(12) UK Patent Application (19) GB (11) 2595544 (13) A

(43) Date of A Publication 01.12.2021

(21) Application No: 2100599.6

(22) Date of Filing: 18.01.2021

(30) Priority Data:
(31) 2000553 (32) 21.01.2020 (33) FR

(71) Applicant(s):
Tyco Electronics France SAS
1 rue Ampère, Pontoise, 95300,
France (including Overseas Departments and Territori es)

(72) Inventor(s):
Hyunji Yuk
Xavier Rouillard
Carlos Salgado

(74) Agent and/or Address for Service:
Baron Warren Redfern
1000 Great West Road, BRENTFORD, TW8 9DW,
United Kingdom

(51) INT CL:
H01R 13/641 (2006.01) ***H01R 13/627*** (2006.01)

(56) Documents Cited:
EP 3211730 A1 **DE 202017105774 U1**
US10135172

(58) Field of Search:
INT CL **H01R**

(54) Title of the Invention: **A connector assembly device having a connector position assurance device**
Abstract Title: **A connector assembly device having a connector position assurance device**

(57) A connector assembly device 100 (Figure 1A) comprising a connector element 102 (Figure 1A) comprising first locking means 132 and configured to be plugged into a complementary connector 200; and a connector position assurance (CPA) device 104, mounted to move relative to the connector element between a delivery position (figures 1A-1D) and a locking position (Figure 2A), the CPA device comprising a flexible locking lance 110 having first locking means 118 forming a connection with the first locking means of the connector element in the locking position; the connector element is provided with a second locking means 134 (Figure 1D) forming a connection with a second locking means 120 (Figure 1F) of the locking lance in the locking position; where the connection between the first locking means of the connector element and the first locking means of the CPA and the connection between the second locking means of the connection element and the second locking means of the CPA take place in different planes.

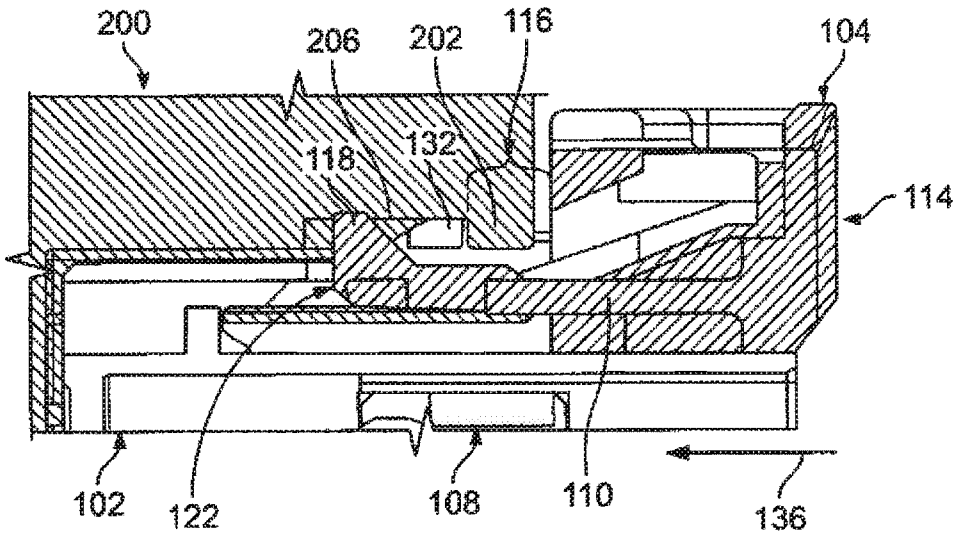

Fig. 2A

GB 2595544 A

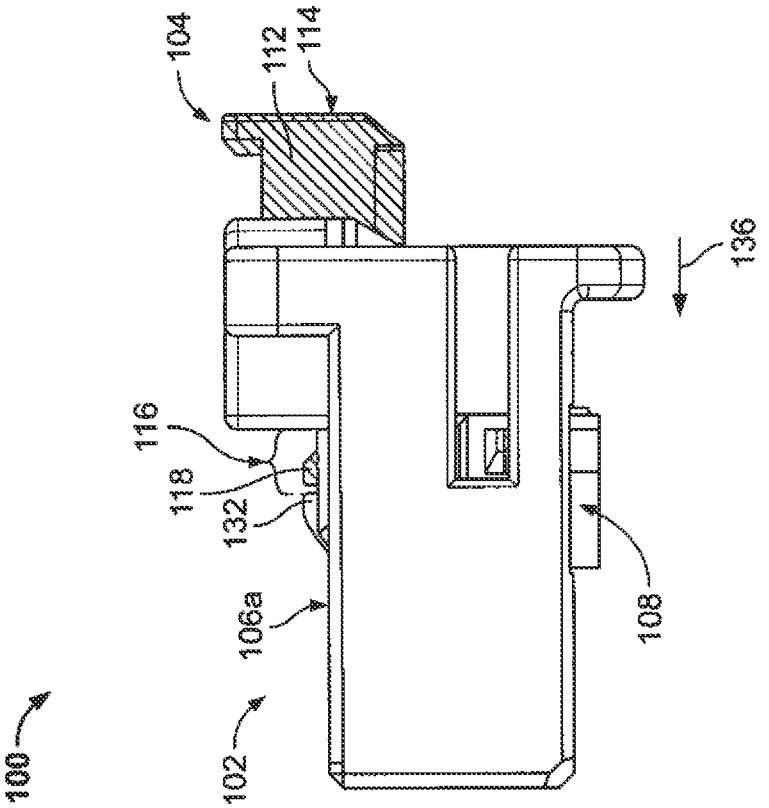
104
112
114
136
116
118
132
106a
108
102
100

