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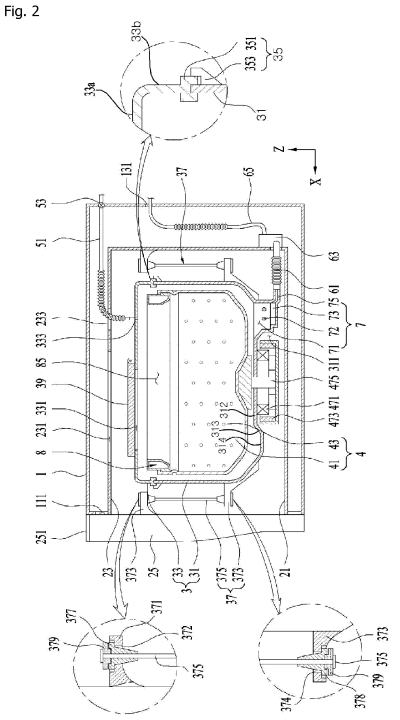
(54) CLOTHING TREATMENT APPARATUS

(57) Disclosed is a clothing treatment apparatus. The clothing treatment apparatus includes: a cabinet; a cylindrical tub provided inside the cabinet to provide a space for storing water and having a width set to be greater than a height thereof; a drum rotatably provided inside the tub; a driver fixed to a bottom surface of the tub, located outside the tub, and rotating the drum; a chamber protruding from the bottom surface of the tub to a bottom surface of the cabinet; and a chamber drain pipe connected to the chamber, wherein the chamber drain pipe extends from a side surface of the chamber in a direction away from a center of the tub.

Fig. 2



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Description

BACKGROUND

Field of the invention

[0001] The present disclosure relates to a clothing treatment apparatus.

Related Art

[0002] In general, the clothing treatment apparatus may include a washing machine, a dryer, and the like. The washing machine may be a washing machine with a drying function.

[0003] Among conventional clothing treatment apparatuses, there is a drawer-type clothing treatment apparatus including a cabinet, a drawer withdrawable from the cabinet, and an accommodating part provided inside the drawer to provide a space for treating clothes such as washing or drying clothes.

[0004] The drawer-type clothing treatment apparatus is designed in such a way that a volume of the cabinet is minimized so that it can be positioned on a lower surface or an upper surface of the apparatus for washing or drying. Since the volume of the cabinet is smaller than that of a general clothes treatment apparatus, the drawer withdrawable from the cabinet and the accommodating part provided in the drawer are also designed in such a way to minimize the volume thereof.

[0005] Since the volume of the accommodating part is a factor that determines the capacity (washing capacity, drying capacity) of the drawer-type clothes processing apparatus, maximizing the volume of the accommodating part in a limited space provided by the cabinet and the drawer is a major design consideration for the drawer-type clothing treatment apparatus.

SUMMARY

[0006] An aspect of the present disclosure provides a dryer, a washing machine, or a dryer-combined washing machine capable of maximizing the volume of a tub and a drum, or a clothing treatment apparatus for refreshing clothing.

[0007] Another aspect of the present disclosure provides a clothing treatment apparatus capable of maximizing the volume of the tub and the drum positioned inside a drawer whose width is set to be greater than a height.

[0008] Yet another aspect of the present disclosure provides a clothing treatment apparatus capable of easily controlling vibration of a tub and a drum.

[0009] Yet another aspect of the present disclosure provides a clothing treatment apparatus for minimizing a risk of damage to a drain pipe and a heating part provided at a bottom surface of a tub while maximizing the volume of the tub.

[0010] In an aspect, there is provided a clothing treatment apparatus includes a tub, a chamber, and a chamber drain pipe connected to the chamber.

[0011] The chamber is formed to protrude from the bottom surface of the tub.

[0012] The chamber drain pipe extends from a side surface of the chamber in a direction away from a center of the tub.

[0013] The clothing treatment apparatus includes a cabinet, a tub, a drum and a driver.

[0014] The tub may be provided inside the cabinet to provide a space for storing water, and may have a cylindrical shape with a width set to be greater than a height.

[0015] The drum may be rotatably provided inside the tub.

[0016] The driver may be fixed to the bottom surface of the tub, located outside the tub, and rotate the drum.

[0017] The clothing treatment apparatus may further include a drain pipe for guiding water discharged through the chamber drain pipe to the outside of the cabinet.

[0018] The chamber drain pipe may be coupled to one end of the drain pipe from the outside of the cylinder extending the outer circumferential surface of the tub and thus coupled thereto.

[0019] The clothing treatment apparatus may further include a drawer formed in the cabinet to be withdrawable and accommodating the tub therein.

[0020] The chamber drain pipe may extend in a direction inclined to a direction in which the drawer is withdrawn out from the cabinet.

[0021] The clothing treatment apparatus may further include a heater for heating water in the tub. The heater may be accommodated in the chamber.

[0022] The chamber may include a heating chamber accommodating the heater, and a water collecting chamber protruding from a bottom surface of the heating chamber toward a bottom surface of the cabinet to form a space in which water is stored.

[0023] The chamber drain pipe may extend in a direction away from the center of the tub from a side surface of the water collecting chamber.

[0024] A side surface and/or a bottom surface of the water collecting chamber may be inclined downward toward the chamber drain pipe.

[0025] The bottom surface of the tub may include a first bottom surface formed in the center of the tub, a second bottom surface formed more outside the tub than the first bottom surface and located below the first bottom surface, and an inclined surface formed to be inclined downward from the first bottom surface toward the second bottom surface.

[0026] The driver may be located below the first bottom surface.

[0027] The chamber may be formed to be spaced apart from the driver and protrude from the second bottom surface to a bottom surface of the cabinet.

[0028] A height of the lowest point of the second bottom surface may be equal to or higher than a height of a lowest

point of the driver with respect to the bottom surface of the cabinet.

[0029] A height of a lowest point of the chamber drain pipe may be equal to or lower than a height of a lowest point of the chamber with respect to the bottom surface of the cabinet.

[0030] A height of a lowest point of the chamber drain pipe may be equal to or higher than a height of a lowest point of the driver with respect to the bottom surface of the cabinet.

[0031] According to one aspect of the present disclosure, the chamber drain pipe may be provided to be positioned between the bottom surface of the tub and the lowest point of the rotor. That is, a height of a lowest point of the chamber drain pipe may be set to be equal to or higher than a height of a lowest point of the rotor.

[0032] The center of the chamber drain pipe may be provided to be located at a position higher than a position of the bottom surface of the water collecting chamber.

[0033] The bottom surface of the water collecting chamber may be inclined downward toward the chamber drain pipe.

[0034] The clothing treatment apparatus may further include a guide protruding from the bottom surface of the water collecting chamber toward the bottom surface of the cabinet to form a passage for guiding water to the chamber drain pipe, and a height of a lowest point of the chamber drain pipe may be set to be equal to or lower than a height of a lowest point of the guide.

[0035] A cross section of the guide may be provided in a semicircular or arc shape, and a bottom surface of the guide may be inclined downward toward the chamber drain pipe.

[0036] A distance from a side surface of the water collecting chamber to a free end of the chamber drain pipe may be set greater than a distance from a side surface of the water collecting chamber to a circumferential surface of the tub.

[0037] According to one aspect of the present disclosure, the bottom surface of the heating chamber may be provided to be inclined downward toward the chamber drain pipe.

[0038] The clothing treatment apparatus may further include a guide protruding from a bottom surface of the heating chamber toward the bottom surface of the cabinet to form a passage for guiding water to the chamber drain pipe, and a height of a lowest point of the chamber drain pipe may be set to be equal to or lower than a height of a lowest point of the guide.

[0039] A cross section of the guide may be provided in a semicircular or arc shape, and a bottom surface of the guide may be inclined downward toward the chamber drain pipe.

[0040] A distance from a side surface of the heating chamber to the free end of the chamber drain pipe may be set to be greater than a distance from a side surface of the heating chamber to the circumferential surface of the tub.

[0041] According to at least one of the embodiments of the present disclosure, it is possible to maximize the volume of the tub and the drum of the clothing treatment apparatus.

[0042] According to at least one of the embodiments of the present disclosure, it is possible to maximize the volume of the tub and the drum positioned inside the drawer whose width is set to be greater than a height.

[0043] According to at least one of the embodiments of the present disclosure, it is possible to easily control vibration of the tub and the drum of the clothing treatment apparatus.

[0044] According to at least one of the embodiments of the present disclosure, it is possible to minimize a risk of damage to the drain pipe and the heating part provided on the bottom surface of the tub while maximizing the volume of the tub.

BRIEF DESCRIPTION OF THE DRAWINGS

[0045]

FIGS. 1 and 2 are views showing a clothing treatment apparatus according to an embodiment of the present disclosure.

FIGS. 3 and 4 show a balancer according to an embodiment of the present disclosure.

FIGS. 5 to 6 show a balancer according to an embodiment of the present disclosure.

FIGS. 7, 8, and 9 show a heating part and a draining part according to an embodiment of the present disclosure.

FIG. 10 shows a heating part and a draining part according to an embodiment of the present disclosure.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0046] Description will now be given in detail according to exemplary embodiments disclosed herein, with reference to the accompanying drawings. For the sake of brief description with reference to the drawings, the same or equivalent components may be provided with the same or similar reference numbers, and description thereof will not be repeated.

