ELECTRICAL CONNECTOR FOR PRINTED CIRCUIT BOARD

FIG. 5

FIG. 6

FIG. 8

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My invention relates to quick detachable multiple unit, electrical connectors that may be applied to chassis boards that have a printed electrical circuit either on one or both sides thereof.

In prior art quick detachable connectors adapted to be joined electrically to a printed circuit board, an indexing member was used which necessitated the removal of two of the electrical terminals. Furthermore, the prior art connectors hereinbefore referred to made no provision for the ready replacement of a broken or defective connector.

It is, therefore, an object of my invention to provide an improved, quick detachable, multiple unit, electrical connector to engage the terminals of a board having printed electrical circuits on one or both sides thereof and which will avoid the above-mentioned difficulties of prior art connectors.

Another object of my invention is to provide a multiple unit electrical connector as aforeaid of unit type construction arranged to permit assembling of units having 6, 8, 10, 12, 20, 30, 36, or 44 contacts thereon assembled as a single unit.

Another object of my invention is to provide a multiple unit printed circuit electrical connector wherein an optional number of flexible electrical contact elements may be utilized.

Another object of my invention is to provide an electrical connector wherein a plurality of electrical contacts are interlocked with a single connector body and a removable insert to definitely secure the electrical contact elements in spaced relationship to each other along the connector body as well as along the printed circuit terminals on the chassis board.

Another object of my invention is to provide an electrical connector in which the electrical contacts are spaced by an insert that locates and secures the electrical contacts in a predetermined position against transverse and longitudinal movements.

Another object of my invention is to provide an electrical connector wherein the parts are self-locking so that additional securing means are not necessary.

Another object of my invention is to provide an electrical connector for a printed circuit that permits the ready removal of one or more of the electrical contacts for renewal or for repair.

Another object of my invention is to provide an indexing or aligning member for a multiple connector adapted for use on a printed circuit board wherein the terminals on the connector are all available for use when the indexing or aligning member is employed.

Another object of my invention is to provide an indexing or aligning member for a multiple connector adapted for use on a printed circuit board wherein there is no necessity of removing any of the contacts or terminals when the indexing member is used.

Another object of my invention is to provide an electrical connector adapted for use on a printed circuit board wherein the terminals or contacts are in wiping engagement with the printed circuit when the connector is attached to or detached from the circuit board.

Another object of my invention is to provide a key insert for a multiple electrical connector, the key providing for definite indexing of a particular multiple connector with relation to a printed circuit chassis board for the proper polarization of the circuits.

Another object of my invention is to provide a quick detachable connector for a printed circuit board, the connector having a body or casing and an insert, and wherein the electrical terminals are self-supporting upon the insert, the terminals being flexibly supported to insure a good electrical contact.

Another object of my invention is to provide a quick detachable connector for a printed circuit board wherein the connector body, its electrical terminal insert, and the electrical terminals will be self-locking and will not be loosened, disturbed, or misaligned by vibration or shock.

Other objects of my invention are to provide an improved device of the character described which can be easily and economically produced, which is sturdy in construction, and which is highly effective in operation.

With the above and related objects in view, my invention consists in the details of construction and combination of parts, as will be more fully understood from the following description, when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view of two quick detachable connectors according to the present invention mounted upon a panel, one of the connectors being shown with a printed circuit chassis board inserted within the connector, and the other quick detachable connector being shown with a printed circuit chassis board about to be inserted therein.

Fig. 2 is an enlarged, sectional view taken along line 2—2 of Fig. 1.

Fig. 3 is a fragmentary, elevational view taken along line 3—3 of Fig. 2.

Fig. 4 is a sectional view taken along line 4—4 of Fig. 2.

Fig. 5 is an enlarged, sectional view taken along line 5—5 of Fig. 1.

Fig. 6 is an enlarged, sectional view taken along line 6—6 of Fig. 1.

Fig. 7 is an enlarged, exploded, partly broken away, perspective view of one of the connectors of Fig. 1.

Fig. 8 is a fragmentary, sectional view showing the indexing key in place in the connector.

Referring now in greater detail to the drawings, wherein similar reference characters refer to similar parts, I show a printed circuit connector embodying my invention and comprising a molded insulating body, generally designated A, a plurality of electrical contacts or terminals, each of which is generally designated as B, and an insulator insert, generally designated as C, of insulating material upon which the contacts B are mounted. The insert C and terminals B are arranged to be inserted within the body A to position and secure the electrical contacts in place within the body A. An indexing or keying member of insulating material, generally designated as D, is also carried by the insert C for a purpose presently to be set forth.

The printed circuit connector is adapted to be mounted upon a panel 8 having a rectangular hole 10 into which the body A is inserted, see Fig. 1. The connector is fixedly held to the panel by a plurality of securing bolts 15 which pass through bolt holes 14 in the connector body.

