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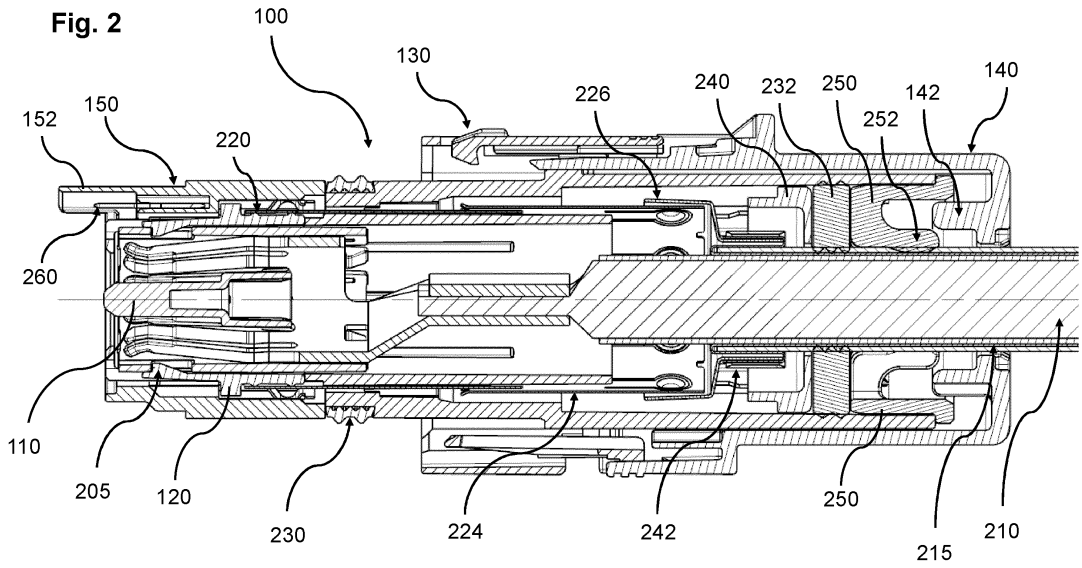
(54) HIGH VOLTAGE CONNECTOR AND METHOD FOR PROVIDING A HIGH VOLTAGE CONNECTION

(57) A high voltage connector is provided which comprises an inner terminal portion, an outer housing, and an inner carrier element disposed between the inner terminal portion and the outer housing such that the inner terminal portion is rotatable with respect to the outer housing. The high voltage connector further comprises a locking assembly which allows for a rotation of the inner terminal portion in a pre-lock condition of the high voltage connector and which prevents the rotation of the inner terminal portion in a final lock condition of the high voltage connector. A method for providing a high voltage connection is also provided.

Fig. 2



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Description

FIELD

[0001] The present disclosure relates to a high voltage connector comprising an inner terminal portion and an outer housing, and to a method for providing a connection via a high voltage connector.

BACKGROUND

[0002] In high voltage connections, a plug connector is usually connected to a header assembly comprising a suitable interface by the use of a direct locking and optionally a device for supporting the connection. During the assembly of an electric or hybrid vehicle requiring high voltage connections, however, an operator may face difficulties when aligning and/or correctly polarizing the plug connector with respect to the header assembly, e. g. due to the rigidity of the vehicle's harness. Moreover, a strain relief function for a cable connected to the plug connector and/or a connector position assurance (CPA) function are usually provided by separate parts independently from the plug connector. This enhances the number of parts required for providing a safe high voltage connection.

[0003] Accordingly, there is a need to have a high voltage connector and a method for providing a high voltage connection which are able to facilitate the assembly of the connection, e.g. in an automotive environment.

SUMMARY

[0004] The present disclosure provides a high voltage connector and to a method for providing a high voltage connection according to the independent claims. Embodiments are given in the subclaims, the description and the drawings.

[0005] In one aspect, the present disclosure is directed at a high voltage connector which comprises an inner terminal portion, an outer housing, and an inner carrier element disposed between the inner terminal portion and the outer housing such that the inner terminal portion is rotatable with respect to the outer housing. Further, the high voltage connector comprises a locking assembly which allows for a rotation of the inner terminal portion in a pre-lock condition of the high voltage connector and which prevents the rotation of the inner terminal portion in a final lock condition of the high voltage connector.

[0006] The inner terminal portion is configured to accommodate or to be connected to a high voltage cable or a similar equipment. The high voltage connector may be configured to be connected to a header assembly, e. g. in order to connect a harness of a vehicle to such a header assembly.

[0007] Due to the inner carrier element being provided between the inner terminal portion and the outer housing, the inner terminal portion and the outer housing are freely rotatable with respect to each other in the pre-lock condition of the high voltage connector. Therefore, the outer housing of the high voltage connector may be properly aligned with respect to the header assembly to which the high voltage connector is to be connected due to the free rotation of the outer housing with respect to the inner terminal portion. This free rotation facilitates or eases the assembly of the high voltage connector e.g. when providing a connection to the header assembly for a vehicle harness. As such, the effort for mounting the high voltage connector, e.g. due to polarization constraints, may be reduced.

[0008] Moreover, the inner carrier element may be rotationally fixed either with the inner terminal portion or with the outer housing in order to provide the rotation of the inner terminal portion and the outer housing with respect to each other in the pre-lock condition. The selection of the portion or element to which the inner carrier element is rotationally fixed may depend on the detailed inner structure of the high voltage connector and its intended use.

[0009] According to an embodiment, the high voltage connector may further comprise a retainer element configured to be engaged with the outer housing. The locking assembly may include the outer housing and the retainer element which may be moveable with respect to each other in order to provide the pre-lock condition and the final lock condition. The final lock condition may be achieved when the outer housing and the retainer element are engaged with each other. For example, the retainer element may be slidable with respect to the high voltage connector in an axial direction along a centerline of the high voltage connector in order to get into an engagement position with respect to the outer housing to achieve the final lock condition. Since the locking assembly may include two elements only, i.e. the outer housing and the retainer element being movable with respect to each other, the high voltage connector may require a small number of parts only in order to provide a safe high voltage connection. The small number of parts may reduce the cost for manufacturing the high voltage connector.

