

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 0 904 612 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

12.12.2001 Bulletin 2001/50

(21) Application number: **97925991.8**

(22) Date of filing: **10.06.1997**

(51) Int Cl.7: **H01R 13/115**

(86) International application number:
PCT/EP97/03013

(87) International publication number:
WO 97/48149 (18.12.1997 Gazette 1997/54)

(54) **PIN BUSHING**

KONTAKTSTIFTBUCHSE

DOUILLE DE BROCHE

(84) Designated Contracting States:
AT BE DE ES FR GB IT SE

(30) Priority: **14.06.1996 DE 19623838**
20.12.1996 DE 19653441

(43) Date of publication of application:
31.03.1999 Bulletin 1999/13

(73) Proprietor: **FRAMATOME CONNECTORS**
INTERNATIONAL
92400 Courbevoie (FR)

(72) Inventors:
• **MÜLLER, Steffen**
D-90469 Nürnberg (DE)

- **PREBÖCK, Friedrich**
D-90552 Röthenbach (DE)
- **NOTTROTT, Rudolf**
D-90411 Nürnberg (DE)
- **MICHLER, Rudolf**
D-90443 Nürnberg (DE)

(74) Representative: **Beetz & Partner Patentanwälte**
Steinsdorfstrasse 10
80538 München (DE)

(56) References cited:
EP-A- 0 638 959 **EP-A- 0 657 962**
DE-A- 1 465 648 **FR-A- 2 673 490**
GB-A- 1 459 694 **US-A- 3 546 664**
US-A- 3 660 806 **US-A- 5 516 310**

EP 0 904 612 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] This invention relates to a pin bushing in accordance with the preamble of claim 1.

[0002] Such a pin bushing is known from DE-A-14 65 648 disclosing a bushing with a receiving part and a side connection part, wherein the receiving part forms a bushing with a base, two side walls and a roof zone, the latter comprising two tongues alternatively radiating from different side walls and extending transversely of the plug direction, said tongues being bent over inwards into the bushing in the top-zone of the opposite side walls.

[0003] Another pin bushing is known from US-A-3 660 806 disclosing a pin bushing with a base, two sidewalls and a roof zone including two tongues extending transversely of the plug in direction and being bent over inwards into the bushing in the top zone, wherein the tongues from there to their ends are straight, two inwardly projecting ribs oriented that longitudinally of the plug in direction are disposed in the base and the tips of the tongues exert each pressure on the sides of the top surface of the contact pin.

[0004] Pin bushings of this kind are used, individually or combined in a plurality in casings, with matching pins in order to produce plugged-in connections.

[0005] The quality of a plugged-in connection is governed by secure hold of the pin in the bushing, and this is dependent on mechanical properties and good electrical contact or low transition resistance, which in turn depends on the firm fit of the pin in the bushing.

[0006] The object of this invention is to provide an improved pin bushing of small dimensions, suitable particularly for heavy current, to guarantee a very firm fit of the pin in the bushing, while ensuring low electrical transition resistance by preventing fretting corrosion.

[0007] This problem is solved by the features of claim 1.

[0008] Features of preferred embodiments of the invention are disclosed in the dependent claims.

[0009] The resilient construction of the tongues which make contact in the roof zone of the pin bushing ensures both a firm fit of the pin in the bushing and also good electrical contact. The latter is due to the fact that even if a pin is tilted when introduced the tongues can bear against the pin surface in the optimal manner.

[0010] The provision of a longitudinal rib in the bottom zone of the bushing also ensures that in the event of the pin being tilted there is adequate contact area between the pin and the bushing.

[0011] The invention will be explained hereinafter with reference to the description of one exemplified embodiment and the drawing wherein:

Fig. 1 is a side view and a plan view of the pin bushing according to the invention and

Fig. 2a is a cross-section through the bushing zone of a first embodiment of the pin bushing which is not

part of the invention.

Fig. 2b is a cross-section through the bushing zone of a second embodiment of the pin bushing according to the invention.

Fig. 2c is a cross-section through the bushing zone of a third embodiment of the pin bushing according to the invention.

Fig. 3 shows a metal stamping from which the bushing is made.

Figs. 4a and 4b show the web surmounting the roof and

Fig. 5 shows windows provided in the front side walls of the bushing.