A printed circuit board, generally designated E, with different printed circuit strips 16 on either one or on
both sides thereof, is constructed to be received between the electrical contacts C of the printed circuit connector. The printed circuit traffic, 16 on the board E, terminates at one edge of the board and are electrically connected to electronic devices (not shown) mounted or printed upon the printed circuit board E.

The printed circuit connector, hereinafter generally described, is adapted to be slipped onto the edge of the printed circuit board E at which the insert 14A abuts against the shoulders 43 which will be referred to more particularly hereinafter. Each spacer C2 of the insert has a vertical wall 46 which prevents the terminals located on adjacent terminal supports C1 from engaging adjoining terminals B on the insert. The vertical wall 46 is as long as, but of greater depth than, the printed circuit traffic 16 terminate and merges at right angles with a flat surface 48, an offset surface 50, and an end surface 52.

At this point, it should be noted that the surfaces 50, 52 along each side of the insert spacers C2, C2 are in the same plane and are adapted to substantially engage the printed circuit traffic 16 terminate. The connector body is interlocked with the terminals B and the insulator insert C in a manner shortly to be described, thereby preventing the insert C from wobbling in a transverse direction. The free sides surfaces of the end terminal supports C1, C1 abut against the walls 22, 22 to prevent longitudinal wobbling of the insert and its terminals in the connector body A.

Each integrally stamped electrical contact or terminal B is made of resilient material and is mounted on a terminal support C1 of the insert C, has a free end 54 to which a wire may be soldered or crimped. It has a branch 56 connected to an offset 58. The offset 58 is connected to a semi-circular portion 60 which then terminates into a contact surface 62 which is substantially parallel to, but spaced from, the offset portion 58 of the terminal. The end 64 of the contact surface 62 is curved inwardly toward the portion 58 has an offset arm 66 which is adapted to lock the terminal against the connector body A by virtue of the arm 66 engaging the straight portion 18 of one or the other of the ledges 17, see Figs. 5 and 6. It is to be noted that each terminal B is laid upon one of the terminal supports C1. Figs. 5 and 6, the construction of the terminal being such that the end 64 is adapted normally to abut against a tapered shoulder 43 and to extend toward a curved edge 42 of the insert C, the terminal supporting itself upon the terminal support C1. The assembled insert C and the terminals B thereon are mounted as a unit within the body A by inserting the assembly into the cavity 11 from the left as seen in Figs. 5 and 6. When this unit or assembly has been pushed far enough into the connector body A, the holding arms 66 engage the straight edges 18 of the ledges 17, as in Fig. 5, to prevent the insert and the connectors B from moving in the opposite direction and being withdrawn, while the curved edges 19, abutting the branch or uncinated portions 56 of the terminals B, prevent the terminals B and the insert C from being moved further in the first or assembly insertion direction. As seen from Figs. 5 and 6, when the assembly B is in place within the body A, the terminals are held between the terminal supporting walls 36B, 36B and the side walls 12A, 14A, respectively, of the connector casing or body A. Since the contacts B are resilient, pressure can be applied to the contact surfaces 62 to cause the contacts to flex. Such pressure is applied when a printed circuit board E with printed circuit strips 16, 16 thereon is inserted between, and brought into engagement with, the terminal contact surfaces 62. The tapered surfaces 12A and 14A on the connector body permit the terminals B to flex, yet also limit the degree of the flexing.

As each terminal engaged by the printed circuit board E is flexed, its curved end 64 is moved away from the associated, tapered edge 43 of the terminal support C1 against which the end 64 normally abuts. The relief afforded by the curved edges 42 permits this.

The terminals B, being supported between the walls 36B, 36B of the terminal support C1 and the side walls 12A, 14A of the connector body, have great flexibility from the vertical walls 40, see Figs. 5 and 6, to the curved ends 66 whereby good electrical contact may be made with the conductive strips 16. The terminal portions 58 and 62, which overlap one another, may flex upwardly, downwardly, or closer to one another, as viewed in Figs. 5 and 6.

The indexing or keying member D, Figs. 7 and 8, com-
prises an insulating member having tapered sides 70, 72 which abut against the walls 12A, 14A of the connector body A. The indexing member D is of a thickness to fit between adjacent pairs of terminals B (see Fig. 1) and to engage one or another of the spaces C2 of the insert C in the same plane therewith and in extension thereof.

An extension 74 on the indexing member D fits between the spaces 50, 50 of the insert. The sides 76, 78 of the indexing member D each have a pair of rounded dimples 80 which fit within the interior of the loop-like portions 69 of the terminals B so that the indexing member will not fall out.

The indexing member D aligns the connector with the printed circuit conductive strips D by interfitting or telescoping with a slot 82 in the printed circuit board E.

The indexing member D enables each connector to be keyed to a particular printed circuit board.

Although my invention has been described in considerable detail, such description is intended as being illustrative rather than limiting, since the invention may be variously embodied, and the scope of the invention is to be determined as claimed.

