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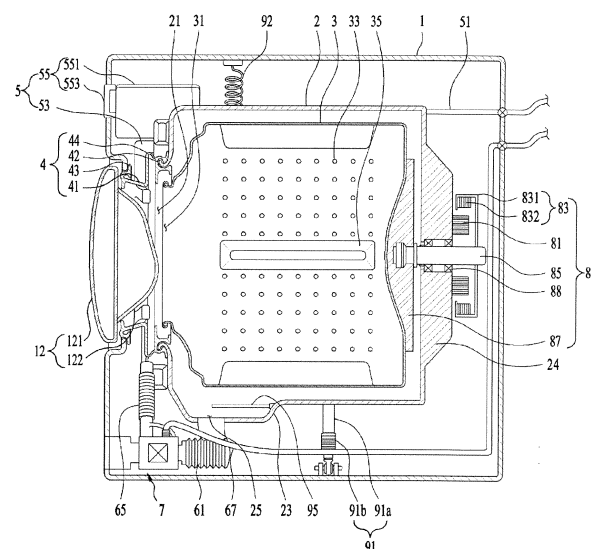
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(54) **LAUNDRY APPARATUS**

(57) There is disclosed a laundry apparatus comprising a cabinet (1); a tub (2) provided in the cabinet and configured to hold water; a drum (3) rotatably mounted in the tub and configured to accommodate laundry; a through-hole (33) penetrating the drum and configured to facilitate communication between the tub and the drum; a pump housing (71) comprising a chamber (91a) defining a predetermined space in which water is stored; a tub water discharge pipe (61) provided to guide the water held in the tub towards the chamber; a pump water discharge pipe (65, 67) provided to guide the water stored in the chamber outside the chamber; an impeller (753) rotatably provided in the chamber and configured to flow the water stored in the chamber towards the pump water discharge pipe; and an air discharge pipe (72) provided to guide air inside the chamber towards the tub or the pump water discharge pipe.

FIG. 2



Description

[0001] Embodiments of the present disclosure relate to a laundry apparatus.

[0002] Hereinafter, a structure of a conventional laundry apparatus and disadvantages thereof will be described referring to FIG. 1.

[0003] Such a conventional laundry apparatus includes a tub T provided to hold water; a tub D rotatably mounted in the tub to accommodate laundry; and a tub water discharge tube TD connected to the tub to discharge the water from the tub T.

[0004] In addition, the conventional laundry apparatus may further include a pump P installed in an outer surface of the tub T and configured to provide a water discharge power; a pump housing PH connected to the tub water discharge pipe TD and configured to accommodate the pump P; and a pump water discharge pipe PD connected to the pump housing PH and configured to discharge the water outside the laundry apparatus.

[0005] Under the above-noted structure, the conventional laundry apparatus has the following disadvantages during the process of discharging the water from the tub T.

[0006] First, the tub T is likely to sag or go down by the weight of the laundry or the rotation of the drum D such that a curved or bent area might occur in the tub water discharge pipe TD as T-trap. Accordingly, an upper end of the bent area caused in the tub water discharge pipe TD might become lower than an upper end of the pump housing PH, only to cause air block so that air is blocked in the pump housing PH.

[0007] In other words, cavitation might occur in the pump housing PH during the water discharging process and deteriorate pumping efficiency enough to cause water to accumulate in the tub. After that, water bubbles might increase noise in the pump housing PH enough to cause damage to a surface of an impeller provided in the pump P, which is a serious problem.

[0008] Second, upon rotating the drum D, the water held in a lower area of the tub T is likely to be continuously raised up along an inner circumferential surface of the tub T by the rotating drum D such that the water accumulation might occur in the tub and that water discharge and laundry spinning effects might deteriorate disadvantageously while noise increases.

[0009] To overcome the disadvantages, an object of the present invention is to address the above-noted and other problems and to provide a laundry apparatus which may facilitate smooth discharge or circulation of wash water.

[0010] Another object of the present invention is to provide a laundry apparatus which may reduce the noise generated during the water discharge or circulation.

[0011] A further object of the present invention is to provide a laundry apparatus which may enhance durability of a pump configured to discharge or circulate wash water.

[0012] The invention is specified by the independent claim. Preferred embodiments are defined in the dependent claims.

