Feb. 9, 1960 R. W. HEWES ET AL 2,924,808

MULTIPLE TERMINAL ELECTRICAL CONNECTORS

Filed May 27, 1957

FIG. 1.

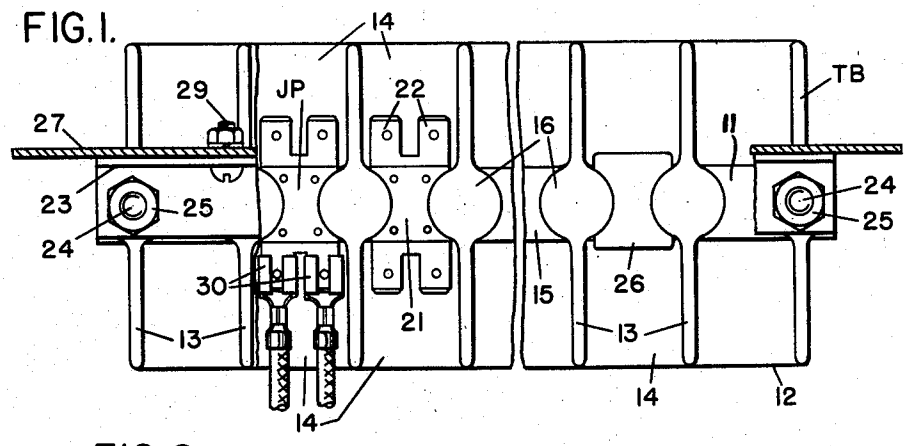


FIG. 2.

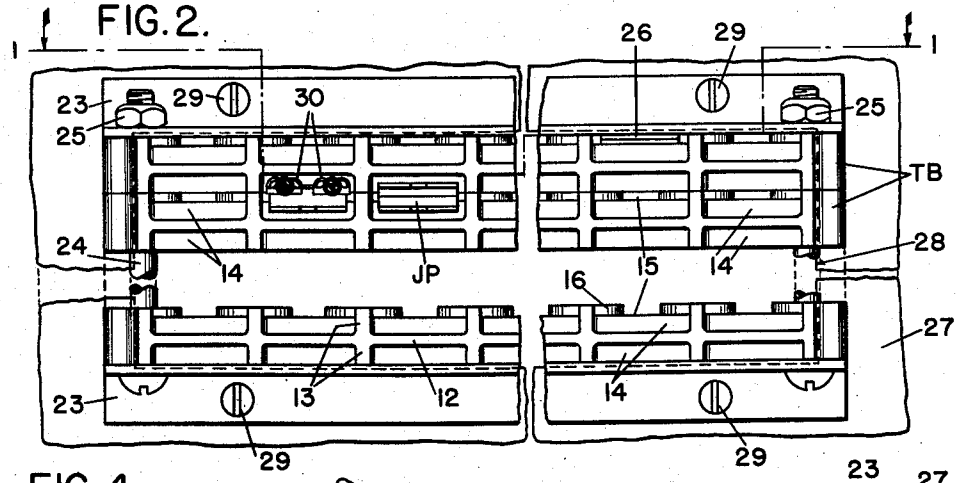


FIG. 4.

