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3,007,129 GANG CONNECTOR FOR TERMINAL BOARDS

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This invention relates to electrical devices and is more particularly concerned with an improved gang connector which is adapted for use with terminal strip members.

Present day control panels and control cabinets frequently have their wire terminations connected to terminal strips, an example of which is disclosed in application Serial No. 685,681, filed September 23, 1957, which was assigned to the assignee of the present invention. To these terminal strips the control wires, power lines, etc., of machinery to be controlled by the electrical control devices located on the control panel or cabinet are usually connected. Further, in industrial wiring, manufacturers of machine tools have found it advisable to locate the electrical control devices which control the operation of their machines in separate control panels or control enclosures. It is to be appreciated that when these machines are installed in a factory, a multitude of connections must be made and frequently these connections are incorrectly made. The gang connector according to the present invention will greatly simplify the installation of these machines and will considerably reduce the time required when the machines are replaced. When the connector according to the present invention is utilized, the manufacturer of the machine tool merely terminates the ends of the wires connected to the machine tool into the gang connector. A corresponding terminal strip is provided on the control panel. Thus, all that is required to install the machine is the insertion of the gang connector in position in the terminal strip to provide a connection which is accomplished in the minimum time without error.

It is an object therefore of the present invention to provide an improved gang connector structure which is adaptable for use with a terminal strip.

It is a further object of the present invention to provide a gang connector which will permit the simultaneous connection of a plurality of wires in a terminal strip.

Another object of the present invention is to provide a gang connector which has a body of molded insulating material arranged to position a plurality of terminal connectors that have wire securing portions on one end and spade-like portions extending from the other end which are adapted to be received in the connectors of a terminal strip.

In carrying out the above object it is another object of the present invention to arrange the connectors on the terminal strip and the gang connectors so that they will be accessible from the top surface of the strip and connector.

Another object of the present invention is to provide a gang connector which will increase rather than decrease the creepage gap distance between the adjacent terminals of a terminal strip.

Further objects and features of the invention will be readily apparent to those skilled in the art from the specification and appended drawing illustrating certain preferred embodiments in which:

FIG. 1 is a top plan view of a terminal strip and gang connector according to the present invention which shows a portion of the terminal strip and gang connector as broken away to illustrate certain features of the present invention.

FIG. 2 is a side view of the gang connector and terminal strip as shown in FIG. 1.

FIG. 3 is a view taken along the dotted line in the direction of arrows 3—3 of FIG. 2, with gang connectors on the left and on the right hand side of the terminal strip shown respectively in a disengaged and an engaged position relative to the terminal strip.

In the drawings, the numeral 10 designates a terminal strip which is more fully described in the application mentioned supra. The terminal strip 10 comprises a plurality of molded segments 18 which are assembled on a channel 12 and held in position on the channel by end clamps 14 and 16. The terminal strip 10 is particularly suited for mounting on a control panel or within a control enclosure, not shown. Each of the molded segments 18 is arranged to nest with its adjacent member and positions terminal connector 20, as in FIG. 3. The terminal connector 20 is formed of a rectangular closed channel of conducting material with threaded openings 22 and 24 to receive the fastening screws 26. Each of the segments 18 has a vertical barrier 28 to separate the individual terminal connectors 20, thus providing an electrical barrier to minimize arcing between the adjacent terminal connectors 20. Each of the molded segments 18 are identical and arranged to nest with one another in a row on the channel 12. When the segments 18 are positioned on the channel and secured thereon by clamps 14 and 16, the segments extending to the right of the clamp 16 face in the opposite direction from the segments extending to the left of clamp 14 in FIG. 1 and accordingly, the segments will not nest at the division where the rightwardly and leftwardly facing segments engage each other. To remedy this situation a filler block 15 shown in FIG. 2 is provided. This filler block is fully described in the application supra.

The gang connector 30, as shown in FIGS. 1-3, comprises a block 32 formed of molded insulating material to have a substantially rectangular shape. The material used for molding the gang connector may be compounds which will form a relatively rigid plastic material, such as a phenol formaldehyde condensation product known as Bakelite or materials which are considered elastomeric in nature, such as natural or synthetic rubbers or combinations thereof which may be compounded as well known to those skilled in the art to provide a relatively resilient, slightly flexible structure having a hardness suitable for the application which will be hereinafter explained.

The block 32 may be molded to an indeterminate length so that it may be divided into segments of the proper length for the particular application involved, as will become hereinafter apparent. This block has a substantially flat bottom wall 34 and rear walls 36. Projecting from the rear wall 36 are spaced projections 38 which are located to be received between the barriers 28 of the terminal strip to increase the air gap creepage distance between the male portions of the connectors carried on the gang connector as will be hereinafter described. Extending between a top wall 40 and a front wall 42 of the block 32 are a plurality of vertically extending cavities 44 which have the portion adjacent the top wall 40 of a U-shaped cross section and the portion adjacent the bottom wall of substantially rectangular cross section. In this connection it is to be noted that the cavities 44 are located side by side along the length of the body 32 and are individually separated by a vertical wall 48 formed of the insulating material of the block 32. A horizontal opening 50 extends through each of the projections 38 and rear wall 36 into each of the cavities 44.

