

Description

The present invention relates to an insulation displacement contact according to the preamble of claim 1 (US-A-4 106 838).

Insulation displacement contacts are well known in the art. One example is described in U.S. Patent 4.118.096, which shows a contact with adjacent tongues which are staggered slightly relative to each other. A double contact is provided through the use of four tongues. If the contact between the cable and the tongues is lost with one set of tongues, there is still possible contact with the other set of tongues. In order to make the tongues sufficiently rigid, both as regards bending in a direction moving the tongues apart and as regards bending of the tongues in the direction of the central axis of the cable, the tongues are made relatively wide. This does, however, mean that limits are set for the distance or pitch between adjacent conductors of a flat cable since the conductors may be touched only by the contacts intended for them, which is determined by the width of the tongues.

U.S. Patent 4,262,984 discloses another insulation displacement contact which comprises a single flat sheet part provided with projecting tongues which are folded over at their end so that a U-shape is obtained.

An insulation displacement contact as described above is known from US-A-4.106.838. From that specification bending of the sheet parts to form a box section is known. In this box section a conductor pin can be introduced. The box section for the conductor pin is positioned adjacent the insulation displacement contact and is a part of the connection portion.

The invention aims to provide an insulation displacement contact to be used in combination with printed circuits which can electrically contact conductors spaced at very small pitch distances.

This object is achieved with the characterizing features of claim 1. Folding in the sense of claim 1 makes it possible to restrict greatly the width of each tongue while still achieving the strength needed for displacing or piercing the cable insulation, thus ensuring good electrical contact with the conductor and making certain that a displacement is provided between conductor and insulating material.

The rigidity of the tongues is now partially achieved by the folded-over side edges of the tongues which lie in a plane at right angles to the crosswidth direction in a connector with multiple contacts. As a result, it is possible to reduce significantly the pitch between adjacent conductors of a flat cable, as well as to reduce the thickness of the material from the contact.

According to a preferred embodiment of the invention, the flat sheet parts are directly connected to each other by means of a 180° fold. In other words, the H-shape extends only over the part of the tongues

near the insertion aperture for the conductor. This is the part under the greatest load.

In order to be able to pierce through the insulation better near the conductor, the folded-over ends of the tongues are designed so that they taper towards the insertion aperture for the conductor.

The invention will be explained in greater detail below with reference to an example of an embodiment shown in the drawing in which:

Fig. 1 shows a flat sheet from which the insulation displacement contact according to the invention is made by folding;

Fig. 2 shows a side view of a number of insulation displacement contacts according to Fig. 1 made by folding;

Fig. 3 shows a detail of a further embodiment of the insulation displacement contact according to the invention; and

Fig. 4 shows a number of insulation displacement contacts according to Fig. 3 disposed in a contact or connector block.

Detailed Description of the Embodiments

Fig. 1 shows a part of a flat metal blank from which the insulation displacement contact according to the invention is obtained by folding. The flat blank is indicated in its entirety by 1, and comprises two flat sheet parts 2 and 3, provided with projecting tongues 6, 7, 8 and 9. An insertion aperture 14 is bounded by the tongues 6 and 7, while another insertion aperture 15 is bounded by the tongues 8 and 9. The ends of the tongues are bevelled, in order to center the conductor and facilitate the piercing of the insulation. The sides of each of the tongues facing away from the apertures 14 and 15 are also bevelled. The adjacent ends of tongues 7 and 8 are separated from the flat sheet parts 2 and 3 by a cut-out 26. The fold lines along which flat blank 1 is to be folded are indicated by dashed lines.

A neck 27 forms a contact strip, which is connected to a contact at the other end of the terminal. This other contact may be any of those well known in the art. In Fig. 2, one such other contact is shown at 35 and is the subject of U.S. Patent 4,721,484 owned by the assignee of the present application. This contact is sold by the Du Pont Company under its trademark "Micro-Tri-Beam".

