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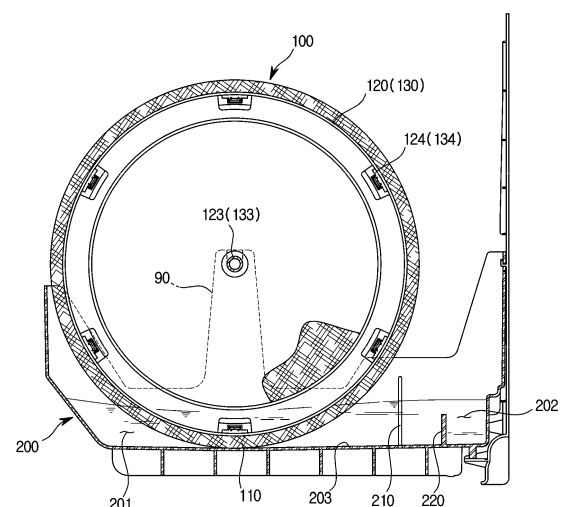
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(54) **HUMIDIFIER AND METHOD FOR CONTROLLING SAME**

(57) Disclosed herein are a humidifier and a control method of a humidifier providing with the hygienic humidification since it is possible to completely evaporate water remaining in a water tub because a humidifying element of a humidifier is disposed adjacent to the bottom of the water tub, further, since the humidifier has a structure configured to raise the humidifying element over the water surface of the water tub after the end of the humidifying operation, it is possible to provide the hygienic humidification without contamination of the humidifying element.

[Fig. 5]



Description

[Technical Field]

[0001] The present disclosure relates to an evaporative humidifier configured to perform humidification by naturally vaporizing water without using ultrasonic waves and a heater, and a control method thereof.

[Background Art]

[0002] An evaporative humidifier is provided with a humidifying element for absorbing water and a blowing fan for forcedly flowing indoor air so that the humidification is performed by allowing dry air in the indoor to pass through the humidifying element absorbing water and to be discharged to the indoor, again.

[0003] Generally, the humidifying element is rotatably provided inside a body of the evaporative humidifier, and supplied with water stored in the water tank while rotating. Conventionally, methods, in which the humidifying element is supplied with water, may be roughly classified into two types.

[0004] First, a lower portion of the humidifying element is immersed in the water of the water tub, and thus the humidifying element directly absorbs the water of the water tub. Second, the humidifying element is provided not to be immersed in water and a water pocket disposed in an outer periphery of the humidifying element is configured to pump up the water in the water tub and then supply the water to an upper portion of the humidifying element.

[0005] As for the former method, there may be a risk of reproducing fungi and bacteria because the lower portion of the humidifying element is immersed although the humidifying function is stopped. The latter method may be cleaner than the former method but, as for the both methods, since the water remains in the water tub after the humidifying function is stopped, there may be a risk of reproducing the fungi and bacteria, and the water tub may be contaminated by the remaining water.

[Disclosure]

[Technical Problem]

[0006] The present disclosure is directed to providing a humidifier having a structure in which a water tub is not contaminated by water remaining in the water tub after a humidifying operation of the humidifier is terminated, and a control method thereof

[0007] Further, the present disclosure is directed to providing a humidifier having a structure in which a humidifying element is not contaminated by water remaining in a water tub after a humidifying operation is terminated, and a control method thereof.

[Technical Solution]

[0008] One aspect of the present invention provides a humidifier including a body, a water tub provided inside of the body to store water, and a humidifying element rotatably provided inside of the body and configured to perform humidification by absorbing water from the water tub, wherein the humidifying element is disposed such that an outer circumference thereof is adjacent to a bottom of the water tub to absorb water in the bottom of the water tub.

[0009] Preferably, the humidifying element may be disposed such that an outer circumference thereof is in contact with a bottom of the water tub.

[0010] In addition, the humidifier may further include a water tank configured to supply water to the water tub, and a blocking device configured to block a water outlet of the water tank to prevent water from being supplied to the water tub.

[0011] Here, the blocking device may be disposed in the water tank or the water tub.

[0012] In addition, the water tub may include a partition configured to divide into a water supply space to which water is supplied from the water tank, and a water storage space configured to supply water to the humidifying element, and provided with an opening configured to allow water to flow from the water supply space into the water storage space; and a blocking device configured to close the opening of the partition.

[0013] In addition, the humidifier may further include a lifting device configured to raise the humidifying element.

[0014] In addition, the humidifier may further include a first cover and a second cover provided in a front side and a rear side of the humidifying element, respectively, to support the humidifying element, wherein the first cover and the second cover are formed in a disk shape having a radius less than a radius of the humidifying element.

[0015] Here, the first cover may include an elastic hook protruding toward the second cover to be coupled to the second cover. The second cover may include an insertion portion to which the elastic hook is coupled. The humidifying element may include a through hole through which the elastic hook and the insertion portion are passed.

[0016] Another aspect of the present invention provides a humidifier including a body, a water tub provided inside of the body to store water, a humidifying element rotatably provided inside of the body and configured to perform humidification by absorbing water from the water tub, and a residual water removal mode in which the humidifying element evaporates water so that the water does not remain in the water tub.

[0017] Here, the residual water removal mode may be terminated when the residual water removal is completed since the humidifying element is rotated for a certain period of time, or the residual water may be terminated by a residual water removal stop instruction of a user.

[0018] In addition, in the residual water removal mode, the humidifying element may be rotated while an outer

circumference of the humidifying element is adjacent to the bottom of the water tub in order to absorb all water remaining on the bottom of the water tub.

[0019] The humidifier may further include a blocking device configured to prevent water from being supplied to the water tub, wherein the blocking device may be operated in the residual water removal mode.

[0020] In addition, the humidifier may further include a lifting device configured to raise the humidifying element, wherein the lifting device may be operated when the residual water removal mode is terminated.

[0021] Still another aspect of the present invention provides a humidifier including: a body; a water tub provided inside of the body to store water; a humidifying element configured to perform humidification by absorbing water from the water tub; a blocking device configured to block the supply of water in the water tub; a motor configured to rotate the humidifying element; and a controller configured to perform a residual water removal mode by controlling the blocking device and the motor.

[0022] In the residual water removal mode, the humidifying element may be rotated while being adjacent to the bottom of the water tub in order to absorb water on the bottom of the water tub.

[0023] In addition, the humidifier may further include a water tank configured to supply water to the water tub. The blocking device may be disposed in the water tank or the water tub to block a water outlet of the water tank. In the residual water removal mode, the controller may control the blocking device so that the blocking device prevents water from being supplied from the water tank to the water tub by blocking the water outlet of the water tank.

[0024] In addition, the water tub may include a partition configured to divide into a water supply space to which water is supplied from the water tank, and a water storage space configured to supply water to the humidifying element, and provided with an opening configured to allow water to flow from the water supply space into the water storage space. The blocking device may be installed in the water tub to block the opening of the partition. In the residual water removal mode, the controller may control the blocking device so that the blocking device prevents water from being supplied from the water supply space to the water storage space, by blocking the opening of the partition.

[0025] In addition, in the residual water removal mode, the controller may control the blocking device so that the blocking device prevents water from further supplying to the water tub, and the controller drives the motor to rotate the humidifying element.

[0026] In addition, the controller may stop the drive of the motor when a certain period of time, in which water remaining in the water tub is completely evaporated, is expired.

[0027] In addition, the humidifier may further include a residual water detection sensor configured to detect whether water remains in the water tub. The controller

may stop the drive of the motor when remaining water is not detected by the residual water detection sensor since water remaining in the water tub is completely evaporated.

[0028] The humidifier may further include a lifting device configured to raise the humidifying element when the residual water removal mode is completed in the residual water removal mode, or when the residual water removal is stopped by a user's instruction, the controller may drive the lifting device to raise the humidifying element.

[0029] Still another aspect of the present invention provides a control method of a humidifier including performing a humidification mode by rotating a humidifying element disposed to absorb water stored in a water tub; when a residual water removal mode is started, operating a blocking device to prevent water from being supplied to the water tub; and rotating the humidifying element in a state in which the supply of water to the water tub is blocked.

[0030] In the residual water removal mode, the humidifying element may be rotated while being adjacent to the bottom of the water tub in order to absorb water on the bottom of the water tub.

[0031] In addition, the residual water removal mode may be automatically performed when the humidification mode is terminated.

[0032] The control method may include stopping the rotation of the humidifying element when a certain period of time, in which all the remaining water of the water tub is evaporated, is expired by counting a period of time from when the residual water removal mode is started.

[0033] In addition, the humidifier may further include a residual water detection sensor configured to detect whether water remains in the water tub, wherein the control method may include stopping the rotation of the humidifying element when remaining water is not detected by the residual water detection sensor since water remaining in the water tub is completely evaporated.

[0034] The residual water removal mode may be terminated when the residual water removal is completed in the water tub, or the residual water removal mode may be terminated by a residual water removal stop instruction of a user.

[0035] When the residual water removal mode is terminated, a lifting device may be operated to raise the humidifying element.

[0036] Whether to perform the residual water removal mode when the humidification mode is terminated may be preset and when the humidification mode is terminated, the residual water removal mode may be performed by determining whether the residual water removal mode is set or not.

[0037] When the humidification mode is terminated, the residual water removal mode may be performed by identifying whether to perform the residual water removal mode.

[Advantageous Effects]

[0038] A user can be provided with the hygienic humidification since it is possible to completely evaporate water remaining in a water tub because a humidifying element of a humidifier is disposed adjacent to the bottom of the water tub.

[0039] Since the humidifier has a structure configured to raise the humidifying element over the water surface of the water tub after the end of the humidifying operation, it is possible to provide the hygienic humidification without contamination of the humidifying element.

[Description of Drawings]

[0040]

FIG. 1 is a front perspective view illustrating a humidifier according to an embodiment.

FIG. 2 is a rear perspective view illustrating the humidifier of FIG. 1.

FIG. 3 is a front exploded perspective view illustrating the humidifier of FIG. 1.

FIG. 4 is an exploded perspective view illustrating the humidifier element assembly of the humidifier of FIG. 1.

FIG. 5 is a cross-sectional view illustrating the water tub and the humidifier element assembly of the humidifier of FIG. 1.

FIG. 6 is a cross-sectional view illustrating a state in which the humidifier element assembly of FIG. 5 is lifted.

FIG. 7 is a cross-sectional view illustrating the water tub and the water tank to illustrate an operation of a blocking device of the humidifier in accordance with an embodiment.

FIG. 8 is a cross-sectional view illustrating a water tub and a water tank to illustrate an operation of a blocking device of a humidifier in accordance with another embodiment.

FIG. 9 is a control block diagram illustrating the humidifier according to an embodiment.

