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(54) **HOUSING FOR AN ELECTRICAL CONNECTOR, ELECTRICAL CONNECTOR WITH A HOUSING AND A METALLIC CONTACT ELEMENT, AND PROCESS FOR CONNECTING AN ELECTRICAL CABLE TO THE ELECTRICAL CONNECTOR**

GEHÄUSE FÜR EINEN ELEKTRISCHEN STECKER, ELEKTRISCHER STECKER MIT EINEM GEHÄUSE UND EINEM METALLISCHEN KONTAKTELEMENT, UND EIN PROZESS FÜR ANSCHLIESSEN EINES ELEKTRISCHEN KABELS AN DIESEN ELEKTRISCHEN STECKER

BOITIER POUR CONNECTEUR ELECTRIQUE, CONNECTEUR ELECTRIQUE COMPORTANT UN BOITIER ET UN ELEMENT DE CONTACT METALLIQUE, ET PROCEDE POUR RACCORDER UN CABLE ELECTRIQUE A CE CONNECTEUR ELECTRIQUE

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Description

[0001] The invention relates to a housing for an electrical connector for receiving a metallic contact element with an insulation-piercing terminal contact region, the housing having a bottom wall, two side walls and a top wall, which is divided into two parts by a slit. Furthermore, the invention relates to an electrical connector with a housing and a metallic contact element which can be arranged in the housing and has an insulation-piercing terminal contact region and a further contact region which adjoins, and is conductively connected to, the insulation-piercing terminal contact region in the direction of the longitudinal axis of a cable which can be introduced. The invention also relates to a process for connecting an electrical cable to the electrical connector.

[0002] There are many applications for which it is desirable that the insulation-piercing connecting technique can be used.

[0003] DE 44 27 674 discloses a branching connector for a large range of wire sizes. This branching connector comprises a housing made of an insulating material and at least one metallic contact element which can be arranged in the housing. The metallic contact element has an insulation-piercing terminal contact region. This in turn has an outer region and an inner region, the inner region being suitable for relatively small cable diameters and the outer region being suitable for relatively large cable diameters. The housing is provided with a cover, which is connected to the actual housing via a film hinge.

[0004] DE 43 31 036 A1 likewise discloses an electrical connector with a housing made of an insulating material and a metallic contact element which can be arranged therein. The housing has a bottom wall, two side walls and a top wall, which has a slit. The width of the slit is in this case smaller than the diameter of a wire to be introduced. The top wall substantially comprises two flexible parts, which are pushed to the side when a cable is introduced. These parts are intended to achieve the effect that, when an electrical wire is introduced into the insulation-piercing terminal contact region, it is aligned exactly with this region and can no longer be pulled back out of this region.

[0005] On the basis of this prior part, it is the object of the invention to specify a housing for an electrical connector, and an electrical connector with such a housing where wires are prevented from inadvertently penetrating into the insulation-piercing terminal contact region through the slit top wall. It is further an object of the invention to specify a process for connecting an electrical cable to the electrical connector.

[0006] The object is achieved by a housing having the features of Patent Claim 1 and by an electrical connector having the features of Patent Claim 4. The further object is achieved by a process with the features of patent claim 10.

[0007] Advantageous developments are respectively specified in the subclaims.

[0008] The housing for the electrical connector is designed in such a way that the side walls can be bent apart and a cable for connection to the insulation-piercing terminal contact region can be introduced through the widened slit produced as a result. This arrangement firstly provides a very simple housing which has no additional part, such as for example a cover. In addition, this very simple housing makes it possible for further processing to proceed with a simple processing tool. The opening of the housing in this case is performed with the same tool as the subsequent attachment of the cable. The opening for attaching the cable, in other words for the so-called stuffer, may be made very small, since the slit is widened by the bending open of the side walls in such a way that the stuffer can enter through the said slit. A one-part, substantially all-enclosed housing is produced.

[0009] To avoid penetration of a cable, it is also particularly advantageous that the slit over the top wall is not straight, but runs, for example, in a zigzagging or meandering manner. This staggering of portions of the slit with respect to one another makes it possible that the slit does not have to close completely, but that the penetration of a cable is nevertheless very improbable.

[0010] It is also of advantage if the housing has in the region of the side walls portions which protrude over the top wall. These portions then serve as a point of contact for the spreading of the side walls. The tool for introducing the cables will thus first of all spread the side walls, introduce the cable and attach it appropriately with the stuffer.

[0011] It is also of particular advantage if the electrical connector has in each case pairs of insulation-piercing terminal lugs for cables of relatively small diameter and for cables of relatively large diameter. The pairs of mutually opposite insulation-piercing terminal lugs for cables of the relatively large diameter are arranged on the outside and the pairs for cables of relatively small diameter are arranged on the inside. If a cable of relatively large diameter is placed into the insulation-piercing terminal lugs, the contact-making of the outer insulation-piercing terminal lugs is carried out. With respect to the inner insulation-piercing terminal lugs, various possibilities are conceivable. For example, it is possible for the inner insulation-piercing terminal lugs to cut into not only the outer insulating sheath of the cable but also into the inner conductor, but this partial separation does not lead to problems, since the cable is held by the strain-relieving regions. It is also possible, however, for the inner insulation-piercing terminal lugs to deform plastically when a thicker cable is introduced.

[0012] It is particularly advantageous if the contact element can be pushed into the housing in the direction of the longitudinal axis of the cable which can be introduced. In this case, it is of advantage if two lock-in positions are provided and, in a first preliminary lock-in position, a cable end can be introduced into the crimping region and, in a second final position, a cable can be

introduced from above through the housing into the insulation-piercing terminal contact region by bending open the housing. Thus, both the crimping contact region and the insulation-piercing terminal contact region are stabilized and protected by the housing.