[0047] In general, a suffix such as "module" and "unit" may be used to refer to elements or components. Use of such a suffix herein is merely intended to facilitate description of the specification, and the suffix itself is not intended to give any special meaning or function.

[0048] In addition, in the following description of the embodiments, a detailed description of known functions and configurations incorporated herein will be omitted when it may impede the understanding of the embodiments. In addition, the accompanying drawings are used to help one easily understand various technical features and it should be understood that the embodiments presented herein are not limited by the accompanying draw-

ings.

[0049] While terms including ordinal numbers, such as "first", "second," etc., may be used to describe various components, such components are not limited by the above terms. The above terms are used only to distinguish one component from another.

[0050] For example, a first component may be referred to as a second component without departing from the scope of the present disclosure, and, likewise, a second component may be referred to as a first component. When a component is referred to as being "directly connected" or "directly accessed" to other component, it should be understood that there is no component therebetween.

[0051] The singular forms are intended to include the plural forms as well, unless the context clearly indicates otherwise.

[0052] Furthermore, although each drawing is described for convenience of description, combining at least two or more drawings by those skilled in the art to implement another embodiment also falls within the scope of the present disclosure.

[0053] As shown in FIG. 1, a clothing treatment apparatus 100 according to an embodiment of the present disclosure may include a cabinet 1 provided with an outlet 111 on a front surface 11 , a tub 3 provided inside the cabinet to provide a space where water is stored, and a drum 4 rotatably provided inside the tub. The clothing treatment apparatus 100 may further include a drawer 2 withdrawable out of the cabinet 1 through the outlet 111. The tub 3 may be provided inside the drawer 2.

[0054] The drawer 2 may include a drawer body 21, a drawer cover 23 forming an upper surface of the drawer body, and a drawer panel 25 fixed to the drawer body 21.

[0055] The drawer body 21 may be provided in a hexahedral shape having an upper side open, and the drawer cover 23 may be fixed to an upper end of the drawer body 21 to form an upper surface of the drawer 2.

[0056] The drawer panel 25 may be provided as a means (handle) for opening and closing the drawer 111 (cabinet door), as well as a means for facilitating withdrawing the drawer body 21 from the cabinet 1 and inserting the drawer body 21 into the cabinet 1.

[0057] A control panel 251 for controlling operation of the clothing treatment apparatus 100 may be provided at an upper surface of the drawer panel 25. The control panel 251 is a means for receiving a control command required to operate a means (water supply part, draining part) for supplying or draining water to or from the tub 3 (a water supply part, a draining part) or to operate a means (driver) for rotating the drum 4. That is, the control panel 251 may include an input part that allows a user to input a control command to the clothing treatment apparatus, and a display unit may be provided for notifying the user of the confirmation of the control command input through the input unit or the execution process of the control command input by the user.

[0058] The drawer cover 23 may be provided with an entry hole 231 passing through the drawer cover 23 and communicating with the inside of the drawer body 21, and a drawer cover 23 passing through the drawer cover 23 and allowing a water supply pipe 51, which will be described later, to be inserted thereinto.

[0059] The cabinet 1 may have a length in a width direction (Y-axis direction) longer than a length in a height direction (Z-axis direction) (a length of a drawer in a width direction may be longer than a length thereof in a height direction). This allows the clothing treatment apparatus 100 to be positioned below or above another treatment apparatus capable of washing or drying clothing, and makes it easier for a user to access the control panel 251 and the entry hole 231.

[0060] As shown in FIG. 2, the tub 3 may include a tub body 31 positioned inside the drawer body 21 to provide a space for storing water.

[0061] The tub body 31 may be provided in a cylindrical shape with an upper side open. When a width of the drawer body 21 is set to be greater than a height of the drawer body, a width of the tub body 31 may be set to be greater than a height of the tub body.

[0062] The tub body 31 may be movably fixed inside the drawer body 21 through a tub support part 37. The tub support part 37 may include a first bracket 371 protruding from the drawer body 21 toward a circumferential surface of the tub body 21, a second bracket 373 protruding from a circumferential surface of the tub body 31 toward a side surface and/or a rear surface of the drawer body and provided at a lower position than that of the first bracket 371, and a support bar 375 having one end (upper end) connected to the first bracket 371 and the other end (lower end)) connected to the second bracket 373.

[0063] The support bar 375 may be connected to the first bracket 371 through a first connecting portion 377 and may be connected to the second bracket 373 through the second connection part 378. The support bar 375 may be connected to the first bracket 371 through a first connecting portion 377 and may be connected to the second bracket 373 through the second connecting portion 378. Similarly, the second connecting portion 378 may be provided such that one end thereof supports the second bracket 373 and the other end thereof passes through the second bracket 373 through a second bracket through-hole 374. In this case, the support bar 375 may be provided as a bar penetrating the first connecting portion 377 and the second connecting portion 378.

[0064] An elastic body 379 may be further provided between an upper end of the support bar 375 and the first connecting portion 377 and between the lower end of the support bar 375 and the second connecting portion 378. The elastic body 379 may be provided as a pad formed of rubber or the like, and the clothing treatment apparatus 100 may damp vibration of the tub body 31 through the elastic body.

[0065] The tub support part 37 having the above-described structure may be provided as a plurality of units,

which are spaced apart from each other at the same angle with respect to a vertical line passing through the center of the tub body 31.

[0066] The tub 3 may further include a tub cover 33 coupled to the tub body 31 to form an upper surface of the tub.

[0067] The tub cover 33 may include a cover body 33a positioned below the inlet 231, and an extension body 33b bent from a circumferential surface of the cover body toward the top of the tub body 31.

[0068] The cover body 33a may be provided with a tub entry hole 331 and a water supply port 333 for communicating an inner space of the tub body 31 with the outside. The tub entry hole 331 may be provided to be opened and closed by a door 39 rotatably coupled to the cover body 33a. Since the door 39 is positioned below the entry hole 231, the door 39 may be rotated in a direction to open the tub entry hole 331 when the drawer is withdrawn from the cabinet. One end of a water supply pipe 51 to be described later is fixed to the water supply port 333.

[0069] The extension body 33b is fixed to an upper end of the tub body 31 through the cover coupling portion 35. The cover fastening part 35 is provided at the free end of the extension body 33b to provide a space in which the upper end of the tub body 31 is accommodated. It may be provided on the circumferential surface to include a second fastening part 353 coupled to the first fastening part 351.

[0070] Unlike the above, the tub cover 33 may be provided with only the cover body 33a fixed to the upper end of the tub body 31.

[0071] The tub 3 is supplied with water through a water supply unit. The water supply part may include a water supply pipe 51 connecting the water supply port 333 and a water supply source located outside the cabinet, and a water supply valve 53 for controlling the opening and closing of the water supply pipe according to a control signal from a controller.

[0072] The water stored in the tub 3 is discharged to the outside of the cabinet 1 through the draining part. The draining part may include a first drain pipe 61 connecting a bottom surface of the tub body 31 and the drain pump 63, and a second drain pipe 65 guiding water discharged from the drain pump 63 to the outside of the cabinet 1. A cabinet through-hole 131 through which the second drain pipe 65 passes may be provided at a rear surface of the cabinet.

[0073] The drum 4 may include a drum body 41 that is rotatably provided inside the tub 3 to provide a space for storing clothing. The drum body 41 may be provided in a cylindrical shape with an upper side open or a cylindrical shape having a through-hole in an upper surface.

[0074] A plurality of communication holes 43 for communicating the inside of the drum body 41 with the inside of the tub 3 may be provided in at least one of the circumferential surface and the bottom surface of the drum body 41.

[0075] The drum body 41 is rotated by a driver. The driver may be fixed to the bottom surface of the tub 3 and positioned outside the tub. The driver may include a stator 471 fixed to the bottom surface of the tub body 31 and positioned outside the tub 3, a rotor 473 rotated by a rotating magnetic field provided by the stator 471, and a rotating shaft 475 connecting the drum body 41 and the rotor 473 through the bottom surface of the tub body 31. As shown in FIG. 2, the rotating shaft 475 may be provided to form a right angle with respect to the entry hole 231 (to form a right angle with respect to the bottom surface of the tub body).

[0076] A balancer 8 may be provided at an upper end of the drum body 41. The balancer 8 is a means for actively damping vibration generated in the drum body while the drum body 41 is rotated.

[0077] As shown in FIG. 3, the balancer 8 may include a housing 81 and 83 fixed to the drum body 41 to form an upper surface of the drum body, a housing through-hole 85 passing through the housing, a circulation passage 87 provided in a ring shape inside the housing to form a movement path of liquid, and the liquid stored in the circulation passage 87.

[0078] Since the housing through-hole 85 is positioned below the tub entry hole 331, clothing fed through the tub inlet 331 move into the drum body 41 through the housing through-hole 85. Accordingly, the housing through-hole 85 serves as a drum entry hole.

[0079] The housing includes a first housing 81 provided in a ring shape, a fixed body 811 provided on a circumferential surface of the first housing 81 to fix the first housing 81 to the circumferential surface of the drum body 41, and a second housing 83 provided in a ring shape and fixed to an upper surface of the first housing 81. An upper end of the first housing 81 and an upper end of the second housing 83 may be coupled by thermal fusion.

[0080] As shown in FIG. 4, a lower end of the first housing 81 may be inserted into the drum body 41, and the upper end of the first housing 81 may be provided to be exposed to the outside of the drum body 41.

