EUROPEAN PATENT SPECIFICATION

(54) Pressure contact terminal fitting
Steckerelement für Druckkontakt
Organe de contact à pression

(84) Designated Contracting States:
DE FR GB IT


(43) Date of publication of application:
03.06.1998 Bulletin 1998/23

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(56) References cited:

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Description

TECHNICAL FIELD

[0001] The present invention relates to a pressure contact terminal fitting.

BACKGROUND TO THE INVENTION

[0002] A pressure-contact electrical terminal fitting has pressure contact blades defining one or more pressure contact grooves, an electric wire being inserted into the pressure contact grooves in use, thereby causing the edges of the blades to cut through the covering of the wire and to make contact with the core, resulting in an electrical connection being established between the wire and the fitting. It is common for such a pressure contact operation to be carried out simultaneously for a plurality of wires and fittings, using a special jig or an automatic machine.

[0003] However, it is conceivable that during maintenance or inspection, etc., a defect may be discovered in a particular pressure contact; in that case only that wire needs to be changed. However, since a jig or an automatic machine for effecting pressure contact is not necessarily available at the maintenance site, the problem cannot be easily resolved.

[0004] The pressure contact terminal fitting of the present invention has been developed after taking the above problem into consideration, and aims to permit the use of a readily available tool for establishing a pressure contact connection.

[0005] US-A-5112244 discloses an electrical terminal having a base defining arched edges to support and centre an insulated wire on the base. A separate connecting member is engageable in the base and has pressure contact blades to cut through the wire insulation in order to make electrical contact with the wire core.

SUMMARY OF THE INVENTION

[0006] According to the invention there is provided a pressure contact terminal fitting comprising a body portion having a base, first and second side walls extending along respective sides of said base, and a pushing-in member having a roof and a wire engaging member for engaging an electrical wire and pushing said wire against said body portion to cause electrical engagement with said fitting, characterised in that said body portion has opposed pressure contact blades for electrical engagement with the core of said wire, and said pushing-in member has a pair of outwardly extending side plates, each said side plate extending along a respective side of said roof so as to be coextensive with and received between said side walls, wherein said side plates and roof of said pushing-in member and said base and side walls of said body portion co-operate to enclose a length of the wire when the wire is inserted into the fitting, the pressure contact blades are bent from said side walls, and the wire engaging member is bent from one or both of said side plates.

[0007] Such a separate pushing-in member may be engaged by pliers acting on the body portion, and this permits replacement of a wire using a readily available tool. Furthermore the pushing-in member protects the wire from direct engagement with the pliers, and this ensures electrical engagement of the wire in a smooth predefined manner without incidental wire damage.

[0008] The pushing-in member may be of electrically conductive material, and have pressure contact blades to electrically engage the wire. Latching means may be provided between the pushing-in member and the body portion. Position setting means may be provided to determine the depth of engagement of the wire, for example by abutment of the body portion and pushing-in member or by engagement of latching means.

[0009] In a preferred embodiment the pushing-in member and body portion are both of open box form, one of the body portion and pushing-in member fitting tightly within the other.

[0010] Preferably the pushing-in member is folded from a sheet metal blank, but it may alternatively be formed from a moulded plastic material.

BRIEF DESCRIPTION OF DRAWINGS

[0011] Other features of the invention will be apparent from the following description of a preferred embodiment shown by way of example only in the accompanying drawings in which:

[0012] Figure 1 is a diagonal view of a first embodiment of the present invention showing a state prior to the pressure contact of the terminal fitting.

[0013] Figure 2 is an expanded view of a pushing-in member of the first embodiment.

[0014] Figure 3 is a cross-sectional view showing a state prior to pressure contact.

[0015] Figure 4 is a side view showing the pressure contact operation.

[0016] Figure 5 is a cross-sectional view showing a completed pressure contact state.

[0017] Figure 6 is a partially cut-away plane view.

[0018] Figure 7 is a diagonal view of a pressure contact electric wire.

