United States Patent

[11] 3,579,170

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[54] **MODULAR ELECTRICAL CONNECTOR ASSEMBLY**
6 Claims, 16 Drawing Figs.

[52] **U.S. Cl.** **339/17,** 339/91, 339/258
[51] **Int. Cl.** **H05k 1/00**
[50] **Field of Search** ..... 339/17, 17 (C), 17 (L), 17 (LM), 17 (M), 258, 91, 205, 276 (A), 177, 258 (P)

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ABSTRACT: A modular electrical connector assembly for making connections to printed circuit boards comprising a plurality of male and female terminals. Each of the female terminals includes a circular cylindrically shaped barrel portion having a plurality of resilient contact members integrally formed from the wall thereof and facing inwardly toward the center thereof, and a pair of tab members for insertion into an aperture in a printed circuit board wherein they are bent to secure the terminal thereon. The male terminals each includes at least one circular cylindrical contact end for insertion into either open end of the barrel portion of a female terminal. The male terminals may be used separately or mounted in spaced relation in an insulating terminal block, and may also have a solderless wrap or other type of connector end for making external connection thereto.

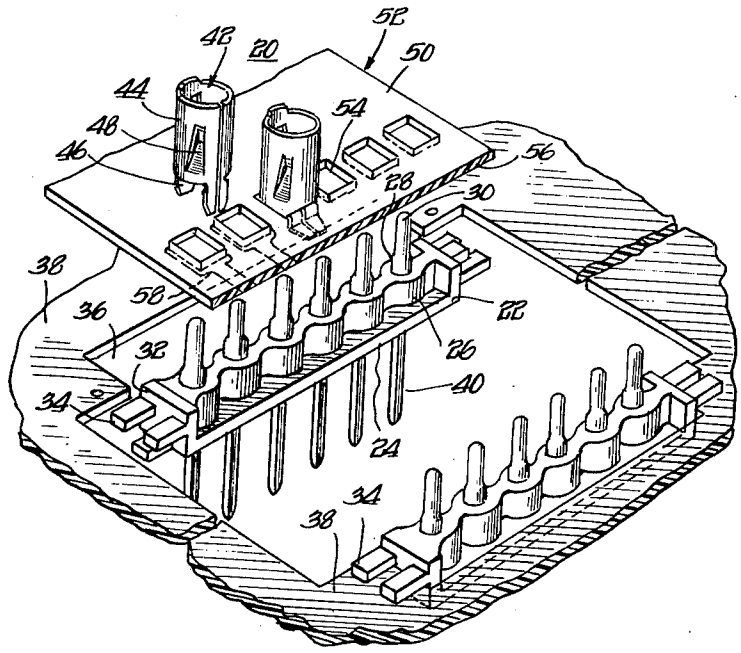


Fig. 1

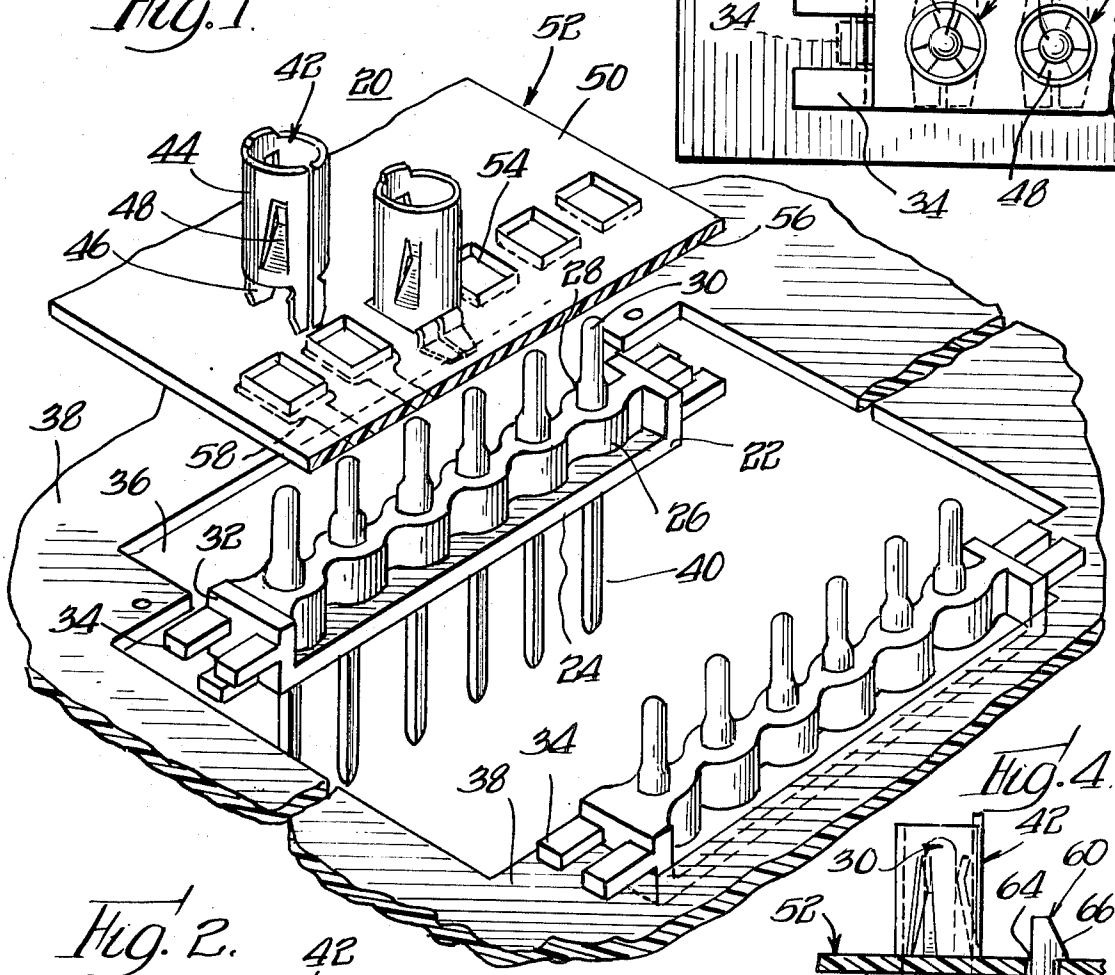


Fig. 3

Fig. 4

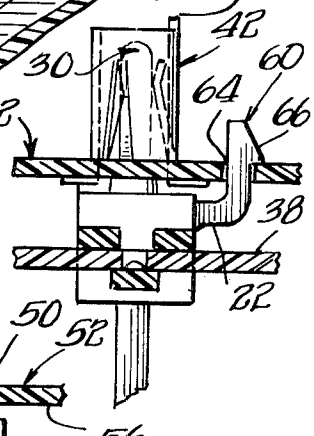
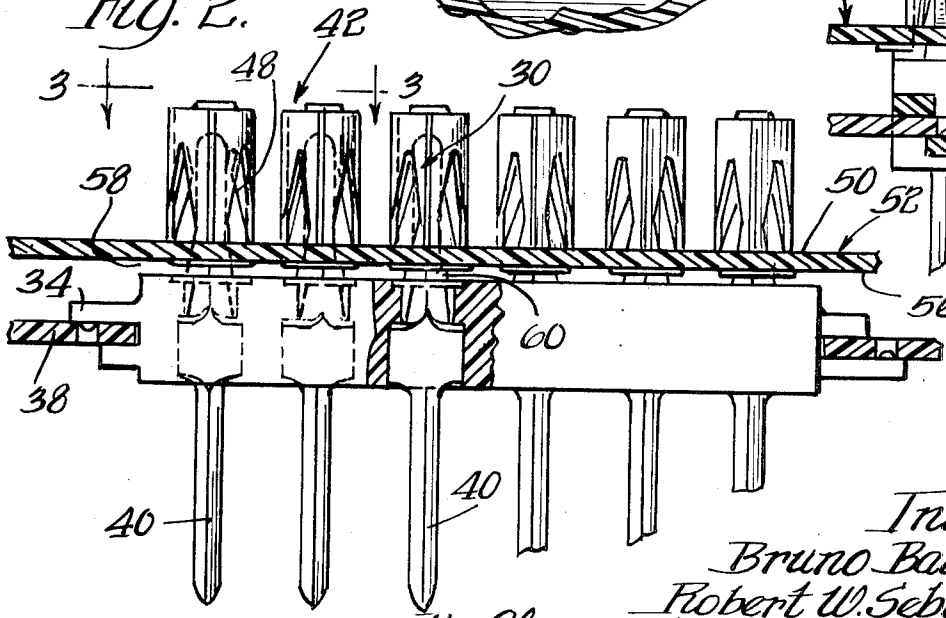


Fig. 2



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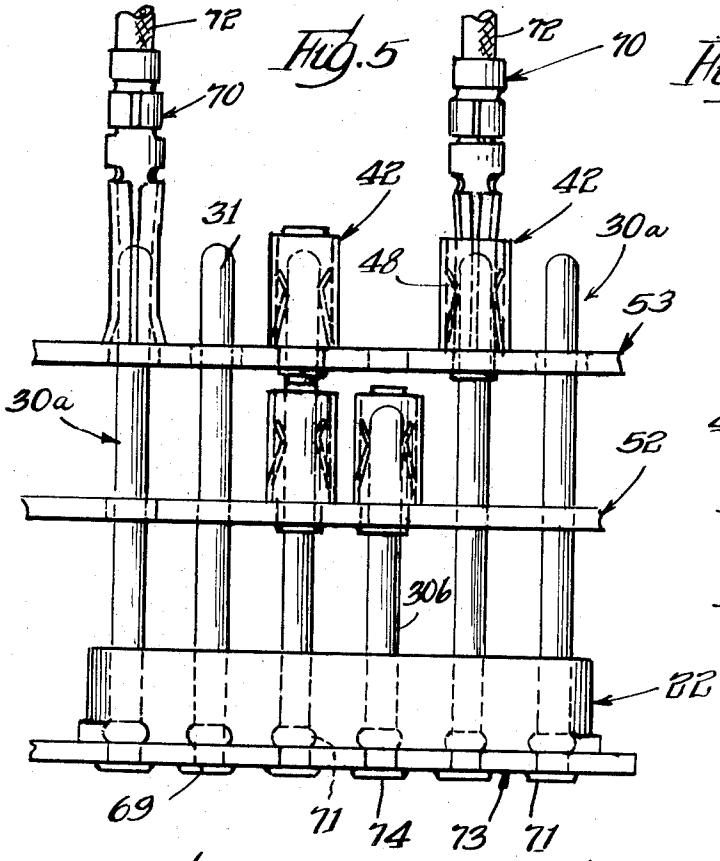