Folding the flat sheet parts 2 and 3 along the center fold line through 180° brings them against each other so each part abuts superimposed over the other. Thereafter or earlier, or at the same time, the outer sides of each of the tongues not adjacent to the apertures 14, 15 are folded over through essentially 90° along their respective fold lines, resulting in the insulation displacement contact as shown in Fig. 2 in its entirety by 30. Sections 18 and 19 are the portions of flat sheet parts 2 and 3, respectively, which remain in abutting contact with one another. It can be seen in

Fig. 2 that the ends which have been folded over form four flanges 31, 32, 33 and 34. It can also be seen from Fig. 2 that various insulation displacement contacts according to the invention are disposed so that they are staggered relative to each other in order to make optimum use of space.

Through use of the flanged parts 31, 32, 33 and 34, the conductors 38 of a cable 37 can be placed closer together, at a smaller pitch, without risk of inadvertent electrical contact between adjacent tongues and a conductor arising when the cable conductor are being inserted. The flanges provide an excellent guide for the conductors as well as optimum stripping of the cable insulation with sufficient strength in the tongues. The tapering of the flanges 31, 32, 33 and 34 towards the insertion aperture ensures that the insulation is easily pierced. Since the flanges 31, 32, 33 and 34 form an obstacle for the cable, the cable will be automatically positioned there with the part with the least resistance. This provides a centering effect due to the fact that the relatively weak insulation part between the conductors comes to rest there.

The insulation displacement contacts 31 shown in Fig. 2 are each provided at their other end with a Micro-Tri-Beam contact 35, but it will be understood that any contact known in the art can be used. All the contacts are incorporated in an insulation block 36. Cable 37 is aligned over contact 31 and pressed down by a top connector insulation block 38 to electrically connect each cable conductor with its respective contact. An extremely small pitch distance between the contact apertures is thereby achieved in an extremely simple manner without further measures.

Figs. 3 and 4 show a further embodiment of the insulation displacement contact of invention, indicated in its entirety by 40. The connection to neck 51 is not shown in any further detail. In Fig. 3, the contact is shown folded up. As in the case of the embodiment of Figs. 1 and 2, the contact 40 is made by folding over a flat blank. Tongues 10, 11, 12 and 13 are provided here with flanges 41, 42, 43 and 44. Unlike the embodiment of Figs. 1 and 2, the flanges 43 and 44 are connected by means of a connecting part 22 with cross-bar 20 connecting these flanges to flanges 41 and 42, the contact has an H-shaped cross-section which has particularly great strength.

Fig. 4 shows schematically an insulation block 45 containing various insulation displacement contacts of the type shown in Fig. 3. Reference number 46 shows the top part of a contact insulation block, which has to be fitted on the insulation block 45 after insertion of the flat, cable (not shown). Here again, the insulation displacement contacts 40 are arranged in a staggered manner.

It will be apparent to one skilled in the art that the invention principles disclosed herein can be practiced by other than the embodiments described, which are presented for purposes of illustration rather than lim-

itation, and the present invention is limited only by the claims which follow.

5 Claims

1. An insulation displacement contact (40) for piercing insulation of a cable (37) to electrically contact one of the conductors in said cable (37) integrally formed from a flat metal blank (1) and comprising

two flat metal sheet parts (2,3) superimposed over one another and in abutting contact with each other;

each flat sheet part (2,3) having an aperture (14,15) for receiving the cable conductor, said aperture of each flat sheet part (2,3) being aligned with one another, and

each flat sheet part (2,3) having a pair of projecting tongues (6,7,8,9,10,11,12,13) bounding and defining said aperture (14,15), the side edge of each tongue facing away from said aperture being tapered along at least a portion of its length to narrow toward its free end, said tapered side of each tongue being folded at right angles to extend away from the plane of each flat sheet part, thereby forming four tapered flanges (41,42,43,44), a pair at each side of the superimposed flat sheet parts (2,3) extending in opposite directions;

wherein one pair of said oppositely extending flanges (41,42;43,44) is connected via a connection portion (22) of said flat metal blank,

characterized in that,

said connection portion (22) comprises at least one 180° fold and wherein all parts of said connection portion (22) either abut another part of said connection portion or said oppositely extending flanges (41,42,43,44) such that the cross section of the contact is approximately H-shaped.

