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(54) **WATER HEATER AND CONTROL METHOD FOR WATER HEATER**

(57) Provided are a water heater (100) and a control method for a water heater (100). The water heater (100) includes a plurality of containers (10) and a plurality of electronic anodes (30). The plurality of containers (10) is in communication with each other. Each container (10) has at least one electronic anode (30) provided in the container (10). The electronic anode (30) is capable of being electrically connected to the container (10). The water heater (100) can lower occurrence of corrosion and water leakage of the container (10) and prolong a service life of the container (10).

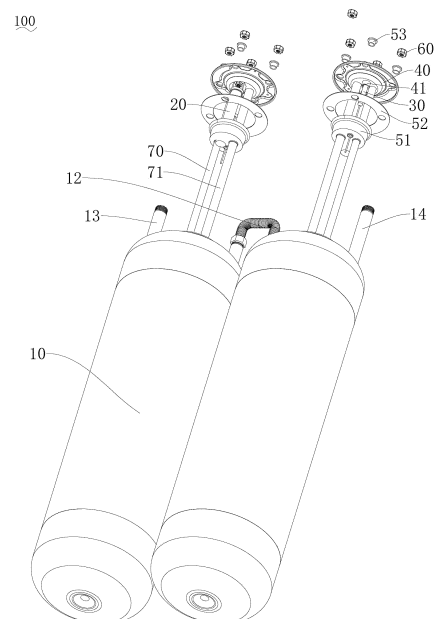


FIG. 1

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Description

PRIORITY INFORMATION

[0001] This application claims priorities to and rights of Chinese Patent Applications No. 202221046904.4 and No. 202210455628.5, both filed before China National Intellectual Property Administration and on April 27, 2022, the entire contents of which are incorporated herein by reference.

FIELD

[0002] The present disclosure relates to the technical field of water heaters, and particularly, to a water heater and a control method for a water heater.

BACKGROUND

[0003] For a double-container electric water heater, it is customary to implement corrosion protection on two containers at the same time. In the related art, for the double-container electric water heater, the corrosion protection is performed on the two containers usually by adopting two magnesium rods. However, when the magnesium rod is used for performing corrosion protection on the container, the magnesium rod has a service life of generally only two years. When the magnesium rod is not replaced in time, the container is extremely prone to corrosion and water leakage.

SUMMARY

[0004] The present disclosure provides a water heater and a control method for a water heater.

[0005] A water heater includes a plurality of containers and a plurality of electronic anodes. The plurality of containers is in communication with each other. Each container has at least one electronic anode provided in the container, and the electronic anode is capable of being electrically connected to the container.

[0006] Optionally, each container of the water heater is electrically connected to the at least one electronic anode to serve as an anti-corrosion device for the container of the water heater. Compared with a traditional water heater that only adopts the magnesium rod to prevent corrosion of the container, a loss of the magnesium rod can be reduced. Moreover, the magnesium rod does not need to be frequently replaced. Therefore, occurrence of corrosion and water leakage in the container is lowered. Moreover, a service life of the container is prolonged.

[0007] Optionally, the water heater further includes a plurality of magnesium rods. Each container has at least one magnesium rod provided in the container; and the container is electrically connected to the electronic anode or the magnesium rod in the same container.

[0008] Optionally, each container has a mounting hole;

the water heater includes a mounting member mounted in the mounting hole; and the magnesium rod and the electronic anode are each mounted on the mounting member.

[0009] Optionally, the mounting member is provided with an insulating bottom support; and the electronic anode is fixed on the insulating bottom support.

[0010] Optionally, a first insulating member is provided between the mounting member and an inner wall of the mounting hole; the first insulating member seals a gap between the mounting member and the mounting hole; and the first insulating member is disposed around the magnesium rod and the electronic anode.

[0011] Optionally, the water heater further includes a pressing member connected to the container through a fastener and compressing the mounting member.

[0012] Optionally, a second insulating member is provided between the pressing member and the mounting member.

[0013] Optionally, a third insulating member is provided between the pressing member and the fastener.

[0014] Optionally, the water heater further includes a heating member mounted on the mounting member and located in the container.

[0015] Optionally, the water heater further includes a heating member mounted on the mounting member and located in the container.

[0016] Optionally, the water heater further includes a plurality of switches and an electric control module. The plurality of switches has a one-to-one correspondence with the plurality of electronic anodes. The electric control module is configured to control position switching of at least one of the plurality of switches, so as to enable the electronic anode or the magnesium rod, which are provided in a same container, to be electrically connected to the container.

[0017] Optionally, the electronic control module is configured to: in response to the electronic anode being electrically connected to the corresponding container, detect a potential value in the container through the electronic anode, and apply a predetermined voltage to the electronic anode based on the potential value. The potential value is inversely related to the predetermined voltage.

[0018] Optionally, the electronic control module is further configured to: control, in response to the potential value being abnormal, the position switching of the switch to disconnect the electronic anode from the container and enable the magnesium rod to be electrically connected to the corresponding container; and/or stop applying a voltage to the electronic anode; and/or transmit an alarm signal of the corresponding container.

[0019] Optionally, the electric control module is configured to: detect the potential value in the container every predetermined time duration; reduce, in response to the potential value being greater than a threshold, a time duration of applying a voltage to the electronic anode; and increase, in response to the potential value being smaller than the threshold, the time duration of applying

the voltage to the electronic anode. The time duration of applying the voltage to the at least one of the plurality of the electronic anodes is equal to the predetermined time duration.

[0020] Provided is a control method for a water heater. The water heater includes a plurality of containers and a plurality of electronic anodes. The plurality of containers is in communication with each other, and each container has electronic anode provided in the container. The control method includes: detecting, in response to the electronic anode being electrically connected to the corresponding container, a potential value in the container through the electronic anode; and applying a predetermined voltage to the electronic anode based on the potential value. The potential value is inversely related to the predetermined voltage.

[0021] The control method for the water heater can adjust and output the predetermined voltage applied to the electronic anode based on the measured potential value in the container, to realize that the potential value of the container is stabilized at a corrosion-stop level. In this way, the container is protected to be stable and from corrosion. Meanwhile, improper application of the predetermined voltage on the electronic anode can be prevented. Further, a service life of the electronic anode and the service life of the container are prevented from being affected.

[0022] Optionally, the control method further includes: controlling, in response to the potential value being abnormal, position switching of a switch to disconnect the electronic anode from the container and enable a magnesium rod to be electrically connected to a corresponding container; and/or stopping applying a voltage to the electronic anode; and/or transmitting an alarm signal of the corresponding container.

[0023] Optionally, the control method further includes: detecting the potential value in the container every predetermined time duration; and reducing, in response to the potential value being greater than a threshold, a time duration of applying a voltage to the electronic anode; and increasing, in response to the potential value being smaller than the threshold, the time duration of applying the voltage to the electronic anode. The time duration of applying the voltage to the electronic anode is equal to the predetermined time duration.

[0024] A water heater includes a plurality of containers, a plurality of electronic anodes, and a controller. The plurality of containers is in communication with each other. Each container has an electronic anode provided in the container. The controller is configured to implement the control method according to any one of the above implementations.

[0025] The water heater has a controller capable of realizing a control method which includes adjusting and outputting the predetermined voltage applied to the electronic anode by measuring a size of the potential value in the container and stabilizing the potential value of the container at the corrosion-stop level. In this way, the plu-

rality of containers of the water heater is protected to be stable and from corrosion. Meanwhile, the improper application of the predetermined voltage on the electronic anode can be prevented. Further, the service life of the electronic anode and the service life of the container are prolonged.

[0026] Additional aspects and advantages of the present disclosure will be provided in part in the following description, or will become apparent in part from the following description, or can be learned from practicing of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The above and/or additional aspects and advantages of the present disclosure will become more apparent and more understandable from the following description of implementations taken in conjunction with the accompanying drawings.

FIG. 1 is a schematic structural view of a water heater according to an implementation of the present disclosure at a certain viewing angle.

FIG. 2 is a schematic structural view of a water heater according to an implementation of the present disclosure at another viewing angle.

FIG. 3 is a structural block diagram of a control switch of an electronic control module of a water heater according to an implementation of the present disclosure.

FIG. 4 is a schematic plan view of an embodiment of a water heater according to an implementation of the present disclosure.

FIG. 5 is a schematic plan view of another embodiment of a water heater according to an implementation of the present disclosure.

FIG. 6 is a schematic flowchart of a control method for a water heater according to an implementation of the present disclosure.

FIG. 7 is a schematic flowchart of a part of a control method for a water heater according to an implementation of the present disclosure.

FIG. 8 is a schematic flowchart of another part of a control method for a water heater according to an implementation of the present disclosure.

FIG. 9 is a schematic flowchart of an embodiment of a control method for a water heater according to an implementation of the present disclosure.

FIG. 10 is a schematic flowchart of another embodiment of a control method for a water heater according to an implementation of the present disclosure.

[0028] Description of symbols of main elements are illustrated with drawings:

water heater 100, container 10, mounting hole 11, connection pipe 12, water inlet pipe 13, water outlet pipe 14, magnesium rod 20, electronic anode 30, mounting member 40, insulating bottom support 41, pressing member

50, first insulating member 51, second insulating member 52, third insulating member 53, fastener 60, heating member 70, temperature measurer 71, electric control module 80, connection wire 81, switch 90.

DETAILED DESCRIPTION

[0029] Implementations of the present disclosure will be further described below with reference to the accompanying drawings. The same or similar elements, or elements having same or similar functions, are denoted by same or similar reference numerals in the drawings.

[0030] In addition, the implementations of the present disclosure described below with reference to the drawings are illustrative, and are only intended to explain the implementations of the present disclosure, rather than limiting the present disclosure.

[0031] In the present disclosure, unless expressly specified and defined otherwise, the first feature "on" or "under" the second feature may mean that the first feature is in direct contact with the second feature, or the first and second features are in indirect contact through an intermediate. Moreover, the first feature "above" the second feature may mean that the first feature is directly above or obliquely above the second feature, or simply mean that the level of the first feature is higher than that of the second feature. The first feature "below" the second feature may mean that the first feature is directly below or obliquely below the second feature, or simply mean that the level of the first feature is smaller than that of the second feature.

[0032] Referring to FIG. 1 and FIG. 2, the water heater 100 according to an implementation of the present disclosure includes a plurality of containers 10 and a plurality of electronic anodes 30. The plurality of containers 10 is in communication with each other. Each container 10 has at least one electronic anode 30 provided in the container 10. The electronic anode 30 is capable of being electrically connected to the container 10.

[0033] In some implementations, the water heater 100 includes a plurality of magnesium rods 20. Each container 10 has at least one magnesium rod 20 provided in the container 10. In a same container 10, one of the electronic anode 30 or the magnesium rod 20 is electrically connected to the container 10.

[0034] According to the implementations of the present disclosure, each container 10 of the water heater 100 is electrically connected with at least one magnesium rod 20 and at least one electronic anode 30 to serve as an anti-corrosion device for the container 10 of the water heater 100. Compared with a traditional water heater 100 that only adopts the magnesium rod 20 to prevent corrosion of the container 10, a loss of the magnesium rod 20 can be reduced. Moreover, the magnesium rod 20 does not need to be frequently replaced. Therefore, occurrence of corrosion and water leakage in the container 10 is lowered. Moreover, a service life of the container 10 is prolonged.