[0013] The electrical connector is suitable for connecting continuous cables of various sizes with a cable end or for connecting two cable ends which lie opposite each other and are of relatively large diameter to a third cable end. The use of the electrical connector thereby proceeds as follows: the contact element is located in the preliminary lock-in position in the housing. First of all, one cable end is introduced into the crimping contact region and the crimping connection is closed. Thereafter, the contact element with the first cable end is introduced into the housing, into the final lock-in position. Then, the second cable, a continuous cable, is introduced from above by a tool. To do so, first of all the side walls of the housing are spread away from each other and then the cable is appropriately attached in the insulation-piercing terminal contact region. Thereafter, the spreading of the side walls is undone.

[0014] An exemplary embodiment of the invention is explained with reference to the drawings, in which:

Figure 1 shows the bottom wall of a housing for an electrical connector;
Figure 2 shows a cross-section parallel to the side wall of the housing;
Figure 3 shows a plan view of the top wall of the housing;
Figure 4 shows a view of a housing in the direction of the cable;
Figure 5 shows a cross-section parallel to the bottom wall through a housing;
Figure 6 shows a cross-section perpendicular to the bottom wall and side wall through the housing;
Figure 7 shows an electrical connector with a metallic contact element in the preliminary lock-in position in the housing;
Figure 8 shows a plan view of such an electrical connector;
Figure 9 shows a cross-section through an electrical connector with a contact element in the final lock-in position;
Figure 10 shows a cross-section through a housing with a metallic contact element, the side walls having been spread apart; and
Figure 11 shows an electrical connector with an introduced cable.

[0015] In Figure 1, a view of a housing 1 according to the invention is represented. The view is of the bottom wall 2 of the housing 1. An opening 3 in the bottom wall, and a step in the bottom wall can be seen. This step can be seen particularly well in the section of Figure 2. The bottom wall in this case comprises a lower portion 2 and a slightly higher portion 4. A side wall 5 and part of the top wall 6 can also be seen in Figure 2. As evident particularly clearly from Figure 3, the top wall 6 has a slit 7, which does not extend in a straight line, however, but is only straight in certain portions and these straight portions are staggered with respect to one another. A larger opening 8, which serves for the stuffer or the attaching tool, can also be seen.

[0016] In Figure 2 there can also be seen two impressions 9 and 10 in the side wall, which serve for the locking of the contact element in the preliminary and final lock-in positions. Figure 4 clearly shows the box-shaped structure of the housing 1. It comprises a bottom wall 2, a top wall 6, which is appropriately divided by the slit 7 into two parts, and also two side walls 5 and 11. The side walls 5 and 11 respectively have portions 12 and 13 which protrude over the top wall 6 and serve as points of contact for a tool, in order to bend the side walls apart.

[0017] In Figure 7, an electrical connector 14 is represented. The housing 1 is substantially in the form of box, as shown in Figures 1 to 6. The top wall 6 is at the top in the Figure and the bottom wall 2 of the housing 1 is at the bottom. Both are shown in a corresponding section. A step 15 in the bottom wall 2 can be seen. It divides the bottom wall 2 into two different regions, into a region 2 and a region 4. Located on the lower level of the bottom wall 2 is the metallic contact element 16. In Figure 7, the metallic contact element 16 has only been pushed in partially; it is in the preliminary lock-in position. Pulling out of the contact element 16 from the housing 1 is prevented by two mutually opposite resilient elements 17 and corresponding depressions 10 in the housing 1, into which the resilient elements 17 engage.

[0018] The metallic contact element 16 has an insulation-piercing terminal contact region 18 and a crimping contact region 19. In the preliminary lock-in position of the contact element 16 in the housing 1, the insulation-piercing terminal contact region 18 is already located in the housing 1, while the crimping contact region 19 is accessible outside the housing 1.

[0019] Crimping contact region 19 and insulation-piercing terminal contact region 18 are conductively connected to each other. The crimping contact region 19 comprises two pairs of crimping lugs arranged one behind the other, of which those further away from the insulation-piercing terminal contact region serve for fixing a cable end to the cable sheath and the crimping lugs arranged closer to the insulation-piercing terminal contact region 18 serve for fixing the stripped conductors of the cable end and consequently for electrical contact-making. The crimping contact region 19 is adjoined by the insulation-piercing terminal contact region 18. Both regions are designed in such a way that cables fixed therein are aligned in line with one another and lie one above the other with respect to the bottom wall 2. The insulation-piercing terminal contact region 18 comprises the actual insulation-piercing terminal lugs 20 to 23 and two strain-relieving regions 24 and 25. If the insulation-piercing terminal contact region 18 is viewed

along the axis of a cable to be inserted, the different regions are arranged one behind the other as follows: a strain-relieving region 24, for example formed by a pair of mutually opposite tongues which are crimped for the strain relief, a pair of mutually opposite insulation-piercing terminal lugs 20, which are suitable for cables of relatively large diameter, two pairs, arranged one behind the other, of insulation-piercing terminal lugs 21 and 22 arranged next to each other, which are suitable for cables of relatively small diameter, a further pair of insulation-piercing terminal lugs 23, arranged next to each other, which are suitable for cables of relatively large diameter, and a strain-relieving region 25, which comprises, for example, two mutually opposite lugs which are crimped for the fixing of the cable. The actual insulation-piercing terminal contact region 18 comprises a W profile with four levels, which in each case have a mutually opposite pair of insulation-piercing terminal lugs 20 to 23.

[0020] In Figure 8, the arrangement according to Figure 7 is represented in plan view of the top wall. The top wall 6 with the slit 7, which is of a staggered arrangement, and with the opening 8 for the attaching tool can be clearly seen. A stop 26, which engages in a widening in the housing 1, can also be seen in Figure 8, at the free end of the crimping contact region 19. This stop 26 avoids the crimping contact region being bent, or even torn off the contact element, when there is strain on the cable end. The corresponding widening in the housing can be seen, for example, in Figure 6 and also in Figure 5 by the reference numeral 27.

