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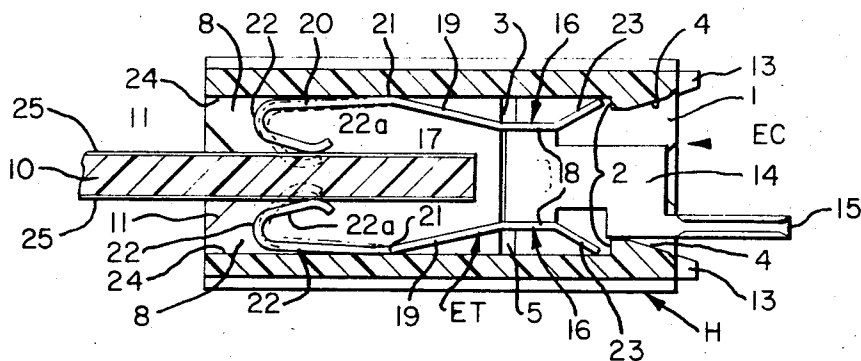
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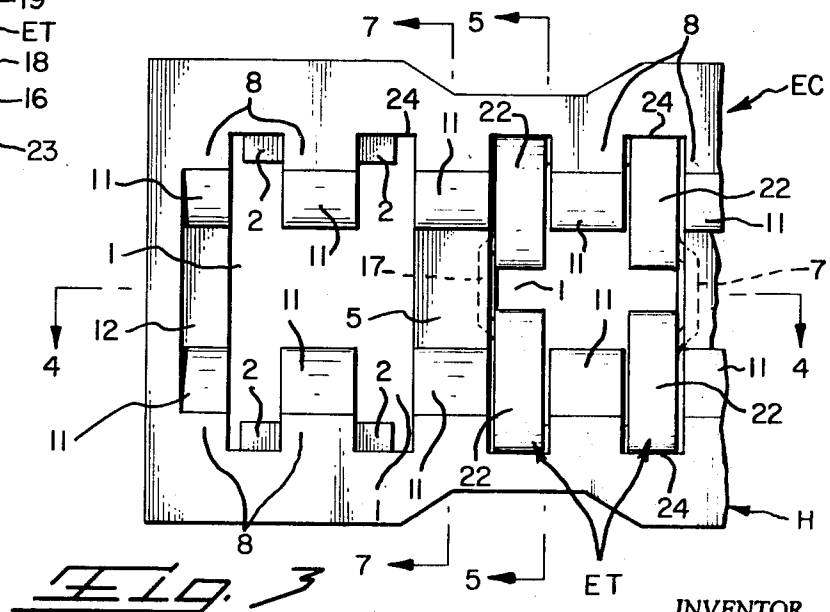
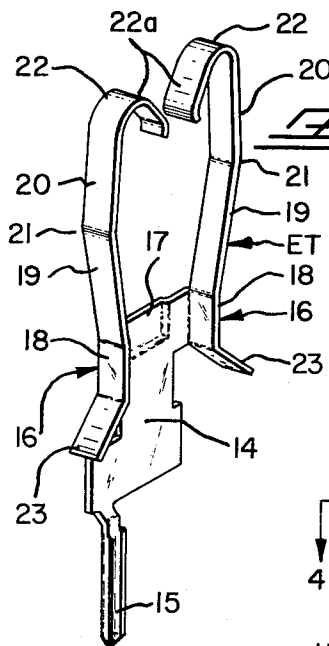
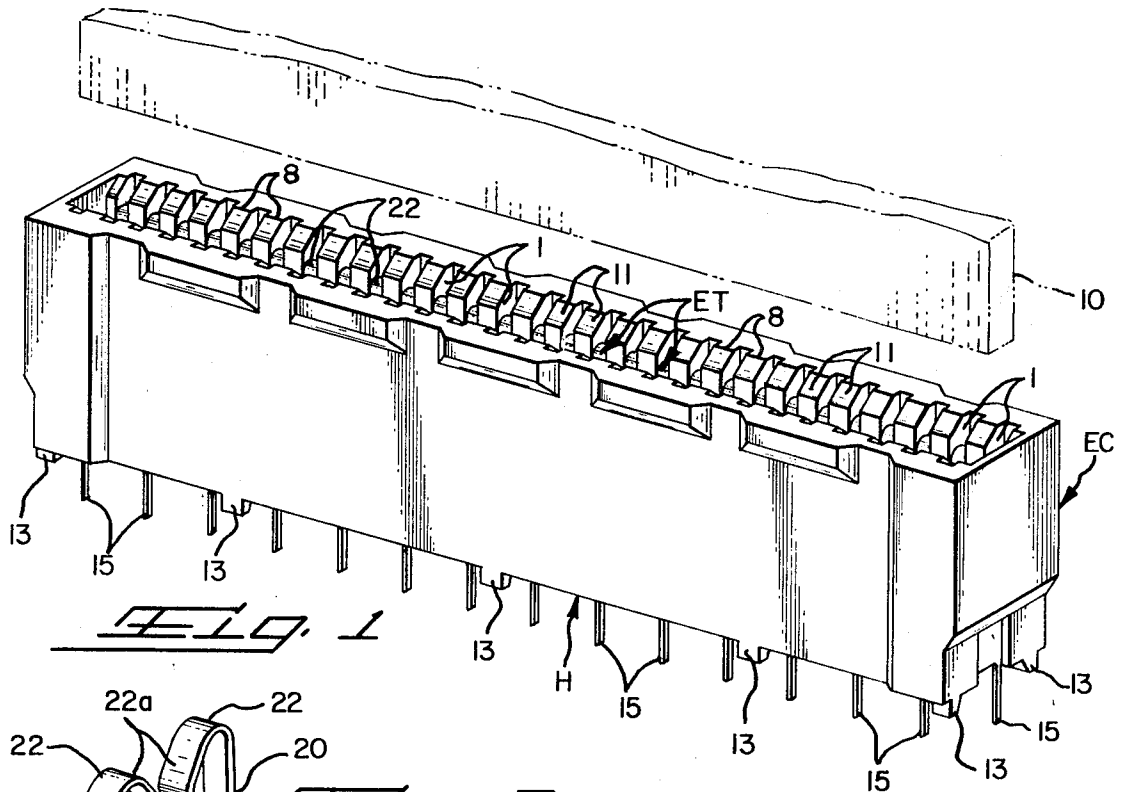
[54] **PRINTED CIRCUIT CONNECTOR**
6 Claims, 9 Drawing Figs.