Fig. 1B

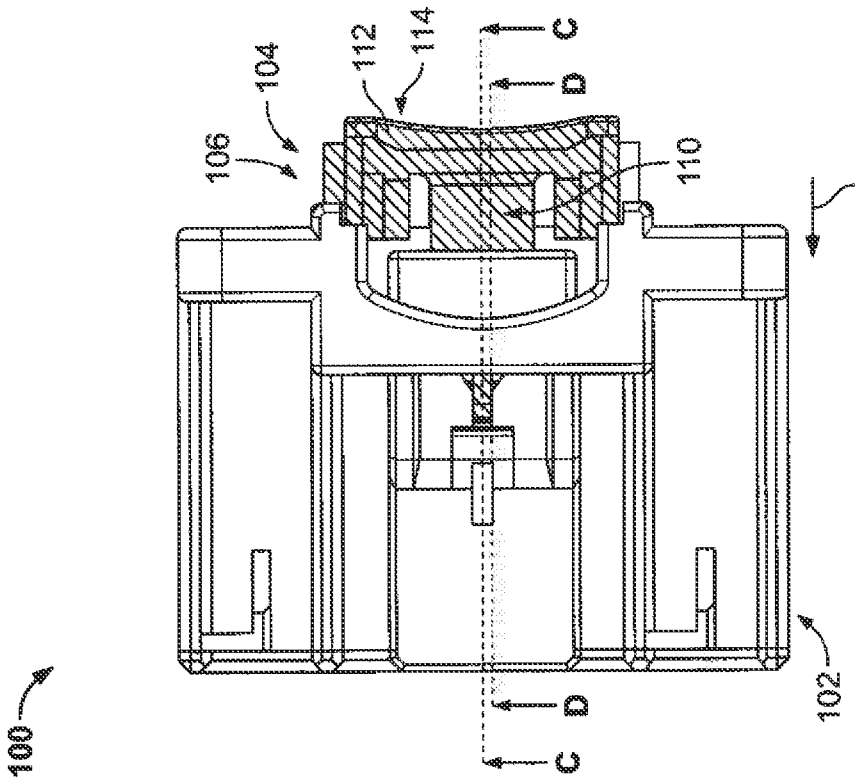
C
D
112
114
104
106
110
136
102
D
C
100

Fig. 1A

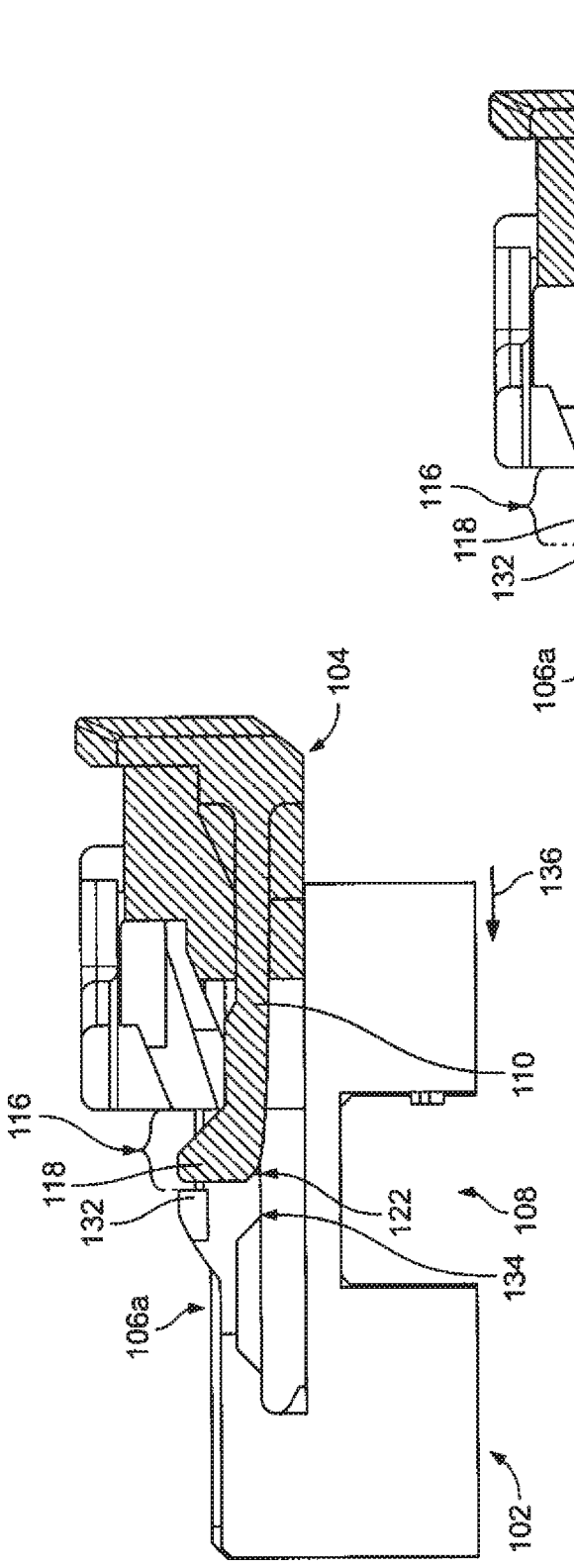
104
136
110
116
118
132
122
108
134
106a
102

Fig. 1C

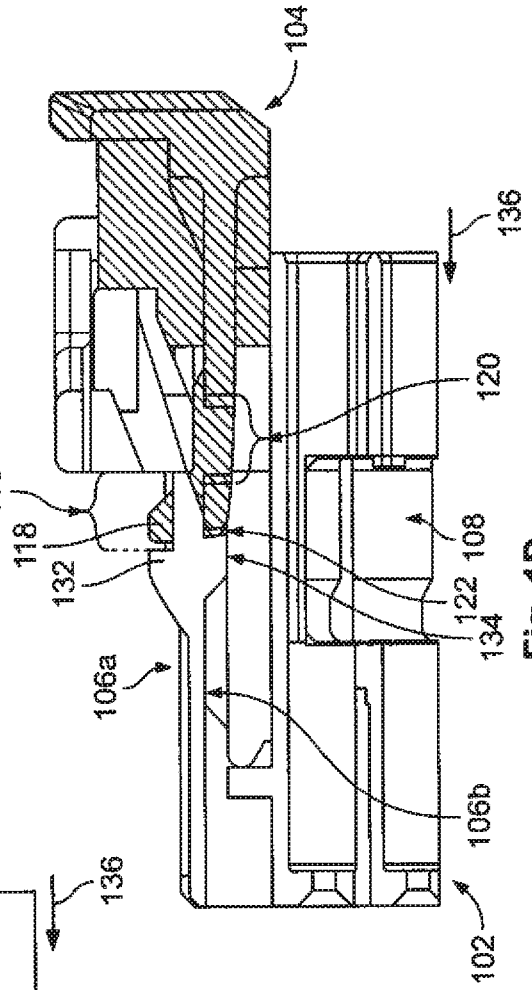
104
136
120
116
118
132
108
122
134
106a
106b
102

