

[54] **MODULAR ELECTRICAL JUNCTION AND INTERCONNECTION MEANS WITH SUPPORTING MEANS FOR TERMINAL BLOCKS**

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[51] Int. Cl. **H01r 9/22, H02b 1/04**

[58] Field of Search **317/118, 122; 339/97 P, 98, 198 R, 198 G, 198 GA, 198 K; 179/98; 174/72 A**

[56] **References Cited**

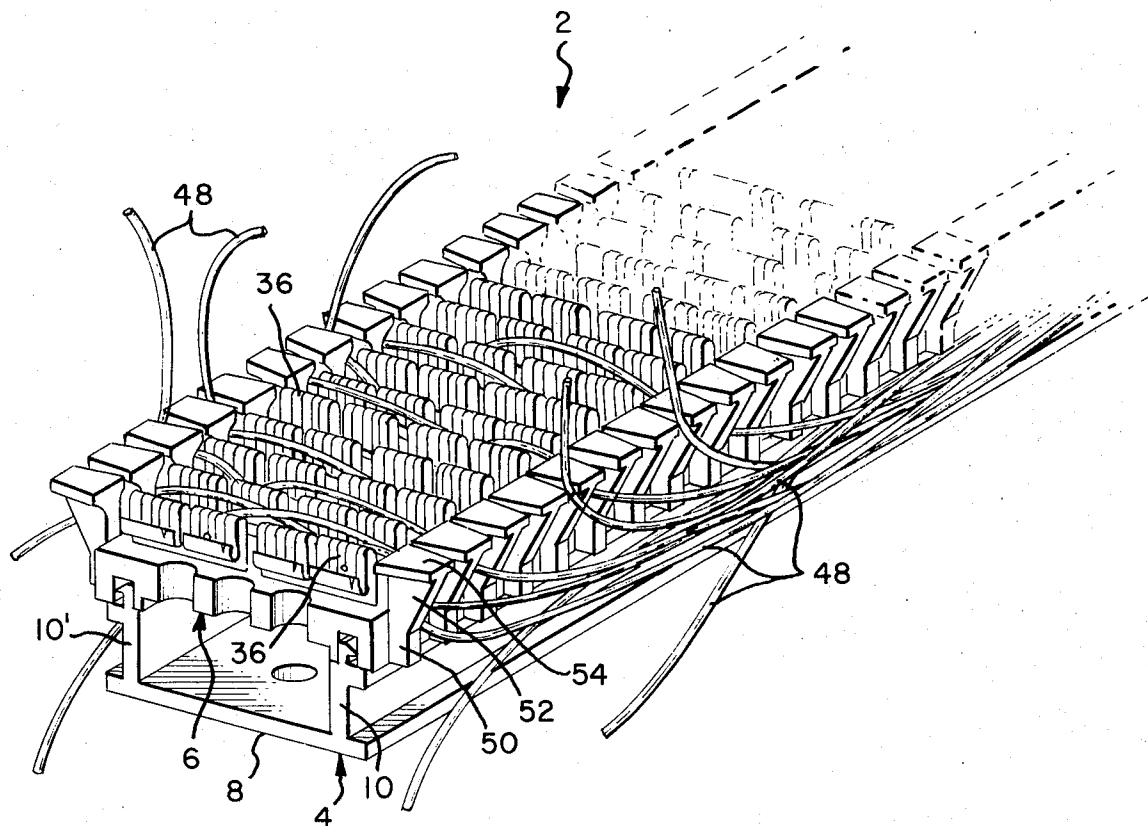
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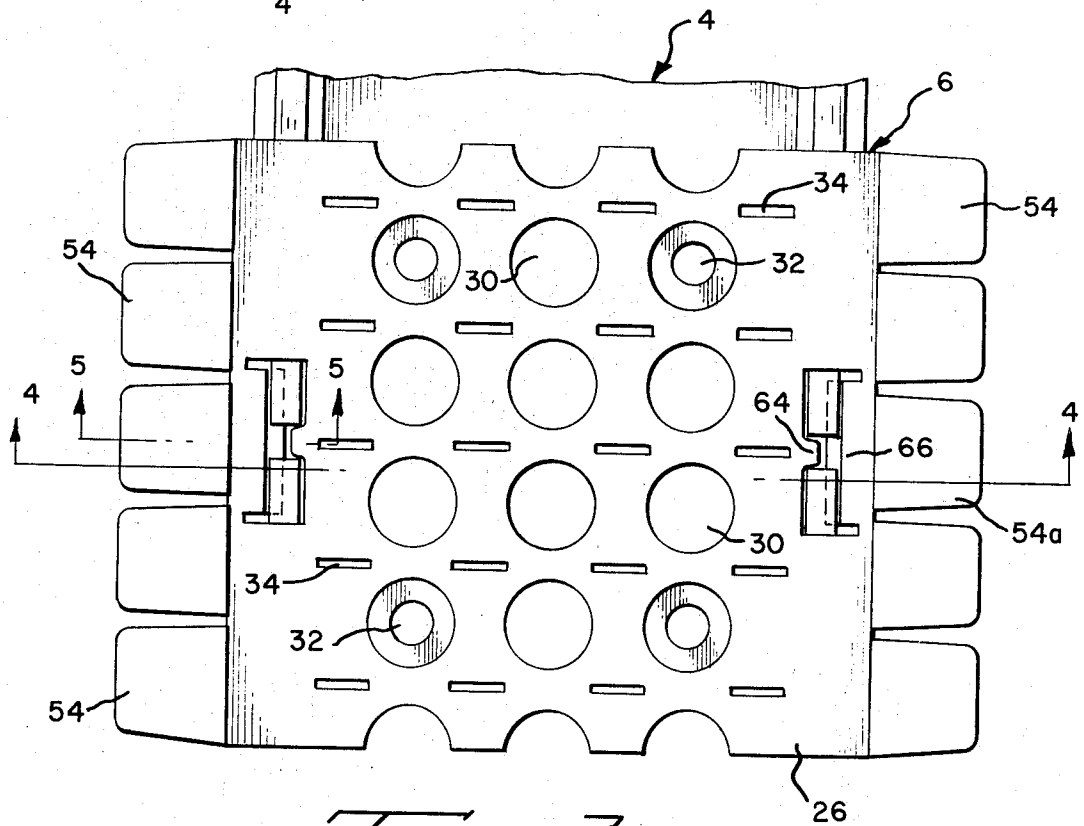
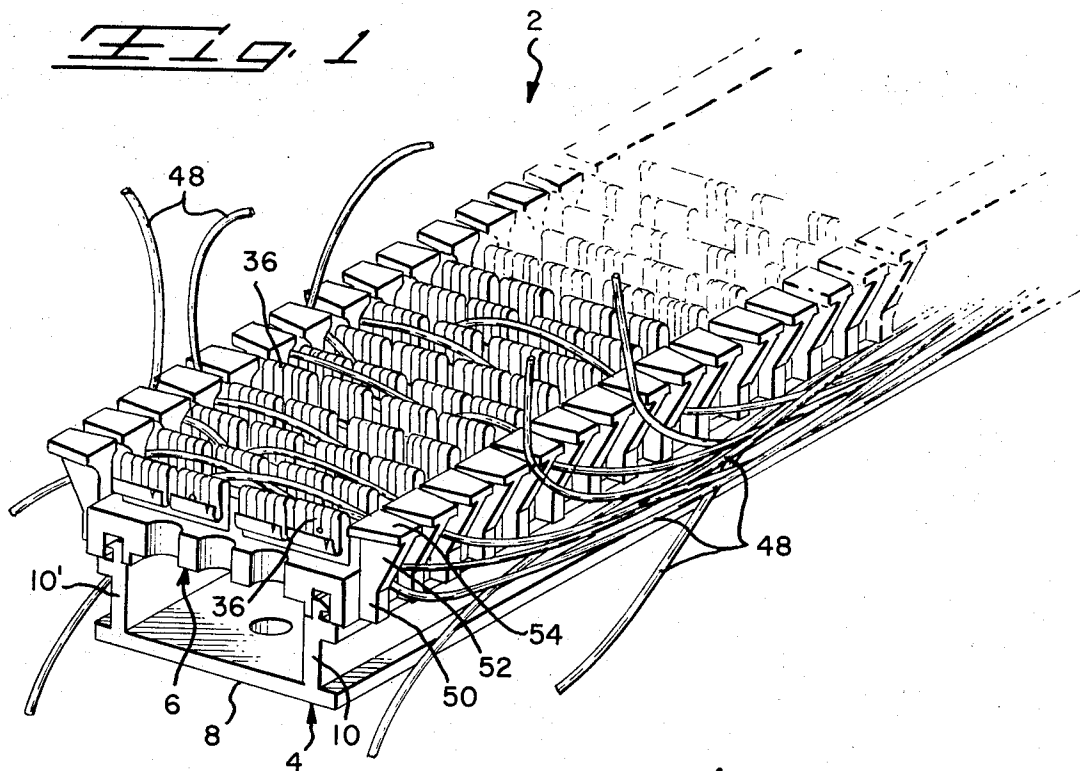
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[57] **ABSTRACT**