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H01r 11/22
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ABSTRACT: A printed circuit connector comprises a dielectric housing having an electrical terminal disposed in a passageway thereof. The terminal includes a cantilevered contact arm extending along a passageway wall, the contact arm having a bight in engagement with the wall to provide a point about which an outer section of the contact arm is movable outwardly toward the passageway wall when a hook-shaped conductor-engaging section of the outer section engages a conductive path on a printed circuit board when it is moved within a board-receiving area in the housing.





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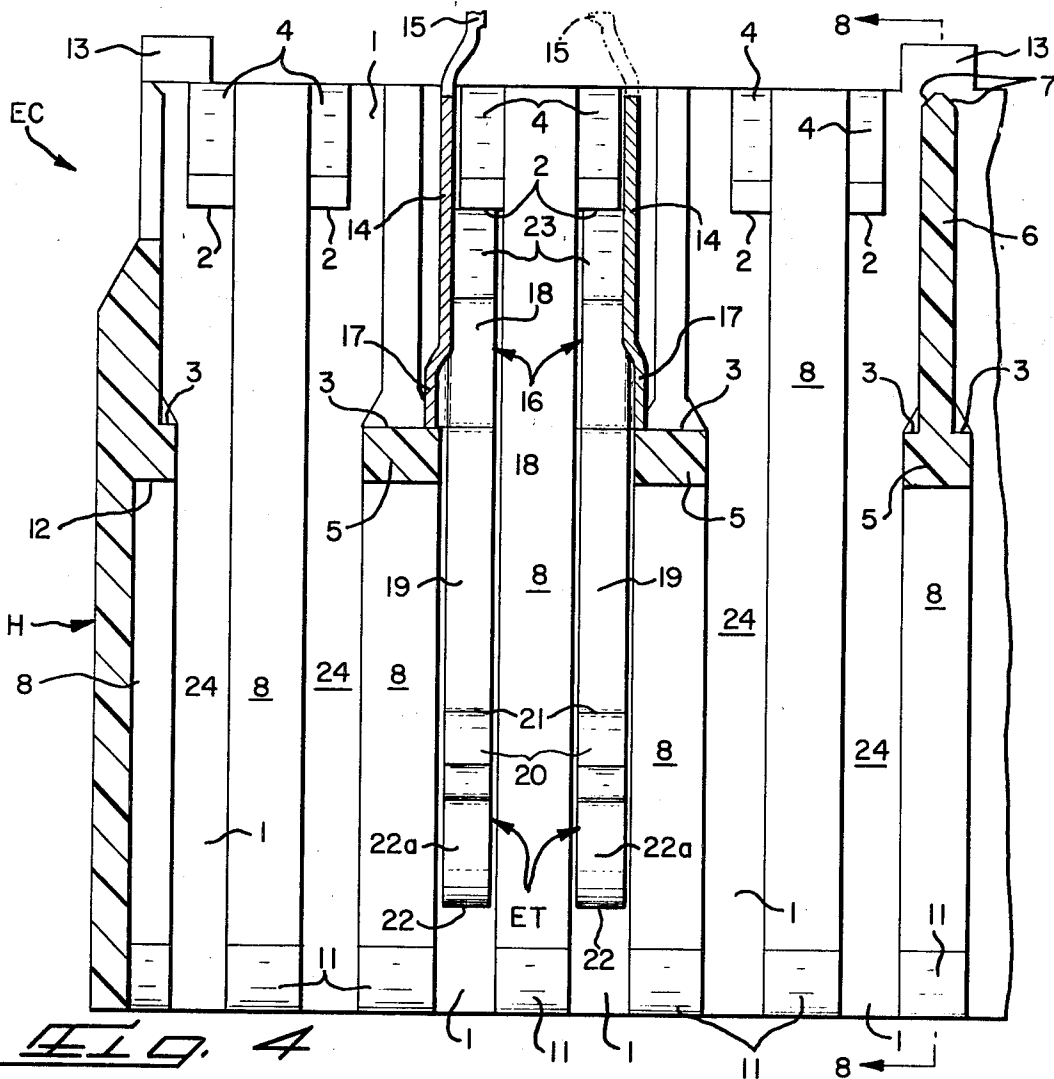


