

United States Patent

Kreutter

[15] 3,701,967

[45] Oct. 31, 1972

[54] FEMALE CONNECTOR STRIP WITH INTERCHANGEABLY RETAINED CONTACT SPRINGS

[72] Inventor: Erich Kreutter, Winterbach, Germany

[73] Assignee: ITT Industries, Inc., New York, N.Y.

[22] Filed: Jan. 29, 1971

[21] Appl. No.: 110,899

[30] Foreign Application Priority Data

Feb. 4, 1970 Germany.....P 20 05 100.7

[52] U.S. Cl.339/217 S, 339/177 R, 339/256 R

[51] Int. Cl.H01r 9/08

[58] Field of Search.....339/217, 252, 256, 258, 177, 339/210, 211, 215

[56] References Cited

UNITED STATES PATENTS

3,047,832 7/1962 Deakin.....339/217 S
1,841,736 1/1932 Jones.....339/217 S

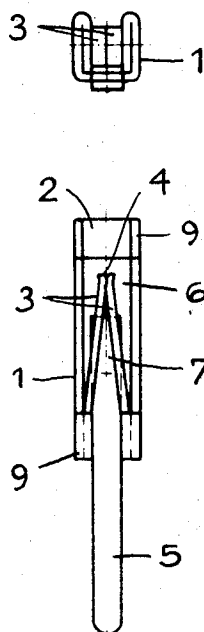
3,047,831 7/1962 Majewski.....339/176
3,426,320 2/1969 Wilm.....339/258
3,289,146 11/1966 Tuchel.....339/176
3,202,959 8/1965 Keller.....339/217 S
3,363,224 1/1968 Gluntz.....339/258

Primary Examiner—Marvin A. Champion
Assistant Examiner—Robert A. Hafer
Attorney—C. Cornell Remsen, Jr., Walter J. Baum, Paul W. Hemminger, Percy P. Lantzy and Thomas E. Kristofferson

[57] ABSTRACT

A female connector strip having contact springs which are interchangeably retained in a contact chamber. The contact chamber has a rectangular cross-section with each of the contact springs being of substantially U-shaped cross-section and having a box-shaped supporting body. The springs have contact points consisting of two ends of the limbs of the U-profile which, within the range of one face side of the supporting body are extended and folded towards the inside, the ends being directed towards each other. Further, the resilient ends of the contact reeds are touching each other.

2 Claims, 4 Drawing Figures



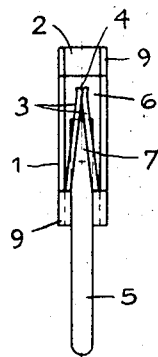
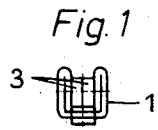


Fig. 2

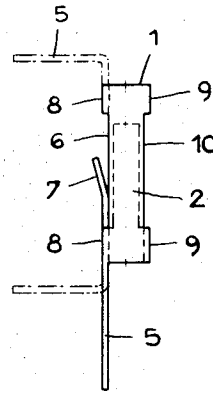


Fig. 3

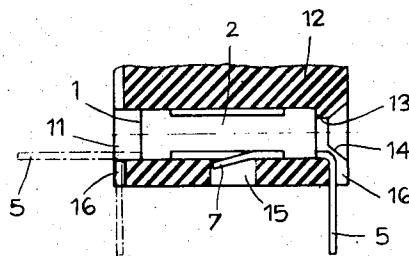


Fig. 4

INVENTOR

ERICH KREUTTER

BY

Harry S. Hatz

ATTORNEY

FEMALE CONNECTOR STRIP WITH INTERCHANGEABLY RETAINED CONTACT SPRINGS

The present invention relates to a female connector strip with contact springs which are interchangeably retained in the contact chambers, for use in telecommunication engineering, or any other communication-processing technique.