[0019] Figure 8 is a diagonal view of a pushing-in member of a second embodiment of the present invention.

[0020] Figure 9 is an expanded view of the pushing-in member of the second embodiment.

[0021] Figure 10 is a diagonal view of a pushing-in member of a third embodiment of the present invention.

[0022] Figure 11 is a cross-sectional view of the third embodiment showing the pushing-in member inserted into the pressure contact member.

[0023] Figure 12 is an expanded view of the pushing-
in member of the third embodiment.

[0024] Figure 13 is a diagonal view showing a locking configuration of a fourth embodiment of the present invention.

[0025] Figure 14 is a diagonal view showing a locking configuration of a fifth embodiment of the present invention.

[0026] Figure 15 is a diagonal view of a pushing-in member of a sixth embodiment which is not part of the invention.

[0027] Figure 16 is a cross-section through the sixth embodiment.

[0028] Figure 17 is a diagonal view of a pushing-in member of an seventh embodiment which is not part of the invention.

[0029] Figure 18 is a cross-section through the seventh embodiment.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0030] A first embodiment of the present invention is described, with reference to Figures 1 to 7. This embodiment is an example of the application of the invention to a female pressure contact terminal fitting. As shown in Figure 1, the terminal fitting of this embodiment comprises a terminal main body 10 and a pushing-in member 23.

[0031] The terminal main body 10 is formed by cutting and bending in sequence an electrically conductive metal plate. It comprises, from front to rear, a connecting member 11 for connection to a tab member of a corresponding male terminal fitting (not shown), a pressure contact member 12, that makes pressure contact with an end of an electric wire 1, and barrels 13 that are crimped to the rear end of the pressure contact portion of the electric wire 1.

[0032] The anteriorly located pressure contact member 11 is schematically angularly tubular in shape. A resilient contact member 15 is formed within the pressure contact member 11 by being bent out from a side face, the resilient contact member 15 making elastic contact with a tab member of a male terminal fitting. A lance 16 is part-sheared from a base face and when the terminal fitting is inserted into a cavity of a connector housing (not shown), the lance 16 is retained unremovably by a stopping member located within the cavity. The pair of barrels 13 are mutually displaced in an anterior-posterior direction.

[0033] The pressure contact member 12 is channel shaped with its upper face open so as to allow the electric wire 1 to be inserted therein. The front and rear ends have a pair of pressure contact blades 17 formed thereon. Specifically, left and right side walls 18 rise up at a right angle from side edges of a base plate 19, and the anterior and posterior ends of the side plates 18 are bent so as to face each other by protruding inwards, thereby forming pairs of anterior and posterior pressure contact blades 17, pressure contact grooves 20 being formed between the mutually facing edges. The width of the pressure contact grooves 20 is set to a specified dimension so as to be slightly smaller than the diameter of the core of the wire 1, the upper end of the pressure contact grooves 20 having guiding faces 21 that narrow towards the grooves 20.

[0034] The pushing-in member 23 is press formed from electrically conductive sheet metal. It has a box-shape with a lower face open so as to fit into the pressure contact member 12. This pushing-in member 23 is inserted until it makes contact with the base plate 19. Its roof plate 24 being in the same plane as the upper edge of the pressure contact member 12, or protruding slightly (see Figure 5). As described later, this is done in order to ensure that a clamping operation can be carried out using a pair of pliers P.

[0035] In particular, as illustrated by the developed plan in Figure 2, left and right side plates 25 are formed by being bent at a right angle from side edges of the roof plate 24. Further, end-face plates 26 are formed on the anterior and posterior ends of the side plates 25, and are bent inwards at a right angle so as to face each other. As shown in Figure 3, a pressure contact groove 27 is formed when the ends of the face plates 26, this groove 27 making pressure contact with the electric wire 1. The width of the groove 27 is the same as that of the pressure contact groove 20. The upper end of the pressure contact groove 27 is closed, and this closed end constitutes a pressing-down member 28 that serves to push in the electric wire 1. The height of the pressing-down member 28 is set so that the electric wire 1 is pressed down to a specified position when the pushing-in member 23 is completely inserted, as described earlier. The lower end of the pressure contact groove 27 has guiding members 29 that widen in the direction of opening of the pressure contact member 12.

