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(54) CONNECTOR

(57) Disclosed is a connector including a plastic frame adapted to be positioned within an opening in a support base plate and mounted on the support base plate, and a plurality of plug modules mounted in the plastic frame. The plastic frame includes a pair of opposite end walls and a pair of opposite longitudinal beams connected between the pair of end walls. The longitudinal beams each comprises an outer sidewall, an inner sidewall opposite to the outer sidewall and a plurality of partition walls connected between the inner sidewall and the outer sidewall. The plurality of partition walls are arranged to separate an internal space between the inner sidewall and the outer sidewall into a plurality of box-shaped cavities. The longitudinal beams are configured with box-shaped cavities, which increases the overall stiffness of the longitudinal beams and the ability of the longitudinal beams to resist lateral deformation. In addition, the plastic frame has advantageous of light weight, convenient processing, low cost and the like.

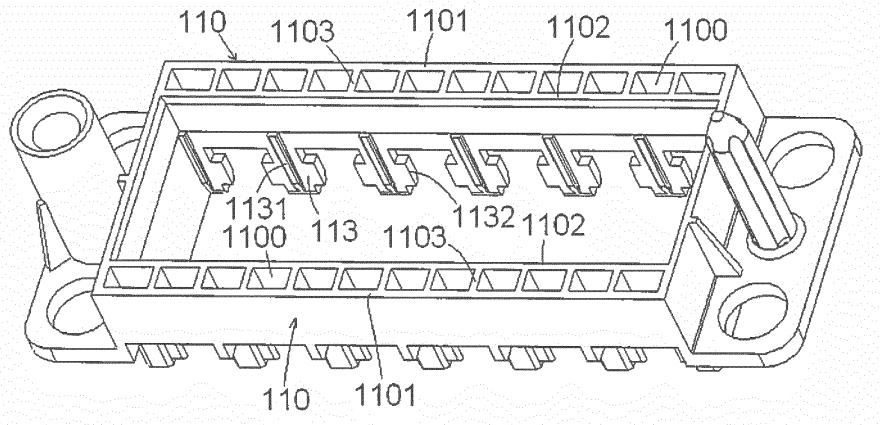

Fig.3

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of Chinese Patent Application No. CN201620727933.5 filed on July 12, 2016 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] Embodiments of the disclosure relate to a connector, and in particular, to a heavy duty connector.

Description of the Related Art

[0003] In the prior art, a heavy duty connector generally comprises a metal housing, a metal frame mounted within the metal housing and a plurality of plug modules mounted within the metal frame. Each plug module comprises a plastic frame and a conductive terminal held in the plastic housing. The metal frame is used to support the plurality of plug modules mounted therein.

[0004] In the prior art, the metal frame are directly connected to the metal housing by bolts on both ends thereof and supported on the metal housing through the both ends thereof. Since each plug module of the heavy duty connector has a larger insert and drawn force (or referred as a retention force), the metal frame mounted with the plurality of plug modules must have enough support strength. In the prior art, the metal frame is generally made of zinc alloy material. Since the zinc alloy material has higher stiffness, a pair of longitudinal beams of the metal frame may have a cantilever structure, which may satisfy the strength requirement. However, the metal frame with higher stiffness will increase the weight of the connector and manufacture cost.

SUMMARY OF THE INVENTION

[0005] The disclosure is made to solve at least one of the above issues and defects existing in the prior art.

[0006] According to an aspect of the disclosure, there is provided a connector comprising: a plastic frame adapted to be positioned within an opening of a support base plate and mounted on the support base plate; and a plurality of plug modules mounted in the plastic frame. The plastic frame comprises a pair of opposite end walls and a pair of opposite longitudinal beams connected between the pair of end walls. Each of the longitudinal beams comprises an outer sidewall, an inner sidewall opposite to the outer sidewall and a plurality of partition walls connected between the inner sidewall and the outer sidewall. The plurality of partition walls are constructed to separate an internal space between the inner sidewall and the outer sidewall into a plurality of box-shaped cavities.

