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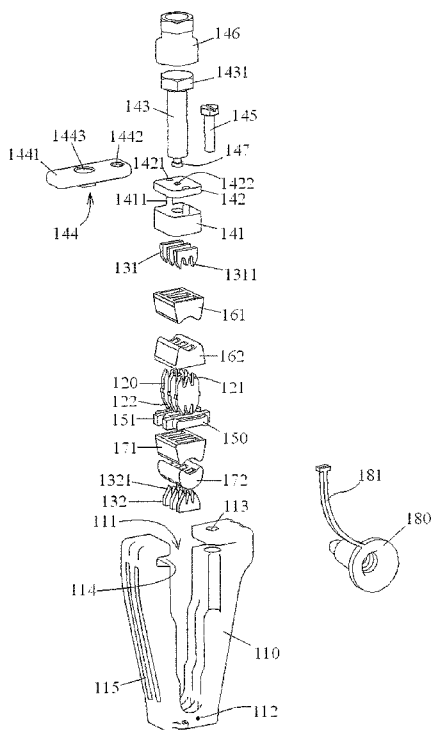


Fig.2

(57) Abstract: An electrical connector for electrically connecting a first power

cable and a second power cable, comprising: a body having a recess formed therein; a conductive piercing 5 member received in the recess, having a first side facing an opening of the recess and a second side facing a bottom of the recess, and formed with at least one tooth at each side of the first and second sides; a first locking member received in the recess and located at the first side of the piercing member; a second locking member received in the recess and located at the second side of the piercing member; and a pressing mechanism mounted on the opening of the recess. The first and second power cables are placed in the recess, the first power cable is located between the first locking member and the piercing member, and the second power cable is located between the second locking member and the piercing member. The pressing mechanism is configured to exert a predetermined press force on the first locking member, the first power cable, the piercing member, the second power cable 15 and the second locking member, so that the teeth on the first and second sides of the piercing member pierce through the insulation layers of the first and second power cables and electrically contact the conductors of the first and second power cables, respectively, and so that the first and second locking member engage the first and second power cables, respectively, to prevent the first and second power cables from being pulled out of the recess.



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ELECTRICAL CONNECTOR

CROSS-REFERENCE TO RELATED APPLICATION

- 5 This application claims the benefit of Chinese Patent Application No. 201310652378.5 filed on December 6, 2013 in the State Intellectual Property Office of China, the whole disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

10 **Field of the Invention**

The present invention relates to an electrical connector, more particularly, relates to an electrical connector for electrically connecting a first power cable and a second power cable.

Description of the Related Art

- 15 In prior art, an electrical connector for electrically connecting middle or low voltage electric power cables generally comprises a pair of rigid half bodies made of metal and a plurality of blade-like members made of metal. The pair of rigid half bodies are adapted to be assembled together by a bolt to form a whole body. The plurality of blade-like members are placed in the assembled body and directly keep in contact with the body. Two electric
20 power cables to be connected are mounted in the body from both sides of the body. By screwing the bolt, the half bodies are tightened to fix the electric power cables in the body. As a result, under the pressing of the pair of half bodies, the plurality of blade-like members pierce through the insulation layers of the electric power cables and come into electrical contact with the conductors of the electric power cables. In this way, the conductors of the
25 pair of electric power cables are electrically connected via the metal blade-like members and the metal body.

- In the prior art, during tightening the pair of rigid half bodies to fix the electrical power cables by screwing the bolt, it is impossible to determine whether a press force exerted on the electrical power cables by the bolt reaches a predetermined press force. On one hand, if
30 the press force exerted on the electrical power cables by the bolt is too small, the blade-like members cannot reliably electrically contact the conductors of the power cables and even cannot build an effective electrical connection between the pair of power cables. On the other hand, if the press force exerted on the electrical power cables by the bolt is too large, the blade-like members may damage or even cut off the conductors of the power cables and
35 disadvantageously affect or disable the conductivity of the power cables.

SUMMARY OF THE INVENTION

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

5 According to an object of the present invention, there is provided an electrical connector capable of building a reliable electrical connection between a pair of power cables without damaging conductors of the power cables.

According to an aspect of the present invention, there is provided an electrical connector for electrically connecting a first power cable and a second power cable,
10 comprising: a body having a recess formed therein; a conductive piercing member received in the recess, having a first side facing an opening of the recess and a second side facing a bottom of the recess, and formed with at least one tooth at each side of the first and second sides; a first locking member received in the recess and located at the first side of the piercing member; a second locking member received in the recess and located at the second
15 side of the piercing member; and a pressing mechanism mounted on the opening of the recess. The first and second power cables are placed in the recess, the first power cable is located between the first locking member and the piercing member, and the second power cable is located between the second locking member and the piercing member. The pressing mechanism is configured to exert a predetermined press force on the first locking member,
20 the first power cable, the piercing member, the second power cable and the second locking member, so that the teeth on the first and second sides of the piercing member pierce through the insulation layers of the first and second power cables and electrically contact the conductors of the first and second power cables, respectively, and so that the first and second locking member engage the first and second power cables, respectively, to prevent
25 the first and second power cables from being pulled out of the recess.

According to an exemplary embodiment of the present invention, each of the first and second locking members has at least one tooth; and the teeth of the first and second locking members pierce into the insulation layers of the first and second power cables, respectively, after the first and second power cables are connected by the electrical connector.

30 According to another exemplary embodiment of the present invention, the teeth of the first and second locking members pierce through the insulation layers of the first and second power cables and electrically contact the conductors of the first and second power cables, respectively.

According to another exemplary embodiment of the present invention, a surface of the

first locking member contacting the first power cable is configured to be a first rough surface with bulges and grooves, a surface of the second locking member contacting the second power cable is configured to be a second rough surface with bulges and grooves, the first and second rough surfaces of the first and second locking members engage the insulation layers of the first and second power cables, respectively, after the first and second power cables are connected by the electrical connector.

According to another exemplary embodiment of the present invention, the bulges and grooves of the first rough surface extend in a direction parallel to or perpendicular to an axial direction of the first power cable, and/or the bulges and grooves of the second rough surface extend in a direction parallel to or perpendicular to an axial direction of the second power cable.

According to another exemplary embodiment of the present invention, the first and the second rough surfaces are shaped in arc surfaces matched with the outer circumferential surfaces of the first and second power cables, respectively.

According to another exemplary embodiment of the present invention, the second locking member is configured to be a separate member mounted on the bottom of the recess of the body, or the second locking member is configured to be integrally formed on the bottom of the recess of the body.

According to another exemplary embodiment of the present invention, the electrical connector further comprises a first elastic sealing block and a second elastic sealing block provided at the first side and the second side of the piercing member, respectively. The teeth on the first and second sides of the piercing member pass through the first and second elastic sealing blocks, respectively. The first and second elastic sealing blocks are pressed on the first and second power cables, respectively, under the predetermined press force after the first and second power cables are connected by the electrical connector, so as to seal locations of the first and second power cables pierced by the piercing member.

According to another exemplary embodiment of the present invention, the electrical connector further comprises a third elastic sealing block and a fourth elastic sealing block provided at the first locking member and the second locking member, respectively. The teeth on the first and second locking members pass through the third and fourth elastic sealing blocks, respectively. The third and fourth elastic sealing blocks are pressed on the first and second power cables, respectively, under the predetermined press force after the first and second power cables are connected by the electrical connector, so as to seal locations of the first and second power cables pierced by the first and second locking members.

According to another exemplary embodiment of the present invention, the electrical

connector further comprises a positioning member on which the piercing member is fixed. The positioning member is formed with end protrusions slideably fitted in guide slots formed in side walls of the recess, so that the positioning member is movable relative to the body in a depth direction of the recess.

5 According to another exemplary embodiment of the present invention, the piercing member has a sheet-like shape and is positioned in a positioning slot formed in the positioning member.

 According to another exemplary embodiment of the present invention, the electrical connector comprises a single or a plurality of sheet-like piercing members.

10 According to another exemplary embodiment of the present invention, the pressing mechanism comprising: a support plate removably mounted on the opening of the recess and formed with a threaded hole therein; a bolt screwed into the threaded hole of the support plate and entering into the recess; and a pressing plate mounted on an end of the bolt entering into the recess.

15 According to another exemplary embodiment of the present invention, the first locking member has a sheet-like shape and is positioned in a positioning slot formed in the pressing plate, and the second locking member has a sheet-like shape and is positioned in a positioning slot formed in the bottom of the recess.

 According to another exemplary embodiment of the present invention, the electrical
20 connector comprises a single or a plurality of sheet-like first locking members and a single or a plurality of sheet-like second locking members.

 According to another exemplary embodiment of the present invention, the electrical connector further comprises a connection plate connected to the end of the bolt by a screw. The pressing plate is assembled on the connection plate by fitting a protrusion formed on the
25 pressing plate into an installation hole formed in the connection plate.

 According to another exemplary embodiment of the present invention, the pressing mechanism comprising: a support plate removably mounted on the opening of the recess and formed with a threaded hole therein; a bolt screwed into the threaded hole of the support plate and entering into the recess; and a pressing plate mounted on an end of the bolt
30 entering into the recess.

 According to another exemplary embodiment of the present invention, the pressing plate is connected to the end of the bolt by a screw.

 According to another exemplary embodiment of the present invention, the first locking member is formed with a chamber in which the pressing plate is embedded.

35 According to another exemplary embodiment of the present invention, the pressing

mechanism further comprises a force control member mounted on the head of the bolt, and the bolt is rotated by operating the force control member, the force control member is configured to be broken when a force exerted on the first and second power cables by the bolt reaches the predetermined press force, so as to protect the first and second power cables from being damaged by an overlarge press force.

According to another exemplary embodiment of the present invention, the force control member comprising: a sleeve part mounted on the head of the bolt; a polygonal head adapted to be operated by a wrench; and a fragile neck connected between the sleeve part and the polygonal head, the fragile neck is configured to be broken when a force exerted on the first and second power cables by the bolt reaches the predetermined press force, so that the polygonal head is separated from the sleeve part.

