

(19)



(11)

EP 4 773 448 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

08.07.2026 Bulletin 2026/28

(51) International Patent Classification (IPC):

H01R 13/506 ^(2006.01) **H01R 13/58** ^(2006.01)**H01R 13/52** ^(2006.01) **H01R 13/56** ^(2006.01)(21) Application number: **26150051.6**

(52) Cooperative Patent Classification (CPC):

H01R 13/506; H01R 13/5841; H01R 13/5202;**H01R 13/562; H01R 13/5804**

(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 ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**

Designated Extension States:

BA

Designated Validation States:

GE KH LA MA MD TN

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(54) **CONNECTOR HOUSING ASSEMBLY AND CONNECTOR**

(57) The present invention discloses a connector housing assembly and a connector. The connector housing assembly comprises: a housing (1); and a rear end cover (2) which is installed on the rear end of the housing (1) and formed with a cable holding part (20). The rear end cover (2) has a cable hole (201) that allows a cable (3) to pass through, and the cable holding part (20) has a holding slot (21) for holding the cable (3) led out from the cable hole (201) of the rear end cover (2), the axial direction of the holding slot (21) is at a certain angle to the axial direction of the cable hole (201). In the present invention, the rear end cover is capable of maintaining the cable led out from its cable hole in an orientation perpendicular to the axial direction of the cable hole. Therefore, the present invention expands the application scope of the connector.

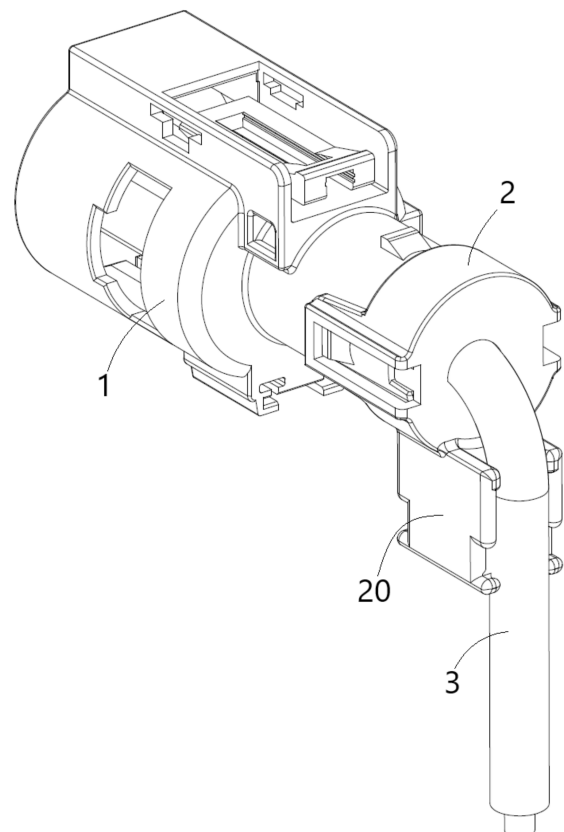


Fig.2

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of Chinese Patent Application No. CN 202520033914.1 filed on January 6, 2025 in the State Intellectual Property Office of China, the whole disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a connector housing assembly and a connector comprising the connector housing assembly.

Description of the Related Art

[0003] In the prior art, a connector typically includes a housing, a terminal, a cable, and a rear end cover. The terminal is set in the housing, and the rear end cover is installed on the rear end of the housing. The cable is electrically connected to the terminal and led out from the cable hole in the rear end cover. In the prior art, the cable led out from the cable hole of the rear end cover usually extends in a straight line along the axial direction of the cable hole. However, in some applications, the cable that need to be led out can be kept in multiple different orientations perpendicular to the axis of the cable hole. The existing connectors cannot meet these application requirements, limiting the application scope of the connectors.

SUMMARY OF THE INVENTION

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

[0005] According to an aspect of the present invention, there is provided a connector housing assembly. The connector housing assembly comprises: a housing; and a rear end cover which is installed on the rear end of the housing and formed with a cable holding part. The rear end cover has a cable hole that allows a cable to pass through, and the cable holding part has a holding slot for holding the cable led out from the cable hole of the rear end cover, the axial direction of the holding slot is at a certain angle to the axial direction of the cable hole.

[0006] According to an exemplary embodiment of the present invention, the axial direction of the holding slot is perpendicular to the axial direction of the cable hole, so that the extension direction of the cable held in the holding slot is perpendicular to the axial direction of the cable hole.

[0007] According to another exemplary embodiment of the present invention, the rear end cover can be installed

on the rear end of the housing in multiple different orientations relative to the housing, so that the cable held in the holding slot can be in multiple different orientations relative to the housing.

5 [0008] According to another exemplary embodiment of the present invention, multiple protrusions are formed on the outer peripheral surface of the rear end of the housing, and the multiple protrusions are evenly spaced in the circumferential direction of the rear end of the housing; an
10 elastic buckle is formed on the rear end cover suitable for engaging with the protrusion, for locking the rear end cover to the rear end of the housing; when the rear end cover is installed on the rear end of the housing in any of the multiple different orientations, the elastic buckle en-
15 gages with the protrusion.

[0009] According to another exemplary embodiment of the present invention, four protrusions are formed on the outer peripheral surface of the rear end of the housing, allowing the rear end cover to be installed on the rear end
20 of the housing in four different orientations.

[0010] According to another exemplary embodiment of the present invention, two elastic buckles are formed on the rear end cover, which are opposite in the radial direction of the cable hole; when the rear end cover is
25 installed on the rear end of the housing in any of the four different orientations, the two elastic buckles are respectively engaged with two of the four protrusions.

[0011] According to another exemplary embodiment of the present invention, four elastic buckles are formed on the rear end cover, and the four elastic buckles are distributed at intervals in the circumferential direction of the rear end cover; when the rear end cover is installed
30 on the rear end of the housing in any of the four different orientations, the four elastic buckles are respectively engaged with the four protrusions.

[0012] According to another exemplary embodiment of the present invention, the elastic buckle comprises an elastic arm and a snap slot formed on the elastic arm, wherein the snap slot is adapted to engage with the
40 protrusion.

[0013] According to another exemplary embodiment of the present invention, multiple positioning notches are formed on the rear end of the housing, and the multiple positioning notches are evenly spaced in the circumferential direction of the rear end of the housing; a position-
45 ing protrusion adapted to engage with the positioning notch is formed in the rear end cover for circumferential positioning of the rear end cover to prevent rotation of the rear end cover relative to the housing; when the rear end cover is installed on the rear end of the housing in any of the multiple different orientations, the positioning protru-
50 sion engages with the positioning notch.

[0014] According to another exemplary embodiment of the present invention, four positioning notches are formed on the rear end of the housing, and four position-
55 ing protrusions are formed in the rear end cover, the four positioning notches are respectively engaged with the four positioning protrusions.

[0015] According to another exemplary embodiment of the present invention, the cable holding part of the rear end cover is connected to the outer side of the peripheral wall of the rear end cover and extends a predetermined length along the radial direction of the cable hole.

[0016] According to another exemplary embodiment of the present invention, each of the housing and the rear end cover is an integral injection molded part.

