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ELECTRICAL TERMINAL CONNECTOR BLOCK

Filed Nov. 19, 1956

2 Sheets-Sheet 1

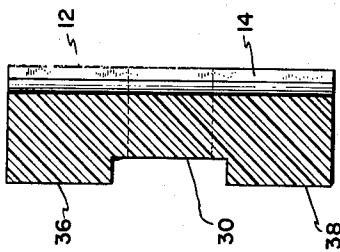


FIG. 4

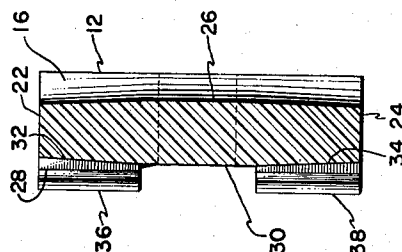


FIG. 3

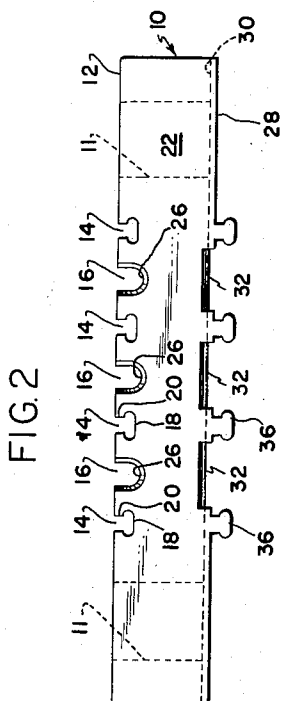


FIG. 2

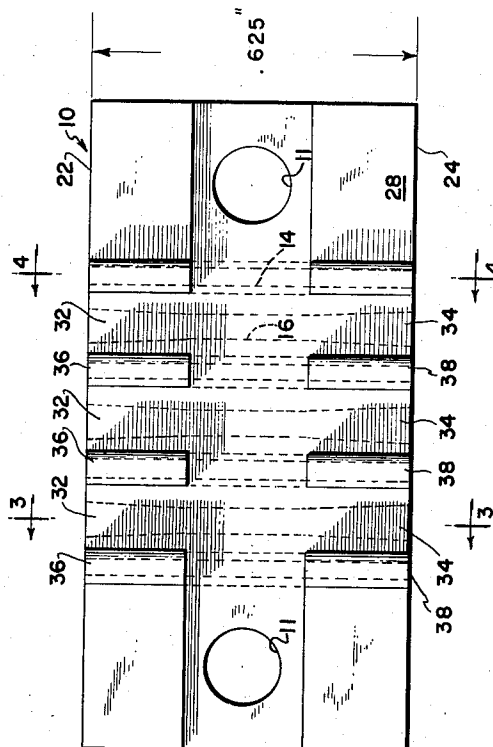


FIG. 1

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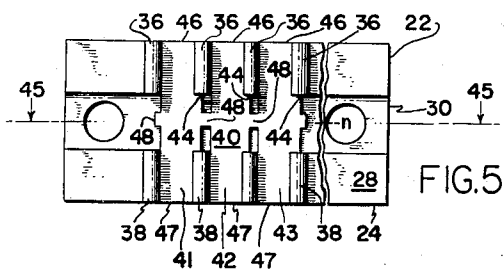