Included also in the gang connector are a plurality of terminal connectors 52, each of which is disposed in a cavity 44. Each of the terminal connectors 52 has a female portion 56 adapted to receive the bared end of a wire and a male portion 54 which is spade-like in character that

extends from the female portion 56 through the opening 50 and external to the projections 38, as shown in the broken-away portion in FIG. 1. The male portions 54 are arranged to be individually received in the respective terminal connectors 20 and secured therein when the screw 26 is tightened. The female portion 56 of the terminal connectors comprises a closed rectangular channel 58 having a threaded opening in its top surface to threadedly receive a threaded screw 60 which is used to secure the bare end of a wire, not shown, in the female portion. Each of the male portions 54 is preferably provided with barbs 62 on their opposite edges which are located to engage the outer surface of the projections 38 to maintain the terminal connectors 52 in position in the block 30. In this connection it is to be noted that if the block 30 is made of resilient elastomeric material, then the barbs 62 will be provided with an inclined leading edge to facilitate the insertion of the spade-like portion 54 through the openings 50. After the barbs are in position against the outer surface of projections 38, the terminal connectors 52 will be securely held in position in the block 30. On the other hand, if the block 30 is formed of a rigid plastic material, such as Bakelite, then the barbs will be formed after the connectors 52 are inserted in the openings 50 or if the barbs are initially present on the male portions 54, then the connectors 52 may be molded in position in the block 30 during the molding of the block in the manner well known to those skilled in the art.

Another feature of the present invention not heretofore explained, is that both the screws 26 and 60 are located so that they will be accessible from the top surface of both the strip 10 and the gang connector 30. This arrangement will facilitate the assembly and disassembly of the gang connector 30 and terminal strip 10.

As previously explained, the block when molded is formed to have an indeterminate length. The block may be formed with grooves 64 which circumscribe the block and extend in the vertical walls 48. These grooves will provide a reference line for dividing the indeterminate lengths of molded block into segments for the particular application involved.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. A gang connector of the character described for use with a terminal strip having a row of spaced terminal members which are individually separated by an insulating wall, comprising; a unitary substantially rectangularly shaped block of molded insulating material, a plurality of cavities in said rectangular block extending between a top wall and one of the side walls of the block, said cavities being individually spaced by vertically extending barriers of block material, a plurality of projections extending from the other side of the block, a terminal member in each of the cavities in the block having a wire securing portion disposed in the cavities, a spade-like portion extending from the wire securing portion through an opening in the block and in the projections in position for securement in the terminals of said strip, and means on the spade-like portions engaging the projections externally for securing the terminal members in the terminal block.

2. In a gang connector of the character described, the combination comprising; a rectangular unitary block of

molded insulating material having a substantially flat bottom and side wall surface, a plurality of spaced vertically extending cavities extending between a top wall surface and the other side wall surface, said cavities being individually separated by vertical walls extending between the top and other side wall, a plurality of projections extending from the first mentioned side wall surface with each projection in alignment with a vertical center line of one of the cavities, a terminal member for each of the cavities, said terminal members each having a closed rectangular channel portions having a threaded opening on a top surface arranged to receive a threaded member for securing an end of a wire in the channel portion when the threaded member is tightened, a spade-like portion attached to the channel portion, said spade-like portion extending through an opening in the projections whereby a portion of the spade-like member extends external to the block of insulating material, and projections on the spade-like member arranged to engage the outer surface of the projections extending from the side wall maintaining the terminal member in the insulating block.

3. The combination as set forth in claim 2 wherein the molded block is formed of resilient elastomeric material.

4. The combination as set forth in claim 2 wherein the threaded members are accessible from the top surface of the block.

5. The combination as set forth in claim 2 wherein the projections are spaced to be received between vertical barriers on a terminal strip.

6. The combination as set forth in claim 5 wherein the terminal strip has connectors which have threaded elements which elements are accessible from the top surface side of the block when the connector is in position on the terminal strip.

7. A gang connector of the character described comprising; a unitary substantially rectangularly shaped block of insulating material, a plurality of spaced cavities extending between a top and one side wall surface of the block, said cavities being individually spaced by vertically extending barriers of block material, grooves in said barriers circumscribing the block providing a reference line for dividing the block into sections of a predetermined length, a plurality of projections extending from the other side wall surface of the block, an opening extending through each of the projections into the cavities, a unitary connector having a wire securing portion disposed in the cavity and a spade-like portion extending through the openings external to the projections on the other side wall surface of the block, and means on the spade-like portion externally engaging the projections for maintaining the connector in the opening.

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