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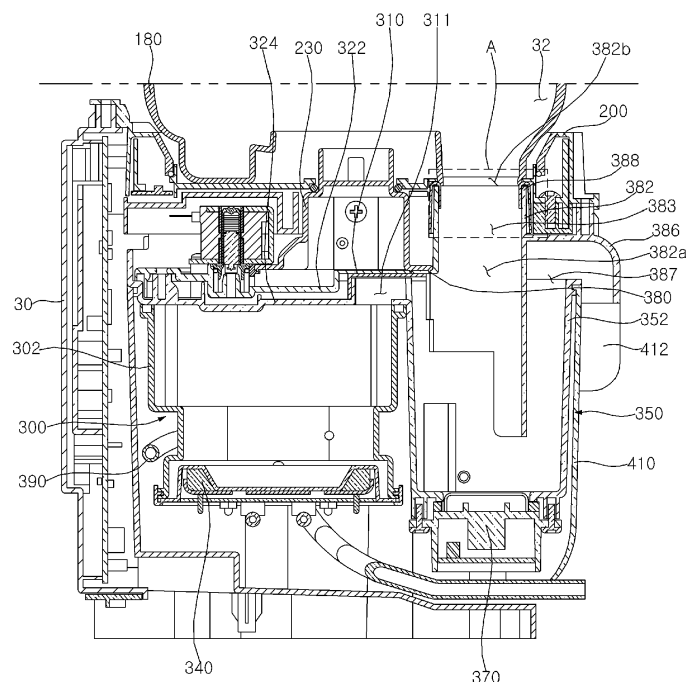
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(54) **HUMIDIFIER**

(57) The present invention relates to a humidifier. The humidifier of the present invention includes a water tank storing water, a humidifying water tank disposed under the water tank and producing humidified air from water supplied from the water tank, an inner shell forming a space in which the water tank is disposed, and disposed

to be spaced apart from an outer circumferential portion of the water tank, an exhaust tube extending upward to send humidified air produced in the humidifying water tank to a discharge channel formed between the water tank and the inner shell, and a sealer disposed to seal the portion between the exhaust tube and the inner shell.

Fig. 8



Description

[0001] The present invention relates to a humidifier, and more specifically, a humidifier that produces humidified air using sterilized water.

[0002] A humidifier is a device that discharges humidified air having a high moisture content by vaporizing water. Humidifiers can produce humidified air by vaporizing water using natural vaporization, heating vaporization, and ultrasonic vibration.

[0003] Such vaporization types each have advantages and disadvantages. As for natural vaporization, it has a problem that a user has to frequently manage a humidification medium that is used.

[0004] As for heating vaporization, a problem of safety accidents may be generated when hot humidified air is directly discharged.

[0005] As for vaporization by ultrasonic vibration, it has a problem that since supplied water is atomized by ultrasonic vibration, humidified air may not smoothly flow into an interior, another problem that when non-sterilized water is used for humidification, unpleasant humidified air may flow into an interior, and a further problem that ultrasonic oscillators are vulnerable to high-temperature heat.

[0006] Further, vaporization by ultrasonic vibration has a problem that water may splash up due to vibration generated by an oscillator. Accordingly, a specific structure is not disposed at the upper portion of a water tank in which an ultrasonic oscillator is disposed, except for a channel through which humidified air is discharged.

[0007] A humidifier that humidifies water supplied from a water tank through heating and ultrasonic vibration has been disclosed in Korean Patent No. KR 10-0158806. Even in this structure, except for a discharge channel through which air flows, a specific structure is not disposed at the upper portion at which an ultrasonic oscillator is disposed.

[0008] The present invention is specified by the independent claim. Preferred embodiments are defined by the dependent claims. A humidifier of the present invention has a structure in which a configuration forming a discharge channel is separated from a humidifying water tank that produces humidified air. In this configuration, water splashed up by an oscillator of the humidifying water tank can flow to a region connected between the configuration forming the discharge channel and the humidifying water tank. This may cause a problem that water leaks outside the spaces of the humidifying water tank and the discharge channel.

[0009] The present invention provides a humidifier for solving this problem.

[0010] In a humidifier of the present invention, a configuration for sensing the weight of a water tank or emitting light toward a discharge channel may be disposed between a humidifying water tank and the configuration forming the discharge channel. Since electric devices are disposed in the configuration, the configuration may mal-

function when water flows into the configuration. Accordingly, when water flows to the configuration, in which electric devices are disposed, between the humidifying water tank and the configuration forming the discharge channel, a problem of a malfunction of the electric devices may be generated.

[0011] The present invention provides a humidifier for solving this problem.

[0012] Condensate water may be produced in a discharge channel while humidified air flows. Such condensate water may flow down due to gravity and flow to the space in which a humidifying water tank is disposed. However, condensate water produced in the discharge channel may flow to a space formed between the humidifying water tank and the configuration forming the discharge channel while flowing to the humidifying water tank. This may cause a problem that water leaks outside the spaces of the humidifying water tank and the discharge channel.

[0013] The present invention provides a humidifier for solving this problem.

[0014] The objectives of the present invention are not limited to the objects described above and other objects will be clearly understood by those skilled in the art from the following description.

[0015] In order to achieve the objectives, a humidifier according to an embodiment of the present invention includes a water tank storing water, a humidifying water tank disposed under the water tank and producing humidified air from water supplied from the water tank, an inner shell forming a space in which the water tank is disposed, and disposed to be spaced apart from an outer circumferential portion of the water tank, an exhaust tube extending upward to send humidified air produced in the humidifying water tank to a discharge channel formed between the water tank and the inner shell, and a sealer disposed to seal the portion between the exhaust tube and the inner shell, so it is possible to prevent water splashed upward by an oscillator from flowing between the exhaust tube and the inner shell.

[0016] The water tank is disposed to apply load to the inner shell disposed over the sealer, so the portion around the sealer can be in closer contact.

[0017] The sealer is disposed between the inner shell and the exhaust tube and has a structure extending downward to be in contact with each of an inner surface and an outer surface of the exhaust tube, so a sealing force around the exhaust tube can be increased.

[0018] The sealer includes an inner protrusion protruding radially inward such that a lower end portion of the inner shell is seated thereon, so water dropping from the inner shell can naturally flow to the exhaust tube.

[0019] The inner protrusion is disposed at a position spaced downward a predetermined distance apart from an upper end of the sealer, so it is possible to prevent water from flowing between the exhaust tube and the inner shell.

[0020] An inner circumferential surface of the lower

end portion of the inner shell has a structure protruding inward further than the inner protrusion, so condensate water produced in the discharge channel can smoothly flow to the exhaust tube when flowing under the inner shell.

[0021] The sealer includes a first contact wall disposed to be in contact with an inner circumferential surface of the exhaust tube, a second contact wall disposed to be in contact with an outer circumferential surface of the exhaust tube, and a connection wall connecting an upper end of the first contact wall and an upper end of the second contact wall.

[0022] A length of the first contact wall may be smaller than a length of the second contact wall.

[0023] The sealer further includes an inner protrusion protruding inward from the first contact wall at a position spaced downward apart from an upper end of the connection wall, and a lower end portion of the inner shell has a step shape disposed over each of the inner protrusion and the connection wall, so it is possible to prevent water from flowing between the inner shell and the exhaust tube.

[0024] A bottom surface of the inner shell includes an exhaust connection wall protruding downward and connected with the exhaust tube, and the sealer may be disposed between the exhaust connection wall and the exhaust tube.

[0025] The lower end of the exhaust connection wall includes a first lower end surface disposed over the inner protrusion and a second lower end surface disposed to be spaced apart radially outward from the first lower end surface and to be spaced apart upward from the first lower end surface, the inner protrusion protrudes under the first lower end surface, and the connection wall is disposed under the second lower end surface, whereby two lower end surfaces disposed at different positions are disposed over different structures, so it is possible to prevent splashing water from flowing into the exhaust tube.

[0026] The humidifier includes a middle tray disposed under the water tank and the inner shell and supporting the inner shell, a hole formed such that humidified air discharged from the humidifying water tank flows is formed on the middle tray, and the middle tray is disposed to be in contact with each of an upper end of the sealer and a lower end of the inner shell between the sealer and the inner shell, so it is possible to prevent water from flowing between the middle tray and the exhaust tube.

[0027] A flange protruding upward around the hole is disposed at the middle tray, and the flange is disposed to be in contact with each of the upper end of the sealer and the lower end of the inner shell between the sealer and the inner shell, so it is possible to prevent water existing between the inner shell and the middle tray from flowing to the exhaust tube and it is possible to prevent water from flowing between the inner shell and the middle tray from the exhaust tube.

[0028] The lower end of the inner shell includes a first lower end surface disposed over the inner protrusion and

a second lower end surface disposed to be spaced apart radially outward from the first lower end surface and to be spaced apart upward from the first lower end surface, the sealer includes an inner protrusion protruding radially inward such that a lower end portion of the inner shell is seated thereon, the first lower end surface may be disposed to be in contact with the inner protrusion, and the second lower end surface may be disposed to be in contact with the flange.

[0029] A diameter of an inner circumferential surface of a lower end portion of the inner shell is larger than a diameter of an inner circumferential surface of the exhaust tube, so water dropping from over the inner shell can flow to the humidifying water tank through the exhaust tube.

[0030] The water tank and the inner shell may be disposed to be separable over the exhaust tube.

[0031] The humidifier of the present invention includes a water tank storing water, a humidifying water tank disposed under the water tank and producing humidified air from water supplied from the water tank using ultrasonic vibration, a middle tray disposed between the water tank and the humidifying water tank and having a hole being open in an up-down direction, an exhaust tube disposed under the middle tray and sending humidified air produced in the humidifying water tank to a portion over the middle tray through the hole, and a sealer disposed between the exhaust tube and the middle tray, so it is possible to prevent water flowing between the middle tray and the exhaust tube.

[0032] The details of other embodiments are included in the following detailed description and the accompanying drawings.

[0033] According to the humidifier of the present invention, one or more effects can be achieved as follows.

[0034] First, water flow between the exhaust tube and the inner shell is prevented by disposing the sealer even in a structure in which the humidifying water tank and the configuration forming the discharge channel are separately formed and combined, so it is possible to prevent water from flowing out of the section in which the water tank and the discharge channel are formed.

