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(54) **ELECTRICAL CONNECTION MODULE AND CONNECTOR**

(57) The present invention discloses an electrical connection module and a connector. The electrical connection module comprises of: an inner housing (3) which is formed with a pair of first terminal slots (301) extending along its longitudinal direction (Y) and a second terminal slot (302) extending along its height direction (Z), and has opposite front and rear ends in its longitudinal direction (Y); a pair of first terminals (11) which are respectively inserted into the pair of first terminal slots (301), and their length and width directions are parallel to the longitudinal direction (Y) and the height direction (Z), respectively; and a second terminal (12) which is inserted into the second terminal slot (302) and its length direction and width direction are parallel to the height direction (Z) and the longitudinal direction (Y), respectively. The pair of first terminal slots (301) are arranged side by side in a transverse direction (X) of the inner housing (3), and the second terminal slot (302) is located between the pair of first terminal slots (301), the first terminal slot (301) extends forward along the longitudinal direction (Y) beyond the second terminal slot (302), and the second terminal slot (302) extends upward along the height direction (Z) beyond the first terminal slot (301); the first terminal slot (301) has a first insertion port (301a) formed on the bottom of the inner housing (3), the second terminal slot (302) has a second insertion port (302a) formed on the bottom of the inner housing (3) and offset from the first insertion port (301a) in the longitudinal direction (Y); the first terminal (11) is used to mate with a first mating

terminal inserted into the first insertion port (301a) along the height direction (Z), and the second terminal (12) is used to mate with a second mating terminal inserted into the second insertion port (302a) along the height direction (Z). The present invention can save the layout space of three terminals, thereby reducing the size of the electrical connection module and connector.

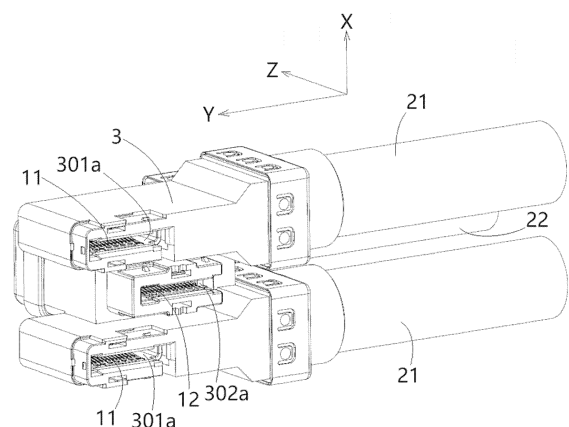


Fig. 2

Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of Chinese Patent Application No. CN202410008596.3 filed on January 2, 2024 in the State Intellectual Property Office of China, the whole disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to an electrical connection module and a connector comprising the electrical connection module.

Description of the Related Art

[0003] In the prior art, it is often necessary to use a 90 degree connector (also known as a right angle connector), which has a cable lead direction perpendicular to the mating direction of the terminals. In the prior art, when the connector has multiple terminals and cables, the multiple terminals are usually arranged side by side in the cable lead direction, and the multiple cables are usually arranged side by side in the mating direction of terminals. This arrangement can lead to the connector being too large in size.

SUMMARY OF THE INVENTION

[0004] The present invention has been made to overcome or alleviate at least one aspect of the above mentioned disadvantages.

[0005] According to an aspect of the present invention, there is provided an electrical connection module. The electrical connection module comprises of an inner housing which is formed with a pair of first terminal slots extending along its longitudinal direction and a second terminal slot extending along its height direction, and has opposite front and rear ends in its longitudinal direction; a pair of first terminals which are respectively inserted into the pair of first terminal slots, and their length and width directions are parallel to the longitudinal direction and the height direction, respectively; and a second terminal which is inserted into the second terminal slot and its length direction and width direction are parallel to the height direction and the longitudinal direction, respectively. The pair of first terminal slots are arranged side by side in a transverse direction of the inner housing, and the second terminal slot is located between the pair of first terminal slots, the first terminal slot extends forward along the longitudinal direction beyond the second terminal slot, and the second terminal slot extends upward along the height direction beyond the first terminal slot, the first terminal slot has a first insertion port formed on the

bottom of the inner housing, the second terminal slot has a second insertion port formed on the bottom of the inner housing and offset from the first insertion port in the longitudinal direction, the first terminal is used to mate with a first mating terminal inserted into the first insertion port along the height direction, and the second terminal is used to mate with a second mating terminal inserted into the second insertion port along the height direction.

[0006] According to an exemplary embodiment of the present invention, the first terminal comprises a first terminal body, which has a first mating part and a first connection part opposite to each other in the longitudinal direction of the inner housing; the first mating part has a first mating port facing the first insertion port for mating with the first mating terminal, and the first connection part is used for electrical connection with a first cable introduced along the longitudinal direction; the second terminal comprises a second terminal body, which has a second mating part and a second connection part opposite to each other in the height direction of the inner housing; the second mating part has a second mating port facing the second insertion port for mating with the second mating terminal, and the second connection part is used for electrical connection with a second cable introduced along the longitudinal direction.

[0007] According to another exemplary embodiment of the present invention, a pair of first cable holes that are respectively communicated with the pair of first terminal slots are formed in the rear end of the inner housing to allow a pair of first cables to be introduced along the longitudinal direction, and a second cable hole that is communicated with the second terminal slot is formed in the rear end of the inner housing to allow a second cable to be introduced along the longitudinal direction; the pair of first cable holes are arranged side by side in the transverse direction of the inner housing, and the second cable hole is located between and above the pair of first cable holes.

[0008] According to another exemplary embodiment of the present invention, the electrical connection module further comprises of a pair of first cables which are respectively introduced from the pair of first cable holes along the longitudinal direction and electrically connected to the first connection parts of the pair of first terminals; and a second cable which is introduced along the longitudinal direction from the second cable hole and electrically connected to the second connection part of the second terminal. The pair of first cables are arranged side by side in the transverse direction of the inner housing, and the second cable is located between and above the pair of first cables.

[0009] According to another exemplary embodiment of the present invention, the first cable has a first conductor end electrically connected to the first connection part of the first terminal body, and the second cable has a second conductor end electrically connected to the second connection part of the second terminal body; the first con-

ductor ends of the pair of first cables are arranged side by side in the transverse direction of the inner housing, and the second conductor end of the second cable is located between and above the first conductor ends of the pair of first cables.

[0010] According to another exemplary embodiment of the present invention, the first mating part and the first connection part are respectively located at both ends of the length direction of the first terminal body, and the length direction and width direction of the first terminal body are parallel to the longitudinal direction and height direction of the inner housing, respectively; the second mating part and the second connection part are respectively located at both ends of the length direction of the second terminal body, and the length direction and width direction of the second terminal body are parallel to the height direction and longitudinal direction of the inner housing, respectively.

[0011] According to another exemplary embodiment of the present invention, the thickness direction of the first terminal body is perpendicular to the longitudinal direction and height direction of the inner housing, the first mating part includes a first top wall plate and a first bottom wall plate spaced opposite each other in the thickness direction of the first terminal body, a first slot is defined between the first top wall plate and the first bottom wall plate to allow the insertion of the first mating terminal.

[0012] According to another exemplary embodiment of the present invention, the thickness direction of the second terminal body is perpendicular to the longitudinal direction and height direction of the inner housing, and the second mating part includes a second top wall plate and a second bottom wall plate spaced opposite each other in the thickness direction of the second terminal body, a second slot is defined between the second top wall plate and the second bottom wall plate to allow the insertion of the second mating terminal.

[0013] According to another exemplary embodiment of the present invention, the first terminal further comprises a pair of first terminal contacts which are respectively installed on the inner sides of the first top wall plate and the first bottom wall plate of the first mating parts, the first terminal contact has multiple first elastic contact arms arranged in a row in the longitudinal direction and extending in the height direction for electrical contact with the first mating terminal inserted along the height direction.

[0014] According to another exemplary embodiment of the present invention, the second terminal further comprises a pair of second terminal contacts which are respectively installed on the inner sides of the second top wall plate and the second bottom wall plate of the second mating part, the second terminal contact has multiple second elastic contact arms arranged in a row in the longitudinal direction and extending in the height direction, for electrical contact with the second mating terminal inserted along the height direction.

[0015] According to another exemplary embodiment of

the present invention, the first terminal further comprises a first terminal limiting member which is U-shaped and is fitted onto the end of the first mating part to ensure that the distance between the first top wall plate and the first bottom wall plate is equal to a predetermined value.

[0016] According to another exemplary embodiment of the present invention, the first terminal limiting member comprises: a first top plate which is attached to the outer side of the first top wall plate; a first bottom plate which is attached to the outer side of the first bottom wall plate; and a first side plate which is connected between the first top plate and the first bottom plate and is attached to the end face of the first mating part.

[0017] According to another exemplary embodiment of the present invention, the first top plate and the first bottom plate have opposite sides in the width direction of the first terminal body, first elastic buckles with a C-shaped cross-section are respectively formed on both sides of the first top plate and the first bottom plate, and first snap slots corresponding to the first elastic buckles are formed on the edges of both sides of the first top wall plate and the first bottom wall plate, the first elastic buckles are engaged into the first snap slots to fix the first terminal limiting member to the first mating part.

[0018] According to another exemplary embodiment of the present invention, first elastic locking pieces are respectively formed on the first top plate and the first bottom plate, and the first elastic locking pieces are engaged with the inner housing to lock the first terminal into the inner housing; first guide ribs extending along the longitudinal direction are respectively formed on the first top plate and the first bottom plate, the first guide ribs are used to cooperate with first guide slots in the inner housing to guide the first terminal to be inserted into the inner housing along the longitudinal direction.

[0019] According to another exemplary embodiment of the present invention, the second terminal further comprises a second terminal limiting member which is annular in shape and is fitted onto the end of the second mating part to ensure that the distance between the second top wall plate and the second bottom wall plate is equal to a predetermined value.

[0020] According to another exemplary embodiment of the present invention, the second terminal limiting member comprises: a second top plate which is attached to the outer side of the second top wall plate; a second bottom plate which is attached to the outer side of the second bottom wall plate; and two second side plates connected between the second top plate and the second bottom plate. The second top plate and the second bottom plate have opposite sides in the width direction of the second terminal body, one second side plate is connected between one side of the second top plate and the second bottom plate and is attached to one side of the second mating part, while the other second side plate is connected between the other side of the second top plate and the second bottom plate and is attached to the other side of the second mating part.

[0021] According to another exemplary embodiment of the present invention, second elastic buckles with a C-shaped cross-section are respectively formed on both sides of the second top plate and the second bottom layer plate, second snap slots corresponding to the second elastic buckles are respectively formed on the left and right edges of the second top wall plate and the second bottom wall plate, the second elastic buckles are engaged into the second snap slots to fix the second terminal limiting member to the second mating part.

[0022] According to another exemplary embodiment of the present invention, second elastic locking pieces are respectively formed on the second top plate and the second bottom plate, and the second elastic locking pieces are engaged with the inner housing to lock the second terminal into the inner housing; second guide ribs extending along the height direction are respectively formed on the second top plate and the second bottom plate, the second guide ribs are used to cooperate with second guide slots in the inner housing to guide the second terminal to be inserted into the inner housing along the height direction.

[0023] According to another exemplary embodiment of the present invention, the first connection part comprises a first top layer plate and a first bottom layer plate stacked and riveted together in the thickness direction of the first terminal body, the first top layer plate and the first bottom layer plate are respectively connected to the first top wall plate and the first bottom wall plate, and the first conductor end is flat and stacked and welded on the first top layer plate or the first bottom layer plate.

[0024] According to another exemplary embodiment of the present invention, the second connection part comprises a second top layer plate and a second bottom layer plate stacked and riveted together in the thickness direction of the second terminal body, the second top layer plate and the second bottom layer plate are respectively connected to the second top wall plate and the second bottom wall plate, the second conductor end is flat and stacked and welded on the second top layer plate or the second bottom layer plate.

[0025] According to another exemplary embodiment of the present invention, the inner housing comprises: a main body which has a top opening communicated with the second terminal slot and the second cable hole; and a top cover which is installed on the top of the main body to close the top opening of the main body, the second terminal and the second cable are inserted into the main body of the inner housing through the top opening of the main body.

[0026] According to another exemplary embodiment of the present invention, the electrical connection module further comprises of a first shielding sleeve which is used to electrically connect a shielding layer of the first cable to an outer shielding shell of the connector; and a second shielding sleeve which is fitted onto the second cable for electrically connecting a shielding layer of the second cable to the outer shielding shell.

[0027] According to another exemplary embodiment of the present invention, the electrical connection module further comprises a rear end cover adapted to be locked to the rear end of the outer shielding shell of the connector, to fix the first cable and the second cable to the outer shielding shell, a through-hole is formed in the rear end cover to allow the first cable and the second cable to pass through.