[0017] According to another aspect of the present invention, there is provided a connector. The connector comprises: the above connector housing assembly; a terminal provided in the housing; and a cable electrically connected to the terminal and led out from the cable hole of the rear end cover.

[0018] According to an exemplary embodiment of the present invention, the cable led out from the cable hole of the rear end cover is not bent and extends directly along the axial direction of the cable hole.

[0019] According to another exemplary embodiment of the present invention, the cable led out from the cable hole of the rear end cover is bent 90 degrees and held in the holding slot of the cable holding part, so that the extension direction of the led-out cable is perpendicular to the axial direction of the cable hole.

[0020] According to another exemplary embodiment of the present invention, the rear end cover is installed on the rear end of the housing in a first orientation relative to the housing, so that the cable held in the holding slot is in the first orientation relative to the housing.

[0021] According to another exemplary embodiment of the present invention, the rear end cover is installed on the rear end of the housing in a second orientation different from the first orientation, so that the cable held in the holding slot is in the second orientation relative to the housing.

[0022] According to another exemplary embodiment of the present invention, the connector further comprises a binding strap used to tie the led-out cable to the cable holding part of the rear end cover to prevent the cable from being detached from the holding slot of the cable holding part.

[0023] According to another exemplary embodiment of the present invention, the connector further comprises a sealing ring which is fitted onto the cable and inserted into the rear port of the housing, the sealing ring is radially compressed between the cable and the housing to achieve sealing between the two.

[0024] In the aforementioned exemplary embodiments according to the present invention, the rear end cover is capable of holding the cable led out from its cable hole in an orientation perpendicular to the axial direction of the cable hole. Therefore, the present invention expands the application scope of the connector.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The above and other features of the present invention will become more apparent by describing in

detail exemplary embodiments thereof with reference to the accompanying drawings, in which:

Figure 1 shows an illustrative perspective view of a connector according to an exemplary embodiment of the present invention, in which the outgoing cable extends in a straight line along the axial direction of the cable hole of the rear end cover;

Figure 2 shows an illustrative perspective view of a connector according to an exemplary embodiment of the present invention, in which the outgoing cable is bent 90 degrees in the axial direction relative to the cable hole of the rear end cover and held onto the cable holding part;

Figure 3 shows an illustrative exploded view of a connector according to an exemplary embodiment of the present invention;

Figure 4 shows an illustrative exploded view of a connector housing assembly according to an exemplary embodiment of the present invention;

Figure 5 shows an illustrative perspective view of the rear end cover of a connector according to an exemplary embodiment of the present invention;

Figure 6 shows an illustrative exploded view of the housing and rear end cover of a connector according to an exemplary embodiment of the present invention;

Figure 7 shows an illustrative assembly view of the housing and rear end cover of a connector according to an exemplary embodiment of the present invention;

Figure 8 shows an illustrative perspective view of a connector according to an exemplary embodiment of the present invention, in which the rear end cover is installed on the housing in a first orientation such that the cable held to the cable holding part is in the first orientation; and

Figure 9 shows an illustrative perspective view of a connector according to an exemplary embodiment of the present invention, wherein the rear end cover is mounted to the housing in a second orientation such that the cable held to the cable holding part is in the second orientation.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0026] Exemplary embodiments of the present disclosure will be described hereinafter in detail with reference to the attached drawings, wherein the like reference numerals refer to the like elements. The present disclosure may, however, be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein; rather, these embodiments are provided so that the present disclosure will be thorough and complete, and will fully convey the concept of the disclosure to those skilled in the art.

[0027] In the following detailed description, for pur-

poses 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.

[0028] According to a general concept of the present invention, there is provided a connector housing assembly. The connector housing assembly comprises: a housing; and a rear end cover which is installed on the rear end of the housing and formed with a cable holding part. The rear end cover has a cable hole that allows a cable to pass through, and the cable holding part has a holding slot for holding the cable led out from the cable hole of the rear end cover, the axial direction of the holding slot is at a certain angle to the axial direction of the cable hole.

[0029] According to another general concept of the present invention, there is provided a connector. The connector comprises: the above connector housing assembly; a terminal provided in the housing; and a cable electrically connected to the terminal and led out from the cable hole of the rear end cover.

[0030] Figure 1 shows an illustrative perspective view of a connector according to an exemplary embodiment of the present invention, in which the outgoing cable 3 extends in a straight line along the axial direction of the cable hole 201 of the rear end cover 2; Figure 2 shows an illustrative perspective view of a connector according to an exemplary embodiment of the present invention, in which the lead out cable 3 is bent 90 degrees in the axial direction relative to the cable hole 201 of the rear end cover 2 and held onto the cable holding part 20; Figure 3 shows an illustrative exploded view of a connector according to an exemplary embodiment of the present invention; Figure 4 shows an illustrative exploded view of a connector housing assembly according to an exemplary embodiment of the present invention; Figure 5 shows an illustrative perspective view of the rear end cover 2 of a connector according to an exemplary embodiment of the present invention; Figure 6 shows an illustrative exploded view of the housing 1 and rear end cover 2 of a connector according to an exemplary embodiment of the present invention; Figure 7 shows an illustrative assembly view of the housing 1 and rear end cover 2 of a connector according to an exemplary embodiment of the present invention; Figure 8 shows an illustrative perspective view of a connector according to an exemplary embodiment of the present invention, in which the rear end cover 2 is installed on the housing 1 in a first orientation, such that the cable 3 held to the cable holding part 20 is in the first orientation; Figure 9 shows an illustrative perspective view of a connector according to an exemplary embodiment of the present invention, in which the rear end cover 2 is mounted on the housing 1 in a second orientation such that the cable 3 held to the cable holding part 20 is in the second orientation.

[0031] As shown in Figures 1 to 9, in an exemplary

embodiment of the present invention, a connector housing assembly is disclosed. The connector housing assembly includes: a housing 1 and a rear end cover 2. The rear end cover 2 is installed on the rear end of the housing 1 and formed with a cable holding part 20. The rear end cover 2 has a cable hole 201 that allows a cable 3 to pass through. The cable holding part 20 has a holding slot 21 for holding the cable 3 led out from the cable hole 201 of the rear end cover 2, the axial direction of the holding slot 21 is at a certain angle to the axial direction of the cable hole 201, such as 30 degrees, 60 degrees, or 90 degrees. In the illustrated embodiment, the axial direction of the holding slot 21 is perpendicular to the axial direction of the cable hole 201, so that the extension direction of the cable 3 held in the holding slot 21 is perpendicular to the axial direction of the cable hole 201.

[0032] As shown in Figures 1 to 9, in the illustrated embodiment, the rear end cover 2 can be installed on the rear end of the housing 1 in multiple different orientations relative to the housing 1, so that the cable 3 held in the holding slot 21 can be in multiple different orientations relative to the housing 1.

[0033] As shown in Figures 1 to 9, in the illustrated embodiment, multiple protrusions 12 are formed on the outer peripheral surface of the rear end of the housing 1, and the multiple protrusions 12 are evenly spaced in the circumferential direction of the rear end of the housing 1. There is an elastic buckle 22 formed on the rear end cover 2, which is suitable for engaging with the protrusion 12, to lock the rear end cover 2 to the rear end of the housing 1. When the rear end cover 2 is installed on the rear end of the housing 1 in any of multiple different orientations, the elastic buckle 22 engages with the protrusion 12.

