Nov. 16, 1965 R. T. CASEY 3,218,520

CIRCUIT BREAKER PANEL ASSEMBLY

Filed March 14, 1963 2 Sheets-Sheet 1

FIG. 1.

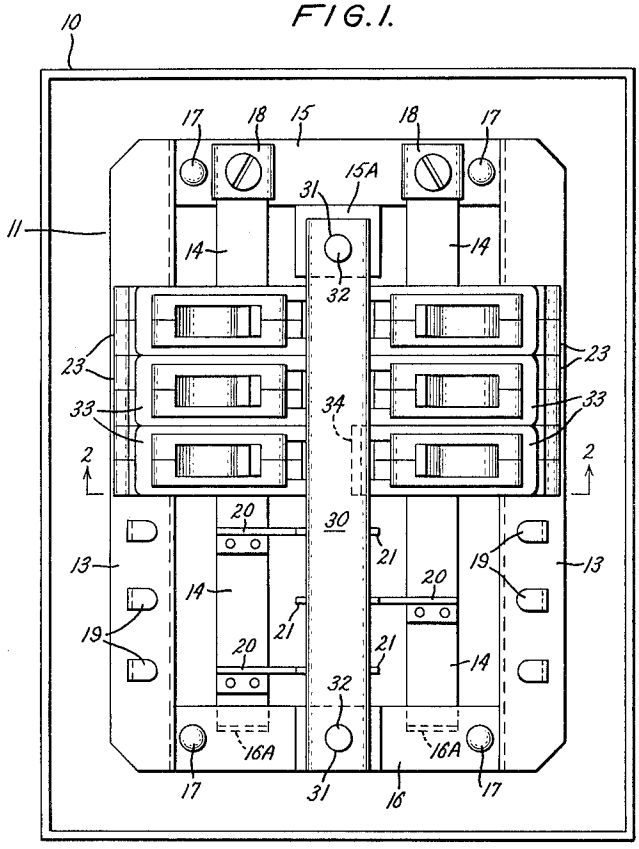


FIG. 3.

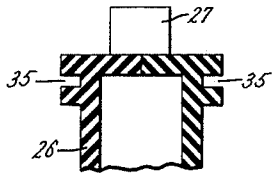


FIG. 4.

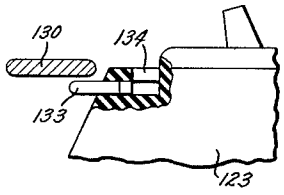


FIG. 5.

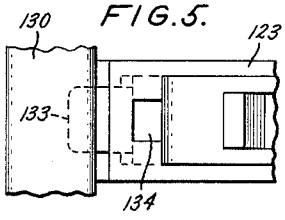
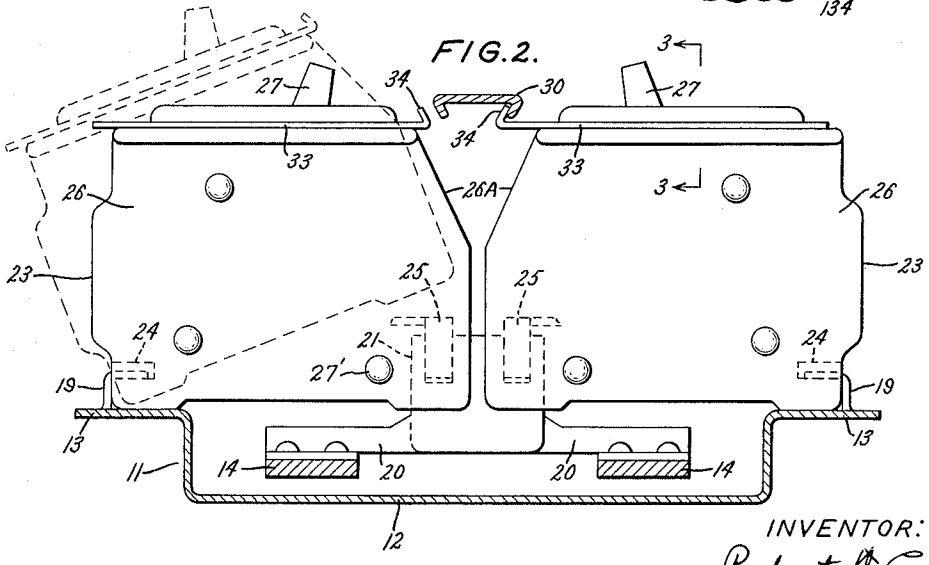


