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(54) ELECTRICAL CONNECTION DEVICE

ELEKTRISCHE VERBINDUNGSVORRICHTUNG

DISPOSITIF DE CONNEXION ÉLECTRIQUE

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to an electrical connection device. The electrical connection device can be applied in vehicle electrical equipment, in particular for battery modules. The invention also relates to a battery comprising battery modules electrically interconnected by said electrical connection devices and to a manufacturing method of said electrical connection devices.

STATE OF THE ART

[0002] Traditionally, electrical terminals of adjacent battery modules were electrically connected by a conductive metallic rigid bar having two holes adapted to receive these terminals. The bar is electrically connected to the terminal by the pression of a screw mechanism. A draw-back of such a connection device is that the electrical connection depends on the distance between the two terminals to be connected. This may lead to have a precise location and alignment of the different modules of the battery.

[0003] US-A-2006/0270286 discloses a connector according to the preamble of claim 1

SUMMARY OF THE INVENTION

[0004] The invention provides an electrical connection device which can be implemented for instance in electrical equipment, such as a battery. The invention further relates to a manufacturing method for such electrical connection device which remedy to at least one of the above draw-backs.

[0005] A goal of the invention is to provide an electrical connection less dependent on the relative position of the equipment terminals to be connected.

[0006] According to one embodiment, the invention covers an electrical connecting device, comprising a first and a second connection portions, each of said connection portions being adapted to be electrically connected with a corresponding electrical device, at least one of said connection portions being disconnectable from the corresponding electrical device. The electrical connecting device further comprises at least one electrical link electrically connecting the first and the second portion together.

[0007] According to one embodiment of the invention, the electrical connecting device comprises a guiding body guiding the second connection portion along a course of the second connection portion which respect to the first connection portion. The electrical link electrically connects the first and the second portion together all along said course.

[0008] Thanks to the guiding body, a relative course between the first and the second connection portion is provided and limited. The electrical link avoids power cut during movement of the second connection portion with respect to the first connection portion. Therefore, the relative position of the first and the second connection portions may be tuned in order to correspond to the distance between the terminals to be connected.

[0009] The electrical device corresponding to each of the first and the second connection portion may be a terminal of two adjacent battery modules.

[0010] In some other embodiments, one might also use one or more of the features as defined in dependant claims.

BRIEF DESCRIPTION OF THE DRAWINGS

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

- Figure 1 is a perspective view of an embodiment of the electrical connection device.
- Figure 2 is a perspective view of a movable sub-assembly of the device of figure 1.
- Figure 3 is a partial cut view of an electrical link of the device of figure 1 following the plane III-III of figures 4 or 5.
- Figure 4 is a longitudinal cut view of the electrical link of the device figure 1 following the arrow IV of figure 3.
- Figure 5 is a side view of the electrical connection device following the plane V-V of figure 1.
- Figure 6 is a perspective view of a second embodiment of electrical connection device.
- Figure 7 is a longitudinal cut view of the electrical link of the second embodiment following plane VII-VII of figure 6.
- Figure 8 is an embodiment of a battery.

DETAILED DESCRIPTION

[0012] As illustrated in figure 1, the electrical connection device 1 comprises a guiding body 2, a first sub-assembly 3a and a second sub-assembly 3b. The first sub-assembly 3a comprises a connection portion 4a of a female type including a plurality of spring tongues 5a extending around an axis 18a. The electrical connection device 1 further comprises a first body 6a receiving the spring tongues 5a and provided with a guiding member 7a consisting of two tenons 8a, 9a sliding in a guiding slot 10 of the guiding body 2. The first body 6a comprises a cylindrical skirt 11a surrounding the spring tongues 5a and including a guiding annular chamfer 12a located axially beyond the spring tongues 5a for guiding the introduction of a male device (not shown) into the connection portion 4a following the connection axis 18a.

[0013] The second sub-assembly 3b comprises a sec-

ond body 6b provided with a guiding member 7'b consisting of two tenons 8'b, 9'b sliding in the same guiding slot 10 than the guiding member 7a of the first body 6a. The second body 6b comprises a cylindrical skirt 11b surrounding spring tongues 5b and including an annular chamfer 12b located axially beyond the spring tongues 5b for guiding the introduction of a male device not shown into a connection portion 4b following a connection axis 18b.

[0014] As illustrated in figure 2, the sub-assembly 3a comprises a first electrical conductive member 13a made of a punched and rolled metallic sheet. The conductive member 13a has a global U-shape with a bottom 14a, a right side 15a and a left side 16a. The connection portion 5a is made of a punched and rolled metallic sheet. The spring tongues 5a extend axially from a C-shaped ring 17a which is press-fitted into the bottom 14a of the conductive member 13a.

[0015] The first sub-assembly 3a further comprises two right tongues 19a extending from the right side 15a and two left tongues 20a extending from the left side 16a. Each of the left and right tongues 19a, 20a extend in a plane perpendicular to the connection axis 18a and substantially in a direction parallel to a plane of symmetry III-III passing by both connection axis 18a, 18b. More details about these tongues will be given later in reference to the figures 3 and 4.

[0016] The two right tongues 19a are shifted from the two left tongues 20a with respect to the direction of the connection axis 18a. The two right tongues 19a alternate with right free spaces 21a which are slightly wider than the width of the left tongues 20a. The two left tongues 20a also alternate with some left free spaces 22a which are slightly wider than the right tongues 19a.

[0017] As illustrated in figures 2 and 5, the first body 6a further comprises another guiding member 7'a made of two tenons 8'a, 9'a, symmetrical from the tenons 8a, 9a with respect to the plane of symmetry III-III.

[0018] The guiding body 2 comprises two stops 10a,10b located at each ends of the slot 10, and two stops 10'a, 10'b located at each ends of the symmetrical slot 10'. The largest distance between the two sub-assemblies 3a,3b, as well as the largest distance between the connection portions 4a,4b, corresponds to a configuration of the electrical connection device 1, in which at least one of the guiding members 7a, 7'a of the first body 6a is in contact with one of the stops 10a, 10'a, and simultaneously, at least one of the guiding members 7b, 7'b of the second body 6b is in contact with one of the stops 10b,10'b.

[0019] The shortest distance between the two sub-assemblies 3a,3b, as well as the shortest distance between the connection portions 4a,4b correspond to a configuration of the electrical connection device 1 in which the first and the second body 6a,6b are in contact to one another. Therefore, the course of the second connection portion 4b with respect with the first connection portion 4a is equal to the largest distance less the shortest distance in between both connection portions 4a,4b.

[0020] In the particular case of the embodiment illustrated in figures 1 to 5, the second sub-assembly 3b is strictly identical to the first sub-assembly 3a previously described and is located symmetrically to an axis 25 of symmetry which is exactly in the middle of the two parallel connection axis 18a, 18b. The second sub-assembly 3b includes the same features 4b to 9b and 11b to 22b named with the adjective "second". These second features are, each of them, identical to the corresponding first feature 4a-9a, 11a-22a previously described for the first sub-assembly 3a.

[0021] As illustrated in figure 4, the right tongues 19a of the first sub-assembly 3a enter into the left free spaces 22b, slide along the left side 16b of the second electrical conductive member 13b and provide an electrical connection between both electrical conductive member 13a, 13b and both connection portions 4a, 4b.