FIG. 10 is a flowchart illustrating a control method for performing a residual water removal mode in the humidifier according to an embodiment.

FIG. 11 is a flowchart illustrating a control method in which a residual water removal stop instruction input step (405) is added to the control method of FIG. 10.

FIG. 12 is a flowchart illustrating a control method in which a step to confirm whether to perform the residual water removal mode is added to the control method of FIG. 10.

FIG. 13 is flowchart illustrating a control method in which a step to raise the humidifying element is added to the control method of FIG. 11.

FIG. 14 is flowchart illustrating a control method in which a step to raise the humidifying element is added to the control method of FIG. 12.

[Mode for Invention]

[0041] Embodiments described in the present disclosure and configurations shown in the drawings are merely examples of the embodiments of the present disclosure, and may be modified in various different ways at the time of filing of the present application to replace the embodiments and drawings of the present disclosure.

[0042] In addition, the same reference numerals or signs shown in the drawings of the present disclosure indicate elements or components performing substantially the same function.

[0043] Also, the terms used herein are used to describe the embodiments and are not intended to limit and / or restrict the present disclosure. The singular forms "a," "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. In this present disclosure, the terms "including", "having", and the like are used to specify features, numbers, steps, operations, elements, components, or combinations thereof, but do not preclude the presence or addition of one or more of the features, elements, steps, operations, elements, components, or combinations thereof.

[0044] It will be understood that, although the terms first, second, third, etc., may be used herein to describe various elements, but elements are not limited by these terms. These terms are only used to distinguish one element from another element. For example, without departing from the scope of the present disclosure, a first element may be termed as a second element, and a second element may be termed as a first element. The term of "and / or" includes a plurality of combinations of relevant items or any one item among a plurality of relevant items.

[0045] Hereinafter, exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[0046] FIG. 1 is a front perspective view illustrating a humidifier according to an embodiment, FIG. 2 is a rear perspective view illustrating the humidifier of FIG. 1, and FIG. 3 is a front exploded perspective view illustrating the humidifier of FIG. 1.

[0047] Referring to FIGS. 1 to 3, an humidifier 1 includes a body 10 forming an appearance thereof, a blowing fan 40 provided in the inside of the body 10 to forcibly

flow air, a water tub 200 provided in the inside of the body 10, and an humidifying element assembly 10 rotatably provided in the body 10 to perform the humidification by receiving the water from the water tub 200 and by evaporating the water.

[0048] The body 10 includes a main housing 11, a front cover 13 coupled to a front opening of the main housing 11, a side cover 14 coupled to a side opening of the main housing 11, and an upper cover 12 coupled to an upper portion of the housing 11.

[0049] An inlet 11a through which dry air in the indoor flows into the body 10 may be provided in a rear surface of the main housing 11, and an outlet 11b through which air, which is moisture by being humidified in the inside of the body 10, is discharged to the indoor, may be provided in the upper surface of the main housing 11. A grill portion 12a corresponding to the outlet 11b is provided on the upper cover 12.

[0050] Therefore, the dry air in the indoor flows into the inside of the body 10 through the rear inlet 11a of the body 10, and then humidified in the inside of the body 10, and then flows upward through the outlet 11b of the body 10.

[0051] This forced airflow may be performed by the blowing fan 40. Particularly, the blowing fan 40 may be a centrifugal fan, and the blowing fan 40 is rotated by a first motor 50 to generate airflow so that air behind the body 10 moves upwardly of the body 10.

[0052] The front cover 13 may be provided with a display 20 configured to allow various information of the evaporative humidifier 1 to be displayed and an input 30 configured to allow various functions of the evaporative humidifier 1 to be operated.

[0053] A humidifying element assembly 100 may be rotatably supported by a support frame 90. The humidifying element assembly 100 may be rotated by receiving a rotational force from a second motor 60.

[0054] The support frame 90 is coupled to the water tub 200. The humidifying element assembly 100 may be separated from the supporting frame 90. Therefore, after the side cover 14 is detached, the water tub 200 and the humidifying element assembly 100 may be mounted or separated in the left-to-right direction inside the body 10. The detail configuration of the humidifying element assembly 100 will be described later.

[0055] The humidifier 1 may further include a filter portion 80 configured to purify the air flowing into the body 10 and a water tank 70 configured to supply water to the water tub 200.

[0056] The water tank 70 is configured to store water required for the humidification and supply a proper amount of water to the water tub 200. The water tank 70 may be mounted to the water tub 200 in a cassette manner. A structure of the water tank 70 and the water tub 200 will be described later in detail.

[0057] The filter portion 80 may include a dust filter, and a deodorization filter. That is, the humidifier 1 may perform an air cleaning function together. The filter por-

tion 80 and the water tank 70 may be mounted or detached to the inside of the body 10 in the vertical direction after the upper cover 12 is detached.

[0058] Hereinafter a configuration of the humidifying element assembly 100, the water tub 200 and the water tank 70 will be described with reference to FIGS. 4 to 8.

[0059] FIG. 4 is an exploded perspective view illustrating the humidifier element assembly of the humidifier of FIG. 1, FIG. 5 is a cross-sectional view illustrating the water tub and the humidifier element assembly of the humidifier of FIG. 1, and FIG. 6 is a cross-sectional view illustrating a state in which the humidifier element assembly of FIG. 5 is lifted. FIG. 7 is a cross-sectional view illustrating the water tub and the water tank to illustrate an operation of a blocking device of the humidifier in accordance with an embodiment, and FIG. 8 is a cross-sectional view illustrating a water tub and a water tank to illustrate an operation of a blocking device of a humidifier in accordance with another embodiment.

[0060] Referring to FIG. 4, the humidifying element assembly 100 includes a humidifying element 110 configured to absorb and vaporize water, and a first cover 120 provided in the front side of the humidifying element 110 to support the humidifying element 110, and a second cover 130 provided in the rear side of the humidifying element 110 to support the humidifying element 110.

[0061] The humidifying element 110 may be formed of a highly absorbent material such as fibers or paper, and may have a substantially disc shape. The humidifying element 110 is provided to be immersed in the water contained in the water tub 200, wherein the humidifying element 110 directly absorbs the water in the water tub, keeps the absorbed water, and then performs the humidification on the air passing through the humidifying element 110.

[0062] At this time, foreign materials such as dust contained in air are filtered by the humidifying element 110, and thus only pure air may pass through the humidifying element 110. Accordingly, the humidifying element 110 may perform the function of filtering together with humidification.

[0063] In addition, the first cover 120 and the second cover 130 may have a disc shape having a radius smaller than a radius of the humidifying element 110. The first cover 120 and the second cover 130 may be integrally injection molded by using a resin material.

[0064] The first cover 120 and the second cover 130 may be provided with rotating shafts 123 and 133, respectively and the humidifying element 110 may be provided with a first through hole 111 through which the rotating shafts 123 and 133 are passed. The rotating shafts 123 and 133 may be rotatably supported by the support frame 90.

[0065] The first cover 120 may have an elastic hook 124 protruding toward the second cover 130 to be engaged with the second cover 130, and the second cover 130 may have an insertion portion 134 into which the elastic hook 124 is inserted. Therefore, as the elastic

hook 124 is inserted into the insertion portion 134, the first cover 120 may be coupled to the second cover 130.

[0066] The elastic hook 124 and the insertion portion 134 may be disposed on outer portions 122 and 132 of the first cover 120 and the second cover 130, respectively. The humidifying element 110 may be provided with a second through hole 112 through which the elastic hook 124 and the insertion portion 134 are passed.

[0067] When it is required that the first cover 120 and the second cover 130 are separated from each other for the wash and the replacement of the humidifying element 110, it may be possible to separate the first cover 120 and the second cover 130 from each other by pressing the elastic hooks 124.

[0068] Alternatively, other coupling structures other than the above-described coupling structure may be used as long as capable of separating the first cover 120 and the second cover 130 from each other.

[0069] Although not shown in the drawings, the first cover 120 and the second cover 130 may form a water pocket on the outer portions 122 and 132 by coupling to each other so as to supply water from the upper portion of the humidifying element 110.

[0070] As for the water pocket, when the water pocket is placed in a lower side, the water pocket may accommodate the water of the water tub 200, and when the water pocket reaches the upper portion, the water may be dropped by a self-weight and thus the water pocket may supply water to the upper portion of the humidifying element 110.

[0071] An outer periphery of the first cover 120 is provided with a toothed portion 125 to receive the rotational force from the second motor 60. Alternatively, the toothed portion 125 may be provided on the second cover 130.

[0072] The first cover 120 and the second cover 130 may support the humidifying element 110. For this, the first cover 120 may include a first support rib 121 configured to support the humidifying element 110.

[0073] The first support rib 121 may be disposed in a radial center of the first cover 120 and may have an approximately spoke shape to allow air to pass through the first cover 120.

[0074] Likewise, the second cover 130 may have a second support rib 131 configured to support the humidifying element 110. The second support rib 131 may be disposed in a radial center of the second cover 130 and may also have a spoke shape to allow the air to pass through the second cover 130.

[0075] Referring to FIGS. 5 to FIG. 8, the water tub 200 is provided in the lower portion of the humidifying element assembly 100, and may receive and store water supplied from the water tank 70. In this way, the water stored in the water tub 200 is supplied to the humidifying element 110.

[0076] The water tub 200 may include a water supply space 202 configured to receive water from the water tank 70 and a water storage space 201 configured to store water, which is to be supplied to the humidification

element 110.

[0077] The water supply space 202 and the water storage space 201 may be partitioned by a partition 210. The partition 210 may be provided with an opening to allow water supplied from the water supply space 202 to supply to the water storage space 201.

[0078] A cap 73 may be provided in a lower side of the water tank 70. The cap 73 may be provided with a water outlet valve 72, wherein the water outlet valve 72 is configured to close a water outlet 71 when the water tank 70 is separated from the humidifier 1, and configured to open the water outlet 71 when the water tank 70 is mounted to the humidifier 1.

[0079] A water supply protrusion 220 may be formed in the water supply space 202 of the water tub 200 to open the water outlet valve 72 of the water tank 70 when the water tank 70 is mounted to the humidifier 1.

[0080] The humidifying element assembly 100 may be disposed such that an outer circumference thereof is adjacent to a bottom 203 of the water tub 200, so that the humidifying element 110 may absorb water at the bottom 203 of the water tub 200. It is appropriate that the outer circumference of the humidifying element 110 is in contact with the bottom 203 of the water tub 200.

[0081] Since a radius of the humidifying element 110 is larger than a radius of the first cover 120 and the second cover 130, the outer circumference of the humidifying element 110 may be in contact with the bottom 203 of the water tub 200.