[0021] In Figure 9, an electrical connector 14 in which the electrical contact element 16 is in the final lock-in position in the housing 1 is represented. The mutually opposite resilient elements 17 then engage in the corresponding second widening of the housing 9. It can be clearly seen that a tongue 28, which engages under a corresponding projection 29 of the housing, is provided at the free end of the contact element 16 on the insulation-piercing terminal side. As a result, the insulation-piercing terminal contact region 18 is safeguarded against bending, if for example a strain acts on the cable.

[0022] In Figure 10 it is shown how the side walls 5 and 11 of the housing 1 are bent apart for receiving a cable 30 in the insulation-piercing terminal contact region. For this purpose, two parts 31 of a tool act on the portions 12 and 13 of the side walls 5 and 11 and bend the side walls apart by pulling them to the outer sides. As a result, the slit in the top wall 6 opens to such an extent that the cable can be introduced through it. The cable is then contacted and fastened in the insulation-piercing terminal contact region. For this purpose, a corresponding attaching tool is introduced through the opening 8 in the top wall, which has likewise been widened. On account of the elastic properties of the housing 1, it will revert to its original form as soon as the tool no longer exerts any tension on the portions 12 and 13. As a result of the special design of the top wall 6, it is not possible for cables to penetrate inadvertently into the contact region. In addition, particularly simple handling of the housing is made possible and no additional parts, such as for example a cover, are required.

[0023] In Figure 11, an installation situation of an electrical connector 14 with a cable 30 and a cable end 33 is represented. In this case, a cable end 33 is fixed at the crimping contact region 19. The conductors of the cable end 33 can be clearly seen. They are held by a crimping lug. It can also be seen that the stops for the preliminary lock-in position 32 have been bent round. As can be clearly seen in Figures 7 and 8, these stops for the preliminary lock-in position strike against the outer wall of the housing 1 and thus prevent the further penetration of the contact element in the preliminary lock-in position. These stops 32 are bent round in the crimping operation, in order in this way to permit the introduction of the contact element 16 in the housing 1 to reach the final lock-in position. After the crimping operation, the metallic contact element 16 was pushed into the housing 1. The resilient elements 17 are thereby pushed further from one widening in the cross-section of the housing to a second widening. In the final lock-in position, a stop of the contact element 16 strikes against the step 15. In the final lock-in position, the second cable 30 is then inserted into the insulation-piercing terminal contact region 18, as already explained in Figure 10. The cable 30 is then conductively connected to the cable end 33.

Claims

1. Housing for an electrical connector for receiving a metallic contact element (16) with an insulation-piercing terminal contact region (18), the housing (1) comprising a bottom wall (2), two side walls (5, 11) and a top wall (6), which is divided into two parts by a slit (7), **characterized in that** the side walls (5, 11) are designed in such a way, that they can be bent apart in such a way that a cable for connection to the contact element (16) can be introduced through the widened slit (7).

2. Housing according to Claim 1, **characterized in that** the side walls (5, 11) have portions (12, 13) which protrude over the top wall (6) and serve as a point of contact for the spreading of the side walls (5, 11).

3. Housing according to one of Claims 1 and 2, **characterized in that** the slit (7) is not of a continuously straight design but has portions staggered with respect to one another.

4. Electrical connector with a housing according to Claim 1, the connector further having a metallic con-

tact element (16) that can be arranged in the housing and has an insulation-piercing terminal contact region (18) and a further contact-making region (19).

5. Electrical connector according to Claim 4, **characterized in that** the metallic contact element (16) has an insulation-piercing terminal contact region (18) and a crimping contact region (19) which adjoins, and is conductively connected to, the insulation-piercing terminal contact region (18) in the direction of the longitudinal axis of a cable which can be introduced.

6. Electrical connector according to Claim 5, **characterized in that** the contact element (16) can be pushed into the housing (1) in the direction of the longitudinal axis of a cable which can be introduced, in such a way that, in a preliminary lock-in position, a cable end (31) can be connected to the crimping contact region (19) and **in that**, in a final lock-in position, at least one cable (30) can be introduced from above into the housing, into the insulation-piercing terminal contact region (18), the side walls being spread apart for introducing the cable.

7. Electrical connector according to one of Claims 5 and 6, **characterized in that** the arrangement of the insulation-piercing terminal contact region (18) and crimping contact region (19) is set up in such a way that the cables are in line with one another and are arranged one above the other in the housing with respect to the bottom wall (2).

8. Electrical connector according to one of Claims 4 to 7, **characterized in that** the insulation-piercing terminal contact region (18) has two strain-relieving regions (24, 25) and **in that** between these regions there are arranged insulation-piercing terminal lugs (20 to 23) respectively opposite each other in pairs, every two pairs (20, 23) of insulation-piercing terminal lugs (21, 22) being intended for cables of relatively small diameter and for cables of relatively large diameter, in such a way that the pairs of insulation-piercing terminal lugs for cables of relatively small diameter lie between those for cables of relatively large diameter.

9. Electrical connector according to one of Claims 4 to 8, **characterized in that** the insulation-piercing terminal contact of the insulation-piercing terminal contact region (18) comprises a W profile with four levels, which in each case have a mutually opposite pair of insulation-piercing terminal lugs (20, 21, 22, 23).

10. Process for connecting an electrical cable to an electrical connector with a housing (1) having a bottom wall (2), two side walls (5,11) and a top wall (6), which is divided into two parts by a slit (7) and a metallic contact element (18) comprising the steps of bending apart the side walls (5,11) of the housing, in such a way that the slit (7) widens introducing the electrical cable (30) through the slit into the housing and connecting the electrical cable (30) with the insulation-piercing terminal contact region (18).

Patentansprüche

1. Gehäuse für einen elektrischen Verbinder für das Aufnehmen eines metallischen Kontaktelementes (16) mit einem Isolierungsdurchdringungsklemmenkontaktbereich (18), wobei das Gehäuse (1) aufweist: eine untere Wand (2); zwei Seitenwände (5, 11); und eine obere Wand (6), die durch einen Schlitz (7) in zwei Teile unterteilt ist, **dadurch gekennzeichnet, daß** die Seitenwände (5, 11) so konstruiert sind, daß sie in einer derartigen Weise auseinandergebogen werden können, daß ein Kabel für eine Verbindung mit dem Kontaktelement (16) durch den verbreiterten Schlitz (7) eingeführt werden kann.