[0035] In an exemplary embodiment of the present disclosure, the container 10 of the water heater 100 may be of a long-barrel-shaped structure on the water heater 100 that has characteristics such as water storage and heat preservation, and may be an enamel container 10, a stainless-steel container 10, or the like. For example, the water heater 100 may have two containers 10. When the water heater 100 has two containers 10, the two containers 10 may be in communication with each other and make an internal communication between the two containers 10 in a pipeline connection manner. A single container 10 may be respectively provided with a water inlet pipeline and a water outlet pipeline at two sides of the container 10. Pipelines at a side where the two containers 10 are connected to each other may be in communication with each other and may be connected to each other through a rigid pipe, a hose, or other water pipes. In this way, one of the pipelines of the two containers 10 facing away from the side where the two containers 10 are connected to each other can be a water inlet pipe 13, and the other one of the pipelines of the two containers 10 facing away from the side where the two containers 10 are connected to each other can be a water outlet pipe 14.

[0036] Further, when the water heater 100 is a water heater 100 with a double-container 10. Each container 10 may be provided with one magnesium rod 20 and one electronic anode 30. Each of the magnesium rod 20 and the electronic anode 30 may be of a cylindrical structure. The magnesium rod 20 and the electronic anode 30 may be inserted into a cavity of the container 10 at the same time and may be electrically connected to the container 10 at the same time. The magnesium rod 20 may be a metal rod primarily composed of magnesium element, may serve as a sacrificial anode in the water heater 100, and may protect a cathode as the container 10. Similarly, the electronic anode 30 may be of a cylindrical rod-shaped structure that predominantly composed of conductive element and is capable of connecting to a power source. For example, the electronic anode 30 may be a pure titanium electronic anode 30. Moreover, the electronic anode 30 may release anode ions by being connected to the power source and may protect the cathode as the container 10.

[0037] Referring to FIG. 1 and FIG. 2, in some implementations, each container 10 has a mounting hole 11. The water heater 100 includes a mounting member 40 that is mounted in the mounting hole 11. The magnesium rod 20 and the electronic anode 30 are each mounted on the mounting member 40.

[0038] In this way, the mounting hole 11 of the container 10 can be used for accommodating the magnesium rod 20 and the electronic anode 30. The mounting member 40 may provide a common mounting component for the magnesium rod 20 and the electronic anode 30. The magnesium rod 20 and the electronic anode 30 are mounted on the mounting member 40, thereby facilitating synchronous and convenient mounting of the magnesium rod 20 and the electronic anode 30 into the mounting

hole 11 of the container 10.

[0039] In an exemplary embodiment of the present disclosure, the mounting hole 11 of the container 10 may be located at an end of the container 10 in a length direction of the container 10. The mounting hole 11 may be located at an opening of the container 10. The mounting hole 11 may have a circular or elliptical cross section. A size of an aperture of the mounting hole 11 may be greater than that of an end of the mounting member 40 on which the magnesium rod 20 and the electronic anode 30 are mounted. In this way, insertion of each of the magnesium rod 20 and the electronic anode 30 on the mounting member 40 can be facilitated. The mounting member 40 may be a disc-shaped part, may be used for mounting and fixing the magnesium rod 20 and the electronic anode 30, and may be connected to a position of the mounting hole 11 of the container 10 and may seal the connection position. For example, the mounting member 40 may be a flat welding flange, a threaded flange, and the like.

[0040] The mounting member 40 may be of a flat disc-shaped structure. The mounting member 40 may be reserved with a part that is connected to a device such as the magnesium rod 20 and the electronic anode 30. The magnesium rod 20 may be connected to the mounting member 40 in a direction vertical to a plane where the mounting member 40 is located. The magnesium rod 20 may be fixedly connected to the mounting member 40 through screws. Similarly, the electronic anode 30 may also be connected to the mounting member 40 in a direction vertical to the plane where the mounting member 40 is located. A connection manner between the electronic anode 30 and the mounting member 40 may be a fixed connection through a fixing base.

[0041] Referring to FIG. 1 and FIG. 2, in some implementations, the mounting member 40 is provided with an insulating bottom support 41. The electronic anode 30 is fixed on the insulating bottom support 41.

[0042] The insulating bottom support 41 has an insulation characteristic, which can isolate the electronic anode 30 from the mounting member 40. The insulating bottom support 41 may improve a level position of the electronic anode 30 away from the mounting hole 11 of the container 10. The insulating bottom support 41 may cause the electronic anode 30 to be unable to be directly connected to the container 10 after deposition of magnesium shavings, water scale, or the like resulting from long-term use of the magnesium rod 20 and the electronic anode 30.

[0043] In an exemplary embodiment of the present disclosure, the insulating bottom support 41 may be made of an insulation material, which may be rubber, plastic, or the like. The insulating bottom support 41 may be of a circular-ring columnar structure. The electronic anode 30 may be fixed to a middle part of the insulating bottom support 41. The insulating bottom support 41 may be disposed between the electronic anode 30 and the mounting member 40. The electronic anode 30 may be fixed on the insulating bottom support 41. Further, the

electronic anode 30 is fixed on the mounting member 40 through the insulating bottom support 41 again.

[0044] Referring to FIG. 1 and FIG. 2, in some implementations, a first insulating member 51 is provided between the mounting member 40 and an inner wall of the mounting hole 11. The first insulating member 51 seals a gap between the mounting member 40 and the mounting hole 11. The first insulating member 51 is disposed around the magnesium rod 20 and the electronic anode 30.

[0045] The first insulating member 51 is disposed between the mounting member 40 and the mounting hole 11 of the container 10, which can isolate the container 10 from the mounting member 40, to ensure insulation of a contact position between the mounting hole 11 of the container 10 and the mounting member 40. Therefore, conduction between the container 10 and the mounting member 40 caused by an insulation problem is avoided. Moreover, operation stability of the heater is improved.

[0046] In an exemplary embodiment of the present disclosure, the first insulating member 51 may be a basin-shaped member made of an insulation material such as rubber. The magnesium rod 20 and the electronic anode 30 may pass through the first insulating member 51 and the first insulating member 51 is sandwiched between the mounting member 40 and the mounting hole 11 of the container 10. Further, an end that faces away from the mounting member 40 and is mounted with the magnesium rod 20 and the electronic anode 30 may be placed into the container 10 from the mounting hole 11 of the container 10. The mounting member 40 may be attached to the mounting hole 11 of the container 10. Two surfaces of an edge of the first insulating member 51 may be tightly attached to the container 10 and the mounting member 40, respectively.

[0047] Referring to FIG. 1 and FIG. 2, in some implementations, the water heater 100 further includes a pressing member 50. The pressing member 50 is connected to the container 10 through fasteners 60 and presses the mounting member 40.

[0048] In this way, the pressing member 50 can press an upper end surface of the mounting member 40 and press the mounting member 40 at the position of the mounting hole 11 of the container 10 under the action of the fastener 60. In addition, the pressing member 50 may provide functions of mounting and pressing, such that the mounting member 40 can be made better pressed and mounted at the position of the mounting hole 11 of the container 10.

[0049] In an exemplary embodiment of the present disclosure, the pressing member 50 may match a shape and structure of the mounting member 40. The pressing member 50 may be matched and attached with the mounting member 40. The mounting member 40 and the pressing member 50 can be tightly pressed together under fastening of the fastener 60, and the mounting member 40 and the pressing member 50 can be pressed and

fixed at the position of mounting hole 11 of the container 10 under the fastening of the fastener 60.

[0050] Referring to FIG. 1 and FIG. 2, in some implementations, a second insulating member 52 is provided between the pressing member 50 and the mounting member 40.

[0051] In this way, the second insulating member 52 can isolate the mounting member 40 from the pressing member 50, to ensure insulativity between the container 10 and the mounting member 40. Moreover, the second insulating member 52 can also protect sealing of a part of the mounting member 40 facing towards the pressing member 50.

[0052] In an exemplary embodiment of the present disclosure, the second insulating member 52 may have a similarly structural form to that of the mounting member 40 and the pressing member 50. The second insulating member 52 may be in a flat shape and may have a certain contact area and thickness. The second insulating member 52 may be made of an insulation material such as rubber or plastic. The second insulating member 52 may be sandwiched between the mounting member 40 and the pressing member 50. The pressing member 50 may first press the mounting member 40 at intervals through the second insulating member 52, and then press and mount the mounting member 40 at the position of the mounting hole 11 of the container 10 through the fastener 60.

[0053] Referring to FIG. 1 and FIG. 2, in some implementations, a third insulating member 53 is disposed between the pressing member 50 and the fastener 60.

[0054] In this way, the third insulating member 53 can be sandwiched between the pressing member 50 and the fastener 60, to allow the fastener 60 to be spaced apart from the pressing member 50 and the mounting member 40. Therefore, the fastener 60 is allowed to be only in a contact connection with an exterior of the container 10. Moreover, the insulativity between the container 10 and the mounting member 40 can be ensured.

[0055] In an exemplary embodiment of the present disclosure, the fastener 60 may be a fixing device for fastening the pressing member 50 and the mounting member 40 at the same time to the position of the mounting hole 11 of the container 10 through a fastening position on the pressing member 50. The fastener 60 may adopt a connection fastening manner of a stud and a nut. For example, when the fastener 60 is in a fastening manner in which the stud and the nut are fitted to each other, the stud may be disposed around the mounting hole 11 of the container 10. Then, the third insulating member 53 may be inserted into the fastening position of the pressing member 50 and the mounting member 40, and then pass through the stud. Further, the pressing member 50 and the mounting member 40 may be pressed and mounted at the position of the mounting hole 11 of the container 10 through a threaded fastening connection between the nut and the stud.

[0056] Referring to FIG. 1 and FIG. 2, in some implementations, the water heater 100 further includes a heat-

ing member 70. The heating member 70 is mounted on the mounting member 40 and located in the container 10. In some implementations, the water heater 100 further includes a temperature measurer 71. The temperature measurer 71 is mounted on the mounting member 40 and located in the container 10. In this way, the water heater 100 may heat water stored in the container 10 through the heating member 70 located in the container 10, and may also monitor a temperature of the water stored in the container 10 through the temperature measurer 71 located in the container 10. Further, functions of water temperature adjustment, energy conservation, and the like of the water heater 100 can be realized.

[0057] In an exemplary embodiment of the present disclosure, the heating member 70 of the water heater 100 may be connected to the mounting member 40. The heating member 70 is located at a position on the mounting member 40 close to the magnesium rod 20 and the electronic anode 30. After energized, the heating member 70 can heat the water in the container 10. The heating member 70 may be a heating pipe made of stainless steel or a copper material. Further, the heating pipe may be in the form of a single-pipe heating pipe, a double-pipe heating pipe, a vortex-type heating pipe, or the like. The temperature measurer 71 may be a metal element having a temperature sensor. The temperature measurer 71 may be close to a position of the heating member 70 mounted on the mounting member 40. In this way, measurement of a water temperature in the core of the container 10 can be facilitated.

