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(54) **ELECTRICAL MALE TERMINAL**

ELEKTRISCHER STECKER

CONNECTEUR ÉLECTRIQUE MÂLE

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Description

1. Field of the invention

[0001] The invention relates to a male terminal having an elongated terminal main part and a separate contact pin.

2. Prior art

[0002] Male terminals consisting in a bush-like terminal main part holding a separate contact pin are commonly formed of bent and stamped metal sheet. Typically a contact bush is formed integrally from a piece of sheet metal which is folded at one end in the form of a box or cage to receive one end of the separate contact pin. After folding of the box the pin is inserted therein and usually fixed by means of a welding operation. The fixation of the contact pin with the terminal main part has to be sufficiently strong and reliable. The other end of the contact bush is usually provided with e.g. crimping vanes for clamping in a conductor or its insulation.

[0003] A disadvantage of the terminals of the prior art is that during assembly the contact pin is not fixed in the contact bush until the welding operation is completed. Further, since the box is closed on all four sides the assembly of pin and contact bush may lead to difficulties during manufacturing. Since such terminals are mass products, production costs and the reliability of the manufacturing process with respect to quality and the reduction of defective products is of paramount importance. Document EP 1 054 471 discloses an electrical terminal according to the preamble of claim 1.

[0004] It is therefore an object of the present invention to provide a terminal which reduces the above-described disadvantage.

3. Summary of the invention

[0005] According to the invention, a male terminal is provided which comprises an elongated terminal main member having preferably a connecting part on one end and a pin-receiving part on the other end as well as a separate contact pin. The pin receiving part of the male terminal has substantially a U shaped form comprising two lateral side walls being substantially parallel to each other as well as a bottom or base wall connecting the two lateral sides. The contact pin rests in said channel such that one end of the pin protrudes from the main terminal member, so that it can be inserted into a corresponding female contact terminal. The channel is preferably formed such that the contact pin may be inserted in said channel from an open side of the channel. Alternatively the channel may be closed by means of a further or fourth wall, which may be bend over the open side of the channel after the pin was inserted therein. However, preferably the channel is open on one side. The channel is further provided with at least two stop members, which stop members protrude preferably from the inner side walls of the channel into the inner space of the channel. Most preferably, these protrusions or stop members are provided by means of a crimping or beading operation applied to the outer walls of the channel, so that the protrusions are formed integrally from the material of the channel walls. The stop elements are provided on or in the inside walls of the channel and are spaced apart from each other with respect to the longitudinal axis of the elongated main terminal member. In this way, the section of the channel between the stop members can be considered as defining a holding space for the contact pin. The contact pin is provided with at least one enlarged portion, which is shaped such that it may fit in the holding space defined between the stop members and the lateral and bottom walls of the channel.

[0006] Preferably the contact pin and the channel are formed such when the contact pin is arranged in its position in the channel, the enlarged portion of the contact pin is arranged in the section of the channel between the at least two stop members, to prevent an axial movement of the contact pin in at least one direction. In this way an accidental loss of the contact pin during assembly or handling of the male terminal can be prevented or at least impeded.

[0007] The contact pin is preferably secured by means of at least one welding operation, most preferably by means of at least one welding spot or seam, which connects the contact pin and the pin receiving part with each other. Advantageously the welding achives an improved electrical continuity. It is further preferred that the at least one welding spot or seam is provided adjacent to one of the at least two stop members. Alternatively also a soldering or brazing operation is possible for the securing of pin and main part..

[0008] The main part of the male terminal is preferably made from a piece of sheet metal.

[0009] In a particularly preferred embodiment, the terminal main part and the contact pin are made from different materials. The contact pin is preferably made of a material which provides for a good electrical contact with the corresponding female terminal. Advantageously, the contact pin is made from copper or a copper alloy. Further the contact pin is preferably provided with a nickel-plating. Still even further the pin is provided with a gold or silver plating. In a most preferred embodiment the gold or silver plating is provided over the nickel-plating. The terminal main part is preferably made from a material which offers good conductivity and good crimping properties to allow a crimping of the contact pin or of a cable or a conductor. A preferred material for the terminal main part is a copper nickel silicium alloy.

[0010] In a preferred embodiment the stop elements are provided in the form of constrictions of the walls of the pin receiving part. Most preferably these constrictions are crimped or beaded in the walls.

[0011] An advantage of the invention is an improved and more reliable electrical continuity between contact

pin and terminal main part.

[0012] Another advantage is an improved cost efficiency and easiness of production. Another advantage is an improved fastening strength of contact pin with terminal main part.

4. Description of the preferred embodiments

[0013] In the following, the invention is described exemplarily with reference to the enclosed figures, in which:

Figs. 1a and b are schematic illustrations of a male terminal according to the invention.

