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

(11) **EP 4 117 125 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
11.01.2023 Bulletin 2023/02

(21) Application number: **20922843.6**

(22) Date of filing: **03.06.2020**

(51) International Patent Classification (IPC):
H01R 13/66 *(2006.01)* ***H01R 13/73*** *(2006.01)*
H01R 27/00 *(2006.01)* ***H01R 31/06*** *(2006.01)*
F25D 23/00 *(2006.01)* ***F25D 29/00*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
H01R 31/065; F25D 29/005; H01R 13/6683;
H01R 24/30; H01R 2103/00

(86) International application number:
PCT/CN2020/094085

(87) International publication number:
WO 2021/174703 (10.09.2021 Gazette 2021/36)

(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: **02.03.2020 CN 202010134150**

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(54) POWER LINE DEVICE AND HOUSEHOLD APPLIANCE

(57) The present invention provides a power supply line device and a household appliance. The power supply line device is used to power the household appliance. The power supply line device comprises a line body, a plug disposed at one end of the line body, and a line body fixing structure disposed at the other end of the line body away from the plug, the line body fixing structure being used to fix the line body to the household appliance, wherein the power supply line device further comprises an environmental parameter identifier which is used to collect environmental parameters outside the household appliance. The household appliance comprises the power supply line device. The power supply line device and the household appliance are not only simple in structure, but also collect more accurate environmental parameters.

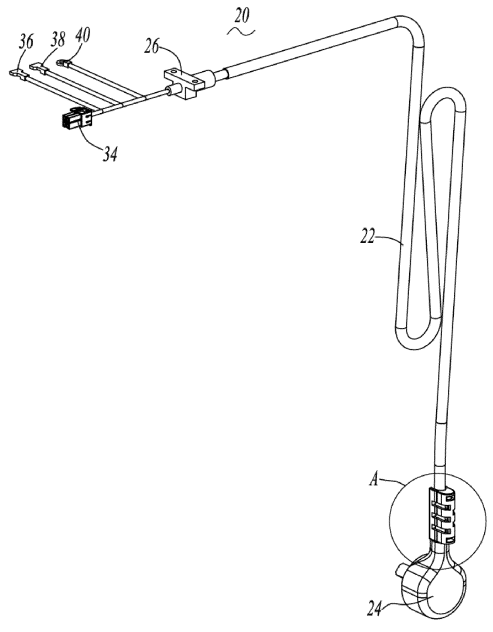

FIG. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to a power supply line device and a household appliance.

BACKGROUND

[0002] A refrigerator comprises a cabinet and a door for operably opening/closing the cabinet, the cabinet is provided with a temperature sensor for sensing an ambient temperature, the ambient temperature sensed by the temperature sensor is transferred to a control system, then the control system transfers a corresponding control instruction to a refrigeration system according to the ambient temperature, and the refrigeration system performs corresponding refrigeration according to a different control instruction. Usually, a signal line needs to be separately led out from the interior of the cabinet, and the temperature sensor is connected to an end of the signal line and disposed on the cabinet. Such an arrangement makes the structure very complicated, and the installation inconvenient. Furthermore, as being affected by the cabinet, the temperature sensed by the temperature sensor is not close to the ambient temperature, so that the control of the refrigeration of the refrigerator cannot be regulated completely according to the ambient temperature such that the refrigerator is not energy-saving enough.

SUMMARY

[0003] An object of the present invention is to provide a power supply line device and a household appliance, which are not only simple in structure, but also collect more accurate environmental parameters.

[0004] To achieve one of the above objects, an embodiment of the present invention provides a power supply line device for powering a household appliance. The power supply line device comprises a line body, a plug disposed at one end of the line body, and a line body fixing structure disposed at the other end of the line body away from the plug, wherein the line body fixing structure is used to fix the line body to the household appliance, wherein the power supply line device further comprises an environmental parameter identifier which is used to collect environmental parameters outside the household appliance.

[0005] As a further improvement of the embodiment of the present invention, the environmental parameter identifier is disposed on the line body.

[0006] As a further improvement of the embodiment of the present invention, the environmental parameter identifier is disposed adjacent to the plug.

[0007] As a further improvement of the embodiment of the present invention, the environmental parameter identifier is disposed adjacent to the line body fixing structure.

[0008] As a further improvement of the embodiment of the present invention, the environmental parameter identifier is detachably disposed on the line body.

[0009] As a further improvement of the embodiment of the present invention, the line body is provided with an accommodating space, and the line body is provided with a signal interface; when the environmental parameter identifier is mounted in the accommodating space, the environmental parameter identifier is interfaced with the signal interface to perform signal transmission.

[0010] As a further improvement of the embodiment of the present invention, the power supply line device further comprises a signal line, an end of the signal line is provided with the environmental parameter identifier, and the signal line is connected to the line body fixing structure.

[0011] As a further improvement of the embodiment of the present invention, the environmental parameter identifier comprises a temperature sensor.

[0012] As a further improvement of the embodiment of the present invention, the environmental parameter identifier comprises a humidity sensor.

[0013] To achieve one of the above objects, an embodiment of the present invention further provides a household appliance comprising a cabinet and the power supply line device according to any of the above technical solutions, the line body fixing structure is fixed to the cabinet, and the environmental parameter identifier is located outside the cabinet.

[0014] As compared with the prior art, the present invention has the following advantageous effects: since the power supply line device for power supply is provided with the environmental parameter identifier which may collect environmental parameters such as ambient temperature and/or ambient humidity, it is unnecessary to separately provide corresponding signal lines and the environmental parameter identifier and mounting structures, which makes the structure simpler and convenient to mount. In addition, the collected environmental parameters are more accurate.

[0015] An object of the present invention is to further provide a power supply line device and a household appliance, which are not only simple in structure, but also collect more accurate environmental parameters.

[0016] To achieve one of the above objects, an embodiment of the present invention provides a power supply line device for powering a household appliance. The power supply line device comprises a line body, a plug disposed at one end of the line body, and a line body fixing structure disposed at the other end of the line body away from the plug, wherein the line body fixing structure is used to fix the line body to the household appliance, wherein the power supply line device further comprises an environmental parameter identifier which is disposed undetachably and used to collect environmental parameters outside the household appliance.

[0017] As a further improvement of the embodiment of the present invention, the line body comprises a power

supply lead wire and a protective sleeve wrapping the power supply lead wire, and the environmental parameter identifier is wrapped in the protective sleeve.

[0018] As a further improvement of the embodiment of the present invention, the environmental parameter identifier is disposed adjacent to the plug.

[0019] As a further improvement of the embodiment of the present invention, the environmental parameter identifier is disposed adjacent to the line body fixing structure.

[0020] As a further improvement of the embodiment of the present invention, the power supply line device further comprises a signal line, an end of the signal line is provided with the environmental parameter identifier, and the signal line is connected to the line body fixing structure.

[0021] As a further improvement of the embodiment of the present invention, a seat body is disposed at an end of the signal line, the environmental parameter identifier is fixedly disposed on the seat body, and the seat body is fixed on the household appliance.

[0022] As a further improvement of the embodiment of the present invention, the environmental parameter identifier comprises a temperature sensor and/or a humidity sensor.

[0023] To achieve one of the above objects, another embodiment of the present invention further provides a household appliance comprising a cabinet and a power supply line device for powering the household appliance, the power supply line device comprises a line body, a plug disposed at one end of the line body, and a line body fixing structure disposed at the other end of the line body away from the plug, wherein the line body fixing structure is used to fix the line body to the household appliance, wherein the power supply line device further comprises an environmental parameter identifier which is disposed undetachably and used to collect environmental parameters outside the household appliance.

[0024] As a further improvement of the embodiment of the present invention, the line body comprises a power supply lead wire and a protective sleeve wrapping the power supply lead wire, and the environmental parameter identifier is wrapped in the protective sleeve.

[0025] As a further improvement of the embodiment of the present invention, the power supply line device further comprises a signal line, an end of the signal line is provided with the environmental parameter identifier, and the signal line is connected to the line body fixing structure and extends into the cabinet.

[0026] As compared with the prior art, the present invention has the following advantageous effects: since the power supply line device for power supply is provided with the environmental parameter identifier which may collect environmental parameters such as ambient temperature and/or ambient humidity, it is unnecessary to separately provide corresponding signal lines and environmental parameter identifier and mounting structures, which makes the structure simpler and convenient to mount. In addition, the collected environmental parameters are more accurate.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027]

FIG. 1 is a perspective view of a power supply line device in a first embodiment of the present invention;
FIG. 2 is a front view of the power supply line device in FIG. 1;
FIG. 3 is a partially-enlarged view of location A in FIG. 1;
FIG. 4 is a partially-enlarged view of location B in FIG. 2;
FIG. 5 is a top view of the power supply line device in FIG. 1;
FIG. 6 is a perspective view of a power supply line device in a second embodiment of the present invention;
FIG. 7 is a front view of the power supply line device in FIG. 6;
FIG. 8 is a perspective view of a power supply line device in a third embodiment of the present invention;
FIG. 9 is a front view of the power supply line device in FIG. 8;
FIG. 10 is a perspective view of a power supply line device in a fourth embodiment of the present invention;
FIG. 11 is a front view of the power supply line device in FIG. 10;
FIG. 12 is a perspective view of a power supply line device in a fifth embodiment of the present invention;
FIG. 13 is a front view of the power supply line device in FIG. 12;
FIG. 14 is a perspective view of a power supply line device in a sixth embodiment of the present invention;
FIG. 15 is a partially-enlarged view of location C in FIG. 14;
FIG. 16 is a left view of the power supply line device of FIG. 14.