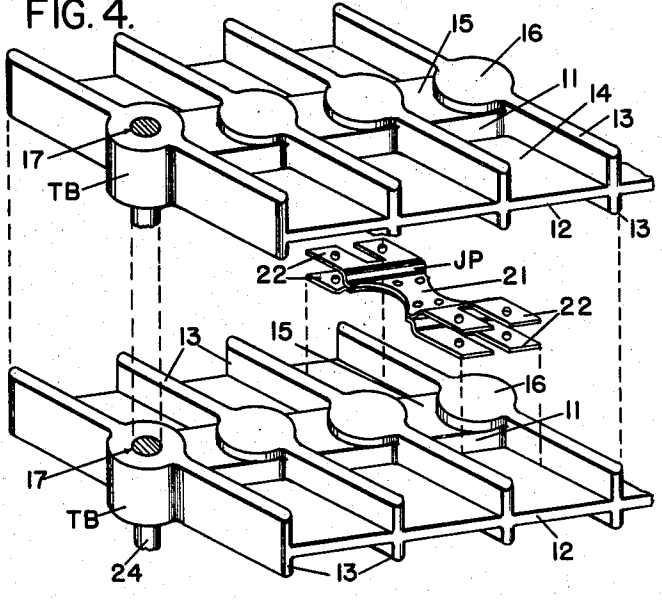
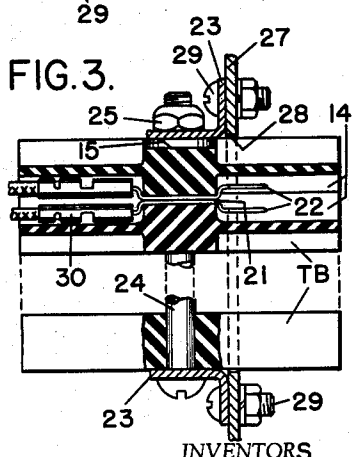


FIG. 3.



INVENTORS
R.W. HEWES AND
J.W. KNAPP

BY Forest B. Hitchcock

THEIR ATTORNEY

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MULTIPLE TERMINAL ELECTRICAL CONNECTORS

Ralph W. Hewes, Rochester, and James W. Knapp, Brockport, N.Y., assignors to General Railway Signal Company, Rochester, N.Y.

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2 Claims. (Cl. 339—198)

This invention relates to multiple terminal electrical connectors and mounting means therefor, and more particularly to an organization of this type wherein the individual parts are identical in construction and may be assembled in any desired quantity.

In various electrical control systems, such as railway traffic control systems, communication systems and the like, numerous wire connections are necessary to complete the circuits between various control units as well as the incoming and outgoing control wires. In common practice, terminal blocks or boards provided with binding posts serve to make gang connections and where necessary soldered connections between wires are commonly used to provide the necessary connections.

The present invention contemplates the use of a plug connection type of gang connector wherein the jack plugs are provided with numerous terminal connector tips to receive the wire connector clips and each jack plug is mounted in its own compartment completely insulated from the adjacent jack plugs. Also, the compartments are spacious enough so that the wire connector clips, when connected to the jack plug, are completely insulated from the wire connector clips in the adjacent compartment, thus obviating the necessity of having insulating sleeves covering each connector clip.

Generally speaking, the terminal block assembly of the present invention comprises a series of molded insulation terminal blocks having rectangular shaped depressions molded therein on both their upper and lower surfaces with webs separating each compartment, much in the same manner as a honeycomb formation. The central web on the upper surface is also provided with a groove therein which connects the compartments located on either side of the central web portion. The jack plugs are each composed of two stamped plates spot welded together, each plate having four offset terminal connector tips. When assembled, the terminal blocks are stacked one on top of the other with a jack plug inserted in each groove in the central web portion and the various terminal blocks are held together by means of bolts passing through holes located in each end thereof. This type of assembly securely clamps each jack plug in position with the four terminal connector tips on each end protruding into separate boxlike housings wherein the wire connector clips may be plug coupled thereto.

The molded terminal blocks may be of any convenient size in length but are all uniform and the eventual capacity in number of terminal jack for each assembly is determined by the number of terminal blocks stacked one upon the other. Angle iron brackets are provided on the top and bottom of the stackings adjacent the central webs and the bolts passing therethrough serve to clamp the various parts together to form one complete unit. These angle iron brackets also provide a mounting means for the complete unit, which may be mounted in various ways.

When mounted in the open the units may be attached to racks comprising a series of spaced parallel bars or

they may be mounted on a wall type panel board having an appropriate opening therein. In each case, there would be a series of compartments and jack plugs located on each side of the rack or wall. The assembly can also be suitably mounted in a wall portion of an instrument casing such as a relay case merely by providing a suitable opening in the casing and inserting one side of the unit therein and fastening the angle iron supports thereto by means of bolts. This type of assembly provides a means whereby the relay wiring connections may be attached on the inside of the casing and all external wiring and jumper wires may be attached outside the casing.