Fig. 2a is a top view of two terminal main parts still attached to their metal stripe.

Fig. 2b is a side view of the main arts shown in fig. 2a.

Fig 2c is a top view of two terminal main parts at an intermediate manufacturing step before folding.

Fig. 3a is a side view of a contact pin used with the male terminal according to the invention.

Fig. 3b is a top view of the contact pin shown in fig. 3a.

Fig 3c is an enlarged cut view of the contact pin shown in fig. 3a

Fig. 4 is a schematic view of a male terminal according to the invention with a further retaining member attached thereto.

[0014] Figs. 1a and 1b show schematic views of a male terminal 1 according to the invention. Fig. 1a shows the terminal as lying on its side with its underside visible to the observer. Fig. 1b shows the same terminal rotated by 90° clockwise around the longitudinal axis. The male terminal comprises a terminal main part 10 comprising a pin receiving part 11 on one end holding a contact pin 20, therein and a connecting part 19 on the other end (see fig. 2a). As it is well known in the art, the connecting part 19 is provided on one end with crimping vanes 14 and 17, which can be crimped respectively on the conductor and on the insulative sheath of a cable (not shown) to secure the male terminal 1 with the same and to ensure electrical continuity. The other end of the main part is provided with the pin receiving 11 part which has essentially the form of a U in cross section. The pin receiving part 11 thus has a bottom or base wall 13 and two lateral side walls 12, 12' being essentially parallel to each other. As can best be seen from fig. 1b, the form of pin receiving part 11 allows access to the contact pin 20, which is held therein. The pin receiving part 11 is further provided with stop members in the form of constrictions 15, 16. In the embodiment shown, constrictions 15,15' are provided in both lateral side walls 12, 12' respectively and constriction 15"in the bottom wall 13. The same is true for constrictions 16,16',16" respectively. In other words: the channel formed by the side and bottom walls 12, 12' and 13 is provided with two circumferential constrictions defining a holding space therebetween. The constriction may e.g. be shaped in the walls of the receiving part 11 by means of crimping, stamping, beading and similar methods.

[0015] As can best be seen from fig. 1b, pin 20 is provided with an enlarged portion 21, which is arranged in the holding space between constrictions 15 and 16 such that a movement of contact pin 20 in the axial direction in or out of the main part is prevented. Alternatively the space between the constrictions could be chosen to allow for a certain axial movement of the pin. Although only two constrictions 15, 16 are shown in the embodiments, it is of course possible to provide more constrictions. Adjacent to constrictions 15 and 16, respectively, two welding spots 40 and 41 are provided to bond contact pin 20 with main part 10. It is of course also possible to provide only one welding spot or more than two welding spots. The welding spots are preferably made by resistance or laser welding.

[0016] The terminal main part 10 shown in the figures is made from a piece of metal sheet by stamping and folding the same. Fig. 2c shows the metal sheet after cutting but before forming of the restrictions and before folding of the walls. The folding lines 12a and 12'a separating the three regions of the sheet corresponding to the walls 12, 12' and the bottom 13 are represented. In the vicinity of those lines 12a, 12'a and in at least part of the area corresponding to the restrictions 15,15',15" and 16,16',16" , advantageously one or more opening, preferentially four openings 25,25',26,26' are arranged in order to facilitate the stamping of restrictions and folding of the walls. Preferentially the restrictions 15,15',15" and 16,16',16" are first stamped into the sheet and afterwards the walls 12,12' are folded. Fig. 2a shows two main parts after they have been stamped and formed but still connected to each other by means of a metal strip 18. As it is well known in the art, metal strip 18 serves to hold the parts through the manufacturing process and is cut off at the end of the same. Fig. 2a shows a schematic top view of the main part when the contact pin is not yet inserted therein. The pin can be inserted from the top into the open channel, such that its enlarged portion comes to rest in the section between constrictions 15 and 16 and is axially held therebetween. Fig. 2b shows the same part in a side view and clearly depicts constrictions 15 and 16 in the lateral and bottom walls. Welding spots 40, 41 are made after pin insertion. Further, two crimping vanes 17 and 17' of the connecting part 19 can be seen, which vanes can be bent around a cable for a secure fastening of the male terminal with a corresponding terminal cable.

[0017] Fig. 3a is a side view of a contact pin which can be used with the male terminal of the invention. Fig. 3b shows the same pin in a top view. As can best be seen

from fig. 3b, the contact pin 20 is provided with an enlarged portion 21, which can e.g. be produced by stamping. The enlarged portion 21 improves the mechanical fastening of the contact pin with the pin receiving part. Fig 3c is a cut view along plane CC of fig 3b, in the enlarged region, showing a preferred design for enlargement, where from an initial square or rectangular cross-section of the pin, a recess 26 is coined out, this way pushing material aside for an enlarged section. Preferentially the enlarged region has a substantially trapezoidal section with two parallel bases, the recess 26 being open towards the larger base 27 of the trapezium.

