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ELECTRICAL CONNECTORS

Filed Dec. 3, 1962

FIG. 1

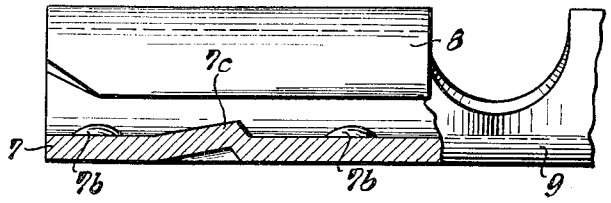


FIG. 2

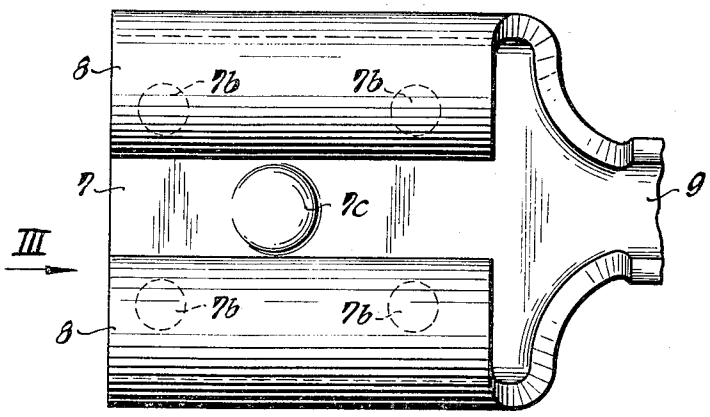
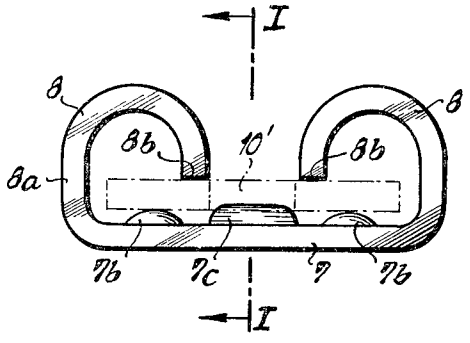


FIG. 3



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ELECTRICAL CONNECTORS

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1 Claim. (Cl. 339—258)

This invention relates to electrical connectors, and more particularly to electrical connectors of the flat contact type wherein a flat contact member is plugged into a resilient socket.

It is a principal object of this invention to provide electrical connectors of the above-noted kind wherein the contact between the interengaging contact elements is enhanced and more positively established and maintained.

It is an ancillary object of the present invention to provide improved electrical connectors which are not only superior, but are simple to manufacture and operate, and can be mass produced economically.

Other objects, and the means in which the same are attained, will become apparent as this specification proceeds.

It is well known to connect two electrical conductors by means of a plug connected to one of the conductors and provided with a flat contact member, and a socket connected to the other conductor and adapted to permit insertion of the flat contact member therein, this socket having a flat bottom and two side walls bent inwardly and downwardly to form resilient tongues terminating at a distance from the bottom. Since the socket is made by punching, the resilient tongues terminate in narrow cutting faces which due to the nature of the cutting operation are composed of an infinite number of uneven surface components.

Electrical connectors of this type, however, suffer from the disadvantage that the flat contact member when plugged into the socket element, does not rest on the bottom of the socket over its entire flat surface, as the bottom, though normally even, is somewhat bent or deformed when insertion of the flat contact member forces the resilient bent back portions of the side walls to move in upward direction, away from the bottom. This deformation of the bottom prevents the flat contact member from resting on the bottom in even, uniformly parallel relationship.

In order to arrive at a true parallelism of the socket bottom and the surface of the flat contact member of the plug, sockets having flat or curved bottoms have been proposed wherein the side walls are not simply bent up at the edges of the bottom, but wherein between the bottom edges and the side walls, bent down, grooves or channel portions are provided which cause the bottom of the socket to be lifted up, toward the free ends of the resilient, bent back portions, so the longitudinal edges of the flat contact member no longer bear against the axes of the resilient portions, an arrangement which indeed results in an increase of the effective contact areas.

Even this improved form of socket, however, fails to positively establish and maintain a secure contact between the flat contact member on the plug, and the bottom and resilient bent back portions, respectively, of the socket.

The present invention contemplates eliminating the drawbacks and shortcomings of the prior art devices mentioned above, and achieving a true parallelism of the plug and socket surfaces relied on for purposes of electric contact, by supporting the flat contact member punctiform

projections which serve as seats for the flat contact member which is forced down on these seats by the spring action of the bent back resilient portions. These projections cause the flat contact member to be disposed truly parallel to the even bottom of the socket as well as to the narrow terminal faces of the resilient portions, and the surface of the flat contact member facing the narrow terminal faces of the resilient portions, in particular, is also truly parallel to these terminal faces. Due to the fact well known in physics, that optimum conditions for the passage of current from one conductor to another are achieved by forced point-to-point contact of the two conductors, the invention results in a superior contact on both the top and bottom faces of the flat contact member and in a minimum resistance to current flow from said member to the top and bottom portions of the socket abutting thereagainst. The resiliency of the contact making socket portions thus is fully exploited for contact securing purposes, the projections on the socket bottom serving not only to establish and maintain true parallelism of the terminal faces of the resilient socket portions with the flat contact member, but moreover to furnish a directed counterpressure acting from the bottom of the socket which in conjunction with the downwardly exerted force of the resilient portions at the top of the socket, tightens the grip of the socket on the flat contact member, thus enhancing the contact between the members joined in the device.