[0010] The retainer element may include a latch portion being engaged with the outer housing for providing the final lock condition. For example, an area or surface connected to the latch portion may be pressed by an operator of the high voltage connector in order to transition the locking assembly from the pre-lock condition to the final lock condition. In this way, the retainer element may slide in the axial direction along the centerline of the high voltage connector in order to arrive at the final lock condition. Hence, the high voltage connector may achieve the final lock condition without the requirement of an additional latch, i.e. in addition to the retainer element.

[0011] The retainer element and the outer housing may provide a connector position assurance (CPA) for the high voltage connector. The connector position assurance may ensure the proper polarization and may pre-

vent a mechanical and/or electrical disconnection during an adverse driving condition of a vehicle, for example, when the high voltage connector is connected to a header assembly.

[0012] The high voltage connector may further comprise a strain relief element, and the retainer element may include a portion which may be engaged with the strain relief element in the final lock condition. Therefore, the retainer element may be regarded as a multi-function retainer providing different functionalities, i.e. locking the high voltage connector, providing the connector position assurance and providing a strain relief, at the same time. Since one part is required for different functions only, the total number of parts or elements required for the high voltage connector may be further reduced which reduces the total cost for the high voltage connector. In addition, the effort for providing the high voltage connection may also be reduced since the retainer element has to be moved only in order to provide different functions simultaneously.

[0013] The strain relief element may include flexible arms which may be configured to surround a cable which is to be connected to the inner terminal portion. Therefore, the strain relief may be provided uniformly in a circumferential direction of the cable and the high voltage connector. By this means, the safety of the high voltage connection may be improved.

[0014] The retainer element may further include a protrusion portion which may engage with the flexible arms of the strain relief element in the final lock condition. For example, the protrusion portion of the retainer element may press each of the flexible arms of the strain relief element against the cable connected to the inner terminal portion.

[0015] According to a further embodiment, the high voltage connector may further comprise an outer carrier element being connected to the outer housing, and a shield element may be disposed between the outer carrier element and the inner carrier element. The shield element may improve the electromagnetic capability (EMC) performance of the high voltage connection. Due to the connection to the outer housing, the outer carrier element may also be rotatable with respect to the inner terminal portion. The outer carrier element may be isolated with respect to the outer housing.

[0016] The inner terminal portion may be fixed to the inner carrier element, and the inner terminal portion and the inner carrier element may be snapped to the outer carrier element by at least one outer engagement element such that a stop may be provided for the rotation of the inner terminal portion with respect to the outer housing. For this embodiment, a stable mechanical connection may be provided for the inner elements with respect to the outer carrier. The rotation of the inner terminal portion may be restricted with respect to the outer housing, but is still enabled generally.

[0017] A high voltage interlock (HVIL) shunt may be mounted to the outer carrier element. This may further improve the safety of the high voltage connection. In addition, the outer carrier element may include a protruding portion in order to protect the high voltage interlock (HVIL) shunt for the high voltage connector.

[0018] The inner terminal portion may be rotatable with respect to the outer housing in a clockwise direction and in a counterclockwise direction. By this means, a rotation for about 360 degrees may be provided for the inner terminal element with respect to the outer housing. This may enhance the flexibility of the high voltage connector for a connection to a header assembly.

[0019] In another aspect, the present disclosure is directed at a method for providing a connection via a high voltage connector. The high voltage connector comprises an inner terminal portion, an outer housing, an inner carrier element disposed between the inner terminal portion and the outer housing, and a locking assembly. According to the method, the outer housing is adjusted with respect to the inner terminal portion to provide a pre-lock condition of the high voltage connector in which the inner terminal portion is rotatable with respect to the outer housing via the inner carrier element. In the pre-lock condition, the outer housing is rotated with respect to the inner terminal portion until the outer housing is in a desired alignment position with respect to a header assembly to which the high voltage connector is to be connected. Thereafter, the outer housing is adjusted with respect to the inner carrier element and to the terminal portion in order to provide a final lock condition of the high voltage connector in which the inner terminal portion is rotationally fixed with respect to the outer housing.

[0020] As such, the method includes steps which are carried out by using the high voltage connector as described above. Therefore, the benefit, the advantages and the disclosure for the high voltage connector are also valid for the method according to the disclosure.

[0021] According to an embodiment, the high voltage connector may further comprise a retainer element. The retainer element may be moved with respect to the outer housing in order to provide a respective transition between the pre-lock condition and the final lock condition. For example, the retainer element may slide in an axial direction along a centerline of the high voltage connector in order to provide the transitions. Since only one part or element may be moved for the transition between the pre-lock condition and the final lock condition, providing the high voltage connection may be facilitated, and the effort for the connection may be reduced.

[0022] The retainer element may include a portion which is pressed for the transition from the pre-lock-condition to the final lock condition. The high voltage connector may also include a so-called "press-2 latch" function which is an intermediate locking condition of the retainer element before arriving at the final lock condition. In this intermediate locking condition, the high voltage interlock (HVIL) shunt is disconnected such that an operator may be aware that no power connection is provided in this condition.

[0023] Moreover, pressing the portion of the retainer element may cause an engagement of a latch of the outer housing which may also entail a disconnection of the high voltage interlock (HVIL) shunt. The further movement of the retainer element may provide a connector position assurance of the high voltage connector. Hence, one method step may be required only in order to perform several different functions within the high voltage connector.

[0024] According to a further embodiment, the high voltage connector may further comprise a strain relief element which may be engaged with the retainer element simultaneously with the transition from the pre-lock condition to the final lock condition. Hence, a further function, i.e. the strain relief function, may be provided by the engagement of the retainer element with the strain relief element when the final lock condition is achieved. This may reduce the number of parts required for the high voltage connector and the effort for providing a safe high voltage connection.

[0025] The strain relief element may include flexible arms which may be compressed by the retainer element when the high voltage connector transitions to the final lock condition. Compressing the flexible arms may further enhance the safety of the high voltage connection by compressing a cable which is to be connected to the high voltage connector.

DRAWINGS

[0026] Exemplary embodiments and functions of the present disclosure are described herein in conjunction with the following drawings, showing schematically:

Fig. 1 a perspective view of a high voltage connector according to the disclosure,

Fig. 2 a cross-sectional view of the high voltage connector as shown in Fig. 1,

Fig. 3 a detailed view of a front portion of the high voltage connector as shown in Fig. 1,

Fig. 4 a cross-sectional view of portions of the high voltage connector as shown in Fig. 1,

Fig. 5 the high voltage connector from Fig. 1 in a pre-lock condition,

Fig. 6 the high voltage connector from Fig. 1 in a final lock condition, and

Fig. 7 a flow diagram illustrating a method for providing a high voltage connection according to various embodiments.

