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(54) CONTROL APPARATUS FOR SELF-CLEANING OF FLOOR SCRUBBER, AND FLOOR SCRUBBER

(57) A control apparatus for self-cleaning of a floor scrubber, and a floor scrubber. The control apparatus for self-cleaning of the floor scrubber includes an excitation portion and a sensing portion (1021); the excitation portion is provided in a base portion (101) of the floor scrubber; the sensing portion (1021) is provided in a main machine portion (102) of the floor scrubber; the excitation portion is configured to transmit a sensing signal when being operated; and the sensing portion (1021) is configured to receive the sensing signal, and trigger the main machine portion (102) to perform a self-cleaning action when the sensing signal satisfies a predetermined condition.

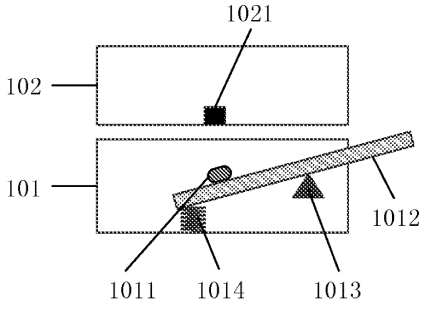

FIG. 1

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Description

CROSS-REFERENCES TO RELATED APPLICATION

[0001] This application claims priority to Chinese Patent Application No. 202110369427.9 filed on April 06, 2021, the entire disclosure of which is incorporated herein by reference.

FIELD

[0002] The present disclosure relates to the field of smart homes, and more particularly, to a control device for self-cleaning of a floor scrubber and a floor scrubber.

BACKGROUND

[0003] At present, after the existing floor scrubber cleans a floor, a water path portion will remain dirt. Moreover, the dirt will stink after a period, bringing bad experience to a user. In order to prevent a pipeline from being smelly, the floor scrubber has added a self-cleaning function, which is capable of automatically rinsing the pipeline and a rolling brush. In the related technical solutions, the floor scrubber has a self-cleaning button on a handle. After the user presses the button to start a self-cleaning mode, the system flushes the pipeline and the rolling brush for self-cleaning. However, when the floor scrubber is placed against a corner of wall, the manual operation becomes very inconvenient. Moreover, after the user fills a clean water tank with water, his(her) hand is wet. At this time, when the user presses the self-cleaning button with his(her) hands, the water may flow into an interior of the floor scrubber along with the press of the self-cleaning button. In this way, other functions of the floor scrubber are influenced to affect use of the floor scrubber. In view of the above, there are no effective solutions so far how to make the self-cleaning operation of the floor scrubber more convenient and faster.

SUMMARY

[0004] In order to solve the existing technical problems, embodiments of the present disclosure provide a control device for self-cleaning of a floor scrubber and a floor scrubber.

[0005] To this end, technical solutions of the embodiments of the present disclosure is realized as follows.

[0006] The embodiments of the present disclosure provide a control device for self-cleaning of a floor scrubber. The control device comprises an excitation portion and a sensing portion. The excitation portion is disposed in a base portion of the floor scrubber, and transmits a sensing signal when being operated. The sensing portion is disposed in a main machine portion of the floor scrubber, and receives the sensing signal and trigger the main machine portion to perform a self-cleaning action when the sensing signal satisfies a predetermined condition.

[0007] In an optional embodiment of the present disclosure, the excitation portion comprises an exciter and a pedaling member. The exciter is disposed at a first side of the pedaling member, and a second side of the pedaling member extends beyond the base portion. When the pedaling member is operated at the second side of the pedaling member, the first side of the pedaling member can be controlled to move in a first direction, enabling the exciter to move towards the sensing portion.

[0008] In an optional embodiment of the present disclosure, the sensing portion triggers the main machine portion to perform the self-cleaning action when a strength of the received sensing signal reaches a predetermined threshold.

[0009] In an optional embodiment of the present disclosure, the exciter is disposed at a first surface of the pedaling member, and a second surface of the pedaling member is connected to a stretchable member fixed to the base portion. The pedaling member controls the first side of the pedaling member to move in a second direction through stretching of the stretchable member, enabling the exciter to move away from the sensing portion.

[0010] In an optional embodiment of the present disclosure, the excitation portion transmits the sensing signal when an object is detected within a predetermined distance range.