[0013] To achieve these objects and other advantages and in accordance with the purpose of the embodiments, as embodied and broadly described herein, a laundry apparatus comprises a cabinet; a tub provided in the cabinet and configured to hold water; a drum rotatably mounted in the tub and configured to accommodate laundry; a through-hole penetrating the drum and configured to facilitate communication between the tub and the drum; a pump housing comprising a chamber defining a predetermined space in which water is stored; a tub water discharge pipe provided to guide the water held in the tub towards the chamber; a pump water discharge pipe provided to guide the water stored in the chamber outside the chamber; an impeller rotatably provided in the chamber and configured to flow the water stored in the chamber towards the pump water discharge pipe; and an air discharge pipe provided to guide air inside the chamber towards the tub or the pump water discharge pipe.

[0014] The air discharge pipe may be connected to an uppermost area out of an outer circumferential surface of the pump housing.

[0015] The pump water discharge pipe may comprise a first pump water discharge pipe provided to guide the water held in the chamber towards the tub, and the impeller may comprise a circulation impeller configured to flow the water stored in the chamber towards the first pump water discharge pipe, and the air discharge pipe may connect a circumferential surface of the first pump water discharge pipe to an upper area of a horizontal line passing a rotation axis of the circulation impeller out of a space defined by the pump housing.

[0016] An area connected with the air discharge pipe out of the circumferential surface of the first pump water discharge pipe may be higher than an upper end of the pump housing.

[0017] The air discharge pipe may connect a circumferential surface of the tub with an upper area of a horizontal line passing a rotation axis of the impeller out of the space defined by the pump housing.

[0018] The pump water discharge pipe may comprise a second pump water discharge pipe provided to guide the water stored in the chamber outside the cabinet, and the impeller may comprise a water discharge impeller configured to flow the water stored in the chamber towards the second pump water discharge pipe, and the air discharge pipe may connect a circumferential surface of the second pump water discharge pipe with an upper area of a horizontal line passing a rotation axis of the water discharge impeller out of the space defined by the pump housing.

[0019] An area connected with the air discharge pipe out of the circumferential surface of the second pump water discharge pipe may be higher than an uppermost area of the chamber.

[0020] The laundry apparatus may further comprise a

discharge pipe connecting pipe projected from a top surface of the pump housing and connected with the air discharge pipe.

[0021] The laundry apparatus may further comprise a sump recessed from a lower area of a circumferential surface of the tub towards a bottom surface of the cabinet and configured to accommodate water; a water discharge hole penetrating a bottom surface of the sump and configured to communicate with the tub water discharge pipe; and a rib projected from an upper end of a lateral surface of the sump to be in parallel with the ground and configured to prevent the water stored in the sump from flowing out of the sump.

[0022] The laundry apparatus may further comprise a lower supporter connected with a circumferential surface of the tub and configured to support the tub, wherein the lower supporter comprises a damper configured to damp vertical vibration of the tub.

[0023] The pump housing may be located in a lower area of the tub, and the tub water discharge pipe may be extendible to have an adjustable length along the movement of the tub.

[0024] Accordingly, the embodiments have the following advantageous effects. According to at least one embodiment of the present disclosure, the laundry apparatus is capable of discharging or circulating wash water smoothly.

[0025] Furthermore, the laundry apparatus is capable of reducing noise.

[0026] Still further, the laundry apparatus is capable of guaranteeing the durability of the pump.

[0027] Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by illustration only, since various changes and modifications within the scope of the invention will become apparent to those skilled in the art from this detailed description.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0028] The present invention will become more fully understood from the detailed description given herein below and the accompanying drawings, which are given by illustration only, and thus are not limitative of the present invention, and wherein:

FIG. 1 is a sectional diagram illustrating a conventional laundry apparatus;

FIG. 2 is a sectional diagram illustrating an inner structure of a laundry apparatus according to the present invention;

FIG. 3 is a perspective diagram illustrating an inside of a cabinet according to one embodiment of an air discharge pipe;

FIG. 4 is an exploded perspective diagram illustrating

ing a pump housing according to the embodiment and peripheral components;

FIG. 5 is a perspective diagram illustrating an inside of a cabinet according to another embodiment of the air discharge pipe;

FIG. 6 is a perspective diagram illustrating an inside of a cabinet according to a further embodiment of the air discharge pipe; and

FIG. 7 is a sectional diagram illustrating one embodiment of an inner structure of a tub provided in the laundry apparatus according to the present invention.