Fig. 5

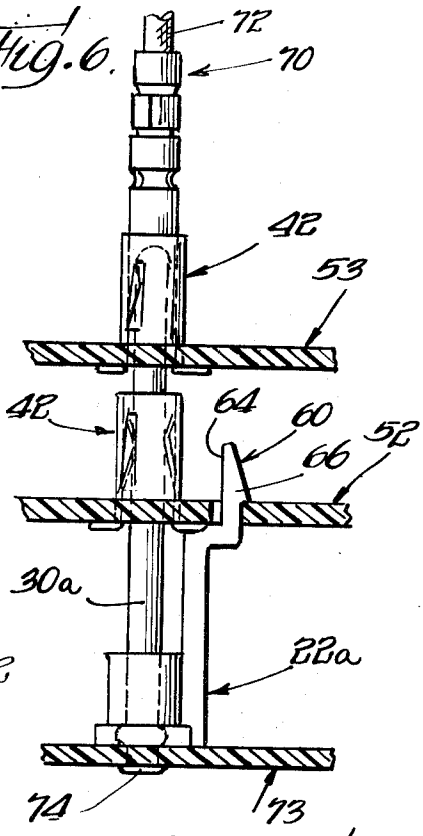

Fig. 6

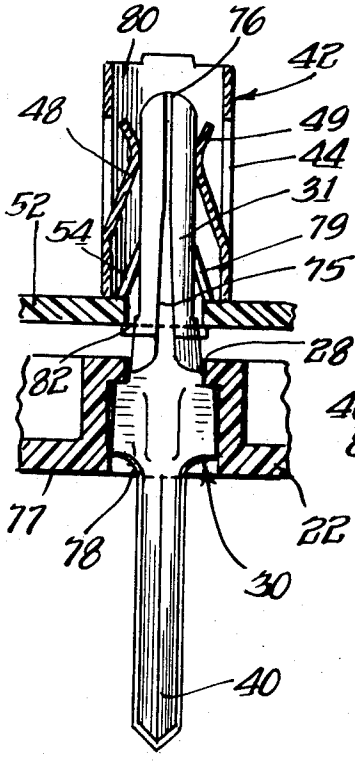

Fig. 7

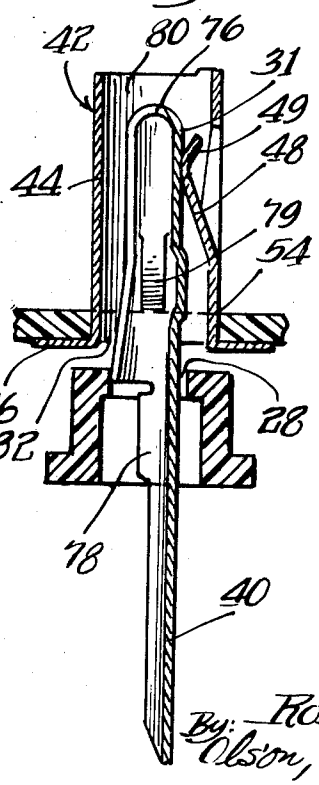

Fig. 8

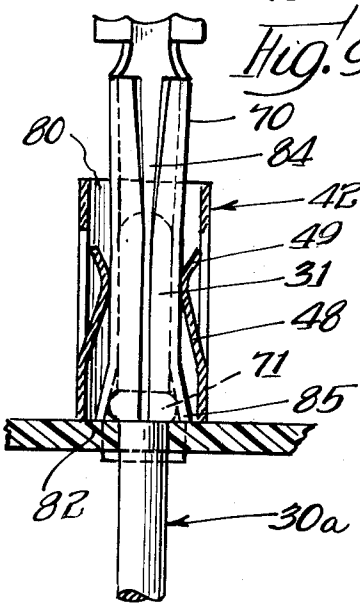

Fig. 9

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Fig. 11.

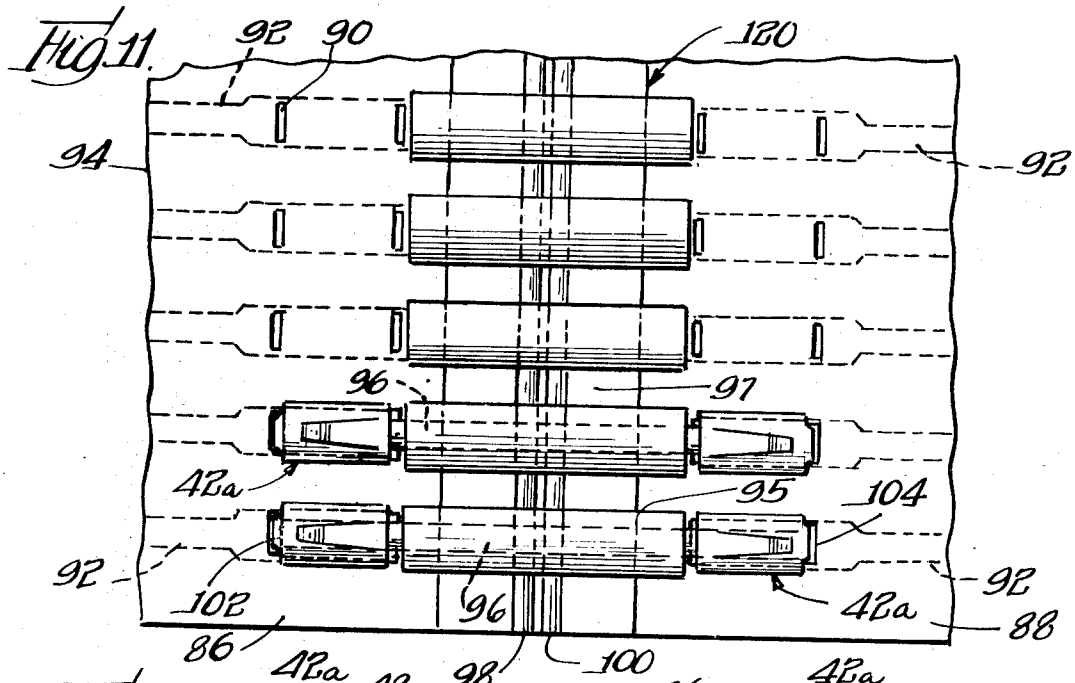

Fig. 12.