[0036] The left and right side plates 25 of the pushing-in member 23 have an anteriorly and posteriorly located pair of pressed locking protrusions 31 formed into a spherical shape. Corresponding to these, the left and right side plates 18 have a pair each of anteriorly and posteriorly locating spherical locking holes 32, the locking protrusions 31 fitting therewith.

[0037] Operation of the first embodiment is as follows. When the pressure contact operation is carried out, as shown in Figure 3, the electric wire 1 is mounted so as to sit on the guiding members 21 of the blades 17. Next, as shown by the arrow in Figure 3, the pushing-in member 23 is pushed down so as to clamp the electric wire 1, and, as shown in Figure 4, the base plate 19 and the roof face 24 are squeezed together by means of the pliers P.

[0038] When this is done, the electric wire 1 is pressed into both the pressure contact groove 27, and into the pressure contact groove 20. The edges of the grooves 20 and 27 cut into a covering 2 of the electric 1, and thereby make contact with the core 3. Finally, as shown
in Figure 5, the electric wire 1 is pressed down by the pressing-down member 28 to the approximate centre of the pressure contact groove 20.

[0039] In this manner, the electric wire 1 and the terminal main body 10 make electrical contact both at the anterior and posterior pressure contact blades 17 and the pushing-in member 23. Simultaneously, the locking protrusion 31 fits with the corresponding locking hole 32, resulting in the pushing-in member 23 being retained.

[0040] Finally, the pair of barrels 13 provided towards the posterior of the pressure contact member 12 are crimped, and as shown in Figure 7, the pressure contact terminal fitting A is formed.

[0041] As described above, according to the first embodiment, even without a specialized automatic tool it is possible to fix a pressure contact fitting easily, using a pair of pliers P. Further, the pushing-in member 23 is locked in a unified manner with the pressure contact member 12. Accordingly, in the case where the pressure contact electric wire is handled, the electric wire 1 is less likely to separate from the pressure contact member 12. Furthermore the strength of the pressure contact member 12 is increased, thereby preventing change in shape, etc. The tensile strength of the connection also improves. Moreover, since the pushing-in member 23 also has the pressure contact groove 27 provided therein, there are four more points making pressure contact, thereby greatly increasing the reliability of the electrical connection.

[0042] Although in the first embodiment a pressure contact groove 27 is also provided in the pushing-in member 23, it may equally be arranged that the pushing-in member 23 serves to merely push in the electric wire 1. In such a case, a cut-away groove may be provided at the location where the pressure contact groove 27 would have been, this cut-away groove clamping the electric wire 1 and allowing it to pass therein.

[0043] In the second and third embodiments, changes have been introduced in the pushing-in member. The same numbers are accorded to parts having the same configuration as in the first embodiment, and an explanation thereof omitted.

[0044] Figures 8 and 9 show a second embodiment of the present invention. As shown in the developed shape in Figure 9, a pushing-in member 23B has side plates 25 formed in a connected manner on left and right side edges of a roof plate 24, and the anterior and posterior side edges of one of the sides plates 25 have end face plates 26B connected thereto, the end face plates 26B having pressure contact grooves 27 pre-formed thereon for an electric wire 1. By bending the extended shape shown in Figure 9 at a right angle along each broken line shown in the diagram, the pushing-in member 23B is formed into a box shape with an open lower face. The pushing-in member 23B thus formed fits inside the pressure contact member 12.

[0045] Figures 10 to 12 show a third embodiment of the present invention.

