April 12, 1966 P. HUSKA 3,246,283

ACCESSIBLE, SELF-MOUNTING TERMINAL BLOCK

Filed Dec. 23, 1963

2 Sheets-Sheet 1

FIG. 1.

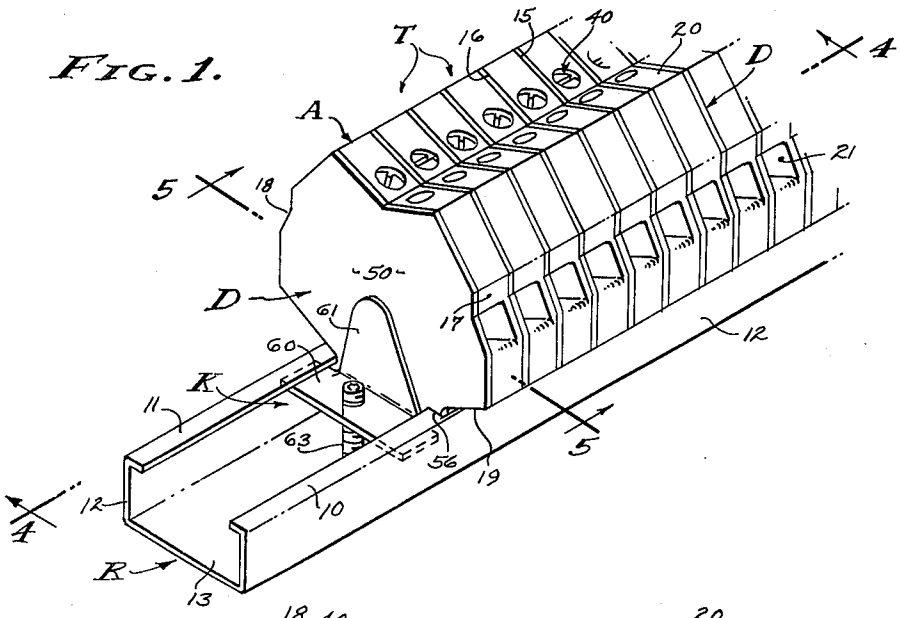


FIG. 2.

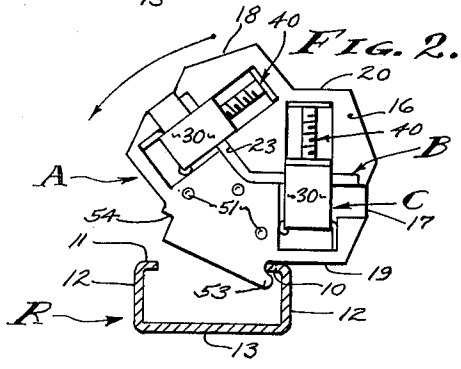


FIG. 3.

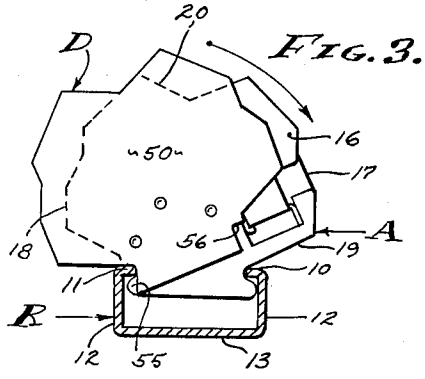
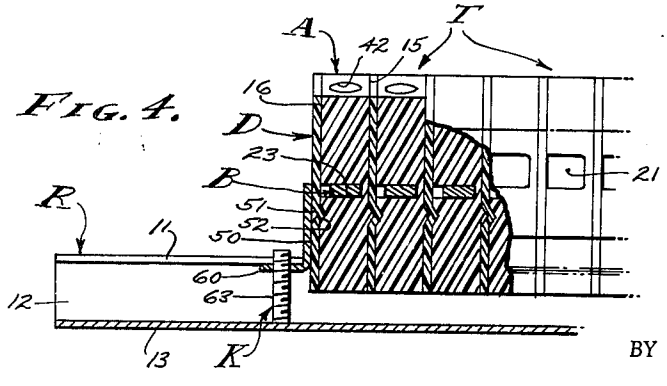


FIG. 4.



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ACCESSIBLE, SELF-MOUNTING TERMINAL BLOCK

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FIG. 5.

