

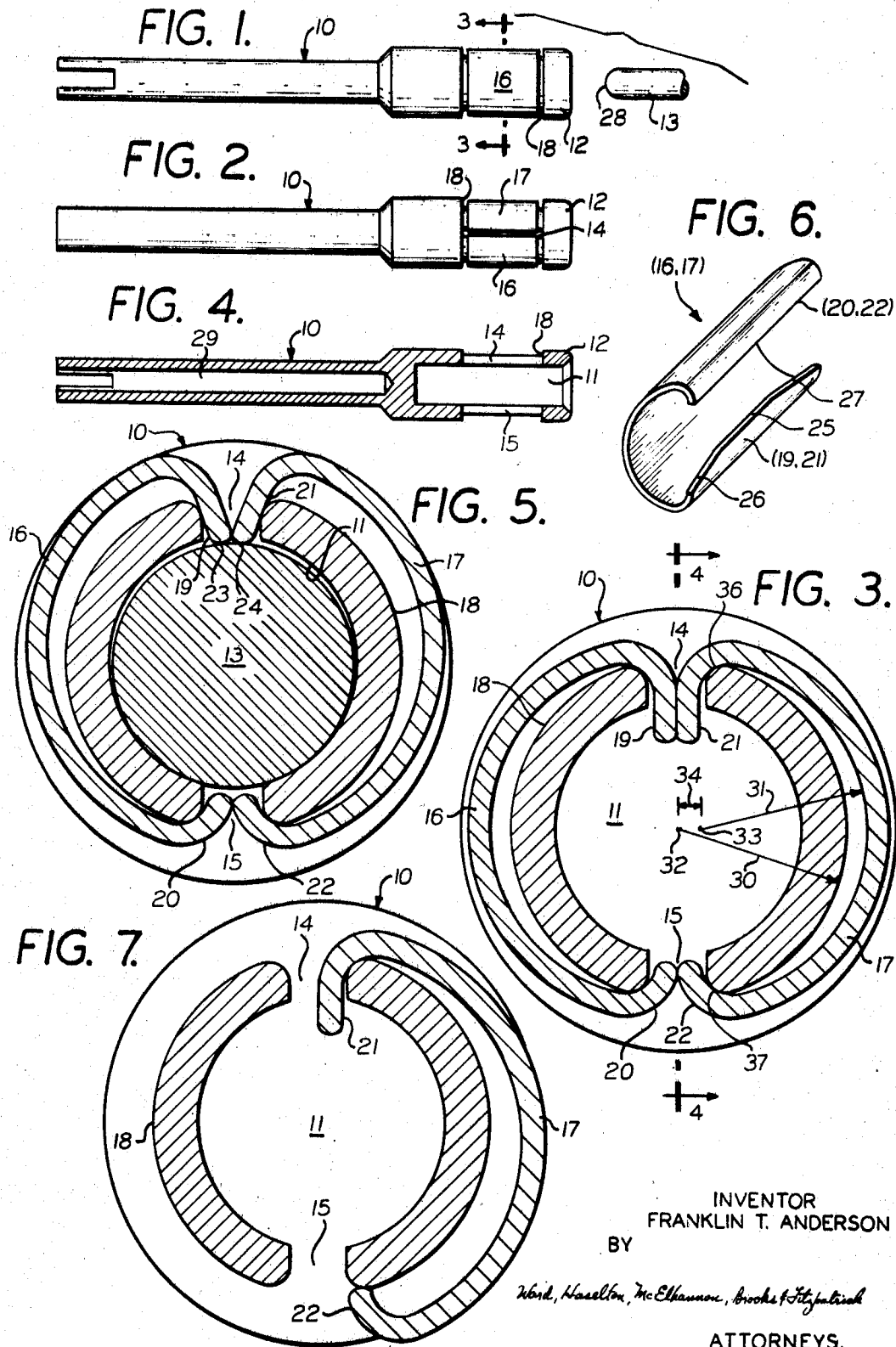
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SOCKET CONTACT FOR ELECTRICAL CONNECTORS

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SOCKET CONTACT FOR ELECTRICAL CONNECTORS

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4 Claims

ABSTRACT OF THE DISCLOSURE

A socket contact has two C-shaped metal spring members which embrace on opposite sides a cylindrical body member within a circumferential channel. Radially, inwardly directed ends of the spring members engage in diametrically opposed longitudinal slots in the body member. The longer ends of the two springs project from the same slot into the axial bore and function to frictionally engage a mating pin.

The present invention relates to electrical connectors and, more particularly, to the socket contact for such connectors.

An electrical connector may take the form of either a receptacle or a plug. The purpose of either, when properly mated with the other, is to establish a good electrical connection. Yet, by its very nature, the connector is intended to provide for separation of the electrical conductors which the connector components serve to interconnect. For satisfactory operation, it is essential that the plug and receptacle both stand up in the face of repeated assembly and disassembly. Moreover, the connector components must resist inadvertent disassembly and must continue to develop good electrical contact when assembled.