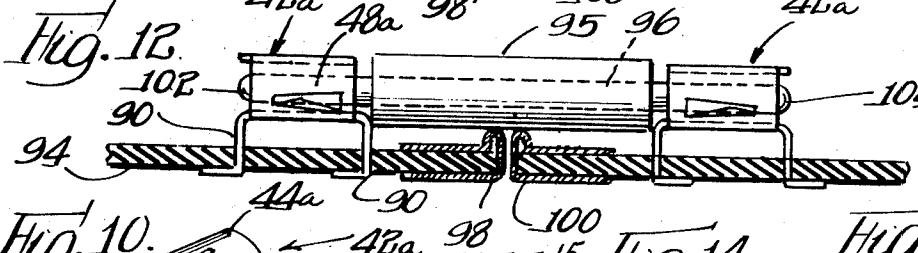

Fig. 10.

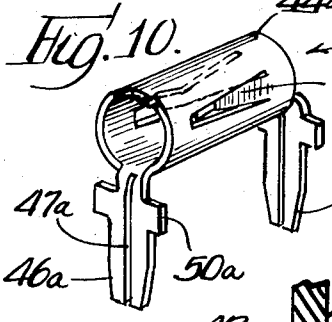

Fig. 13.

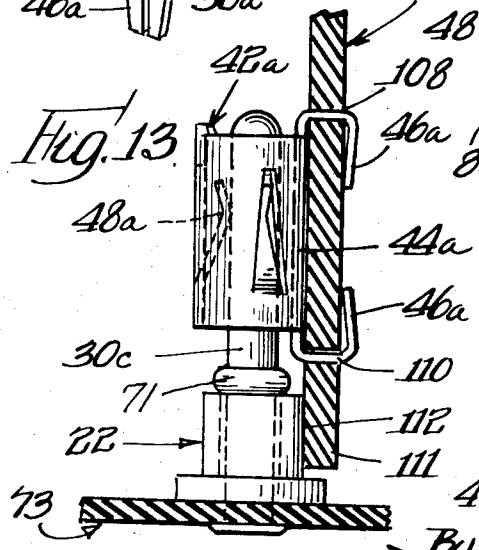

Fig. 14.

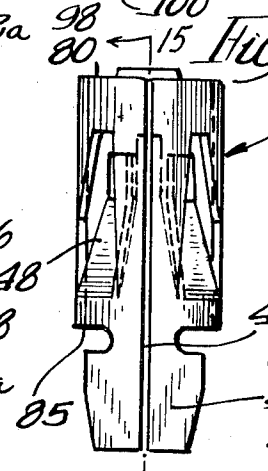

Fig. 15.

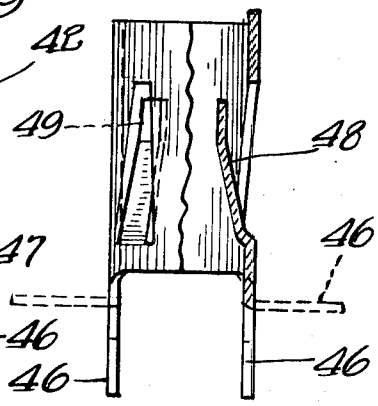

Fig. 16.

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MODULAR ELECTRICAL CONNECTOR ASSEMBLY

BACKGROUND OF THE INVENTION

This invention relates generally to electrical connector devices and more particularly to modular electrical connector assemblies for making connections to printed circuit boards or the like.

SUMMARY OF THE INVENTION

It is a general object of this invention to provide a new and improved modular electrical connector assembly which is easily adaptable for making connection to a plurality of circuit boards or the like which may be oriented in various manners with respect to each other.

It is another object of this invention to provide a modular electrical connector assembly of the above-described type which is simple to produce, easy to use, and provides dependable electrical connections.

It is still another object of this invention to provide a modular electrical connector assembly of the last-mentioned type which furnishes a means whereby a plurality of stacked circuit boards may be efficiently interconnected.

Briefly, a preferred embodiment of a connector assembly according to the invention comprises a plurality of male and female terminals. The female terminals are hollow, open-ended and have a cylindrical shape. They are capable of being mounted individually on a printed circuit board with the male terminal receiving ends thereof positioned at one of two angles relative to the board through apertures therein, and are thereby connected to correspondingly apertured printed conductors. A like number of male terminals are individually, removably mounted in an insulative block, which, in one embodiment thereof, may be snapped into an opening in a printed circuit board or chassis, and which are likewise cylindrically shaped and dimensioned so as to be inserted into the female terminals from either end of the latter. The opposite ends of the male terminals may be terminated such as, for example, in a V-shaped solderless wrap or a crimp connect type ending.