[0034] As shown in Figures 1 to 9, in the illustrated embodiment, four protrusions 12 are formed on the outer peripheral surface of the rear end of the housing 1, so that the rear end cover 2 can be installed on the rear end of the housing 1 in four different orientations, and the cable 3 held in the holding slot 21 can be in four different orientations, such as the vertical downward orientation (as shown in Figures 2 and 8), the vertical upward orientation, the horizontal left orientation, and the horizontal right orientation (as shown in Figure 9).

[0035] As shown in Figures 1 to 9, in the illustrated embodiment, two elastic buckles 22 are formed on the rear end cover 2, and the two elastic buckles 22 are opposite in the radial direction of the cable hole 201. When the rear end cover 2 is installed on the rear end of the housing 1 in any of four different orientations, the two elastic buckles 22 are respectively engaged with two of the four protrusions 12.

[0036] However, the present invention is not limited to the illustrated embodiment. For example, in another exemplary embodiment of the present invention, four elastic buckles 22 are formed on the rear end cover 2, and the four elastic buckles 22 are distributed at intervals in the circumferential direction of the rear end cover 2. When the rear end cover 2 is installed on the rear end of the

housing 1 in any of four different orientations, the four elastic buckles 22 are respectively engaged with the four protrusions 12.

[0037] As shown in Figures 1 to 9, in the illustrated embodiment, the elastic buckle 22 includes an elastic arm 22a and a snap slot 22b formed on the elastic arm 22a, which is adapted to engage with the protrusion 12.

[0038] As shown in Figures 1 to 9, in the illustrated embodiment, multiple positioning notches 13 are formed on the rear end of the housing 1, and the multiple positioning notches 13 are evenly spaced in the circumferential direction of the rear end of the housing 1. A positioning protrusion 23 suitable for engaging with the positioning notch 13 is formed in the rear end cover 2 for circumferential positioning of the rear end cover 2 to prevent rotation of the rear end cover 2 relative to the housing 1. When the rear end cover 2 is installed on the rear end of the housing 1 in any of multiple different orientations, the positioning protrusion 23 engages with the positioning notch 13.

[0039] As shown in Figures 1 to 9, in the illustrated embodiment, four positioning notches 13 are formed on the rear end of the housing 1, and four positioning protrusions 23 are formed in the rear end cover 2. The four positioning notches 13 are respectively engaged with the four positioning protrusions 23.

[0040] As shown in Figures 1 to 9, in the illustrated embodiment, the cable holding part 20 of the rear end cover 2 is connected to the outer side of the peripheral wall of the rear end cover 2 and extends a predetermined length along the radial direction of the cable hole 201.

[0041] As shown in Figures 1 to 9, in the illustrated embodiment, each of the housing 1 and the rear end cover 2 is an integral injection molded part.

[0042] As shown in Figures 1 to 9, in another exemplary embodiment of the present invention, a connector is also disclosed. The connector includes the aforementioned connector housing assembly, a terminal (not shown), and a cable 3. The terminal is set in the housing 1. The cable 3 is electrically connected to the terminal and led out from the cable hole 201 in the rear end cover 2.

[0043] As shown in Figures 1 to 9, in an embodiment, the cable 3 led out from the cable hole 201 of the rear end cover 2 is not bent and extends directly along the axial direction of the cable hole 201.

[0044] As shown in Figures 1 to 9, in another embodiment, the cable 3 led out from the cable hole 201 of the rear end cover 2 is bent 90 degrees and held in the holding slot 21 of the cable holding part 20, so that the extension direction of the led out cable 3 is perpendicular to the axial direction of the cable hole 201.

[0045] As shown in Figures 2 and 8, in the illustrated embodiment, the rear end cover 2 is installed on the rear end of the housing 1 in a first orientation relative to the housing 1, so that the cable 3 held in the holding slot 21 is in a first orientation relative to the housing 1.

[0046] As shown in Figure 9, in the illustrated embodiment, the rear end cover 2 is installed on the rear end of

the housing 1 in a second orientation different from the first orientation, so that the cable 3 held in the holding slot 21 is in the second orientation relative to the housing 1.

[0047] As shown in Figures 1 to 9, in the illustrated embodiment, the connector further includes a binding strap (not shown) for binding the led-out cable 3 to the cable holding part 20 of the rear end cover 2 to prevent the cable 3 from being detached from the holding slot 21 of the cable holding part 20.

[0048] As shown in Figures 1 to 9, in the illustrated embodiment, the connector further comprises a sealing ring 4, which is fitted onto the cable 3 and inserted into the rear port of the housing 1. The sealing ring 4 is radially compressed between the cable 3 and the housing 1 to achieve sealing between the two.

[0049] 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.

[0050] 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.

[0051] As used herein, an element recited in the singular and proceeded with the word "a" or "an" should be understood as not excluding plural of said elements or steps, unless such exclusion is explicitly stated. Furthermore, references to "one embodiment" of the present invention are not intended to be interpreted as excluding the existence of additional embodiments that also incorporate the recited features. Moreover, unless explicitly stated to the contrary, embodiments "comprising" or "having" an element or a plurality of elements having a particular property may include additional such elements not having that property.

Claims

1. A connector housing assembly, comprising:

a housing (1); and
a rear end cover (2) which is installed on the rear end of the housing (1) and formed with a cable holding part (20),
wherein the rear end cover (2) has a cable hole (201) that allows a cable (3) to pass through, and the cable holding part (20) has a holding slot (21) for holding the cable (3) led out from the cable hole (201) of the rear end cover (2), the axial direction of the holding slot (21) is at a certain angle to the axial direction of the cable hole