[0007] According to an exemplary embodiment of the disclosure, each longitudinal beam further comprises a bottom wall connected to the inner sidewall, the outer sidewall and bottoms of the partition walls. The bottom wall of each longitudinal beam is formed with a plurality of protruding support ribs. The support ribs on the longitudinal beams are supported on a surface of the support base plate when the plastic frame is mounted onto the support base plate.

[0008] According to another exemplary embodiment of the disclosure, the plurality of partition walls are uniformly distributed at a predetermined interval along a length direction of the longitudinal beams. The plurality of protruding support ribs are uniformly distributed at a predetermined interval along the length direction of the longitudinal beams.

[0009] According to further another exemplary embodiment of the disclosure, the support ribs are arranged parallel with the partition walls.

[0010] According to yet another exemplary embodiment of the disclosure, each support rib is positioned at a middle position between a corresponding pair of partition walls.

[0011] According to still another exemplary embodiment of the disclosure, the plastic frame further comprises a pair of end mount plates extending outwardly from the pair of end walls horizontally, and the pair of end mount plates are connected and supported on a surface of the support base plate.

[0012] According to further another exemplary embodiment of the disclosure, each end mount plate is connected to the surface of the support base plate through a pair of thread connectors.

[0013] According to yet another exemplary embodiment of the disclosure, the plastic frame is formed with a solid plug extending uprightly on one of the pair of end mount plates thereof and a hollow plug extending uprightly on the other of the pair of end mount plates thereof.

[0014] According to still another exemplary embodiment of the disclosure, when the connector is mated with a mating connector, the solid plug on the connector is inserted into a center hole of a hollow plug of the mating connector, and a solid plug on the mating connector is inserted into a center hole of the hollow plug of the connector.

[0015] According to further another exemplary embodiment of the disclosure, the plastic frame further comprises a plurality of positioning plates extending uprightly from bottoms of the inner sidewalls of the longitudinal beams. When the plastic frame is mounted onto the support base plate, the plurality of positioning plates on the plastic frame are inserted into the opening of the support base plate to position the plastic frame in the opening of the support base plate.

[0016] According to yet another exemplary embodiment of the disclosure, each position plate is formed with

a protruding rib extending uprightly on an inner surface thereof. Each plug module is adapted to be clamped and positioned between the protruding ribs of two adjacent positioning plates.

[0017] According to still another exemplary embodiment of the disclosure, the support ribs are perpendicular to the positioning plates and connected to the positioning plates at an outside thereof, respectively.

[0018] According to further another exemplary embodiment of the disclosure, each plug module comprises a plastic housing and a conductive terminal held in the plastic housing. When the connector is mated with a mating connector, the plug modules on the connector are connected with plug modules on the mating connector so as to electrically connect the conductive terminal on the connector with a conductive terminal on the mating connector.

[0019] According to yet another exemplary embodiment of the disclosure, each of the connector and the mating connector comprises a heavy duty connector, and a retention force between each pair of plug modules connected with each other is greater than 300N.

[0020] In various embodiment of the disclosure as described above, the longitudinal beams are configured with box-shaped cavities, which increases the overall stiffness of the longitudinal beams and the ability of the longitudinal beams to resist lateral deformation. In addition, the plastic frame has advantageous of light weight, convenient processing, low cost and the like.

[0021] In addition, in some embodiments of the disclosure, the bottom wall of each longitudinal beam is formed with the plurality of protruding support ribs, and the plurality of protruding support ribs are supported on the surface of the support base plate, which further improves the support strength of the longitudinal beams, satisfying the requirement of large retention force on the plug modules.

[0022] Other objects and advantages of the disclosure will be apparent by the following description with reference to the accompanying drawings and will be helpful for a comprehensive understanding to the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The features and advantages of the disclosure will become more apparent with reference to the accompanying drawings which should not be construed as being limitative to the disclosure, in which:

Figure 1 shows a schematic assembly view of a connector according to an exemplary embodiment of the disclosure;

Figure 2 shows a schematic exploded view of the connector according to an exemplary embodiment of the disclosure;

Figure 3 shows a schematic perspective view of a plastic frame of the connector shown in Figure 1 when seen from a top view; and

Figure 4 shows a schematic perspective view of the plastic frame of the connector shown in Figure 1 when seen from a bottom view.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0024] Embodiments of the disclosure will be described hereinafter in detail with reference to the attached drawings. In the description, the same or similar reference numerals refer to the same or similar components. The description to the embodiments of the disclosure hereinafter with reference to the attached drawings is intended to explain the general inventive idea of the invention and should not be construed as being limitative to the disclosure.

