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(54) POWER LINE DEVICE AND COMBINATION SYSTEM HAVING AT LEAST ONE HOUSEHOLD APPLIANCE

(57) The present invention provides a power supply line device and a combination system having at least one set of household appliance. The power supply line device is used for powering at least one set of household appliance. The power supply line device comprises a plug line and a first line body pluggably and electrically connected to the plug line, a first end of the plug line is provided with a plug for plugging in an external power supply, the first line body comprises a first plugging interface and a first power supply interface electrically communicated with the first plugging interface, and the first plugging interface is pluggably and electrically connected with a second end of the plug line. The power supply line device and the combination system having at least one set of household appliance according to the present invention make the costs lower and the structure simpler and compacter.

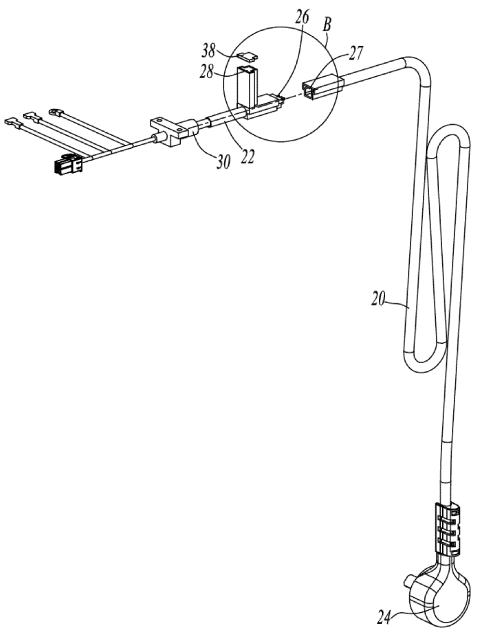

FIG. 4

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Description

TECHNICAL FIELD

[0001] The present invention relates to a power supply line device and a combination system having at least one set of household appliance.

BACKGROUND

[0002] At present, when a plurality of sets of refrigerators are used in combination, a plurality of sockets needs to be provided, or a power strip having a plurality of outlets needs to be additionally equipped to power the plurality of sets of refrigerators, thereby causing a high manufacturing cost. Furthermore, a temperature sensor for sensing an ambient temperature needs to be provided for each set of refrigerator to control the refrigeration of each set of refrigerator. Furthermore, usually the temperature sensor is disposed on the cabinet and located outside the cabinet. 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. As such, a signal line needs to be separately led out from the interior of the cabinet of each set of refrigerator, and the temperature sensor is connected to an end of the signal line and disposed on the cabinet. Such an arrangement makes the cost high, 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 combination system having at least one set of household appliance, which make the costs lower and the structure simpler and compacter.

[0004] To achieve one of the above objects, an embodiment of the present invention provides a power supply line device for powering at least one set of household appliance. The power supply line device comprises a plug line and a first line body pluggably and electrically connected to the plug line, a first end of the plug line is provided with a plug for plugging in an external power supply, the first line body comprises a first plugging interface and a first power supply interface electrically communicated with the first plugging interface, and the first plugging interface is pluggably and electrically connected with a second end of the plug line.

[0005] As a further improvement of the embodiment of the present invention, the first plugging interface and the first power supply interface are set to match each other.

[0006] As a further improvement of the embodiment of the present invention, the first line body extends into a first household appliance to power the first household appliance, the power supply line device further comprises a second line body pluggably and electrically connected to the first power supply interface, and the second line body extends into a second household appliance to power the second household appliance.

[0007] As a further improvement of the embodiment of the present invention, the second line body comprises a second plugging interface and a second power supply interface electrically communicated with the second plugging interface, and the second plugging interface is pluggably and electrically connected to the first power supply interface.

[0008] As a further improvement of the embodiment of the present invention, structural forms of the first plugging interface and second plugging interface are the same, and structural forms of the first power supply interface and second power supply interface are the same.

[0009] As a further improvement of the embodiment of the present invention, the first line body further comprises a protective cover for opening or closing the first power supply interface.

[0010] As a further improvement of the embodiment of the present invention, the power supply line device further comprises an environmental parameter identifier, and the environmental parameter identifier is used to collect environmental parameters outside the household appliance.

[0011] As a further improvement of the embodiment of the present invention, the environmental parameter identifier is disposed on the plug line.

