to provide a generally L-shaped configuration. An aperture extends through the juncture of the base portion and contact blade portion so as to permit assembly of the first contact member therein. The base portion is provided with an aperture therein for seating a suitable fastener which extends therethrough and engages with the busbar to provide the means for securing it thereto.

The tongue on the contact blade portion of the second contact member may be secured in the aperture of the base of the first contact member by various means. In that embodiment wherein the tongues of the contact blade portion extend through the contact arm, the necessary engagement and securing is effected by the engagement of the tongues in the apertures of the contact arm by deformation or other suitable techniques. In the aforementioned embodiment wherein the first contact member is assembled within an aperture extending through the juncture of the contact blade and base portions of the second contact member, the tongue is directly engaged with the base of the first contact member by deformation or the like. It will readily be appreciated that brazing, soldering, and adhesives may also be employed either singly or in combination with deformation of the tongues.

It will be appreciated that the configuration of the contact blade of the first contact member and of the contact blade portion of the second contact member may be varied so as to permit feeding thereon of only one control device or two control devices as may be desired. Furthermore, the contact blade portion of the first contact member may be notched centrally thereof so as to permit seating thereon of control devices of the type having an obstruction in front of the contact jaws thereof whereby the obstruction will fit into the notch and the contact jaws will fit about the contact blade portion.

Because of the ease of assembly of the several parts it can be seen that not only is field installation possible but also field repair is greatly simplified since a few parts will permit construction of the desired arrangement. Moreover, a redesign of circuitry requiring use of different contact arrangements within the panel board or load center is not a significant problem.

The several elements may be formed economically and rapidly by various metal forming processes including stamping, forging and casting. Assembly can be effected rapidly even with hand tools by inserting the tongues through the aperture in the first contact member (and the contact arms) and upsetting the ends thereof, and/or by other suitable techniques effecting the desired securing of the two members.

Brief description of the drawings

FIGURE 1 is a plan view of a control device panel board embodying the present invention;

FIGURE 2 is a sectional view thereof along the line 2—2 of FIGURE 1 and with circuit breakers shown in phantom line;

FIGURE 3 is a partially diagrammatic plan view of a panel board assembly showing various types of contact assemblies of the present invention and two different modules of circuit breakers mounted thereon;

FIGURE 4 is a perspective view of circuit breakers of two different modules of widths for which the present invention is adapted;

FIGURE 5 is a fragmentary perspective view of a contact assembly embodying the present invention;

FIGURE 6 is an exploded view of the contact assembly of FIGURE 5;

FIGURE 7 is a perspective view of another contact assembly embodying the present invention with the center busbar fragmentarily shown in phantom line;

FIGURES 8 and 9 are perspective views of other embodiments of contact members;

FIGURE 10 is a fragmentary perspective view of still another contact assembly embodying the present invention;

FIGURE 11 is a fragmentary, partially sectional view illustrating the mounting of a large module circuit breaker on a contact assembly of the present invention; and

FIGURE 12 is a similar view on an enlarged scale illustrating the mounting of two small module circuit breakers on the contact assembly.

Detailed description of the illustrated embodiments

Turning first in detail to FIGURES 1–3 of the drawings, therein illustrated is electric circuit control device panel board assembly embodying the present invention utilizing a base or saddle generally designated by the numeral **2** and having a generally planar center portion **4** and upstanding side walls **6** with outwardly extending flanges **8** and inwardly extending hooks **10** spaced along the length thereof to provide channels **12** therebetween. The upwardly extending portions of the hooks **10** have apertures **13** therein for a purpose to be explained hereinafter. Apertures **14** are provided in the base **2** for receiving fasteners (not shown) to secure the base **2** in a suitable enclosure (not shown) and a terminal board **16** is provided at one end thereof.