2. Gehäuse nach Anspruch 1, **dadurch gekennzeichnet, daß** die Seitenwände (5, 11) Abschnitte (12, 13) aufweisen, die über die obere Wand (6) vorstehen und als ein Kontaktpunkt für das Spreizen der Seitenwände (5, 11) dienen.

3. Gehäuse nach einem der Ansprüche 1 und 2, **dadurch gekennzeichnet, daß** der Schlitz (7) nicht eine kontinuierlich geradlinige Konstruktion ist, sondern Abschnitte aufweist, die mit Bezugnahme zueinander versetzt sind.

4. Elektrischer Verbinder mit einem Gehäuse nach Anspruch 1, wobei der Verbinder außerdem ein metallisches Kontaktelement (16) aufweist, das im Gehäuse angeordnet werden kann und einen Isolierungsdurchdringungsklemmenkontaktbereich (18) und einen weiteren Kontaktgabebereich (19) aufweist.

5. Elektrischer Verbinder nach Anspruch 4, **dadurch gekennzeichnet, daß** das metallische Kontaktelement (16) einen Isolierungsdurchdringungsklemmenkontaktbereich (18) und einen Crimpkontaktbereich (19) aufweist, der angrenzt an den und leitend verbunden ist mit dem Isolierungsdurchdringungsklemmenkontaktbereich (18) in der Richtung der Längsachse eines Kabels, das eingeführt werden kann.

6. Elektrischer Verbinder nach Anspruch 5, **dadurch gekennzeichnet, daß** das Kontaktelement (16) in

das Gehäuse (1) in der Richtung der Längsachse eines Kabels, das eingeführt werden kann, in einer derartigen Weise hineingedrückt werden kann, daß in einer vorläufigen Sperrposition ein Kabelende (31) mit dem Crimpkontaktbereich (19) verbunden werden kann, und daß in einer endgültigen Sperrposition mindestens ein Kabel (30) von oben in das Gehäuse in den Isolierungsdurchdringungsklemmenkontaktbereich (18) eingeführt werden kann, wobei die Seitenwände für das Einführen des Kabels auseinandergespreizt werden.

7. Elektrischer Verbinder nach einem der Ansprüche 5 und 6, **dadurch gekennzeichnet, daß** die Anordnung des Isolierungsdurchdringungsklemmenkontaktbereiches (18) und des Crimpkontaktbereiches (19) so aufgebaut wird, daß die Kabel miteinander in einer Linie sind und eines über dem anderen im Gehäuse mit Bezugnahme auf die untere Wand (2) angeordnet sind.

8. Elektrischer Verbinder nach einem der Ansprüche 4 bis 7, **dadurch gekennzeichnet, daß** der Isolierungsdurchdringungsklemmenkontaktbereich (18) zwei Zugentlastungsbereiche (24, 25) aufweist, und dadurch, daß zwischen diesen Bereichen Isolierungsdurchdringungsklemmenansätze (20 bis 23) entsprechend einander gegenüberliegend in Paaren angeordnet sind, wobei alle zwei Paare (20, 23) der Isolierungsdurchdringungsklemmenansätze (21, 22) für Kabel mit relativ kleinem Durchmesser und für Kabel mit relativ großem Durchmesser so beabsichtigt sind, daß die Paare der Isolierungsdurchdringungsklemmenansätze für Kabel mit relativ kleinem Durchmesser zwischen jenen für Kabel mit relativ großem Durchmesser liegen.

9. Elektrischer Verbinder nach einem der Ansprüche 4 bis 8, **dadurch gekennzeichnet, daß** der Isolierungsdurchdringungsklemmenkontakt des Isolierungsdurchdringungsklemmenkontaktbereiches (18) ein W-Profil mit vier Ebenen aufweist, die in jedem Fall ein gegenseitig gegenüberliegendes Paar von Isolierungsdurchdringungsklemmenansätzen (20, 21, 22, 23) aufweisen.

10. Verfahren für das Verbinden eines elektrischen Kabels mit einem elektrischen Verbinder mit einem Gehäuse (1), das aufweist: eine untere Wand (2); zwei Seitenwände (5, 11); und eine obere Wand (6), die durch einen Schlitz (7) in zwei Teile unterteilt ist; und einem metallischen Kontaktelement (18), das die folgenden Schritte aufweist: Auseinanderbiegen der Seitenwände (5, 11) des Gehäuses so, daß sich der Schlitz (7) verbreitert; Einführen des elektrischen Kabels (30) durch den Schlitz in das Gehäuse; und Verbinden des elektrischen Kabels (30) mit dem Isolierungsdurchdringungsklemmenkontaktbereich (18).

Revendications

1. Boîtier pour un connecteur électrique destiné à recevoir un élément de contact métallique (16) avec une région de contact à bornes à percement de l'isolation (18), le boîtier (1) comprenant une paroi inférieure (2), deux parois latérales (5, 11) et une paroi supérieure (6), divisée en deux parties par une fente (7), **caractérisé en ce que** les parois latérales (5, 11) sont configurées de sorte à pouvoir être écartées par pliage, pour permettre l'introduction d'un câble servant à la connexion de l'élément de contact (16) à travers la fente élargie (7).

2. Boîtier selon la revendication 1, **caractérisé en ce que** les parois latérales (5, 11) comportent des parties (12, 13) débordant au-dessus de la paroi supérieure (6) et servant de point de contact pour l'écartement des parois latérales (5, 11).

3. Boîtier selon l'une des revendications 1 et 2, **caractérisé en ce que** la fente (7) n'a pas une configuration droite continue, mais comporte des parties échelonnées les unes par rapport aux autres.

4. Connecteur électrique comportant un boîtier selon la revendication 1, le connecteur comportant en outre un élément de contact métallique (16) pouvant être agencé dans le boîtier et comportant une région de contact à bornes à percement de l'isolation (18) et une autre région d'établissement de contact (10).