[0012] Fig. 1a shows the pin bushing 1 from the side. The receiving part 2 is on the right. The cable connection part 3 is on the left. The tip of a pin part 4 is shown diagrammatically on the right next to the pin bushing 1. The pin part 4 is plugged into the receiving part 2, which has the shape of a substantially rectangular bushing 5. Locking springs 12 are formed in the side walls of the bushing part and lock the pin bushing, in a housing if required.

[0013] The cable connection part 3 is in this case shown in the form of a crimp connection part, although this has no limiting force. Any other fixing technique is possible here and, accordingly, any suitable construction of the cable connection part 3.

[0014] Fig. 1b is a plan view of the pin bushing according to the invention and the tip of a contact pin 4. It will be seen that the roof zone of the bushing 5 consists of, tongues 9, the construction of which will be apparent in detail from the description of Fig. 2. These tongues 9 are extensions of the side walls and are folded over through about 90° so that the top part thereof extends substantially parallel to the bottom zone of the bushing. In the example shown here, four tongues are distributed over the roof zone of the bushing and each extend transversely of the plug-in direction and are each formed alternately on opposite side walls. Just before the opposite side wall, the tongues 9 are bent away obliquely inwards and have a length so selected that the tips of the tongues 9 terminate just before the side wall from which the tongue projects. Fig. 1b again shows the locking springs 12 bent out of the side walls.

[0015] Fig. 2a is a cross-section through the bushing zone 5 of a first embodiment of the pin bushing 1, showing the shape of the tongues 9 more clearly. It will be seen that the tongue 9 in the foreground starts from the left side wall 7a and substantially its first half forms the outer contour of the roof zone 8 of the pin bushing. Just before reaching the opposite side wall 7b, the tongue is bent inwards, care being taken in respect of the angle of curvature to ensure that the front zone of the tongue

has maximum elasticity when bent through the curvature zone, and to ensure that the front tongue zone rests as flatly as possible on the outer surface of the pin when the pin 4 is inserted. The non-hatched tongue 9, which extends from the opposite side wall 7b, is arranged in mirror-symmetry in relation to the hatched tongue with respect to the central vertical of the section shown in Fig. 2a. The tips 11 in the unstressed position shown here are at a certain distance from the side walls 7a, 7b, but this distance decreases as soon as they are pressed upwards as a result of the introduction of the contact pin 4. Preferably, the length of the tongues is so selected that even when the pin 4 is inserted the contact tips remain in contact with the pin surface.

[0016] Fig. 2b shows a second embodiment of the inventive pin bushing which is considerably flatter in the bushing zone as compared to the embodiment shown in Fig. 2a. This comes from the fact that in the roof zone the tongues are only slightly bent inwards instead of being fold backwards. In the embodiment shown in Fig. 2b the tongues, seen from their ends, are unbent up to their base in the upper area of the side walls. Only the bending fold at the upper side edge is curved here.

[0017] Alternatively to the embodiment shown in Fig. 2a here also the rib 10 in the bottom zone is designed differently. Here the rib has a semicircular cross-section which comes from the bottom part being punched out in the area of the rib 10 along the longitudinal edges thereof and the rib being subsequently bent upwards with the side edges thereof.

[0018] Fig. 2c also shows a flat embodiment of the bushing zone, in which, however, the tongues are slightly bent over the entire length thereof, and in which the rib is punched out of the bottom zone of the bushing along the longitudinal edges thereof.

[0019] By means of the punched-out ribs 10 also in the bottom zone of the pin bushing it is ensured that in the case of a tilted insertion of a plug lance an optimal electrical contact is guaranteed, since the surface of the rib can adapt itself to the tilting to a certain extent.

[0020] Figs. 4a and 4b show an alternative embodiment wherein a web 13 is formed at the top end of the right-hand side wall 7b and surmounts the roof zone 8 of the bushing 5 and is bent on the left-hand side to bear against the side wall 7a. A kind of cage is formed as a result which effectively prevents unintentional opening of the bushing.

[0021] A rib 10 (Fig. 2) is provided in the bottom zone 6 of the bushing 5 and extends in the plug-in direction. This rib creates specific contact relationships with the pin 4, since the flanks of the rib slope away on both sides to ensure secure support of the pin surface.