Fig. 1D

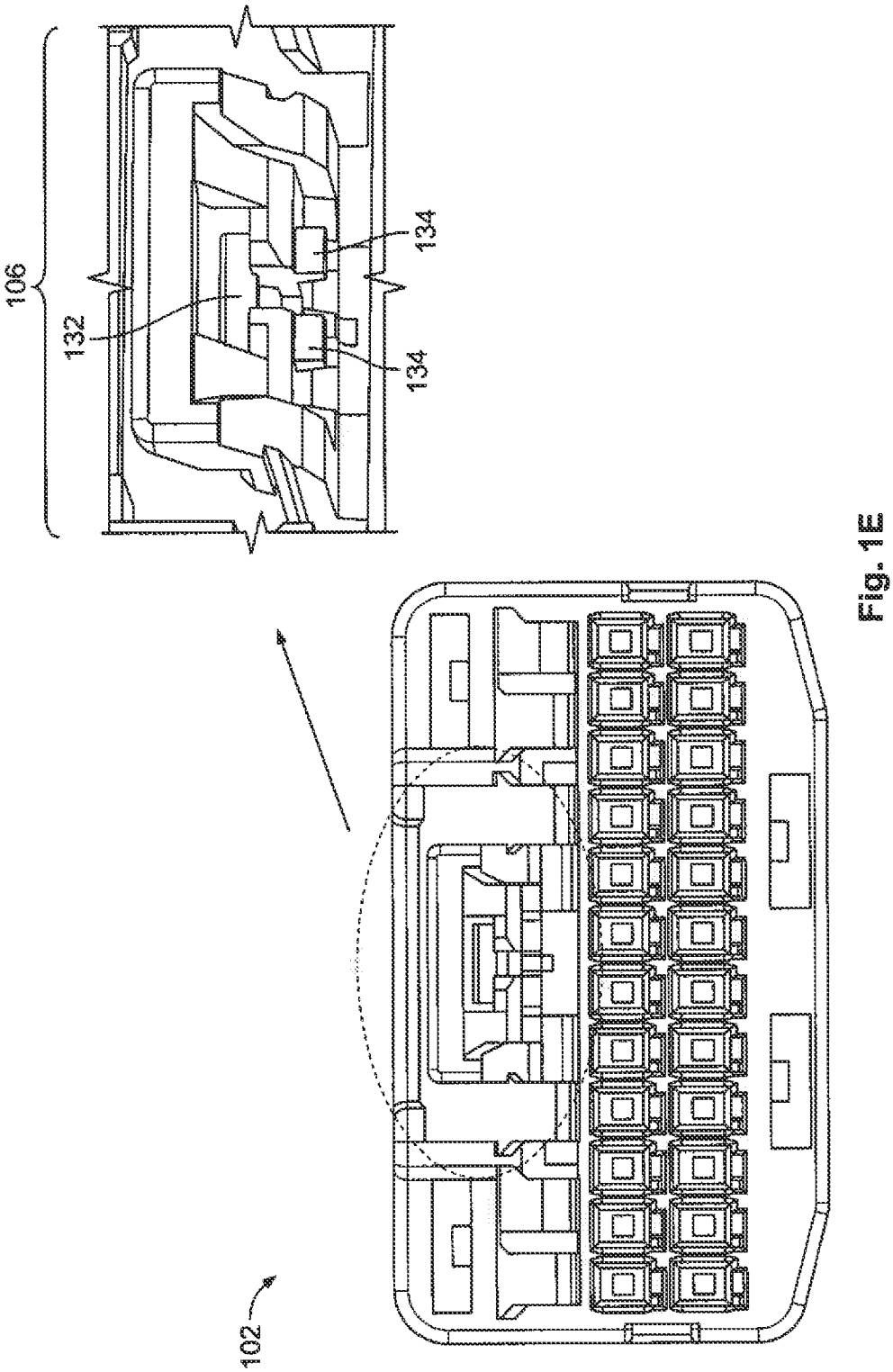

Fig. 1E

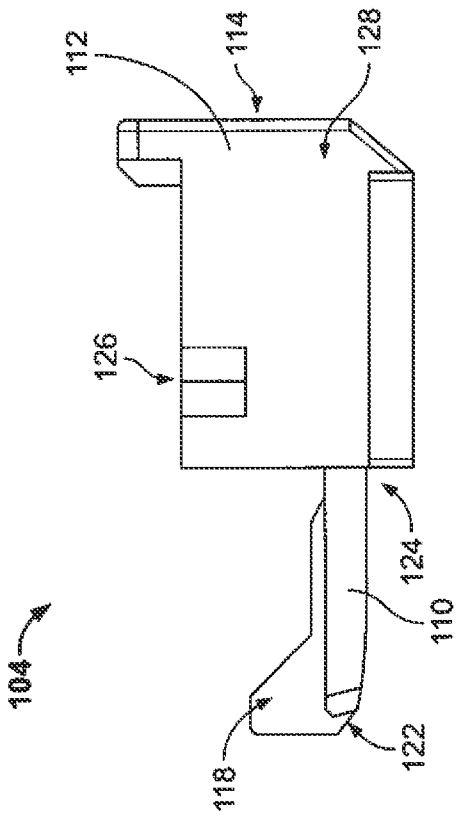
112
114
128
126
124
110
104
118
122

Fig. 1G

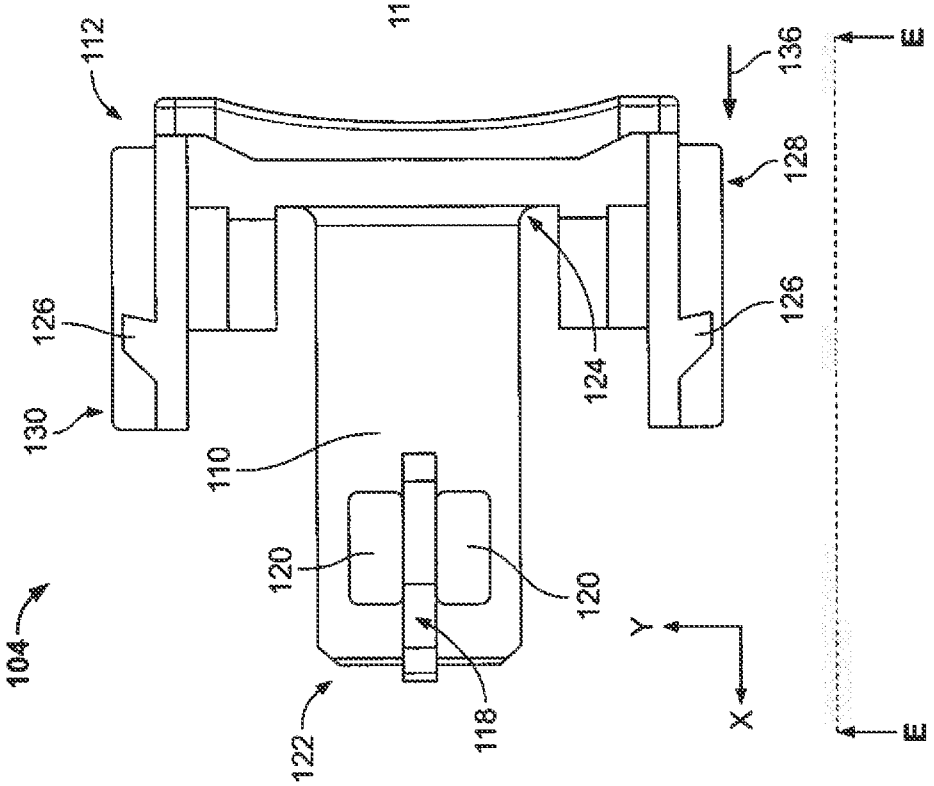
112
136
E
128
126
126
130
124
110
120
120
104
Y
X
118
122
E

Fig. 1F

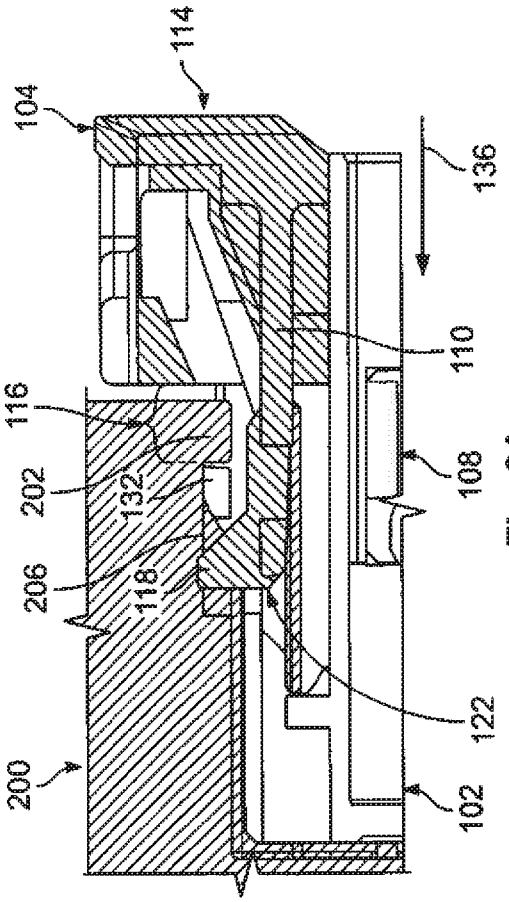
104
114
136
110
116
202
132
108
206
118
122
200
102