DETAILED DESCRIPTION

[0028] The present invention will be described in detail in conjunction with embodiments shown in the figures. However, the embodiments are not intended to limit the present invention. Structural, methodogical or function variations made by those having ordinary skill in the art according to these embodiments are all comprised in the protection scope of the present invention.

[0029] In the description of specific embodiments of the present invention, terms indicating orientational or positional relationship such as "up", "down", "front", "rear", "left", "right", "vertical", "horizontal", "bottom", "in" and "out" is orientational or positional relationship based on what is shown in the figures, or the terms are used to

describe mutual positional relationship of components in the vertical, perpendicular or gravitational direction, and the vertical direction refers to the up-down direction of the paper shown in the figures; "in" and "out" usually refer to the inside and outside of the cavity relative to the cavity.

[0030] As shown in FIG. 1 through FIG. 5, a first embodiment of the present invention discloses a household appliance, and the household appliance in the present embodiment may be any household appliance that needs a power supply line device 20, for example, a refrigerator, a freezer, a washing machine, an air conditioner, microwave or oven etc. Preferably, the household appliance is any type of smart/intelligent household appliance. Specifically, the household appliance is a refrigerator in the present embodiment.

[0031] The household appliance comprises a cabinet having a chamber, and the chamber may be divided into different numbers of compartments as needed. The present invention further discloses a power supply line device 20 for powering the household appliance. One end of the power supply line device 20 extends into the cabinet, and the other end of the power supply line device 20 is connected to an external power supply.

[0032] The power supply line device 20 comprises a line body 22, a plug 24 disposed at one end of the line body 22, and a line body fixing structure 26 disposed at the other end of the line body 22 away from the plug 24, wherein the line body fixing structure 26 is used to fix the line body 22 to the household appliance. Specifically, the line body fixing structure 26 is used to fix the line body 22 to the cabinet of the household appliance.

[0033] The power supply line device 20 further comprises an environmental parameter identifier 28 which is used to collect environmental parameters outside the household appliance. The refrigerator further comprises a control system and a refrigeration system connected with the control system. The environmental parameters collected by the environmental parameter identifier 28 are transmitted to the control system, and the control system receives and analyzes the environmental parameters, and then generates corresponding control instructions according to different environmental parameters. The above control instructions are transmitted to the refrigeration system, and the refrigeration system performs corresponding refrigeration or other operations according to different control instructions.

[0034] In the preferred embodiment, since the power supply line device 20 for power supply is provided with the environmental parameter identifier 28 which may collect environmental parameters such as ambient temperature and/or ambient humidity, it is unnecessary to separately provide corresponding signal lines and the environmental parameter identifier 28 and corresponding mounting structures, which makes the structure simpler and convenient to mount. In addition, the environmental parameter identifier 28 is not affected by the temperature of the cabinet, and the collected environmental parameters really reflect the environment outside the cabinet, so that the collected environmental parameters are more accurate. As a result, the control system can perform specific control better according to the external environment.

[0035] The line body fixing structure 26 is fixed to the cabinet, and the environmental parameter identifier 28 is located outside the cabinet. Usually, a fixing hole is provided on the cabinet, and the line body 22 passes through the fixing hole. In order to make the affixation of the line body 22 firmer, part of the line body fixing structure 26 may extend into the fixing hole. Certainly, the line body fixing structure 26 may also be arranged to be completely located outside the fixing hole. A detachable fastening structure such as a bolt may be used to fix the line body fixing structure 26 to the cabinet. Certainly, the line body fixing structure 26 may also be adhered to the outside of the cabinet by using an adhesive. The term "detachable" usually means detaching a corresponding structure with or without a tool without damaging the component.

[0036] Furthermore, the environmental parameter identifier 28 is disposed on the line body 22. Specifically, the environmental parameter identifier 28 is disposed adjacent to the plug 24. Such an arrangement makes the environmental parameter identifier 28 farther away from the cabinet, and the collected environmental parameters are more accurate. The environmental parameter identifier 28 comprises a temperature sensor and/or a humidity sensor. That is to say, the environmental parameter identifier 28 may be configured to include only one sensor for collecting one parameter, or configured to include a plurality of sensors for collecting two or more parameters.

[0037] The environmental parameter identifier 28 is detachably disposed on the line body 22. Certainly, the environmental parameter identifier 28 may also be integrally integrated into the power supply line device 20, i.e., the environmental parameter identifier 28 is set to be non-detachable, which will be described in detail in the following embodiments. Here, the term "non-detachable" here means that the environmental parameter identifier 28 cannot be detached with or without a tool without damaging the power supply line device 20, that is to say, the power supply line device 20 must be damaged if the environmental parameter identifier 28 is detached.

[0038] The line body 22 is provided with an accommodating space, and the environmental parameter identifier 28 is accommodated in the accommodating space. Furthermore, the line body 22 is provided with a signal interface. When the environmental parameter identifier 28 is mounted in the accommodating space, the environmental parameter identifier 28 is interfaced with the signal interface to perform signal transmission. Furthermore, for the sake of safety and reliability, the line body 22 is provided with a cover body 30 for at least partially covering the environmental parameter identifier 28. The cover body 30 can be opened when the environmental parameter identifier 28 needs to be replaced, and the cover body 30 may cover the environmental parameter

identifier 28 again after the replacement of the environmental parameter identifier 28 is completed. In the preferred embodiment, when the cover body 30 is opened, the cover body 30 is completely detached from the line body 22, that is, the cover body 30 is completely separated from the line body 22. After the environmental parameter identifier 28 is replaced duly, the cover body 30 may be mounted on the line body 22 again. Certainly, the cover body 30 may also be configured in a way that the cover body 30 is not separated from the line body 22 when the cover body 30 is opened, the cover body 30 has an open state and a closed state, and the cover body 30 may be operated to be movable between the open state and the closed state. When the cover body 30 is moved to the open state, the environmental parameter identifier 28 may be replaced. After the replacement is completed, the cover body 30 may be operated to move to the closed state. Preferably, the cover body 30 may be operatively rotated between the open state and the closed state, to achieve the transition between the open state and the closed state.

[0039] Furthermore, the cover body 30 is snap-connected to the line body 22, the cover body 30 is an injection-molded member, the cover body 30 has a raised snap-fitting portion, and the cover body 30 is snap-fitted to the line body 22 by utilizing certain elasticity of the cover body 30 as the injection-molded member. In addition, in order to make the environmental parameter identifier 28 more sensitive and the collected parameters more accurate, the cover body 30 is provided with a plurality of through holes 32. Specifically, the plurality of through holes 32 are arranged at an interval in an extension direction of the line body 22.

[0040] The power supply line device 20 further comprises a signal connector 34, the signal connector 34 and the environmental parameter identifier 28 are located on both sides of the line body fixing structure 26, the environmental parameter identifier 28 is electrically connected to the signal connector 34, and the signal connector 34 is pluggably connected to the control system. The power supply line device 20 further comprises a positive terminal 36, a negative terminal 38 and a neutral terminal 40.

[0041] FIG. 6 to FIG. 7 illustrate a second embodiment of the present invention. The second embodiment differs from the first embodiment in the specific position of an environmental parameter identifier 42.

[0042] In the embodiment, the environmental parameter identifier 42 is disposed adjacent to a line body fixing structure 44. The environmental parameter identifier 42 is also detachably disposed on a line body 46, and provided with a cover body 48 covering the environmental parameter identifier. The fixing manner of the cover body 48 is the same as the fixing manner in the first embodiment, and will not be described in detail any more here.

[0043] As shown in FIG. 8 to FIG. 9, a third embodiment of the present invention is different from the first embodiment in that the environmental parameter identifier 50 is set to be non-detachable.

[0044] In this embodiment, the environmental parameter identifier 50 is set to be non-detachable, i.e., the environmental parameter identifier 50 cannot be detached without damaging all the parts.

[0045] Specifically, the line body 52 comprises a power supply lead wire and a protective sleeve wrapping the power supply lead wire, and the environmental parameter identifier 50 is wrapped in the protective sleeve. The protective sleeve extends in an extension direction of the power supply lead wire and completely wraps the power supply lead wire, so the environmental parameter identifier 50 cannot be detached. Furthermore, the environmental parameter identifier 50 is disposed adjacent to the plug 54. Other configurations are the same as those in the first embodiment, and will not be described in detail any more here.

[0046] FIG. 10 to FIG. 11 illustrate a fourth embodiment of the present invention. The fourth embodiment is the same as the third embodiment in that the environmental parameter identifier 56 is also set to be non-detachable, and the environmental parameter identifier 56 is wrapped in the protective sleeve. The fourth embodiment differs from the third embodiment in the specific position of the environmental parameter identifier 56. In the embodiment, the environmental parameter identifier 56 is disposed adjacent to the line body fixing structure 58.

[0047] FIG. 12 to FIG. 13 illustrate a fifth embodiment of the present invention. In the embodiment, the power supply line device further comprises a signal line 60, an end of the signal line 60 is provided with an environmental parameter identifier 62, and the signal line 60 is connected to the line body fixing structure 64, and the signal line 60 extends in the cabinet. In addition, the signal wire 60 and the line body 66 pass through the same end of the line body fixing structure 64, and then pass through the line body fixing structure 64 out of the other end of the line body fixing structure 64 and are integrated together.

[0048] The environmental parameter identifier 62 may be set to be detachable or non-detachable. In this embodiment, a seat body 68 is disposed at an end of the signal line 60, the environmental parameter identifier 62 is fixedly disposed on the seat body 68, and the seat body 68 is fixed on the household appliance. Specifically, the environmental parameter identifier 62 is integrally integrated into the seat body 68 and cannot be detached. Additionally, the environmental parameter identifier 62 comprises a temperature sensor for collecting an ambient temperature. Certainly, the environmental parameter identifier 62 may also be configured to comprise a humidity sensor for collecting environmental humidity.

