(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 993 176 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
04.05.2022 Bulletin 2022/18

(21) Application number: **21205400.1**

(22) Date of filing: **28.10.2021**

(51) International Patent Classification (IPC):
H01R 13/52 *(2006.01)* ***H01R 24/00*** *(2011.01)*
H01R 25/14 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
H01R 25/142; H01R 13/5202; H01R 24/005

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **31.10.2020 CN 202011197804**

(71) Applicants:
- **Self Electronics Co., Ltd.**
  Ningbo City, Zhejiang 315103 (CN)
- **SELF ELECTRONICS Germany GmbH**
  51149 Köln (DE)

(72) Inventors:
- **CHEN, Dong**
  Ningbo, 315103 (CN)
- **XU, Kai**
  Ningbo, 315103 (CN)
- **Lin, Wanjiong**
  Ningbo City, Zhejiang 315103 (CN)

(74) Representative: **2K Patentanwälte Blasberg Kewitz & Reichel Partnerschaft mbB**
Schumannstrasse 27
60325 Frankfurt am Main (DE)

(54) WATERPROOF ELECTRIC POWER ACCESS DEVICE

(57) The present invention discloses a waterproof electric power access device comprising a power supply track and a current collector head set on said power supply track, said power supply track comprising: a track body; a mounting slot, set on the upper surface of said track body and extending in the length direction, including a bot-tom and two opposite sides; two slots, set on two sides respective-ly, extending in the length direction; two strip-shaped conductive members, set on two sides of said slots; two strip seals, sealing said slots on each side; said current collector head comprising: a rotation seat; an external connector, provided on said rotation seat; two current collector members, electrically connected to said external connector, provided on said rotation seat and extending opposite to each other in a direction perpendicular to said thick-ness direction, said rotation seat being rotated so that the two current collector members squeeze through the strip seals on each side and will be inserted into said slots against the corresponding strip-shaped conductive members.

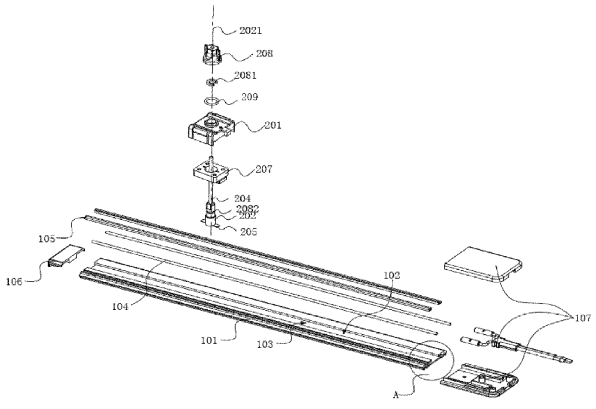

FIG. 2

EP 3 993 176 A1

Description

Field of the invention

[0001] The present invention relates to the field of electric power transmission technology, in particular, to a waterproof electric power access device.

Background of the invention

[0002] The electric power access track system is often used in shelves, display cabinets and other places; this electric power access system can adjust the length of the electric power supply wire according to the size of the room, has a neat and beautiful appearance and is very convenient to use.

[0003] However, the existing electric power access track system is not designed to be waterproof, can only be used in a dry environment, the scope of application is greatly restricted, and the moisture is easy to cause short circuit in the electric power access system, resulting in damage to the connected lamps and other electrical equipment, and even bring about the risk of electric shock.

Detailed description of the invention

[0004] In view of this, the present invention provides a waterproof electric power access device to solve the above technical problems.

[0005] A waterproof electric power access device, comprising a power supply track and a current collector head set on said power supply track, said power supply track having a length direction, a thickness direction and a width direction, said power supply track comprising:

a track body;

a mounting slot, provided on the upper surface of said track body and extending in the length direction, comprising a bottom and two opposite sides;

two slots, provided on each of the two sides and extending in the length direction;

two strip-shaped conductive members, provided in said slots on each side;

two strip seals, sealing said slots on each side;

said current collector head comprising:

a rotation seat;

an external connector, provided on said rotation seat;

two current collector members, electrically connected to said external connector, set on said rotation seat and extending opposite to each other in a direction perpendicular to said thickness direction, said rotation seat being rotated so that the two current collector members squeeze through the strip seals on each side and will be inserted into said slot against the corresponding strip-shaped conductive members.

[0006] In preferred embodiments, said current collector members are in the form of a sheet or needle.

[0007] In preferred embodiments, said rotation seat is made of waterproof material, said external connector and the two current collector members are electrically connected inside said rotation seat.

[0008] In preferred embodiments, said current collector head further comprises:

a fixed seat, said rotation seat being provided on said fixed seat rotating around a rotation central axis, said rotation central axis being provided parallel to said thickness direction;

an annular seal, provided on said fixed seat and set around said current collector members.

[0009] In preferred embodiments, said annular seal comprises a first sealing section and a second sealing section affixed to the outer surface of said track body, said first sealing section and said second sealing section being connected to each other by a third sealing section and a fourth sealing section to form an annulus, said third sealing section and said fourth sealing section being located above said mounting slot.

[0010] In preferred embodiments, said third sealing section is provided with a first sealing block that snaps into said mounting slot, and said fourth sealing section is provided with a second sealing block that snaps into said mounting slot.

[0011] In preferred embodiments, said first sealing section, said second sealing section, said first sealing block and said second sealing block are provided with at least one first sealing rib on the bottom surface; wherein said first sealing block and said second sealing block are provided with at least one second sealing rib on both sides of second sealing block.

[0012] In a preferred embodiment, said strip-shaped conductive members are flush with the notches of the corresponding installed slots.

[0013] In a preferred embodiment, said current collector head further comprises a fixed rotation sleeve set outside said rotation seat.

[0014] In a preferred embodiment, between said rotation seat and fixed seat is provided with a first sealing ring.

[0015] In a preferred embodiment, said rotation sleeve and said fixed seat are provided with a second sealing ring between them.

[0016] In a preferred embodiment, said fixed seat is provided with a fixing connector for connecting said track body.

[0017] In preferred embodiments, said fixing connector comprises:

two swing arms, respectively provided on each side of said fixed seat, connected in the middle to said fixed seat by means of a pivot point, said swing arms swinging around said pivot point and having the elasticity to return to the original position;

two hook portions, set at the ends of the two swing arms and set opposite to each other.

[0018] In a preferred embodiment, said fixing connector and fixed seat are manufactured in one piece.

[0019] In preferred embodiments, said fixing connector and fixed seat is made of nylon or acrylic.

Technical effect of the present invention

[0020] The waterproof electric power access device of the present invention, by providing strip seals in the slots with strip-shaped conductive members to the power supply track for waterproof settings, with the current collector head rotating and snapping into the strip-shaped conductive members, the damage to the waterproof structure is small, and also by setting in the current collector head a sealing structure, the whole device has a good waterproof effect.

Description of the attached drawings

[0021] The following describes embodiments of the present invention in conjunction with the accompanying drawings, in which:

FIG. 1 is a schematic diagram of the structure of the waterproof electric power access device of this embodiment.