[0022] Instead of the rib 10 shown here with a flat platformlike surface, it is also possible to provide two parallel ribs of convexly curved cross-section if required. Since the tips 11 of the tongues 9 each exert pressure on the side edges of the top surface of the contact pins, effective pressure on the opposite rib 10 is guaranteed.

[0023] This effectively compensates for any tilting on introduction of the pin 4.

[0024] The electrical transition resistance is thus kept low and the mechanical static friction between the pin and the bushing is increased.

[0025] Fig. 3 shows a metal semiproduct consisting of a metal stamping from which the contact bushing according to the invention is made. The broken lines correspond to the folding edges about which the metal is bent through 90° in each case to form the contact bushing. Reinforcing ribs 16 will be seen on the tongues 9, such ribs being disposed on the longitudinal centre-line of the tongues 9 in the longitudinal direction to reinforce the tongues in this zone.

[0026] The edges of the tongues 9 are rounded as will be apparent from reference 15 in Fig. 3. Since these edges may possibly come into contact with the pin, as will be apparent from Fig. 2, it is important that there should be no catching or damage to the coating of the pin at this place, e.g. due to a sharp edge or a burr.

[0027] Figs. 4a and 4b show windows 14 in the side walls, in addition to the web 13 already mentioned.

[0028] Fig. 5 shows the cage 17 disposed around the bushing zone in order to protect it against opening up and guide lips 19a, 19b which are provided in the receiving zone of the bushing and which correctly position the pin on introduction into the bushing.

[0029] The above description of one exemplified embodiment has no limiting force. On the contrary, the invention covers all possible variants within the scope of the claims.

Claims

1. A pin bushing (1) with a receiving part (2) for a pin (4) and a side connection part (3), wherein the receiving part (2) forms a bushing (5) with a base (6), two side walls (7a, 7b) and a roof zone (8), the latter comprising at least two tongues (9) alternately radiating from different side walls (7a; 7b) and extending transversely of the plug-in direction, said tongues being bent over inwards into the bushing (5) in the top zone of the opposite side walls (7a, 7b), the tongues (9) from there up to their ends are straight or the tongues (9) are bent over their entire lengths towards the interior of the bushing,

characterised in that

at least one inwardly projecting rib (10) oriented longitudinally of the plug-in direction is disposed in the base (6) of the bushing and the rib (10) is punched out at the longitudinal edges thereof,

in that the tips of the tongues (9) exert each pressure on the side edges of the top surface of the contact pins such that any tilting on introduction of the pin (4) is compensated.

2. A pin bushing according to claim 1, **characterised**

in that the tongues extend obliquely downwards towards the side walls (7b, 7a) from which they respectively extend.

3. A pin bushing according to claim 1 or 2, **characterised in that** the rib (10) is punched out at the longitudinal edges thereof and is semicircularly bent in cross-section. 5
4. A pin bushing according to claim 3, **characterized in that** the side edges of the rib (10) are bent upwardly. 10
5. A pin bushing according to one of the claims 1 or 2, **characterised in that** a web (13) engaging around the opposite edge of the bushing starts from that side wall which is opposite the side wall (7a, 7b) from which a tongue (9) starts. 15
6. A pin bushing according to any of the preceding claims, **characterised in that** the cross-section. of the bushing zone (5) of the receiving part is substantially rectangular. 20
7. A pin bushing according to any one of the preceding claims, **characterised in that** when the pin part (4) is plugged in the bent or bent-over part of the tongue (19) extends substantially parallel to the pin surface and is pressed elastically against the latter. 25
8. A pin bushing according to claim 8, **characterised in that** the distance between the ends (11) of tongues (9) of opposite orientation is smaller, transversely of the plug-in direction when the pin is plugged-in, than the pin width (4). 30
9. A pin bushing according to any one of the preceding claims, **characterised in that** the side connection part (3) is a crimp connection part. 35
10. A pin bushing according to any one of the preceding claims, **characterised in that** the side walls of the bushing (5) comprise locking springs (12) for locking in a casing. 40
11. A pin bushing according to any one of the preceding claims, **characterised in that** the tongues (9) comprise, at least in the roof zone (8), at least one reinforcing rib (16) extending parallel to their longitudinal dimension. 45
12. A pin bushing according to any one of the preceding claims, **characterised in that** the front edges (15) of the tongues (9) are rounded. 50
13. A pin bushing according to any one of the preceding claims, **characterised in that** windows (14) are 55

formed in the side walls in the front zone of the bushing.