[0028] According to another exemplary embodiment of the present invention, the electrical connection module further comprises of a first end cap which is installed on the first insertion port of the inner housing and formed with a first guide port for guiding the first mating terminal to be inserted into the first insertion port; and a second end cap which is installed on the second insertion port of the inner housing and formed with a second guide port for guiding the second mating terminal to be inserted into the second insertion port.

[0029] According to another exemplary embodiment of the present invention, a wall recess is formed on the outer side of the front end of the inner housing, which is located between the front ends of the pair of first terminal slots and in front of the second terminal slot; the wall recess is used to cooperate with an installation portion of the outer shielding shell of the connector, so that the connector can be fastened to a mating outer shielding shell by a bolt passing through the installation portion of the outer shielding shell along the height direction.

[0030] According to another aspect of the present invention, there is provided a connector. The connector comprises of an outer shielding shell which is formed with an installation chamber; and the above electrical connection module inserted into the installation chamber of the outer shielding shell.

[0031] According to an exemplary embodiment of the present invention, the outer shielding shell has an installation portion embedded in the wall recess of the inner housing, and a connection hole extending along the height direction of the outer shielding shell is formed in the installation portion; the connector further comprises a bolt that passes through the connection hole and is adapted to be threaded into a threaded hole of the mating outer shielding shell to fasten the connector to a mating connector.

[0032] According to another exemplary embodiment of the present invention, the outer shielding shell has front and rear ends that are opposite in its longitudinal direction, and bottom and top sides that are opposite in its height direction; the installation chamber has a rear port located at the rear end of the outer shielding shell, and the electrical connection module is inserted into the installation chamber through the rear port, the first cable and the second cable of the electrical connection module extend out of the rear port along the longitudinal direction; the installation chamber also has a bottom port located on the bottom of the front end of the outer shielding shell, and the first insertion port and the second insertion port of the inner housing of the electrical connection module are

located in the bottom port, so that the first mating terminal and the second mating terminal can be respectively inserted into the first insertion port and the second insertion port of the inner housing along the height direction through the bottom port.

[0033] According to another exemplary embodiment of the present invention, the connector further comprises a sealing ring which is set in the bottom port of the outer shielding shell and is suitable for being compressed between the outer shielding shell and the mating outer shielding shell to achieve sealing between the two.

[0034] In the aforementioned exemplary embodiments according to the present invention, the second terminal slot is located between the pair of first terminal slots and is offset from the pair of first terminal slots by a predetermined distance in the longitudinal direction of the inner housing. This layout can save the arrangement space of three terminals, thereby reducing the size of the electrical connection module and connector.

[0035] In the aforementioned exemplary embodiments according to the present invention, since the second terminal slot is offset by a predetermined distance from the pair of first terminal slots in the longitudinal direction of the inner housing, a wall recess facing the second terminal slot can be formed on the inner housing to allow the bolt used to fasten the connector to the mating connector to pass through the wall recess, so that the bolt is closer to the center of the connector, effectively preventing the connector from being subjected to unbalanced forces.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] The above and other features of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the accompanying drawings, in which:

Figure 1 shows an illustrative perspective view of an electrical connection module according to an exemplary embodiment of the present invention when viewed from the top;

Figure 2 shows an illustrative perspective view of an electrical connection module according to an exemplary embodiment of the present invention when viewed from the bottom;

Figure 3 shows an illustrative exploded view of an electrical connection module according to an exemplary embodiment of the present invention when viewed from the bottom;

Figure 4 shows an illustrative perspective view of the inner housing and end cap of an electrical connection module according to an exemplary embodiment of the present invention;

Figure 5 shows an exploded sectional view of an electrical connection module according to an exemplary embodiment of the present invention;

Figure 6 shows an assembled sectional view of an electrical connection module according to an ex-

emplary embodiment of the present invention;

Figure 7 shows another exploded sectional view of an electrical connection module according to an exemplary embodiment of the present invention;

Figure 8 shows another assembly sectional view of an electrical connection module according to an exemplary embodiment of the present invention;

Figure 9 shows an illustrative exploded view of the inner housing of an electrical connection module according to an exemplary embodiment of the present invention;

Figure 10 shows an illustrative perspective view of the first terminal and first cable of an electrical connection module according to an exemplary embodiment of the present invention;

Figure 11 shows an illustrative perspective view of the first terminal of an electrical connection module according to an exemplary embodiment of the present invention;

Figure 12 shows an illustrative perspective view of the second terminal and second cable of an electrical connection module according to an exemplary embodiment of the present invention;

Figure 13 shows an illustrative perspective view of the second terminal of an electrical connection module according to an exemplary embodiment of the present invention;

Figure 14 shows an illustrative exploded view of a connector according to an exemplary embodiment of the present invention when viewed from the bottom;

Figure 15 shows an illustrative exploded view of a connector according to an exemplary embodiment of the present invention when viewed from the top;

Figure 16 shows an illustrative perspective view of a connector according to an exemplary embodiment of the present invention when viewed from the bottom; and

Figure 17 shows a longitudinal sectional view of a connector according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0037] Exemplary embodiments of the present disclosure will be described hereinafter in detail with reference to the attached drawings, wherein the like reference numerals refer to the like elements. The present disclosure may, however, be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein; rather, these embodiments are provided so that the present disclosure will be thorough and complete, and will fully convey the concept of the disclosure to those skilled in the art.

[0038] In the following detailed description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the disclosed embodiments. It will be apparent, however, that

one or more embodiments may be practiced without these specific details. In other instances, well-known structures and devices are schematically shown in order to simplify the drawing.

[0039] According to a general concept of the present invention, there is provided an electrical connection module. The electrical connection module comprises of an inner housing which is formed with a pair of first terminal slots extending along its longitudinal direction and a second terminal slot extending along its height direction, and has opposite front and rear ends in its longitudinal direction; a pair of first terminals which are respectively inserted into the pair of first terminal slots, and their length and width directions are parallel to the longitudinal direction and the height direction, respectively; and a second terminal which is inserted into the second terminal slot and its length direction and width direction are parallel to the height direction and the longitudinal direction, respectively. The pair of first terminal slots are arranged side by side in a transverse direction of the inner housing, and the second terminal slot is located between the pair of first terminal slots, the first terminal slot extends forward along the longitudinal direction beyond the second terminal slot, and the second terminal slot extends upward along the height direction beyond the first terminal slot, the first terminal slot has a first insertion port formed on the bottom of the inner housing, the second terminal slot has a second insertion port formed on the bottom of the inner housing and offset from the first insertion port in the longitudinal direction, the first terminal is used to

mate with a first mating terminal inserted into the first insertion port along the height direction, and the second terminal is used to mate with a second mating terminal inserted into the second insertion port along the height direction.

[0040] According to another general concept of the present invention, there is provided a connector. The connector comprises of: an outer shielding shell which is formed with an installation chamber; and the above electrical connection module inserted into the installation chamber of the outer shielding shell.

[0041] Figure 1 shows an illustrative perspective view of an electrical connection module 100 according to an exemplary embodiment of the present invention when viewed from the top; Figure 2 shows an illustrative perspective view of the electrical connection module 100 according to an exemplary embodiment of the present invention when viewed from the bottom; Figure 3 shows an illustrative exploded view of the electrical connection module 100 according to an exemplary embodiment of the present invention when viewed from the bottom; Figure 4 shows an illustrative perspective view of the inner housing 3 and end caps 33, 34 of the electrical connection module 100 according to an exemplary embodiment of the present invention; Figure 5 shows an exploded cross-sectional view of an electrical connection module 100 according to an exemplary embodiment of the present invention; Figure 6 shows an assembled

sectional view of an electrical connection module 100 according to an exemplary embodiment of the present invention; Figure 7 shows another exploded cross-sectional view of the electrical connection module 100 according to an exemplary embodiment of the present invention; Figure 8 shows another assembly sectional view of the electrical connection module 100 according to an exemplary embodiment of the present invention.

[0042] As shown in Figures 1 to 8, in an exemplary embodiment of the present invention, an electrical connection module 100 is disclosed. The electrical connection module 100 includes an inner housing 3, a pair of first terminals 11, and a second terminal 12. A pair of first terminal slots 301 extending along a longitudinal direction Y of the inner housing 3 and a second terminal slot 302 extending along a height direction Z of the inner housing 3 are formed in the inner housing 3. The inner housing 3 has front and rear ends that are opposite in its longitudinal direction Y. The pair of first terminals 11 are respectively inserted into the pair of first terminal slots 301, and the length and width directions of the first terminals 11 are parallel to the longitudinal Y and height Z directions of the inner housing 3, respectively. The second terminal 12 is inserted into the second terminal slot 302, and the length and width directions of the second terminal 12 are parallel to the height direction Z and longitudinal direction Y of the inner housing 3, respectively.

[0043] As shown in Figures 1 to 8, in the illustrated embodiment, the pair of first terminal slots 301 are arranged side by side in the transverse direction X of the inner housing 3, and a second terminal slot 302 is located between the pair of first terminal slots 301. The first terminal slot 301 extends forward along the longitudinal direction Y beyond the second terminal slot 302, and the second terminal slot 302 extends upward along the height direction Z beyond the first terminal slot 301. The first terminal slot 301 has a first insertion port 301a formed on the bottom side of the inner housing 3, the second terminal slot 302 has a second insertion port 302a formed on the bottom side of the inner housing 3. The second insertion port 302a is offset from the first insertion port 301a in the longitudinal direction (Y). The first terminal 11 is used to mate with a first mating terminal (not shown) inserted into the first insertion port 301a along the height direction Z, and the second terminal 12 is used to mate with a second mating terminal (not shown) inserted into the second insertion port 302a along the height direction Z.

[0044] Figure 9 shows an illustrative exploded view of the inner housing 3 of the electrical connection module 100 according to an exemplary embodiment of the present invention; Figure 10 shows an illustrative perspective view of the first terminal 11 and the first cable 21 of the electrical connection module 100 according to an exemplary embodiment of the present invention; Figure 11 shows an illustrative perspective view of the first terminal 11 of the electrical connection module 100 ac-

cording to an exemplary embodiment of the present invention; Figure 12 shows an illustrative perspective view of the second terminal 12 and the second cable 22 of the electrical connection module 100 according to an exemplary embodiment of the present invention; Figure 13 shows an illustrative perspective view of the second terminal 12 of the electrical connection module 100 according to an exemplary embodiment of the present invention.

[0045] As shown in Figures 1 to 13, in the illustrated embodiment, the first terminal 11 includes a first terminal body 110. The first terminal body 110 has a first mating part 111 and a first connection part 112 that are opposite to each other in the longitudinal direction Y of the inner housing 3. The first mating part 111 has a first mating port 111a facing the first insertion port 301a for mating with the first mating terminal, and the first connection part 112 is used for electrical connection with a first cable 21 introduced along the longitudinal direction Y. The second terminal 12 includes a second terminal body 120, which has a second mating part 121 and a second connection part 122 that are opposite to each other in the height direction Z of the inner housing 3. The second mating part 121 has a second mating port 121a facing the second insertion port 302a for mating with the second mating terminal, and the second connection part 122 is used for electrically connecting with a second cable 22 introduced along the longitudinal direction Y.

[0046] As shown in Figures 1 to 13, in the illustrated embodiment, a pair of first cable holes 301b are formed in the rear end of the inner housing 3, which are respectively communicated with the pair of first terminal slots 301 to allow a pair of first cables 21 to be introduced along the longitudinal direction Y. A second cable hole 302b is formed in the rear end of the inner housing 3, which is communicated with the second terminal slot 302 to allow a second cable 22 to be introduced along the longitudinal direction Y. The pair of first cable holes 301b are arranged side by side in the transverse direction X of the inner housing 3, and a second cable hole 302b is located between and above the pair of first cable holes 301b.

[0047] As shown in Figures 1 to 13, in the illustrated embodiment, the electrical connection module 100 further includes a pair of first cables 21 and a second cable 22. The pair of first cables 21 are respectively introduced from the pair of first cable holes 301b along the longitudinal direction Y and electrically connected to the first connection parts 112 of the pair of first terminals 11. The second cable 22 is introduced along the longitudinal direction Y from the second cable hole 302b and electrically connected to the second connection part 122 of the second terminal 12. The pair of first cables 21 are arranged side by side in the transverse direction X of the inner housing 3, and the second cable 22 is located between and above the pair of first cables 21.

[0048] As shown in Figures 1 to 13, in the illustrated embodiment, the first cable 21 has a first conductor end 211 electrically connected to the first connection part 112

of the first terminal body 110, and the second cable 22 has a second conductor end 221 electrically connected to the second connection part 122 of the second terminal body 120. The first conductor ends 211 of the pair of first cables 21 are arranged side by side in the transverse direction X of the inner housing 3, and the second conductor end 221 of the second cable 22 is located between and above the first conductor ends 211 of the pair of first cables 21.

[0049] As shown in Figures 1 to 13, in the illustrated embodiment, the first mating part 111 and the first connection part 112 are located at both ends of the length direction of the first terminal body 110, and the length direction and width direction of the first terminal body 110 are parallel to the longitudinal direction Y and height direction Z of the inner housing 3, respectively. The second mating part 121 and the second connection part 122 are located at both ends of the length direction of the second terminal body 120, and the length direction and width direction of the second terminal body 120 are parallel to the height direction Z and longitudinal direction Y of the inner housing 3, respectively.