DESCRIPTION OF THE DRAWINGS

A better understanding of the present invention and its organization and construction may be had by referring to the description below in conjunction with the accompanying drawings wherein:

FIG. 1 is an exploded, fragmentary perspective view of a modular connector assembly according to the invention, being used to make connections from a printed circuit board to a chassis or mounting plate of an electrical or electronic unit;

FIG. 2 is a side sectional view of the assembly of FIG. 1 as shown in an assembled condition;

FIG. 3 is a top plan view of a portion of the assembly of FIG. 2 taken along the line 3–3 thereof;

FIG. 4 is an end view of another embodiment of the modular connector assembly according to the invention including a modified male connector housing or block;

FIG. 5 is a side partial sectional view of still another embodiment of the modular connector assembly according to the invention for use in interconnecting a plurality of stacked printed circuit boards;

FIG. 6 is an end partial sectional view of the embodiment of the modular connector assembly of FIG. 5 including a modified male connector housing or block;

FIG. 7 is an enlarged side sectional view of a single connection of a modular connector assembly according to the invention, illustrating the manner in which the male and female terminals are interconnected;

FIG. 8 is an enlarged end sectional view of the connection of FIG. 7;

FIG. 9 is a side sectional view of a single male and female connection of a modular connector assembly according to the invention shown accommodating still another connector terminal;

FIG. 10 is a perspective view of one embodiment of the female connector terminal;

FIG. 11 is a top plan view of still another embodiment of the modular connector assembly according to the invention shown interconnecting a pair of connector bores in an edge-to-edge relation;

FIG. 12 is a side view of the modular connector assembly of FIG. 11;

FIG. 13 is a side sectional view of yet another embodiment of a modular electrical connector assembly according to the invention using a female connector terminal of the type shown in FIG. 12;

FIG. 14 is a side view of a female terminal used in a modular connector assembly embodiment of the type shown in FIG. 1 of the drawings;

FIG. 15 is a cross-sectional view of the female connector terminal of FIG. 14 taken along the line 15–15; and

FIG. 16 is a top plan view of the female connector terminal of FIG. 14.

DETAILED DESCRIPTION

Referring now to the drawings more in detail, there is shown a first embodiment of a modular electrical connector assembly 20 according to the invention in FIG. 1 thereof. The connector assembly 20 comprises a male terminal block 22 formed of a plastic insulating material such as, for example, nylon. The male terminal block comprises a lower base 24 having a plurality of raised, integrally formed interconnected bosses 26 extending therefrom. Each of the bosses 26 includes an aperture 28 therein for receiving a male terminal 30. The terminal block 22 includes a pair of sidewalls 32 from which there extends a plurality of mounting tabs 34 which serve to attach the terminal block within an aperture 36 in a chassis, mounting plate, or the like 38. As can be seen by the male terminal block 22 shown at the extreme right of FIG. 1, the mounting tabs 34 are slipped about a portion of the chassis or plate 38 to secure the male connector thereto. The male terminals 30 as shown herein include terminating ends 40 of the solderless wrap type. This particular solderless wrap ending will be described in more detail hereinafter.

The female terminals 42 of the connector 20 comprise a circular cylindrical barrel or housing 44 which is constructed of a one-piece rolled metal sheet having a seam or separation 47 extending the length thereof and including, formed integrally therewith, a pair of tabs 46 and a plurality of resilient inwardly bent, spaced apart contacts 48 cut or stamped from the housing 44 of the terminal. The tabs 46 extend through an aperture 54 in the printed circuit board and are bent to a position parallel to and engaging the opposite surface 56 of the printed circuit board where they are solder connected to printed conductors 58 located on surface 56 and terminating at apertures 54.

While both the male and female terminals are used separately and independently, each type may be formed in a chain and may be individually severed therefrom as required. The modular connector of FIG. 1 is illustrated in FIG. 2 as it appears in a connected state. As can be seen in this figure, the male terminals are received in the open-ended female terminals and are mechanically and electrically connected thereto by means of the resilient inwardly bent contacts 48. It will be noted that the male connector terminals 30, which will be described in more detail hereinafter, are flared outwardly near the connector block 22. Thus, upon the insertion thereof into the female terminals 42 mounted on printed circuit board 52, a space 58 is provided therebetween, in that the circuit board rests on these flared portions 60 of the male terminals. The provision of a space 58 provides adequate electrical clearance and allows adequate air circulation between the chassis and printed circuit board to prevent heat buildup in components mounted on the latter.

With reference to FIG. 3 of the drawings, which is a top plan view of the modular connector assembly of FIG. 2, the manner in which the male terminals 30 are both mechanically and

electrically connected to the female terminals 42 will be seen. The contacts 48 are pressed against terminals 30, assuring an adequate connection therewith. In addition, the figure shows how tabs 34 grip the chassis plate 38 to secure the male terminal block 22 thereto.

As shown in FIG. 4, the block 22 includes an integral arm 60 which extends upwardly from a sidewall 62 thereof and into an aperture 64 provided in the printed circuit board 52 so as further to secure the block 22 and printed circuit board to each other. The arm 60 at the free end thereof, includes a locking bayonet lug 66 which, after entering aperture 64, protrudes over and engages the printed circuit board, locking the board and chassis together.

An alternative embodiment of the modular connector assembly is shown in FIG. 5. This embodiment is provided for interconnecting stacked printed circuit boards as well as connecting the boards to external circuitry (not shown). The female connector terminals 42 are like those shown in the previously discussed figures; however, the male terminals 30*a* and 30*b* are elongated to accommodate a plurality of printed circuit boards 52, 53 in a stacked or sandwiched relation. The terminals 30*a* and 30*b* are, like the terminals 30, mounted in a terminal block 22 of a plastic insulating material, and the female terminals are individually secured to the respective printed circuit boards in the manner shown in FIG. 1. Because the female terminals 42 are open at both ends thereof, the male terminals 30*a* are able to pass through and beyond the female terminals to be interconnected with additional female terminals mounted on another printed circuit board therebeyond.