[0011] The embodiments of the present disclosure provide a floor scrubber. The floor scrubber comprises a main machine portion, a base portion carrying the main machine portion, and any one of the above control devices of the floor scrubber.

[0012] In an optional embodiment of the present disclosure, the main machine portion comprises a clean water tank for storing clean water, a clean water pipeline, a water pump, and a rolling brush. The water pump is disposed at the clean water pipeline. The clean water pipeline has an end connected to the clean water tank, and a water outflowing direction at another end of the water pipeline faces towards the rolling brush. The water pump is started, when the main machine portion performs the self-cleaning action, to guide the clean water in the clean water tank to the rolling brush through the clean water pipeline, enabling the rolling brush to be cleaned by the clean water.

[0013] In an optional embodiment of the present disclosure, the main machine portion further comprises a water suction fan, a sewage pipeline, and a sewage tank for storing sewage. A water inflowing direction at an end of the sewage pipeline faces towards the rolling brush, and another end of the sewage pipeline is connected to the sewage tank. The water suction fan is started, when the main machine portion performs the self-cleaning action, to perform suction to collect the sewage generated by cleaning the rolling brush to the sewage tank through the sewage pipeline.

[0014] With the control device for the self-cleaning of the floor scrubber and the floor scrubber according to the embodiments of the present disclosure, the control de-

vice comprises the excitation portion and the sensing portion. The excitation portion is disposed in the base portion of the floor scrubber, and the sensing portion is disposed in the main machine portion of the floor scrubber. The excitation portion transmits the sensing signal when being operated. The sensing portion receives the sensing signal and trigger the main machine portion to perform the self-cleaning action when the sensing signal satisfies the predetermined condition. The technical solutions of the embodiments of the present disclosure enable the excitation portion to transmit the sensing signal when being operated, and enable the sensing portion to receive the sensing signal and trigger the floor scrubber to perform the self-cleaning action when the sensing signal satisfies the predetermined condition. Therefore, the operation is more convenient and faster, and the user experience is better.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] In order to clearly explain technical solutions of the embodiments of the present disclosure or in the related art, accompanying drawings used in the description of the embodiments or the related art are briefly described below. Obviously, the accompanying drawings as described below are merely some embodiments of the present disclosure. Based on structures illustrated in these drawings, other accompanying drawings may be obtained by those skilled in the art without creative effort.

[0016] FIG. 1 is a schematic diagram of a control device for self-cleaning of a floor scrubber according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0017] In order to make the objects, technical solutions, and advantages of the present disclosure more apparent and clearer, specific technical solutions of the present disclosure will be described in further detail below in combination with accompanying drawings of the embodiments of the present disclosure. The embodiments described below are for illustrative purposes only, and are not intended to limit the scope of the present disclosure thereto.

[0018] The present disclosure will be further described in detail below in combination with the following specific implementations and the accompanying drawings.

[0019] The embodiments of the present disclosure provide a control device for self-cleaning of a floor scrubber. FIG. 1 is a schematic diagram of a control device for self-cleaning of a floor scrubber according to an embodiment of the present disclosure. As illustrated in FIG. 1, the control device for the self-cleaning of the floor scrubber comprises an excitation portion and a sensing portion 1021. The excitation portion is disposed in a base portion 101 of the floor scrubber, and is configured to transmit a sensing signal when being operated. The sensing portion 1021 is disposed in a main machine portion 102 of the floor scrubber. The sensing portion 1021 is configured to receive the sensing signal and trigger the main machine portion 102 to perform a self-cleaning action when the sensing signal satisfies a predetermined condition.

[0020] The floor scrubber is any type of floor scrubber that may be used in daily life, such as a hand-propelled floor scrubber and an electric floor scrubber. The embodiment of the present disclosure is not limited to the type of the floor scrubber.

[0021] The excitation portion may be disposed in the base portion 101 of the floor scrubber, and the sensing portion 1021 may be disposed in the main machine portion 102 of the floor scrubber. The base portion 101 of the floor scrubber is configured to carry the main machine portion 102 of the floor scrubber to maintain upright support of the main machine portion 102. The main machine portion 102 may comprise main components of the floor scrubber.

