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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **Electrical contact with compliant section and its use with a printed circuit board.**

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Description

This invention relates to an electrical contact in accordance with the generic clause of claim 1.

Modern electronic apparatus makes extensive use of printed circuit boards employing plated-through-holes (PTH). As an alternative to soldering contacts in these holes, it has been proposed to use contacts which engage the hole by friction only. Such contacts 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 contacts can be removed and replaced. The compliant contacts 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.

Document EP-A-0 208 500 describes an electrical press-fit contact whereby said contact includes a compliant section of a substantially "C"-shaped cross-section and comprises first an second arm portions with a base portion therebetween, whereby the thickness of the compliant section increases steadily from the base portion to the arm portion such that the center of the base portion is of least thickness to form a hinge about which a first and second arm portion maybe preferentially deflected.

It is 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 contact for PTH's which achieves the above objects and, additionally, provides ease of insertion and removal with minimal plating damage.

These objects are accomplished with an electrical contact according to claim 1.

The thinner, or relieved section of such a contact, 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.

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.

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., 0,20 - 0,23mm (0.008 - 0.009 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 0,02 - 0,08mm (0.001 - 0.003 inches) 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 0,5mm (0.020 inches).

The bight can be thinned by coining or swaging to a thickness of about 0,02mm (0.001 inches) less than the arms. When the "C" section is formed it typically will have a diameter of 1,17 ± 0,02mm (0.046 ± 0.001 inches) and will be received within apertures having diameters of from 0,94 - 1.09mm (0.037 to 0.043 inches).

Claims

1. An electrical contact (10) for insertion into an aperature (30) in a printed circuit board (32) wherein said contact (10) comprises:
a compliant, aperture engaging portion (20) having a generally "C"-shaped cross-section

formed from opposing arms (22,24) extending from a joined bight (26);
said opposing arms (22,24) engaging said aperture (30) along their outer surface substantially to the ends thereof;
characterized in that
said arms (22,24) having a substantially uniform, given thickness along a major portion of their length; and
said joined bight (26) having a thickness less than said given thickness.

2. An electrical contact (10) of claim 1 comprising:
a body (12) having a longitudinal axis (14) with first and second spaced apart portions (16,18) separated by and connected to the compliant portion (20).

3. The use of an electrical contact as claimed in claim 1 with a printed-circuit board (32) whereby the contact is inserted into an aperture of the pc-board so that said compliant portion engages said aperture (30) which has its sides coated with an electrically conductive material (33).

Patentansprüche

1. Elektrischer Kontakt (10), zum Einsetzen in eine Öffnung (30) in einer Leiterplatte (32), wobei der Kontakt (10) folgendes umfaßt:
einen federnden Bereich (20), der mit der Öffnung in Eingriff steht und einen im wesentlichen "C"-förmigen Querschnitt aufweist, und aus gegenüberliegenden Armen (22, 24) geformt ist, die sich von einer angrenzenden Einbuchtung (26) aus erstrecken,
wobei die gegenüberliegenden Arme (22, 24) mit ihrer äußeren Oberfläche, im wesentlichen an deren Enden, mit der Öffnung (30) in Eingriff stehen;
dadurch gekennzeichnet,
daß die Arme (22, 24) über einen Großteil ihrer Länge eine im wesentlichen gleichmäßige vorgegebene Dicke aufweisen; und
die angrenzende Einbuchtung (26) eine Dicke aufweist, die geringer ist als die vorgegebene Dicke.

2. Elektrischer Kontakt (10) nach Anspruch 1, der umfaßt:
einen Körper (12), der eine Längsachse (14) mit ersten und zweiten voneinander beabstandeten Bereichen (16, 18) aufweist, die durch den federnden Bereich (20) voneinander getrennt und verbunden sind.

3. Verwendung eines elektrischen Kontaktes nach Anspruch 1 in einer Leiterplatte (32), wobei der Kontakt in eine Öffnung der Leiterplatte eingesetzt wird, so daß der federnde Bereich mit der Öffnung (30) in Eingriff steht, wobei die Seiten der Öffnung mit einem elektrisch leitfähigen Material (33) beschichtet sind.

Revendications

1. Contact électrique (10) à insérer dans une ouverture (30) pratiquée dans une carte (32) à circuit imprimé, le dit contact (10) comprenant :
une partie souple (20) s'introduisant dans l'ouverture, présentant en coupe une forme générale en C réalisée à partir de bras opposés (22, 24) s'étendant d'une anse de raccordement (26);
les dits bras opposés (22, 24) entrant en contact de la dite ouverture (30) sur leur surface extérieure substantiellement à leurs extrémités;
caractérisé en ce que
les dits bras (22, 24) ont une épaisseur donnée substantiellement uniforme sur une majeure partie de leur longueur; et que
la dite anse de raccordement (26) présente une épaisseur inférieure à la dite épaisseur donnée.