Electrical junction means for interconnecting a multiplicity of wires comprises a channel-shaped frame member having a plurality of mounting blocks secured thereto. Electrical terminals mounted on the mounting blocks provide interconnections among wires extending to the junction zone. The individual mounting blocks are removably secured to the frame in predetermined locations by means of latch arms and keys in the mounting blocks.

4 Claims, 6 Drawing Figures





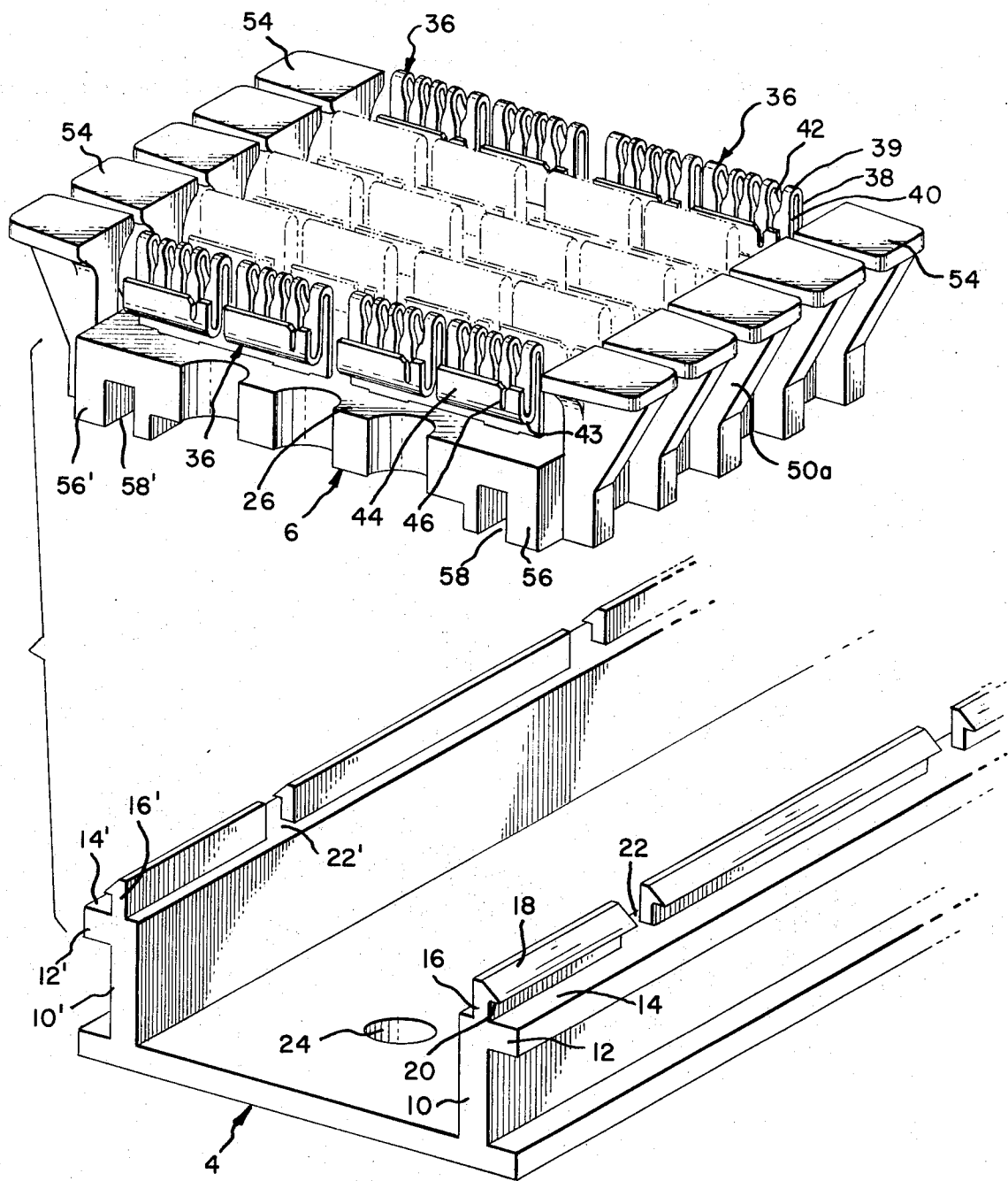
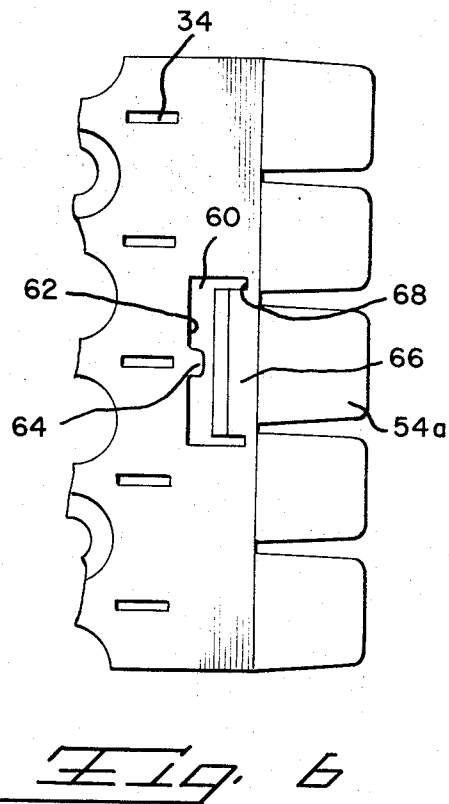
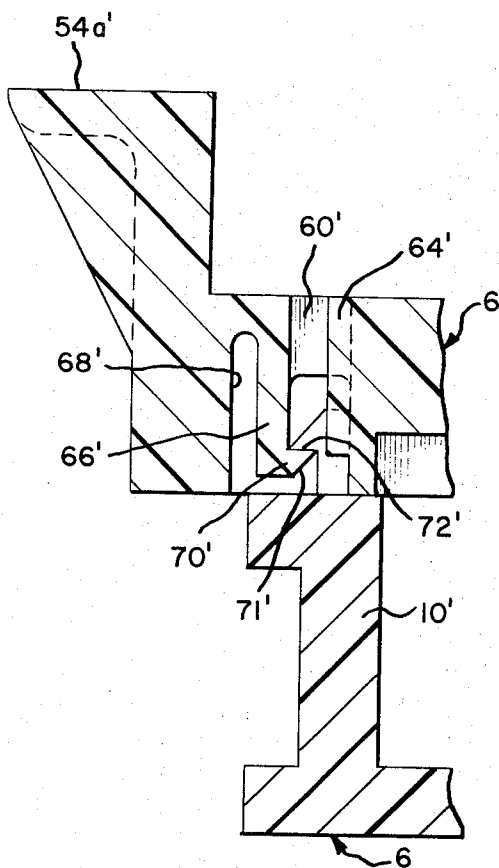
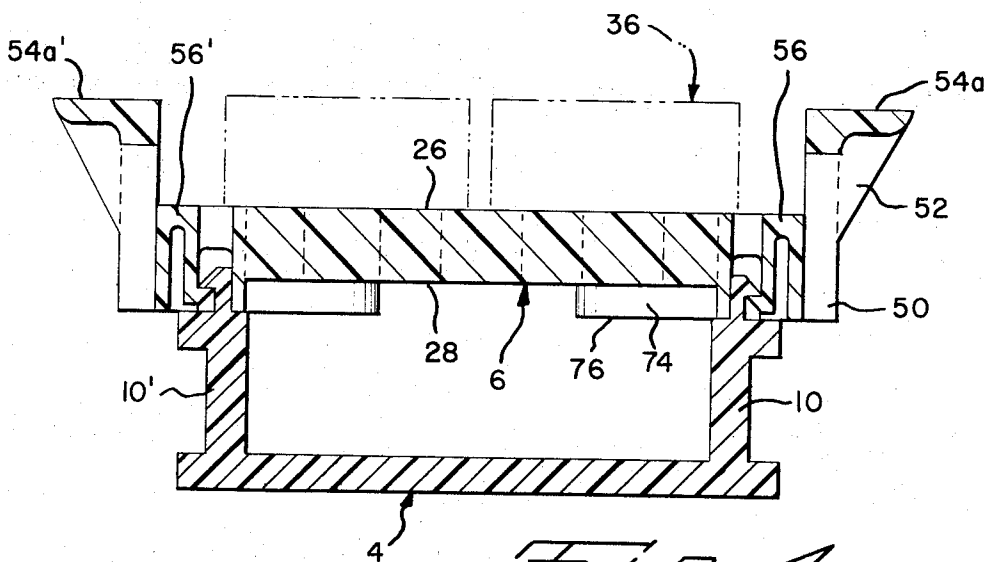