FIG. 4

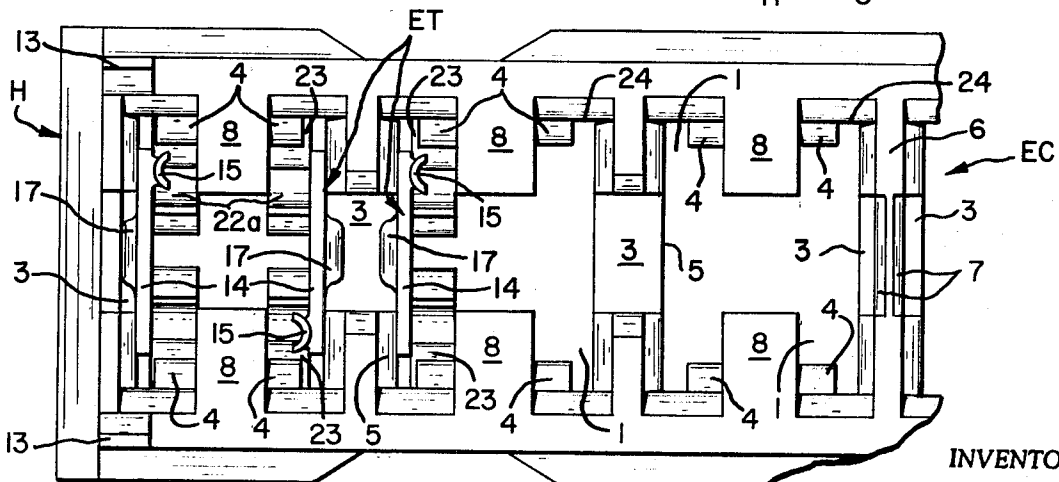
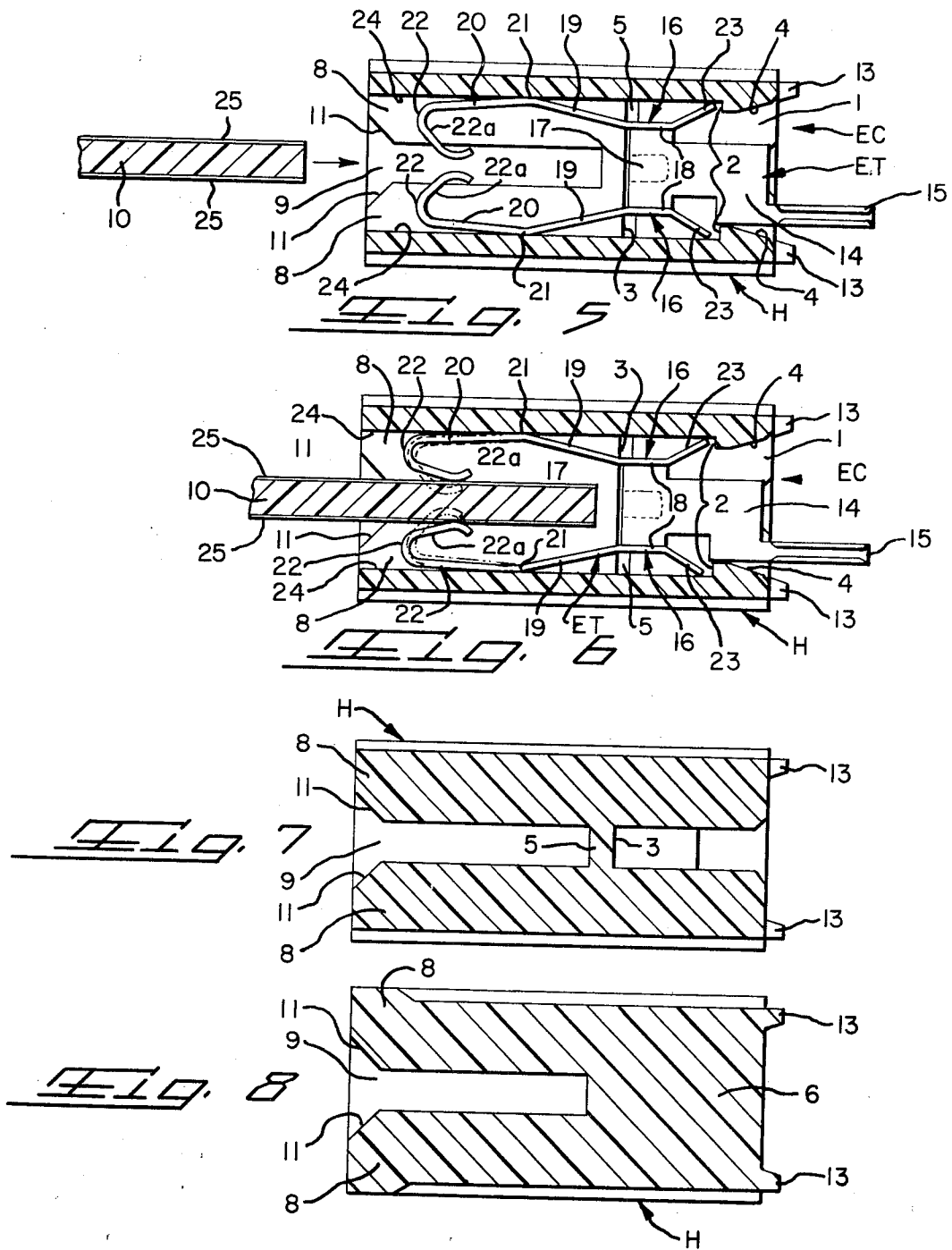


FIG. 9

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PRINTED CIRCUIT CONNECTOR

This invention relates to electrical connectors and more particularly to electrical connectors of the printed circuit board variety.

Many types of printed circuit connectors are in use and have been proposed in view of the enormous use for these connectors and this use increases yearly as more and more electronic applications are being used to perform or control operations heretofore not performed or controlled by electronic application. It therefore becomes important to provide printed circuit connectors that have the important features of being economical and reliable.

An object of the invention is to provide a printed circuit connector having a terminal provided with a cantilevered contact arm which is provided with a bight in engagement with a passageway wall of a housing to define a point about which one part of the contact arm moves away from a longitudinal axis of the contact arm and another part also moves away from the axis when the other part is engaged by a printed circuit board.

Another object is the provision of a printed circuit connector having a hook-shaped spring contact as part of an elongated cantilevered beam which enhances the spring characteristics of the spring contact.

A further object is to provide a printed circuit connector including a cantilevered beam having a hook-shaped spring contact for engagement with a conductive path of a printed circuit board when an edge thereof is inserted within a channel of a housing, the cantilevered beam being sufficiently long to preclude any set taking place therein during engagement of the spring contact with the conductive path.

An additional object is the provision of a printed circuit connector wherein a housing thereof is provided with projection means to engage a printed circuit board when the connector is secured thereon to provide ventilation for the connector.

A still further object is that the terminal fits snugly within sections of the passageway in order that hook-shaped spring contact means are stabilized therein and their movement is guided thereby.

A still further object of the invention is to provide a printed circuit connector having a cantilevered beam provided with an inner section and an outer section having a hook-shaped contact section, the inner section being bent inwardly toward an insertion axis while the outer section is bent outwardly from the insertion axis when an edge of a printed circuit board is brought into engagement with the contact section.

