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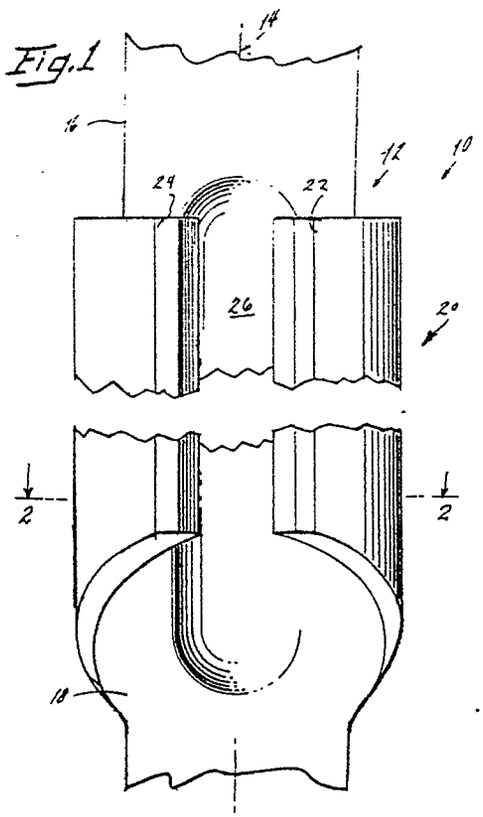
(71) Applicant: **GTE Products Corporation**
100 West 10th Street
Wilmington, DE 19801(US)

(72) Inventor: **Barnhart, Robert V.**
205 Margate Road
York, PA 17404(US)
Inventor: **Nemcovsky, Rhonda L.**
901 Conewango Ave.
Warren, PA 16365(US)

(74) Representative: **Patentanwälte Grünecker, Kinkeldey, Stockmair & Partner**
Maximilianstrasse 58
D-8000 München 22(DE)

(54) Electrical connector with compliant section.

(57) A "C" shaped compliant electrical contact has a thinned bight and thicker arms for better conformance to the shape of printed circuit board plated-through-holes. Less stress is set up in the boards and good contact is made with the hole.



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ELECTRICAL CONNECTOR WITH COMPLIANT SECTION

Technical Field

This invention relates to electrical connectors and more particularly to such connectors having a compliant section. Still more particularly, it relates to such connectors for insertion into plated through holes in printed circuit boards.

Background Art

Modern electronic apparatus makes extensive use of printed circuit boards employing plated-through-holes (PTH). As an alternative to soldering connectors in these holes, it has been proposed to use connectors which engage the hole by friction only. Such connectors generally employ a compliant section for engagement to provide good mechanical and electrical contact. It is desirable that minimum damage be done to the PTH so that such connectors can be removed and replaced. The compliant connectors generally available take several forms: the "eye-of-the-needle" approach, as shown in U.S. Pat. Nos. 3,545,080; 3,634,819; and 4,206,964; the "split beam" approach, shown in U.S. Pat. Nos. 4,066,326; 4,186,982; the opposed "C" sections shown in U.S. Pat. No. 4,701, 140: and the single "C" section, shown in U.S. Pat. Nos. 3,783,433; 4,017,143; 4,076,356; and 4,166,667.

While some of these techniques work to a greater or lesser extent, all have one or more problems, such as cost of making; failure to form a good gas tight seal with the PTH; difficulty of insertion or removal; or, when used in high numbers in thin printed circuit boards, a tendency to warp the boards because of the pressure they exert on the apertures.

Disclosure Of The Invention

It is, therefore, an object of the invention to obviate the disadvantages of the prior art.

It is another object of the invention to enhance electrical connection in plated-through-holes.

Yet another object of the invention is the provision of an electrical connector for PTH's which achieves the above objects and, additionally, provides ease of insertion and removal with minimal plating damage.

These objects are accomplished, in one aspect of the invention, by the provision of an electrical contact which has a compliant portion which is substantially "C" shaped in cross-section. The "C" shape is formed from opposing arms which extend from a joined bight. The arms have a substantially uniform, given thickness along a major part of their length. The joined bight has a thickness less than the given thickness.

This thinner, or relieved section, allows for more deflection of the arms. As the ends deflect, so does the thinner relieved area of the bight. The contact can be formed by standard stamping and swaging techniques at a competitive cost.

Brief Description Of The Drawings

Fig. 1 is an elevational view of a contact of the invention; and

Fig. 2 is a sectional view taken along the line 2-2 of Fig. 1 and showing the contact in a plated through hole.

Best Mode For Carrying Out The Invention

For a better understanding of the present invention, together with other and further objects, advantages and capabilities thereof, reference is made to the following disclosure and appended claims taken in conjunction with the above-described drawings.