I claim as my invention:

1. An electrical connector comprising: a body having a passageway therebetween, a ledge on one wall within said passageway, said ledge having a curved outer surface, a straight surface connecting the end of the outer curved surface with said one wall, an insert having an outer bounding surface of substantially the same configuration as said one wall and said curved surface of said ledge, and a flexible terminal held between said connector body and said insert, said terminal having a curved portion positioned between the curved portion of said ledge and said insert and an outwardly projecting portion abutting said straight surface of said ledge to lock said terminal, said insert, and said body together.

2. An electrical connector for use with a printed circuit board having a printed conductor thereon, said connector comprising a body having a pair of walls with a passageway therebetween, a ledge on one wall within said passageway, said ledge having a curved outer surface, a straight surface connecting the end of the outer curved surface with said one wall, an insert having an outer bounding surface of substantially the same configuration as said one wall and said curved surface of said ledge, and a flexible terminal held between said connector body and said insert, said terminal having a curved portion positioned between the curved portion of said ledge and said insert and an outwardly projecting portion abutting said straight surface of said ledge to lock said terminal, said insert, and said body together, said flexible terminal also having a flat surface adapted to have wipping engagement with said printed circuit conductor when the connector is attached to or detached from said printed circuit board.

3. A printed circuit connector comprising a connector body of insulating material having a cavity adapted to receive a printed circuit board, an insert removably mounted in said cavity, said insert having alternate relatively narrow terminal receiving portions and relatively wide portions extending beyond said narrow portions, and a plurality of resilient electrical terminals carried by said insert each on a different one of said narrow portions, said wide portions separating adjacent ones of said terminals from each other having a contact portion overlying and spaced from another portion thereof to provide a space therebetween, and each said contact portion terminating in a free end portion, said insert narrow portions including parts adapted to hold a portion of the terminals thereon against said connector body, said insert narrow portions also including extensions protruding into said spaces, and said insert narrow portions further including shoulders against which said free end portions of said contact portions normally abut.

4. A printed circuit connector according to claim 3 wherein each of said insert narrow portions carries a pair of said terminals in opposed relation with the contact portions thereof facing each other and spaced from each other for reception of a printed circuit board therebetween.

5. A printed circuit connector according to claim 4 wherein each of said insert narrow portions also includes a stop portion for limiting the extent of entrance of said printed circuit board between said terminal contact portions.

6. A printed circuit connector according to claim 3 wherein said insert narrow portions are provided with reliefs between said extensions and said shoulders thereof, and wherein said contact portion free end portions are disposed to move freely in said reliefs upon flexure of said contact portions toward the respective portions of said terminals which they overlie.

7. A printed circuit connector for use with a printed circuit board of insulating material having a plurality of printed conductor strips thereon, said connector comprising a connector body of insulating material having a central passageway therethrough to receive said board, a projection on said body extending within said passageway, an insert of insulating material within said central passageway, a plurality of pairs of terminals mounted upon said insert in spaced relation to each other for engaging one of said conductor strips on each side of said printed circuit board, and means on said insert and each of said terminals complementary to said projection to retain said insert and terminals in locked position within said body.

8. The invention of claim 7 including means to keep said terminals spaced and isolated from one another.

9. The invention of claim 7 including an indexing member adapted to be held between the adjacent pairs of said terminals for indexing said connector with reference to one printed circuit board to which said connector is adapted to be connected.

10. The invention of claim 7 wherein each of said terminals is flexible in one direction against an associated printed circuit conductor strip on said printed circuit board, and means to prevent those of said terminals which are on the same side of said printed circuit board from moving towards each other.

11. A printed circuit connector for use with a printed circuit board having a plurality of conductive strips and an indexing slot, said connector comprising a connector body of insulating material having a central passageway therethrough, a projection on said body extending within said passageway, a removable insert within said central passageway, a plurality of terminals mounted upon said insert, means on said insert and each of said terminals complementary to said projection to retain said body, insert, and terminals in locked relation, each of said terminals being flexible and yieldable in one direction against a separate printed circuit conductor strip on said board, means to prevent those of said terminals which are adapted to engage the same side of the printed circuit board from moving towards each other, and an indexing member carried by said insert adapted to be received within said slot for indexing said connector with reference to said printed circuit board.

12. A printed circuit connector for use with a printed circuit board of insulating material having a plurality of printed conductor strips thereon, said connector comprising a connector body of insulating material having a central passageway therethrough to receive said board, a projection on said body extending within said passageway, an insert of insulating material within said central passageway, a plurality of terminals mounted upon said insert in spaced relation to each other for engaging one of said conductor strips on said printed circuit board, and
7 means on said insert and each of said terminals complementary to said projection to retain said insert and terminals in locked position within said body.

13. The invention of claim 12 including means for maintaining said terminals in spaced and insulated relationship from each other.

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