Prior art female connector strips typically contain contact springs of various designs in their contact chambers. One widely known feature of such contact springs is the bifurcated design thereof. These contacts are made of two equal halves which, within the range of the connecting lugs, are joined together by way of spot welding. In another embodiment, the bifurcated contact spring is made of one piece. It comprises a U-shapedly bent center part, with the contact springs being arranged in a face-sided extension of the U-limbs. In order to achieve good spring properties, the cross-section of the contact springs is tapered in direction towards the ends thereof. On the opposite face side of the center part a connecting lug is provided. In the described embodiments the spring limbs of the contacts are unprotected until inserted in the female connector strip, and thus likely to be damaged, by excessive widening. These types of forked contact springs, moreover, are also unsuitable for being used when the rectangularly bent-off connecting lugs thereof are to be soldered into printed circuit boards, because a special mounting of the body of the female connector strip is required.

The present invention is based on the problem of providing a female connector strip whose contact springs are suitable for embodying a connector of small size having a large number of poles. In addition thereto, the contact springs are supposed to permit a miniaturized construction of the female connector strip. Part of the problem is to find a way to arrange the limbs of the springs in such manner that they are also protected in cases where the contact spring is positioned outside a contact chamber. According to the invention this is accomplished in a contact chamber having a rectangular cross-section. Completely passing through the female connector strip, there is supported a contact spring of substantially U-shaped cross-section having a box-shaped supporting body, with the contact reeds thereof consisting of the two ends of the limbs of the U-profile which, within the range of one face side of the supporting body are extended and folded towards the inside, with these ends being arranged to be directed towards each other, in such a way that the resilient ends of the contact reeds within the supporting body touch each other.

According to one embodiment of the invention there is provided in the bottom of the box-shaped supporting body a recess of U-shaped contour capable of being engaged by a locking tongue.

According to a further embodiment of the invention both the recess and the cutout portions which are provided at the limb-ends of the U-profile, constitute engaging surfaces for the supporting body. In a further embodiment of the invention, randomly on one or both face sides of the supporting body, in continuation of its land portions connecting the U-limbs, there are provided the connecting lugs.

According to another embodiment of the invention, it is provided that the female connector strip, on the plug-in side, comprises a projecting portion projecting into the contact chamber, and that the contact chamber opening on this side is provided with bevelled insertion edges.

According to a further feature of the invention, the contact spring in the contact chamber leads with one face side against a shoulder formed by the projecting portion, whereas at the same time, its locking tongue engages the recess passing through the female connector strip from the outside to the contact chamber.

Finally, in an additional type of embodiment of the invention, the angularly bent off connecting lugs of the contact spring, within the female connector strip range, are arranged to engage slots provided on the open sides of the contact chamber in the female connector strip.

By the special design according to the invention it is possible to attain different advantages. The contact springs permit the use of female connector strip bodies made of one piece, providing for a simple design of the contact chambers. The contact spring itself is made of one piece and comprises an engaging device. The resilient parts are protected within the supporting body, thus avoiding deformations from the outside. Moreover, U-shaped design of the contact spring can be well mastered from the production-technical point of view.

By folding the contact reeds, the thickness of the material is doubled, thus increasing the mechanical stability of the contact spring. The connecting lugs can be led away from both ends of the contact spring randomly, and may be designed to have any suitable shape. Moreover, the contact spring may also be processed economically by suspension from a tape. Finally, the female connector strip is suitable for being used in accordance with the piling technique, where several female connector strips are plugged on to correspondingly long contact pins.

The advantages of this invention, both as to its construction and mode of operation, will be readily appreciated as the same become better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures.

FIG. 1 depicts a contact spring as viewed from its plug-in side;

FIG. 2 shows a top view of the contact spring of FIG. 1;

FIG. 3 illustrates a side view of the contact spring of FIG. 1; and

FIG. 4 shows the partial sectional view of a female connector strip with contact spring mounted therein.