[0029] Referring to the accompanying drawings, exemplary embodiments of the present disclosure will be described in detail. Regardless of numeral references, the same or equivalent components may be provided with the same reference numbers and description thereof will not be repeated.

[0030] For the sake of brief description with reference to the drawings, the sizes and profiles of the elements illustrated in the accompanying drawings may be exaggerated or reduced and it should be understood that the embodiments presented herein are not limited by the accompanying drawings.

[0031] The accompanying drawings are used to help easily understand various technical features and it should be understood that the embodiments presented herein are not limited by the accompanying drawings. As such, the present disclosure should be construed to extend to any alterations, equivalents and substitutes in addition to those which are particularly set out in the accompanying drawings.

[0032] First of all, referring to FIG. 2 illustrating a side view of a laundry apparatus according to the present invention, an entire configuration of the laundry apparatus will be described.

[0033] The laundry apparatus may include a cabinet 1 defining an exterior design; a tub 2 provided in the cabinet and a drum 3 rotatably mounted in the tub 2 and configured to accommodate laundry.

[0034] The cabinet 1 may have an opening formed in a front side of the cabinet to introduce the laundry and a door 12 may be rotatably coupled to the cabinet to open and close the opening.

[0035] The door 12 may be configured of a circular door frame 121; and a transparent window 122 provided in a center of the door frame.

[0036] Here, as defining directions to make the specific structure of the laundry apparatus, which will be described as follows, easily understood, a direction towards the door 12 with respect to the center of the cabinet 1 may be defined as a front side.

[0037] A reversed direction of the direction towards the door 12 may be defined as a rear side. A right side and a left side may be naturally defined by the front and rear sides.

[0038] The tub 2 may be provided as a cylinder shape

with a longitudinal axis disposed in parallel or keeping 0~30 degrees with a bottom surface of the cabinet so as to define a predetermined space in which water is stored. The tub 2 may include a tub opening 21 formed in a front side to communicate with the opening.

[0039] The tub 2 may be fixed to the bottom surface of the cabinet 1 by a lower supporter 91 having a support bar 91a and a damper 91b connected to the support bar 91a. Accordingly, the vibration generated in the tub 2 by the rotation of the drum 3 may be damped.

[0040] In addition, an elastic supporter 92 provided in a top surface of the cabinet 1 may be connected to a top surface of the tub 2. Accordingly, the vibration generated in the tub 2 and transferred to the cabinet 1 may be damped.

[0041] The drum 3 may be provided in a cylinder shape having a longitudinal axis arranged in parallel or keeping 0~30 degrees with the bottom surface of the cabinet so as to accommodate the laundry. The drum may include a drum opening 31 formed in a front side to communicate with the tub opening 21.

[0042] Accordingly, a user may load laundry into the drum 3 through the opening, the tub opening 21 and the drum opening 31 or unload the laundry from the inside of the drum 3.

[0043] Also, the drum 3 may include a plurality of through-holes 33 penetrating an outer circumferential surface of the drum 3 so as to draw water from the tub 2 into the drum 3 and also discharge the water from the laundry to the inside of the tub 2.

[0044] A lifter 35 may be further provided in an inner circumferential surface of the drum 3 to agitate the laundry when the drum 3 is rotated. The drum 3 may be rotatable by a drive unit 8 provided behind the tub 2.

[0045] The drive unit 8 may include a stator 81 fixed to a rear surface of the tub 2; a rotor 83 rotatable by the electromagnetic action with the stator 81; and a shaft 85 connecting the drum 3 and the rotor 83 with each other via the rear surface of the tub 2.

[0046] The stator 81 may be secured to a rear surface of a bearing housing 24 provided in the rear surface of the tub 2. The rotor 83 may be configured of a permanent magnet 832 spaced a predetermined distance apart from the stator 81 in a perpendicular direction with respect to the shaft 85; and a rotor housing 831 provided to connect the permanent magnet 832 and the shaft 85 with each other.

[0047] The bearing housing 24 may include a housing-through-hole 26 penetrating the bearing housing 24 to facilitate communication between the inside and outside of the tub 2; and a plurality of bearings 88 provided in the housing-through hole 26 to support the shaft 85.