[0046] The side plates 25 are connected to the left and right side edges of a roof plate 24, and the front and rear ends of one of the side plates 25 have inner side end face plates 26B connected thereto, these having pressure contact grooves 27 pre-formed thereon for the electric wire 1. Further, the anterior and posterior ends of the roof face 24 similarly have outer side end face plates 26A connected thereto, these having pressure contact grooves 27 pre-formed thereon for the electric wire 1. The box shaped pushing-in member 23C having an open lower face shown in Figure 10 is formed by effecting bending at a right angle along the broken lines shown in the diagram. When the pushing-in member 23C of the third embodiment is inserted into the pressure contact member 12 of the terminal main body 10, as shown in Figure 11, the outer and inner side end face plates 26A and 26B respectively clamp the anterior and posterior faces of the pressure contact blades 17.

[0047] It is also possible to have the pressure contact groove portions in the pushing-in members 23A to 23C of the second and third embodiments function respectively as slideways for the electric wire 1, thereby limiting their function to pressing down the electric wire 1.

[0048] In the fourth and fifth embodiments, the locking portion of the pushing-in member is improved. The same numbers are accorded to parts having the same configuration as in the first embodiment, and an explanation thereof omitted.

[0049] Figure 13 shows a fourth embodiment of the present invention. Left and right side plates 25 of a pushing-in member 23D have a pair each of anteriorly and posteriorly located, triangular-shaped locking protrusions 41 formed by part-shearing. When the pushing-in member 23D is completely inserted locking protrusions 41 fit into angular locking holes 42 in the side plates 18.

[0050] Figure 14 shows a fifth embodiment. The portions constituting the boundaries between a roof face 24 and left and right side plates 25 in a pushing-in member 23E have locking holes 43 cut out therefrom. Left and right side plates 18 of a pressure contact member 12 have locking members 44 that fit into the locking holes 43, these locking members 44 being bent diagonally inwards.

[0051] The locking configurations of the fourth and fifth embodiments can also apply in the case where the pushing-in members 23B and 23C of the second and third embodiments are employed.

[0052] In the sixth and seventh embodiments, which are not part of the invention as illustrated, the configuration of the portion specifying the amount of insertion of the electric wire is changed. The basic configuration of the pressing-in member itself is the same as that in the first embodiment; the same numbers are accorded to parts having the same configuration, and an explanation thereof omitted.

[0053] Figures 15 and 16 show the sixth embodiment. In a pushing-in member 23F, a pressure contact groove 27A, which is formed between end face plates 26C bent
so as to face each other, extends up to an upper end, and the central portion of a roof plate 24 is pressed inwards, thereby forming an additional pressing-down member 51 for the electric wire 1.

[0054] Figures 17 and 18 show a seventh embodiment of the present invention. In a pushing-in member 23G of the seventh embodiment, a pressure contact groove 27A, formed between end face plates 26C, extends up to the roof face 24. The roof face 24 has a pair of additional pressing-down members 52 formed by cutting into the roof face 24 at anterior and posterior locations, the pressing-down members 52 serving in use to push in an electric wire 1.

[0055] The configurations of the sixth and seventh embodiments for setting the amount of pressing down of the electric wire also apply in the case where the pushing-in members 23B and 23C of the second and third embodiments are employed, and the embodiments six and seven in combination with the second and third embodiments are part of the invention as claimed in claim 11 (not illustrated).

[0056] The present invention is not limited to the embodiments described above with the aid of figures. For example, the possibilities described below also lie within the scope of the present invention as defined by the claims. In addition, the present invention may be embodied in various other ways without deviating from the scope thereof.

1. In each of the above embodiments, the pushing-in member is made from electrically conductive sheet metal. However, if the focus is on the pushing-in function of the electric wire, the pushing-in member may equally be made of non-electrically conducting sheet metal, or from synthetic resin or the like.
2. The pushing-in member may equally be arranged to be removable from the pressure contact member after pressure contact with the electric wire. Such an arrangement is also included in the invention.
3. The present invention may equally be applied in the case of a male pressure contact terminal fitting.

