May 2, 1967 J. W. YOST 3,317,885

ELECTRICAL CONNECTOR FOR PRINTED CIRCUIT BOARDS

Filed Feb. 26, 1965

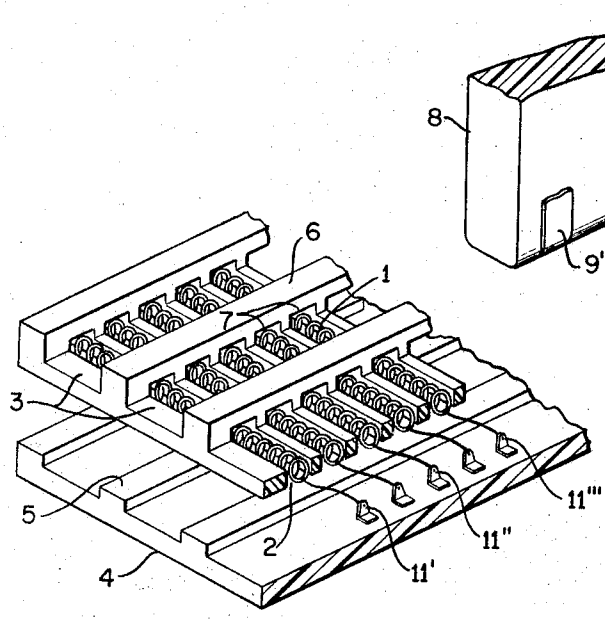


Fig. 3

Fig. 1

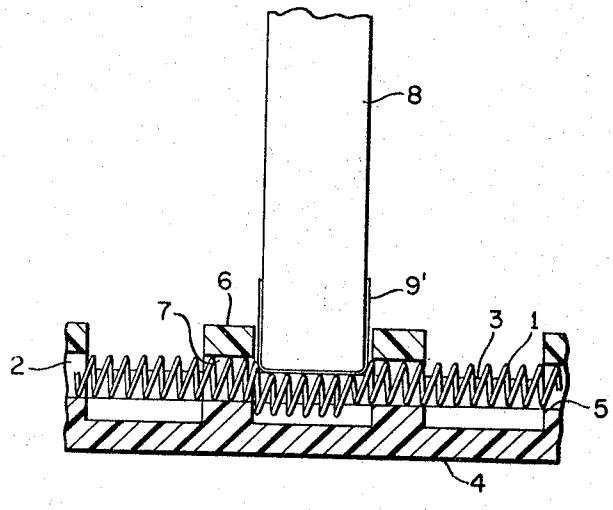


Fig. 2

INVENTOR.
JAMES W. YOST

BY

Robert J. Mathews

ATTORNEY

United States Patent Office 3,317,885 Patented May 2, 1967

3,317,885

ELECTRICAL CONNECTOR FOR PRINTED CIRCUIT BOARDS

James Whitney Yost, Rochester, N.Y., assignor to Stromberg-Carlson Corporation, Rochester, N.Y., a corporation of Delaware

Filed Feb. 26, 1965, Ser. No. 435,446
9 Claims. (Cl. 339—176)

The present invention relates to electrical connectors and, more particularly, to electrical connectors which are readily utilized in conjunction with printed circuit boards.

A vast quantity of electronic systems, such as electronic telephone exchanges, utilize banks of printed circuit cards which are rack mounted. A multiconductor cable generally makes electrical contact with the numerous access points of each printed circuit board in the rack through male-female connectors. In other words, each circuit card is plugged into a row of female connectors so that each access point of a particular card contacts an associated female connector in that row of connectors associated with the particular card. Since thousands of these connectors are utilized in numerous electronic systems, it is desirable to reduce manufacturing costs of these banks of female connectors.

Accordingly, it is the principal object of the present invention to provide a new and improved electrical connector.

It is a further object of the present invention to provide electrical connectors which will considerably reduce the manufacturing costs of banks of female printed circuit card connectors.

Further objects and advantages of the invention will become apparent as the following description proceeds, and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the invention, reference may be had to the accompanying drawings, in which:

FIG. 1 discloses an "expolded" isometric view of a female connector array fabricated in accordance with the present invention;

FIG. 2 discloses a side view of the array; and

FIG. 3 discloses an edge of a typical printed circuit card which is inserted into the cross channels of the array.