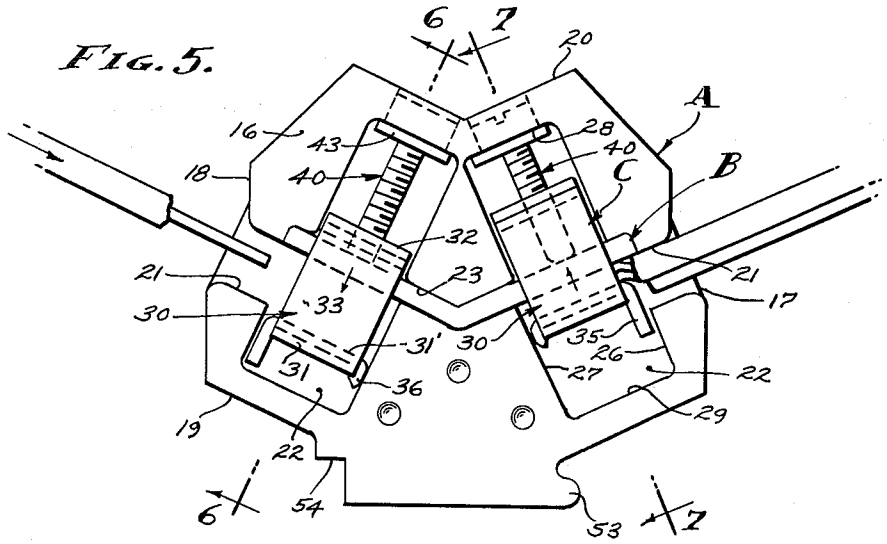


FIG. 6.

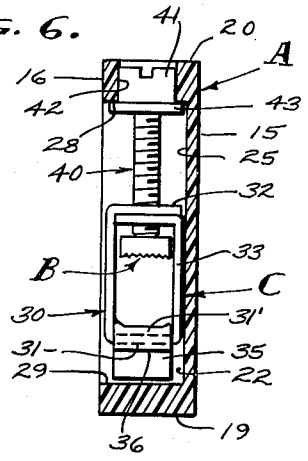


FIG. 7.

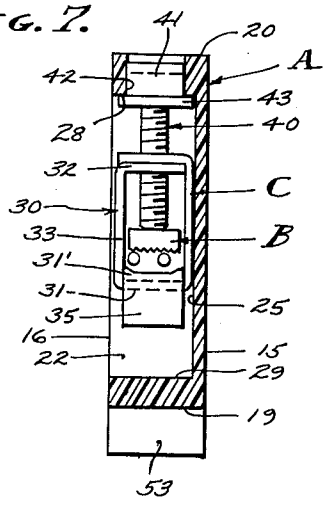
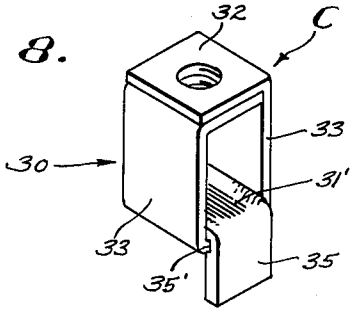


FIG. 8.



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3,246,283

ACCESSIBLE, SELF-MOUNTING TERMINAL BLOCK

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6 Claims. (Cl. 339—198)

This invention relates to terminal connection of electrical conductors and is particularly concerned with a terminal block that affords improved accessibility to the place of electrical connection and wherein the block is self-mounting upon a rail adapted to receive and hold the same.

Difficulty arises in the adequate provision of terminal connections where electrical conductors are joined. Not only must electrical separation be maintained relative to other conductors, but compactness of construction and accessibility are prime factors to be considered, and in addition it is highly desirable that modification and/or replacement be easily accomplished. Therefore, it is necessary to isolate conducting elements so as to eliminate danger of short-circuiting; it is highly desirable to dispose the terminal connection so as to be visible and also accessible; and it is highly desirable that the block per se be installable as a modular unit independently of like adjacent units.

An object of this invention is to provide a terminal block unit wherein the electrically conductive parts as well as the terminal conductor ends are electrically isolated by adequate insulation. In the construction hereinafter described there are no weaknesses of design in this connection and no danger of electrical failure.