[0082] Referring to FIG. 6, the supporting frame 90 may be provided with a lifting device 91 configured to raise the humidifying element assembly 100. The lifting device 91 may raise the humidifying element 110 above the water surface of the water stored in the water tub 200 so that the humidifying element 110 is not immersed in the water stored in the water tub 200.

[0083] During the humidifier 1 is being used, the lifting device 91 may be lowered to allow the humidifying element 110 to absorb the water of the water tub 200, and during the humidifier 1 is not used, the lifting device 91 may be raised so that the humidifying element 110 is not immersed in the water in a state in which the water is stored in the water tub 200.

[0084] According to an embodiment, the water supply protrusion 220 configured to open the water outlet valve 72 of the water tank 70 may be used as the blocking device 230 configured to block the water outlet valve 72.

[0085] FIG. 7A is a view illustrating a case in which the water outlet 71 is opened since the water supply protrusion 220 is raised and pushes up the water outlet valve 72 of the water tank 70, and FIG. 7B is a view illustrating a case in which the water outlet valve 72 of the water tank 70 blocks the water outlet 71 since the water supply protrusion 220 is raised.

[0086] Although not shown in the drawings, the water outlet valve 72 of the water tank 70 may be opened by the blocking device 230 provided in the water tank 70 when the water tank 70 is mounted to the humidifier 1 in

a state in which the water supply protrusion 220 is not provided in the water tub 200.

[0087] In this case, an electrically operated valve may be used as the water outlet valve 72 of the water tank 70, wherein the electrically operated valve may be configured such that the water tank 70 and the humidifier 1 transmits an electric signal and a terminal is connected to allow the water tank 70 to receive the power, when the water tank 70 is mounted to the humidifier 1.

[0088] When the water blocking device 230 disposed in the water tub 200 or the water tank 70 blocks the water outlet 71 of the water tank 70, water may be prevented from being supplied from the water tank 70 to the water tub 200 and thus the supply of water to the humidifying element 110 may be stopped.

[0089] According to another embodiment, the water outlet valve 72 of the water tank 70 may be opened by the water supply protrusion 220 provided in the water supply space 202 of the water tub 200, and the opening 211 of the partition 210 may be blocked by the blocking device 230, wherein the opening 211 is configured to allow water to flow from the water supply space 202 to the water storage space 201.

[0090] FIG. 8A is a view illustrating a state in which the opening 211 of the partition 210 is opened since the blocking device 230 is raised, and FIG. 8B is a view illustrating a state in which the opening 211 of the partition 210 is closed since the blocking device 230 is lowered.

[0091] Since the water, which is supplied to the water supply space 202 from the water tank 70, does not flow into the water storage space 201 when the blocking device 230 closes the opening 211 of the partition 210, the water supply to the humidifying element 110 may be stopped.

[0092] FIG. 9 is a control block diagram illustrating the humidifier according to an embodiment.

[0093] As illustrated in FIG. 9, the humidifier 1 may include an input 30, a display 20, a controller 300 and a drive circuit 310.

[0094] The input 30 may receive a control instruction from a user. As illustrated in FIG. 1, the input 30 may be provided as a button type on the front cover 12, but is not limited thereto. The input 30 may be implemented by a dial, a switch, or a touch pad, but is not limited thereto. The input 30 may include a variety of devices configured to generate an electrical signal corresponding to an input by a user's manipulation, such as pressing, touching, pressure, or rotating.

[0095] The display 20 may display information related to the humidifier 1 in accordance with a display control signal of the controller 300. The display 20 may be configured to allow a user to identify an operation state of the humidifier 1 by displaying user's operation state by recognizing information inputted through the input 30, and by displaying a humidification mode state or a residual water removal mode state of the humidifier 1.

[0096] The display 20 may be disposed on the front cover 12 as illustrated in FIG. 1, but is not limited thereto.

The display 20 may be implemented a liquid crystal display (LCD), a light emitting diode (LED), an organic emitting diode (OLED), an active matrix organic light emitting diode (AMOLED), a flexible display, or a three-dimensional display (3D display).

[0097] In response to a drive control signal of the controller 300, the drive circuit 310 may drive the first motor 50, the second motor 60, the blocking device 230, and the lifting device 91, which are related to the operation of the humidifier 1.

[0098] The first motor 50 rotates the blowing fan 40 and the second motor 60 rotates the humidifying element assembly 100. The blocking device 230 prevents water from being supplied to the water tub 200 from the water tank 70 or prevents water from flowing into the water storage space 201 from the water supply space 202 of the water tub 200. The lifting device 91 raises the humidifying element 110 over the water surface of water remaining in the water tub 200 or the water storage space 201 of the water tub 200.

[0099] The humidifier 1 may further include a residual water detection sensor 320 and/or a memory 330. The residual water detection sensor 320 may identify whether water remains in the water tub 200, and transmit information to the controller 300. The memory 330 may store setting information such as whether to perform the residual water removal function when the use of the humidifier 1 is terminated.

[0100] Hereinafter an operation process and effect of the humidifier including the residual water removal mode, and a control method of the humidifier according to an embodiment will be described.

[0101] FIG. 10 is a flowchart illustrating a control method for performing a residual water removal mode in the humidifier according to an embodiment.

[0102] As for a conventional evaporative humidifier, residual water is present in a water tub even after a humidification operation is terminated. The humidifier 1 according to an embodiment includes a residual water removal mode in which the humidifying element 110 evaporates the residual water of the water tub 200 so that water does not remain in the water tub 200 after the humidification operation is completed.

[0103] Through the residual water removal mode, it may be possible to prevent the humidifying element 110 from being contaminated by fungi or bacteria during the humidifier 1 is not used, and it may be possible to perform the hygienic humidification since clean water is newly supplied to the water tub 200 when the humidification operation is re-started.

[0104] The residual water removal mode may be started by a start instruction to start the residual water removal mode, which is input by a user through the input 30. It may be possible to set the residual water removal mode to be automatically started by an end instruction of the humidification mode, which is input by a user. The humidification mode represents an operation state in which the humidification is performed by continuously supply-

ing water to the humidifying element 110 while rotating the humidifying element 110.

[0105] Referring to FIG. 10, when the residual water removal mode of the humidifier 1 is started, the controller 300 may drive the blocking device 230 to prevent the water from being supplied to the water tub (401).

[0106] The step of blocking the supply of water to the water tub (401) includes preventing the water from being supplied to the water storage space 201 since the blocking device 230 blocks the water outlet 71 of the water tank 70 and the blocking device 230 blocks the opening 211 provided in the partition 210 of the water tub 200. That is, the step of blocking the supply of water to the water tub (401) is to prevent water from being additionally supplying to the water tub 200 or the water storage space 201.

[0107] When the residual water removal mode is started during the operation of the humidification mode, the controller 300 operates the second motor 60 to continuously rotate the humidification element 110 to remove residual water. On the other hand, when the residual water removal mode is started in a state in which the humidifying element 110 is not rotated, the controller 300 operates the second motor 60 to rotate the humidifying element 110 (402).

[0108] In the residual water removal mode, the humidifying element 110 may be rotated while the outer circumference of the humidifying element 110 is adjacent to the bottom 203 of the water tub 200, in order to absorb and evaporate all water remaining on the bottom of the water tub 200. Particularly, it may be appropriate that the outer circumference of the humidifying element 110 is disposed in slightly contact with the bottom 203 of the water tub 200. More particularly, in order not to generate a noise by the friction between the humidifying element 110 and the bottom 203 of the water tub 200, it may be more appropriate that the humidifying element 110 is disposed apart from the bottom 203 of the water tub 200 by a distance, which allows all water in the water tub 200 to be absorbed into the humidifying element 110 by the surface tension of the water.

[0109] When the humidifying element 110 rotates to remove the residual water, the controller 300 determines whether the residual water removal is completed (403). When the humidifying element 110 rotates, absorbs and evaporates all the remaining water in the water tub 200, the removal of the remaining water is completed. The completion of the removal of the remaining water may not represent the termination of the residual water removal mode.

[0110] In the humidifier 1 according to the embodiment, a period of time in which all the remaining water of the water tub 200 is evaporated by the rotation of the humidifying element 110, is stored in the memory 330. The controller 300 may count a period of time from when the residual water removal mode is started, and when the counted period of time exceeds the certain period of time, which is stored in the memory, the controller 300 may

determine that the residual water removal is completed.

[0111] According to another embodiment, in order to identify whether water remains in the water tub 200, the controller 300 may determine whether the residual water removal is completed or not, by using the residual water detection sensor 320 provided in the water tub 200. When the water in the water tub 200 is completely evaporated and the remaining water is not detected by the residual water detection sensor 320, the controller 300 determines that the residual water removal is completed.

[0112] When it is determined that the residual water removal is not completed, the controller 300 performs the residual water removal by continuously rotating the humidifying element 110 and determines again whether the residual water removal is completed (403).

[0113] When it is determined that the residual water removal is completed, the controller 300 may stop the rotation of the humidifying element 110 by stopping the rotation of the second motor 60 (404), and thus the residual water removal mode of the humidifier 1 may be terminated.

[0114] During the humidifier 1 performs the residual water removal mode, a user may command stopping the residual water removal mode through the input 30, and FIG. 11 is a flowchart illustrating a control method in which a residual water removal stop instruction input step (405) is added to the control method of FIG. 10.

[0115] Referring to FIG. 11, when a residual water removal stop instruction is input by a user (405) in a state in which the humidifying element 110 is rotated (402) for the residual water removal since the residual water removal mode is started and the water supply to the water tub is stopped (401), the controller 300 may stop the rotation of the humidifying element 110 (404) by immediately stopping the operation of the second motor 60 and terminate the residual water removal.

[0116] When the residual water removal stop instruction is not input (405), the controller 300 may maintain the rotation of the humidifying element 110 and determine whether the residual water removal is completed (403) by counting a rotation time of the humidifying element 110 or by using a residual water detection signal of the residual water detection sensor 320. When the residual water removal is completed, the controller 300 may stop the rotation of the humidifying element 110 and terminate the residual water removal mode.

[0117] FIG. 12 is a flowchart illustrating a control method in which a step to confirm whether to perform the residual water removal mode is added to the control method of FIG. 10.

[0118] As described above, the residual water removal mode may be started by the start instruction of the residual water removal mode, which is input by a user through the input 30. Alternatively, it may be possible to set such that the residual water removal mode is automatically started when the user's humidification mode end instruction is input, or it may be possible to perform the residual water removal mode by allowing a user to confirm wheth-

er to perform the residual water removal mode, when the user's humidification mode end instruction is input.