The male terminals, as shown in FIG. 5, need not be of the same length. If, as in the case of male terminal 30*b*, the connection is only to a first level of printed circuit boards 52, then the male terminal 30*b* need only be as long as is required to make the connection. The male terminals when used in the stacked arrangement are secured in the block 22 by a bead or collar 71, and the block is connected to a support base or board 73 by the flanged ends 74 of the male terminals which are formed as shown in FIGS. 5 and 6 by a riveting or the like process. The board 73 provides a base for the stacked printed circuit board arrangement.

The stacked printed circuit board arrangement may be connected to external circuitry (not shown) through female connectors, such as 70, which can be slipped over the ends 31 of the male terminals and which are connected at the other end thereof to a lead wire 72 extending to the external circuitry. A female connector 70 may be used whether or not a female terminal 42 is connected at the end 31 of a male terminal, such as 30*a*.

Looking at FIG. 5, the leftmost male terminal 30*a* has connected, at the end 31 thereof, a female connector 70, but is not connected by means of a female terminal 42 to the printed circuit board 53, whereas the male terminal 30*a* which is to the left of the rightmost terminal connections of FIG. 5, includes a female terminal 42 which serves to connect the male terminal 30*a* to the printed circuit board 53 as well as being connected to an external circuit by means of terminal connector 70. In the latter case, the terminal connector is slipped over the male terminal end 31 between the contacts 48 of the female terminal 42 and the male terminal 30*a*. In the former case, however, where no female terminal 42 is provided, it is advantageous to provide a second bead or collar 71 at the "base" thereof (adjacent printed circuit board 53) to insure good electrical contact between the connector 70 and the male terminal 30*a*. The bead, as will be seen, may be used even when the female terminal is also used, if desired. This will be explained in greater detail hereinafter.

It should be noted that the terminating ends 74 of the male terminals of FIGS. 5 and 6 do not include an external connector element but, as explained above, are attached to a support member 73 which serves as a base for the stacked printed circuit boards. If, however, the stacked circuit board arrangement is mounted in an aperture in a chassis, such as in FIG. 1, the terminating end 74 would then be eliminated and terminating ends, such as shown in FIG. 2, could be substituted therefor.

FIG. 6, which shows a side view of the arrangement of FIG. 5, illustrates the mounting arm 60, similar to the one of the embodiment of FIG. 4, which has a locking lug 66 at the free end thereof to be inserted into an aperture 64 in the first stacked printed circuit board 52 more firmly to support the printed circuit board arrangement. The arm 60 takes up a portion of the load of the stacked boards, so that the male terminals 30*a* will not be damaged due to excessive weight applied thereto.

Structural details of the male and female terminals comprising the embodiment of FIGS. 1—4 of a modular terminal connector according to the invention are shown in FIGS. 7 and 8. The male terminal 30 is formed of a single sheet of resilient metal. The terminal end 31 is formed by rolling the sheet metal into a circular, cylindrical shape. This accounts for the seam or separation 75 (FIG. 7) extending the length of the terminal end 31. It will be noted that the extreme tip 76 of the terminal end 31 is rounded for easy insertion thereof into a female terminal 42. The central portion of the male terminal 30 includes a pair of wings 78 which serve to position and to limit insertion of the male terminal in the aperture 28 in the terminal block 22. This particular embodiment of the male terminal also includes a pair of downwardly and outwardly extending strips 79 which, after the male terminal 30 is inserted from the lower surface 77 of the block into aperture 54 in printed circuit board 52, and extends therethrough, open to prevent the terminal 30 from being retracted therefrom.

The terminal 30 may be released from aperture 28, however, by manually pinching the strips 79 toward the terminal end 31 and withdrawing the terminal 30 at surface 77 of the block from the aperture. The terminating end 40 of the male terminal 30 as shown herein is V-shaped to provide a solderless wrap connection thereto. Being of resilient material, the V-shaped terminal end will be compressed upon wrapping with wire. The resilient V-shaped end, in attempting to resume its original condition after being wrapped, will cause the solderless wrap connection to be more securely maintained to insure a good mechanical and electrical connection therebetween.

The female terminal 42, like the male terminal, is formed from a sheet of metal and is rolled into its circular cylindrical shape. The tabs 46, in this embodiment extending from one end of the terminal from opposite sides thereof, are integrally formed with the housing 44 and are, after being received in an aperture 54 in a printed circuit board, bent outwardly from the housing 44 to secure the terminal to the printed circuit board. A seam 47 extends the length of the terminal into one of the tabs 46 and provides a desirable degree of resiliency when inserting the tabs into an aperture and upon receiving a male terminal. As mentioned above, a plurality, preferably three, of resilient contact strips 48 are formed from housing 44 and extend inwardly thereinto toward the center thereof mechanically to grip and electrically to connect the female terminal to the male terminal inserted thereinto. Each contact strip 48, it will be noted, is reversely bent near the free ends thereof to form a contact section 49 so that the contact strips may easily engage a male terminal 30 inserted from either open end 80 or 82 thereof. The section 49 also acts as a cam surface for a male terminal being inserted from end 80 of the female terminal 42.