[0022] In some optional embodiments, the excitation portion continuously transmits the sensing signal. Moreover, when a user's foot acts on the excitation portion, a position and/or signal strength of the excitation portion changes, which enables the sensing portion 1021 to receive the sensing signal with varying signal strengths. When a strength of the sensing signal reaches a predetermined threshold, it is indicated that the sensing portion 1021 receives a sensing signal satisfying the predetermined condition, and the main machine portion 102 is further triggered to start performing the self-cleaning action based on the sensing signal. In other optional embodiments, when the user's foot performs an action on the excitation portion, the excitation portion transmits the sensing signal, enabling the sensing portion 1021 to receive the sensing signal. Accordingly, when the sensing portion 1021 receives the sensing signal, it is indicated that the sensing portion 1021 receives the sensing signal satisfying the predetermined condition, and further triggers the main machine portion 102 to start performing the self-cleaning action based on the sensing signal.

[0023] The change in the position of the excitation portion corresponds to change in the strength of the signal received by the sensing portion 1021. In an embodiment, when the user's foot does not act on the excitation portion, the excitation portion is furthest away from the sensing portion 1021. Accordingly, the strength of the signal received by the sensing portion 1021 is minimum. When the user's foot acts on the excitation portion, a distance between the excitation portion and the sensing portion 1021 gradually decreases until it is minimum. When the distance between the excitation portion and the sensing portion 1021 is minimum, the strength of the signal received by the sensing portion 1021 is maximum.

[0024] In this embodiment, in some optional examples, the sensing signal may be a sensing signal generated by a specific physical characteristic of a substance. In an example, the excitation portion comprises a magnetic material, such as a magnet. The magnet has a magnetic field. Since magnetic field intensities corresponding to

different distances between the magnets are different, the sensing signal may be induced by the magnetic field of the magnet. Accordingly, the sensing portion receives a magnetic field intensity (or magnetic induction intensity) induced by the magnetic field of the magnet. In other optional embodiments, the sensing signal may be an electrical signal transmitted by an electronic component, and/or an optical signal transmitted by an optical component, etc.

[0025] In some optional embodiments, the excitation portion comprises an exciter 1011 and a pedaling member 1012. The exciter 1011 is disposed at a first side of the pedaling member 1012, and a second side of the pedaling member 1012 extends beyond the base portion 101. The pedaling member 1012 is configured to be operated at the second side of the pedaling member 1012 to control the first side of the pedaling member 1012 to move in a first direction, enabling the exciter 1011 to move towards the sensing portion 1021.

[0026] In some embodiments, the sensing portion 1021 is configured to trigger the main machine portion to perform the self-cleaning action when a strength of the received sensing signal reaches a predetermined threshold.

[0027] The predetermined threshold may be configured as values suitable for the current condition by the user in advance based on different usage conditions, e.g., different excitation devices, or may be configured with a corresponding numerical value before the floor scrubber device leaves the factory. When the usage condition changes, the predetermined threshold may be reset.

[0028] In this embodiment, the pedaling member 1012 is a pedal or a foot lever. An end (i.e., the second side) of the pedaling member 1012 is located outside the base portion 101, and another end (i.e., the first side) of the pedaling member 1012 is located inside the base portion 101. Based on lever principle, when the user applies a force to the pedaling member 1012 at the second side of the pedaling member 1012, i.e., by stepping on the pedal with the foot, the exciter 1011 located at the first side of the pedaling member 1012 moves in the first direction along with movement of the second side of the pedaling member 1012 in a second direction. For example, with reference to FIG. 1, the first direction refers to a downward direction, and the second direction refers to an upward direction. As an example, the exciter 1011 is made of a magnetic material. An intensity of a magnetic field detected by the sensing portion 1021 increases with reduction in a distance between the exciter 1011 and the sensing portion 1021 of the main machine portion 102. When the intensity of the magnetic field received by the sensing portion 1021 in the main machine portion 102 is greater than a predetermined value, the main machine portion 102 is triggered to start performing the self-cleaning action. In this way, it is possible to keep clean and sanitary of a rolling brush and a pipeline of the floor scrubber. Moreover, the rolling brush is prevented from smudging, breeding bacteria, generating odor, or the like. Therefore, the user does not have to worry about inconvenient operation, for example, a user's inability to start a self-cleaning mode due to limitation of a placement position when the floor scrubber is placed at a corner of wall, user's inconvenience for pressing a self-cleaning button when user's hands have water, or the like. In this case, the user's hands are liberated, and convenience of user's operation is improved.