[0119] In the flowchart shown in FIG. 12, the termination of the humidification mode represents the beginning of the flowchart. When the humidification mode is terminated, the controller 300 determines whether to perform the residual water removal mode (407). The method of determining whether to perform the residual water removal mode may be a method of determining whether it is preset in the memory 330 or a method of determining by allowing the user to select through the input 30.

[0120] According to the former method, when it is possible to preset such that the residual water removal mode is started upon the termination of the humidification mode, in the memory 330, the controller 300 may determine whether the residual water removal mode is set in the memory 330 (407) when the humidification mode is terminated.

[0121] It may be set such that the humidifying element 110 is continuously rotated from when the humidification mode end instruction is input until the step (407) to confirm whether to perform the residual water removal mode, and when it is determined not to perform the residual water removal mode (407), the controller 300 stops the rotation of the humidifying element 110 (404) and terminates.

[0122] On the other hand, when it is determined to perform the residual water removal mode (407), the humidifying element is continuously rotated to remove the residual water (402), and the water supply to the water tank is blocked (401).

[0123] According to the latter method, when determining whether to perform the residual water removal mode, the controller 300 may display a question of whether to perform the residual water removal mode, on the display 20 and allow a user to confirm whether to perform the residual water removal mode (407), and when the user inputs the performance of the residual water removal mode, to the input 30, the controller 300 performs the residual water removal mode in response to the input.

[0124] Although not shown in the drawings, in the latter method, it may be set such that the rotation of the humidifying element 110 is immediately stopped when the humidification mode end instruction is input. In this case, on the step of confirming whether to perform the residual water removal mode (407), when it is input such that the residual water removal mode is not to be performed, or when there is no input related to the performance of the residual water removal mode, the controller 300 immediately terminates the mode, and when it is input such that the residual water removal mode is to be performed, the controller 300 stops the supply of water to the water tub (401) and rotates the humidifying element 110 to remove the residual water, again (402).

[0125] The humidifier 1 may include the lifting device 91 configured to raise the humidifying element 110 or the humidifying element assembly 100. FIGS. 13 and 14 are flowcharts illustrating a control method in which a step

to raise the humidifying element is added to the control methods of FIGS. 11 and 12.

[0126] Referring to FIG. 13, when the residual water removal is completed or when the residual water removal mode is interrupted by a user's instruction, the controller 300 stops the rotation of the humidifying element 110 (404), and the controller 300 drives the lifting device 91, wherein the lifting device 91 raises the humidifying element 110 so that the humidifying element 110 is not immersed in the residual water in the water tub 200.

[0127] Referring to FIG. 14, when it is input such that the residual water removal mode is not to be performed (407), the controller 300 drives the lifting device 91, wherein the lifting device 91 raises the humidifying element 110 so that the humidifying element 110 is not immersed in the residual water in the water tub 200.

[0128] In addition, although not shown in the drawings, it may be set such that when the residual water removal mode is terminated, the lifting device 91 is operated to raise the humidifying element 110.

[0129] While the present disclosure has been particularly described with reference to exemplary embodiments, it should be understood by those of skilled in the art that various changes in form and details may be made without departing from the spirit and scope of the present disclosure.

Claims

1. A humidifier comprising:

a body;
a water tub provided inside of the body to store water; and
a humidifying element rotatably provided inside of the body and configured to perform humidification by absorbing water from the water tub, wherein the humidifying element is disposed such that an outer circumference thereof is adjacent to a bottom of the water tub to absorb water in the bottom of the water tub.

2. The humidifier of claim 1, wherein the humidifying element is disposed such that an outer circumference thereof is in contact with a bottom of the water tub.

3. The humidifier of claim 1, further comprising:

a water tank configured to supply water to the water tub; and
a blocking device configured to block a water outlet of the water tank to prevent water from being supplied to the water tub.

4. The humidifier of claim 3, wherein the blocking device is disposed in the water tank or

the water tub.

5. The humidifier of claim 1, wherein the water tub comprises:

a partition configured to divide into a water supply space to which water is supplied from the water tank, and a water storage space configured to supply water to the humidifying element, and provided with an opening configured to allow water to flow from the water supply space into the water storage space; and a blocking device configured to close the opening of the partition.

6. The humidifier of claim 1, further comprising a lifting device configured to raise the humidifying element.

7. The humidifier of claim 1, further comprising a first cover and a second cover provided in a front side and a rear side of the humidifying element, respectively, to support the humidifying element, wherein the first cover and the second cover are formed in a disk shape having a radius less than a radius of the humidifying element.

8. The humidifier of claim 7, wherein:

the first cover comprises an elastic hook protruding toward the second cover to be coupled to the second cover,
the second cover comprises an insertion portion to which the elastic hook is coupled, and
the humidifying element comprises a through hole through which the elastic hook and the insertion portion are passed.

9. A humidifier comprising:

a body;
a water tub provided inside of the body to store water;
a humidifying element configured to perform humidification by absorbing water from the water tub;
a blocking device configured to block the supply of water in the water tub;
a motor configured to rotate the humidifying element; and
a controller configured to perform a residual water removal mode by controlling the blocking device and the motor.

10. The humidifier of claim 9, further comprising a water tank configured to supply water to the water tub, wherein:

the blocking device is disposed in the water tank

or the water tub to block a water outlet of the water tank, and

in the residual water removal mode, the controller controls the blocking device so that the blocking device prevents water from being supplied from the water tank to the water tub by blocking the water outlet of the water tank.

11. The humidifier of claim 9, wherein:

the water tub comprises a partition configured to divide into a water supply space to which water is supplied from the water tank, and a water storage space configured to supply water to the humidifying element, and provided with an opening configured to allow water to flow from the water supply space into the water storage space,
the blocking device is installed in the water tub to block the opening of the partition, and
in the residual water removal mode, the controller controls the blocking device so that the blocking device prevents water from being supplied from the water supply space to the water storage space, by blocking the opening of the partition.

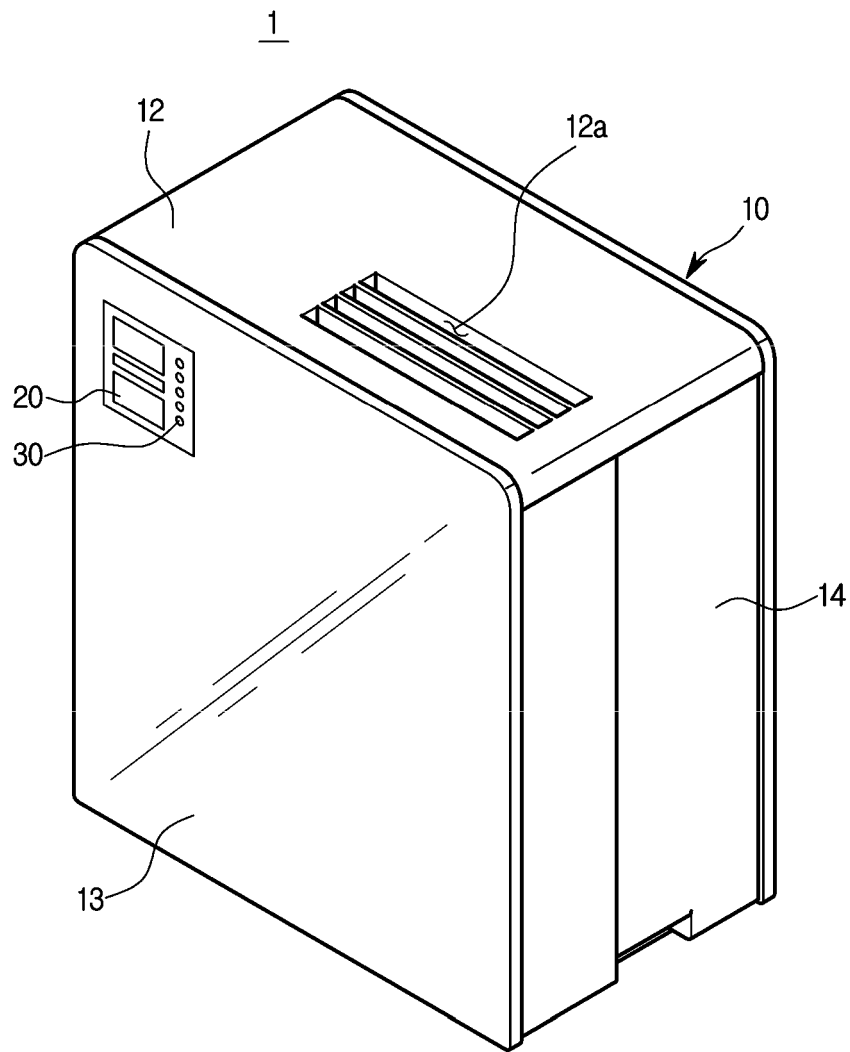
12. The humidifier of claim 9, wherein in the residual water removal mode, the controller controls the blocking device so that the blocking device prevents water from further supplying to the water tub, and the controller drives the motor to rotate the humidifying element.

13. The humidifier of claim 12, wherein the controller stops the drive of the motor when a certain period of time, in which water remaining in the water tub is completely evaporated, is expired.

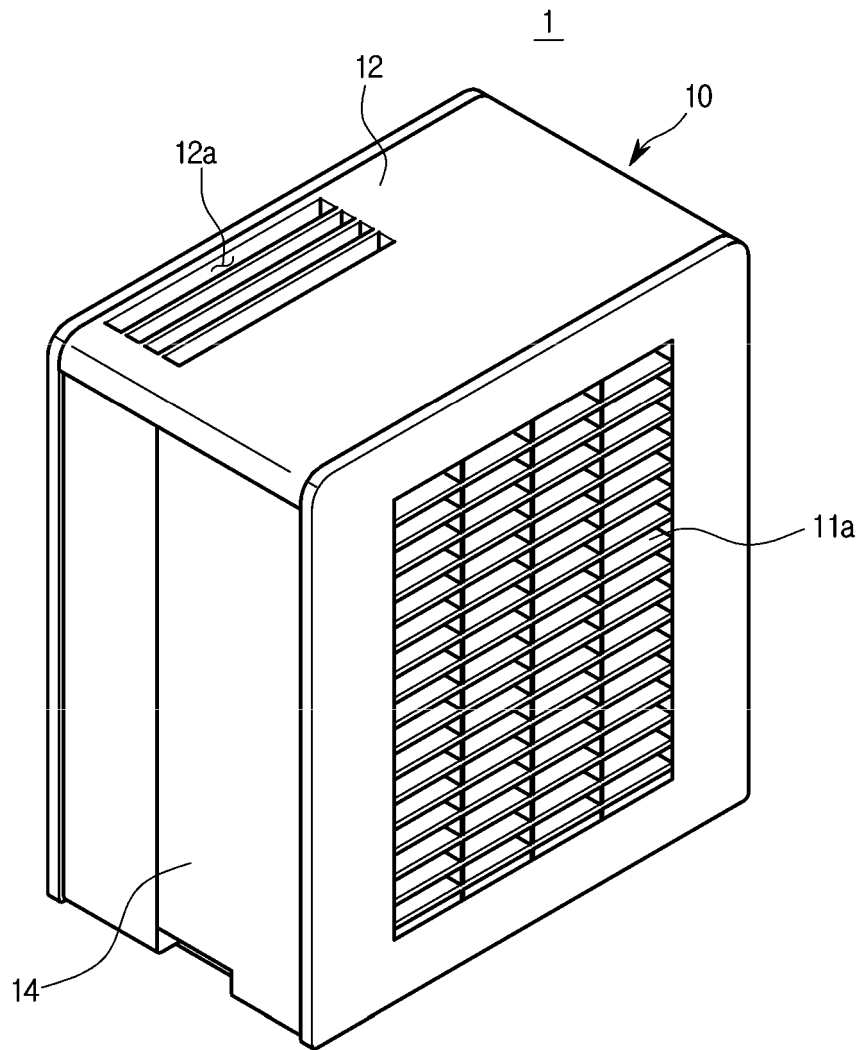
14. The humidifier of claim 12, further comprising a residual water detection sensor configured to detect whether water remains in the water tub, wherein the controller stops the drive of the motor when remaining water is not detected by the residual water detection sensor since water remaining in the water tub is completely evaporated.

