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E. SCHWEITZER ETAL

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ELECTRIC CONNECTOR SOCKET

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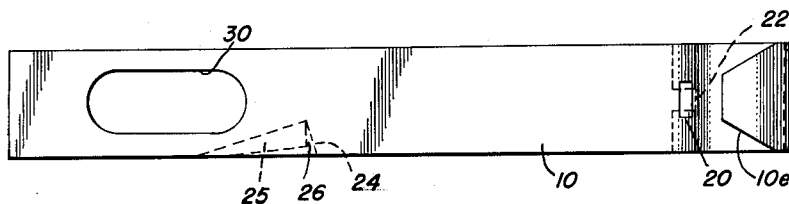


Fig. 1.

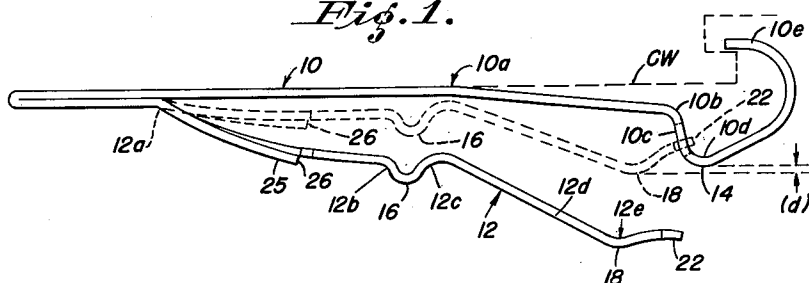


Fig. 2.

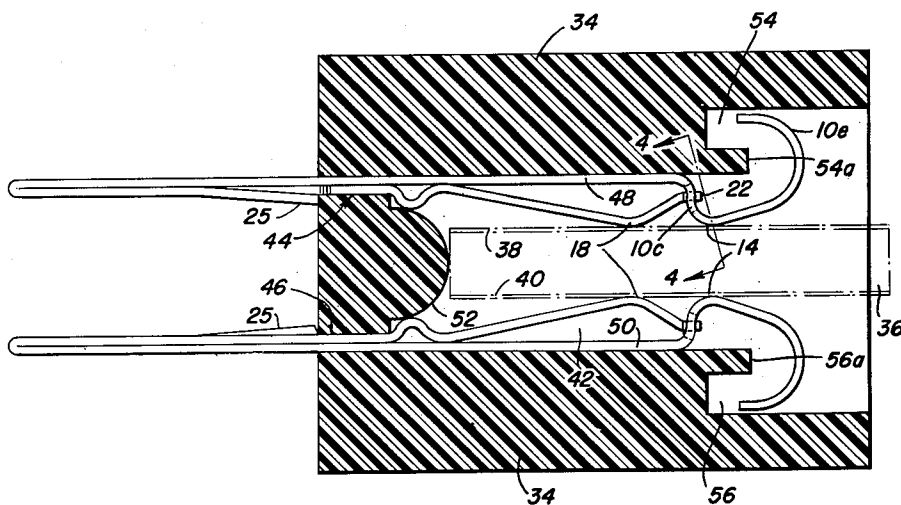


Fig. 3.

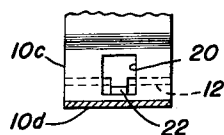


Fig. 4.

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ELECTRIC CONNECTOR SOCKET

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7 Claims. (Cl. 339-176)

This invention relates to socket connectors and more particularly to multi-connector sockets of the type adapted to engage and establish electrical contact with opposite sides of a printed circuit panel having circuitry printed on both sides of the panel. Connector sockets of this type are illustrated in U.S. patents to Gilbert 2,875,425 and Mason 2,882,511.

The problem in connection with the design of sockets of this type is to insure that the contact structure will be effective to establish positive electrical connection to each of a plurality of printed circuit conductors whenever the panel carrying such conductors is inserted in the socket.

Accordingly, it is the principal object of the present invention to provide in a connector socket of the above mentioned type an improved contact member which will insure the establishment of positive contact electrically with printed electrical conductors carried on one or both sides of a printed circuit panel insertable within the socket, such contact being established at more than one point on each printed conductor.

Other objects of the present invention may be listed as follows:

(1) To provide a socket connector in which the individual contacts have periods of natural resonance which lie well beyond the critical range for airborne and space equipment of approximately 2,000 cycles per second.

(2) To provide contact members in a socket connector, each of which includes two active spring levers, each such lever representing an independent contact facility.

(3) To provide a contact socket which will tolerate a substantially wide range of printed circuit panel board thicknesses.

(4) To provide for a small entrance angle for the printed circuit panel to insure a smooth entry of the panel into the socket.

(5) To provide a structure of this type which is effective to reduce the entry of dirt into the socket.

Other objects of the present invention will be apparent from the following detailed description when read in conjunction with the attached sheet of drawings in which

FIG. 1 is an elevational view of the back face of one of the contact members of the present invention;

FIG. 2 is a side view of a contact member taken in a plane at 90° to that of FIG. 1;

FIG. 3 shows a sectional view through a connector assembly in accordance with the present invention and illustrates the circuit contacting action of the contact members of FIGS. 1 and 2; and

FIG. 4 is a section on the lines 4-4 of FIG. 3.