[0058] Referring to FIG. 3 to FIG. 5, in some implementations, the water heater 100 includes a plurality of switches 90 and an electronic control module 80. The plurality of switches 90 has a one-to-one correspondence with the plurality of electronic anodes 30. The electronic control module 80 is configured to control position switching of at least one of the plurality of switches 90, enabling one of the electronic anode 30 and the magnesium rod 20 in a same container 10 to be electrically connected to the container 10.

[0059] In the water heater 100, the switch 90 can be controlled through the electronic control module 80. In different cases, an anode or an electronic anode 30 may be sacrificed to perform corrosion protection on the container 10. Therefore, purposes of reducing a loss of the sacrificial anode, prolonging the service life of the container 10, and lowering water pollution are realized.

[0060] In an exemplary embodiment of the present disclosure, the water heater 100 may be a double-container water heater 100. The double-container water heater 100 may have two containers 10. When the water heater 100 is a double-container water heater 100, one electric control module 80 may be provided for the water heater 100. The one electronic control module 80 may control the switch 90, and two switches 90 may be provided, i.e., one electronic control module 80 may control the two switches 90. One of the two switches 90 may control an electrical connection of one container 10 in the double-

container water heater 100 to the magnesium rod 20 and the electronic anode 30 in the container 10. Similarly, the other one of the two switches 90 may control an electrical connection of the other container 10 in the double-container water heater 100 to the magnesium rod 20 and the electronic anode 30 in the container 10.

[0061] Referring to FIG. 3 to FIG. 5, in some implementations, the electronic control module 80 is configured to: in response to the electronic anode 30 being electrically connected to the corresponding container 10, detect a potential value in the container 10 through the electronic anode 30, and apply a predetermined voltage to the electronic anode 30 based on the potential value. The potential value is inversely related to the predetermined voltage.

[0062] In this way, the electronic control module 80 adjusts and outputs the predetermined voltage applied to the electronic anode 30 based on a size of the measured potential value in the container 10. Therefore, it can be realized that the potential value of the container 10 is stabilized at a corrosion-stop level, to protect the container 10 to be stable and from being corroded. Meanwhile, an improper predetermined voltage can be prevented from being applied to the electronic anode 30. Further, a service life of the electronic anode 30 and the service life of the container 10 are prolonged.

[0063] In an exemplary embodiment of the present disclosure, in one embodiment (as illustrated in FIG. 4), the water heater 100 may be an upright double-container water heater 100. When the upright double-container water heater 100 is used, two containers 10 are vertically arranged and installed side by side. Moreover, bottoms of the two containers 10 may be connected to each other through a connection pipe 12. An end of a container 10 may be mounted with an electronic anode 30 and a magnesium rod 20. An end of the other container 10 may be mounted with an electronic anode 30 and a magnesium rod 20. The container 10, the electronic anode 30, and the magnesium rod 20 may be each electrically connected to the electronic control module 80 through the connection wire 81.

[0064] In another embodiment (as illustrated in FIG. 5), the water heater 100 may be a horizontal double-container water heater 100. When the horizontal double-container water heater 100 is used, an upper container 10 and a lower container 10 are horizontally installed side by side. Moreover, middle parts of the upper container 10 and the lower container 10 are connected through two connection pipes 12. An electronic anode 30 and a magnesium rod 20 may be mounted at an end of a container 10. An electronic anode 30 may be mounted at an end of the other container 10 and a magnesium rod 20 may be mounted on a lower part of the other container 10. The container 10, the electronic anode 30, and the magnesium rod 20 may each be electrically connected to the electronic control module 80 through the connection wire 81.

[0065] After the two containers 10 are filled with water,

a voltage may be inputted to the electric control module 80, with a numerical value ranging from 3V to 10V. The electric control module 80 may be started. The electric control module 80 may control a relay, to enable the container 10 to be communicated with the electronic anode 30, and output the predetermined voltage with a numerical value in a range from 0.2V to 8V. A tank pressure is applied to the electronic anode 30 and the container 10. Cathode polarization currents are provided to the two containers 10, respectively. The electric control module 80 adjusts an output voltage on the electronic anode 30 based on the measured potential value, which enables each of the potential values of the two containers 10 to be stabilized at the corrosion-stop level.

[0066] The potential value is inversely related to the predetermined voltage. It can be understood that, for example, when the potential value of the container 10 measured by the electronic control module 80 is 900 mV, it indicates a stable corrosion-stop level. When the potential value of the container 10 measured by the electronic control module 80 is smaller than 900 mV, the container 10 may be susceptible to corrosion. Moreover, the electronic control module 80 may adjust the predetermined voltage inputted to the electronic anode 30, such as raising from 500 mV to 1000 mV. Therefore, the electronic anode 30 can improve its output, enabling the potential value of the container 10 to be increased to 900 mV, and the container 10 can be at the stable corrosion-stop level. Similarly, when the potential value of the container 10 measured by the electronic control module 80 is greater than 900 mV, the container 10 can be susceptible to corrosion. The electronic control module 80 can adjust the predetermined voltage inputted to the electronic anode 30, such as reducing from 1000 mV to 500 mV. Therefore, the electronic anode 30 can reduce the output, enabling the potential value of the container 10 to be reduced to 900 mV. Moreover, the container 10 can be at the stable corrosion-stop level.

[0067] Referring to FIG. 3 to FIG. 5, in some implementations, the electronic control module 80 is further configured to: control, in response to the potential value being abnormal, the position switching of the switch 90 to disconnect the electronic anode 30 from the container 10, and enable the magnesium rod 20 to be electrically connected to the corresponding container 10; and/or stop applying a voltage to the electronic anode 30; and/or transmit an alarm signal of the corresponding container 10.

[0068] In this way, the water heater 100 can control the switch 90 to disconnect an electrical connection between the electronic anode 30 and the container 10 by the electronic control module 80 detecting abnormality of the potential value, e.g., in cases where the water heater 100 is powered off, where the electronic anode 30 fails, and the like. The magnesium rod 20 is used to perform corrosion protection on the container 10 and an alarm signal is transmitted. In this way, the purpose of reducing the loss of the magnesium rod 20, prolonging the service

life of the container 10, and lowering the water pollution can be realized. The electronic control module 80 is configured to transmit an alarm signal to improve safety during operation of the water heater 100.

[0069] In an exemplary embodiment of the present disclosure, when the electric control module 80 detects that a potential value of one of the containers 10 is in a fault state, the electric control module 80 may immediately stop outputting the predetermined voltage to the electronic anode 30 in the container 10, and then process a fault of an assembly of the container 10 and the electronic anode 30. The electronic anode 30 may be disconnected from the container 10 and the magnesium rod 20 may be connected to the container 10, such that the magnesium rod 20 is used for performing corrosion protection on the container 10. At the same time, the electric control module 80 may also transmit an alarm signal synchronously and independently. It can be understood that the electronic anode 30 in the other container 10 and the other container 10 are unaffected, and the electronic anode 30 continuously protects the other container 10.

[0070] For example, when the electric control module 80 is powered off or the potentials of the two containers 10 are each detected to be in the fault state, the two electronic anodes 30 are disconnected from the two containers 10. Moreover, the two containers 10 are respectively connected to the corresponding magnesium rods 20, to continuously protect the two containers 10.

[0071] For example, when the potential value of the container 10 exceeds 1200 mV, it indicates that the container 10 is in the fault state. When the electronic control module 80 detects that the potential value of the container 10 exceeds 1200 mV, the electronic control device may output the predetermined voltage that is lowered to zero the electronic anode 30 in the container 10 and transmit an alarm signal. Moreover, the electronic control device may further control the switch 90 to disconnect the connection between the electronic anode 30 and the container 10.

[0072] Referring to FIG. 3 to FIG. 5, in some implementations, the electronic control module 80 is configured to: detect the potential value in the container 10 every predetermined time duration; reduce, in response to the potential value being greater than a threshold, a time duration of applying a voltage to the electronic anode 30; and increase, in response to the potential value being smaller than the threshold, the time duration of applying the voltage to the electronic anode 30. The time duration of applying the voltage to the electronic anode 30 is equal to the predetermined time duration.

[0073] In this way, the electronic control module 80 further adjusts a time duration of the voltage applied to the electronic anode 30 based on a comparison between a threshold and the potential value detected by the container 10 within a predetermined time duration, to stabilize the potential value of the container 10 at the corrosion-stop level. Therefore, the container 10 is protected to be stable and from being corroded. Meanwhile, appli-

cation of an abnormal time duration of the voltage on the electronic anode 30 can be prevented. Further, the service life of the electronic anode 30 and the service life of the container 10 are affected.

[0074] In an exemplary embodiment of the present disclosure, after the two containers 10 are filled with water, the electric control module 80 may detect the potential value of the container 10 in the predetermined time duration. For example, a threshold of the potential value may be 900 mV. The electric control module 80 may keep the potential value of the container 10 stable at the threshold when applying a fixed voltage of 1000 mV to the electronic anode 30 for a time duration of 5 minutes. When the electric control module 80 detects that the potential value of the container 10 is 1200 mV within 5 minutes, the potential value of the container 10 is greater than the threshold. Moreover, the electric control module 80 may maintain the fixed voltage of 1000 mV applied to the electronic anode 30 for a voltage time duration smaller than 5 minutes. In this way, the potential value of the container 10 can be lowered to a threshold state of 900 mV. Similarly, when the electric control module 80 detects that the potential value of the container 10 is 700 mV within 5 minutes, the potential value of the container 10 is smaller than the threshold. In addition, the electric control module 80 may maintain a voltage of 1000 mV applied to the electronic anode 30 for a voltage time duration greater than 5 minutes. In this way, the potential value of the container 10 can be increased to a threshold state of 900 mV.

[0075] Referring to FIG. 6, in a control method for a water heater 100 according to the implementations of the present disclosure, the water heater 100 includes a plurality of containers 10 and a plurality of electronic anodes 30. The plurality of containers 10 is in communication with each other. Each container 10 has at least one electronic anode 30 provided in the container 10. The control method includes the following actions.

[0076] At S1, in response to the electronic anode 30 being electrically connected to the corresponding container 10, a potential value in the container 10 is detected through the electronic anode 30.

[0077] At S2, a predetermined voltage is applied to the electronic anode 30 based on the potential value. The potential value is inversely related to the predetermined voltage.

[0078] According to the implementations of the present disclosure, the control method for the water heater 100 may adjust and output the predetermined voltage applied to the electronic anode 30 based on the size of the measured potential value in the container 10, to realize that the potential value of the container 10 is stabilized at the corrosion-stop level. Therefore, the container 10 is protected to be stable and from being corroded. Meanwhile, the improper predetermined voltage can be prevented from being applied to the electronic anode 30. Further, the service life of the electronic anode 30 and the service life of the container 10 are affected.