[0049] The seat body 68 is detachably fixed to the household appliance by using a fastener such as a bolt, and the seat body 68 may be fixed to different positions on the outside the household appliance according to specific needs. Certainly, the seat body 68 may also be fixed on the household appliance by adhesion with an adhesive.

[0050] FIG. 14 through FIG. 16 illustrate a sixth embodiment of the present invention. The sixth embodiment differs from the fifth embodiment in that in this embodiment, an environmental parameter identifier 70 comprises both a temperature sensor 72 as well as a humidity sensor 74. Other configurations are the same as those in the fifth embodiment, and will not be described in detail any more here.

[0051] It should be understood that although the description is described according to the embodiments, not every embodiment only comprises one independent technical solution, that such a description manner is only for the sake of clarity, that those skilled in the art should take the description as an integral part, and that the technical solutions in the embodiments may be suitably combined to form other embodiments understandable by those skilled in the art.

[0052] The detailed descriptions set forth above are merely specific illustrations of feasible embodiments of the present invention, and are not intended to limit the scope of protection of the present invention. All equivalent embodiments or modifications that do not depart from the art spirit of the present invention should fall within the scope of protection of the present invention.

Claims

1. A power supply line device for powering a household appliance, the power supply line device comprising a line body, a plug disposed at one end of the line body, and a line body fixing structure disposed at the other end of the line body away from the plug, the line body fixing structure being used to fix the line body to the household appliance, wherein the power supply line device further comprises an environmental parameter identifier which is used to collect environmental parameters outside the household appliance.

2. The power supply line device according to claim 1, wherein the environmental parameter identifier is disposed on the line body.

3. The power supply line device according to claim 2, wherein the environmental parameter identifier is disposed adjacent to the plug.

4. The power supply line device according to claim 2, wherein the environmental parameter identifier is disposed adjacent to the line body fixing structure.

5. The power supply line device according to claim 2, wherein the environmental parameter identifier is detachably disposed on the line body.

6. The power supply line device according to claim 5, wherein the line body is provided with an accommodating space, and the line body is provided with a signal interface; when the environmental parameter identifier is mounted in the accommodating space, the environmental parameter identifier is interfaced with the signal interface to perform signal transmission.

7. The power supply line device according to claim 1, the power supply line device further comprises a signal line, an end of the signal line is provided with the environmental parameter identifier, and the signal line is connected to the line body fixing structure.

8. The power supply line device according to claim 1, wherein the environmental parameter identifier comprises a temperature sensor.

9. The power supply line device according to claim 1, wherein the environmental parameter identifier comprises a humidity sensor.

10. A household appliance, wherein the household comprising a cabinet and the power supply line device according to any of claims 1-9, the line body fixing structure is fixed to the cabinet, and the environmental parameter identifier is located outside the cabinet.