Fig. 2A

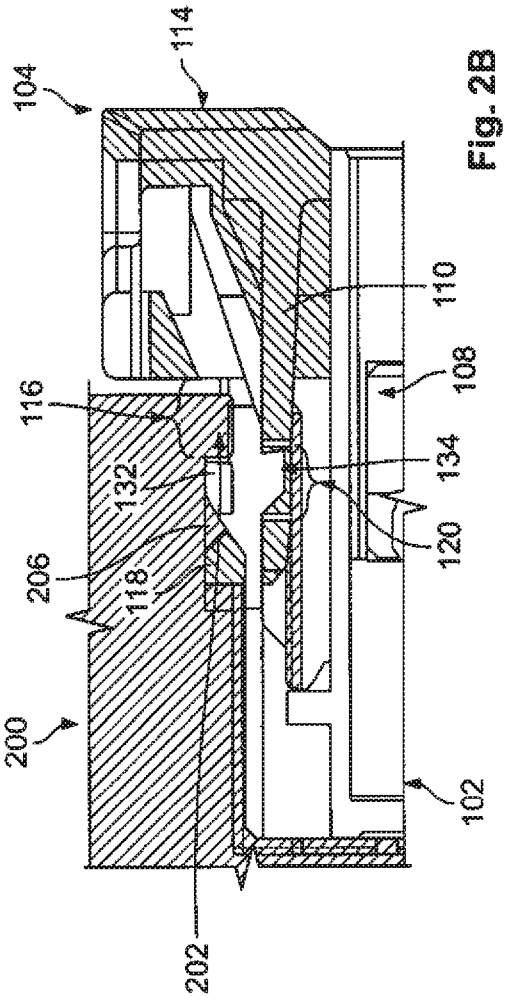
104
114
110
116
108
132
134
120
206
118
200
102
202

