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TERMINAL ASSEMBLY FOR ENCLOSED ELECTRIC APPARATUS

Filed Nov. 18, 1954

3 Sheets-Sheet 1

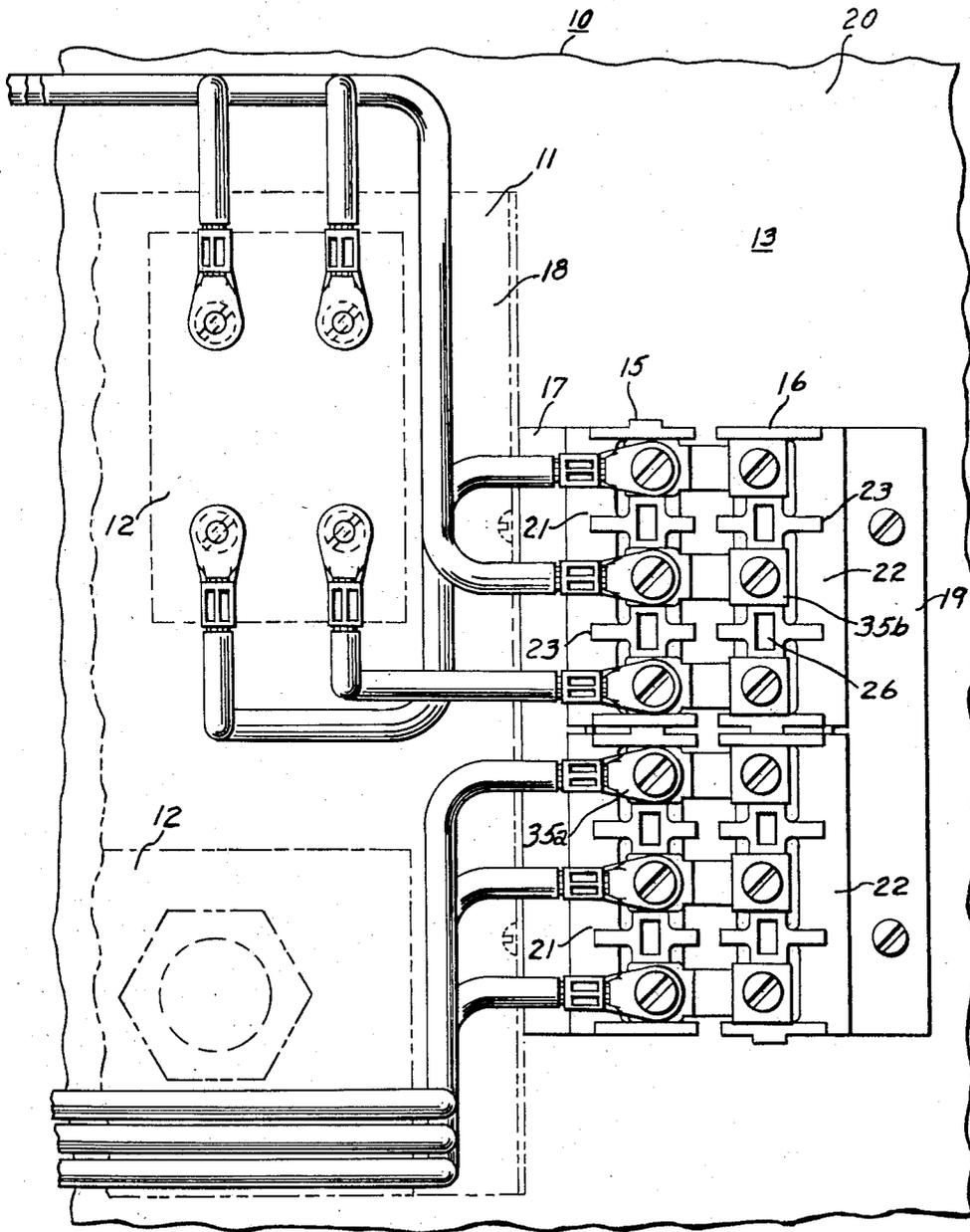


Fig. 1.

