March 16, 1965 G. H. GLUNTZ 3,173,738

TERMINAL BLOCK CONSTRUCTION

Filed Dec. 18, 1961 2 Sheets-Sheet 1

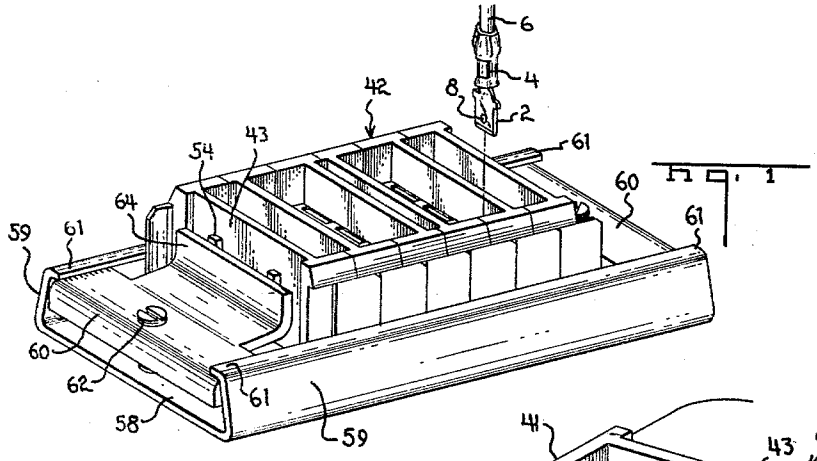


Fig. 1