Electrical contact between the plug and receptacle is generally developed by bringing together a pin contact and a socket contact. As to which connector component, the plug or receptacle, contains the socket contact and which the pin depends on the particular installation. It is the construction of the socket contact which constitutes the subject of the present invention.

In essence, the present invention is directed to the type of socket contact which employs a rigid body member having a bore for receiving and guiding a pin when interfitted therewith, in combination with spring means for frictionally engaging the pin and insuring good electrical contact while developing adequate contact engaging and separating forces. Prior constructions of this type have met with various objections. Often, the spring elements were easily dislodged from the body member. In other cases, the spring elements were unduly deformed during assembly with the body member thereby adversely affecting their operating capability. It has been difficult with prior constructions to establish a satisfactory compromise to improve the spring retention factor while avoiding undue distortion during assembly. The problem has been further complicated by the necessity for the sockets to remain operable over an extremely wide range of ambient temperatures.

It is an object of the present invention to provide a socket construction which overcomes the disadvantages inherent in prior constructions. A redundancy feature has been incorporated in the new socket providing for increased reliability. The nature of the design is such that the spring is subjected to no greater deformation during assembly than is imparted to it during use.

In accordance with the present invention, there is provided a socket contact for an electrical connector comprising a cylindrical body member having an axial

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bore extending inwardly from a pin engaging end for receiving a pin contact therein, a pair of diametrically opposed longitudinal slots in the wall of the body member each providing radial communication between the bore and the exterior of the body member, and a pair of arcuate spring members embracing the body member, one on each side thereof, the spring members having a radially inwardly directed end engaged in each of the slots with the member extending circumferentially therebetween, one end of each spring member projecting completely through its associated slot and for a distance into the bore for frictional engagement with a pin contact upon insertion thereof into the socket.

The invention will be better understood after reading the following detailed description of a presently preferred embodiment thereof with reference to the accompanying drawings in which:

FIGURE 1 is an elevational view of a socket contact constructed in accordance with the present invention with a pin about to be inserted;

FIGURE 2 is a top view of the socket contact of FIGURE 1;

FIGURE 3 is an enlarged sectional view taken along line 3—3 in FIGURE 1;

FIGURE 4 is a longitudinal sectional view taken along line 4—4 in FIGURE 3, but to the same scale as FIGURES 1 and 2;

FIGURE 5 is a view similar to FIGURE 3 but showing the relationship of the socket parts with a pin inserted;

FIGURE 6 is a perspective view of one of the spring members employed in the embodiment shown in FIGURES 1 to 5; and

FIGURE 7 is a view similar to FIGURE 3 showing one of the spring members in the process of being assembled with the body member.

The same reference numerals are used throughout the figures of the drawings to designate the same or similar parts.

Referring now to the drawings, it will be seen that the socket consists of a cylindrical body member 10 having an axial bore 11 extending inwardly from the pin engaging end 12 for receiving a pin contact therein, such as the contact 13 seen fragmentarily in FIGURE 1. A pair of diametrically opposed longitudinal slots 14 and 15 are formed in the wall of the body member 10. Each of the slots 14 and 15 provides radial communication between the bore 11 and the exterior of the body member.

A pair of identical arcuate spring members 16 and 17 embrace the body member 10, one on each side thereof, within a circumferential channel 18 axially spaced from the pin engaging end 12. The spring members 16 and 17 each have radially inwardly directed ends 19, 20 and 21, 22, respectively, which are engaged in the respective slots 14 and 15 with the spring member extending circumferentially therebetween. One end of each spring member (as best seen in FIGURE 3, the end 19 of spring 16 and the end 21 of spring 17) projects completely through its associated slot 14 and for a distance into the bore 11. The opposite ends 20 and 22 of the spring members 16 and 17, respectively, have a length which is sufficient to provide substantial retention of the spring members against radial separation from the body member 10 but insufficient to pass completely through the associated slot 15 into the bore 11.

FIGURE 3 shows the relationship of the spring members 16 and 17 relative to the body member 10 prior to insertion of a pin. When a pin, e.g., the pin 13, is inserted in the socket it will assume the general position shown in FIGURE 5 projecting or displacing the ends 19 and 21 of the spring elements radially outwardly while being

urged by the very same spring elements into intimate contact with the opposite side of the wall of the bore 11 where the slot 15 is located. As seen in FIGURE 5, the depth of channel 18 is such that no part of the spring member 16 or 17 projects radially beyond the external surface of the body member adjacent the channel.