[0081] The fixed body 811 may be provided as a ring-shaped protrusion that protrudes from one surface of the first housing 81 (a side surface of the first housing) facing the circumferential surface of the drum body 41 toward the circumferential surface of the drum body 41. That is, a diameter of the fixed body 811 may be set to be greater than a diameter of a lower end of the first housing 81 (a diameter of the fixed body may be set to be the same as a diameter of a through-hole in an upper surface of the drum body 41, and a diameter of a lower end of the first housing may be set to be smaller than a diameter of the fixed body).

[0082] The first housing 81 may be provided with a ring-shaped first passage 871, in which an upper surface of the first housing is provided with a groove bent concavely in a direction away from the cover body 33a, and a ring-shaped second passage 873 in which a bottom

surface of the second housing 83 is provided as a groove bent concavely toward the cover body 33a. In this case, the circulation passage 87 may be formed by combining the first passage 871 and the second passage 873.

[0083] An amount of liquid moving along the circulation passage will vary according to a volume of the circulation passage 87, and thus, the balancer 8 having the above-described structure is advantageous in controlling vibration of the drum body 41 as the volume of the circulation passage 87 increases in a case where the same liquid is used. In addition, if a height of the housing 81 and 83 is increased to increase the volume of the circulation passage 87, a length of the drum body 41 will increase, possibly increasing the volume of the drum body 41 (which is the effect of increasing a capacity of treating clothing).

[0084] Meanwhile, the above-described effect may be expected by increasing the height of the housing 81 and 83 and the volume of the circulation passage, but when the height of the center of gravity G of the balancer 8 is increased, an upper end of the drum body 41 and an upper end of the tub 3 vibrate more intensely. When the height of the center of gravity G of the balancer 8 is increased, a distance between a lower end of the tub support part 37 and the center of gravity G is increased (which means that a distance between a support point formed by the tub support part and the center of gravity of the entire drum is increased). This may mean that a distance (a length of the moment arm) perpendicular to a force acting on the center of gravity G from the lower end of the tub support part 37 (a force generated when liquid moves along the inside of the circulation passage) is increased, and the increased length of the moment arm may mean the upper end of the tub 3 possibly vibrates more intensely.

[0085] Accordingly, in order to minimize the height of the center of gravity G of the balancer while increasing the volume of the circulation passage and the height of the housing, it is preferable that a width W1 of the first passage 871 is set wider than a width W2 of the second passage 873.

[0086] Making the width W1 of the first passage wider than the width W2 of the second passage may be implemented in various ways. FIG. 4 illustrates an example in which a thickness T1 of both side walls of the first housing 81 forming the first passage 871 is smaller than a thickness T2 of both side walls of the second housing 83 forming the second passage 873.

[0087] In this case, a point on both sides of the lower end of the second passage 873 facing the circumferential surface of the tub body 31 and a point on both sides of the upper end of the first passage 871 facing the circumferential surface of the tub body 31 may be connected so as not to form a step, and a point on both sides of the lower end of the second passage 873 toward the center of the drum body 41 and a point on both sides of the upper end of the first passage 871 toward the center of the drum body may be connected to form a step.

[0088] As shown in an enlarged view shown in the upper right side of FIG. 4, a point on both side surfaces of the lower end of the second passage 873 facing the circumferential surface of the tub body 31 and a point on both side surfaces of the upper end of the first passage 871 facing the circumferential surface of the tub body 31 may be connected to form a step, and a point on both sides of the lower end of the second passage 873 toward the center of the drum body 41 and a point on both side surfaces of the upper end of the first passage 871 facing the center of the drum body 41 may be connected so as not to form a step.

[0089] As shown in an enlarged view shown in a lower right side of FIG. 4, the both side surfaces of the lower end of the second passage 873 and the both side surfaces of the upper end of the first passage 871 may be connected to form a step.

[0090] In order to minimize the height of the center of gravity G of the balancer, it is preferable that the height of the bottom surface B of the circulation passage 87 (a height of the bottom surface of the first passage) is set lower than a height of the top of the drum body 41.

[0091] In addition, when a width of the circulation passage 87 (a length of the circulation passage parallel to a radial direction of the drum body) is increased in order to increase a volume of the circulation passage 87, the volume of the drum body is reduced (which means that an amount of clothing that can be treated in the drum body is reduced). Therefore, it is preferable that a width of the circulation passage 87 is set shorter than a height of the circulation passage (which is a length of the circulation passage parallel to a height direction of the drum body).

[0092] As shown in the drawings, the center of gravity G of the balancer may be set to be located inside the first passage 871. In this case, the height of the first housing 81 may be set to be greater than the height of the second housing 83.

[0093] A length of the second passage 873 (a depth of the second passage) with respect to the height direction of the drum body 41 may be equal to a length of the first passage 871 with respect to the height direction of the drum body 41 (a depth of the first passage) or may be shorter than the length of the first passage 871. This is to lower the center of gravity of the balancer. Although not shown in the drawings, the depth of the second passage may be set to be greater than the depth of the first passage.

[0094] When the drum body 41 is rotated at a high rotational speed (a rotational speed that causes a centrifugal force of 1G or more), it is preferable that liquid not move along the circulation passage unless vibration of the drum body exceeds a preset reference vibration. This is because, when the liquid moves inside the circulation passage while rotating at the rotational speed in which centrifugal force of 1 G or more is induced in a radial direction of the drum body, vibration according to the movement of the liquid may occur in the drum body 41.

[0095] In order to prevent the liquid from moving along

the circulation passage while the drum body 41 is rotated at a high speed, the circulation passage 87 may be provided with a plurality of anti-slip walls.

[0096] As shown in FIG. 3, one ends of the anti-slip walls 88 may be fixed to an outer circumferential surface of the circulation passage 87 (a surface facing the circumferential surface of the tub body), and free ends thereof may be provided as boards protruding toward an inner circumferential surface of the circulation passage 87 (a surface facing the center of the drum body). The free ends of the anti-slip walls 88 should be provided so as not to contact the inner circumferential surface of the circulation passage 87. This is because, when the drum body 41 is rotated at a low speed or when the drum body 41 is rotated eccentrically, the liquid must be able to move along the circulation passage.

[0097] The anti-slip walls 88 are preferably provided with a plurality of boards spaced apart from each other at the same angle with respect to the center of the housing through-hole 85.

[0098] FIG. 5 shows another embodiment of the balancer 8, and this embodiment is characterized in that the circulation passage 87 is divided into two chambers C1 and C2 with a partition wall 89. In this case, the liquid is stored in a first chamber C1 and a second chamber C2, individually.

[0099] The partition wall 89 may include a first partition wall 891 provided in the first housing 81 to divide the inside of the first passage 871 into two spaces, and a second partition wall 893 provided in the second housing 83 to divide the inside of the second passage 873 into two spaces. In this case, a free end of the first partition wall 891 and a free end of the second partition wall 893 may be coupled to each other by thermal fusion.

[0100] FIG. 6 shows another embodiment of the balancer 8, and a clothing treatment apparatus 100 according to this embodiment is characterized by including a balancer support part 45 protruding from the circumferential surface of the drum body 41 toward the center of the drum body, and a fastening groove 813 formed as a concavely bent groove by the circumferential surface of the first housing 81 to form a space in which the balancer support 45 is accommodated.

[0101] The fastening groove 813 may be formed in a circumferential surface of the fixed body and a corner of a bottom surface of the fixed body in the space provided by the fixed body 811 to thereby accommodate at least a portion of the balancer support part 45.

[0102] FIG. 6 shows an example in which the balancer support part 45 is provided as a protrusion having a semicircular or arc-shaped cross section and the fastening groove 813 is provided to accommodate an area above a horizontal line passing through the center of the balancer support 45 in the area of the balancer support 45. When the fastening groove 813 is provided in the fixed body 811, the height of the center of gravity G of the balancer may be further lowered. The circulation passage 87 provided in the embodiment of FIG. 6 may also be divided into the first chamber C1 and the second chamber C2 by the partition wall 89.

[0103] A heating part 7 for heating water inside the tub 3 may be further provided at the bottom surface of the tub body 31 to wash clothing with water at a temperature higher than room temperature.

[0104] As shown in FIG. 2, the heating part 7 may be accommodated in a chamber 71 and 73 protruding from the bottom surface of the tub toward the bottom surface of the cabinet.

[0105] The heating part 7 may include a heater 72 for heating water in the tub, and a chamber drain pipe 75 connected to the chamber 71 and 73.

[0106] The chamber 71 and 73 may be formed in the shape of a groove protruding from the bottom surface of the tub body 31 (which is a groove protruding from the bottom surface of the tub body toward the bottom surface of the cabinet, or a groove protruding from the bottom surface of the tub body toward the bottom surface of the drawer body).

[0107] The bottom surface of the tub body 31 may be inclined toward the chamber 71 and 73 so that water remaining at the bottom of the tub body 31 is able to move to the chamber 71 and 73.

[0108] The chamber 71 and 73 may include a heating chamber 71 accommodating the heater 72 therein, and a water collecting chamber 73 protruding from the heating chamber 71 from the bottom surface of the heating chamber 71 toward the bottom surface of the cabinet 1 to store water.

[0109] As shown in FIG. 7(a), the water collecting chamber 73 may be provided as a space for storing water as a bottom surface of the heating chamber 71 protrudes toward the bottom surface of the drawer body 21 or the bottom surface of the cabinet 1.