Fig. 3



MODULAR ELECTRICAL JUNCTION AND INTERCONNECTION MEANS WITH SUPPORTING MEANS FOR TERMINAL BLOCKS

BACKGROUND OF THE INVENTION

This invention relates to electrical junction and interconnecting means forming interconnections among a relatively large number of wires. The embodiment of the invention disclosed herein is particularly intended for use in the telephone industry but can be used wherever large numbers of wires extending to a junction zone must be interconnected.

It is frequently necessary in telephone systems to form permanent but changeable or serviceable interconnections among hundreds or even thousands of wires extending to a junction zone in a building in order to provide telephone service to various locations in the building. The junction systems used for forming such interconnections must be relatively compact, must be permanent in the sense that connections made in the system will have a long life if no changes are required and they must also be serviceable to permit wiring changes or additions when additional telephones are installed or the locations are changed. Finally, connectors of this type must be relatively low in price in view of the numbers used.

The present invention is directed to the achievement of a modular terminal junction and interconnection means which satisfies the requirements discussed above. The herein disclosed embodiment of the invention comprises a mounting frame on which a plurality of modular terminal blocks are mounted at precisely predetermined locations. The terminal blocks have mounted thereon electrical terminals each of which is adapted to receive two or more wires so that wires extending to the junction zone can be commonly connected to each other and, by forming connections between selected terminal members with jumper wires, to other wires in the junction zone. The individual terminal module blocks are removably mounted on the frame in a manner which provides a permanent assembly if changes are not required but which permits removal of the individual modules should changes be necessary.