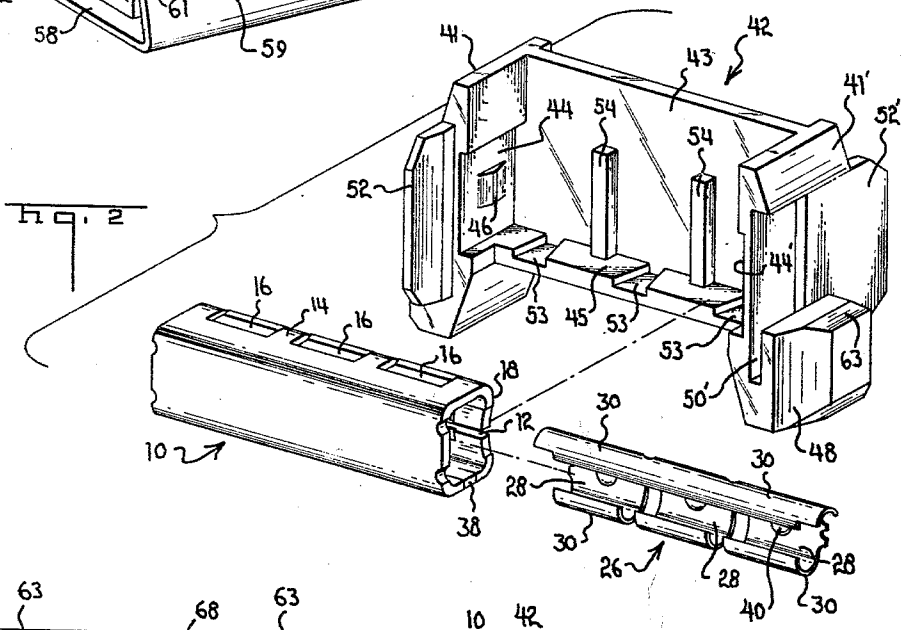


Fig. 2

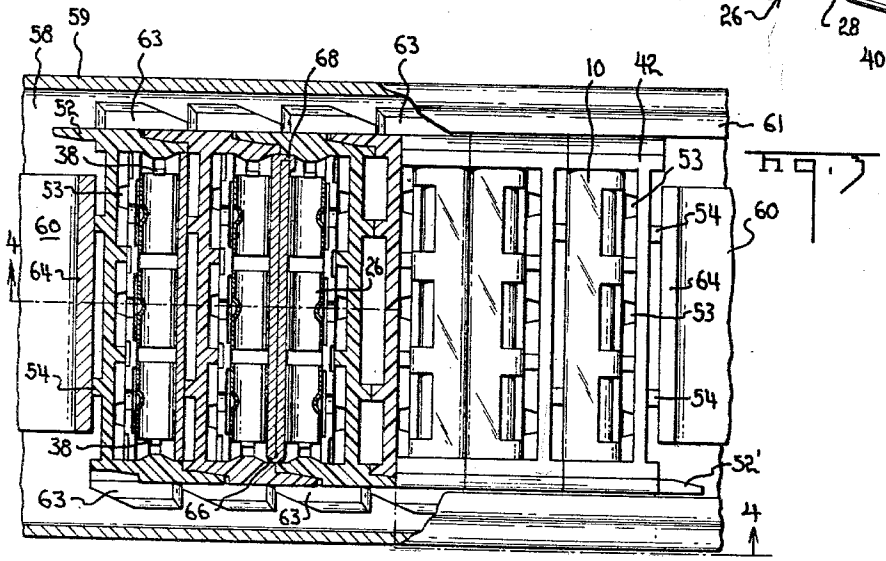


Fig. 3

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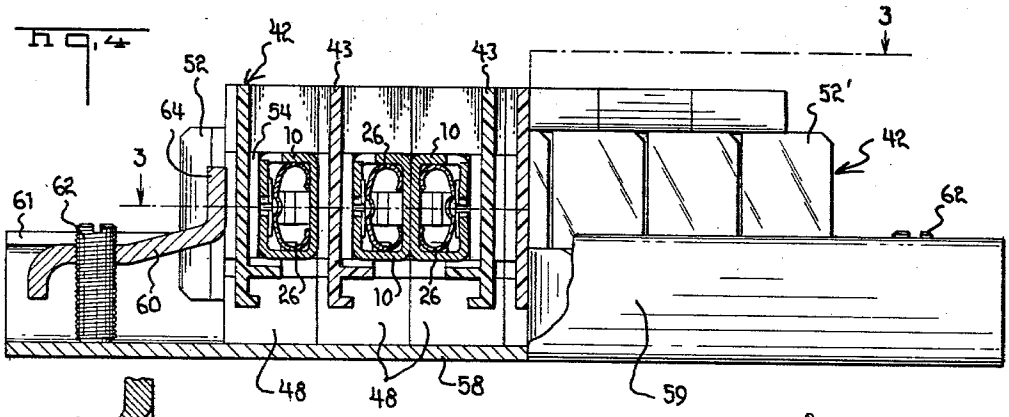