[0022] Similarly, the left tongues 20a of the first sub-assembly 3a enter into the right free spaces 21b and slide along the right side 15b of the second electrical conductive member 13b and therefore, provide an electrical connection between both connection portions 4a, 4b. The right tongues 19b of the second sub-assembly 3b enter into the left free spaces 22a, slide along the left side 16a of the first electrical conductive member 13a and therefore provide an electrical connection between both connection portions 4a, 4b. The left tongues 20b of the second sub-assembly 3b enter into the right free spaces 21a, slide along the right side 15a of the first electrical conductive member 13a and therefore, provide again an electrical connection between both connection portions 4a, 4b.

[0023] In other words, the electrical connection device 1 comprises an electrical link between both connection portions 4a, 4b. Such electrical link consists in two electrically conductive members 13a, 13b, each of them holding and being electrically connected with one of the two connection portions 4a, 4b.

[0024] At least, one electrically conductive member 13a holds and is electrically connected with a spring tongue. Said spring tongue slides along a receiving portion of the other electrically conductive member 13b and is electrically connected with said other electrically conductive member 13b all along a course of displacement of one of the connection portions 4a, 4b with respect to the other.

[0025] The spring tongue 19a and/or 20a may form one electrically conductive piece part together with the conductive member 13a, like in the illustrated embodiment. However, in a variant, the spring tongue 19a, 20a may be a piece part different from the conductive member 13a.

[0026] The spring tongues 19a,20a are resiliently urged on the receiving portion 16b,15b through the free space 22b,21b of the corresponding part, so that a suitable friction retains the two portions 4a,4b together within the whole above-mentioned course. This course is as

high as one centimetre, so as to adapt to the relative locations of the two axes 18a,18b. This course is limited by the stops 10a, 10b, 10'a, 10'b contacting the respective guiding member 7a, 7'a or 7b, 7'b and by the contact between the two bodies 4a,4b.

[0027] An electrical link between two electrical devices to be connected can cross an electrical field within the conductive material of the link all along an electrical path between the two electrical devices. The electrical cross section of the electrical link is by definition perpendicular to said electrical field.

[0028] The electrical cross-section of the electrical link is designed to be larger than a reference electrical cross-section all along the electrical path between the two connection portions 4a, 4b.

[0029] In the particular case of the first embodiment, such the electrical cross-section is provided as hereafter. The connection portions 4a, 4b are adapted to receive a male contact which has a geometrical cross-section. Said geometrical cross-section is considered as the reference cross-section for the electrical link. The number of spring tongues 5a,5b and the shape of their extremity are such that the total area, corresponding to the sum of the contact areas of the spring tongues 5a, 5b on said male contact (not shown) is larger or equal to the reference cross-section. The press-fit area between the ring 17a, 17b and the bottom 14a, 14b is designed so as to have a conductive area larger than the reference cross-section. The extremity of each right or left spring tongues 19a, 19b,20a,20b is designed so as the total area corresponding to the sum of all contact areas between said spring tongues and their respective receiving portion 15a,15b,16a,16b, is larger or equal to the reference cross-section. The total area equal to the addition of the geometrical cross-section of each spring tongues 19a, 19b, 20a, 20b is also larger than the reference cross-section. Therefore, such an electrical link does not introduce a point of linear electrical resistance higher than the linear resistance of the electrical device to be connected.

[0030] The electrical connection device 1 is therefore suitable for transmitting high intensity of electric current of several hundreds of Amperes as it may be needed in a battery of vehicles. The electrical connection device 1 does not introduce "hot spots" within the electrical transmission.

[0031] As illustrated in figure 5, the guiding members 7a, 7b, 7'a, 7'b of the bodies 6a, 6b are each made of a pair of tenons 8a-9a, 8b-9b, 8'a-9'a, 8'b-9'b. Each of these tenons is located at the extremity of a flexible arm and includes a chamfer so as the first body 6a can be introduced within the guiding body 2 following the arrow F1, and so as, the second body 6b can be introduced within the guiding body 2 following the arrow F2.

[0032] The second embodiment 40 illustrated in figures 6 and 7 is very similar to the first embodiment 1 previously described. There are only two differences, everything else being identical. The first difference is that the second embodiment 40 comprises two connection portions 30a, 30b which are male contacts. Preferably, the male contacts 30a,30b have a smooth extremity, for example of an ogival type, adapted to enter a female connector. The male contact 30a, 30b may have an enlarged base 32a,32b so that the previously described electrical conductive member 13a,13b can receive either the female connection portion 4a,4b of the first embodiment 1 or the male contact 30a,30b of the second embodiment 40. The second difference is that the electrical connection device 40 comprises a first and a second bodies 33a,33b which differ from the bodies 6a,6b previously described only by the fact that there is no skirt 11a and that the male contact 30a,30b is press fitted into it.

[0033] One can understand that the invention covers a large combination of different bodies, electrically conductive members, connection portions, or electrical links.

[0034] In another embodiment of electrical connection device, the two sub-assemblies 3a, 3b may be different. For example, only the first and the second electrical conductive member 13a, 13b and the lateral spring tongues 19a-20a, 19b-20b are identical and symmetrically positioned with respect to the axis of symmetry 25. However, the type of the first end second connection portion 4a,4b may be different. The first and the second bodies 6a,6b are adapted to the corresponding type of the connection portions 4a,4b as described in the first or the second embodiments 1,40.

[0035] In a variant, the type of each of the connection portion can be chosen independently in a list comprising for example: a male contact, a female contact, a through hole. Additionally, one of the connection portions 4a or 4b may be a non disconnectable connection like a crimped or a wrapped flexible electrical wire.

[0036] In a variant, there is no first body 6a and the first electrical conductive member 13a directly slides into the guiding body 2.

[0037] In a variant, the guiding body 2 may comprise an electrically conductive material which may contribute to the electrical link between both connection portions.

[0038] In a variant, there is no first body 6a and the guiding body 2 directly holds the first connection portion 4a. In other words, the guiding body 2 and the first electrical conductive member 13a form the same piece part which has both functions of being part of the electrical link and of mechanically guiding the second connection portion 4b all along a course. Such piece part may include stops for limiting the course.

[0039] In another variant, the electrical link may comprise a spring tongue directly sliding along one or along the two connection portions. A holding mechanism may hold each of the two connection portions without electrical connecting said connection portion, and allows a relative movement between the two connection portions. Said spring tongue may extend directly from one connection portion or may be held by the holding mechanism.

[0040] In another variant, the second electrical conductive member 13b, holding and electrically connecting

the second connecting portion 4b or 30b is a telescopic member with respect to the guiding body 2 which may be or may include the first electrical conductive member 13a which holds and is electrically connected with the first connection portion, or forms a simple piece part with the first connection portion 4a or 30a.

[0041] In reference to figure 8, the battery 50 comprises a series of battery modules 52 arranged side by side. Each battery module 52 comprises a positive and a negative terminals 51. The battery 50 further comprises a series of electrical connection devices as previously described, assembled between one positive terminal of a module and one negative terminal of an adjacent module. Therefore, different battery modules are electrically interconnected in series. Thanks to the relative course between the two connection portion 4a,4b, or 30a,30b, the connection between the battery module terminals 51 is made easier as it does not request a precise alignment of two adjacent modules 52. Moreover, this is achieved in a packed environment (modules are very close to one another).

Claims

1. Electrical connection device (1,40), comprising a first and a second connection portions (4a-4b, 30a-30b), each of said connection portions being adapted to be electrically connected with a corresponding electrical device, at least one of said connection portions being disconnectable from the corresponding electrical device, the electrical connecting device further comprising at least one electrical link (13a-19a-13b) electrically connecting the first and the second portion together, **characterized in that** it comprises a guiding body (2) guiding the second connection portion (4b,30b) along a course of the second connection portion with respect to the first connection portion (4a,30a) being a relative course between the first and the second connection portion,
and in that the electrical link (13a-19a-13b) electrically connects the first and the second connection portions together all along said course, wherein the electrical link (13a-19a-13b) comprises a first electrically conductive member (13a) holding the first connection portion (4a,30a) and a second electrically conductive member (13b) holding the second connection portion (4b,30b), wherein the electrically conductive members (13a, 13b) are symmetrically arranged with respect to an axis of symmetry (25).