Still an additional object is the provision of a printed circuit connector wherein a wall of a passageway limits outward movement of an outer section of a terminal in the passageway when a hook-shaped contact section is engaged by a printed circuit board.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there is shown and described an illustrative embodiment of the invention; it is to be understood, however, that this embodiment is not intended to be exhaustive nor limiting of the invention but is given for purposes of illustration in order that others skilled in the art may fully understand the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

In the drawings:

FIG. 1 is a perspective view of an electrical connector according to the present invention with part of a printed circuit board in phantom exploded therefrom;

FIG. 2 is a perspective view of the electrical terminal of the electrical connector;

FIG. 3 is a front elevational view of part of the electrical connector;

FIG. 4 is a view taken along lines 4—4 of FIG. 3;

FIG. 5 is a view taken along lines 5—5 of FIG. 3 with an edge of a printed circuit board exploded therefrom;

FIG. 6 is a view similar to FIG. 5 but with the edge of the printed circuit board in position within the electrical connector;

FIG. 7 is a view taken along lines 7—7 of FIG. 3;

FIG. 8 is a view taken along lines 8—8 of FIG. 4; and

FIG. 9 is a rear elevational view of part of the electrical connector.

Electrical connector EC comprises a dielectric housing H and electrical terminals ET. Housing H is conventionally molded from any suitable dielectric material and it includes passageways 1 extending therethrough and in which electrical terminals ET are removably disposed. Each of the passageways is provided with rear stop surfaces 2 and a forward stop surface 3. Rear stop surfaces 2 are provided with beveled surfaces 4. Inwardly from the sides of housing H, forward stop surfaces 3 are located on posts 5 extending between the inside surfaces of housing H. Some of the posts 5 are provided with extensions 6 to provide strength to the housing. The outer ends of extensions 6 in alignment with forward stop surfaces 3 have beveled surfaces 7 as illustrated in FIG. 4.

Projections 8 extend inwardly from the top and bottom of housing H in opposed relationship and they are spaced at equal intervals therealong. Projections 8 are spaced from each other so as to provide a channel 9 in which an edge of a printed circuit board 10 is received as illustrated in FIG. 6. Projections 8 are provided with beveled surfaces 11 to facilitate the insertion of the printed circuit board within channel 9. Posts 5 and surfaces 12 (only one being shown in FIGS. 3 and 4) in the sides of housing H define stop means to limit the inner movement of the printed circuit board within the housing as illustrated in FIG. 6. Lugs 13 extend outwardly from the rear surface of housing H and these lugs engage a printed circuit board when the housing is mounted thereon to space the housing from the printed circuit board to provide ventilation.

Electrical terminals ET are provided with a base plate 14 from which are depended a post 15 and contact arms 16. Post 15 is offset from the longitudinal axis of electrical terminal ET and baseplate 14 has a depression 17 formed therein. Contact arms 16 are connected to baseplate 14 via sections 18 so that the contact arms 16 are disposed at right angles with respect to plate 14 and in opposing relationship to define cantilever beams. Each of contact arms 16 includes an inner section 19 and an outer section 20. Inner section 19 is directed away from the longitudinal axis of the electrical terminal while outer section 20 is directed toward the longitudinal axis so that a bight 21 is located therebetween. Outer section 20 also terminates in a hook-shaped contact 22 having a contact-engaging section 22a, the free end of which is directed toward base plate 14. Outwardly directed sections 23 are provided rearwardly of sections 18.

In assembly, electrical terminals ET are inserted into respective passageways 1 until depressions 17 engage forward stop surfaces 3 and outwardly directed sections 23 are disposed in alignment with rear stop surfaces 2 thereby securing the electrical terminals in position in the passageways. Beveled surfaces 4 assist in the insertion of the electrical terminals within passageways 1 in that these surfaces cause outwardly directed sections 23 to be springably directed in an inward manner during the insertion of the electrical terminals in their respective passageways and once the electrical terminals have been positioned within their respective passageways to the point where sections 23 clear surfaces 2, sections 23 spring to their normal position so as to be in alignment with rear stop surfaces 2 to prevent the terminal from being removed from the passageways except by means of a tool which will deflect sections 23 inwardly to clear surfaces 2 so that the terminals can be removed from passageways 1 when desired. Posts 15 of every other passageway are in alignment with one another, however they can be positioned in alignment with one another throughout the electrical connector on either side thereof if

desired by providing appropriate stop posts 5 for each passageway. Thus, electrical terminals Et can be inserted in passageways 1 so that posts 15 can be positioned on either side of channel 9 as desired.