14. A pin bushing according to any one of the preceding claims, **characterised in that** a cage (17) surrounds the contact zone and has, at the entry end of the bushing, at least one guide lip (19a, 19b) to guide the pin on its introduction into the bushing.

Patentansprüche

1. Steckerhülse (1) mit einem Aufnahmeabschnitt (2) für einen Steckerstift (4) und einem Seitenverbindungsabschnitt (3), wobei der Aufnahmeabschnitt (2) eine Hülse (5) mit einer Grundfläche (6), zwei Seitenwänden (7a, 7b) und einer Dachzone (8) bildet, wobei letztere mindestens zwei Zungen (9) umfasst, die abwechseln von verschiedenen Seitenwänden (7a, 7b) abstrahlen und sich quer zur Einsteckrichtung erstrecken, wobei die Zungen in der oberen Zone der gegenüberliegenden Seitenwände (7a, 7b) nach innen in die Hülse (5) umgebogen sind und die Zungen (9) von dort bis zu ihren Enden gerade sind, oder die Zungen (9) über ihre gesamte Länge in Richtung des Inneren der Hülse umgebogen sind, **dadurch gekennzeichnet, dass** mindestens eine nach innen ragende Rippe (10), die längs zur Einsteckrichtung ausgerichtet ist, in der Grundfläche (6) der Hülse angeordnet ist, und die Rippe (10) an ihren Längsrändern ausgestanzt ist, und dass die Enden der Zungen (9) jeden Druck auf die Seitenränder der Oberseite des Kontaktstifts ausüben, so dass jegliches Verkippen bei Einführen des Stifts (4) ausgeglichen wird.
2. Steckerhülse nach Anspruch 1, **dadurch gekennzeichnet, dass** sich die Zungen schräg nach unten in Richtung der Seitenwände (7b, 7a) erstrecken, von denen sich jeweils erstrecken.
3. Steckerhülse nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Rippe (10) an ihren Längsrändern ausgestanzt ist und im Querschnitt halbkreisförmig gebogen ist.
4. Steckerhülse nach Anspruch 3, **dadurch gekennzeichnet, dass** die Seitenränder der Rippe (10) nach oben gebogen sind.
5. Steckerhülse nach einem der Ansprüche 1 oder 2, **dadurch gekennzeichnet, dass** ein Steg (13), der um den gegenüberliegenden Rand der Hülse herumgreift, von der Seitenwand ausgeht, die der Seitenwand (7a, 7b) gegenüberliegt, von der die Zunge ausgeht.

6. Steckerhülse nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Querschnitt der Hülsenzzone (5) des Aufnahmeabschnitts im wesentlichen rechteckig ist. 5
7. Steckerhülse nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sich, wenn der Steckerstiftabschnitt (4) eingesteckt wird, der gebogene oder umgebogene Abschnitt der Zunge (9) im wesentlichen parallel zur Oberfläche des Steckerstifts erstreckt und elastisch gegen letztere gedrückt wird. 10
8. Steckerhülse nach Anspruch 8, **dadurch gekennzeichnet, dass** der Abstand zwischen den Enden (11) der Zungen (9) mit entgegengesetzter Ausrichtung quer zur Einsteckrichtung kleiner ist, wenn der Steckerstift eingesteckt wird, als die Breite des Steckerstifts (4). 15
9. Steckerhülse nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Seitenverbindungsabschnitt (3) ein Crimpverbindungsabschnitt ist. 20
10. Steckerhülse nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Seitenwände der Hülse (5) Befestigungsfedern zur Befestigung in einem Gehäuse umfassen. 25
11. Steckerhülse nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Zungen (9) zumindest in der Dachzone (8) mindestens eine Verstärkungsrippe (16) umfassen, die sich parallel zu ihrer Längsausdehnung erstreckt. 30
12. Steckerhülse nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die vorderen Kanten (15) der Zungen (9) abgerundet sind. 35
13. Steckerhülse nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** in den Seitenwänden in der vorderen Zone der Hülse Fenster (14) ausgebildet sind. 40
14. Steckerhülse nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** ein Käfig (17) die Kontaktzone umgibt und an dem Eingangs-ende der Hülse mindestens eine Führungslippe (19a, 19b) zur Führung des Steckerstifts beim Einführen in die Hülse aufweist. 45

