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(54) **ELECTRICAL CONNECTOR ASSEMBLY**

ELEKTRISCHE VERBINDUNGSEINRICHTUNG

ENSEMBLE CONNECTEUR ÉLECTRIQUE

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(73) Proprietor: **Aptiv Technologies Limited**

St. Michael (BB)

(72) Inventors:

- **SCHMITT, Gilles**
F-28210 Senantes (FR)

- **GUILLANTON, Erwan**
F-28000 Chartres (FR)

(74) Representative: **GIE Innovation Competence
Group**

310, avenue Berthelot
69372 Lyon Cedex 08 (FR)

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Description

FIELD OF THE INVENTION

[0001] The present invention is related to electrical connector assemblies, and electrical connectors for such assemblies.

BACKGROUND OF THE INVENTION

[0002] Electrical connector assemblies have long been known to comprise a first and a second electrical connector which are complementarily matable for allowing electrical connection between two electrical appliances.

[0003] In particular, some kind of electrical connectors have numerous electrical ways. In such case, it is common that electrically conducting contacts, each connected to a cable, are inserted in a corresponding receptacle of an electrically insulating housing. During insertion, each electrical contact deflects a locking lance of the housing, which then spring back to a locking position when the electrical contact is fully inserted. In this position, the contact is locked in the receptacle.

[0004] Recently, so-called 'terminal position assurance devices' (TPA) have been developed. Such devices allow to detect that a locking lance is still in its deflected state and, thus, that the electrical contact is not fully inserted. Before inserting the contacts, this TPA member normally is in an intermediate position. The conception of TPA members is such that, when all the electrical devices are fully inserted, this device can be moved respectively to the housing between the intermediate position and a fully-locked position. In its fully-locked position, it does not interfere with the mating of the two electrical connectors of the assembly. However, in its intermediate position, the TPA member interferes with the mating movement of the two electrical connectors, to thereby prevent their mating. Further, when the electrical contact is only partly inserted, the TPA member is prevented from moving from its intermediate position to its locked position. Therefore, it is possible to detect that all the contacts are not fully inserted when it is not possible to move the TPA member to its locked position. Further, this will prevent the two electrical connectors to be connected, and hence make sure that an improper operation is impossible.

[0005] Example of such an electrical connector assembly is known from US6827609. Other examples are disclosed in documents US2007020997A1, US2006183376A1, US6599150B1 and EP1168519A2.

[0006] Document US6599150B1 is considered to disclose an electrical connector assembly according to the preamble of independent claim 1.

[0007] TPA members might be placed in its locking position during handling of the connector, before the insertion of any contact. This is problematic since later insertion of the contacts while the TPA member is locked (i. e. closed) might deteriorate one or more parts of the connector.

SUMMARY OF THE INVENTION

[0008] The present invention provides an electrical connector assembly according to claim 1.

[0009] In such a connector assembly, the TPA member in an intermediate position, prevents the first and second electrical connectors to fully mate and, in the locked position, the contact is prevented from being moved to its locked position. The person or machine inserting the contact in the receptacle will necessarily detect the wrong position (locked or closed position) of the TPA member, and improper operation can be prevented.

[0010] According to other embodiments, one might use one or more of the features defined in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Other characteristics and advantages of the invention will readily appear from the following description of one of its embodiments, provided as a non-limitative example, and of the accompanying drawings.

[0012] On the drawings :

- Fig. 1 is a perspective exploded view of an electrical connector for a connector assembly according to one embodiment,
- Fig. 2 is an opposite perspective view of the TPA member,
- Fig. 3a is a vertical sectional view of the electrical connector of Fig. 1 along line IIIa-IIIa of Fig. 1, with the TPA member in its intermediate position and a contact in its outer position, also schematically showing the mating connector,
- Fig. 3b is the same view as Fig. 3a, with the contact in its locked position,
- Fig. 3c is the same view as Fig. 3b, with the TPA member in its locked position,
- Fig. 4a is the same view as Fig. 3a, with the TPA member in its locked position,
- Fig. 4b is a sectional view of the electrical connector of Fig. 1 along line IVb-IVb of Fig. 1, with the TPA member in its locked position, the contacts being in their outer position.

[0013] On the different figures, the same reference signs designate like or similar elements.

DETAILED DESCRIPTION

[0014] Fig. 3a shows an electrical connector 3 for an electrical connector assembly 1 comprising a first electrical connector 2 and the second electrical connector 3. The first and second electrical connectors are adapted to mate along a mating direction X, and comprise complementary locking features 32, 33, of any suitable type, which enable the first and second connectors to be locked to one another in a suitable mating relative position.

[0015] For example, the first electrical connector 2 comprises a dielectric housing 34 defining a plurality of receptacles 35, some or each of them receiving an electrically conducting contact 36 to be put in electrical communication with a complementary contact of the second connector when the first and second connectors are mated. For example, the electrical contacts of the first connector are designed as pins.

[0016] The second connector 3 is shown in detail on Fig. 1. It comprises a main housing 4 which is made of an electrically insulating material. The main housing also comprises the mating locking feature 32 adapted to cooperate with the complementary locking mating feature of the first connector. The housing 4 defines a plurality of pathways. In the present example, there are two pathways or contact receptacles 5a, 5b, adapted each to correspond to a receptacle of the first electrical housing. However, more pathways for both connectors would be possible in other embodiments.