[0025] In addition, in the below detail description, for easy to explain, many specific details are set forth to provide a complete understanding to the disclosure. However, one or more embodiments can be obviously carried out without these specific details. In other cases, well-known structures and devices are illustrated to simplify the drawings.

[0026] According to the general technical concept of the disclosure, there is provided a connector comprising a plastic frame adapted to be positioned within an opening in a support base plate and mounted on the support base plate, and a plurality of plug modules mounted in the plastic frame. The plastic frame comprises a pair of opposite end walls and a pair of opposite longitudinal beams connected between the pair of end walls. The longitudinal beams each comprises an outer sidewall, an inner sidewall opposite to the outer sidewall and a plurality of partition walls connected between the inner sidewall and the outer sidewall. The plurality of partition walls are constructed to separate an internal space between the inner sidewall and the outer sidewall into a plurality of box-shaped cavities.

[0027] Figure 1 shows a schematic assembly view of a connector according to an exemplary embodiment of the disclosure, and Figure 2 shows a schematic exploded view of a connector according to an exemplary embodiment of the disclosure.

[0028] As shown in Figures 1 and 2, in the illustrated embodiments, the connector mainly comprises a plastic frame 100 and a plurality of plug modules 300. The connector according to the disclosure is adapted to be mounted onto a support base plate 200. As illustrated in Figure 2, the support base plate 200 is formed with an opening 201 therein. The plastic frame 100 is adapted to be positioned within the opening 201 in the support base plate 200 and mounted onto the support base plate 200. The plurality of plug modules 300 are mounted into the plastic frame 100.

[0029] Figure 3 shows a schematic perspective view of a plastic frame 100 of the connector shown in Figure 1 when seen from a top view, and Figure 4 shows a sche-

matic perspective view of the plastic frame 100 of the connector shown in Figure 1 when seen from a bottom view.

[0030] As shown in Figures 1 through 4, in the illustrated embodiments, the plastic frame 100 comprises a pair of opposite end walls 120, 120 and a pair of opposite longitudinal beams 110, 110 connected between the pair of opposite end walls 120, 120.

[0031] In an exemplary embodiment of the disclosure, as best shown in Figures 3 and 4, each longitudinal beam 110 comprises an outer sidewall 1101, an inner sidewall 1102 opposite to the outer sidewall 1101, and a plurality of upright partition walls 1103 connected between the outer sidewall 1101 and the inner sidewall 1102. The plurality of upright partition walls 1103 are constructed to separate an internal space between the inner sidewall 1102 and the outer sidewall 1101 into a plurality of box-shaped cavities 1100. In this way, the longitudinal beams 110 are configured with box-shaped cavities, which increases the overall stiffness of the longitudinal beams 110 and the ability of the longitudinal beams 110 to resist lateral deformation. In addition, in the disclosure, the plastic frame made of plastic material has advantageous of light weight, convenient processing, low cost and the like.

[0032] As shown in Figure 4, in the illustrated embodiments, each longitudinal beam 110 further comprises a bottom wall 111 connected to the inner sidewall 1102, the outer sidewall 1101 and bottoms of the partition walls 1103. The bottom wall 111 of each longitudinal beam 110 is formed with a plurality of protruding support ribs 112. As shown in Figures 1 and 2, in the illustrated embodiments, when the plastic frame 100 is mounted onto the support base plate 200, the support ribs 112 on the longitudinal beams 110 are supported on a surface of the support base plate 200. In this way, it is possible to further improve the support strength of the longitudinal beams 110, satisfying the requirement of large retention force on the plug modules 300.

[0033] As shown in Figures 1 through 4, in the illustrated embodiments, the plurality of upright partition walls 1103 are uniformly distributed at a predetermined interval along a length direction of the longitudinal beams 110. The plurality of protruding support ribs 112 are uniformly distributed at a predetermined interval along the length direction of the longitudinal beams 110.