DETAILED DESCRIPTION

[0027] Fig. 1 depicts a high voltage connector 100 according to the disclosure in a perspective view. The high voltage connector 100 includes an inner terminal portion 110 which is connected to an inner carrier element 120. The high voltage connector 100 further includes an outer housing 130 and a retainer element 140. In addition, an outer carrier element 150 is connected to the outer housing 130. The inner carrier element 120 and the outer carrier element 150 are made of an insulating material.

[0028] For the high voltage connector 100, a centerline 160 is shown which defines an axial direction for the high voltage connector 100. In order to provide a high voltage connection, the high voltage connector 100 is moved along the axial direction as indicated by the arrow 170 in order to be connected to a header assembly (not shown).

[0029] As will be explained in detail below, the inner terminal portion 110 and the inner carrier element 120 are rotatable with respect to the outer housing 130, i.e. in a clockwise direction and in a counterclockwise direction as indicated by the arrows 180. More precisely, the inner carrier element 110 is rotatable with respect to the outer housing 130 as long as the high voltage connector 100 is in a pre-lock condition (see also Fig. 5). By the rotation of the outer housing 130 and the outer carrier element 150 with respect to the inner terminal portion 110, a proper alignment of the high voltage connector 100 is provided via a protruding portion 152 of the outer carrier element 150 with respect to the header assembly (not shown) to which the high voltage connector 100 is to be connected.

[0030] The proper alignment of the outer housing 130 and the outer carrier element 150 due to the rotation with respect to the inner terminal portion 120 facilitates the installation of the high voltage connector 100 in order to provide the high voltage connection. In a vehicle environment, for example, the high voltage connector 100 may be connected to a harness of a vehicle which would restrict the movability and flexibility of the high voltage connector 100 if the inner terminal portion 110 were not rotatable with respect to the outer housing 130.

[0031] Fig. 2 depicts a cross-sectional view of the high voltage connector 100 as shown in Fig. 1. The inner terminal portion 110 of the high voltage connector 100 is connected to a cable 210 which includes a shield braid 215 at its outer circumference. As can be recognized on the left side of Fig. 2, the inner carrier element 120 is rotationally fixed to the inner terminal portion 110 via the engagement elements 205 which are located in corresponding openings of the inner terminal portion 110. As indicated by the gap between the inner carrier element 120 and the outer carrier element 150, the inner terminal portion 110 and the inner carrier element 120 are rotatable with respect to the outer carrier element 150. Since the outer carrier element 150 is fixed to the outer housing 130, the inner terminal portion 110 and the inner carrier element 120 are rotatable also with respect to the outer

housing 130.

[0032] Different shields are provided between the outer elements, i.e. the outer housing 130 and the outer carrier element 150, on one hand and the inner elements, i.e. the inner terminal portion 110 and the inner carrier element 120, on the other hand. These shields include a front shield 220, a rear shield 224 and a recovery shield 226. Moreover, different seals are provided for electric isolation. The seals include an interface seal 230 which is disposed between the outer housing 130 and the outer carrier element 150, whereas a cable seal 232 is disposed between the outer housing 130 and the cable 210.

[0033] In order to stabilize the high voltage connector 100 mechanically and regarding its water tightness, a spacer 240 is also disposed between the outer housing 130 and the cable 210. In addition, an outer or inner ferrule 242 is located around the recovery shield 226, wherein the outside option is shown in the figures, and the shield braid 215 of the cable 210 in order to support the fixation of the cable 210 at the high voltage connector 100.

[0034] The high voltage connector 100 further includes a strain relief element 250 which has a plurality of flexible arms 252 surrounding the cable 210. The retainer element 140 includes a protrusion 142 which is able to be engaged with the strain relief element 250 in order to press the flexible arms 252 against the cable 210. By this means, a strain relief function is provided for the cable 210.

[0035] Moreover, the high voltage connector 100 includes a high voltage interlock (HVIL) shunt 260 which is disposed close to the outer carrier element 150 as a further safety feature of the high voltage connector 100. The high voltage interlock (HVIL) shunt 260 is disposed on the inner side of the protruding portion 152 of the outer carrier element 150. As mentioned above the protruding portion 152 ensures a proper alignment of the high voltage connector 100 with respect to the header assembly (not shown).

[0036] In the illustration of Fig. 2, the high voltage connector 100 is still in a so-called pre-lock condition in which the retainer element 140 is not latched yet with the outer housing 130 in order to allow for a rotation between the outer housing 130 and the inner terminal portion 110. The pre-lock condition of the high voltage connector 100 and its transition to a final lock condition will be discussed in detail in context of Figs. 5 and 6 below.

[0037] Figs. 3 and 4 show details of the assembly of the high voltage connector 100, i.e. details regarding the connection of the inner terminal portion 110, the inner carrier element 120, the outer carrier element 150 and the outer housing 130. As already mentioned above in context of Fig. 2, the inner carrier element 120 is fixed to the inner terminal portion 110 via the engagement elements 205 being located in corresponding openings of the inner terminal portion 110.

[0038] As indicated by the circles 310 in Fig. 3, the inner carrier element 120 is further provided with outer engagement elements 320 in order to be snapped to the outer carrier element 150. Nevertheless, a rotation of the inner carrier element 120 together with the inner terminal portion 110 is possible with respect to the outer carrier element 150 and therefore with respect to the outer housing 130 around the center line 160 (see Fig. 1) of the high voltage connector 100.

[0039] As indicated by the ovals 410 in Fig. 4, the outer carrier element 150 is located and snapped, i.e. fixed, to the outer housing 130. Due to the snapping connections as described in context of Figs. 3 and 4, a proper mechanical connection is provided between the inner terminal portion 110, the inner carrier element 120, the outer carrier element 150 and the outer housing 130. In spite of this, the inner terminal portion 110 together with the inner carrier element 120 is still rotatable with respect to the outer carrier element 150 and the outer housing 130 if the high voltage connector 100 is in the pre-lock condition as shown in Fig. 5.