FIG. 2.



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FIG. 7.

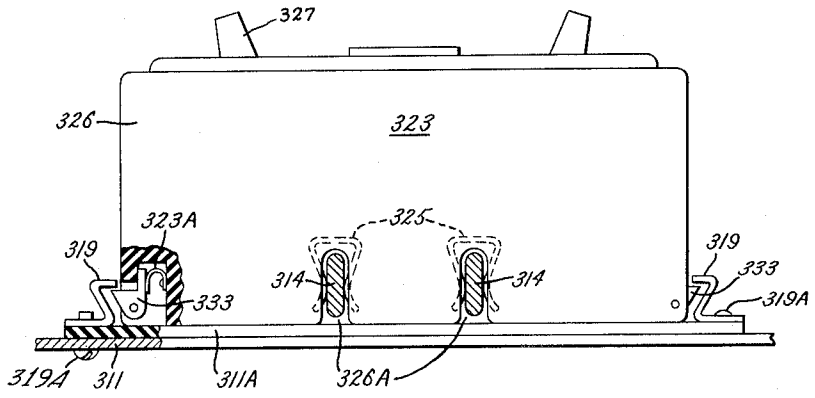


FIG. 6.

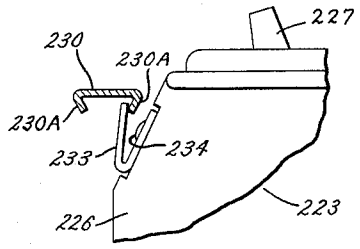
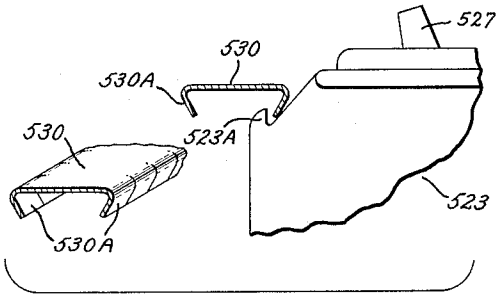


FIG. 8.



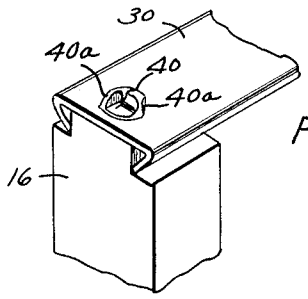


FIG. 9

INVENTOR:
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United States Patent Office 3,218,520 Patented Nov. 16, 1965

3,218,520

CIRCUIT BREAKER PANEL ASSEMBLY

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Filed Mar. 14, 1963, Ser. No. 265,143
11 Claims. (Cl. 317—119)

The present invention relates to electric circuit breaker panel assemblies and more particularly to such panel assemblies which include means for preventing the unauthorized exchanging or interchanging of circuit breakers in such assemblies.

Electric circuit breaker panel assemblies of the type described are commonly used for the protection of branch circuits in residential and commercial buildings. For adequate protection of such branch circuits, it is necessary that each such circuit have associated with it a circuit breaker of an ampere rating corresponding to the capacity of the wiring used in the circuit. For additional safety, it is required that such panel assemblies include means for preventing the user from removing a given circuit breaker and substituting therefor a circuit breaker of higher ampere rating.