Other objects, purposes, and characteristic features of the present invention will be apparent or pointed out as the description of the invention progresses and reference is made to the accompanying drawings, in which:

Fig. 1 is a top plan view of the multiple terminal electrical connector of the present invention shown partly broken away and partly in section as indicated partially by the line 1—1 of Fig. 2;

Fig. 2 is a side elevational view of the apparatus shown in Fig. 1 and shows the stacking of the terminal blocks and their clamping and mounting means;

Fig. 3 is an end elevational view to further show the apparatus of Fig. 2 and is shown partially in section to more clearly indicate the mounting means of the jack plugs; and

Fig. 4 is an exploded perspective view of two terminal blocks and a jack plug of the present invention to more clearly show structure.

In describing the invention in detail, reference will be made to the various parts of the drawings by distinctive reference characters whereas like parts will be referred to by like reference characters.

The terminal blocks TB are of molded insulation material and resemble a honeycomb structure. Each block has a longitudinal central rib or backbone portion 11 from which, extending in opposite directions, are horizontal partitions 12 and vertical partitions 13, thus forming a series of compartments 14 on both the upper and lower surfaces of the terminal block on either side of the central rib portion 11. The top surface of this central rib portion 11 is provided with molded grooves 15 extending between oppositely located compartments 14. The sides of these grooves 15 are semi-circular in shape, thus leaving the elevated portion in the form of a round boss 16, the top surface of which is flush with the top surface of the vertical partitions 13. Holes 17 are provided in the two end bosses 16.

The grooves 15 are formed to receive the jack plugs JP. These jack plugs JP are made up of two special stamped plates of suitable electrical contact material which are placed back to back and spot welded together. Each plate has a central flat portion 21 which has its side edges formed semi-circular to match the sides of the groove 15. The end portions of each plate are offset and forked to form two terminal connector tips 22. As shown more clearly in Fig. 4, when assembled, each jack plug JP has a central flat portion and four separated terminal connector tips on each end thereof.

A complete multiple terminal connector unit comprises a stack of terminal blocks TB having rows of jack plugs JP inserted therebetween in each groove and compartment. The assembly is clamped together by means of angle brackets 23 and bolts 24. The angle brackets 23 are located adjacent to and parallel with the central rib portion 11 of the terminal blocks TB and the bolts 24 pass through holes in the angle brackets 23 and the holes 17 located in the end bosses 16. More specifically, the unit is assembled by first passing the bolts 24 through the lower angle iron bracket 23 and then placing the first

terminal block TB on top of the bracket 23 with the bosses 16 and the grooves 15 face up, the bolts 24 entering the holes 17. Next a jack plug JP is placed in each groove 15, the semi-circular sides of the jack plug fitting within the correspondingly shaped groove. The thickness of the jack plug JP also corresponds to the depth of the groove 15 so that the central flat portion 21 of the jack plug JP snugly fills the groove 15, the top surfaces of the jack plugs JP and the bosses 16 lying substantially flush with each other.

A second terminal block TB is now placed on top of the first terminal block and the bottom surfaces of its central rib portion 11 and vertical partitions 13 will lie flush on the top surfaces of the bosses 16 and vertical partitions 13 of the first terminal block TB. This procedure is repeated until the unit is built up to the desired quota whereupon the top angle bracket 23 is placed into position and nuts 25 are threaded onto the bolts 24.

It can readily be seen that the tightening down of the nuts 25 will firmly clamp the stacked terminal blocks TB together between the two angle brackets 23, thus forming a complete unit. The various jack plugs JP are firmly held in their various grooves 15 and the four terminal connector tips 22 on each end of the jack plugs JP will project into their respective boxlike housings formed by the compartments 14 in the terminal blocks TB located on each side of the central rib portions 11. It will be noted that the top terminal block TB of the stacked assembly is not provided with jack plugs JP in its grooves 15 due to the presence of the top angle bracket 23. However, in certain installations where the multiple terminal connector unit is mounted in the wall section of a casing and dust or dirt may be a factor, the grooves 15 may be filled with dummy shims or plates 26 shaped similar to the central flat portions 21 of the jack plugs JP, as shown in Fig. 1 and 2.