[0079] In an exemplary embodiment of the present disclosure, the electronic anode 30 is electrically connected to the container 10. Then, the potential value of the container 10 is detected by the electronic anode 30. Further, the predetermined voltage applied to the electronic anode 30 is adjusted by determining whether the potential value is higher or lower than a predetermined value. When the potential value is higher than the predetermined value, the predetermined voltage is lowered. When the potential value is lower than the predetermined value, the predetermined voltage is increased. The potential value is inversely related to the predetermined voltage.

[0080] Referring to FIG. 7, in some implementations, the control method further includes the following actions.

[0081] At S3, in response to the potential value being abnormal, position switching of a switch 90 is controlled to disconnect the electronic anode 30 from the container 10 and enable a magnesium rod 20 to be electrically connected to a corresponding container 10; and/or

[0082] At S4, a voltage applied to the electronic anode 30 is stopped; and/or

[0083] At S5, an alarm signal of the corresponding container 10 is transmitted.

[0084] In this way, the water heater 100 can control the switch 90 to disconnect the electrical connection between the electronic anode 30 and the container 10 by the electronic control module 80 detecting the abnormality of the potential value, e.g., in a case where the water heater 100 is powered off, where the electronic anode 30 fails, and the like. The magnesium rod 20 is used for performing corrosion protection on the container 10 and an alarm signal is transmitted. In this way, the purpose of reducing the loss of the magnesium rod 20, prolonging the service life of the container 10, and lowering water pollution can be achieved. The electronic control module 80 may also transmit an alarm signal to improve the safety during the use of the water heater 100.

[0085] In an exemplary embodiment of the present disclosure, after the potential value of the container 10 is detected through the electronic anode 30 in the actions (at S1 and S2), it may be further determined whether the potential value is in an abnormal state. Then, the electrical connection between the electronic anode 30 and the container 10 may be disconnected and a connection between the magnesium rod 20 and the corresponding container 10 may be switched into synchronously by controlling the position of the switch 90. Then, the predetermined voltage may be stopped from being applied to the electronic anode 30. Further, an alarm signal may be transmitted for the corresponding container 10

[0086] Further, it can be understood that, after the electronic control module detects and determines that the potential value is in the abnormal state, one of, two of, or all of action at S3, action at S4, and action at S5 may be performed. For example, the abnormal potential value of the container 10 is greater than 2000m V. When the electrical control module 80 detects that the potential val-

ue of the container 10 is 2500 mV, one of action at S3, action at S4, and action at S5 may be performed, i.e., the electronic control module 80 may control a control switch 90 to disconnect the electrical connection between the electronic anode 30 and the container 10 and be switched into a connection between the magnesium rod 20 and the corresponding container 10 or stop applying a predetermined voltage to the electronic anode 30 or transmit an alarm signal for the corresponding container 10.

[0087] Similarly, two of action at S3, action at S4 and action at S5 may be performed, i.e., the electronic control module 80 may control the control switch 90 to disconnect the electrical connection between the electronic anode 30 and the container 10 and be switched into a connection between the magnesium rod 20 and the corresponding container 10 and stop applying a predetermined voltage to the electronic anode 30. Alternatively, the electronic control module 80 may control the control switch 90 to disconnect the electrical connection between the electronic anode 30 and the container 10 and be switched into a connection between the magnesium rod 20 and the corresponding container 10 and transmit an alarm signal for the corresponding container 10 at the same time. Alternatively, the electronic control module 80 stops applying a predetermined voltage to the electronic anode 30 and transmits an alarm signal for the corresponding container 10 at the same time.

[0088] Similarly, all of action at S3, action at S4, and action at S5 may be performed, i.e., the electronic control module 80 may control the control switch 90 to disconnect the electrical connection between the electronic anode 30 and the container 10 and be switched into a connection between the magnesium rod 20 and the corresponding container 10, and stop applying a predetermined voltage to the electronic anode 30, and transmit an alarm signal for the corresponding container 10 at the same time.

[0089] Referring to FIG. 8, in some implementations, the control method further includes the following actions.

[0090] At S6, the potential value in the container 10 is detected every predetermined time duration.

[0091] At S7, in response to the potential value being greater than a threshold, a time duration of applying a voltage to the electronic anode 30 is reduced and a time duration of applying the voltage to the electronic anode 30 is equal to the predetermined time duration. In response to the potential value being smaller than the threshold, the time duration of applying the voltage to the electronic anode 30 is increased and a time duration of applying the voltage to the electronic anode 30 is equal to the predetermined time duration.

[0092] In this way, the electronic anode 30 serves as a reference electrode and measures real-time potential of the container 10 by taking a predetermined time duration as a interval. After comparing a measured potential value of the container 10 with the threshold, the time duration of applying the voltage to the electronic anode 30

is adjusted in time, such that the potential of the container 10 is made at the corrosion-stop level. Moreover, the potential of the container 10 can be dynamically adjusted and always maintained within a protection potential range by continuously the above actions in the loop. When a fault occurs, the fault can be identified and a fault mode is entered. Moreover, the fault is processed, and a standby device is used to protect the container 10, enabling the container 10 to be each protected in various cases. Moreover, operation processes of the plurality of electronic anodes 30 are independent from each other and do not interfere with each other. Therefore, the plurality of containers 10 can be protected concurrently.

[0093] In an exemplary embodiment of the present disclosure, the potential value in the container 10 may be detected once within a predetermined time duration. Then, the time duration of applying the voltage to the electronic anode 30 may be reduced in response to the potential value being greater than the threshold. The time duration of applying the voltage to the electronic anode 30 may be increased in response to the potential value being smaller than the threshold. At this time, the time duration of applying the voltage to the electronic anode 30 is equal to the predetermined time duration.

[0094] In an implementation (as illustrated in FIG. 9 and referring to FIG. 3 to FIG. 5), in a case where the electronic anode 30 is electrically connected to the corresponding container 10, the electronic anode 30 runs a start-up mode, on-off of a predetermined time duration is performed to the container 10 and the electronic anode 30 through the electronic control device 80, and the potential value in the container 10 is detected. After operating a detection period T_j with the predetermined time duration, the electronic anode 30 detects the potential value U_t at time point T_j . It is determined whether U_t is in the fault state. When the U_t is in the fault state, fault is directly processed by adopting one or more of execution actions in action at S3, action at S4, and action at S5. For example, the control switch 90 may disconnect the electrical connection between the electronic anode 30 and the container 10, may use the magnesium rod 20 to perform corrosion protection on the container 10, may transmit an alarm signal, and use other fault processing. Then, the container 10 can be protected by using the standby device, and the standby device may use a processing mode such as using a standby magnesium rod or an electronic anode to replace a fault device. When the U_t is normal, an adjustment mode is performed.

[0095] In the adjustment mode, the on-off time of the previous predetermined time duration is used for operation. A potential value U_1 of the container 10 is detected when operation in a T_j has passed. It is detected whether the U_t is in the fault state. When the U_t is in the fault state, the fault is processed, and the standby device is used to protect the container 10. When the U_t is normal, U_1 is compared with a threshold value U_0 . In response to the U_1 being greater than U_0 , the time duration of applying a voltage to the electronic anode 30 is reduced. In re-

sponse to U_1 being smaller than U_0 , the time duration of applying a voltage to the electronic anode 30 is increased. The next on-off of the predetermined time duration is performed in the next period. The potential value U_1 of the container 10 is detected again after running for a T_j . Moreover, fault determination and identification and the on time duration adjustment are performed. Accordingly, the loop realizes the protection for the container 10.

[0096] Another electronic anode 30 uses the same control method as the above-mentioned electronic anode 30, operates simultaneously, and independently protects the other container 10.

[0097] In another embodiment (as illustrated in FIG. 10 and referring to FIG. 3 to FIG. 5), in a case where the electronic anode 30 is electrically connected to the corresponding container 10, the on-off of a predetermined time duration may be performed on the container 10 and the electronic anode 30 by the electronic control device 80, and the potential value in the container 10 may be detected. The electronic anode 30 runs a start-up mode A. The start-up mode A may be that an on-off of a predetermined time duration performed by the electronic control module is smaller than an on-off of a predetermined time duration of the start-up mode in the embodiment of FIG. 9. After running a predetermined time duration of T_A , the electronic anode 30 is switched into a start-up mode B. The start-up mode B may be that an on-off of a predetermined time duration performed by the electronic control module is greater than the on-off of the predetermined time duration of the start-up mode in the embodiment of FIG. 9. A predetermined time duration of T_B is run again and then the adjustment mode is entered. In a stage between running the start-up mode A and running the start-up mode B, fault determination and identification and processing are not performed.

[0098] In the adjustment mode, the on-off time of the previous predetermined time duration is used for operation. The potential value U_1 of the container 10 is detected when operation in a potential value detection period T_j has passed. It is detected whether the U_t is in the fault state. When the U_t is in the fault state, the fault is processed and one or more of execution actions of action at S3, action at S4, and action at S5 is used. For example, the control switch 90 may disconnect the electrical connection between the electronic anode 30 and the container 10, may use the magnesium rod 20 to perform corrosion protection on the container 10, may transmit an alarm signal, and use other fault processing. The container 10 is protected by using the standby device, and the standby device may use a processing mode such as using a standby magnesium rod or an electronic anode to replace a fault device. When the U_t is normal, U_1 is compared with the threshold value U_0 . In response to the U_1 being greater than U_0 , the time duration of applying a voltage to the electronic anode 30 is reduced. In response to U_1 being smaller than U_0 , the time duration of applying a voltage to the electronic anode 30 is increased. The next on-off of the predetermined time du-

ration is performed in the next period. The potential value U1 of the container 10 is detected again after running for a Tj. Moreover, the fault determination and identification and the on time duration adjustment are performed. Accordingly, the loop realizes the protection for the container 10.

[0099] Another electronic anode 30 uses the same control method as the above-mentioned electronic anode 30, operates simultaneously, and independently protects the other container 10.

[0100] Referring to FIG. 5 to FIG. 10, a water heater 100 according to an implementation of the present disclosure includes a plurality of containers 10, a plurality of electronic anodes 30, and a controller (not shown). The plurality of containers 10 is in communication with each other. Each container 10 has at least one electronic anode 30 provided in the container 10. The controller is configured to implement the control method of the foregoing implementations.

[0101] The water heater 100 according to the implementations of the present disclosure has a controller capable of realizing a control method which includes adjusting and outputting the predetermined voltage applied to the electronic anode 30 by measuring a size of the potential value in the container 10 and stabilizing the potential value of the container 10 at the corrosion-stop level. In this way, the plurality of containers 10 of the water heater 100 is protected to be stable and from corrosion. Meanwhile, the improper application of the predetermined voltage on the electronic anode 30 can be prevented. Further, the service life of the electronic anode 30 and the service life of the container 10 are prolonged.

[0102] In an exemplary embodiment of the present disclosure, the water heater 100 realizes a control method which includes adjusting and outputting the predetermined voltage applied to the electronic anode 30 based on the size of the measured potential value of the container 10 through a controller electrically connected to the plurality of containers and the plurality of electronic anodes. The electronic anode 30 inside the water heater 100 is electrically connected to the container 10. Then, the electronic anode 30 is controlled by the controller to detect the potential value of the container 10. Then, the controller determines whether the potential value is higher or lower than the predetermined value, and further perform control operations such as a predetermined voltage adjustment applied to the electronic anode 30.