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3 Sheets-Sheet 2

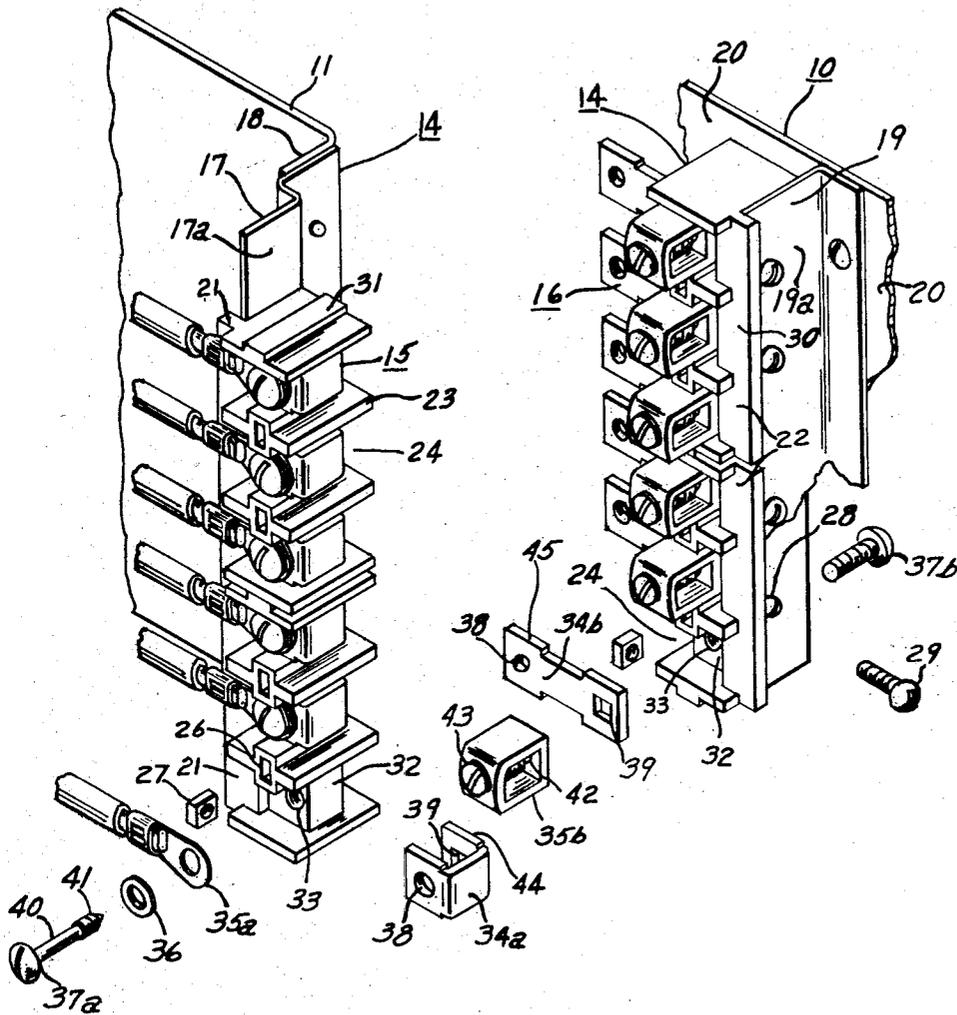


Fig. 2.

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3 Sheets-Sheet 3

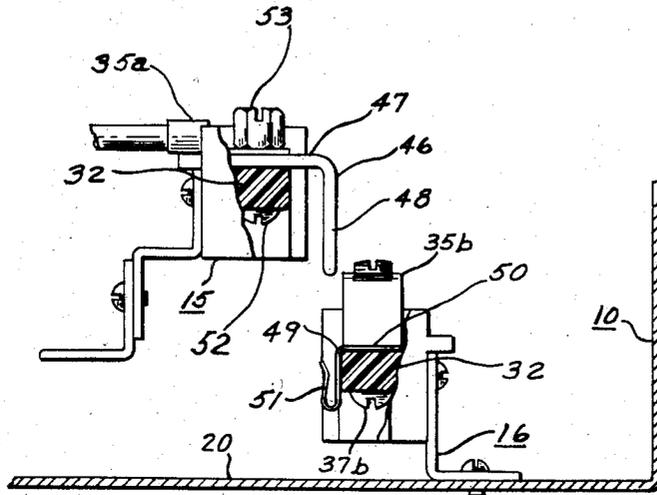


Fig. 4.