According to another exemplary embodiment of the present invention, the pressing mechanism further comprises a locking nut screwed on the bolt, the locking nut is configured to lock the bolt in place when the force exerted on the first and second power cables by the bolt reaches the predetermined press force.

According to another exemplary embodiment of the present invention, one end of the support plate is fixed with a screw in a notch formed in one sidewall of the opening of the recess, and the other end of the support plate is held in a notch formed in the other sidewall of the opening of the recess.

According to another exemplary embodiment of the present invention, the body exhibits a substantially V-typed shape.

According to another exemplary embodiment of the present invention, the electrical connector further comprises a sealing cap attached to the body and adapted to cover and seal a bared end of at least one of the first and second power cables.

According to another exemplary embodiment of the present invention, the body, the first locking member and the second locking member are all made of conductive material.

According to another exemplary embodiment of the present invention, the pressing mechanism comprising: a support plate removably mounted on the opening of the recess and formed with a threaded hole therein; and a bolt screwed into the threaded hole of the support plate and entering into the recess, so as to exert a press force on the first locking member, the first power cable, the piercing member, the second power cable and the second locking member.

According to another exemplary embodiment of the present invention, the body is a single rigid member, and the support plate is a single elastic member.

According to another exemplary embodiment of the present invention, the pressing

mechanism further comprises a force control member mounted on the head of the bolt, and the bolt is rotated by operating the force control member, the force control member is configured to be broken when a force exerted on the first and second power cables by the bolt reaches the predetermined press force, so as to protect the first and second power cables from being damaged by an overlarge press force.

According to another exemplary embodiment of the present invention, an axis of the bolt is perpendicular to and intersects with axes of the first and second power cables in the same plane, so that the press force is exerted evenly and symmetrically on both sides of each of the first and second power cables.

According to the above exemplary embodiments of the present invention, the electrical connector not only can reliably electrically connect a pair of power cables, but also protect the power cables from being damaged by an overlarge press force.

Furthermore, in an exemplary embodiment of the present invention, the electrical connector comprises a single rigid body. In the prior art, an electrical connector comprises a pair of half rigid bodies. Accordingly, the electrical connector of the present invention has a configuration different from that of the electrical connector in the prior art.

BRIEF DESCRIPTION OF THE DRAWINGS

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:

Fig.1 is an illustrative perspective assembled view of an electrical connector according to a first exemplary embodiment of the present invention;

Fig.2 is an illustrative perspective exploded view of an electrical connector according to a first exemplary embodiment of the present invention;

Fig.3 is an illustrative view of electrically connecting a first power cable and a second power cable by the electrical connector according to the first exemplary embodiment of the present invention;

Fig.4 is an illustrative cross section view of the electrical connector of Fig.3;

Fig.5 is an illustrative perspective assembled view of an electrical connector according to a second exemplary embodiment of the present invention;

Fig.6 is an illustrative perspective exploded view of an electrical connector according to a second exemplary embodiment of the present invention;

Fig.7 is an illustrative view of electrically connecting a first power cable and a second power cable by the electrical connector according to the second exemplary embodiment of

the present invention;

Fig.8 is an illustrative cross section view of the electrical connector of Fig.7;

Fig.9 is an illustrative perspective view of a first locking member of the electrical connector according to a second exemplary embodiment of the present invention; and

5 Fig.10 is an illustrative axial cross section view of the electrical connector of Fig.7.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

Exemplary embodiments of the present disclosure will be described hereinafter in detail
10 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.

15 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.

20 According to a general concept of the present invention, there is provided an electrical
connector for electrically connecting a first power cable and a second power cable,
comprising: a body having a recess formed therein; a conductive piercing member received
in the recess, having a first side facing an opening of the recess and a second side facing a
bottom of the recess, and formed with at least one tooth at each side of the first and second
25 sides; a first locking member received in the recess and located at the first side of the
piercing member; a second locking member received in the recess and located at the second
side of the piercing member; and a pressing mechanism mounted on the opening of the
recess. The first and second power cables are placed in the recess, the first power cable is
located between the first locking member and the piercing member, and the second power
30 cable is located between the second locking member and the piercing member. The pressing
mechanism is configured to exert a predetermined press force on the first locking member,
the first power cable, the piercing member, the second power cable and the second locking
member, so that the teeth on the first and second sides of the piercing member pierce
through the insulation layers of the first and second power cables and come into electrical
35 contact with the conductors of the first and second power cables, respectively, and so that

the first and second locking member engage the first and second power cables, respectively, to prevent the first and second power cables from being pulled out of the recess.

First Embodiment

5 Figs.1-4 show an electrical connector according to a first embodiment of the present invention.

Fig.1 is an illustrative perspective assembled view of an electrical connector according to a first exemplary embodiment of the present invention; Fig.2 is an illustrative perspective exploded view of an electrical connector according to a first exemplary embodiment of the present invention.

As shown in Fig.1 and Fig.2, the electrical connector mainly comprises a body 110, a piercing member 120, a first locking member 131, a second locking member 132 and a pressing mechanism.

Referring to Figs.1-2, a recess 111 is formed in the body 110. The recess 111 has an opening in an upper portion of the body 110 and a bottom 112 at lower portion of the body 110.

In an exemplary embodiment of the present invention, as shown in Figs.1-2, the body 110 exhibits a substantially V-typed shape. In this way, it can reduce the material for making the body 110.

As shown in Figs.1-2, the piercing member 120 is received in the recess 111. The piercing member 120 is used to electrically connect a first power cable 10 and a second power cable 20 (see Figs.3-4). Thereby, the piercing member 120 is made of conductive material, for example, metal, such as copper.

In an embodiment, as shown in Figs.1-2, the piercing member 120 has a sheet-like shape, and the electrical connector comprises a plurality of sheet-like piercing members 120. But the present invention is not limited to this, the electrical connector may comprise a single sheet-like piercing members 120.

As shown in Figs.1-2, each of the piercing members 120 has a first side facing the opening of the recess 111 and a second side facing the bottom 112 of the recess 111. Each of the piercing members 120 is formed with at least one tooth 121 at the first side and at least one tooth 122 at the second side. In the illustrated embodiment, three teeth 121, 122 formed on the piercing members 120 each has a substantial triangle shape.

As shown in Figs.1-2, the first locking member 131 is received in the recess 111 and located at the first side of the piercing member 120, the second locking member 132 is received in the recess 111 and located at the second side of the piercing member 120.

As shown in Figs.1-2, the first locking member 131 has at least one tooth 1311 facing the piercing member 120 at the first side of the piercing member 120, and the second locking member 132 has at least one tooth 1321 facing the piercing member 120 at the second side of the piercing member 120. In an illustrated embodiment, the teeth 1311, 1321
5 formed on the first and second locking members 131, 132 each has a substantial triangle shape.

In an exemplary embodiment of the present invention, as shown in Figs.1-2, the pressing mechanism mainly comprises a support plate 144, a bolt 143 and a pressing plate 141.

10 As shown in Figs.1-2, the support plate 144 is removably mounted on the opening of the recess 111 and formed with a threaded hole 1443 therein. The bolt 143 is screwed into the threaded hole 1443 of the support plate 144 and enters into the recess 111. The pressing plate 141 is mounted on an end of the bolt 143 entering into the recess 111. In this way, as shown in Figs.3-4, by rotating the bolt 143, a press force can be exerted on the first locking
15 member 131, the first power cable 10, the piercing member 120, the second power cable 20 and the second locking member 132 received in the recess 111.

In an embodiment, as shown in Figs.1-2, one end of the support plate 144 is fixed with a screw 145 in a notch formed in one sidewall of the opening of the recess 111, and the other end of the support plate 144 is held in a notch formed in the other sidewall of the opening of
20 the recess 111. As shown in Figs.1-2, a hole 1442 is formed in the one end of the support plate 144, the screw 145 passes through the hole 1442 and screwed to the one sidewall of the opening of the recess 111. In this way, the support plate 144 can be detached from the body 110. But the present invention is not limited to the illustrated embodiment, for example, both ends of the support plate 144 may be connected to both sidewalls of the opening of the
25 recess 111 by screws.

In an exemplary embodiment of the present invention, as shown in Figs.1-2, the electrical connector further comprises a connection plate 142 connected to the end of the bolt 143 by a screw 147 (see Fig.4), and the pressing plate 141 is assembled on the connection plate 142 by fitting at least one protrusion 1411 formed on the pressing plate 141
30 into at least one installation hole 1421 formed in the connection plate 142.

As shown in Figs.1-2, the first locking member 131 has a sheet-like shape and is positioned in a positioning slot (not shown) formed in the pressing plate 141. The second locking member 132 has a sheet-like shape and is positioned in a positioning slot (not shown) formed in the bottom of the recess 111.

35 In an embodiment, the electrical connector may comprise a single or a plurality of

sheet-like first locking members 131 and a single or a plurality of sheet-like second locking members 132. In the illustrated embodiment, the electrical connector comprises three sheet-like first locking members 131 and three sheet-like second locking members 132.

In an exemplary embodiment, as shown in Figs.1-2, the electrical connector may further comprise a positioning member 150 on which the piercing member 120 is fixed. As shown in Figs.1-2, the positioning member 150 is formed with end protrusions 151 fitted in guide slots 115 formed in sidewalls of the recess 111, so that the positioning member 150 is movable relative to the body 210 in a depth direction (a vertical direction in Figs.1-2) of the recess 111.

As shown in Figs.1-2, the plurality of piercing members 120 are arranged to be spaced from each other, and fitted and fixed in the respective positioning slots formed in the positioning member 150.

Fig.3 is an illustrative view of electrically connecting a first power cable 10 and a second power cable 20 by the electrical connector according to the first exemplary embodiment of the present invention; Fig.4 is an illustrative cross section view of the electrical connector of Fig.3.

As shown in Figs.3-4, when the first power cable 10 and the second power cable 20 are placed in the recess 111 and connected by the electrical connector, the first power cable 10 is located between the first locking member 131 and the first side of the piercing member 120, and the second power cable 20 is located between the second locking member 132 and the second side of the piercing member 120.