[0012] To achieve one of the above objects, another embodiment of the present invention further provides a combination system having at least one set of household appliance. The combination system comprises a first household appliance which comprises a cabinet and a power supply line device for powering the first household appliance, wherein the power supply line device comprises a plug line and a first line body pluggably and electrically connected to the plug line, the first line body is provided with a line body fixing structure for fixing the first line body to the cabinet, a first end of the plug line is provided with a plug for plugging in an external power supply, the first line body comprises a first plugging interface and a first power supply interface electrically communicated with the first plugging interface, and the first plugging interface is pluggably and electrically connected with a second end of the plug line.

[0013] As a further improvement of the embodiment of the present invention, the combination system further comprises a second household appliance, the power supply line device further comprises a second line body pluggably and electrically connected to the first power

supply interface, and the second line body extends into the second household appliance to power the second household appliance.

[0014] As compared with the prior art, the present invention has the following advantageous effects: since the first plugging interface of the first line body is pluggably and electrically connected with the plug line and thereby can be connected to an external power supply, the first power supply interface of the first line body may power another household appliance so that one external power supply socket may power multiple sets of household appliances. In addition, the power supply line device 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. Furthermore, the collected environmental parameters may be used by multiple sets of household appliances, which makes the structure simpler, compacter and cost-effective.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a rear view of a power supply line device in a specific embodiment of the present invention;
FIG. 2 is a perspective view of the power supply line device of FIG. 1;
FIG. 3 is a partially-enlarged view of location A in FIG. 2;
FIG. 4 is an exploded perspective view of the power supply line device of FIG. 1;
FIG. 5 is a partially-enlarged view of location B in FIG. 4.

DETAILED DESCRIPTION

[0016] 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.

[0017] 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.

[0018] As shown in FIG. 1 through FIG. 5, a first embodiment of the present invention discloses a combination system having at least one set of household appliance. The household appliance may be any type of household appliance or multiple types of household appliances that need a power supply line device, for example, a refrigerator, a freezer, a washing machine, an air conditioner, microwave or oven etc. "Multiple types" here refer to two or more types. Preferably, the household appliance is any type of smart/intelligent household appliance. Specifically, the household appliance is a refrigerator in the present embodiment.

[0019] The combination system comprises a first household appliance which comprises a cabinet. The cabinet has 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 for powering the household appliance. One end of the power supply line device extends into the cabinet, and the other end of the power supply line device is connected to an external power supply.

[0020] The power supply line device is used to power at least one set of household appliance, and the at least one set of household appliance may be set to be of the same type of household appliances, or of different types of household appliances.

[0021] The power supply line device comprises a plug line 20 and a first line body 22 pluggably and electrically connected to the plug line 20, a first end of the plug line 20 is provided with a plug 24 for plugging in an external power supply, the first line body 22 comprises a first plugging interface 26 and a first power supply interface 28 electrically communicated with the first plugging interface 26, and the first plugging interface 26 is pluggably and electrically connected with a second end of the plug line 20. Furthermore, the second end of the plug line 20 is provided with a docking interface 27 that is plugged with the first plugging interface 26 to electrically connect the plug line 20 with the first line body 22. In addition, the first line body 22 is provided with a line body fixing structure 30 for fixing the first line body 22 to the cabinet.

[0022] In the present preferred embodiment, since the first plugging interface 26 of the first line body 22 is pluggably and electrically connected to the plug line 20 and may be connected to an external power supply, and a first power supply interface 28 of the first line body 22 may power another household appliance, one external power supply socket may power a plurality of sets of household appliance.

[0023] The first line body 22 extends into the first household appliance to power the first household appliance. The combination system further comprises a second household appliance, the power supply line device further comprises a second line body (not shown) pluggably and electrically connected to the first power supply interface 28, and the second line body extends into the second household appliance to power the second household appliance.

[0024] Furthermore, the second line body comprises a second plugging interface and a second power supply interface electrically communicated with the second plugging interface, and the second plugging interface is pluggably and electrically connected to the first power supply interface 28. Preferably, the first plugging interface 26 and the first power supply interface 28 are set to match each other. According to such an arrangement, a structural form of the second plugging interface may be set to be the same as the structural form of the first plugging interface 26. The structural form of the second power supply interface is set to be the same as the structural form of the first power supply interface 28. Therefore, the structure of the entire power supply line device is simpler.

[0025] Certainly, according to the number of sets of household appliances to be powered, the power supply line device may provide more line bodies, the second line body is plugged into the first line body 22, a third line body is plugged into the second power supply interface of the second line body, a fourth line body is plugged into the third line body, and so on. The number of sets of household appliances is equal to the number of the line bodies.

[0026] The first line body 22 further comprises a protective cover 38 for opening or closing the first power supply interface 28. In this way, when only one set of household appliance is arranged in the combination system, the protective cover 38 may be placed in a closed state, thereby closing the first power supply interface 28 and preventing the first power supply interface 28 from being touched, which is safer.