In accordance with the present invention, columns of female connectors are fabricated by positioning unitary electrically conductive springs **1** within associated spring containing channels **2**, as shown in FIG. 1. Rows of cross channels **3** for receiving the printed circuit cards are formed over the spring containing channels **2** and in a diretcion perpendicular to the spring containing channels, as shown. A ribbed base **4** enables ribs **5** to support the coil springs at support points along the length of the springs. In other words, ribs **5** are aligned with spring retaining members **6** which, upon coacting with ribs **5**, form orifices **7** through which the springs pass. The printed circuit cards, such as card **8**, have edge contacts **9**, shown in FIG. 3, so that when a card is inserted into a particular cross channel, the spring sections of all of the springs at that particular cross channel are stretched and laterally displaced, as shown in FIG. 2, to effect electrical contact with those edge contacts present on the card (e.g., **9'**, **9''**, **9'''**). Coil springs **1** are connected to terminals **11**, as shown, to provide for cable access. Preferably, members **6** which form the printed circuit card-receiving cross channels are made of resilient plastic so that when a printed circuit card is inserted into a particular cross channel the sides of the card will be gripped and accordingly the card will be supported. If further support is required, a series of parallel channels may be provided to coact with the tops of the cards (not shown) as is well known in the art.

Let it be assumed that card **8** shown in FIG. 3 is inserted into cross channel **3**. Card contact members **9'**, **9''** and **9'''** will be electrically connected to terminals **11'**, **11''** and **11'''**, respectively.

It should be understood that the cross channels **3** need not be oriented perpendicularly to spring containing channels **2** so long as they are situated in a direction transverse to the spring containing channels. It should also be understood that springs **1** need not necessarily be cylindrical coil springs, although this type of spring would be highly preferable.

Since the aforesaid frame and ribbed base members may be fabricated of injection molded plastic and a single spring may contact numerous circuit board contact members, the economy of the connector array of the present invention should be apparent. After the plastic members, shown in FIG. 1, have been fabricated, it is a very simple matter to insert the coil springs into the spring containing channels **2**. The ribbed base member **4** is thereafter placed against the array containing the springs so that fib portions **5** are coincident with members **6**. The two parts are then fused or otherwise fastened together.

While there has been shown and described a specific embodiment of the invention, other modifications will readily occur to those skilled in the art. It is not, therefore, desired that this invention be limited to the specific arrangement shown and described, and it is intended in the appended claims to cover all modifications within the spirit and scope of the invention.

I claim:

1. In combination, a plurality of circuit boards having conductive members along at least one edge thereof, a frame member having a plurality of columns of channels formed thereon and having a plurality of rows of channels transverse to said columns of channels formed thereon, said rows of channels and said columns of channels being formed in opposite planar surfaces of said frame member, a plurality of unitary elongated conductive springs each positioned within a particular one of said columns of channels and the channels forming said rows of channels, said springs being flexible in a direction transverse to the length of said springs, said frame member including a plurality of resilient side members forming said rows of channels and resiliently engaging the one edge of respective circuit boards with the conductive members thereof in contact with and laterally deflecting said springs, and a base member having a plurality of ribs in parallel overlapping alignment with the side members of said frame member for supporting said springs within said columns of channels.

2. The combination defined in claim **1** wherein said springs are coil springs.

3. In combination, a plurality of circuit boards having conductive members along at least one edge thereof, a frame member consisting of a first plurality of spaced parallel struts and a second plurality of spaced parallel struts in spaced parallel planes, the points of intersection of said transversely disposed struts being securely interconnected to form rows of channels on one side and columns of channels on the other side of said frame member, a plurality of coil springs each positioned within a particular one of said columns of channels and additionally extending into at least a portion of the channels forming said rows of channels, said springs being flexible in a direction transverse to the plane of said frame member, the struts forming said rows of channel being laterally resilient so as to forcefully engage the one edge of respective circuit boards with the conductive members thereof in contact with and laterally deflecting said springs, and a base member having a plurality of ribs parallel with said resilient struts and in supporting contact with said springs.

4. A female printed circuit card connector comprising a plurality of elongated spring members capable of resilient

movement in a direction transverse to the longitudinal axis thereof, a plurality of parallel spacing members each positioned between a respective pair of said spring members and forming a plurality of columns of channels within which said spring members are positioned, a plurality of parallel spring retaining members secured to said spacing members at an angle thereto on one side of said spring members, and a plurality of parallel rib members aligned with said spring retaining members on the other side of said springs for maintaining said spring members in position within said channels.

5. The combination defined in claim 4 wherein said rib members and said spring retaining members are in parallel overlapping relationship.

6. The combination defined in claim 4 wherein said spring retaining members are resilient in a direction transverse to the length thereof in the plane of said members.

7. The combination defined in claim 4 wherein said spring retaining members and said rib members are positioned transversely to said spring members and said spacing members.

8. The combination defined in claim 4 wherein said spring members extend above the surface of said spacing members on the side thereof secured to said spring retaining members.

9. The combination as set forth in claim 4 wherein said electrically conductive springs are coil springs.

References Cited by the Examiner

UNITED STATES PATENTS

2,482,998	9/1949	Andersson	339—18
3,173,732	3/1965	James	339—17

FOREIGN PATENTS

864,584	4/1961	Great Britain.

MARVIN A. CHAMPION, *Primary Examiner.*

W. DONALD MILLER, *Examiner.*