Claims

1. A pressure contact terminal fitting comprising a body portion (12) having a base, first and second side walls (18) extending along respective sides of said base, and a pushing-in member (23) having a roof (24) and a wire engaging member (28) for engaging an electrical wire (1) and pushing said wire (1) against said body portion (12) to cause electrical engagement with said fitting, characterised in that said body portion has opposed pressure contact blades (17) for electrical engagement with the core of said wire (1), and said pushing-in member (23) has a pair of outwardly extending side plates (25), each said side plate extending along a respective side of said roof (24) so as to be coextensive with and received between said side walls (18), wherein said side plates (25) and roof (24) of said pushing-in member (23) and said base and side walls (18) of said body portion (12) co-operate to enclose a length of the wire when the wire is inserted into the fitting, the pressure contact blades (17) are bent from said side walls (18), and the wire engaging member (28) is bent from one or both of said side plates (25).

2. A fitting according to claim 1 wherein the pushing-in (23) member and body portion (12) have mutually engageable latching means (31,32;41,42;43,44).

3. A fitting according to claim 1 or claim 2 wherein the pushing-in member (23) is of electrically conductive material, and in use is adapted to make electrical contact with said wire (1).

4. A fitting according to claim 3 wherein said pushing-in member (23) includes opposed pressure contact blades defining a groove (27) for electrical engagement with the core of said electrical wire (1).

5. A fitting according to any preceding claim and further including position setting means (28,51,52) adapted to set the pushing-in distance of said wire (1).

6. A fitting according to claim 5 wherein said position setting means comprises mutually engageable abutment portions of said body portion (12) and pushing-in member (23).

7. A fitting according to claim 6 wherein said position setting means comprise mutually engageable retaining means (31,32) of said body portion (12) and pushing-in member (23).

8. A fitting according to any preceding claim wherein said body portion (12) is in the form of a substantially rectangular open box, a short side of which defines said pressure contact blades (17), and said pushing-in member (23) is in the form of an inverted substantially rectangular open box.

9. A fitting according to claim 8 wherein said pushing-in member (23) is insertable in the opening of said body portion (10).

10. A fitting according to claim 8 or claim 9 wherein the short sides (26) of said pushing-in (23) member define at least one wire engaging member (28).

11. A fitting according to claim 8 or claim 9 wherein an
additional wire engaging member (51,52) is up-standing from the base (24) of said pushing-in member (23).

Patentansprüche

1. Steckerelement bzw. Anschluß mit Druckkontakt bzw. Druckkontaktanschluß aufweisend

   einen Körperabschnitt (12), der eine Basis bzw. Boden, erste und zweite Seitenwände (18) hat, die jeweiligen Seiten erstrecken sich entlang der Basis und ein Eindrückbauteil (23), das ein Dach (24) hat und ein Kabeleingreifbauteil (28) zum Eingreifen eines elektrischen Kabels (1) und zum Drücken des Kabels (1) gegen den Körperabschnitt (12), um elektrischen Eingriff mit dem Element zu verursachen,

dadurch gekennzeichnet, daß

2. Element gemäß Anspruch 1, wobei das Eindrückbauteil (23) und der Körperabschnitt (12) gegenseitig eingreifbare Verriegelungs- bzw. Verrastungsmittel (31, 32; 41, 42; 43, 44) haben.

3. Element gemäß Anspruch 1 oder 2, wobei das Eindrückbauteil (23) aus elektrisch leitendem Material ist und im Gebrauch angepaßt ist, um einen elektrischen Kontakt mit dem Kabel (1) herzustellen.


7. Element gemäß dem Anspruch 6, wobei die Positioneinstellmittel gegenseitig eingreifbare Haltemittel (31, 32) des Körperabschnitts (12) und Eindrückbauteils (23) aufweisen.


9. Element gemäß Anspruch 8, wobei das Eindrückbauteil (23) in die Öffnung des Körperabschnittes (10) einsetzbar bzw. einrastbar bzw. einlegbar ist.