FIG. 5

FIG. 8

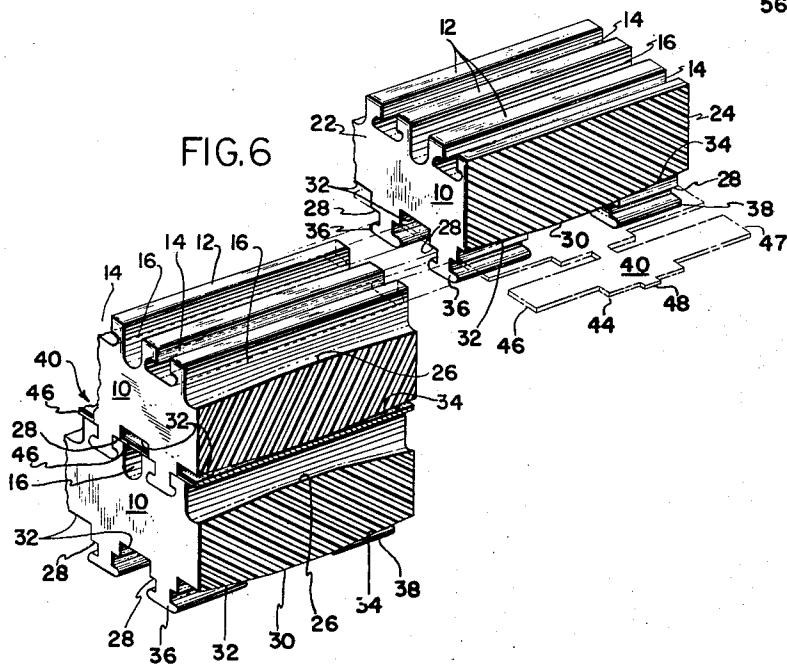
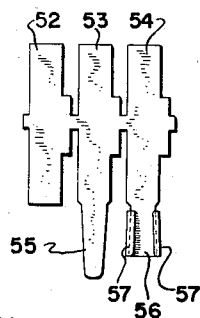


FIG. 6

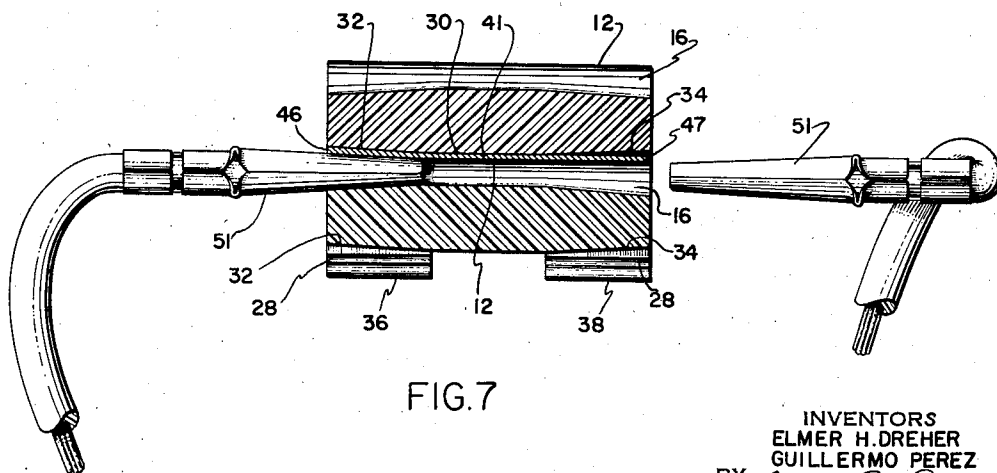


FIG. 7

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ELECTRICAL TERMINAL CONNECTOR BLOCK

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5 Claims. (Cl. 339—198)

This invention relates to electrical terminal connectors; more particularly it relates to a compact, simply constructed electrical terminal connector wherein one or more wire terminals of a plurality of wires may be connected thereto; and specifically to a combination of electrical terminal connector blocks having spring contacts so arranged therein that a plurality of wire terminals of similar or differing types may be positively and securely connected together in a plurality of shorted arrangements without the necessity for soldering.

In the prior art where it is necessary to connect a plurality of wires to a common electrical terminal connector, the terminal boards comprising the electrical terminal connector are necessarily large and space consuming; further, in order to make good low resistance connections an appreciable time is required by skilled technicians to solder them. In some applications, as in computers, where space is at a premium and wire terminal ends are small, compact electrical terminal connectors are required and the connections thereto must be made without the necessity for soldered joints. Some of the compact electrical terminal connectors known to the art however, in addition to a smaller version of the well known terminal boards, utilize units each having a number of female receptacles joined to a common male receptacle which is adapted to be inserted in said terminal board. These units are difficult to fabricate and as a practical matter, this difficulty in fabrication limits the size of individual units and consequently the number of wire terminals that can be connected thereto. This limitation therefore, in order that a large number of wire terminals be accommodated, requires a plurality of individual units, all of which must be connected to the terminal board, thereby defeating the object of compact terminal connectors, i.e., space saving and simplicity.