[0034] As shown in Figures 1 through 4, in the illustrated embodiments, the support ribs 112 are arranged parallel with the partition walls 1103. A spacing between two adjacent partition walls 1103 may be determined according to the stiffness and strength of the longitudinal beams 110. A spacing between two adjacent support ribs 112 may be determined according to a width dimension of the plug modules 300 to be mounted. Therefore, in an exemplary embodiment, the spacing between the two adjacent partition walls 1103 may be equal to or not equal to that between the two adjacent support ribs 112. Each support rib 112 is positioned at a middle position between a corresponding pair of partition walls 1103. In this way, it is possible to further improve the support strength of the longitudinal beams 110.

[0035] As shown in Figures 1 through 4, in the illustrated embodiments, the plastic frame 100 further comprises a pair of end mount plates 121 extending outwardly from the pair of end walls 120, 120 horizontally. The pair of end mount plates 121 are connected and supported on the surface of the support base plate 200. In the illustrated embodiments, as shown in Figures 1 and 2, each end mount plate 121 is connected to the surface of the support base plate 200 through a pair of thread connectors 1210.

[0036] As shown in Figures 1 and 2, in the illustrated embodiments, the plastic frame 100 is formed with a solid plug 1211 extending uprightly on one of the pair of end mount plates 121 thereof, and a hollow plug 1212 extending uprightly on the other of the pair of end mount plates 121 thereof.

[0037] When the connector as shown in Figure 1 is mated with a mating connector (not shown), the solid plug 1211 on the connector is inserted into a center hole of a hollow plug of the mating connector, and a solid plug on the mating connector is inserted into a center hole of the hollow plug 1212 of the connector. In this way, it is convenient to insert the plastic frame 100 on the connector onto a plastic frame on the mating connector.

[0038] As shown in Figures 1 through 4, in the illustrated embodiments, the plastic frame 100 further comprises a plurality of positioning plates 113 extending uprightly from bottoms of the inner sidewalls 1102 of the longitudinal beams 110. When the plastic frame 100 is mounted onto the support base plate 200, the plurality of positioning plates 113 on the plastic frame 100 are inserted into the opening 201 of the support base plate 200 to position the plastic frame 100 in the opening 201 of the support base plate 200.

[0039] As shown in Figures 1 through 4, in the illustrated embodiments, each position plate 113 is formed with a protruding rib 1131 extending uprightly on an inner surface thereof. Each plug module 300 is adapted to be clamped and positioned between the protruding ribs 1131 of two adjacent positioning plates 113. In this way, each plug module 300 may be inserted and held between the two adjacent positioning plates 113. In addition, when the plug module 300 is inserted between the two adjacent positioning plates 113, the plug module 300 is engaged with two lateral protrusions 1132 on the position plates 113 so as to provide a retention force to the plug module 300 through the two lateral protrusions 1132 on the position plates 113.

[0040] In an exemplary embodiment of the disclosure, the positioning plates 113 are configured to be mated with inserting ends of the plug modules 300, thus has foolproof function to prevent the plug modules 300 are inversely inserted into the plastic frame 100.

[0041] As shown in Figures 1 through 4, in the illustrated embodiments, the support ribs 112 are perpendicular to the positioning plates 113 and connected to the posi-

tioning plates 113 at an outside thereof, respectively. In this way, it is possible to further improve the support stiffness and strength of the longitudinal beams 110.

[0042] As shown in Figures 1 through 4, in the illustrated embodiments, each plug module 300 comprises a plastic housing and a conductive terminal held in the plastic housing. When the connector is mated with the mating connector, the plug modules 300 on the connector are connected with plug modules on the mating connector so as to electrically connect the conductive terminal on the connector with a conductive terminal on the mating connector.

[0043] As shown in Figures 1 through 4, in the illustrated embodiments, the connector and the mating connector each is constructed as a heavy duty connector, and a retention force between each pair of plug modules connected with each other is greater than 300N.