2. Electrical connection device (1,40) according to claim 1, wherein the first connection portion (4a,30a) is movable with respect to the guiding body (2) and is guided by the guiding body.

3. Electrical connection device (1,40) according to the claim 1 or 2, wherein the guiding body (2) is structured and adapted such that the movement of the second connection portion (4b, 30b) with respect to the first connection portion (4a, 30a) is a translation, preferably along a translation axis passing through both connection portions.

4. Electrical connection device (1,40) according to claim 3, wherein the translation axis is normal to a connection axis of at least one, preferably both said connection portions.

5. Electrical connection device according to the claim 1 or 2, wherein the guiding body is structured and adapted such that the movement of the second connection portion with respect to the first connection portion is a rotation with respect to a rotation axis remote from both connection portions (4a,4b).

6. Electrical connection device (1,40) according to the claim 5, wherein the electrical link (13a-19a-13b) comprises a spring tongue (19a) extending from one (13a) of the first and the second electrically conductive members and sliding along a receiving portion (16b) of the other (13b) of the first and the second electrically conductive members.

7. Electrical connection device (1, 40) according to any of the preceding claims, wherein the first (13a) and second (13b) electrically conductive members are identical to one another.

8. Electrical connection device (1,40) according to any of the claims 6 to 7, wherein at least one of the first and second electrically conductive members (13a, 13b) is made of a punched and rolled metal sheet.

9. Electrical connection device according to claim 1, wherein the first connection portion (4a) is in a fixed position with respect to the guiding body (2).

10. Electrical connection device (1,40) according to any of the claims 6 to 9, comprising a first body (6a,33a) receiving the first electrically conductive member (13a) and a second body (6b,33b) receiving the second electrically conductive member (13b).

11. Electrical connection device (1,40) according the claim 10, wherein at least one of the first and second bodies (6a,6b,33a,33b) is made of an insulating material.

12. Electrical connection device (1,40) according any of the claims 10 and 11, wherein each of the first and second bodies (6a,6b,33a,33b) comprises a guiding member (7a, 7'a, 7b, 7'b) cooperating with the guiding body.

13. Electrical connection device (1,40) according to any

of the claims 10 to 12, wherein the first (6a,33a) and second (6b,33b) bodies are identical and symmetrically arranged with respect to an axis of symmetry (25).

14. Electrical connection device (1) according to any of the claims 10 to 13, wherein at least one of the first and second bodies (6a,6b) surrounds the corresponding connection portion (4a,4b) and/or is adapted to mechanically guide the electrical connection between the corresponding connection portion (4a,4b) and the corresponding electrical device.

15. Electrical connection device (1,40) according to any of the claims 10 to 14, wherein the guiding member of at least one of the first and second bodies comprises a feature chosen in the group of: a longitudinal slot, a longitudinal nerve, one or several retractable tenon (8a, 8'a, 9a, 9'a).

16. Electrical connection device (1) according to any of the preceding claims, wherein at least one of the connection portions (4a,4b) is a female contact including at least one conductive spring tongue (5a,5b).

17. Electrical connection device (40) according to any of the preceding claims, wherein at least one of the connection portions is a male contact (30a,30b) including an extremity adapted to smoothly slide into a female contact.

18. Electrical connection device (40) according to any of claims 1-17, wherein the guiding body (2) comprises a stop (10a,10b,10'c,10'b) adapted to define a maximal course of the second portion with respect to the first portion.

19. Battery (50) comprising a first and a second battery module (52) including each at least one electrical terminal (51), the battery further comprising an electrical connection device (1,40) according to any of the preceding claims, wherein the first connection portions is connected with one of said at least one electrical terminal of the first battery module and the second connection portion is connected with one of said at least one electrical terminal of the second battery module.

20. Method for manufacturing an electrical connection device according to claims 1-19 comprising the steps of:

- assembling a first connection portion (4a,33a) to a guiding body (2),
- assembling a second connection portion (4b,33b) to said guiding body (2),
- electrically connecting said first and second portions together,

characterised in that said electrically connecting step and said second connection portion (4b) assembling step are such that the second portion is still movable with respect to the guiding body (2).

Patentansprüche

1. Elektrische Verbindungsvorrichtung (1, 40), die erste und zweite Verbindungsteile (4a-4b, 30a- 30b) aufweist, wobei jeder der Verbindungsteile ausgebildet ist, mit einer entsprechenden elektrischen Vorrichtung elektrisch verbunden zu werden, wobei zumindest einer der Verbindungsteile von der entsprechenden elektrischen Vorrichtung trennbar ist, wobei die elektrische Verbindungsvorrichtung weiter zumindest eine elektrische Verbindung (13a-19a-13b) aufweist, die die ersten und zweiten Teile elektrisch miteinander verbindet, **dadurch gekennzeichnet, dass** sie weiter einen Führungskörper (2) aufweist zum Führen des zweiten Verbindungsteils (4b, 30b) entlang eines Verlaufs des zweiten Verbindungsteils in Bezug auf den ersten Verbindungsteil (4a, 30a), der ein relativer Verlauf zwischen dem ersten und dem zweiten Verbindungsteil ist,
und dadurch, dass die elektrische Verbindung (13a-19a-13b) die ersten und zweiten Verbindungsteile entlang des gesamten Verlaufs elektrisch miteinander verbindet, wobei die elektrische Verbindung (13a-19a-13b) ein erstes elektrisch leitendes Element (13a) aufweist, das den ersten Verbindungsteil (4a, 30a) hält, und ein zweites elektrisch leitendes Element (13b), das den zweiten Verbindungsteil (4b, 30b) hält, wobei die elektrisch leitenden Elemente (13a, 13b) in Bezug auf eine Symmetrieachse (25) symmetrisch angeordnet sind.

2. Elektrische Verbindungsvorrichtung (1, 40) gemäß Anspruch 1, wobei der erste Verbindungsteil (4a, 30a) in Bezug auf den Führungskörper (2) bewegbar ist und durch den Führungskörper geführt wird.

3. Elektrische Verbindungsvorrichtung (1, 40) gemäß Anspruch 1 oder 2, wobei der Führungskörper (2) strukturiert und ausgebildet ist derart, dass die Bewegung des zweiten Verbindungsteils (4b, 30b) in Bezug auf den ersten Verbindungsteil (4a, 30a) eine Translation ist, vorzugsweise entlang einer Translationsachse, die durch beide Verbindungsteile geht.

4. Elektrische Verbindungsvorrichtung (1, 40) gemäß Anspruch 3, wobei die Translationsachse senkrecht zu einer Verbindungsachse von zumindest einem, vorzugsweise beiden Verbindungsteilen ist.

5. Elektrische Verbindungsvorrichtung gemäß An-

spruch 1 oder 2, wobei der Führungskörper strukturiert und ausgebildet ist derart, dass die Bewegung des zweiten Verbindungsteils in Bezug auf den ersten Verbindungsteil eine Rotation in Bezug auf eine Rotationsachse entfernt von beiden Verbindungsteilen (4a, 4b) ist.