Another object of this invention is to provide a terminal block unit wherein the axes of the terminal conductor ends are inclined and thereby disposed most advantageously for ease of access. With the structure that I provide, binding posts and/or clamp type fasteners are avoided, and in accordance with the invention an opening is provided into which the conductor end is simply inserted and after which the structure is tightened.

It is another object of this invention to provide a terminal block wherein the fewest number of parts are required and wherein correct installation of all parts, including particularly the terminal conductor ends, is inherently assured. With the structure hereinafter disclosed, each part involved has its place in the combination and coacts with the other associated parts so as to have but one mode of assembly without requiring additional fasteners, and so as to receive the terminal conductor ends in but the proper manner only. Briefly, the various parts are captured in proper operating position upon assembly, there being positive positioning of parts with guards to assure proper installation of the terminal conductor ends.

It is still another object of this invention to provide a terminal block unit that is self-mounting upon a rail especially provided therefor, all without requirement of additional parts. With the structure that I provide a multiplicity of terminal block units is arranged on a rail as will be described and a keeper at each end of the rail positions the blocks whereby the said blocks are not only positioned on the rail but are simultaneously captured thereon.

The various objects and features of this invention will be fully understood from the following detailed description of the typical form and application thereof, throughout which description reference is made to the accompanying drawings, in which:

FIG. 1 is a perspective view showing the installation of a multiplicity of terminal blocks on a rail.

FIGS. 2 and 3 are sectional views through the rail,

FIG. 2 showing the process of positioning the body part and elements carried thereby, and FIG. 3 showing the process of positioning the plate of a mounting means, the parts being moved as indicated by the arrows.

FIG. 4 is a vertical sectional view of a terminal block taken as indicated by line 4—4 on FIG. 1.

FIG. 5 is a vertical sectional view taken as indicated by line 5—5 on FIG. 1.

FIGS. 6 and 7 are sectional views taken as indicated by lines 6—6 and 7—7 on FIG. 5.

FIG. 8 is a perspective view of the stirrup-shaped terminal clamp means.

In FIG. 1 of the drawings I have shown a multiplicity of terminal blocks T mounted on a support rail R, there being a keeper K that locates the blocks in position on the rail. It will be readily apparent that any number of terminal blocks T can be arranged adjacently as shown, and that a keeper K or the like can be installed at each end of the row of said blocks (preferably the keeper K as shown). Generally, the invention involves the terminal blocks T each comprising a body A, a bus B, clamp means C, and a mounting means D. Additionally, the invention involves the support rail R which is especially formed to coact with the mounting means D.

The support rail R is the foundation upon which the terminal blocks T are arranged and involves a pair of inwardly disposed flanges **10** and **11** carried in a common plane by upstanding walls **12**. It is preferred that the rail R be a single symmetrical part and it is shown as a formed cross-section of one body of material with the walls **12** extending upward from opposite parallel sides of a bottom **13**. The bottom **13** is flat and thus the flanges **10** and **11** are parallel with said bottom and are opposed to each other. As a result, the said flanges present a pair of spaced downwardly faced shoulders.

The body A of the terminal block T is formed of an insulating material as shown, preferably by a molding technique. The body A is characterized by its bilateral symmetry except for a single feature which is unique in the self-mounting of the block. Primarily, the body A is a solid part having front and back faces **15** and **16** that are parallel and which are disposed normal to the rail R. That is, the faces **15** and **16** are vertical and extend transverse of the rail R which can be considered as normally horizontal. The body A is considerably wider than the rail R and is chambered and channeled in order to secure the electrically conductive parts. Further, the body A is characterized by its angularity of cross-section whereby opposite sides **17** and **18** face upwardly at an angle. As is shown, the sides **17** and **18** are each inclined (on the average) at about 25° so as to extend inwardly from a substantially broad base **19** to a rather narrow top **20**. The said angle can vary, it being understood that the broadness of the base **19** will increase with any increase in said angle. Thus, the body A is triangular with a broadened mounting base.

The body A is bilateral in order to accommodate the terminal ends of a pair of opposite conductors with at least one conductor approaching each side **17** and **18**. The said conductors have bared ends which enter the terminal block body, there being an opening **21** at each side to pass each conductor into a chamber **22** at each side. Thus, there is a pair of spaced chambers **22** formed within the body A, said chambers being interconnected by a channel **23**. In accordance with the invention the chambers **22** and channel **23** are open to the face **16** and are formed into the body A to freely accept the clamp means C and bus B. The chamber **22** is a rectangular cavity having a front wall **25** parallel to the face **15**, opposed and parallel side walls **26** and **27**, and top and bottom walls **28** and **29**. The channel **23** intersects the chambers **22** whereby the bus B can be carried in said

channel so as to pass through the chambers with support at the opposite side walls **26** and **27**. As is shown, the channel **23** is normal to the walls **26** and **27** substantially midway between the top and bottom walls **28** and **29**.