The connector arrangement of FIG. 9 is like that of the leftmost configuration in the stacked printed circuit board arrangement of FIG. 5. It is shown in an enlarged form so that the component parts thereof may be described in greater detail. The female connector 70 is placed over the end 31 of the male terminal 30*a*. The connector 70, also having a circular cylindrical shape with a separation or seam 84 extending the length thereof, fits tightly over the terminal 30*a* to make both a mechanical and electrical connection therewith. The free end 85 of the connector 70 is flared outwardly to assume

a position about the collar or bead 71 of the terminal 30a, having aided in telescoping with male terminal 30a. The connector 70 likewise makes an electrical connection with the female terminal 42 through the resilient contacts 48 of the latter. Because the connector 70 is inserted from end 80 of the female terminal 42, reversely bent sections 49 serve as cam surfaces to allow the connector 70 to be inserted between the contacts 48 and the male terminal end 31 with little effort.

Another embodiment of a female terminal 42a is shown in FIG. 10 of the drawings. This embodiment includes, like the embodiment of FIGS. 1—9, a circular, cylindrical housing 44a of rolled sheet metal having a seam or separation 47a extending in a direction perpendicular to the axis thereof with a plurality of resilient contacts 48a formed therefrom and extending into the center of the housing. The terminal likewise includes a pair of mounting tabs 46a which are integrally formed with the barrel or housing 44a. Tabs 46a, however, unlike those of the female terminal embodiments discussed heretofore, extend from opposite ends of the terminal, normally at an angle of 90° to the axis of the cylindrical terminal 42. Thus, the female terminal 42a is able to be mounted on a printed circuit board with the central axis thereof substantially parallel to the plane of the printed circuit board, as shown in FIGS. 11—13.

Referring to FIGS. 11 and 12, there is shown therein a plurality of female terminals 42a, some of which are connected to each of a pair of printed circuit boards 86 and 88. Each of the terminals 42a is mounted, as shown in FIG. 12, by extending the tabs 46a thereof through a pair of spaced-apart apertures 90 which extend through the printed circuit board, and at least one of which extends through a conductor, each of which is designated by the numeral 92 printed on one surface of the board. The printed conductors 92 are located on the lower surface 94 of the printed circuit boards 86 and 88 (FIG. 11) and the tabs 46a are, like tabs 46 of the previously discussed female terminal embodiment, bent over to secure the terminal to the board and at the same time make an electrical connection with the conductors. The tabs 46a are soldered to the conductors to insure an adequate connection.

In the particular modular connector configuration of FIGS. 11 and 12 a male terminal 96 in the form of a straight, cylindrically shaped tube is used to interconnect the female terminals 42a on board 86 with those on board 88, thereby to interconnect the circuitry or components (not shown) mounted on the respective printed circuit boards. The printed circuit boards 86 and 88 also include edge reinforcements 98 and 100 which are slipped over and snapped onto the mating edges of the printed circuit boards, so that when the boards are brought together thereat, the edge connectors contact each other to brace the boards and protect the edges thereof. The edge reinforcements 98 and 100 are held in an interconnected abutting relation by means of the female and male terminals 42a and 96 of the printed circuit board configuration. The terminals 42a, as can be seen in FIG. 12, are not resting on the board but are elevated therefrom. Lateral projections 50a thereof prevent the tabs from being inserted completely into apertures 90. A plurality of insulating tubes each designated 95 has been provided to prevent short circuiting between the terminals 96 and the edge reinforcements 98 and 100. These tubes 95 are interconnected by a webbing 97 to provide a terminal block 120 which allows for the handling of all the male terminals 96 inserted therein as a unit when interconnecting the boards as described.

The male terminal 96, like those of the previously discussed embodiments is formed from a rolled sheet of metal and is rounded at each end 102, 104 thereof for easy insertion into female terminals 42a. The female terminals 42a include resilient contacts 48a formed in the housing or barrel 44a thereof which both electrically and mechanically connect male terminals 96 thereto.

Printed circuit boards can be mounted at right angles to one another with the female terminals 42a, as shown in FIG. 13. The female terminal 42a has been mounted on a printed circuit board 106 through a pair of apertures 108 and 110 extending therethrough. In this figure, the barrel 44a lies flat against the printed circuit board with little or no space therebetween. The tabs 46a have been bent over to secure the terminal on the board. The male terminal portion of the arrangement comprises a terminal like that shown in FIG. 5, wherein a printed circuit board 73 is used as a base support for the terminal block 22 which includes a plurality of male terminals 30c mounted therein. These terminals 30c illustrate still another embodiment of a male terminal according to the invention. These terminals include beads or collars 71 which are not imbedded in the block 22, but instead are located outwardly therefrom and serve as stops to prevent the male terminals 30c from being driven too deeply into the block 22, since the terminals 30c carry more of a load (the printed circuit board 106). The circuit board 106, it will be noted, is mounted at right angles to the printed circuit board 73. It will be noted that the end 111 of board 106 extends downwardly adjacent block 22 and is held thereagainst at the side 112 thereof to further support the board 106.

Turning now to FIGS. 14—16, there is shown in an enlarged and more detailed view the female terminal 42 according to the invention as originally described. As explained above, the terminal is formed of a single sheet of resilient metal which has been rolled into a circular, cylindrical shaped barrel or housing 44 and therefore includes a seam or separation 47 running the length thereof. Three resilient tangs or contacts 48 are stamped or cut from barrel 44 for electrically and mechanically connecting the terminal 42 to a male terminal, such as has been described above. The terminal has formed integrally therewith a pair of tabs 46 which, by being inserted into an aperture, or apertures, in a printed circuit board or the like and being bent upwardly, as shown in dotted lines in FIG. 15 beneath the board, serve to secure the terminal 42 thereto as well as, after being soldered, electrically connecting the terminal to a conductor printed on an adjacent surface of the board. The female terminal 42 is open at both ends, making it possible to receive therein a male terminal from either end thereof.