2. Insulation displacement contact according to claim 1, having connection means (51) for electrical connection with a further electrical part, wherein said connection means are provided at the free end of the contact remote from the introduction end for the conductor.
3. An insulation displacement contact according to one of the preceding claims wherein the flat sheet parts (2,3) are formed integrally from a flat metal blank (1) and are superimposed over one another by folding approximately 180° at a fold line in a portion connecting the flat sheet parts to each other.
4. Insulation displacement contact according to one of the preceding claims, wherein the flanges



Fig. 2 that the ends which have been folded over form four flanges 31, 32, 33 and 34. It can also be seen from Fig. 2 that various insulation displacement contacts according to the invention are disposed so that they are staggered relative to each other in order to make optimum use of space.

Through use of the flanged parts 31, 32, 33 and 34, the conductors 38 of a cable 37 can be placed closer together, at a smaller pitch, without risk of inadvertent electrical contact between adjacent tongues and a conductor arising when the cable conductor are being inserted. The flanges provide an excellent guide for the conductors as well as optimum stripping of the cable insulation with sufficient strength in the tongues. The tapering of the flanges 31, 32, 33 and 34 towards the insertion aperture ensures that the insulation is easily pierced. Since the flanges 31, 32, 33 and 34 form an obstacle for the cable, the cable will be automatically positioned there with the part with the least resistance. This provides a centering effect due to the fact that the relatively weak insulation part between the conductors comes to rest there.

The insulation displacement contacts 31 shown in Fig. 2 are each provided at their other end with a Micro-Tri-Beam contact 35, but it will be understood that any contact known in the art can be used. All the contacts are incorporated in an insulation block 36. Cable 37 is aligned over contact 31 and pressed down by a top connector insulation block 38 to electrically connect each cable conductor with its respective contact. An extremely small pitch distance between the contact apertures is thereby achieved in an extremely simple manner without further measures.

Figs. 3 and 4 show a further embodiment of the insulation displacement contact of invention, indicated in its entirety by 40. The connection to neck 51 is not shown in any further detail. In Fig. 3, the contact is shown folded up. As in the case of the embodiment of Figs. 1 and 2, the contact 40 is made by folding over a flat blank. Tongues 10, 11, 12 and 13 are provided here with flanges 41, 42, 43 and 44. Unlike the embodiment of Figs. 1 and 2, the flanges 43 and 44 are connected by means of a connecting part 22 with cross-bar 20 connecting these flanges to flanges 41 and 42, the contact has an H-shaped cross-section which has particularly great strength.

Fig. 4 shows schematically an insulation block 45 containing various insulation displacement contacts of the type shown in Fig. 3. Reference number 46 shows the top part of a contact insulation block, which has to be fitted on the insulation block 45 after insertion of the flat, cable (not shown). Here again, the insulation displacement contacts 40 are arranged in a staggered manner.

It will be apparent to one skilled in the art that the invention principles disclosed herein can be practiced by other than the embodiments described, which are presented for purposes of illustration rather than lim-

itation, and the present invention is limited only by the claims which follow.

Claims

1. An insulation displacement contact (40) for piercing insulation of a cable (37) to electrically contact one of the conductors in said cable (37) integrally formed from a flat metal blank (1) and comprising

two flat metal sheet parts (2,3) superimposed over one another and in abutting contact with each other;

each flat sheet part (2,3) having an aperture (14,15) for receiving the cable conductor, said aperture of each flat sheet part (2,3) being aligned with one another, and

each flat sheet part (2,3) having a pair of projecting tongues (6,7,8,9,10,11,12,13) bounding and defining said aperture (14,15), the side edge of each tongue facing away from said aperture being tapered along at least a portion of its length to narrow toward its free end, said tapered side of each tongue being folded at right angles to extend away from the plane of each flat sheet part, thereby forming four tapered flanges (41,42,43,44), a pair at each side of the superimposed flat sheet parts (2,3) extending in opposite directions;

wherein one pair of said oppositely extending flanges (41,42;43,44) is connected via a connection portion (22) of said flat metal blank,

characterized in that,

said connection portion (22) comprises at least one 180° fold and wherein all parts of said connection portion (22) either abut another part of said connection portion or said oppositely extending flanges (41,42,43,44) such that the cross section of the contact is approximately H-shaped.