15. The humidifier of claim 12, further comprising a lifting device configured to raise the humidifying element, wherein when the residual water removal is completed in the residual water removal mode, or when the residual water removal is stopped by a user's instruction, the controller drives the lifting device to raise the humidifying element.

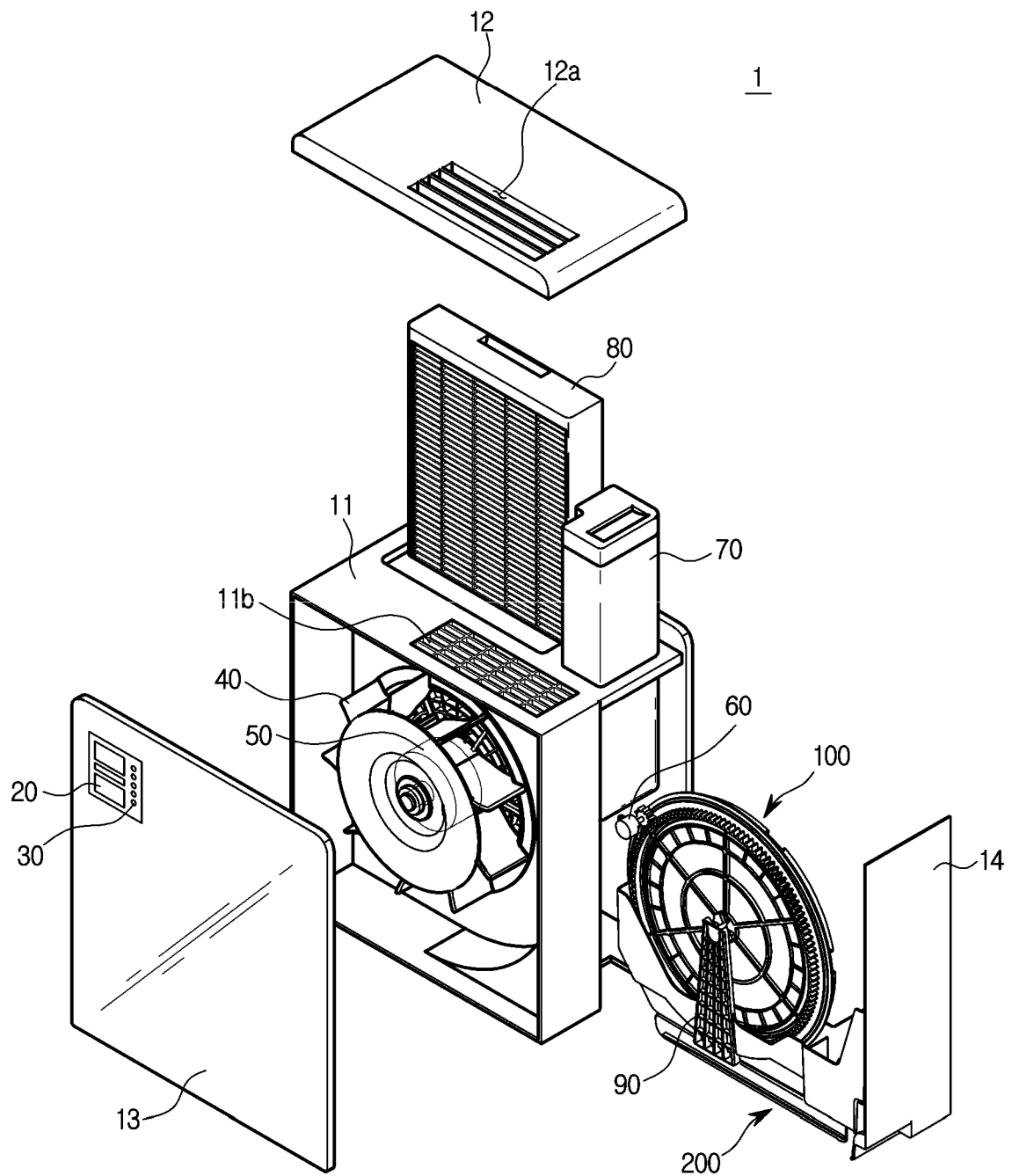
【Fig. 1】



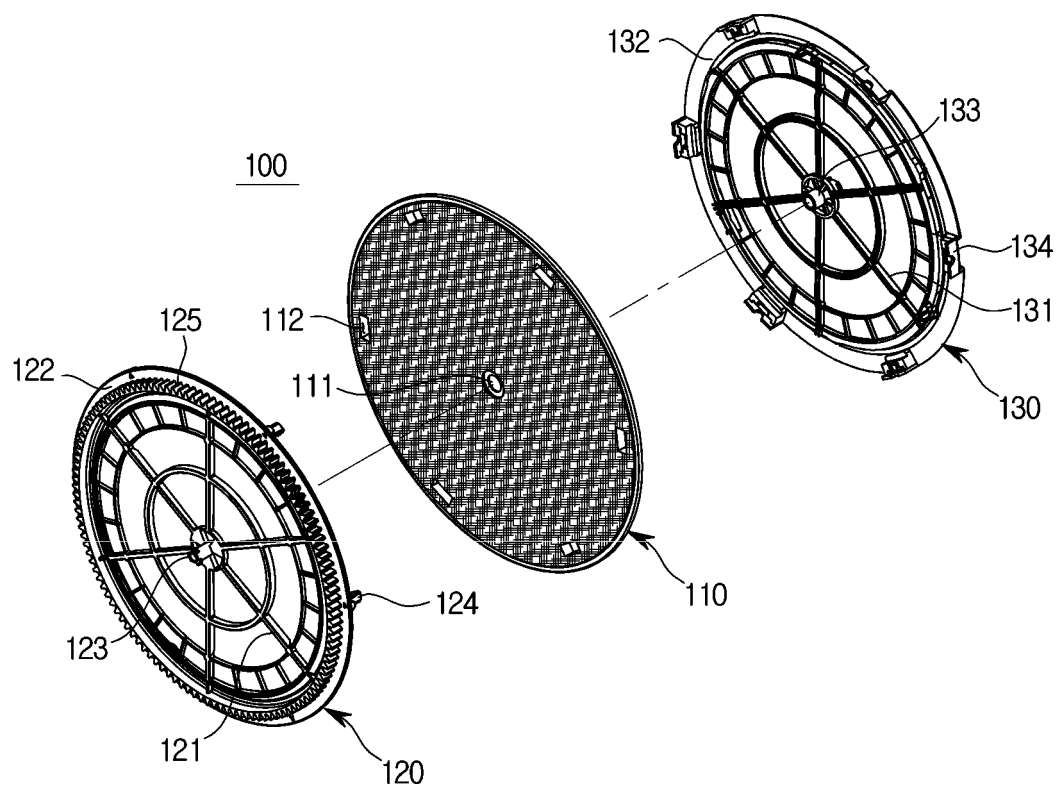
【Fig. 2】



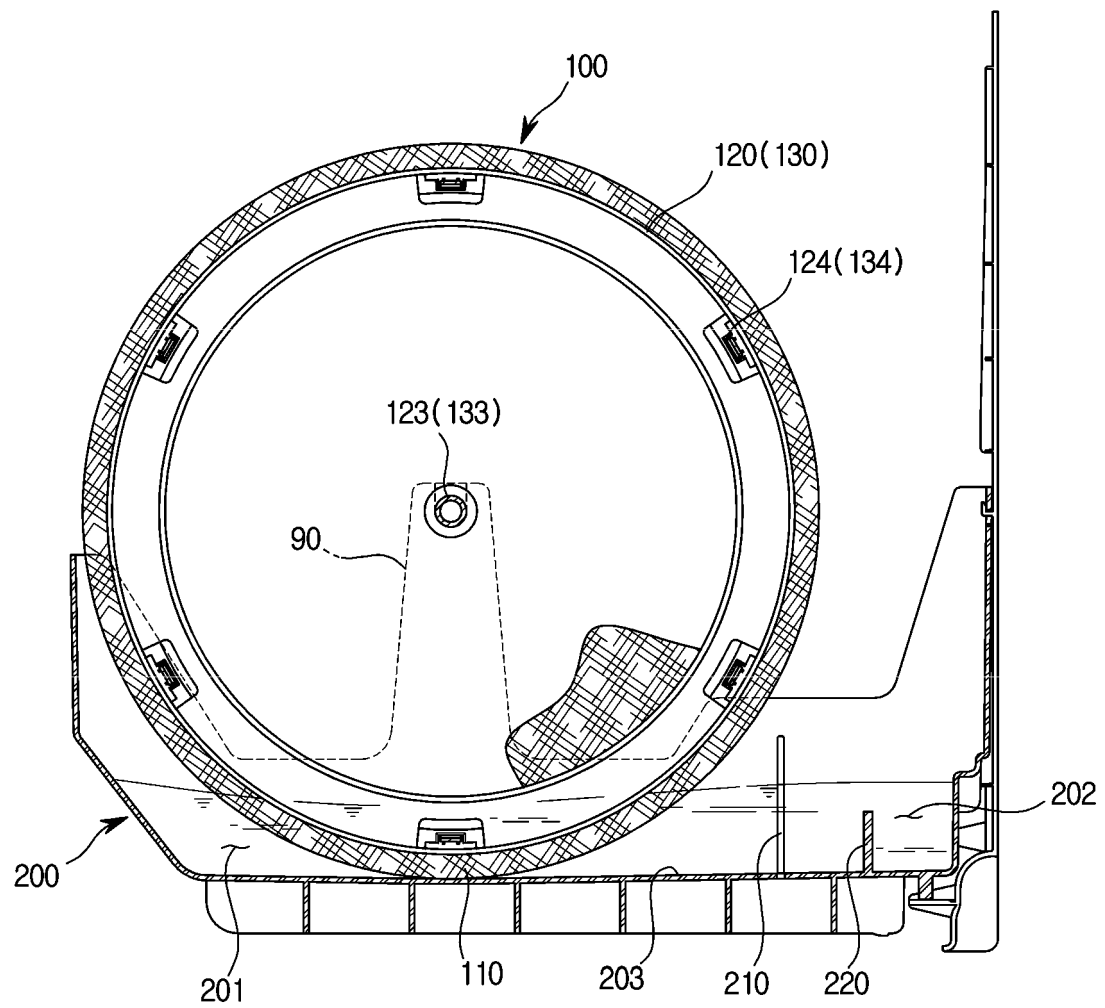
【Fig. 3】



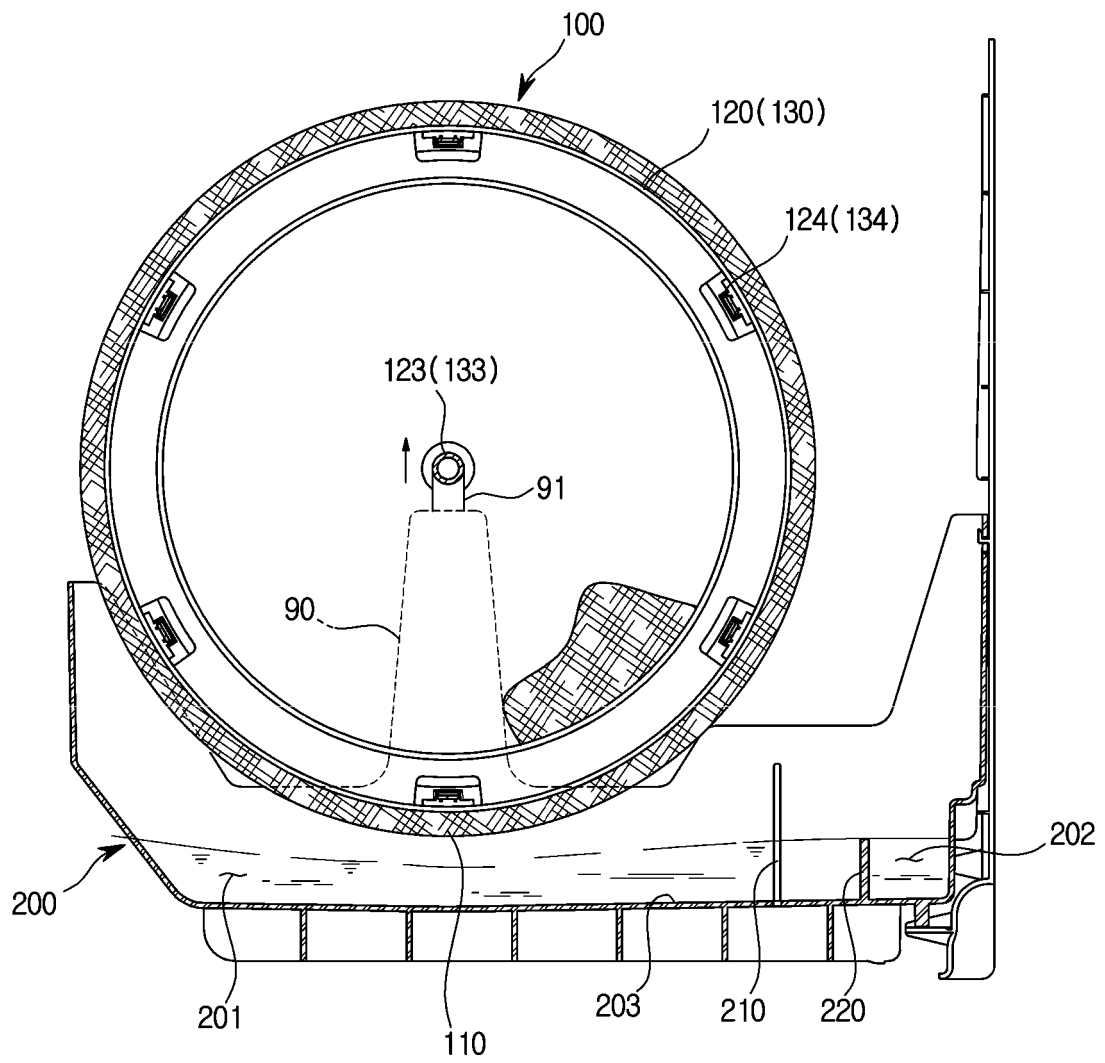
【Fig. 4】



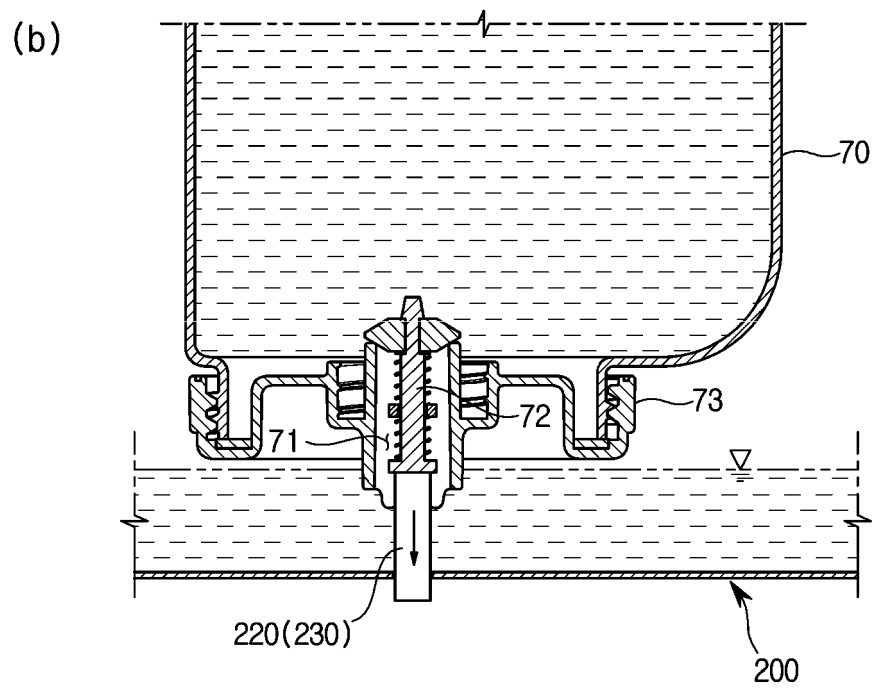
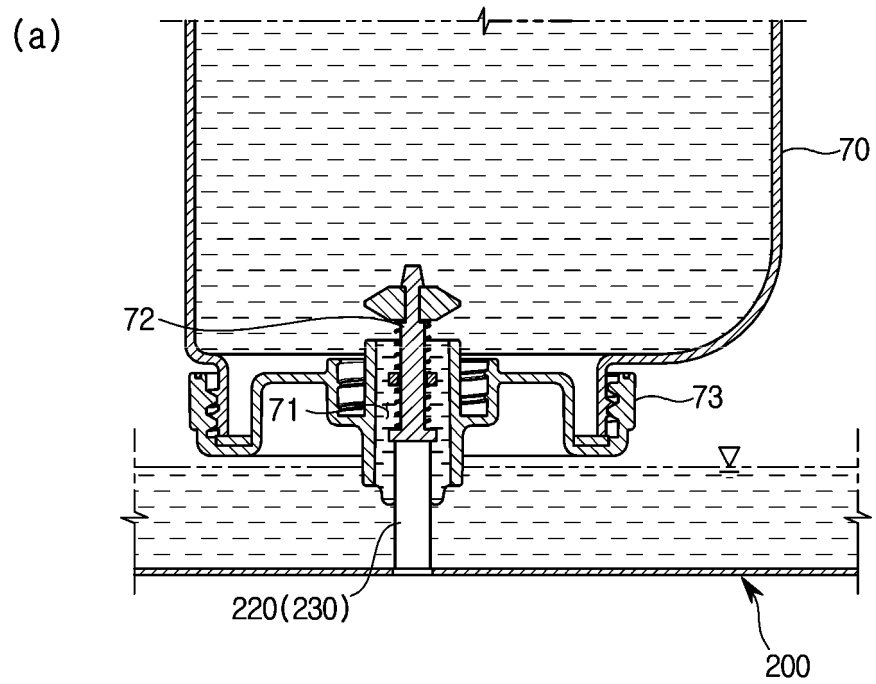
【Fig. 5】