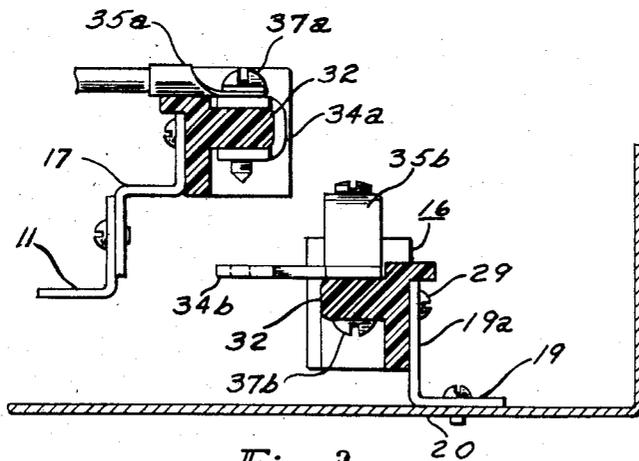


Fig. 3

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**TERMINAL ASSEMBLY FOR ENCLOSED  
ELECTRIC APPARATUS**

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Application November 18, 1954, Serial No. 469,818

5 Claims. (Cl. 339—198)

My invention relates to electric apparatus, such as large motor control centers or power distribution centers, where a plurality of electric control or power distributing units are mounted within a general enclosure or cabinet. More particularly, my invention relates to a terminal assembly for enabling electrical connection to and from the electric units mounted within such cabinets.

In an application of Raymond N. Rowe, Serial No. 469,817, filed concurrently with the present application and assigned to the present assignee, there is disclosed a two-part or split terminal assembly for use in providing interconnection between electric units within such general enclosure or cabinet. With such split terminal assembly one of the subassemblies is mounted on the electric unit while the other subassembly is mounted on an inner wall of the enclosure. In this way connections from the electric unit to its terminal subassembly as well as connections between terminal subassemblies mounted on the general enclosure can all be made at the factory rather than in the field; the two parts or subassemblies being usually interconnected by a simple plug-in or other easily formed and easily detachable fastening means. My present invention constitutes an improvement in such split terminal assemblies and has for one important object the provision of an unusually rugged, yet inexpensive, split terminal assembly.

Another important object of the invention is to provide a split terminal block assembly which utilizes blocks of molded insulating material having identical configuration; such insulating blocks constituting the principal supporting structures of both subassemblies.

An additional object of my invention is to provide a split terminal assembly which utilizes identical connector strips for the interconnections between aligned terminals of the split terminal assembly.

A further object of the invention is to provide a split terminal assembly in which all of the wire connecting terminals are easily accessible from the front.

A still further object of the invention is to provide a split terminal assembly in which both subassemblies can be easily mounted from the side on conventional mounting brackets.

A still further object of the invention is to provide a split terminal assembly in which all of the components are easily assembled on or detached from the insulating blocks of each terminal subassembly.

In general, in accordance with the invention, a terminal assembly is provided which is split into two general parts or subassemblies one of which is mounted on the electric unit and the other which is mounted on an inner wall of the enclosure within which the electric unit is to be located. Each of the subassemblies comprises an insulating block having a row of spaced holes extending from front to rear therethrough to enable the insertion of screw-type fastening means from either direction. These individual fastening means each function to secure both a wire connecting terminal and a metal connector strip to the insulating block thereby to provide

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a row of such terminals and connector strips. In one form of the invention, the screw-type individual fastening means of one of the subassemblies also functions to make an easily separable interconnection between the connector strips associated with different subassemblies of the two-part terminal assembly.

In accord with a further feature of the invention, the wire connecting terminals and connector strips of each subassembly are further insulated from one another by transverse partitions of the molded insulating block. Means are provided within these partitions for permitting fastening of insulating blocks to a supporting bracket from a side thereof thereby not to interfere with the assembly of the metal connector strips, wire connecting terminals, or screw-type fastening means for these components from the front or rear of each terminal sub-assembly.

In accordance with a further feature of the invention, the same molded insulating blocks are adapted for use with connector strips of different configuration in order to provide plug-in interconnection between the subassemblies of the split terminal assembly.

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, together with further objects and advantages thereof may be easily understood by referring to the following description taken in connection with the accompanying drawings in which:

Figure 1 is a plan view of a mounted and interconnected split terminal assembly embodying the invention;

Figure 2 is a perspective view, partly exploded, of the split terminal assembly of Figure 1;

Figure 3 is a sectional view of the split terminal assembly of Figure 1 in disengaged condition; and

Figure 4 is a cross-sectional view of a further embodiment of the invention whereby the split terminal assembly of Figure 1 is adapted for plug-in use.

