Jan. 5, 1965 S. E. GENTILE 3,164,709

TERMINAL BLOCK CONNECTOR ASSEMBLY

Filed May 5, 1961 2 Sheets-Sheet 1

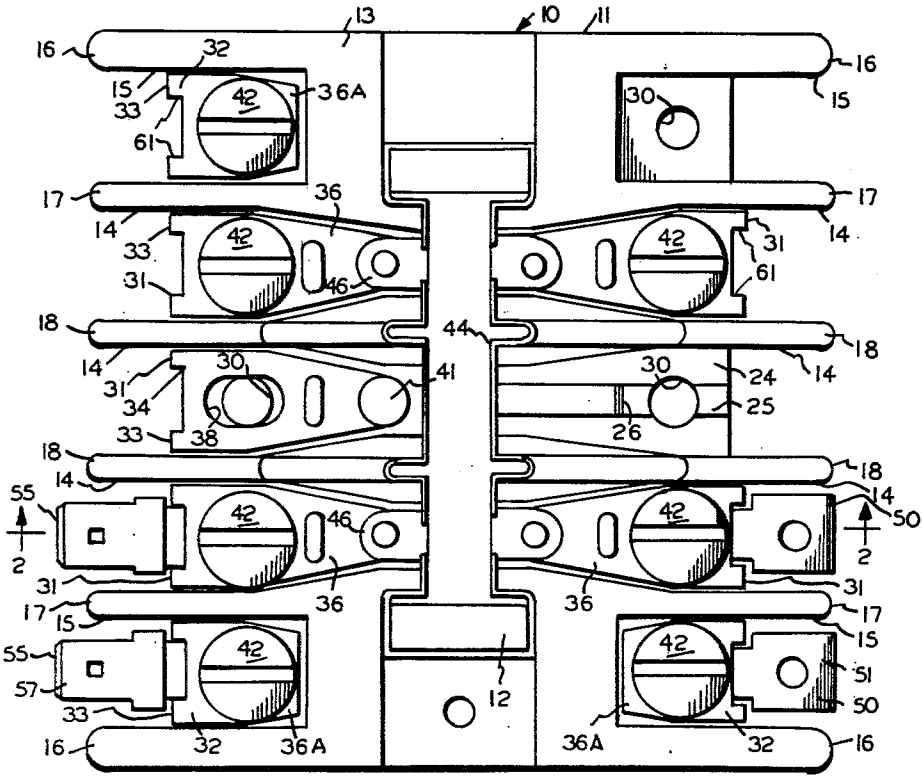


FIG.1

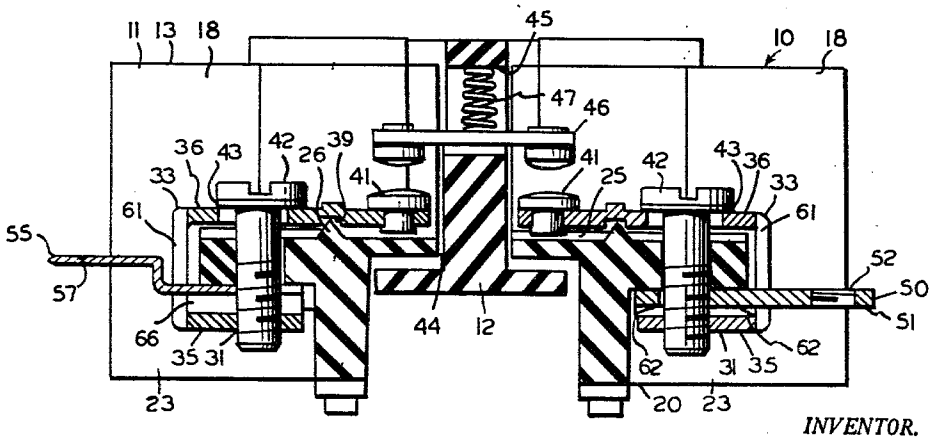


FIG.2

INVENTOR.