As shown in Figs.3-4, the pressing mechanism is configured to exert a predetermined press force on the first locking member 131, the first power cable 10, the piercing member 120, the second power cable 20 and the second locking member 132, so that the teeth 121, 122 on the first and second sides of the piercing member 120 pierce through the insulation layers 11, 21 of the first and second power cables 10, 20 and come into electrical contact with the conductors 12, 22 of the first and second power cables 10, 20, respectively. In this way, the first power cable 10 and the second power cable 20 are electrically connected via the conductive piercing member 120.

As shown in Figs.3-4, when the first power cable 10 and the second power cable 20 are electrically connected by the electrical connector, the teeth 1311, 1321 of the first and second locking members 131, 132 pierce into and engage the insulation layers 11, 21 of the first and second power cables 10, 20, respectively, to prevent the first and second power cables 10, 20 from being pulled out of the recess 111.

In an exemplary embodiment of the present invention, the teeth 1311, 1321 of the first

and second locking members 131, 132 pierce through the insulation layers 11, 21 of the first and second power cables 10, 20 and electrically contact the conductors 12, 22 of the first and second power cables 10, 20, respectively. In this case, if the body 110, the first and second locking members 131, 132 are made of conductive material, the first and second power cables 10, 20 are also electrically connected via the first and second locking members 131, 132 and the body 110. But the present invention is not limited to this, any one of the first and second locking members 131, 132 and the body 110 may be made of non-conductive material. In this case, the first and second locking members 131, 132 cannot be used to electrically connect the first and second power cables 10, 20.

In an exemplary embodiment of the present invention, as shown in Figs.1-4, the pressing mechanism may further comprise a force control member 146 mounted on the head 1431 of the bolt 143. The bolt 143 is rotated by operating the force control member 146. The force control member 146 is configured to be broken when a force exerted on the first and second power cables 10, 20 by the bolt 143 reaches the predetermined press force. In this way, the press force exerted on the first and second power cables 10, 20 can be accurately controlled to the predetermined press force, so as to protect the conductors of the first and second power cables 10, 20 from being damaged or even cut off by the teeth 121, 122 of the piercing members 120 and the teeth 1311, 1321 of the locking members 131, 132 due to an overlarge press force and prevent the teeth 121, 122 of the piercing members 120 and the teeth 1311, 1321 of the locking members 131, 132 from being unreliably contact the conductors of the first and second power cables 10, 20 due to an insufficient press force.

In an exemplary embodiment of the present invention, as shown in Figs.1-4, the force control member 146 mainly comprises a sleeve part 1461, a polygonal head 1462 and a fragile neck 1463.

The sleeve part 1461 is mounted on the head 1431 of the bolt 143. The polygonal head 1462 is adapted to be operated by a wrench (not shown) to rotate the bolt 143. The fragile neck 1463 is connected between the sleeve part 1461 and the polygonal head 1462. The fragile neck 1463 is configured to be broken when a force exerted on the first and second power cables 10, 20 by the bolt 143 reaches the predetermined press force, so that the polygonal head 1462 is separated from the sleeve part 1461.

In an embodiment, as shown in Fig.4, the pressing mechanism may further comprise a locking nut 148 (indicated by dash line in Fig.4) screwed on the bolt 143. The locking nut 148 is configured to lock the bolt 143 in place when the force exerted on the first and second power cables 10, 20 by the bolt 143 reaches the predetermined press force. In this case, the bolt 143 will not be released, so that electrical connection between the first and second

power cables 10, 20 is held.

In an exemplary embodiment of the present invention, as shown in Figs.1-4, the electrical connector may further comprise a first elastic sealing block 162 and a second elastic sealing block 171 provided at the first side and the second side of the piercing member 120, respectively. The teeth 121, 122 on the first and second sides of the piercing member 120 pass through the first and second elastic sealing blocks 162, 171, respectively. The first and second elastic sealing blocks 162, 171 are pressed on the first and second power cables 10, 20, respectively, under the predetermined press force after the first and second power cables 10, 20 are connected by the electrical connector, so as to seal and protect locations of the first and second power cables 10, 20 pierced by the piercing member 120.

In an exemplary embodiment of the present invention, as shown in Figs.1-3, the electrical connector may further comprise a sealing cap 180 attached to the body 110 and adapted to cover and seal a bared end of at least one of the first and second power cables 10, 20. In an example, the first power cable 10 is a trunk cable, and the second power cable 20 is a branch cable, the sealing cap 180 is covered on a bared end of the second power cable 20 to protect the end of the conductor of the second power cable 20 therein.

In an exemplary embodiment of the present invention, the body 110 may be a single rigid member that does not elastically deform under the predetermined press force. The support plate 144 may be a single elastic member that elastically deforms under the predetermined press force. In this way, an operator may determine whether the press force exerted on the power cables reaches the predetermined press force by simply viewing the deformation of the support plate 144, so as to protect the first and second power cables 10, 20 from being damaged by an overlarge press force.

In the prior art, the power cables is pressed between two rigid half bodies, and even if the press force exerted on the power cables becomes overlarge, the two rigid half bodies do not elastically deform. As a result, the blade-like members cut into or even cut off the conductors of the power cables.

Please be noted that the support plate may be rigid, and the press force exerted on the power cables 10, 20 by the bolt 143 may be accurately controlled by the force control member 146, instead of by viewing the elastic deformation of the support plate.

In an exemplary embodiment of the present invention, as shown in Figs.3-4, an axis of the bolt 143 is perpendicular to and intersects with axes of the first and second power cables 10, 20 in the same plane, so that the press force is exerted evenly and symmetrically on both sides of each of the first and second power cables 10, 20, and so that the piercing member

120 keep reliable contact with the conductors 12, 22 of the first and second power cables 10, 20.

Second Embodiment

5 Figs.5-10 show an electrical connector according to a second embodiment of the present invention.

Fig.5 is an illustrative perspective assembled view of an electrical connector according to a second exemplary embodiment of the present invention; Fig.6 is an illustrative perspective exploded view of an electrical connector according to a second
10 exemplary embodiment of the present invention.

As shown in Fig.5 and Fig.6, the electrical connector mainly comprises a body 210, a piercing member 220, a first locking member 241, a second locking member 216 and a pressing mechanism.

Referring to Figs.5-6, a recess 211 is formed in the body 210. The recess 211 has an
15 opening in an upper portion of the body 210 and a bottom 212 at lower portion of the body 210.

In an exemplary embodiment of the present invention, as shown in Figs.5-6, the body 210 exhibits a substantially V-typed shape. In this way, it can reduce the material to make the body 210.

20 As shown in Figs.5-6, the piercing member 220 is received in the recess 211. The piercing member 220 is used to electrically connect a first power cable 10 and a second power cable 20 (see Figs.7-8). Thereby, the piercing member 220 is made of conductive material, for example, metal, such as copper.

In an embodiment, as shown in Figs.5-6, the piercing member 220 has a sheet-like
25 shape, and the electrical connector comprises a plurality of sheet-like piercing members 220. But the present invention is not limited to this, the electrical connector may comprise a single sheet-like piercing members 220.

As shown in Figs.5-6, each of the piercing members 220 has a first side facing the opening of the recess 211 and a second side facing the bottom 212 of the recess 211. Each of
30 the piercing members 220 is formed with at least one tooth 221 at the first side and at least one tooth 222 at the second side. In the illustrated embodiment, the teeth 221, 222 formed on the piercing members 220 have a triangle shape.

As shown in Figs.5-6, the first locking member 241 is received in the recess 211 and located at the first side of the piercing member 220, the second locking member 216 is

received in the recess 211 and located at the second side of the piercing member 220.

In an exemplary embodiment of the present invention, as shown in Figs.9-10, a surface of the first locking member 241 in contact with the first power cable 10 is configured to be a first rough surface 10g with bulges and grooves, a surface of the second locking member 216 in contact with the second power cable 20 is configured to be a second rough surface 20g with bulges and grooves. As shown in Figs.9-10, the first and second rough surfaces 10g, 20g of the first and second locking members 10, 20 engage the insulation layers 11, 21 of the first and second power cables 10, 20, respectively, after the first and second power cables 10, 20 are connected by the electrical connector.

In an exemplary embodiment of the present invention, as shown in Figs.5-6, the pressing mechanism mainly comprises a support plate 244, a bolt 243 and a pressing plate 242.

As shown in Figs.5-6, the support plate 244 is removably mounted on the opening of the recess 211 and formed with a threaded hole 2443 therein. The bolt 243 is screwed into the threaded hole 2443 of the support plate 244 and enters into the recess 211. The pressing plate 242 is mounted on an end of the bolt 243 entering into the recess 211. In this way, as shown in Figs.7-8, by rotating the bolt 243, a press force can be exerted on the first locking member 241, the first power cable 10, the piercing member 220, the second power cable 20 and the second locking member 216 received in the recess 211.

In an embodiment, as shown in Figs.5-6, one end of the support plate 244 is fixed with a screw 245 in a notch formed in one sidewall of the opening of the recess 211, and the other end of the support plate 244 is held in a notch formed in the other sidewall of the opening of the recess 211. As shown in Figs.5-6, a hole 2442 is formed in the one end of the support plate 244, the screw 245 passes through the hole 2442 and screwed to the one sidewall of the opening of the recess 211. In this way, the support plate 244 can be detached from the body 210. But the present invention is not limited to the illustrated embodiment, for example, both ends of the support plate 244 may be connected to both sidewalls of the opening of the recess 211 by screws.

In an exemplary embodiment of the present invention, as shown in Figs.5-6, the pressing plate 242 is directly connected to the end of the bolt 243 by a screw 247 (see Fig.8).

In an exemplary embodiment of the present invention, as shown in Figs.5-6, the first locking member 241 is formed with a chamber 2411 in which the pressing plate 242 is embedded.

In an exemplary embodiment, as shown in Figs.5-6, the electrical connector may

further comprise a positioning member 250 on which the piercing member 220 is fixed. As shown in Figs.5-6, the positioning member 250 is formed with end protrusions 251 slideably fitted in guide slots 215 formed in sidewalls of the recess 211, so that the positioning member 250 is movable relative to the body 210 in a depth direction (a vertical direction in Figs.5-6) of the recess 211.