5. Connecteur électrique selon la revendication 4, **caractérisé en ce que** l'élément de contact métallique (16) comporte une région de contact à bornes à percement de l'isolation (18) et une région de contact de sertissage (19) adjacente et connectée par conduction à la région de contact à bornes à percement de l'isolation (18) dans la direction de l'axe longitudinal d'un câble pouvant être introduit.

6. Connecteur électrique selon la revendication 5, **caractérisé en ce que** l'élément de contact (16) peut être poussé dans le boîtier (1) dans la direction de l'axe longitudinal d'un câble pouvant être introduit, de sorte que dans une position de verrouillage préliminaire, une extrémité de câble (31) peut être connectée à la région de contact de sertissage (19), et que dans la position de verrouillage finale, au moins un câble (30) peut être introduit d'en haut dans le boîtier, dans la région de contact à bornes à percement de l'isolation (18), les parois latérales étant écartées l'une de l'autre en vue de l'introduction du

câble.

7. Connecteur électrique selon l'une des revendications 5 et 6, **caractérisé en ce que** l'agencement de la région de contact à bornes à percement de l'isolation (18) et de la région de contact de sertissage (19) est tel que les câbles sont alignés les uns avec les autres et sont agencés les uns au-dessus des autres dans le boîtier par rapport à la paroi inférieure (2).

8. Connecteur électrique selon l'une des revendications 4 à 7, **caractérisé en ce que** la région de contact à bornes à percement de l'isolation (18) comporte deux régions de décharge de traction (24, 25), des pattes de bornes à percement de l'isolation (20 à 23) étant respectivement agencées entre ces régions, opposées les unes aux autres et agencées par paires, deux paires (20, 23) des pattes de bornes à percement de l'isolation (21, 22) étant à chaque fois destinées à des câbles de diamètre relativement réduit et aux câbles de diamètre relativement grand, de sorte que les paires des pattes de bornes à percement de l'isolation pour les câbles à diamètre relativement réduit sont agencées entre celles destinées aux câbles de diamètre relativement grand.

9. Connecteur électrique selon l'une des revendications 4 à 8, **caractérisé en ce que** le contact à bornes à percement de l'isolation de la région de contact à bornes de percement d'isolation (18) comprend un profil en W avec quatre niveaux, comportant dans chaque cas une paire de pattes de bornes à percement de l'isolation mutuellement opposées (20, 21, 22, 23).

10. Procédé de connexion d'un câble électrique à un connecteur électrique comportant un boîtier (1) comportant une paroi inférieure (2), deux parois latérales (5, 11) et une paroi supérieure (6), divisée en deux parties par une fente (7) et un élément de contact métalliquc (18) comprenant les étapes d'écartement par pliage des parois latérales (5, 11) du boîtier, de sorte que la fente (7) est élargie, permettant l'introduction du câble électrique (30) à travers la fente dans le boîtier, et connectant le câble électrique (30) à la région de contact à bornes à percement de l'isolation (19).

