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TERMINAL CONNECTOR BLOCK

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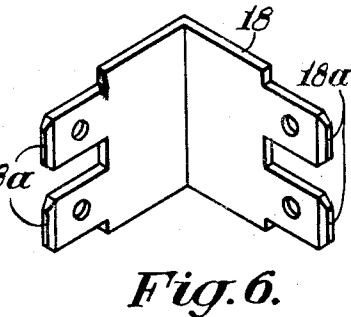
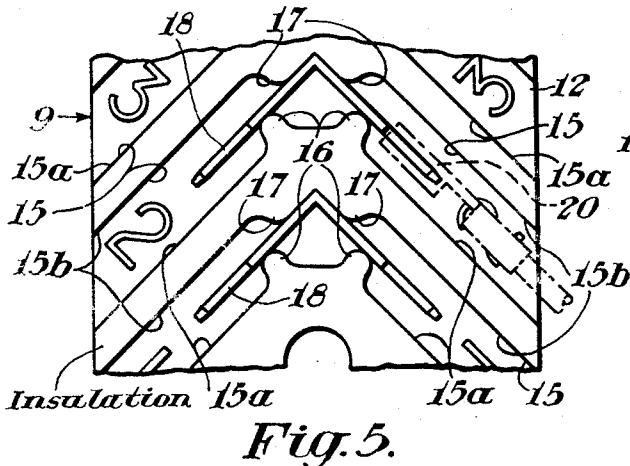
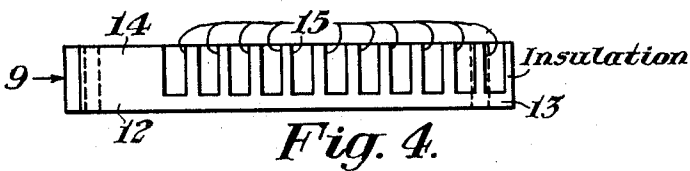
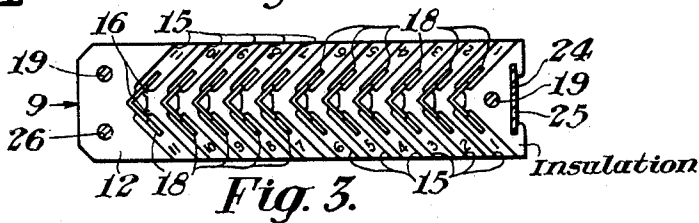
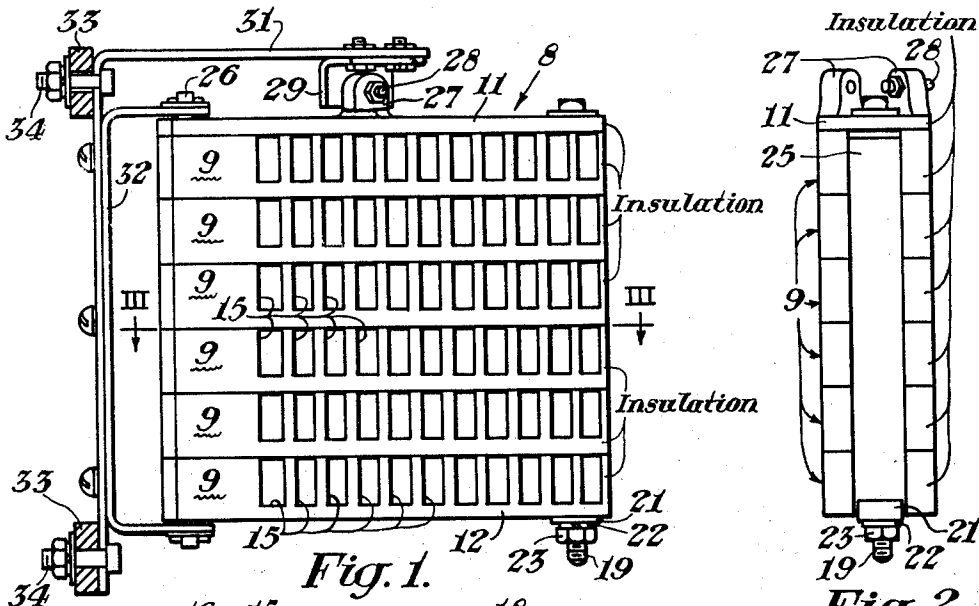


Fig. 5.

Fig. 6.