Revendications

1. Manchon à fiche (1) doté d'un élément de réception (2) pour fiche (4) et d'un élément de connexion latéral (3), dans lequel l'élément de réception (2) for-

me un manchon (5) muni d'une base (6), deux parois latérales (7a, 7b) et un élément supérieur (8), ce dernier comprenant au moins deux languettes (9) rayonnant alternativement à partir des différentes parois (7a, 7b) et s'étendant transversalement par rapport au sens d'enfichage, lesdites languettes étant repliées à l'intérieur du manchon (5) dans la partie supérieure des parois latérales opposées (7a, 7b), les languettes (9) étant droites jusqu'à leurs extrémités ou les languettes (9) étant repliées sur toute leur longueur à l'intérieur du manchon, **caractérisé en ce que**

au moins une membrure saillante à l'intérieur (10), orientée longitudinalement par rapport au sens de l'enfichage, est disposée dans la base (6) du manchon et

en ce que la membrure (10) est découpée à l'emporte pièce sur les arêtes longitudinales de celle-ci,

en ce que

les embouts des languettes (9) exercent chacun une pression sur les arêtes latérales de la surface supérieure des fiches de contact de façon à ce que toute inclinaison à l'introduction de la fiche (4) soit compensée.

2. Manchon à fiche selon la revendication 1, **caractérisé en ce que** les languettes s'étendent à l'oblique vers le bas, en direction des parois latérales (7b, 7a) à partir desquelles elles s'étendent respectivement.
3. Manchon à fiche selon la revendication 1 ou 2, **caractérisé en ce que** la membrure (10) est découpée à l'emporte pièce sur les arêtes longitudinales de celle-ci et est repliée en demi-cercle dans le sens transversal.
4. Manchon à fiche selon la revendication 3, **caractérisé en ce que** les arêtes latérales de la membrure (10) sont repliées vers le haut.
5. Manchon à fiche selon l'une des revendications 1 ou 2, **caractérisé en ce qu'une** patte (13) s'engageant sur l'arête opposée du manchon prend naissance sur la paroi latérale qui est opposée à la paroi latérale (7a, 7b) sur laquelle une languette (9) prend naissance.
6. Manchon à fiche selon l'une des revendications précédentes, **caractérisé en ce que** la coupe transversale de la zone du manchon (5) de l'élément de réception est essentiellement rectangulaire.
7. Manchon à fiche selon l'une des revendications précédentes, **caractérisé en ce que**, lorsque l'élément de la fiche (4) est enfiché dans la partie pliée ou

repliée de la languette (9), il s'étend essentiellement parallèlement à la surface de la fiche et est pressé élastiquement sur cette dernière.

8. Manchon à fiche selon la revendication 8, **caracté- 5**
risé en ce que la distance entre les extrémités (11)
des languettes (9) de direction opposée est infé-
rieure, transversalement par rapport au sens d'en-
fichage quand la fiche est enfichée, à la largeur de
la fiche (4). 10
9. Manchon à fiche selon l'une des revendications pré-
cédentes, **caractérisé en ce que** l'élément de con-
nexion latéral (3) est un élément de connexion serti. 15
10. Manchon à fiche selon l'une des revendications pré-
cédentes, **caractérisé en ce que** les parois latéra-
les du manchon (5) comprennent des ressorts de
verrouillage (12) pour le verrouillage dans un boî-
tier. 20
11. Manchon à fiche selon l'une des revendications pré-
cédentes, **caractérisé en ce que** les languettes (9)
comprennent au moins sur le dessus (8), au moins
une membrure de renforcement (16) s'étendant pa- 25
rallèlement à leur axe longitudinal.
12. Manchon à fiche selon l'une des revendications pré-
cédentes, **caractérisé en ce que** les arêtes fronta-
les (15) des languettes (9) sont arrondies. 30
13. Manchon à fiche selon l'une des revendications pré-
cédentes, **caractérisé en ce que** des fenêtres (14)
sont formées dans les parois latérales de la zone
frontale du manchon. 35
14. Manchon à fiche selon l'une des revendications pré-
cédentes, **caractérisé en ce qu'une** cage (17) en-
toure la zone de contact et possède à l'extrémité de
l'entrée du manchon, au moins une lèvre guide 40
(19a, 19b) pour guider la fiche lors de son introduc-
tion dans le manchon.