2. Insulation displacement contact according to claim 1, having connection means (51) for electrical connection with a further electrical part, wherein said connection means are provided at the free end of the contact remote from the introduction end for the conductor.
3. An insulation displacement contact according to one of the preceding claims wherein the flat sheet parts (2,3) are formed integrally from a flat metal blank (1) and are superimposed over one another by folding approximately 180° at a fold line in a portion connecting the flat sheet parts to each other.
4. Insulation displacement contact according to one of the preceding claims, wherein the flanges



(41,42,43,44) form the legs and the abutting flat sheet parts form the cross-bar (20) of the H-shape.

5. An insulation displacement contact according to one of the claims 1-4 wherein one pair of said oppositely extending flanges (41,42,43,44) are connected via a portion of said flat metal blank (1) which extends towards the other end of the contact.
6. An insulation displacement contact according to one of the preceding claims wherein the free end of each tongue (6-13) is bevelled.

Patentansprüche

1. Isolation-Verdrängungskontakt (40) zum Durchstechen der Isolation eines Kabels (37), um einen der Leiter in dem Kabel (37) elektrisch zu kontaktieren, wobei der Kontakt einstückig aus einem flachen Metall-Rohling (1) hergestellt ist, mit zwei flachen Metallblechteilen (2, 3), die übereinanderliegend und in Berührungskontakt miteinander angeordnet sind,

wobei jedes flache Blechteil (2, 3) eine Öffnung (14,15) aufweist, um den Kabel-Leiter aufzunehmen, wobei die Öffnungen jedes flachen Blechteils (2, 3) zueinander ausgerichtet sind, und

jedes flache Blechteil (2, 3) ein Paar von vorspringenden Zungen (6, 7, 8, 9 10, 11,12, 13) besitzt, die die Öffnung (14,15) begrenzen und festlegen, wobei der Seitenrand jeder Zunge, der von der Öffnung weg zeigt, wenigstens entlang einem Abschnitt seiner Länge sich verjüngend verläuft, um in Richtung auf sein freies Ende zu schmaler zu werden, und wobei die sich verjüngende Seite jeder Zunge in einem rechten Winkel umgefaltet ist, so daß sie sich aus der Ebene jedes der flachen Blechteile weg erstreckt und dadurch vier sich verjüngende Flansche (41, 42, 43, 44) ausgebildet sind und sich ein Paar auf jeder Seite der übereinanderliegenden flachen Blechteile (2, 3) in entgegengesetzten Richtungen erstrecken, und

wobei ein Paar der sich entgegengesetzt erstreckenden Flansche (41, 42; 43, 44) über einen Verbindungsabschnitt (22) des flachen Metall-Rohlings verbunden ist, dadurch gekennzeichnet,

daß der Verbindungsabschnitt (22) wenigstens eine 180°-Faltung aufweist, und daß alle Teile des Verbindungsabschnitts (22) entweder an einen anderen Teil des Verbindungsabschnitts anstoßen oder an die sich entgegengesetzt erstreckenden Flansche (41, 42, 43, 44) anstoßen,

derart, daß der Querschnitt des Kontaktes etwa H-förmig gestaltet ist.

2. Isolation-Verdrängungskontakt nach Anspruch 1, der Verbindungseinrichtungen (51) besitzt, um mit einem weiteren elektrischen Teil eine elektrische Verbindung herzustellen, wobei die Verbindungseinrichtungen an dem freien Ende des Kontaktes angeordnet sind welches von dem Einführende für den Leiter entfernt liegt.

3. Isolation-Verdrängungskontakt nach einem der vorhergehenden Ansprüche, bei dem die flachen Blechteile (2, 3) einstückig aus einem flachen Metall-Rohling (1) hergestellt sind und dadurch übereinanderliegend angeordnet sind, daß eine Faltung von ca. 180° an einer Faltungslinie in einem Abschnitt durchgeführt wird, welcher die flachen Blechteile miteinander verbindet.