[0110] The chamber drain pipe 75 may be in the form of a pipe passing through a side surface of the water collecting chamber 73. The chamber drain pipe 75 may be in the form of a pipe passing through a side surface of the water collecting chamber 73. The chamber drain pipe 75 may be a pipe extending in a direction away from the circumferential surface of the tub body 31 from a side surface of the water collecting chamber 73 (-X-axis direction).

[0111] Accordingly, the volume of the tub 3 and the drum 2 may be maximized.

[0112] Meanwhile, unlike the drawings, when the chamber drain pipe 75 is provided at the bottom surface of the water collecting chamber 73, a first drain pipe 61 fixed to the chamber drain pipe 75 may be located at a bottom surface of the drawer body 21 or in a space between the bottom surface of the cabinet 1 and the chamber drain pipe 75.

[0113] In this state, when vibration occurs in the tub body 31 due to rotation of the drum body 41, the chamber drain pipe 75 and the first drain pipe 61 may be damaged due to friction with the bottom surface of the drawer body 21 or the bottom surface of the cabinet 1.

[0114] When the chamber drain pipe 75 is provided at a side surface of the water collecting chamber 73, it is possible to minimize damage to the chamber drain pipe 75 in the event of vibration of the tub body 31. That is, as shown in FIG. 7 (a), when the chamber drain pipe 75 is provided as a pipe extending in a direction away from the center of the tub, the above-described risk may be minimized.

[0115] The chamber drain pipe 75 may be coupled to one end of the first drain pipe 61. The chamber drain pipe 75 may be coupled to the first drain pipe 61 in such a way of being inserted into one end of the first drain pipe 61.

[0116] One end of the first drain pipe 61 may be fixed to the chamber drain pipe 75, and the other end thereof may be connected to the drain pump 63. The drain pump 63 may be fixed to the same position as the chamber drain pipe 75 or at a lower position than that of the chamber drain pipe 75.

[0117] Accordingly, when the chamber drain pipe 75 is provided as a pipe extending in a direction away from the center of the tub 3 from a side surface of the chamber 71 and 73, it is possible to prevent damage to the first drain pipe 61 in the event of vibration of the tub body 31.

[0118] The chamber drain pipe 75 may be positioned between the bottom surface of the tub 3 and a lowest point of the driver. The chamber drain pipe 75 may be located between the bottom surface of the tub 3 and a lowest point of the rotor. A height of a lowest point of the chamber drain pipe 75 may be equal to a height of a lowest point of the rotor 473 or may be higher than the height of the lowest point of the rotor 473 (See FIG. 2).

[0119] Accordingly, it is possible to prevent the chamber drain pipe 75 from being damaged in the event of vibration of the tub body 31.

[0120] Meanwhile, as shown in FIG. 7 (a), the height of the lowest point of the chamber drain pipe 75 may be equal to a height of a lowest point of the water collecting chamber 73 or may be lower than the height of the lowest point of the water collecting chamber 73.

[0121] A side and/or bottom surface of the water collecting chamber 73 may be inclined downward toward the chamber drain pipe 75, and a bottom surface 77 (a first inclined surface) of the heating chamber 71 may be inclined downward toward the water collecting chamber 73.

[0122] Accordingly, it is possible to minimize residual water in the heating chamber 71 and the water collecting chamber 73.

[0123] The chamber drain pipe 75 may be coupled to one end of the first drain pipe 61 outside a virtual cylinder that extends an outer circumferential surface of the tub body 31.

[0124] The chamber drain pipe 75 may have one end coupled to a side surface of the water collecting chamber 73, and the other end thereof may be a free end.

[0125] A distance H1 from a side surface of the water collecting chamber 73 to the free end of the chamber drain pipe 75 may be greater than a distance H2 from a side surface of the water collecting chamber 73 to the circumferential surface of the tub body 31.

[0126] The chamber drain pipe 75 may be coupled to the first drain pipe 61 from an outer circumferential surface of the tub body 31 based on the center of the tub body 31.

[0127] Accordingly, a position where the chamber drain pipe 75 and the first drain pipe 61 are coupled may be located outside the outer circumferential surface of the tub, thereby maximizing the volume of the tub 3 and the drum 2.

[0128] As shown in FIGS. 7 (b) and 8, the heating part 7 may further include a guide 76 protruding from the bottom surface of the water collecting chamber 73 to form a passage for guiding water to the chamber drain pipe 75.

[0129] As shown in FIG. 7(b), a lowest point of the guide 76 (a lowest point in a bottom surface of the guide) may be located at a position lower than a lowest point of the water collecting chamber 73 based on the bottom surface of the cabinet 1 or the bottom surface of the drawer 2. A lowest point of the chamber drain pipe 75 (a lowest point in a bottom surface of the chamber drain pipe) may be at a height equal to the lowest point of the guide 76 or lower than the lowest point of the guide 76 based on the bottom surface of the cabinet 1 or the bottom surface of the drawer 2.

[0130] Accordingly, an amount of residual water in the water collecting chamber 73 may be minimized.

[0131] A bottom surface of the guide 76 may be inclined downward toward the chamber drain pipe 75.

[0132] As shown in FIG. 9, a cross-section of the guide 76 may be provided in a semicircular or arc shape.

[0133] A surface 78 (a side surface of the water collecting chamber) connecting the bottom surface 77 of the heating chamber 71 and the bottom surface of the water collecting chamber 73 may be inclined further toward the chamber drain pipe 75 in a direction from the bottom surface 77 of the heating chamber 71 to the bottom surface of the water collecting chamber 73.

[0134] As the lowest point of the chamber drain pipe 75 is closer to the bottom surface of the drawer 2 or the bottom surface of the cabinet 1, the chamber drain pipe 75 and the first drain pipe 61 may be more likely damaged in the event of vibration of the tub body 31. In order to increase the height of the lowest point of the chamber drain pipe 75, a center 751 of the chamber drain pipe 75 may be located at a position higher than the bottom surface of the water collecting chamber 73.

[0135] As shown in FIGS. 1, 2, and 9, the chamber drain pipe 75 may extend in a direction (-X-axis and +Y-axis directions) that is inclined to a direction in which the drawer 2 is to be withdrawn out from the cabinet 1 (+X-axis direction). The chamber drain pipe 75 may extend from a side surface of the chamber 71 and 73 in a direction away from the center of the tub 3, and may extend near a corner area where the side surface and the rear surface of the drawer 2 meet.

[0136] The chamber drain pipe 75 may extend in a direction in which the second bracket 373 protrudes. The chamber drain pipe 75 may extend from a side surface of the chamber 71 and 73 in a direction away from the center of the tub 3, and in a direction in which the second bracket 373 protrudes from the outer circumferential surface of the tub body 31 toward a side surface and/or rear surface of the drawer body.

[0137] Accordingly, as the chamber drain pipe 75 extends to or near an edge of the cabinet 1 or drawer 2, it is possible to minimize a volume of the tub 3 from being reduced by the chamber drain pipe 75 and to maximize the volume of the tub 3 and the drum 2.

[0138] A driver mounting groove 311 protruding toward the tub cover 33 may be further provided at the bottom surface of the tub body 31.

[0139] As shown in FIG. 2, the driver may be located inside the driver mounting groove 311. The stator 471 and the rotor 473 may be located inside the driver mounting groove 311. In this case, the lowest point of the chamber drain pipe 75 may be located between the lowest point of the rotor 473 and the bottom surface of the tub body 31.

[0140] As shown in FIG. 2, the bottom surface of the tub body 31 may include a first bottom surface 312, a second bottom surface 314, and an inclined surface 313. The driver mounting groove 311 may be formed by the first bottom surface 312, the inclined surface 313, and the second bottom surface 314.

[0141] The first bottom surface 312 may be formed in the center of the tub body 31. The first bottom surface 312 may be formed in an area within a predetermined distance from the center of the tub body 31.

[0142] The second bottom surface 314 may be formed outside the first bottom surface 312 with respect to the center of the tub body 31. The second bottom surface 314 may be located below the first bottom surface 312. The second bottom surface 314 may be positioned lower than the first bottom surface 312 with respect to the bottom surface of the cabinet 1 or the bottom surface of the drawer 2.

[0143] The inclined surface 313 may be formed to be inclined downward from the first bottom surface 312 to the second bottom surface 314.

[0144] The driver may be located below the first bottom surface 312. The stator 471 and the rotor 473 may be located below the first bottom surface 312.

[0145] The chambers 71 and 73 may be spaced apart from the driver and protrude from the second bottom surface 314 toward the bottom surface of the cabinet 1 or the bottom surface of the drawer 2.

[0146] Based on the first bottom surface 312, the second bottom surface 314 and the chambers 71 and 73 are located at a lower position, thereby minimizing a reduction in the volume of the tub 3 so as to secure a space for the installation of the heating part 7 and maximizing the volume of the tub 3 and the drum 2.

[0147] FIG. 10 shows a clothing treatment apparatus according to an embodiment of the present disclosure. The heating part 7 shown in FIGS. 10 (a) and (b) is different from the embodiment of FIG. 7 in that the water collecting chamber 73 is not included.

[0148] The heating part 7 shown in FIG. 10 (a) may include a heating chamber 71 protruding from the bottom surface of the tub body 31 to form a space in which the heater 72 is accommodated, and a chamber drain pipe 75 connected to the heating chamber 71.