Fig. 4

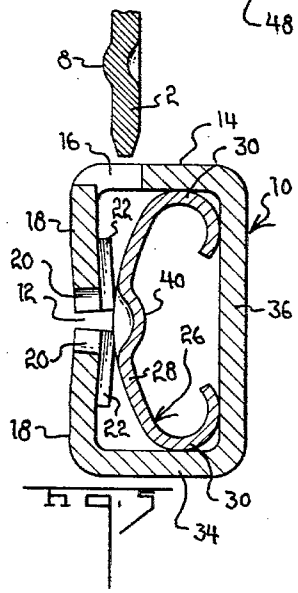


Fig. 5

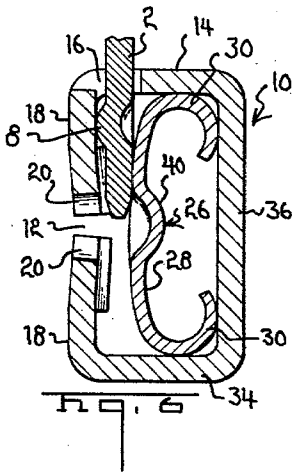


Fig. 6

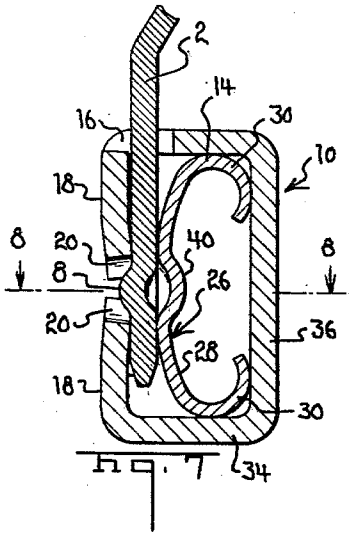


Fig. 7

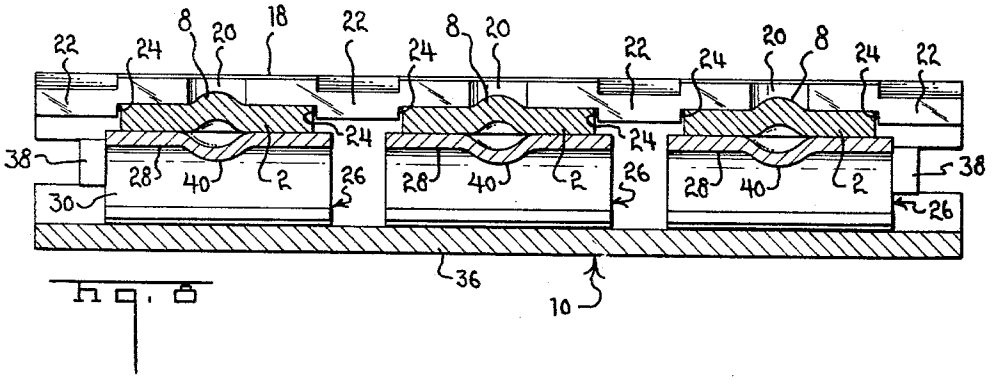


Fig. 8

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TERMINAL BLOCK CONSTRUCTION

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4 Claims. (Cl. 339—198)

This invention relates to terminal blocks for forming electrical connections among a plurality of conductors having tab-type terminals on their ends.

An object of the invention is to provide an improved terminal block of simplified construction. A further object is to provide a modular type terminal block by means of which a terminal block assembly for any desired number of conductors can be made from a small number of types of identical parts. A further object is to provide a modular type terminal block which permits assembly of its component parts in alternative ways to provide common electrical connections for different numbers of terminals. A still further object is to provide a terminal block which avoids the need for separate clamps or fasteners to retain the terminals in the block and which achieves positive clamping of the terminals in a manner such as to avoid accidental removal thereof.

These and other objects of the invention are achieved in a preferred embodiment comprising a generally rectangular metallic cage or block member having a plurality of aligned slots on one side thereof and adjacent to the edge between the one side end and adjacent side. A C-shaped spring assembly is contained within the cage in a manner such that the web of the spring is biased towards the adjacent side so that upon insertion of a tab through any one of the slots, the tab is pressed against the adjacent side to establish electrical contact therewith. In a terminal block assembly in accordance with the invention the individual cage members are contained between identical dielectric housing units which mate with each other to permit assembly or construction of a terminal block of any desired length for any desired number of terminals. The dielectric housings, themselves, are contained within and clamped within a channel-shaped base member by means of which the entire assembly can be mounted on a panel.

In the drawing:

FIGURE 1 is a perspective view of a terminal block assembly in accordance with the invention.

FIGURE 2 is an exploded perspective view showing one of the dielectric housing units, a cage member and a spring member in accordance with the preferred embodiment.

FIGURE 3 is a top plan view with parts broken away of the embodiment of FIGURE 1, this view being taken along the lines 3—3 of FIGURE 4.

FIGURE 4 is a view taken along the lines 4—4 of FIGURE 3.

FIGURES 5, 6 and 7 are sectional views illustrating the action of the spring member and the manner in which the terminal paths are held within the cage member; and

FIGURE 8 is a view taken along the lines 8—8 of FIGURE 7.

The disclosed embodiment of the invention is adapted to form electrical connections among wires or other conductors having tabs of the type shown at 2 on their ends. Such tabs have ferrule portions 4 by means of which they are crimped onto the ends of wires 6, the disclosed form of tab having a dimple 8 thereon to improve its engagement with the terminal block.