[0017] One electrical cable 9 is shown on Fig. 1 in relation to the pathway 5b. The connector also comprises a cable in relation to the contact receptacle 5a, which is not shown for the sake of clarity. Such a cable 9 is for example crimped on an electrically conductive contact 7 which has a front mating portion 8 suitable to mate with a first connector pin, an intermediate portion 37 which is fixed, for example crimped, on the electrical core (not visible) of the cable 9, and, when necessary, a back portion 38 which is fixed, for example crimped, onto the insulating sheath 10 of the cable 9. The electrical cables and contacts are inserted into the housing 4, in particular in a respective pathway, along an insertion direction Y which, in the present example, is parallel to the direction X of mating of the two connectors.

[0018] The cables are inserted into the housing 4 through a grid 11 which is mechanically lockable on the housing 4 by any suitable way, such as, for example snap-fitting. In the illustrated embodiment, elastic locking lances 12 cooperate with receiving holes (not visible) of the housing to retain the grid 11 in the housing.

[0019] The second electrical connector further comprises a TPA member 13. This TPA member 13 can be releasably locked on the housing 4 in two distinct positions, (this could be achieved in any suitable way, such as, for example, by snap-fitting) and movable relative to the housing between these two positions along a direction Z which, in the present embodiment, is parallel to the mating direction X.

[0020] As shown on Fig. 2, the TPA member 13 comprises a locking lance 39 with which engage a complementary abutting portion 40 of the housing. Other mechanisms are possible.

[0021] For each contact receptacle in the housing 4, the TPA member 13 comprises an abutting surface 23, the operation of which will be described in more details below. Further, between these two contact receptacles, an interference finger 28 extends, this finger being provided with an abutting surface 30 which, in the present

embodiment, is provided on the same side of the TPA member 13 with respect to the position of the electrical contacts (on Fig. 2, the above side), and faces in a direction opposite to that of the abutting surfaces 23.

[0022] In its intermediate position, the front face of TPA member 13 interferes with the first connector when the first connector is moved along the direction X toward the second connector to be mated thereto. The first and second connectors cannot be mated.

[0023] Fig. 3a shows in detail a cross-section through one receptacle 5b, or pathway, of the second electrical connector. Fig. 3a shows the TPA member 13 in its intermediate position, and the contact 7 in an outer position in which it is not retained in the housing 4.

[0024] The contact 7 has a box-shaped front mating portion 8 which has a top facing surface 15 and a rear locking portion 16.

[0025] In the housing, the contact receptacle 5b is defined by a dielectric wall 17 partly or fully surrounding the contact 7 to be inserted. The wall 17 comprises a locking member such as a lance 18 which has an elastically flexible body 19 carrying a stop portion 20 protruding toward the contact, having a sloped surface 24 facing toward the contact in this position, and an opposite straight surface 25. The flexible body 19 is elastically movable by bending about an axis perpendicular to the plane of the cross-section of Fig. 3a, as illustrated by the arrow 21. Further, the body 19 comprises a top-face abutting surface 22 on the side of the body 19 which is opposite to the side which carries the stop portion 20.

[0026] The TPA member 13 comprises a parallel abutting surface 23 which, in the shown position, is situated at a distance, along the axis Z, and not facing the surface 22, thereby enabling the body 19 to be upwardly flexed along the arrow 21.

[0027] As shown on Fig. 3a, in the so-called outer position of the contact 7, the front end of the contact 7 is located upstream of the locking lance 18 along the contact insertion Y.

[0028] Then, upon insertion of the contact 7 along the insertion direction Y, an insertion force F has to be applied so that the contact moves along the insertion direction such as the top-face surface 15 of the contact will push on the sloped surface 24 of the stop portion 20. The locking lance is deflected from its locking position to its insertion position (not shown). Then, upon total insertion of the contact, as shown on Fig. 3b, the contact 7 reaches its locked position wherein the locking lance 18 deflects back to or toward its original position and, in any case, in a position where the contact 7 is locked in the housing 4. The straight surface 25 engages the rear locking portion 16 of the contact to perform this locking.

[0029] As shown in Fig. 3c, once the contact(s) 7 have been inserted in the housing, the TPA member 13 is moved along direction Z from its intermediate position to its locked position (Fig. 3c) as explained above. In this position, the abutting surface 23 of the TPA member 13 faces the surface 22 of the lance 18 in close proximity,

thereby limiting the bending movement of the lance 18 and hence an unwanted removal of the contact 7 in a direction opposite to the insertion direction Y is prevented. Further, as explained above, in this position of the TPA member, the first and second electrical connectors are allowed to be fully mated.

[0030] It should be mentioned here that, although this is not visible on the drawings, when the electrical contact 7 is in its intermediate position wherein it deflects the locking lance 18 along the arrow 21, the lance 18 prevents the TPA member 13 from being moved from its intermediate position to its locked position. For example, this is achieved by a front interfering feature 26 of the lance 18 which interferes with a complementary front feature 27 of the TPA member 13 upon this movement (see Fig. 3b). Thereby, it is ensured that the TPA member 13 can be moved from its intermediate position to its locked position (and thereby allow full mating of the two connectors) only when no electrical contact is in its intermediate position.

[0031] Fig. 4a shows a state in which the TPA member was unexpectedly placed in its locked position before the insertion of the contacts is finished, for example before it has even started. In this position, the contacts 7 are shown in their outer position (although it is understood that they could be further away from the right), and the TPA member 13 is in its locked position.