[0149] The chamber drain pipe 75 may include the chamber drain pipe 75 extending from a side surface of the heating chamber 71 in a direction away from the center of the tub body 31 (-X-axis direction) to discharge the water stored in the heating chamber 71.

[0150] Accordingly, it is possible to maximize the volume of the tub 3 and the drum 2.

[0151] In this embodiment, the chamber drain pipe 75 may be located between the bottom surface of the tub body 31 and a lowest point of the rotor 473. A lowest point of the chamber drain pipe 75 may be equal to a lowest point of the heating chamber 71 or may be lower than the lowest point of the heating chamber 71. The bottom surface 77 of the heating chamber 71 may be formed to be inclined downward toward the chamber drain pipe 75.

[0152] Accordingly, it is possible to minimize an amount of residual water in the heating chamber 71.

[0153] The chamber drain pipe 75 may be coupled to one end of the first drain pipe 61 outside a virtual cylinder that extends an outer circumferential surface of the tub body 31.

[0154] The chamber drain pipe 75 may have one end coupled to a side surface of the heating chamber 71, and the other end thereof may be a free end.

[0155] A distance from the side surface of the heating chamber 71 to the free end of the chamber drain pipe 75 may be greater than a distance from the side surface of the heating chamber 71 to the circumferential surface of the tub body 31.

[0156] The chamber drain pipe 75 may be coupled to the first drain pipe 61 from an outer circumferential surface of the tub body 31 based on the center of the tub body 31.

[0157] Accordingly, a position where the chamber drain pipe 75 and the first drain pipe 61 are coupled may be located outside the outer circumferential surface of the tub, thereby maximizing the volume of the tub 3 and the drum 2.

[0158] As shown in FIG. 10 (b), a guide 76 may be further included at the bottom surface of the heating chamber 71. The guide 76 is a passage that protrudes from the bottom surface 77 of the heating chamber toward the bottom surface of the cabinet 1 or the bottom surface of the drawer 2 to guide water to the chamber drain pipe 75. The lowest point of the chamber drain pipe 75 may be equal to the lowest point of the guide 76 or may be lower than the lowest point of the guide 76.

[0159] Accordingly, it is possible to minimize an

amount of residual water in the heating chamber 71.

[0160] The chamber drain pipe 75 may be located between the bottom surface of the tub 3 and the lowest point of the rotor 473. A height of a lowest point of the chamber drain pipe 75 may be equal to a height of the lowest point of the rotor 473 or may be higher than the height of the lowest point of the rotor 473.

[0161] Accordingly, it is possible to prevent the chamber drain pipe 75 from being damaged in the event of vibration of the tub body 31.

[0162] Although a case where the heating part 7 and the balancer 8 are applied to the clothing treatment apparatus 100 in which the tub 3 is provided in the drawer 2 withdrawable out from the cabinet 1 has been described, the heating unit 7 and the balancer 8 may be applied to apparatuses other than the drawer-type clothing treatment apparatus.

[0163] That is, the heating part 7 and the balancer 8 may be applied to a top loading type clothing treatment apparatus that includes a cabinet, a tub fixed through a tub support part inside the cabinet, and a drum rotatably provided in the tub.

[0164] In addition, the heating part 7 and the balancer 8 may be applied to a clothing treatment apparatus fixed to an upper surface of a washing machine or an upper surface of a dryer. In this case, the drawer 2 provided in the clothing treatment apparatus 100 may be omitted. That is, the cabinet 1 of the clothing treatment apparatus may be fixed to an upper surface of a cabinet (second cabinet) of the washing machine or dryer, the tub 3 may be connected to the inside of the cabinet 1 through the tub support part 37, and a through hole may be provided in the upper surface of the cabinet 1 to expose the door 39 to the outside of the cabinet 1.

[0165] Any or other embodiments of the present disclosure described above are not mutually exclusive or distinct. Certain embodiments or other embodiments of the disclosure described above are not mutually exclusive or distinct from each other. Any or all elements of the embodiments of the disclosure described above may be combined with another or combined with each other in configuration or function.

[0166] For example, a configuration "A" described in one embodiment of the disclosure and the drawings and a configuration "B" described in another embodiment of the disclosure and the drawings may be combined with each other. Namely, although the combination between the configurations is not directly described, the combination is possible except in the case where it is described that the combination is impossible.

[0167] More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings, and the appended claims. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

Claims

1. A clothing treatment apparatus comprising:

a cabinet;
a cylindrical tub provided inside the cabinet to provide a space for storing water and having a width set to be greater than a height thereof;
a drum rotatably provided inside the tub;
a driver fixed to a bottom surface of the tub, located outside the tub, and rotating the drum;
a chamber protruding from the bottom surface of the tub to a bottom surface of the cabinet; and
a chamber drain pipe connected to the chamber, wherein the chamber drain pipe extends from a side surface of the chamber in a direction away from a center of the tub.

2. The clothing treatment apparatus of claim 1, wherein, with respect to the bottom surface of the cabinet, a height of a lowest point of the chamber drain pipe is equal to or lower than a height of a lowest point of the chamber.

3. The clothing treatment apparatus of claim 1, wherein, based on the bottom surface of the cabinet, a height of a lowest point of the chamber drain pipe is equal to a height of a lowest point of the driver or higher than the height of the lowest point of the driver.

4. The clothing treatment apparatus of claim 1, wherein a side surface and/or a bottom surface of the chamber is inclined downward toward the chamber drain pipe.

5. The clothing treatment apparatus of claim 1, further comprising: a heater for heating water stored in the tub,
wherein the heater is accommodated in the chamber.

6. The clothing treatment apparatus of claim 5,

wherein the chamber comprises:

a heating chamber accommodating the heater; and
a water collecting chamber protruding from a bottom surface of the heating chamber toward a bottom surface of the cabinet to form a space in which water is stored, and

wherein the chamber drain pipe extends from a side surface of the water collecting chamber in a direction away from the center of the tub.

7. The clothing treatment apparatus of claim 1,

wherein a bottom surface of the tub comprises:

a first bottom surface formed in the center of the tub;
a second bottom surface formed outside the tub than the first bottom surface and positioned below the first bottom surface; and
an inclined surface inclined downward from the first bottom surface toward the second bottom surface,

wherein the chamber is positioned below the first bottom surface.

8. The clothing treatment apparatus of claim 7, wherein based on the bottom surface of the cabinet, a height of a lowest point of the second bottom surface of the cabinet is equal to a height of a lowest point of the driver or is higher than a height of the lowest point of the driver.

9. The clothing treatment apparatus of claim 7, wherein the chamber is formed to be spaced apart from the driver and protrude from the second bottom surface to a bottom surface of the cabinet.

10. The clothing treatment apparatus of claim 1, further comprising;

a drain pipe for guiding water discharged to the chamber drain pipe to the outside of the cabinet;
wherein the chamber drain pipe is inserted into one end of the drain pipe from the outside of the cylinder extending the outer circumferential surface of the tub and thus coupled thereto.

11. The clothing treatment apparatus of claim 1, further comprising:

a drawer formed in the cabinet to be withdrawable and accommodating the tub therein,
wherein the chamber drain pipe extends in a direction inclined to a direction in which the drawer is withdrawn out from the cabinet.