- (201).
2. The connector housing assembly according to claim 1,
 wherein the axial direction of the holding slot (21) is perpendicular to the axial direction of the cable hole (201), so that the extension direction of the cable (3) held in the holding slot (21) is perpendicular to the axial direction of the cable hole (201);
 and/or
 wherein the rear end cover (2) can be installed on the rear end of the housing (1) in multiple different orientations relative to the housing (1), so that the cable (3) held in the holding slot (21) can be in multiple different orientations relative to the housing (1).
 3. The connector housing assembly according to claim 2,
 wherein multiple protrusions (12) are formed on the outer peripheral surface of the rear end of the housing (1), and the multiple protrusions (12) are evenly spaced in the circumferential direction of the rear end of the housing (1);
 wherein an elastic buckle (22) is formed on the rear end cover (2) suitable for engaging with the protrusion (12), for locking the rear end cover (2) to the rear end of the housing (1);
 wherein when the rear end cover (2) is installed on the rear end of the housing (1) in any of the multiple different orientations, the elastic buckle (22) engages with the protrusion (12).
 4. The connector housing assembly according to claim 3,
 wherein four protrusions (12) are formed on the outer peripheral surface of the rear end of the housing (1), allowing the rear end cover (2) to be installed on the rear end of the housing (1) in four different orientations.
 5. The connector housing assembly according to claim 4,
 wherein two elastic buckles (22) are formed on the rear end cover (2), which are opposite in the radial direction of the cable hole (201);
 wherein when the rear end cover (2) is installed on the rear end of the housing (1) in any of the four different orientations, the two elastic buckles (22) are respectively engaged with two of the four protrusions (12).
 6. The connector housing assembly according to claim 4,
- wherein four elastic buckles (22) are formed on the rear end cover (2), and the four elastic buckles (22) are distributed at intervals in the circumferential direction of the rear end cover (2);
 wherein when the rear end cover (2) is installed on the rear end of the housing (1) in any of the four different orientations, the four elastic buckles (22) are respectively engaged with the four protrusions (12).
7. The connector housing assembly according to claim 3,
 wherein the elastic buckle (22) comprises an elastic arm (22a) and a snap slot (22b) formed on the elastic arm (22a), wherein the snap slot (22b) is adapted to engage with the protrusion (12).
 8. The connector housing assembly according to claim 3,
 wherein multiple positioning notches (13) are formed on the rear end of the housing (1), and the multiple positioning notches (13) are evenly spaced in the circumferential direction of the rear end of the housing (1);
 wherein a positioning protrusion (23) adapted to engage with the positioning notch (13) is formed in the rear end cover (2) for circumferential positioning of the rear end cover (2) to prevent rotation of the rear end cover (2) relative to the housing (1),
 wherein when the rear end cover (2) is installed on the rear end of the housing (1) in any of the multiple different orientations, the positioning protrusion (23) engages with the positioning notch (13).
 9. The connector housing assembly according to claim 8,
 wherein four positioning notches (13) are formed on the rear end of the housing (1), and four positioning protrusions (23) are formed in the rear end cover (2), the four positioning notches (13) are respectively engaged with the four positioning protrusions (23).
 10. The connector housing assembly according to claim 2,
 wherein the cable holding part (20) of the rear end cover (2) is connected to the outer side of the peripheral wall of the rear end cover (2) and extends a predetermined length along the radial direction of the cable hole (201);
 and/or
 wherein each of the housing (1) and the rear end cover (2) is an integral injection molded part.

11. A connector, comprising:

the connector housing assembly according to any one of claims 1-10;
 a terminal provided in the housing (1); and 5
 a cable (3) electrically connected to the terminal and led out from the cable hole (201) of the rear end cover (2).

12. The connector according to claim 11, 10

wherein the cable (3) led out from the cable hole (201) of the rear end cover (2) is not bent and extends directly along the axial direction of the cable hole (201); 15
 and/or
 wherein the cable (3) led out from the cable hole (201) of the rear end cover (2) is bent 90 degrees and held in the holding slot (21) of the cable holding part (20), so that the extension direction 20
 of the led-out cable (3) is perpendicular to the axial direction of the cable hole (201).

13. The connector according to claim 12, 25

wherein the rear end cover (2) is installed on the rear end of the housing (1) in a first orientation relative to the housing (1), so that the cable (3) held in the holding slot (21) is in the first orientation relative to the housing (1); 30
 and/or
 wherein the rear end cover (2) is installed on the rear end of the housing (1) in a second orientation different from the first orientation, so that the cable (3) held in the holding slot (21) is in the 35
 second orientation relative to the housing (1).

14. The connector according to claim 12, further comprising: 40
 a binding strap used to tie the led-out cable (3) to the cable holding part (20) of the rear end cover (2) to prevent the cable (3) from being detached from the holding slot (21) of the cable holding part (20).

15. The connector according to claim 11, further comprising: 45

a sealing ring (4) which is fitted onto the cable (3) and inserted into the rear port of the housing (1), wherein the sealing ring (4) is radially compressed between the cable (3) and the housing 50
 (1) to achieve sealing between the two.

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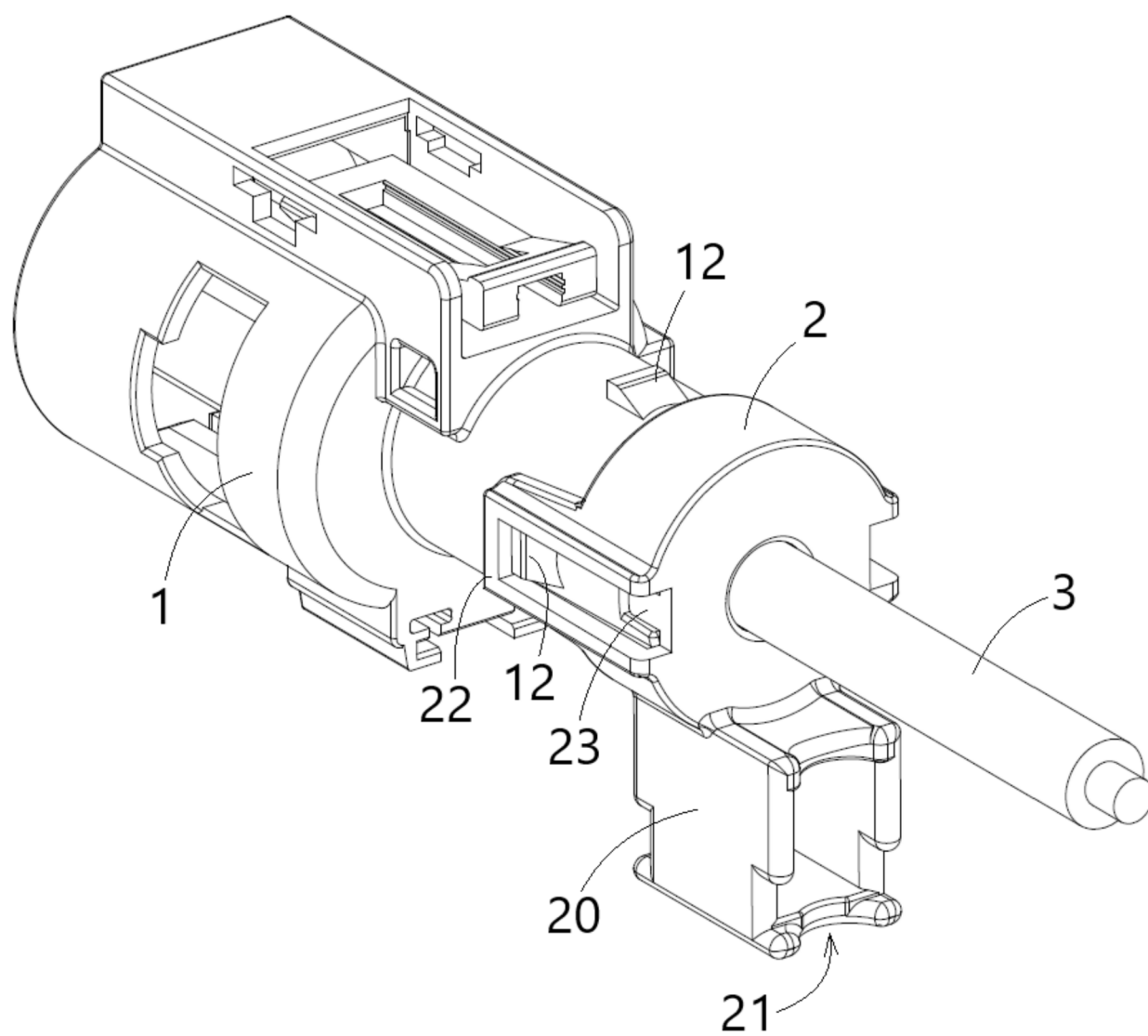