[0103] In the description of this specification, descriptions with reference to the terms "some implementations", "an implementation", "some implementations", "examples", "specific examples", or "some examples" etc., mean that specific features, structure, materials or characteristics described in conjunction with the embodiment or example are included in at least one embodiment or example of the present disclosure. In this specification, the schematic representations of the above terms do not necessarily refer to the same embodiment or example. Moreover, the described specific features, structures,

materials or characteristics may be combined in any one or more embodiments or examples in a suitable manner. In addition, those skilled in the art can combine the different embodiments or examples and the features of the different embodiments or examples described in this specification without contradicting each other.

[0104] In addition, the terms "first" and "second" are only used for descriptive purposes, and cannot be understood as indicating or implying relative importance or implicitly indicating the number of indicated technical features. Therefore, the features associated with "first" and "second" may explicitly or implicitly include at least one of the features. In the description of the present disclosure, "a plurality of" means at least two, such as two or three, unless otherwise specifically defined.

[0105] Although embodiments according to the present disclosure have been shown and described, it would be appreciated by those skilled in the art that the above embodiments are illustrative and cannot be construed to limitation on the present disclosure, and changes, alternatives, modifications, and variations can be made in the embodiments without departing from scope of the present disclosure. The scope of the present disclosure is defined by the claims and their equivalents.

Claims

1. A water heater, comprising:

a plurality of containers that are in communication with each other; and
a plurality of electronic anodes, each container having at least one electronic anode provided in the container, and the electronic anode being capable of being electrically connected to the container.

2. The water heater according to claim 1, further comprising a plurality of magnesium rods, wherein:

each container has at least one magnesium rod provided in the container; and
the container is electrically connected to:
the electronic anode, or the magnesium rod in the same container.

3. The water heater according to claim 2, wherein:

each container has a mounting hole;
the water heater comprises a mounting member mounted in the mounting hole; and
the magnesium rod and the electronic anode are each mounted on the mounting member.

4. The water heater according to claim 3, wherein:

the mounting member is provided with an insu-

- lating bottom support; and
the electronic anode is fixed on the insulating bottom support.
5. The water heater according to claim 3, wherein: 5
- a first insulating member is provided between the mounting member and an inner wall of the mounting hole;
the first insulating member seals a gap between the mounting member and the mounting hole; and
the first insulating member is disposed around the magnesium rod and the electronic anode. 10
6. The water heater according to claim 3, further comprising a pressing member connected to the container through a fastener and compressing the mounting member. 15
7. The water heater according to claim 6, wherein a second insulating member is provided between the pressing member and the mounting member. 20
8. The water heater according to claim 7, wherein a third insulation member is provided between the pressing member and the fastener. 25
9. The water heater according to claim 3, further comprising a heating member mounted on the mounting member and located in the container. 30
10. The water heater according to claim 1, further comprising: 35
- a plurality of switches having a one-to-one correspondence with a plurality of electronic anodes; and
an electric control module configured to control position switching of at least one of the plurality of switches, so as to enable the electronic anode or the magnesium rod, which are provided in a same container to be electrically connected to the container. 40
11. The water heater according to claim 10, wherein the electronic control module is configured to: in response to the electronic anode being electrically connected to the corresponding container, detect a potential value in the container through the electronic anode, and apply a predetermined voltage to the electronic anode based on the potential value, the potential value being inversely related to the predetermined voltage. 50
12. The water heater according to claim 11, wherein the electronic control module is further configured to: 55
- control, in response to the potential value being abnormal, the position switching of the switch to disconnect the electronic anode from the container and enable the magnesium rod to be electrically connected to the corresponding container; and/or
stop applying a voltage to the electronic anode; and/or
transmit an alarm signal of the corresponding container.
13. The water heater according to claim 11, wherein the electric control module is configured to:
- detect the potential value in the container every predetermined time duration;
reduce, in response to the potential value being greater than a threshold, a time duration of applying a voltage to the electronic anode; and
increase, in response to the potential value being smaller than the threshold, the time duration of applying the voltage to the electronic anode, wherein the time duration of applying the voltage to the electronic anode is equal to the predetermined time duration.
14. A control method for a water heater, the water heater comprising a plurality of containers and a plurality of electronic anodes, the plurality of containers being in communication with each other, and each container having at least one of the plurality of electronic anodes provided in the container, the control method comprising:
- detecting, in response to the electronic anode being electrically connected to the corresponding container, a potential value in the container through the electronic anode; and
applying a predetermined voltage to the electronic anode based on the potential value, the potential value being inversely related to the predetermined voltage.
15. The control method according to claim 14, further comprising: 45
- controlling, in response to the potential value being abnormal, position switching of a switch to disconnect the electronic anode from the container and enable a magnesium rod to be electrically connected to a corresponding container; and/or
stopping applying a voltage to the electronic anode; and/or
transmitting an alarm signal of the corresponding container.
16. The control method according to claim 14, further

comprising:

detecting the potential value in the container
every predetermined time duration; and
reducing, in response to the potential value be- 5
ing greater than a threshold, a time duration of
applying a voltage to the electronic anodes and
increasing, in response to the potential value be-
ing smaller than the threshold, the time duration
of applying the voltage to the electronic anode, 10
wherein the time duration of applying the voltage
to the electronic anode is equal to the predeter-
mined time duration.

17. A water heater, comprising: 15

a plurality of containers that is in communication
with each other;
a plurality of electronic anodes, each container
having at least one of the plurality of electronic 20
anodes provided in the container; and
a controller configured to implement the control
method according to any one of claims 14 to 16.

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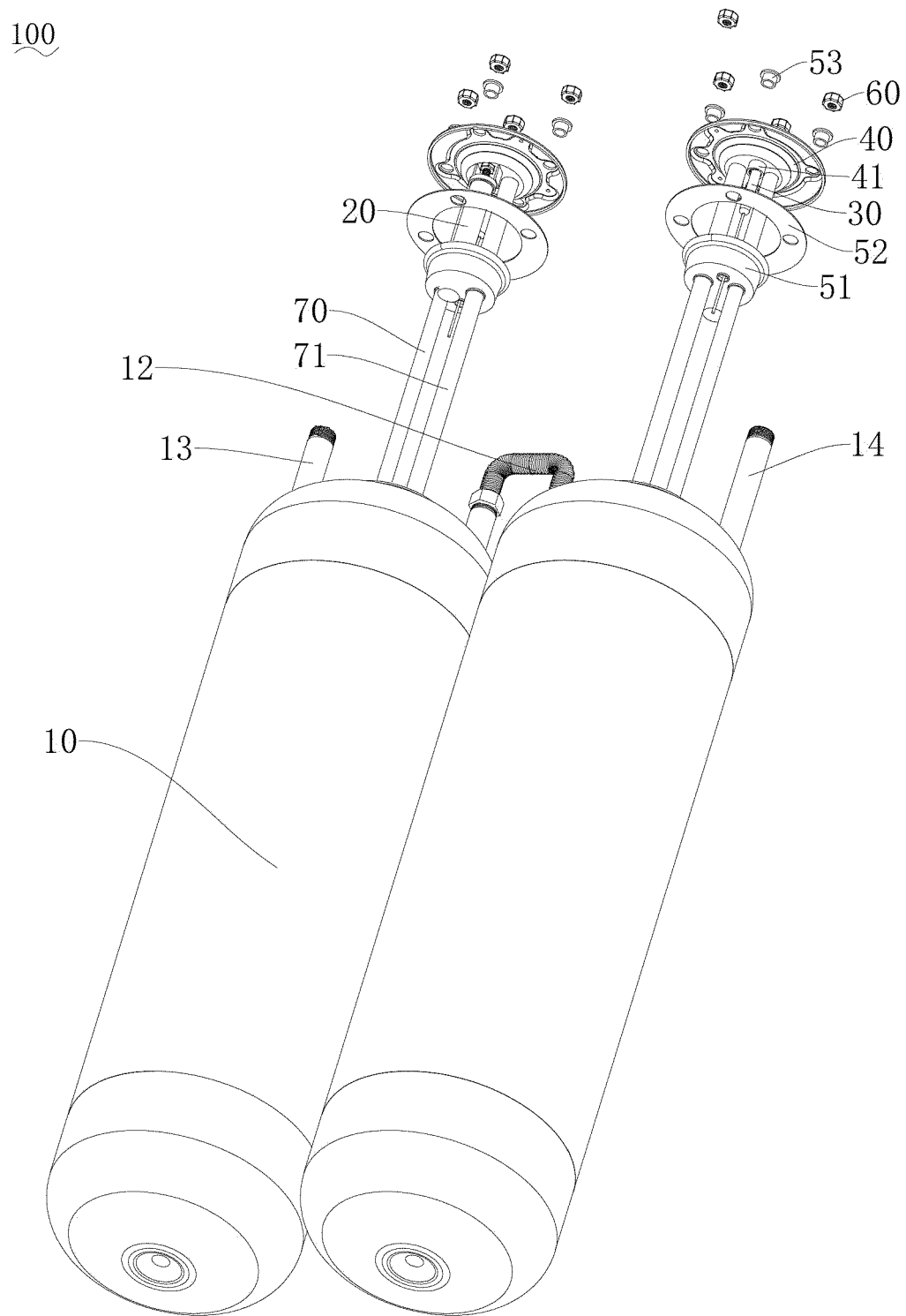