Fig. 1

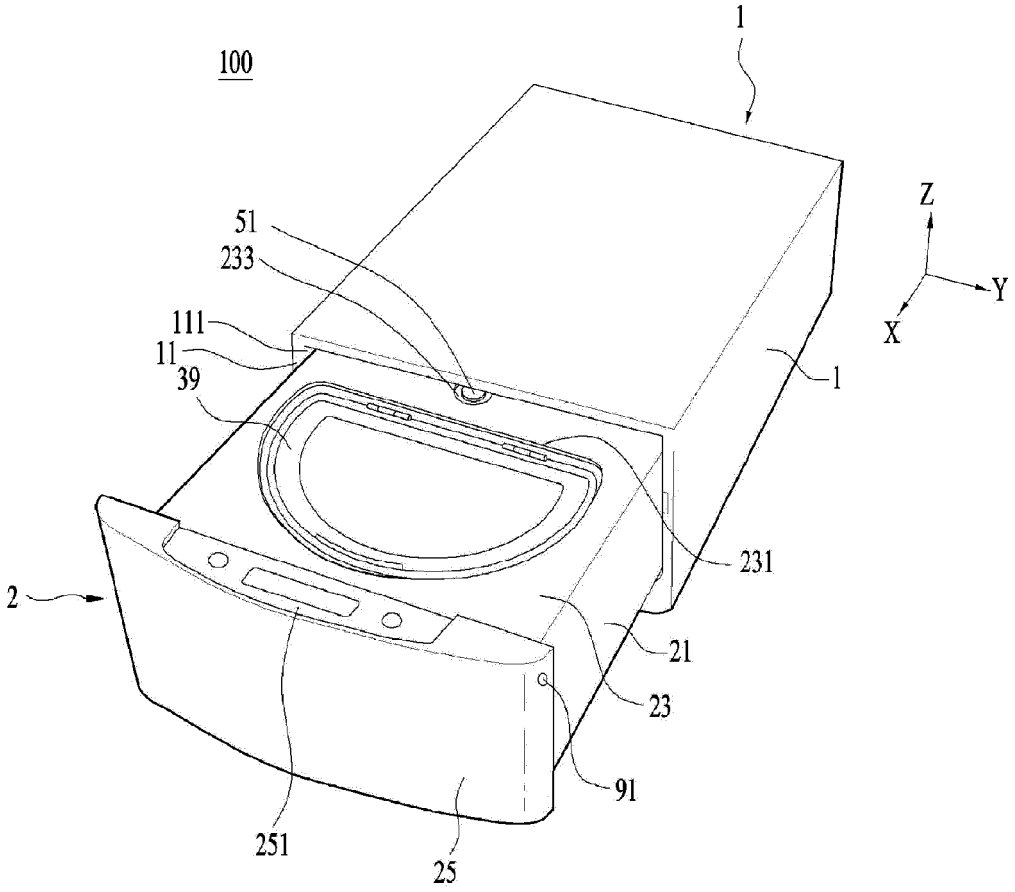

Fig. 2

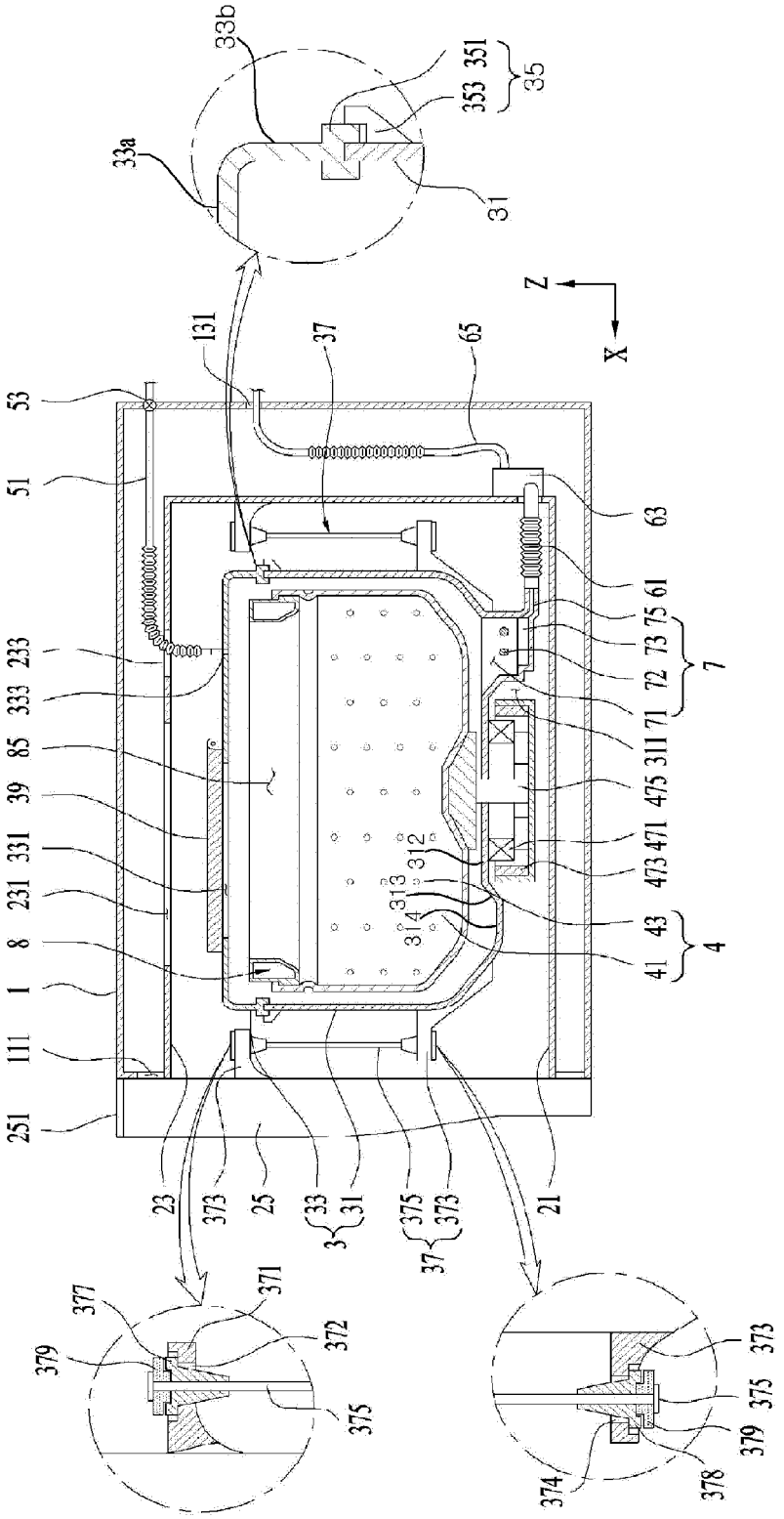
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Fig. 3