Fig.1

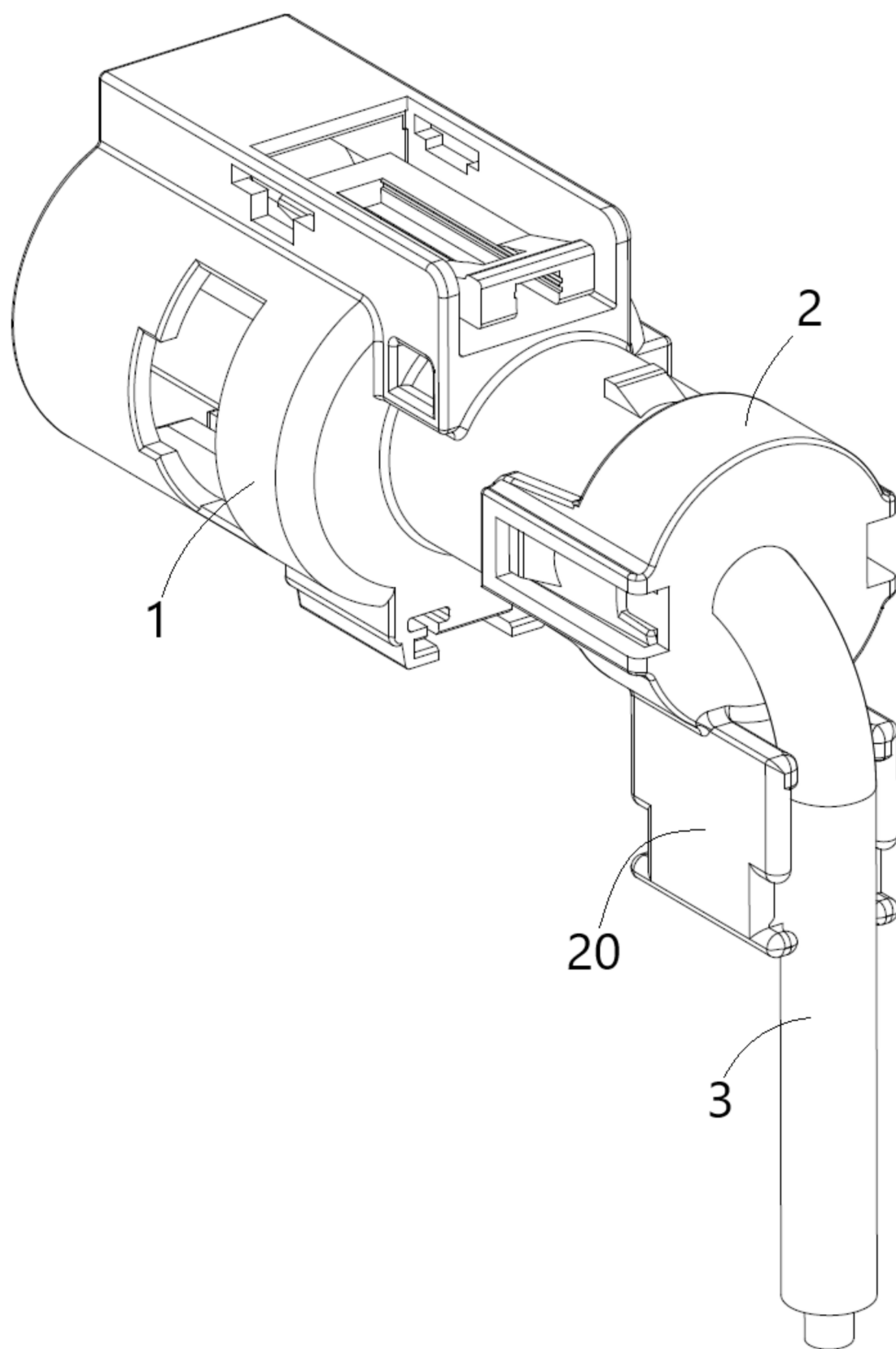


Fig.2

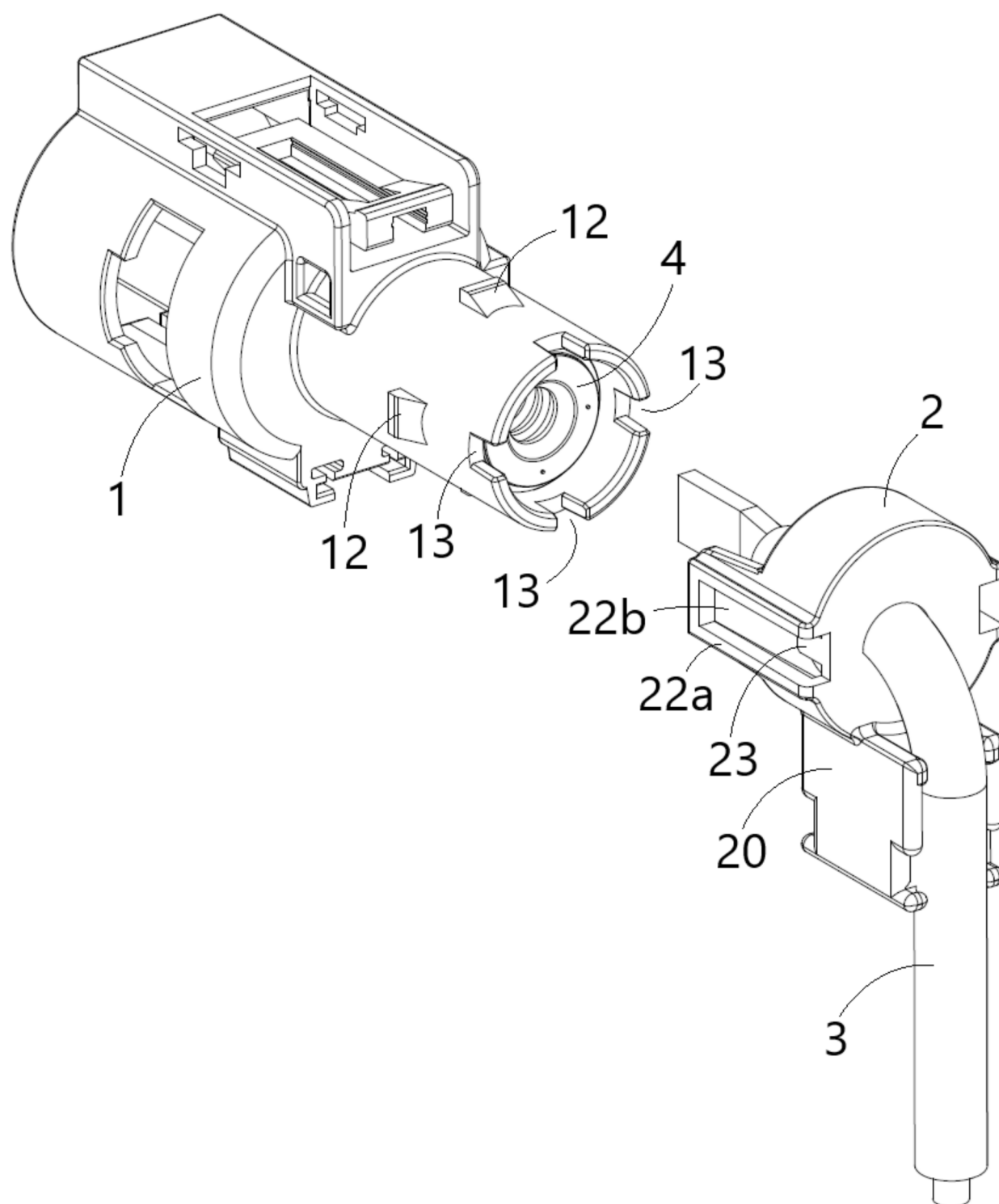


Fig.3

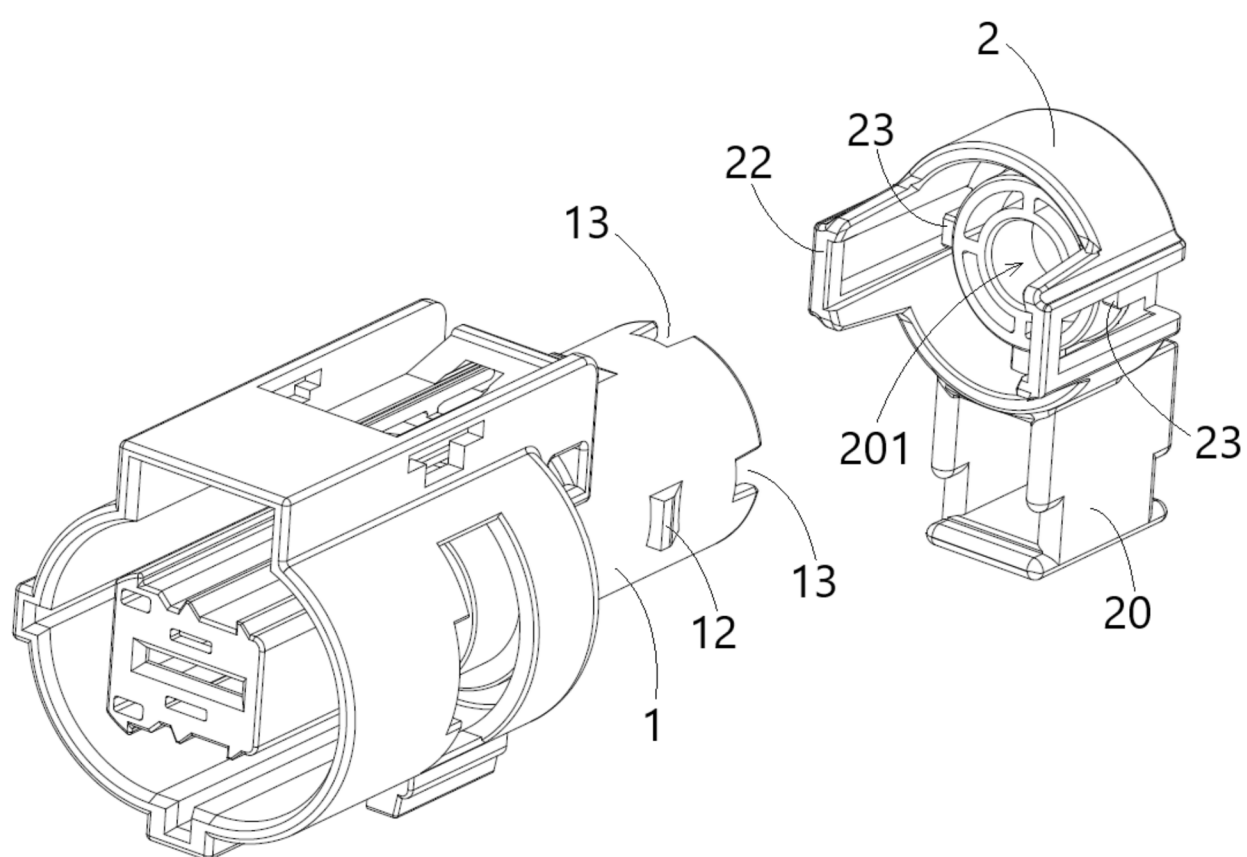


Fig.4

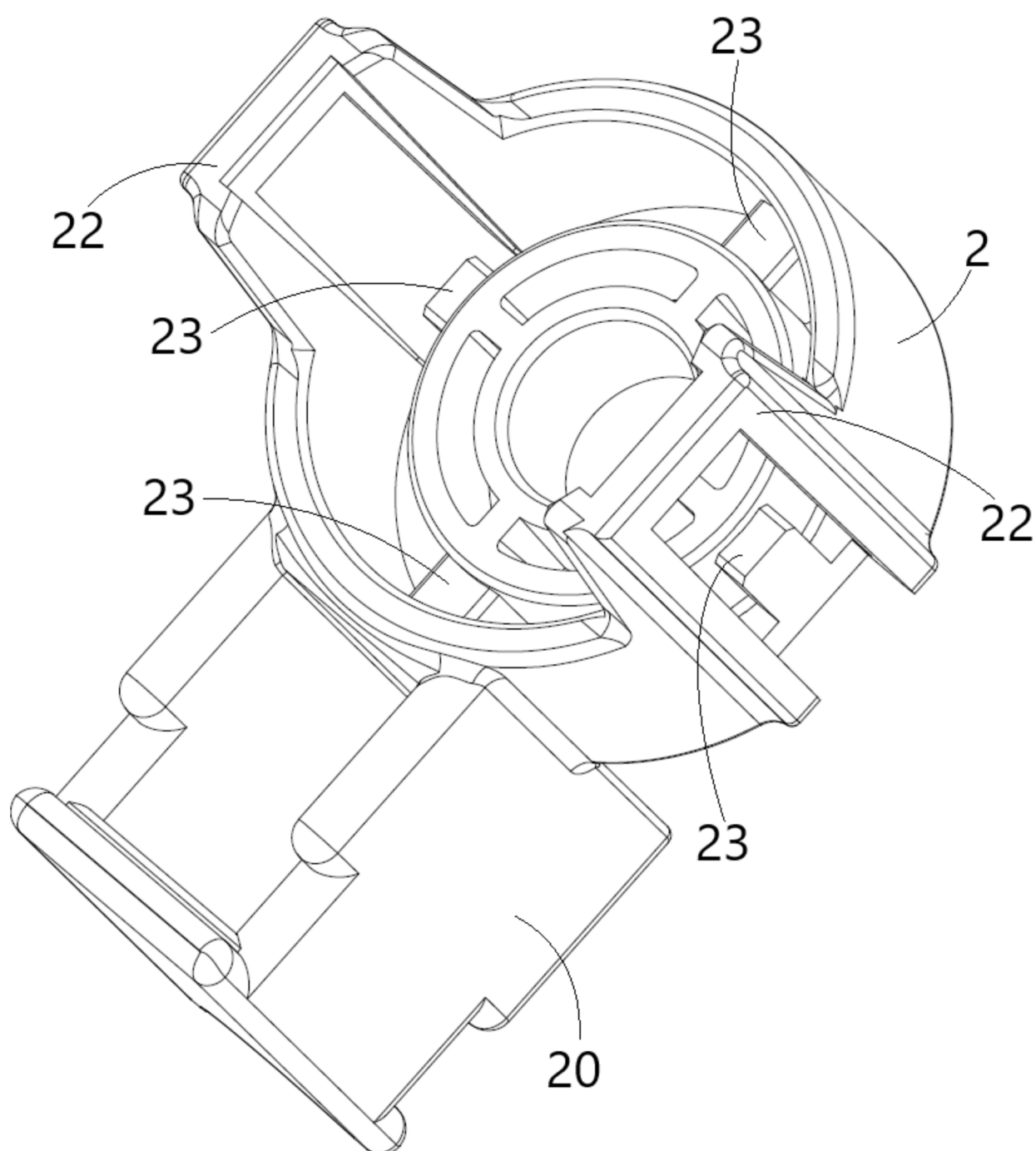


Fig.5

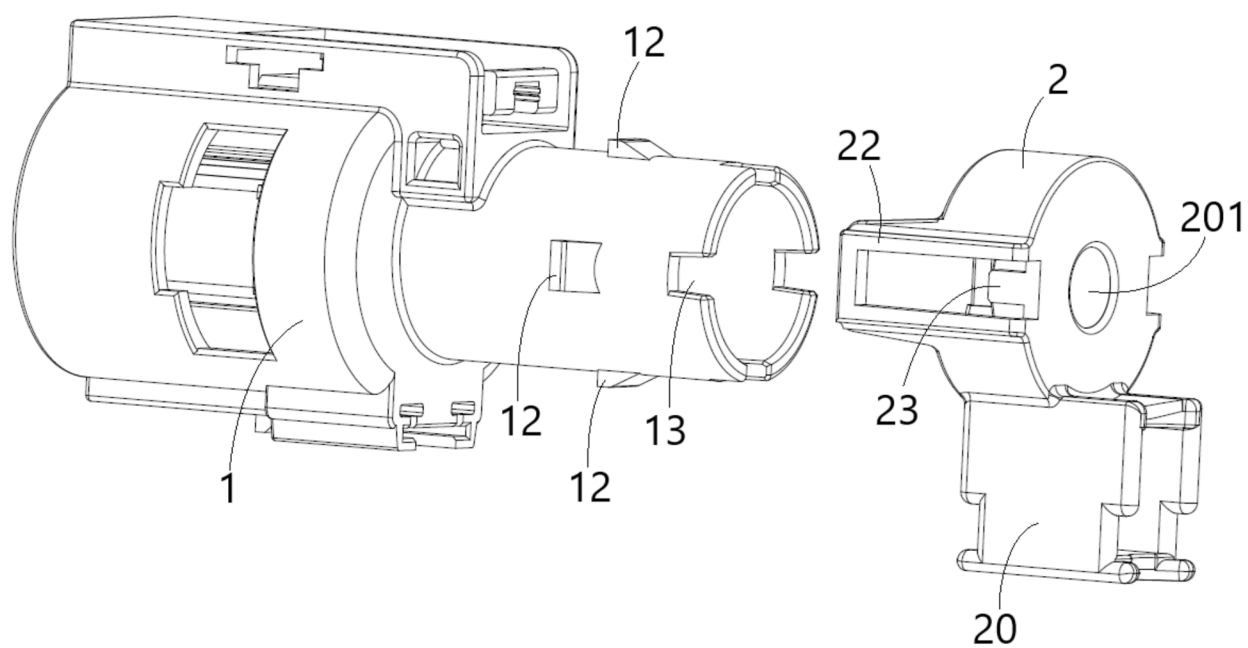


Fig.6