[0018] Fig. 4 is another illustration of the male terminal 1 according to the invention. The male terminal 1 is further provided with a retaining member 30 made from a piece of folded metal sheet and having essentially the form of a box with two open ends. The retaining member 30 can be fastened around the pin receiving part of the male terminal 1 and serves for a particularly secure and protected connection of pin 20 and main part 10 and for locking of the terminal in a connector housing (not shown). The retaining member 30 is preferably made of a high-strength material as e.g. stainless steel.

[0019] It should be noted, that the figures show the embodiments in an enlarged view. In reality the length of the main terminal 10 is for example in the range of a few centimeters, for example 2 to 4 cm, and the strength of the sheet metal from which the terminal is made of is in the range of 0,1 to 0,5 mm, preferably around 0,2 mm. The contact pin may have a length in the order of 1 cm, for example 0,5 to 2 cm, and a thickness of maybe 0,5 mm up to 1 mm.

Claims

1. Male electrical terminal (I) comprising:

a. an elongated main terminal member (10) having a pin receiving part (11) on one end; and
b. a separate contact pin (20) held by the pin receiving part (11),

the pin receiving part (11) comprises two lateral side walls (12, 12') being substantially parallel with each other and a bottom wall (13), said walls forming a preferably open channel for the reception of the contact pin (20), **characterized in that** at least two stop elements (15, 16) are provided on the inside walls of the channel, which stop elements (15, 16) are spaced apart from each other with respect to the longitudinal axis of the elongated main terminal member (10) and the contact pin is provided with at least one enlarged portion (21) which is arranged in the section of the channel between said spaced apart stop elements (15,16).

2. Male terminal according to claim 1, **characterized in that** the stop elements (15, 16) are provided in the form of constrictions of the walls (12; 12'; 13).

3. Male terminal according to claim 1 or 2, **characterized in that** the stop elements (15,16) are crimped or beaded in the walls (12; 12'; 13).

4. Male terminal according to any of the preceding claims, **characterized in that** the at least two stop elements (15, 16) are provided in the form of constrictions in the lateral side walls (12, 12') and the bottom wall (13) defining thereby a holding space bounded on three sides by the walls of the pin receiving part and wherein the contact pin (20) is provided with at least one correspondingly enlarged portion (21) which fits in the holding space between the at least two constrictions.

5. Male terminal according to any of the preceding claims, **characterized in that** contact pin (20) is fixed to at least one of the lateral side walls (12, 12') by means of at least one welding spot (40, 41) or seam.

6. Male terminal according to claim 5, **characterized in that** the at least one welding spot (40, 41) or seam is provided adjacent to one of the stop elements (15, 16).

7. Male terminal according to any of the preceding claims, **characterized in that** the main terminal member (10) and the separate contact pin (20) are made from different materials.

8. Male terminal according to any of the preceding claims, **characterized in that** the enlarged portion (21) is provided by means of two wings on opposite sides of the contact pin.

9. Male terminal according to any of the preceding claims, **characterized in that** the male terminal (1) further comprises a retaining member (30) arranged around at least part of the pin receiving part (11) and the part of the contact pin (20) arranged therein.

10. Male terminal according to claim 9, **characterized in that** the retaining member (30) is shaped in the form of a box having two opposed open ends.

Patentansprüche

1. Elektrischer Steckkontakt (1) aufweisend:

a. ein längliches Hauptanschlusselement (10) das an einem Ende einen Aufnahmeabschnitt (11) für einen Stift hat; und
b. einen separaten Kontaktstift (20) der von dem

Aufnahmeabschnitt (11) für den Stift gehalten wird,

wobei der Aufnahmeabschnitt (11) für den Stift laterale Seitenwände (12, 12') aufweist, die im Wesentlichen zueinander parallel sind und eine untere Wand (13), wobei die Wände einen vorzugsweise offenen Kanal für die Aufnahme des Kontaktstifts (20) bilden, **dadurch gekennzeichnet, dass** zumindest zwei Anschlagselemente (15, 16) an den inneren Wänden des Kanals vorgesehen sind, welche Anschlagselemente (15, 16) voneinander bezüglich der länglichen Achse des länglichen Hauptanschlusselements (10) beabstandet sind, und wobei der Kontaktstift mit zumindest einem vergrößerten Abschnitt (21) versehen ist, der in dem Abschnitt des Kanals zwischen den voneinander beabstandeten Anschlagselementen (15, 16) angeordnet ist.

2. Steckkontakt gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Anschlagselemente (15, 16) in Form von Einschnürungen der Wände (12; 12'; 13) vorgesehen sind.

3. Steckkontakt gemäß Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Anschlagselemente (15, 16) in die Wände (12; 12'; 13) gecrimpt oder gebördelt sind.