6. Elektrische Verbindungsvorrichtung (1, 40) gemäß Anspruch 5, wobei die elektrische Verbindung (13a-19a-13b) eine Federzunge (19a) aufweist, die sich von einem (13a) der ersten und zweiten elektrisch leitenden Elemente erstreckt und entlang eines Aufnahmeteils (16b) des anderen (13b) der ersten und zweiten elektrisch leitenden Elemente gleitet.

7. Elektrische Verbindungsvorrichtung (1, 40) gemäß einem der vorhergehenden Ansprüche, wobei die ersten (13a) und zweiten (13b) elektrisch leitenden Elemente identisch zueinander sind.

8. Elektrische Verbindungsvorrichtung (1, 40) gemäß einem der Ansprüche 6 bis 7, wobei zumindest eines der ersten und zweiten elektrisch leitenden Elemente (13a, 13b) aus einem gestanzten und gewalzten Blech besteht.

9. Elektrische Verbindungsvorrichtung gemäß Anspruch 1, wobei der erste Verbindungsteil (4a) in Bezug auf den Führungskörper (2) in einer festen Position ist.

10. Elektrische Verbindungsvorrichtung (1, 40) gemäß einem der Ansprüche 6 bis 9, die einen ersten Körper (6a, 33a) zum Aufnehmen des ersten elektrisch leitenden Elements (13a) und einen zweiten Körper (6b, 33b) zum Aufnehmen des zweiten elektrisch leitenden Elements (13b) aufweist.

11. Elektrische Verbindungsvorrichtung (1, 40) gemäß Anspruch 10, wobei zumindest einer der ersten und zweiten Körper (6a, 6b, 33a, 33b) aus einem isolierenden Material besteht.

12. Elektrische Verbindungsvorrichtung (1, 40) gemäß einem der Ansprüche 10 und 11, wobei jeder der ersten und zweiten Körper (6a, 6b, 33a, 33b) ein Führungselement (7a, 7'a, 7b, 7'b) aufweist, das mit dem Führungskörper zusammenwirkt.

13. Elektrische Verbindungsvorrichtung (1, 40) gemäß einem der Ansprüche 10 bis 12, wobei der erste (6a, 33a) und der zweite (6b, 33b) Körper identisch sind und in Bezug auf eine Symmetrieachse (25) symmetrisch angeordnet sind.

14. Elektrische Verbindungsvorrichtung (1) gemäß einem der Ansprüche 10 bis 13, wobei zumindest einer der ersten und zweiten Körper (6a, 6b) den entsprechenden Verbindungsteil (4a, 4b) umgibt und/oder ausgebildet ist zum mechanischen Führen der elektrischen Verbindung zwischen dem entsprechenden Verbindungsteil (4a, 4b) und der entsprechenden elektrischen Vorrichtung.

15. Elektrische Verbindungsvorrichtung (1, 40) gemäß einem der Ansprüche 10 bis 14, wobei das Führungselement von zumindest einem der ersten und zweiten Körper ein Merkmal aufweist, das ausgewählt ist aus Gruppe von: ein Längsschlitz, ein Längsnerv, ein oder mehrere zurückziehbare Zapfen (8a, 8'a, 9a, 9'a).

16. Elektrische Verbindungsvorrichtung (1) gemäß einem der vorhergehenden Ansprüche, wobei zumindest einer der Verbindungsteile (4a, 4b) eine Kontaktbuchse mit zumindest einer leitenden Federzunge (5a, 5b) ist.

17. Elektrische Verbindungsvorrichtung (40) gemäß einem der vorhergehenden Ansprüche, wobei zumindest einer der Verbindungsteile ein Steckkontakt (30a, 30b) mit einer Extremität ist, die ausgebildet ist, reibungslos in eine Kontaktbuchse zu gleiten.

18. Elektrische Verbindungsvorrichtung (40) gemäß einem der Ansprüche 1-17, wobei der Führungskörper (2) einen Anschlag (10a, 10b, 10'c, 10'b) aufweist, der ausgebildet ist zum Definieren eines maximalen Verlaufs des zweiten Teils in Bezug auf ersten Teil.

19. Batterie (50), die ein erstes und ein zweites Batteriemodul (52) aufweist, die jeweils zumindest einen elektrischen Anschluss (51) umfassen, wobei die Batterie weiter eine elektrische Verbindungsvorrichtung (1, 40) gemäß einem der vorhergehenden Ansprüche aufweist, wobei der erste Verbindungsteile mit einem des zumindest einen elektrischen Anschlusses des ersten Batteriemoduls verbunden ist und der zweite Verbindungsteil mit einem des zumindest einen elektrischen Anschlusses des zweiten Batteriemoduls verbunden ist.

20. Verfahren zur Herstellung einer elektrischen Verbindungsvorrichtung gemäß den Ansprüchen 1-19, das die Schritte aufweist:

- Zusammenfügen eines ersten Verbindungsteils (4a, 33a) und eines Führungskörpers (2),
- Zusammenfügen eines zweiten Verbindungsteils (4b, 33b) und des Führungskörpers (2),
- elektrisches Verbinden der ersten und zweiten Teile miteinander,

dadurch gekennzeichnet, dass der Schritt des elektrischen Verbindens und der Schritt des Zusammenfügens des zweiten Verbindungsteils (4b) derart

sind, dass der zweite Teil in Bezug auf den Führungskörper (2) weiterhin bewegbar ist.

Revendications

1. Dispositif de connexion électrique (1, 40), comprenant une première et une seconde portion de connexion (4a-4b, 30a-30b), chacune desdites portions de connexion étant adaptée à être électriquement connectée avec un dispositif électrique correspondant, l'une aux moins desdites portions de connexion étant déconnectable depuis le dispositif électrique correspondant, le dispositif de connexion électrique comprenant en outre au moins une liaison électrique (13a-19a-13b) qui connecte électriquement la première et la seconde portion ensemble, **caractérisé en ce qu'**il comprend un corps de guidage (2) qui guide la seconde portion de connexion (4b, 30b) le long d'un trajet de la seconde portion de connexion par rapport à la première portion de connexion (4a, 30a) qui est un trajet relatif entre la première et la seconde portion de connexion,
et **en ce que** la liaison électrique (13a-19a-13b) connecte électriquement la première et la seconde portion de connexion ensemble tout au long dudit trajet, dans lequel la liaison électrique (13a-19a-13b) comprend un premier élément électriquement conducteur (13a) qui maintient la première portion de connexion (4a, 30a) et un second élément électriquement conducteur (13b) qui maintient la seconde portion de connexion (4b, 30b), dans lequel les éléments électriquement conducteurs (13a, 13b) sont agencés symétriquement par rapport à un axe de symétrie (25).

2. Dispositif de connexion électrique (1, 40) selon la revendication 1, dans lequel la première portion de connexion (4a, 30a) est déplaçable par rapport au corps de guidage (2) et est guidée par le corps de guidage.

3. Dispositif de connexion électrique (1, 40) selon la revendication 1 ou 2, dans lequel le corps de guidage (2) est structuré et adapté de telle façon que le mouvement de la seconde portion de connexion (4b, 30b) par rapport à la première portion de connexion (4a, 30a) est une translation, de préférence le long d'un axe de translation qui passe à travers les deux portions de connexion.

4. Dispositif de connexion électrique (1, 40) selon la revendication 3, dans lequel l'axe de translation est perpendiculaire à un axe de connexion de l'une au moins et de préférence des deux portions de connexion.

5. Dispositif de connexion électrique selon la revendication 1 ou 2, dans lequel le corps de guidage est structuré et adapté de telle façon que le mouvement de la seconde portion de connexion par rapport à la première portion de connexion est une rotation par rapport à un axe de rotation éloigné des deux portions de connexion (4a, 4b).