One means for providing such additional protection, in accordance with the prior art, has been to provide a locking means or "locking bar" which locks all such circuit breakers in place and which can be removed only by partial disassembly of the panel, thus discouraging the user from making such undesired substitutions. A panel assembly of this type is shown, for example, in copending application Serial No. 108,440, filed May 8, 1961, by Robert E. Bristol and assigned to the same assignee as the present invention.

The use of such locking bar type systems, however, has the disadvantage that in order to install the breakers initially, or to add an additional breaker at some later time, even by authorized personnel, it is necessary to remove the locking bar.

It is an object of the present invention to provide a circuit breaker panel assembly of the type including means for locking circuit breakers in place, in which circuit breakers may be inserted without removing the aforesaid locking means, but may not thereafter be removed until the locking means is released.

In accordance with the invention in one form, an electric circuit breaker panel assembly is provided including a support and means for mounting and connecting circuit breakers on the support, together with means for locking such circuit breakers on the support. Cooperating means is also provided, carried by the locking means and the circuit breakers whereby the circuit breakers may be snapped into locked position without removing the locking bar, but cannot be removed unless the locking bar is first removed.

In one form of the invention, an electric circuit breaker panel assembly is provided of the type including means for releasably locking circuit breakers to a support including a locking bar, each of the circuit breakers including resilient means which snaps into locking engagement with the aforesaid locking bar when the device is assembled on the panel and from which it cannot be released without removal of the locking bar. In another form of the invention, the locking bar itself includes resiliently deformable portions which are deflected by the circuit breakers when they are installed and which serve to lock the circuit breakers in place until the locking bar is removed.

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 plan view of an electric circuit breaker panel assembly incorporating the invention, the front cover or "trim" of the enclosing box being removed;

FIGURE 2 is an elevation view, partially in section, of the interior portion of the panel assembly of FIGURE 1, taken generally on the line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary sectional view of one of the circuit breakers of FIGURE 2, taken substantially on the line 3—3 of FIGURE 2;

FIGURES 4 and 5 are fragmentary elevation and plan views respectively of another embodiment of the invention;

FIGURE 6 is a fragmentary elevation view of another embodiment of the invention;

FIGURES 7 and 8 are fragmentary views of fourth and fifth embodiments of the invention, respectively; and

FIGURE 9 is a fragmentary view of an alternate method of mounting the locking bar.

In FIGURES 1–3 of the drawings, the invention is shown as incorporated in an electric circuit breaker panel assembly comprising a generally rectangular box-like enclosure **10** having a supporting pan **11** mounted on the back wall thereof by suitable means, not shown. The supporting pan **11** includes a back wall **12** and a pair of outwardly directed side flange portions **13**. Each of the flanges **13** includes a row of retaining hooks **19**, for a purpose to be described.

A pair of elongated bus bars **14** are supported in insulated relation on the pan **11** by means of upper and lower insulating supporting blocks **15** and **16** respectively. The supporting blocks **15** and **16** extend between the flanges **13** of the pan **11**, and are mounted to the back wall **12** by suitable means such as by rivets **17**. The block **16** includes recesses or pockets **16A** receiving the lower ends of the bus bars **14**. The upper ends of the bus bars **14** are supported on the surface of the block **15** and are secured thereto by suitable means such as by screws, not shown, extending from the underside of the block **15** into threaded engagement with the bottom wall of screw-clamp type wire connectors **18**. The insulating block **15** includes a centrally positioned offset portion **15A** for a purpose to be described. The bus bars **14** include transversely extending connecting strap portions **20** terminating in a row of upstanding contact blade portions **21**.