As shown in Figs.5-6, the plurality of piercing members 220 are spaced from each other and fitted and fixed in the respective positioning slots formed in the positioning member 250.

Fig.7 is an illustrative view of electrically connecting a first power cable 10 and a second power cable 20 by the electrical connector according to the second exemplary embodiment of the present invention; Fig.8 is an illustrative cross section view of the electrical connector of Fig.7.

As shown in Figs.7-8, when the first power cable 10 and the second power cable 20 are placed in the recess 211 and connected by the electrical connector, the first power cable 10 is located between the first locking member 241 and the first side of the piercing member 220, and the second power cable 20 is located between the second locking member 216 and the second side of the piercing member 220.

As shown in Figs.7-8, the pressing mechanism is configured to exert a predetermined press force on the first locking member 241, the first power cable 10, the piercing member 220, the second power cable 20 and the second locking member 216, so that the teeth 221, 222 on the first and second sides of the piercing member 220 pierce through the insulation layers 11, 21 of the first and second power cables 10, 20 and bring into electrical contact with the conductors 12, 22 of the first and second power cables 10, 20, respectively. In this way, the first power cable 10 and the second power cable 20 are electrically connected via the conductive piercing member 220.

As shown in Figs.7-8 and 10, when the first power cable 10 and the second power cable 20 are electrically connected by the electrical connector, the first and second rough surfaces 10g, 20g of the first and second locking members 10, 20 engage the insulation layers 11, 21 of the first and second power cables 10, 20, respectively, so as to prevent the first and second power cables 10, 20 from being pulled out of the recess 211. In the illustrated embodiment, the bulges and grooves formed on the first and second rough surfaces 10g, 20g have a semicircular cross section. But the present invention is not limited to this, the cross section of the bulges and grooves formed on the first and second rough surfaces 10g, 20g may have a triangle shape, a rectangle shape or any other suitable shape.

In an exemplary embodiment of the present invention, as shown in Figs.5-8, the

pressing mechanism may further comprise a force control member 246 mounted on the head 2431 of the bolt 243. The bolt 243 is rotated by operating the force control member 246. The force control member 246 is configured to be broken when a force exerted on the first and second power cables 10, 20 by the bolt 243 reaches the predetermined press force. In this way, the press force exerted on the first and second power cables 10, 20 can be accurately controlled to the predetermined press force, so as to protect the conductors of the first and second power cables 10, 20 from being damaged or even cut off by the teeth 221, 222 of the piercing members 220 due to an overlarge press force and prevent the teeth 221, 222 of the piercing members 220 from being unreliably contact the conductors of the first and second power cables 10, 20 due to an insufficient press force.

In an exemplary embodiment of the present invention, as shown in Figs.5-8, the force control member 246 mainly comprises a sleeve part 2461, a polygonal head 2462 and a fragile neck 2463.

The sleeve part 2461 is mounted on the head 2431 of the bolt 243. The polygonal head 2462 is adapted to be operated by a wrench (not shown) to rotate the bolt 243. The fragile neck 2463 is connected between the sleeve part 2461 and the polygonal head 2462. The fragile neck 2463 is configured to be broken when a force exerted on the first and second power cables 10, 20 by the bolt 243 reaches the predetermined press force, so that the polygonal head 2462 is separated from the sleeve part 2461.

In an embodiment, as shown in Fig.8, the pressing mechanism may further comprise a locking nut 248 (indicated by dash line in Fig.8) screwed on the bolt 243. The locking nut 248 is configured to lock the bolt 243 in place when the force exerted on the first and second power cables 10, 20 by the bolt 243 reaches the predetermined press force.

In an exemplary embodiment of the present invention, as shown in Figs.5-8, the electrical connector may further comprise a first elastic sealing block 262 and a second elastic sealing block 271 provided at the first side and the second side of the piercing member 220, respectively. The teeth 221, 222 on the first and second sides of the piercing member 220 pass through the first and second elastic sealing blocks 262, 271, respectively. The first and second elastic sealing blocks 262, 271 are pressed on the first and second power cables 10, 20, respectively, under the predetermined press force after the first and second power cables 10, 20 are connected by the electrical connector, so as to seal and protect locations of the first and second power cables 10, 20 pierced by the piercing member 220.

Fig.9 is an illustrative perspective view of a first locking member 241 of the electrical connector according to a second exemplary embodiment of the present invention; and Fig.10

is an illustrative axial cross section view of the electrical connector of Fig.7.

In an exemplary embodiment of the present invention, as shown in Figs.5-10, the bulges and grooves on first rough surface 10g of the first locking member 241 extend in a direction perpendicular to an axial direction of the first power cable 10. But the present invention is not limited to this, the bulges and grooves on first rough surface 10g of the first locking member 241 may extend in a direction angled to an axial direction of the first power cable 10.

Similarly, in an exemplary embodiment of the present invention, as shown in Figs.5-10, bulges and grooves on second rough surface 20g of the second locking member 216 extend in a direction perpendicular to an axial direction of the second power cable 20. But the present invention is not limited to this, the bulges and grooves on second rough surface 20g of the second locking member 216 may extend in a direction angled to an axial direction of the second power cable 20.

In an exemplary embodiment of the present invention, as shown in Fig.6, the first and the second rough surfaces 10g, 20g are shaped in arc surfaces matched with the outer circumferential surfaces of the first and second power cables 10, 20, respectively.

In an embodiment, referring to Fig.6 again, the second locking member 216 is configured to be integrally formed on the bottom 212 of the recess 211 of the body 210. For example, the bulges and grooves are directly formed on the inner surface of the bottom 212 of the recess 211 of the body 210. But the present invention is not limited to this, the second locking member 216 may be a separate member mounted on the bottom 212 of the recess 211 of the body 210.

In an exemplary embodiment of the present invention, as shown in Figs.5-7, the electrical connector may further comprise a sealing cap 280 attached to the body 210 and adapted to cover and seal a bared end of at least one of the first and second power cables 10, 20. In an example, the first power cable 10 is a trunk cable, and the second power cable 20 is a branch cable, the sealing cap 280 is covered on a bared end of the second power cable 20 to protect the end of the conductor of the second power cable 20 therein.

In an exemplary embodiment of the present invention, the body 210 may be a single rigid member that does not elastically deform under the predetermined press force. The support plate 244 may be a single elastic member that elastically deforms under the predetermined press force. In this way, an operator may determine whether the press force exerted on the power cables reaches the predetermined press force by simply viewing the deformation of the support plate 244, so as to protect the first and second power cables 10, 20 from being damaged by an overlarge press force.

In the prior art, the power cables is pressed between two rigid half bodies, and even if the press force exerted on the power cables becomes overlarge, the two rigid half bodies do not elastically deform. As a result, the blade-like members cut into or even cut off the conductors of the power cables.

5 Please be noted that the support plate 244 may be rigid, and the press force exerted on the power cables 10, 20 by the bolt 243 may be accurately controlled by the force control member 246, instead of by viewing the elastic deformation of the support plate.

10 In an exemplary embodiment of the present invention, as shown in Figs.7-8, an axis of the bolt 243 is perpendicular to and intersects with axes of the first and second power cables 10, 20 in the same plane, so that the press force is exerted evenly and symmetrically on both sides of each of the first and second power cables 10, 20, and so that the piercing member 220 reliably contact the conductors 12, 22 of the first and second power cables 10, 20.

15 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.

20 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.

25 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.

What is claimed is,

1. An electrical connector for electrically connecting a first power cable (10) and a second power cable (20), comprising:

5 a body (110) having a recess (111) formed therein;

a conductive piercing member (120) received in the recess (111), having a first side facing an opening of the recess (111) and a second side facing a bottom (112) of the recess (111), and formed with at least one tooth (121, 122) at each side of the first and second sides;

10 a first locking member (131) received in the recess (111) and located at the first side of the piercing member (120);

a second locking member (132) received in the recess (111) and located at the second side of the piercing member (120); and

a pressing mechanism mounted on the opening of the recess (111),

15 wherein the first and second power cables (10, 20) are placed in the recess (111), the first power cable (10) is located between the first locking member (131) and the piercing member (120), and the second power cable (20) is located between the second locking member (132) and the piercing member (120),

wherein the pressing mechanism is configured to exert a predetermined press force on
20 the first locking member (131), the first power cable (10), the piercing member (120), the second power cable (20) and the second locking member (132), so that the teeth (121, 122) on the first and second sides of the piercing member (120) pierce through the insulation layers (11, 21) of the first and second power cables (10, 20) and come into electrical contact with the conductors (12, 22) of the first and second power cables (10, 20), respectively, and
25 so that the first and second locking member (131, 132) engage the first and second power cables (10, 20), respectively, to prevent the first and second power cables (10, 20) from being pulled out of the recess (111).

2. The electrical connector according to claim 1,

30 wherein each of the first and second locking members (131, 132) has at least one tooth (1311, 1321); and

wherein the teeth (1311, 1321) of the first and second locking members (131, 132) pierce into the insulation layers (11, 21) of the first and second power cables (10, 20), respectively, after the first and second power cables (10, 20) are connected by the electrical
35 connector.

3. The electrical connector according to claim 2,

wherein the teeth (1311, 1321) of the first and second locking members (131, 132) pierce through the insulation layers (11, 21) of the first and second power cables (10, 20) and come into electrical contact with the conductors (12, 22) of the first and second power cables (10, 20), respectively.

4. The electrical connector according to claim 1,

wherein a surface of the first locking member (241) in contact with the first power cable (10) is configured to be a first rough surface (10g) with bulges and grooves,

wherein a surface of the second locking member (216) in contact with the second power cable (20) is configured to be a second rough surface (20g) with bulges and grooves,

wherein the first and second rough surfaces (10g, 20g) of the first and second locking members (10, 20) engage the insulation layers (11, 21) of the first and second power cables (10, 20), respectively, after the first and second power cables (10, 20) are connected by the electrical connector.

5. The electrical connector according to claim 4,

wherein the bulges and grooves of the first rough surface (10g) extend in a direction parallel to or perpendicular to an axial direction of the first power cable (10), and/or

wherein the bulges and grooves of the second rough surface (20g) extend in a direction parallel to or perpendicular to an axial direction of the second power cable (20).