Fig. 2B

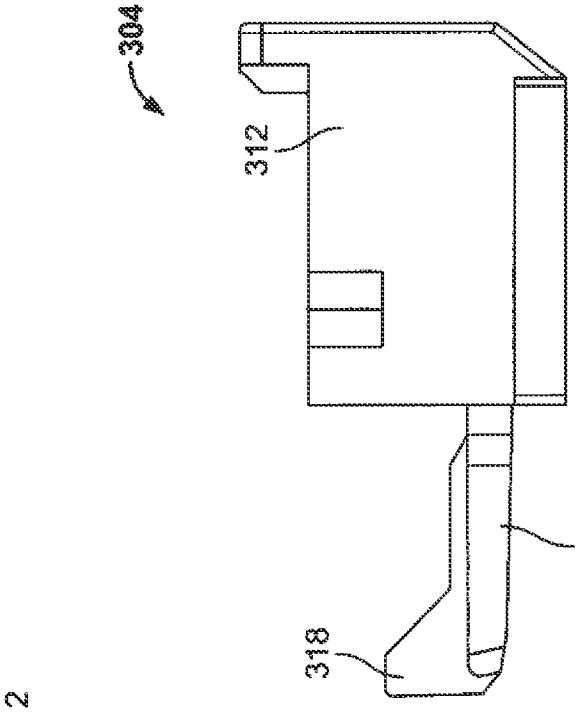

Fig. 3B

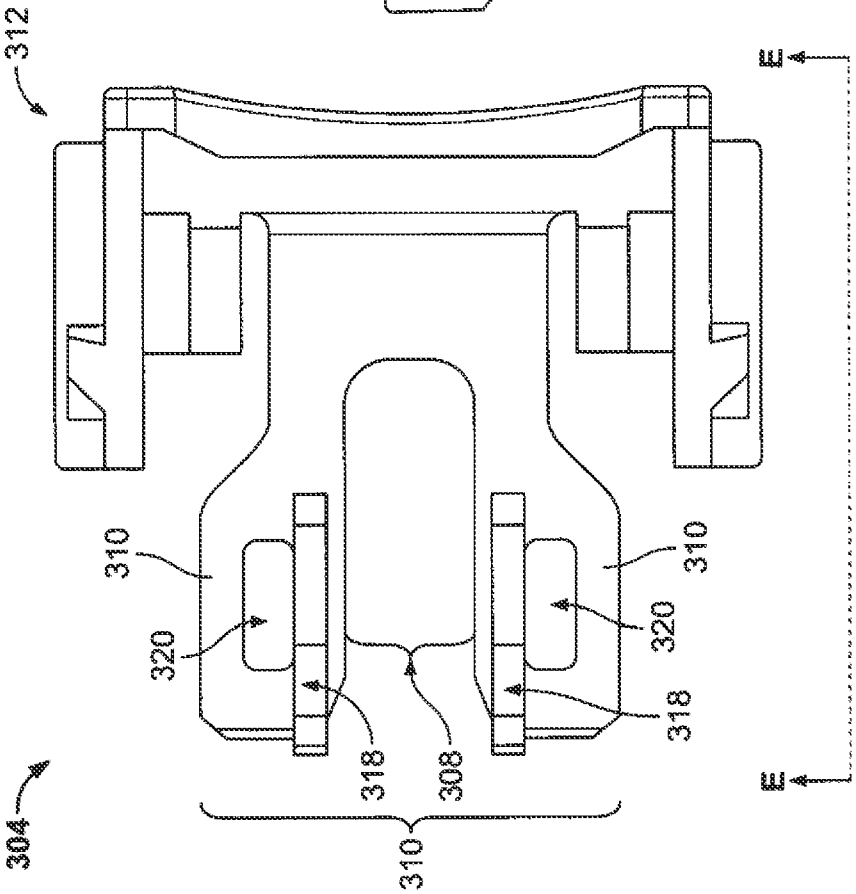

Fig. 3A

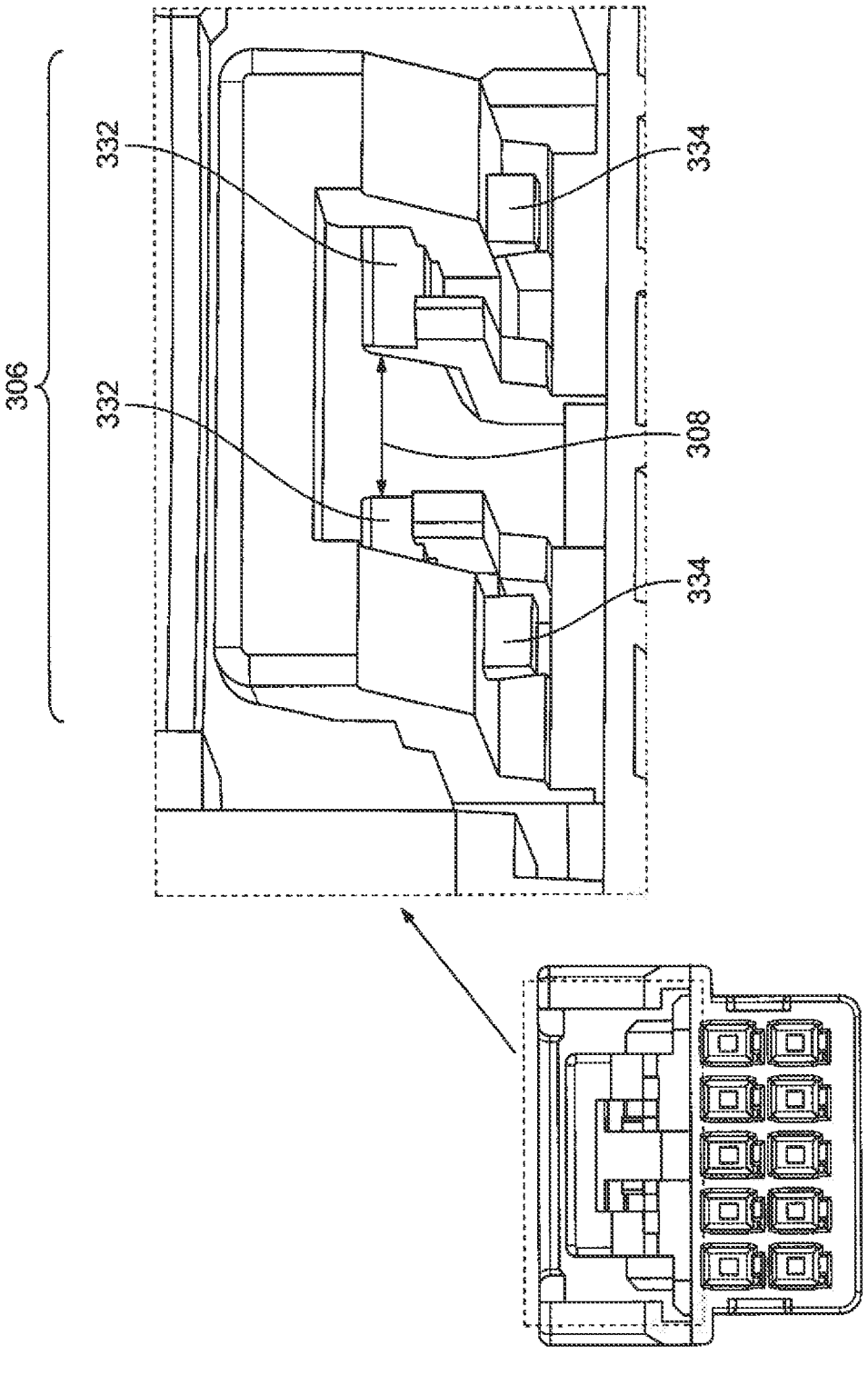

Fig. 3C

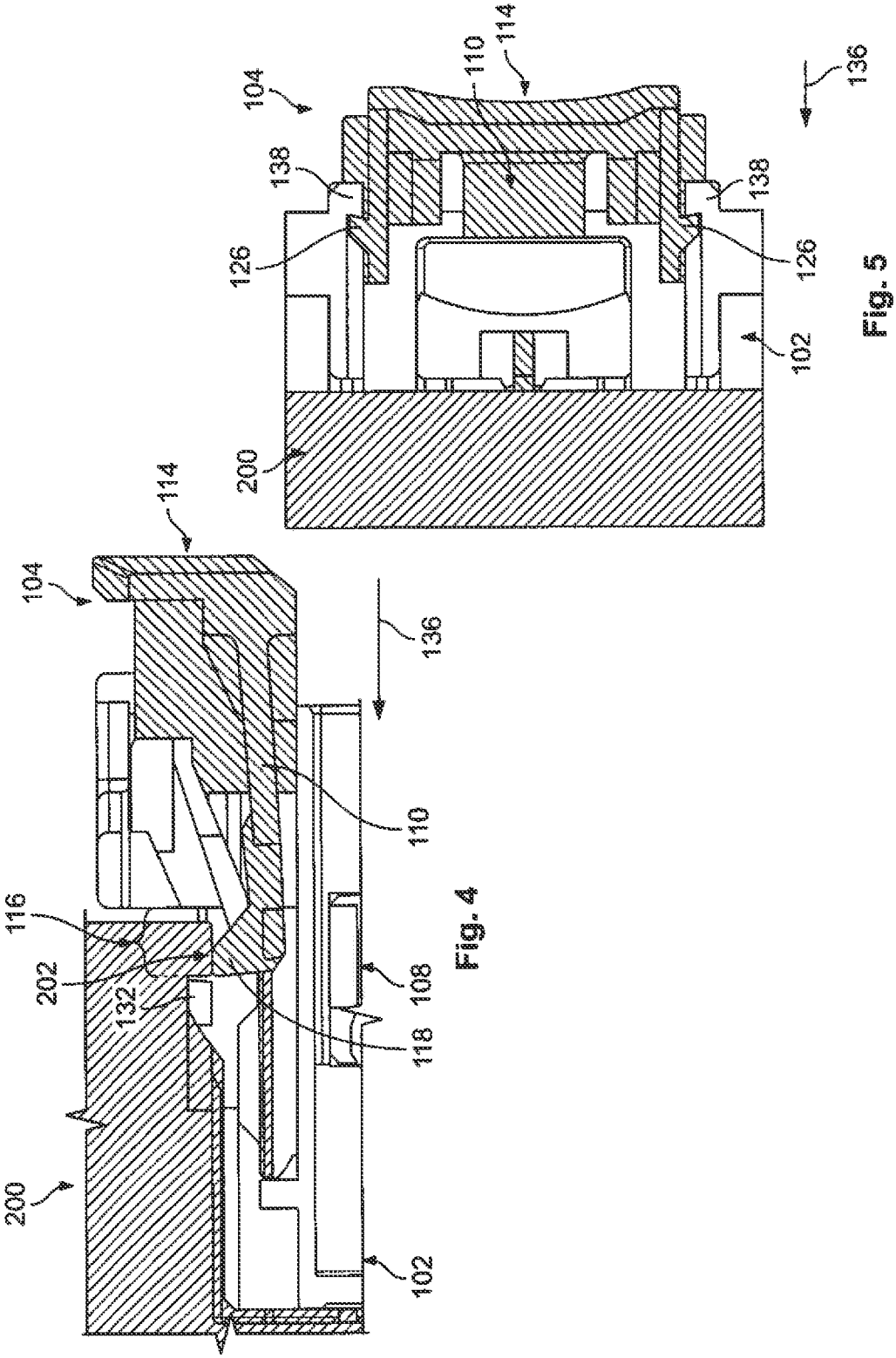

Fig. 4

Fig. 5

A CONNECTOR ASSEMBLY DEVICE HAVING A CONNECTOR POSITION ASSURANCE DEVICE

The present invention relates to a connector assembly device comprising a connector element and a Connector Position Assurance (CPA) device.

Such a device that can be used in motor vehicles is known from DE 20 2017 10 774 U1. The device of DE 20 2017 105 774 U1 includes a connector element configured to be plugged into and locked with a complementary connector. Furthermore, that connector includes a Connector Position Assurance (CPA) device that makes it possible to check and to be assured that proper mating is maintained with the complementary connector, and in particular while the connector is being used in an environment that may be regularly subjected to shocks or vibration, as applies typically to the situation in which it is used in a motor vehicle. Maintaining proper mating is achieved by a central lance provided with a latch implementing a form-fitting connection with a retaining element of the connector element when the connector element is mated with the complementary connector and when the CPA device is in an assembly position relative to the connector element.

The CPA device further comprises secondary elements that are distinct from the lance and that are arranged on the lateral sides of the CPA device so as to maintain the CPA device in a position called a pre-assembly position relative to the connector element before insertion into the complementary connector. Maintaining the CPA device in the pre-assembly position is achieved by a co-operation between the secondary elements and cross-pieces present in the connector element.

Starting from that known device, the object of the present invention is to provide an improved assembly device that complies with the compactness standards required by motor vehicle manufacturers and making it possible to achieve more effective locking of the complementary connector with the connector element.

The present invention provides a connector assembly device comprising a connector element comprising first locking means and configured to be plugged into and locked with a complementary connector; and a connector position assurance device, also known as a CPA device, mounted to move relative to the connector element between a first position called a delivery position and a second position called a locking position, the CPA device comprising a flexible locking lance having first locking means associated with the first locking means of the connector element and configured to implement a form-fitting connection with the first

locking means of the connector element in the locking position so as to lock the connector element when it is plugged into the complementary connector, thereby preventing any movement of the CPA device in the direction going from the locking position towards the delivery position; said connector assembly device being characterized in that the connector element is provided with second locking means and the locking lance is provided with second locking means associated with the second locking means of the connector element, and configured to implement a second form-fitting connection with the second locking means of the connector element in the locking position, thereby preventing any movement of the CPA device in the direction going from the locking position towards the delivery position; and the form-fitting connection between the first locking means and the associated first locking means, and the form-fitting connection between the second locking means and the associated second locking means take place in different planes.