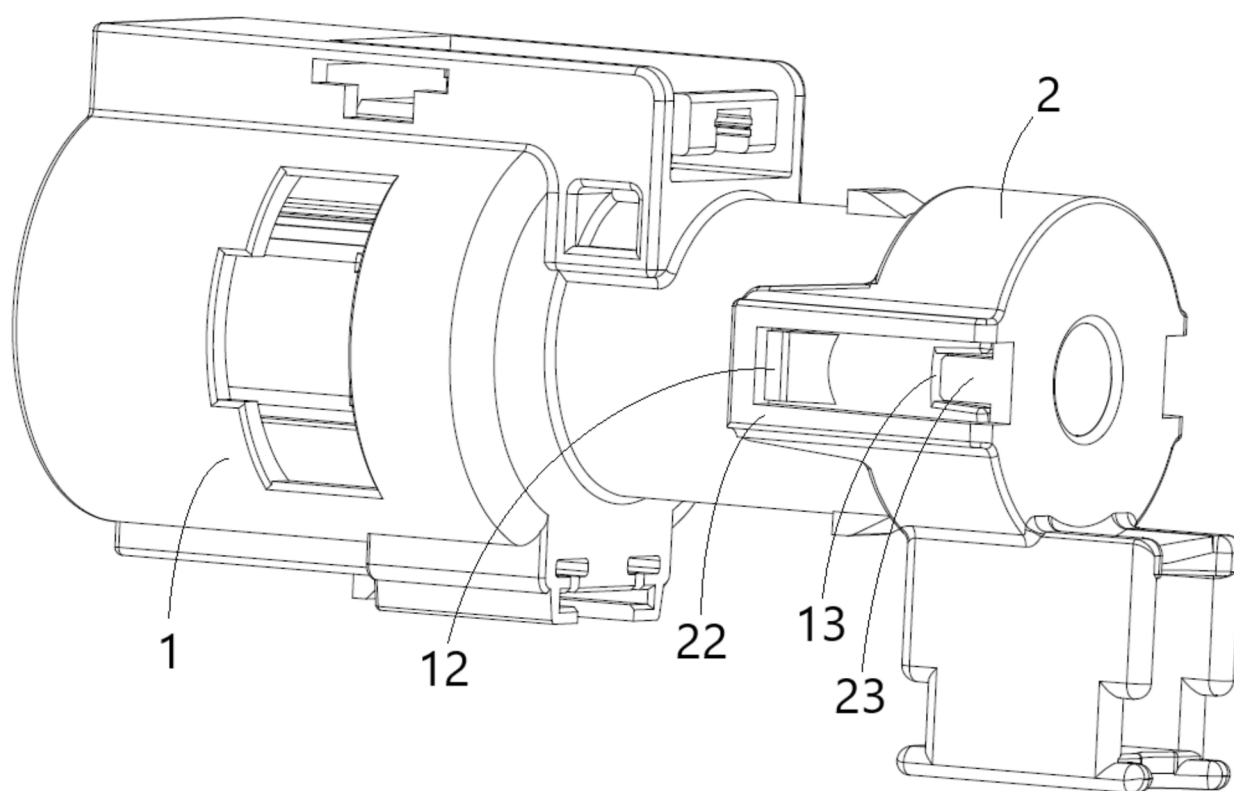


Fig.7

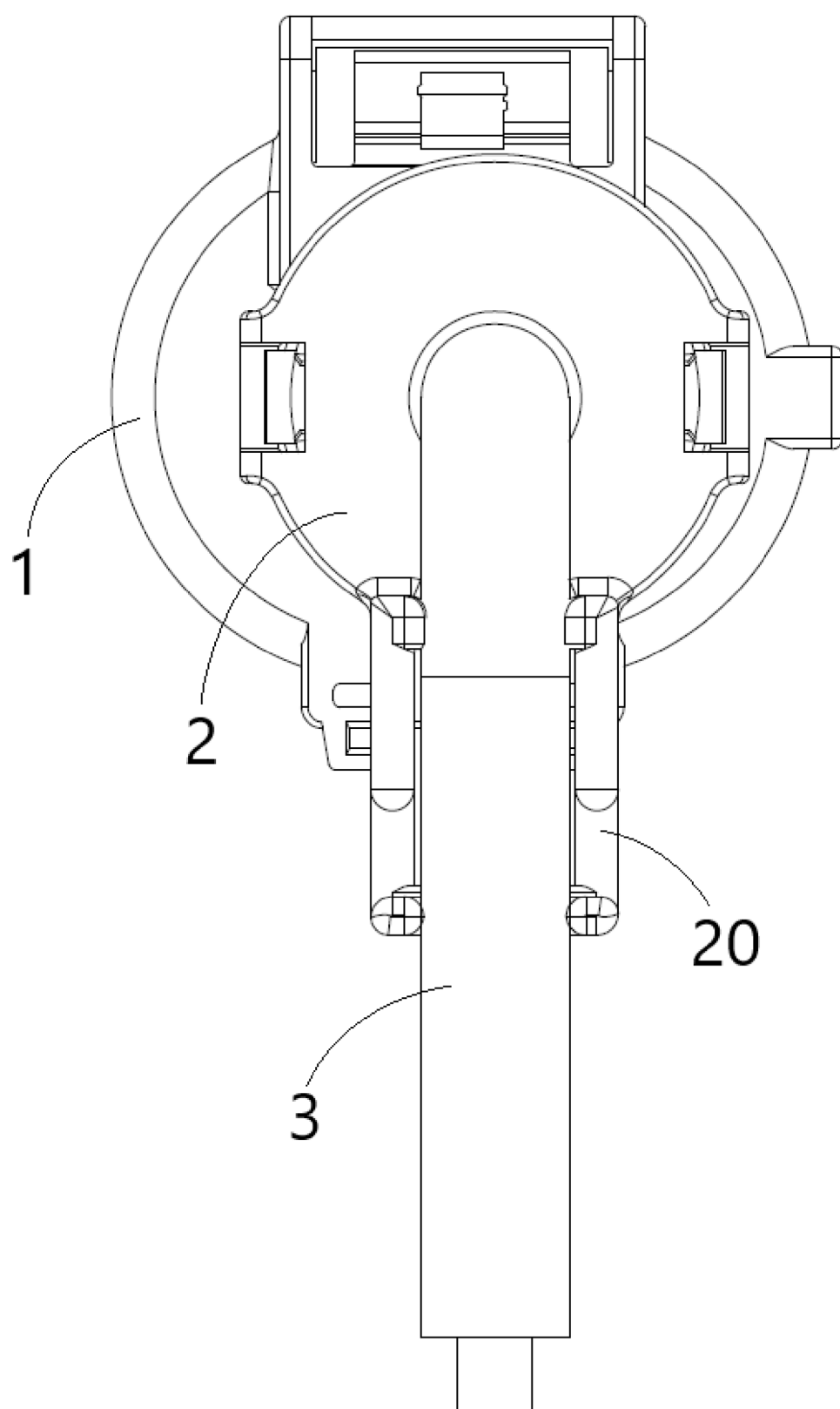


Fig.8

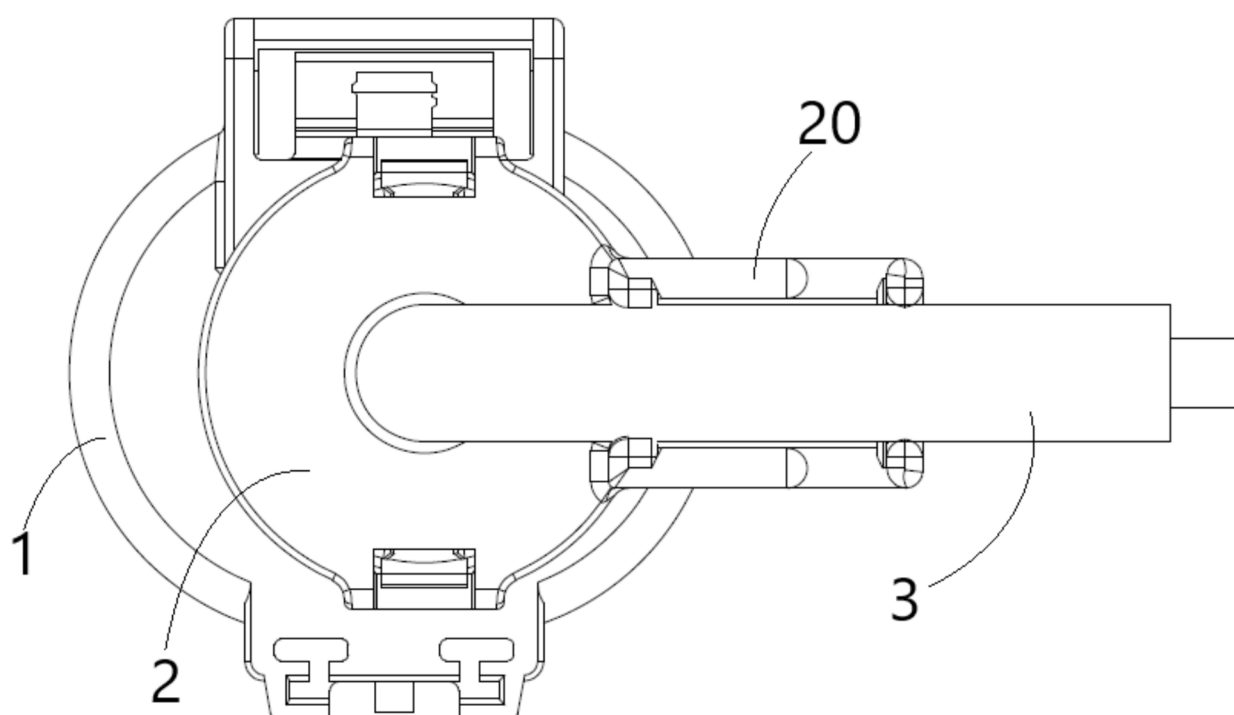


Fig.9



EUROPEAN SEARCH REPORT

Application Number

EP 26 15 0051

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	US 2020/406838 A1 (MENEZ FRÉDÉRIC [FR] ET AL) 31 December 2020 (2020-12-31)	1-8, 10-14	INV. H01R13/506
Y	* paragraph [0036] - paragraph [0050]; figures 1,2,5 *	15	H01R13/58
X	US 2017/077640 A1 (DIESSEL THORSTEN [DE] ET AL) 16 March 2017 (2017-03-16)	1-9, 11-13	ADD. H01R13/52 H01R13/56
Y	* paragraph [0002] - paragraph [0110]; figures 1A,1B, 2,3A,5A, 5B *	15	
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Y	* paragraph [0013] - paragraph [0018]; figures 1,2,6,7,9 *	15	
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