[0048] An arm 87 may be provided in a rear surface of the drum 3 and configured to easily transfer the rotational force of the rotor 83 to the drum 3. The shaft 85 configured to transfer the rotational force of the rotor 83 may be fixed to the arm 87.

[0049] Meanwhile, the laundry apparatus according to

one embodiment may further include a water supply hose 51 provided to be supplied water by an external supply source; and a detergent supply unit 55 provided in the cabinet 1 and configured to supply a washing detergent to the tub 2.

[0050] The detergent supply unit 55 may include a detergent box 551 fixed to an inner wall of the cabinet 10; and a detergent box drawer 553 detachable from the detergent box 551 to be retractable from the front side of the cabinet 1.

[0051] In this instance, the washing detergent supplied to the inside of the detergent box 551 may be mixed with water to easily flow into the tub 2. For that, the water supply hose 51 may be connected with the detergent box 551.

[0052] A gasket 4 may be provided between the opening of the cabinet 1 and the tub opening 21. The gasket 4 may be configured to prevent leakage of water into the cabinet 1 from the tub 2 and the vibration of the tub 2 from being transferred to the cabinet 1.

[0053] Specifically, the gasket 4 may include a cabinet fixing portion 43 connected to an area where the opening of the cabinet 1 is formed; a tub fixing portion 42 connected to an area where the tub opening 21 is formed; and a circular gasket body 41 provided to connect the cabinet fixing portion 43 and the tub fixing portion 42 with each other.

[0054] The gasket 4 may be made of a flexible material (e.g., rubber) so as to damp the vibration transferred to the cabinet 1 from the tub 2. The vibration may be more effectively damped by a vibration isolating member 44 that is curved from a circumferential surface of the gasket body 41 along a perpendicular direction with respect to the circumferential surface.

[0055] The laundry apparatus according to one embodiment may further include a water supply pipe 52 configured to supply water to the tub 2. The water supply pipe 53 may be provided to connect the detergent box 551 with the gasket 4 or the detergent box 551 with the tub 2.

[0056] The water supply pipe 63 may be made of a flexible material with elasticity so as to damp the vibration transferred to the detergent box 551 secured to the inner surface of the cabinet 1 from the tub 2.

[0057] A weight balancer 93 may be provided in a front surface of the tub 2 outside the gasket 4 and configured to damp the vibration generated in the drum 3. The weight balancer 93 may include a first balancer 931 and a second balancer 932 provided in both sides of the tub 2 with respect to a center of a right-and-left width direction of the tub 2, respectively.

[0058] Meanwhile, a water discharge hole 25 maybe formed in the bottom surface of the tub 2 to discharge the water held in the tub 2 and a tub water discharge pipe 61 provided to form a water discharge path in communication with the water discharge hole 25 so as to allow the water to flow outside the tub 2 may be connected to the water discharge hole 25.

[0059] A heater 95 configured to heat water and a sump 23 provided to accommodate the heater 95 may be provided in an area underneath the tub 2.

[0060] The sump 23 may be recessed from the bottom surface of the tub 2 downwardly so as to prevent the overheat of the heater 95 while continuously accommodating a predetermined amount of water.

[0061] When the sump 23 is provided underneath the tub 2, the water discharge hole 25 may be formed in a bottom surface of the sump 23 and the tub water discharge pipe 61 may be connected with the bottom surface of the sump 23 to facilitate communication between the tub water discharge pipe 61 and the water discharge hole 25.

[0062] The laundry apparatus according to one embodiment may further include a pump assembly 7 connected to the tub water discharge pipe 61 to discharge the water held in the tub 2.

[0063] Hereinafter, referring to FIG. 3, the pump assembly 7 and peripheral components will be described in detail.

[0064] The pump assembly 7 may be formed in a cylinder shape and include a pump housing 71 providing a chamber (91a, see FIG. 4) in which the water discharged via the tub water discharge pipe 61 is stored; and a circulation pump 75 configured to re-supply the water stored in the pump housing 71 to the tub 2.

[0065] The circulation pump 75 may include a circulation impeller 753 rotatably provided in the chamber 71a; and a circulation motor 751 connected to a side of the pump housing 71 and configured to circulate the circulation impeller 753 (see FIG. 7).