As shown in FIG. 16, the three contacts or tangs 48 converge near the center 116 of the cylindrical terminal 42, so that a male terminal (not shown) being inserted into the female terminal is mechanically held between the three contacts to make a good electrical contact therewith. Because of the provision of three converging contacts 48, the female terminals advantageously may accept wide tolerance variations in the male terminals' location and therefore insure an adequate connection therebetween. As mentioned heretofore, the upper sections 49 of contacts 48 are formed by reversely bending the contacts. This insures a good electrical connection between the terminals and an ease of insertion of the male terminal from either end 80 or 85 of the female terminal.

Thus, the modular terminal connector comprising the female terminal embodiments and male terminal embodiments, as discussed, provide an assembly whereby printed circuit boards may be interconnected or connected to external circuitry easily and efficiently. The connections are quickly removable and may be changed, if necessary. They are easy to work with and ideal for use in radio or television sets; office equipment, for example, computers, calculators, etc.; tape recorders; musical instruments, including amplifiers, etc.; communications equipment; testing equipment; and many others.

While particular embodiments of the invention have been shown and described, it should be understood that the invention is not limited thereto, since many modifications may be made. It is therefore contemplated to cover by the present application any and all such modifications

We claim:

1. A modular electrical connector assembly for use in making electrical connections to printed circuit boards, said assembly comprising: a terminal block of insulating material having integrally formed therewith a resilient arm member in-

cluding locking means at the free end thereof for securing said arm in a corresponding aperture in said printed circuit board, thereby mechanically to interconnect said terminal block and said printed circuit board, a plurality of male terminals, said male terminals each being elongated and mounted in a spaced-apart relation in said terminal block and each of said male terminals including a leading and a tailing end portion, the leading end portions of said terminals being in substantially parallel alignment and extending from a first side of said terminal block, said leading end portions each being cylindrically shaped with a blunt leading end for inserting into a corresponding female terminal, and the trailing end portions thereof extending outwardly from a second, opposite side of said terminal block and including electrical connecting means, and a plurality of female terminals, said female terminals each including a hollow, open-ended, cylindrically shaped barrel portion having a plurality of mounting tabs extending therefrom, said tabs being insertable into an aperture in a printed circuit board, thereby to secure said hollow barrel portion to said printed circuit board, said barrel portion including a plurality of resilient contact members extending inwardly thereinto, each of said resilient contact members of each of said female terminals being connected at one end thereof to the wall of said barrel portion with the free ends thereof extending inwardly into and at an angle with respect to the axis of said barrel portion toward a first end thereof, and wherein each said contact member includes, near the free end thereof, a partially reversely bent section, said sections providing camming surfaces for a male terminal being inserted into either end of said barrel portion.

2. A modular electrical connector assembly as claimed in claim 1 wherein said tabs of said female terminals extend from one end of said barrel portion at opposite sides thereof, whereby upon mounting said female terminals to said printed circuit board, the axes thereof are substantially perpendicular to the plane of said board.

3. A modular electrical connector assembly as claimed in claim 1 wherein said tabs of each said female terminal extend from one side of said barrel portion at opposite ends thereof whereby upon mounting said female terminals to said printed circuit board, the axes thereof are substantially parallel to the plane of said board, and wherein the plane of said printed circuit board is substantially parallel to the axes of said male terminals upon the insertion of the latter into said female terminals.

4. A modular electrical connector assembly as claimed in claim 1 wherein said electrical connecting means of the trailing end portions of said male terminals each includes a V-shaped solderless wrap terminal ending and wherein said terminal block includes at opposite ends thereof, means for securing said block in an aperture of a mounting panel.

5. A modular electrical connector assembly as claimed in claim 1 wherein said female terminals are of a one-piece, metal construction with said tabs, said resilient contact members and said barrel portion being integrally formed with each other.

6. A modular electrical connector assembly for use in making electrical connections to printed circuit boards, said assembly comprising: a terminal block of insulating material having integrally formed therewith a resilient arm member including locking means at the free end thereof for securing said arm in a corresponding aperture in said printed circuit board, thereby mechanically to interconnect said terminal block and said printed circuit board, a plurality of female terminals, said female terminals each including a hollow, open-ended, cylindrically shaped barrel portion having a plurality of mounting tabs extending therefrom, said tabs being insertable into an aperture in a printed circuit board, thereby to secure said hollow barrel portion to said printed circuit board, said barrel potion including a plurality of resilient contact members extending inwardly thereinto, each of said resilient contact members of each of said female terminals being connected at one end thereof to the wall of said barrel portion with the free end thereof extending inwardly into and at an angle with respect to the axis of said barrel portion towards a first end thereof, each of said contact members including, near the free end thereof, a partially reversely bent section, said sections providing camming surfaces for a male terminal being inserted into either end of said barrel portion, and a plurality of male terminals, said male terminals each being elongated and mounted in spaced relation in said terminal block and each of said male terminals including a first end having a rolled, cylindrically shaped terminal portion including a blunted leading end for insertion thereof into a corresponding one of said female terminals and the second end having a pair of winged sections which, upon the insertion of the leading end of said male terminal into said terminal block, engages said terminal block to secure said terminal therein, said first end further including two normally outwardly extending members which, upon the insertion of the leading end into said terminal block, are pressed inwardly towards said end, and upon exiting from the opposite side of said terminal block assume their normal position to prevent said male terminal from being removed from said block.