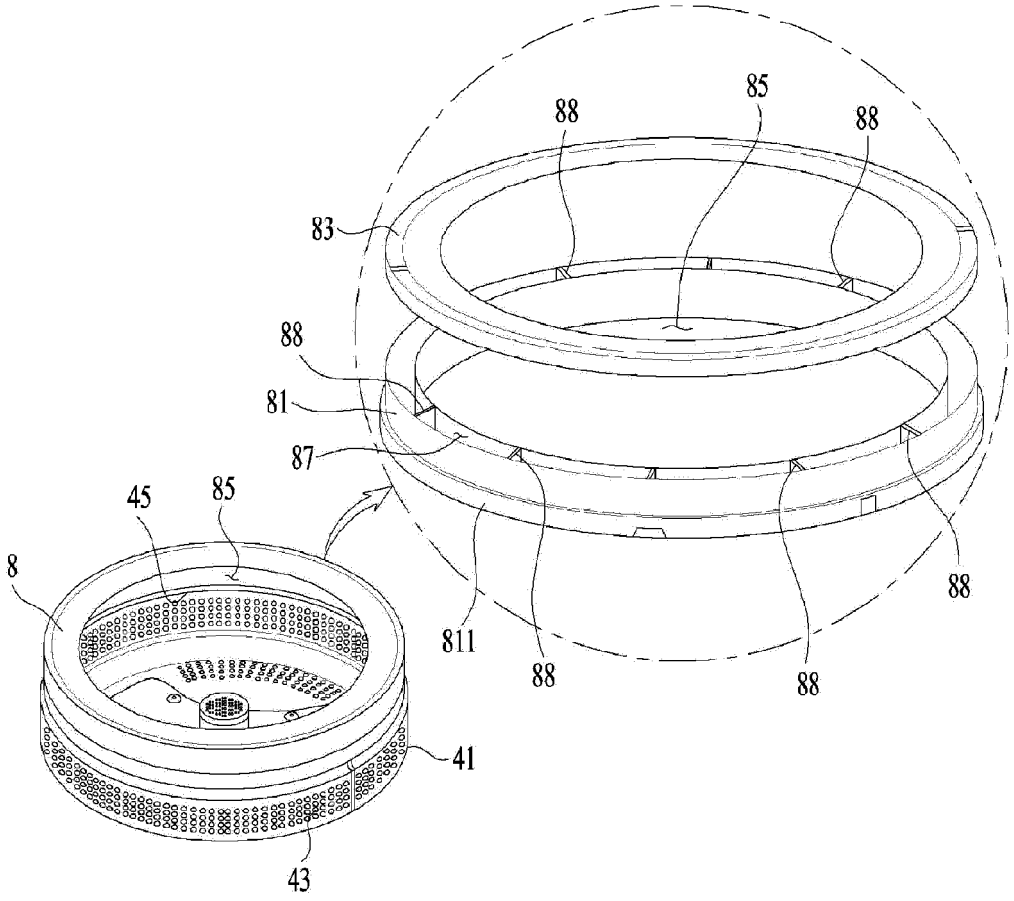

Fig. 4

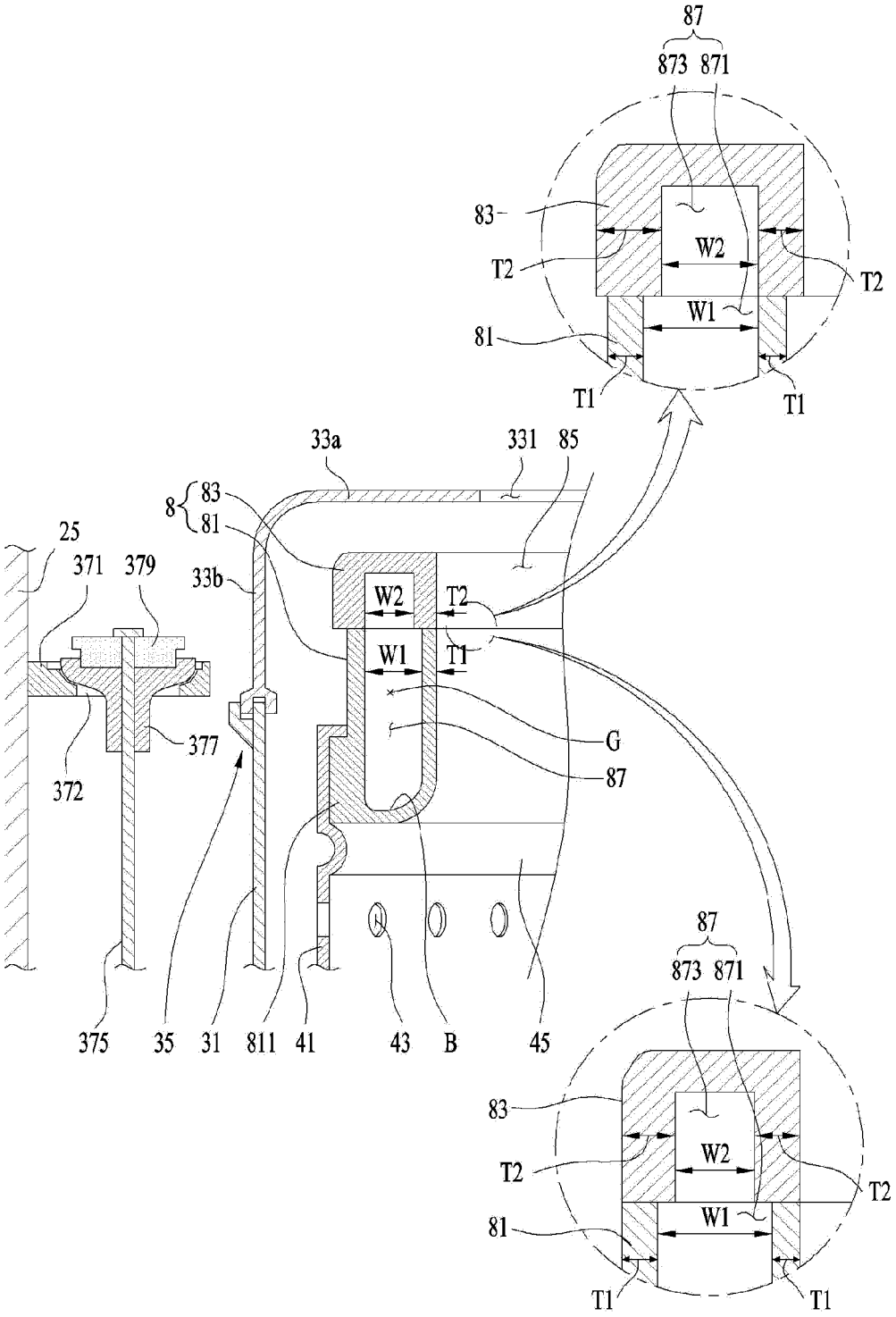
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Fig. 5

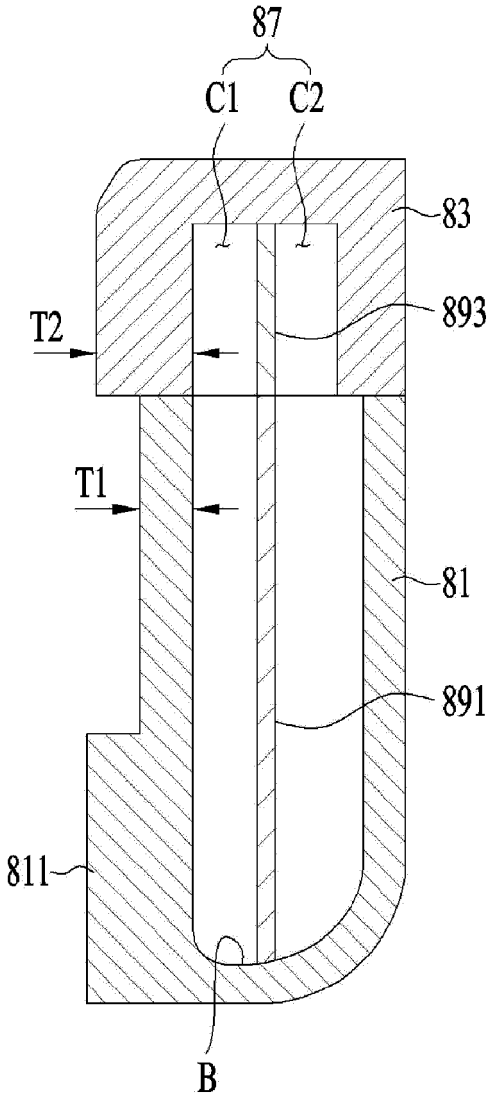

Fig. 6

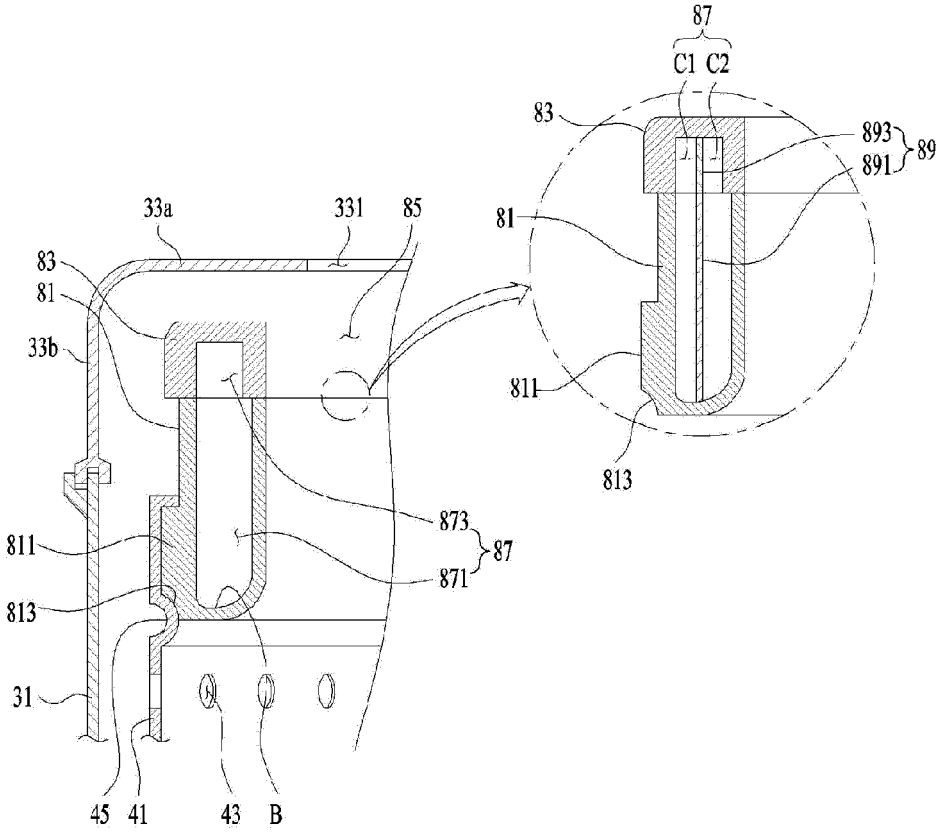
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Fig. 7

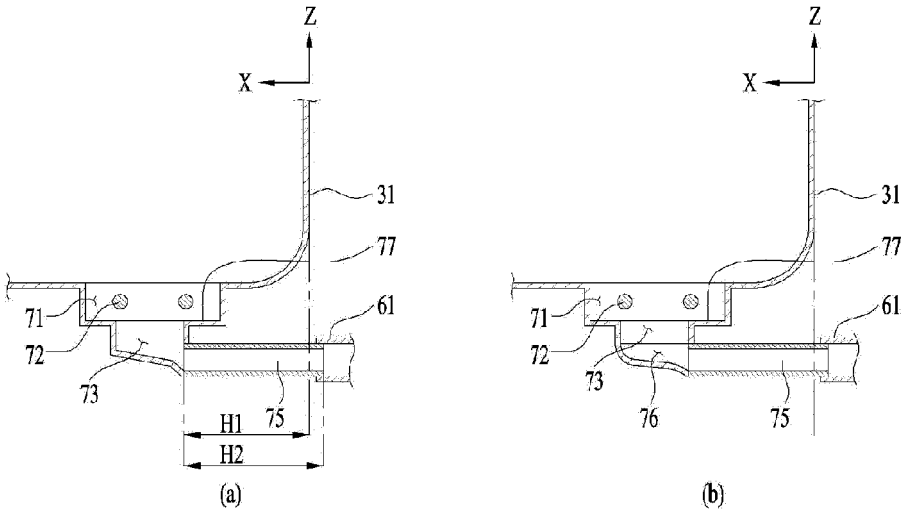
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Fig. 8

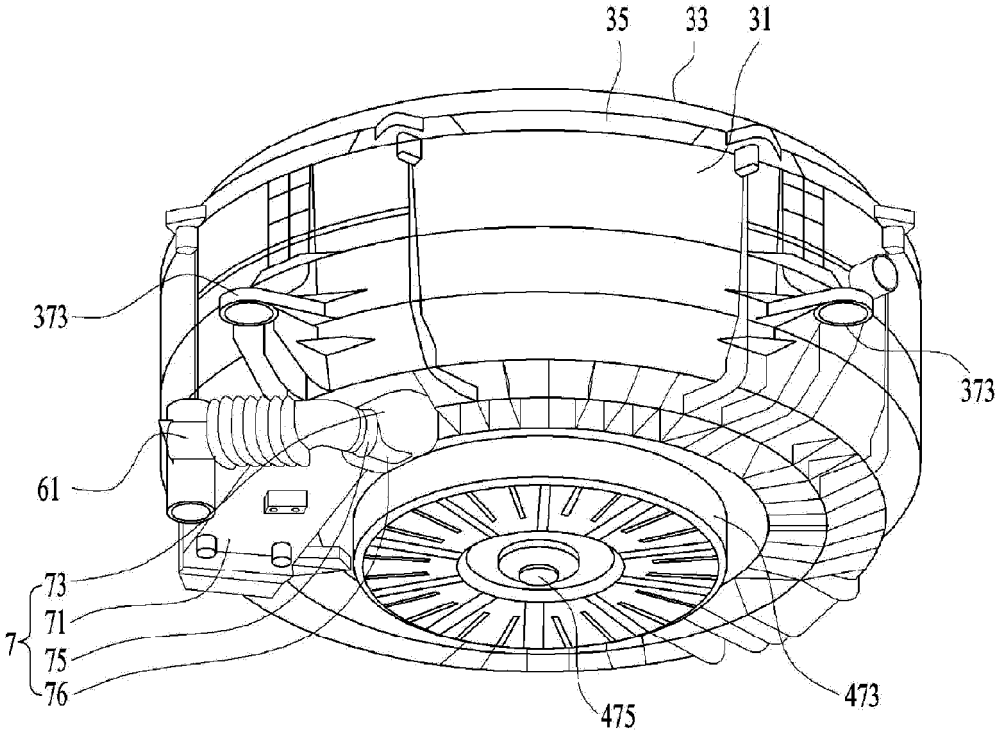
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Fig. 9