4. Steckkontakt gemäß irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die zumindest zwei Anschlagselemente (15, 16) in der Form von Einschnürungen in den lateralen Seitenwänden (12, 12') vorgesehen sind und, dass die untere Wand (13) dadurch eine Haltefläche definiert, die an drei Seiten begrenzt ist durch die Wände des Aufnahmeabschnitts für den Stift, und wobei der Kontaktstift (20) mit zumindest einem in entsprechender Weise vergrößerten Abschnitt (21) versehen ist, der in den Halteraum zwischen den zumindest zwei Einschnürungen hineinpasst.

5. Steckkontakt gemäß irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Kontaktstift (20) an zumindest einer der lateralen Seitenwände (12, 12') befestigt ist durch zumindest einen Schweißpunkt (40, 41) oder Naht.

6. Steckkontakt gemäß Anspruch 5, **dadurch gekennzeichnet, dass** der zumindest eine Schweißpunkt (40, 41) oder Naht angrenzend an eines der Anschlagselemente (15, 16) angeordnet ist.

7. Steckverbinder gemäß einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** das Hauptanschlusselement (10) und der separate Kontaktstift (20) aus verschiedenen Materialien gemacht sind.

8. Steckverbinder gemäß einem der vorhergehenden Ansprüche, **gekennzeichnet dadurch, dass** der vergrößerte Abschnitt (21) bereitgestellt ist durch zwei Flügel an gegenüberliegenden Seiten des Kontaktstifts.

9. Steckverbinder gemäß irgendeinem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Steckkontakt (1) weiterhin ein Halteelement (30) aufweist, dass um zumindest einen Teil des Aufnahmeabschnitts (11) für den Stift herum angeordnet ist und wobei der Teil des Kontaktstifts (20) darin angeordnet ist.

10. Steckverbinder gemäß Anspruch 9, **dadurch gekennzeichnet, dass** das Haltelement (30) in Form einer Kiste ausgebildet ist, die zwei sich gegenüberliegende offene Enden hat.

Revendications

1. Borne électrique mâle (1), comprenant :

   a. un élément principal allongé de borne (10) comportant une partie de réception de broche (11) sur une extrémité ; et
   b. une broche de contact séparée (20) retenue par la partie de réception de broche (11),

   la partie de réception de broche (11) comprend deux parois latérales (12, 12') sensiblement parallèles l'une à l'autre et une paroi inférieure (13), lesdites parois formant une gorge de préférence ouverte pour la réception de la broche de contact (20), **caractérisée en ce qu'**au moins deux éléments de butée (15, 16) sont prévus sur les parois intérieures de la gorge, lesquels éléments de butée (15, 16) sont espacés l'un de l'autre par rapport à l'axe longitudinal de l'élément principal allongé de borne (10) et la broche de contact est pourvue d'au moins une partie agrandie (21) qui est agencée dans la section de la gorge entre lesdits éléments de butée espacés (15, 16).

2. Borne mâle selon la revendication 1, **caractérisée en ce que** les éléments de butée (15, 16) sont prévus sous forme de rétrécissements des parois (12 ; 12' ; 13).

3. Borne mâle selon la revendication 1 ou 2, **caractérisée en ce que** les éléments de butée (15, 16) sont sertis ou nervurés dans les parois (12 ; 12' ; 13).

4. Borne mâle selon une quelconque des revendications précédentes, **caractérisée en ce que** les au moins deux éléments de butée (15, 16) sont prévus sous forme de rétrécissements dans les parois laté-

rales (12, 12') et la paroi inférieure (13) définissant ainsi un espace de retenue borné sur trois côtés par les parois de la partie de réception de broche et dans laquelle la broche de contact (20) est pourvue d'au moins une partie agrandie de façon correspondante (21) qui va dans l'espace de retenue entre les au moins deux rétrécissements.

5. Borne mâle selon une quelconque des revendications précédentes, **caractérisée en ce que** la broche de contact (20) est fixée à au moins une des parois latérales (12, 12') au moyen d'au moins un point de soudage (40, 41) ou joint.

6. Borne mâle selon la revendication 5, **caractérisée en ce que** l'au moins un point de soudage (40, 41) ou joint est prévu de façon adjacente à un des éléments de butée (15, 16).

7. Borne mâle selon une quelconque des revendications précédentes, **caractérisée en ce que** l'élément principal de borne (10) et la broche de contact séparée (20) sont faits de matériaux différents.

8. Borne mâle selon une quelconque des revendications précédentes, **caractérisée en ce que** la partie agrandie (21) est prévue au moyen de deux ailes sur des côtés opposés de la broche de contact.