[0035] Further, since the water tank that is the structure forming the discharge channel and the inner shell are disposed to be separable from the humidifying water tank or the exhaust tube, it is possible to individually manage the configuration forming the discharge channel. The advantage of this is that it is possible to easily manage the configuration forming the discharge channel in which water continuously exists. The advantage of this is that it is possible to keep parts, which may be contaminated by moisture, clean.

[0036] Second, water is prevented from flowing into a place where electric devices for driving the humidifier are disposed, so there is the advantage of it being possible to keep stable operation of the humidifier.

[0037] Third, it is possible to prevent condensate water produced in the discharge channel from leaking between

configurations using a structure in which the condensate water produced in the discharge channel drops back to the humidifying water tank. It is possible to prevent water from leaking to regions excluding the humidifying water tank and the discharge channel, so there is the advantage in that it is possible to keep stable operation of the humidifier.

[0038] The effects of the present invention are not limited to those described above and other effects not stated herein may be made apparent to those skilled in the art from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039]

Fig. 1 is a perspective view of a humidifier according to an embodiment of the present invention.

Fig. 2 is a plan view of Fig. 1.

Fig. 3 is a cross-sectional view taken along line III-III' of Fig. 2.

Fig. 4 is an exploded perspective view of a water tank, an inner shell, and a middle tray according to an embodiment of the present invention.

Fig. 5 is a perspective view of the middle tray according to an embodiment of the present invention.

Fig. 6 is a cross-sectional perspective view of a side to which a structure including the water tank, the inner shell, and the middle tray according to an embodiment of the present invention has been coupled.

Fig. 7 is a perspective view of the coupled state of a humidifying module and the middle tray according to an embodiment of the present invention.

Fig. 8 is a cross-sectional view of a side illustrating a structure in which the middle tray and the inner shell are disposed over the humidifying module according to an embodiment of the present invention.

Fig. 9 is an enlarged view of the part A of Fig. 8.

DETAILED DESCRIPTION

[0040] The advantages and features of the present invention, and methods of achieving them will be clear by referring to the exemplary embodiments that will be described hereafter in detail with reference to the accompanying drawings. However, the present invention is not limited to the exemplary embodiments described hereafter and may be implemented in various ways, the exemplary embodiments are provided to complete the description of the present invention and let those skilled in the art completely know the scope of the present invention, and the present invention is defined by the claims. Like reference numerals indicate like components throughout the specification.

[0041] Hereinafter, the present invention will be described with reference to the drawings illustrating a humidifier according to embodiments of the present invention.

<Entire Structure>

[0042] First, the entire configuration of a humidifier of the present invention is described with reference to Figs. 1 to 3.

[0043] A humidifier of the present invention can vaporize water using ultrasonic vibration. A humidifier of the present invention can discharge humidified air by heating water. A humidifier of the present invention can discharge humidified air produced by ultrasonic vibration and humidified air produced by heating.

[0044] Referring to Figs. 1 to 3, a humidifier includes a case 10 forming an external shape and having an inlet 24a and an outlet 12a, a filter device disposed in the case 10 and filtering air suctioned into the inlet 24a, a blower 60 disposed in the case 10 and blowing air in the case 10 from the inlet 24a to the outlet 12a, a water tank 100 disposed in the case 10 and storing water, and a humidifying module being supplied with water from the water tank 100 and producing humidified air.

[0045] The humidifying module may include a first humidifying water tank 300 that heats water and a second humidifying water tank 350 that produces humidified air from water. The humidifying module may include a humidifying module housing 410 circumferentially covering the first humidifying water tank 300 and the second humidifying water tank 350. A channel housing 430 may be circumferentially disposed outside the humidifying module housing 410. A blowing channel 70 may be formed between the humidifying module housing 410 and the channel housing 430. Hereafter, the configuration and arrangement of the humidifying module are described in detail.

<Case>

[0046] The entire case 10 may have a cylindrical shape.

[0047] The case 10 may include an intake grill 24 forming the inlet 24a through which air flows inside and a discharge grill 12 forming the outlet 12a through which air is discharged.

[0048] The inlet 24a may be formed on the circumferential surface of the case 10 having a cylindrical shape. The outlet 12a may be formed on the top surface of the case 10 having a cylindrical shape. The humidifier of the present invention can suction air through the circumferential surface and discharge air through the top surface.

[0049] Referring to Fig. 3, the intake grill 24 can cover the outer sides of a filter 50 and a blowing housing 68 to be described below. A plurality of inlets 24a formed in the up-down direction and circumferentially spaced apart from each other may be formed on the intake grill 24. The inlets 24a may be formed around the filter 50. The inlets 24a may be formed on the lower portion of the intake grill 24. The inlets 24a may be formed on the lower portion of the intake grill 24 and the upper portion of the intake grill 24 may be formed to be closed to protect the

configuration inside the humidifier.

[0050] A plurality of grills 24b extending in the up-down direction is disposed at the intake grill 24. The plurality of grills 24b may be disposed to be spaced apart from each other in the circumferential direction of the intake grill 24. A plurality of inlets 24a may be formed between the plurality of grills 24b.

[0051] The intake grill 24 may be divided into a lower intake grill section 25a at which the inlets 24a are formed and an upper intake grill section 25b disposed over the lower intake grill section 25a. A display 30 to be described below may be disposed at the upper intake grill section 25b. The upper intake grill section 25b can cover the outer sides of the blowing housing 68 and the humidifying module to be described hereafter.

[0052] The humidifier may include a discharge grill 12 forming the outlet 12a and a water tank cover 14 disposed over the water tank 100. The discharge grill 12 may have a structure that is separated upward from an outer shell 22 to be described below. The water tank cover 14 may have a structure that is separated from the discharge grill 12 or the water tank 100. The discharge grill 12 may include a plurality of ribs 12b radially extending from the outer circumferential portion of the water tank cover 14. The plurality of ribs 12b disposed at the discharge grill 12 may be disposed to be circumferentially spaced apart from each other on the outer circumference surface of the water tank cover 14.

[0053] Referring to Fig. 2, the water tank cover 14 may include a center cover 16 and an edge cover 18 disposed around the center cover 16. The center cover 16 may have a structure that becomes convex upward as it goes to the center. A water supply hole 20 through which water flows into the water tank 100 may be formed between the edge cover 18 and the center cover 16.

[0054] Referring to Fig. 1, the discharge grill 12 may be disposed over a first discharge channel 32 and over a second discharge channel 34 to be described below. The plurality of outlets 12a may be formed between the plurality of ribs 12b disposed at the discharge grill 12.

[0055] The discharge grill 12 may have a predetermined height in the up-down direction. Accordingly, mixing channels 13 may be formed between the plurality of ribs 12b disposed at the discharge grill 12. Air flowing through the first discharge channel 32 and air flowing through the second discharge channel 34 can be mixed in the mixing channels 13.

[0056] Each of the plurality of ribs 12b is formed such that the height of the outer circumferential end is larger than the height of the inner circumferential end. Accordingly, the air flowing through the first discharge channel 32 and the second discharge channel 34 can be guided radially inward.

[0057] The case 10 may include an outer shell 22 that guides air flowing therein to the outlets 12a. The outer shell 22 may form an inner shell 180 to be described below and the second discharge channel 34.

[0058] The outer shell 22 includes an upper outer shell

22a disposed under the discharge grill 12 and a lower outer shell 22b disposed under the upper outer shell 22a. The lower outer shell 22b may be made of a transparent material.

[0059] The case 10 may include a bottom wall 26 covering the underside of the intake grill 24.

[0060] The humidifier may include a base 28 disposed under the case 10 and spacing the bottom wall 26 a predetermined distance apart from the ground. The upper end portion of the base 28 may be connected with the bottom wall 26. The bottom wall 26 is disposed to cover the bottom surface of the humidifier spaced apart upward from the ground from the base 28.

[0061] Referring to Fig. 2, the display 30 is disposed on a side of the case 10. The display 30 enables a user to control the power or operation of the humidifier. A display showing the operation state, etc. of the humidifier to a user may be disposed at the display 30.

[0062] <Filter device>

The filter device can filter air suctioned inside through the inlets 24a using the filter 50. The filter device can blow filtered air upward.

[0063] Referring to Fig. 3, the filter device includes a filter 50 filtering air that is suctioned into the inlets 24a, and a filter mount fixing the filter 50 in the case 10.

[0064] The filter 50 may have a cylindrical shape. Accordingly, the filter 50 can filter air that is suctioned in the front, rear, left, and right directions perpendicular to the up-down direction. Air suctioned into the inlet 24a can flow to an internal space of the filter 50. Air that has passed through the filter 50 can flow to the blower 60 disposed over the filter 50.

[0065] The filter mount includes a lower plate 52 disposed under the filter 50, an upper plate 54 disposed on the filter 50, and supporters (not shown) connecting the lower plate 52 and the upper plate 54.

[0066] The lower plate 52 is disposed under the filter 50. The lower plate 52 can sense whether the filter 50 is disposed while moving up and down. A fan sterilizer 53 that emits ultraviolet light upward may be disposed at the center of the lower plate 52. The fan sterilizer 53 can sterilize a blowing fan 62 to be described below or the inside of the filter 50.

[0067] An orifice 56 is formed on the upper plate 54. The orifice 56 may be formed at the center of the upper plate 54. The orifice 56 can make air flowing in the filter 50 flow to the blowing fan 62. The inner circumferential end of the upper plate 54 has an upward bending shape, so it is possible to guide air flowing upward through the internal space of the filter 50 to the blowing fan 62.

[0068] The supporters 58 can connect the lower plate 52 and the upper plate 54. The supporters 58 may be disposed to be circumferentially spaced apart from each other.

<Blower>

[0069] The blower 60 includes a blowing fan 62 generating airflow in the case 10 and a fan motor 64 rotating the blowing fan 62.

[0070] Referring to Fig. 3, the blowing fan 62 may form a fan suction port at a side facing the orifice 56 and a fan discharge port opposite to the fan intake port. As the blowing fan 62, a mixed flow fan of which the fan discharge port faces the center of a circle at the opposite side to the fan intake port may be used. The blowing fan 62 may include a hub connected with the fan motor 64, a shroud disposed to be spaced a predetermined distance apart from the hub and forming the fan intake port, and a blade radially extending to connect the hub and the shroud.