[0044] It would be appreciated by those skilled in the art embodiments as described and shown above are exemplary and various changes or modifications may be made thereto by those skilled in the art. Structures described in various embodiments may be combined in any forms without conflicting with each other in structure or principle.

[0045] Although embodiments of the disclosure have been described in detail with reference to the accompanying drawings, the embodiments disclosed in the accompanying drawings is intended to be illustrative, rather than being construed as a limitation to the disclosure.

[0046] Although some embodiments of the general concept of the disclosure have been illustrated and described, it should be understood by those skilled in the art that modification can be made to these embodiments without departing from the principle and spirit of the disclosure. The scope of the disclosure is defined by claims and their equivalents.

[0047] It should be noted that phase "comprise" or "include" does not exclude other elements or steps, and the phrase "a" or "an" does not exclude multiple. In addition, any reference numerals in claims should not be construed as limiting the scope of the disclosure.

Claims

1. A connector comprising:

a plastic frame (100) adapted to be positioned within an opening (201) of a support base plate (200) and mounted on the support base plate (200); and
a plurality of plug modules (300) mounted in the plastic frame (100),
wherein the plastic frame (100) comprises a pair of opposite end walls (120,120) and a pair of opposite longitudinal beams (110,110) connected between the pair of end walls (120,120),
wherein each of the longitudinal beams (110, 110) comprises an outer sidewall (1101), an inner sidewall (1102) opposite to the outer sidewall (1101) and a plurality of partition walls (1103) connected between the inner sidewall (1102) and the outer sidewall (1101); and
the plurality of partition walls (1103) are constructed to separate an internal space between the inner sidewall (1102) and the outer sidewall (1101) into a plurality of box-shaped cavities (1100).

2. The connector according to claim 1, wherein
each longitudinal beam (110) further comprises a bottom wall (111) connected to the inner sidewall (1102), the outer sidewall (1101) and bottoms of the partition walls (1103);
the bottom wall (111) of each longitudinal beam (110) is formed with a plurality of protruding support ribs (112); and
the support ribs (112) on the longitudinal beams (110) are supported on a surface of the support base plate (200) when the plastic frame (100) is mounted onto the support base plate (200).

3. The connector according to claim 2, wherein
the plurality of partition walls (1103) are uniformly distributed at a predetermined interval along a length direction of the longitudinal beams (110); and
the plurality of protruding support ribs (112) are uniformly distributed at a predetermined interval along the length direction of the longitudinal beams (110).

4. The connector according to claim 3, wherein the support ribs (112) are arranged parallel with the partition walls (1103).

5. The connector according to claim 4, wherein each support rib (112) is positioned at a middle position between a corresponding pair of partition walls (1103).

6. The connector according to claim 1, wherein the plastic frame (100) further comprises a pair of end mount plates (121) extending outwardly from the pair of end walls (120, 120) horizontally, and the pair of end mount plates (121) are connected and supported on a surface of the support base plate (200).

7. The connector according to claim 6, wherein each end mount plate (121) is connected to the surface of the support base plate (200) through a pair of thread connectors (1210)

8. The connector according to claim 6, wherein the plastic frame (100) is formed with a solid plug (1211) extending uprightly on one of the pair of end mount plates (121) thereof and a hollow plug (1212) extending uprightly on the other of the pair of end mount

plates (121) thereof.

9. The connector according to claim 8, wherein when the connector is mated with a mating connector, the solid plug (1211) on the connector is inserted into a center hole of a hollow plug of the mating connector, and a solid plug on the mating connector is inserted into a center hole of the hollow plug (1212) of the connector.

10. The connector according to claim 6, wherein
the plastic frame (100) further comprises a plurality of positioning plates (113) extending uprightly from bottoms of the inner sidewalls (1102) of the longitudinal beams (110); and
when the plastic frame (100) is mounted onto the support base plate (200), the plurality of positioning plates (113) on the plastic frame (100) are inserted into the opening (201) of the support base plate (200) to position the plastic frame (100) in the opening (201) of the support base plate (200).

11. The connector according to claim 10, wherein
each position plate (113) is formed with a protruding rib (1131) extending uprightly on an inner surface thereof; and
each plug module (300) is adapted to be clamped and positioned between the protruding ribs (1131) of two adjacent positioning plates (113).