FIG. 1

100

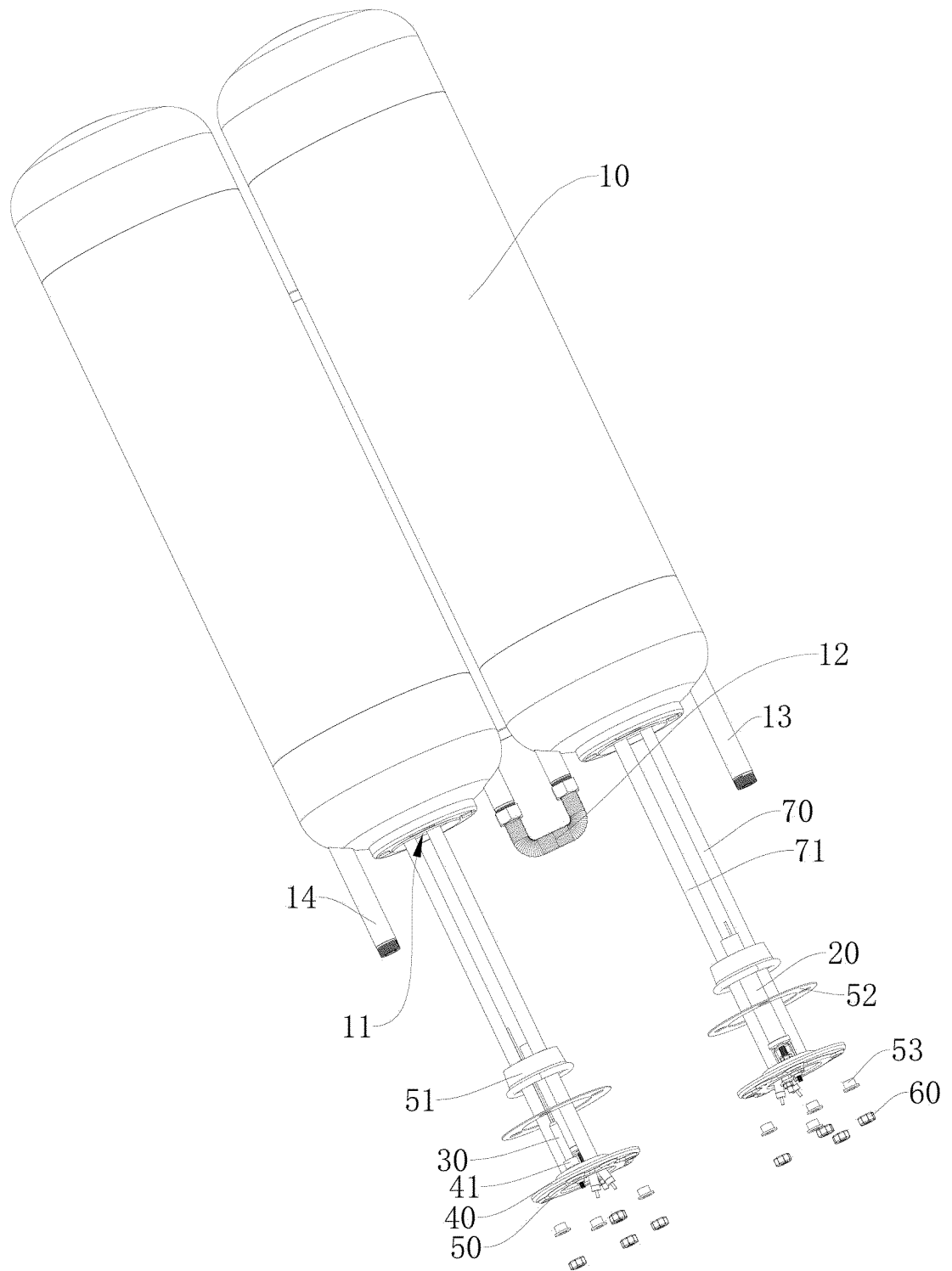


FIG. 2

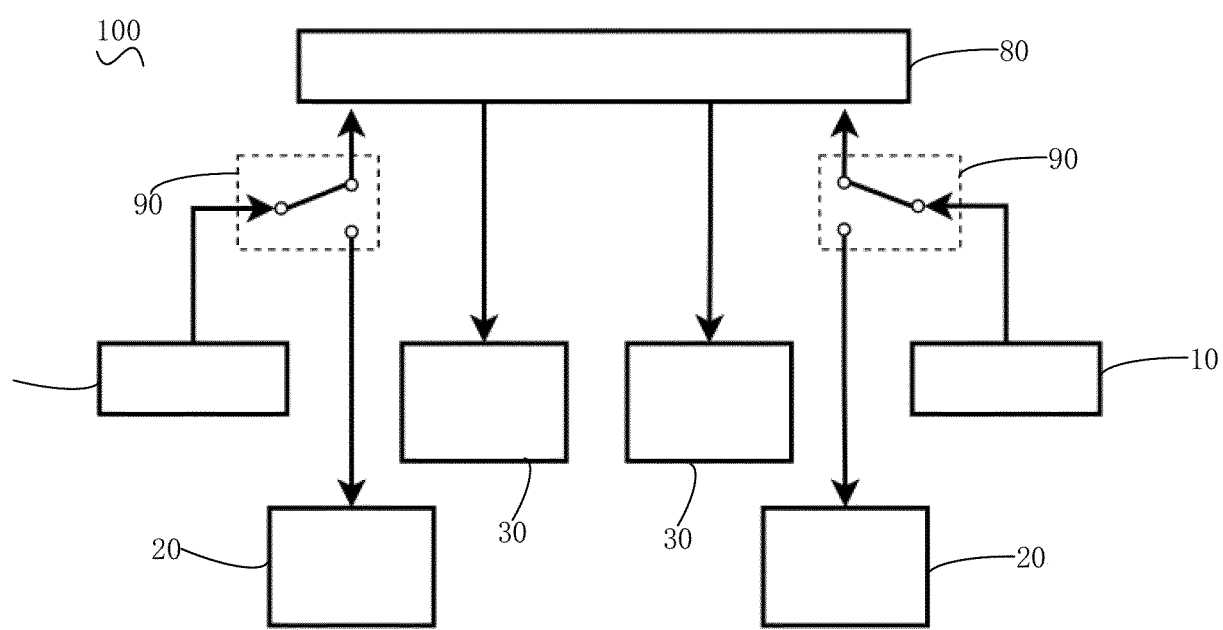


FIG. 3

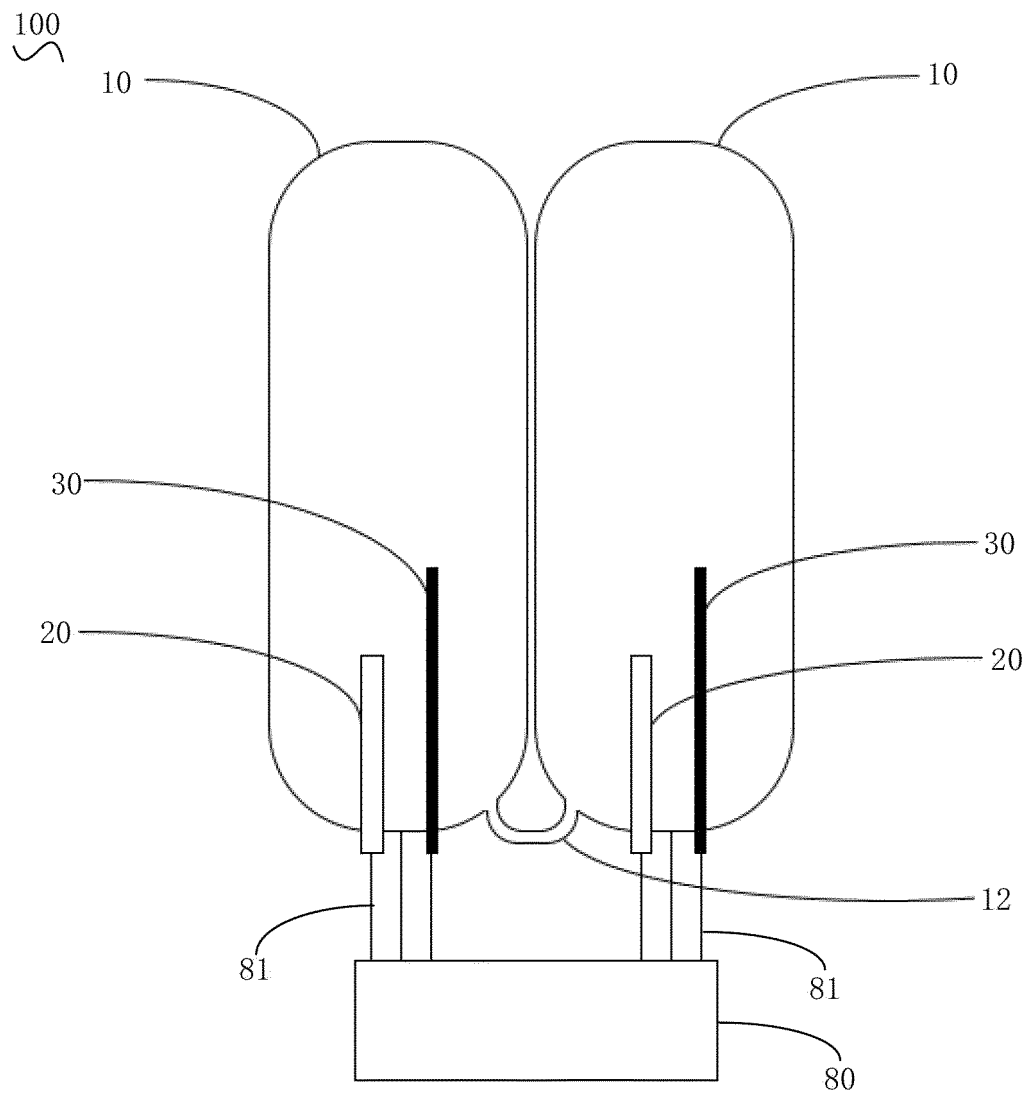


FIG. 4

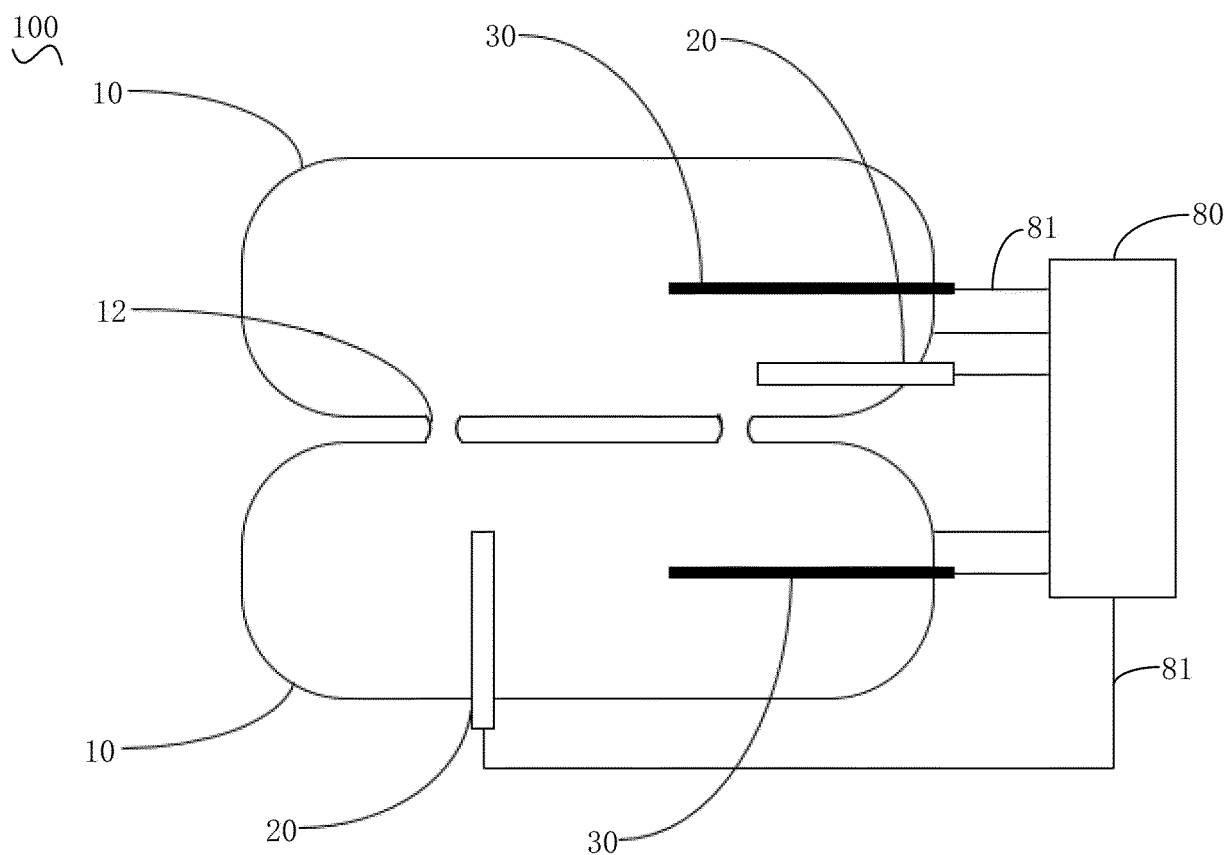


FIG. 5

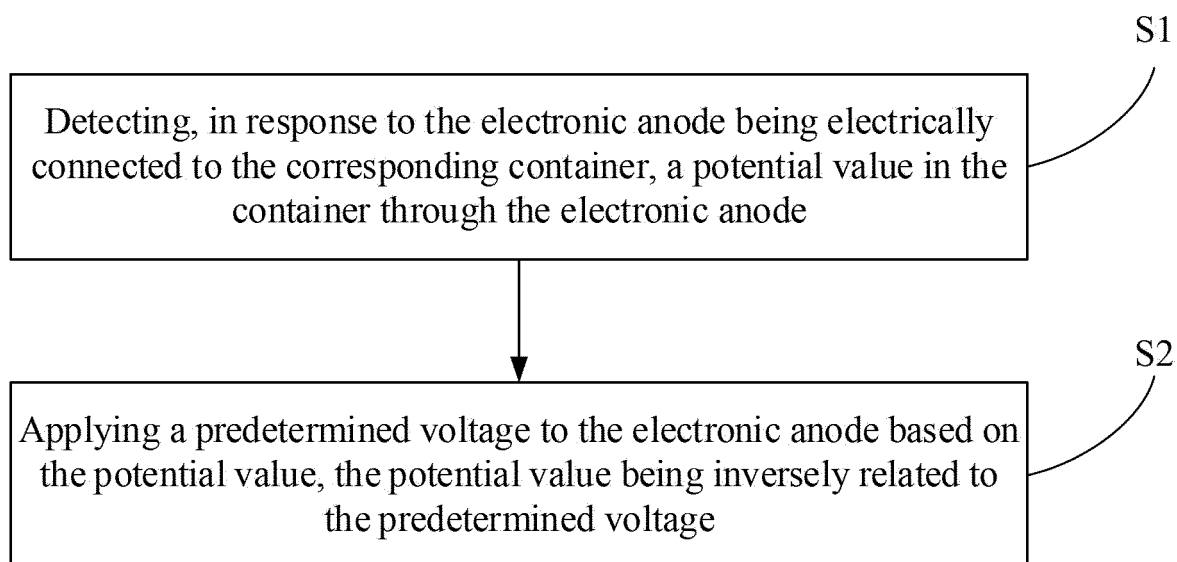


FIG. 6

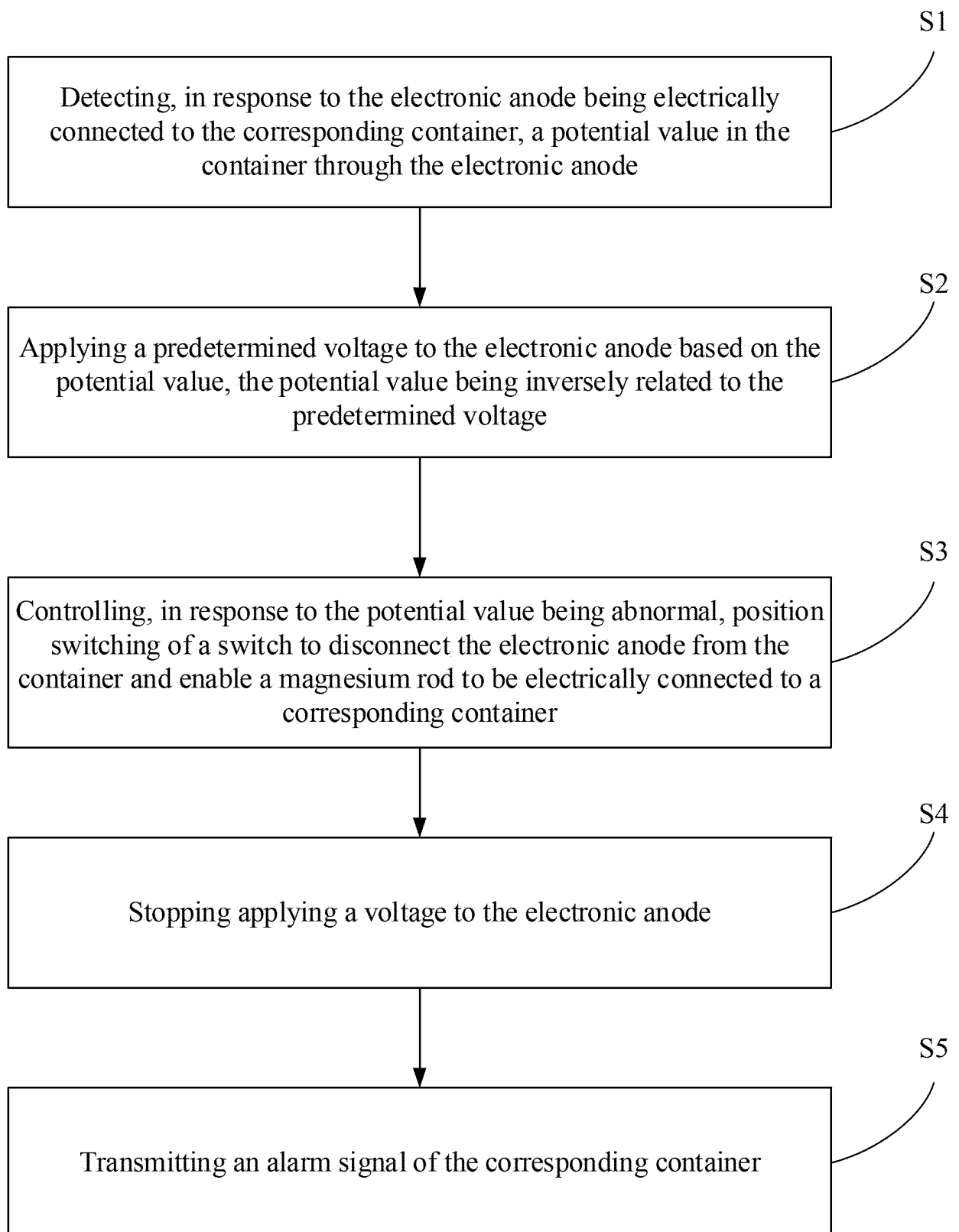


FIG. 7

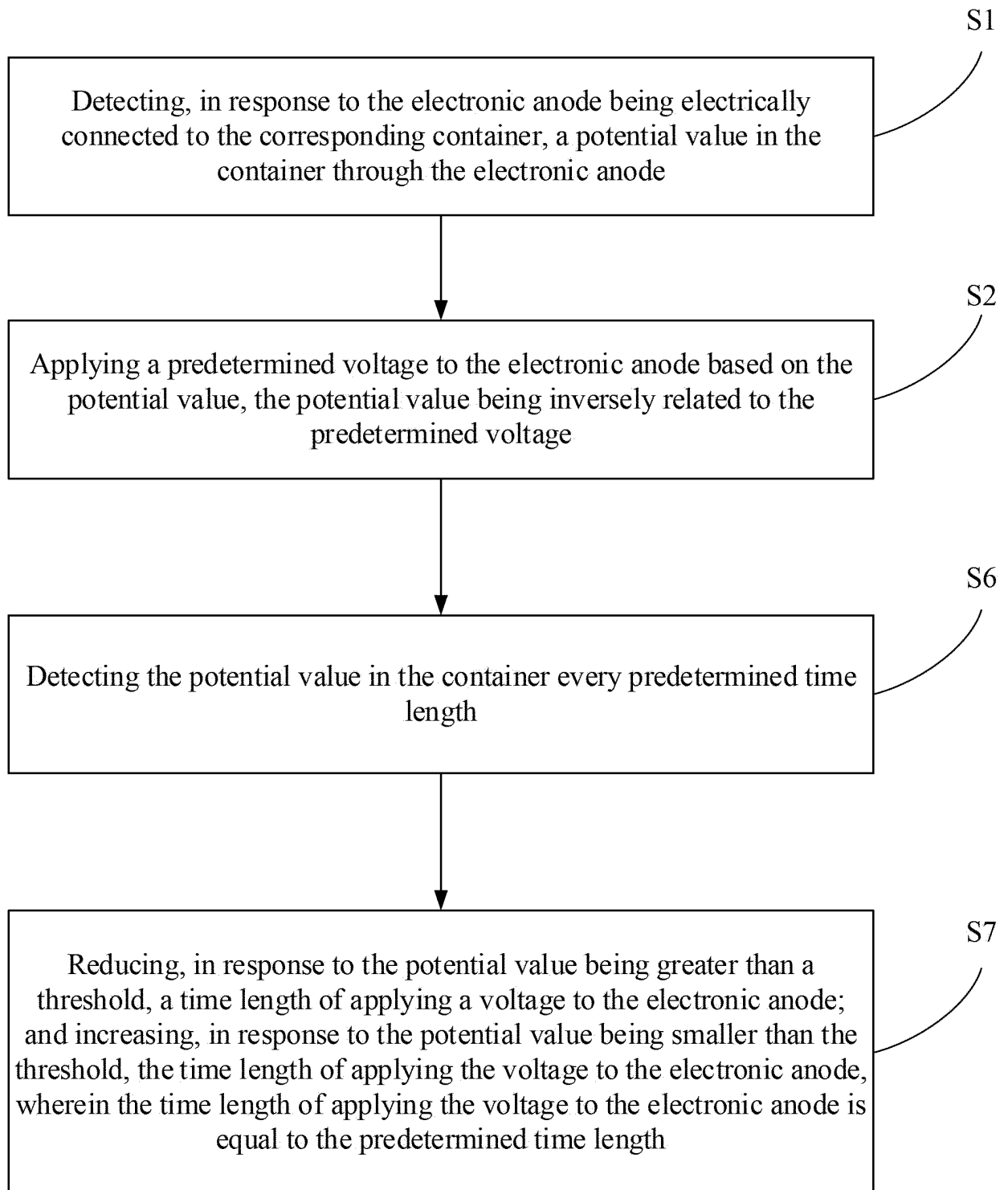


FIG. 8

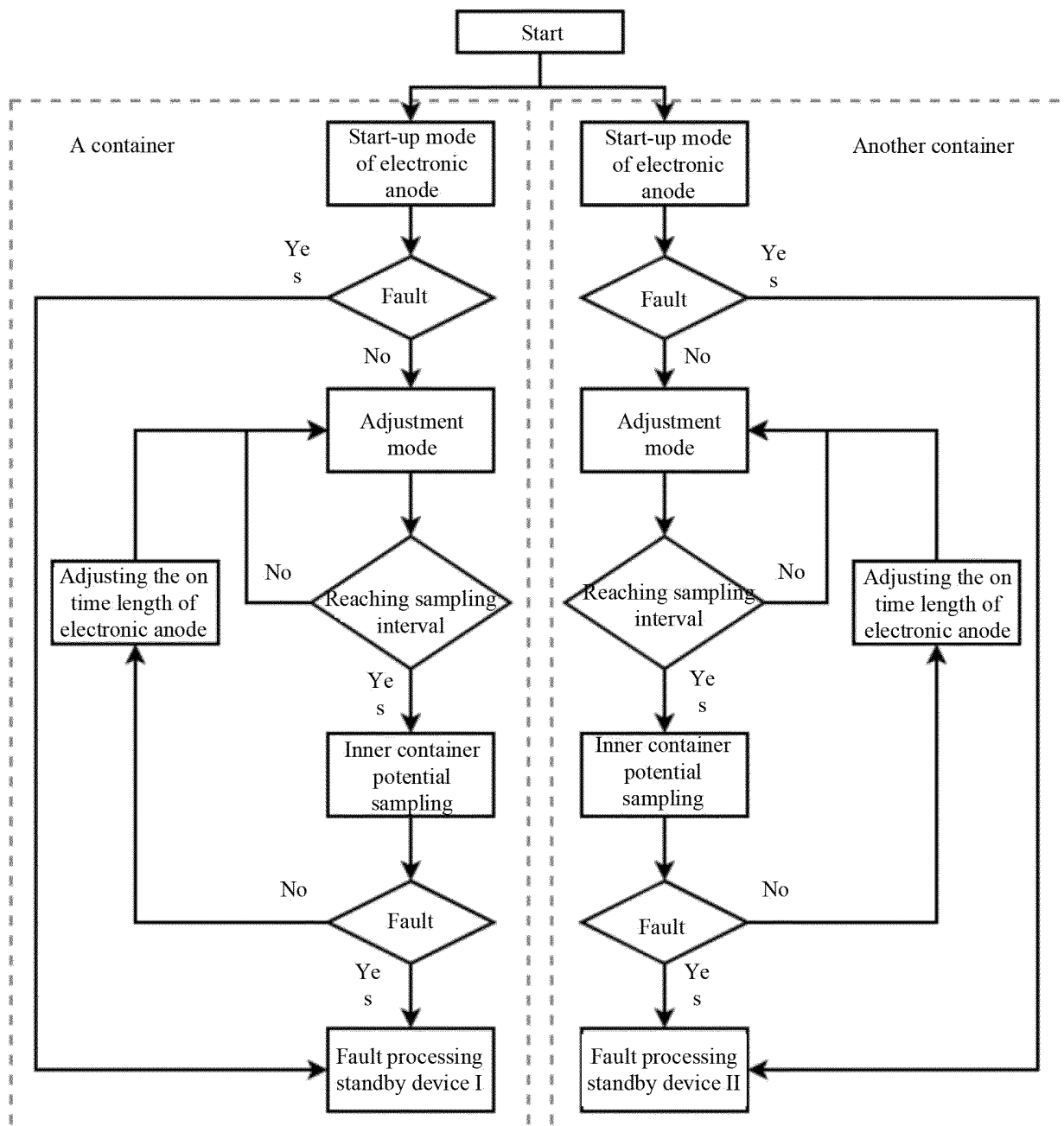


FIG. 9

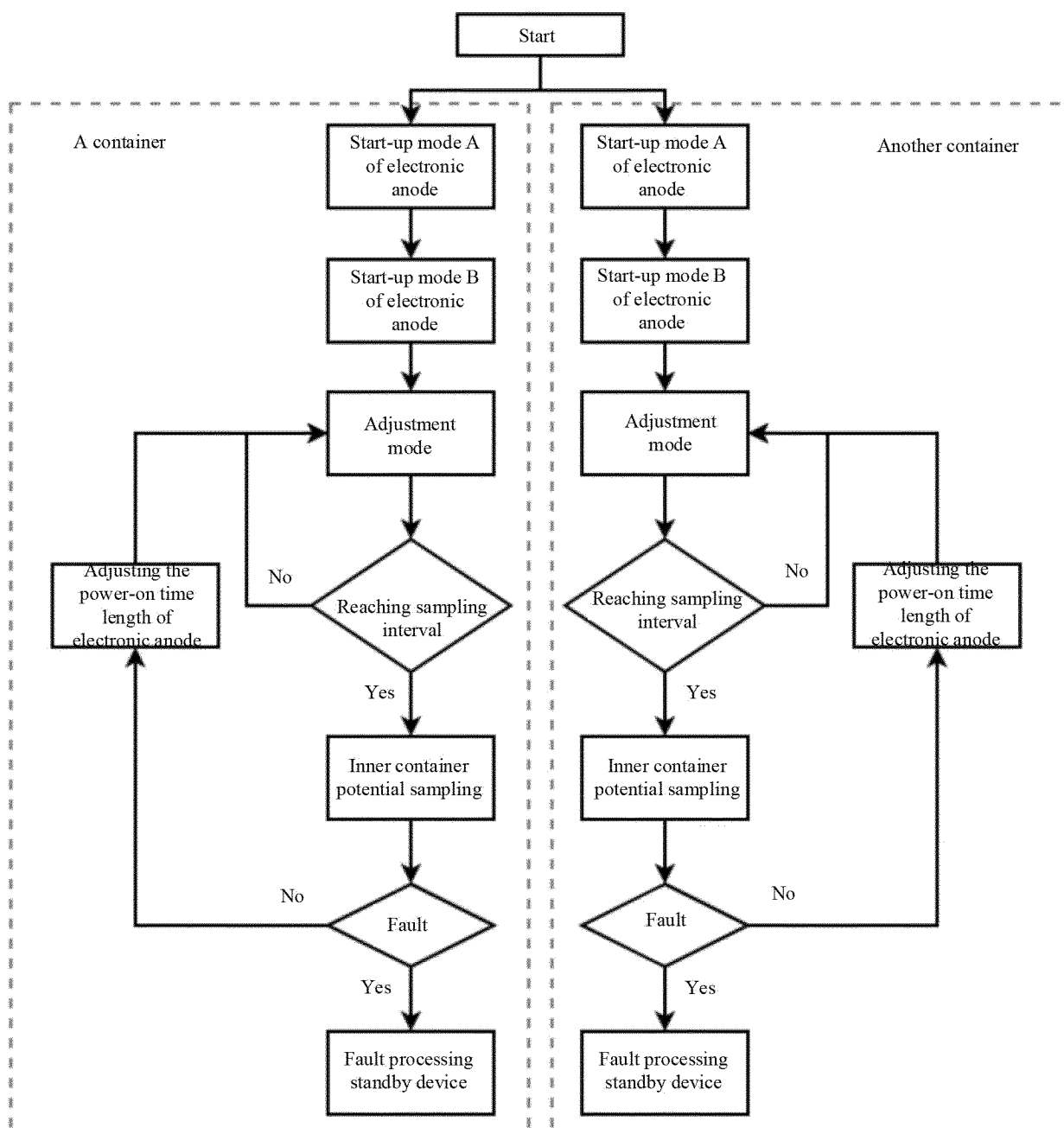


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/103081

A. CLASSIFICATION OF SUBJECT MATTER F24H 9/45(2022.01)i; F24H 9/00(2022.01)i; F24H 9/20(2022.01)i; F24H 15/421(2022.01)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) F24H9/-;F24H15/-																		
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, CJFD, DWPI, VEN, USTXT: 热水器, 内胆, 电子阳极, 镁棒, 牺牲阳极, 安装孔, 安装件, 绝缘, 压紧件, 紧固件, 开关, 电控模块, 控制模块, 电位, 电压, 异常, 报警, 保护, water, heater?, inner, tank+, electron+, anod+, magnesium, sacrificial, mount+, hole?, insulat+, switch+, control+, potential, pressure, voltage, abnorm+, alarm+, protect+																		
C. DOCUMENTS CONSIDERED TO BE RELEVANT																		
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>CN 211695424 U (WUHU MIDEA KITCHEN & BATH APPLIANCES MANUFACTURING CO., LTD.) 16 October 2020 (2020-10-16) description, paragraphs 0046-0059, and figures 1-7</td> <td>1-3, 