[0071] The blowing fan 62 can operate to send air upward from the lower portion. The blowing fan 62 can suction air toward the orifice 56 and discharge air toward the blowing housing 68 in which a diffuser 72 is disposed.

[0072] The fan motor 64 may be disposed over the blowing fan 64.

[0073] The blower includes a motor cover 66 covering the outer side of the fan motor 64 and the blowing housing 68 disposed to be spaced apart radially outward from the motor cover 66 and guiding upward the air blown by the blowing fan 62.

[0074] A blowing channel 70 through which the air blown by the blowing fan 62 flows upward may be formed between the motor cover 66 and the blowing housing 68. The blowing channel 70 may extend to the region in which a humidifying module housing 410 and a channel housing 430 are formed.

[0075] The intake grill 24 may be disposed outside the blowing housing 68.

[0076] The blower 60 includes the diffuser 72 disposed between the motor cover 66 and the blowing housing 68 and reducing the rotational component of the air blown upward by the blowing fan 62. A plurality of diffusers 72 may be disposed to be circumferentially spaced.

[0077] A control box 74 forming a space in which a circuit board 76 is disposed therein may be disposed over the motor cover 66. The control box 74 may be disposed to be spaced apart inward from the blowing housing 68. Accordingly, the blowing channel 70 can be formed also in the space between the control box 74 and the blowing housing 68.

[0078] A plurality of circuit board 76 may be disposed in the control box 74.

<Water tank, inner shell, middle tray>

[0079] A water tank, an inner shell, and a middle tray are described with reference to Fig. 4.

[0080] The humidifier includes a water tank 100 forming a space in which water is stored, an inner shell 180 forming a space in which the water tank 100 is disposed, and a middle tray 200 disposed under the inner shell 180.

[0081] The water tank 100 may be in the state in which an inner water tank 102 is disposed in an outer water tank 160. Accordingly, a connector holder 132 may be disposed in a through-hole 164 of the outer water tank 160.

[0082] The outer water tank 160 may be disposed, with the inner shell 180 disposed therein, over the middle tray 200. The middle tray 200 may be a structure supporting the inner shell 180, the outer water tank 160, and the inner water tank 102. Accordingly, the load of the inner water tank 102, the outer water tank 160, and the inner shell 180 can be transmitted to the middle tray 200.

[0083] The outer water tank 160 is circumferentially disposed outside the inner water tank 102.

[0084] The through-hole 164 is formed on the bottom surface of the outer water tank 160 and some components of a connector 120 may be disposed under the outer water tank 160 through the through-hole 164.

[0085] A pair of first water tank protrusions 170a and 170b protruding downward from the bottom surface of the outer water tank 160 and a second water tank protrusion 168 protruding downward from the bottom surface of the outer water tank 160 may be disposed on the bottom surface of the outer water tank 160.

[0086] The pair of first water tank protrusions 170a and 170b may be disposed opposite to each other with the through-hole 164 therebetween. The pair of first water tank protrusions 170a and 170b can transmit the load of the inner water tank 102 and the outer water tank 160 to weight sensors 212a and 212b of the middle tray 200 to be described below. The pair of first water tank protrusions 170a and 170b can transmit the load of the inner water tank 102 and the outer water tank 160 to the weight sensors 212a and 212b (see Fig. 6) directly or indirectly through the inner shell 180.

[0087] The second water tank protrusion 168 may be disposed between the pair of first water tank protrusions 170a and 170b.

[0088] The inner shell 180 can form a space in which the water tank 100 is disposed.

[0089] A shell through-hole 184 is formed on the bottom surface of the inner shell 180. The shell through-hole 184 is disposed under the through-hole 164 of the outer water tank 160. The connector 120 may be disposed in the shell through-hole 184.

[0090] A pair of first shell protrusions 188a and 188b in which the pair of first water tank protrusions 170a and 170b of the outer water tank 160 is mounted may be disposed at the inner shell 180. The pair of first shell protrusions 188a and 188b may have a structure protruding downward from the bottom surface of the inner shell 180.

[0091] A second shell protrusion 190 in which the second water tank protrusion 168 of the outer water tank 160 is mounted may be disposed at the inner shell 180. A space in which the second water tank protrusion 168 is inserted may be formed in the second shell protrusion 190.

[0092] An exhaust connection tube 192 formed such that humidified air discharged from the humidifying module flows therethrough is disposed on the bottom surface of the inner shell 180. An exhaust connection tube hole 194 is formed in the exhaust connection tube 192.

[0093] The middle tray 200 is disposed under the inner shell 180. A first hole 204 through which a supply tube 230 is disposed is formed on the middle tray 200. The first hole 204 may be formed at the center of a tray plate 202.

[0094] A second hole 208 through which humidified air discharged from the second humidifying water tank 350 flows is formed on the middle tray 200. The second hole 208 may be disposed at a position radially spaced apart from the first hole 204.

[0095] Hereafter, a middle tray is described with reference to Fig. 5.

[0096] The humidifier includes a middle tray 200 separating the region in which the water tank 100 is disposed and the region in which the humidifying module is disposed. The middle tray 200 can sense the level of water stored in the water tank 100. The middle tray 200 can emit light to humidified air that is discharged.

[0097] The middle tray 200 is disposed under the water tank 100. The middle tray 200 is disposed over a second humidifying water tank wall 352 or a first humidifying water tank wall 302 to be described below. Weight sensors 212a and 212b that sense the level of water in the water tank 100 as weight may be disposed at the middle tray 200.

[0098] A lamp 216 (see Fig. 6) that emits light toward the first discharge channel 32 may be disposed at the middle tray 200.

[0099] The middle tray 200 includes a tray plate 202 and a lamp housing 218 that is circumferentially disposed outside the tray plate 202 and in which the lamp 216 is disposed.

[0100] A first hole 204 through which the supply tube 230 is disposed is formed at a side on the tray plate 202. The first hole 204 may be formed at the center of a tray plate 202. A portion of the supply tube 230 is disposed over the first hole 204. The connector 120 of the inner water tank 102 may be connected to the supply tube 230 disposed over the first hole 204.

[0101] A first flange 206 protruding upward from the tray plate 202 is disposed around the first hole 204. Accordingly, it is possible to prevent water flowing on the tray plate 202 from flowing under the middle tray 200.

[0102] A second hole 208 through which humidified air discharged from the second humidifying water tank 350 flows is formed at another side on the tray plate 202. A second flange 210 protruding upward from the tray plate 202 is disposed around the second hole 208. The second flange 210 can prevent water flowing on the tray plate 202 from flowing under the middle tray 200 through the second hole 208.

[0103] The lamp housing 218 is disposed around the tray plate 202. The lamp housing 218 may be formed in

a ring shape. The lamp 216 that emits light upward may be disposed inside the lamp housing 218. A side of the lamp housing 218 may be made of a material that transmits the light emitted from the lamp 216.

[0104] The middle tray 200 may be disposed to cover the tops of the first humidifying water tank 300 and the second humidifying water tank 350. The middle tray 200 may form a space in which the first humidifying water tank 300 and the second humidifying water tank 350 are disposed by being combined with a humidifying module housing 410 to be described below.

[0105] The water tank, the inner shell, and the middle tray are described with reference to Fig. 6.

[0106] The inner water tank 102 may be disposed in the outer water tank 160. When the inner water tank 102 is disposed in the outer water tank 160, the outer circumferential surface of the inner water tank 102 may be in contact with the inner circumferential surface of the outer water tank 160.

[0107] The outer water tank 160 is circumferentially disposed outside the inner water tank 102. The outer water tank 160 may be disposed to be in contact with the outer circumferential portion of the inner water tank 102. Accordingly, it is possible to minimize condensate water that is produced on the outer circumferential portion of the inner water tank 102.

[0108] The upper end portion 162 of the outer water tank 160 may be formed to be spaced apart from the inner water tank 102. That is, the upper end portion 162 of the outer water tank 160 may be formed such that the radial expansion ratio increases as it goes upward.

[0109] The water softener 140 is disposed in the inner water tank 102. The water softener 140 is connected with the connector 120 disposed in the inner water tank 102, whereby the water softener 140 can be fixed. A gasket 152 is disposed at the upper end portion of the water softener 140 to be in close contact with the inner circumferential surface of the inner water tank 102. Accordingly, water flowing in the inner water tank 102 can flow down through the water softener 140.

[0110] The inner shell 180 is disposed to be spaced apart from the outer water tank 160. The inner shell 180 is disposed to be spaced apart from the water tank 100. The first discharge channel 32 through which humidified air flows is formed between the inner shell 180 and the outer water tank 160.

[0111] The first water tank protrusions 170a and 170 of the outer water tank 160 are inserted in the first shell protrusions 188a and 188b of the inner shell 180, whereby the outer water tank 160 can be fixed. The inner shell 180 may have a structure to which the load of the outer water tank 160, the inner water tank 102, and the water softener 140 is transmitted.

[0112] The first discharge channel 32 is formed between the inner shell 180 and the outer water tank 160. Humidified air produced in the second humidifying water tank 350 or the first humidifying water tank 300 to be described below can flow through the first discharge

channel 32. The inner shell 180 may be made of a transparent material.

[0113] The inner shell 180 is disposed over the middle tray 200. The weight sensors 212a and 212b are disposed on the middle tray 200 at the portions that are in contact with the inner shell 180. The weight sensors 212a and 212b can sense the level of water stored in the inner water tank 102 by sensing the load of the inner shell 180, the outer water tank 160, the inner water tank 102, and the water softener 140.

[0114] The first shell protrusions 188a and 188b of the inner shell 180 may be disposed on the weight sensors 212a and 212b of the middle tray 200.

[0115] The first hole 204 may be formed on the middle tray 200. The first hole 204 is disposed at the center of the middle tray 200. The supply tube 230 may be disposed through the first hole 204 of the middle tray 200.

[0116] The middle tray 200 includes the tray plate 202 disposed under the inner shell 180 and the lamp housing 218 disposed around the tray plate 202. The lamp housing 218 is disposed around the tray plate 202. The lamp housing 218 may have a ring-shaped structure. The lamp housing 218 may be disposed to protrude upward from the tray plate 202.