6. Dispositif de connexion électrique (1, 40) selon la revendication 5, dans lequel la liaison électrique (13a-19a-13b) comprend une languette à ressort (19a) s'étendant depuis l'un (13a) du premier et du second élément électriquement conducteur et coulissant le long d'une portion de réception (16b) de l'autre (13b) du premier et du second élément électriquement conducteur.

7. Dispositif de connexion électrique (1, 40) selon l'une quelconque des revendications précédentes, dans lequel le premier (13a) et le second (13b) élément électriquement conducteur sont identiques l'un à l'autre.

8. Dispositif de connexion électrique (1, 40) selon l'une quelconque des revendications 6 et 7, dans lequel l'un au moins du premier et du second élément électriquement conducteur (13a, 13b) est fabriqué à partir d'une tôle métallique poinçonnée et laminée.

9. Dispositif de connexion électrique selon la revendication 1, dans lequel la première portion de connexion (4a) est dans une position fixe par rapport au corps de guidage (2).

10. Dispositif de connexion électrique (1, 40) selon l'une quelconque des revendications 6 à 9, comprenant un premier corps (6a, 33a) recevant le premier élément électriquement conducteur (13a) et un second corps (6b, 33b) recevant le second élément électriquement conducteur (13b).

11. Dispositif de connexion électrique (1, 40) selon la revendication 10, dans lequel l'un au moins du premier et du second corps (6a, 6b, 33a, 33b) est réalisée en un matériau isolant.

12. Dispositif de connexion électrique (1, 40) selon l'une quelconque des revendications 10 et 11, dans lequel chacun du premier et du second corps (6a, 6b, 33a, 33b) comprend un élément de guidage (7a, 7'a, 7b, 7'b) coopérant avec le corps de guidage.

13. Dispositif de connexion électrique (1, 40) selon l'une quelconque des revendications 10 à 12, dans lequel le premier corps (6a, 33a) et le second corps (6b, 33b) sont identiques et agencés symétriquement par rapport à un axe de symétrie (25).

14. Dispositif de connexion électrique (1) selon l'une

quelconque des revendications 10 à 13, dans lequel l'un au moins du premier et du second corps (6a, 6b) entoure la portion de connexion correspondante (4a, 4b) et/ou est adapté à guider mécaniquement la connexion électrique entre la portion de connexion correspondante (4a, 4b) et le dispositif électrique correspondant.

15. Dispositif de connexion électrique (1, 40) selon l'une quelconque des revendications 10 à 14, dans lequel l'élément de guidage de l'un au moins du premier et le second corps comprend une caractéristique choisie dans le groupe comprenant : une fente longitudinale, une nervure longitudinale, un ou plusieurs tenons rétractables (8a, 8'a, 9a, 9'a).

16. Dispositif de connexion électrique (1) selon l'une quelconque des revendications précédentes, dans lequel l'une au moins des portions de connexion (4a, 4b) est un contact femelle incluant au moins une languette à ressort conductrice (5a, 5b).

17. Dispositif de connexion électrique (40) selon l'une quelconque des revendications précédentes, dans lequel l'une au moins des portions de connexion est un contact mâle (30a, 30b) incluant une extrémité adaptée à coulisser en douceur jusque dans un contact femelle.

18. Dispositif de connexion électrique (40) selon l'une quelconque des revendications 1 à 17, dans lequel le corps de guidage (2) comprend un arrêt (10a, 10b, 10'c, 10'b) adapté à définir un trajet maximum de la seconde portion par rapport à la première portion.

19. Batterie (50) comprenant un premier et un second module de batterie (52) qui inclut chaque au moins une borne électrique (51), la batterie comprenant en outre un dispositif de connexion électrique (1, 40) selon l'une quelconque des revendications précédentes, dans laquelle la première portion de connexion est connectée à l'une au moins desdites au moins une borne électrique du premier module de batterie et la seconde portion de connexion est connectée à l'une desdites au moins une borne électrique du second module de batterie.

20. Procédé pour fabriquer un dispositif de connexion électrique selon les revendications 1 à 19, comprenant les étapes consistant à :

- assembler une première portion de connexion (4a, 33a) à un corps de guidage (2),
- assembler une seconde portion de connexion (4b, 33b) audit corps de guidage (2),
- connecter électriquement ladite première et ladite seconde portion ensemble,

caractérisé en ce que ladite étape de connexion électrique et ladite étape d'assemblage de la seconde portion de connexion (4b) sont telles que la seconde portion est encore déplaçable par rapport au corps de guidage (2).

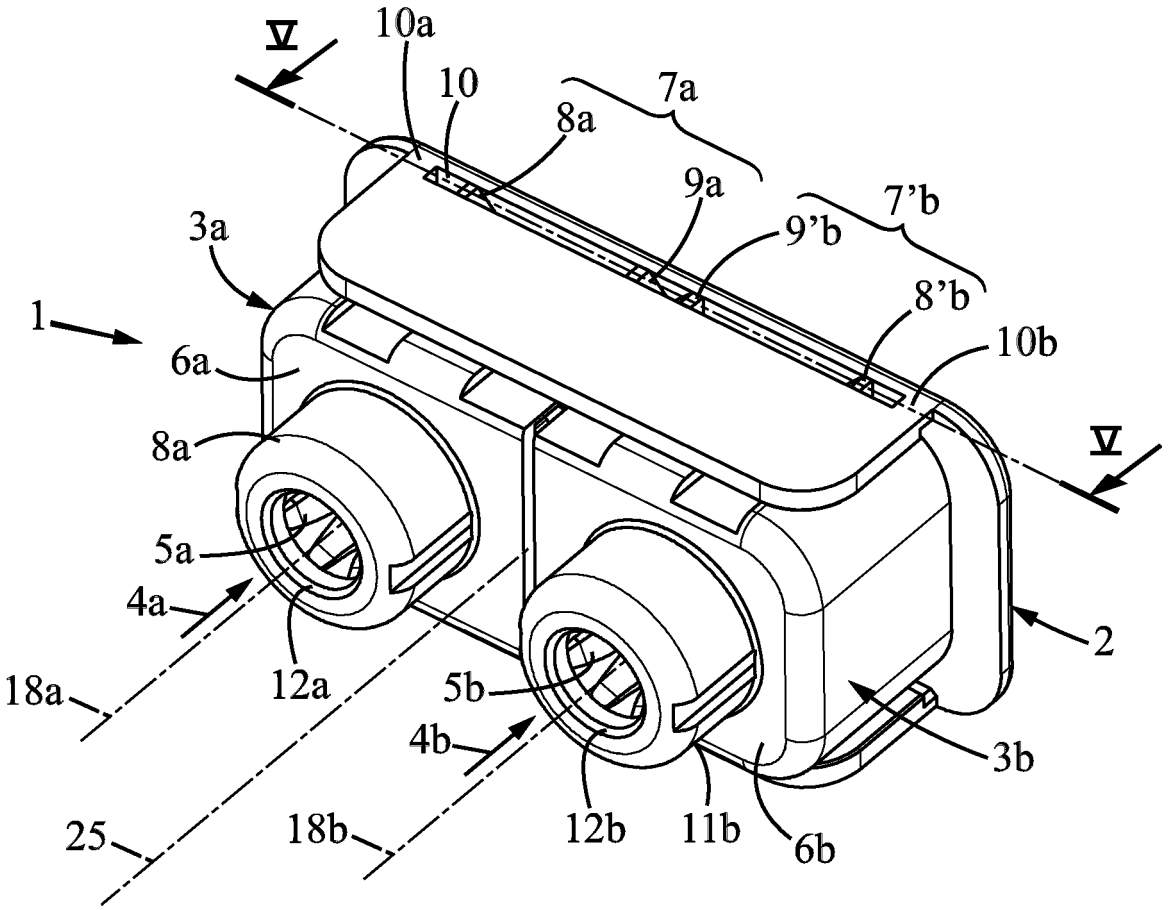
V
10a
10
8a
7a
9a
7'b
9'b
3a
8'b
1
10b
6a
V
8a
5a
4a
2
18a
12a
5b
4b
3b
25
18b
12b
11b
6b