The bus B is a bar-shaped part that is carried in the channel **23** to span between the two chambers and to seat at opposite side walls of each chamber. Since the chambers are angularly related the channel is turned or bent at the center of the block and is V-shaped. Therefore, the bus B is a V-shaped bar and which, according to the invention, is of lesser width than the chambers **22**. That is, the edges of the bus B are spaced from the wall **25** and also from the back face **16**.

The clamp means C involves parts which enter into the chamber **22** to be captured therein. The structure is shown in the assembled condition and wherein the clamp means C involves a stirrup part **30** that is cooperatively related to the bus B with an operating screw **40** acting between said stirrup part and said bus. The stirrup part **30** has a jaw **31** disposed beneath the bus B and it has a head **32** disposed above the bus B. Extending between the jaw **31** and head **32** is one or more legs **33**, whereby movement of the head **32** is transmitted to the jaw **31**. As shown, the stirrup part **30** is a folded metal tube structure, of one part, wherein a pair of legs **33** project upward from the jaw **31** to straddle and freely pass by the bus B. The two legs **33** then overlap to form the head **32** which is of double thickness and which is threaded to receive the operating screw **40**.

In practice, the tubular part which forms the clamp means C is made of steel and is reinforced with a facer **31'** formed of highly conductive metal. The facer **31'** is essentially a flat part that overlies the jaw **31** and preferably formed with a concaved conductor-centering face. Said concaved face is established by upwardly swaging the margins of the facer **31'**; and said concaved face being longitudinally knurled or the like as shown. A guard **35** depends from the facer **31'** to operate along the wall **26**, whereby a conductor end cannot enter under the jaw. The guard **35** is indented at **35'** in order to lock onto the jaw **31**, there being a tab **36** at the end opposite the guard **35** and which is deflected and/or turned partially under the jaw **31** to effect a permanent assembly.

The operating screw **40** is threaded into the head **32** on an axis normal to the jaw **31**. Said screw **40** has a head **41** adapted to be turned by a suitable tool, such as by a screwdriver and the head **40** is round and is accessible from the exterior of the body A through an opening **42** in the top **20**. The opening **42** is round and enters into the chamber **22** where the screw **40** has a flange **43** engageable with the top wall **28** of the chamber. Thus, the operating screw **40** is made of a length to be captured between said flanged engagement at wall **28** and engagement of the end of said screw with the top of the bus B.

In order to assemble the terminal block T from the parts as above described, suitable clearances are provided so that with the tip of the operating screw **40** entered into the head **32** and with the stirrup part **30** engaged over the bus B, said parts can then be dropped into the chamber and/or chambers **22** and channel **23**, and into the alignment shown.

With the parts assembled as above described the mounting means D is applied and which comprises one or more plates **50** of insulating material that fit flush against the back face or faces **16** of the body or bodies A. In carrying out the invention, the bodies A and/or plates **50** are stacked together as may be required; that is, body against body or plate against body as may be desired. Thus, the chamber and/or chambers **22** and channel **23** are closed with the stirrup and/or stirrups **30** and with the operating screw and/or screws **40** captured in place with the bus B.

Further, the mounting means D involves the cooperative relationship of the body A and plate **50**, each of which is characterized by its hooked engagement with the above described rail R. In accordance with the invention the body A is adapted to have hooked engagement with the flange **10**, while the plate **50** is adapted to have hooked engagement with the flange **11**, or vice versa. Still further, and in order to have positive locking engagement at the two flanges **10** and **11**, the plate **50** has keyed engagement with the body A. As is shown, the body **8** has a keying recess or alternatively and preferably a keyed arrangement of two or more recesses **51** formed in the back face **16**, there being correspondingly shaped and placed projections **52** extending from the front face of the plate **50**. In accordance with the invention there is an outwardly turned lug **53** at one side of the body A and a seat **54** at the other side. The lug **53** engages under the shoulder formed by flange **10**, while the seat **54** rests upon flange **11**. Further, there is a shoulder at the seat **54** to engage the inner edge of flange **11**. There is an outwardly turned lug **55** at the other side of plate **50** and a seat **56** at the opposite side. The lug **55** engages under the shoulder formed by flange **11**, while the seat **56** rests on flange **10**. Further, there is a shoulder at the seat **56** to engage the inner edge of flange **11**. From FIGS. 2 and 3 of the drawings it will be apparent how the body A and plate **50** are revolved (oppositely) upon installation, and when properly hooked and seated they are slid into engagement with the projection or projections **52** entering the recess or recesses **51**.