Referring to Figures 1, 2 and 3, the invention is shown in one form in connection with an enclosure or cabinet 10 (only the rear and one side wall being shown in the drawings) within which an electric unit 11 is adapted to be mounted. Unit 11 may carry a plurality of electric components or control elements 12, shown in block outline form, to and from which electrical connection is desired to be made. In motor control centers and power distribution centers, electric units 11 are normally mounted within cabinet 10 so as to provide a space or wiring trough 13 along one side within cabinet 10. The split terminal assembly of the invention is mounted within the region of this wiring trough.

In accord with the invention a split terminal assembly 14 comprises two subassemblies 15 and 16, respectively; one subassembly 15 being mounted on electric unit 11 and the other subassembly 16 being mounted on an internal wall within cabinet 10. In the embodiment of the invention shown in the drawings a generally N-shaped metal bracket 17 is employed to mount subassembly 15 on a side wall 18 of unit 11 while an L-shaped metal bracket 19 is used to mount terminal subassembly 16 to a rear wall 20 of cabinet 10. Alternatively, other suitably shaped brackets may be employed for mounting subassembly 15 on a rear rather than side wall of unit 11 or for mounting subassembly 16 upon a side rather than rear inner wall of cabinet 10. The portions 17a and 19a of mounting bracket 17 and 19 upon which subassemblies 15 and 16 are directly supported should, however, be in spaced parallel alignment with one another in planes perpendicular to the rear wall 20 of cabinet 10 when unit 11 is in mounted position within the cabinet.

Each subassembly 15 and 16 comprises a plurality of molded insulating blocks 21, 22, preferably of identical

configuration thereby to minimize the number of assembly components required. Only two such blocks are shown in connection with the subassembly 15 and only two such blocks are likewise shown in connection with subassembly 16 although it will be appreciated that as many blocks may be used as necessary to accommodate the number of wiring connections required. Each of the insulating blocks 21 and 22 is divided by integrally molded transverse partitions 23 into a plurality of recessed sections 24 thereby to improve the electrical isolation between electrically conducting members mounted within these recess. In the drawings blocks 21 and 22 are shown as each comprising three such sections although it will be appreciated that they may comprise more or less number of sections as convenient. In order to mount insulating blocks 21 and 22 upon the upstanding portions 17a and 19a of brackets 17 and 19 without interference with or possible electrical connection to the electrically conducting members within sections 24 of the insulating blocks, the innermost partitions 23 have an enlarged central portion within which a rectangular cavity 26 is formed for accommodating a nut 27. A hole 28 opening from one side of the insulating block extends transversely therein and registers with this rectangular cavity 26. These holes are aligned with similar longitudinally-spaced holes in portions 17a and 19a of mounting brackets 17 and 19 so that screws 29 may be inserted therethrough and threaded into inserted nuts 27. Insulating blocks 21 and 22 preferably also have outwardly projecting integrally molded flanges or lips 30 adjacent the top thereof which seat on the upper edges of mounting brackets 17 and 19 thereby to assist in the secure positioning of the blocks upon the mounting brackets as well as to provide additional insulation between any interconnecting wires and these mounting brackets. One end of each insulating block 21, 22 preferably also has an integrally molded projection or boss 31 for providing increased spacing and improved electrical isolation between adjacent sections of contiguous blocks.

Each section 24 of the insulating blocks 21, 22 has an integrally molded generally cubical main body portion 32 having a hole 33 formed from front to rear therethrough thereby to provide a row of such holes within the terminal subassemblies 15 and 16 extending generally perpendicular to the rear wall 20 of cabinet 10. Subassemblies 15 and 16 are mounted on their respective mounting brackets 17 and 19 so that the sections 24 of one subassembly 15 are in transverse alignment with the sections 24 of subassembly 16. Mounting brackets 17 and 19 are arranged on electric unit 11 and cabinet 10 respectively such that one subassembly 15 is closely spaced alongside the other subassembly 16 when the electric unit 11 is in mounted position within cabinet 10.

