

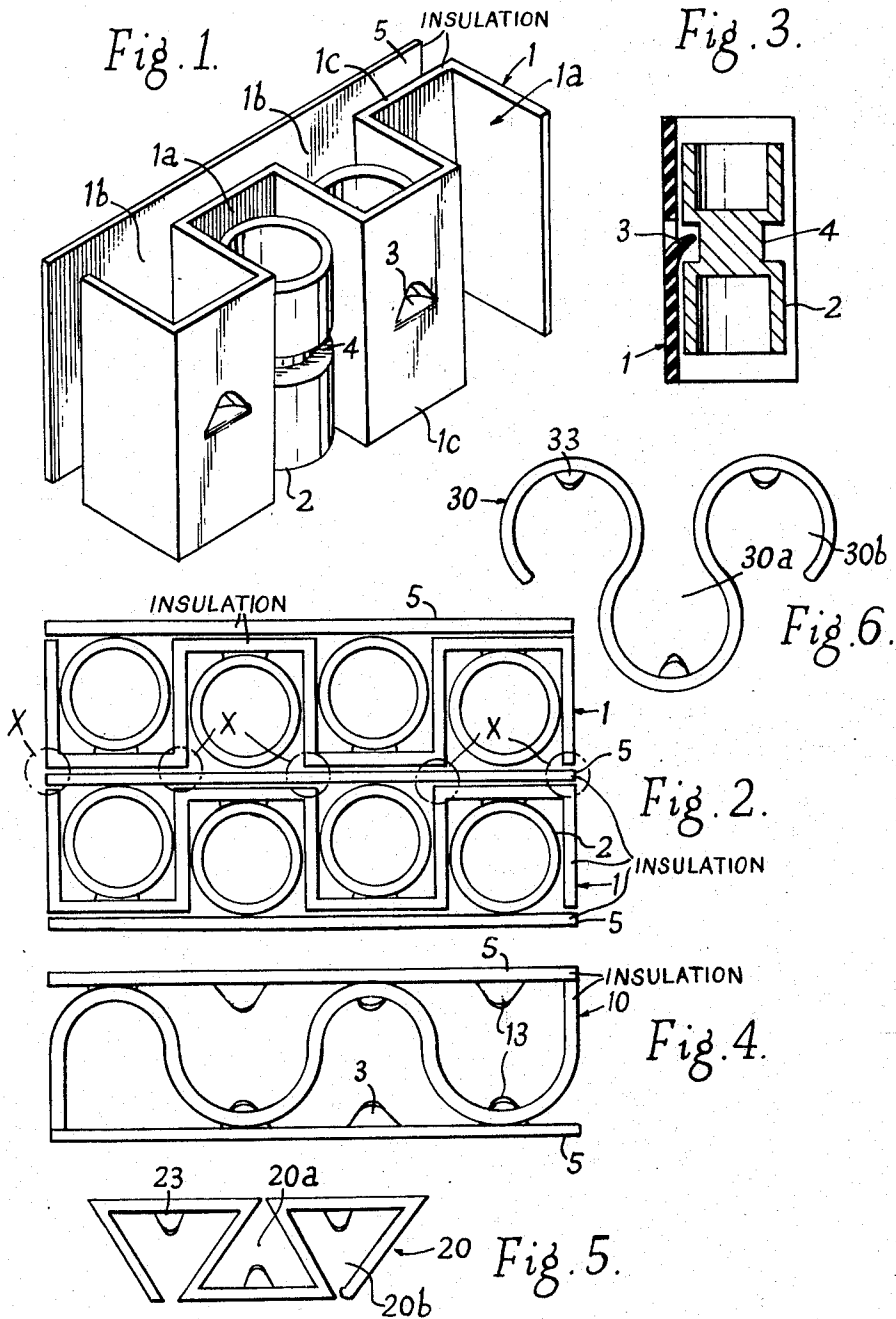
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SOCKET UNITS FOR PLUG-AND-SOCKET CONNECTORS

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3,263,205 SOCKET UNITS FOR PLUG-AND-SOCKET CONNECTORS

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5 Claims. (Cl. 339—198)

This invention relates to plug-and-socket connectors and has for an object to provide a plug-and-socket type connector unit having an insulating body of improved construction, which is particularly suitable for the use with contact elements of small diameters and thus for the use in connectors employing miniature and sub-miniature types of contacts. In plug-and-socket type connectors as hitherto normally made, the insulating body of each connector member is formed as a molding in which holes to house the contacts are formed in the molding operation with the help of cores constituted by suitable die pins. If the holes are very narrow, these die pins have been liable to bend under the pressure of the molding material, and it is therefore a more specific object of the present invention to provide an improved insulating body which avoids the need of using a mold equipped with such pin cores.

According to the invention the dielectric body of a plug-and-socket connector member comprises a strip or strips of dielectric material, each strip being bent in alternate directions to form undulations, the spaces between individual undulations constituting contact-accommodating chambers, and adjacent undulations of each strip being rigidly interconnected by flat portions of dielectric material attached to the apices of adjacent undulations so as to prevent opening of the undulations. All the undulations projecting to one side of a strip may be secured to one flat element of dielectric material, or each undulation gap may be bridged by a separate flat element, for example by the flat back of an undulation of an adjacent strip of suitable construction. The term undulation is employed in this specification in a general sense, and is not tied down to a sinusoidal or other particular shape of the repetitive deviations. In order to retain a metal contact in the chamber thus formed in each undulation, the wall of the undulation is preferably formed with a resilient tongue or its equivalent, which projects into the chamber and which may be pressed out from the material when the undulated strip is made from sheet or strip plastic, or the strip may be molded integrally with the tongues if desired.