Referring now to the drawings with greater particularity, there is shown in Fig. 1 an electrical contact 10 having a body 12 with a longitudinal axis 14. First portion 16 and second portion 18 are separated by and connected to a compliant portion 20. The compliant portion 20 has a generally "C" shaped cross-section, more clearly seen in Fig. 2, which is formed from opposed arms 22 and 24 which extend from a joined bight 26. The arms 22 and 24 have a given, substantially uniform thickness, which can be, e.g., .008-009 inches, for a major part of their length. The free ends 28 of the arms can be radiused or beveled, as shown.

The joined bight 26 has a thickness which is less than the thickness of the arms, e.g., about 0.001-003" less, thus providing more evenly distributed stresses about the plated-through-hole or aperture 30 in the printed circuit board 32. The aperture 30 can have an electrically conductive coating 33 thereon. This more even distribution of forces contributes to less hole deformation and, therefore, less accumulated stresses in the printed circuit board, which causes less warpage.

Further, this configuration provides greater contact surface area to the aperture 30 because the thinner portion of the bight more readily conforms

to the aperture.

Preferably, the contact can be made by stamping from sheet stock of phos-bronze having a thickness of .020".

The bight can be thinned by coining or swaging to a thickness of about 0.001" less than the arms . When the "C" section is formed it typically will have a diameter of 0.046 ± .001" and will be received within apertures having diameters of from 0.037" to 0.043".

While there have been shown and described what are at present considered to be the preferred embodiments of the invention, it will be apparent to those skilled in the art that various changes and modifications can be made herein without departing from the scope of the invention as defined by the appended claims.

Claims

1. An electrical contact for insertion into an aperture in a printed circuit board wherein said contact comprises:
a compliant, aperture engaging portion having a generally "C" shaped cross-section formed from opposing arms extending from a joined bight;
said opposing arms engaging said aperture along their outer surface substantially to the ends thereof;
said arms having a substantially uniform, given thickness along a major portion of their length; and
said joined bight having a thickness less than said given thickness.

2. An electrical contact comprising:
a body having a longitudinal axis with first and second spaced apart portions separated by and connected to a compliant portion;
said compliant portion having a generally "C" shaped cross-section formed from opposing arms extending from a joined bight;
said arms having a substantially uniform, given thickness along a major part of their length; and
said joined bight having a thickness less than said given thickness.

3. An electrical contact as claimed in Claim 1 for insertion into a mounting aperture in an insulated board and wherein said aperture has sides which are coated with an electrically conductive material.