Referring now to FIGS. 1 to 4, the contact spring 1 is shown made of one piece construction. The spring consists of an oblong supporting body 2 of substantially U-shaped cross-section designed to have the shape of a box. Within the range of one face side of the supporting body 2, the ends of the limbs of the U-profile are extended and in such a way bent over inwardly, as to be lying flatly against each other. In the direction of the opposite face side of the supporting body 2, the bent-over limb ends continue as the contact reeds 3. These reeds are arranged in relation to one another, in such a

way that their ends touch each other either under pressure, or only have a small spacing between them. In order to avoid insertable (not shown) contact pins from being damaged, the ends of the contact reeds are slightly bent off. This forms a slight funnel-shaped opening 4 between the ends thereof. The land portion of the supporting body 2 connecting the limbs of the U-profile, is randomly extended on one or both of the face sides. This extension is designed as a connecting lug 5 which may either be of the stretched or angularly bent-off type. The bottom of the box-shaped supporting body 2 comprises a recess 6 of U-shaped design produced by way of punching. Owing to the shape of the recess or cutout 6 there will remain a tongue which, when slightly bent or lifted towards the outside, will act as a locking tongue 7.

Manufacture of the contact spring 1 is effected by punching it out of a resilient sheet metal, and cutting free the contours of the contact spring 1 as projected in a plane. The width of the cutout 6 is chosen so that during the subsequent rolling up, or the following bending processes to which the contact spring is subjected, there will be formed the supporting surfaces 8. The ends of the U-limbs, within the range of the face sides of the supporting body 2, likewise form supporting surfaces 9 which respectively result from a correspondingly arranged recess or cutout 10.

FIG. 4 shows a contact spring as inserted in the contact chamber 11 of the female connector strip 12. The female connector strip 12 which is made in one piece from an insulating material, contains several such contact chambers 11 which all have a rectangular cross-section, and extend through the female connector strip 12 in one or two rows arranged in parallel relation. At one end of the contact chamber there is arranged a projecting portion 13 projecting into the contact chamber opening. For the purpose of facilitating the insertion of contact pins, this contact chamber opening is still provided with bevelled insertion edges 14. To each contact chamber 11 there is assigned one opening which is designed as a cutout 15 respectively extending from the outside of the female connector strip 12 to the contact chamber 11.

When equipping the female connector strip 12, the contact spring 1 is pushed to such an extent into the contact chamber 11, that its face side will meet against the projecting portion 13 acting as a limiting shoulder. At the same time, the locking tongue 7, which was previously bent over towards the inside, will resiliently

engage the cutout portion or recess 15, thus reassuming its original position, and protecting the contact spring 1 against axial movements. Unlatching can be effected with the aid of a simple tool which, when inserted into the recess or cutout 15, will cause the locking tongue 7 to be bent back into the contact chamber 11.

When equipping the female connector strip 12, the particular face side of the contact spring 1 which is in opposition to the end of the locking tongue is inserted into the contact chamber 11. If, on this particular face side, there is provided a connecting lug 5, the corresponding bending over thereof will be effected after completion of the assembly. A connecting lug 5 arranged on the opposite face side (as shown by dotted lines), can already be bent off prior to the insertion into the contact chamber 11.

For preventing the bent-over connecting lugs 5 from projecting over the outside edges of the female connector strip 12, a slot 16 is provided on each opening side of the contact chamber 11 within the female connector strip 12.

What is claimed is:

1. A conductor for the socket of an electrical connector, said conductor comprising: a folded conductive sheet metal stamping, said stamping having a rectangular bottom panel, first and second parallel side panels of the same shape and size folded normal to said bottom panel, tabs folded sharply at the upper ends of said side panels to positions everywhere contiguous to the facing surfaces of said side panels, a spring finger cut out of each of said tabs and having mutually adjacent base portions connected from said tabs, said fingers being bent out of the planes of said tabs to positions contiguous to each other between said tabs, all of said panels, tabs, and fingers being made of a single piece of sheet metal and being integral with one another along corresponding edges thereof.

2. The invention as defined in claim 1, including an insulator block having a rectangular hole extending thereinto from one side thereof, said insulator having a shoulder at the other side thereof projecting radially into said rectangular hole, the formed stamping fitting contiguously inside said rectangular hole abutting said shoulder, said insulator having a transverse hole intercepting said rectangular hole intermediate its ends, said bottom panel having a leaf spring tine cut out thereof by integral therewith and extending into said transverse hole.

* * * * *