The inwardly directed projections on the socket bottom which are of uniform height and which are embossed or stamped from the bottom are provided in the form of punctiform projections such as knob-shaped bosses. Preferred are at least four bosses, evenly distributed over the bottom of the socket. When the bottom is embossed to produce small bosses or cams, the latter are disposed on both sides of the center line of the bottom in regions across which extend the resilient portions in the top part of the socket. Preferably the bosses are spaced evenly from the center line of the bottom, and are disposed in pairs which are arranged symmetrically relative to one another as well as the center-line.

In the drawings accompanying this specification and forming part thereof, a preferred embodiment of the invention is illustrated diagrammatically by way of example, the intent being to exemplify and illustrate the invention rather than to limit the invention in any way.

In the drawings:

FIG. 1 is a diagrammatic side elevation of a second embodiment of the invention, shown largely in section taken along the line I—I in FIG. 3;

FIG. 2 is a top view of the device shown in FIG. 1, and

FIG. 3 is a front view of the embodiment of the invention illustrated in FIGS. 1 and 2 viewed in the direction of the arrow marked III in FIG. 2.

Referring to the drawings wherein like elements are denoted by identical reference numerals, the socket is seen to comprise a bottom **7**, and on both sides thereof, upwardly and inwardly bent resilient portions **8**. The socket extends into a portion **9** on which to mount a conductor; this portion may be provided with claws for the solderless attachment of the end of a conductor.

In accordance with the invention, the bottom **7** is embossed to provide inwardly directed projections which serve as seats or abutments for a flat contact member to be inserted in the socket and exposed to the spring action of the resilient portions **8**. A flat contact member **10** is shown in dot and dash lines, in FIG. 3.

As shown in FIGS. 1, 2 and 3 of the drawings, a device according to the invention comprises embossed, punched or stamped bottom portions **7***b* of cam or knob-shaped boss type configuration. Four such bosses **7***b* are distrib-

uted evenly over the bottom **7** of the socket. They are spaced evenly from the center line of the bottom, and are juxtaposed in pairs which are symmetrically arranged with respect to one another as well as to the longitudinal center line of the bottom. They are disposed in regions of the bottom **7** across which extend the resilient portions **8**. As shown in FIG. 3, the bosses **7***b* are effective in supporting the flat contact member **10** in true parallelism to the bottom **7** of the socket, and to match the downwardly directed force of the resilient portion **8**, by an upwardly directed counterpressure forcing the flat contact member **10** against the terminal faces **8***b* of the resilient portions **8**.

Preferably, the bottom **7** of the socket is provided on its longitudinal center line, with a cam shaped projection **7***c* which is designed to engage a corresponding depression or recess **10'** provided in the flat contact member **10**, in a manner not uncommon in the art.

We wish it to be understood that we do not desire to be limited to the exact details of construction, design and operation shown and described, as modifications falling within the scope of the appended claim and involving no departure from the spirit of the invention, nor any sacrifice of the advantages thereof, may occur to persons skilled in the art.

We claim:

An electrical plug and socket connector comprising a flat plug of rectangular configuration, a one-piece resilient socket member adapted to be formed by cutting and punching a single piece of rigid material, said socket member having an elongated flat planar rectangular bottom portion, two parallel, shallow side wall portions extending first upwardly, then inwardly and then downwardly toward said bottom portion and perpendicularly thereto to form thereby an open top portion which is bound by a pair of identical tongue edges, the end faces of said edges being perpendicular to the longitudinal surfaces of said tongue edges, an open end portion of said bottom portion which is formed with a constricted throat edge for mounting a conductor and an open opposite end portion having a rectangular configuration to receive the shallow, flat rectangular plug element, the bottom of said socket being provided with four generally identical bosses of uniform height which are struck out of the base plane of the bottom and symmetrically distributed in pairs on both sides of the longitudinal center of said base adjacent the four corners of the base, each of said tongue edges of said side walls terminating at the identical distance above each of said four bosses which is less than the height of said flat plug element to urge the lower tongue edge end faces to bear perpendicularly against the flat top surface of the plug, said four bosses supporting the bottom of said flat plug with the upper and lower surfaces of said flat plug being maintained respectively in generally parallel relation to the lower tongue faces and to the flat bottom of the socket, said bottom portion having an inwardly directed cam projection located between said four bosses and extending above each of said four bosses, said cam projection facilitating fitting of said plug into said socket by spring action of the material of the socket surrounding said bosses and cam projection as a result of the bearing action of said tongue faces against the top surface of said plug, and a recess corresponding to said cam projection on said flat plug member, said recess adapted to be engaged by said cam-shaped projection on insertion of said flat plug member into said socket.

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