[0050] As shown in Figures 1 to 13, in the illustrated embodiment, the thickness direction of the first terminal body 110 is perpendicular to the longitudinal direction Y and height direction Z of the inner housing 3. The first mating part 111 includes a first top wall plate 11a and a first bottom wall plate 11b spaced opposite each other in the thickness direction of the first terminal body 110, and a first slot 11c is defined between the first top wall plate 11a and the first bottom wall plate 11b to allow the insertion of the first mating terminal.

[0051] As shown in Figures 1 to 13, in the illustrated embodiment, the thickness direction of the second terminal body 120 is perpendicular to the longitudinal direction Y and height direction Z of the inner housing 3. The second mating part 121 includes a second top wall plate 12a and a second bottom wall plate 12b spaced opposite each other in the thickness direction of the second terminal body 120, and a second slot 12c is defined between the second top wall plate 12a and the second bottom wall plate 12b to allow the insertion of the second mating terminal.

[0052] As shown in Figures 1 to 13, in the illustrated embodiment, the first terminal 11 further includes a pair of first terminal contacts 101, which are respectively installed on the inner sides of the first top wall plate 11a and the first bottom wall plate 11b of the first mating parts 111. The first terminal contact 101 has multiple first elastic contact arms 101a, which are arranged in a row along the longitudinal direction Y and extend in the height direction Z, for electrical contact with the first mating terminal inserted along the height direction Z.

[0053] As shown in Figures 1 to 13, in the illustrated embodiment, the second terminal 12 further includes a pair of second terminal contacts 102, which are respectively installed on the inner sides of the second top wall plate 12a and the second bottom wall plate 12b of the second mating parts 121. The second terminal contact

102 has multiple second elastic contact arms 102a, which are arranged in a row along the longitudinal direction Y and extend in the height direction Z, for electrical contact with a second mating terminals inserted along the height direction Z.

[0054] As shown in Figures 1 to 13, in the illustrated embodiment, the first terminal 11 further includes a first terminal limiting member 103, which is U-shaped and fitted onto the end of the first mating part 111 to ensure that the distance between the first top wall plate 11a and the first bottom wall plate 11b is equal to a predetermined value.

[0055] As shown in Figures 1 to 13, in the illustrated embodiment, the first terminal limiting member 103 includes a first top plate 103a, a first bottom plate 103b, and a first side plate 103c. The first top plate 103a is attached to the outer side of the first top wall plate 11a. The first bottom plate 103b is attached to the outer side of the first bottom wall plate 11b. The first side plate 103c is connected between the first top plate 103a and the first bottom plate 103b and is attached to the end face of the first mating part 111.

[0056] As shown in Figures 1 to 13, in the illustrated embodiment, the first top plate 103a and the first bottom plate 103b have opposite sides in the width direction of the first terminal body 110. First elastic buckles 103f with a C-shaped cross-section are respectively formed on both sides of the first top plate 103a and the first bottom plate 103b, and first snap slots 11f corresponding to the first elastic buckles 103f are respectively formed on the edges of the first top wall plate 11a and the first bottom wall plate 11b. The first elastic buckles 103f are engaged in the first snap slots 11f to fix the first terminal limiting member 103 to the first mating part 111.

[0057] As shown in Figures 1 to 13, in the illustrated embodiment, first elastic locking pieces 103d are formed on the first top plate 103a and the first bottom plate 103b, respectively. The first elastic locking pieces 103d are engaged with the inner housing 3 to lock the first terminal 11 into the inner housing 3. First guide ribs 103e extending along the longitudinal direction Y are respectively formed on the first top plate 103a and the first bottom plate 103b. The first guide ribs 103e are used to cooperate with first guide slots in the inner housing 3 to guide the first terminal 11 to be inserted into the inner housing 3 along the longitudinal direction Y.

[0058] As shown in Figures 1 to 13, in the illustrated embodiment, the second terminal 12 further includes a second terminal limiting member 104, which is annular in shape and is fitted onto the end of the second mating part 121 to ensure that the distance between the second top wall plate 12a and the second bottom wall plate 12b is equal to a predetermined value.

[0059] As shown in Figures 1 to 13, in the illustrated embodiment, the second terminal limiting member 104 includes a second top plate 104a, a second bottom plate 104b, and two second side plates 104c. The second top plate 104a is attached to the outer side of the second top

wall plate 12a. The second bottom plate 14b is attached to the outer side of the second bottom wall plate 12b. Two second side plates 104c are connected between the second top plate 104a and the second bottom plate 104b. The second top plate 104a and the second bottom plate 104b have opposite sides in the width direction of the second terminal body 120. One second side plate 104c is connected between one side of the second top plate 104a and the second bottom plate 104b, and is attached to one side of the second mating part 121. The other second side plate 104c is connected between the other side of the second top plate 104a and the second bottom plate 104b, and is attached to the other side of the second mating part 121.

[0060] As shown in Figures 1 to 13, in the illustrated embodiment, second elastic buckles 104f with a C-shaped cross-section are respectively formed on both sides of the second top plate 104a and the second bottom plate 104b, and second snap slots 12f corresponding to the second elastic buckles 104f are respectively formed on the edges of the left and right sides of the second top wall plate 12a and the second bottom wall plate 12b. The second elastic buckles 104f are engaged into the second snap slots 12f to fix the second terminal limiting member 104 to the second mating part 121.

[0061] As shown in Figures 1 to 13, in the illustrated embodiment, second elastic locking pieces 104d are formed on the second top plate 104a and the second bottom plate 104b, respectively. The second elastic locking pieces 104d are engaged with the inner housing 3 to lock the second terminal 12 into the inner housing 3. Second guide ribs 104e extending along the height direction Z are formed on the second top plate 104a and the second bottom plate 104b, respectively. The second guide ribs 104e are used to cooperate with the second guide slots in the inner housing 3 to guide the second terminal 12 to be inserted into the inner housing 3 along the height direction Z.

[0062] As shown in Figures 1 to 13, in the illustrated embodiment, the first connection part 112 includes a first top layer plate 12a and a first bottom layer plate 12b stacked and riveted together in the thickness direction of the first terminal body 110. The first top layer plate 12a and the first bottom layer plate 12b are connected to the first top wall plate 11a and the first bottom wall plate 11b, respectively. The first conductor end 211 is flat and stacked and welded on the first top layer plate 12a or the first bottom layer plate 12b.

[0063] As shown in Figures 1 to 13, in the illustrated embodiment, the second connection part 122 includes a second top layer plate 122a and a second bottom layer plate 122b stacked and riveted together in the thickness direction of the second terminal body 120. The second top layer plate 122a and the second bottom layer plate 122b are connected to the second top wall plate 12a and the second bottom wall plate 12b, respectively. The second conductor end 221 is flat and stacked and welded on the second top layer plate 122a or the second bottom

layer plate 122b.

[0064] As shown in Figures 1 to 13, in the illustrated embodiment, the inner housing 3 includes a main body 3a and a top cover 3b. A top opening is formed at the top of the main body 3a, which is communicated with the second terminal slot 302 and the second cable hole 302b. The top cover 3b is installed on the top of the main body 3a to close the top opening of the main body 3a. The second terminal 12 and the second cable 22 are inserted into the main body 3a of the inner housing 3 through the top opening of the main body 3a.

[0065] As shown in Figures 1 to 13, in the illustrated embodiment, the electrical connection module 100 further includes a first shielding sleeve 41 and a second shielding sleeve 42. The first shielding sleeve 41 is used to electrically connect the shielding layer of the first cable 21 to the outer shielding shell 7 of the connector. The second shielding sleeve 42 is fitted onto the second cable 22, used to electrically connect the shielding layer of the second cable 22 to the outer shielding shell 7. In the illustrated embodiment, the front ends of the first shielding sleeve 41 and the second shielding sleeve 42 are fitted onto the rear end of the inner housing 3, and the rear ends of the first shielding sleeve 41 and the second shielding sleeve 42 are respectively fitted and crimped onto the shielding layers of the first cable 21 and the second cable 22.

[0066] As shown in Figures 1 to 13, in the illustrated embodiment, the electrical connection module 100 further includes a rear end cover 5, which is adapted to be locked onto the rear end of the outer shielding shell 7 of the connector to fix the first cable 21 and the second cable 22 to the outer shielding shell 7. A through-hole is formed in the rear cover 5 to allow the first cable 21 and the second cable 22 to pass through.

[0067] Although not shown, in an exemplary embodiment of the present invention, the electrical connection module 100 may further include a sealing member that can be installed into the rear port 70b of the outer shielding shell 7 to seal the rear port 70b of the outer shielding shell 7. There are through holes formed on the seal that allow the first cable 21 and the second cable 22 to pass through.

[0068] As shown in Figures 1 to 13, in the illustrated embodiment, the electrical connection module 100 further includes a first end cap 33 and a second end cap 34. The first end cap 33 is installed on the first insertion port 301a of the inner housing 3 and is formed with a first guide port 33a for guiding the first mating terminal to be inserted into the first insertion port 301a. The second end cap 34 is installed on the second insertion port 302a of the inner housing 3 and formed with a second guide port 34a for guiding the second mating terminal to be inserted into the second insertion port 302a.

[0069] As shown in Figures 1 to 13, in the illustrated embodiment, a wall recess 32 is formed on the outer side of the front end of the inner housing 3. The wall recess 32

is located between the front ends of the pair of first terminal slots 301 and in front of the second terminal slot 302. The wall recess 32 is used to mate with the installation portion 72 of the outer shielding shell 7 of the connector, so that the connector can be fastened to a mating outer shielding shell (not shown) by a bolt 71 passing through the installation portion 72 of the outer shielding shell 7 along the height direction Z.

[0070] Figure 14 shows an illustrative exploded view of a connector according to an exemplary embodiment of the present invention when viewed from the bottom; Figure 15 shows an illustrative exploded view of a connector according to an exemplary embodiment of the present invention when viewed from the top; Figure 16 shows an illustrative perspective view of a connector according to an exemplary embodiment of the present invention when viewed from the bottom; Figure 17 shows a longitudinal sectional view of a connector according to an exemplary embodiment of the present invention.

[0071] As shown in Figures 1 to 17, in another exemplary embodiment of the present invention, a connector is also disclosed. The connector includes an outer shielding shell 7 and an electrical connection module 100. An installation chamber 70 is formed in the outer shielding shell 7. The electrical connection module 100 is inserted into the installation chamber 70 of the outer shielding shell 7.

[0072] As shown in Figures 1 to 17, in the illustrated embodiment, the outer shielding shell 7 has an installation portion 72 embedded in the wall recess 32 of the inner housing 3, and a connection hole 73 extending along the height direction Z of the outer shielding shell 7 is formed in the installation portion 72. The connector also includes a bolt 71, which passes through the connection hole 73 and is suitable for threaded connection to the threaded hole of the mating outer shielding shell to fasten the connector to the mating connector. In the illustrated embodiment, the bolt 71 passes through the wall recess 32 of the inner housing 3. Therefore, the bolt 71 is closer to the center of the inner housing 3, which can reduce the length of the force arm and effectively prevent the connector from experiencing force imbalance.

[0073] As shown in Figures 1 to 17, in the illustrated embodiment, the outer shielding shell 7 has front and rear ends opposite in its longitudinal direction Y, and bottom and top sides opposite in its height direction Z. The installation chamber 70 has a rear port 70b located at the rear end of the outer shielding shell 7. The electrical connection module 100 is inserted into the installation chamber 70 through the rear port 70b, and the first cable 21 and the second cable 22 of the electrical connection module 100 extend out of the rear port 70b along the longitudinal direction Y. The installation chamber 70 also has a bottom port 70a located on the bottom side of the front end of the outer shielding shell 7. The first insertion port 301a and the second insertion port 302a of the inner housing 3 of the electrical connection module 100 are located in the bottom port 70a, so that the first mating

terminal and the second mating terminal can be respectively inserted into the first insertion port 301a and the second insertion port 302a of the inner housing 3 along the height direction Z through the bottom port 70a.

[0074] As shown in Figures 1 to 17, in the illustrated embodiment, the connector further includes a sealing ring 74, which is set in the bottom port 70a of the outer shielding shell 7 and is suitable for being compressed between the outer shielding shell 7 and the mating outer shielding shell to achieve sealing between the two.

[0075] It should be appreciated for those skilled in this art that the above embodiments are intended to be illustrated, and not restrictive. For example, many modifications may be made to the above embodiments by those skilled in this art, and various features described in different embodiments may be freely combined with each other without conflicting in configuration or principle.

[0076] Although several exemplary embodiments have been shown and described, it would be appreciated by those skilled in the art that various changes or modifications may be made in these embodiments without departing from the principles and spirit of the disclosure, the scope of which is defined in the claims and their equivalents.