[0117] The lamp 216 that emits light upward is disposed inside the lamp housing 218. A plurality of lamps 216 circumferentially spaced apart from each other may be disposed in a ring-shaped space formed by the lamp housing 218. The lamp 216 can emit light to the upper portion at which the inner shell is disposed.

[0118] The lamp 216 can emit light to the first discharge channel 32 formed by the inner shell 180 and the outer water tank 160. Accordingly, humidified air flowing through the first discharge channel 32 can be visually seen from the outside.

[0119] Flow paths between the water tank, the inner shell, and outer shell are described with reference to Fig. 7.

[0120] Humidified air produced in the second humidifying water tank 350 or the first humidifying water tank 300 can flow to the first discharge channel 32 through an exhaust tube 382. Humidified air can be discharged outside through the first discharge channel 32. Further, condensate water produced in the first discharge channel 32 can flow into the second humidifying water tank 350 through the exhaust tube 382.

[0121] The exhaust tube 382 disposed over the second humidifying water tank wall 352 is disposed under the second hole 208 of the middle tray 200.

[0122] The inner shell 180 and the outer shell 22 are disposed to be spaced apart from each other, thereby forming the second discharge channel 34. Filtered clean air blown by the blower 60 can flow through the second discharge channel 34.

[0123] A second shell protrusion 190 in which the second water tank protrusion 168 of the outer water tank 160 is mounted may be disposed at the inner shell 180. A space in which the second water tank protrusion 168 is

inserted may be formed in the second shell protrusion 190.

[0124] An exhaust connection tube 192 that guides humidified air discharged from the second humidifying water tank 350 to the first discharge channel 32 is disposed at the inner shell 180. The exhaust connection tube 192 may have a structure extending downward from the bottom surface of the inner shell 180. The exhaust connection tube 192 may have a shape corresponding to the exhaust tube 382.

[0125] The lower end portion of the exhaust connection tube 192 may be connected with the upper end portion of the exhaust tube 382. The lower end portion of the exhaust connection tube 192 may be disposed inside further than the upper end portion of the exhaust tube 382.

[0126] Hereafter, the configuration and arrangement of the humidifying module and the arrangement of a sealer, the middle tray, and the inner shell are described with reference to Fig. 8.

[0127] The humidifier of the present invention includes the supply tube 230 for supplying water stored in the water tank 100 to the first humidifying water tank 300. The supply tube 230 is disposed between the water tank 100 and the first humidifying water tank 300. The supply tube 230 can temporarily store water that is discharged from the water tank 100 and supplied to the first humidifying water tank 300.

[0128] The humidifier of the present invention includes the humidifying module housing 401 forming a space in which the first humidifying water tank 300 and the second humidifying water tank 350 are disposed. The display 30 may be disposed on a side of the humidifying module housing 410. The middle tray 200 may be disposed over the humidifying module housing 410.

[0129] A supply chamber 232 in which water is temporarily stored may be formed in the supply tube 230. A sensor 234 that senses the hardness of water stored in the supply tube 230 may be disposed on a side of the supply tube 230.

[0130] The upper end portion of the supply tube 230 may be disposed to protrude upward from the middle tray 200. The upper end portion of the supply tube 230 may be disposed through the first hole 204 formed on the middle tray 200 and may be connected with the inner water tank 102 disposed over the supply tube 230.

[0131] The humidifier of the present invention may include a humidifying module that heats water and produces humidified air. The humidifying module may include a first humidifying water tank 300 that heats water and a second humidifying water tank 350 that produces humidified air using an oscillator 370.

[0132] The humidifier may include a first connection tube 390 and a second connection tube (not shown) that connect the first humidifying water tank 300 and the second humidifying water tank 350. The first connection tube 390 can supply water heated in the first humidifying water tank 300 to the second humidifying water tank 350. A

second valve (not shown) opening/closing the first connection tube 390 may be disposed in the first connection tube 390. A pump (not shown) supplying water stored in the second humidifying water tank 350 to the first humidifying water tank 300 may be disposed in the second connection tube.

[0133] The first humidifying water tank 300 and the second humidifying water tank 350 may be connected through a connecting tube 310 disposed over the first connection tube 390.

[0134] The first humidifying water tank wall 302 may have a cylindrical shape in which water is stored. The underside of the first humidifying water tank wall 302 may be open and a heater 340 may be disposed under the first humidifying water tank wall 302.

[0135] The first humidifying water tank 300 may include upper covers 322 and 326 disposed over the first humidifying water tank wall 302. The upper covers 322 and 326 are disposed over an upper water tank wall 304.

[0136] The upper covers 322 and 326 may be disposed to cover at least a portion of the top of the first humidifying water tank wall 302. The upper covers 322 and 326 may include a first upper cover 322 and a second upper cover 326 disposed under the first upper cover 322.

[0137] A connecting channel 311 connecting the first humidifying water tank 300 and the second humidifying water tank 350 may be formed in the connecting tube 310. Humidified air produced and flowing upward in the first humidifying water tank 300 can flow to the second humidifying water tank 350 through the connecting channel 311.

[0138] The second humidifying water tank 350 includes the second humidifying water tank wall 352 forming a space in which water is stored, and the oscillator 370 disposed under the second humidifying water tank wall 352 and vibrating to atomize the water inside the second humidifying water tank wall 352.

[0139] Two oscillators 370 may be disposed on the bottom surface of the second humidifying water tank wall 352. The two oscillators 370 may be disposed to be spaced apart from each other in a direction perpendicular to the up-down direction.

[0140] The second humidifying water tank 350 includes a humidifying water tank cover 380 disposed over the second humidifying water tank wall 352. The humidifying water tank cover 380 can supply humidified air produced inside the second humidifying water tank wall 352 to the first discharge channel 32.

[0141] The humidifying water tank cover 380 includes an exhaust tube 382 for sending humidified air upward. The exhaust tube 382 may have a structure extending upward from the humidifying water tank cover 380. The exhaust tube 382 may have a substantially elliptical pillar shape.

[0142] The upper end of the exhaust tube 382 may be disposed to be in contact with the middle tray 200. In this configuration, the upper end of the exhaust tube 382 may be disposed to be in direct contact with the middle tray

200 or in indirect contact with the middle tray 200 through a separate sealer 388.

[0143] The exhaust tube 382 may be disposed under the middle tray 200. The exhaust tube 382 may be disposed under the inner shell 180.

[0144] The sealer 388 is disposed between the exhaust tube 382 and the middle tray 200. The sealer 388 is disposed between the exhaust tube 382 and the inner shell 180. The sealer 388 is disposed between the exhaust tube 382 and the middle tray 200 and/or the inner shell 180.

[0145] The sealer 388 can prevent water that is moved upward by the oscillator 370 disposed in the second humidifying water tank 350 from flowing between the exhaust tube 382 and the middle tray 200. Further, the sealer 388 can prevent water that is moved upward by the oscillator 370 disposed in the second humidifying water tank 350 from flowing between the exhaust tube 382 and the inner shell 180.

[0146] When condensate water produced in the inner shell 280 flows downward, the sealer 388 can prevent the condensate water from flowing between the exhaust tube 382 and the inner shell 180.

[0147] An exhaust tube inlet 382a (or an exhaust tube hole) is formed on the lower end of the exhaust tube 382. An exhaust tube outlet 382b is formed on the upper end of the exhaust tube 382. The exhaust tube 382 can form an exhaust tube channel 383 between the exhaust tube inlet 382a and the exhaust tube outlet 382b.

[0148] An air supply hole 387 is formed at a side of the humidifying water tank cover 380. External air can flow into the second humidifying water tank wall 352 through the air supply hole 387. The air supply hole 387 may have an upward open shape.

[0149] The humidifying water tank cover 380 includes an air guide cover 386 for supplying air flowing through the blowing channel 70 to the second humidifying water tank wall 352. The air guide cover 386 makes a portion of air, which flows outside the humidifying module housing 410, flow into the second humidifying water tank wall 352 through the air supply hole 387.

[0150] An air guide rib 412 that converts a rotational stream flowing along the humidifying module housing 410 into a rising stream may be disposed under the air guide cover 386.

[0151] The air guide cover 386 may have a structure extending outward from the circumferential surface of the humidifying module housing 410. Accordingly, the air guide cover 386 can guide air flowing upward along the blowing channel 70 such that a portion of the air flows to the second humidifying water tank wall 352.

[0152] A lower extension wall 384 is disposed between the exhaust tube inlet 382a and the air supply hole 387. The lower extension wall 384 may have a shape bending toward the exhaust tube inlet 382a when seen from above. Accordingly, the air flowing in the second humidifying water tank wall 352 through the air supply hole 387 can flow along the lower portion and the inner circumfer-

ential surface of the second humidifying water tank wall 352.

[0153] The lower extension wall 384 may extend downward between the exhaust tube inlet 382a and the air supply hole 387. The lower extension wall 384 can make the air flowing in the second humidifying water tank wall 352 through the air supply hole 387 flow under the second humidifying water tank wall 352.

[0154] Hereafter, the structure of the sealer of the present invention and the configuration and arrangement of relevant components are described with reference to Fig. 9.

[0155] The sealer 388 is disposed over the exhaust tube 382. The sealer 388 is disposed to be seated at the upper end of the exhaust tube 382. The sealer 388 may be disposed to be in contact with the outer circumferential surface and the inner circumferential surface of the exhaust tube 382.

[0156] The sealer 388 may include a first contact wall 388a disposed to be in contact with the inner circumferential surface of the exhaust tube 382, a second contact wall 388b disposed to be in contact with the outer circumferential surface of the exhaust tube 382, and a connection wall 388c connecting the upper end of the first contact wall 388a and the upper end of the second contact wall 388b.

[0157] The middle tray 200 may be disposed to be seated over the sealer 388.

[0158] The sealer 388 includes a first contact wall 388a disposed to be in contact with the inner circumferential surface of the exhaust tube 382, a second contact wall 388b disposed to be in contact with the outer circumferential surface of the exhaust tube 382, and a connection wall 388c connecting the upper end of the first contact wall 388a and the upper end of the second contact wall 388b.

[0159] The sealer 388 includes an inner protrusion 389 protruding radially inward such that the lower end portion of the inner shell 180 is seated thereon. The exhaust connection tube 192 of the inner shell 180 may be disposed over the inner protrusion 389. The lower end portion of the exhaust connection tube 192 may be disposed over the inner protrusion 389.