FIG. 2 is an exploded view of the waterproof electric power access device of this embodiment.

FIG. 3 is an enlarged schematic diagram of part A in FIG. 2.

FIG. 4 is an exploded view of the current collector head of the waterproof electric power access device of this embodiment in another direction.

FIG. 5 is a cross-sectional view of the current collector head of the waterproof electric power access device of this embodiment (in disconnected state).

FIG. 6 is a cross-sectional view of the current collector head of the waterproof electric power access device of this embodiment (in connected state).

FIG. 7 is a schematic diagram of the structure of the waterproof electric power access device of this embodiment (hidden track body, in disconnected state).

FIG. 8 is an enlarged schematic diagram of part B in FIG. 7.

FIG. 9 is a schematic diagram of the structure of the waterproof electric power access device of this embodiment (hidden track body, in connected state).

FIG. 10 is an enlarged schematic diagram of part C in FIG. 9.

Specific embodiments

[0022] The following specific embodiments of the present invention are described in further detail based on the accompanying drawings. It should be understood that the description of embodiments of the present invention herein is not intended to limit the scope of protection of the present invention.

[0023] As shown in Figures 1 to 10, this embodiment of the waterproof electric power access device including a power supply track 100 and a current collector head 200 set on said power supply track 100. The invention is mostly used for shelves. In most cases the power supply track 100 is a long flat strip. For the sake of simplicity, said power supply track has a length direction X, a thickness direction Z and a width direction Y. X, Y and Z form a Cartesian coordinate system.

[0024] The said power supply track 100 includes: a track body 101, a mounting slot 102, two slots 103, two strip-shaped conductive members 104 and two strips seals 105. Generally, both ends are also provided with end caps 106 and inputs 107, which is state of the art and will not be repeated. The mounting slot 102 is set on the upper surface of the track body 101 and extends in the length direction X, roughly U-shaped, including a bottom 1021 and two opposite sides 1022. The depth of the mounting slot 102 determines the thickness of the track body 101, so generally, it is not too deep. Two slots 103 are set on the two sides 1022, extending in the length direction X. Two strip-shaped conductive members 104 are provided in said slots 103 on each side. Two strip seals 105 seal said slots 103 on each side. The slots 103 in the above have depth in the width direction and the openings/notches of the two slots 103 are opposite to each other. Said strip-shaped conductive members 104 have length and the shape of the cross-section can be circular, triangular, quadrilateral or other, as long as they

can be installed into the slots 103. In this embodiment. Said strip-shaped conductive members 104 have a circular cross-section. The position of the slots 103 on the two sides 1022 can be at the bottom, middle or top. In order to keep the thickness of the track body 101 as small as possible, the slots 103 in this embodiment are at the bottom of the two sides 1022. Said strip seals 105 are elastic and therefore has a more variable cross-sectional shape, as long as they can be deformed and then seal the slot 103.

[0025] Said current collector head 200 includes a rotation seat 202, an external connector 204 and two current collector members 205. The external connector 204 is provided on said rotation seat 202. The two current collector members 205 are electrically connected to said external connector 204, set on said rotation seat 202 and extending opposite to each other in a direction perpendicular to said thickness direction Z. Said rotation seat 202 rotates so that the two current collector members 205 squeeze through the strip seals 105 on each side and will be inserted into said slots 103 against the corresponding strip-shaped conductive members 104 to achieve electrical connection. Manually rotating the rotation seat 202, the current collector members 205 squeeze through the strip seals 105 and will be inserted into the slots 103. The current collector members 205 can pass above or below the strip seals 105, in this embodiment, below the strip seals 105. Said current collector head 200 is not in connection to the power supply track 100, as shown in Figures 5 and 7. Said current collector head 200 is in connection to the power supply track 100, as shown in Figures 6 and 9.

[0026] Said external connector 204 is used to connect external electrical equipment, can be sockets, plugs and other forms, can be with or without wires. Only the wires are drawn in this embodiment, this is the prior art and will not be repeated.

[0027] The said current collector members 205 are in the form of a sheet or needle. The interface of the sheet or needle is smaller and it is easier to pass through the strip seals 105. Two current collector members 205 can be in the same plane, or in different planes. In this embodiment, said current collector members 205 are sheets, two current collector members 205 are in the same plane and set in the bottom of the rotation seat 202 on both sides, in the same line.

[0028] Said rotation seat 202 is made of waterproof material, said external connector 204 and the two current collector members 205 are electrically connected inside said rotation seat 202. This not only makes the whole waterproof, but also smaller.

[0029] To make the whole waterproof, in another embodiment, said current collector head 200 further includes a fixed seat 201 and an annular seal 207. Said rotation seat 202 rotates around a rotation center axis 2021 set on said fixed seat 201. Said rotation center axis 2021 is provided parallel to said thickness direction Z, and the annular seal 207 is set on said fixed seat 201 and set around said current collector members 205. The fixed seat 201 can be manually fixed on the power supply track 100 while the current collector members 205 are located in the mounting slot 102, and then rotating the rotation seat 202 makes the current collector members 205 inserted into the slots 103 and electrically connected to the strip-shaped conductive members 104 , while the current collector head 200 is fixed on the power supply track 100 due to the frictional force. The outer side of the annular seal 207 is pressed against the track body 101 to form a sealing structure at the said current collector members 205. The annular seal 207 is fixed to the fixed seat 201 by inserting a hole into a pillar, which is relatively common and will not be repeated here.

[0030] Further, said annular seal 207 comprises a first sealing section 2071 and a second sealing section 2072 affixed to the outer surface of said track body 101. Said first sealing section 2071 and said second sealing section 2072 are connected to each other by a third sealing section 2073 and a fourth sealing section 2074 to form an annulus. Said third sealing section 2073 and said fourth sealing section 2074 are located above said mounting slot 102. The above settings can create a better sealing effect.

[0031] Further, said third sealing section 2073 is provided with a first sealing block 2075 that snaps into said mounting slot 102, and said fourth sealing section 2074 is provided with a second sealing block 2076 that snaps into said mounting slot 102.

[0032] Further, said first sealing section 2071, said second sealing section 2072, said first sealing block 2075 and said second sealing block 2076 are provided with at least one first sealing rib 2077 on the bottom surface, said first sealing rib 2077 can be provided in multiple ways from the inside out to improve the sealing effect.

[0033] The first sealing block 2075 and the second sealing block 2076 are provided with at least one second seal rib 2078 on both sides, and the second seal rib 2078 can be provided in multiple ways from the inside out to improve the sealing effect. The cross-section of the sealing rib can be in the form of a sheet or a triangle.

[0034] Further, said strip-shaped conductive members 104 are flush with the notches of the correspondingly installed slots 103. Thereby, it can be pressed against both sides of said first sealing block 2075 and second sealing block 2076 to further improve the sealing effect.

[0035] In order to facilitate installation, in this embodiment, the current collector head 200 also includes a fixed rotation sleeve 208 set outside the rotation seat 202 .