[0029] In some optional embodiments, the pedaling member 1012 has a first surface and a second surface at the first side of the pedaling member. The exciter 1011 is disposed at the first surface of the pedaling member 1012, and the second surface of the pedaling member 1012 is connected to a stretchable member 1014 fixed to the base portion 101. The pedaling member 1012 is configured to control the first side of the pedaling member 1012 to move in the second direction through stretching of the stretchable member 1014, enabling the exciter 1011 to move away from the sensing portion 1021.

[0030] In this embodiment, the exciter 1011 may be an electrical sensor, a magnetic sensor, an optical sensor, or other sensors, which is not limited herein. The pedaling member 1012 may be a pedal or a foot level. In order to complete a pedaling action, a support member 1013 is required to provide a support function. The support member 1013 is fixed in the base portion 101, and is equivalent to a fulcrum of a lever. The support member 1013 supports the pedaling member 1012 in a position close to the second side of the pedaling member 1012 or in a middle position of the pedaling member 1012. In this way, a displacement of the first side of the pedaling member 1012 moving in the first direction is smaller than or equal to a displacement of the second side of the pedaling member 1012 moving in the second direction. Therefore, a small movement range of the user's foot can make the exciter 1011 move in a greater range. The exciter 1011 is located right above the first side of the pedaling member 1012, i.e., the first surface of the pedaling member 1012. The stretchable member 1012 is further disposed below the first side of the pedaling member 1012, i.e., the second surface of the pedaling member 1012. As an example, the stretchable member 1012 may be a retractable component, such as a spring. In this way, when the user's foot removes an action from the second side of the pedaling member, the exciter 1011 can move away from the sensing portion 1021 through stretching control of the stretchable member 1012, enabling the exciter 101 to move to an initial position.

[0031] In an optional embodiment of the present disclosure, the excitation portion is configured to transmit the sensing signal when an object is detected within a predetermined distance range.

[0032] In this embodiment, the excitation portion may be disposed at an edge of the base portion 101, and a sensing member of the excitation portion is located outside the base portion 101 and has a sensing direction towards the outside of the base portion 101. In an exam-

ple, the excitation portion comprises a photoelectric sensor, and a sensing member of the photoelectric sensor is located outside the base portion 101. When the user approaches the photoelectric sensor to a predetermined distance, the photoelectric sensor detects an object within the predetermined distance range and transmits the sensing signal. The sensing portion 1021 triggers the main machine portion 102 to perform the self-cleaning action after receiving the sensing signal.

[0033] In this embodiment, the sensing portion 1021 has an execution function and a function of receiving a signal or detecting a signal. In an example, the function of receiving a signal or detecting a signal may be implemented by a sensor or a sensing chip, and the execution function may be implemented by a controller or a control chip. Under normal conditions, the main machine portion 102 has a main control board for controlling the floor scrubber therein. Moreover, the controller or the control chip may be a controller or a control chip separately provided by the sensing portion 1021, or may be implemented by the main control board of the floor scrubber.

[0034] In this embodiment, after the exciter 1011 moves in the first direction, the exciter 1011 and the sensing portion 1021 may be in a contact or non-contact relationship.

[0035] The technical solutions of the embodiments of the present disclosure enables the sensing portion to receive the sensing signal through an action of the foot on the excitation portion, in which the sensing signal satisfies the predetermined condition and is transmitted by the excitation portion. In this way, the floor scrubber starts to perform the self-cleaning action. Therefore, the operation is more convenient and faster, and the user experience is better.

[0036] Based on the above embodiments, the embodiments of the present disclosure further provide a floor scrubber. The floor scrubber comprises a main machine portion, a base portion configured to carry the main machine portion, and any one of the above control devices of the floor scrubber.

[0037] In an embodiment, the main machine portion comprises a clean water tank for storing clean water, a clean water pipeline, a water pump, and a rolling brush. The water pump is disposed at the clean water pipeline. The clean water pipeline has an end connected to the clean water tank, and a water outflowing direction at another end of the water pipeline faces towards the rolling brush. When the main machine portion performs the self-cleaning action, the water pump is started and guides the clean water in the clean water tank to the rolling brush through the clean water pipeline, enabling the rolling brush to be washed by clean water.