Fig.1

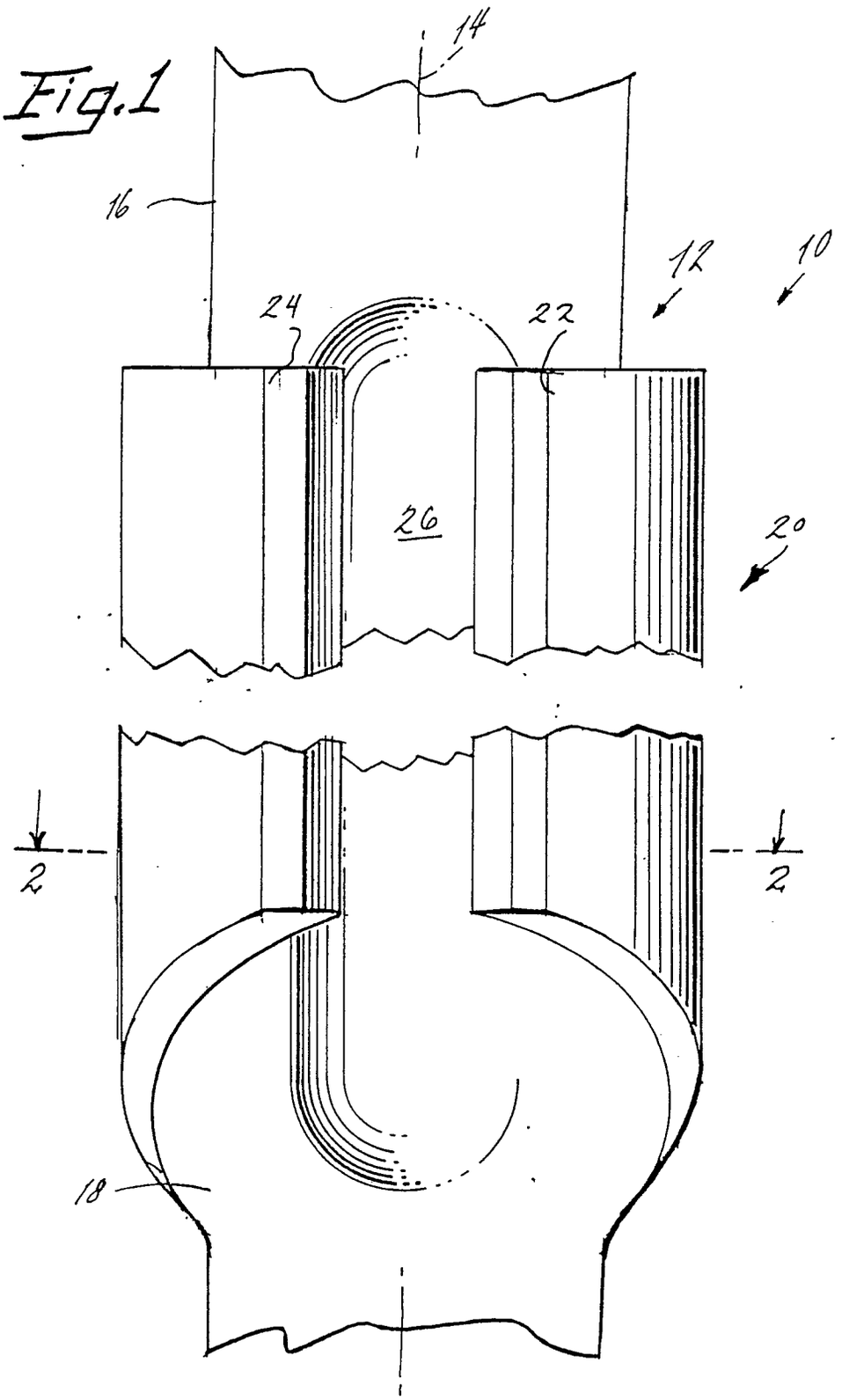
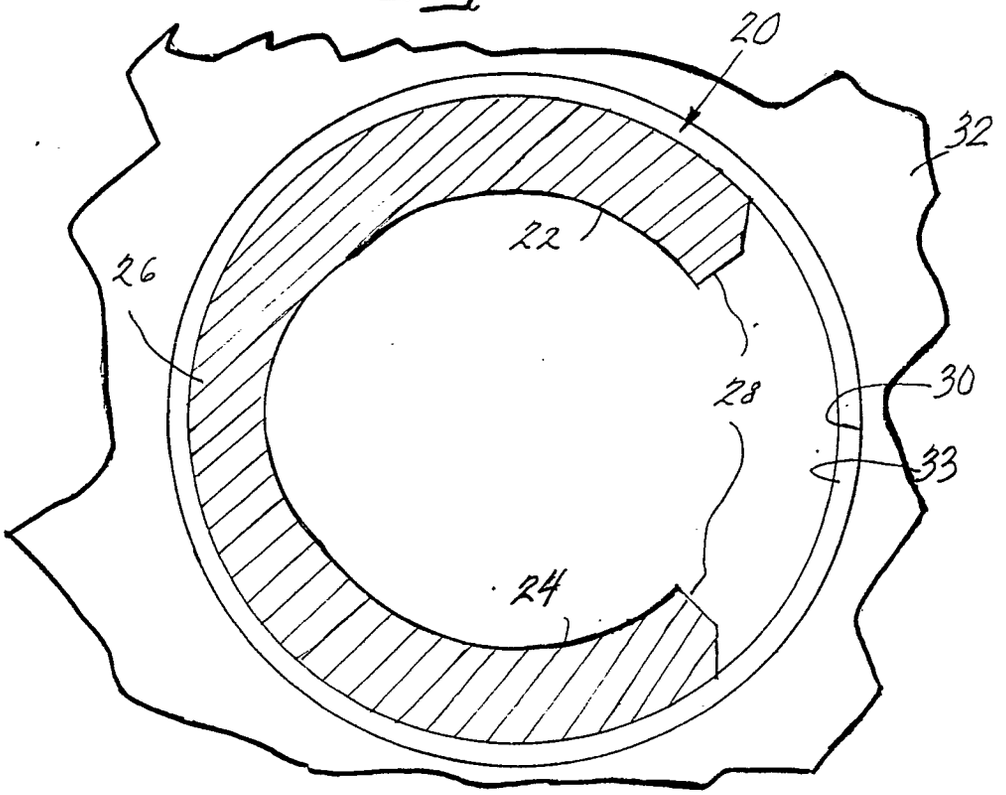


Fig. 2



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 88 11 8968

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	DE-A-2 937 883 (SIEMENS AG) * page 3, lines 5-11; page 4, lines 15-22; figure 2 *	1-3	H 01 R 9/09
X	EP-A-0 208 500 (BICC PUBLIC LIMITED COMPANY) * page 2, lines 1-15 *	1-3	
X	DE-A-3 220 781 (HARTING ELEKTRONIK GMBH) * abstract *	1-3	
D,A	US-A-4 017 143 (KNOWLES) * claims *	1	
D,A	US-A-4 076 356 (TAMBURRO) * column 1 - column 2, line 11; figures 1-9 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

H 01 R 9/00
H 01 R 13/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	10-03-1989	CLOSA D.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
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& : member of the same patent family, corresponding document