On the center portion **4** of the saddle **2** is insulation **18** above which extend parallel to the side walls **6** three busbars **20**, **22** and **24** each having a terminal **26** at the one end thereof for connection to a power supply to provide a different current phase. On the outer busbars **20** and **24** are contact arms generally designated by the numeral **28** with planar mounting portions **30** secured to the busbars **20** and **24** by suitable means such as rivets **32** and planar body portions **34** extending parallel to the center portion **4** and which are upwardly offset by the neck portions **36**.

As can be seen, the contact arms **28** extend over the center busbar **22** and are insulated therefrom by the molded insulating members generally designated by the numerals **38** and **40**. The insulating member **38** receives a single contact arm **28** and the insulating member **40** receives a pair of contact arms **28**. Both insulating members **38**, **40** have base portions **42** with depending legs **44** to provide support therefor outwardly from the busbar **22**. Upstanding ribs **46** are molded in the upper surface and extend normally to the busbar **22** so as to provide one channel **48** receiving and seating the contact arm **28** in the instance of the insulating member **38** and two channels **48** in the instance of the insulating member **40**. Side walls **50** extending normally to the busbar **22** are also provided for increased insulating distance and support for the circuit breakers received therein. The insulating member **40** also has a center wall **52** between the two channels **48** extending parallel to the side walls **50**.

The contact blades for engagement by the contact jaws of the circuit breakers are provided by several combinations of elements secured to the contact arms **28** or directly to the center busbar **22**. By the present construction, great versatility can be provided in the type of contact blades at any position with the panel board so as to permit mounting thereat of a large number of possible combinations of control devices or so as to preclude mounting thereat of certain combinations of control devices.

Before turning to the detailed structure of the contact blade assemblies, it will be seen that the present invention is intended to permit the utilization of control devices of two widths or modules generally designated by the numerals **54** and **56** with the latter being one-half the width of the former. As seen in FIGURE 4, the control devices **54**, **56** are of generally conventional circuit breaker construction with insulating housings **58** and operating

handles **60**. The large module breaker **54** has its contact jaws **62** at the front end extending parallel to its longitudinal axis and has a recess (not shown) in its rear surface which receives a hook **10** on the side wall **6** for proper positioning and retention. The smaller module breaker **56** has its contact jaws **64** at the front end thereof extending normally to its longitudinal axis and has one or more tongues **66** projecting from its rear surface for seating in the channels **12** between the hooks **10** or in the apertures **13** in the hooks **10**.

Turning first to the contact blade assembly illustrated in FIGURES 5 and 6, it can be seen that the contact arm **28** has three apertures **68** therein spaced longitudinally thereof adjacent its free end. A first contact member generally designated by the numeral **70** has a generally U-shaped cross-section with a planar base portion **72** seated on the contact arm **28** and having an aperture **74** therein registering with the central aperture **68** in the contact arm **28**. Its two leg positions **76** extend upwardly therefrom in parallel spaced relationship and normally to the longitudinal axis of the contact arm **28**, and thus being parallel to the several busbars **20, 22** and **24**. A relatively wide notch **78** is provided in the upper edge of each of the leg portions **76** centrally thereof for a purpose to be described, and it can be seen that the leg portions **76** are somewhat wider than the base portion **72** so as to project laterally therefrom. Each of the leg portions **76** also has a second, relatively narrow notch **78'** within the notch **78**, for a purpose to be described.

A second contact member generally designated by the numeral **80** has a planar body portion **82** of greater height than the leg portions **76**. A pair of slots **84** extend vertically from the bottom of the contact member **80** and receive portions of the leg portions **76** of the first contact member **70**. Depending from the lower edge of the body portion **82** are three spaced tongues **86** which seat in the apertures **68** of the contact arm **28** when the parts are assembled is shown in FIGURE 5, with the center tongue **86** also passing through the aperture **74** in the base portion **72** of the first contact member **70**. The tongues **86** are secured to the contact arm **28** by deforming portions thereof to engage against the bottom surface about the apertures **68** or by any other suitable means, thus providing mounting and electrical connection of both contact members **70** and **80** to the contact arm **28** as shown in FIGURE 5. Accordingly, the complete contact assembly thus provided has a center contact blade projecting above the first contact member **70** and extending parallel to the contact arms **28** and normally to the busbars **20, 22** and **24** and the side walls **6** and two wings extending normally to either side of the center contact blade. This structure permits mounting of four small module circuit breakers **56**, or, in the alternative, two small module circuit breakers **56** and one large module breaker **54**, or, as a further alternative, two large module breakers **54**.