9. Borne mâle selon une quelconque des revendications précédentes, **caractérisée en ce que** la borne mâle (1) comprend en outre un élément de retenue (30) agencé autour d'au moins une partie de la partie de réception de broche (11) et de la partie de la broche de contact (20) agencée dans celle-ci.

10. Borne mâle selon la revendication 9, **caractérisée en ce que** l'élément de retenue (30) présente la forme d'une boîte comportant deux extrémités ouvertes opposées.

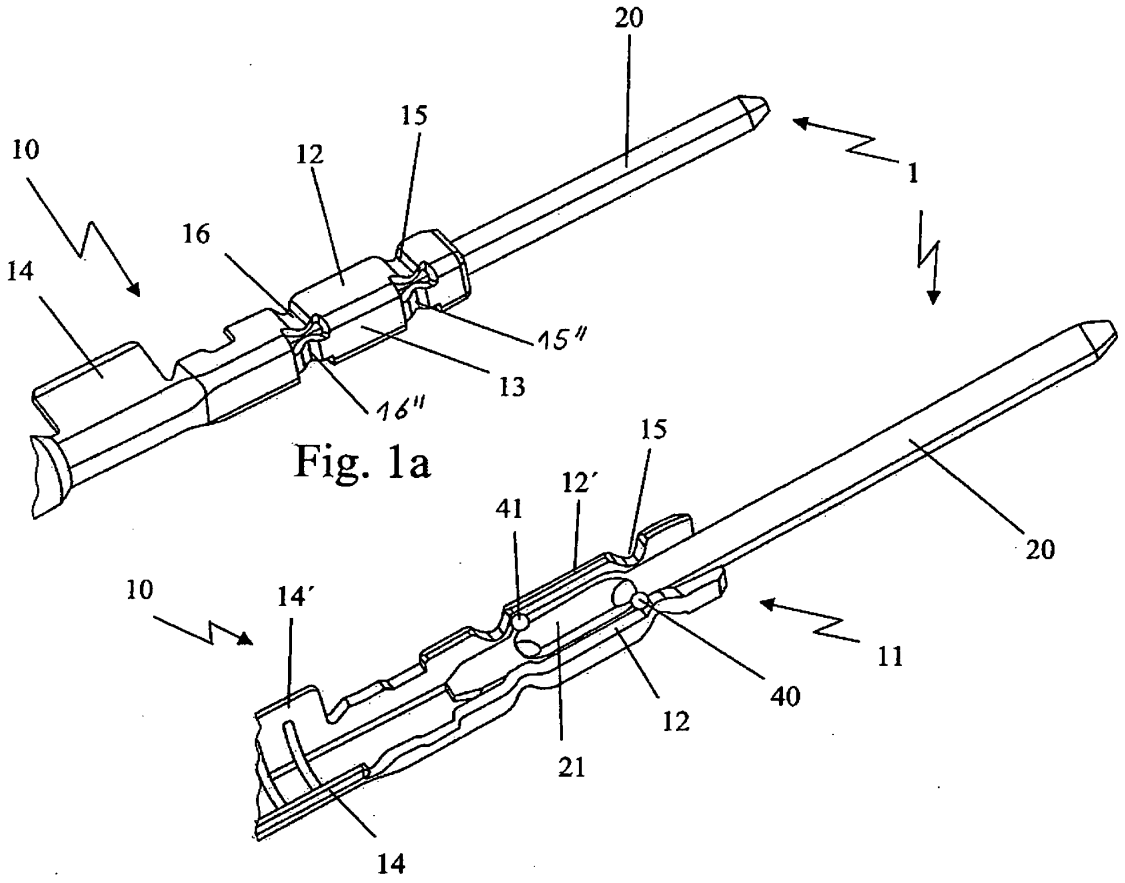

Fig. 1a

Fig. 1b

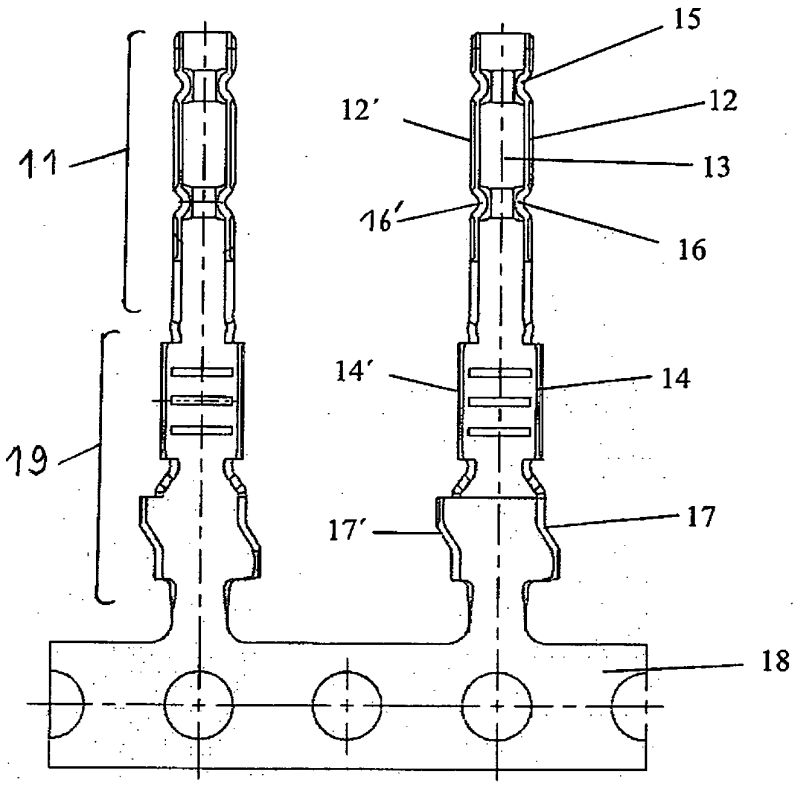

Fig. 2a

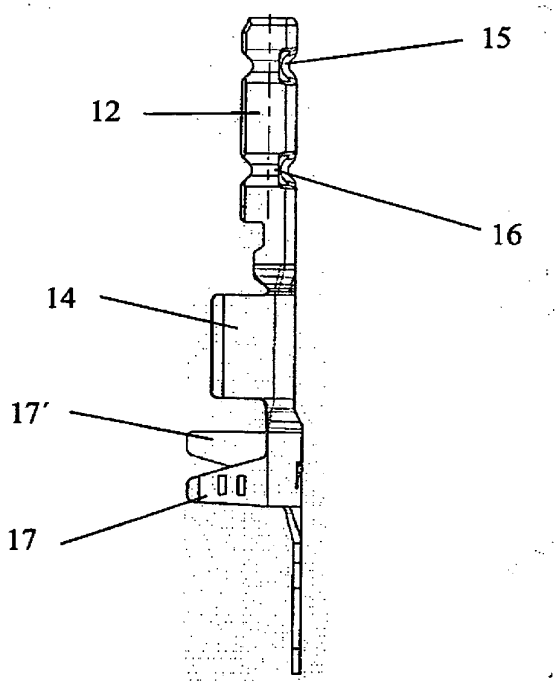

Fig. 2b

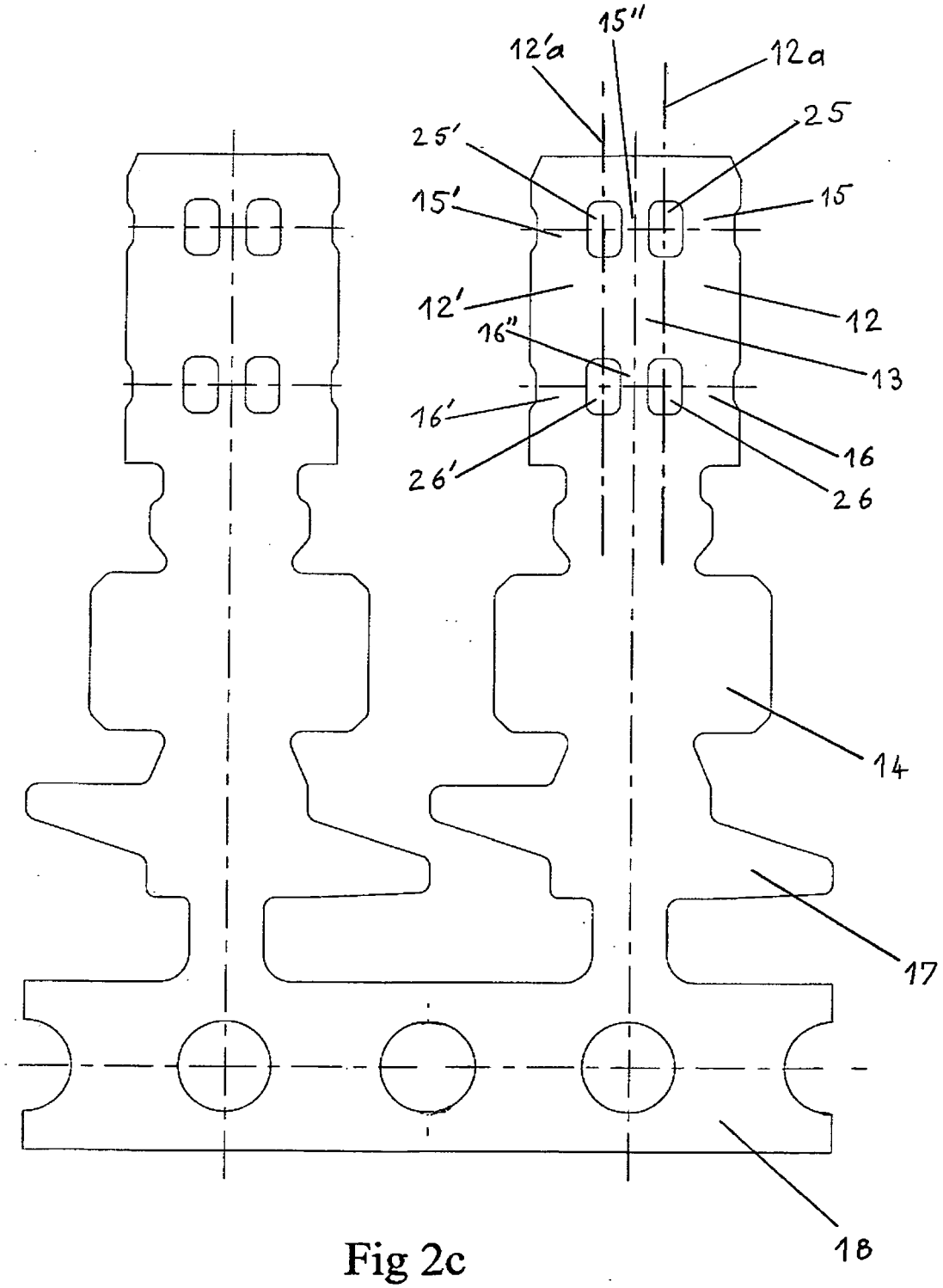

Fig 2c

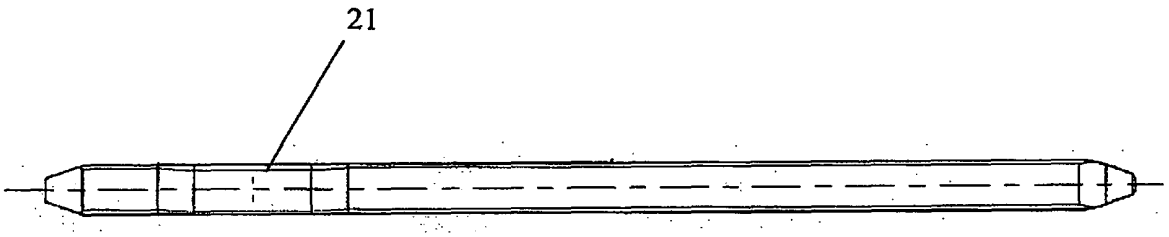

Fig. 3a