9</td> </tr> <tr> <td>Y</td> <td>CN 211695424 U (WUHU MIDEA KITCHEN & BATH APPLIANCES MANUFACTURING CO., LTD.) 16 October 2020 (2020-10-16) description, paragraphs 0046-0059, and figures 1-7</td> <td>4-8, 10-17</td> </tr> <tr> <td>Y</td> <td>CN 208980798 U (GUANGDONG GEMAKE ELECTRIC APPLIANCE CO., LTD.) 14 June 2019 (2019-06-14) description, paragraphs 0026-0031, and figures 1-7</td> <td>4-8</td> </tr> <tr> <td>Y</td> <td>CN 104451702 A (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI) 25 March 2015 (2015-03-25) description, paragraphs 0027-0040, and figures 1-2</td> <td>10-17</td> </tr> <tr> <td>A</td> <td>CN 211695425 U (WUHU MIDEA KITCHEN & BATH APPLIANCES MANUFACTURING CO., LTD.) 16 October 2020 (2020-10-16) entire document</td> <td>1-17</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	CN 211695424 U (WUHU MIDEA KITCHEN & BATH APPLIANCES MANUFACTURING CO., LTD.) 16 October 2020 (2020-10-16) description, paragraphs 0046-0059, and figures 1-7	1-3, 9	Y	CN 211695424 U (WUHU MIDEA KITCHEN & BATH APPLIANCES MANUFACTURING CO., LTD.) 16 October 2020 (2020-10-16) description, paragraphs 0046-0059, and figures 1-7	4-8, 10-17	Y	CN 208980798 U (GUANGDONG GEMAKE ELECTRIC APPLIANCE CO., LTD.) 14 June 2019 (2019-06-14) description, paragraphs 0026-0031, and figures 1-7	4-8	Y	CN 104451702 A (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI) 25 March 2015 (2015-03-25) description, paragraphs 0027-0040, and figures 1-2	10-17	A	CN 211695425 U (WUHU MIDEA KITCHEN & BATH APPLIANCES MANUFACTURING CO., LTD.) 16 October 2020 (2020-10-16) entire document	1-17
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																
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Y	CN 208980798 U (GUANGDONG GEMAKE ELECTRIC APPLIANCE CO., LTD.) 14 June 2019 (2019-06-14) description, paragraphs 0026-0031, and figures 1-7	4-8																
Y	CN 104451702 A (GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI) 25 March 2015 (2015-03-25) description, paragraphs 0027-0040, and figures 1-2	10-17																
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.																		
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Date of the actual completion of the international search 09 December 2022	Date of mailing of the international search report 15 December 2022																	
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International application No.

PCT/CN2022/103081

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 211204441 U (WUHU MIDEA KITCHEN & BATH APPLIANCES MANUFACTURING CO., LTD.) 07 August 2020 (2020-08-07) entire document	1-17
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REFERENCES CITED IN THE DESCRIPTION

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