2. Contact électrique (10) selon la revendication 1, comprenant un corps (12) présentant un axe longitudinal (14), avec des première et deuxième parties espacées l'une de l'autre (16, 18), séparées par et connectées à la partie souple (20).

3. Utilisation d'un contact électrique selon la revendication 1 avec une carte à circuit imprimé (32), selon laquelle le contact est inséré dans une ouverture de la carte à circuit imprimé de telle manière que la dite partie souple entre en contact de la dite ouverture (30) qui a ses parois recouvertes d'un matériaux électriquement conducteur (33).

Fig.1

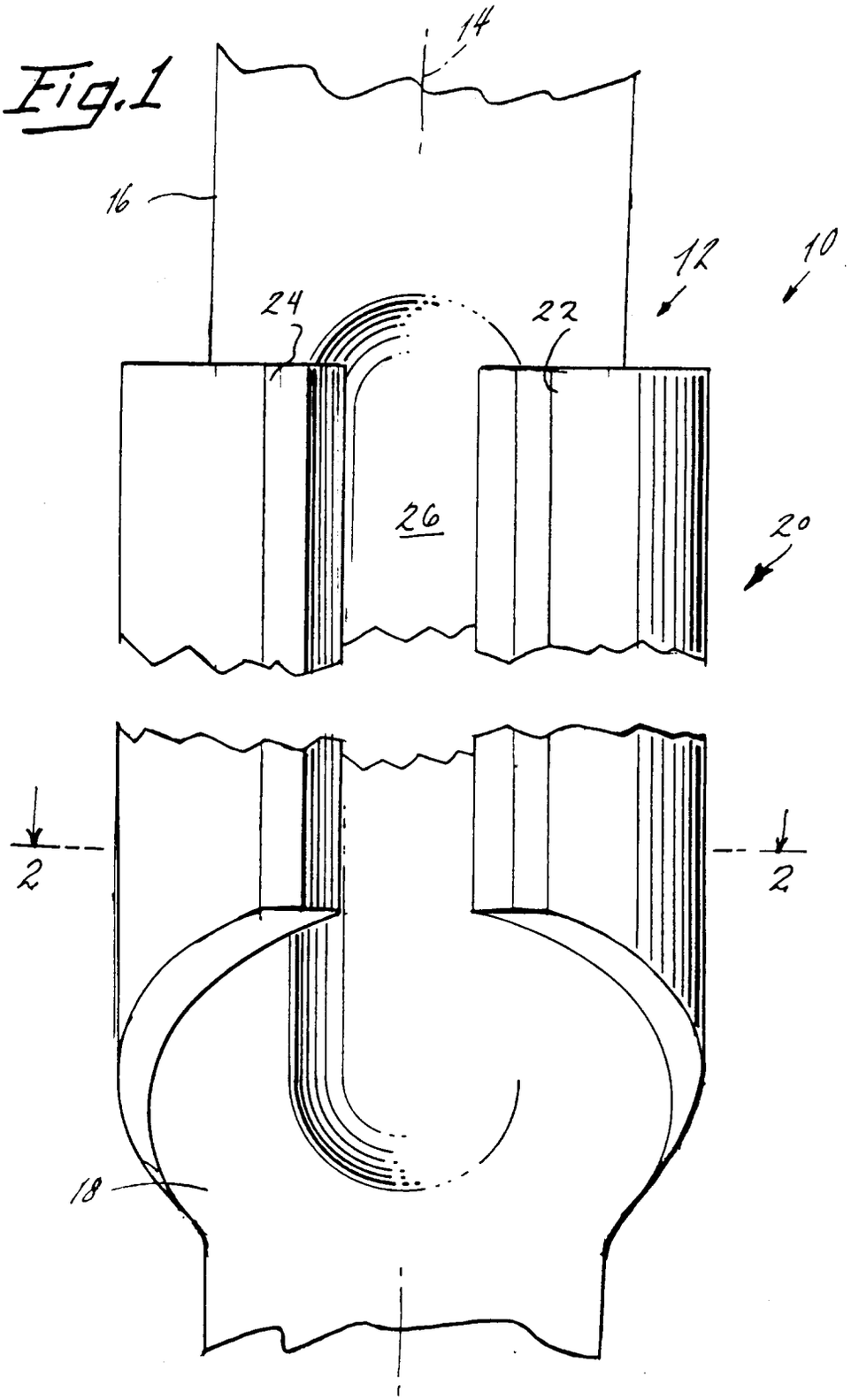


Fig. 2