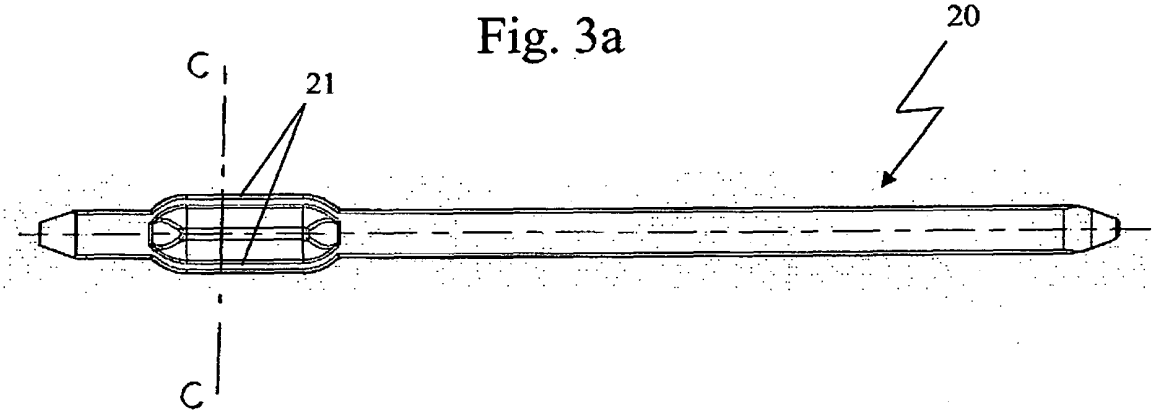

Fig. 3b

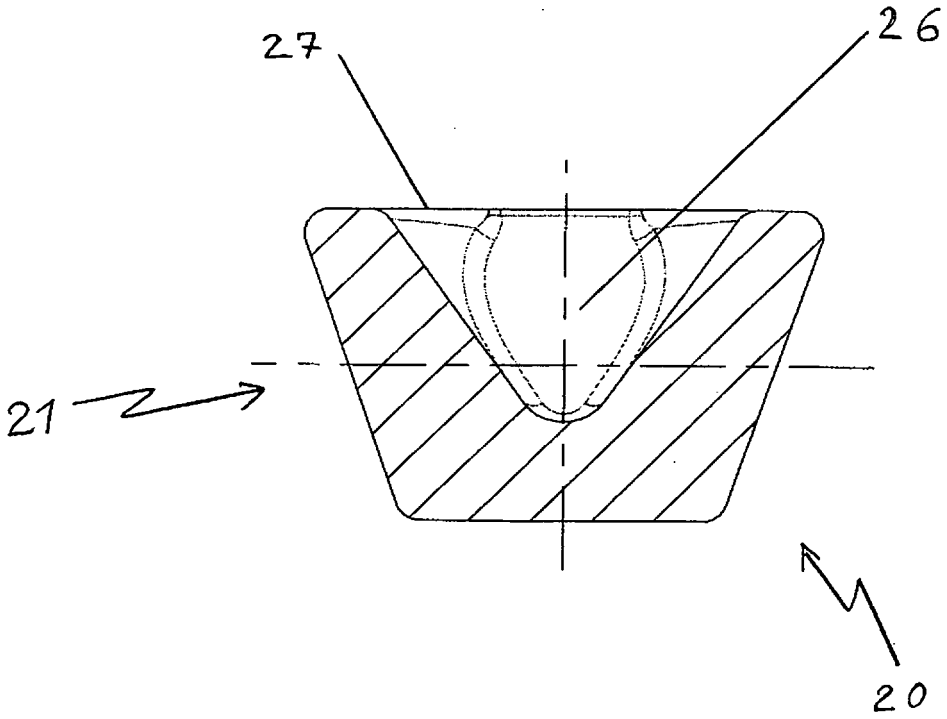

Fig. 3c

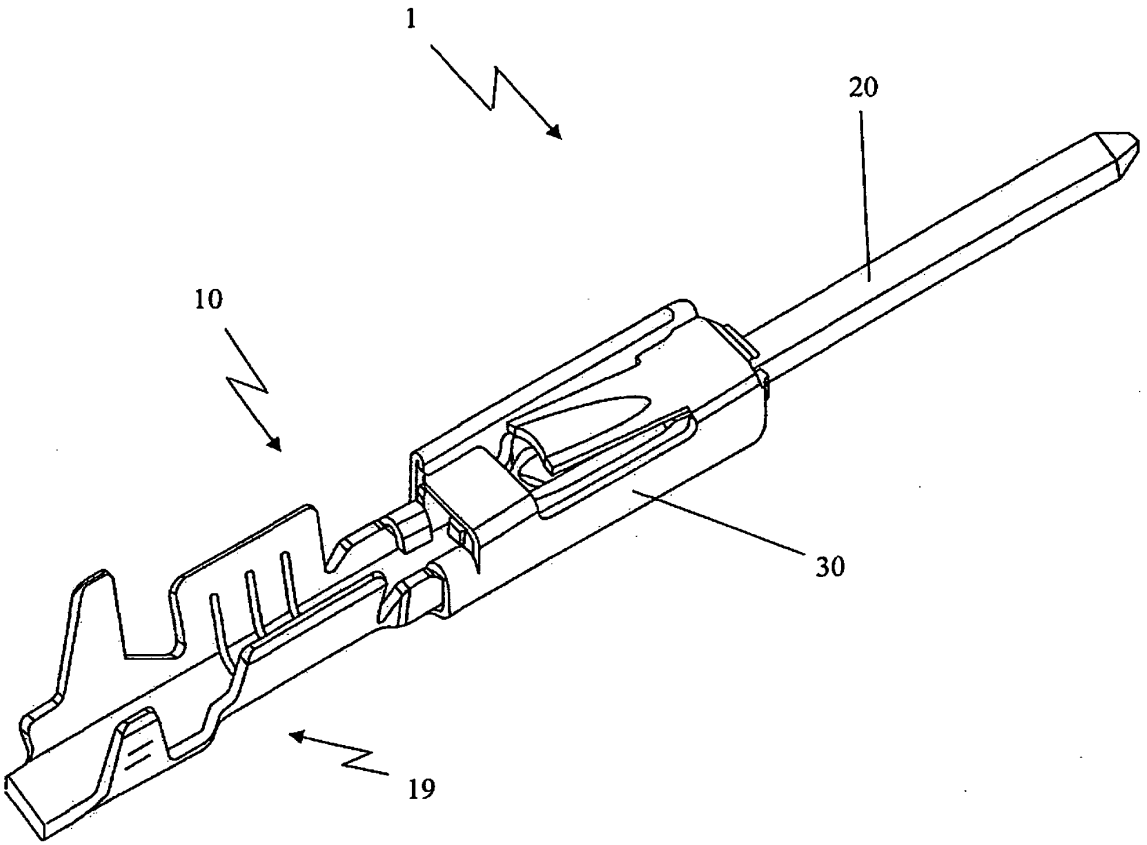

Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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