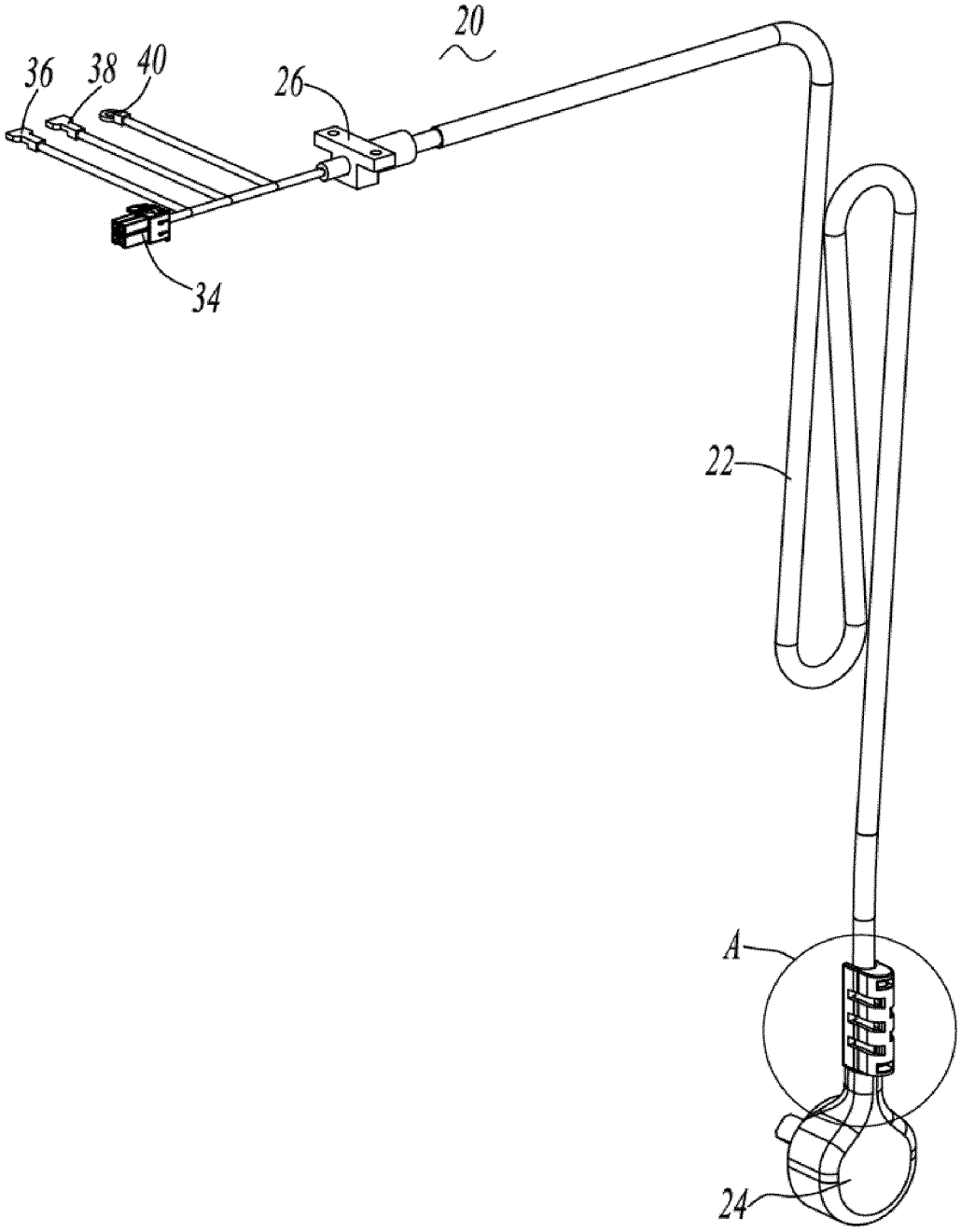

FIG. 1

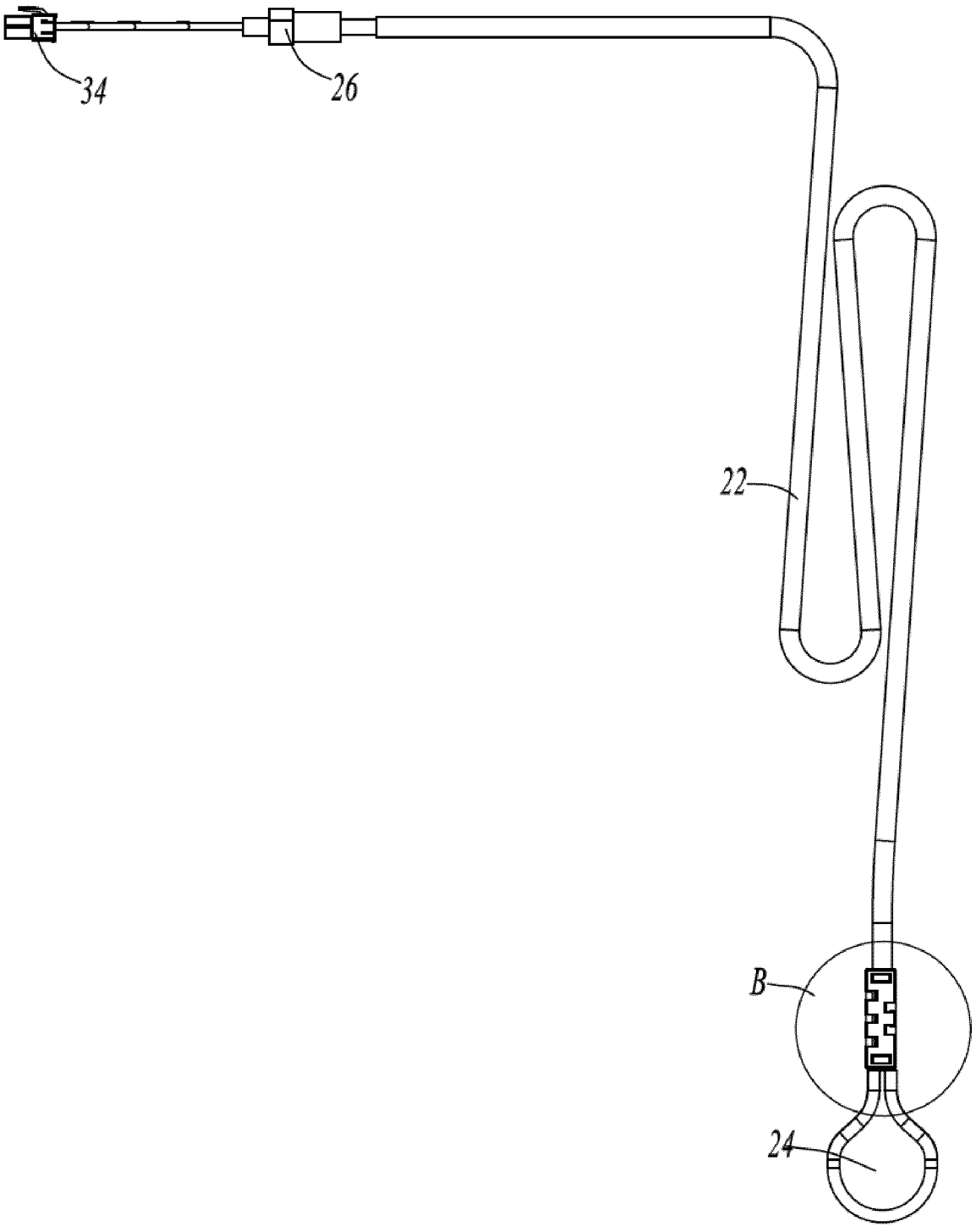

FIG. 2

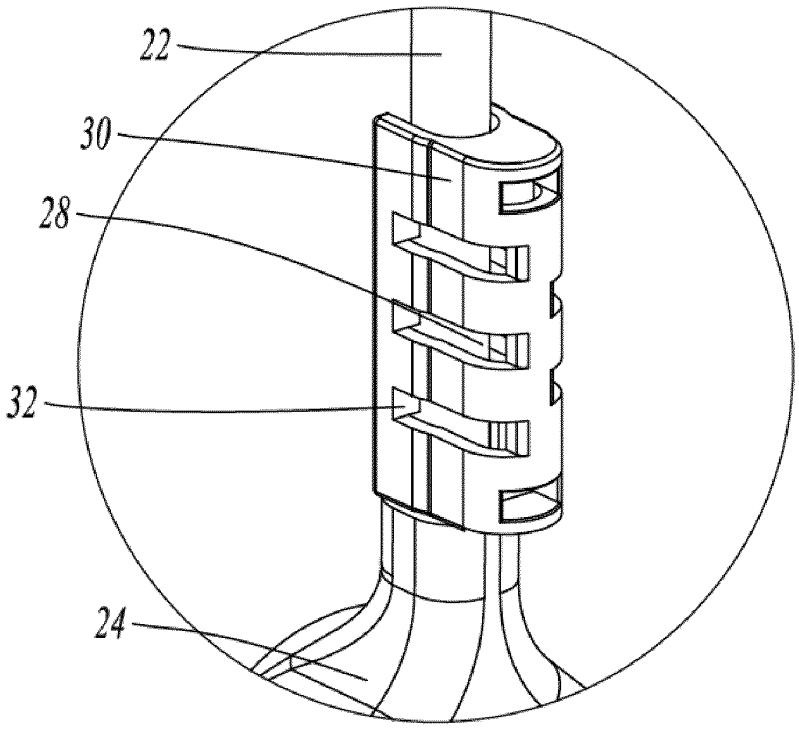

FIG. 3

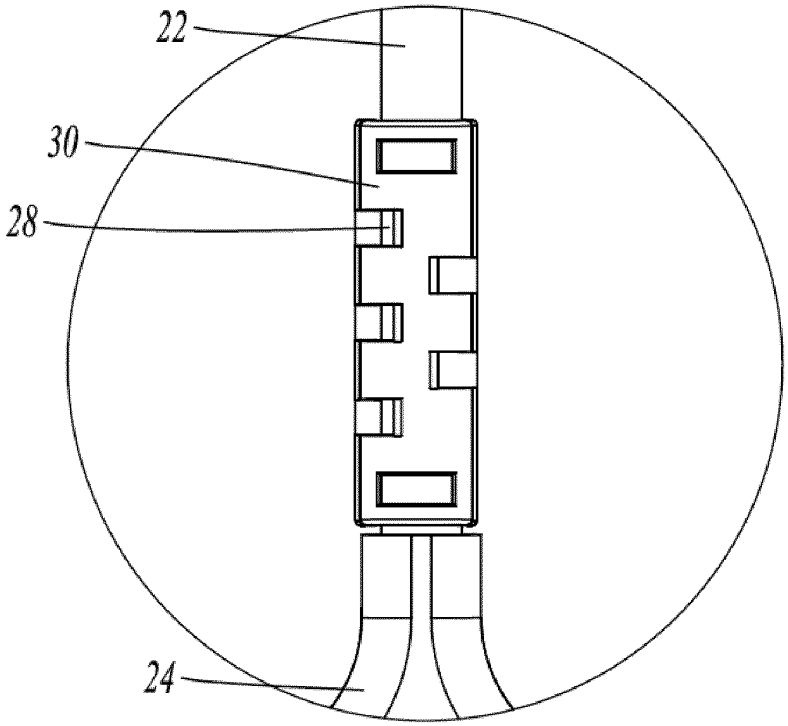

FIG. 4

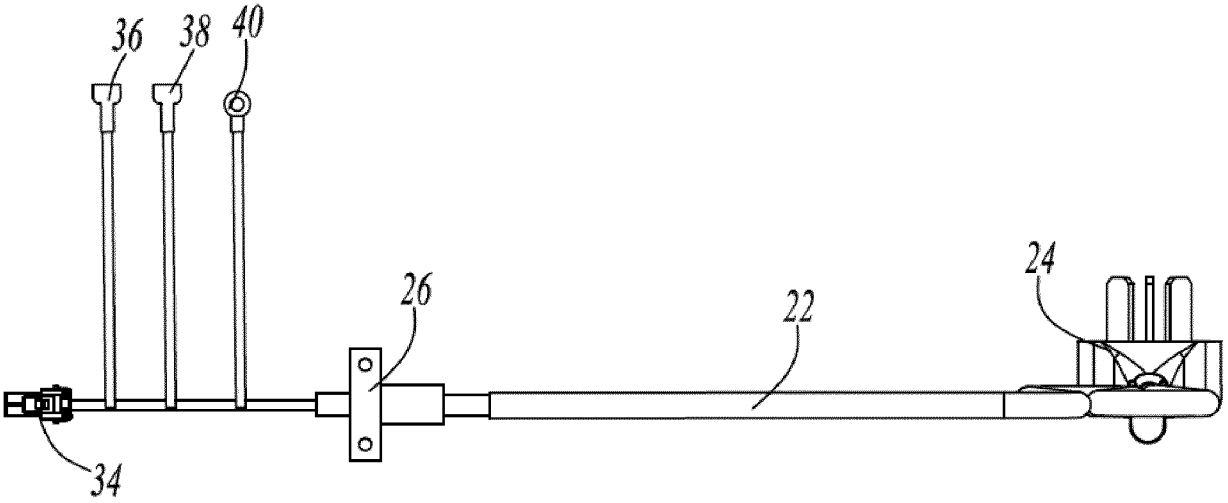

FIG. 5

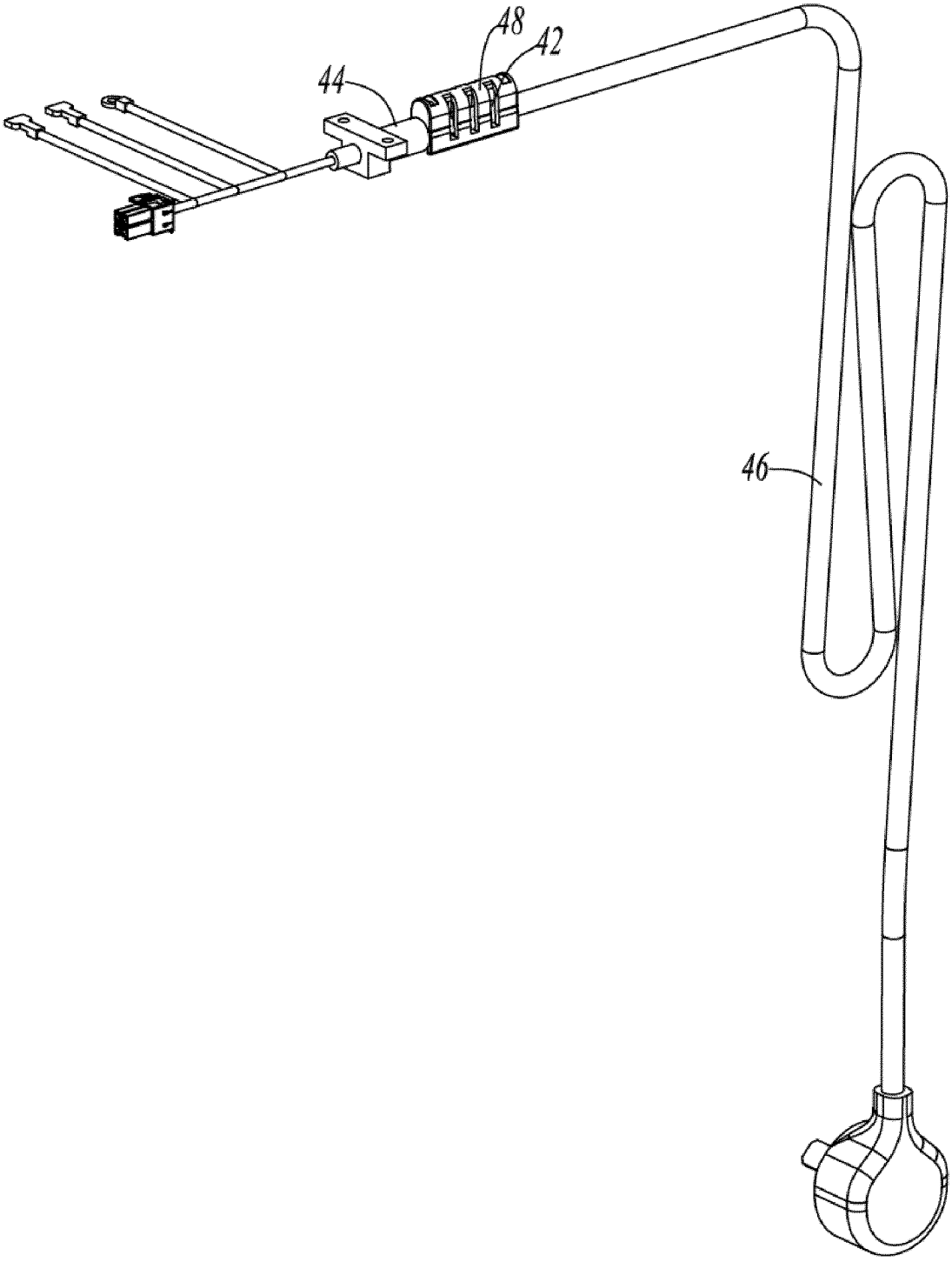

FIG. 6

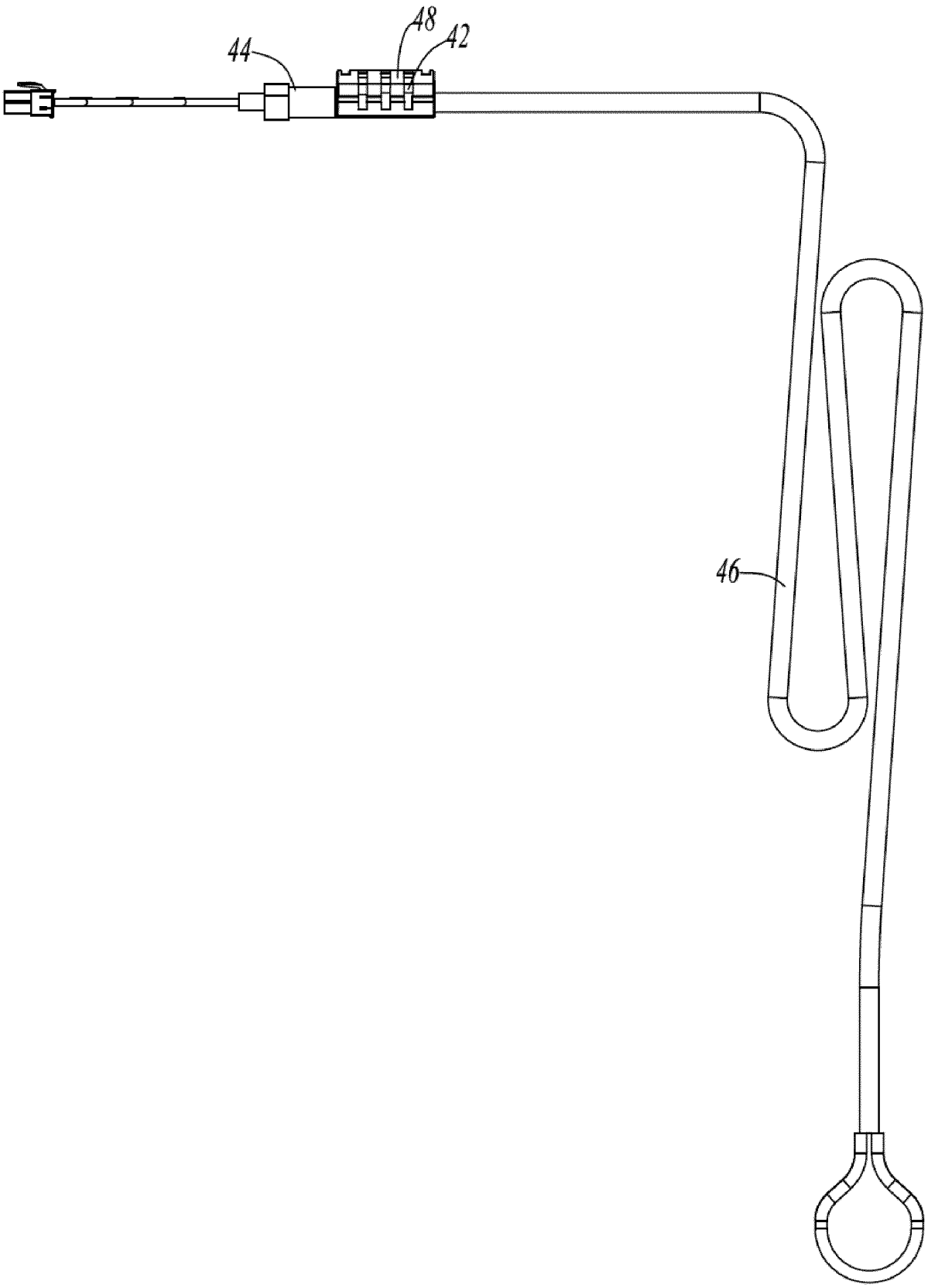

FIG. 7

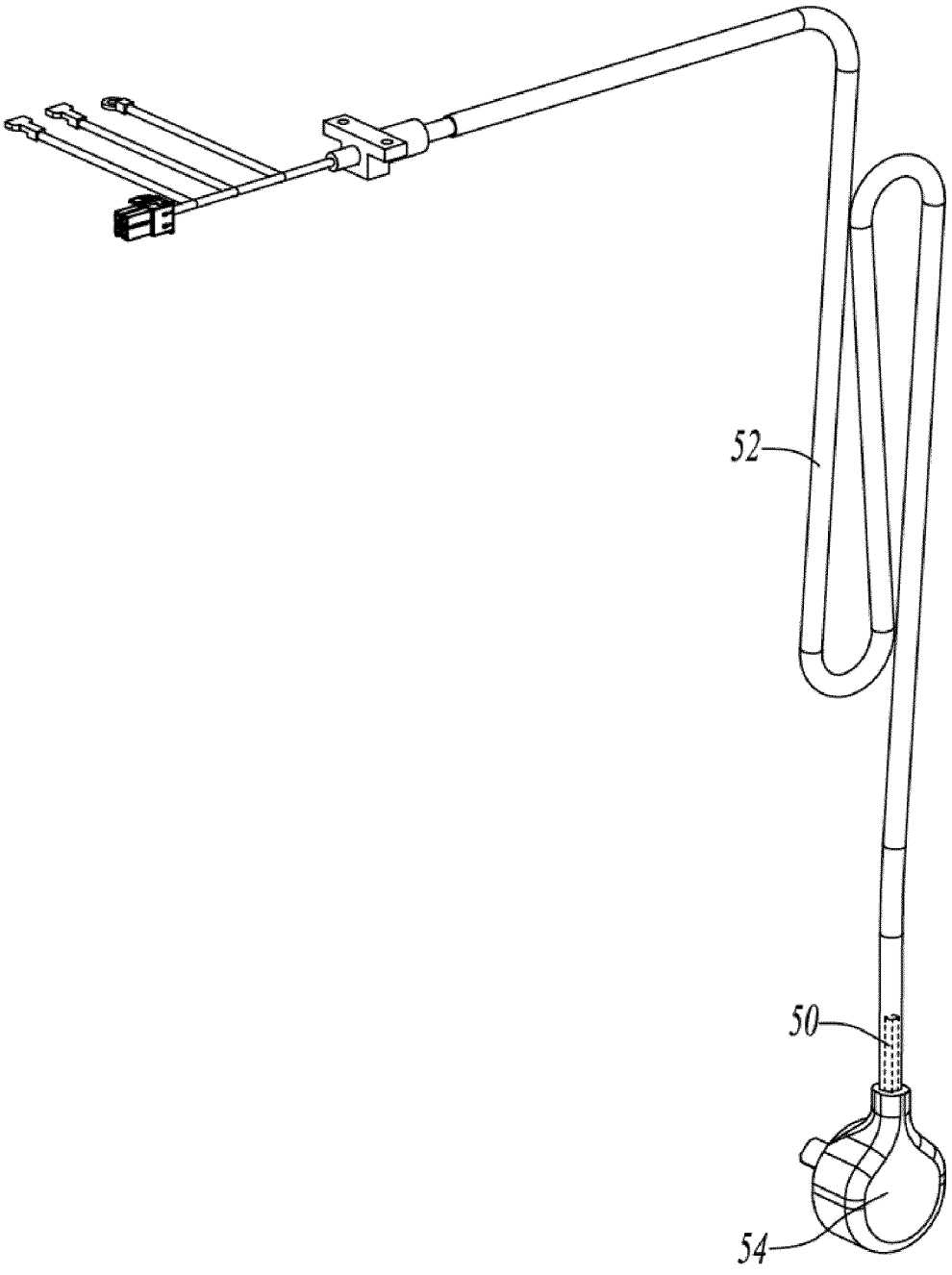

FIG. 8

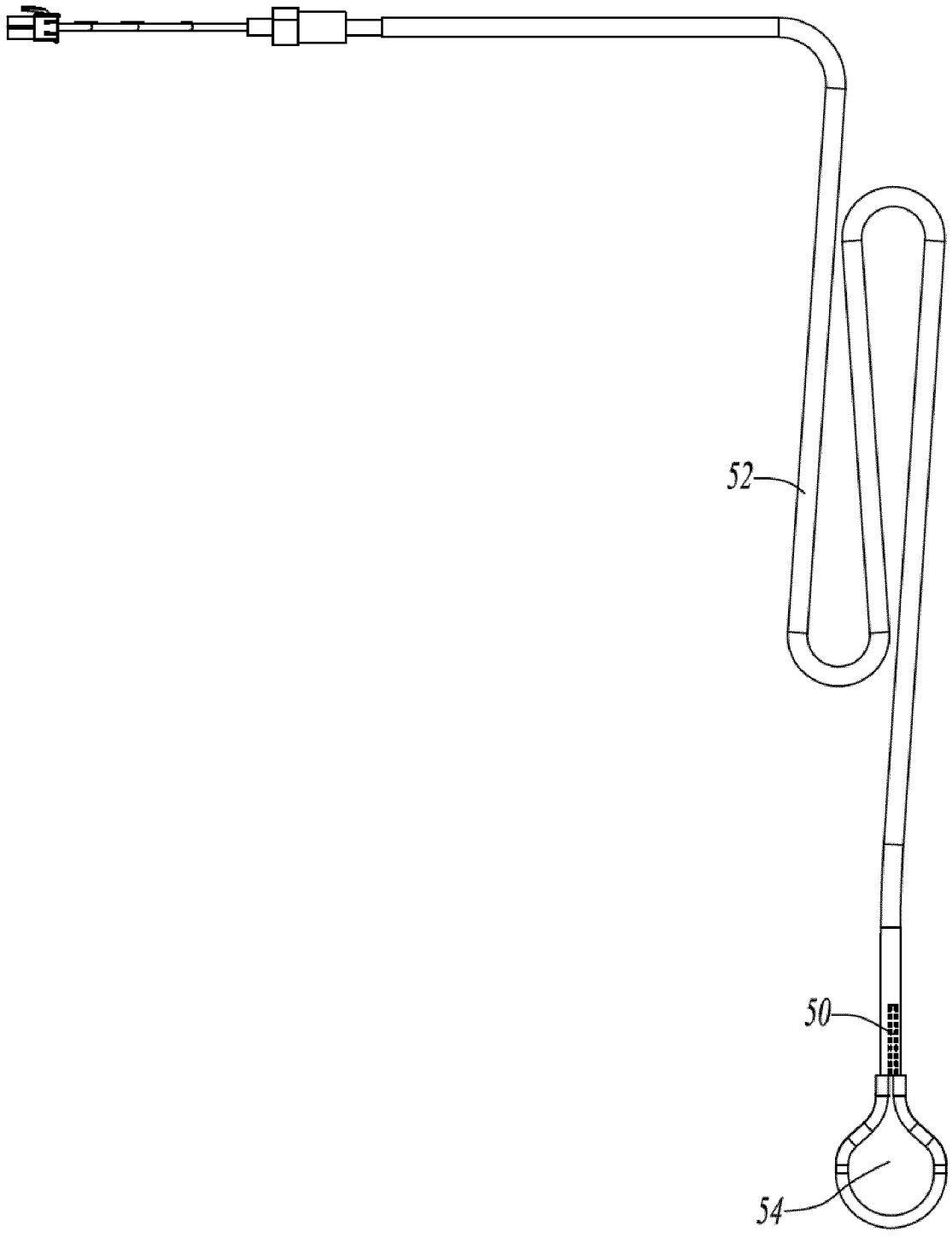

FIG. 9

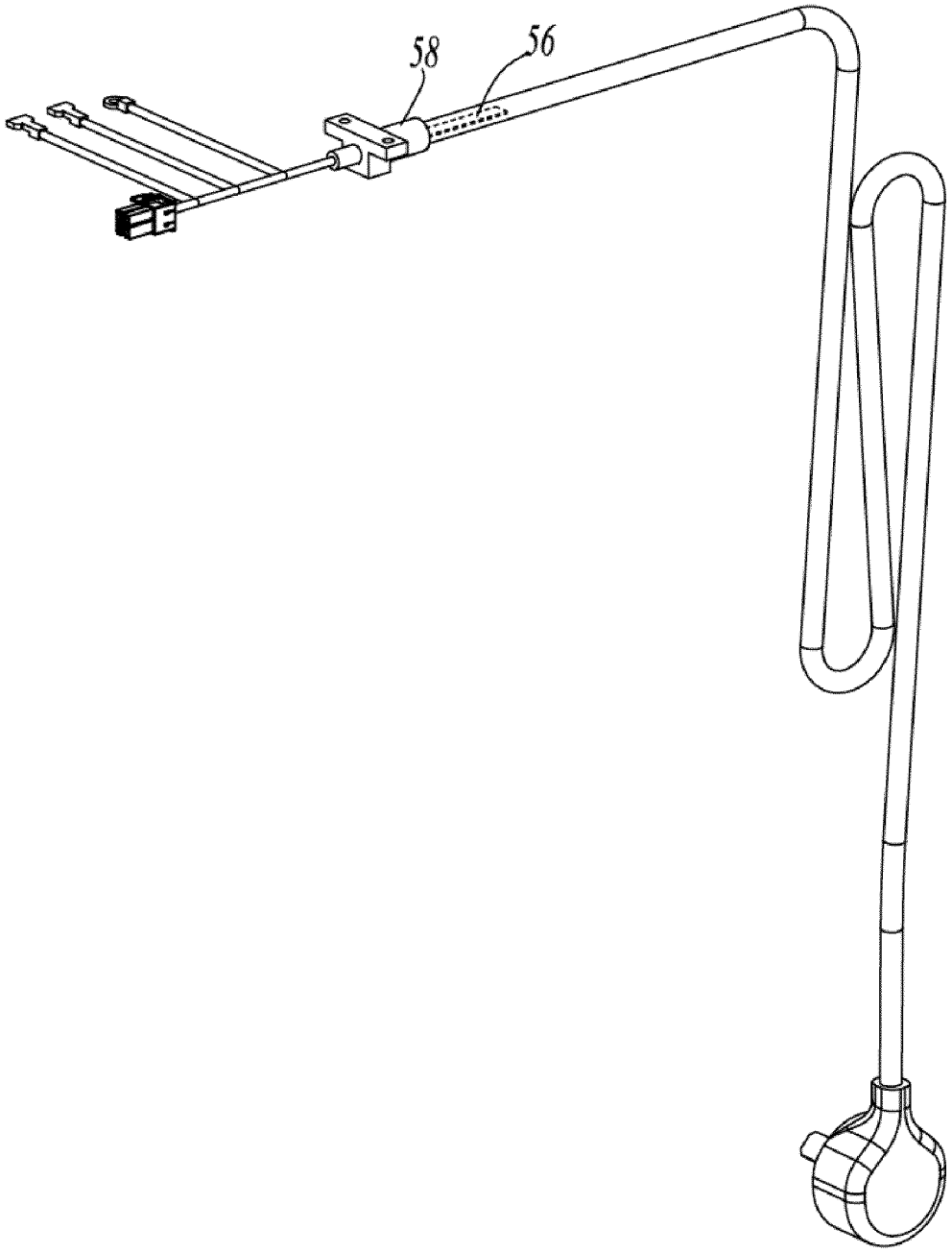

FIG. 10

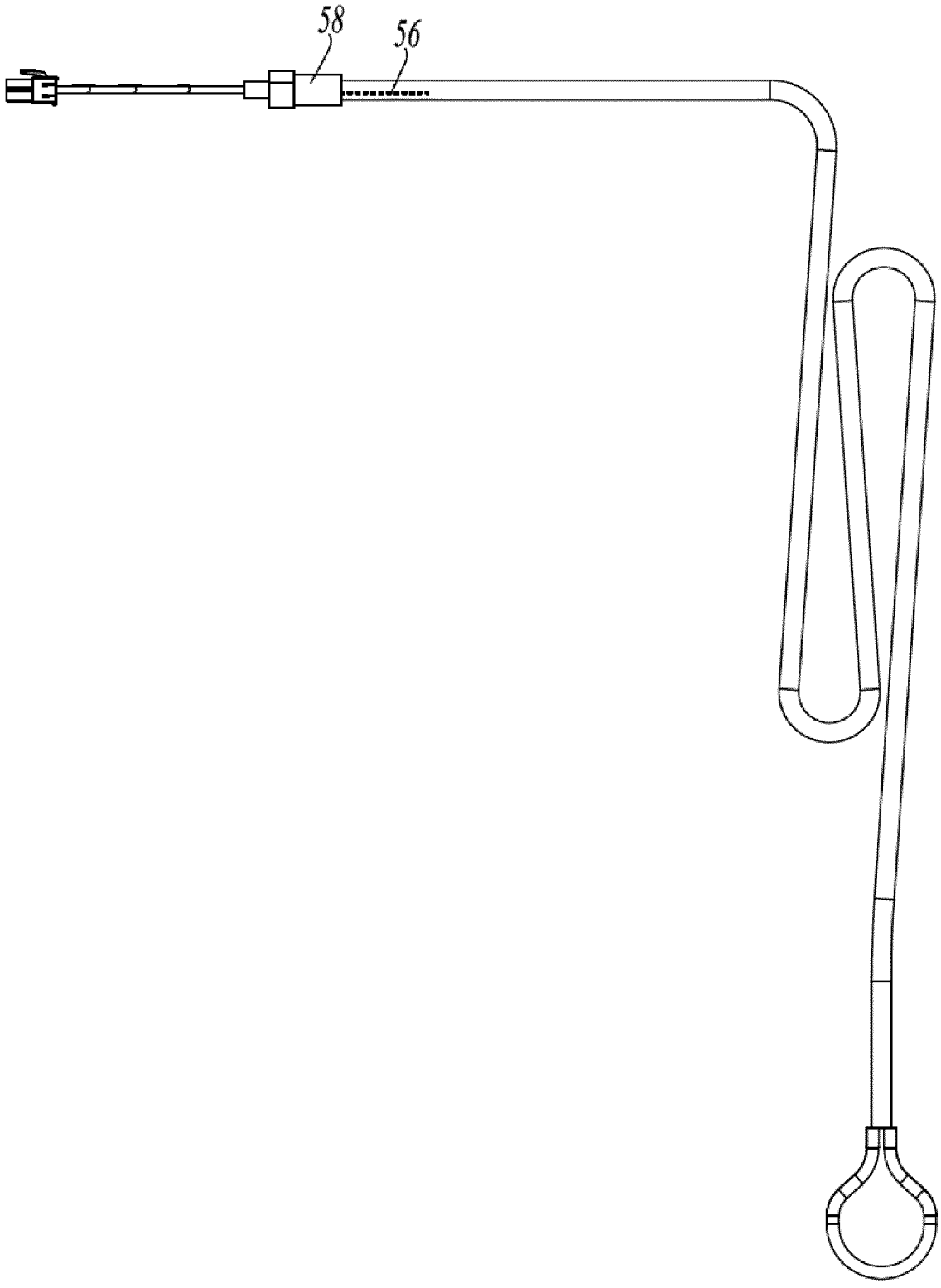

FIG. 11