[0027] In order to make the plugging of the first line body 22 and the second line body more convenient without being affected by space, an opening direction of the first plugging interface 26 and the direction of the first power supply interface 28 are set to be perpendicular to each other.

[0028] In the present preferred embodiment, when the protective cover 38 is opened, the protective cover 38 is completely detached from the first power supply interface 28, that is, the protective cover 38 is completely separated from the first line body 22. After the second line body is unplugged, the protective cover 38 is mounted on the first power supply interface 28 of the first line body 22. Certainly, in order to prevent the loss of the protective cover 38, the protective cover 38 may also be configured in a way that when the protective cover 38 is opened, the protective cover 38 is not separated from the first line body 22, the protective cover 38 has an open state and a closed state, and the protective cover 38 is operable to move between the open state and the closed state. When the protective cover 38 is moved to the open state, the second line body may be plugged in, and after the second line body is unplugged, the protective cover 38 may be operated to move to the closed state. Preferably, the protective cover 38 may be operatively rotated between the open state and the closed state to achieve the transition between the open state and the closed state.

[0029] Furthermore, the protective cover 38 is snap-connected to the first line body 22, the protective cover 38 is an injection-molded member, the protective cover 38 has a raised snap-fitting portion, and the protective cover 38 is snap-fitted to the first line body 22 by utilizing certain elasticity of the protective cover 38 as the injection-molded member.

[0030] The power supply line device further comprises an environmental parameter identifier 40, and the environmental parameter identifier 40 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 40 are transmitted to the control system, the control system receives and analyzes the environmental parameters and then generates corresponding control instructions according to the difference of the environmental parameters, the control instructions are transmitted to the refrigeration system, and the refrigeration system performs corresponding refrigeration or other operations according to different control instructions. In addition, other household appliances may also include other corresponding control systems and other execution systems connected to the control systems. The control systems also receive the above-mentioned environmental parameters, and the execution systems also perform corresponding operations according to different instructions sent by the control systems.

[0031] In the present preferred embodiment, since the power supply line device is provided with the environmental parameter identifier 40 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 40 and corresponding mounting structures, which makes the structure simpler and convenient to mount. In addition, the environmental parameter identifier 40 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. Furthermore, the collected environmental parameters may be used by multiple sets of household appliances, which makes the structure simpler, compacter and cost-effective.

[0032] Preferably, the environmental parameter identifier 40 is disposed on the plug line 20. As such, the arrangement of a signal transmission line of the environmental parameter identifier 40 is simpler. Furthermore, the environmental parameter identifier 40 is disposed adjacent to the plug 24. Certainly, the environmental parameter identifier 40 may also be disposed at other positions of the plug line 20, e.g., disposed closer to the first plugging interface 26. In addition, the environmental parameter identifier 40 is made farther away from the

cabinet, and the collected environmental parameters are more accurate. The environmental parameter identifier 40 comprises a temperature sensor and/or a humidity sensor. That is to say, the environmental parameter identifier 40 may be configured to include only one sensor for collecting one type of parameter, or configured to include a plurality of sensors for collecting two or more types of parameters.

[0033] The line body fixing structure 30 is fixed to the cabinet, and the environmental parameter identifier 40 is located outside the cabinet. Usually, a fixing hole is provided on the cabinet, and the line body passes through the fixing hole. In order to make the affixation of the line body firmer, part of the line body fixing structure may extend into the fixing hole. Certainly, the line body fixing structure 30 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 30 to the cabinet. Certainly, the line body fixing structure 30 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.

[0034] The environmental parameter identifier 40 is detachably disposed on the power supply line device. Specifically in the embodiment, the environmental parameter identifier 40 is detachably provided on the plug line 20.

[0035] For the sake of better safety and reliability, the plug line 20 is provided with a cover body 41 for at least partially covering the environmental parameter identifier 40. The cover body 41 can be opened when the environmental parameter identifier 40 needs to be replaced, and the cover body 41 may cover the environmental parameter identifier 40 duly again after the replacement of the environmental parameter identifier 40 is completed.

[0036] Furthermore, the cover body 41 is snap-connected to the plug line 20, the cover body 41 is an injection-molded member, the cover body 41 has a raised snap-fitting portion, and the cover body 41 is snap-fitted to the plug line 20 by utilizing certain elasticity of the cover body 41 as the injection-molded member. In addition, in order to make the environmental parameter identifier 40 more sensitive and the collected parameters more accurate, the cover body 41 is provided with a plurality of through holes 43. Specifically, the plurality of through holes 43 are arranged at an interval in an extension direction of the plug line 20.