45

50

55

Fig.1

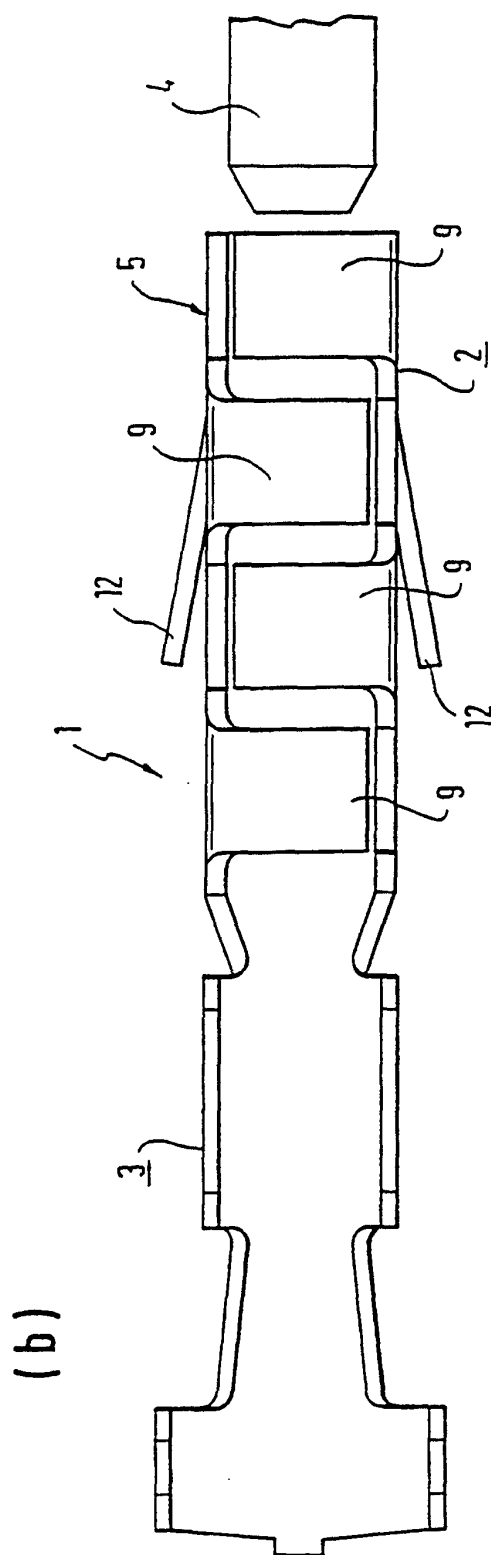
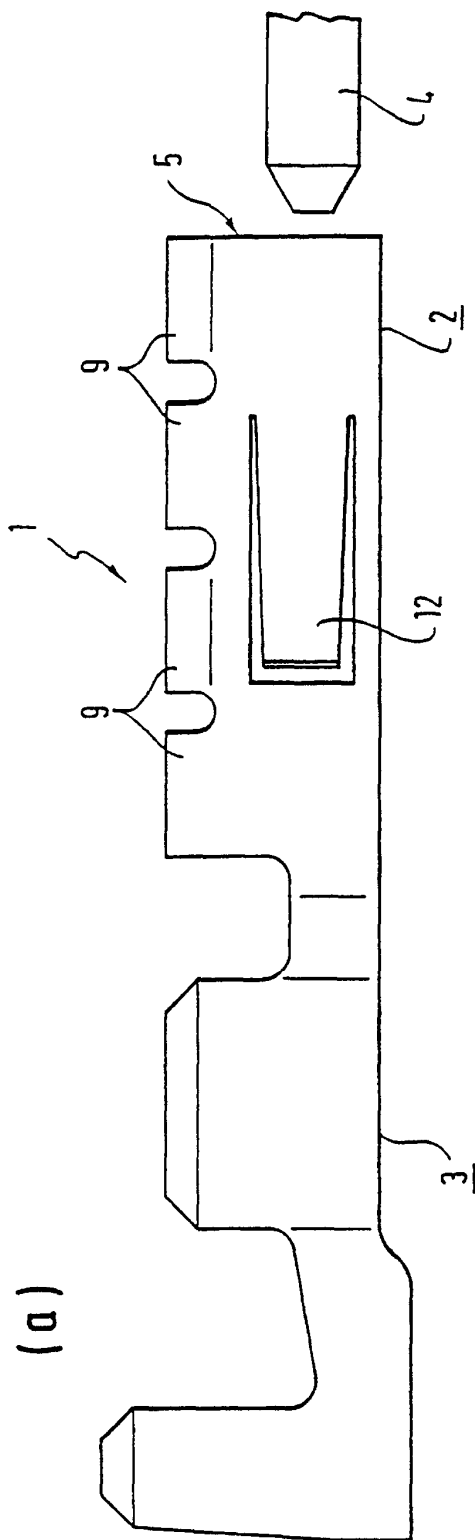