[0160] The inner protrusion 389 is disposed to be spaced downward a predetermined distance apart from the upper end of the sealer 388.

[0161] The length 389D of the diameter formed by the inner circumferential surface of the inner protrusion 389 is larger than the length 192D of the diameter of the inner circumferential surface of the lower end portion of the inner shell 180. That is, the lower end of the inner shell 180 protrudes toward the inside of the sealer 388 further than the inner protrusion 389. Accordingly, condensate water produced in the first discharge channel 32 and flowing under the inner shell 180 can flow into the second humidifying water tank 350 through the exhaust tube 382.

[0162] The lower end 196 of the exhaust connection tube 192 may include a first lower end surface 196a dis-

posed over the inner protrusion 389 and a second lower end surface 196b disposed to be spaced apart radially outward from the first lower end surface 196a and to be spaced apart upward from the first lower end surface 196a. The first lower end surface 196a and the second lower end surface 196b may be connected to a vertical surface 196c extending upward. The first lower end surface 196a and the second lower end surface 196b may be formed in a step shape.

[0163] The inner protrusion 389 is disposed under the first lower end surface 196a. The first lower end surface 196a may be disposed to be in contact with the inner protrusion 389.

[0164] A connection wall 388c of the sealer 388 may be disposed under the second lower end surface 196b. The middle tray 200 may be disposed under the second lower end surface 196b. The second flange 210 of the middle tray 200 may be disposed under the second lower end surface 196b.

[0165] The middle tray 200 is disposed between the second lower end surface 196b of the inner shell 180 and the upper end surface of the sealer 388. The second flange 210 of the middle tray 200 may be disposed between the connection wall 388c of the sealer 388 and the second lower end surface 196b of the inner shell 180.

[0166] The middle tray 200 may be disposed to be in contact with two surfaces of each of the connection wall 388c of the sealer 388 and the second contact wall 388b. The second flange 210 of the middle tray 200 is disposed to be in contact with the connection wall 388c of the sealer 388. Further, a wall 211 extending upward for the position at which the second flange 210 of the middle tray 200 is disposed may be disposed to be in contact with the outer circumferential surface of the second contact wall 388b.

[0167] The extension length 388bL of the second contact wall 388b downward from the connection wall 388c may be larger than the extension length 388aL of the first contact wall 388a downward from the connection wall 388c.

[0168] When water splashed upward by operation of the oscillator 370 disposed in the second humidifying water tank 350 moves to the inner circumferential surface of the exhaust tube 382, the water can flow into the second humidifying water tank 350 along the inner circumferential surface of the exhaust tube 382.

[0169] When water splashed upward by operation of the oscillator 370 disposed in the second humidifying water tank 350 moves to the inner circumferential surface of the sealer 388, the water can flow into the second humidifying water tank 350 along the inner circumferential surface of the sealer 388 and the inner circumferential surface of the exhaust tube 382.

[0170] When water splashed upward by operation of the oscillator 370 disposed in the second humidifying water tank 350 moves to the inner circumferential surface of the exhaust connection tube 192 of the inner shell 180, the water sequentially flows to the inner circumferential surface of the exhaust connection tube 192, the inner

circumferential surface of the sealer 388, and the inner circumferential surface of the exhaust tube 382, thereby being able to flow into the second humidifying water tank 350.

[0171] By the shapes of the first lower end surface 196a and the second lower end surface 196b of the exhaust connection tube 192, water can be prevented from flowing between the inner shell 180 and the exhaust tube 382 in spite of upward splashing of water in the second humidifying water tank 350.

[0172] Further, since the sealer 388 is disposed between the second lower end surface 196b of the exhaust connection tube 192 and the exhaust tube 382 and the second flange 210 of the middle tray 200 is disposed between the second lower end surface 196b of the exhaust connection tube 192 and the sealer 388, it is possible to completely prevent water from flowing between the exhaust tube 382 and the exhaust connection tube 192.

[0173] Although exemplary embodiments of the present invention were illustrated and described above, the present invention is not limited to the specific exemplary embodiments and may be modified in various ways by those skilled in the art without departing from the scope of the present invention described in claims, and the modified examples should not be construed independently from the scope of the present invention.

Claims

1. A humidifier comprising:

a water tank (100) for storing water;
a humidifying water tank (350) disposed under the water tank (100) and configured to produce humidified air from water supplied from the water tank (100);
an inner shell (180) forming a space in which the water tank (100) is disposed, and disposed to be spaced apart from an outer circumferential portion of the water tank (100);
an exhaust tube (382) extending upward to send humidified air produced in the humidifying water tank (350) to a discharge channel formed between the water tank (100) and the inner shell (180); and
a sealer (388) disposed to seal the portion between the exhaust tube (382) and the inner shell (180).

2. The humidifier of claim 1, wherein the water tank (100) is disposed to apply load to the inner shell (180) disposed over the sealer (388).

3. The humidifier of claim 1 or 2, wherein the sealer (388) is disposed between the inner shell (180) and the exhaust tube (382) and has a structure extending

downward to be in contact with each of an inner surface and an outer surface of the exhaust tube (382).

4. The humidifier of any one of claims 1 to 3, wherein the sealer (388) includes an inner protrusion (389) protruding radially inward such that a lower end portion of the inner shell (180) is seated thereon.

5. The humidifier of claim 4, wherein the inner protrusion (389) is disposed at a position spaced downward a predetermined distance apart from an upper end of the sealer (388).

6. The humidifier of claim 4 or 5, wherein an inner circumferential surface of the lower end portion of the inner shell (180) has a structure protruding inward further than the inner protrusion (389).

7. The humidifier of any one of claims 1 to 6, wherein the sealer (388) includes:

a first contact wall (388a) disposed to be in contact with an inner circumferential surface of the exhaust tube (382);

a second contact wall (388b) disposed to be in contact with an outer circumferential surface of the exhaust tube (382); and

a connection wall (388c) connecting an upper end of the first contact wall (388a) and an upper end of the second contact wall (388b), wherein a length of the first contact wall (388a) is smaller than a length of the second contact wall (388b).

8. The humidifier of claim 7, when dependent on any one of claims 1 to 3, wherein the sealer (388) further includes an inner protrusion (389) protruding inward from the first contact wall (388a) at a position spaced downward apart from an upper end of the connection wall (388c), and a lower end portion of the inner shell (180) has a step shape disposed over each of the inner protrusion (389) and the connection wall (388c).

9. The humidifier of any one of claims 1 to 8, wherein a bottom surface of the inner shell (180) includes an exhaust connection wall (192) protruding downward and connected with the exhaust tube (382), and the sealer (388) is disposed between the exhaust connection wall (192) and the exhaust tube (382).

10. The humidifier of claim 9, wherein a lower end (196) of the exhaust connection wall (192) includes:

a first lower end surface (196a) disposed over the inner protrusion (389); and

a second lower end surface (196b) disposed to be spaced apart radially outward from the first lower end surface (196a) and to be spaced apart

upward from the first lower end surface (196a), wherein the inner protrusion (389) protrudes under the first lower end surface (196a), and the connection wall (388c) is disposed under the second lower end surface (196b).

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11. The humidifier of any one of claims 1 to 10, comprising a middle tray (200) disposed under the water tank (100) and the inner shell (180) and supporting the inner shell (180),

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wherein a hole (204, 208) formed such that humidified air discharged from the humidifying water tank (350) flows is formed on the middle tray (200), and the middle tray (200) is disposed to be in contact with each of an upper end of the sealer (388) and a lower end of the inner shell (180) between the sealer (388) and the inner shell (180).

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12. The humidifier of claim 11, wherein a flange (206, 210) protruding upward around the hole (204, 208) is disposed at the middle tray (200), and the flange (206, 210) is disposed to be in contact with each of the upper end of the sealer (388) and the lower end of the inner shell (180) between the sealer (388) and the inner shell (180).

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13. The humidifier of claim 12, wherein the sealer (388) includes an inner protrusion (389) protruding radially inward such that a lower end portion of the inner shell (180) is seated thereon, the inner shell (180) includes:

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a first lower end surface (196a) disposed over the inner protrusion (389); and

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a second lower end surface (196b) disposed to be spaced apart radially outward from the first lower end surface (196a) and to be spaced apart upward from the first lower end surface (196a), wherein the first lower end surface (196a) is disposed to be in contact with the inner protrusion (389), and

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the second lower end surface (196b) is disposed to be in contact with the flange (206, 210).

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14. The humidifier of any one of claims 1 to 13, wherein a diameter of an inner circumferential surface of a lower end portion of the inner shell (180) is larger than a diameter of an inner circumferential surface of the exhaust tube (382).

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15. The humidifier of any one of claims 1 to 14, wherein the water tank (100) and the inner shell (180) are disposed to be separable over the exhaust tube (382).