All figures of the drawing are made on a greatly enlarged scale for a better showing of the structure.

In general, the foregoing objects are achieved by providing an elongated insulating body having a plurality of cavities opening freely through one face of the body and communicating with each other to provide an elongated

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slot for receiving one edge of the printed circuit panel. Each cavity is provided at its bottom with a pair of narrow slits opening through the opposite face of the body. Suitable socket bodies are disclosed in the above-mentioned patents. A pair of contact members are received in each of the cavities and are supported in the cavity by stem portions extending outwardly through the slit openings. In the preferred embodiment, each contact member is formed by bending a flat strip of conductive material back upon itself to define a pair of adjacent substantially parallel leg portions of different lengths. The folded end of the strip passes through the narrow slit at the bottom of the cavity and supports the two legs within the cavity. The terminal portions of the two legs are formed to provide contact points or areas facing towards the opposite wall of the cavity, the two contact points being located at different distance from the mouth of the cavity but lying in substantially the same contact plane and facing corresponding contact points formed in the opposite contact member. The contact members are formed of resilient or springy material of good conductivity, such as Phosphor bronze or beryllium copper.

Referring now to the drawings, and particularly to FIG. 2 thereof which illustrates a preferred form of one of the individual contactor members, it will be seen that in general, the contact member is formed by folding back upon itself a flat leaf spring of conductive material, thus defining a pair of legs 10 and 12, the back leg 10 being longer than the front leg 12. The folded end of the strip is tightly folded as shown in FIGURE 2 to form a stem 30 for the contact member, which stem passes through a slit opening in the bottom wall of the cavity adjacent a side wall of the cavity. The leg 10 is flat and straight from the folded end to the point 10a where it inclines away from the face of the cavity wall (represented at CW) by a slight angle to the point 10b where it is inclined away from the wall at a greater angle to form a shoulder portion 10c, and then is bent back at the point 10d to form a contact area or point 14 facing away from the plane CW of the cavity wall. The terminal portion of leg 10 is bent into the form of a reversely directed hook portion 10e.

The leg 12 is formed in close contact with leg 10 adjacent the fold up to the point 12a where it is bowed outwardly from leg 10 and then extends generally parallel to leg 10 to the point 12b where it is bent outwardly and back to form a loop 16 which serves as a stop to limit the insertion of the stem of the contact member into the slit opening. Leg 12 is then bent at 12c so that the portion 12d is inclined away from the wall face CW by a greater angle than the adjacent portion of leg 10. At 12e the leg 12 is bent back towards leg 10 to form a contact area or point 18 which normally lies at a greater distance from wall face CW than contact point 14 on leg 10. In the outwardly bent portion 10c of the leg 10, an opening 20 is formed as shown most clearly in FIG. 4. The end of the other leg 12 has a tongue portion 22 of reduced width which in the assembled condition of the contact member is received within the opening 20, as shown by the dotted lines in FIGURE 2.

In order to effectively lock the legs within the insulating body, each leg 12 is slit transversely at one edge as indicated at 24 and a triangular portion 25 adjacent the slit is bent out of the plane of the leg to form an edge sur-

face 26 which will abut the exterior of the insulating body. Each connector therefor will lock with the insulating body between the surface 26 and the stop 16. Both legs 10 and 12 are preferably provided with openings 30 to facilitate soldering of connecting wiring thereto.

That portion 12d of leg 12 which lies between the electrical contact area or point 18 and the limit stop 16 forms a leaf spring support for the contact point 18 and, as shown most clearly in solid lines in FIG. 2, normally urges the contact point 18 outwardly or away from the leg 10 and its contact point 14. When the tongue 22 of leg 12 is entered in opening 20 of leg 10, leg 12 is in a stressed state tending to move contact point 18 to the position shown in solid lines, but such movement is prevented by the tongue 22 in the opening 20. The tongue 22 normally holds the contact point 18 in a position which is somewhat advanced with respect to contact point 14 by a short distance (d) but does not restrain the rearward movement of contact 18. The leg 10 also forms a leaf spring support for the other contact area or point 14 normally urging the point to move away from the wall CW, but the hook portion 10e limits the amount of such movement without restraining rearward movement of the contact point.

Referring now to FIG. 3 of the attached drawings, this is a sectional view through a socket connector in accordance with the present invention, and showing how pairs of the contact members described with reference to FIG. 2 are assembled within an insulating body in order to provide opposed pairs of separately sprung electrical contact areas or points. The reference numeral 34 designates the insulating body generally and a printed circuit panel is indicated at 36 in the position which it would occupy once inserted within the socket so that its printed conductors 38 and 40 will each be engaged at two spaced points by the contact points 14 and 18 of each connector piece.

The insulating body 34 includes a plurality of cavities 42 each opening freely to one face of the body and terminating at the opposite body face in a pair of parallel slitted openings 44 and 46. The inner opposed side walls of the cavity 48 and 50 are plane, parallel surfaces with which the legs 10 of the connectors are in engagement in their assembled position. The floor of the cavities between the slits is bulged inwardly at 52 to provide an abutment for limiting the insertion of the printed circuit panels. This bulged area, of course, extends through the full length of the body member.