SALVATORE E. GENTILE

BY

Robert D. Sommer

AGENT

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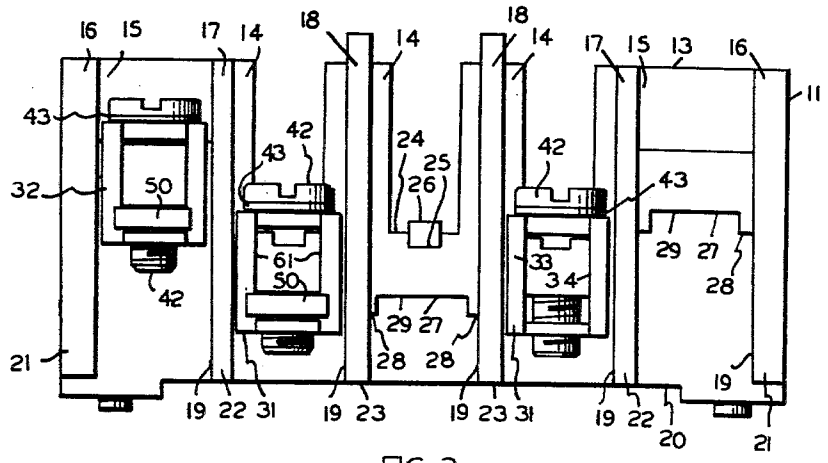


FIG.3

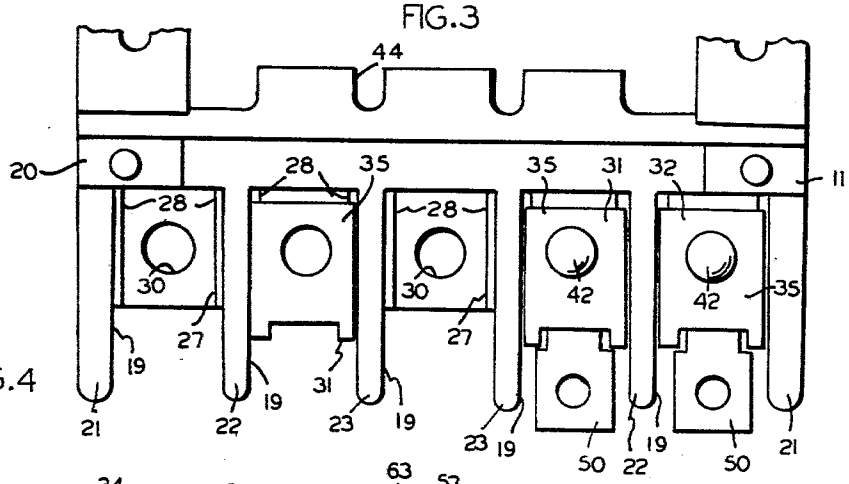


FIG.4

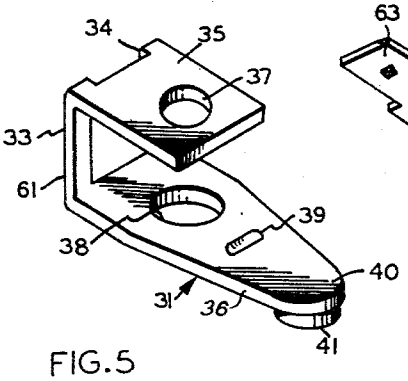


FIG.5

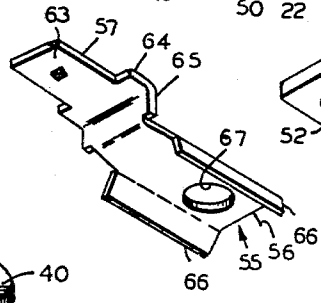


FIG.6

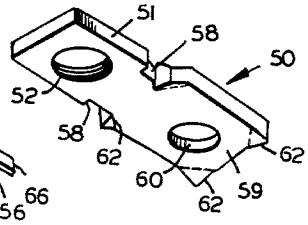


FIG.7

INVENTOR.
SALVATORE E. GENTILE
BY
Robert D. Sommer
AGENT

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TERMINAL BLOCK CONNECTOR ASSEMBLY

Salvatore E. Gentile, Logansport, Ind., assignor to Essex Wire Corporation, Fort Wayne, Ind., a corporation of Michigan

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4 Claims. (Cl. 200—166)

This invention relates to terminal block connector assemblies of a type especially suited for use in electric switch and contactor devices, although the invention is applicable for the connection of conductors in other electrical devices.

An important object of the invention is to provide a reliable and low-cost terminal block connector assembly to which either wire conductors or terminal conductors may be easily and quickly attached.