[0077] As used herein, an element recited in the singular and proceeded with the word "a" or "an" should be understood as not excluding plural of said elements or steps, unless such exclusion is explicitly stated. Furthermore, references to "one embodiment" of the present invention are not intended to be interpreted as excluding the existence of additional embodiments that also incorporate the recited features. Moreover, unless explicitly stated to the contrary, embodiments "comprising" or "having" an element or a plurality of elements having a particular property may include additional such elements not having that property.

Claims

1. An electrical connection module, comprising:

an inner housing (3) which is formed with a pair of first terminal slots (301) extending along its longitudinal direction (Y) and a second terminal slot (302) extending along its height direction (Z), and has opposite front and rear ends in its longitudinal direction (Y);

a pair of first terminals (11) which are respectively inserted into the pair of first terminal slots (301), and their length and width directions are parallel to the longitudinal direction (Y) and the height direction (Z), respectively; and

a second terminal (12) which is inserted into the second terminal slot (302) and its length direction and width direction are parallel to the height direction (Z) and the longitudinal direction (Y), respectively,

wherein the pair of first terminal slots (301) are arranged side by side in a transverse direction (X) of the inner housing (3), and the second terminal slot (302) is located between the pair of first terminal slots (301), the first terminal slot (301) extends forward along the longitudinal direction (Y) beyond the second terminal slot (302), and the second terminal slot (302) extends upward along the height direction (Z) beyond the first terminal slot (301),

wherein the first terminal slot (301) has a first insertion port (301a) formed on the bottom of the inner housing (3), the second terminal slot (302) has a second insertion port (302a) formed on the bottom of the inner housing (3) and offset from the first insertion port (301a) in the longitudinal direction (Y),

wherein the first terminal (11) is used to mate with a first mating terminal inserted into the first insertion port (301a) along the height direction (Z), and the second terminal (12) is used to mate with a second mating terminal inserted into the second insertion port (302a) along the height direction (Z).

2. The electrical connection module according to claim 1,

wherein the first terminal (11) comprises a first terminal body (110), which has a first mating part (111) and a first connection part (112) opposite to each other in the longitudinal direction (Y) of the inner housing (3); the first mating part (111) has a first mating port (111a) facing the first insertion port (301a) for mating with the first mating terminal, and the first connection part (112) is used for electrical connection with a first cable (21) introduced along the longitudinal direction (Y); wherein the second terminal (12) comprises a second terminal body (120), which has a second mating part (121) and a second connection part (122) opposite to each other in the height direction (Z) of the inner housing (3); the second mating part (121) has a second mating port (121a) facing the second insertion port (302a) for mating with the second mating terminal, and the second connection part (122) is used for electrical connection with a second cable (22) introduced along the longitudinal direction (Y).

3. The electrical connection module according to claim 2,

wherein a pair of first cable holes (301b) that are respectively communicated with the pair of first terminal slots (301) are formed in the rear end of the inner housing (3) to allow a pair of first cables (21) to be introduced along the longitudinal di-

rection (Y), and a second cable hole (302b) that is communicated with the second terminal slot (302) is formed in the rear end of the inner housing (3) to allow a second cable (22) to be introduced along the longitudinal direction (Y); wherein the pair of first cable holes (301b) are arranged side by side in the transverse direction (X) of the inner housing (3), and the second cable hole (302b) is located between and above the pair of first cable holes (301b).

4. The electrical connection module according to claim 3, further comprising:

a pair of first cables (21) which are respectively introduced from the pair of first cable holes (301b) along the longitudinal direction (Y) and electrically connected to the first connection parts (112) of the pair of first terminals (11); and a second cable (22) which is introduced along the longitudinal direction (Y) from the second cable hole (302b) and electrically connected to the second connection part (122) of the second terminal (12), wherein the pair of first cables (21) are arranged side by side in the transverse direction (X) of the inner housing (3), and the second cable (22) is located between and above the pair of first cables (21).

5. The electrical connection module according to claim 4,

wherein the first cable (21) has a first conductor end (211) electrically connected to the first connection part (112) of the first terminal body (110), and the second cable (22) has a second conductor end (221) electrically connected to the second connection part (122) of the second terminal body (120); wherein the first conductor ends (211) of the pair of first cables (21) are arranged side by side in the transverse direction (X) of the inner housing (3), and the second conductor end (221) of the second cable (22) is located between and above the first conductor ends (211) of the pair of first cables (21).

6. The electrical connection module according to claim 2,

wherein the first mating part (111) and the first connection part (112) are respectively located at both ends of the length direction of the first terminal body (110), and the length direction and width direction of the first terminal body (110) are parallel to the longitudinal direction (Y) and height direction (Z) of the inner housing

(3), respectively;

wherein the second mating part (121) and the second connection part (122) are respectively located at both ends of the length direction of the second terminal body (120), and the length direction and width direction of the second terminal body (120) are parallel to the height direction (Z) and longitudinal direction (Y) of the inner housing (3), respectively.

7. The electrical connection module according to claim 6,

wherein the thickness direction of the first terminal body (110) is perpendicular to the longitudinal direction (Y) and height direction (Z) of the inner housing (3), the first mating part (111) includes a first top wall plate (11a) and a first bottom wall plate (11b) spaced opposite each other in the thickness direction of the first terminal body (110), a first slot (11c) is defined between the first top wall plate (11a) and the first bottom wall plate (11b) to allow the insertion of the first mating terminal;

wherein the thickness direction of the second terminal body (120) is perpendicular to the longitudinal direction (Y) and height direction (Z) of the inner housing (3), and the second mating part (121) includes a second top wall plate (12a) and a second bottom wall plate (12b) spaced opposite each other in the thickness direction of the second terminal body (120), a second slot (12c) is defined between the second top wall plate (12a) and the second bottom wall plate (12b) to allow the insertion of the second mating terminal.

8. The electrical connection module according to claim 7,

wherein the first terminal (11) further comprises: a pair of first terminal contacts (101) which are respectively installed on the inner sides of the first top wall plate (11a) and the first bottom wall plate (11b) of the first mating parts (111), wherein the first terminal contact (101) has multiple first elastic contact arms (101a) arranged in a row in the longitudinal direction (Y) and extending in the height direction (Z) for electrical contact with the first mating terminal inserted along the height direction (Z); wherein the second terminal (12) further comprises:

a pair of second terminal contacts (102) which are respectively installed on the inner sides of the second top wall plate (12a) and the second bottom wall plate (12b) of the second mating part (121),

wherein the second terminal contact (102) has multiple second elastic contact arms (102a) arranged in a row in the longitudinal direction (Y) and extending in the height direction (Z), for electrical contact with the second mating terminal inserted along the height direction (Z).

9. The electrical connection module according to claim 7,

wherein the first connection part (112) comprises a first top layer plate (112a) and a first bottom layer plate (112b) stacked and riveted together in the thickness direction of the first terminal body (110), the first top layer plate (112a) and the first bottom layer plate (112b) are respectively connected to the first top wall plate (11a) and the first bottom wall plate (11b), and the first conductor end (211) is flat and stacked and welded on the first top layer plate (112a) or the first bottom layer plate (112b); wherein the second connection part (122) comprises a second top layer plate (122a) and a second bottom layer plate (122b) stacked and riveted together in the thickness direction of the second terminal body (120), the second top layer plate (122a) and the second bottom layer plate (122b) are respectively connected to the second top wall plate (12a) and the second bottom wall plate (12b), the second conductor end (221) is flat and stacked and welded on the second top layer plate (122a) or the second bottom layer plate (122b).

10. The electrical connection module according to claim 3,

wherein the inner housing (3) comprises:

a main body (3a) which has a top opening communicated with the second terminal slot (302) and the second cable hole (302b); and a top cover (3b) which is installed on the top of the main body (3a) to close the top opening of the main body (3a),

wherein the second terminal (12) and the second cable (22) are inserted into the main body (3a) of the inner housing (3) through the top opening of the main body (3a).

11. The electrical connection module according to claim 4, further comprising:

a first shielding sleeve (41) which is used to electrically connect a shielding layer of the first cable (21) to an outer shielding shell (7) of the connector; and

a second shielding sleeve (42) which is fitted onto the second cable (22) for electrically connecting a shielding layer of the second cable (22) to the outer shielding shell (7).

12. The electrical connection module according to claim 4, further comprising:

a rear end cover (5) adapted to be locked to the rear end of the outer shielding shell (7) of the connector, to fix the first cable (21) and the second cable (22) to the outer shielding shell (7), wherein a through-hole is formed in the rear end cover (5) to allow the first cable (21) and the second cable (22) to pass through.

13. The electrical connection module according to claim 1, further comprising:

a first end cap (33) which is installed on the first insertion port (301a) of the inner housing (3) and formed with a first guide port (33a) for guiding the first mating terminal to be inserted into the first insertion port (301a); and a second end cap (34) which is installed on the second insertion port (302a) of the inner housing (3) and formed with a second guide port (34a) for guiding the second mating terminal to be inserted into the second insertion port (302a).

14. The electrical connection module according to any one of claims 1-13,

wherein a wall recess (32) is formed on the outer side of the front end of the inner housing (3), which is located between the front ends of the pair of first terminal slots (301) and in front of the second terminal slot (302); wherein the wall recess (32) is used to cooperate with an installation portion (72) of the outer shielding shell (7) of the connector, so that the connector can be fastened to a mating outer shielding shell by a bolt (71) passing through the installation portion (72) of the outer shielding shell (7) along the height direction (Z).

15. A connector, comprising:

an outer shielding shell (7) which is formed with an installation chamber (70); and the electrical connection module (100) according to any one of claims 1-14 which is inserted into the installation chamber (70) of the outer shielding shell (7).

16. The connector according to claim 15,

wherein the outer shielding shell (7) has an

installation portion (72) embedded in the wall recess (32) of the inner housing, and a connection hole (73) extending along the height direction (Z) of the outer shielding shell (7) is formed in the installation portion (72); 5
wherein the connector further comprises a bolt (71) that passes through the connection hole (73) and is adapted to be threaded into a threaded hole of the mating outer shielding shell to fasten the connector to a mating connector. 10

17. The connector according to claim 15,

wherein the outer shielding shell (7) has front and rear ends that are opposite in its longitudinal direction (Y), and bottom and top sides that are opposite in its height direction (Z); 15
wherein the installation chamber (70) has a rear port (70b) located at the rear end of the outer shielding shell (7), and the electrical connection module (100) is inserted into the installation chamber (70) through the rear port (70b), the 20
first cable (21) and the second cable (22) of the electrical connection module (100) extend out of the rear port (70b) along the longitudinal direction (Y); 25
wherein the installation chamber (70) also has a bottom port (70a) located on the bottom of the front end of the outer shielding shell (7), and the first insertion port (301a) and the second insertion port (302a) of the inner housing (3) of the 30
electrical connection module (100) are located in the bottom port (70a), so that the first mating terminal and the second mating terminal can be respectively inserted into the first insertion port (301a) and the second insertion port (302a) of 35
the inner housing (3) along the height direction (Z) through the bottom port (70a).

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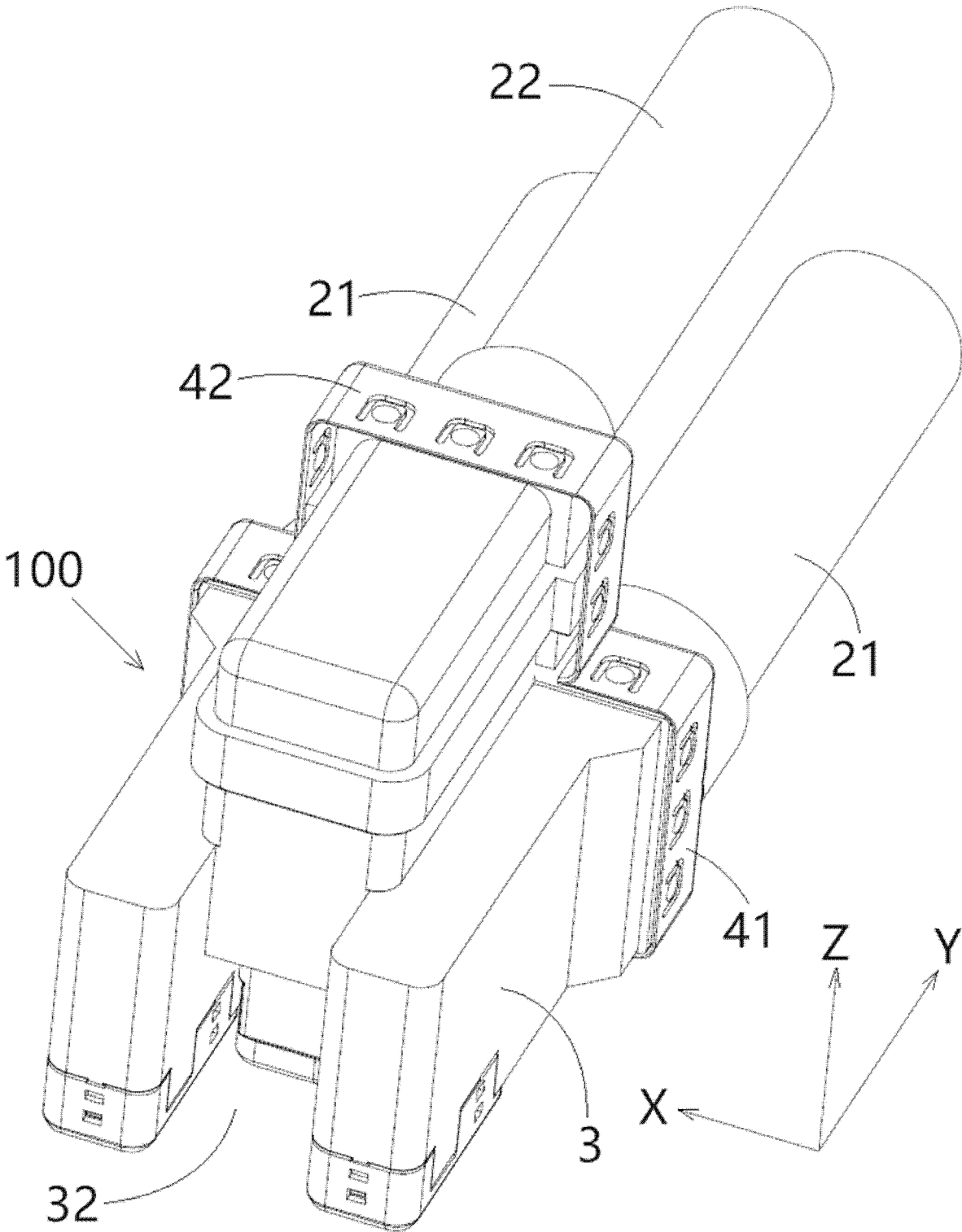