It is accordingly an object of the invention to provide an improved junction and interconnection means for a large number of wires extending to a junction zone. A further object is to provide a versatile and flexible junction means which can be adapted for use under a wide variety of conditions and for the accommodation of varying numbers of wires. A further object is to provide a junction means for wires which permits wiring changes to be carried out with a minimum of time and labor. A still further object is to provide a low-cost highly reliable junction and interconnecting means which can be used under a variety of conditions.

These and other objects of the invention are achieved in a preferred embodiment thereof which is briefly described in the foregoing abstract, which is described in detail below, and which is shown in the accompanying drawings in which:

FIG. 1 is a fragmentary perspective view of a terminal junction means in accordance with the invention.

FIG. 2 is a fragmentary plan view of a terminal block mounted on the framed member of the system, the terminal block shown in this Figure having no terminal members mounted thereon.

FIG. 3 is a perspective view showing a terminal block exploded from a mounting frame.

FIGS. 4 and 5 are views taken along the lines 4—4 and 5—5 of FIG. 2.

FIG. 6 is a fragmentary view of one side of a terminal block illustrating details of the key and latching means by means of which the individual blocks are removably secured to the frame.

A terminal junction means 2 in accordance with the invention comprises a mounting frame 4 having a plurality of individual modular terminal blocks 6 mounted thereon. The frame 4 is generally channel-shaped in cross-section and has a flat web 8 and parallel sidewalls 10, 10' extending from the sides of the wall. As will be apparent from FIG. 4, the frame and the individual terminal blocks are symmetrical about a vertical center line. Accordingly, corresponding structural elements on the right and lefthand sides of the frame and the blocks are identified by the same reference numerals, differentiated by prime marks.

The sidewalls 10, 10' have laterally extending flanges 12 on their upper ends which provide enlarged supporting surfaces 14 for the terminal blocks. Mounting rails 16 extend upwardly from these surfaces and have enlarged upper ends which are beveled downwardly and outwardly as shown at 18. These enlarged upper ends of the rails provide downwardly facing shoulders 20 which cooperate with latch arms on the terminal blocks as will be described below. The rails of the disclosed embodiment are notched at periodic intervals 22, 22' the notches 22 in the rail 16 being in alignment with the notches 22' in the rail 16' in order to precisely locate the individual terminal blocks on the frame as will also be described below. The web 8 has drilled holes 24 at intervals along its length so that it can be secured by fasteners to a mounting surface.

The frame may be produced from any suitably rigid and strong material and is advantageously manufactured by continuous extrusion of a relatively firm plastic such as self-extinguishing fire retardant grade of a rigid polyvinyl chloride. The notches 22, 22' and the holes 24 are then formed by machining operations or by punching.

The individual terminal blocks 6 are generally rectangular and have an upper surface 26 and a lower surface 28 which faces the web when the block is mounted on the frame. Holes 30 may be formed in the block at the time of manufacture in the interest of good molding practice and in order to economize on the quantity of molding material used in the manufacturing process. Also, the wires 48 or some of these wires, can be located between the side-walls 10, 10' and dressed through these holes.

The plurality of terminal members 36 are mounted in rectangular openings 34 in each block, these terminal members being of the general type disclosed in the U.S. patent to Patton U.S. Pat. No. 3,617,983 and having a pair of parallel plate sections 38, 40 which are joined to each other by a bight 39. Wire receiving slots 42 extend into the bight and into each of the plate sections, electrical connection of a wire to the terminal being effected by forcing the wire downwardly and into the relatively narrow root portions of the slots. The terminal members shown have a third plate section 34 which is connected to the plate section 40 by a bight 43. This third plate section is adapted to co-operate with a wire inserter to trim the end portion of a wire while it is

being moved into one of the slots 42 as explained in the above identified Patton patent. The third plate section 44 may be provided with notches or slots 46 at selected locations in alignment with one of the slots 42 so that at least one wire extending to each terminal member 36 is not cut but may extend in both directions to additional terminal members and serve as a buss member to electrically common several terminals.