10. Element gemäß des Anspruchs 8 oder 9, wobei die kurzen Seiten (26) des Eindrückbauteils (23) mindest ein Kabeleingriffsbauteil (28) definieren.

11. Element gemäß dem Anspruch 8 oder 9, wobei ein zusätzliches Kabeleingriffselement (51, 52) von der Basis (24) des Eindrückbauteils (23) hervorsteht bzw. aufrechtssteht.

Revendications

1. Cosse de contact par pression comprenant une partie formant corps (12), comportant une base, des première et seconde parois latérales (18) s'étendant le long de côtés respectifs de la base, et une pièce de pénétration par poussée (23) comportant une partie supérieure (24) et un moyen (28) de venue en prise avec un fil, destinée à venir en prise avec un fil électrique (1) et à pousser ledit fil (1) en appui sur la partie formant corps (12) de façon à provoquer une coopération électrique avec la cos-
se, caractérisée en ce que la partie formant corps comporte des lames de contact de pression (17) opposées, destinées à une coopération électrique avec l'âme dudit fil (1), et la pièce de pénétration par poussée (23) comporte deux plaquettes latérales (25) dirigées vers l'extérieur, les plaquettes latérales s'étendant chacune le long d'un côté respectif de la partie supérieure (24) de façon à présenter la même étendue que lesdites parois latérales (18) et à être reçues entre celles-ci, tandis que les plaquettes latérales (25) et la partie supérieure (24) de la pièce de pénétration par poussée (23) et la base et les parois latérales (18) de la partie de corps (12) coopèrent de façon à enfermer un tronçon du fil lorsque le fil est introduit dans la cosse, les lames de contact par pression (17) sont pliées à partir des parois latérales (18) et le moyen (28) de venue en prise avec un fil est plié à partir de l'une des plaquettes latérales (25) ou des deux.

2. Cosse suivant la revendication 1, dans laquelle la pièce de pénétration par poussée (23) et la partie formant corps (12) comportent des moyens de verrouillage (31, 32 ; 41, 42 ; 43, 44).

3. Cosse suivant la revendication 1 ou la revendication 2, dans laquelle la pièce de pénétration par poussée (23) est en une matière électriquement conductrice et, lors d'une utilisation, sert à réaliser un contact électrique avec ledit fil (1).

4. Cosse suivant la revendication 3, dans laquelle la pièce de pénétration par poussée (23) comporte des lames de contact de pression opposées définissant une gorge (27) destinée à une coopération électrique avec l'âme dudit fil électrique (1).

5. Cosse suivant une revendication précédente quelconque et comprenant des moyens de fixation de position (28, 51, 52) servant à fixer la distance de pénétration par poussée dudit fil (1).

6. Cosse suivant la revendication 5, dans laquelle les moyens de fixation de position comprennent des parties de venue en butée de la partie formant corps (12) et de la pièce de pénétration par poussée (23) qui peuvent coopérer mutuellement.

7. Cosse suivant la revendication 6, dans laquelle les moyens de fixation de position comprennent des moyens de retenue (31, 32) de la partie formant corps (12) et de la pièce de pénétration par poussée (23) qui peuvent coopérer mutuellement.

8. Cosse suivant une revendication précédente quelconque, dans laquelle la partie formant corps (12) à la forme d'un caisson ouvert sensiblement parallélépipédique dont un petit côté définit lesdites la-

9. Cosse suivant la revendication 8, dans laquelle la pièce de pénétration par poussée (23) a la forme d'un caisson ouvert sensiblement parallélépipédique retourné.

10. Cosse suivant la revendication 8 ou la revendication 9, dans laquelle les petits côtés (26) de la pièce de pénétration par poussée (23) définissent au moins un moyen (28) de venue en prise avec un fil.

11. Cosse suivant la revendication 8 ou la revendication 9, dans laquelle un moyen supplémentaire (51, 52) de venue en prise avec un fil se dresse à partir de la base (24) de la pièce de pénétration par poussée (23).