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[54] PRINTED CIRCUIT BOARD CONNECTOR

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[52] **U.S. Cl.** .....**339/186 M**, 339/17 L, 339/221 M

[51] **Int. Cl.** **H05k 1/07**, H01r 13/64

[58] **Field of Search**.....339/17 L, 17 LC, 176 MP, 221 M, 339/184 M, 186 M

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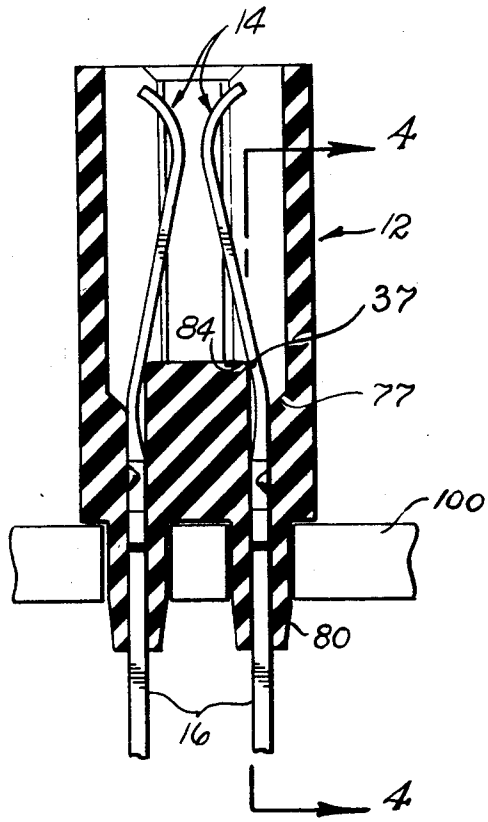
[57] **ABSTRACT**

A printed circuit board connector having a plurality of contacts mounted in the connector housing. The contacts are formed of a spring contact portion having a contacting surface and a terminal portion interconnected by a central mounting portion. The contact is inserted in the housing in an unstressed condition and abuts a housing inner wall member upon partial insertion, the contact being positioned adjacent the inner wall member upon full insertion into the housing with a portion of the contact abutting the inner wall member. The contact surface of the contact is normally adjacent the top end of the housing, remote from the contact portion adjacent the inner wall member. Moreover, the inner wall member may define an edge against which the printed circuit board engages to limit its movement upon insertion of the board into the housing. The contact mounting portion may be provided with means for engaging the housing so as to correctly position the contact in the housing.

4 Claims, 5 Drawing Figures



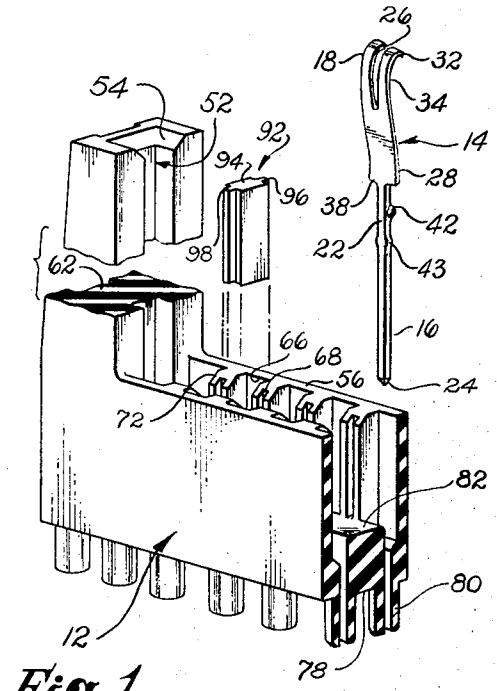


Fig. 1.

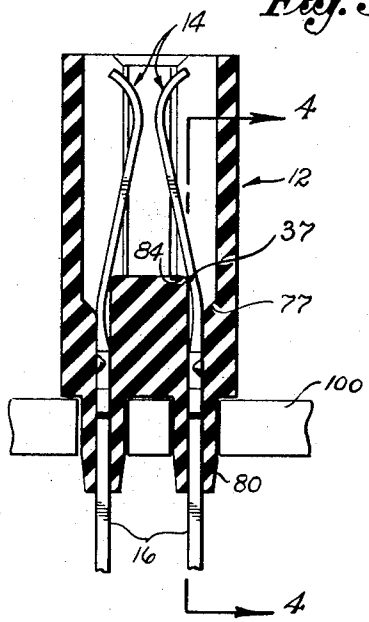


Fig. 3.

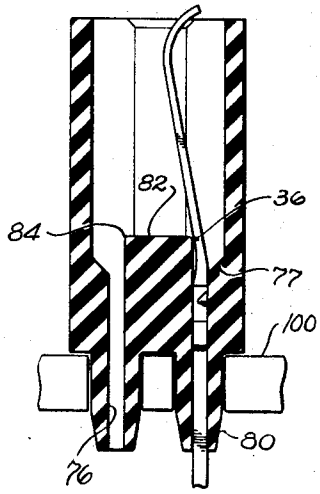


Fig. 2.