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3,150,910

## TERMINAL CONNECTOR BLOCK

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My invention relates to a terminal connector block, and more particularly to a terminal connector block having an connector confined with an opening in a piece of insulating material.

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 wire. In common practice, terminal blocks or boards provided with binding posts serve to make gang connections, and, where necessary, soldered connections between wire are commonly used to provide the necessary connections. Although such devices have served the purpose of making electrical connections, they take up considerable space and involve a great deal of time for assembly. Presently, the solderless or slip-on type terminal has become very popular because it is compact, has good holding power, and can be readily applied to wires of various sizes by automatic machines. Those concerned with the development of circuits between control units have long recognized the need for space saving terminal connectors that require a minimum of connecting time. My present invention fulfills this need. One of the critical problems confronting designers of terminal connectors which are compact yet suitable for use with safety equipment is the maintenance of high breakdown voltage and high electrical leakage resistance between terminals and at the same time providing protection against circuits being accidentally established between terminals such as might occur due to pieces of wire, tools or other objects falling on or otherwise making contact with the terminals.

The general purpose of my invention is to provide a terminal connector block for use particularly with slip-on type terminals, and which additionally overcomes the possibility of breakdowns and unwanted circuit connections between terminals.

An object of my present invention is the provision of a compact terminal block which is easily manufactured.

Another object is to provide a terminal connector block of a minimum number of parts which, when assembled, produce a rugged structural unit.

A further object of my invention is the provision of an assemblage constituting a terminal connector block which offers any number of terminal connectors by the stacking of identical blocks together in a simplified fashion.

Still another object is to provide a terminal connector block having a plurality of terminal connectors oriented such that they are accessible for wiring from one wiring position.

Other objects and features of my invention will become apparent to those skilled in the art as the disclosure is made in the following detailed description of a preferred embodiment of my invention as illustrated in the accompanying sheet of drawings in which:

FIG. 1 shows a number of terminal connector blocks stacked together and mounted on a hinge bracket;

FIG. 2 shows an end view of the terminal connector block;

FIG. 3 illustrates a top plan view of a single terminal connector block with terminal connectors in place;

FIG. 4 illustrates a side view of the single unit terminal connector block shown in FIG. 3;

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FIG. 5 shows an enlarged portion of the terminal connector block of FIG. 3 with a terminal connector in place; and

FIG. 6 shows a perspective view of a terminal connector.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIG. 1, a stack or assembly 8 of six terminal blocks 9 with a cover 11 of insulating material fixed on the uppermost block 9 of the stack. Blocks 9 are identical and any number of such blocks may be used in such stacks.

As shown in FIGS. 3, 4 and 5, each of the terminal blocks 9 includes a piece 12 of insulating material having a rectangular base portion 13 and a rectangular body portion 14 provided with openings or slots 15 extending through the body portion from side to side. Each opening 15 makes a dihedral angle intermediate the sides of the block 9 and is provided with two spaced shoulders or protuberances 16 extending therein from the wall 15a of the opening 15. The protuberances 16 are positioned from the apex of the dihedral angle provided in the opening 15 and, for example, extend in length from the base portion 13 to the surface onto which the slots 15 open between the sides of the block 9.

Two shoulders or bosses 17 are provided on the opposite wall 15b of the opening 15 and protrude therein and also extend, for example, from the base portion 13 to the surface onto which the slots 15 open between the sides of the block 9. The bosses 17 join between the sides of the block 9 to form a V-shaped groove which serves as an abutment for locating a terminal connector 18 in proper position.

Each opening 15 has disposed therein one of the terminal connectors 18 which is a one-piece rectangular strip of electrical conductive material, such as brass, having two terminal receiving ends 18a extending outwardly from each side of the terminal connector for receiving slip-on type terminals 20. The terminal connector is bent intermediate its ends at a dihedral angle corresponding to that formed by the juncture of bosses 17.