4. Isolation-Verdrängungskontakt nach einem der vorhergehenden Ansprüche, bei dem die Flansche (41, 42, 43, 44) die Beine und die aneinanderstoßenden flachen Blechteile die Querstrebe (20) der H-Gestalt formen.

5. Isolation-Verdrängungskontakt nach einem der Ansprüche 1 bis 4, bei dem ein Paar der sich in entgegengesetzter Richtung erstreckenden Flansche (41, 42, 43, 44) über einen Abschnitt des flachen Metall-Rohlings (1) verbunden sind, der sich zu dem anderen Ende des Kontaktes hin erstreckt.

6. Isolation-Verdrängungskontakt nach einem der vorhergehenden Ansprüche, bei dem das freie Ende jeder Zunge (6-13) abgeschrägt ist.

Revendications

1. Contact à déplacement d'isolation (40) pour percer l'isolation d'un câble (37), afin d'établir un contact électrique avec l'un des conducteurs dudit câble (37), formé monobloc à partir d'une pièce métallique plate (1), et comprenant

deux parties en feuille métallique plate (2, 3) superposées l'une sur l'autre, et en contact entre elles;

chaque partie en feuille métallique plate (2, 3) ayant une ouverture (14, 15) pour recevoir le conducteur du câble, lesdites ouvertures de chaque partie en feuille métallique plate (2, 3) étant alignées entre elles; et

chaque partie en feuille métallique plate (2, 3) comportant une paire de langues en saillie (6, 7, 8, 9, 10, 11, 12, 13) délimitant et définissant ladite ouverture (14, 15), le bord latéral de cha-



que langue du côté opposé auxdites ouvertures étant effilé le long d'une partie au moins de sa longueur, en se rétrécissant vers son extrémité libre, ledit côté effilé de chaque langue étant plié à angle droit de façon à s'étendre en dehors du plan de chaque partie en feuille plate, constituant ainsi quatre brides effilées (41, 42, 43, 44), les paires situées de chaque côté des parties en feuille plate superposées (2, 3) s'étendant dans des directions opposées;

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dans lequel une paire desdites brides s'étendant dans des directions opposées (41, 42; 43, 44) est connectée par l'intermédiaire d'une partie de connexion (22) de ladite feuille métallique plate,

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caractérisé en ce que,

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ladite partie de connexion (22) comprend au moins un pli à 180°, et en ce que toutes les parties de ladite partie de connexion (22) touchent soit une autre partie de ladite partie de connexion, soit lesdites brides s'étendant dans des directions opposées (41, 42, 43, 44), de façon que la coupe transversale du contact soit approximativement en forme de H.

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2. Contact à déplacement d'isolation selon la revendication 1, comportant des moyens de connexion (51) pour une connexion électrique avec un autre élément électrique, dans lequel lesdits moyens de connexion sont disposés à l'extrémité libre du contact éloignée de l'extrémité d'introduction pour le conducteur.

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3. Contact à déplacement d'isolation selon l'une des revendications précédentes, dans lequel les parties en feuille plate (2, 3) sont formées monobloc à partir d'une pièce métallique plate (1), et sont superposées l'une au-dessus de l'autre par pliage de 180° environ sur une ligne de pliage située dans une partie reliant les parties en feuille plate entre elles.

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4. Contact à déplacement d'isolation selon l'une des revendications précédentes, dans lequel les brides (41, 42, 43, 44) constituent les jambages et les parties en feuille plate en contact constituent la barre transversale (20) de la forme en H.

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5. Contact à déplacement d'isolation selon l'une des revendications 1 à 4, dans lequel deux desdites brides s'étendant dans des directions opposées (41, 42, 43, 44) sont connectées par l'intermédiaire d'une partie de ladite pièce métallique plate (1) qui s'étend vers l'autre extrémité du contact.

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6. Contact à déplacement d'isolation selon l'une des revendications précédentes, dans lequel l'extrémité libre de chaque langue (6-13) est biseautée.

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