By means of the second locking means and of its associated locking means, it becomes possible to improve the stability and the reliability of the locking, because the forces exerted on the CPA device are shared between the two locking means at different places, thereby making the locking more robust.

In providing a device, the present invention may be further improved by means of the following embodiments.

In an embodiment, the form-fitting connection between the first locking means and the associated first locking means, and the form-fitting connection between the second locking means and the associated second locking means may take place in different planes that are parallel to the direction going between the locking position and the delivery position. Thus, the reliability of the locking of the CPA device in the assembly device is made even more robust relative to the unlocking direction, going from the locking position towards the delivery position.

In an embodiment, in the delivery position and in the absence of a complementary connector, the first and/or second locking means of the connector element may block the associated first and/or second locking means of the CPA device in the direction going from the delivery position towards the locking position by/with a form-fitting connection. Thus, when the connector element is not plugged in with a complementary connector, the CPA device is prevented from going inadvertently towards the locking position.

In an embodiment, in the delivery position and in the absence of a complementary connector, the free end of the locking lance of the CPA device may abut against the second locking

means of the connector element. Thus, the second locking means of the connector element serve to secure both the delivery position and the locking position of the CPA device.

In an embodiment, the first and the second locking means of the connector element may be protrusions (projections) protruding in different directions, in particular in opposite directions. Thus, it is possible to achieve locking that is more robust with a design that is of relatively low complexity.

In an embodiment, the protrusions may protrude perpendicularly to the direction going from the delivery position towards the locking position. By using opposite directions, the distribution of the forces is further optimized.

In an embodiment, the associated first locking means may be a lance head latch. In an embodiment, the associated second locking means may be a recess, in particular a through hole. By using a recess on the lance side and a protrusion on the connector element side, it is possible to implement a form-fitting connection that acts in a plurality of directions, in particular in the plane of the lance. This makes the locking even more robust, in particular against vibration. Furthermore, by using a recess, advantage is taken of the same flexing of the lance to put in place the two form-fitting connections.

In an embodiment, the lance head latch may be positioned at the free end of the locking lance and the recess is adjacent to the lance head latch, on a lateral side of the lance head latch. Thus, without enlarging the lance compared with the state of the art, it becomes possible to provide a second form-fitting connection.

In an embodiment, the associated second locking means may comprise a second recess positioned on the other side of the lance head latch. Thus, the locking may take place at three different places.

In an embodiment, the recess may be arranged further away from the free end of the locking lance than the lance head latch is. Thus, the form-fitting connections are also implemented in two different planes perpendicularly to the direction going from the delivery position to the locking position.

In an embodiment, the CPA device may comprise two locking lances, in particular parallel to each other, each one comprising associated first locking means and associated second locking means. Thus, the forces on the CPA device are distributed even better so as to avoid inadvertent unblocking, i.e. unlatching.

In an embodiment, the CPA device may further comprise stop means, in particular positioned on a lateral side of the CPA device, parallel to the direction going from the delivery position to the locking position, so as to prevent the connector element and the CPA device from being disassembled. Thus, the CPA device cannot be removed inadvertently from the connector element or be lost.

The invention and its advantages are explained in more detail below by means of preferred embodiments with reference in particular to the following accompanying figures, in which:

Figure 1A is a view seen from above of a first embodiment of a connector assembly device of the present invention, when the CPA device is in the delivery position;

Figure 1B is a side view of the first embodiment of a connector assembly device of the present invention, when the CPA device is in the delivery position;

Figure 1C is a section view on section C-C of Figure 1 of the first embodiment of a connector assembly device of the present invention, when the CPA device is in the delivery position;

Figure 1D is a section view on section D-D of Figure 1 of the first embodiment of a connector assembly device of the present invention, when the CPA device is in the delivery position;

Figure 1E is a front view of the connector element in the first embodiment of the present invention, with an enlarged view of the connection portion;

Figure 1F is a view seen from above of the CPA device in the first embodiment of the present invention;

Figure 1G is a side view of the CPA device in the first embodiment of the present invention;

Figure 2A is a section view on the same section C-C as in Figure 1C of the first embodiment of a connector assembly device of the present invention in the presence of a complementary connector when the CPA device is in the locking position;

Figure 2B is a section view on the same section D-D as in Figure 1D of the connector assembly device with the complementary connector when the CPA device is in the locking position;

Figure 3A is a view seen from above of a CPA device in a second embodiment of the present invention;

Figure 3B is a side view of the CPA device in the second embodiment of the present invention;

Figure 3C is a front view of the connector element in the second embodiment of the present invention, with an enlarged view of the connection portion of the connector element;

Figure 4 is a section view on the same section D-D as in Figure 1A of the first embodiment of a connector assembly device of the present invention with the complementary connector, when the CPA device is in the delivery position, but in the presence of the complementary connector; and

Figure 5 is a view seen from above of Figure 4.

The invention is described in more detail below by using advantageous embodiments by way of example and with reference to the drawings. The embodiments described are possible configurations, and it should be borne in mind that the individual characteristics as described above may be provided independently from one another or be omitted entirely when implementing the present invention.

Figures 1A to 1G, 2A, 2B, 4, and 5 show the same first embodiment of an assembly device 100 of the invention in two different states. Figures 1A to 1G show the assembly device 100 in a state without the mating connector 200, and Figures 2A to 2B show the assembly device 100 in a locked state in which it is locked with a mating connector 200.

Figure 1A shows the assembly device 100 that comprises a connector element 102 and a Connector Position Assurance (CPA) device 104, which is inserted into the connector element 102, and more specifically into the connection portion 106 of the connector element 102. In Figures 1A to 1D, the CPA device 104 is in a position called a delivery position. The CPA device 104 is mounted to move relative to the connector element 102, between the delivery position, shown in Figures 1A to 1D, and a second position called a locking position, shown in Figures 2A and 2B.

A second locking element 108 shown in Figures 1B, 2A, and 2B and in Figure 4 may also be present in the assembly device 100. The second locking element 108 is not involved in the locking mechanism of the CPA device of the present invention. It is therefore not necessary for locking the CPA device of the present invention.

The CPA device 104 has a contact or push surface 114, which is a surface on which a user can exert pressure for inserting the CPA device 104 into the connection portion 106 of the connector element 102.

As shown in particular in Figures 1A, 1C, and 1D or indeed in Figures 1F and 1G, the CPA device 104 comprises a locking lance 110 that extends from a main body 112 of the CPA

device 104 in the insertion direction 136, as shown in Figure 1F. The insertion direction 136 corresponds to the direction going from the delivery position towards the locking position of the CPA device 104.

The locking lance 110 extends from the center of the main body 112. The locking lance 110 comprises first locking means 118 and second locking means 120.

In this embodiment, the first locking means 118 is a lance head latch or leg, i.e. a projection perpendicular to the plane surface of the locking lance 110. In Figures 1F and 1G, the lance head latch 118 is positioned at the free end 122 of the locking lance 110, opposite from the end 124 connected to the main body 112. Furthermore, the lance head latch 118 is positioned centrally on the locking lance 110 in the direction Y.

In a variant, the first locking means may also comprise a plurality of latches. In another variant, the latch may also be positioned in some other position on the locking lance.

In this embodiment, the second locking means 120 is a recess in the locking lance 110, in particular a through hole, as shown in Figures 1F and 1G. In this example, the second locking means 120 comprises two recesses. In a variant, the second locking means 120 may comprise only one recess.