6. The electrical connector according to claim 5,

wherein the first and the second rough surfaces (10g, 20g) are shaped in arc surfaces matched with the outer circumferential surfaces of the first and second power cables (10, 20), respectively.

7. The electrical connector according to claim 4,

wherein the second locking member (216) is configured to be a separate member mounted on the bottom (212) of the recess (211) of the body (210), or

wherein the second locking member (216) is configured to be integrally formed on the bottom (212) of the recess (211) of the body (210).

8. The electrical connector according to claim 1, further comprising:

a first elastic sealing block (162) and a second elastic sealing block (171) provided at the first side and the second side of the piercing member (120), respectively,

wherein the teeth (121, 122) on the first and second sides of the piercing member (120) pass through the first and second elastic sealing blocks (162, 171), respectively,

5 wherein the first and second elastic sealing blocks (162, 171) are pressed on the first and second power cables (10, 20), respectively, under the predetermined press force after the first and second power cables (10, 20) are connected by the electrical connector, so as to seal locations of the first and second power cables (10, 20) pierced by the piercing member (120).

10

9. The electrical connector according to claim 2, further comprising:

a third elastic sealing block (161) and a fourth elastic sealing block (172) provided at the first locking member (131) and the second locking member (132), respectively,

15 wherein the teeth (1311, 1321) on the first and second locking members (131, 132) pass through the third and fourth elastic sealing blocks (161, 172), respectively,

wherein the third and fourth elastic sealing blocks (161, 172) are pressed on the first and second power cables (10, 20), respectively, under the predetermined press force after the first and second power cables (10, 20) are connected by the electrical connector, so as to seal locations of the first and second power cables (10, 20) pierced by the first and second
20 locking members (131, 132).

10. The electrical connector according to claim 1, further comprising:

a positioning member (150) on which the piercing member (120) is fixed,

25 wherein the positioning member (150) is formed with end protrusions (151) slideably fitted in guide slots (115) formed in side walls of the recess (111), so that the positioning member (150) is movable relative to the body (210) in a depth direction of the recess (111).

11. The electrical connector according to claim 10,

30 wherein the piercing member (120) has a sheet-like shape and is positioned in a positioning slot formed in the positioning member (150).

12. The electrical connector according to claim 2, wherein the pressing mechanism comprising:

35 a support plate (144) removably mounted on the opening of the recess (111) and formed with a threaded hole (1443) therein;

a bolt (143) screwed into the threaded hole (1443) of the support plate (144) and entering into the recess (111); and

a pressing plate (141) mounted on an end of the bolt (143) entering into the recess (111).

5

13. The electrical connector according to claim 12,

wherein the first locking member (131) has a sheet-like shape and is positioned in a positioning slot formed in the pressing plate (141), and

wherein the second locking member (132) has a sheet-like shape and is positioned in a positioning slot formed in the bottom of the recess (111).

10

14. The electrical connector according to claim 12, further comprising:

a connection plate (142) connected to the end of the bolt (143) by a screw (147),

wherein the pressing plate (141) is assembled on the connection plate (142) by fitting a protrusion (1411) formed on the pressing plate (141) into an installation hole (1421) formed in the connection plate (142).

15

15. The electrical connector according to claim 4, wherein the pressing mechanism comprising:

20

a support plate (244) removably mounted on the opening of the recess (211) and formed with a threaded hole (2443) therein;

a bolt (243) screwed into the threaded hole (2443) of the support plate (244) and entering into the recess (211); and

a pressing plate (242) mounted on an end of the bolt (243) entering into the recess (211).

25

16. The electrical connector according to claim 15,

wherein the pressing plate (242) is connected to the end of the bolt (243) by a screw (247).

30

17. The electrical connector according to claim 16,

wherein the first locking member (241) is formed with a chamber (2411) in which the pressing plate (242) is embedded.

35

18. The electrical connector according to claim 12 or 15,

wherein the pressing mechanism further comprises a force control member (146) mounted on the head (1431) of the bolt (143), and the bolt (143) is rotated by operating the force control member (146),

5 wherein the force control member (146) is configured to be broken when a force exerted on the first and second power cables (10, 20) by the bolt (143) reaches the predetermined press force, so as to protect the first and second power cables (10, 20) from being damaged by an overlarge press force.

10 19. The electrical connector according to claim 18, wherein the force control member (146) comprising:

a sleeve part (1461) mounted on the head (1431) of the bolt (143);

a polygonal head (1462) adapted to be operated by a wrench; and

15 a fragile neck (1463) connected between the sleeve part (1461) and the polygonal head (1462),

wherein the fragile neck (1463) is configured to be broken when a force exerted on the first and second power cables (10, 20) by the bolt (143) reaches the predetermined press force, so that the polygonal head (1462) is separated from the sleeve part (1461).

20 20. The electrical connector according to claim 12 or 15,

wherein the pressing mechanism further comprises a locking nut (148) screwed on the bolt (143), and

25 wherein the locking nut (148) is configured to lock the bolt (143) in place when the force exerted on the first and second power cables (10, 20) by the bolt (143) reaches the predetermined press force.

21. The electrical connector according to claim 12 or 15,

wherein one end of the support plate (144) is fixed with a screw (145) in a notch formed in one sidewall of the opening of the recess (111), and

30 wherein the other end of the support plate (144) is held in a notch formed in the other sidewall of the opening of the recess (111).

22. The electrical connector according to claim 1, wherein the body (110) exhibits a substantially V-typed shape.

23. The electrical connector according to claim 1, further comprising:

a sealing cap (180) attached to the body (110) and adapted to cover and seal a bared end of at least one of the first and second power cables (10, 20).

5

24. The electrical connector according to claim 1, wherein the pressing mechanism comprising:

a support plate (144) removably mounted on the opening of the recess (111) and formed with a threaded hole (1443) therein;

10 a bolt (143) screwed into the threaded hole (1443) of the support plate (144) and entering into the recess (111), so as to exert a press force on the first locking member (131), the first power cable (10), the piercing member (120), the second power cable (20) and the second locking member (132).

15

25. The electrical connector according to claim 24,

wherein the pressing mechanism further comprises a force control member (146) mounted on the head (1431) of the bolt (143), and the bolt (143) is rotated by operating the force control member (146),

20 wherein the force control member (146) is configured to be broken when a force exerted on the first and second power cables (10, 20) by the bolt (143) reaches the predetermined press force, so as to protect the first and second power cables (10, 20) from being damaged by an overlarge press force.

25

26. The electrical connector according to claim 24,

wherein an axis of the bolt (143) is perpendicular to and intersects with axes of the first and second power cables (10, 20) in the same plane, so that the press force is exerted evenly and symmetrically on both sides of each of the first and second power cables (10, 20).