A plurality of electric circuit protective devices, comprising electric circuit breakers **23**, are mounted on the support **11** by an integral lug portion **24** extending under one of the retaining lugs **19**. The other end of each of the circuit breakers **23** carries a plug-in type socket **25** which extends into engagement with one of the contact blades **21**. Each of the circuit breakers **23** includes a generally rectangular insulating casing **26** comprising two complementary halves retained in assembled relation by suitable means such as by rivets **27'**. The circuit breaker casings **26** have a corner portion **26A** shaped to provide clearance for pivoting about the lugs **19**, even though the locking bar **30** is in place. Suitable circuit protecting mechanism, not shown, is housed within the enclosure **23** and adapted to be operated by the manually engageable operating handle **27**. A suitable type of mechanism is shown, for example, in Patent No. 2,627,563, W. A. Thomas, assigned to the same assignee as the present invention.

The circuit breakers **23** are made in different current ratings, such as 15, 20, 30, and 50 amperes. All of such different rating breakers are of identical size and mounting provisions, but are clearly marked as to ampere rating.

For the purpose of preventing unauthorized interchange of circuit breakers, locking means is provided including a locking bar **30** extending lengthwise of the panel,

substantially centrally of the pan **11**. The bar **30** is retained in a predetermined fixed position by means of tapped holes **31** at each end, which threadedly receive screws **32** which are inserted upwardly from under the supporting blocks **15** and **16** respectively. The locking bar **30** can be removed, therefore, only from the back of the pan **11**, the pan **11** having a portion, not shown, cut away to provide access to the heads of the screws **32**.

Each of the circuit breakers **23** carries an elongated slidable locking member **33**, having its end **34** return-bent at an angle to the remainder of the member to form a detent. The locking member **33** is of generally rectangular frame-like formation and includes portions slidably guided in grooves **35** at each side, see FIGURE 3. The panel assembly is preferably manufactured and sold with the locking bar **30** in place.

In use, the electrician merely inserts circuit breakers **23** in place with the locking member **33** in retracted position, as shown in the left hand portion of FIGURE 2, by hooking the lug portion **24** under the corresponding hook member **19** and rotating the circuit breaker about this engagement into plugged-in engagement with the contact blade **21**. When the breaker is in mounted position, the locking member **33** is slid transversely into locked engagement with the locking bar **30**, as shown in the right hand portion of FIGURE 2. Thereafter, it is impossible to remove the circuit breaker **23** without first releasing the locking bar **30**. The bar **30** can be released, however, only by access to the back of the pan **11**, to get at the head of the screw **32**.

In FIGURES 4 and 5, there is shown another embodiment of the invention, including a flat strap-like locking bar **130** and a circuit breaker **123** having a slidable locking tang **133** which is normally in retracted position, but which can be projected to interlocking position by access through the opening **134** in the top of the casing. Once the locking lug **133** has been projected into locking position, it no longer has any portion accessible through the opening **134**, and therefore the breaker **123** cannot be removed until the locking bar **130** has been first removed.

In FIGURE 6 there is shown another embodiment of the invention in which a locking bar **230** is provided generally similar to the bar **30** of the form of FIGURE 2. The circuit breaker **223** includes a generally V-shaped resilient locking clip **233** which is retained on the casing **226** by suitable means such as by a rivet **234**. In this form of the invention, as the circuit breaker **223** is rotated into mounted position, the resilient clip **233** is deflected by the locking bar **230** and until the breaker is in fully mounted position, at which time it snaps into engagement with the turned-in lip **230A** of the locking bar **230**. In this form of the invention, therefore, no positive locking act is required by the installing electrician. The breakers merely snap into locked position and cannot thereafter be removed until the locking bar is first removed.

Referring to the form of the invention shown in FIGURE 7, the invention is shown as incorporated in an electric circuit breaker panel assembly comprising a supporting pan **311** which is adapted to be mounted within a suitable enclosure, not shown. The support **311** has a pair of electrical bus bars **314** mounted thereon in edgewise relation thereto by suitable means, not shown. A sheet of insulating material **311A** overlies the base **11** and lies between the bus bars **314** and base **311**. A pair of elongated generally Z-shaped retaining brackets **319** are mounted along either edge of the base **311** by means of screws **319A** extending upwardly into threaded engagement with the bar **319** from the underside of the supporting pan **311**.