It will be readily apparent that when a large module breaker **54** is in mounted position on the blade portion **82**, the breaker is restrained from all movement except pivoted movement about the retaining hook **10** in a direction away from the back wall of the base **2**. In use, the assembly shown in FIGURE 1 is enclosed in a generally rectangular box, not shown, having a cover with openings thru which the handles of the circuit breakers project, and having portion overlying parts of the circuit breaker casing, thereby preventing such pivotal movement.

Movement of such large module breakers laterally, that is, in a direction parallel to the busbars, **20, 22, 24** is, of course, prevented by the blade **82** which is received in the breaker contact jaws **62**.

In the case of the small module breakers **56**, however, the leg portions **76** of the contact assembly do not per se prevent lateral movement of the circuit breakers. In order to achieve such lateral positioning in accordance with the invention the legs **76** are notched at **78** as heretofore described, and the casings of the circuit breakers **56** have side portions **56A** (see FIGURE 12) received in these notches adjacent the body portion **82** of the contact member **80**. Such lateral positioning is important, since the top portions of the breaker casings, include embossed portions (see **56'** of breaker **56** in FIGURE 4) which must fit into corresponding openings in the enclosure cover (not shown).

As shown in phantom line of FIGURE 5, the second contact member **80** may have a notch **88** formed in the upper edge thereof to permit mounting of two large module circuit breakers **54** thereon extending from both directions as seen in FIGURES 2 and 3 when such breakers have an obstruction at their front edge requiring the notch for clearance to fit thereover.

Turning now to FIGURE 7, there illustrated is a similar contact blade structure provided for assembly directly upon the center busbar **22** instead of on a contact arm **28**. The first contact member **70*a*** is as described with respect to the embodiment of FIGURES 5 and 6 with the suffixes *a* added to the numerals. However, the second contact member generally designated by the numeral **90** is of generally L-shaped configuration with a planar base portion **92** and a planar contact blade **94** extending upwardly therefrom. The contact blade **94** is of greater height than the body portion **82** of the second contact member **80** so as to equal the total height of the member **80** from the busbars produced by the thickness of the contact arm **28** and the offset provided by the neck portion **36**. As can be seen, the base portion **92** has an aperture **93** therein for a fastener such as a rivet **96** (seen in FIGURE 1) to secure the contact member **90** to the center busbar **22** with the contact blade **94** extending normally to the longitudinal axis of the several busbars.

The base portion **92** and contact blade **94** have an aperture or cut out **98** formed therein extending through their juncture, and two slots **100** extend upwardly into the contact blade **94** to accommodate the leg portions **76*a*** of the first contact member **70*a***. The aperture **98** is so formed as to provide a depending tongue which extends through the aperture **74*a*** in the first contact member **70*a*** and is deformed to secure it tightly with the leg portions **76*a*** seated in the slots **100**. As in the prior embodiment, the contact blade **94** may be notched as at **94*b*** if so desired.

In FIGURE 8, there is illustrated a first contact member generally designated by the numeral **102** and designed to provide wings to only one side of the center contact blade. Here again there is a base portion **104** with a mounting aperture **106** therein but the leg portions **108** extend over only one-half the base portion **104** and have notches **110** and **110'** at the inside of the upper edges corresponding in function to notches **78** and **78'** respectively of the contact members **70**, previously described.

In FIGURE 9, there is illustrated a first contact member generally designated by the numeral **112** designed to provide a pair of wings spaced to opposite of the center contact blade but for mounting control devices from only one side. Here the member **112** is of generally L-shaped configuration with a planar base portion **114** with a mounting aperture **116** therein and an upstanding leg portion **118** with notches **120** and **120'** in the center of its upper edge.