Still referring to FIG. 3, it will be seen that the side walls 48 and 50 terminate at points spaced equally from the outer face of the body and that recesses 54 and 56 are provided to form lips 54a and 56a which serve as stops for the hooked ends 10e of the legs 10.

To assemble a connector in the body, it is only necessary to insert the tightly folded portion of legs 10 and 12 into one of the slitted openings a sufficient distance to allow the spur portion 25 to spring out and edge 26 engages the under surface of the body. This is effective to lock the body between the edge surface 26 and the limit stop 16 and position the contact member as shown in FIG. 3.

With two contact members so assembled as shown in FIG. 3, it will be seen that the contact areas 14 and 18 of each member are urged into engagement with the printed circuitry carried by the panel 36 whenever such panel is inserted into the connecting cavities of the body. Each contact area of each connector is separately spring supported and should one spring fail, then the other is effective to maintain the desired electrical contact.

From the foregoing, it will be apparent to those skilled in the art that there is herein shown and described a novel and useful socket connector having numerous advantages over the prior art. While a preferred embodiment has been chosen for purposes of this disclosure, variations will occur to those skilled in the art and applicants therefore

are entitled to the benefit of a full range of equivalents within the scope of the appended claims.

We claim:

1. A socket connector comprising: an insulating body including a cavity opening freely into one face thereof and having parallel sidewalls, the opposite end of said cavity terminating in a slit opening through the opposite face of said body; a contact member mounted in said cavity and including a pair of substantially parallel legs comprising a flat conductive spring strip folded back upon itself, the folded end of said strip extending through and being supported in said slit opening, one of said legs adjacent a sidewall of said cavity extending along said wall a substantial distance and then curved outwardly into said cavity and back toward said wall to form a first contact point spaced from said wall, the other of said legs extending into said cavity and being inclined away from said one leg and then back towards said one leg at a point spaced inwardly of the mouth of said cavity from said first contact point to form a second contact point in substantially the same plane as the first contact point.

2. A socket connector as defined by claim 1 and in which one of said legs is notched and flared to form an abutment cooperating with the outer wall of said body member adjacent said slit to prevent withdrawal of said contact member after insertion of said contact member into said cavity.

3. A socket connector as defined by claim 1 in which one of said legs includes an inwardly bowed portion which engages the bottom of the cavity to limit the extent of insertion of said legs into said slit opening.

4. A socket connector as defined by claim 1 in which the portion of said leg forming said first contact point includes an opening therethrough in the outward bend and the other leg terminates in a reduced end portion received within said opening.

5. A socket connector for establishing electrical connection to a plurality of conductors printed on both sides of an insulating panel comprising: an elongated insulating body member including a plurality of cavities opening freely through one face thereof, each cavity including opposed parallel side walls, and terminating in a pair of parallel restricted slit openings through the opposite face of the body member, and each cavity being in free communication with each adjacent cavity; a pair of identical contact members mounted in each cavity and including a pair of substantially parallel legs comprising a flat conductive strip folded back upon itself, the folded end of said strip extending through and being supported in said slit opening, one of said legs adjacent a sidewall of said cavity extending along said wall a substantial distance and then curved sharply outwardly into said cavity and back toward said wall to form a first contact point spaced from said wall, the other of said legs extending into said cavity and being inclined away from said one leg and then back towards said one leg at a point spaced inwardly of the mouth of said cavity from said first contact point to form a second contact point in substantially the same plane as the first contact point, each cavity thus providing pairs of opposed double contact members for contacting opposite sides of a two-sided printed circuit panel.

6. A socket connector comprising a body of insulating material having a cavity formed therein with parallel sidewalls, said cavity being closed at the bottom except for a narrow slit along one sidewall of the cavity which extends through to the opposite face of the body, a contact member mounted in said cavity and comprising a strip of conducting material extending into said slit and having an intermediate portion extending upwardly from the bottom of said cavity and inclined away from the wall of said cavity by a relatively small angle, said intermediate portion being bent inwardly near the upper end thereof to form a shoulder portion inclined away from said wall at a relatively large angle, the terminal portion of said strip being bent back from said shoulder portion

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towards the wall of said cavity to form a rounded contact point facing away from said wall, said contact member including a second contact strip the lower end of which is held in fixed position adjacent said first strip at the bottom of said cavity and having an intermediate portion extending upwardly into said cavity and being inclined away from the intermediate portion of the first contact strip, said intermediate portion of the second contact strip being bent back towards the first contact strip to form a second contact point located below said first contact point, said first contact strip having a portion which engages a portion of said second contact strip to restrain movement

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of said second contact point towards the middle plane of the cavity and normally maintaining said second contact point in a position in advance of said first contact point.

7. A socket connector according to claim 6 wherein the upper end of said second contact strip terminates in a narrow portion which extends into a hole formed in the shoulder portion of the first contact strip and holds the contact point of the second strip in an advanced position with respect to the contact point of the first contact strip.

No references cited.