As previously mentioned, the angle brackets 23 also serve to form a mounting means for the complete multiple terminal connector unit where it is desired to mount such unit in the wall of a relay casing or on a terminal board or a rack. Such a mounting has been illustrated on the drawings and the wall or board has been designated 27. A suitable opening 28 is provided in the wall 27 and the complete multiple terminal connector unit is inserted in the opening with the back side of the angle brackets 23 bearing against the surface of the wall 27. The connector unit is then fastened to the wall by means of bolts 29 passing through the angle brackets and wall. This type of mounting provides a means whereby internal wiring and external wiring may be coupled together by means of the jack plugs JP.

Each wire is provided with a wire connector clip 30 of well known standard manufacture and the plug connections for the various wires are made by merely forcing the wire connector clips 30 over the terminal connector tips 22 of the jack plugs JP. In regular commercial plug connectors of this type, such as for example the well known "AMP" connections, suitable lock tabs on the clips 30 and depressed lock dimples on the contact tips 22 provide the necessary contact pressure and locking means when the units are plug connected. The material is usually silver plated brass which provides a good low resistance contact and is practically immune to corrosion.

As shown more particularly in Fig. 3, the connector clips 30 are well within the boxlike compartments 14 when in their plugged in positions, thus completely isolating and insulating one group of connectors from an adjacent group of connectors and there is no necessity for having insulated sleeves for each connector. Also the spacing between compartments is far enough apart to prevent any current creepage and thus insures safety. A suitable tool such as special pliers, etc., may be used to grip the connector clips when making or breaking the plug-in connections.

It is believed there has been shown and described herein a multiple terminal electrical connector unit in accordance with the present invention which lends tself to universal use and is versatile with regards to the connector capacity. Various combinations may be assembled as required and various combinations of wiring connections can be made, all without any change in any of the detail parts. The four terminal connector tips on each end of the jack plugs provide ample terminals for most interconnected circuits and where more are required a simple jumper wire from one jack plug to the other on either end will practically double the capacity. Also, manufacturing costs are held to a minimum as regardless of the size of the unit, the three essential parts including the terminal blocks, the jack plugs and the angle brackets are all individually the same. The only variation is in the length of the clamping bolts.

Having shown and described one form which the present invention may assume it is desired to be understood that various modifications could be made in the present form all without departing from the spirit of the invention or the scope of the appending claims.

What we claim is:

1. In a multiple contact electrical connector, a series of vertically stacked identical terminal blocks of insulating material, each of said blocks having a plurality of pairs of recesses longitudinally located along both its upper and lower surfaces with a longitudinal separating rib on both its upper and lower surfaces to partially separate the two recesses of each pair, said series of stacked blocks forming pairs of oppositely disposed compartments with narrow connecting passages between the two compartments of each pair, a series of identical jack plugs each having a flat central portion and two offset end portions, each of said end portions having a plurality of separated distinct terminal connector tips, one of said jack plugs being located within each pair of said compartments with its central flat portion held in said narrow connecting passage between the two compartments of that pair and its terminal connector tips being positioned in said oppositely disposed compartments for receiving detachable plug connectors, and a clamping means for securing said terminal blocks in their vertically stacked positions.

2. In a multiple contact electrical connector, two or more stacked identical terminal blocks each having a series of recesses therein along its opposite sides matching corresponding recesses in the adjacent terminal block of the stack to form oppositely disposed spaced compartments along each side of said terminal blocks with narrow connecting passages between each pair of oppositely located compartments, a series of longitudinally spaced jack plugs located between said terminal blocks and each having a multiple number of terminal receiving ends located in said oppositely disposed compartments and each having a narrow portion extending between the terminal receiving ends located in its respective narrow passage between two compartments formed by said terminal blocks, and means for clamping said terminal blocks together to hold said jack plugs in said respective compartments.

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