FIG. 1

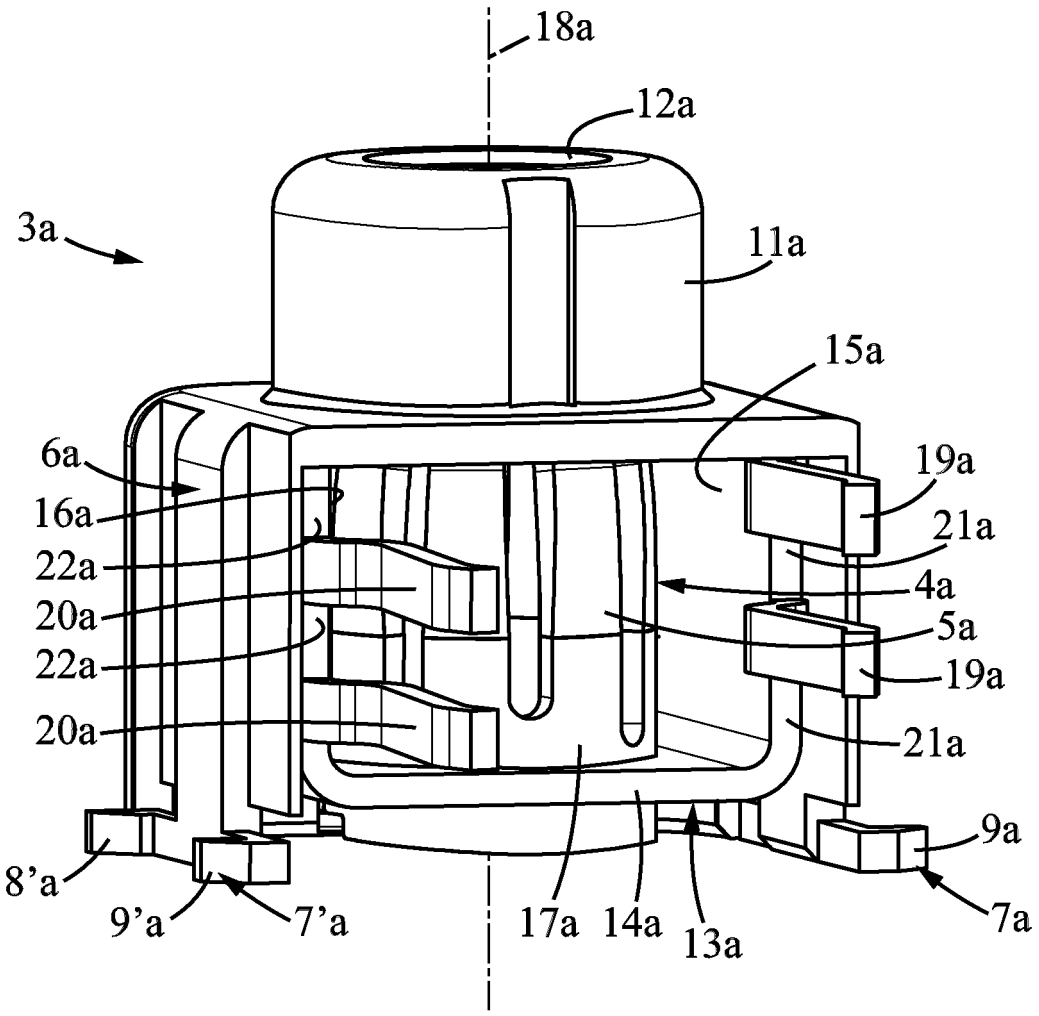
18a
12a
3a
11a
15a
6a
19a
16a
21a
22a
4a
20a
5a
22a
19a
20a
21a
9a
8'a
9'a
7'a
17a
14a
13a
7a