Fig.1

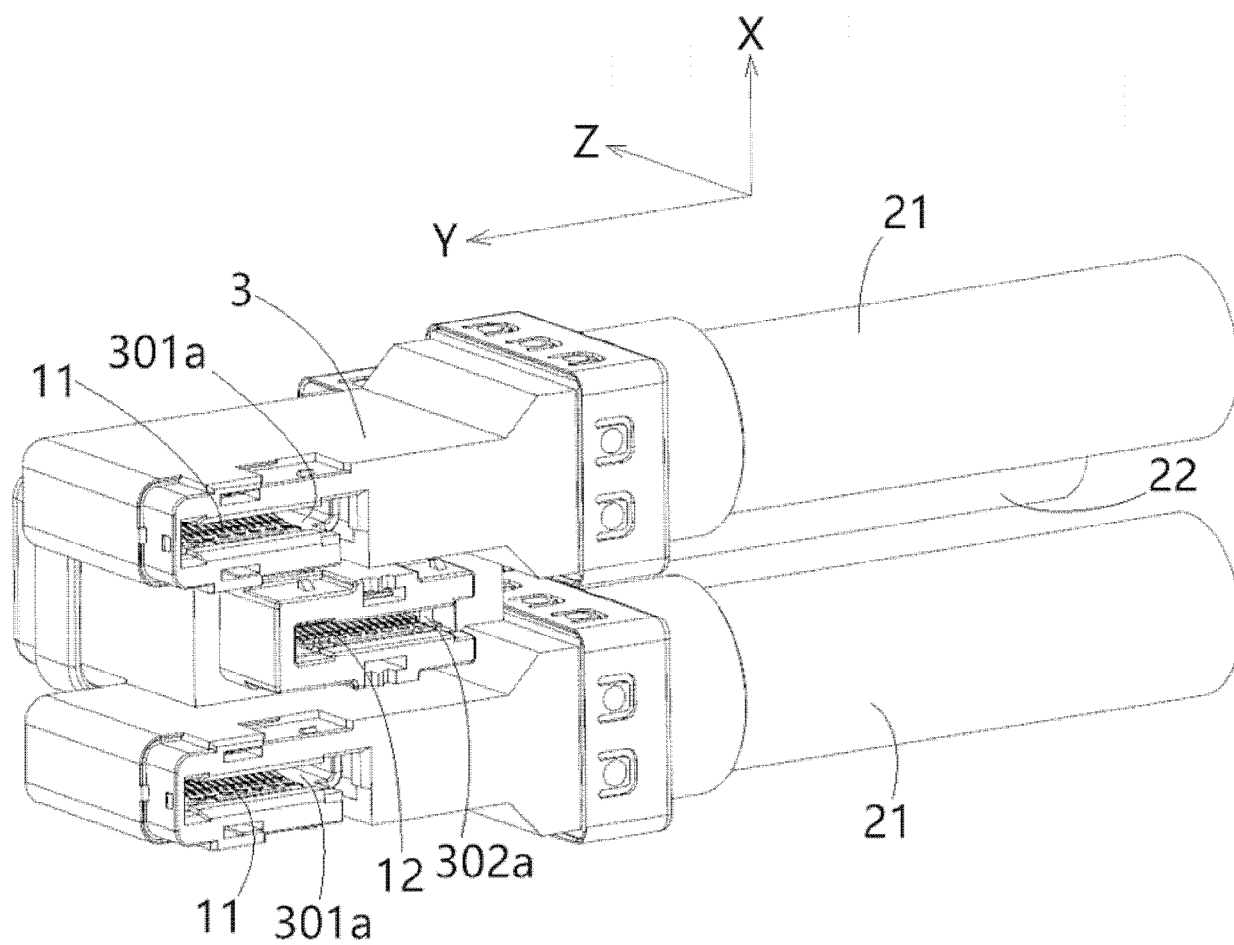


Fig.2

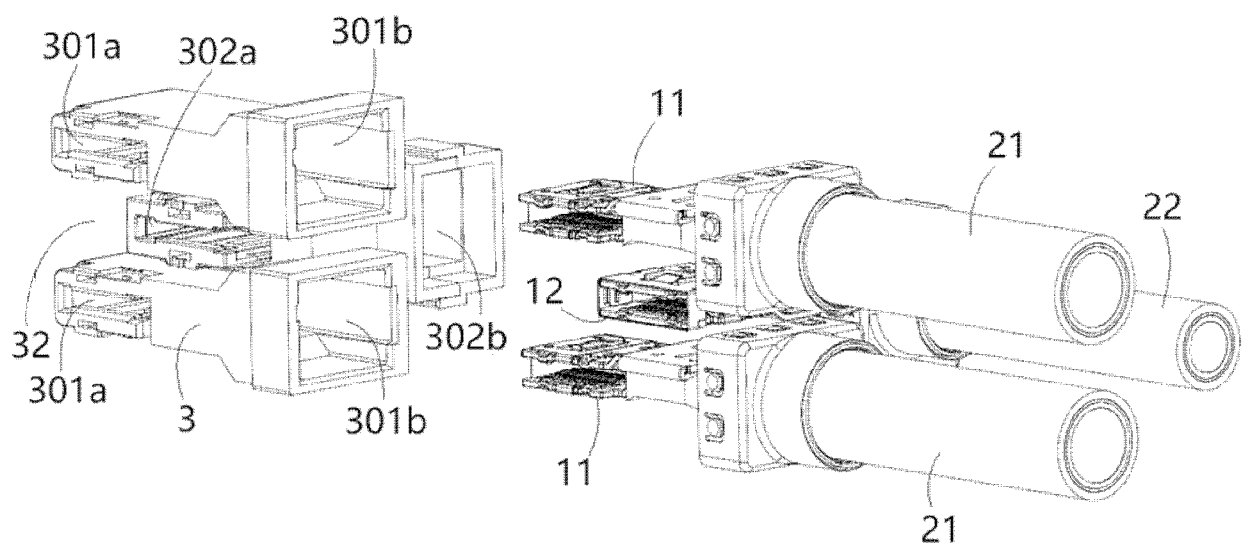


Fig.3

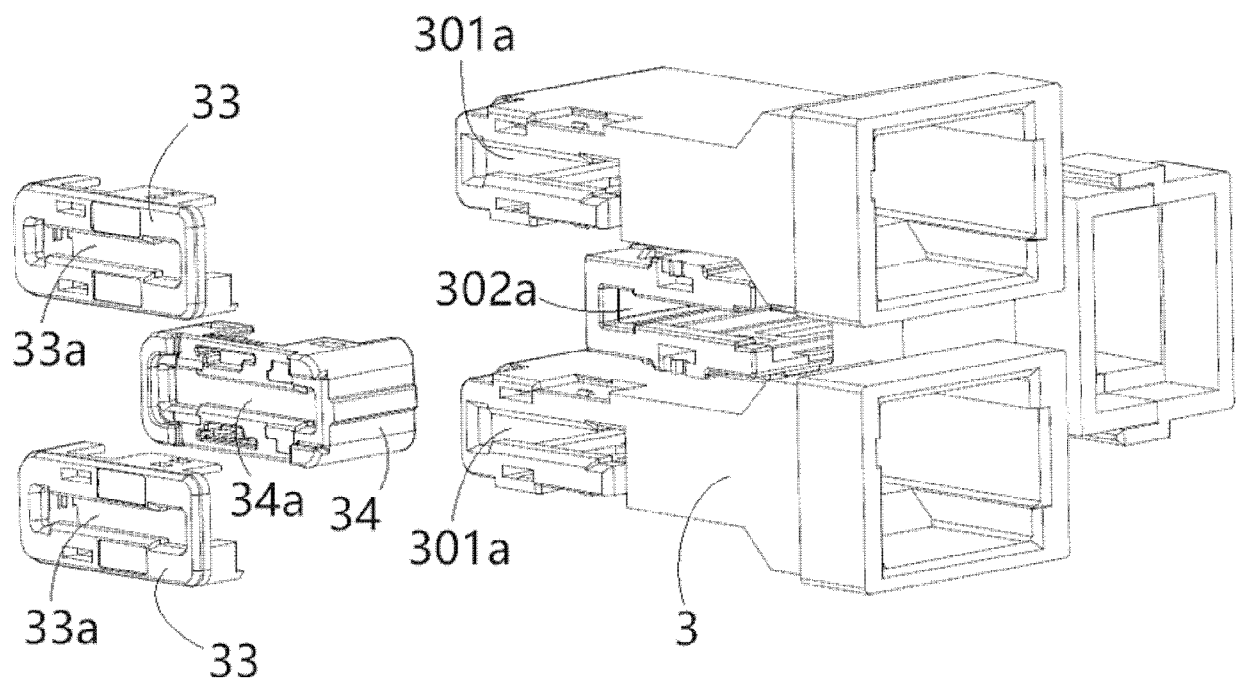


Fig.4

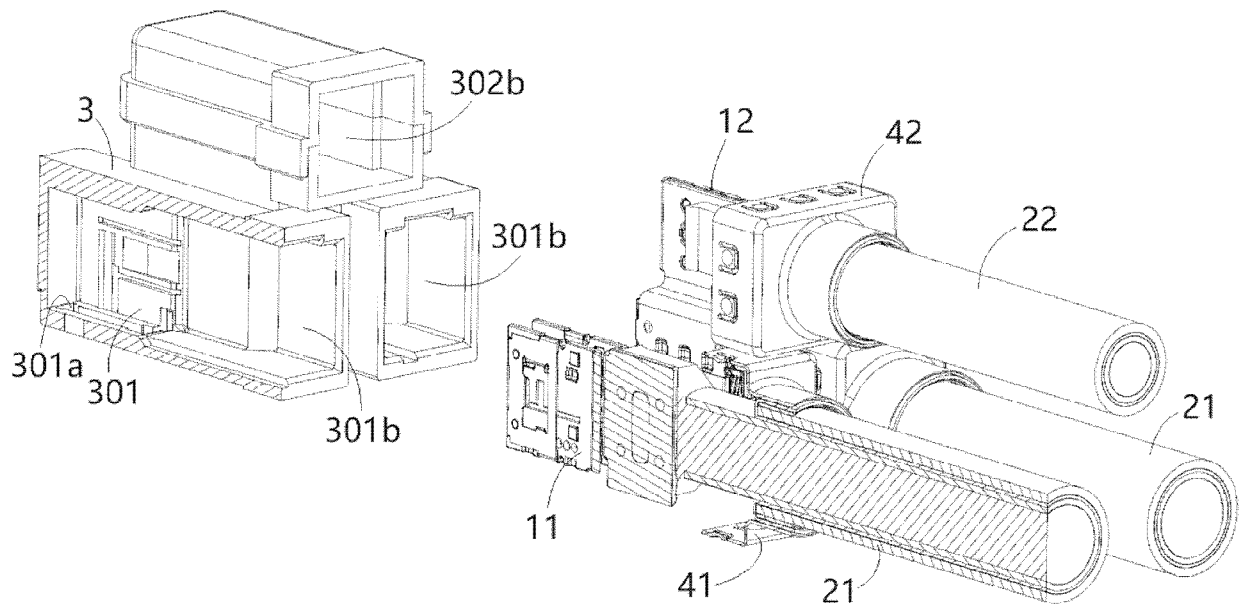


Fig.5

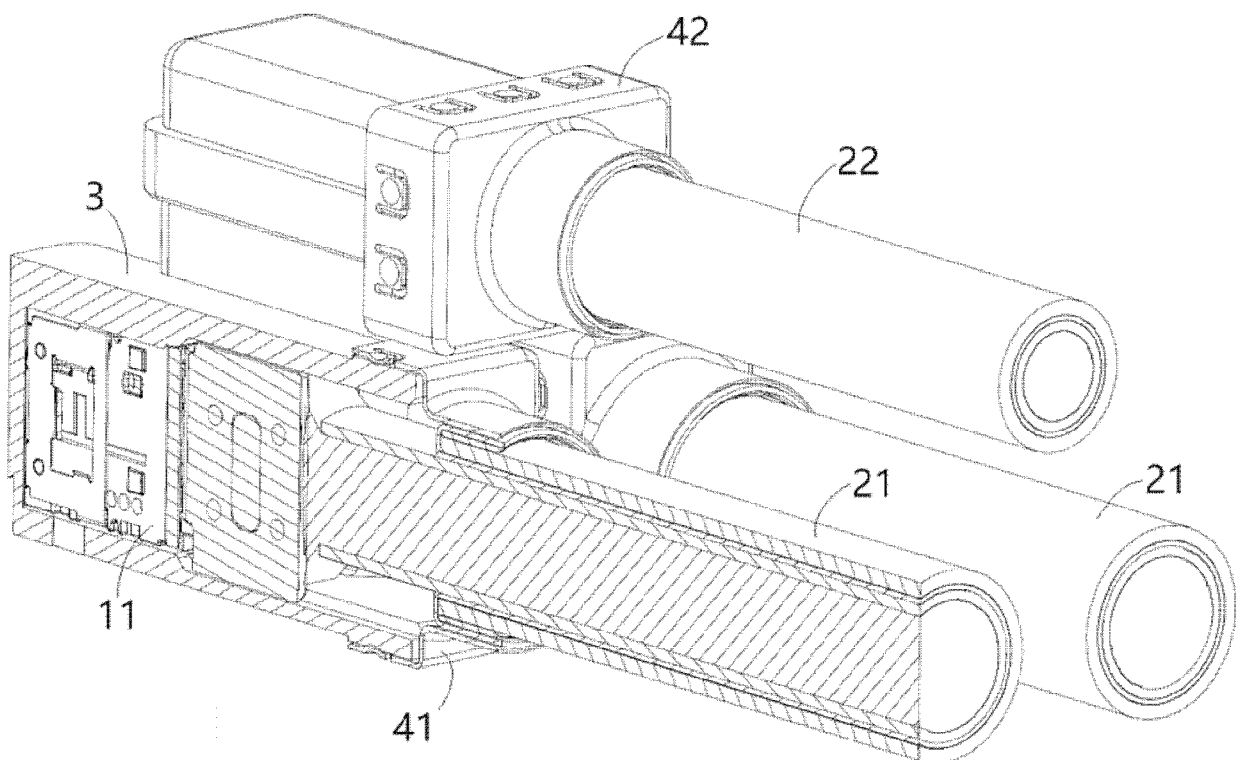


Fig.6

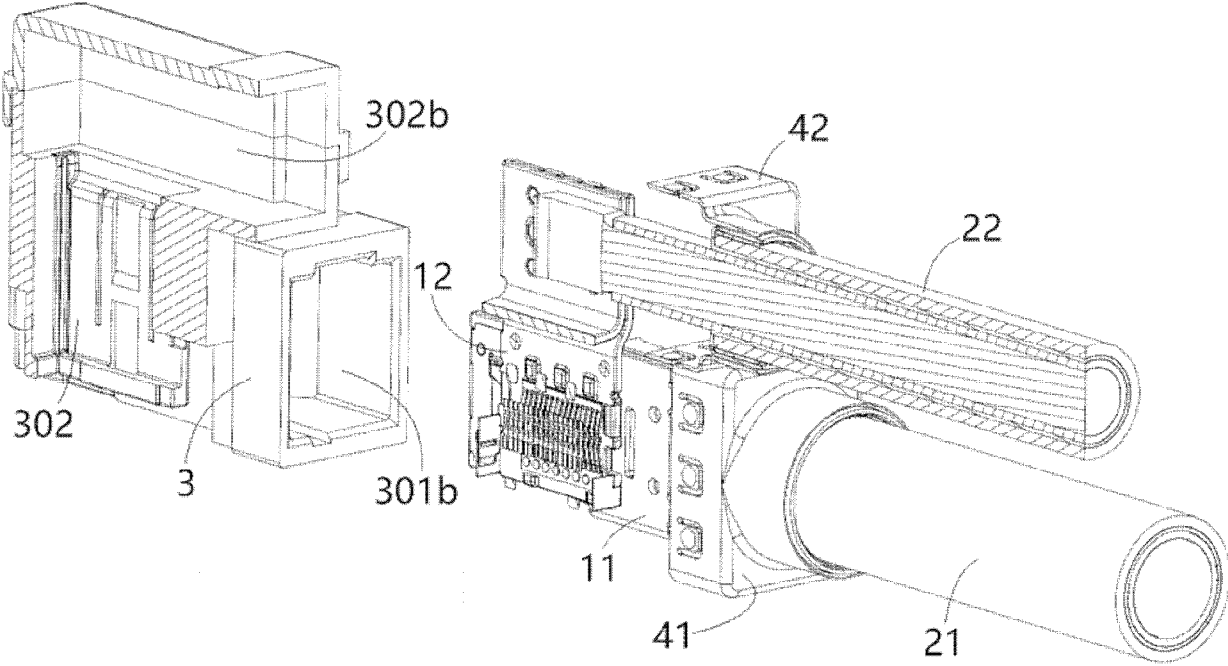


Fig.7

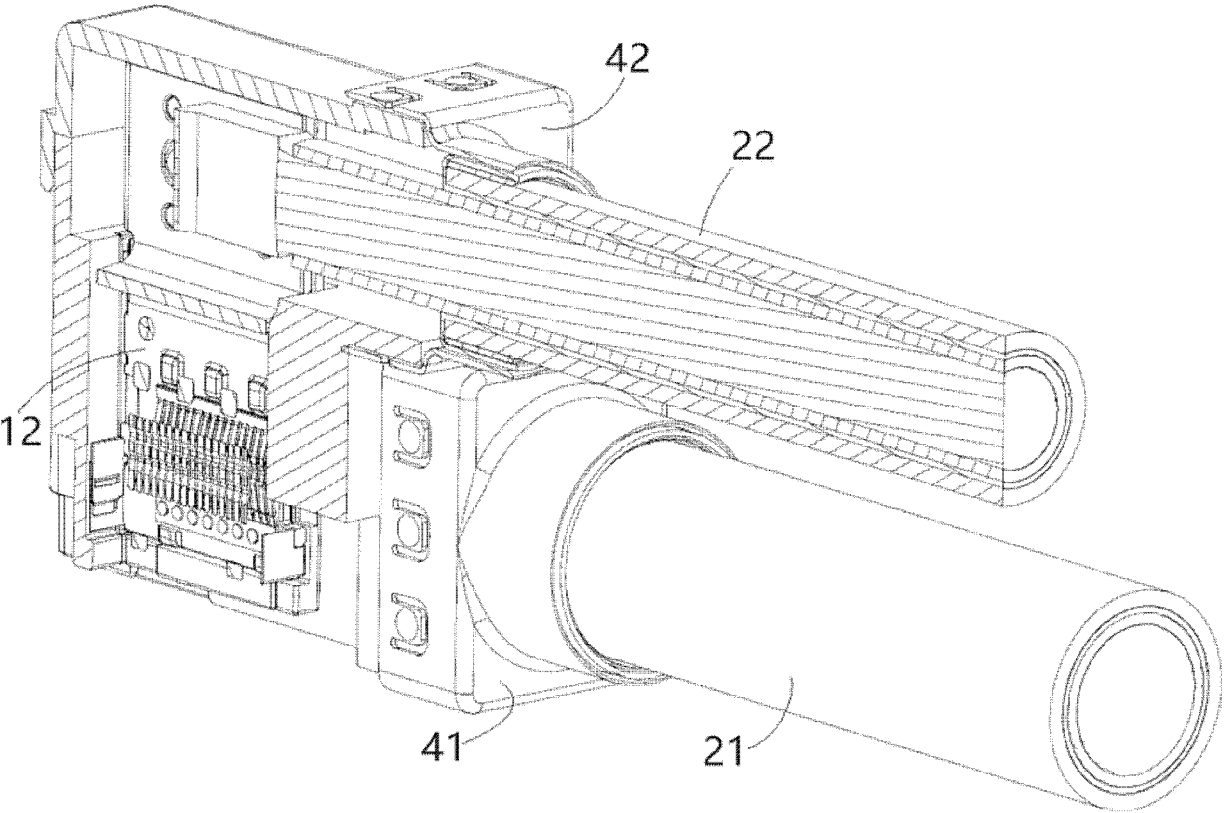


Fig.8

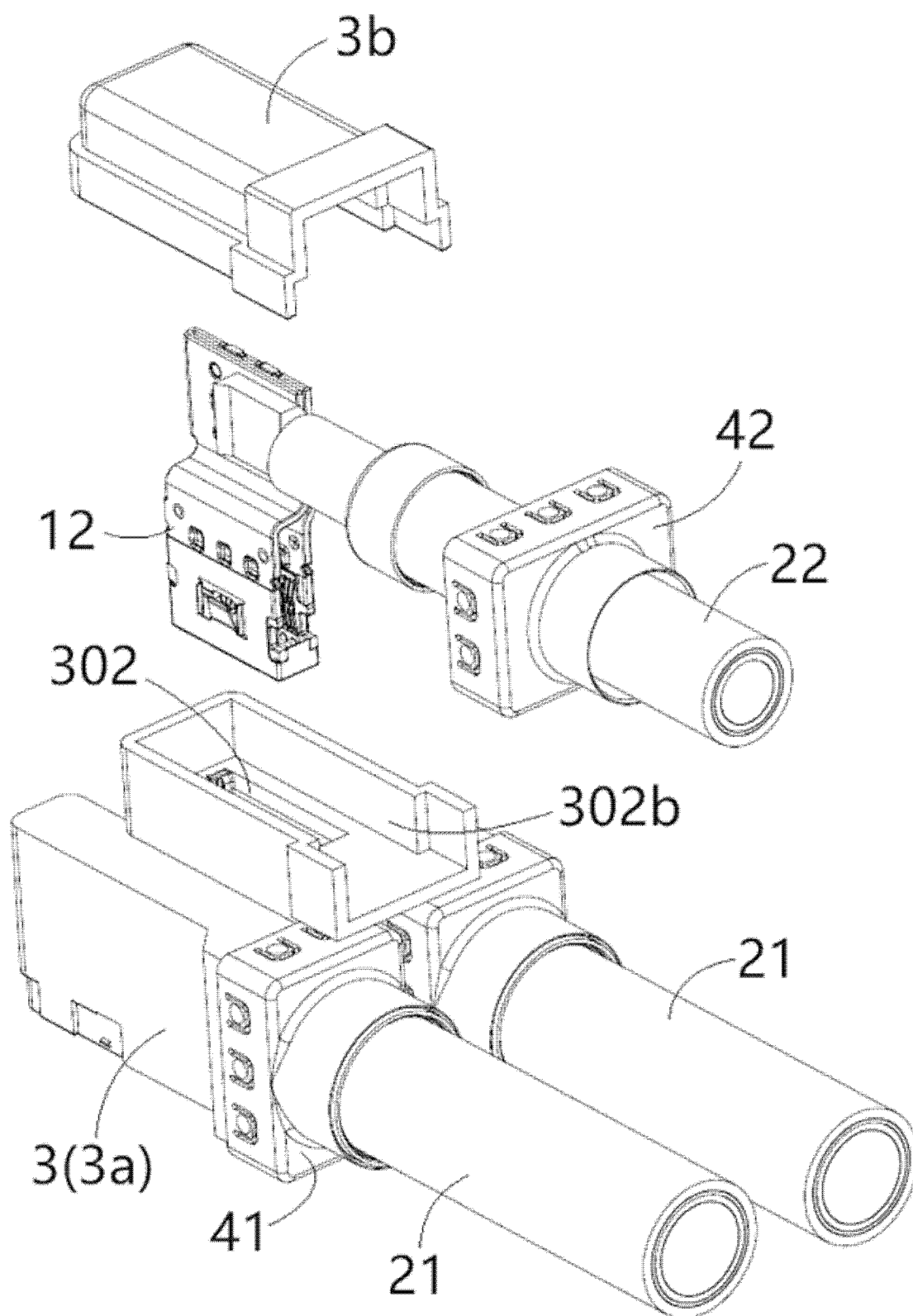