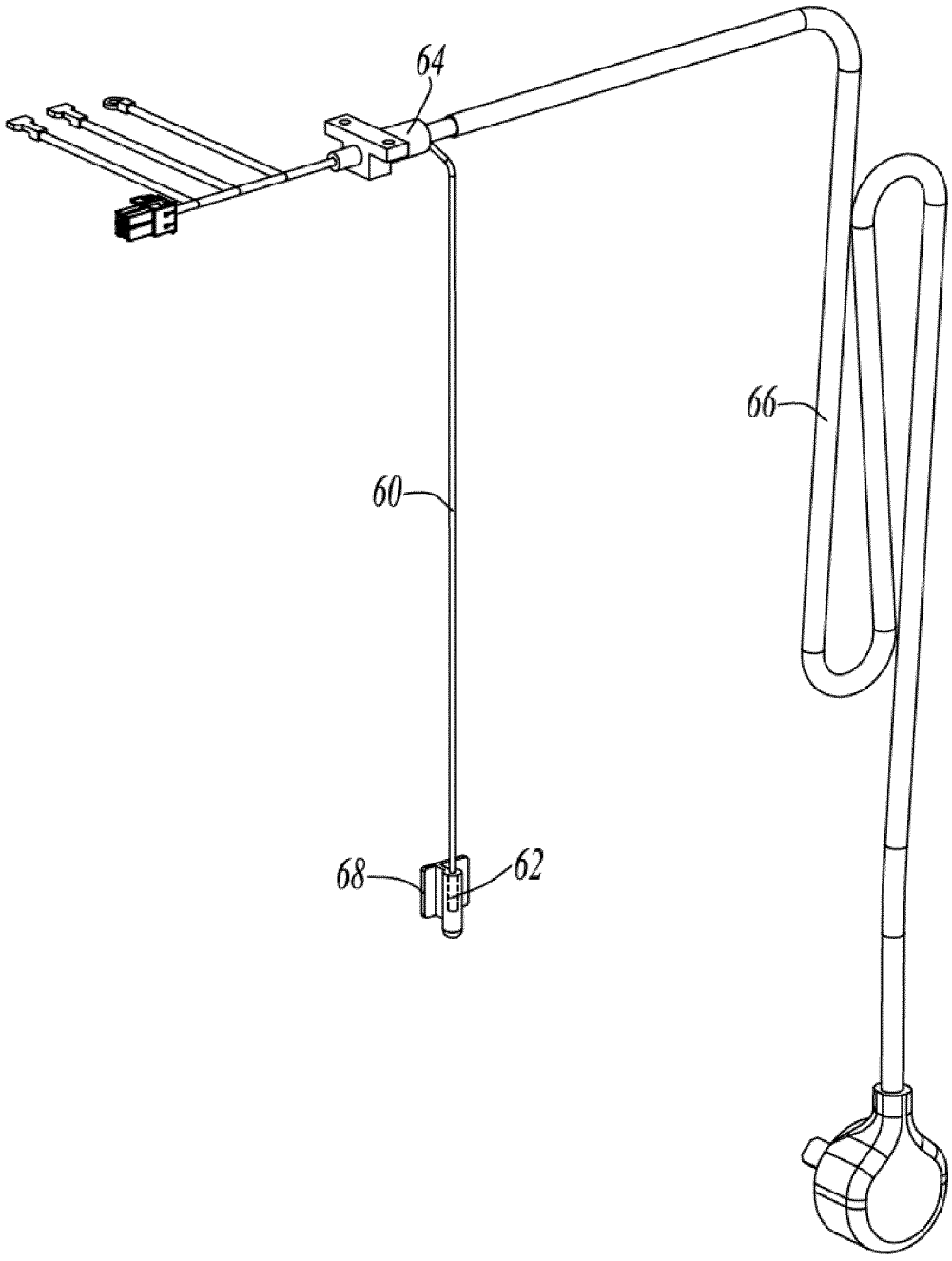

FIG. 12

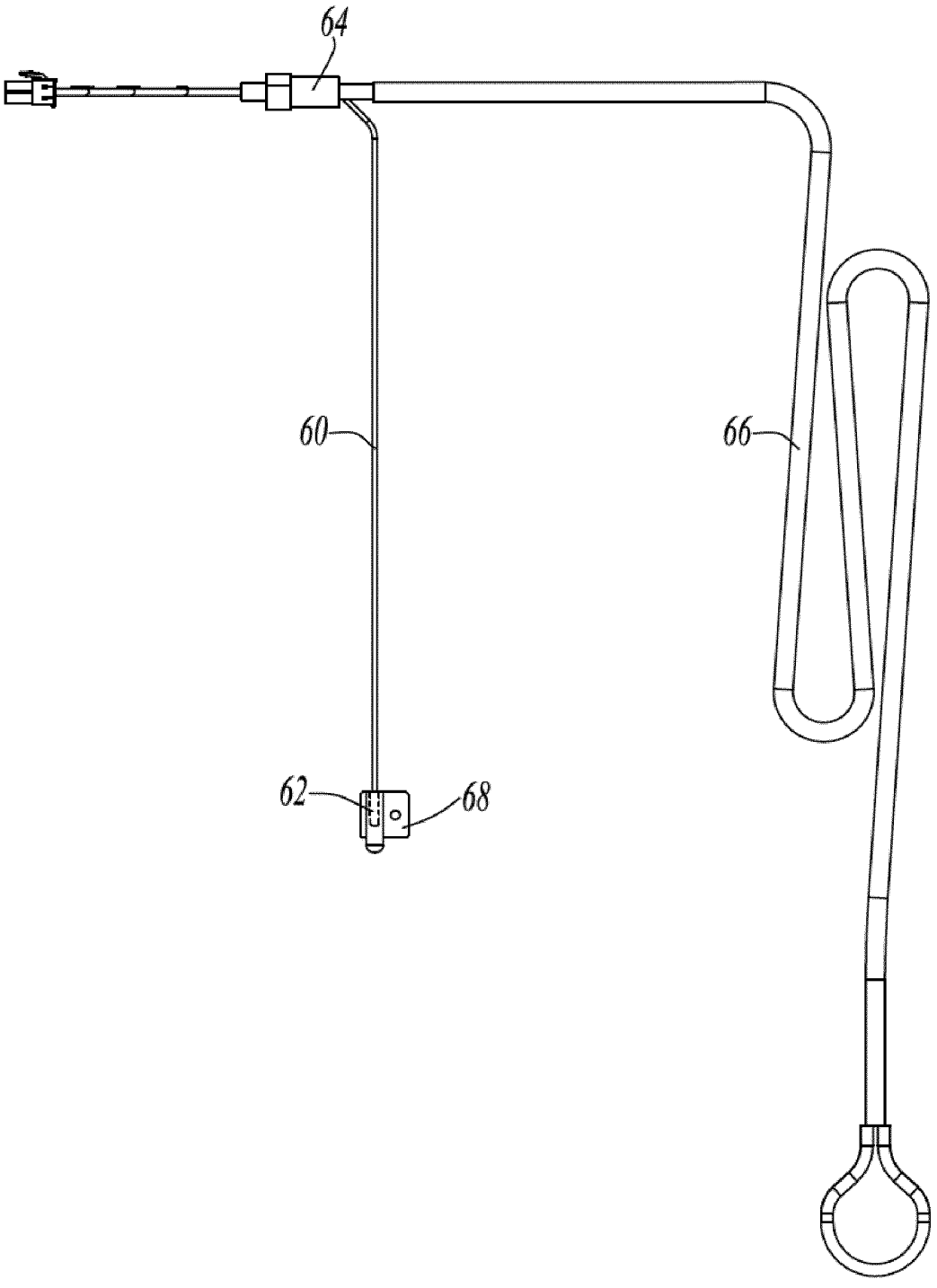

FIG. 13

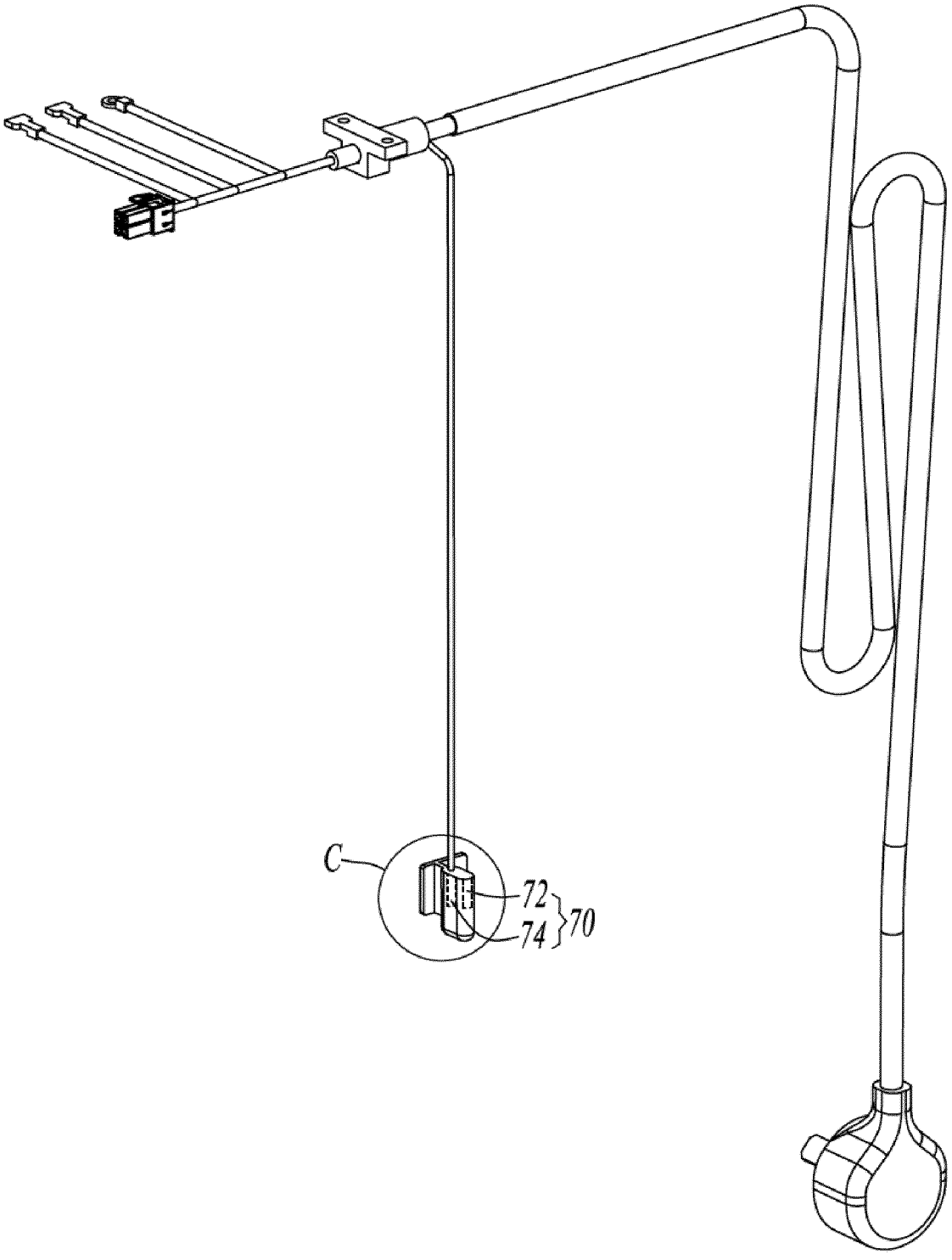

FIG. 14

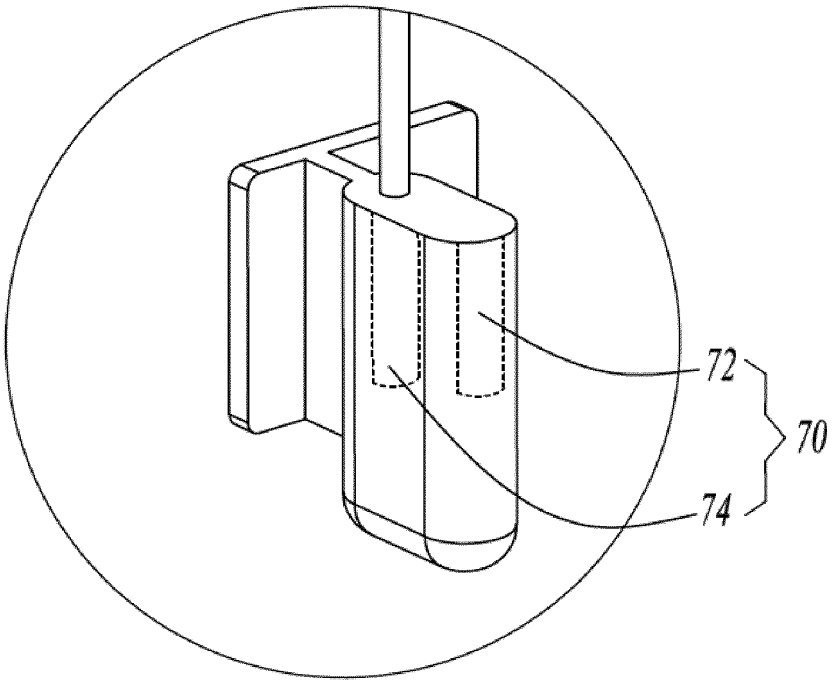

FIG. 15

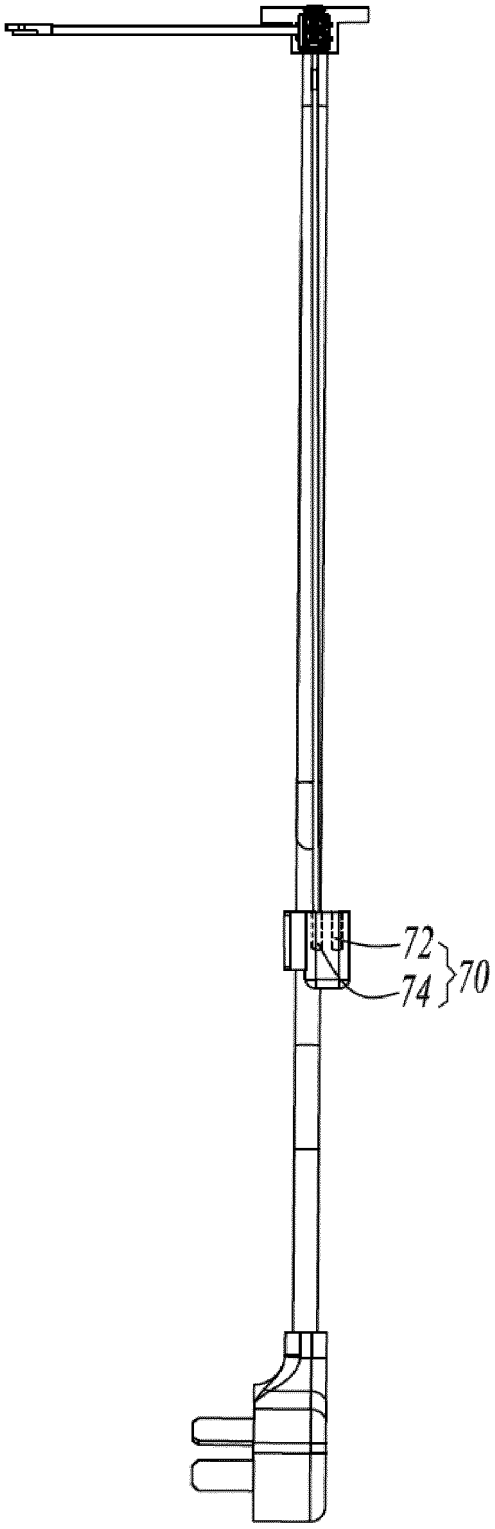

FIG. 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/094085

A. CLASSIFICATION OF SUBJECT MATTER

H01R 13/66(2006.01)i; H01R 13/73(2006.01)i; H01R 27/00(2006.01)i; H01R 31/06(2006.01)i; F25D 23/00(2006.01)i; F25D 29/00(2006.01)i

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 F25D