[0038] In some optional embodiments, the main machine portion further comprises a amend, a sewage pipeline, and a sewage tank for storing sewage. A water inflowing direction at an end of the sewage pipeline faces towards the rolling brush, and another end of the sewage pipeline is connected to the sewage tank. When the main machine portion performs the self-cleaning action, the water suction fan is started to perform suction to collect the sewage generated by cleaning the rolling brush to the sewage tank through the sewage pipeline.

[0039] During the self-cleaning of the floor scrubber, the water pump of the floor scrubber uniformly sprays the clean water in the clean water tank on the rolling brush through the clean water pipeline. Meanwhile, the rolling brush rotates at a predetermined rotational speed, and the rotational speed and a duration of the rotation are sufficient to throw much, especially most, of the sewage from the rolling brush by a centrifugal force. Further, the water suction fan operates synchronously to form a negative pressure at the sewage pipeline. In this way, most of the sewage caused by flushing the rolling brush, especially the sewage thrown out by the centrifugal effect, is suctioned into the sewage tank to complete cleaning of the rolling brush.

[0040] It should be noted that, the floor scrubber may further include other components, such as a main control board, a button display board, and a rolling brush electrode.

[0041] While the specific embodiments of the present disclosure have been described above, the scope of the present disclosure is not limited to these embodiments. Various variants and alternatives can be easily conceived by those skilled in the art without departing from the technical scope of the present disclosure. Therefore, these variants and alternatives are to be encompassed by the scope of present disclosure as defined by the claims as attached.

Claims

1. A control device for self-cleaning of a floor scrubber, the control device comprising:

   an excitation portion disposed in a base portion of the floor scrubber, the excitation portion transmitting a sensing signal when being operated; and

   a sensing portion disposed in a main machine portion of the floor scrubber, the sensing portion receiving the sensing signal and trigger the main machine portion to perform a self-cleaning action when the sensing signal satisfies a predetermined condition.

2. The control device according to claim 1, wherein the excitation portion comprises an exciter and a pedaling member, the exciter being disposed at a first side of the pedaling member, and a second side of the pedaling member extending beyond the base portion; and

   when the pedaling member is operated at the second side of the pedaling member, the first side of the pedaling member can be controlled to move in a first

direction, enabling the exciter to move towards the sensing portion.

3. The control device according to claim 2, wherein the sensing portion triggers the main machine portion to perform the self-cleaning action when a strength of the received sensing signal reaches a predetermined threshold.

4. The control device according to claim 2, wherein the exciter being disposed at a first surface of the pedaling member, and a second surface of the pedaling member being connected to a stretchable member fixed to the base portion; and
the pedaling member controls the first side of the pedaling member to move in a second direction through stretching of the stretchable member, enabling the exciter to move away from the sensing portion.

5. The control device according to claim 1, wherein the excitation portion transmits the sensing signal when an object is detected within a predetermined distance range.

6. A floor scrubber, comprising:

a main machine portion;
a base portion carrying the main machine portion; and
a control device according to any one of claims 1 to 5.

7. The floor scrubber according to claim 6, wherein the main machine portion comprises a clean water tank for storing clean water, a clean water pipeline, a water pump, and a rolling brush, wherein:

the water pump is disposed on the clean water pipeline;
the clean water pipeline has an end connected to the clean water tank, and a water outflowing direction at an other end of the water pipeline faces towards the rolling brush; and
the water pump is started, when the main machine portion performs a self-cleaning action, to guide the clean water in the clean water tank to the rolling brush through the clean water pipeline, enabling the rolling brush to be cleaned by the clean water.

8. The floor scrubber according to claim 7, wherein the main machine portion further comprises a water suction fan, a sewage pipeline, and a sewage tank for storing sewage, wherein:

a water inflowing direction at an end of the sewage pipeline faces towards the rolling brush, and an other end of the sewage pipeline is connected to the sewage tank; and
the water suction fan is started, when the main machine portion performs the self-cleaning action, to perform a suction to collect the sewage generated by cleaning the rolling brush into the sewage tank through the sewage pipeline.