The preferred form of the invention comprises a generally rectangular block unit or cage 10 which may be of any suitable conductive material, for example, tin-plated brass. Block unit 10 is formed by stamping and bending operations which leave an open seam 12 along a side 18 thereof and has aligned slots 16 on one side 14, these slots being located adjacent to the edge between the side 14 and the adjacent side 18. Semi-circular recesses 20 are provided on the opposed edges at the seam 12, these slots being located centrally with respect to the slots 16 so that they will receive the dimple 8 of the terminal tab. The side 18 of the cage has inwardly displaced sections 22 (FIGURE 8) between the slots, the width of these inwardly displaced sections being such that the shoulders 24 on the interior surface of side 18 are spaced apart a distance substantially equal to, and slightly greater than, the width of the terminal tabs 2. These shoulders function to guide the tabs when they are inserted through the slots 16.

A generally C-shaped spring assembly 26 contained within block unit 10 comprises three integrally-connected spring members. Each spring member has a web 28 and a pair of arms 30, the spring assembly being so dimensioned that when it is inserted into the block, the web of each spring bears against the two adjacent inwardly displaced sections 22 (see FIGURE 8) while the arms bear against the sides 14 and 34 and the ends of the arms bear against the back wall 36. The spring assembly is retained within the block unit or cage 10 by means of tabs 38 which are bent upwardly from the side 34 at each end. Advantageously, the springs have a central depression 40 in their webs which, when the springs are in the cage, face the semi-circular recesses 20 along the seam 12 so that the dimple 8 of the tab will be received within the complementary recess regardless of the orientation of the tab at the time of insertion.

A preferred form of housing is made up of a bank of similar modular units 42 (FIGURE 2) each having sidewalls 41, 41' connected by an integral vertical cross panel 43 and a base panel 45. The sidewalls 41, 41' are substantially identical to each other but have their corresponding external elements reversed from right to left. Sidewall 41 has a recess 44 on its inner surface for reception of the ends of the cage member 10 and an upstanding projection 46 centrally located thereon to function as a detent and hold the cage member between the sidewalls and against the panel 43. The lower portion 48 of the sidewall has a slot 50 on one side on its outside surface and an ear 52 which extends from the opposite side. The sidewall 41' has a recess 44' which is opposed to recess 44 and has a slot 50' and ear 52'. Slot 50 is identical to slot 50' and ear 52 is identical to ear 52', however, the locations of slots and ears are reversed, as between the two sidewalls, from right to left when the module is viewed from above. This arrangement permits two of the modules 42 to be assembled in either of two ways to accommodate either one or two of the block units 10 as is described below.

The housing unit 42 is advantageously formed by injection molding in a single piece and may include reinforcing ribs 54 on the vertical panel 43 if required. Ribs 54 and recesses 53 in base panel 45 also serve to provide for air circulation around the block units in order to facilitate the evaporation of any moisture which may condense in the terminal block unit. An additional function of the ribs is to increase the creepage path between adjacent block units separated by a vertical panel 43.

A terminal block unit assembly in accordance with the invention is mounted and clamped together by means of a channel-shaped base member 58 having sidewalls 59 with inwardly turned edge portions 61, the height of the sidewalls 59 being such that the edge portion 61 will overlie a vertical surface portion 63 of the sides 41, 41'. The housing units are clamped by means of a clamping mem-

ber **60** having a flange **64** which bears against the ribs **54** of the panel **43** of the end housing unit. This clamp extends laterally to a position beneath the inwardly turned edges **61** of the channel **58** and is held in position by means of a set screw **62** which is tightened down against the base of the channel to hold the parts firmly in position.

In use, when it is desired to make a terminal block unit assembly from components in accordance with the invention, the appropriate number of block members **10** having springs therein are fitted into an equal number of housing units **42** and the housing units are positioned against each other in the channel-shaped base member with their ears **52**, **52'** and recesses **50**, **50'** interengaged. If it is desired to have some common connections for six wires rather than three wires, it is merely necessary to reverse one module **42** with respect to the next adjacent module (i.e. to turn it around) so that the base panels **45** of the two modules are proximate to each other and the vertical panels **43** are remote from each other. When two modules are assembled to each other in this manner, the space between their panels **43** will be sufficient to receive two of the terminal block units **10** as is shown in FIGURES 1, 3 and 8. It should be noted that reversal of a module unit in the module bank in this manner can be achieved by virtue of the left-to-right reversal of the recesses **44**, **44'** and the ears **52**, **52'** on the sidewalls of each module.