A number of embodiments of the invention will now be described with reference to the accompanying drawing, in which

FIGURE 1 is a perspective view showing an undulated strip and a backing strip forming part of one embodiment,

FIGURE 2 is a plan view of a complete socket member of the same embodiment,

FIGURE 3 is a sectional elevation illustrating the co-operation of the fixing tongue with a groove in a socket contact element, while

FIGURES 4, 5 and 6 are fragmentary plan views illustrating modifications.

Referring now first to FIGURE 1, an insulating body having holes for the accommodation of connector contacts, shown as bushings 2, is formed by providing a strip 1 of insulating material which is bent transversely in alternate directions in a square-wave pattern, so as to form at each side a series of rectangular pockets 1a and 1b respectively, each of which has a width and depth equal to the diameter of a contact bushing 2. Instead

of being formed by bending at flat strip, this undulated strip may if desired be produced by edgewise extrusion, or finally the strip may be molded by transverse pressure, employing suitably castellated mold or die elements.

5 The strip 1 presents at each side a series of flat-surfaced portions 1c constituting the bottom wall of each pocket; and in order to close the tops of the pockets and render the whole arrangement rigid, flat strips or panels 5 of insulating material are applied to each side of the thus-formed strip and attached to the adjacent bottom walls of alternate pockets in any suitable manner, for example by sticking or sweating.

10 In order to retain the contact bushings 2 against longitudinal displacement, each bushing is provided with a circumferential groove 4, and one or more walls of each pocket are provided with integral tongues 3 which resiliently project into the pocket for engagement with the groove 4 of a contact. These tongues are conveniently produced by deformation of the pocket wall and/or of the strip or panel 5 closing each pocket. If desired these tongues or equivalent projecting portions may be formed by molding.

15 In FIGURE 1 only one strip or panel 5 is shown, in order to illustrate more conveniently the arrangement of the contacts in the pockets and the formation of the tongues 3. In practice, however, a similar panel will also be applied to the other side to close the pockets 1b. A complete unit or part of a unit of this kind is shown in FIGURE 2. The central panel strip 5 may, if desired, be omitted provided that the strips 1 are secured to each other at each of the overlapping corners as indicated schematically by the chain-dotted circles x.

20 More particularly when pockets are to be formed by bending of a flat strip, it may be found more convenient to bend the strip in the undulated-curve form shown at 10 in FIGURE 4 to avoid the need of forming sharp corners, the flat panels 5 being in this case secured to the apex of each undulation of the strip 10. In the embodiment illustrated in FIGURE 4, tongues 13 are formed both in the strip 10 at the apex of each undulation and in each panel 5 facing the centre of each open pocket.

25 FIGURE 5 shows another modification, in which a strip 20 is bent to form on alternate sides pockets 20a and 20b of substantially triangular cross-section. Due to the considerable overlap of the parallel flat portions at the two sides of the strip, this form of strip may be preferred when a number of adjacent strips are to be joined without the interposition of a flat panel since the large areas of overlap will facilitate the establishment of junctions of the kind indicated at X in FIGURE 2. Tongues 23 are provided on the flat parallel portions of the strip 20.

30 FIGURE 6 shows a strip 30 which is bent to form partially closed rounded-bottom pockets 30a and 30b which are staggered in relation to each other, the total amplitude of the undulations being substantially greater than the radius of the contacts to be employed in the pockets. Strips of this kind are intended to be enclosed between flat strips or panels 5 similarly to those of the embodiment of FIGURE 4, and are provided with inwardly projecting integral tongues 33, no tongues being provided on the closing panel strips or panels.

35 It will be observed that in all the illustrated forms of the invention the contacts 2 can be conveniently retained by tongues or projections integral with the connector body, a feature which is difficult if not impossible to achieve in the case of the conventional insulating blocks having pin-molded holes.

What I claim is:

40 1. A plug-in-type electrical connector member, which comprises an insulating body including a first strip of

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dielectric material, bent in alternate directions to form undulations, the spaces between individual undulations constituting contact-accommodating chambers, and a second strip having flat portions and being so secured to the first strip that adjacent undulations of the first strip are rigidly interconnected by such flat portions of the second strip, each said flat portion being attached to the apices of two adjacent undulations of the first strip so as to prevent opening of the undulations, at least some of the chambers including a wall portion formed with an integral element resiliently projecting into the chamber; and a plurality of plug-in-type contacts each having a generally cylindrical portion accommodated in one of the chambers equipped with such projecting element, and each having at the outer side of said generally cylindrical portion a circumferential groove co-operating with the projecting element of said chamber.

2. An electrical connector member as claimed in claim 1, wherein the first strip is bent respectively in opposite directions at alternate pairs of consecutive points spaced by rectilinear portions of the strip so as to form an angularly undulated line, whereby the flat portions of the second strip each form, jointly with a length of the first strip that forms a gap, a series of four walls enclosing a quadrilateral-section chamber.

3. An electrical connector member as claimed in claim 2, wherein at least some of the contacts are bushings each having a central circumferential groove at its outer side.

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4. An electrical connector member as claimed in claim 1, wherein the first strip is formed with rectangular corrugations having portions extending parallel to the plane of the said flat portion of the second strip interconnected by portions extending transversely of the said plane.

5. An electrical connector member as claimed in claim 1, comprising at least two strips in each of which alternate corrugations include flat portions extending longitudinally of the strips and respectively forming corrugation apices at opposite sides of the strip in longitudinally overlapping relation, the flat portions at one side of one strip and those at the opposite side of an adjacent second strip being interconnected near their ends so that a plurality of flat portions of each strip each close the circumference of a chamber formed between adjacent corrugations of the other strip.

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