[0032] In this case, the TPA member 13 ensures that no contact can be fully inserted in a corresponding receptacle. This is deemed achieved even if the force for inserting the contact into its locked position is at least three, preferably at least ten times the force F required to insert the contact in the receptacle in the normal operation described above in relation to Figs. 3a and 3b. With the present embodiment, the contact 7 and the TPA member 13 cooperate to prevent such an insertion. This is achieved, in the present example, by providing the TPA member 13 with the finger 28 which is inserted, in the locked position of the TPA member 13, in a corresponding cavity 29 of the housing. The finger is shown on Fig. 4b, which corresponds to a cross-section parallel to the one of Fig. 4a, but slightly shifted in a direction perpendicular to these cross-sections. The finger 28 comprises the abutting surface 30 and the cavity 29 comprises a complementary abutting surface 31 which faces the abutting surface 30. Thus, any movement of the TPA member 13 with respect to the housing 4 can be prevented in a direction normal to the insertion direction (in particular in a direction of movement of the TPA member with respect to the housing corresponding to a movement caused by the bending of the lance 18 about the arrow 21). The efforts E occurring in case of a tentative insertion are shown on Figs. 4a and 4b.

[0033] In this case, upon insertion of the contact 7 in the receptacle, the top surface 15 of the contact tends to cause a bending movement of the lance 18 upwardly according to the arrow 21 as explained above, and the top surface 22 of the lance will tend to cause an upward

(on the drawing), or partly upward, movement of the TPA member with respect to the housing. However, this upward movement is prevented by abutment of the abutting surface 30 of the finger on the corresponding abutting surface 31 of the housing.

[0034] Further, when the first connector 2 is mated with the second connector 3, the TPA member is sandwiched between the inner part of the second connector (where the contacts are inserted) and the outer or peripheral skirt of the second connector. The contact is then maintained in position by the lance 18, which is blocked by the finger 28, which abuts against the abutting surface of the housing, while the TPA member abuts itself against the first connector in the vicinity of the finger 28, and the TPA member is also prevented from radially extending by the outer skirt of the second connector.

[0035] If a too great force is needed to insert the contact 7 in the receptacle, this will be noticed either by the operator or machine inserting the cable. Then, the TPA member could be placed back to its intermediate position, for example using a suitable tool, before normal operation, as described above in relation to Fig. 3a to 3c, can be achieved.

Claims

1. An electrical connector assembly comprising :

- a first electrical connector (2),
- a second electrical connector (3) comprising:
 - a dielectric housing (4) comprising a plurality of receptacles (5a, 5b), each on which having a wall (17) and a locking member (18) adapted to take a locking position, and an insertion position, wherein the plurality of receptacles are arranged in a network of rows,
 - a TPA member (13), adapted to move with respect to the dielectric housing between an intermediate position, and a locked position,
 - an electrical contact (7), having a locking feature (16), the contact being adapted to be inserted in the receptacle along an insertion direction (Y), and movable in the receptacle:
 - . from an outer position, wherein the contact (7) does not mechanically influence the locking member,
 - . through an intermediate position, wherein the contact (7) deflects the locking member to its insertion position,
 - . to a locked position, wherein the locking feature (16) cooperates with the locking member of the housing in its

locking position to lock the electrical contact in the housing,

wherein the TPA member (13) is adapted, in its intermediate position, to mechanically engage the first electrical connector to prevent the first and second electrical connectors to fully mate, and, in its locked position, to allow the first and second electrical connectors to fully mate,

wherein, in the intermediate position of the contact (7), the contact prevents the TPA member (13) from being moved from its intermediate position to its locked position with respect to the housing, and, in the locked position of the contact, the contact enables the TPA member to be moved from its intermediate position to its locked position with respect to the housing,

wherein, in the locked position of the TPA member, the contact (7), the housing (4) and the TPA member (13) are adapted so that, upon moving the contact from its outer position toward its locked position, they mechanically cooperate to prevent the contact from being moved to its locked position, wherein the locking member (18) has a first abutting surface (22) and the TPA member (13) has a second abutting surface (23), the first and second abutting surfaces facing one another in the locked position of the TPA member, wherein the TPA member (13) comprises a finger (28) extending between two contact receptacles (5a, 5b), which is inserted, in the locked position of the TPA member (13), in a corresponding cavity (29) of the housing (4) for preventing a movement of the TPA member (13) with respect to the housing (4) in a direction normal to the insertion direction, **characterized in that** the finger (28) has a third abutting surface (30) and the housing has a fourth abutting surface (31), the third and fourth abutting surfaces facing one another in the locked position of the TPA member so as to prevent a movement of the locking member (18) from its locking position to its insertion position

wherein, the third and fourth abutting surfaces (30,31) are disposed in a plane between two adjacent receptacles (5a, 5b).

2. Electrical connector assembly according to claim 1 wherein, in the intermediate position of the TPA member, the third and fourth abutting surfaces (30,31) are not facing each other, thereby allowing a movement of the locking member from its locking position to its insertion position.
3. Electrical connector assembly according to claim 1 or 2 wherein, in the intermediate position of the TPA member, the first and second abutting surfaces (22,23) are not facing each other, thereby allowing a movement of the locking member (18) from its locking position to its insertion position.