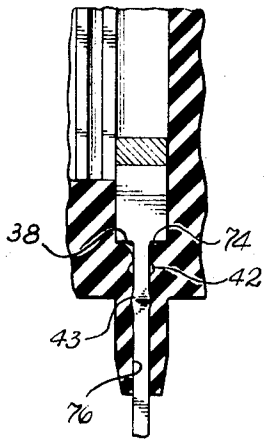


Fig. 4.

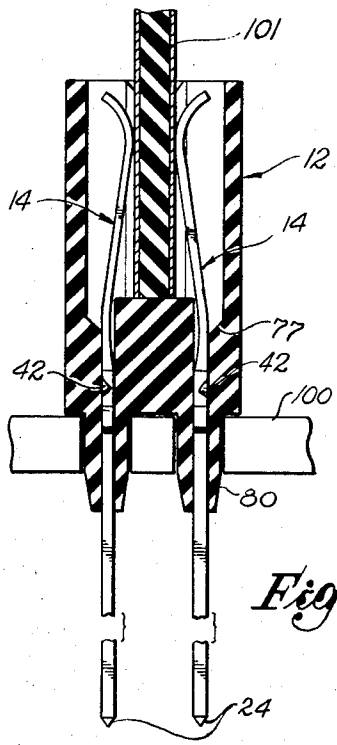


Fig. 5.

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PRINTED CIRCUIT BOARD CONNECTOR

The invention relates in general to printed circuit board connectors and, more particularly, to an electrical contact mounted in a connector which is pre-loaded at the base of the connector.

BACKGROUND OF THE INVENTION

Conventional printed circuit board connectors utilize contacts to electrically connect the printed circuit board connector to electrical equipment or other printed circuit board connectors. Typically, these contacts are pre-loaded at the tip of the contact near the entry in the connector housing where the printed circuit board enters the housing. However, it has been found that damage to the contact would occur if the contact is dislodged because of the exposure of the loaded portion of the contact to external forces. Alternative arrangements for loading the contact to provide the desired contacting force has utilized the insertion of the printed circuit board connector itself to position the contact by movement of the contact so that the desired contact force can be provided. Alternatively, arrangements have been provided wherein an external member acts on the contact after or during the insertion of the printed circuit board into the contact. These arrangements have been found to be complex and rather expensive. Moreover, it has been found that the resultant contacting forces were not as desired.

In order to overcome the attendant disadvantages of prior art printed circuit board connectors, the present invention provides an electrical contact which, upon insertion into the connector, provides the desired pre-load at the base of the contact so that when a printed circuit board is inserted into the connector, deflection of the contact by the board will provide the desired force between the contact and the circuit board conductors. Moreover, the contact can be easily inserted into the connector to the correct desired position with a minimum of effort and skill.

The advantages of this invention, both as to its construction and mode of operation will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings which are to be regarded as merely illustrative:

FIG. 1 depicts an exploded perspective view of a preferred embodiment of an electrical contact prior to insertion of the contact into the connector body;

FIG. 2 shows a cross sectional view of the electrical connector body utilizing the contact of FIG. 1 with the contact partially inserted into the connector body;

FIG. 3 depicts the electrical contact of FIG. 2 fully inserted into the electrical body;

FIG. 4 illustrates the cross sectional view of the connector body and contact as positioned in FIG. 3 taken along the line 4—4 of FIG. 3; and

FIG. 5 shows the connector body of FIGS. 1–4 with a printed circuit board inserted therein.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is shown in FIG. 1 a preferred embodiment of the electrical connector housing 12 having a plurality of electrical contacts 14 which are to be mounted therein. The contacts 14 are formed of a terminal portion 16 and a spring contact portion 18 which are interconnected by a central mounting portion 22. The contacts 14 are preferably stamped from suitable metal stock to provide the desired strength for the metallic contacts. The terminal portion 16 is generally square in cross-section and may be tapered as at 24 to facilitate insertion of the contact into the connector housing 12.

The spring contact portion 18 is shown as bifurcated by means of a slot 26 which opens at the top end of the contact to provide redundant contact points to the printed circuit board conductor as well as multiple frequency of vibrations since each portion is not identical. Normally, the spring portion contains a shank end 28 which interconnects the mounting portion 22 to the bifurcated end of the contact. As shown in the drawing, the spring portion is tapered from the shank portion 28 to the outer end 32 of the contact. By tapering the spring contact portion in thickness upwardly a predetermined spring rate can be provided within the spring portion. The spring portion 18 is bent in a first direction at the shank 28 and then reverse bent in the opposite direction as at 34 in the vicinity of the slot 26 until finally the tip portion terminates at outer end 32. The portion 28 and portion 34 both may be curved along a predetermined radius with the junction of the two portions tangential. The inner side surface of the contact forms the initial point of pre-load with the insulator housing at point 36 on the contact surface, as shown in FIG. 2. Further, the final point of contact, as will be explained hereinafter, is the point 37.