12. The connector according to claim 11, wherein the support ribs (112) are perpendicular to the positioning plates (113) and connected to the positioning plates (113) at an outside thereof, respectively.

13. The connector according to claim 1, wherein
each plug module (300) comprises a plastic housing and a conductive terminal held in the plastic housing; and
when the connector is mated with a mating connector, the plug modules (300) on the connector are connected with plug modules on the mating connector so as to electrically connect the conductive terminal on the connector with a conductive terminal on the mating connector.

14. The connector according to claim 13, wherein each of the connector and the mating connector comprises a heavy duty connector, and a retention force between each pair of plug modules connected with each other is greater than 300N.

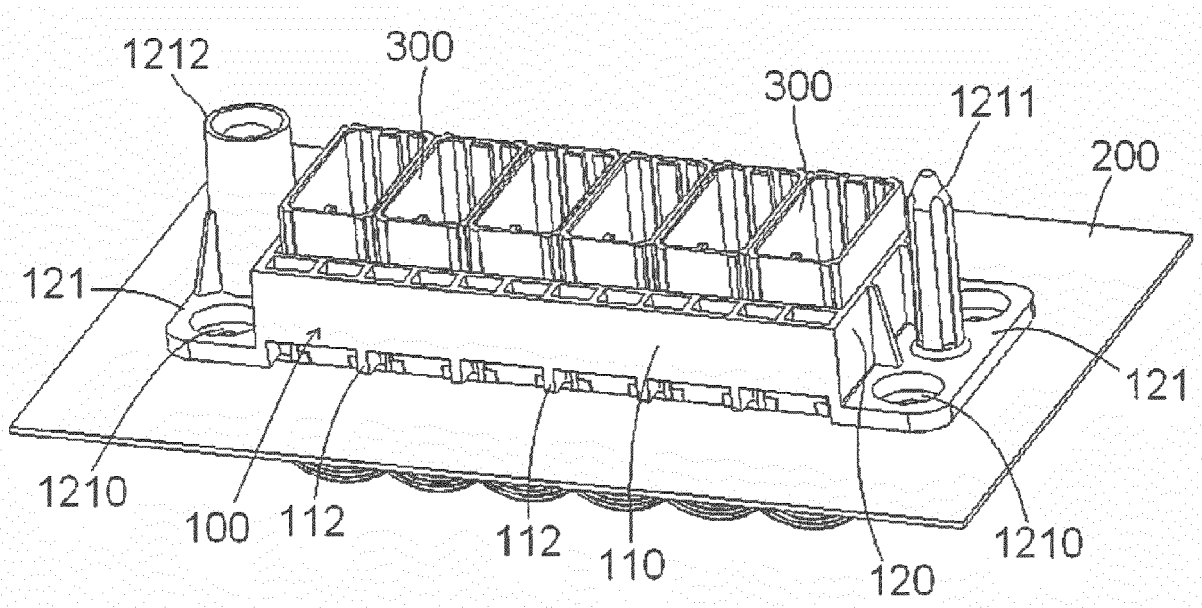


Fig.1

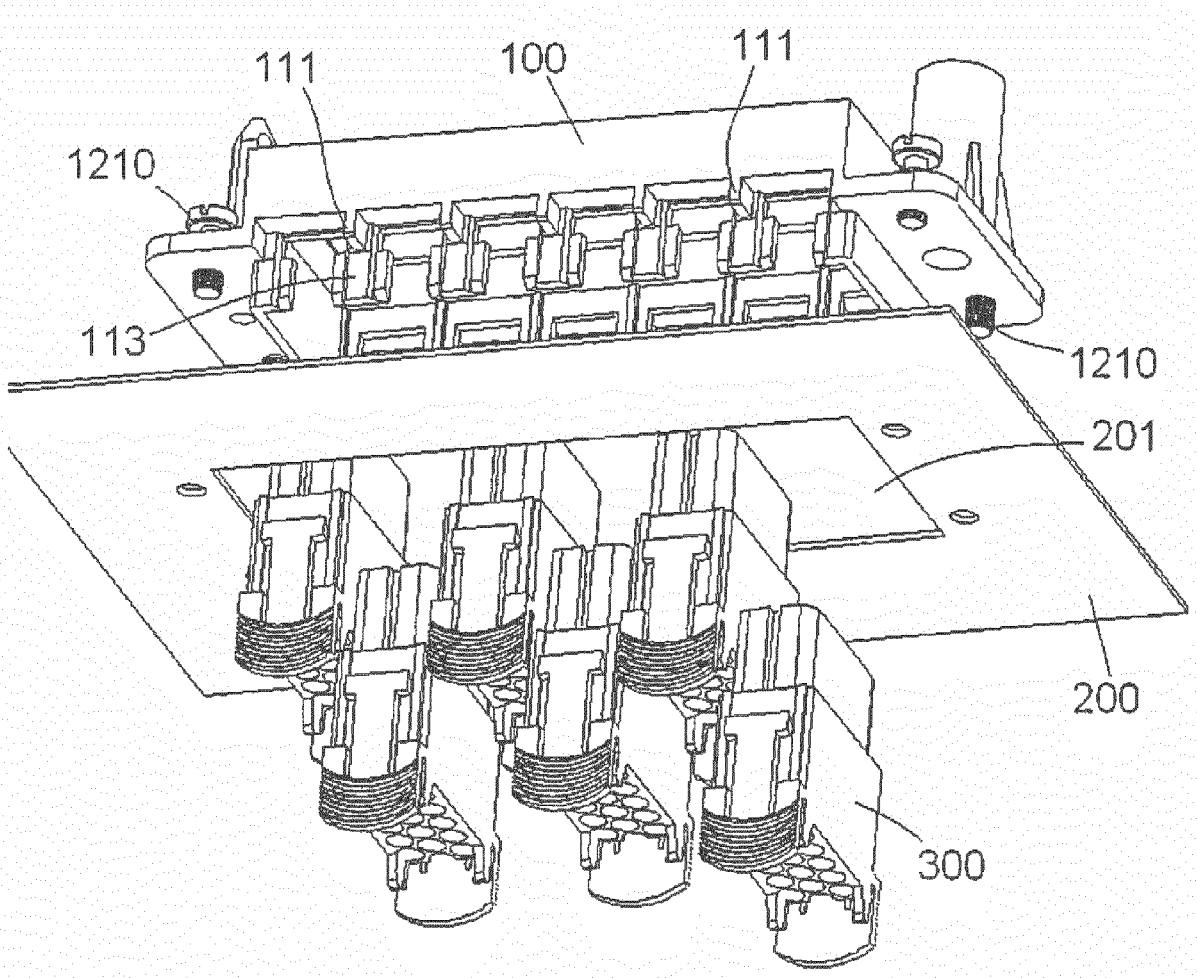
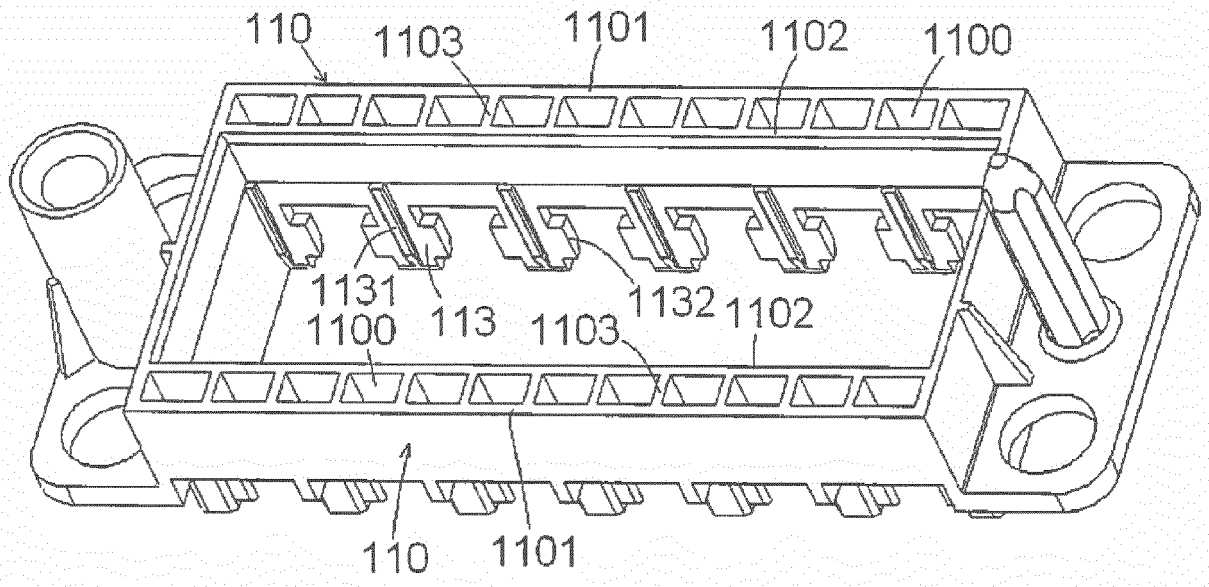