4. Connector assembly according to any of claims 1 to 3, wherein the first connector has a first mating locking feature (33), and the second connector has a second complementary mating locking feature (32), wherein, when the TPA member is in its locked position, the first connector is movable with respect to the second connector from a pre-mated position to a fully mated position wherein the first and second mating locking features cooperate to lock together the first and second electrical connectors.

5. Connector assembly according to claim 4, wherein the second mating locking feature (32) is on the housing (4).

Patentansprüche

1. Elektrische Verbindungseinrichtung, die Folgendes umfasst:

- einen ersten elektrischen Verbinder (2),
- einen zweiten elektrischen Verbinder (3), umfassend:

- ein dielektrisches Gehäuse (4), umfassend mehrere Aufnahmen (5a, 5b), die jeweils eine Wandung (17) und ein Verriegelungselement (18), dazu angepasst, eine Verriegelungsposition und eine Einführungsposition einzunehmen, aufweisen, wobei die mehreren Aufnahmen in einem Netzwerk von Reihen angeordnet sind,
- ein TPA-Element (13), angepasst zum Bewegen bezüglich des dielektrischen Gehäuses zwischen einer Zwischenposition und einer verriegelten Position,
- einen elektrischen Kontakt (7), ein Verriegelungsmerkmal (16) aufweisend, wobei der Kontakt angepasst ist, um in die Aufnahme entlang einer Einführungsrichtung (Y) eingeführt zu werden, und in der Aufnahme bewegbar ist:

- von einer äußeren Position, wobei der Kontakt (7) das Verriegelungselement nicht mechanisch beeinflusst,
- über eine Zwischenposition, wobei der Kontakt (7) das Verriegelungselement in seine Einführungsposition biegt,
- in eine verriegelte Position, wobei das Verriegelungsmerkmal (16) mit dem Verriegelungselement des Gehäuses in seiner Verriegelungsposition zusammenwirkt, um den elektrischen Kontakt im Gehäuse zu verriegeln,

wobei das TPA-Element (13) angepasst ist, in seiner Zwischenposition, mechanisch in den ersten elektrischen Verbinder einzugreifen, um zu verhindern, dass der erste und der zweite elektrische Verbinder vollständig zusammengefügt werden, und, in seiner verriegelten Position, dem ersten und zweiten elektrischen Verbinder zu ermöglichen, vollständig zusammengefügt zu werden,

wobei, in der Zwischenposition des Kontakts (7), der Kontakt verhindert, dass das TPA-Element (13) von seiner Zwischenposition in seine verriegelte Position bezüglich des Gehäuses bewegt wird, und wobei, in der verriegelten Position des Kontakts, der Kontakt dem TPA-Element ermöglicht, von seiner Zwischenposition in seine verriegelte Position bezüglich des Gehäuses bewegt zu werden,

wobei, in der verriegelten Position des TPA-Elements, der Kontakt (7), das Gehäuse (4) und das TPA-Element (13) so angepasst sind, dass, bei Bewegen des Kontakts von seiner äußeren Position in Richtung seiner verriegelten Position, sie mechanisch zusammenwirken, um zu verhindern, dass der Kontakt in seine verriegelte Position bewegt wird, wobei das Verriegelungselement (18) eine erste Grenzfläche (22) hat und das TPA-Element (13) eine zweite Grenzfläche (23) hat, wobei die erste und die zweite Grenzfläche in der verriegelten Position des TPA-Elements zueinander zeigen,

wobei das TPA-Element (13) einen Finger (28) umfasst, der sich zwischen zwei Kontaktaufnahmen (5a, 5b) erstreckt, der, in der verriegelten Position des TPA-Elements (13), in einen entsprechenden Hohlraum (29) des Gehäuses (4) eingeführt wird, um eine Bewegung des TPA-Elements (13) bezüglich des Gehäuses (4) in einer Richtung normal zur Einführungsrichtung zu verhindern,

dadurch gekennzeichnet, dass

der Finger (28) eine dritte Grenzfläche (30) hat und das Gehäuse eine vierte Grenzfläche (31) hat, wobei die dritte und die vierte Grenzfläche in der verriegelten Position des TPA-Elements zueinander zeigen, um eine Bewegung des Verriegelungselements (18) aus seiner Verriegelungsposition in seine Einführungsposition zu verhindern,

wobei die dritte und vierte Grenzfläche (30, 31) in einer Ebene zwischen zwei angrenzenden Aufnahmen (5a, 5b) angeordnet sind.

2. Elektrische Verbindungseinrichtung nach Anspruch 1, wobei, in der Zwischenposition des TPA-Elements, die dritte und vierte Grenzfläche (30, 31) nicht zueinander zeigen, dadurch eine Bewegung des Verriegelungselements aus seiner Verriegelungsposition in seine Einführungsposition ermöglichend.
3. Elektrische Verbindungseinrichtung nach Anspruch 1 oder 2, wobei, in der Zwischenposition des TPA-Elements, die erste und zweite Grenzfläche (22, 23)

nicht zueinander zeigen, dadurch eine Bewegung des Verriegelungselements (18) aus seiner Verriegelungsposition in seine Einführungsposition ermöglichend.