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Fig. 1

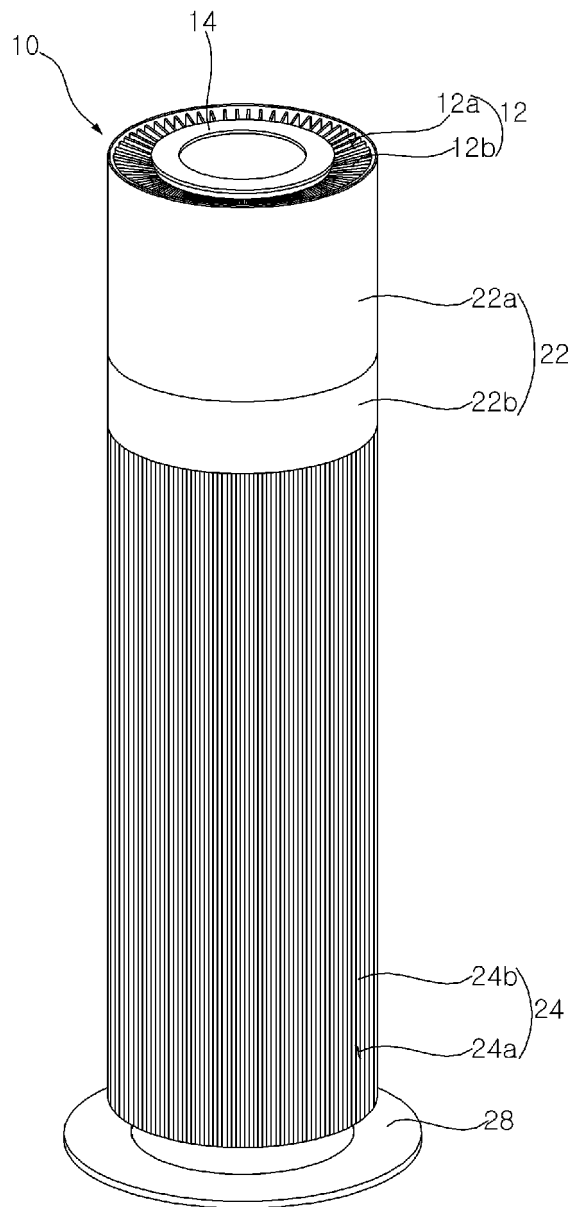


Fig. 2

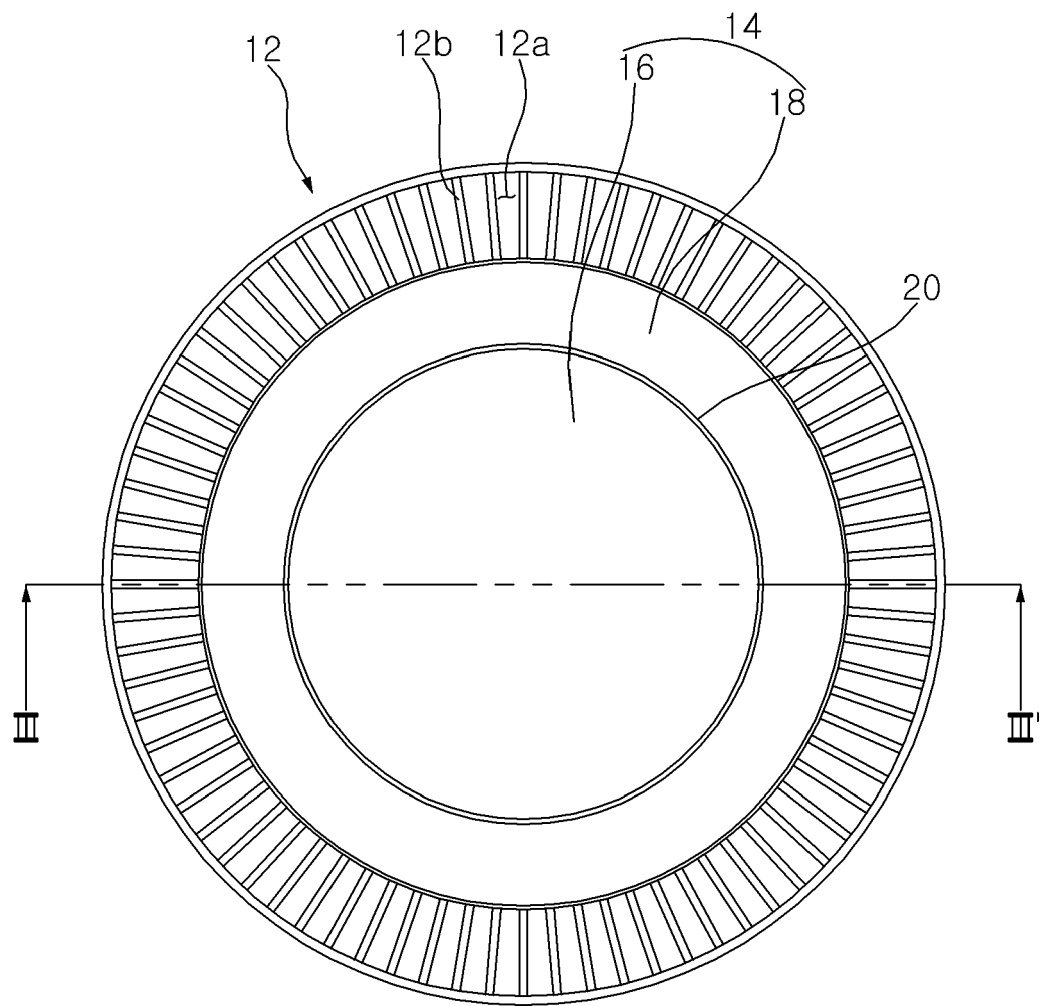


Fig. 3

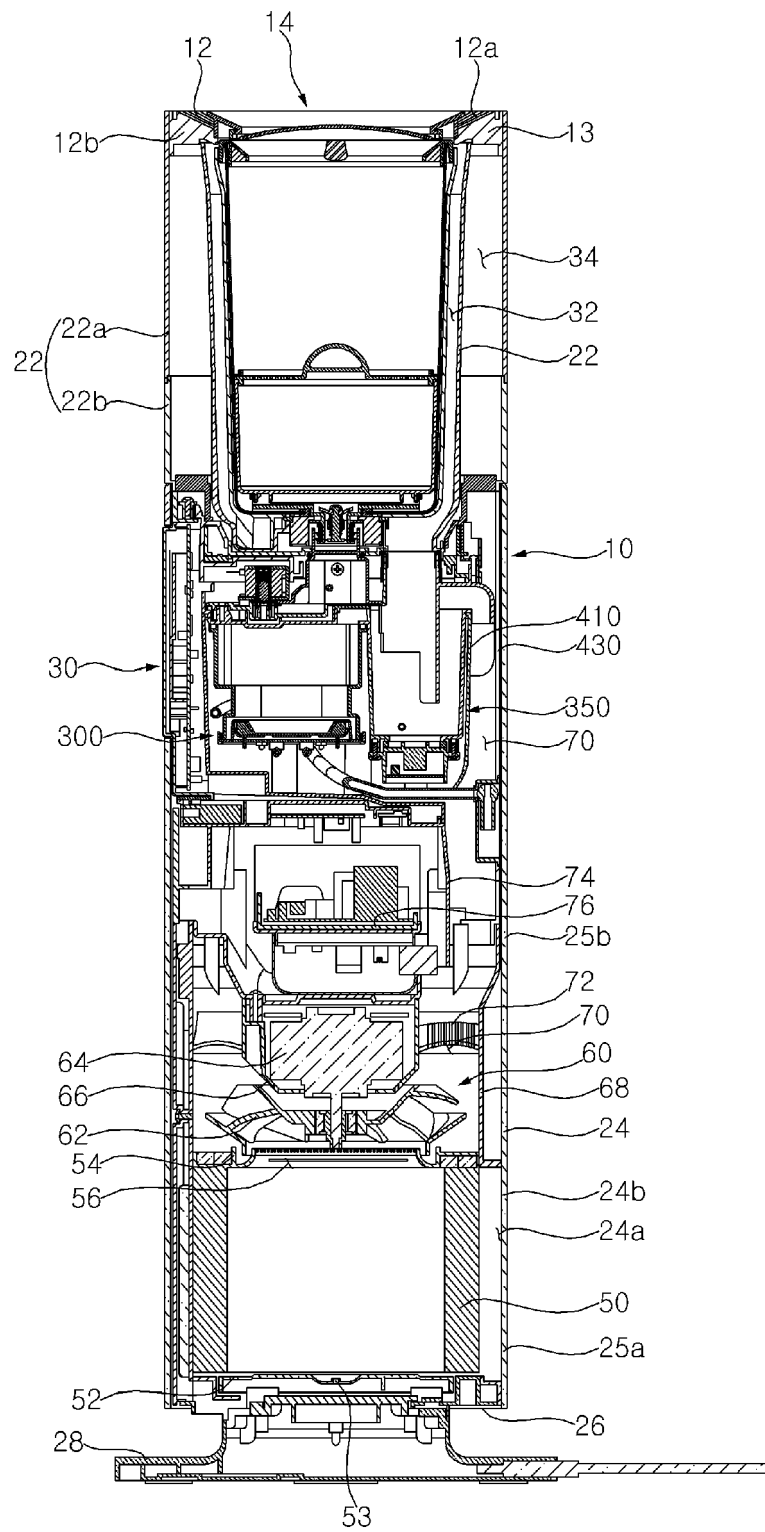


Fig. 4

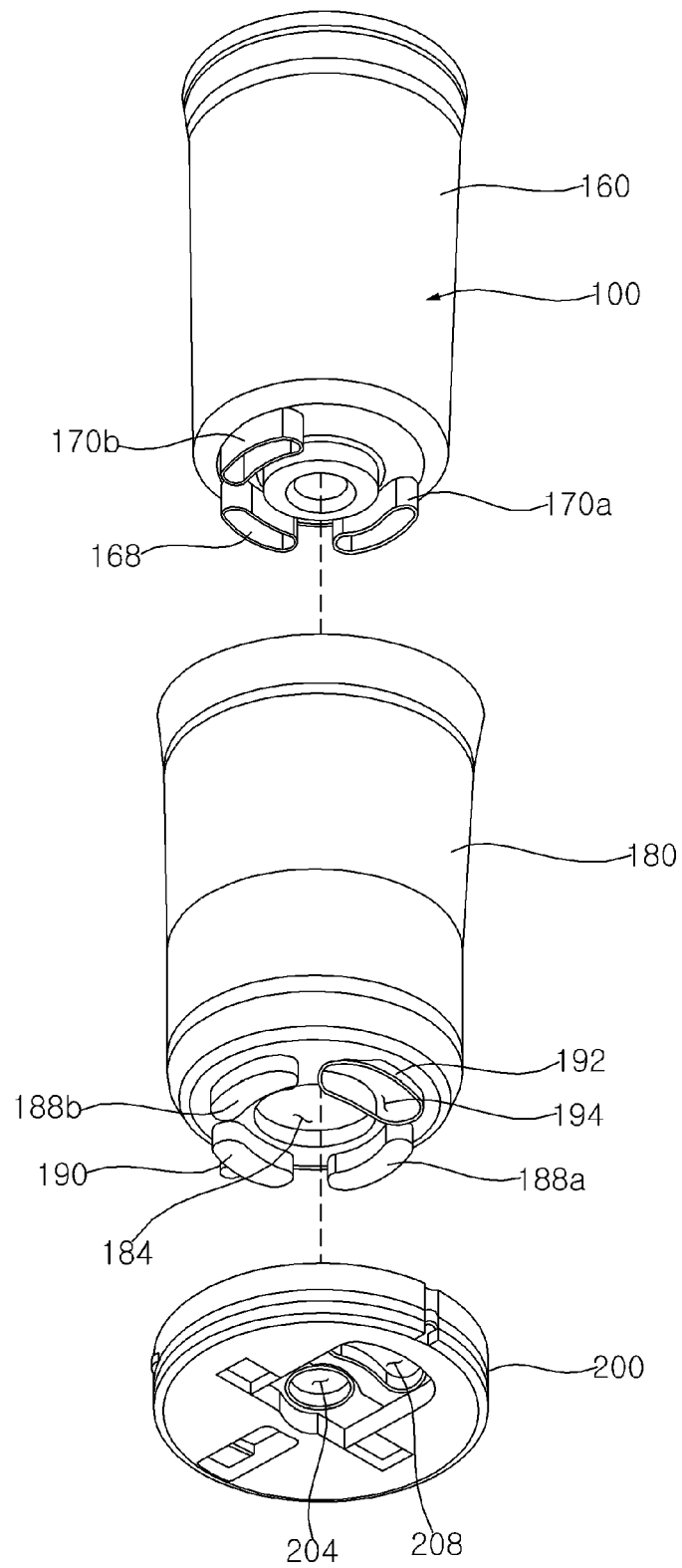