As shown in Figures 1F and 1G, the recesses 120 are adjacent to the lance head latch 118 on either side of the lance head latch 118. The second locking means 120 is arranged further away from the free end 122 of the locking lance 110 than the lance head latch 118 is.

The locking lance 110 is a flexible element, in such a manner that, while the CPA device 104 is being inserted into the connector element 102 from the delivery position to the locking position or vice versa, the locking lance 110 can bend downwards, as shown in Figure 4. Indeed, the locking lance 110 can be deflected in order to enable the CPA device 104 to be inserted from its delivery position towards the locking position in the connector element 102 as plugged into the complementary connector 200, which can be locked with the connector element 102, as shown in Figures 2A and 2B. In particular, the locking of the connector element 102 with the complementary connector 200 takes place by form-fitting connection or latching, in particular by snap-fastening, with a locking region 116 of the connector element 102. Furthermore, the locking of the connector element 102 with the complementary connector 200 also takes place by means of the first locking means 118 of the locking lance 110 of the CPA device 104.

The CPA device 104 further comprises stop means 126 that are positioned laterally on the main body 112 of the CPA device 104, on either side of the lance 110. The stop means 126 may be constituted by latches, and as such projections extending outwards from the lateral sides 128, 130 of the main body 112 of the CPA device 104. The stop means 126 is configured in such a manner that when the CPA device 104 is inserted into the connector element 102 to its delivery position, the stop means 126 prevents the CPA device 104 from coming back out of the connection portion 106 once it has been inserted to its delivery position. Thus, the CPA device 104 remains assembled with the connector element 102.

The connector element 102 comprises first locking means 132 configured to provide the locking with a complementary connector 200 as described above.

The first locking means 118 of the CPA device 104 is also referred to as associated locking means because they are associated with the first locking means 132 of the connector element 102 and are configured to implement a form-fitting connection with the first locking means 132 of the connector element 102 in the locking position, so as to lock the connector element 102 when it is plugged into the complementary connector 200, thereby preventing movement of the CPA device 104 in the direction going from the locking position towards the delivery position, as shown in Figure 2A.

The connector element 102 comprises second locking means 134. The second locking means 134 is associated with the second locking means 120 (also referred to as the associated second locking means) of the locking lance 110 of the CPA device 104, and are configured to implement a second form-fitting connection with the second locking means 120 of the CPA device 104 in the locking position, thereby preventing the CPA device 104 from moving in the direction going from the locking position towards the delivery position, as shown in Figure 2B.

The first locking means 132 and the second locking means 134 of the connector element 102 are protrusions protruding in different directions, in particular in opposite directions. As shown in Figure 1E, in the enlarged view of the connection portion 106 of the connector element 102, the protrusions 132, 134 protrude perpendicularly to the direction going from the delivery position towards the locking position, in opposite directions. In particular, in Figure 1E, the protrusion of the first locking means 132 is a projection extending outwards from the top surface 106a of the connection portion 106 of the connector element 102, whereas the protrusions of the second locking means 134 are projections extending outwards from the bottom surface 106b of the connection portion 106 of the connector

element 102. The first locking means 132 and the second locking means 134 of the connector element 102 have a function of acting as abutments.

The first locking means 118 of the CPA device 104 is arranged and configured such that, in the absence of the complementary connector 200, the CPA device 104 remains blocked, i.e. prevented from moving, in the connector element 102 in its delivery position, which position is the one shown in Figures 1A to 1D. Indeed, in the delivery position, the first locking means 118 of the CPA device 104 is in the locking region 116 of the connection portion 106 of the connector element 102, in such a manner that a portion of their protrusion extends outwards from the top surface 106a of the connection portion 106 of the connector element 102 and abuts against the first locking means 132, thereby preventing the CPA device 104 from advancing in the insertion direction 136, as is shown in Figures 1B, 1C, and 1D.

Furthermore, in its delivery position, the CPA device 104 of the device 100 of the invention is also blocked, i.e. prevented from moving, in the insertion direction 136, because the free end 122 of the locking lance 110 of the CPA device also abuts against the second locking means 134 of the connection portion 106 of the connector element 102, i.e. against the projections or abutments 134, as shown in Figures 1C and 1D.

In its delivery position, the CPA device 104 cannot be inserted any further into the connector element 102, in particular into the connection portion 106. In this way, the CPA device 104 is blocked, i.e. latched, reliably in its delivery position, while also being blocked, i.e. prevented from moving, in the direction opposite to the insertion direction 136, which is the direction going from the delivery position towards the locking position, by the stop means 126 of the CPA device 104.

The form-fitting connection between the first locking means 132 of the connector element 102 and the associated first locking means 118 of the CPA device 104, and the form-fitting connection between the second locking means 134 of the connector element 102 and the associated second locking means 120 of the CPA device 104 preventing insertion of the CPA device 104 towards the locking position take place in different planes. In addition, the planes of the form-fitting connections are parallel to the direction going between the locking position and the delivery position, as shown in Figures 1C and 1D.

In the first embodiment shown in Figures 1A to 1D, the device 100 is not mated with the complementary connector 200, and the protrusion of the first locking means 118 of the locking lance 110 of the CPA device 104 is thus snap-fastened into the locking region 116 of the connector element 102.

When the complementary connector 200 is plugged into and locked with the connector element 102, the complementary connector 200 is locked at the locking region 116 of the connector element 102, as shown in Figures 2A and 2B. The complementary connector 200 comprises a protrusion 202 that is snap-fastened in a manner known from state of the art with the first locking means 132 of the locking zone 116 of the connector element 102 so as to provide a reliable connection. In the presence of the protrusion 202, the first locking means 132 initially flex downwards and then come back up once the protrusion 202 has gone past, and come to be received in an excavation or excess 206 in the complementary connector 200.

When the complementary connector 200 is put in place on the connector element 102 so as to be plugged in and locked, its protrusion 202 also comes to bear against the first locking means 118 of the locking lance 110 of the CPA device 104, so that the locking lance 110 is deflected towards the inside of the connection portion 106 in order to enable the CPA device 104 to be inserted from its delivery position towards the locking position in the connector element 102, as shown in Figure 4. The protrusion 202 of the complementary connector 200 is thus snap-fastened into the locking region 116 of the connection portion 106 that has become free, and the complementary connector 200 is maintained plugged-in and locked with the connector element 102. The CPA device 104 is inserted until it reaches the locking position.

Thus, the first locking means 118 of the CPA device 104 leads to the CPA device 104 being unblocked, i.e. unlatched, when the complementary connector 200 is locked to the connector element 102, enabling the CPA device 104 to be inserted to the locking position. In other words, in accordance with the present invention, the CPA device 104 is released from its delivery position only by interaction with the complementary connector 200, and in particular only if the complementary connector 200 has been inserted far enough into the connector element 102.

The CPA device 104 advancing to the position arranged to lock the connector element 102 as plugged into the complementary connector 200 can be achieved only by unlocking, i.e. unlatching, the CPA device 104, which becomes possible only once the connector element 102 is inserted into and locked with the complementary connector 200.

In Figure 4, although the CPA device 104 is no longer blocked from moving in the insertion direction 136, because the first locking means 118 of the locking lance 110 no longer abut against the first locking means 132 and become free, i.e. released, the CPA device 104 remains blocked from moving in the direction opposite from the insertion direction 136 by the

stop means 126 that abut against a latch 138 in the connector element 102, as shown in Figure 5.

In the locking position of the CPA device 104 and as shown in Figure 2A, the first locking means 118 of the CPA device have, in the insertion direction 136, gone past the first locking means 132 of the connector element and now implement a form-fitting connection therewith in the direction opposite from the insertion direction 136.