[0036] There are various ways of fixing a connection, such as screw, glue, etc. In this embodiment, in order to also fix said rotation seat 202 axially on said fixed seat 201, said rotation seat 202 and said rotation sleeve 208 are provided with a fixing ring 2081, said rotation seat 202 is provided with a first annular slot 2082 that snaps into the inner ring of said fixing ring 2081, correspondingly, the rotation sleeve 208 is provided with a second annular slot 2083 that snaps into the outer ring of the

said fixing ring 2081 and it is fixed after assembly.

[0037] In order to improve the overall sealing effect, in this embodiment, a second sealing ring 209 is provided between said rotation sleeve 208 and the fixed seat 201.

[0038] In another embodiment, said rotation seat 202 and fixed seat 201 are provided with a first sealing ring (not shown in the figure), similar in structure and installation to the second sealing ring 209, except that it is installed between said rotation seat 202 and the fixed seat 201.

[0039] In this embodiment, said fixed seat 201 is provided with a fixing connector 2011 for connecting said track body 101. A fixing connector can take a variety of forms, such as fasteners, magnetic adsorption, etc. Specifically in this embodiment, said fixing connector 2011 includes: two swing arms 2012 and two hook portions 2014. Two swing arms 2012 are provided on each side of said fixed seat 201, connected in the middle to said fixed seat 201 by means of a pivot point 2013, said swing arms 2012 swinging around said pivot point 2013 and having the elasticity to return to the original position. Two hook portions 2014 are provided at the ends of two swing arms 2012 and set opposite to each other.

[0040] In use, the tops of the two swing arms 2012 can be manually brought together so that the two hook portions 2014 are separated. The current collector head 200 is mounted on the power supply track 100. The annular seal 207 is pressed against the track body 101, and the hook portions 2014 snap into the track body 101. When the hand is released, the rebound force brings the two hook portions 2014 together so that the fixed seat 201 snap into the track body 101.

[0041] In order to reduce the cost, the fixing connector 2011 and the fixed seat 201 are manufactured in one piece. In order to ensure the reliability and resilience of the fixing connector 2011, the fixing connector 2011 and the fixed seat 201 are made of nylon or acrylic.

[0042] The above is only a preferred embodiment of the present invention, and is not intended to limit the scope of protection of the present invention. Any modification, equivalent replacement or improvement within the spirit of the invention, etc., is covered by the scope of the claims of the present invention.

[0043] The present invention discloses a waterproof electric power access device, comprising a power supply track and a current collector head set on said power supply track, said power supply track comprising: a track body; a mounting slot, set on the upper surface of said track body and extending in the length direction, including a bottom and two opposite sides; two slots, set on two sides respectively, extending in the length direction; two strip-shaped conductive members, set on two sides of said slots; two strip seals, sealing said slots on each side; said current collector head comprising: a rotation seat; an external connector, provided on said rotation seat; two current collector members, electrically connected to said external connector, provided on said rotation seat and extending opposite to each other in a direction perpendicular to said thickness direction, said rotation seat rotating so that the two current collector members squeeze through the strip seals on each side and will be inserted into said slots against the corresponding strip-shaped conductive members.

Claims

1. A waterproof electric power access device comprising a power supply track (100) and a current collector head (200) set on said power supply track (100), said power supply track having a length direction (X), a thickness direction (Z) and a width direction (Y), **characterized in that** said power supply track (100) comprises:

    a track body (101);
    a mounting slot (102), provided on the upper surface of said track body (101) and extending in the length direction (X), comprising a bottom (1021) and two opposite sides (1022);
    two slots (103), provided on each of the two sides (1022) and extending in the length direction (X);
    two strip-shaped conductive members (104), provided in said slots (103) on each side;
    two strip seals (105), sealing said slots (103) on each side,
    said current collector head (200) comprising:

        a rotation seat (202);
        an external connector (204), provided on said rotation seat (202);
        two current collector members (205), electrically connected to said external connector (204), set on said rotation seat (202) and extending opposite to each other in a direction perpendicular to said thickness direction(Z), said rotation seat (202) being rotated so that the two current collector members (205) squeeze through the strip seals (105) on each side and will be inserted into said slots (103) against the corresponding strip-shaped conductive members (104).

2. The waterproof electric power access device according to claim 1, **characterized in that** said current collector members (205) are in the form of a sheet or needle.

3. The waterproof electric power access device according to claims 1 to 2, **characterized in that** the rotation seat (202) is made of waterproof material, said external connector (204) and two current collector members (205) are electrically connected inside said rotation seat (202).

4. The waterproof electric power access device according to any of claims 1 to 3, **characterized in that** said current collector head (200) further comprises:

a fixed seat (201), said rotation seat (202) being provided on said fixed seat (201) rotating around a rotation center axis (2021), said rotation center axis (2021) being provided parallel to said thickness direction (Z);
an annular seal (207), set on said fixed seat (201) and set around said current collector members (205).

5. The waterproof electric power access device according to claim 4, **characterized in that** said annular seal (207) comprises a first sealing section (2071) and a second sealing section (2072) affixed to the outer surface of said track body (101), said first sealing section (2071) and said second sealing section (2072) being connected to each other by a third sealing section (2073) and a fourth sealing section (2074) to form an annulus, said third sealing section (2073) and said fourth sealing section (2074) being located above said mounting slot (102).

6. The waterproof electric power access device according to claim 5, **characterized in that** said third sealing section (2073) is provided with a first sealing block (2075) that snaps into said mounting slot (102) and said fourth sealing section (2074) is provided with a second sealing block (2076) that snaps into said mounting slot (102).

7. The waterproof electric power access device according to claim 6, **characterized in that** said first sealing section (2071), said second sealing section (2072), said first sealing block (2075) and said second sealing block (2076) are provided with at least one first sealing rib (2077) on the bottom surface, said first sealing block (2075) and second sealing block (2076) are provided with at least one second sealing rib (2078) on both sides of second sealing block (2076).

8. The waterproof electric power access device according to any of claims 5 to 7, **characterized in that** said strip-shaped conductive members (104) are flush with the notches of the corresponding installed slots (103).

9. The waterproof electric power access device according to any of claims 5 to 8, **characterized in that** said current collector head (200) also includes a fixed rotation sleeve (208) set outside said rotation seat (202).

10. The waterproof electric power access device according to claim 9, **characterized in that** between said rotation seat (202) and fixed seat (201) is provided with a first sealing ring .

11. The waterproof electric power access device according to claims 9 to 10, **characterized in that** said rotation sleeve (208) and fixed seat (201) are provided with a second sealing ring (209) between them.

12. The waterproof electric power access device according to any of claims 5 to 11, **characterized in that** said fixed seat (201) is provided with a fixing connector (2011) for connecting said track body (101).