[0040] As mentioned above in context of Fig. 2, the protrusion 142 of the retainer element 140 is still not engaged with the strain relief element 250 if the high voltage connector 100 is in the pre-lock condition as shown in Fig. 5. Therefore, the flexible arms 252 of the strain relief element 250 still allow for a rotation of the outer housing 130 with respect to the inner terminal portion 110 and therefore, conversely, for a rotation of the cable 210 with respect to the outer housing 130.

[0041] Moreover, the retainer element 140 further includes a blocking and header activation element 144 for positioning the retainer element 140 with respect to the outer housing 130. This is indicated by the oval 510. The retainer element 140 further includes a latch 146 which is still out of engagement in the illustration of Fig. 5, i.e. in the pre-lock condition of the high voltage connector 100. Moreover, the retainer element 140 also includes a portion 148 which provides a so-called "press-2 latch" function" which is an intermediate locking condition of the retainer element 140 before arriving at the final lock condition. In this intermediate locking condition, the high voltage interlock (HVIL) shunt 260 is disconnected such that an operator is aware that no power connection is provided in this condition.

[0042] By moving the retainer element 140 with respect to the outer housing 130, the high voltage connector 100 is transitioned from the pre-lock condition to the final lock condition as shown in Fig. 6. The blocking and header activation element 144 also contributes to a connector position assurance (CPA) function for the high voltage connector 100 with respect to the header assembly in the final lock condition. The connector position assurance ensures the proper polarization and prevents a mechanical and/or electrical disconnection during an adverse driving condition of a vehicle when the high voltage connector 100 is connected to the header assembly.

[0043] After a proper alignment of the high voltage connector 100 with respect to the header assembly (not shown) which is provided by the rotation of the outer

housing 130 with respect to the inner terminal portion 110, the retainer element 140 is shifted along the centerline 160 (see Fig. 1) of the high voltage connector 100, i.e. to the left in the illustration of Figs. 5 and 6, such that the latch 146 is engaged with the outer housing 130 of the high voltage connector 100. Simultaneously, the flexible arms 252 of the strain relief element 250 are pressed against the cable 210 by the engagement of the protrusion 142 of the retainer element 140 with the strain relief element 250. Due to the pressing of the flexible arms 252 against the cable 210, any rotation between the outer housing 130 and the inner terminal portion 110 of the high voltage connector 100 is disabled, and simultaneously a strain relief is provided for the cable 210. At the same time, the press-2 latch function blocks the retainer element 140 such that the inner terminal portion 110 is fixed with respect to the outer housing 130.

[0044] Fig. 7 shows a flow diagram illustrating a method 700 for providing a connection via a high voltage connector. The high voltage connector may include an inner terminal portion, an outer housing, an inner carrier element disposed between the inner terminal portion and the outer housing, and a locking assembly.

[0045] At 702, the outer housing may be adjusted with respect to the inner terminal portion to provide a pre-lock condition of the high voltage connector in which the inner terminal portion may be rotatable with respect to the outer housing via the inner carrier element. At 704, the outer housing may be rotated with respect to the inner terminal portion in the pre-lock condition until the outer housing is in a desired alignment position with respect to a header assembly to which the high voltage connector is to be connected. At 706, the outer housing may be adjusted with respect to the inner carrier element and to the terminal portion to provide a final lock condition of the high voltage connector in which the inner terminal portion is rotationally fixed with respect to the outer housing, e.g. by a retainer element being positioned in the final lock condition.

[0046] According to various embodiments, the high voltage connector may further comprise a retainer element, and the retainer element may be moved with respect to the outer housing in order to provide a respective transition between the pre-lock condition and the final lock condition.

[0047] According to various embodiments, the retainer element may include a portion which is pressed for the transition from the pre-lock condition to the final lock condition.

[0048] According to various embodiments, the high voltage connector may further comprise a strain relief element, and the strain relief element may be engaged with the retainer element simultaneously with the transition from the pre-lock condition to the final lock condition.

[0049] According to various embodiments, the strain relief element may include flexible arms which may be compressed by the retainer element when the high voltage connector transitions to the final lock condition.

[0050] According to various embodiments, a high voltage connector may comprise an inner terminal portion, an outer housing, an inner carrier element disposed between the inner terminal portion and the outer housing such that the inner terminal portion is rotatable with respect to the outer housing, and a locking assembly which may allow for a rotation of the inner terminal portion in a pre-lock condition of the high voltage connector and which may prevent the rotation of the inner terminal portion in a final lock condition of the high voltage connector.

[0051] According to various embodiments, the high voltage connector may further comprise a retainer element configured to be engaged with the outer housing, and the locking assembly may include the outer housing and the retainer element which may be movable with respect to each other in order to provide the pre-lock condition and the final lock condition.

[0052] According to various embodiments, the retainer element may include a latch portion being engaged with the outer housing for providing the final lock condition.

[0053] According to various embodiments, the retainer element and the outer housing may provide a connector position assurance for the high voltage connector.

[0054] According to various embodiments, the high voltage connector further may include a strain relief element, and the retainer element includes a portion which is engaged with the strain relief element in the final lock condition.

[0055] According to various embodiments, the strain relief element may include flexible arms which may be configured to surround a cable which is to be connected to the inner terminal portion.

[0056] According to various embodiments, the retainer element may include a protrusion portion which engages with the flexible arms of the strain relief element in the final lock condition.

[0057] According to various embodiments, the high voltage connector may further comprise an outer carrier element being connected to the outer housing, and a shield element may be disposed between the outer carrier element and the inner carrier element.

[0058] According to various embodiments, the inner terminal portion may be fixed to the inner carrier element, and the inner terminal portion and the inner carrier element may be snapped to the outer carrier element by at least one outer engagement element such that a stop may be provided for the rotation of the inner terminal portion with respect to the outer housing.

[0059] According to various embodiments, a high voltage interlock shunt may be mounted to the outer carrier element.

[0060] According to various embodiments, the inner terminal portion may be rotatable with respect to the outer housing in a clockwise direction and in a counterclockwise direction.