The instant invention obviates the disadvantages of the prior art by utilizing contact strips sandwiched between rectangular members or concentric cylindrical members of insulating material; each adjacent insulating member being provided with cooperating interlock means whereby as many as is desired may be employed to accommodate any number of wires. Adjacent members, between which are sandwiched the contact strips, are provided with cooperating cutouts so shaped as to receive and securely hold in electrically contacting relationship with the contact strips, the terminal ends of the wires to be connected to the terminal block.

An object of the invention therefore is the provision of a compact electrical terminal connector block adapted to connect a plurality of wires.

Another object of the invention is to provide an electrical terminal connector block construction which is inexpensively and easily manufactured, and capable of being assembled, in any number, into a small compact unit whereby as many wires as may be desired may be connected thereto.

Still another object of the invention is the provision of small compact terminal connector blocks wherein a plu-

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ality of wires may be positively and securely connected in electrically contacting relationship without the necessity for soldered connections.

A further object of the invention is to provide a terminal connector block fabricated of moldable insulating material and electrically conductive blanks.

A still further object of the invention is to provide a plug-in type terminal connector block adapted to electrically connect a multitude of wires having a sandwich type construction wherein all pressures developed by plugged in wire terminals are taken by interlock means formed in the insulating materials of which the block is composed.

With these and other objects in view, as will hereinafter more fully appear, and which will be more particularly pointed out in the appended claims, reference is now made to the following detailed description of preferred embodiments taken in connection with the accompanying drawings in which;

Fig. 1 is a plan view of an insulating block constructed in accordance with the invention and drawn to scale of 4:1;

Fig. 2 is a side view of the insulating block shown in Fig. 1;

Fig. 3 is a cross sectional view taken along lines 3—3 of Fig. 1;

Fig. 4 is a cross sectional view taken along lines 4—4 of Fig. 1;

Fig. 5 is a plan view of a contact strip formed in accordance with the invention showing its relationship to an insulating block;

Fig. 6 shows a perspective view of an assembly of blocks and contact strips in accordance with the invention;

Fig. 7 is a cross sectional view of an assembly showing the manner in which a wire terminal is inserted and positively held by the novel construction; and

Fig. 8 shows contact strip modifications to which wire terminals of varied shapes may be connected.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in Figs. 1 through 4, which illustrate a preferred embodiment, a rectangular block of electrical insulating material generally designated by reference numeral 10. The insulating material, many of which are known to the art, is one which is amenable to being molded and in a specific embodiment, nylon was found suitable. While the block has been shown as rectangular it is to be understood that cylindrical or other suitably shaped wafers are within the scope of the invention. In the case of cylindrical wafers, for example, a terminal block would be built through employment of a plurality of concentric cylinders.

Referring specifically to Figs. 1 and 2 the block 10 is provided with bores 11 adjacent its ends whereby the block 10 or a plurality of operatively connected blocks may be secured, as by bolts or the like to a chassis.

In accordance with the invention each of the formed blocks in an assembly are identical. One surface 12 of each block 10 has alternately formed therein a plurality of transverse slots or splines 14 and a plurality of substantially semi-cylindrical transverse channels 16. The slots 14 are all similarly shaped and, in the illustrative embodiment shown, comprise an oblong portion 18 connected to the surface 12 by a relatively narrow neck portion 20. The channels 16, as most clearly shown in Fig. 3 taper from the sides 22 and 24 of the wafer toward the surface 12 to a straight central portion 26.