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)

CNABS; CNTXT; CNKI; SIPOABS; DWPI; USTXT; WOTXT; EPTXT: 家用电器, 电源线, 插头, 传感器, 感测, 环境参数, 温度, 湿度, household appliance, domestic appliance, power, plug, cable, sens+, detect+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 108336613 A (POWERTECH IND CO., LTD.) 27 July 2018 (2018-07-27) description, paragraphs [0025]-[0054], and figures 1-7	1-10
X	GB 2569972 A (BEKO PLC) 10 July 2019 (2019-07-10) description page 5 line 16- page 16 line 5, figures 1, 2	1-10
A	CN 107112698 A (VOLEX PLC) 29 August 2017 (2017-08-29) entire document	1-10
A	CN 205488851 U (FOXCONN (KUNSHAN) COMPUTER CONNECTOR CO., LTD. et al.) 17 August 2016 (2016-08-17) entire document	1-10

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"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	Date of mailing of the international search report
13 October 2020	**27 November 2020**

Name and mailing address of the ISA/CN	Authorized officer
China National Intellectual Property Administration (ISA/CN) **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** **China**	
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2020/094085

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	108336613	A	27 July 2018	None			
GB	2569972	A	10 July 2019	None			
CN	107112698	A	29 August 2017	US	10224678	B2	05 March 2019
				WO	2016081909	A1	26 May 2016
				US	2017358890	A1	14 December 2017
				CA	2996611	C	12 March 2019
				CA	2996611	A1	26 May 2016
				HK	1243232	A0	06 July 2018
CN	205488851	U	17 August 2016	US	2017207583	A1	20 July 2017
				US	9780501	B2	03 October 2017

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