Sept. 25, 1956 U. G. ABERLE 2,764,749

TERMINAL BLOCK

Filed April 7, 1952

Fig. 1.

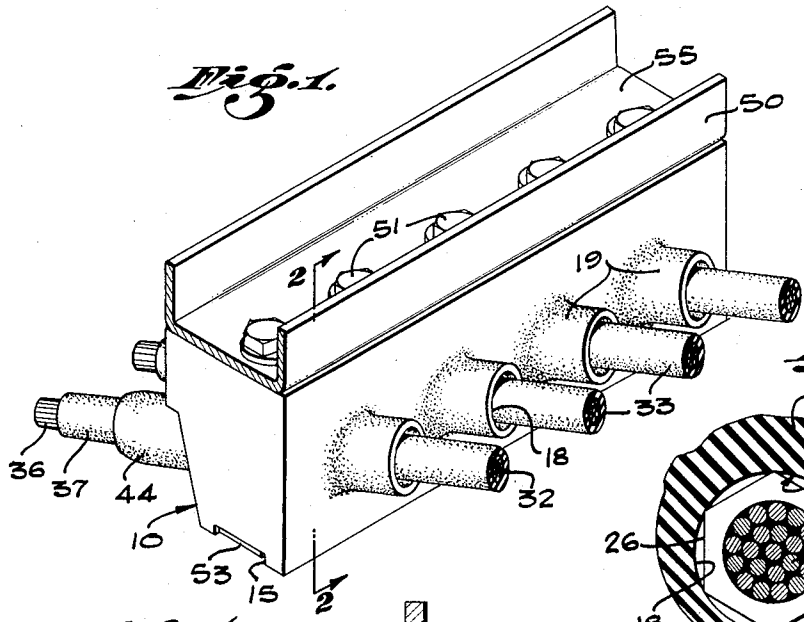


Fig. 3.

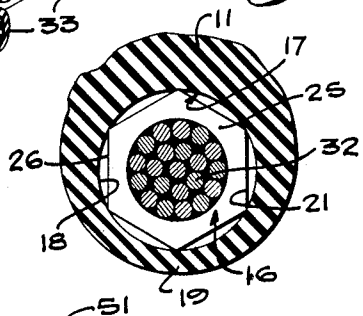


Fig. 4.

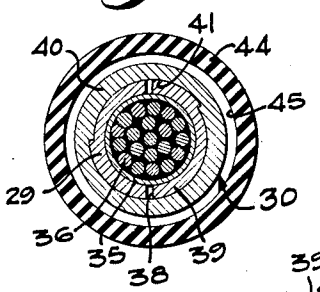


Fig. 2.

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TERMINAL BLOCK

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4 Claims. (Cl. 339—150)

This invention relates to terminal connectors for coupling electrical conductors and more particularly to insert type connectors adapted for plural usage in a common terminal block.

The invention has particular utility in connection with the joining of conductors under conditions where vibration is encountered, where a positive, manually releasable electrical connection for high voltage conductors is required, and where removability of the connector elements is desired for economy and ease of maintenance.

It has commonly been the practice, when connecting two conductors in end-to-end relation, and in construction requiring releasability, to employ various types of switches and "jackknife" devices that are often difficult to install and service, and are frequently affected by sand, wind and moisture. For example, modern locomotives utilize connectors for joining large electric generator cables to the truck traction motors. These trucks and their motors must be replaced and serviced at regular intervals, and for accessibility, the conductors and connectors are usually placed in open regions of the truck where they are constantly blasted by abrasive materials such as sand, cinders and the like, thus causing deterioration of the connectors and the necessity for frequent replacement of the units.

It is therefore among the objects of the present invention to provide a novel electrical connector and insulating terminal block combination having positive release characteristics whereby electrical conductors may be easily, rapidly and efficiently joined and disconnected.

Another object of the invention is to provide a novel supporting terminal block for a plurality of conductors wherein elements thereof are securely anchored in place, and releasability for replacement or service may be easily effected.

A further object of the invention is to provide a novel terminal block and connector combination having effective electrical insulation whereby the connector elements are supported relatively free from vibration, abrasion and corrosion damage.