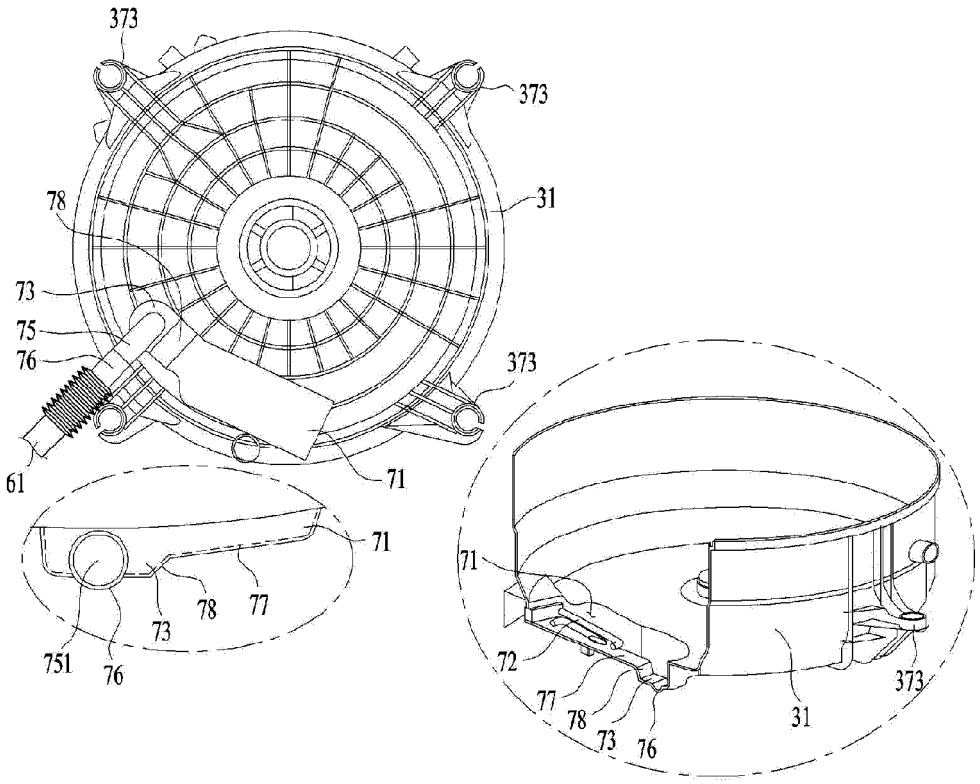
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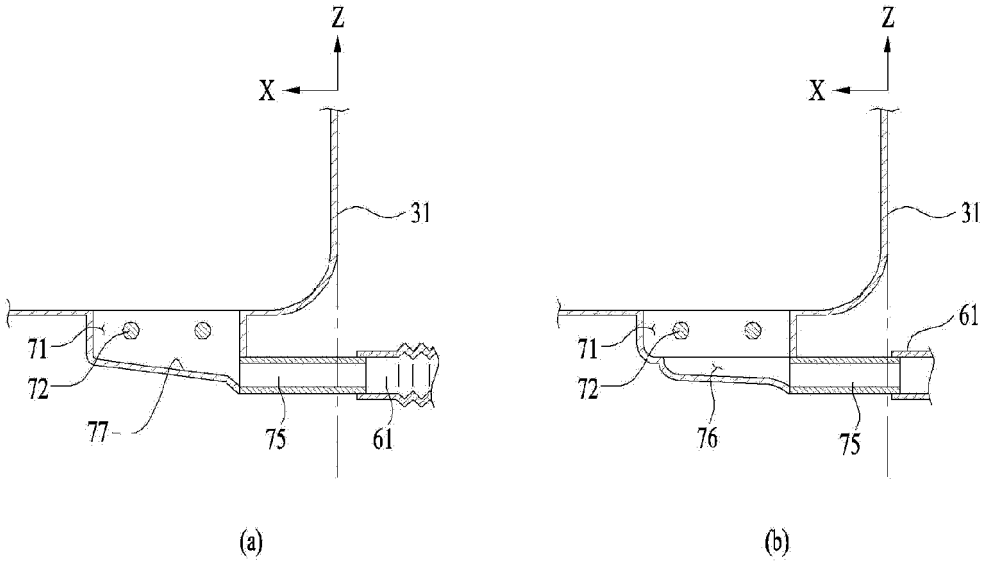
Fig. 10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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2021/005172

A. CLASSIFICATION OF SUBJECT MATTER

D06F 37/24(2006.01)i; **D06F 37/12**(2006.01)i; **D06F 37/40**(2006.01)i; **D06F 39/04**(2006.01)i; **D06F 39/08**(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)

D06F 37/24(2006.01); D06F 29/00(2006.01); D06F 37/14(2006.01); D06F 39/04(2006.01); D06F 39/08(2006.01); D06F 39/12(2006.01); D06L 1/00(2006.01)

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: 의류처리장치(clothes treating apparatus), 드럼(drum), 챔버(chamber), 배수관(drain pipe), 히터(heater)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-1962149 B1 (LG ELECTRONICS INC.) 26 March 2019 (2019-03-26) See paragraphs [0046], [0048] and [0061]-[0062], claim 1 and figures 1-5.	1-5,7-9,11
Y		6,10
Y	KR 10-1824985 B1 (LG ELECTRONICS INC.) 02 February 2018 (2018-02-02) See paragraphs [0039]-[0040] and figure 3.	6
Y	KR 20-1999-0019297 U (DAEWOO ELECTRONICS CO., LTD.) 15 June 1999 (1999-06-15) See claim 1 and figures 3-4.	10
A	JP 2019-146717 A (PANASONIC IP MANAGEMENT CORP.) 05 September 2019 (2019-09-05) See paragraphs [0037]-[0038] and figures 2 and 13-14.	1-11
A	US 2013-0185873 A1 (BOMAR et al.) 25 July 2013 (2013-07-25) See paragraphs [0023]-[0024] and figure 2.	1-11

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
06 August 2021	**09 August 2021**
Name and mailing address of the ISA/KR **Korean Intellectual Property Office** **Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208** Facsimile No. **+82-42-481-8578**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2019)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2021/005172

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
KR	10-1962149	B1	26 March 2019	CN	102844486	A	26 December 2012
				CN	102844486	B	09 September 2015
				DE	112011101522	B4	03 September 2020
				DE	112011101522	T5	29 May 2013
				KR	10-1683114	B1	06 December 2016
				KR	10-1710393	B1	27 February 2017
				KR	10-1752410	B1	29 June 2017
				KR	10-2011-0121091	A	07 November 2011
				KR	10-2011-0122467	A	10 November 2011
				KR	10-2011-0130664	A	06 December 2011
				KR	10-2016-0098150	A	18 August 2016
				KR	10-2016-0098151	A	18 August 2016
				KR	10-2018-0002081	A	05 January 2018
				KR	10-2018-0092927	A	20 August 2018
				US	10081898	B2	25 September 2018
				US	10179964	B2	15 January 2019
				US	2011-0265524	A1	03 November 2011
				US	2016-0369443	A1	22 December 2016
				US	2019-0112743	A1	18 April 2019
				WO	2011-136609	A2	03 November 2011
				WO	2011-136609	A3	19 July 2012
KR	10-1824985	B1	02 February 2018	AU	2010-203288	A1	10 February 2011
				AU	2010-203288	B2	05 July 2012
				CA	2710699	A1	22 January 2011
				CA	2710699	C	29 January 2013
				CA	2788503	A1	22 January 2011
				CA	2788503	C	31 March 2015
				CN	101962896	A	02 February 2011
				CN	101962896	B	16 January 2013
				KR	10-1696706	B1	16 January 2017
				KR	10-1864277	B1	04 June 2018
				KR	10-2011-0009535	A	28 January 2011
				KR	10-2011-0009915	A	31 January 2011
				KR	10-2011-0009919	A	31 January 2011
				US	2011-0016927	A1	27 January 2011
KR	20-1999-0019297	U	15 June 1999		None		
JP	2019-146717	A	05 September 2019	CN	111742094	A	02 October 2020
				SG	11202007269	A	29 September 2020
				TW	201937036	A	16 September 2019
				WO	2019-167422	A1	06 September 2019
US	2013-0185873	A1	25 July 2013	US	9121124	B2	01 September 2015

Form PCT/ISA/210 (patent family annex) (July 2019)