As described above, the essential feature of mounting is that the body A has keyed engagement with the mounting plate **50** when respective lugs **53** and **55** are engaged under the flanges of the supporting rail, there being a mounting plate **50** shown between each of the bodies A. It is to be understood, however, that it is not necessary to employ a mounting plate **50** with each and every body A, and therefore both the body A and plate **50** are provided with opposite projections **52** and recesses **51**. Thus, the front **15** of one body A is engageable with the back **16** of the next adjacent body A, closing the chambers and channel therein, said bodies being locked against rotation by means of the projection and recess engagement. Further, in accordance with the invention, the projections **52** and recesses **51** are cam shaped so as to have a centering action and as well to have a prying action. The projections **52** and recesses **51** are preferably mating cone shapes, as shown, whereby the inclined formation results in alignment when parts are brought together. Conversely, when the parts are shifted, in any lateral direction, relative to each other, then the inclined formation of the cones results in a cam action that separates the blocks and/or plates.

From the foregoing it will be seen that a multiplicity of terminal blocks T are assembled, each from a body A, a bus B and stirrrup **30** and operating screw **40**. The parts are simply placed together with the bus B immovably spanning the chamber or chambers **22**. The opening **21** is positioned below the bus B and upon initial assembly the opening **21** is above the jaw **31**. In said initially assembled condition the guard **35**, in the nature of a tongue, engages the bottom **29** of the chamber while the flange **43** of the operating screw **40** engages the top **28** of the chamber. Thus, there is positive depression of the clamp means C whereby all obstructions are removed from opening **21**, in order to receive the terminal conductor end. However, upon operation and/or re-use the guard **35** assures that the terminal conductor end cannot be inserted other than between the bus B and jaw **31**, even when the stirrup **30** is not fully depressed. Finally, upon insertion of a terminal conductor end in position between the bus B and jaw **31** (see FIGS. 5 and 7) the screw **40** operates as a volume to apply pressure directly between the top of the bus B and head **41**. Since the stirrup legs **33** depend equally at either side of the bus to carry the transverse jaw **31**, clamping ac-

tion is positive without reliance upon any body part of insulating material.

With the parts as disclosed and assembled as above described any number of terminal blocks T can be arranged along the rail R. That is, the bodies A can be stacked in front-to-back relationship and as many mounting plates **50** used as may be advisable. For example, groups of bodies A are arranged directly together and a mounting plate **50** is arranged between a pair of bodies at suitable intervals as determined by said grouping. Thus, the groups of bodies A are locked to the rail R at intervals as may be desired.

Positioning along said rail R is determined by suitable stops or perferably by the keepers K, one at each end of the row of blocks. As is shown, the keeper K is a sheet metal part comprising a plate **60** that extends or spans between the flanges **10** and **11** of the rail. Said plate **60** is flat and it is provided with a tab **61** that presses flat against the endmost block or mounting plate. In order to secure the keeper K in position the plate **60** has a threaded opening for the reception of a set screw **63** that bites into the bottom **13**. Thus, the keepers K are engaged with the endmost terminal blocks T and are set in position by tighening the screws **63**.

Having described a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any modifications or variations that may appear to those skilled in the art and fall within the scope of the following claims.

Having described my invention, I claim:

1. A terminal block including:

(a) a body of insulating material with a chamber formed therein and with an opening into said chamber,

(b) and clamp means in said chamber for engagement with a conductor entered through said opening and comprising, an elongated bus fixedly occupying the chamber, a stirrup-shaped part movably occupying the chamber and with a jaw underlying the bus and with legs at either side of the bus and extending to a head overlying said bus, an elongated facer overlying the jaw and opposed to said bus and with a guard depending therefrom to close the opening when the facer is operated toward said bus, and an operating screw accessible through a second opening in the body to extend between the head and bus to pull the jaw toward said bus and said screw having a flange engaged with the chamber wall to position said screw and cause said screw to retract the jaw and facer from said bus.