Insulating block portions 32 of terminal subassemblies 15 and 16 function to support all of the electrically conducting members forming easily separable interconnection to and from the electrical components of unit 11. The electrically conducting members carried by each block portion 32 of subassembly 15 comprise connector strip 34a, wire connecting terminal 35a, washer 36 and a fastening means comprising captive screw 37a. The corresponding electrically conducting members carried by each block portion of subassembly 16 comprise connector strip 34b, wire connecting terminal 35b and a fastening means comprising screw 37b. It will be observed that each connector strip 34a of subassembly 15 has identical cross section from end to end as connector strip 34b of subassembly 16, the only difference being that connector 34a is bent to form a U while connector strip 34b is flat. Both strips have a round tapped hole 38 adjacent to one end and a square hole 39 of larger diameter adjacent the opposite end. U-shaped connector strip 34a embrace the three exposed sides of each insulating block portion 32 with its endwise holes 38, 39

aligned with hole 33 passing through the insulating block portion 32. Connector strips 34a as well as the terminals 35a and washers 36 are all held in place within their respective sections 24 by means of captive screws 37a passing through the aligned holes thereof. Captive screw 37a has a thin non-threaded shank portion 40 terminating in an enlarged threaded end portion 41 which, once threaded through the top hole 38, cannot fall out or be removed out of hole 38 except by the reverse rotation thereof. Once the enlarged end portion 41 of screw 37a passes through threaded hole 38, however, the screw is free to move along the axis of hole 33 for a distance equal to the length of shank portion 40. When fully inserted, the enlarged threaded end portion of screw 37a passes through and a short distance beyond the square hole 39 in connector strip 34a. Captive screw 37a also functions to make the easily separable interconnection between the connector strips 34a and 34b as will be more fully described hereinafter.

Each connector strip 34b and solderless lug-type connecting terminal 35b is securely supported within a section 24 of subassembly 16 by means of a simple fastening screw 37b inserted through hole 33 of block 32 and through rectangular hole 39 of connector strip 34b and threaded into tapped hole 42 in the bottom of lug 35b. A screw 43 threaded to the top of each lug 35b makes hold-down connection to the bare end of a wire inserted within the lug from the side thereof.

All direct electrical connections to and from the control elements 12 of unit 11 are made to the terminals 35a of subassembly 15 mounted on the unit 11. Similarly, all wiring connection from other units or power sources intended for these elements of control unit 11 are made to correspondingly aligned terminals 35b of subassembly 16 within wiring trough 30. Easily separable interconnection between all of the pairs of aligned terminals of the two subassemblies are then made by merely mounting electric unit 11 in its proper position within cabinet 10 so that the end portions 45 of connector strips 34b pass between the adjacent partitions 23 of terminal blocks 21 and abut contiguously against the bottom surface of the end portions 44 of connector strips 34a of subassembly 15. Tapped holes 38 of connector strips 34b are aligned beneath rectangular holes 39 of connector strips 34a and the contiguous flat surfaces of these connector strips are tightly pressed together by tightening captive screws 37a within tapped holes 38 of connector strips 34b. The tightening of these captive screws serves not only to bring the two connector strips into good electrical connection with one another but also serves to tighten the head of the screws against the apertured end portion of terminals 35a thereby insuring good electrical connection between these terminals and their respective connector strips 34a.

The tightening of each screw 37a within tapped hole 38 also serves to make mechanical as well as electrical connection between the two subassemblies 15 and 16. Where there are at least a moderate number of such mechanical as well as electrical interconnections the strength of the mechanical connection resulting therebetween may be sufficient to eliminate the necessity for any further mounting or fastening means between this side of electric unit 11 and the rear wall of cabinet 10, thereby also eliminating the necessity for alignment between the terminal assemblies and such unit mounting means.

Referring now to Figure 4, I have shown another embodiment of the invention substantially identical to that shown in Figures 1-3 but modified to provide plug-in type interconnection between the electrically conducting members of the two subassemblies 15 and 16. In this embodiment of the invention connector strips 34a are replaced by L-shaped rigid metal connector strips 46 each having an apertured portion 47 seated on the front face of insulating block portion 32 beneath terminal 35a and

having a male or stab portion 48 spaced from the exposed side of block portion 32 and extending toward rear wall 20 of cabinet 10 substantially perpendicular thereto. Conductor strips 34b are likewise replaced by resilient metal connector strips 49 each having a flat portion 50 seated on the front face of block portion 32 beneath terminal lug 35b and having a female or socket portion 51 of a U-shaped cross section extending alongside block portion 32 and adapted to receive and tightly engage the sides of stab portion 48 of connector strip 46. Each captive screw 37a is also replaced by a conventional threaded screw 52 inserted from the rear through hole 33 in the same manner as screw 37b and threaded into a suitable nut 53 which serves securely to mount terminal 35a and connector strip 46 within its section 24 of subassembly 15.