Furthermore, as shown in Figure 2B, in the locking position of the CPA device 104, the second locking means 120 associated with the second locking means 134 of the connector element 102 also realizes a form-fitting connection with the second locking means 134 of the connector element 102, thereby also preventing any movement of the CPA device 104 in the direction opposite from the insertion direction 136. Indeed, the protrusion of the second locking means 134 engages in a form-fitting manner into the recess 120. By inserting the latch 134 into the recess 120, blocking is implemented in both directions in the plane perpendicular to the section D-D, thereby increasing the reliability of the locking, even in the presence of vibration.

Thus, the locking position is achieved by a plurality of form-fitting connections, thereby increasing the resistance to inadvertent unblocking, i.e. to inadvertent unlatching. In particular, by placing the connections in different planes relative to the insertion direction 136, the forces are better distributed and the reliability of the device is increased.

In the locking position of the CPA device 104 in the connector element 102, a retaining force is present at the locking lance 110. Thus, the locking of the CPA device 104 is increased. This also applies for unlocking.

The locking position of the CPA device 104 is achievable with or without continuous stress on the CPA device 104.

In a second embodiment of the invention, shown in Figures 3A to 3C, the CPA device 304 may include two locking lances 310 that are centered in the central recess of the main body 312 of the CPA device 304 and separated from each other by a central recess 308. In particular, the two locking lances 310 are parallel to each other, each comprising associated first locking means 318, a latch in this example, and associated second locking means 320, a recess in this example. The first locking means 318 and the second locking means 320 of the second embodiment thus correspond essentially to those described for the first embodiment, and they perform the same functionality with a connector element 302 having complementary first and second locking means 332 and 334.

Thus, as shown in Figure 3C, the connector element 302 includes a connection region 306 having two first locking means 332 associated with the first locking means 318 positioned on respective ones of the locking lances 310 and two second locking means 334 associated with the second locking means 320 positioned on respective ones of the locking lances 310. The two pairs of locking means 332, 334 are separated by the same distance 308 as the lances 310.

Blocking, i.e. latching, in the delivery position, going from the delivery position to the locking position in the presence of a complementary connector, and blocking, i.e. latching, in the locking position take place in the same way as in the first embodiment.

The embodiments described are merely possible configurations, and it should be borne in mind that the individual characteristics of the various embodiments may be combined or be provided independently from one another.

REFERENCES

100: assembly device
102: connector element
104: CPA device
106: connection portion
106a: top surface of the connection portion
106b: bottom surface of the connection portion
108: second locking element
110: locking lance
112: main body
114: push surface of the CPA device
116: locking region
118: first locking means of the CPA device
120: second locking means of the CPA device
122: free end of the locking lance
124: end of the locking lance
126: stop means of the CPA device
128, 130: lateral side of the CPA device
132: first locking means of the connector element
134: second locking means of the connector element
136: insertion direction
138: latches

200: complementary connector
202: protrusion of the complementary connector
206: excavation or recess

300: assembly device
302: connector element
304: CPA device
308: distance between locking lances
310: locking lances
312: main body
318: first locking means of the CPA device
320: second locking means of the CPA device
332: first locking means of the connector element
334: second locking means of the connector element

CLAIMS

1. A connector assembly device (100, 300) comprising:
a connector element (102, 302) configured to be plugged into and locked with a complementary connector (200) and comprising first locking means (132, 332); and
a connector position assurance device (104, 304), also known as a CPA device (104, 304), mounted to move relative to the connector element (102, 302) between a first position called a delivery position and a second position called a locking position, the CPA device (104, 304) comprising a flexible locking lance (110, 310) having first locking means (118, 318) associated with the first locking means (132, 332) of the connector element (102, 302) and configured to implement a form-fitting connection with the first locking means (132, 332) of the connector element (102, 302) in the locking position so as to lock the connector element (102, 302) when it is plugged into the complementary connector (200), thereby preventing any movement of the CPA device (104, 304) in the direction going from the locking position towards the delivery position;
characterized in that:
the connector element (102, 302) comprises second locking means (134, 334) and the locking lance (110, 310) comprises second locking means (120, 320) associated with the second locking means (134, 334) of the connector element (102, 302), and configured to implement a second form-fitting connection with the second locking means (134, 334) of the connector element (102, 302) in the locking position, thereby preventing any movement of the CPA device (104, 304) in the direction going from the locking position towards the delivery position; and
the complementary-shape coupling between the first locking means (132, 332) and the associated first locking means (118, 318), and the complementary-shape coupling between the second locking means (134, 334) and the associated second locking means (120, 320) take place in different planes.

2. The assembly device according to claim 1, wherein the form-fitting connection between the first locking means (132, 332) and the associated first locking means (118, 318), and the form-fitting connection between the second locking means (134, 334) and the associated second locking means (120, 320) take place in different planes that are parallel to the direction between the locking position and the delivery position.

3. The assembly device according to claim 1 or claim 2, wherein, in the absence of a complementary connector (200) and in the delivery position, the first and/or second locking means (132, 332, 134, 334) of the connector element (102, 302) block the associated first and/or second locking means (118, 318, 120, 320) of the CPA device (104, 304) with a form-fitting connection, in the direction going from the delivery position towards the locking position.

4. The assembly device according to any one of claims 1 to 3, wherein, in the delivery position and in the absence of a complementary connector (200), the free end (122) of the locking lance (110, 310) of the CPA device (104, 304) abuts against the second locking means (134, 334) of the connector element (102, 302).

5. The assembly device according to any one of claims 1 to 4, wherein the first (132, 332) and the second locking means (134, 334) of the connector element (102, 302) are protrusions (132, 332, 134, 334) protruding in different directions, in particular in opposite directions.

6. The assembly device according to claim 5, wherein the protrusions (132, 332, 134, 334) protrude perpendicularly to the direction going from the delivery position towards the locking position.

7. The assembly device according to any one of claims 1 to 6, wherein the associated first locking means (118, 318) is a lance head latch (118, 318).

8. The assembly device of any one of claims 1 to 7, wherein the associated second locking means (120, 320) is a recess (120, 320), in particular a through hole.

9. The assembly device according to claims 7 and 8, wherein the lance head latch (118, 318) is positioned at the free end (122) of the locking lance (110, 310) and the recess (120, 320) is adjacent to the lance head latch (118, 318), on a lateral side of the lance head latch (118, 318).

10. The assembly device according to claim 8 or claim 9, wherein the associated second locking means (120, 320) comprises a second recess (120, 320) positioned on the other side of the lance head latch (118, 318).

11. The assembly device according to any one of claims 8 to 10, wherein the recess (120, 320) is arranged in such a manner as to be further away from the free end (122) of the locking lance (110, 310) than the lance head latch (118, 318) is.

12. The assembly device according to any one of claims 1 to 11, wherein the CPA device (304) comprises two locking lances (310), in particular parallel to each other, each one being provided with associated first locking means (318) and with associated second locking means (320).

Intellectual Property Office

Application No:	GB2100599.6	**Examiner:**	Contract Unit Examiner
Claims searched:	1-12	**Date of search:**	27 September 2021

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-12	EP3211730 A1 (DAI-ICHI SEIKO CO LTD) paragraph [0067]; figures 10B, 18C, 20
A	-	US10135172 B1 (FOLTZ KEITH RICHARD ET AL) figures 4-5
A	-	DE202017105774 U1 (LEONI BORDENTZ SYS GMBH) figure 1

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

Worldwide search of patent documents classified in the following areas of the IPC

H01R

The following online and other databases have been used in the preparation of this search report

International Classification:

Subclass	Subgroup	Valid From
None		