FIG. 2

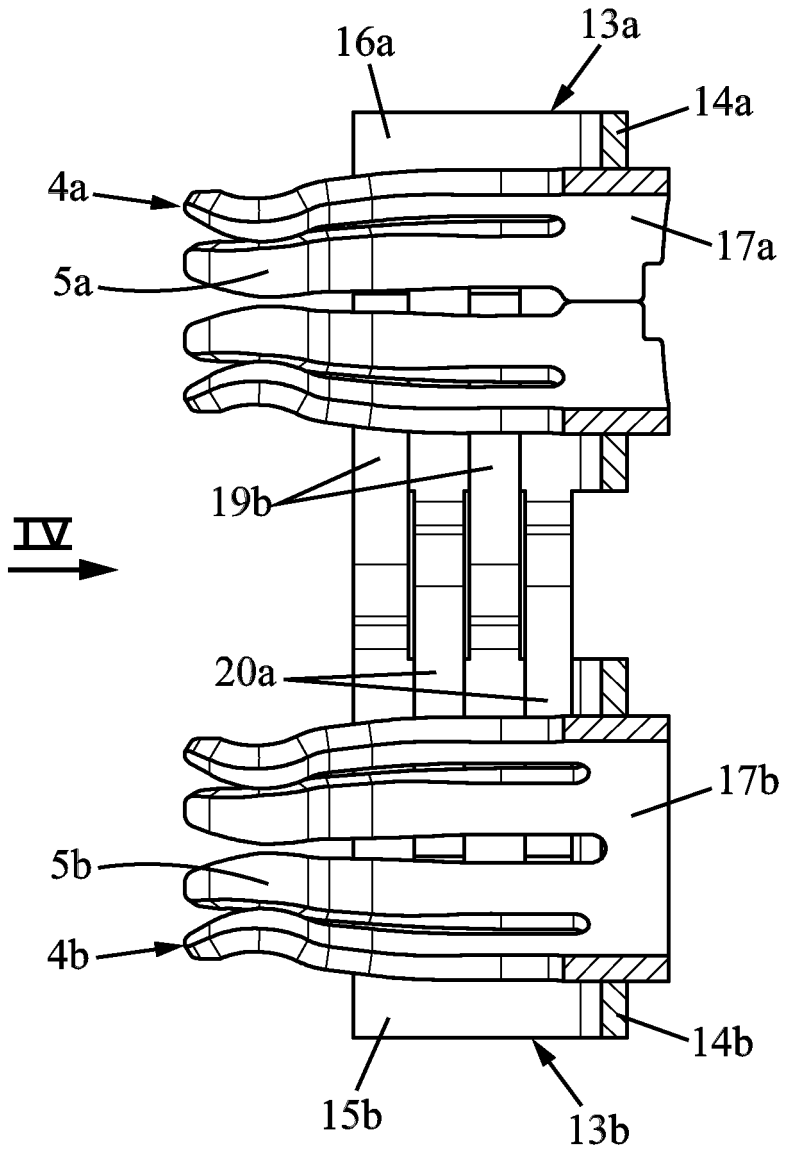

FIG. 3

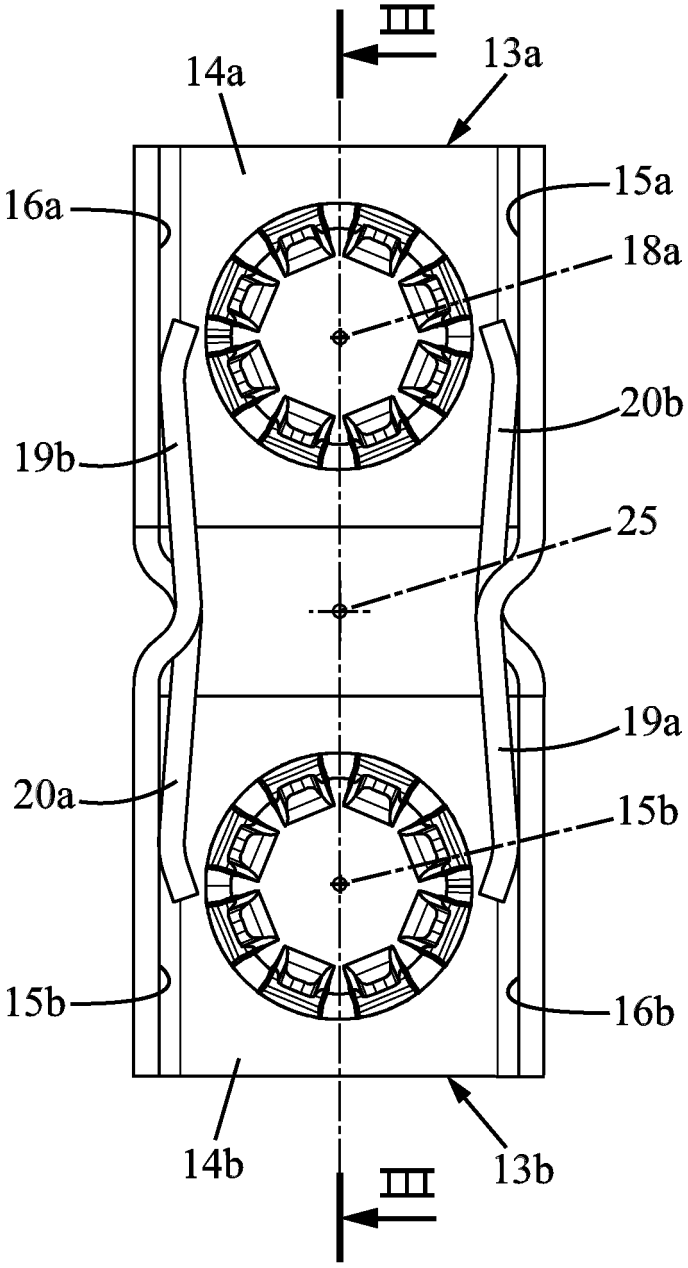
III
14a
13a
16a
15a
18a
20b
19b
25
19a
20a
15b
15b
16b
14b
13b
III

FIG. 4

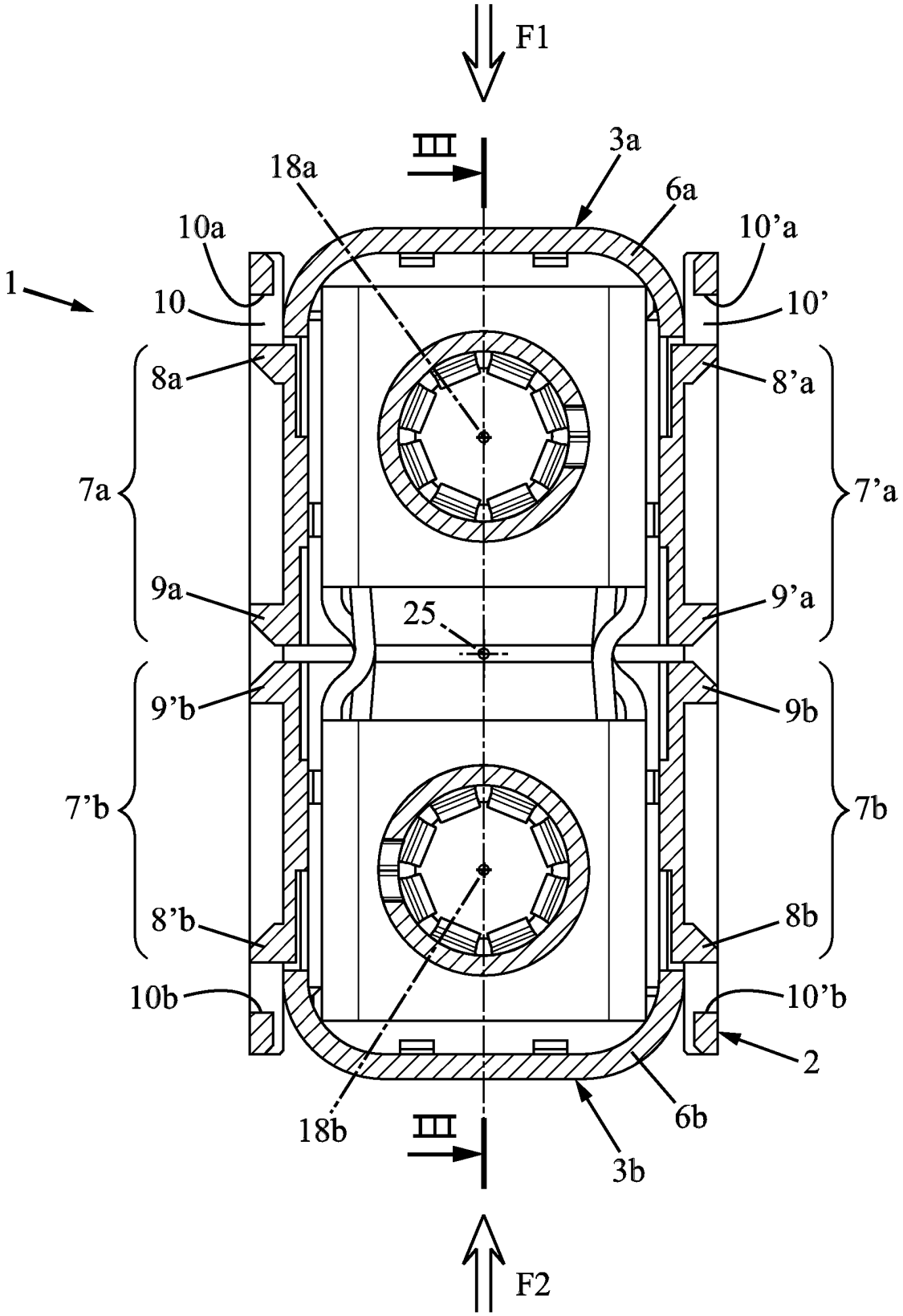
F1
III
3a
18a
6a
10a
10'a
1
10
10'
8a
8'a
7a
7'a
9a
9'a
25
9'b
9b
7'b
7b
8'b
8b
10b
10'b
2
18b
III
6b
3b
F2