4. Elektrische Verbindungseinrichtung nach einem der Ansprüche 1 bis 3, wobei der erste Verbinder ein erstes Verbindungsverriegelungsmerkmal (33) aufweist und der zweite Verbinder ein zweites, komplementäres Verbindungsverriegelungsmerkmal (32) aufweist, wobei, wenn sich das TPA-Element in seiner verriegelten Position befindet, der erste Verbinder bezüglich des zweiten Verbinders von einer vorgefügten Position zu einer vollständig zusammengeführten Position bewegbar ist, wobei das erste und das zweite Verbindungsverriegelungsmerkmal zusammenwirken, um den ersten und den zweiten elektrischen Verbinder miteinander zu verriegeln.
5. Verbindungseinrichtung nach Anspruch 4, wobei das zweite Verbindungsverriegelungsmerkmal (32) am Gehäuse (4) befindlich ist.

Revendications

1. Ensemble de connecteur électrique, comprenant:

- un premier connecteur électrique (2),
- un second connecteur électrique (3), comprenant:

- un boîtier diélectrique (4) comprenant une pluralité de réceptacles (5a, 5b), chacun de ceux-ci présentant une paroi (17) et un élément de verrouillage (18) adapté pour adopter une position verrouillage, et une position d'insertion, dans lequel la pluralité de réceptacles sont agencés en un réseau de rangées,

- un élément TPA (13), adapté pour se déplacer par rapport au boîtier diélectrique entre une position intermédiaire et une position verrouillée,

- un contact électrique (7), présentant un composant de verrouillage (16), le contact étant adapté pour être inséré dans le réceptacle le long d'une direction d'insertion (Y), et étant déplaçable dans le réceptacle:

- à partir d'une position extérieure, dans laquelle le contact (7) n'influence pas mécaniquement l'élément de verrouillage,

- en passant par une position intermédiaire, dans laquelle le contact (7) dévie l'élément de verrouillage vers sa position d'insertion,

• jusqu'à une position verrouillée, dans laquelle le composant de verrouillage (16) coopère avec l'élément de verrouillage du boîtier dans sa position de verrouillage pour verrouiller le contact électrique dans le boîtier,

dans lequel l'élément TPA (13) est adapté, dans sa position intermédiaire, pour engager mécaniquement le premier connecteur électrique afin d'empêcher les premier et second connecteurs électriques de s'accoupler complètement, et, dans sa position verrouillée, afin de permettre aux premier et second connecteurs électriques de s'accoupler complètement,

dans lequel, dans la position intermédiaire du contact (7), le contact empêche l'élément TPA (13) d'être déplacé à partir de sa position intermédiaire jusqu'à sa position verrouillée par rapport au boîtier, et, dans la position verrouillée du contact, le contact permet à l'élément TPA d'être déplacé à partir de sa position intermédiaire jusqu'à sa position verrouillée par rapport au boîtier,

dans lequel, dans la position verrouillée de l'élément TPA, le contact (7), le boîtier (4) et l'élément TPA (13) sont conçus de telle sorte que, lors du déplacement du contact à partir de sa position extérieure en direction de sa position verrouillée, ils coopèrent mécaniquement pour empêcher le contact d'être déplacé jusqu'à sa position verrouillée, dans lequel l'élément de verrouillage (18) présente une première surface de butée (22) et l'élément TPA (13) présente une deuxième surface de butée (23), les première et deuxième surfaces de butée étant situées l'une en face de l'autre dans la position verrouillée de l'élément TPA,