Reference numeral list

[0061]

100	high voltage connector
110	inner terminal portion
120	inner carrier element
130	outer housing
140	retainer element
142	protrusion
144	blocking and header activation element
146	latch
148	press portion of the retainer element
150	outer carrier element
152	protruding portion of the outer carrier element
160	centerline of the high voltage connector
170	arrow
180	arrow
205	engagement element
210	cable
215	shield braid of the cable
220	front shield
224	rear shield
226	recovery shield
230	interface seal
232	cable seal
240	spacer
242	outer ferrule
250	strain relief element
252	flexible arm of the strain relief
260	high voltage interlock (HVIL) shunt
310	circle
320	outer engagement element
410	oval
510	oval
700	flow diagram illustrating a method for providing a high voltage connection
702	step of adjusting the outer housing with respect to the inner terminal portion to provide a pre-lock condition of the high voltage connector in which the inner terminal portion is rotatable with respect to the outer housing via the inner carrier element
704	step of rotating the outer housing with respect to the inner terminal portion in the pre-lock condition until the outer carrier is in a desired alignment position with respect to a header assembly to which the high voltage connector is to be connected
706	step of adjusting the outer housing with respect to the inner carrier element and to the terminal portion to provide a final lock condition of the high voltage connector in which the inner terminal portion is rotationally fixed with respect to the outer housing

Claims

1. High voltage connector (100), comprising:

an inner terminal portion (110),
an outer housing (130),
an inner carrier element (120) disposed between the inner terminal portion (110) and the outer housing (130) such that the inner terminal portion (110) is rotatable with respect to the outer housing (130), and
a locking assembly (130, 140) which allows for a rotation of the inner terminal portion (110) in a pre-lock condition of the high voltage connector (100) and which prevents the rotation of the inner terminal portion (110) in a final lock condition of the high voltage connector (100).

2. High voltage connector (100) according to claim 1, wherein

the high voltage connector (100) further comprises a retainer element (140) configured to be engaged with the outer housing (130), and
the locking assembly (130, 140) includes the outer housing (130) and the retainer element (140) which are movable with respect to each other in order to provide the pre-lock condition and the final lock condition.

3. High voltage connector (100) according to claim 2, wherein
the retainer element (140) includes a latch portion (146) being engaged with the outer housing (130) for providing the final lock condition.

4. High voltage connector (100) according to claim 2 or 3, wherein
the retainer element (140) and the outer housing (130) provide a connector position assurance for the high voltage connector (100).

5. High voltage connector according (100) to any one of claims 2 to 4, wherein

the high voltage connector (100) further comprises a strain relief element (250), and
the retainer element (140) includes a portion (142) which is engaged with the strain relief element (250) in the final lock condition.

6. High voltage connector (100) according to claim 5, wherein
the strain relief element (250) includes flexible arms (252) which are configured to surround a cable (210) which is to be connected to the inner terminal portion (110).

7. High voltage connector (100) according to claim 6, wherein
the retainer element (140) includes a protrusion portion (142) which engages with the flexible arms (252) of the strain relief element (250) in the final lock condition.

8. High voltage connector (100) according to any one of claims 1 to 7, wherein

the high voltage connector (100) further comprises an outer carrier element (150) being connected to the outer housing (130), and
a shield element (220) is disposed between the outer carrier element (150) and the inner carrier element (120).

9. High voltage connector (100) according to claim 8, wherein

the inner terminal portion (110) is fixed to the inner carrier element (120), and
the inner terminal portion (110) and the inner carrier element (120) are snapped to the outer carrier element (150) by at least one outer engagement element (320) such that a stop is provided for the rotation of the inner terminal portion (110) with respect to the outer housing (130).

10. High voltage connector (100) according to claims 8 or 9, wherein
a high voltage interlock shunt (260) is mounted to the outer carrier element (150).

11. Method for providing a connection via a high voltage connector (100), wherein the high voltage connector (100) comprises an inner terminal portion (110), an outer housing (130), an inner carrier element (120) disposed between the inner terminal portion (110) and the outer housing, and a locking assembly, the method comprising:

adjusting the outer housing (130) with respect to the inner terminal portion (110) to provide a pre-lock condition of the high voltage connector (100) in which the inner terminal portion (110) is rotatable with respect to the outer housing (130) via the inner carrier element (120),
in the pre-lock condition, rotating the outer housing (130) with respect to the inner terminal portion (110) until the outer housing (130) is in a desired alignment position with respect to a header assembly to which the high voltage connector (100) is to be connected, and
adjusting the outer housing (130) with respect to the inner carrier element (120) and to the inner terminal portion (110) to provide a final lock condition of the high voltage connector (100) in which the inner terminal portion (110) is rotationally fixed with respect to the outer housing (130).

12. Method according to claim 11, wherein
the high voltage connector (100) further comprises a retainer element (140), and the retainer element (140) is moved with respect to the outer housing (130) in order to provide a respective transition between the pre-lock condition and the final lock condition.

13. Method according to claim 12, wherein
the retainer element (140) includes a portion (148) which is pressed for the transition from the pre-lock condition to the final lock condition.

14. Method according to of claim 12 or 13, wherein

the high voltage connector (100) further comprises a strain relief element (250), and
the strain relief element (250) is engaged with the retainer element (140) simultaneously with the transition from the pre-lock condition to the final lock condition.

15. Method according to claim 14, wherein
the strain relief element (250) includes flexible arms (252) which are compressed by the retainer element (140) when the high voltage connector (100) transitions to the final lock condition.