Another object of the invention is to provide a terminal block connector assembly for a switch or contactor having stationary contacts on connector members which are each reliably held on an insulator terminal block by a single screw so that the connector member may be readily removed by unscrewing the screw.

A further object of the invention is to provide a terminal block connector assembly that is adapted for use with various types of electrical terminals.

In a preferred form of the invention, connector members which each consist of a U-shaped metal clamp are mounted on an insulator block with one arm of the clamp overlaying one surface of the block and the other arm overlaying the other surface of the block. The connecting portion of the clamp has an elongated slot through which a conductor member may be inserted into a channel formed in one surface of the block under the respective arm of the clamp. The two arms and the block have aligned openings through which extends a screw for clamping the conductor member between the block and an arm of the clamp. One arm of the clamp may have an extension which carries a switch contact at its free end and also may have a transverse notch in which is seated a complementary projection on the block whereby the clamp is yieldably secured to the block member when the screw is removed.

For a more complete understanding of the invention, reference should be had to the following description and accompanying drawings which illustrate a preferred embodiment of the invention.

FIG. 1 is a top plan view of the switching assembly of a contactor embodying the invention;

FIG. 2 is a cross sectional view of the terminal block and contact carrier assemblies of the switching assembly taken along the line 2—2 of FIG. 1;

FIG. 3 is a side elevational view of the terminal block assembly as viewed in the right side of FIG. 1;

FIG. 4 is a fragmentary bottom plan view of the terminal block assembly;

FIGS. 5, 6 and 7 are isometric views of the parts of the terminal block assembly.

Referring to the drawings, the invention is shown applied to the switching assembly 10 of a contactor comprising a combined terminal and contact block 11 and a movable contact carrier 12. The switching assembly 10 may be secured to and operated by a conventional electromagnetic actuator (not shown). It will be understood that the invention is not limited to such a switching device but is capable of use in connection with various types of electrical apparatus.

The block 11 has a generally rectangular outline and may be molded from any suitable insulating material such as a phenolic resin. The upper surface 13 of the block is provided with a plurality of compartments 14, 15 formed by isolating barriers 16, 17 and 18. A corresponding set of compartments 19 are formed on the parallel lower surface 20 of the block 11 by isolating barriers 21, 22 and 23 which are, respectively, in alignment with the barriers 16, 17 and 18 to form continuations thereof. The floor 24 of each of the compartments 14 is provided with a central longitudinal recess 25 interrupted by a transverse projection 26 which extends slightly above the floor 24. Along the bottom of each compartment 19 is a wide longitudinal channel 27 providing a shoulder 28 at each side of the compartment. The floor 29 of each compartment 19 has an opening 30 passing entirely through the block 11 to the respective compartment 14 or 15 on the opposite surface 13.

The particular block 11 shown is designed to receive in clamping engagement therewith six combined contact and connector clamps 31 and four connector clamps 32. Both clamps 31 and 32 are formed in a U-shape from a somewhat resilient metal such as brass. As shown in FIG. 5, clamp 31 includes a base or connecting portion 33 provided with a slot 34 which extends across the full length of the base 33. The two parallel arms 35 and 36 of the clamp 31 are provided, respectively, with a threaded aperture 37 and an elongated aperture 38, in alignment with the aperture 37. The inner side of arm 36 is provided with a transversely extending notch 39 intermediate aperture 38 and the free end 40 which carries a contact 41. The clamp 32 is similar to clamp 31 and may be formed from the clamp 31 by cutting off the end portion of arm 36 along a line passing between the aperture 38 and the notch 39 whereby the remainder constitutes an arm 36A substantially equal in length to arm 35.

The arm 36 of each clamp 31 is positioned in a compartment 14 with the other arm 35 engaging the shoulders 28 in the respective compartments 19. The spacing between the inner surfaces of arms 35 and 36 is substantially equal to that between the floor 24 of compartment 14 and the outer surfaces of shoulders 28 in compartment 19 and it will be seen that when projection 26 is seated in notch 39, the clamps 31 are yieldably held upon the block 11. The arm 36A of each clamp 32 is similarly positioned in a compartment 15 with the other arm 35 positioned in the respective compartment 19. Each of the clamps 31, 32 are secured in position by a screw 42 passing through aperture 38 of the arm 36 or 36A, opening 30 of the block 11, and received in the threaded aperture 37. Lock washers 43 may be provided to prevent loosening of the screws 42 after being tightened.