Integral barriers 50 are provided in the sides of each block and extend upwardly above the upper surface 26 thereof. These barriers have outwardly directed intermediate sections 52 and 54 which extend on each side of each barrier towards the cap sections of the adjacent barriers. The individual wires 48 can thus be located between adjacent barriers and held in position in an orderly and neat arrangement. As will be explained below, one of these barrier members 50a on each side of the block also serves as a lever for disengaging the latching arms of the block from the rails 16, 16'.

The side portions 56, 56' of the individual blocks are relatively thicker than the central portions as clearly shown in FIG. 4 and have parallel grooves 58, 58' on their undersides, the widths of these grooves being equal to, and slightly greater than, the widths of the enlarged upper ends of the rails 16, 16' so that the rails can freely enter the grooves when a block is assembled to the frame.

Rectangular openings 60 extend through the relatively thick side portions 56, 56' of the blocks outwardly of the side rows of terminal receiving openings 34 and intersect the grooves 58, 58'. Each opening 60, 60' has an integral key of rectangular cross-section 64 extending from its inner wall 62. These keys are dimensioned to fit within the notches 22, 22' of the rails so that the individual terminal blocks can be assembled to the frame only at the predetermined positions. The keys also prevent sliding movement of the individual terminal blocks along the rails because of the fact that the sides of the keys bear against the faces of the rails.

The terminal blocks are removably held on the frame by means of latch arms 66, 66' which extend downwardly through the openings 60 and which are spaced from the walls 68, 68' which are opposite to the walls 62, 62'. The lower ends 70, 70' of the latch arms have inwardly directed flanges which are beveled on the undersides at 71, 71', and which provide upwardly facing shoulders 72, 72'. The latch arms 66, 66' are stiffly flexible towards the cavity walls 68, 68' so that an individual terminal block can be assembled to the frame by aligning the key members 64, 64' with a pair of notches 22, 22' and pushing downwardly on the block. The latch arms will be cammed outwardly or towards the walls 68, 68' by the beveled surfaces 18, 18' and after the downwardly facing surfaces of the enlarged side portions 56, 56', move against the surfaces 14, 14', the arms will return to their normal positions and securely latch the block to the frame.

The individual terminal blocks can be removed from the frame by grasping the cap portions 54a, 54a' of the central barrier members between the thumb and forefinger and pressing these cap members inwardly towards the center of the frame. The resulting elastic deformation of the central portion of the frame causes the lower ends of the latch arms 66, 66' to swing outwardly until the enlarged lower ends are clear of the upper ends of the rails. The terminal block can then be removed by lifting it from the rails. Alternatively, an individual terminal block can

be removed by simply inserting a screwdriver blade into one of the openings 60, 60' and twisting the blade so that one side of the blade engages the latch arm and swings it toward the wall 68 or 68'. The block can then be swung upwardly and the latch arm on the opposite side of the block will be disengaged from the rail on the opposite side.

Under some circumstances, it may be desirable to secure one or more terminal blocks directly to a panel rather than to mount a frame member 4 on the panel. To permit this alternative mounting method, ribs 74 are provided on the underside 28 of each block beneath some of the openings 32. These ribs extend laterally to the relatively thick side portion 56, 56' and have lower surfaces 76 which are co-planar with the lower surfaces of the side portions. The holes 32 are of a reduced diameter in their lower portions so that the block can be mounted on a wooden panel by driving a fastener through two or more of the holes 32 and into the panel.