The protuberances 16 and the bosses 17 cooperate with the V-shaped groove to position and keep the terminal connector in place. In other words, the surfaces of the bosses 17 and the protuberances 16 contact the opposite surfaces, respectively, of the terminal connector 18 at spaced, opposite points to position the terminal connector centrally in its opening 15. The terminal receiving ends 18a of the terminal connector 18 extend outwardly beyond the protuberances 16 and the bosses 17 ending at a point intermediate the protuberances and the sides of the piece 12 where the opening is wide enough so the external slip-on terminals 20 may be easily applied, as shown in FIG. 5. The honeycomb construction of the piece 12 provides ample room for the external slip-on terminals 20 and at the same time provides insulating walls between all electrical connections. The V-shaped groove formed by the juncture of the bosses 17 positions the corresponding V-shaped terminal connector 18 in the center of the slot or opening 15 such that the sides of the terminals 18 are engaged loosely at two points along their lengths, one point being the contact between one boss 17 and one surface of the side, and the other point being the contact between one protuberance 16 and the surface of the opposite side of the terminal connector 18. In the preferred embodiment, the contact between bosses 17 and protuberances 16 with connector 18 is a surface contact and a line contact, respectively, varying in length in accordance with the lengths of the bosses 17 and protuberances 16.

The terminal connector 18 is a strip of rigid electrically conductive material, and is prevented from flexing,

when slip-on terminals are applied, by the surfaces of the protuberance 16 and the boss 17 loosely engaging the sides of the terminal connector. The gap or spacing which exists laterally between parallel planes including the engaging surfaces of the boss 17 and the protuberance 16, for placement of the width of each side of the terminal connector 18 therebetween, is of slightly more width than the width of the sides of the connector 18. Accordingly, the terminal connector 18 may be easily dropped or placed in position. Additionally, the leg of the V-shaped groove, formed by the juncture of the bosses 17, opposite the side of the terminal connector 18 which is being wired, for example, resists any inwardly-directed force when a connection to the end 18a is made.

To assemble the connectors 18 within the piece 12, molded, for example, in the shape above described, each angular connector is inserted in an opening 15 simply by sliding the connector into its corresponding V-shaped groove until the connector 18 bottoms within the slot 15. The sides of the connector 18 lie within the gap between bosses 17 and protuberances 16, respectively, which are spaced to permit entrance of the connector 18 as hereinbefore described. In final assembly, the contact between the sides of the connector 18 and the surfaces of the protuberances 16 and bosses 17 maintains the connector in position during wiring of the connectors 18 to leads without bonding, such as by adhesives, between the engaging surfaces of the piece 12 and connector 18.

The surface of the base portion 13 forming the bottom of the openings 15 has raised figures molded within the openings 15 near each side of the piece 12 for ready identification of the terminal connector positions. The cover 11 also has raised figures molded on its surface to identify the row of terminal connectors 18 which it overlies.

The assemblage of blocks 9 and the cover 11, FIGS. 1 and 2, is held together by suitable headed fasteners such as bolts 19 passing through apertures formed in each end of the piece 12 and cover 11, and secured thereto by an angle washer 21, lock washer 22 and nut 23. As best shown in FIGS. 2 and 3, each block 9 is provided at one end with a channel 24 for holding an identification tag 25. When a number of blocks 9 are stacked together as in FIGS. 1 and 2, a single strip identification tag 25 may be inserted in the aligned channels 24 and held in place by the angle washer 21.

The end of the piece 12 opposite the tag end is provided with an additional aperture so that a hinge pin 26 may be inserted therethrough for purposes of mounting the terminal block as a hinge, as shown in FIG. 1. The cover 11 is provided with a pair of lugs 27 upstanding from the surface of the cover. Fastened to either of the lugs 27 in a familiar way is a spherical member 28 which engages a female cabinet-type latch 29 provided on a bracket 31 which supports a member 32 to which the hinge pin 26 is connected for arcuate movements of the assemblage of blocks 9 about the axis of the hinge pin. The latch 29 may be mounted on either side of the hinge bracket 31 for either right- or left-hand latching. Bracket 31 is secured to an equipment-supporting member 33 of a housing by bolts 34, for example.

A preferred method of utilizing my invention of a new terminal block would be to have it mounted as a hinge near one end of an equipment-supporting member of a housing containing relays or other control equipment. The relays or other control equipment would be prewired to one side of the terminal connectors of my terminal block as a modular unit and, when the unit is placed in the field, the external slip-on terminals are connected in proper place on the other side of the terminal connectors. Wires are easily connected to my terminal block because they enter and leave at an angle to the terminal block. The identity of the entrance wire and the connection of the leaving wire can be made from one position. Thus it may be seen my invention is com-

5 pact, having a large number of terminal connectors in a small space. Any number of terminal connectors can be provided for, the terminal connectors may be easily manufactured, and the connections may be made from one position.

10 It should be understood, of course, that the foregoing disclosure relates to only a preferred embodiment of the invention and that numerous modifications or alterations may be made therein without departing from the spirit and scope of my invention as set forth in the appended claims.