Other and further important objects of the invention will become apparent from the following description, appended claims and accompanying drawing, wherein:

Fig. 1 is an isometric view of the terminal block and connector combination, shown attached to a supporting structure and embodying the features of the invention;

Fig. 2 is a typical transverse sectional view of one of the connectors, taken substantially as indicated by line 2—2, Fig. 1;

Fig. 3 is a fragmentary end view of one of the connector inserts, as secured in the terminal block, taken substantially as indicated by line 3—3, Fig. 2; and

Fig. 4 is a sectional view through the releasable portion of the connector and protective member, taken substantially as indicated by line 4—4, Fig. 2.

Referring primarily to Figs. 1 and 2 of the drawing, the terminal connector is shown as comprising an elongated block, indicated generally at 10, which may be

constructed from any suitable resilient electrical insulating material such as, for example, molded neoprene. The block 10 has a body 11 which is rectangular in longitudinal cross-section. One side of the body, adjacent the lower rearward edge thereof, is provided with a longitudinal undercut and a downwardly directed face 12. A longitudinal groove 15 is provided in the lower surface of the body.

The body 11 is adapted to resiliently receive and support a plurality of connectors, generally indicated at 16, on axes substantially perpendicular to the face 12. The typical construction of the connectors 16 is illustrated primarily in Fig. 2, and, inasmuch as the connectors of the invention are identical, only one will be described. Each connector is initially removably positioned in a transverse aperture 17 in the body 11, each aperture having a cylindrical forward end portion 18 formed in a cyindrical projection 19 from the body, the inner end of the portion 18 being indicated by the the transverse dotted line in Fig. 2, to the left of the section line 3—3. The rearward end of the aperture 17 is provided with a reduced diameter cylindrical portion 20. A portion 21, intermediate the cylindrical portions 18 and 20, is of hexagonal cross-section, and a shoulder 22 is formed at the junction of the hexagonal portion 21 and the reduced diameter portion 20. A cylindrical projection 23, from the face 12, surrounds the outer end of portion 20 and is provided with an annular outwardly directed flange 24.

Each of the connectors 16 has a current carrying main body or terminal insert 25 formed with a hexagonal outer surface 26 and a reduced diameter cylindrical section 27, which co-operate with the portions 21 and 20 respectively, and shoulder 22, to prevent rotation of the insert and to insure a positive location of the insert in the aperture 17. The forward end of the insert 25 extends beyond the portion 21 and slightly into the cylindrical portion 18 of the aperture 17. The rearward end of the insert 25 has an integral, further reduced diameter, connector body 29 which extends beyond the aperture 17 and forms one element of a releasable connector generally indicated at 30, details of which will be later described. The forward end of the insert 25 is spaced from the forward end of the projection 19 and is provided with a bore 31 for reception of conductor strands or elements 32 of a conductor cable 33. The elements 32 may be secured in the bore 31, for example, by soldering, in order to provide a positive electrical connection.

The connector 30 is of the type shown in Williams Patent No. 2,231,310 and includes a bore 34, in the body 29, for the reception of a thimble or post 35 which is secured, as by soldering to conductor elements 36 of the end of another conductor cable 37. The body 29 is longitudinally slotted as at 38, in this instance in two places, these being diametrically opposite, as shown in Fig. 4. The outer surface of the body 29 has force transmitting means in the form of a helical wedge or buttress screw thread 39 which extends substantially throughout the length of the body 29. A force transforming nut 40 has an internal complementary wedge thread 41, extending substantially one-half the length thereof. The nut is screwed onto the body 29, the inner end 42 thereof forming a force applying means by engagement with a shoulder 43 at the junction of the body 29 and the cylindrical section 27 of the insert 25, the construction being such that when the end 42 of the nut 40 engages the shoulder 43, a force will be applied through the nut 40 to the slotted body 29, by means of the co-operating wedge threads 39 and 41, to clamp the thimble 35 in the bore 34. It may thus be seen that the thimble 35

may be released from the connector by merely turning the nut 40 through a small angle to relax the force transmitted thereto through the wedge threads 39 and 41.

A non-conductive insulating protective cap 44 extends rearwardly from the body and has an internal recess 45 for the reception of the connector 30 and an axial bore 46 which is adapted to snugly engage the cable 37. The forward end of the cap 44 is provided with an inner annular groove 47 which is adapted to receive the flange 24 thereby removably securing the cap 44 to the body 11.