Fig. 5

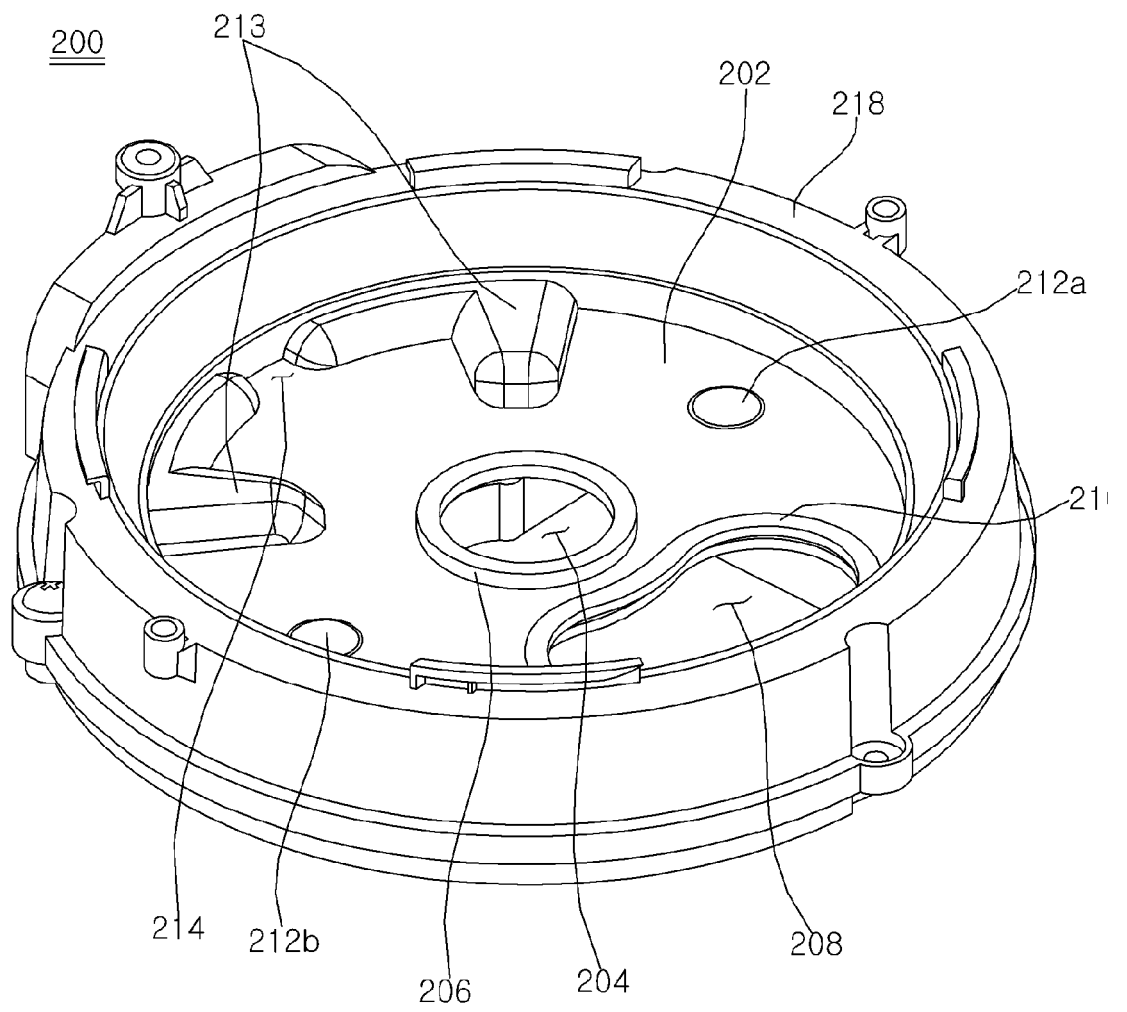


Fig. 6

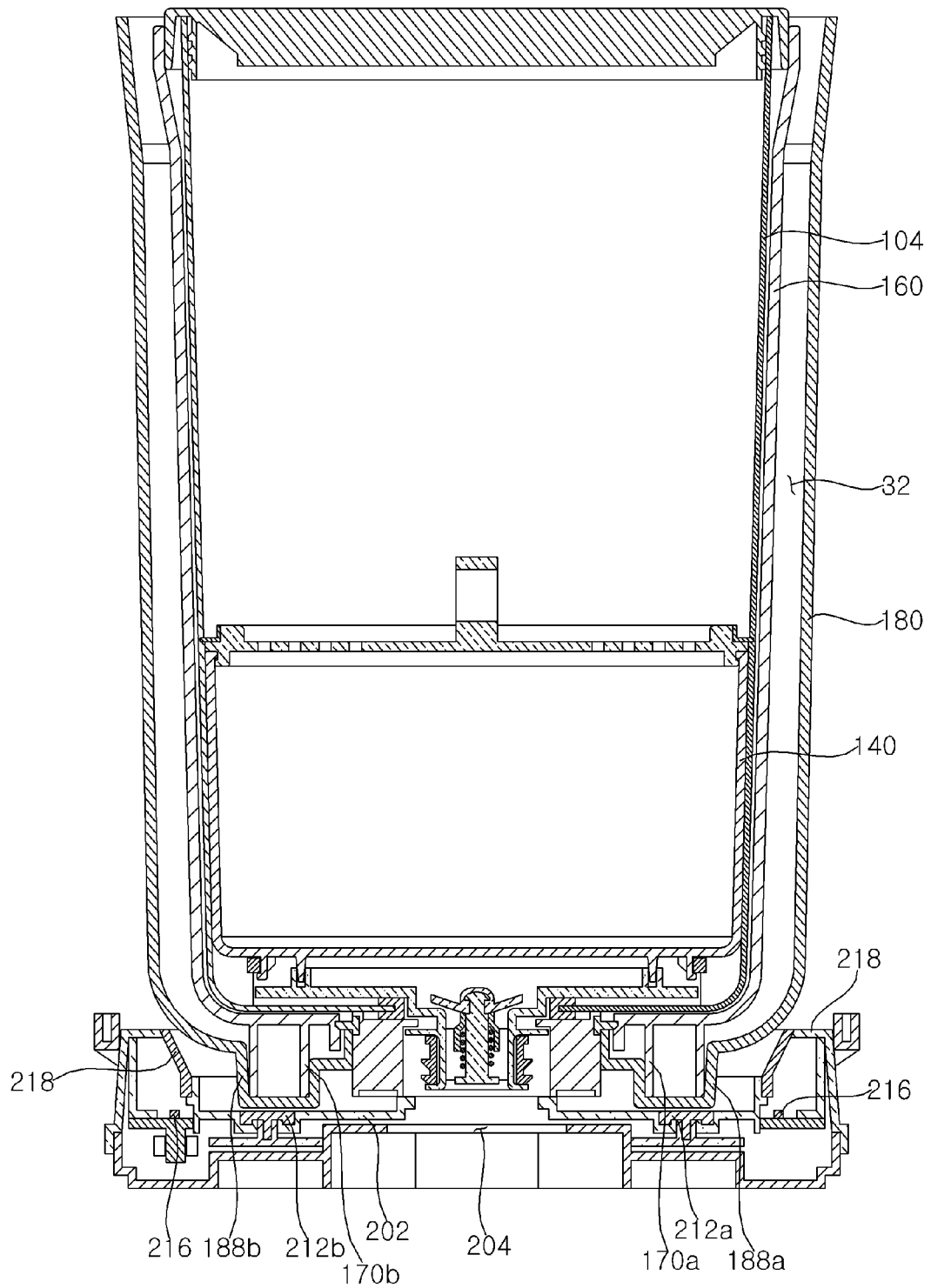


Fig. 7

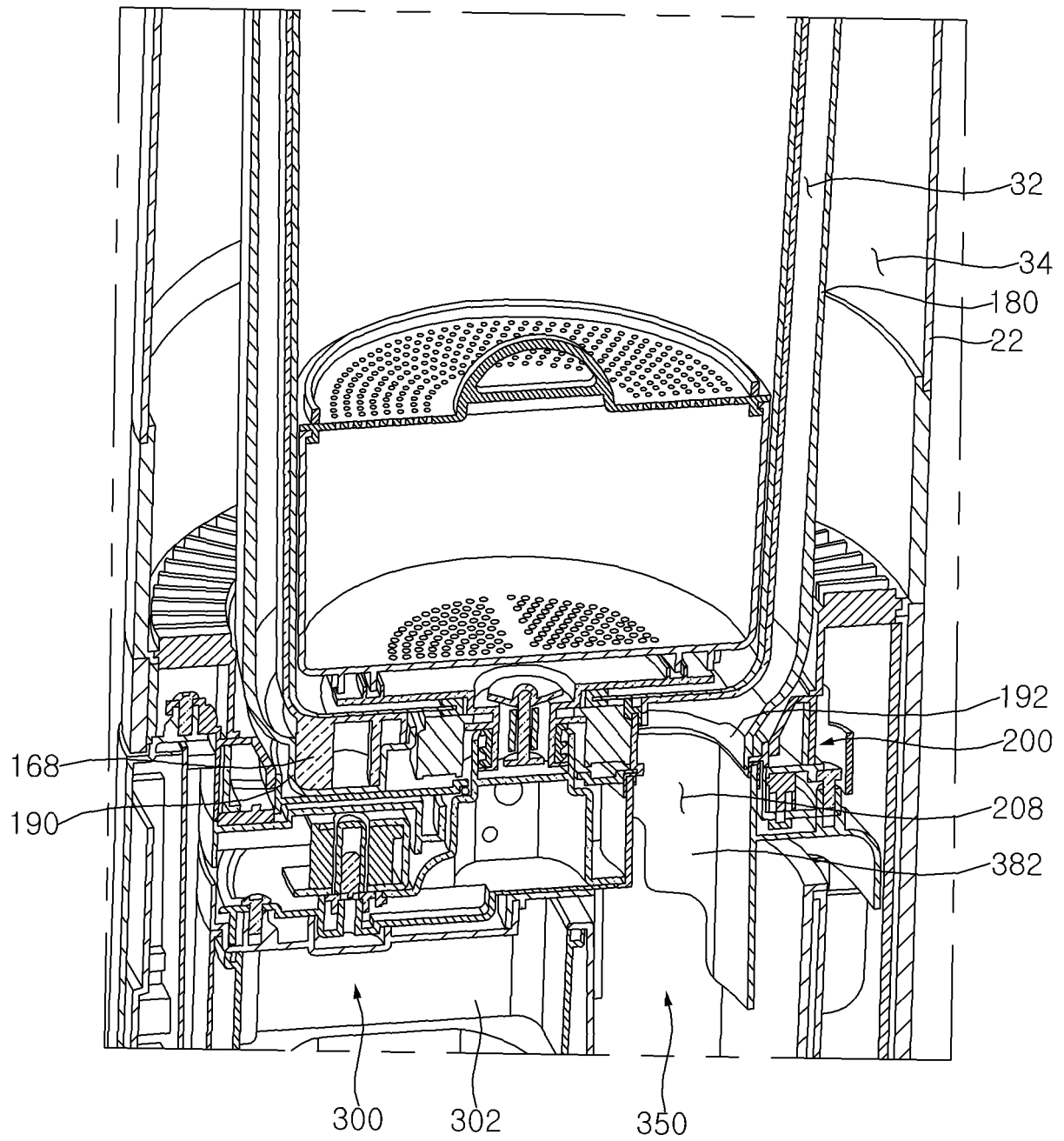


Fig. 8

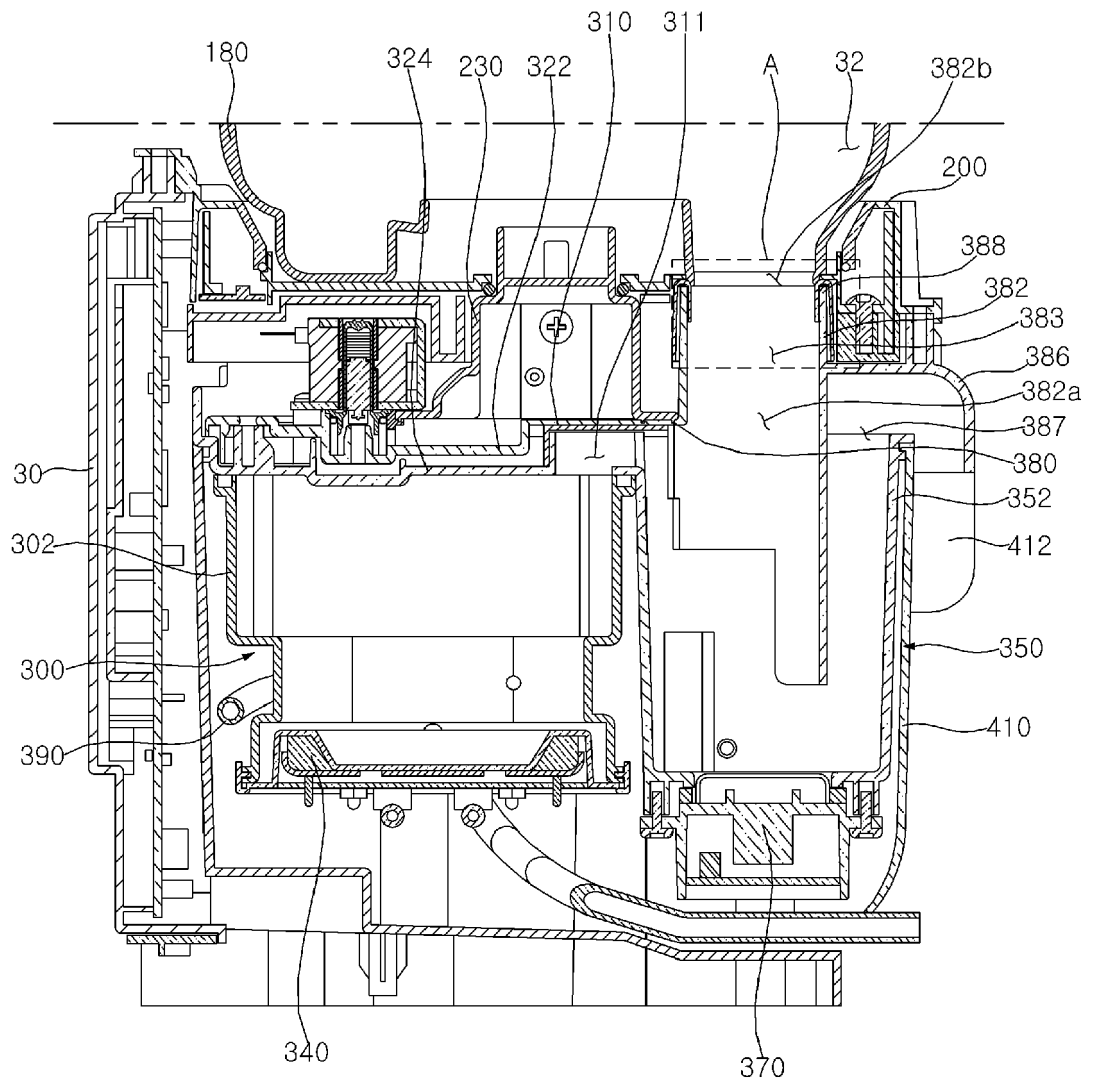