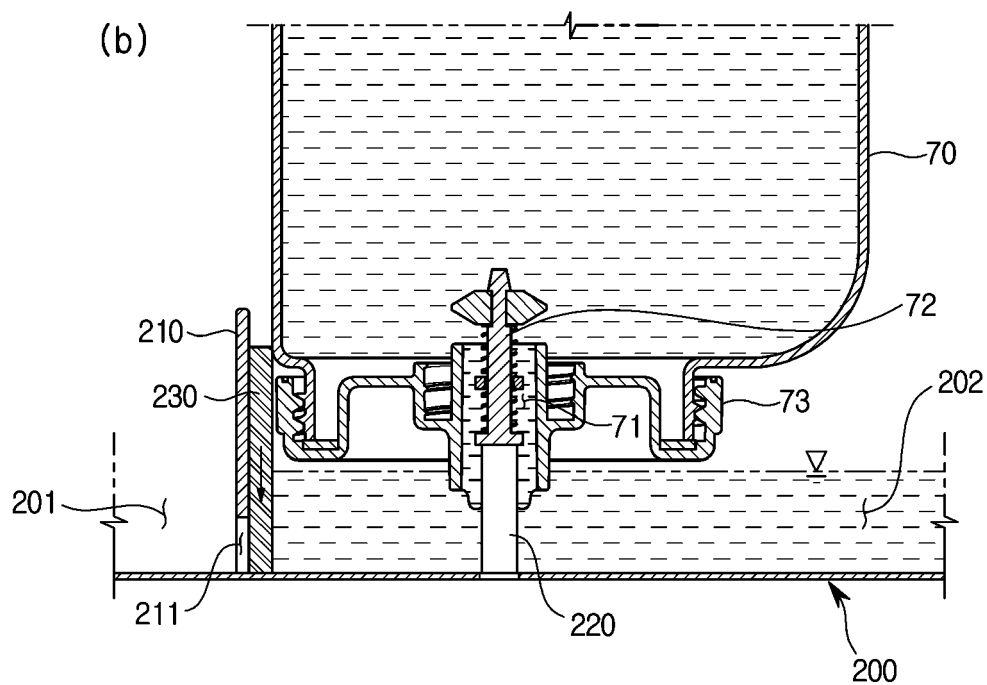
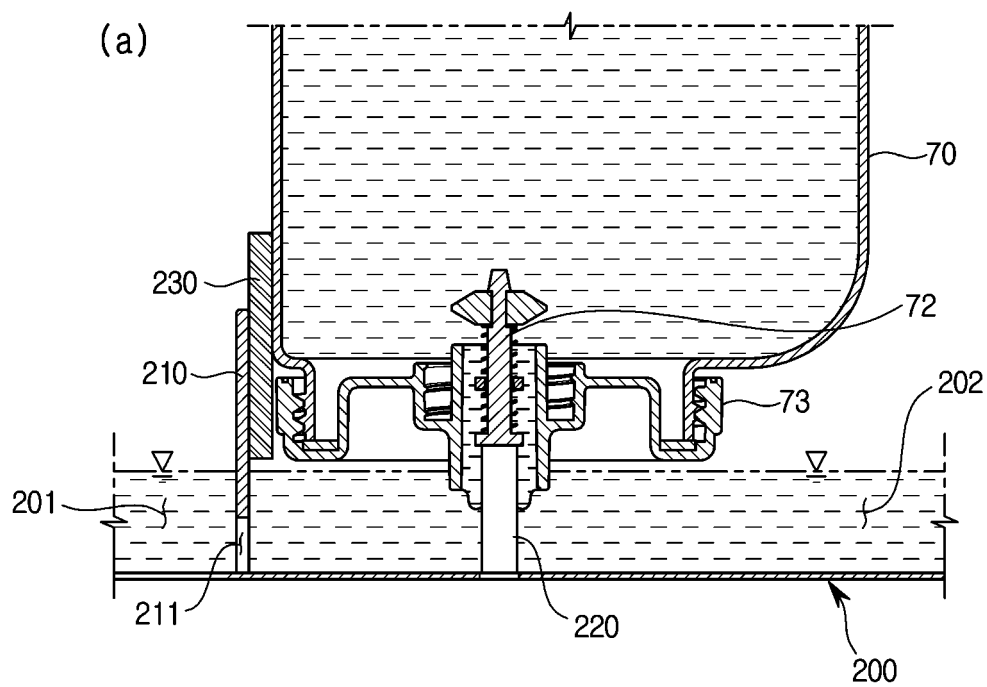
【Fig. 6】