Means are provided to secure the block body 11 to a supporting structure 50, including a plurality of bolts 51 which extend downwardly from the structure 50 through bores 52 in the body 11, and an elongate clamp plate 53 positioned in the lower groove 15. The bolts 51 are provided with nuts 54 which, when tightened thereon against the plate 53, cause a compression of the resilient body 11 to thus secure the insert 25 in the aperture 17. The plate 53 and the portion 55 of the member 50 act to distribute the compression force applied to the body over the entire area thereof.

It may thus be seen that the terminal connector of the present invention is quickly releasable by means of the connector 30, is supported in a block in such a manner as to be easily maintained and replaced and is protected against abrasive bombardment and corrosion by means of the projection 19 and the protective member 44, as well as the block body 11.

Having thus described the invention and the present embodiment thereof it is desired to emphasize the fact that many modifications may be resorted to in a manner limited only by a just interpretation of the following claims.

I claim:

1. In an electric conductor terminal block, means for releasably joining complementary ends of conductors in end-to-end relationship comprising, in combination: a non-conductive resilient block body; a transverse elongate aperture through said body; an elongate current carrying connector insert removably positioned in said aperture; means for rigidly securing one of said conductor ends to said insert, the other end of said insert extending beyond an outer surface of said body; axially disposed releasable connector means carried by said extended end of said insert whereby releasably to connect another of said conductor ends with said insert; an insulating protective member removably attached to said body and surrounding said extended end of said insert; terminal block attachment members extending through said block body adjacent said aperture; force-distributing means engaging said body and interconnecting protruding ends of said attachment members on two sides of said block body; and force-applying means for said attachment members to effect compression across entire surfaces of said resilient block body to rigidly secure said insert in said aperture.

2. In an electric conductor terminal block, means for releasably joining complementary ends of conductors in end-to-end relationship comprising, in combination: a non-conductive resilient block body; a transverse elongate aperture disposed through said body, a portion of the length of said aperture being hexagonal in cross-section; an elongate current carrying connector insert removably positioned in said aperture, a portion of the length of said insert being hexagonal in cross-section and adapted for cooperation with said hexagonal portion of said aperture, one end of said insert being axially spaced from one end of said hexagonal portion of said aperture; means for rigidly securing one of said conductor ends in said insert, the other end of said insert extending beyond an outer surface of said body; axially disposed releasable connector means carried by said extended end of said insert whereby releasably to connect another of said conductor ends with said insert; and compression means disposed across entire surfaces of said block body for rigidly securing said insert therein.

3. In an electric conductor terminal block, means for releasably joining complementary ends of conductors in end-to-end relationship comprising, in combination: a non-conductive resilient block body; a transversely disposed elongate aperture through said body; an elongate current carrying connector insert removably positioned in said aperture; means for rigidly securing one of said conductor ends in said insert, the other end of said insert extending beyond an outer surface of said body; a longitudinally slotted recess in the extended end of said insert; a sleeve secured to another of said conductor ends, said sleeve being adapted for slidable reception in said slotted recess; helical external wedge force-transforming formations formed on said extended end; contractile means positioned about said extended ends and having internal complementary helical wedge force-transmitting formations; a shoulder formed on said insert and adapted for engagement by and providing a force-applying means for said contractile means; and compression means disposed across substantially the entire surfaces of two sides of said block body for rigidly securing said insert therein.

4. An electrical conductor terminal block for releasably joining complementary ends of conductors in end-to-end relation, the combination of: a non-conductive resilient block body; a transverse elongate aperture through said body, a portion of the length of said aperture being hexagonal in cross-section and provided with an inwardly directed shoulder; an elongate current carrying insert removably positioned in said aperture, a portion of the length of said insert being hexagonal in cross-section for cooperation with said hexagonal portion of said aperture, longitudinal movement therein being limited by engagement of the inner end of said hexagonal portion of said insert with said shoulder, one end of said insert being spaced from one end of said aperture and secured to one of said conductor ends, the other end of said insert extending beyond said body; a longitudinally slotted recess in the extended end of said insert for the reception of a sleeve secured to another of said conductor ends; external force-transforming formations formed on said extended end; contractile means positioned about said extended end and having internal complementary force-transmitting formations; force-applying means for said contractile means; an insulating protective member removably attached to said body and surrounding said extended end of said insert; terminal block attachment members extending through said body adjacent and at substantially right angles to said aperture; force-distributing means engaging said body and interconnecting protruding ends of said attachment members; and force-applying means for said attachment members to cause compression of said resilient block body to rigidly secure said insert in said aperture.

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