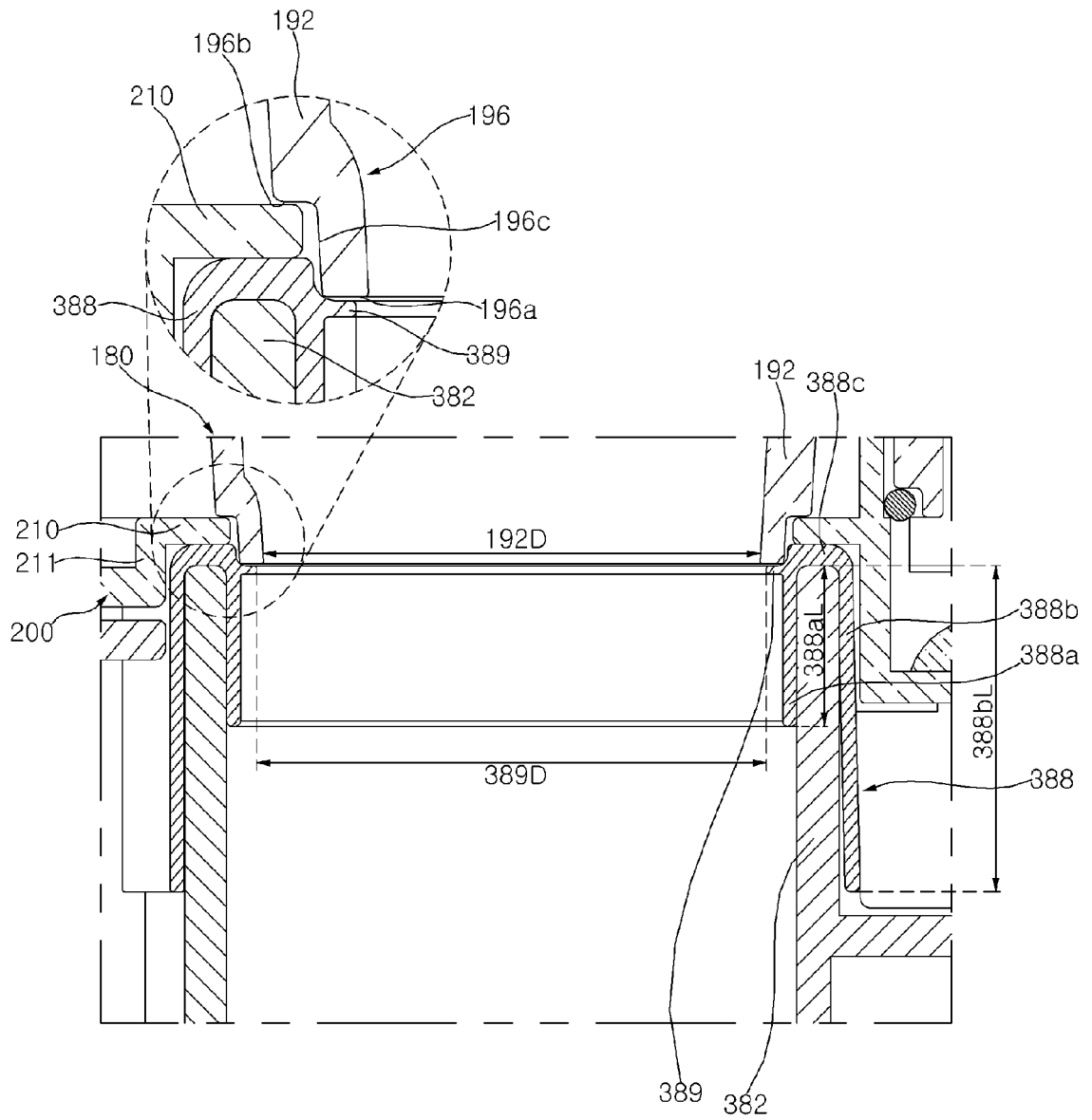


Fig. 9





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Place of search Munich		Date of completion of the search 8 September 2024	Examiner Mattias Grenbäck
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