30

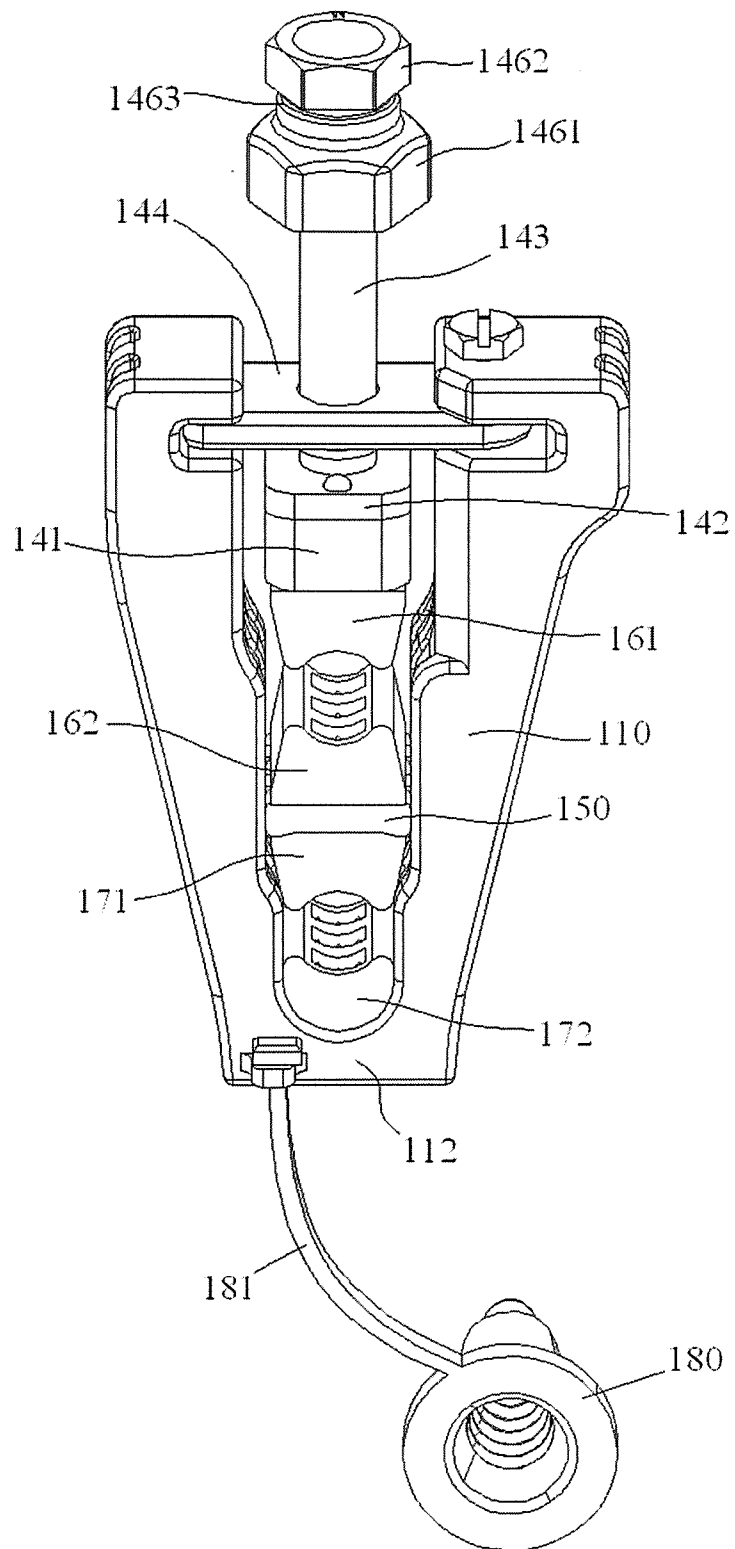


Fig.1

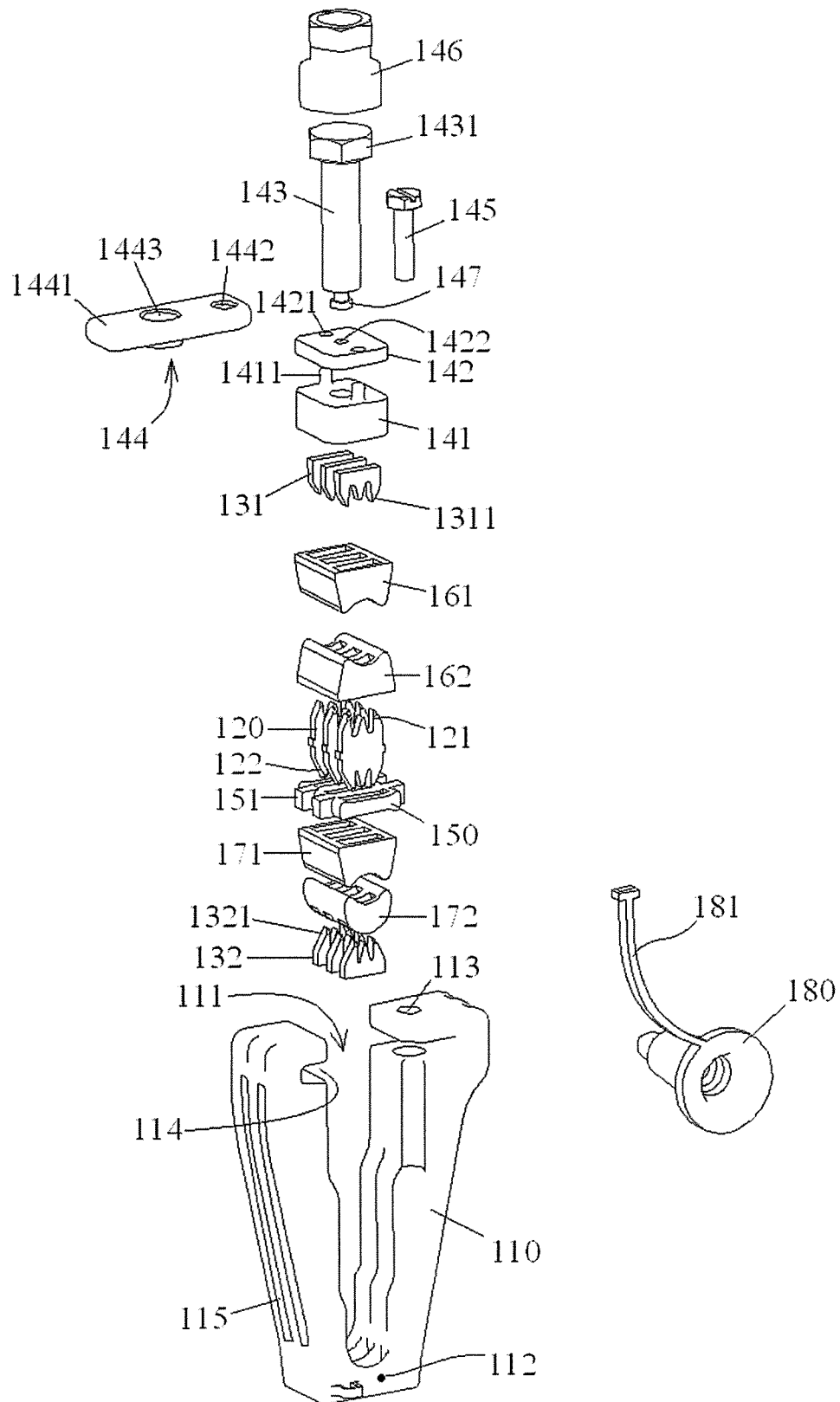


Fig.2

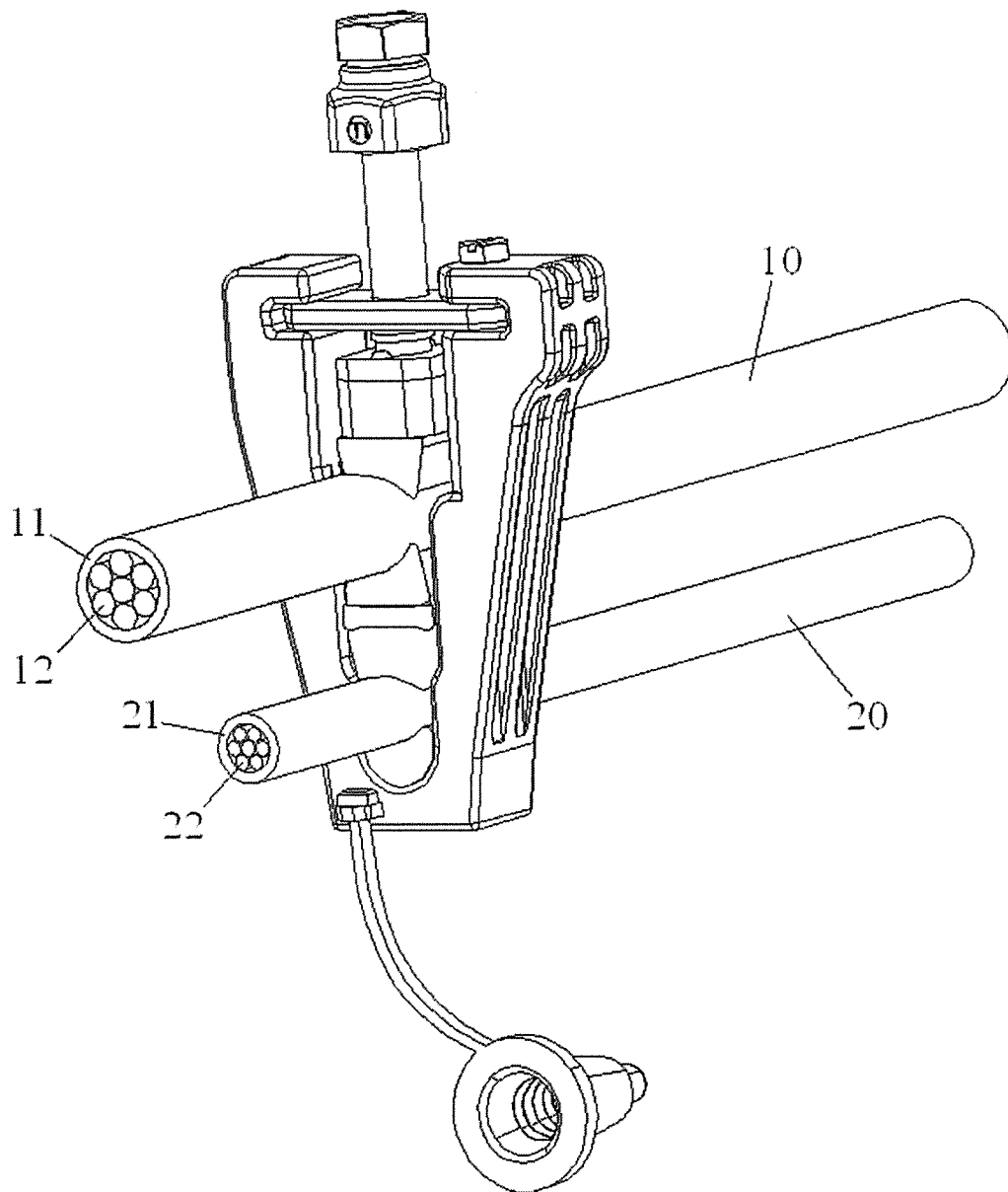


Fig.3

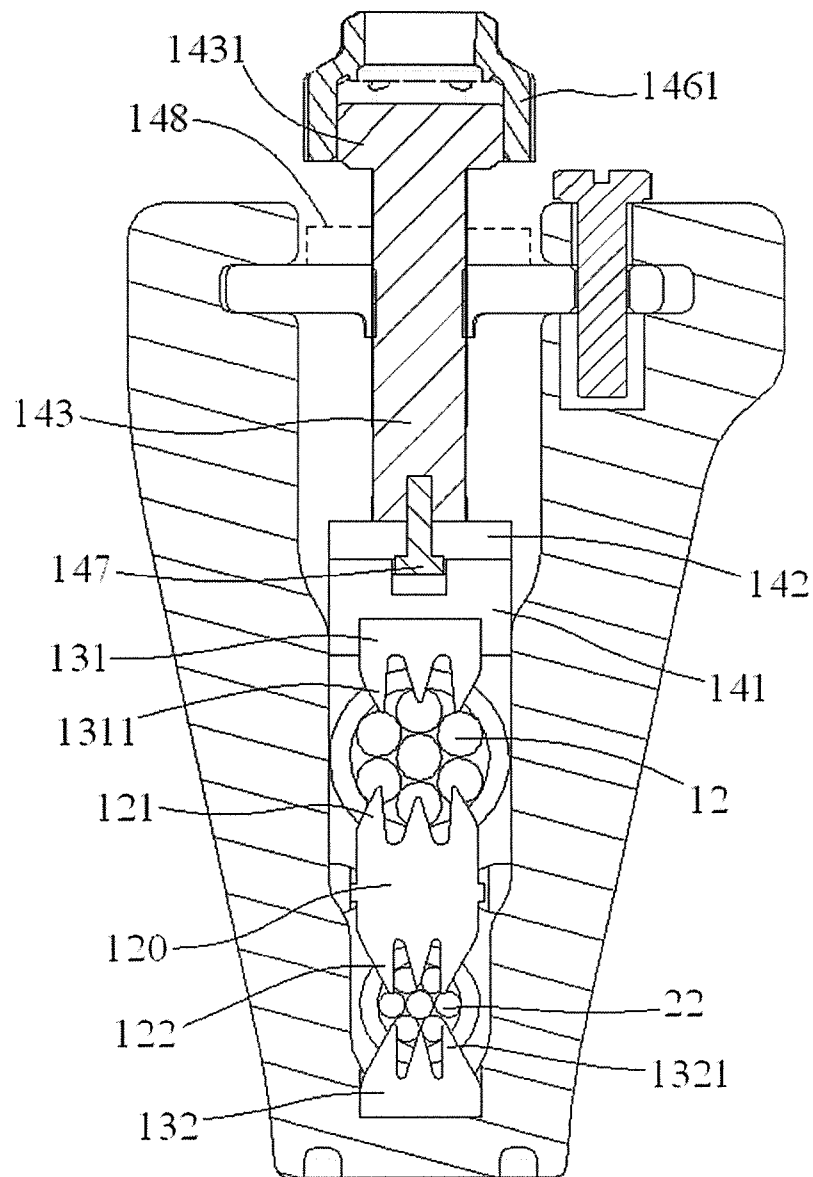


Fig.4

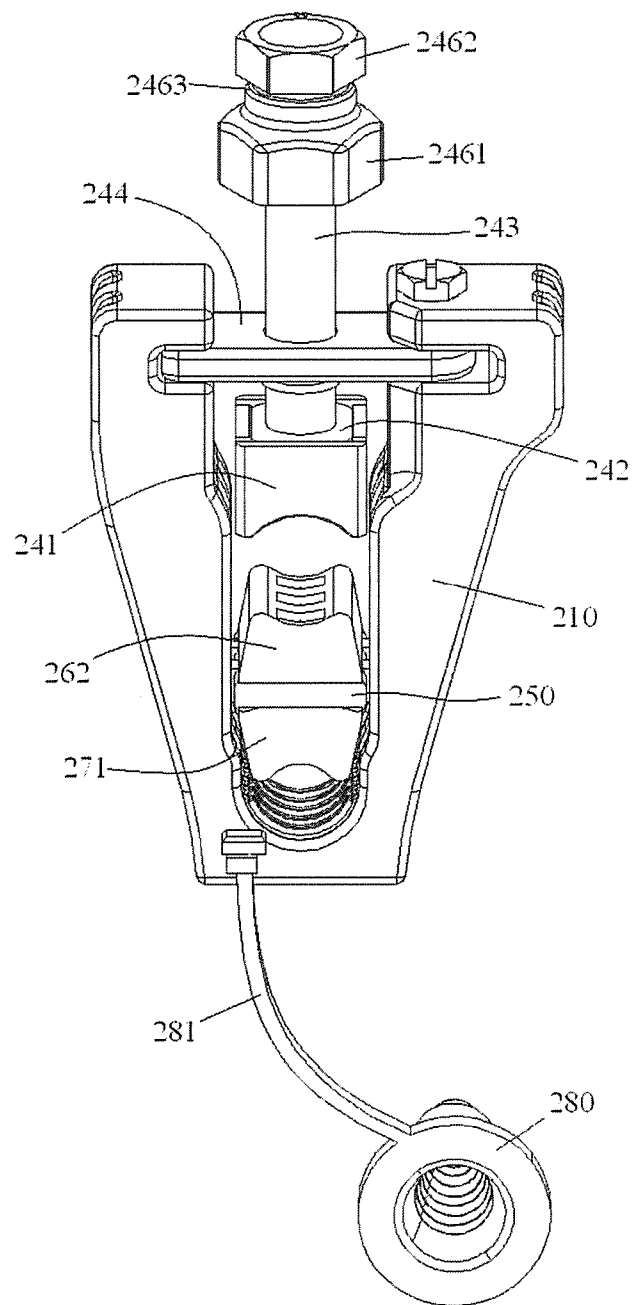


Fig.5

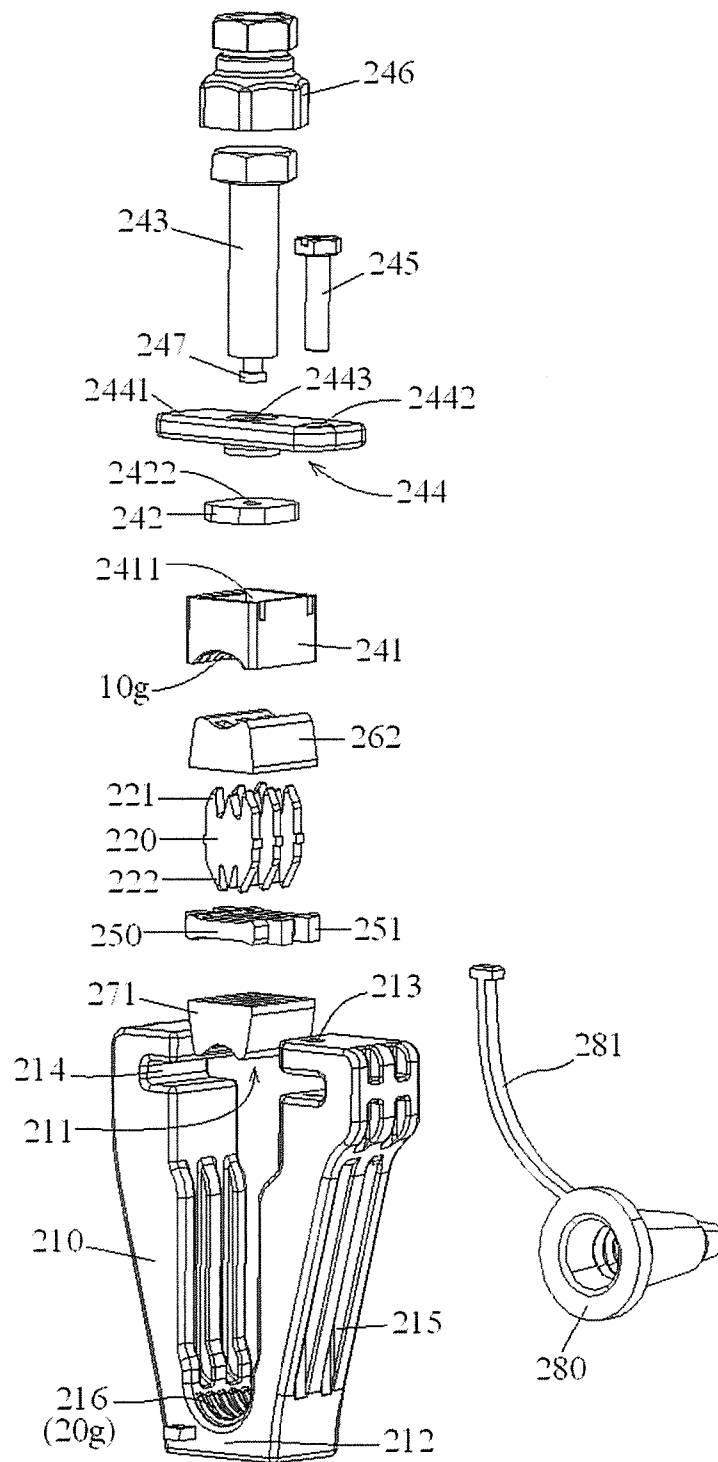


Fig.6

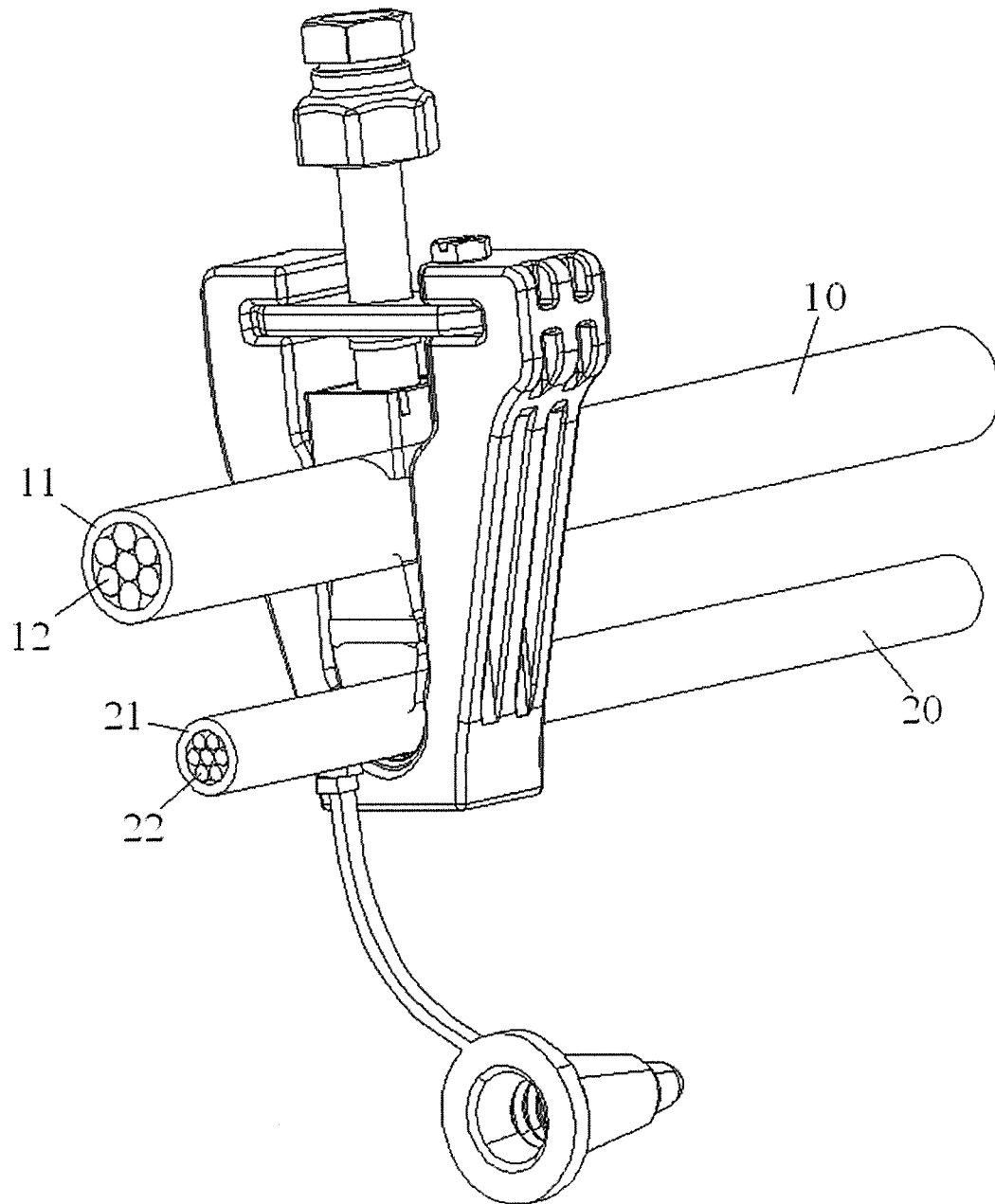


Fig.7

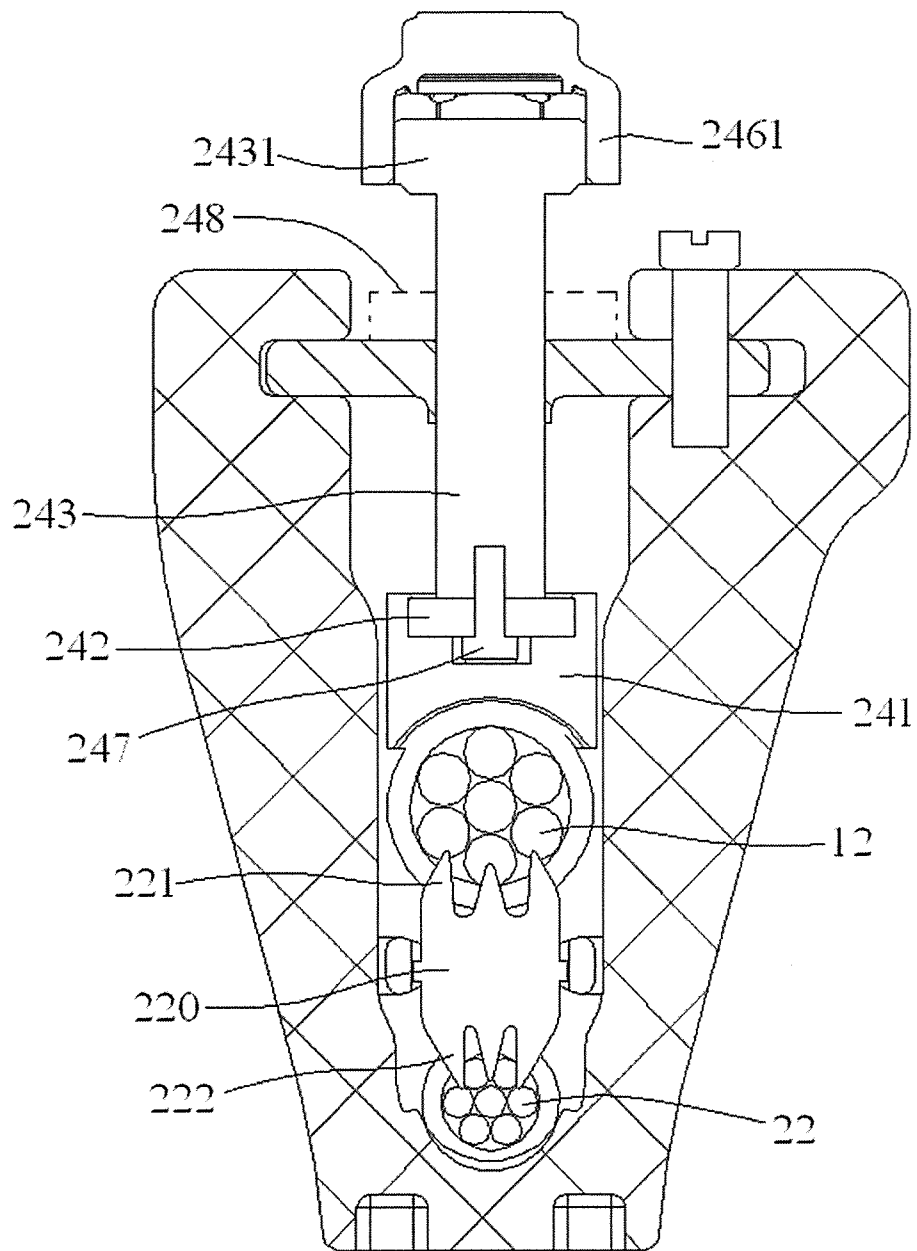


Fig.8

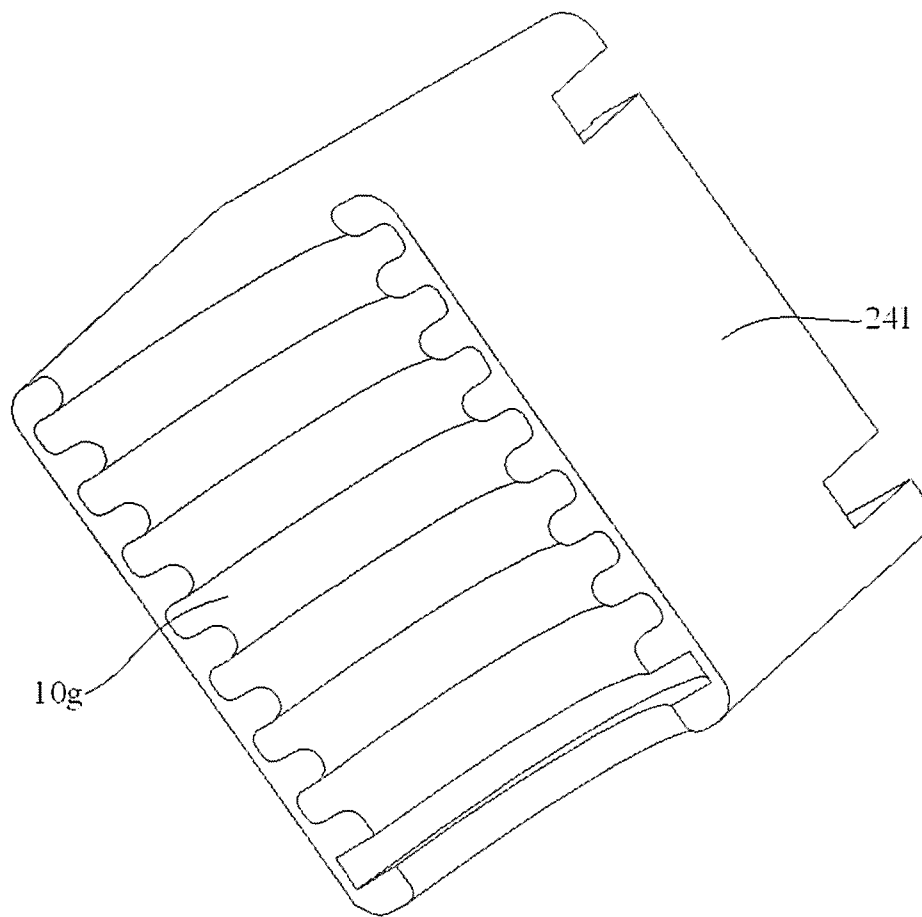


Fig.9

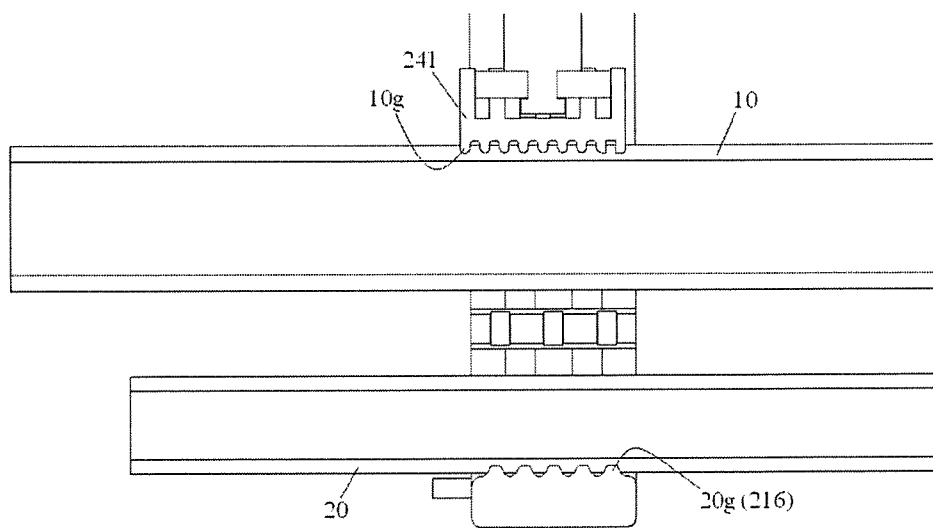


Fig.10

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2014/066358

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01R4/24

ADD. H01R103/00 H01R4/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 080 034 A (WERNER WALTER MYERS) 21 March 1978 (1978-03-21)	1-3,22
Y	figures 1-5	4-21, 23-26
X	----- GB 2 185 159 A (B & H NOTTINGHAM LTD) 8 July 1987 (1987-07-08) figures 5-6	1
X	----- FR 1 534 124 A (CONNECTEURS ALBERT BONNEAU C A) 26 July 1968 (1968-07-26)	1
Y	figure 18 page 3, column 2, paragraph 5-6; figures 15-17	4-7
	----- -/--	



Further documents are listed in the continuation of Box C.



See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

18 February 2015

Date of mailing of the international search report

24/02/2015

Name and mailing address of the ISA/

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Authorized officer

Ferreira, João

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2014/066358

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 1 238 442 B1 (FRAMATOME CONNECTORS INC [FR] FRAMATOME CONNECTORS INT [FR]) 5 October 2005 (2005-10-05) paragraph [0041]; figures 1,2,4 -----	8-21, 23-26
A	FR 2 760 570 A1 (APP MAT ELECT CONST [FR]) 11 September 1998 (1998-09-11) figures 1-3 -----	1-26

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2014/066358

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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