13. The waterproof electric power access device according to claim 12, **characterized in that** said fixing connector (2011) comprises:

two swing arms (2012), respectively provided on each side of said fixed seat (201), connected in the middle to said fixed seat (201) by means of a pivot point (2013), said swing arms (2012) swinging around said pivot point (2013) and having the elasticity to return to the original position;
two hook portions (2014), provided at the ends of each of the two swing arms (2012) and set opposite to each other.

14. The waterproof electric power access device according to claim 13, **characterized in that** said fixing connector (2011) and fixed seat (201) are manufactured in one piece.

15. The waterproof electric power access device according to claims 14 to 15, **characterized in that** the fixing connector (2011) and the fixed seat (201) are made of nylon or acrylic.

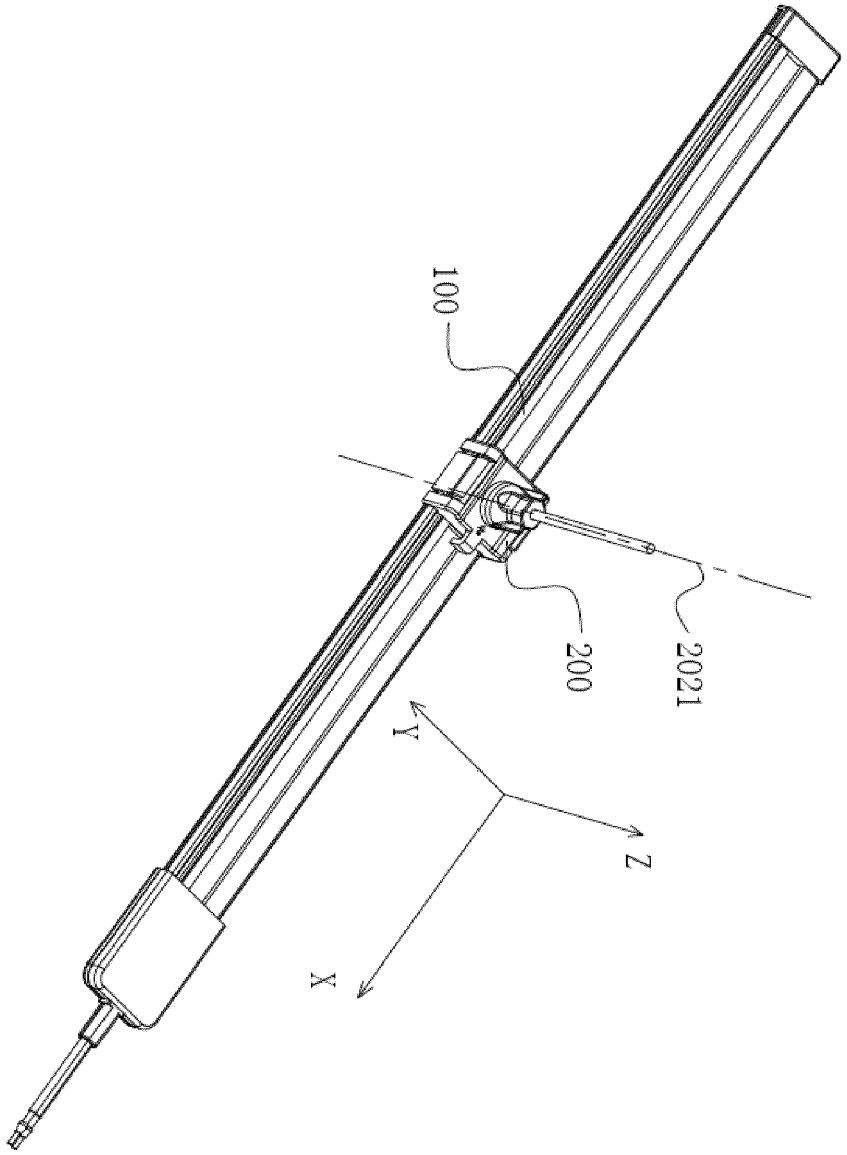

FIG. 1

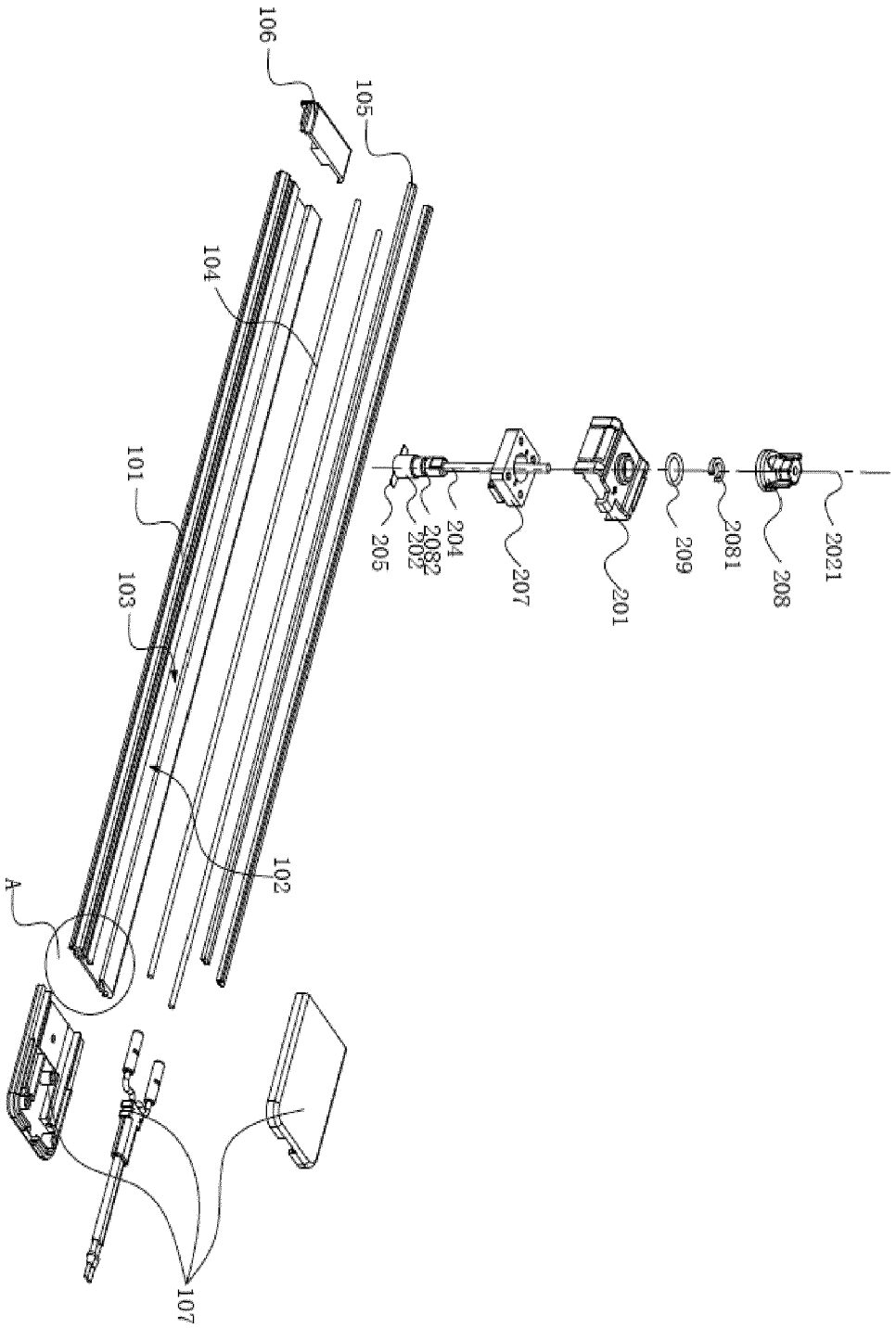
106
105
104
101
103
102
A
107
205
2082
204
207
201
209
2081
208
2021