Where two modules **42** are assembled as described above to accommodate two terminal block units **10**, the two block units may be soldered or welded together to assure electrical contact between them. As an alternative, double cage or block units of this type can be formed at the time of manufacture of the block units since the block units are advantageously made by progressive die-forming operations in end-to-end stripped form. To form a double block unit then it is merely necessary to avoid severing two adjacent block units and bend the connecting section between the two block units to 180° until the backs of the two block units are against each other as shown at **66** in FIGURE 3. The opposite ends of the block units can then be locked together by bending over the connecting slug of one of the block units as shown at **68**.

As shown in FIGURES 5–7, the electrical connection is formed by merely inserting the tab into one of the slots of the cage to compress the spring until the dimple on the tab is received within the semi-circular recesses **20** of the side **18** of the cage. The tab need not be preferentially oriented since if the tab were reversed from the position of FIGURES 5 to 7, the dimple would be received within the recess **40** of the spring rather than the recess **20** of the cage itself. As the tab is inserted, the spring is compressed so that it exerts a force against the tab thus pressing it against the innerwall of the side **18** of the cage after insertion. Since the spring is confined on all sides, the amount of force required to compress it and therefore, the amount required to insert the tab can be closely controlled. Moreover, a high retention force can be imposed upon the tab with the spring by virtue of the fact that the spring is confined by the walls or sides **14**, **34** and **36**.

The invention is advantageous in any wiring arrangement where frequent changes are contemplated or must be provided for. If, for example, it should become necessary to accommodate more wires in the terminal block assembly of FIGURE 1 and if these wires should be accommodated in the central portion of the block, it is merely necessary to loosen one of the clamps **64**, wedge apart two of the central housing units **42**, and insert the appropriate number of additional housing units with cages therein where desired.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only.

I claim:

1. A terminal block comprising a bank of identical insulating modules assembled to each other in side-by-side relationship, each of said modules having a pair of upstanding sidewalls integrally joined by a cross member, said cross member including supporting means for supporting a conductive terminal-receiving block unit and a panel for separating the terminal-receiving block unit of each module from the terminal-receiving block unit of the next adjacent module, each of said terminal-receiving block units being rectangular and having a plurality of aligned spaced-apart slots on one side thereof and extending along the edge between said one side and an adjacent side, and spring means in said block, said spring means having a generally C-shaped cross section with its web portion biased towards the internal surface of said adjacent side and having its arms pressing against the internal surface of said one side and the side opposite to said one side whereby terminal tabs inserted into said slots are pressed against said adjacent side.

2. A device as set forth in claim 1 wherein each of said sidewalls of said modules has a projecting portion and a recess conforming to said projecting portion, the recess and projection portion of each of said side-walls of each module being reversed from left to right with respect to the other sidewall.

3. A stamped and formed elongated rectangular terminal block unit for reception of a plurality of terminal tabs, said block unit having at least one open end and having a plurality of aligned spaced-apart slots on one side thereof and extending along the edge between said one side and an adjacent side, said adjacent side having inwardly displaced wall portions between said slots thereby to define pairs of opposed shoulders on the internal wall of said one side on each side of each of said slots, and spring means in said block unit, said spring means comprising a number of springs equal to the number of said slots, each of said springs having a generally C-shaped cross section and having its web portion bearing against said adjacent side, said springs having a width substantially equal to the width of said slots, said springs being connected to each other in side-by-side aligned relationship and being spaced apart by a distance substantially equal to the spacing between said slots, said spring means reposing within said block unit with the web portions thereof against said adjacent side whereby, upon insertion of a terminal tab into one of said slots, said tab is received between said shoulders and is pressed against said opposite side by one of said springs.

4. A device as set forth in claim 3 including a centrally located concave dimple on said web of each of said springs and a plurality of openings in said adjacent side, each of said openings being opposed to one of said dimples, said dimples and said openings permitting insertion of a terminal tab having a locking dimple thereon in either orientation relative to said spring.

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