In FIGURE 10, the first contact member **112** of FIGURE 9 is combined with a second contact member generally designated by the numeral **122** designated to permit mounting thereon of breakers from the same direction as can be mounted on the contact member **112**. Here the second contact member **122** has a planar body **124** with a generally L-shaped configuration with the base leg portion **126** having vertically extending slots **128** therein and three depending tongues (not seen) engaged in the apertures **68** of the contact arm **28**. The upper inner edge of the vertical leg portion **130** is beveled to

permit mounting of certain control devices as described with respect to FIGURE 5.

In FIGURES 3, 11 and 12 there are illustrated several control device assemblies provided by contact assemblies of the type illustrated in FIGURES 5 and 7. Large module breakers **54** may be mounted in face-to-face assembly with the contact jaws **62** clamping opposite surfaces of the second contact member **80**. A large module breaker **54** may be mounted in face-to-face assembly with a pair of small module breakers **56** having their contact jaws **64** clamping opposite surfaces of the adjacent leg portion **76** of the first contact member **70** to opposite sides of the contact member **80**.

It will also be appreciated that four small module breakers **56** can be mounted by securing a pair on each leg portion **76**. Moreover, if so desired, only one small module circuit breaker **56** may be mounted on one or both leg portions **76**.

Various combinations of the illustrated contact members may be employed if so desired. The second contact member **122** of FIGURE 10 may be combined with the first contact members **70** and **102** of FIGURES 6 and 8. The first contact members **70** and **102** may be combined with the second contact member **90** of FIGURE 7, and this latter member may be reconfigured similarly to that of FIGURE 10 if so desired. Moreover, if so desired the second contact members **80**, **90** and **122** may be used alone if it is desired to preclude mounting of small module circuit breakers **56** at any given location.

In each of the several embodiments, it can be seen that the contact assembly has a first contact member with a generally planar base with an aperture therein and an upstanding contact blade extending substantially normally to the base and substantially parallel to the side walls **6**. A second contact member has a contact blade portion of greater height than the contact blade of the first member and has a slot extending vertically upwardly from adjacent the lower end thereof which receives the leg portion of the first contact member which is notched to provide alignment and enhance engagement therebetween. A depending tongue on the contact blade portion of the second contact member extends through the aperture in the base of the first contact member and is secured therein. Means are provided for securing this assembly to the contact arm or busbar which may be tongues on the second contact member in the instance of a contact arm or a base leg with an aperture in the instance of a center busbar.

It will be appreciated that great versatility is provided the assembler of the panel board since a stock of but a few component parts will permit him to fabricate readily contact assemblies of any chosen capability. He can permit utmost latitude in the number and types of control devices which can be assembled at a given location, or he can limit the types and numbers of control devices that can be utilized. Thus, custom arrangements may be made speedily and economically as required.

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 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. In an electrical control device panel board, the combination comprising:

(a) a base member providing a generally planar center portion;

(b) a plurality of parallel extending busbars above said center portion;

(c) and contact means on said busbars including a first contact member having a generally planar base with an aperture therein and an upstanding contact blade extending substantially normal to said base and substantially parallel to said busbars and a second contact member having a contact blade portion of greater height than said contact blade of said first contact member with a slot extending upwardly from adjacent the lower end thereof and a tongue depending therefrom, the contact blade of said first contact member being disposed in said slot of said second contact member with said tongue projecting through said aperture in said base of said first contact member and secured therein, said contact blade of said first contact member and said contact blade portion of said second contact member extending at right angles to each other and perpendicular to said planar portion of said base member; and means securing said contact means on said busbars.

2. The panel board of claim **1** wherein said first contact member has a pair of contact blades providing a generally U-shaped cross-section and wherein said second contact member has a pair of slots in its contact blade portion receiving said pair of contact blades.