The circuit breaker assembly **323** includes a pair of plug-in type sockets **325**, each associated with a corresponding one of the circuit breakers contained in the casing **323**. The casing **323** is provided with slots **326A**

extending inwardly from the back wall thereof, so that when the circuit breaker **323** is pressed directly down onto the bus bars **314**, the bus bars **314** enter the slots **326A** and into resiliently engaged contact with the socket members **325**.

The circuit breaker **323** is also provided with a pair of resiliently mounted catches or retaining latches **333** pivotally mounted in the insulating casing **326** of the breaker **323** and biased outwardly by a compression spring **323A**.

Since the catches **333** snap into engagement with the Z-shaped locking bars **319**, the breaker **323** cannot be removed after initial insertion without first removing at least one of the locking bars **319**. This can be done only by access from the back of the supporting plate or pan **311**, since the strips **319** are mounted on the base **311** by means of screws extending upwardly into threaded engagement with the bar **319** from the underside of the supporting pan **311**.

The forms of the invention shown in FIGURES 1 through 6 have the advantageous characteristic that because of the shaping of the casing and the placement of the interfering member, circuit breakers having similar configuration but omitting the slidable locking member **34**, **134**, or **234** respectively, may be used. Such breakers may be mounted and removed without interference by the locking bar. This may be desirable, since the highest rating breakers, i.e., 50 amperes are not required by the electrical safety regulations to have means for locking them in place. Thus circuit breakers having 50-ampere rating may, if desired, be used without locking means, since if they are removed, there can be no breaker having a higher ampere rating substituted therefor since such breakers are not available in higher rating. Thus the circuit controlled by such a circuit breaker would be protected at least as well, and in fact, "over-protected" by any rating smaller than 50 amperes.

In the form of the invention shown in FIGURE 8, a locking bar **530** is provided of relatively thin, resilient material. The bar **530** includes integral resilient finger portions **530A**. The circuit breaker **523** includes an integral catch portion **523A**.

In use, the circuit breaker **523** is engaged with a retaining hook, not shown, and rotated into mounted position. During such installation, the catch portion **523A** engages and deflects one of the fingers **530A**, which snaps over the catch **523A**, to the position shown. Thereafter, removal of the breaker **523** is not possible until the locking bar **530** is removed.

If desired, circuit breakers having the same general configuration as breaker **523** may also be provided, omitting the catch portion **523A**, so that such breakers may be inserted and removed without interference by the locking bar **530**.

In FIGURE 9, there is shown an alternate method of retaining the locking bar **30** in place on the support **11** of FIGURE 1. In this form, screws **40** are provided at each end of the bar **30** (only one shown), which extend through the insulating blocks **15** and **16** respectively, and into threaded engagement with the pan **11**. The screws **30** are provided with special heads in a well-known manner, which permit rotation of the screws by a conventional screwdriver in inserting direction, but do not permit rotation of the screws by a conventional screwdriver, in the opposite direction. For the purpose of permitting removal of the screws **40** by authorized personnel, they are provided with flattened side portions **40A**, which permit rotation in a removing direction by means of a special tool, not shown, having a socket closely conforming to the outline of the screw-head **40**.

While several specific embodiments of the invention have been shown and described, it will be readily apparent that many modifications thereof can readily be made by those skilled in the art, and I therefore intend,

by the appended claims, to cover all such modifications as fall within the true spirit and scope of the invention.

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

1. An electric control device panel assembly comprising:
(a) a generally planar support having a back surface and a front surface,
(b) at least one electrical bus bar conductor supported on said front surface of said support,
(c) a plurality of electric circuit control devices supported in mounted position on said front surface of said support and each electrically connected to at least one of said bus bars.
(d) a locking bar releasably mounted in a fixed position on said front surface of said support by retaining means, said retaining means comprising means impeding release of said locking bar by access from the front side of said support,
(e) interengaging means carried by each of said devices and said locking bar,
(f) said interengaging means comprising means preventing removal of said devices from said support while said locking bar is in said fixed position but not preventing insertion of said devices into said mounted position while said locking bar is in said fixed position.