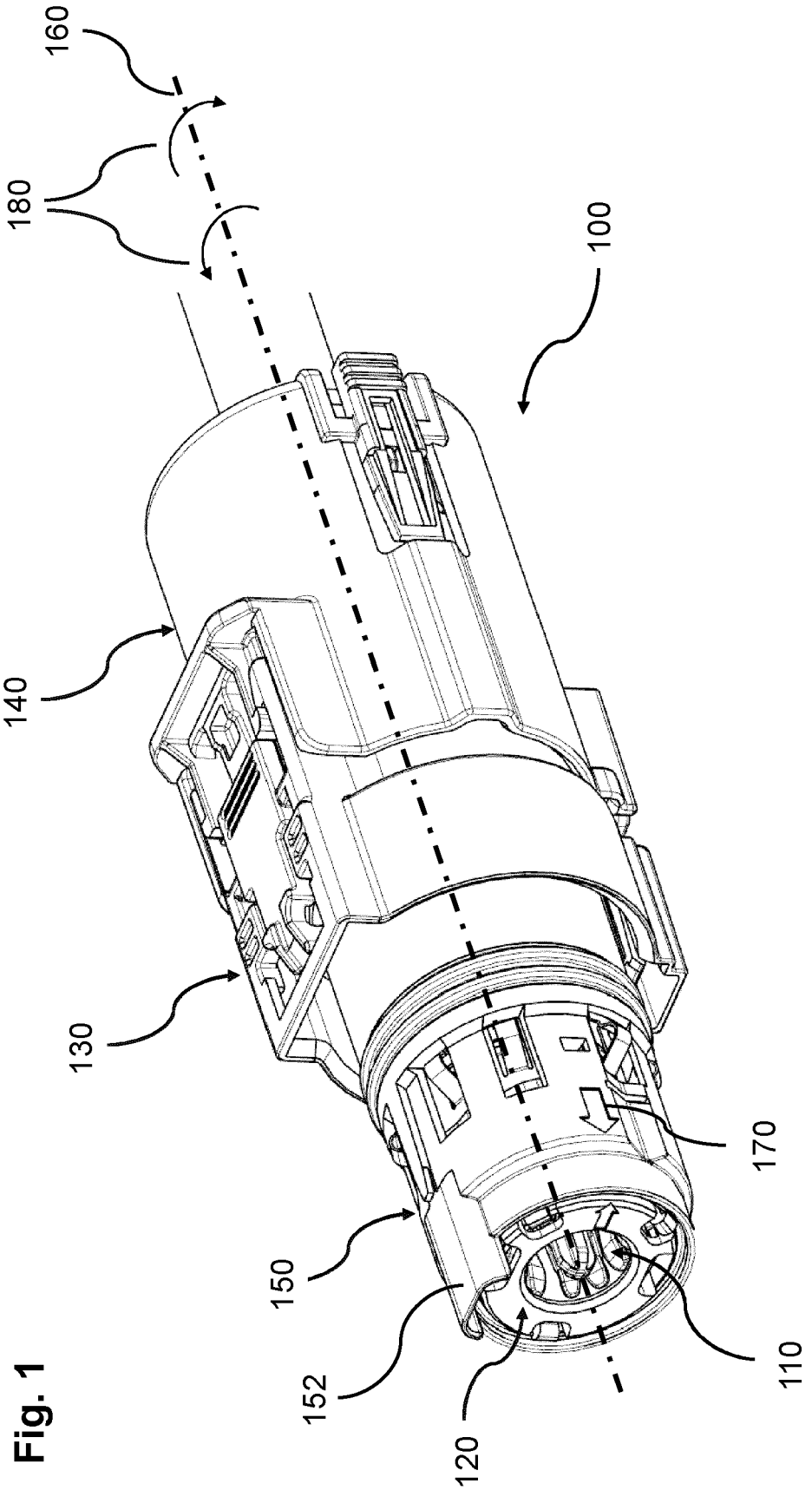


Fig. 1

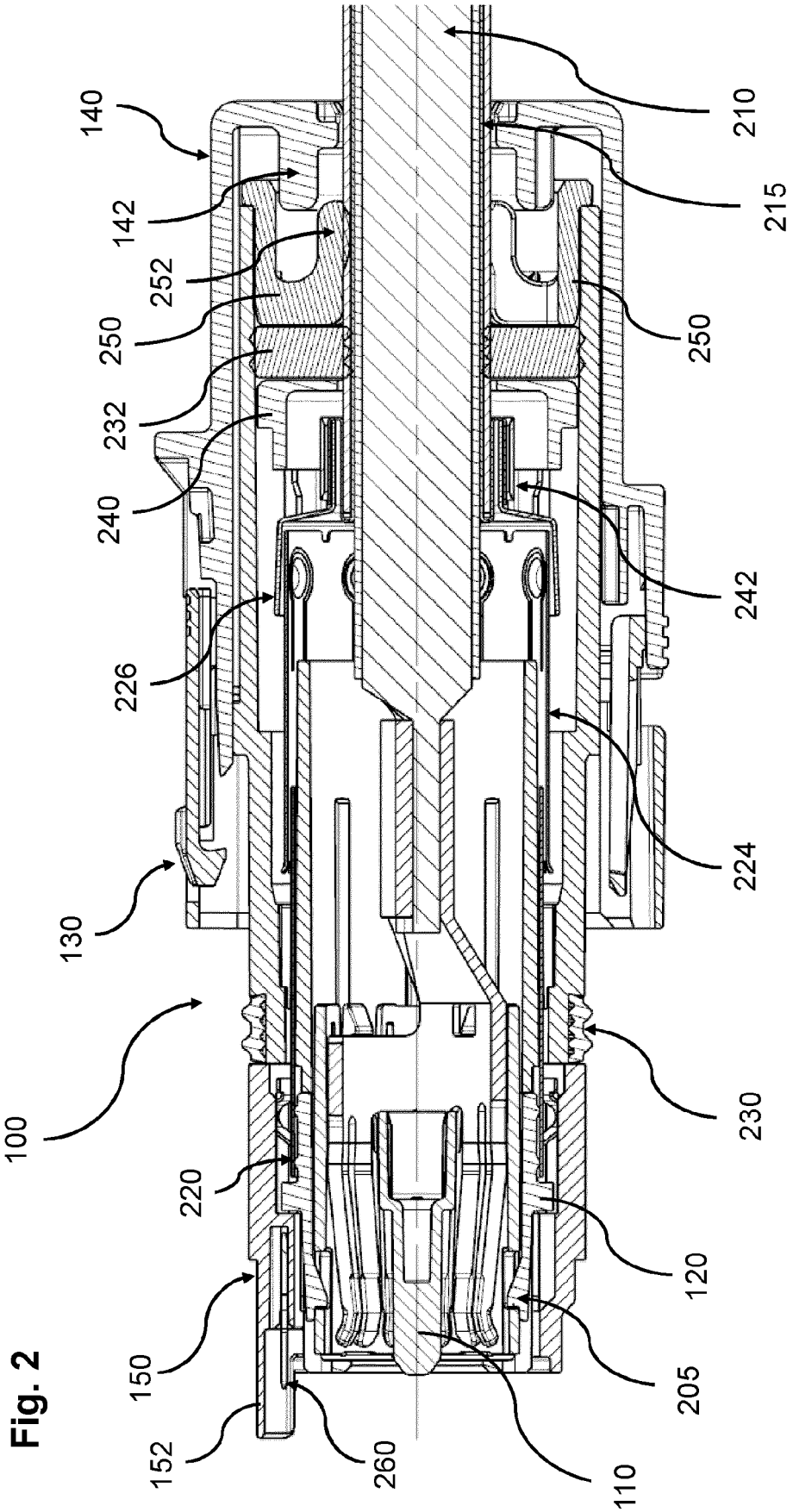

140
142
252
250
232
240
226
130
100
220
150
152
260
110
205
120
230
224
242
250
215
210