Fig.2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1102
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1131
1100
113
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1102
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Fig.3

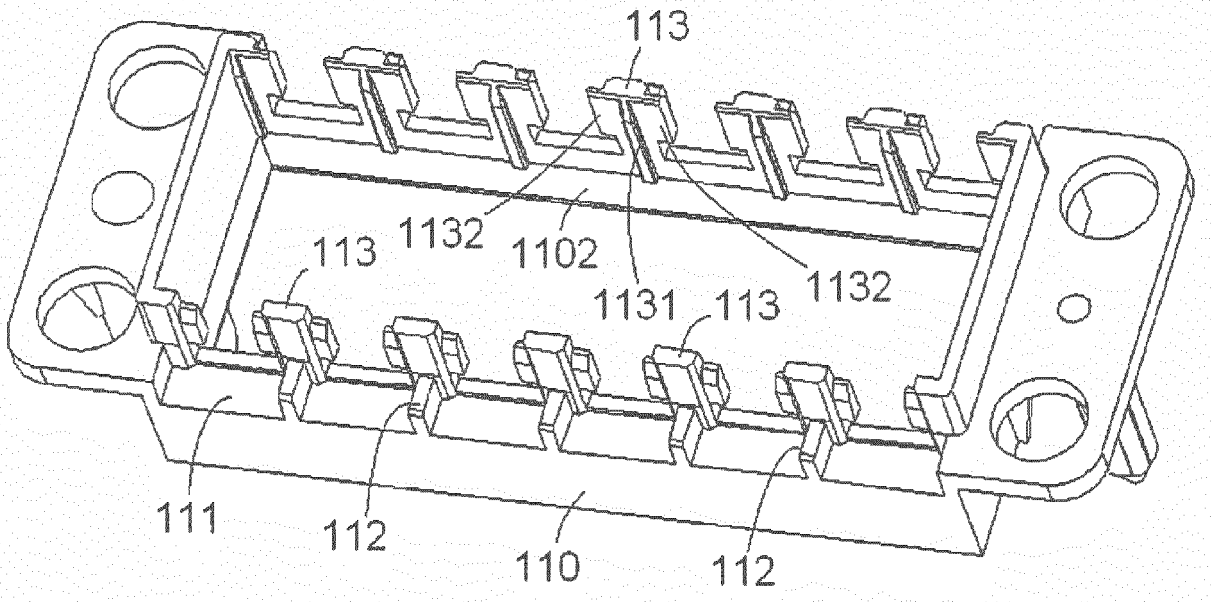
113
113
1132
1102
1132
1131
113
111
112
110
112

Fig.4

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EUROPEAN SEARCH REPORT

Application Number
EP 17 17 9681

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Y	* abstract * * paragraph [0026] - paragraph [0026] * * paragraph [0040] - paragraph [0040] * * figures 1-4 *	6-14	H01R13/518 ADD. H01R13/53 H01R13/64
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TECHNICAL FIELDS SEARCHED (IPC)
H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 October 2017	Pugliese, Sandro

CATEGORY OF CITED DOCUMENTS

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