[0037] Certainly, the environmental parameter identifier 40 may also be integrally integrated into the power supply line device, i.e., the environmental parameter identifier 40 is set to be non-detachable. Here, the term "non-detachable" here means that the environmental parameter identifier 40 cannot be detached with or without a tool without damaging the power supply line device, that is to say, the power supply line device must be damaged if the environmental parameter identifier 40 is detached.

[0038] When the environmental parameter identifier 40 is set to be non-detachable, the plug line 20 comprises a power supply lead wire and a protective sleeve wrapping the power supply lead wire, and the environmental parameter identifier 40 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 40 cannot be detached.

[0039] The first line body 22 further comprises a signal connector 42, the signal connector 42 and the environmental parameter identifier 40 are located on both sides of the line body fixing structure 30, the environmental parameter identifier 40 is electrically connected to the signal connector 42, and the signal connector 34 is pluggably connected to the control system. The first line body further comprises a positive terminal 44, a negative terminal 46 and a neutral terminal 48.

[0040] In addition, the second line body may be set to be the same as the first line body 22 in the structure and configuration as needed, and the only thing is that a specific length of the line harness is different. Certainly, the second line body and the first line body 22 may also be set to be different in the structure and configuration.

[0041] 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.

[0042] 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 at least one set of household appliance, wherein the power supply line device comprises a plug line and a first line body pluggably and electrically connected to the plug line, a first end of the plug line is provided with a plug for plugging in an external power supply, the first line body comprises a first plugging interface and a first power supply interface electrically communicated with the first plugging interface, and the first plugging interface is pluggably and electrically connected with a second end of the plug line.

2. The power supply line device according to claim 1, wherein the first plugging interface and the first pow-

er supply interface are set to match each other.

3. The power supply line device according to claim 2, wherein the first line body extends into a first household appliance to power the first household appliance, the power supply line device further comprises a second line body pluggably and electrically connected to the first power supply interface, and the second line body extends into a second household appliance to power the second household appliance.

4. The power supply line device according to claim 3, wherein the second line body comprises a second plugging interface and a second power supply interface electrically communicated with the second plugging interface, and the second plugging interface is pluggably and electrically connected to the first power supply interface.

5. The power supply line device according to claim 4, wherein structural forms of the first plugging interface and second plugging interface are the same, and structural forms of the first power supply interface and second power supply interface are the same.

6. The power supply line device according to claim 1, wherein the first line body further comprises a protective cover for opening or closing the first power supply interface.

7. The power supply line device according to claim 1, wherein the power supply line device further comprises an environmental parameter identifier, and the environmental parameter identifier is used to collect environmental parameters outside the household appliance.

8. The power supply line device according to claim 7, wherein the environmental parameter identifier is disposed on the plug line.

9. A combination system having at least one set of household appliance, the combination system comprising a first household appliance which comprises a cabinet and a power supply line device for powering the first household appliance, wherein the power supply line device comprises a plug line and a first line body pluggably and electrically connected to the plug line, the first line body is provided with a line body fixing structure for fixing the first line body to the cabinet, a first end of the plug line is provided with a plug for plugging in an external power supply, the first line body comprises a first plugging interface and a first power supply interface electrically communicated with the first plugging interface, and the first plugging interface is pluggably and electrically connected with a second end of the plug line.

10. The combination system according to claim 9, wherein the combination system further comprises a second household appliance, the power supply line device further comprises a second line body pluggably and electrically connected to the first power supply interface, and the second line body extends into the second household appliance to power the second household appliance.