The block 11 is provided with an elongated recess 44 in which the carrier 12 moves. As best shown in FIG. 2, the carrier 12 is provided with generally rectangular openings 45 for receiving the bridging contacts 46 and their associated springs 47. In the position of the carrier shown in FIG. 2, the bridging contacts 46 are disengaged from the stationary contacts 41 carried by the clamps 31. Upon movement of the carrier 12 downward, the bridging contacts 46 engage the contacts 41 and are yieldingly held in engagement therewith under the action of springs 47.

It will be apparent that if any of the contacts 41 become worn or damaged, the clamps 31 may be readily removed for replacement. The clamps 31 may be removed from the block 11 by taking out the screws 42 and sliding the clamps 31 off the block 11. The drawing shows the block 11 with one of the clamps 31 removed and with the screw 42 for another clamp 31 also removed. It is not necessary to remove the bridging contacts 46 to remove the clamps 31 and FIG. 1 shows one of the bridging contacts 46 removed only for purposes of illustration.

The screws 42 may be employed for fastening the bared ends of conductors and conductor terminals to the

clamps 31 and 32. The clamps 32 with their associated screws 42 may be used as isolated wiring junctions for connecting circuits independently of the switch contacts. The electric coil of an electromagnetic actuator for the switching assembly 10, for instance, could be connected to two of the clamps 32.

In addition, auxiliary terminals may be employed with any of the clamps 31 and 32 for making connections to external circuits. The auxiliary terminals may be of any suitable design comprising, for example, a relatively flat terminal 50 having a terminal portion 51 with a threaded opening 52 for a terminal screw as shown in FIG. 7, or it may comprise a terminal 55 having a generally channel-shaped main body portion 56 with an offset tab terminal portion 57 as shown in FIG. 6. The terminal 50 has a pair of notches 58 formed in its opposite edges intermediate the terminal portion 51 and a rectangular main body portion 59. The body portion 59 is dimensioned to loosely fit in channel 27 of each compartment 19 and is provided with a central hole 60 in axial alignment with the opening 30 in the block 11. The terminal 50 extends through slot 34 of either clamp 31, 32 with the two side legs 61 of the clamp base 33 disposed in the notches 58. The terminal 50 is mounted in the clamp 31 or 32 before the latter is positioned on the block 11 by first turning the terminal 50 approximately 90° from its relative position shown in FIG. 2, inserting the body portion 59 through the slot 34 in the base 33 until the notches 58 are aligned with the side legs 61, and turning it to the position shown in FIG. 2. The four corners 62 of the body portion 59 are upturned so that the dimension between the extremities of the corners 62 and the opposite side of the body portion 59 is somewhat greater than that of the dimension between the floor of channel 27 and the outer surfaces of shoulders 28. Thus when the screw 42 is tightened with terminal 50 mounted in either of the clamps 31, 32, the body portion 59 of terminal 50 is firmly held between the arm 35 and the floor of channel 27.

The terminal portion 57 of terminal 55 has a portion 63 of narrowed width extending from its free end to a wider portion 64, the terminal portion 57 being offset from the main body portion 55 by a transverse connecting portion 65. The main body portion 56 has its side edges 66 turned outwardly so that the dimension between the extremities of the edges 66 and the opposite side of the body portion 56 is somewhat greater than that of the dimension between the floor of the channel 27 and the outer surfaces of the shoulders 28. Further, the body portion 56 is dimensioned so that the side edges 66 will fit loosely within the channel 27. The body portion 56 has a hole 67 through which screw 42 passes when a clamp 31 or 32 with terminal 55 extending through slot 34 is mounted upon the terminal block 11. With the parts so arranged, tightening of the screw 42 develops a clamping force which firmly holds the terminal 55 between the arm 35 of clamp 31 or 32 and the floor of channel 27.

It will be seen that, by reason of this construction, body portions of the auxiliary terminals 50 and 55 are firmly held in position and sufficient pressure is insured between the body portions and the arm of the clamp to provide an adequate electrical connection. The engagement of the notches 58 of terminal 50 with the side legs 61 of the clamps and the engagement of the side legs 61 between the connecting portion 65 and the ends of the side edges 66 of the terminal 55 prevent the accidental withdrawal of the terminals from their assembled relation with the clamps. Although only two types of auxiliary terminals are shown, it will be appreciated that other types of auxiliary terminals may be employed.