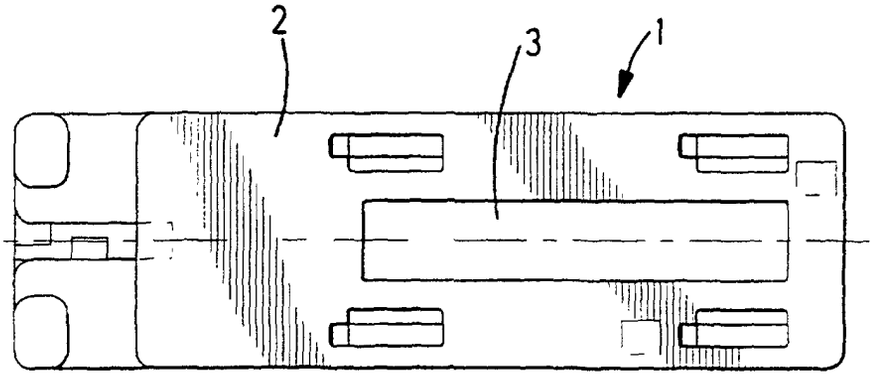

Fig. 1

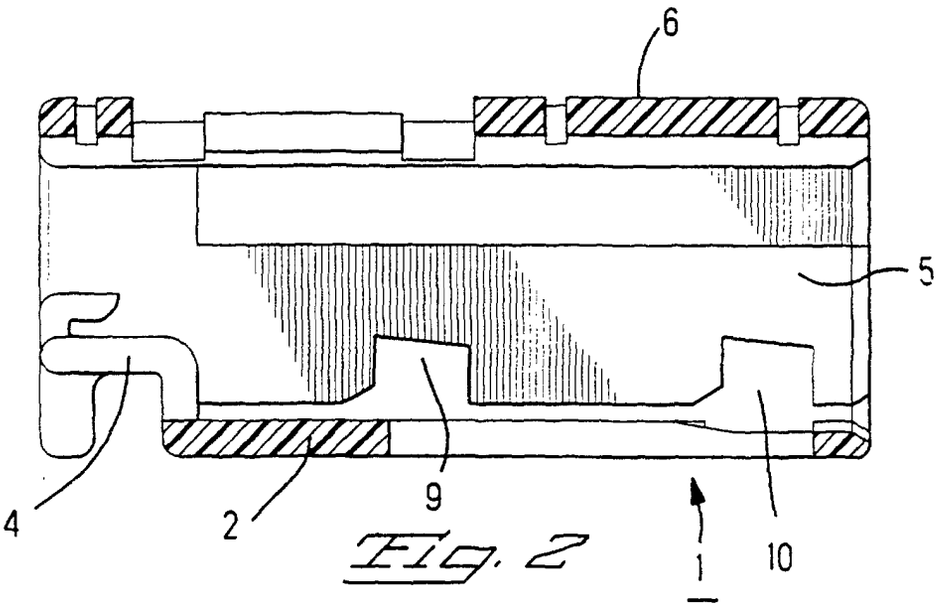

Fig. 2

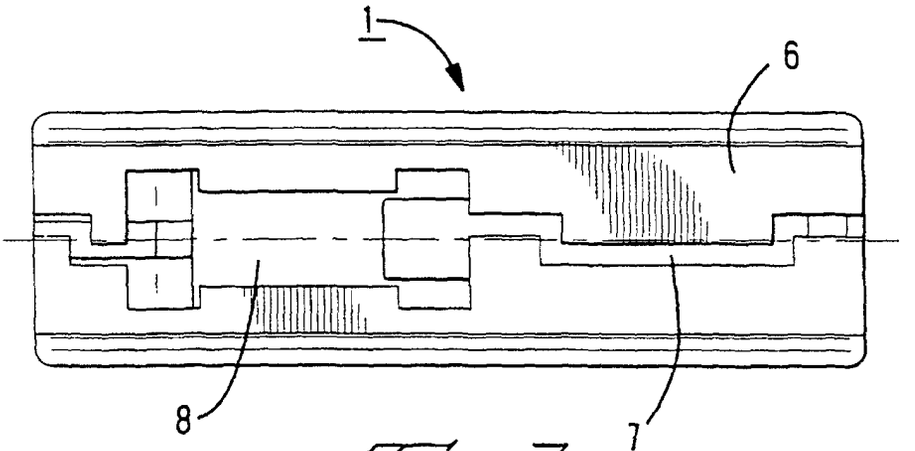

Fig. 3

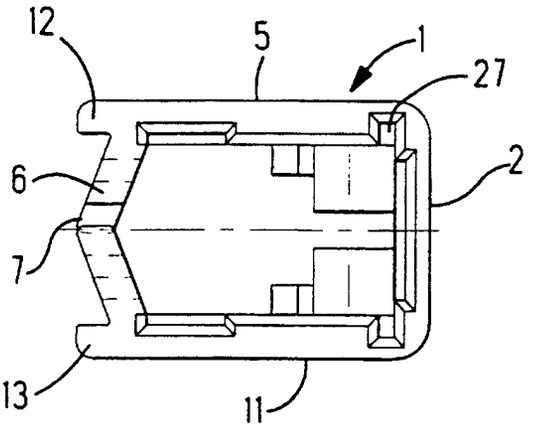