The surface 28 opposite surface 12 has formed therein a centrally disposed longitudinally extending rectangular groove 30 of constant predetermined depth and width.

Extending inwardly from the sides 22 and 24 at right angles to groove 30 are a plurality of oppositely disposed transverse grooves 32 and 34 respectively. As most clearly seen in Fig. 3 grooves 32 and 34 taper toward the surface 28 from sides 22 and 24 to the bed of longitudinal groove 30 and as clearly seen from Fig. 2 are disposed opposite to the channels 16 in surface 12. A plurality of oppositely disposed lugs 36 and 38, complimentary in shape to slots 14 and disposed oppositely thereto extend outwardly from surface 28 in alternate relationship with the aligned transverse tapering grooves 32 and 34. Lugs 36 and 38, as most clearly seen in Figs. 1 and 3, extend transversely from the sides 22 and 24 respectively to the bank of longitudinally extending groove 30 for reasons which will be apparent infra.

Referring now to Figs. 5 and 6 there is shown a spring contact strip generally designated by 40 which is adapted to repose in the grooves 30, 32 and 34 in the surface 28 of a block 10. Strip 40 is stamped from a blank of any suitable conducting material and in a specific embodiment .010 beryllium alloy 25½ hard hardened to Rockwell 15N78-80.5 was employed. The strip 40 as shown comprises a plurality of contact sections 41, 42, 43 . . . n depending on the size of the block.

Each of the contact sections is substantially rectangular and includes a substantially rectangular anchoring portion 44 extending laterally from one or both sides of the contact sections and disposed about a line 45 intermediate the ends 46 and 47 of each section. The thickness of the contact strip is equal to the depth of groove 30 in surface 28 of the block. As may be seen from Fig. 5 the length and width of each section 41, 42 and 43 is equivalent to the width of the blocks 10 of insulating material and to the width of aligned grooves 32 and 34 respectively. The length and width of each rectangular anchoring portion 44 is equivalent to the width of the longitudinal groove 30 formed in the surface 28 of the block and approximately half the width of the outwardly extending lugs 36 and 38 respectively. Integral with and joining each contact section about the line 45 is a shorting section 48. Prior to assembly any one or more of the shorting sections 48 may be cut out depending on the requirements of a particular application.

Referring now to Fig. 6 there is shown the manner of assembling or disassembling blocks 10 and spring contact strips 40 to form a terminal connector adapted to connect a plurality of wire terminals, or as many as is desired, by adding or removing blocks and contact strips. As is apparent from the description of Fig. 5 contact strips 40 rest on the flat longitudinal groove 30 in surface 28 of the block 10; the ends 46 and 47 of each contact section 41, 42 and 43 projecting into the grooves 32 and 34 and flush with the surface 28. The anchoring portions 44 of the strip prevent any lateral movement or removal of the contact strips after two blocks have been splined together. As shown when two blocks 10 are splined together, the central portion of each spring contact section is held tightly between adjacent blocks by the flat bed of groove 30 on one block and the surface 12 on an adjacent block. Also, after splining two blocks together, it may be seen that tapering channels 16 and aligned tapering transverse grooves 32 and 34 are facing each other with the projecting ends 46 and 47 of the contact sections dividing each of the areas bounded by the channels and transverse grooves. As is apparent the ends 46 and 47 of a contact section on either side 22 and 24 of the assembly are free to move into the transverse tapering grooves 32 and 34 respectively.

As seen in Fig. 7 the insertion of a wire terminal end 51 into a channel 16 forces the end 46 of a contact section up into the tapering groove 32 thereby holding the terminal end securely and in positive contact with the spring contact section. All stresses set up in the assembly by the insertion of the wire terminal end 51

are taken by the lugs 36 and 38 and splines 14 thereby preventing any separation of the block or loosening of the connection. As is obvious from the above any number of wire terminals may be connected together or in various combinations to one or more of a plurality of voltage sources in the manner of a switchboard.