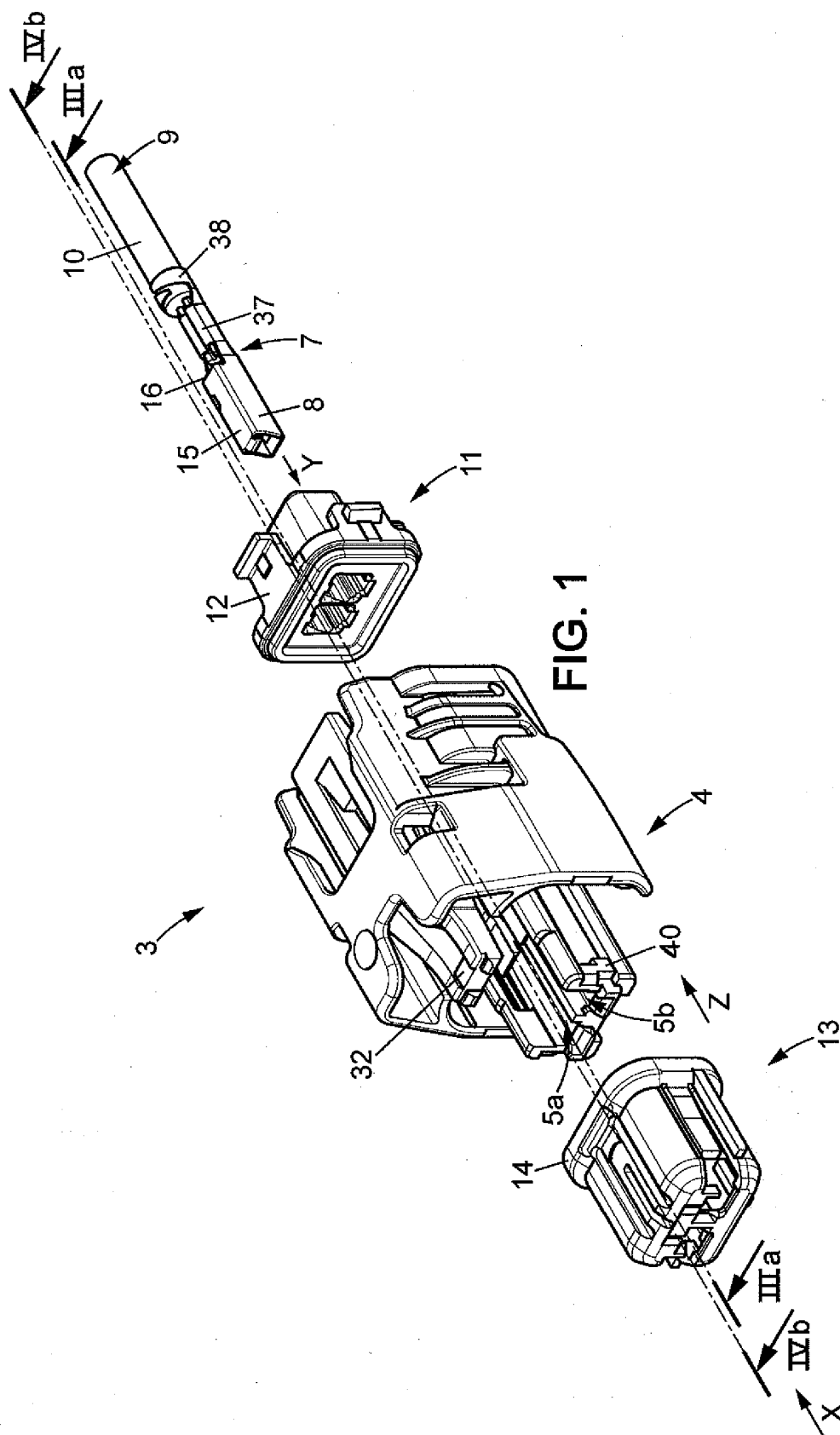
dans lequel l'élément TPA (13) comprend un doigt (28) qui s'étend entre deux réceptacles de contact (5a, 5b), qui est inséré, dans la position verrouillée de l'élément TPA (13), dans une cavité correspondante (29) du boîtier (4) afin d'empêcher un déplacement de l'élément TPA (13) par rapport au boîtier (4) dans une direction normale à la direction d'insertion,

caractérisé en ce que le doigt présente une troisième surface de butée (30) et le boîtier présente une quatrième surface de butée (31), les troisième et quatrième surfaces de butée étant situées l'une en face de l'autre dans la position verrouillée de l'élément TPA de manière à empêcher un déplacement de l'élément de verrouillage (18) à partir de sa position de verrouillage jusqu'à sa position d'insertion, dans lequel les troisième et quatrième surfaces de butée (30, 31) sont disposées dans un plan entre deux réceptacles voisins (5a, 5b).

2. Ensemble de connecteur électrique selon la revendication 1, dans lequel, dans la position intermédiaire

de l'élément TPA, les troisième et quatrième surfaces de butée (30, 31) ne sont pas situées l'une en face de l'autre, permettant de ce fait un déplacement de l'élément de verrouillage à partir de sa position de verrouillage jusqu'à sa position d'insertion.

3. Ensemble de connecteur électrique selon la revendication 1 ou 2, dans lequel, dans la position intermédiaire de l'élément TPA, les première et seconde surfaces de butée (22, 23) ne sont pas situées l'une en face de l'autre, permettant de ce fait un déplacement de l'élément de verrouillage (18) à partir de sa position de verrouillage jusqu'à sa position d'insertion.
4. Ensemble de connecteur selon l'une quelconque des revendications 1 à 3, dans lequel le premier connecteur présente un premier composant de verrouillage d'accouplement (33), et le second connecteur présente un second composant de verrouillage d'accouplement complémentaire (32), dans lequel, lorsque l'élément TPA se trouve dans sa position verrouillée, le premier connecteur est déplaçable par rapport au second connecteur à partir d'une position pré-accouplée jusqu'à une position complètement accouplée, dans lequel les premier et second composant de verrouillage d'accouplement coopèrent pour verrouiller l'un à l'autre les premiers et second connecteurs électriques.
5. Ensemble de connecteur selon la revendication 4, dans lequel le second composant de verrouillage d'accouplement (32) est située sur le boîtier (4).