It will thus be seen that I have provided an unusually versatile and economical split terminal assembly which utilizes identical molded insulating blocks 21, 22 for both subassemblies and enables the mounting of all electrically conducting members thereon by screw type fasteners easily inserted from the front or rear thereof. The terminal assembly is adapted to carry many different types of conventional, easily obtained, wire connecting terminals such as soldered or crimped on terminals 35a beneath nut 53 or screw head 37a, or such as solderless lug type terminals 35b which are screwed down against the blocks. In addition, the two subassemblies 15 and 16 are joined by easily formed and easily separable combined mechanical and electrical interconnections which are either plug-in type or are formed by the same screw down operation by which one of each pair of interconnected terminals is mounted on its respective section of the molded insulating block. Moreover, both subassemblies are adapted for easy mounting in side-by-side relation on separate panels by screws inserted within suitably formed partitions of the molded blocks which serve not only to house and insulate such mounting screws but also electrically to isolate the conductive connector strips associated with each terminal.

Although I have described above specific embodiments of the invention many modifications may be made, and I intend by the appended claims to cover all such modifications as fall within the true scope and spirit of the invention.

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

1. A split terminal block assembly comprising a pair of insulating blocks each having a row of spaced holes formed from front to rear therethrough, a first set of U-shaped metal connector strips each engaging three sides of one of said blocks and having holes adjacent both ends registering with one of the spaced holes of said block, a second set of metal connector strips each having holes adjacent both ends, each hole registering with one of the spaced holes on different blocks, and individual screw-type fastening means inserted through said registering holes of said strips of said first and second sets for mounting said connection strips on said one of said blocks and for connecting a wire-receiving terminal thereto and for electrically interconnecting pairs of said connector strips mounted on different blocks.

2. The split terminal block of claim 1 wherein the pair of insulating blocks are molded blocks and have identical configuration.

3. A split terminal block assembly comprising a pair

of insulating blocks each having a row of spaced holes formed front to rear therethrough, a first set of U-shaped metal connector strips each engaging three sides of one of said blocks and having holes adjacent both ends registering with one of the spaced holes adjacent both ends registering with one of the spaced holes of said block, a second set of metal connector strips each having holes adjacent both ends each hole registering with one of the spaced holes on different blocks, wire connecting terminals each having a hole registering with a respective one of the holes on said blocks, and individual screw-type fastening means inserted through said registering holes for mounting said terminals and said connector strips on said blocks and for electrically interconnecting pairs of said connector strips mounted on different blocks.

4. A split terminal block assembly comprising a pair of insulating blocks each having a plurality of spaced parallel insulating partitions separating the block into a plurality of sections, communicating apertures formed from the front and side of each block within said partitions and mounting means for said block comprising a fastening member having a portion extending into one of said apertures and a retaining member in the other of said apertures in interlocking engagement with said portion of said mounting member, and electrically conducting strip members mounted within the sections of both blocks, the electrically conducting members mounted on one block being constructed to make easily formed interconnection with the electrically conducting members mounted on the other block.

5. Electrical connecting apparatus comprising a support, a pair of insulating members adapted to be mounted in generally parallel side-by-side relation on said support, a plurality of terminal fastening means carried by each of said insulating members and adapted to receive a wire-connecting terminal, said fastening means being disposed in equally spaced relation in a row on each of said insulating members to provide a plurality of transversely aligned pairs of fastening means when said members are in side-by-side relation, a connector strip for each of said fastening means, each of said connector strips being attached at one end thereof to a respective one of said insulating members by one of said fastening means and means releasably interconnecting the other ends of the corresponding connector strips of each of said pairs whereby to releasably interconnect said wire-receiving terminals, one of said corresponding connector strips of each pair having its free end portion returned to provide an electrical socket and the other of said corresponding connector strips having its free end adapted to be received in said socket when said insulating members are in side-by-side relation.

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