Fig. 2a

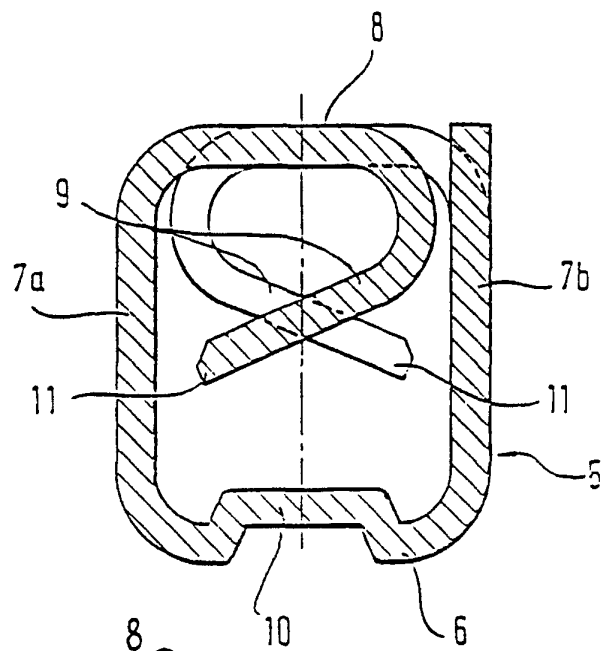


Fig. 2b

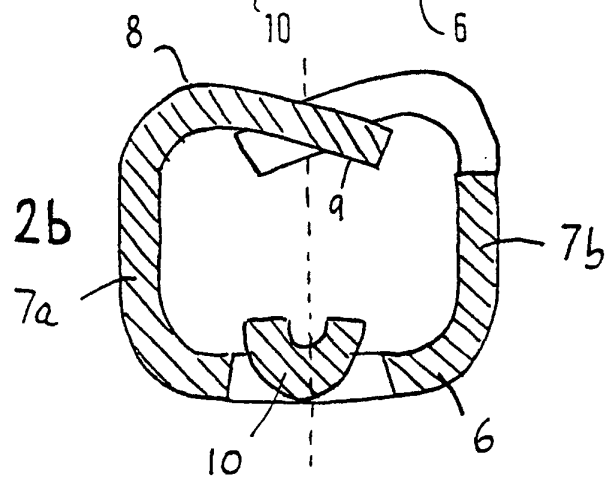


Fig. 2c

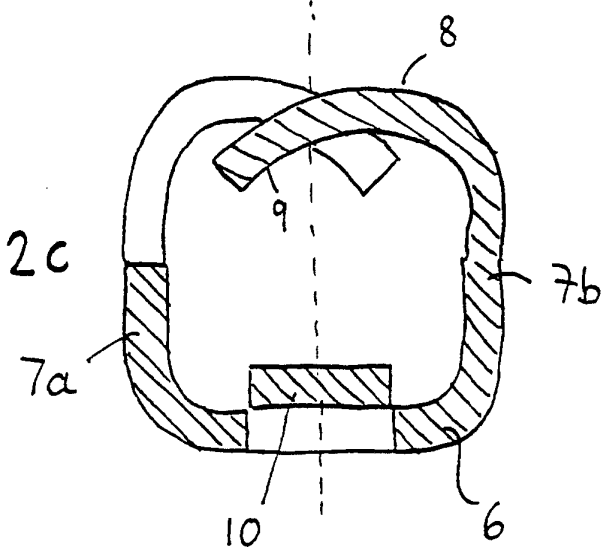