The central mounting portion 22 is of approximately equal thickness as the shank 28 at its junction with the shank, but is of reduced width, thus forming downwardly facing shoulders 38. Further, the sides of the mounting portion contain barbs 42 which extend outwardly and are utilized to affix the contact to the connector housing. Further, directly below the barbs, a slight bulge 43 in the contact provides the desired stability of the contact terminal area when moving the terminal area of the contact through the insulator housing to assure that the terminal area is inserted straight in the housing.

The housing 12 further contains U-shaped openings 52 at the raised top ends of the housing. The openings 52 may have a slight taper as shown at 54 to form a guide for proper insertion of a printed circuit board into the opening. The insulator housing is further formed of a pair of sidewalls 56 and a pair of end walls 62. Positioned along the sidewalls are a plurality of pairs of diametrically opposed U-shaped openings 66. Further, spaced between adjacent U-shaped openings 66 are diametrically opposed slot portions 68. The remainder of the sidewall 62 formed between the U-shaped passageway 66 and the slot portions 68 are wall divider members 72, the U-shaped configurations 66 terminating at a rounded shoulder section 74 with coaxial square formed recesses 76 forming a continuation of the U-shaped passageways 66. The side wall 56 may be tapered as at 77 as it forms part of the passageway 66 so as to provide a lead-in for the contacts 14 during their insertion.

The bottom wall of the insulator housing 78 has extending therefrom a plurality of pairs of cylindrical portions 80 which allow the rectangular recesses 76 to extend beyond the bottom wall portion 78 of the insulating housing. An inner wall member 82 formed above the shoulders 74 forms an integral part of the connector housing and defines an edge against which the printed circuit board engages to limit its movement within the opening 52. The corners 84 of the inner edge 82 define the inner end of the coaxial recess 76.

A polarization key 92 is formed of a generally rectangular central section 94 and a pair of side flanges 96, 98 whose thickness is such that the members 96, 98 may be inserted into the slot 68 so as to provide the correct polarization mating with the printed circuit board. Upon insertion of the polarization key 92 the bottom surface of the central section 94 will rest on the edge 82 at which position the top surface of key will be flush with the top of the connector housing.

The housing 12 has been depicted as being seated on a plane member which may be a ground plane or other support device. If the member 100 is a ground plane, metallic bushings could be provided by removing hub portion 80 and replacing it with a grounding bushing which would electrically connect the terminal portions of the contact to the ground plane.

The contacts are mounted in the connector housing by inserting the contacts with the terminal end 16 being inserted from the top of the connector housing and the edge 32 facing the sidewall of the connector housing. As shown in FIG. 2, the terminal member extends through the recess 76 until the point

36 on the contact surface abuts the corner 84 of the insulator housing. Then the terminal end of the contact is grasped by a suitable tool and the contact further inserted into the connector housing until the shoulder 38 abuts the shoulder section 74 of the insulator housing, thus securely positioning the contact in the insulator housing. During this final insertion of the contact the barbs 42 tend to penetrate the insulator housing and form a tight fit thereon with the insulator housing material flowing around the barbs. The insulator housing is normally made of a thermoplastic material such as Noryl or similar polyprophelene type materials. Moreover, during this final insertion period, the surface 36 is forced against the edge 84 with the accompanying pre-loading of the contact. This pre-loading not only produces the desired given force with which the contact will mate with adjacent conductive surfaces of a printed circuit board 101 as shown in FIG. 5, but also provides the desired and consistent dynamic gap between the diametrically opposed contacts in the housing of the connector.

What is claimed is:

1. A printed circuit board connector formed of a housing having a top end and a bottom end having a plurality of electrical contacts mounted therein, said housing having openings into which said contacts are inserted and an inner wall member formed in said housing intermediate said housing ends;

each of said contacts being formed of a spring contact portion and a terminal portion interconnected by a central mounting portion, said contacts upon partial insertion contacting said housing inner wall member, and said contacts upon full insertion into said housing contacting an edge of said inner wall member to pre-load said contacts; and

each of said spring contact portions having a shank portion curved along a radius in a first direction and a contacting surface portion extending from said shank portion and curved along a radius in a second direction with the junction of said curved portions being tangential, said contacts being fully inserted in said housing and having said shank portion contacting said edge of said inner wall member, said edge being defined by a pair of perpendicular surfaces and forming a contact pre-loading point.

2. A printed circuit board connector in accordance with claim 1 wherein when each of said contacts is fully inserted in said housing the contacting surface portion of said contact is positioned adjacent the top end of the housing and remote from said contact pre-loading point.

3. A printed circuit board connector in accordance with claim 2 wherein the spring contact portion of each of said contacts between the inner wall member and the top end of the housing is free standing.

4. A printed circuit board connector in accordance with claim 1 wherein said inner wall member defines a surface against which a printed circuit board engages to limit its movement upon insertion of the board into the housing.

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