Having thus described my invention, what I claim is:

1. A terminal connector block which comprises a piece of insulating material having a plurality of openings extending therethrough; each of said opening making an angle intermediate the sides of said piece; opposed and spaced shoulders formed on the walls of the openings for guidingly contacting a terminal connector at spaced points; and a terminal connector selectively positioned within the openings and between the opposed shoulders, said terminal connector being prebent at an angle to correspond to the angle of the openings.

2. A terminal connector block which comprises a piece of insulating material having a series of openings extending therethrough, each of said openings making an angle intermediate the sides of said piece, opposed and spaced protuberances formed on the walls of the openings for contacting a terminal connector at spaced points, and a terminal connector positioned within the openings, said terminal connector being prebent at an angle intermediate its ends at an angle to correspond to the angle of the openings and being provided with a plurality of terminal receiving ends for attaching incoming and outgoing wires from the sides of the block.

3. A terminal connector block which comprises a piece of insulating material having a plurality of openings extending therethrough, each of said openings making an angle intermediate the sides of said piece, the wall of each of the openings having opposed and spaced shoulders extending inwardly into each opening and lying in spaced parallel planes, and a connector of electrically conductive material prebent at an angle intermediate its ends to correspond to the angle of said openings and selectively positioned within said openings with the shoulders in guiding engagement with opposite surfaces of the connector at spaced points whereby the terminal is positioned centrally within said openings, the thickness of the strip being less than the spacing between the parallel planes.

4. A terminal connector block which comprises a piece of insulating material having a plurality of walled apertures extending therethrough from side to side forming a dihedral angle intermediate the sides and in communication with the exterior of the block on a surface of the block intermediate the sides thereof, spaced shoulders extending into each aperture from a pair of opposite walls of each aperture and a terminal connector prebent at an angle intermediate its ends to correspond to the dihedral angle of each walled aperture with opposite surfaces in contact with the shoulders, each end of the connector being spaced from each side of the piece within each aperture.

5. A terminal connector block comprising an elongated rectangular piece of insulating material having a plurality of parallel angular slots extending therethrough from side to side and a channel formed in one end of the block, a terminal connector bent at an angle intermediate its ends to correspond to the angle of the slots and positioned within each slot in contact with each pair of walls of the piece forming the respective slots, identification means positioned within the channel, indicia formed on each wall of the slot visible by an observer viewing from a position at the channeled end of the block, and a cover fixedly superposed on the block and extending over each of the connectors within the slots.

6. A terminal connector block comprising an elongated rectangular piece of insulating material having a plurality

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of parallel slots extending therethrough from side to side and a channel formed in one end of the block, each slot making an angle intermediate to the sides of said piece, a terminal connector having an angle intermediate its ends to correspond to the angle of the slot and positioned within each slot in contact with each pair of walls of the piece forming the respective slots, identification means positioned within the channel, and a clip fastened to the block and biased against the identification means for fixing the means within the channel.

7. A terminal block comprising a piece of insulating material having an angular slot formed therein, a pair of spaced shoulders extending from opposite walls of the slot on each side of the apex of the angular slot, the shoulders on each side of the angular slot having spatially opposed contacting portions, an angular terminal connector of a thickness less than the spacing between the opposed contacting portions positioned between the shoulders in guiding contact therewith, and the apex of the angular connector nesting in the apex formed by one of the shoulders on each side of the angular wall of the piece pair of walls forming the slot whereby endwise thrust on the terminal connector toward the center of the slot is resisted by the abutment of the connector with the wall of the slot near the apex.

8. A terminal block comprising a piece of insulating material having a slot passing from side to side of the piece and open at the top; one wall of the slot having two planar portions forming a dihedral angle intermedi-

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ate the sides of the piece; the other wall of the slot having two planar portions parallel to the planar portions of the one wall for a part of their lengths extending from the piece sides toward center of the piece; sections of the one wall forming bosses adjacent the juncture of its portions lying in planes including the centerline of the slot; the other wall having protuberances opposite the bosses and extending toward the centerline of the slot; a planar terminal connector with a plurality of terminal-receiving ends, the connector having a dihedral angle corresponding to the angle of the one wall positioned in congruent relationship therewith and guidingly held between the bosses and the protuberances on the centerline of the slot with the ends of the connector spaced within the slot; and a cover of insulating material fixedly engaged to the top of the piece over the slot.

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