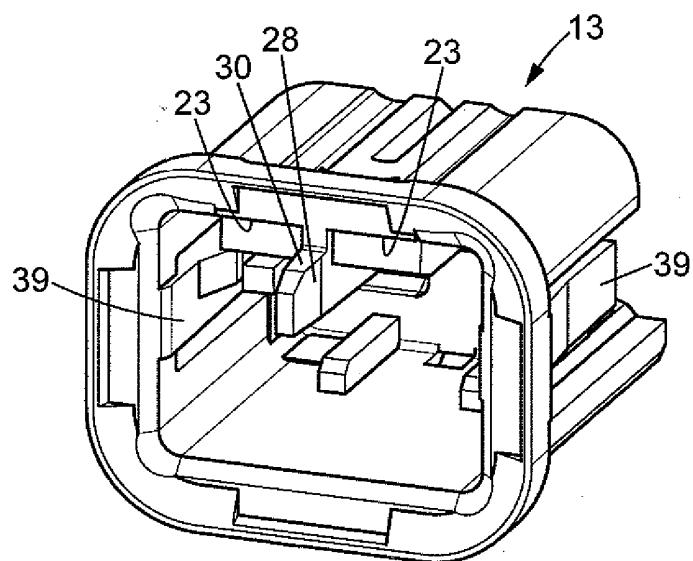


FIG. 2

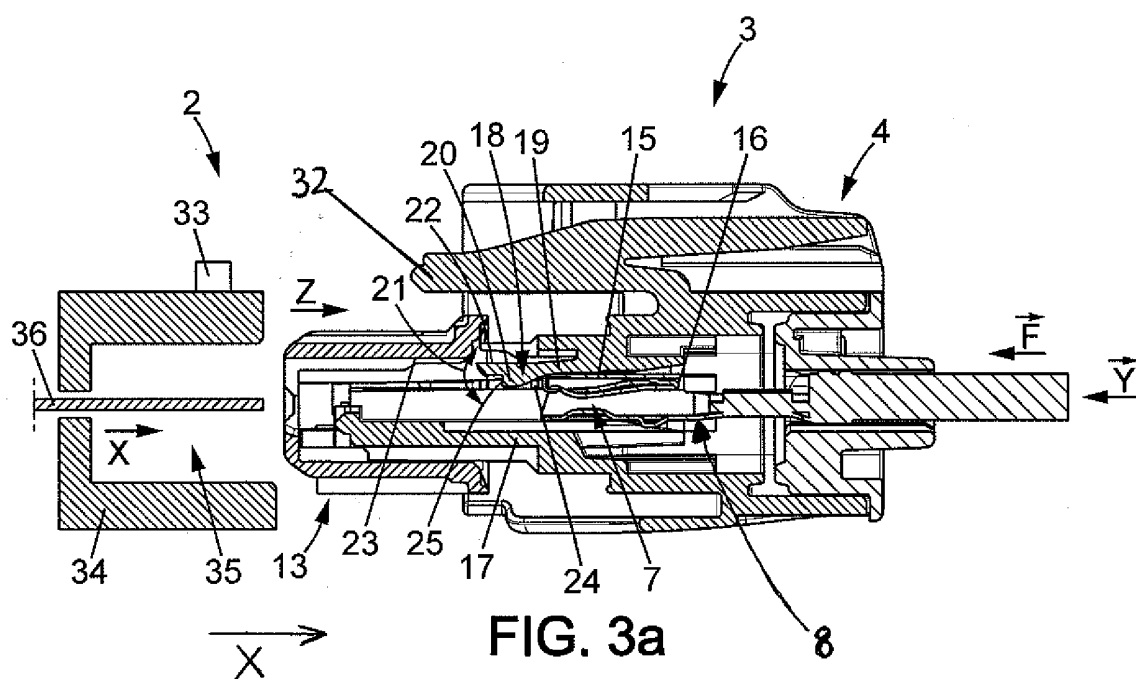
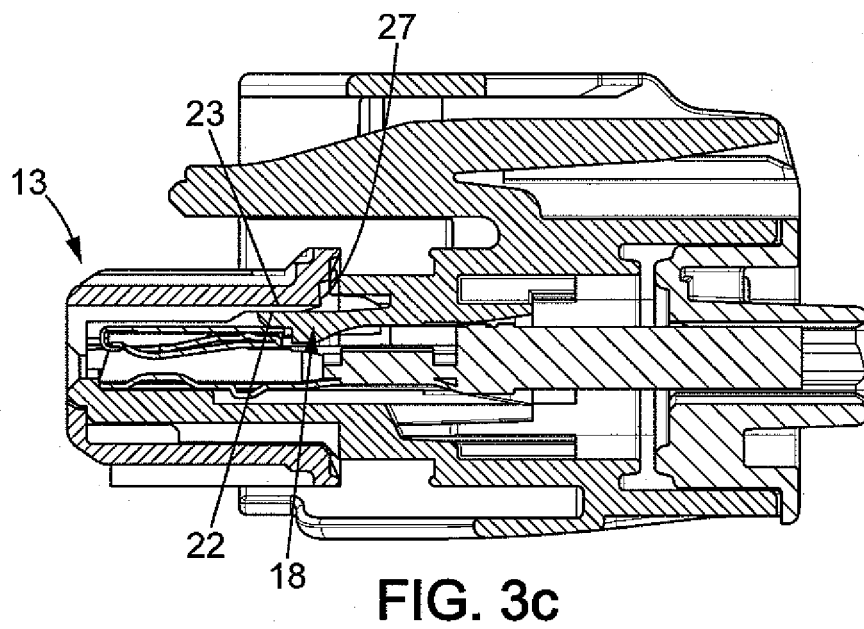
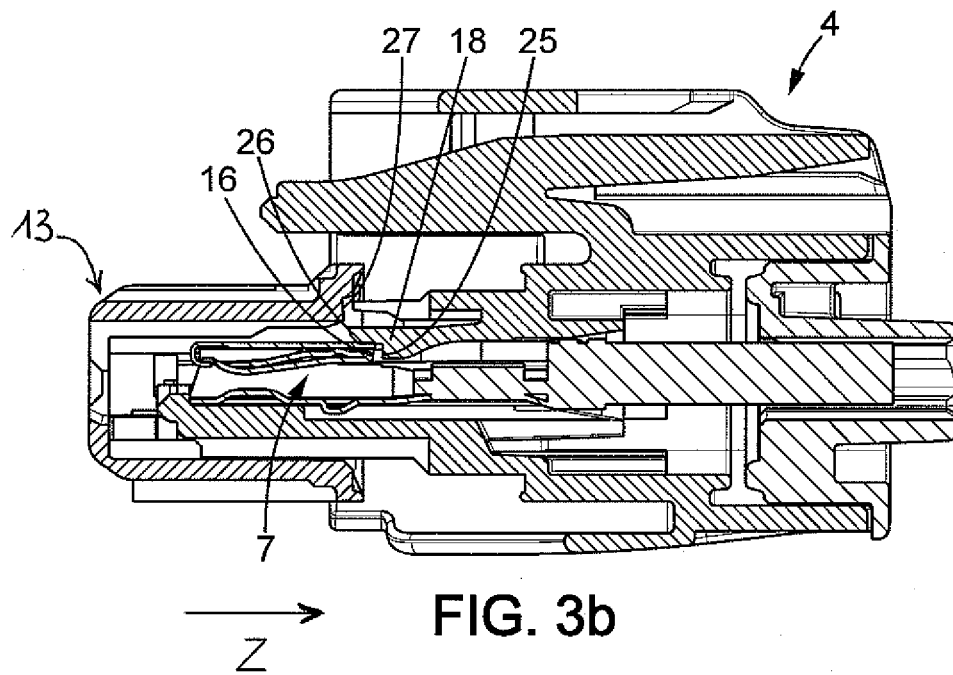