2. An electric circuit control device panel assembly comprising:
(a) a generally planar support having a back surface and a front surface,
(b) at least one elongated electrical bus bar supported in insulated relation on said front surface of said support,
(c) a plurality of electric circuit control devices supported in mounted position on said front surface of said support and each electrically connected to said bus bar,
(d) an elongated locking bar carried by said support at the front surface thereof in a predetermined fixed position,
(e) interengaging means carried by each of said control devices and said locking bar,
(f) said interengaging means comprising means preventing removal of said devices from said support while said locking bar is in said fixed position without preventing insertion of said devices into said mounted position whole said locking bar is in said fixed position, and
(g) releasable means mounting said locking bar at the ends thereof on said support, said releasable means comprising means impeding release of said locking bar by access from the front of said support.

3. An electric control device panel assembly comprising:
(a) a generally planar support having a back surface and a front surface,
(b) at least one electrical bus bar supported in insulated relation on said front surface of said support,
(c) a plurality of electric circuit control devices supported in mounted position on said front surface of said support and each electrically connected to at least one of said bus bars,
(d) an elongated locking bar carried by said support at the front surface thereof in a predetermined fixed position,
(e) interengaging means carried by each of said control devices and said locking bar,
(f) said interengaging means comprising means preventing removal of said devices from said support while said locking bar is in said fixed position without preventing insertion of said devices into said mounted position while said locking bar is in said fixed position, and
(g) means mounting said locking bar on said support, said mounting means being releasable only by access from said back surface of said support.

4. An electric control device panel assembly comprising:
(a) a support,
(b) a plurality of electrical bus bars supported in insulated relation on said support,
(c) a plurality of electric circuit control devices supported on said support and each electrically connected to at least one of said bus bars, each of said control devices including an insulating casing,
(d) a locking bar carried by said support in a predetermined mounted position,
(e) at least some of said control devices including a locking member movable with respect to said casing,
(f) said locking member being movable to a noninterfering position in which said device may be mounted on said support while said locking bar is in said predetermined mounted position,
(g) said locking member also being movable to an interfering position when said device is mounted on said support, said locking member when in said interfering position engaging said locking bar and preventing removal of said device from said support,
(h) means preventing movement of said locking member from said interfering to said non-interfering position while said device is mounted on said support and said locking bar is in said predetermined mounted position, and
(i) means releasably mounting said locking bar to said support, said releasable mounting means comprising means impeding release of said locking bar by access from the front of said support.

5. An electric control device panel assembly comprising:
(a) a support,
(b) at least two parallel spaced electrical bus bars mounted in insulated relation on said support,
(c) at least one electrical control device supported on said support and electrically connected to at least one of said bus bars,
(d) a releasable locking bar supported on said support in a predetermined fixed position centrally thereof and parallel to said bus bars, said locking bar having an elongated recess therein at the underside thereof,
(e) at least some of said electric control devices having a slidable locking member including a detent portion received in said recess of said elongated locking member after said control device is in mounted position and while said locking bar is in mounted position, said detent being releasable only by releasing said locking bar, and
(f) means retaining said locking bar in said position on said support, said retaining means comprising means impeding release of said locking bar by access from the front of said support.

6. An electric circuit control device panel assembly comprising:
(a) a support,
(b) at least two electrical conducting bus bars mounted in spaced apart relation on said support,
(c) an elongated locking bar mounted in a predetermined fixed position on said support,
(d) at least one electric circuit control device supported in mounted position on said support and electrically connected to at least one of said bus bars, said circuit control device including an insulating casing,
(e) said circuit controlling device including a locking member movable with respect to said insulating casing between a non-locking and a locking position, said locking member including a portion in locking engagement with said locking bar when said device is in said mounted position and said locking member is in said locking position, said locking member when

in said non-locking position having a portion accessible for moving said locking member from said non-locking to said locking position, said locking member when in said locking position having no portion thereof accessible for movement of said locking member from said locking to said non-locking position, and

(f) means releasably retaining said locking bar in said position on said base, said retaining means comprising means impeding release of said locking bar by access from the front of said panel assembly.