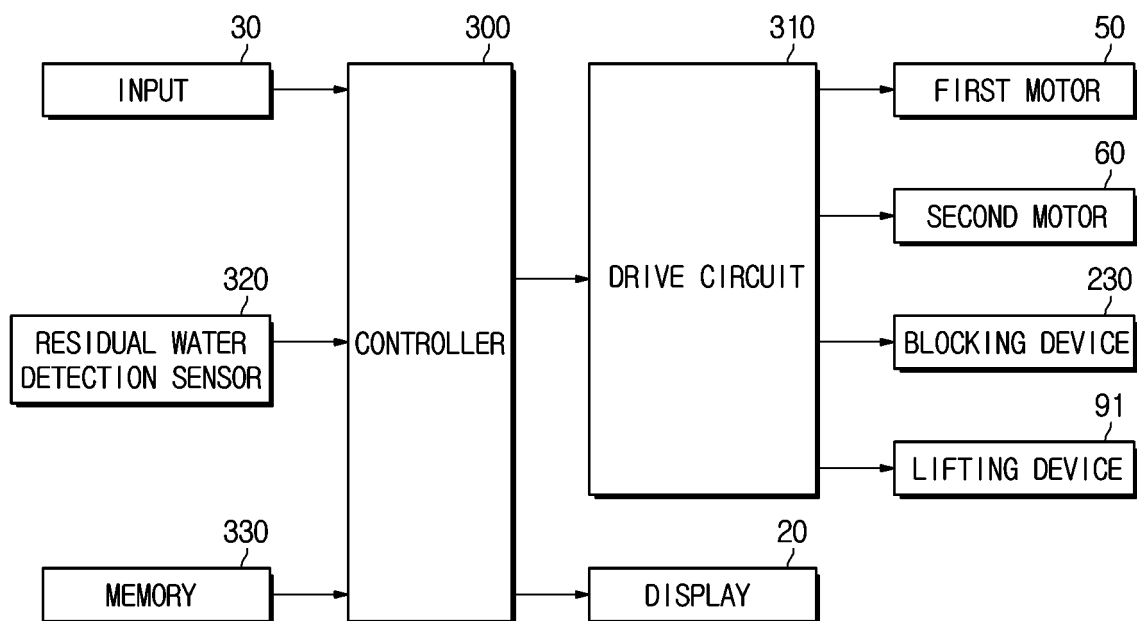
【Fig. 7】



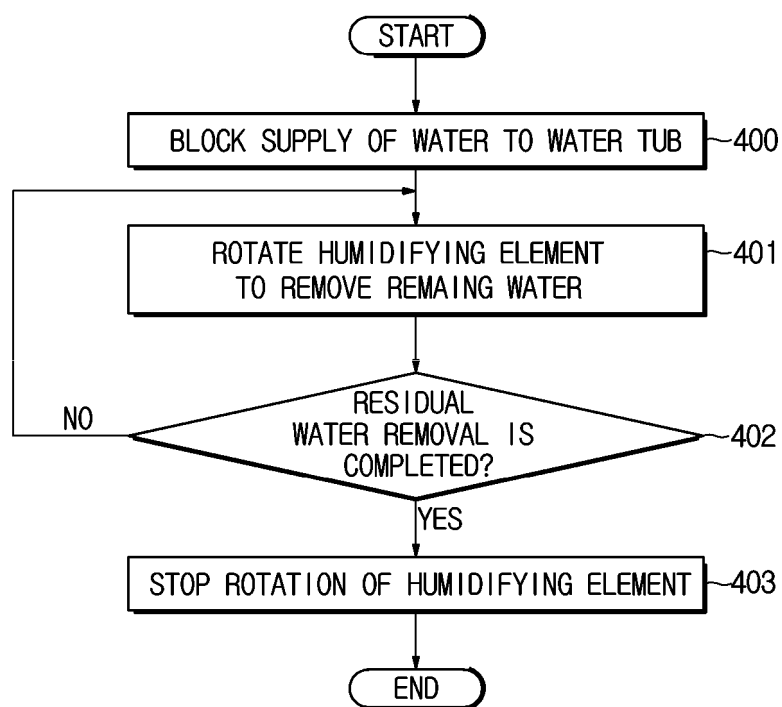
【Fig. 8】



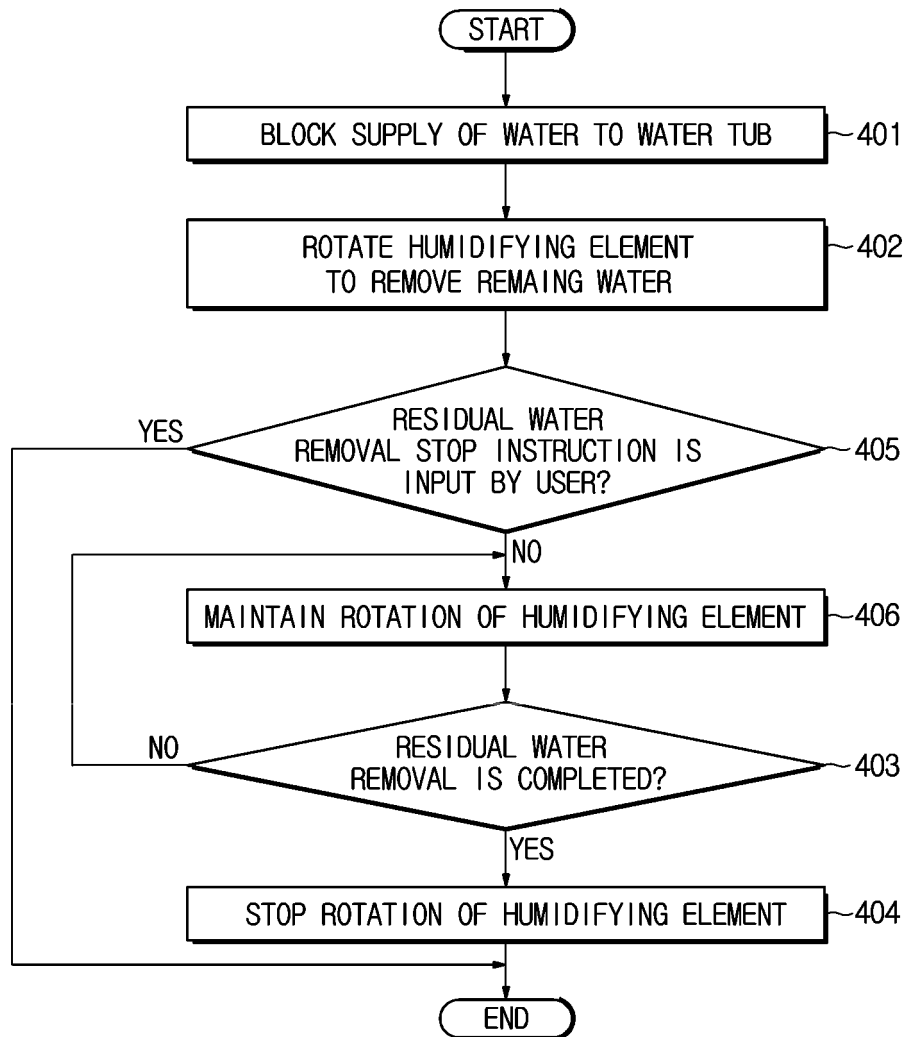
【Fig. 9】



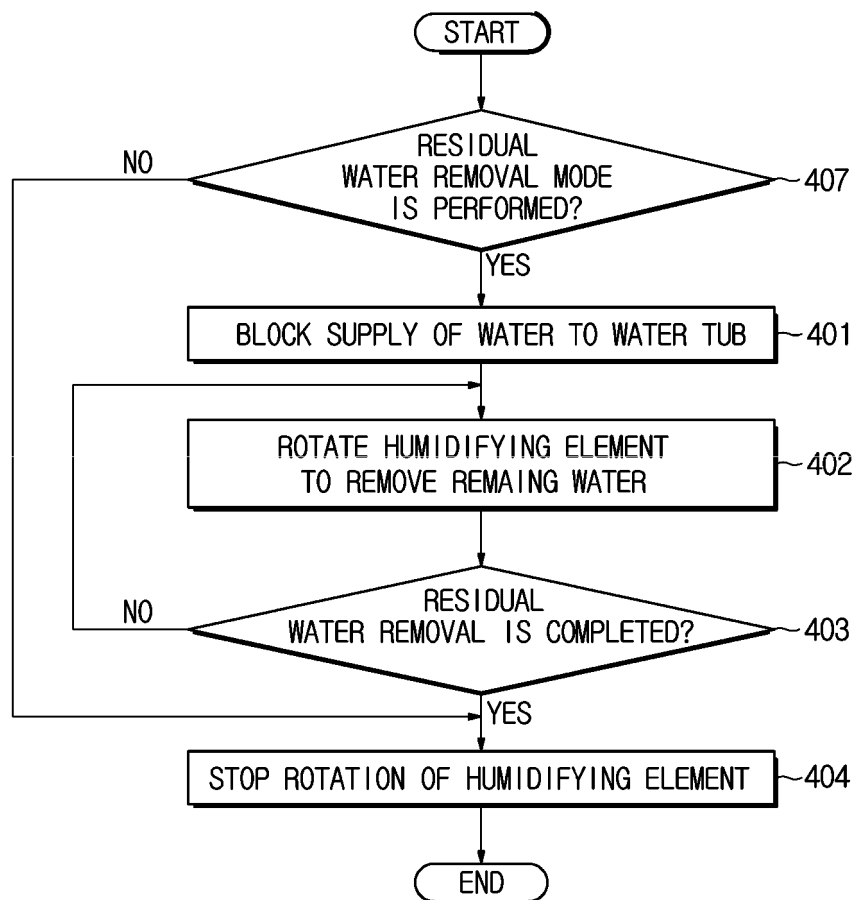
【Fig. 10】



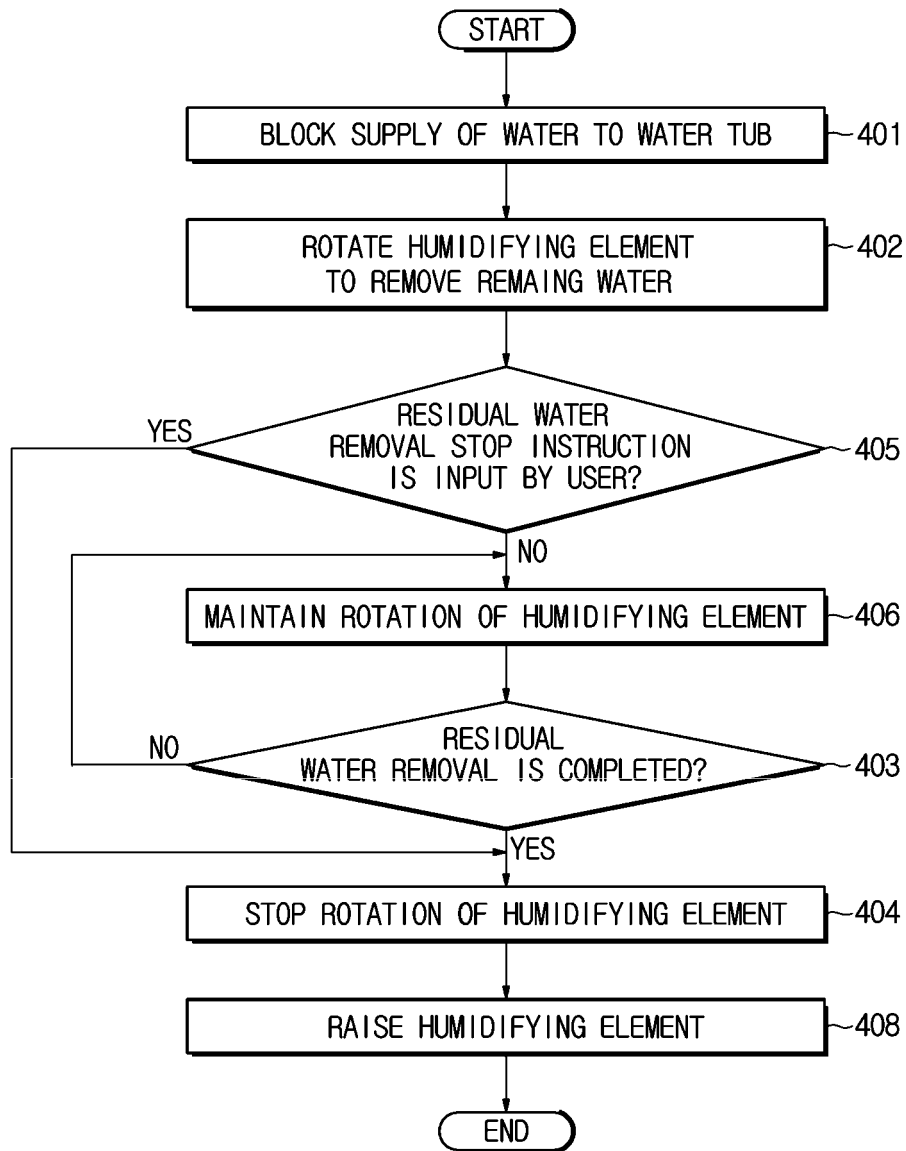
【Fig. 11】



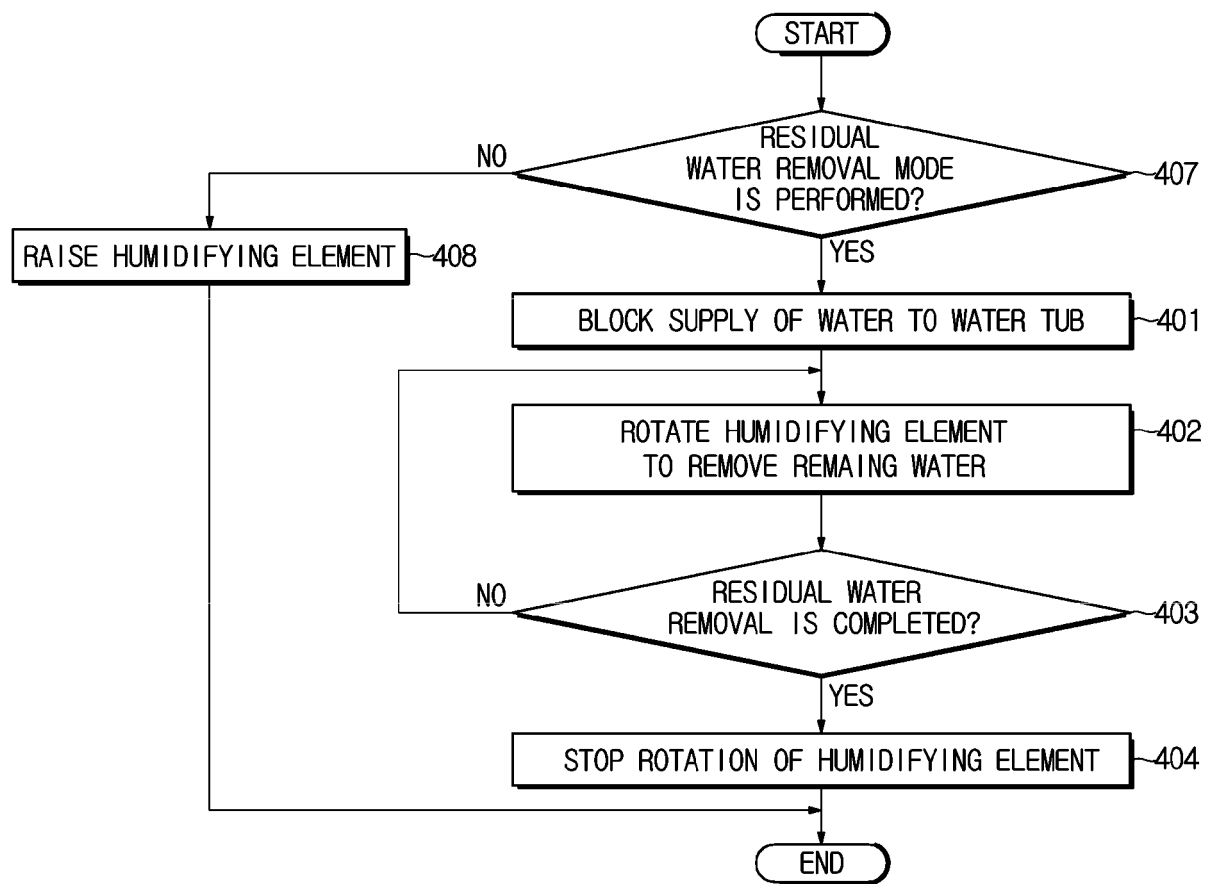
【Fig. 12】



【Fig. 13】



【Fig. 14】



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2016/009787

A. CLASSIFICATION OF SUBJECT MATTER

F24F 6/06(2006.01)i, F24F 6/16(2006.01)i, F24F 13/28(2006.01)i, F24F 13/20(2006.01)i, F24F 11/00(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24F 6/06; F24F 6/14; F24F 6/16; B01D 46/42; F24F 6/00; F24F 6/02; F24F 6/12; F24F 13/28; F24F 13/20; F24F 11/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models: IPC as above

Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: humidifier, water tank, humidification element, blocking device, lifting, section, disk, cover, elasticity, hook, residual water

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2014-0078939 A (SAMSUNG ELECTRONICS CO., LTD.) 26 June 2014 See paragraphs [0032]-[0044], [0055] and figures 1-7.	1-15
Y	JP 2008-064429 A (SHARP CORP.) 21 March 2008 See paragraphs [0024]-[0029] and figure 1.	1-15
Y	KR 10-0803035 B1 (WOONGJIN CUCHEN CO., LTD.) 18 February 2008 See paragraphs [0034], [0050]-[0052] and figures 2-4.	9-15
A	KR 20-2010-0004490 U (LIHOM CO., LTD.) 03 May 2010 See paragraphs [0020]-[0026] and figure 2.	1-15
A	KR 10-2014-0074670 A (COWAY CO., LTD.) 18 June 2014 See claim 1 and figure 1.	1-15

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

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"P" document published prior to the international filing date but later than the priority date claimed

"I" 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

09 NOVEMBER 2016 (09.11.2016)

Date of mailing of the international search report

17 NOVEMBER 2016 (17.11.2016)

Name and mailing address of the ISA/KR


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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2016/009787

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KR 20-2010-0004490 U	03/05/2010	KR 20-0453813 Y1	31/05/2011
KR 10-2014-0074670 A	18/06/2014	NONE	