FIG. 5

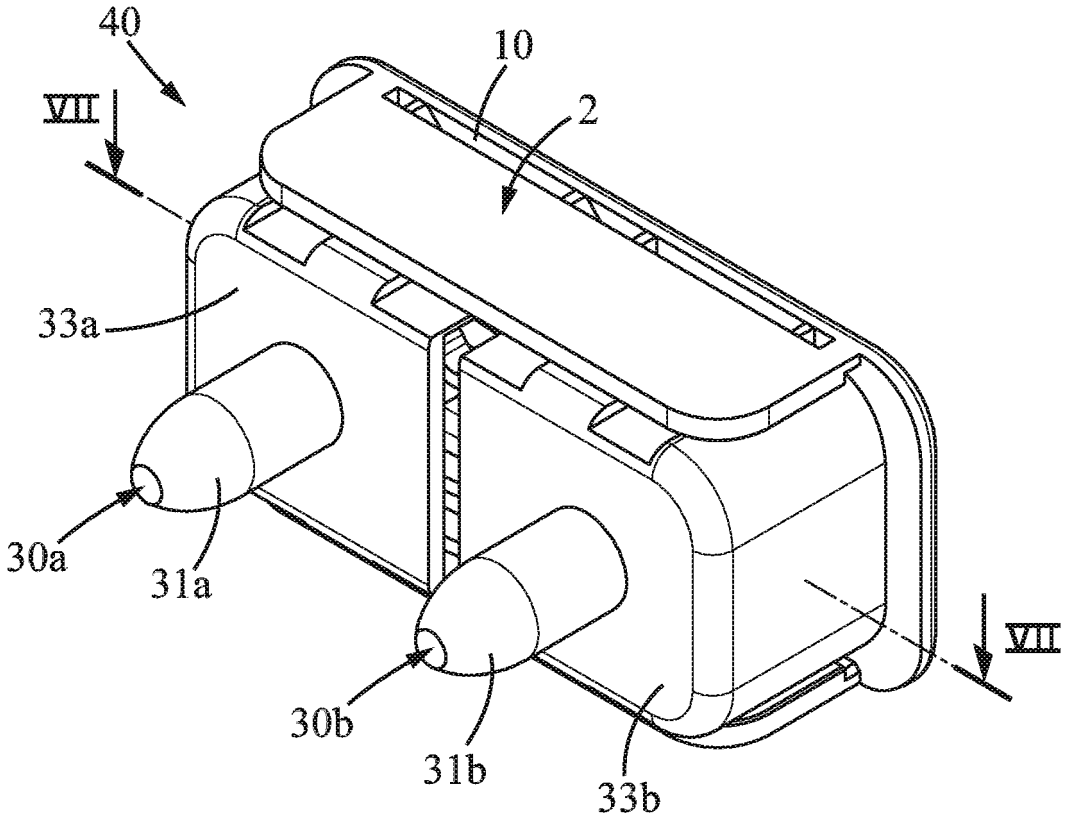

FIG. 6

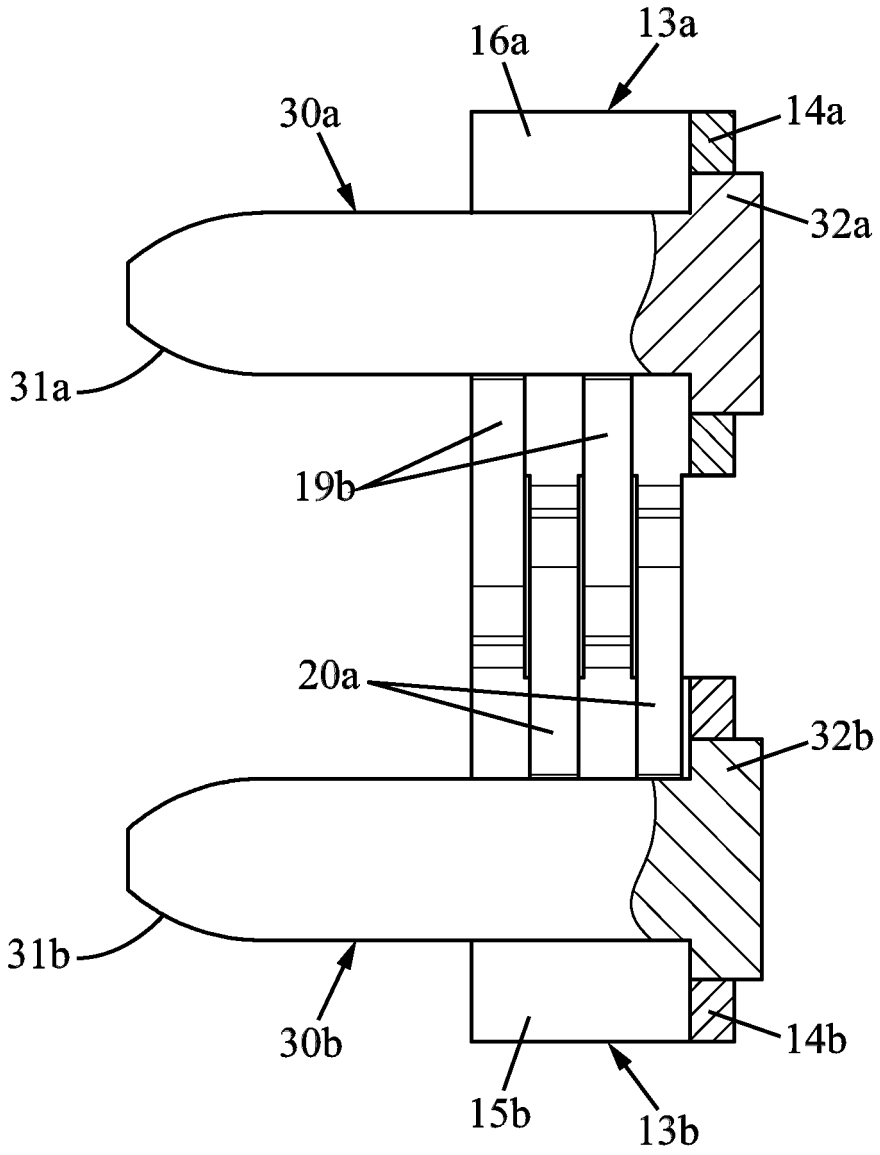

FIG. 7

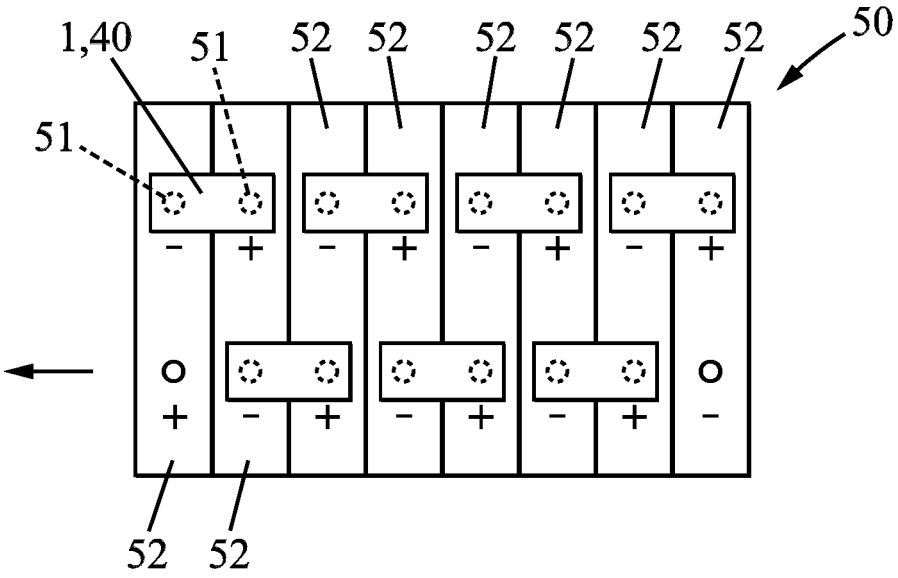

FIG. 8

REFERENCES CITED IN THE DESCRIPTION

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