Fig. 2

Fig. 4

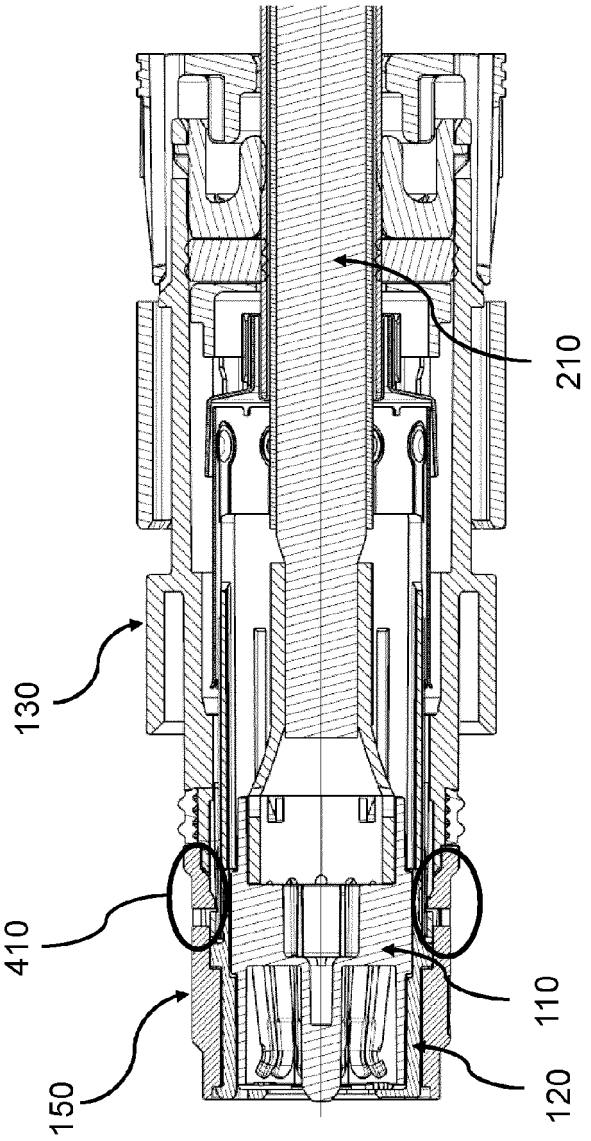


Fig. 3

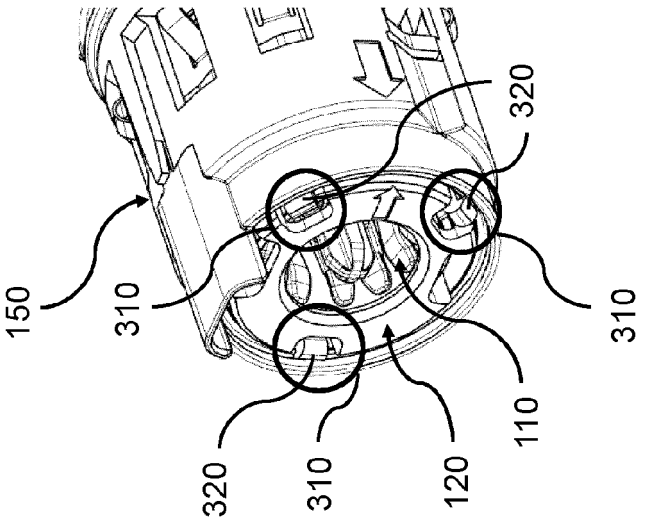


Fig. 6

Final lock condition

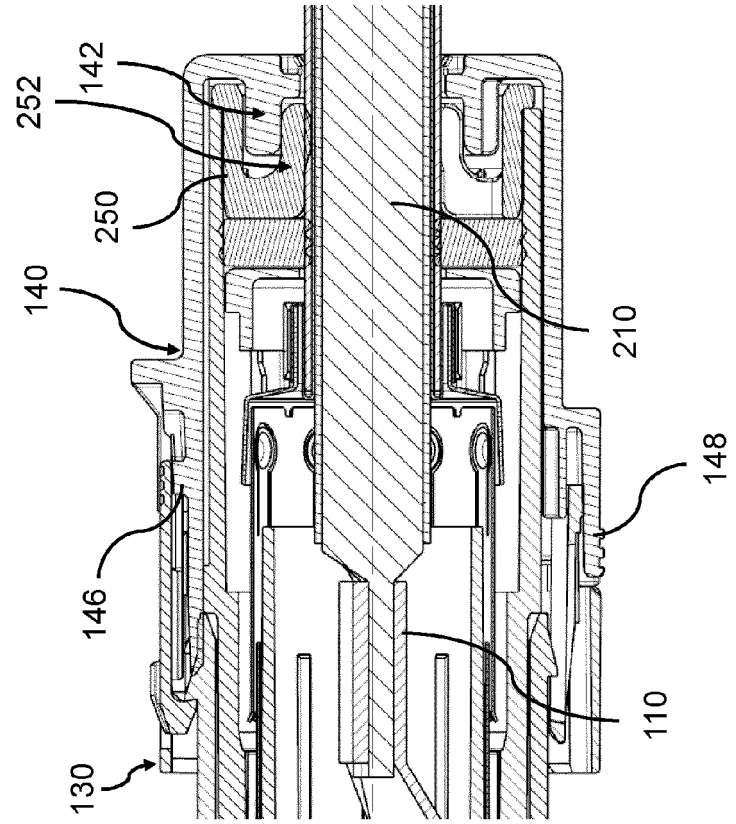


Fig. 5

Pre-lock condition

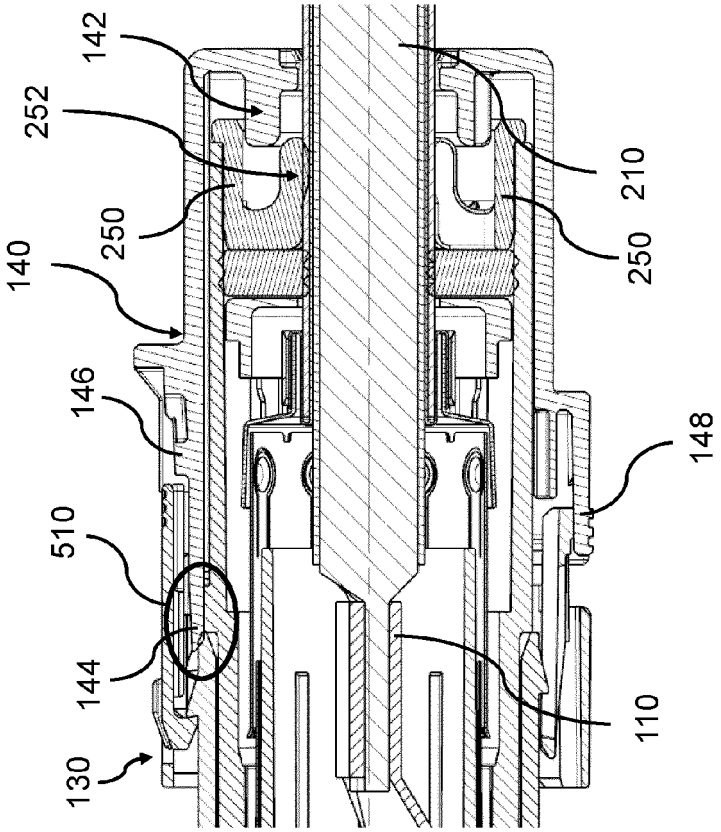
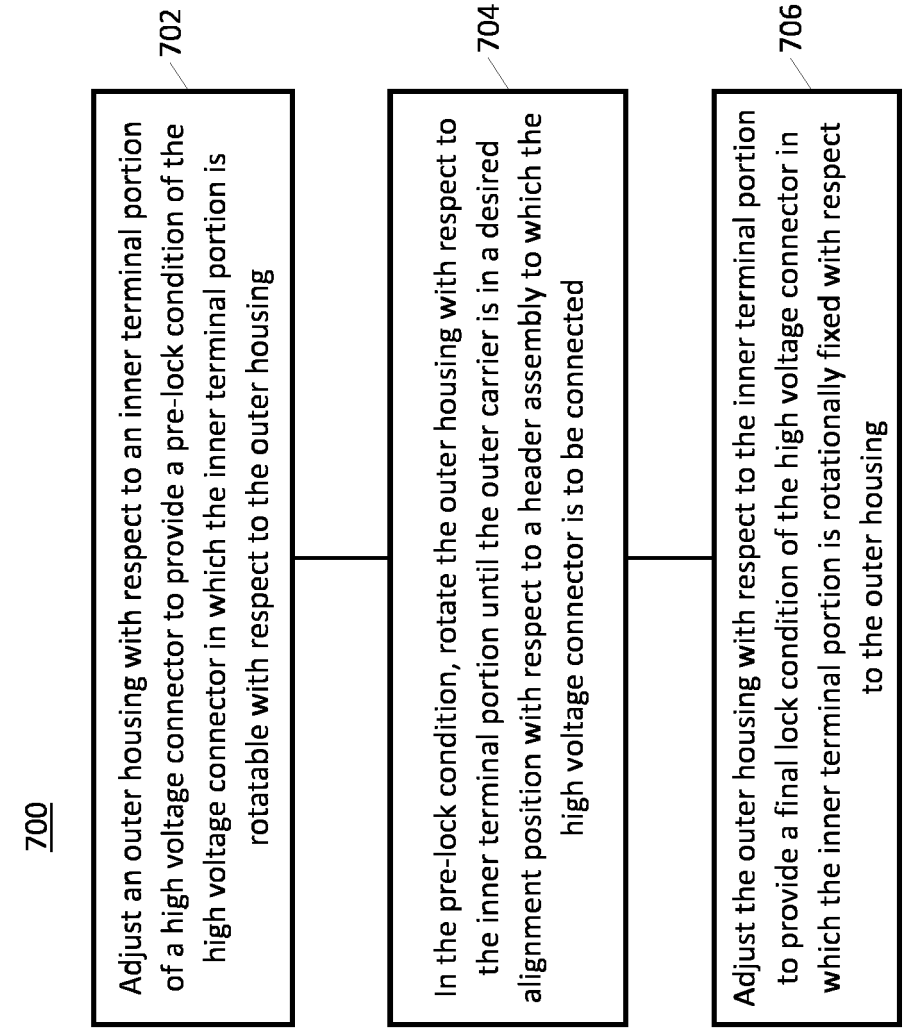


Fig. 7


700
702
Adjust an outer housing with respect to an inner terminal portion of a high voltage connector to provide a pre-lock condition of the high voltage connector in which the inner terminal portion is rotatable with respect to the outer housing
704
In the pre-lock condition, rotate the outer housing with respect to the inner terminal portion until the outer carrier is in a desired alignment position with respect to a header assembly to which the high voltage connector is to be connected
706
Adjust the outer housing with respect to the inner terminal portion to provide a final lock condition of the high voltage connector in which the inner terminal portion is rotationally fixed with respect to the outer housing

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EUROPEAN SEARCH REPORT

Application Number
EP 22 21 4071

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A	EP 3 979 428 A1 (TE CONNECTIVITY GERMANY GMBH [DE]) 6 April 2022 (2022-04-06) * paragraphs [0033], [0080]; figure 3 *	1-15	INV. H01R13/631 H01R13/58 H01R13/641 H01R24/38 H01R13/506 ADD. H01R13/422 H01R13/707 H01R103/00
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TECHNICAL FIELDS SEARCHED (IPC)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	31 May 2023	Vautrin, Florent

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31-05-2023

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