FIG. 2

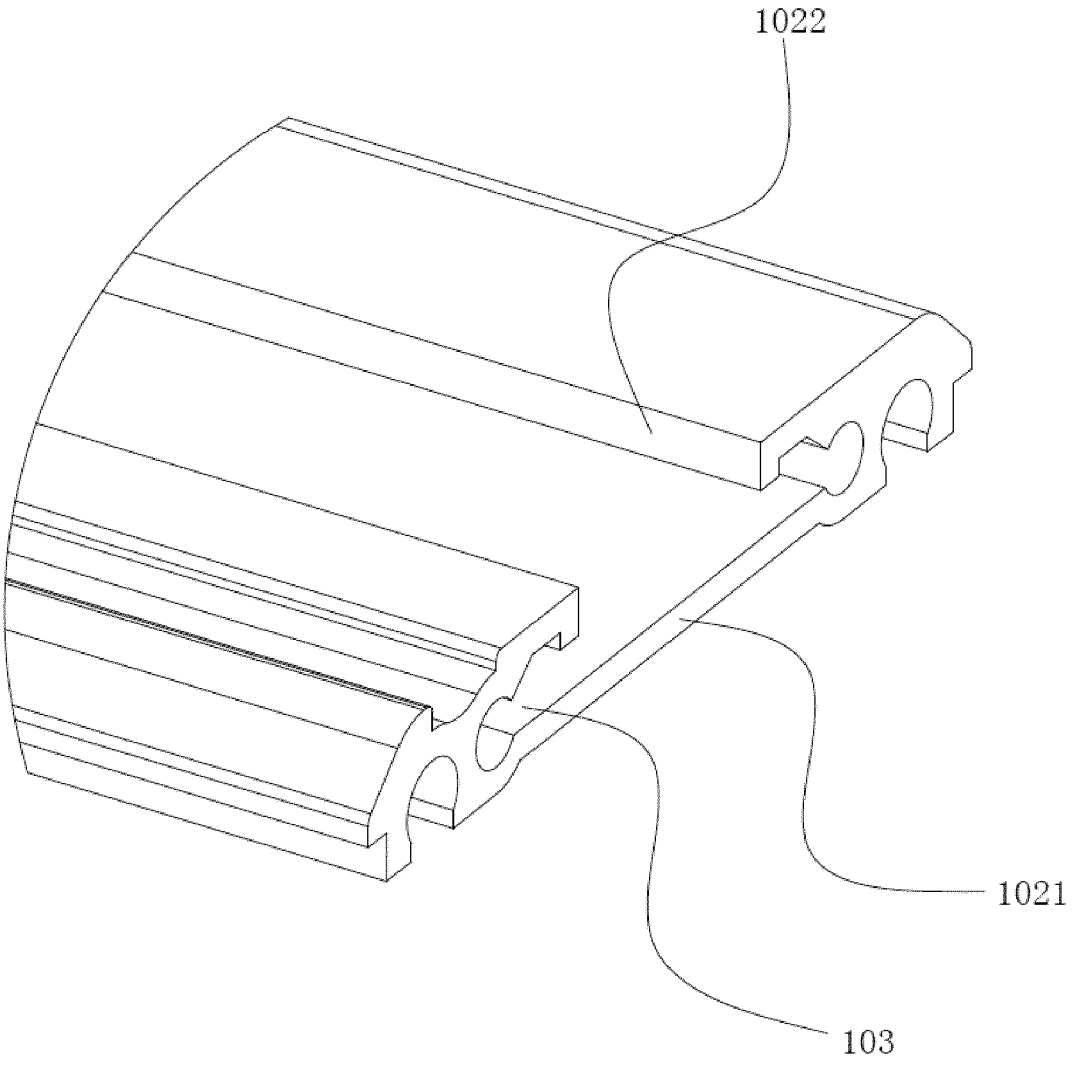

FIG. 3

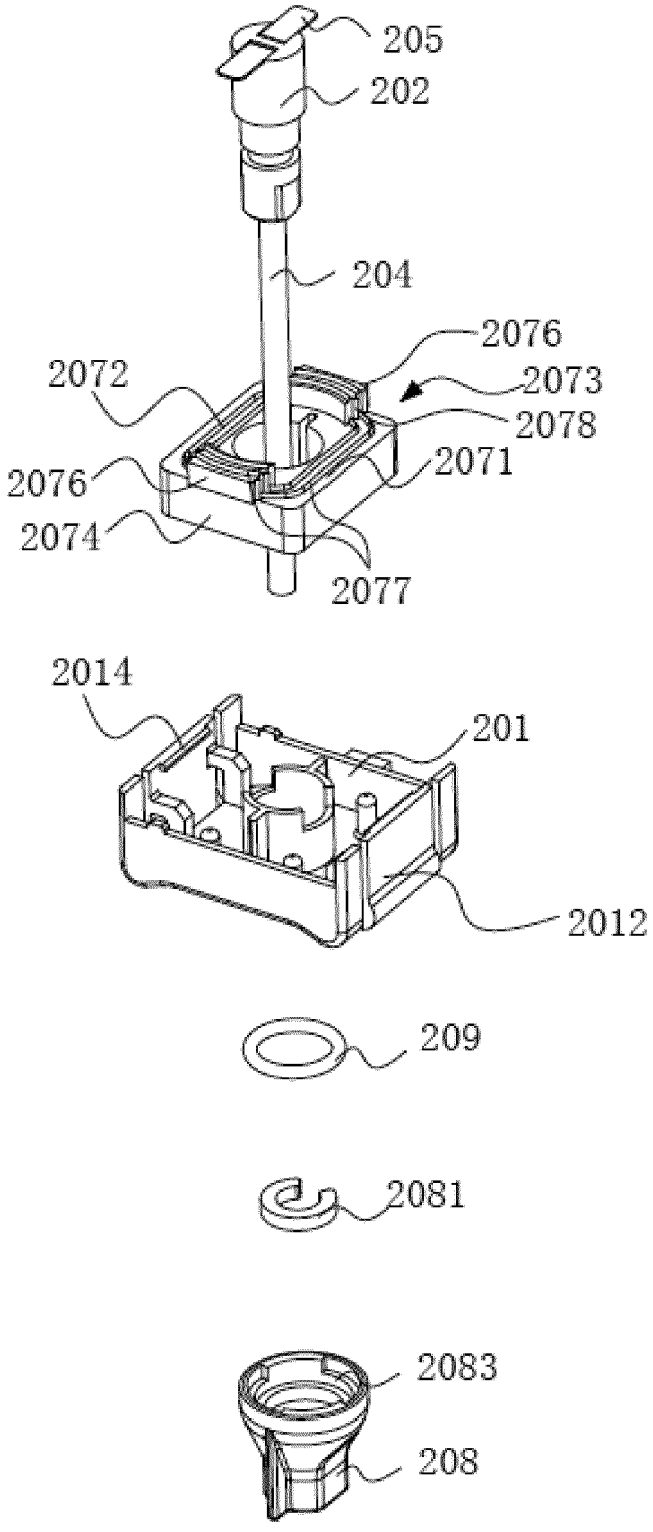
205
202
204
2076
2072
2073
2078
2071
2076
2074
2077
2014
201
2012
209
2081
2083
208