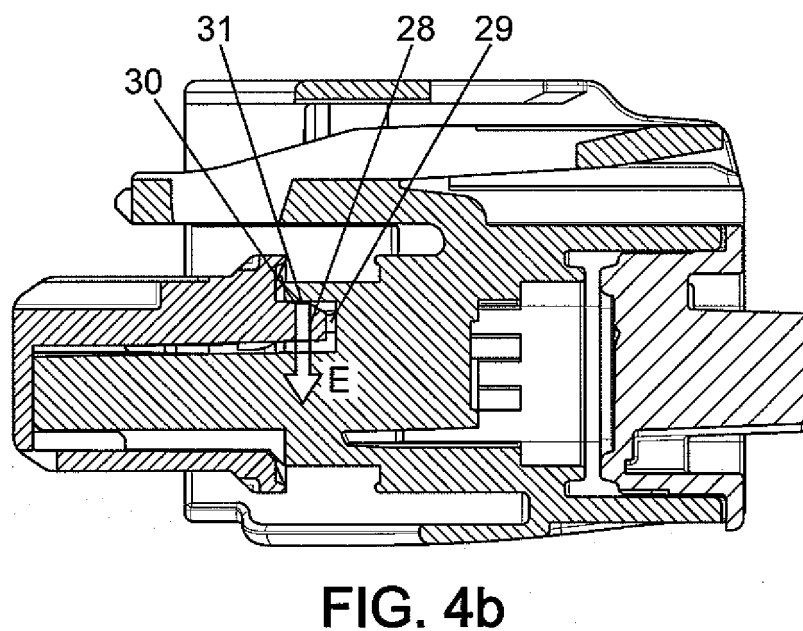
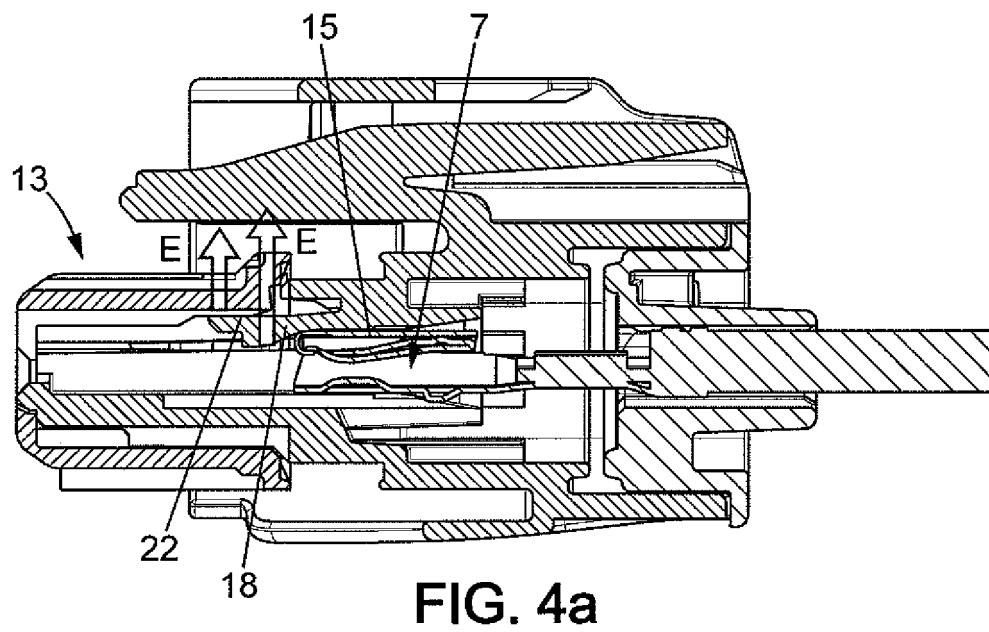


FIG. 3a





REFERENCES CITED IN THE DESCRIPTION

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