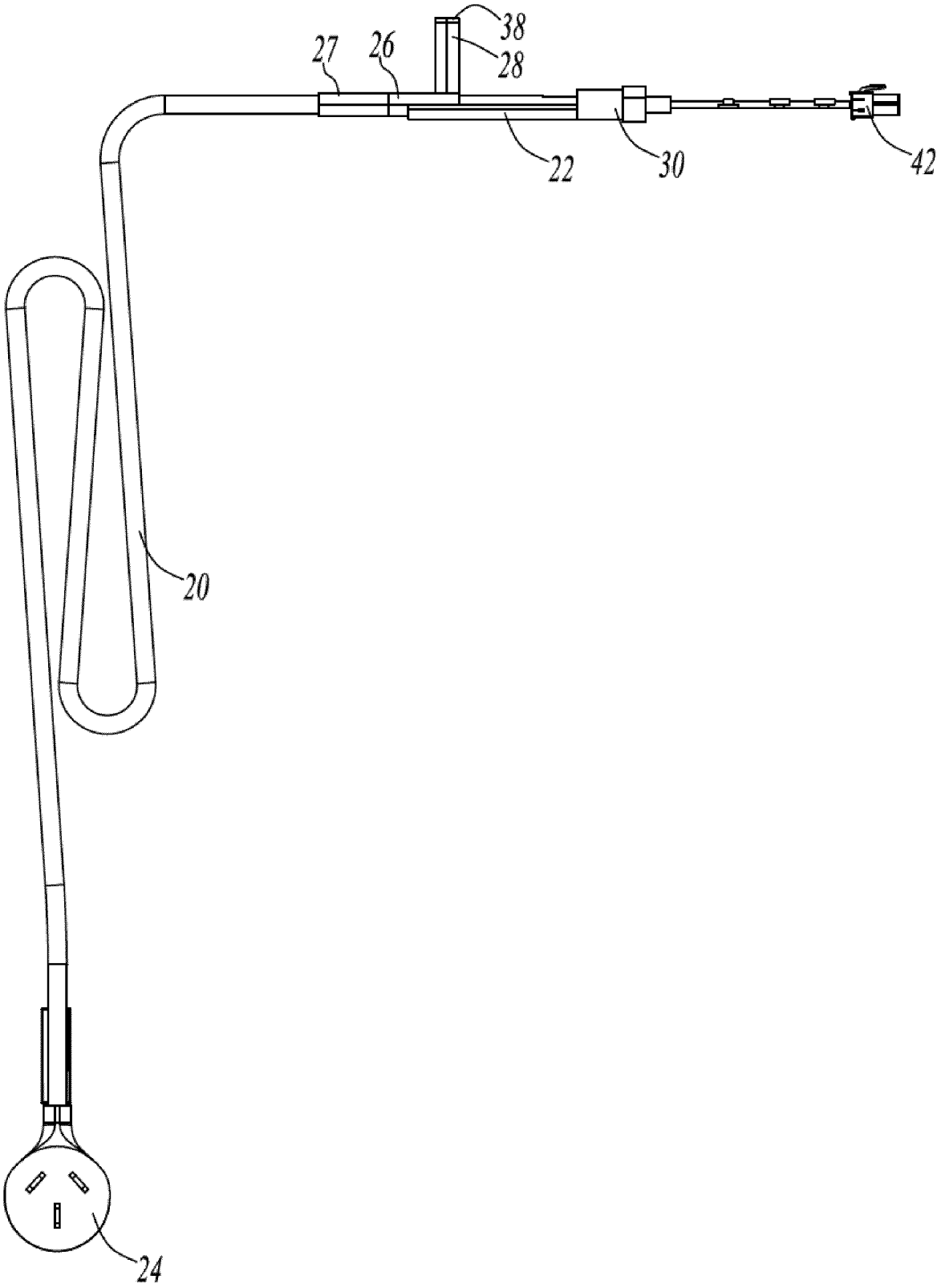

FIG. 1

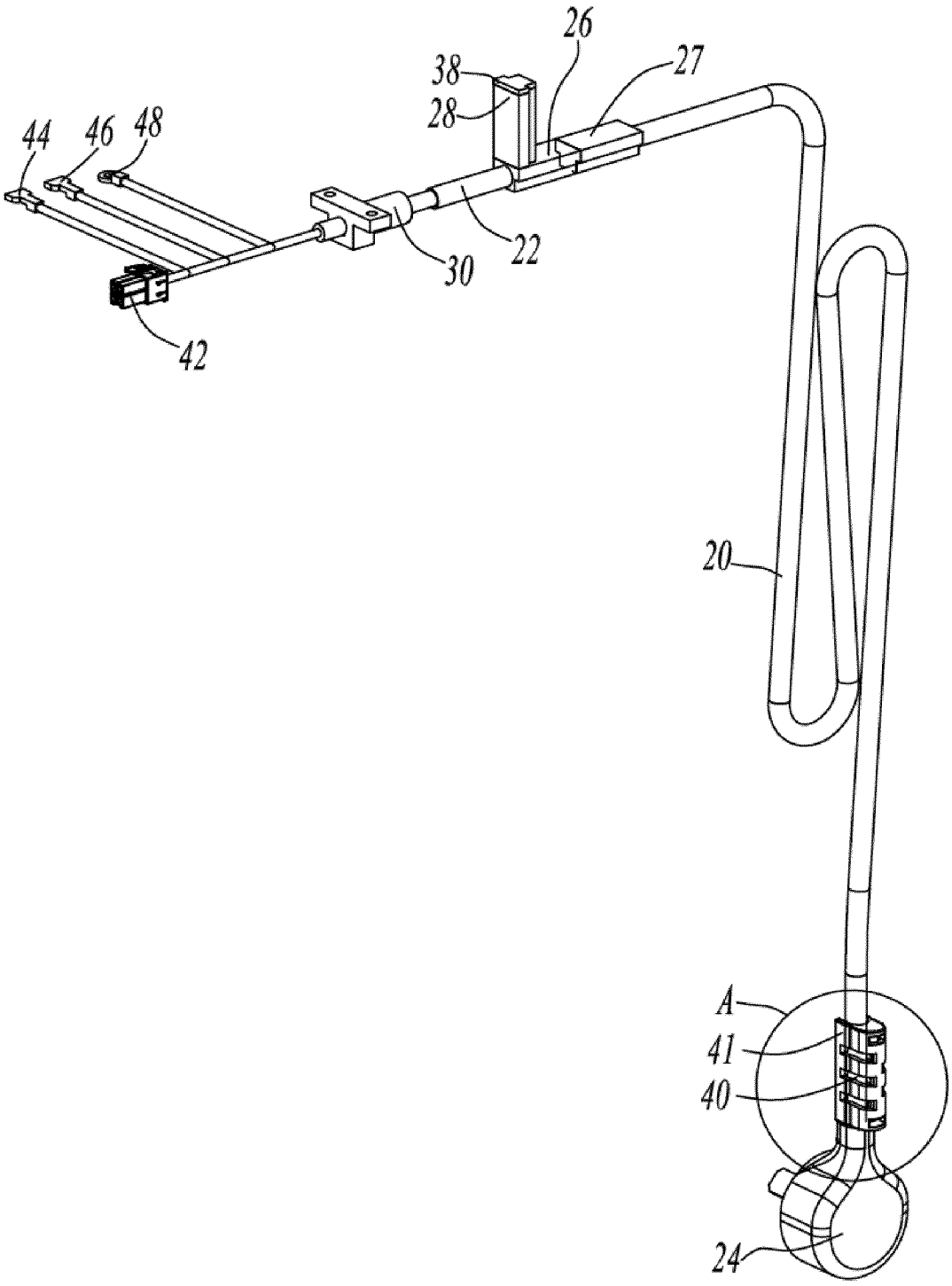

FIG. 2

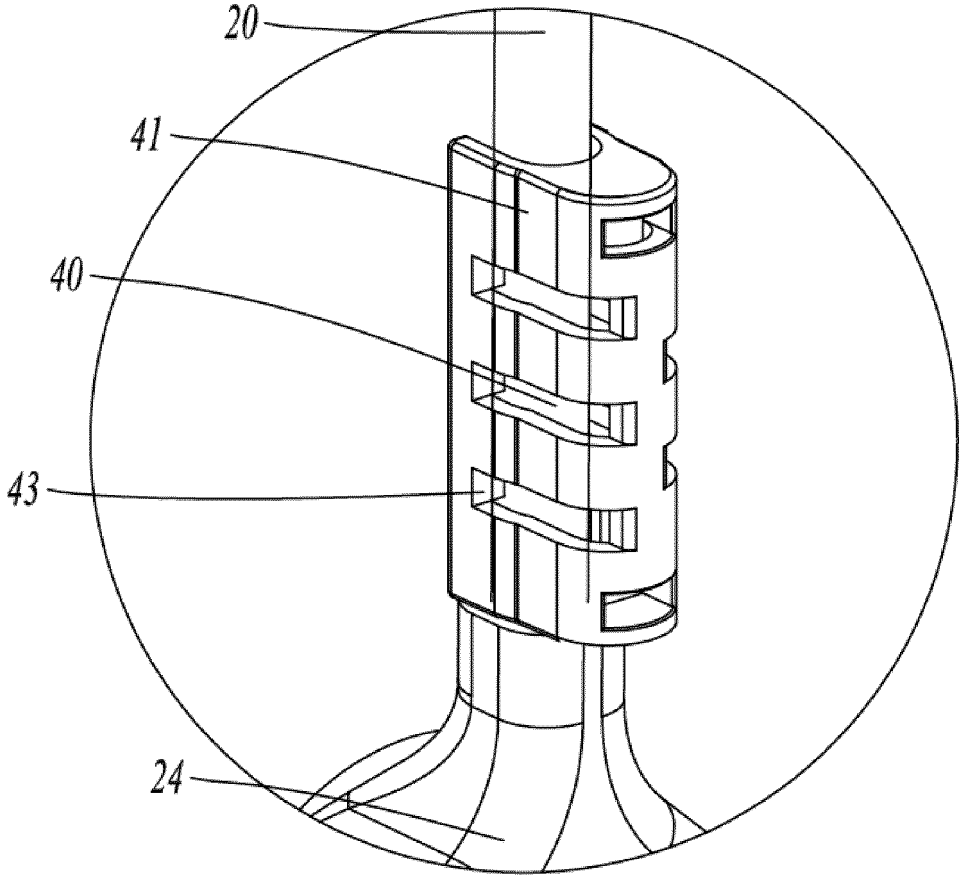

FIG. 3

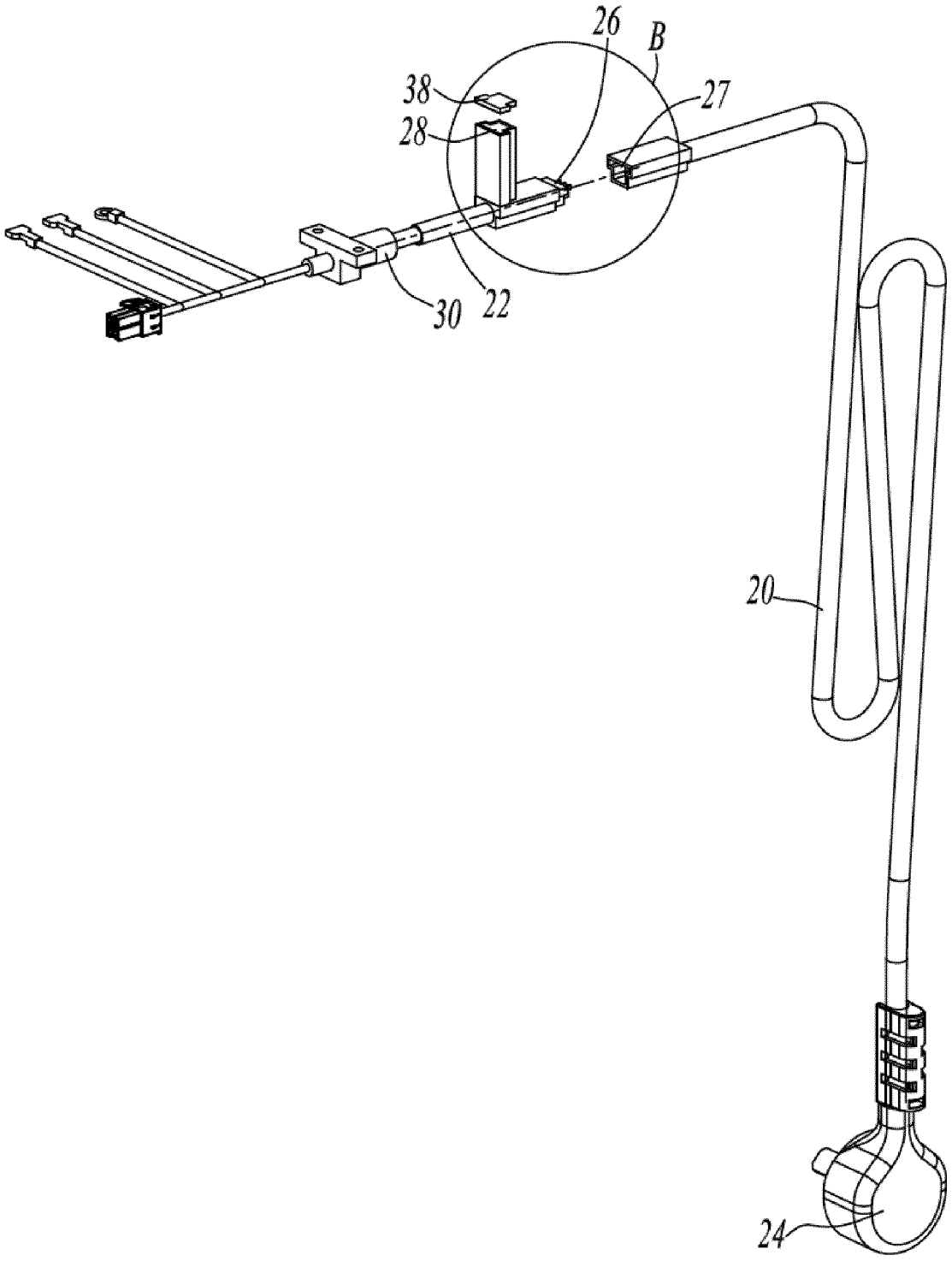

FIG. 4

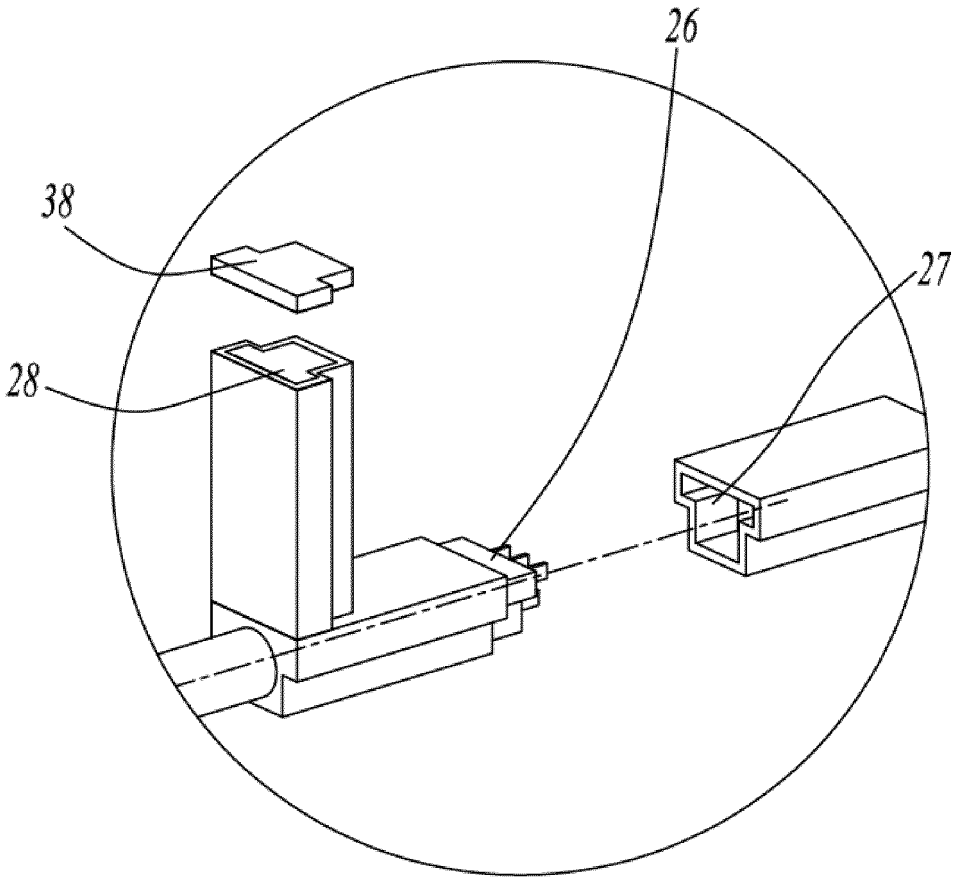

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/094087

A. CLASSIFICATION OF SUBJECT MATTER

H01R 27/00(2006.01)i; H01R 31/06(2006.01)i; H01R 24/00(2011.01)i; H01R 13/66(2006.01)i; H01R 13/502(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