Fig. 4

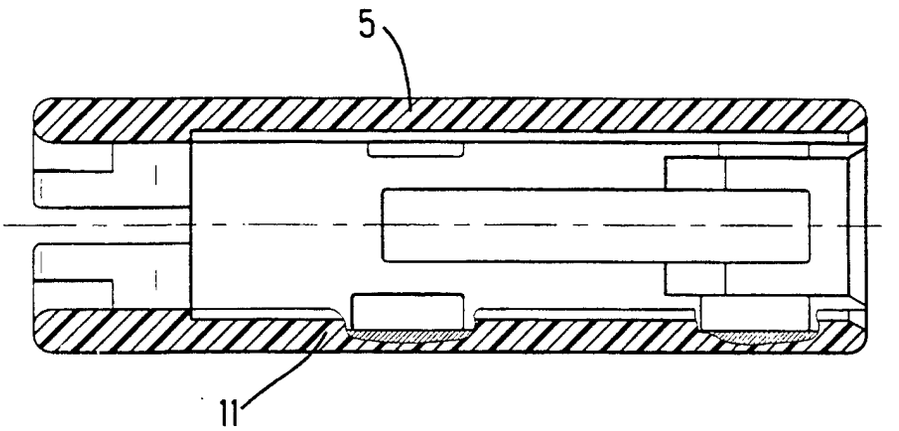

Fig. 5

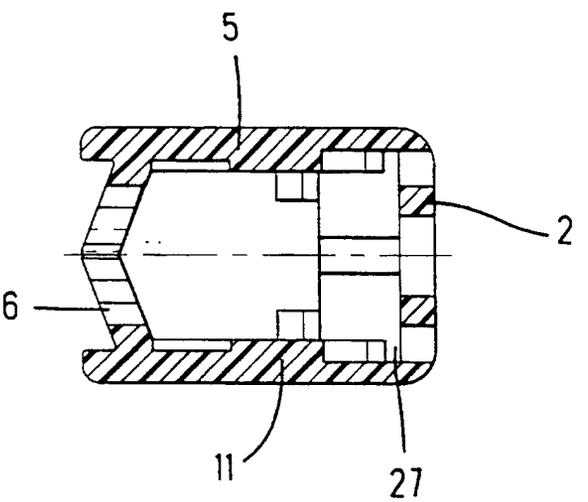

Fig. 6

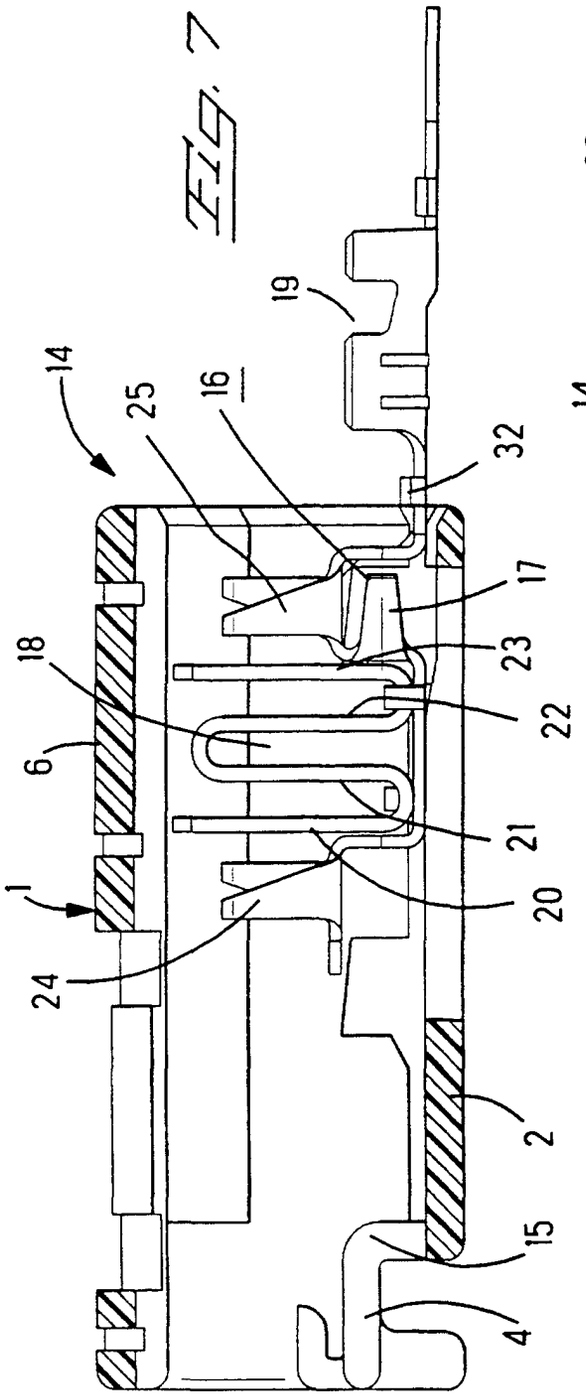

Fig. 7