2. A terminal block including:

(a) a body of insulating material having a front and a back disposed in spaced parallel planes, a side extending between the front and back, and with a chamber formed in the body and entering the back thereof, and there being an opening into the chamber through said side,

(b) clamp means inserted into the chamber at said back for engagement with a conductor entered through said opening and comprising, an elongated bus fixedly occupying the chamber, a stirrup-shaped part movably occupying the chamber and with a jaw underlying and opposed to the bus and with legs at either side of the bus and extending to a head overlying said bus, and an operating screw accessible through a second opening in the body to extend between the head and bus to pull the jaw toward said bus and said screw having a flange engaged with the chamber wall to position said screw and cause said screw to retract the jaw from said bus,

(c) and a plate of insulating material covering the back of the body and fixedly capturing the bus and movably capturing the stirrup shaped part in said chamber.

3. A terminal block for mounting on a rail having opposite inwardly disposed side flanges, and including:

(a) a body of insulating material having a front and a back disposed transversely of the rail in spaced parallel planes, a side extending between the front and back of the body, a chamber formed in and entering the back of the body, there being an opening into the chamber through said side, and an outwardly disposed hook at one side of the body to engage one of said rail flanges,

(b) clamp means in said chamber for engagement with a conductor entered through said opening and comprising a part with a jaw opposed to a bus and an operating screw extending between the said part and bus to clamp them together with the conductor therebetween,

(c) and mounting means comprising a plate of insulating material covering the back of the body to capture the clamp means in said chamber, and said plate having an outwardly disposed hook at the other side of the body to engage the other of said rail flanges.

4. A terminal block for mounting on a rail having opposite inwardly disposed side flanges, and including:

(a) a body of insulating material having a front and a back disposed transversely of the rail in spaced parallel planes, a side extending between the front and back of the body, a chamber formed in and entering the back of the body, there being an opening into the chamber through said side, and an outwardly disposed hook at one side of the body to engage one of said rail flanges and a seat to engage the other of said rail flanges,

(b) clamp means in said chamber for engagement with a conductor entered through said opening and comprising a part with a jaw opposed to a bus and an operating screw extending between the said part and bus to clamp them together with the conductor therebetween,

(c) and mounting means comprising a plate of insulating material covering the back of the body to capture the clamp means in said chamber, and said plate having an outwardly disposed hook at the other said of the body to engage the other of said rail flanges and a seat to engage the first mentioned of said rail flanges.

5. A terminal block for mounting on a rail having opposite inwardly disposed side flanges, and including:

(a) a body of insulating material having a front and a back disposed transversely of the rail in spaced parallel planes, a side extending between the front and back of the body and with a keying recess formed in the body and entering said back thereof, a chamber formed in and entering the back of the body, there being an opening into the chamber through said side, and an outwardly disposed hook at one side of the body to engage one of said rail flanges,

(b) clamp means in said chamber for engagement with a conductor entered through said opening and comprising a part with a jaw opposed to a bus and an operating screw extending between the said part and bus to clamp them together with the conductor therebetween,

(c) and mounting means comprising a plate of insulating material covering the back of the body and with a keying projection mated with said recess to capture the clamp means plate on said body, and said plate having an outwardly disposed hook at the other side of the body to engage the other of said rail flanges.

6. A terminal block for mounting on a rail having opposite inwardly disposed side flanges, and including:

(a) a body of insulating material having a front and a back disposed transversely of the rail in spaced paral-

lel planes, a side extending between the front and back of the body and with a keying recess formed in the body and entering said back thereof, a chamber formed in and entering the back of the body, there being an opening into the chamber through said side, and an outwardly disposed hook at one side of the body to engage one of said rail flanges and a seat to engage the other of said rail flanges,

(b) clamp means in said chamber for engagement with a conductor entered through said opening and comprising a part with a jaw opposed to a bus and an operating screw extending between the said part and bus to clamp them together with the conductor therebetween,

(c) and mounting means comprising a plate of insulating material covering the back of the body and with a keying projection mated with said recess to

capture the clamp means plate on said body, and said plate having an outwardly disposed hook at the other side of the body to engage the other of said rail flanges and a seat to engage the first mentioned of said rail flanges.

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