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)

CNPAT, CNKI, WPI, EPODOC: 电源线, 电源, 电器, 插头, 接口, 插拔, 第二, 环境, 识别, power, line, electrical, appliance, plug, interface, insert, second, environment, identify

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 207052835 U (SHENZHEN HUYUAN ELECTRIC TECH CO., LTD.) 27 February 2018 (2018-02-27) description, paragraph 24, and figure 1	1, 2, 6, 9
Y	CN 207052835 U (SHENZHEN HUYUAN ELECTRIC TECH CO., LTD.) 27 February 2018 (2018-02-27) description, paragraph 24, and figure 1	7, 8
Y	CN 108336613 A (POWERTECH IND CO., LTD.) 27 July 2018 (2018-07-27) description, paragraphs 25-54, figures 1-7	7, 8
Y	CN 2919601 Y (LAI, Lichun) 04 July 2007 (2007-07-04) description, pages 2-3, and figure 1	3-5, 10
Y	CN 107887767 A (DONGGUAN LIANGEN ELECTRONIC CO., LTD.) 06 April 2018 (2018-04-06) description, paragraphs 28-32, figures 1, 3	3-5, 10
A	US 2017033514 A1 (SURE-FIRE ELECTRICAL CORPORATION) 02 February 2017 (2017-02-02) 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
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 November 2020	**03 December 2020**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2020/094087

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 207052835 U	27 February 2018	None	
CN 108336613 A	27 July 2018	None	
CN 2919601 Y	04 July 2007	None	
CN 107887767 A	06 April 2018	None	
US 2017033514 A1	02 February 2017	None	

Form PCT/ISA/210 (patent family annex) (January 2015)