The blocks 6 are advantageously manufactured by a molding process by using a suitable flame retardant and self-extinguishing plastic material. In order to ensure high degree of dimensional stability in these blocks and in order to provide the physical properties required for the flexible latch arms 66, 66' it is desirable to use a material such as Noryl (General Electric Company trademark for resins based on phenylene oxide) or a material having similar properties. Noryl is also a desirable material from the standpoint of dielectric strength. It will be apparent of an inspection of the drawings that the blocks 6 can be molded in a straight action mold, that is, a mold having core pins which extend only in the direction of movement of the core pins. A straight action mold is advantageous as compared to a mold having core pins which extend transversely of the direction of movement of the mold parts in that a straight action mold is less expensive to produce and maintain and lower manufacturing costs are achieved.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only.

What is claimed is:

1. Electrical junction means for forming electrical connections among a plurality of wires comprising:
 - a generally channel-shaped mounting frame having a web and sidewalls, each of said sidewalls having a mounting rail extending from its free end, said mounting rails having spaced-apart notches therein,
 - a plurality of terminal module blocks supported on said frame on said free ends of said sidewalls, each of said module blocks comprising a one-piece molding of insulating material having a lower side which is opposed to said web and having an upper side and having wire receiving terminal members mounted on said upper side,
 - each of said module blocks having a pair of parallel grooves in its lower side, said rails extending into said grooves, each of said blocks having a pair of openings extending therethrough from its upper side to its lower side, each of said openings intersecting one of said grooves,
 - key means in each of said openings, each said key means comprising a key member integral with one

wall of its respective opening and extending into one of said notches thereby to prevent movement of said blocks along said rails,

latching means serving to latch each of said blocks to said rails, each of said latching means comprising a latch arm in one of said openings, each of said latch arms being integral with its respective block adjacent to said upper side and extending downwardly towards said lower side, each of said latch arms being spaced from, and flexibly movable towards, a second wall of its respective opening which is opposite to said one wall, each of said latch arms having a free end adjacent to said lower side of its respective block, and

interengaging means on said free ends of said latch arms and said rails, said interengaging means being engageable and disengageable upon flexural movement of said latch arms towards said second wall, whereby said blocks are secured in predetermined positions on said frame by said key means and said latch arms, and said blocks are individually removable from said frame upon flexure of said latch arms towards said second wall.

2. Electrical junction means as set forth in claim 1, each of said blocks having a plurality of barrier members which are integral with, and which extend laterally from said two opposite ends, said barriers serving to separate wires extending to said blocks.

3. Electrical junction means as set forth in claim 2, said barrier members extending beyond said first side, one of said barrier members on each of said ends being effective as a lever arm for disengaging the proximate one of said latch arms from the associated one of said rails.

4. A terminal module member which is adapted to be disengageably mounted on a pair of parallel mounting rails, said rails having spaced apart notches therein,

said terminal module member comprising:

a one-piece molded block of insulating material, said block having means on one side thereof for mounting wire-receiving terminals thereon and having a pair of parallel grooves on another side thereof which is opposite to said one side, said grooves being adapted to receive said rails,

said block having a pair of openings extending there-through from said one side to said other side, each of said openings intersecting one of said grooves, key means in each of said openings, each said key means comprising a key member integral with one wall of its respective opening and adapted to extend into one of said notches thereby to prevent movement of said block along said rails,

latching means for latching said block to said rails, said latching means comprising a latch arm in each of said openings, each of said latch arms being integral with its respective block adjacent to said one side and extending downwardly towards said other side, each of said latch arms being spaced from, and flexibly movable towards, a second wall of its respective opening which is opposite to said one wall, each of said latch arms having a free end adjacent to said other side of its respective block, and hook means on said free ends of said latch arms adapted for engagement with said rails, said hook means being engageable and disengageable upon flexural movement of said latch arms towards said second walls, whereby

said blocks can be secured in predetermined positions on said rails by said key means and said latch arms, and said blocks can be individually removable from said rails upon flexure of said latch arms towards said second wall.

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