While the invention has been shown and described in its preferred embodiment and has included certain details, it should be understood that the invention is not to be limited to the precise details herein illustrated and described, since the same may be carried out in other ways falling within the scope of the invention as claimed.

What is claimed is:

1. A terminal block connector assembly comprising an insulator block member having first and second parallel surfaces and an opening therethrough; said block member having an open ended channel formed in said first surface in communication with said opening; a clamping member in clamping engagement with said block member; said clamping member consisting of a metal strip bent to U-shape with first and second parallel arms and a connecting portion; said first arm overlying said first surface and extending over said channel to form therewith a receptacle for a conductor member; said first arm being provided with an internally threaded aperture in alignment with said opening in said block member; said second arm overlying said second surface and having an aperture in alignment with said aperture in said first arm; said connecting portion of said clamping member being provided with a slot aligned with the open end of said channel for insertion of a conductor member therethrough into said receptacle; and a screw extending through said apertures in said arms and said opening in said block member; said screw being threaded in said aperture of said first arm and having a head portion cooperating with said second arm for drawing said arms together into clamping engagement with said block member; said clamping engagement developing a clamping force to hold a conductor member inserted through said slot into said channel in electrical connection with said arm.

2. A terminal block connector assembly comprising an insulator block member having first and second parallel surfaces and an opening therethrough; said block member having an open ended channel formed in said first surface in communication with said opening; a clamping member in clamping engagement with said block member; said clamping member consisting of a metal strip bent to U-shape with first and second parallel arms and a connecting portion; said first arm overlying said first surface and extending over said channel to form therewith a receptacle; said first arm being provided with an internally threaded aperture in alignment with said opening in said block member; said second arm overlying said second surface and having an aperture in alignment with said aperture in said first arm; said connecting portion of said clamping member being formed with a slot aligned with the open end of said channel; a terminal member having a body portion disposed in said channel in said block member and a terminal portion extending through said slot in said connecting portion; said body portion being provided with a hole in alignment with said opening in said block; said body portion being shaped to partially project from said channel in engagement with said first arm; and a screw extending through said apertures in said arms; said opening in said block member and said hole in said terminal member; said screw having threaded engagement with said aperture in said first arm and having a head portion cooperating with said second arm for drawing said arms together into clamping engagement with said block member and said body portion of said terminal member.

3. A terminal block connector assembly comprising an insulator block member having first and second parallel surfaces and an opening therethrough; said block member having an open ended channel formed in said first surface in communication with said opening; a clamping member in clamping engagement with said block member; said clamping member consisting of a metal strip bent to U-shape with first and second parallel arms and a connecting portion; said first arm overlying said first surface and extending over said channel to form therewith a receptacle for a conductor member; said first arm being provided with an internally threaded aperture in alignment with said opening in said block member; said

second arm overlying said second surface and having an aperture in alignment with said aperture in said first arm; said connecting portion of said clamping member being provided with a slot in alignment with the open end of said channel for insertion of said conductor member therethrough into said receptacle; a screw extending through said apertures in said arms and said opening in said block member and threaded in said first arm for applying a clamping pressure to said arms whereby said conductor member may be firmly clamped in said channel in said block member; said second surface of said block member having a barrier partition in close relation with each side of said second arm so as to restrain said clamping member from excessive rotary motion about the axis of said screw; said second arm having an integral extension with an electrical switch contact attached adjacent the free end thereof; said second surface having an integral projection disposed between barrier portions; said extension of said second arm being provided with a complementary transverse notch for receiving said projection; the spacing of said arms being just sufficiently greater than the spacing between said surfaces to provide clearance therebetween and to afford yielding seating engagement of said projection with said notch in said

extension whereby said clamping member is yieldably secured to said block member when said screw is removed.

4. A terminal block connector assembly according to claim 3 and including a terminal member having a body portion disposed in said channel in said block member and a terminal portion extending through said slot in said connecting portion; said body portion being provided with a hole in alignment with said opening in said block; said screw extending through said hole in said body portion; and said body portion being shaped to project from said first surface when disposed in said channel to effect clamping of said terminal member between said block member and said first arm when said screw is threaded into said aperture in said first arm.

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