7. An electric circuit controlling device panel assembly comprising:

(a) a support,

(b) at least two electrical bus bars supported in insulated relation on said support,

(c) at least one electrical control device mounted on said support and electrically connected to at least one of said bus bars,

(d) a locking member mounted in a predetermined fixed position on said support,

(e) said electrical control device including a locking projection, means mounting said locking projection on said device for movement from a locking position to a non-locking position, means biasing said projection toward said locking position at all times, said projection engaging said locking member when said locking member is in said predetermined position as said device is mounted on said support and being deflected thereby, said biasing means moving said projection into interlocking relation with said locking member when said device is mounted on said support, said projection being substantially inaccessible for movement away from said locking position when said device is mounted on said support and said locking member is in said predetermined position, and

(f) means retaining said locking bar in said position on said support, said retaining means comprising means impeding release of said locking bar by access from the front of said support.

8. An electric circuit controlling device panel assembly comprising:

(a) a support,

(b) at least two electrical bus bars supported in insulated relation on said support,

(c) at least one electrical control device mounted on said support and electrically connected to at least one of said bus bars,

(d) an elongated locking bar supported on said support in a predetermined fixed position,

(e) said locking bar including integral resiliently deformable locking portions,

(f) said control device including an integral rigid locking projection, said control device and said support being disposed and arranged so that as said control device is moved to said mounted position said integral projection of said control device engages and deflects at least one of said resiliently deformable portions of said locking bar, whereby said circuit breaker is retained in mounted position and cannot be removed until after removal of said locking bar,

(g) and means retaining said locking bar in said position on said support, said retaining means comprising means impeding release of said locking bar by access from the front of said support.

9. An electric control device panel assembly comprising:

(a) an enclosure containing a support,

(b) at least two electrical bus bars supported in spaced apart insulated relation on said support,

(c) at least one electrical control device, said control device comprising an insulating body having opposed end portions,

(d) a resilient locking member carried by said control device at each of said end portions,

(e) a pair of elongated rigid locking members carried by said support adjacent said end portions of said device,

(f) said resilient locking members being spaced apart a distance slightly greater than the spacing of said rigid locking members and each having a first locking position and a second non-locking position, means carried by said device biasing each of said locking members from said non-locking to said locking position, each of said elongated rigid locking members of said support and moving said resilient locking member from said locking to said non-locking position as said device is mounted on said support, said biasing means moving said locking member from said non-locking to said locking position when said device is in mounted position on said support,

(g) at least one of said elongated rigid locking members being releasably mounted on said support by retaining means releasable by access from a direction other than the front of said support.

10. An electric circuit control device panel assembly as set forth in claim 9 wherein said one elongated locking means is mounted on said support by means accessible for release only from the back of said support.

11. An electric circuit control device panel assembly comprising:

(a) a support,

(b) at least one elongated bus bar conductor mounted in insulated relation on said support,

(c) an elongated locking bar mounted on said support in a predetermined fixed position,

(d) at least one electrical control device mounted on said support, said control device including a plug-in type electrical connecting means electrically connected to a portion of said electrical bus bar,

(e) said control device including a resiliently deformable locking projection cooperating with a portion of said locking bar to prevent removal of said electrical control device from said panel without first removing said locking bar,

(f) said locking projection of said control device engaging and being deflected by a portion of said locking bar and snapping into interlocked engagement with said locking bar when said bar is in said fixed position as said electrical control device is moved into plug-in engagement with said portion of said bus bar, and

(g) means releasably retaining said locking bar in said fixed position on said support, said retaining means being releasable only by access from a direction other than from the front of said support.

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