Fig.9

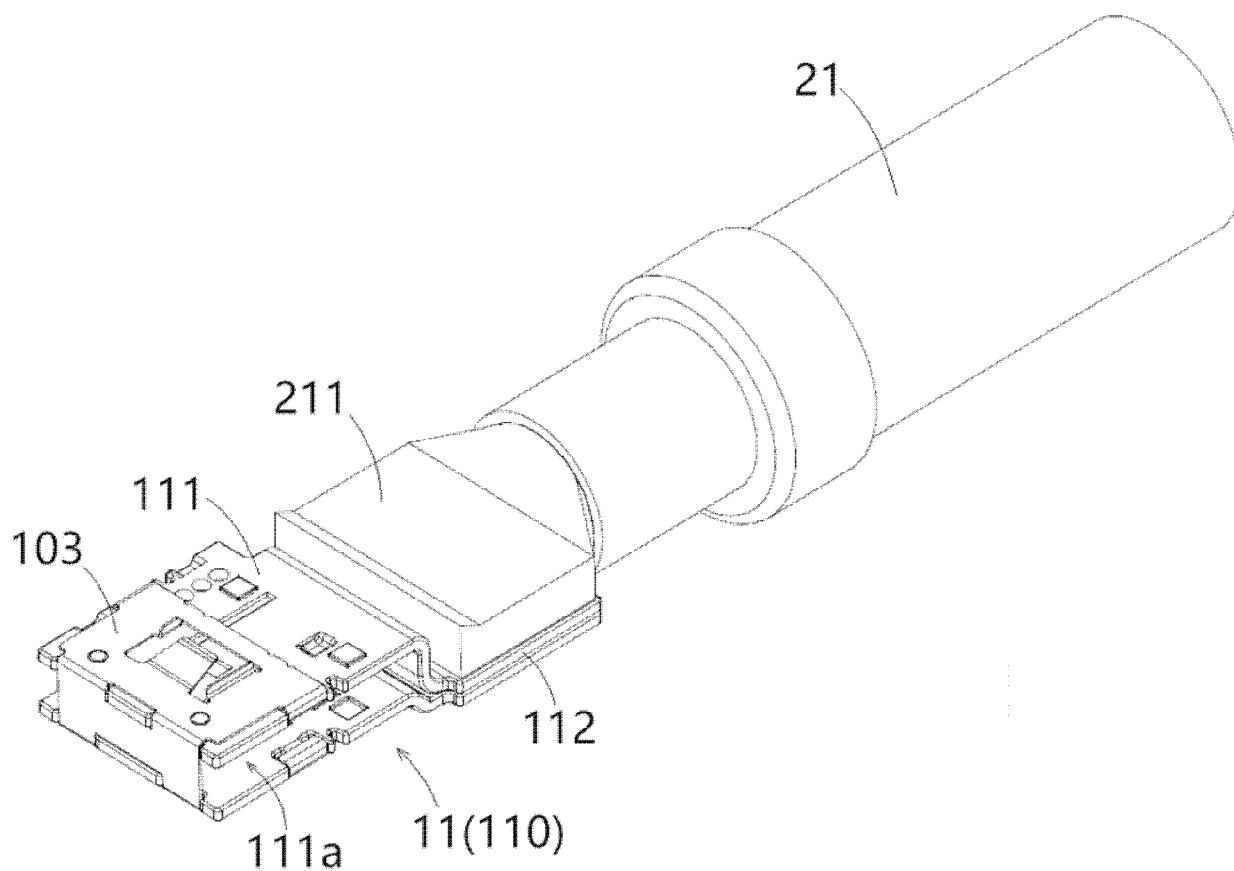


Fig.10

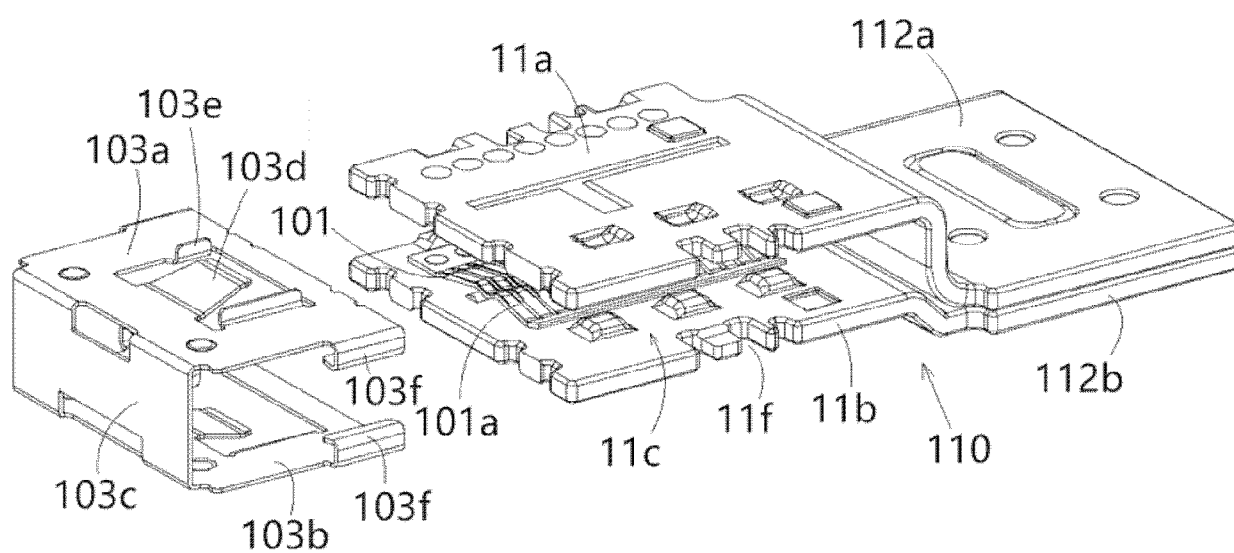


Fig.11

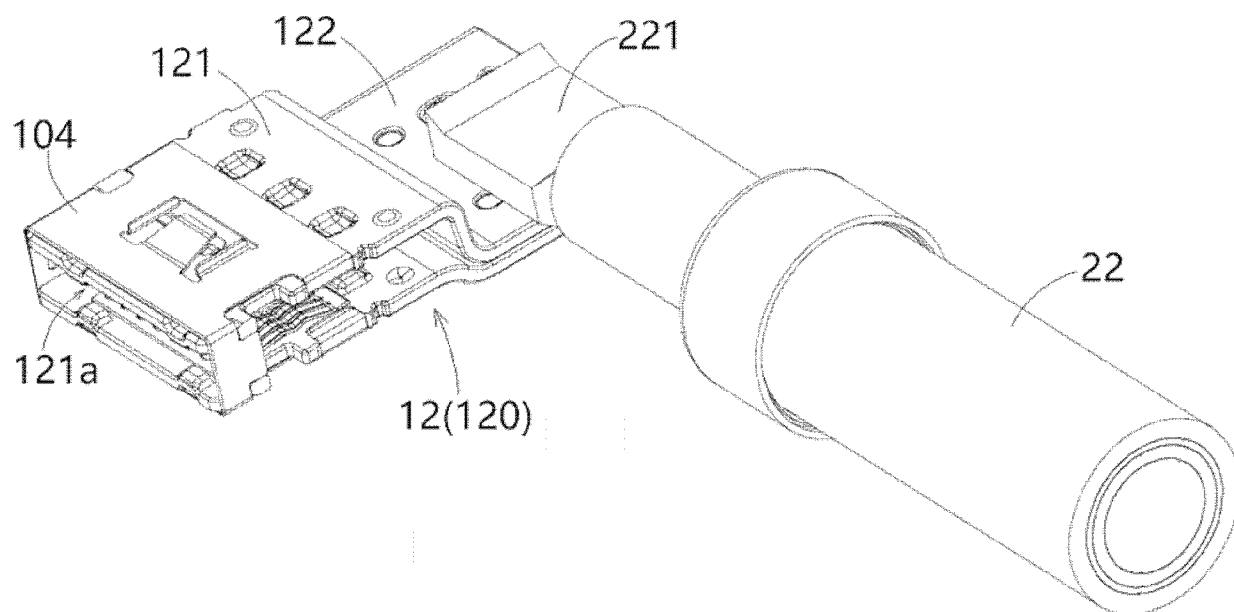


Fig.12

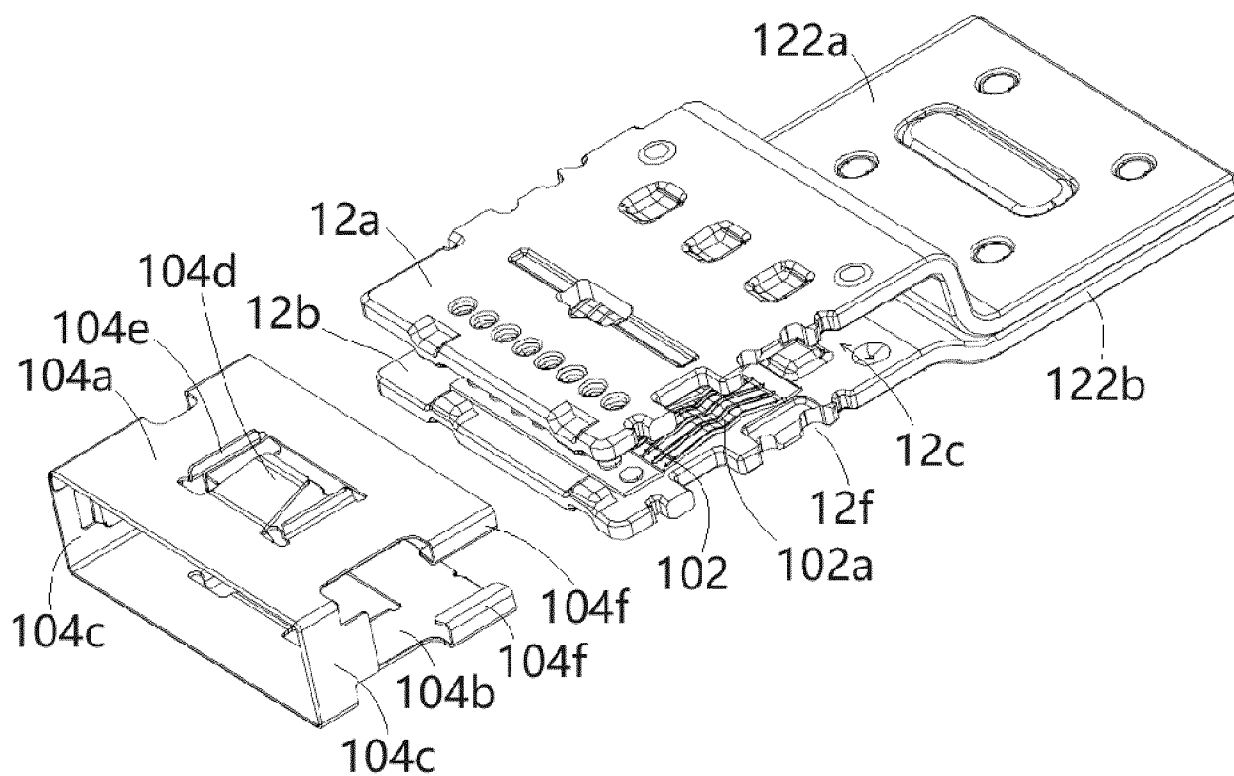


Fig.13

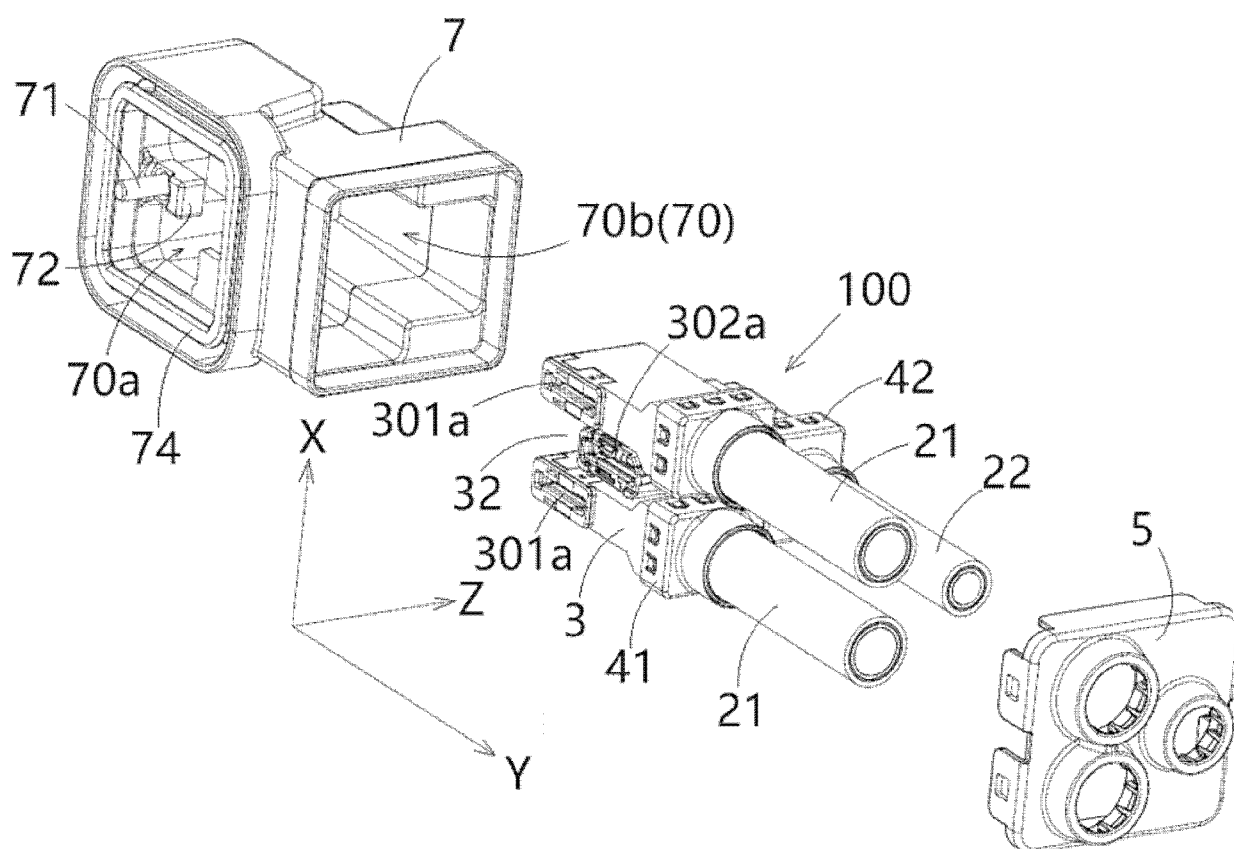


Fig.14

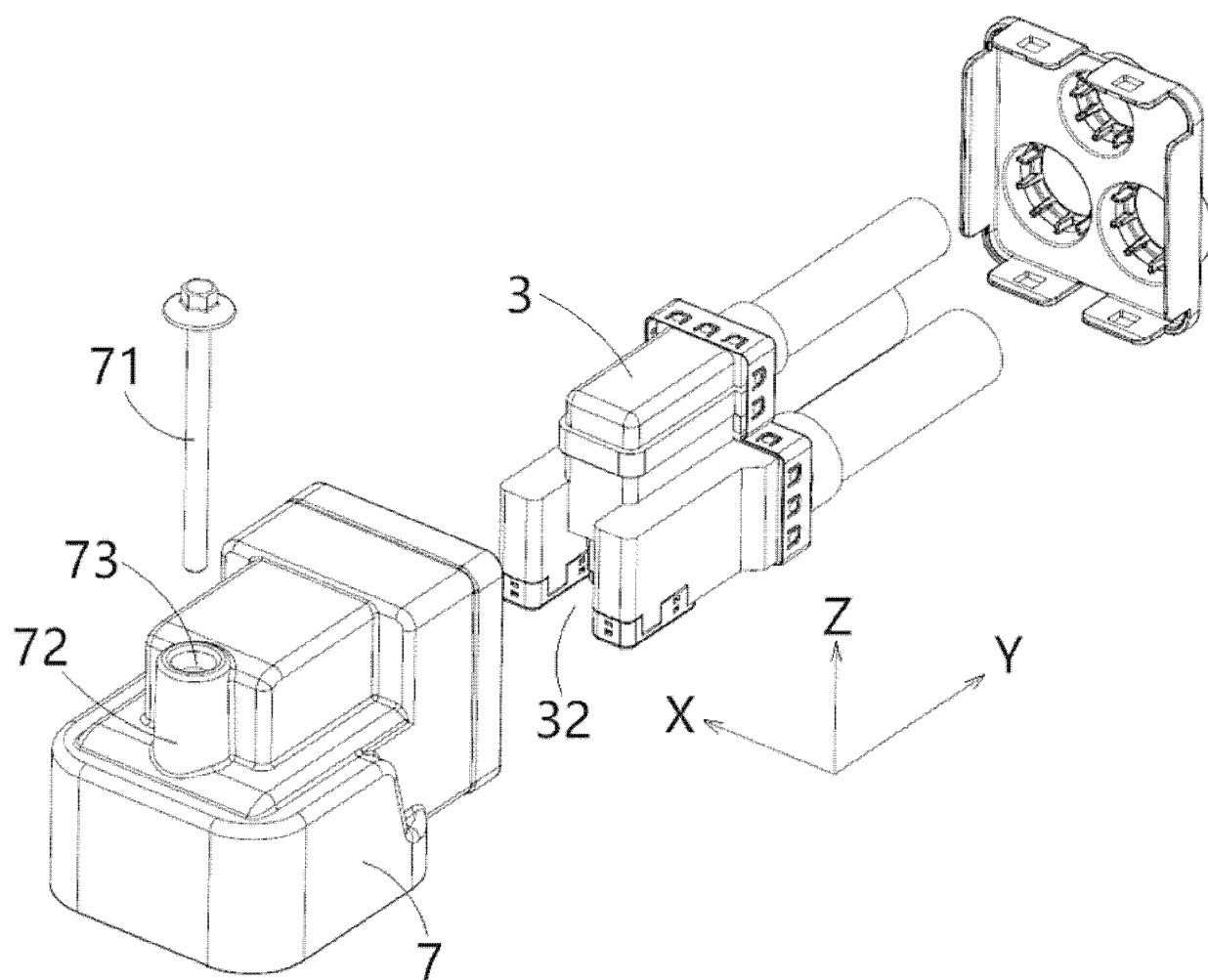


Fig.15

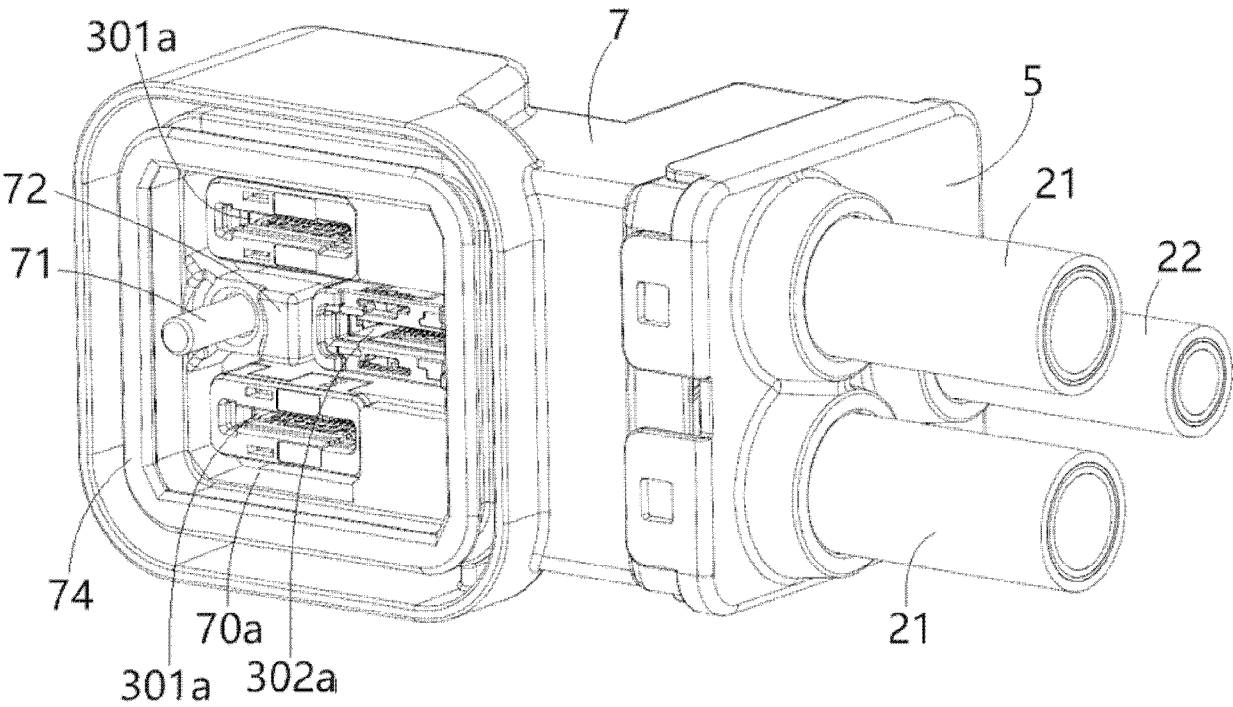


Fig.16

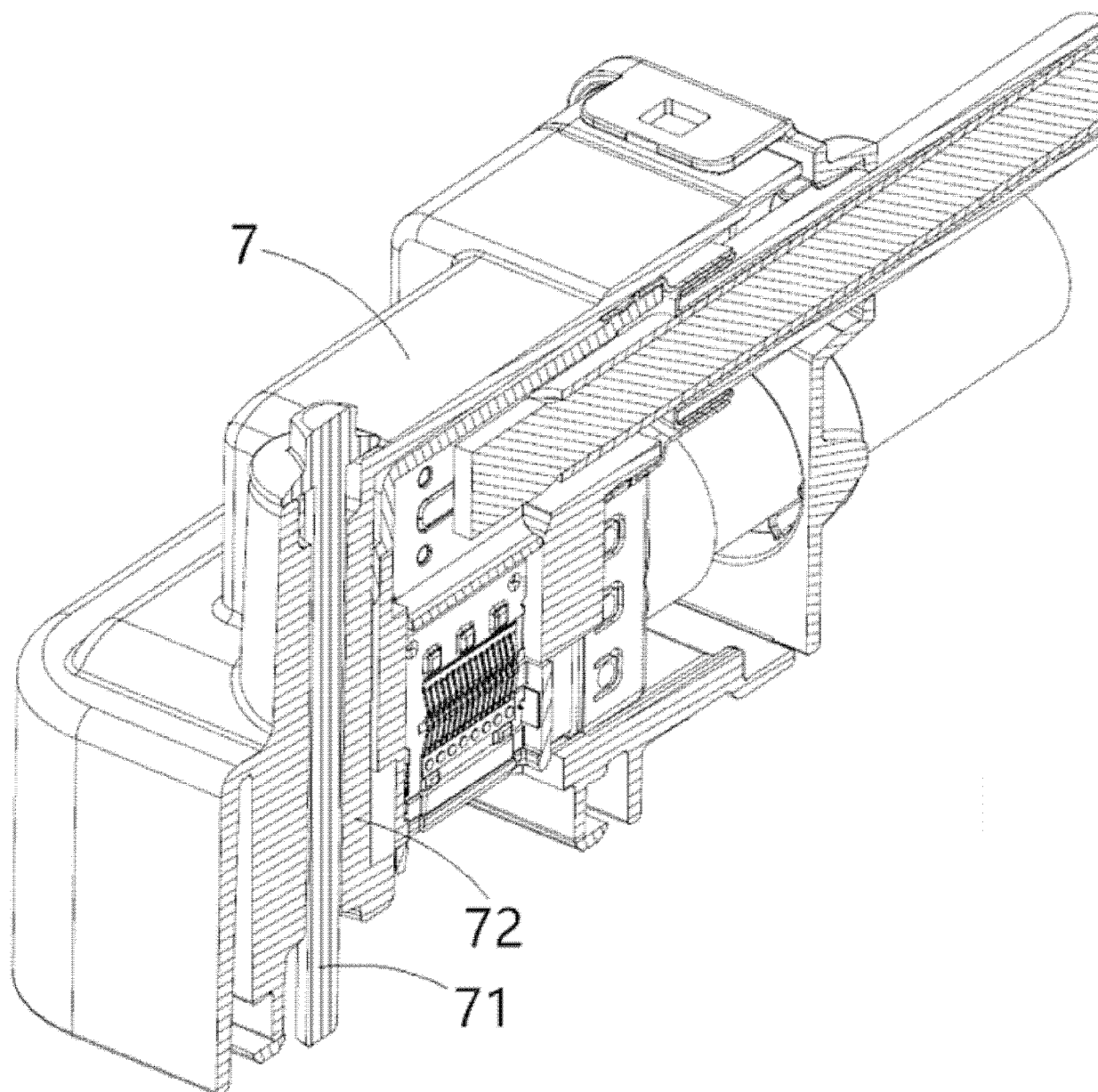


Fig.17



EUROPEAN SEARCH REPORT

Application Number

EP 24 22 2894

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	CN 216 958 665 U (TYCO ELECT SUZHOU CO LTD; TYCO ELECTRONICS SHANGHAI CO LTD) 12 July 2022 (2022-07-12) * figures 1-9 *	1-17	INV. H01R24/76
A	WO 2023/127407 A1 (YAZAKI CORP [JP]) 6 July 2023 (2023-07-06) * figures 1-5 *	1-17	ADD. H01R13/187 H01R13/6593 H01R13/11
			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		16 May 2025	Pimentel Ferreira, J
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 24 22 2894

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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16-05-2025

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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