The clearance between the contact arms and the passageways is such that the contact arms fit snugly within the passageways in order that hook-shaped contacts 22 are stabilized therein and they are guided during movement of the contact arms therein so that no twisting action of the contact arms occur to therefore provide evenness of engagement of contacts 22 with the conductive paths of the printed circuit board.

As can be discerned from an observation of FIGS. 5 and 6, bights 21 of contact arms 16 rest against walls 4 of passageways 1 to provide preloading of the contact arms and hook-shaped contacts 22 have contact-engaging sections 22a which extend within channel 9 so as to engage conductive paths 25 on printed circuit board 10 when the edge thereof is inserted within channel 9. Projections 8 limit the amount of deflection of contacts 22.

In operation, the edge of printed circuit board 10 is inserted within channel 9 of electrical connector EC and hook-shaped contacts 22 are cammed in an outward direction by engagement of the printed circuit board with contact-engaging sections 22a and outer sections 20 of the contact arms pivot about bights 21 as the edge of the printed circuit board is inserted within channel 9 while contact-engaging sections 22a wipingly engage the conductive paths 25 as the edge of the printed circuit board is being moved to a position against posts 5. The initial action of contact arms 16 when engaged by the edge of the printed circuit board 10 is to cause outer sections 20 to pivot about bights 21 and this causes inner sections 19 to bend slightly in toward the insertion axis of the connector. Walls 24 act as stop means to limit the outer movement of outer sections 20 to prevent any setting of the contact arm from taking place. Hook-shaped contacts 22 are placed under stress as contact-engaging sections 22a wipingly engage conductive paths 25 of the printed circuit board during the movement thereof to a stop position against posts 5. Contact arms 16 therefore have spring characteristics provided by inner sections 19, outer sections 20 and hook-shaped contacts 22 during the engagement thereof with printed circuit board 10 so that the spring characteristics are distributed over the entirety of the contact arms to provide evenness of forces on the conductive paths and contact-engaging sections thereby reducing the wear thereon after repeated insertions and removals.

It will, therefore, be appreciated that the aforementioned and other desirable objects have been achieved; however, it should be emphasized that the particular embodiment of the invention, which is shown and described herein, is intended as merely illustrative and not as restrictive of the invention.

The invention is claimed in accordance with the following:

1. An electrical connector for making electrical contact with a printed circuit board or the like and comprising a dielectric housing having at least one electrical terminal removably disposed therein, said housing having top and bottom surfaces and including a channel in communication with said top surface and adapted to receive therein one edge of said printed circuit board, at least one terminal containing passageway transverse to and generally normal to said channel and communicating between said channel and said bottom surface, said passageway having located intermediate its ends on one side thereof a first edge surface facing said bottom surface comprising a first stop means allowing said terminal to be inserted only from said bottom surface, two spaced second edge surfaces comprising second stop means located intermediate the ends of said passageway transverse to said first edge surface and facing said top surface, said electrical terminal comprising a base member having electrical conductor engaging means extending therefrom outside of said bottom surface, a pair of contact arms each integral with and spaced by said base member, each contact arm defining a cantilevered beam and including an inner section and an outer section, said inner section being directed away from a longitudinal axis of said electrical terminal and said outer section being directed toward said axis, said inner and outer sections at their intersection forming a bite on each contact arm, each said bite engaging walls of said passageway and reacting therewith to preload said contact arms, said outer sections terminating as hook-shaped contacts extending into said channel and having contact-engaging sections, each contact arm having an end opposite from said contacts comprising outwardly directed cantilevered sections in interfering relationship with said second stop means to resist extraction of said terminal from said passageway, and a depression in said base member in interfering relationship with said first stop means to prevent overinsertion of said terminal into said passageway.

2. An electrical connector according to claim 1 wherein said wall defines stop means to limit the movement of said outer section away from said axis when said hook-shaped contact is engaged by said circuit board.

3. An electrical connector according to claim 1 wherein each said contact arm is disposed at right angles with respect to said base member.

4. An electrical connector according to claim 1 wherein each said contact arm fits snugly in said passageway so that each said contact arm is stabilized and guided therein.

5. An electrical connector according to claim 1 wherein said hook-shaped contact has a free end directed toward said base member.

6. An electrical connector as set forth in claim 1 wherein said housing contains a plurality of said passageways and a plurality of said contacts.

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