Both the ends 19 and 21 of the two spring members bear firmly against the pin 13 at spaced apart points 23 and 24. These points 23 and 24 represent line contacts since, as best seen in FIGURE 6, the intermediate portion 25 of the longitudinal edge of ends 19 and 21 is straight and parallel to the longitudinal axis of the C-shaped member which has been formed from spring sheet metal.

Still referring to FIGURE 6, it will be seen that on opposite sides of the intermediate portion 25, the edge is tapered at 26 and 27. The tapered portions 26 and 27, depending upon the orientation of the spring member relative to the body member 10, cooperate with the rounded nose 28 of the pin 13 (best seen in FIGURE 1) for proper camming action as the pin is inserted into the socket.

While the details form no part of the present invention, it will be observed that the socket is provided with a solder cup 29 at the end opposite its pin engaging end. This is best seen in FIGURE 4.

Referring to FIGURE 3, notice should be taken of the two radii designated 30 and 31 radiating from respective origins 32 and 33 which are separated a distance 34. While these do not represent critical dimensions, they do represent dimensions which it has been found can readily be controlled to provide optimum results. As shown, the two centers 32 and 33 are displaced, along a line normal to the line passing through the centers of slots 14 and 15, a distance equal to the thickness of the stock used for spring member 17. This discussion, for convenience, is limited to spring member 17, it being understood that mirror symmetry exists around the line 4-4 and that element 16 is identical to element 17 but reversed in orientation.

Prior to assembly with the body member 10, the radius 31 of the inside surface 35 of spring member 17 is chosen slightly smaller than the radius 30 of the outside surface of the body member in the channel 18. The difference in radii should be chosen such that when the spring is assembled with the body member as seen in FIGURE 3 there is slight frictional engagement between the spring member 17 and the body member 10 immediately adjacent the slots 14 and 15 in the vicinity of the points 36 and 37. At most, it is preferred that there be no play at these points. As an example, with a radius 30 of .044 inch, the radius 31 was chosen between .042 and .043 inch. With a bore of approximately .067 inch in diameter, the ends 19 and 21 of the spring members were arranged to project approximately .01 inch therein.

As seen in FIGURE 7, the spring member 17 (and in similar manner the member 16 which is not shown) can be assembled with the body member 11 without unduly deforming the spring member. This is accomplished by first inserting the longer end 21 into its slot 14 and then urging the shorter end 22 into the opposite slot 15, as shown. It has been found that by proportioning the parts as shown in the drawings the assembly can be made without excessive distortion of the spring and with the short end 22 or 20 achieving significant anchorage in the slot 15. In fact, the amount of displacement or deformation of the spring element necessary to assemble the spring with the body member as seen in FIGURE 7 is approximately the same as the displacement developed by insertion of a pin within the socket as seen in FIGURE 5.

An inherent advantage, not previously mentioned but evident from an examination of FIGURE 5, derives from the side-by-side disposition of the two ends 19 and

21 of the two springs in the single slot 14. It will be seen from FIGURE 5 that the spring ends 19 and 21 tend to provide mutual support for each other to prevent buckling or unwanted deformation upon insertion of pin 13. Numerous other advantages will occur to those skilled in the present art.

Having described the presently preferred embodiment of the invention, it should be understood that numerous changes may be made therein without departing from the true spirit of the invention.

What is claimed is:

1. A socket contact for an electrical connector comprising a cylindrical body member having an axial bore extending inwardly from a pin engaging end for receiving a pin contact therein, a pair of diametrically opposed longitudinal slots in the wall of said body member each providing radial communication between said bore and the exterior of said body member, and a pair of generally C-shaped spring sheet metal members having an end engaged in each of said slots, the ends of the spring members engaged in one of said slots both projecting completely through said one slot and for a distance into said bore for frictional engagement with a pin contact upon insertion thereof into said socket, the lengths of the opposite ends of said spring members being sufficient to provide substantial retention of said spring members against radial separation from said body member but insufficient to pass through the associated slot into said bore, the dimensioning and shaping of the spring members relative to the body member being such that when assembled therewith frictional engagement occurs between the spring members and the body member immediately adjacent the said slots while at least some clearance exists between the spring members and the body member around the body member between said slots.

2. A socket contact according to claim 1, wherein said spring members are disposed in a circumferential channel in said body member axially spaced from the pin engaging end thereof, the depth of said channel being related to the dimensions of said spring members and the assembled clearance therebetween such that said spring members at no time project radially beyond the external surface of said body member adjacent said channel during normal use of said socket, and said slots are confined to the width of said channel.

3. A socket according to claim 1, wherein the ends of the spring members which project completely through said one slot are each formed with a longitudinal edge having an intermediate portion parallel to the longitudinal axis of the corresponding spring member and having end portions which are both tapered.

4. A socket contact according to claim 1, wherein the C-shaped spring members intermediate their ends, at least prior to assembly with said body member, are cylindrical in form with a radius of curvature slightly less than that of the surface of the body member which it embraces.

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