FIG. 4

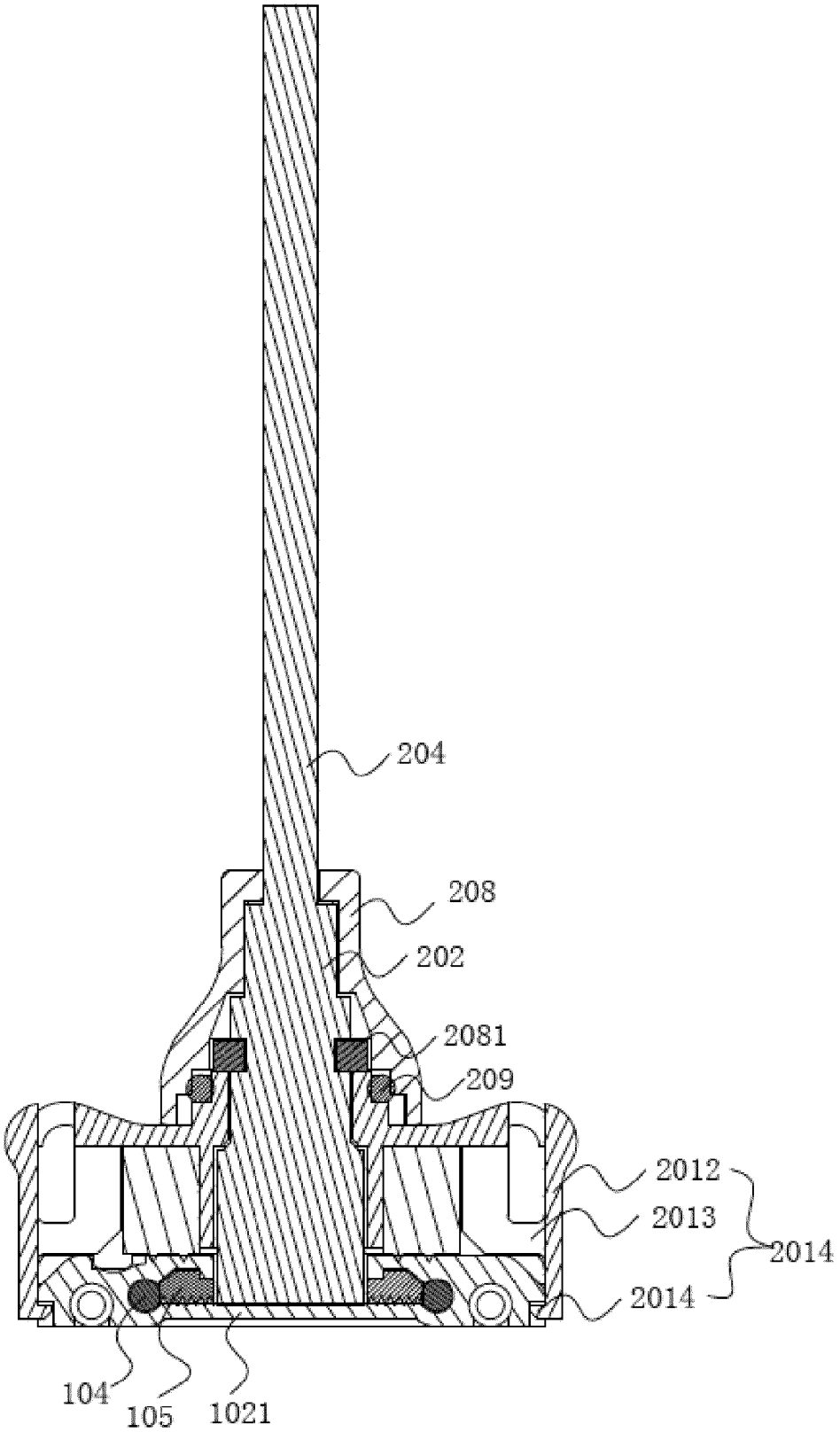

FIG. 5

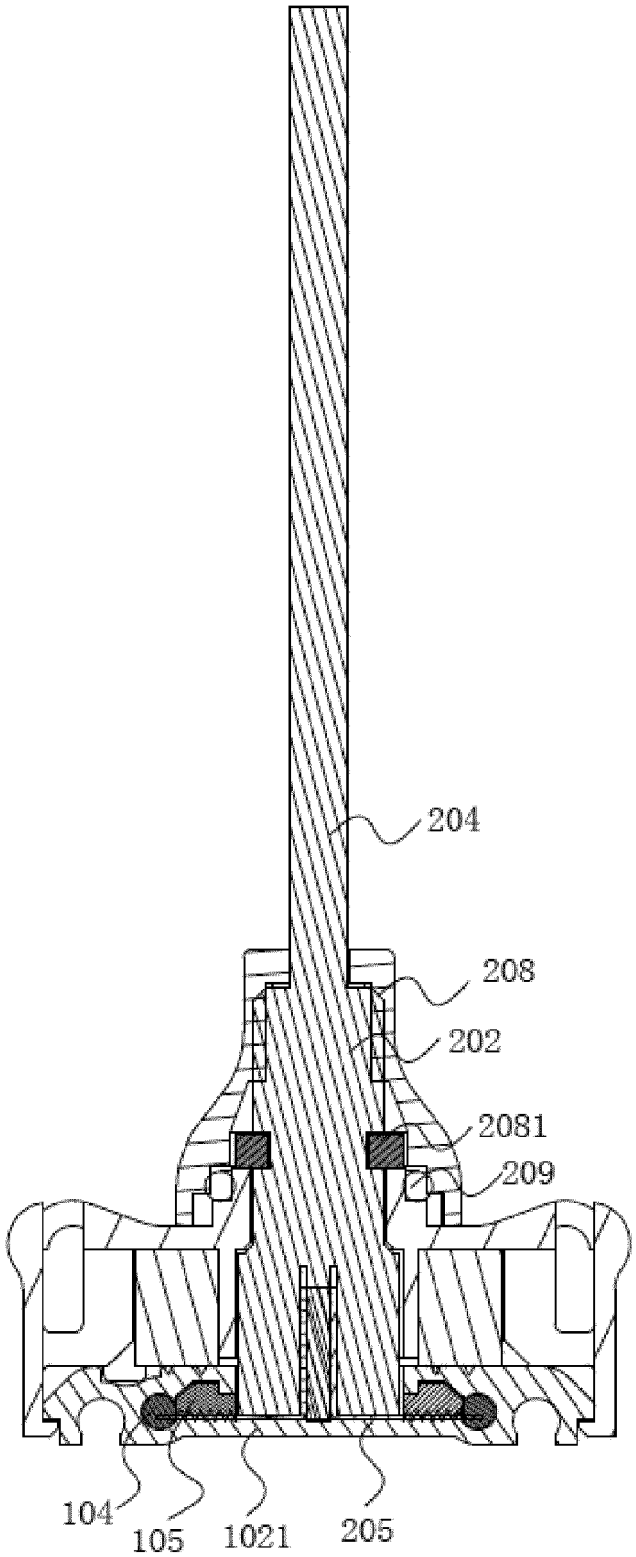

FIG. 6

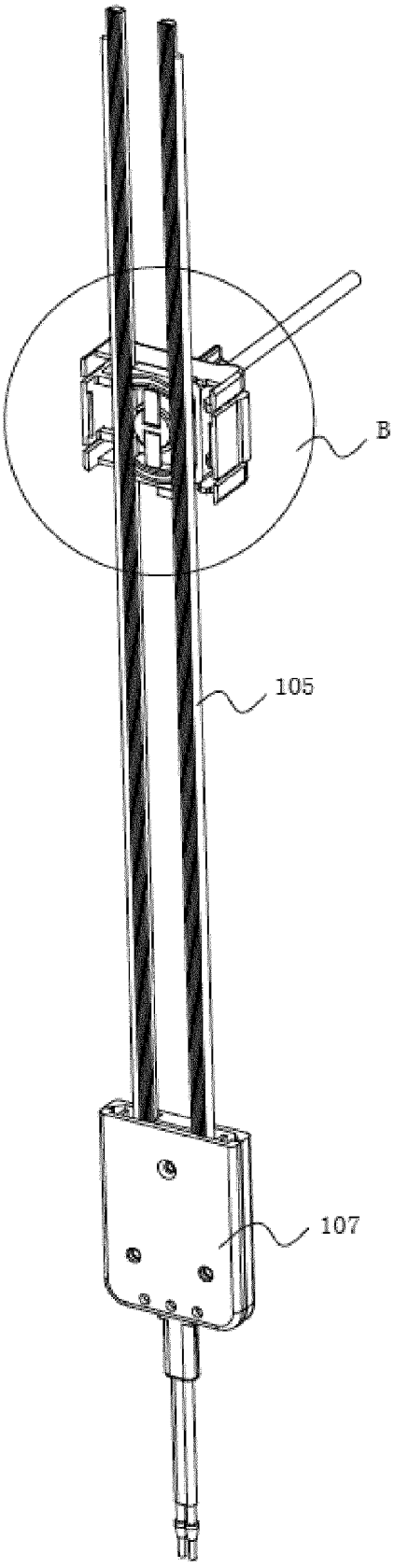

FIG. 7

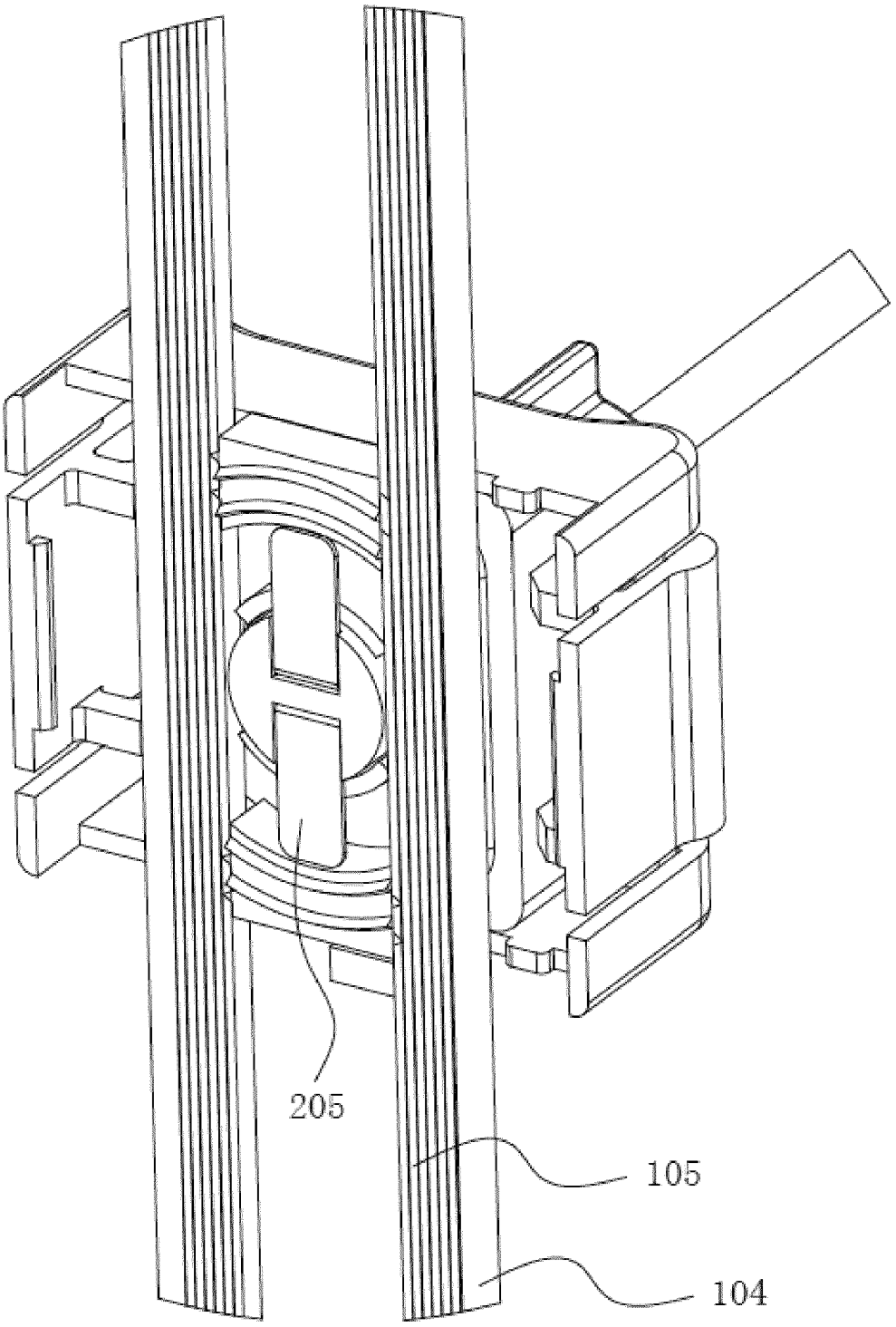

FIG. 8

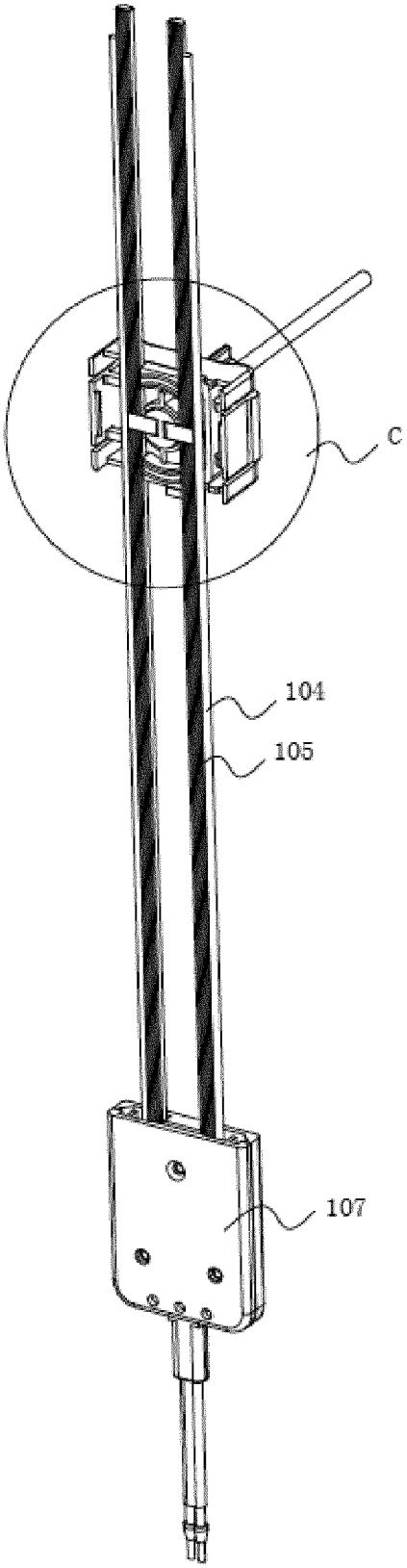

FIG. 9

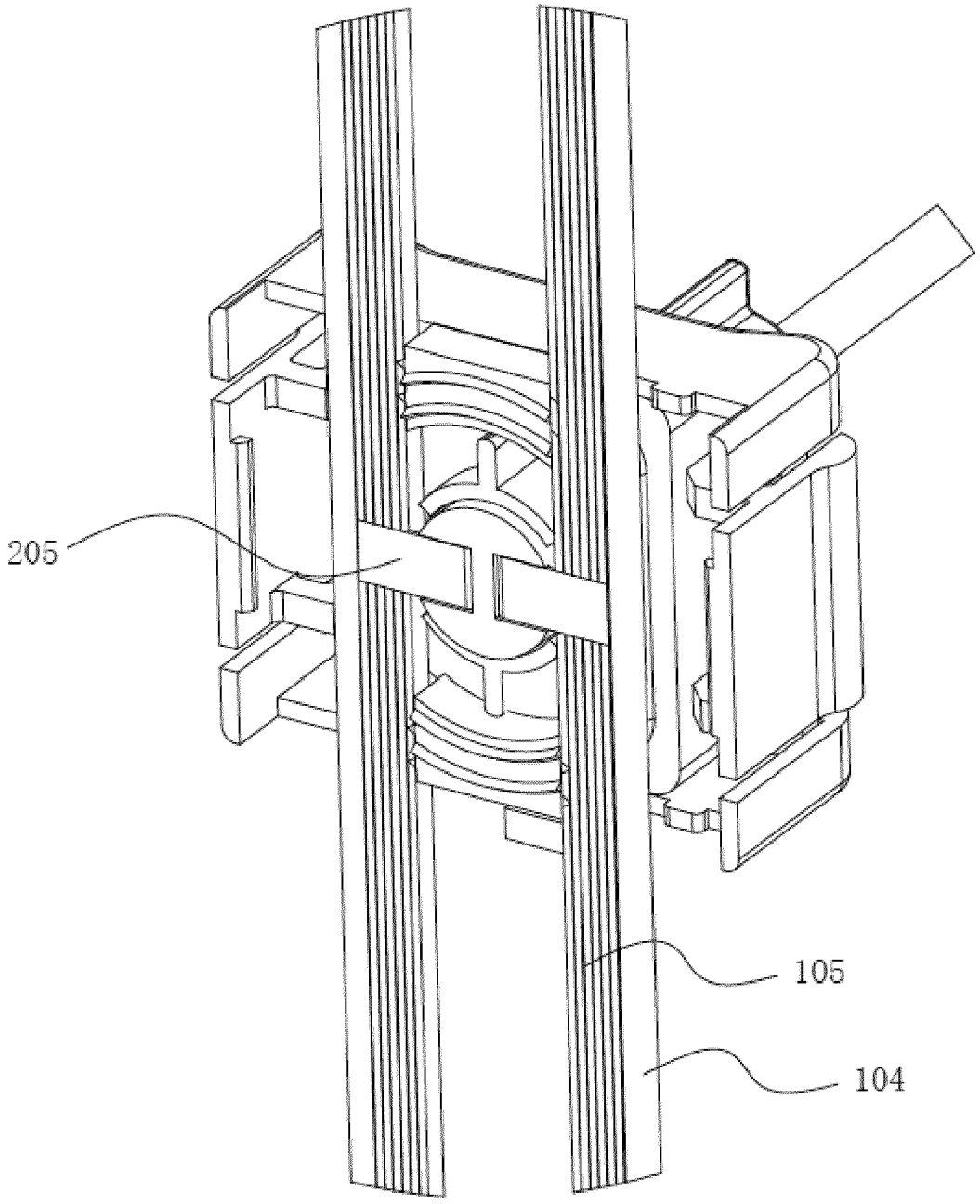

FIG. 10

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 21 20 5400

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 211 743 424 U (SELF ELECTRONICS CO LTD) 23 October 2020 (2020-10-23) * paragraph [0002] - paragraph [0069]; figures 1,2,3,4,5 *	1-15	INV. H01R13/52 H01R24/00 H01R25/14
Y	CN 208 687 504 U (SHENZHEN ZHONGYUEXIGUANG TECH CO LTD) 2 April 2019 (2019-04-02) * paragraph [0001] - paragraph [0040]; figure 10 *	1-15	
Y	US 2016/104985 A1 (EWING BRENT [US] ET AL) 14 April 2016 (2016-04-14) * the whole document *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01R

1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 March 2022	Mateo Segura, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 21 20 5400

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-03-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 211743424 U	23-10-2020	NONE	
CN 208687504 U	02-04-2019	NONE	
US 2016104985 A1	14-04-2016	NONE	

EPO FORM P0459

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