Fig.3

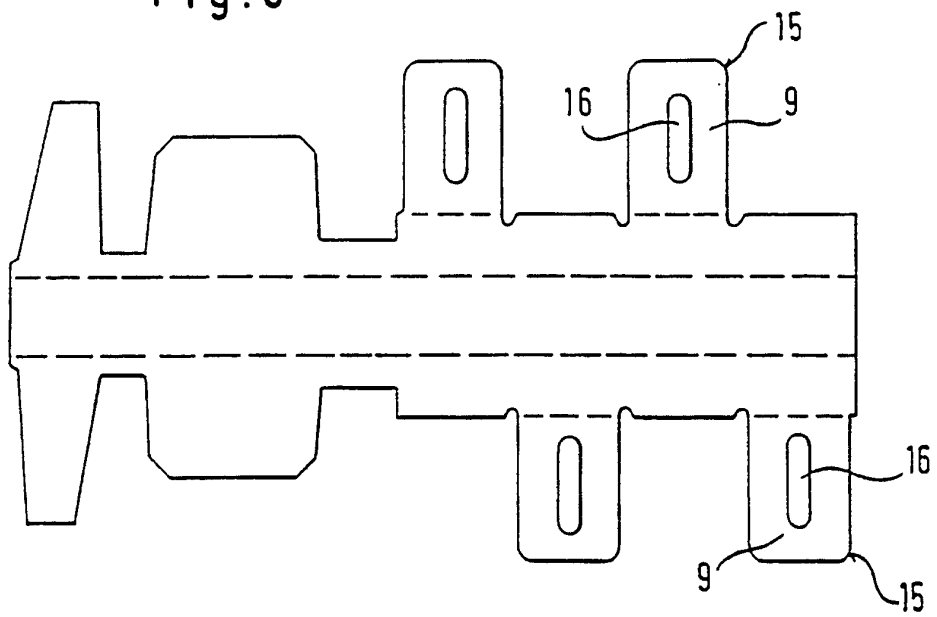


Fig.4A

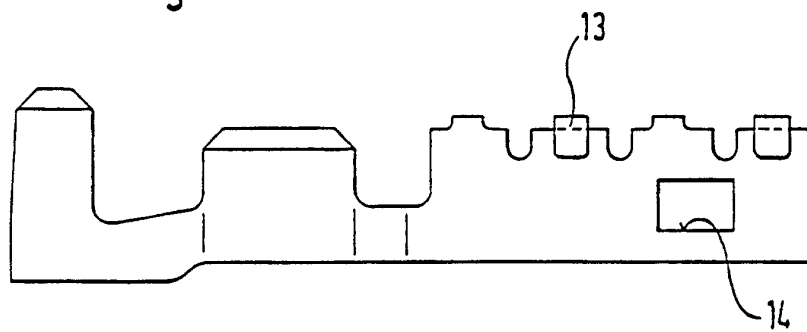


Fig.4B

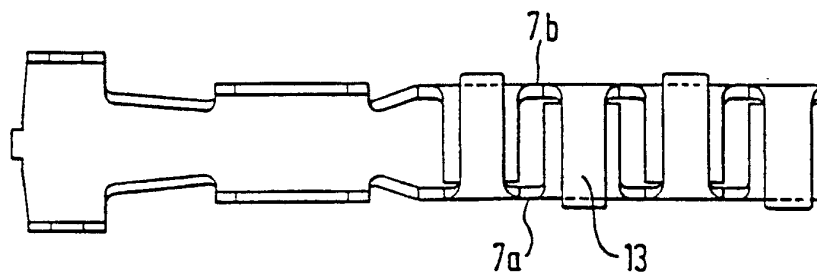


Fig. 5