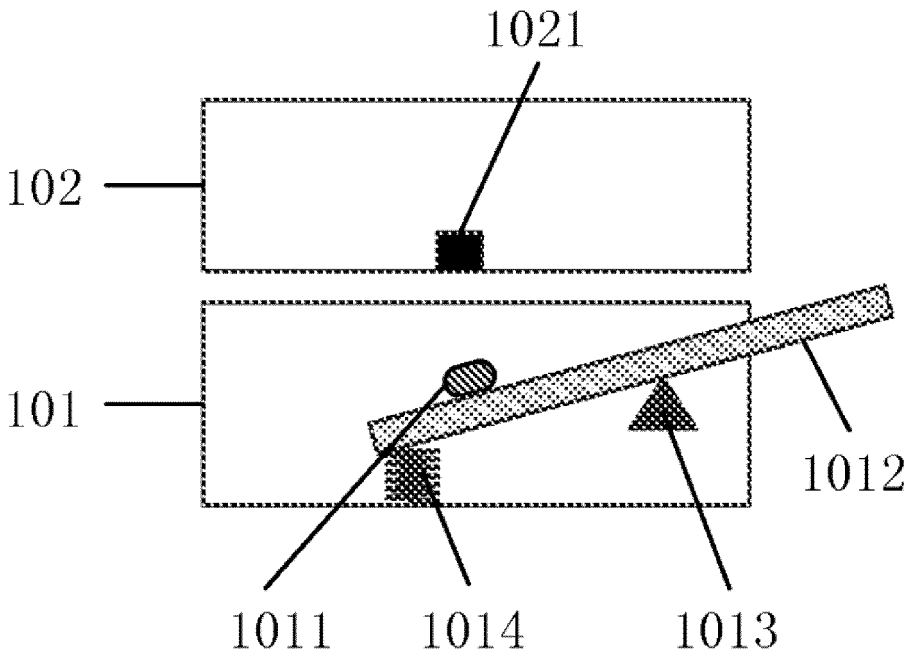

FIG. 1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/072408

A. CLASSIFICATION OF SUBJECT MATTER

A47L 11/293(2006.01)i; A47L 11/282(2006.01)i; A47L 11/40(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)

A47L11/-;F26B21/-

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; EPODOC; WPI: 美的, 洗地机, 扫地机, 清扫器, 扫地机器人, 清洁, 清洗, 冲洗, 冲刷, 自清洗, 自清洁, 弹簧, 踩, 踏, 传感器, 激发, 启动, 开启, 感应, 靠近, 接近, 按钮, 按键, floor+, clean+, wash+, machine+, scrubber+, sweeper+, self+, sensor+, trample+, tread+, stamp+, step+, close+, near+, proximity, auto+, spring+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN 211187076 U (SHENZHEN SHANGSIMAI TECHNOLOGY CO., LTD.) 07 August 2020 (2020-08-07) description, paragraphs 0002-0051, and figures 1-9	1-8
Y	CN 212001464 U (UNION HOSPITAL, TONGJI MEDICAL COLLAGE, HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY) 24 November 2020 (2020-11-24) description, paragraphs 0002-0038, and figures 1-2	1-8
Y	CN 112120613 A (SHENZHEN JIEAO INTELLIGENT TECHNOLOGY CO., LTD.) 25 December 2020 (2020-12-25) description, paragraphs 0010-0094, and figures 1-4	7-8
A	CN 107289679 A (ANHUI CHUNHUI ELECTRICAL EQUIPMENT CO., LTD.) 24 October 2017 (2017-10-24) entire document	1-8
A	CN 208755893 U (GUANGZHOU YINGJIE ELECTRIC APPLIANCE CO., LTD.) 19 April 2019 (2019-04-19) entire document	1-8

☑ 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
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"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
28 February 2022	**29 March 2022**
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

International application No.
PCT/CN2022/072408

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CA 2482322 A1 (GENERAL ELECTRIC COMPANY) 30 December 2005 (2005-12-30) entire document	1-8

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/072408

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 211187076 U	07 August 2020	None	
CN 212001464 U	24 November 2020	None	
CN 112120613 A	25 December 2020	None	
CN 107289679 A	24 October 2017	CN 107289679 B	07 February 2020
CN 208755893 U	19 April 2019	None	
CA 2482322 A1	30 December 2005	CA 2482322 C	10 April 2012
		US 2006011606 A1	19 January 2006
		US 7038175 B2	02 May 2006

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

REFERENCES CITED IN THE DESCRIPTION

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