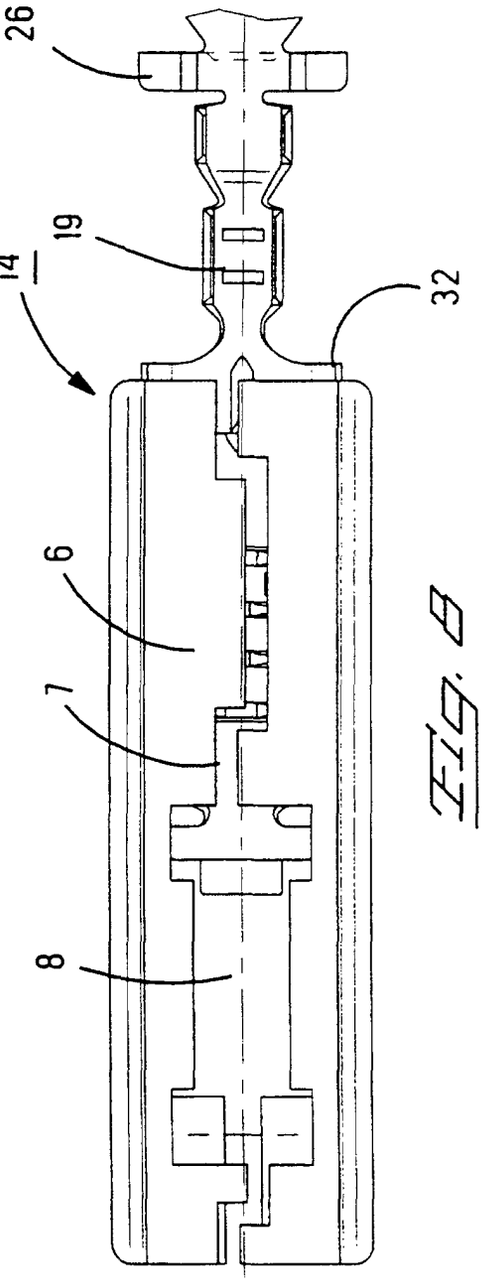

Fig. 8

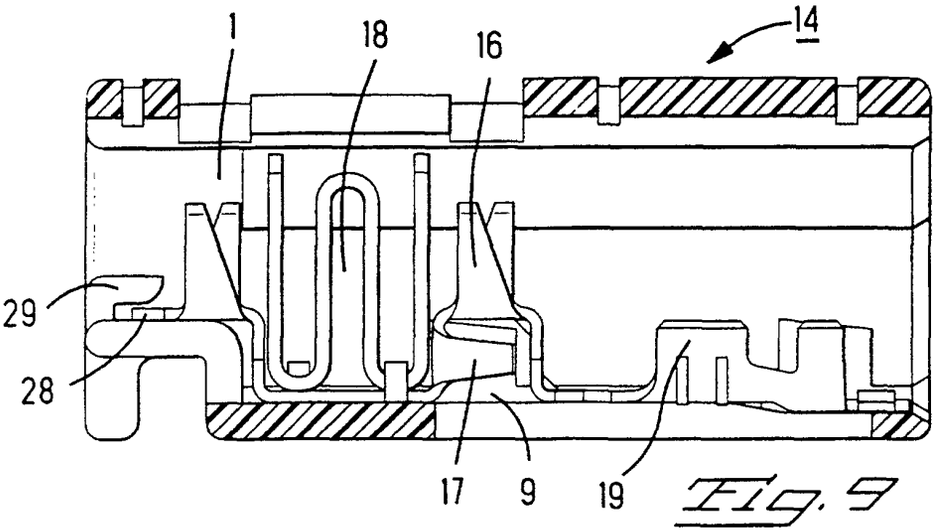

Fig. 9

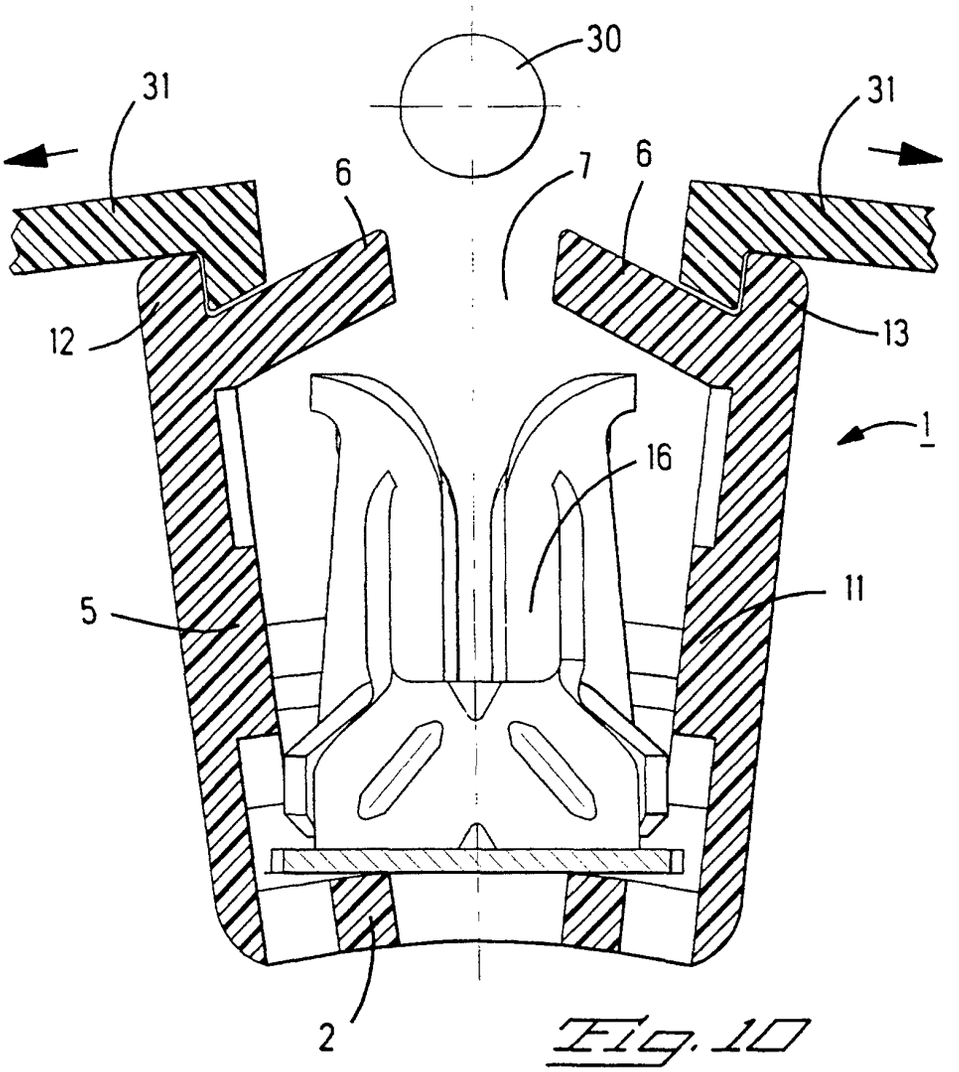

Fig. 10

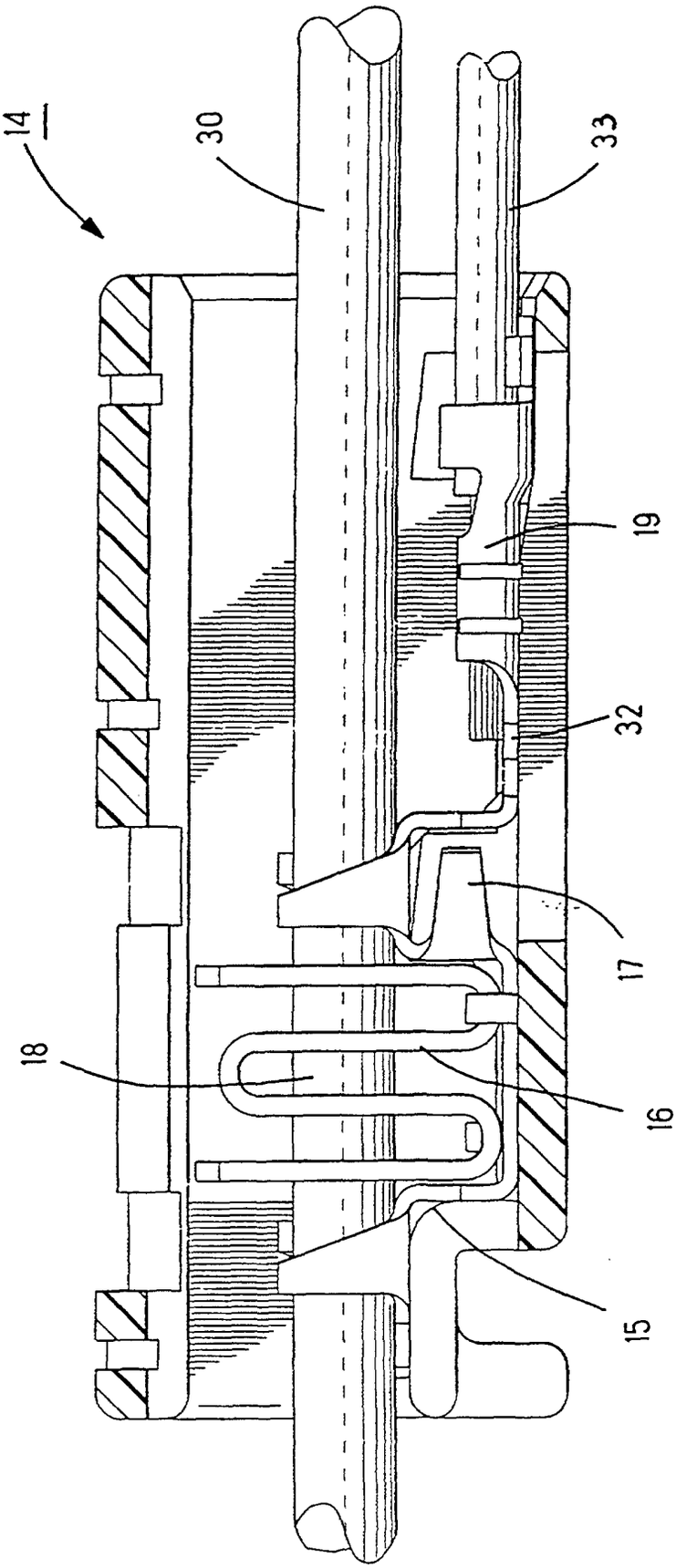

FIG. 11