Fig. 8 shows a combination spring contact strip having three different contact sections 52, 53 and 54 which may be employed in accordance with the invention. Section 52 is identical with the sections of strip 40 described with reference to Fig. 5. Contact sections 53 and 54 differ from 52 only in that one 53, is formed with a tongue 55 adapted to extend beyond the block assembly whereby a clamp type wire terminal may be connected to the block assembly; and the other 54 is formed with a tongue 56 shaped so that portions 57 thereof may be bent to form a receptacle for a spade type wire terminal. It is to be understood however that the shape of the channels, grooves, and splines in the blocks may take forms other than that described herein e.g. the channels 16 might be formed to receive spade type wire terminals obviating the necessity for a contact strip such as 56.

It should be understood, of course, that the foregoing disclosure relates only to preferred embodiments of the invention and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

The invention claimed is:

1. An electrical terminal connector block comprising a predetermined number of blocks of insulating material and said predetermined number less one of electrically conductive spring contact strips interposed between said blocks, cooperating means integrally formed on adjacent surfaces of said blocks for securely locking said strips between adjacent blocks, said strips comprising a plurality of separable connected sections, tapering channels in one surface of said blocks, tapering grooves opposite said channels formed in the surface of adjacent blocks, said contact sections dividing the receptacles formed by said grooves and channels into two areas whereby when terminals are inserted into one of said areas, the spring contact is forced to occupy said other area, thereby holding said terminals securely.

2. An electrical terminal connector construction comprising a plurality of insulating members alternately arranged with connected multiple contacts, cooperating means on adjacent members for securely retaining said contacts between adjacent members, cooperating tapering recesses in adjacent members alternately arranged with respect to said retaining means thereby forming cavities, said multiple contacts having unsupported portions projecting into and dividing said cavities, said unsupported contact portions adapted, upon insertion of wire terminals, to elastically deflect and thereby securely hold said wire terminals in said cavities.

3. An electrical terminal connector comprising a plurality of blocks of insulating material alternately arranged with respect to flat contact strips, complimentary lugs and slots on the surfaces of adjacent blocks for locking said contact strips between said blocks, cooperating recesses in adjacent blocks tapering inwardly from the sides thereof alternately arranged with respect to said lugs and slots, said cooperating recesses forming tapering cavities, said contact strips having unsupported portions projecting into and dividing said cavities whereby insertion of tapered wire terminals into one half of said divided cavities causes said contact portion to deflect into said other half and securely hold said wire terminals in said cavities, said lugs and slots absorbing the stresses set up by the wire terminals in said cavities.

4. An electrical terminal connector construction comprising a predetermined number of blocks of insulating

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material, and said predetermined number less one of electrically conductive flat spring contact strips, said strips having anchor portions and terminal contact portions, cooperating lugs and slots integrally formed on adjacent surfaces of said blocks for securely locking the anchor portions of said contact strips between said blocks, cooperating tapering channels and grooves formed in adjacent surfaces of said blocks, said contact portions of said contact strips extending into the areas formed by said channels and grooves, whereby when wire terminals are inserted into said channels said contact portions are wedged into said grooves thereby securely retaining said wire terminals, said lugs and slots absorbing the stresses set up by the wedged-in wire terminals thereby preventing loosening of the connection.

5. An electrical terminal connector construction comprising a plurality of blocks of insulating material alternately arranged with respect to a plurality of straight flat contact members, said members having anchor portions and rectangular terminal contact portions, cooperating lugs and slots integrally formed on adjacent surfaces of said block for holding said blocks together whereby said anchor portions of said contact members are

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tightly held between said blocks, cooperating tapering substantially semi-cylindrical channels and tapering rectangular grooves formed in adjacent surfaces of said blocks alternately with said slots and lugs, said rectangular contact portions extending into and dividing the areas formed by said tapering channels and grooves whereby when tapered wire terminals are inserted into said tapering channels said contact members are wedged into said grooves thereby securely retaining said wire terminals, said lugs and slots absorbing the stresses set up by the wedged-in wire terminals.

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