3. The panel board of claim **1** wherein said first contact member contact blade has a notch in the upper edge thereof adjacent its center seating said second contact member to provide wings to both sides of said contact blade portion thereof.

4. The panel board of claim **2** wherein said first contact member contact blades each have notches in the upper edges thereof adjacent their center seating said second contact member to provide a pair of wings on both sides of said contact blade portion thereof.

5. The panel board of claim **2** wherein said second contact member is adjacent one end of said contact blades of said first contact member to provide a pair of wings on one side of said contact blade portion thereof.

6. The panel board of claim **1** wherein said second contact member has a plurality of tongues depending from the lower end of said contact blade portion and wherein said means securing said contact means on said busbars is provided by said tongues extending through and being secured in apertures in a contact arm secured to a busbar and extending normally thereto.

7. The panel board of claim **1** wherein said second contact member has a base portion extending normally to said contact blade portion to provide a generally L-shaped configuration and is provided with an aperture in both portions extending through the juncture thereof to permit assembly of said first contact member thereon, said base portion having means extending therethrough engaged with one of said busbars to provide said securing means.

8. The panel board of claim **1** wherein said second contact member has a notch in the upper edge thereof adjacent its center.

9. The panel board of claim **1** wherein said contact blade portion of said second contact member is of generally L-shaped configuration.

10. The panel board of claim **1** wherein said first contact member has a pair of contact blades providing a generally U-shaped cross-section and having notches in the upper edges thereof adjacent their centers and wherein said second contact member has a pair of slots therein receiving said pair of contact blades and is itself received in said notches thereof to provide a pair of wings on both sides of said contact blade portion thereof and wherein said contact means includes a contact arm extending normally to said busbars with one end thereof secured thereto and a plurality aperture adjacent its other end, said second contact member having a plurality of tongues depending therefrom and extending through said apertures of said contact arm and secured therein.

11. In an electrical device panel board, the combination comprising:

(a) a base having a generally planar center portion;

(b) a plurality of parallel extending busbars above said center portion;

(c) a multiplicity of contact means on said busbars including a contact arm secured at one end to said

busbars and extending normally thereto, a first contact member at the other end of said contact blade extending substantially normal to said base and substantially parallel to said busbars, and a second contact member having a contact blade portion of greater height than said contact blade of said first contact member with a slot therein extending upwardly from adjacent the lower end thereof and a plurality of tongues depending therefrom, said first contact member being disposed in said slot of said second contact member with said tongue projecting through said aperture in said base thereof and being secured therein, said contact blade of said first contact member and said contact blade portion of said second contact member extending at right angles to each other and perpendicular to said base member, said plurality of tongues on said second contact member extending through apertures in said contact arm and being secured therein to provide firm assembly thereto, at least some of said contact means having first contact members providing a pair of contact blades each with notches in the upper edge adjacent the center thereof and second contact members having a pair of slots receiving said pair of contact blades at said notches therein to provide a pair of wings on both sides of said contact blade position.

12. The panel board of claim **11** wherein there are three busbars with said contact arms extending over the center busbar so as to locate said contact members thereabove and wherein said contact means includes a third contact member having a generally planar base with an aperture therein and an upstanding contact blade extending substantially normal to said base and substantially

parallel to said busbars and a fourth contact member of generally L-shaped configuration with a base portion secured to said center busbar and a contact blade portion extending upwardly from said base portion to a greater height than said contact blade of said third contact member with a slot therein extending upwardly into said blade portion from an aperture in both base and blade portions extending through the juncture thereof to permit assembly of said third contact member thereon, said contact blade of said third contact member being seated in said slot and said contact blade portion having a tongue into said aperture therein and secured in said aperture in said third contact member base portion to provide firm assembly thereof.

13. The panel board of claim **12** wherein said third contact member has a pair of contact blades providing a generally U-shaped cross-section and wherein said fourth contact member has a pair of slots receiving said pair of contact blades.

14. The panel board of claim **11** wherein at least some of said second contact members have a notch in the upper edge thereof adjacent the center.

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