[0066] The pump assembly 7 may include a water discharge pump 73 provided in a side area of the pump housing 71 and configured to generate a pressure difference in the tub water discharge pipe 61.

[0067] The water discharge pump 73 may include a water discharge impeller 733 rotatably mounted in the chamber 71a; and a water discharge motor connected to the side area of the pump housing 71 and disposed in the opposite area to the circulation motor 751 to rotate the water discharge impeller 733 (see FIG. 7).

[0068] In this instance, the water discharge motor 731 has to be provided in the laundry apparatus necessarily but the circulation motor 751 may be provided selectively when necessary. The present embodiment is premised on that the circulation motor 751 is provided in the laundry apparatus.

[0069] The water discharge pump 73 and the circulation pump 75 may be actuated selectively. The water pumped by the water discharge pump 73 and the circulation pump 75 in the chamber 72 may be discharged from the pump housing 71 via pump water discharge pipes 65 and 67 connected to the pump housing 71.

[0070] The pump water discharge pipe 65 may include a first pump water discharge pipe 65 provided to re-supply the water pumped by the circulation pump 75 to the tub 2; and a second pump water discharge pipe 67 pro-

vided to discharge the water pumped by the water discharge pump 73 outside the cabinet 1.

[0071] The second pump water discharge pipe 67 may be extended from the pump housing 71 to an upper area with respect to a horizontal surface passing the shaft of the drum 3 from the rear surface of the cabinet 1.

[0072] Moreover, the first pump water discharge pipe 65 may be connected to a guide pipe 69 provided along an outer circumference of the gasket 4 and the guide pipe 69 may be in communication with a plurality of spraying nozzles 46 provided in an inner circumferential surface of the gasket 4.

[0073] The plurality of the spraying nozzles 46 may extend from the inner circumferential surface of the gasket 41 towards the drum 3 inside so as to spray water into the drum 3.

[0074] A filter member 77 may be further provided in a predetermined area of the pump housing 71 and configured to filter and remove foreign substances (e.g., lint) from the water draw from the tub 2.

[0075] According to one embodiment of the present invention, the pump housing 71 may be disposed under the tub 2 and the tub water discharge pipe 61 may be made of a flexible material that is able to bend along the movement of the tub 2.

[0076] Accordingly, when the drum 3 is rotated or a large amount of laundry is loaded into the drum 3, the tub 2 and the tub water discharge pipe 61 is likely to sag downwardly enough to cause a problem of air blocking in an upper area of the chamber provided in the pump housing 71.

[0077] To solve the problem, the laundry apparatus according to one embodiment of the present invention may further include an air discharge pipe 72 configured to guide air inside the chamber 71a towards the first pump water discharge pipe 65, in communication with the chamber 71a.

[0078] Hereinafter, referring to FIG. 4, the air discharge pipe 72 provided in one embodiment of the laundry apparatus and peripheral structures will be described in detail.

[0079] The air discharge pipe 72 may connect a circumferential surface of the first pump water discharge pipe 65 and an upper area of the pump housing 71 above a horizontal line passing a rotation axis of the circulation impeller 753 with each other.

[0080] More specifically, the air discharge pipe 72 may extend from the outer circumferential surface of the first pump water discharge pipe 65 along a lateral direction and bend downwardly towards the top surface of the pump housing 71, only to be connected to the top surface of the pump housing 71,

[0081] In other words, to directly discharge the air blocked in the chamber 71a of the pump housing 71 through the first pump water discharge pipe 65, the area connected with the air discharge pipe out of the circumferential surface of the first pump water discharge pipe 65 may be formed higher than an upper end of the cham-

ber 71a.

[0082] Accordingly, the air inside the chamber 71a of the pump housing 71 may be smoothly discharged via the air discharge pipe 72 such that water discharge can be facilitated enough to prevent water accumulating between the tub 2 and the drum 3 and reduce the noise generated by the impeller 733 and 753 striking water bubbles and then prevent the damage to the surface of the impeller 733 and 753 caused by bubbles.

[0083] Meanwhile, the air discharge pipe 72 may be integrally formed with the pump housing 71 as one body. Alternatively, it may be separately formed from the pump housing 71 for easy and smooth assembly.

[0084] For that, the pump housing 71 may further include a discharge pipe connecting pipe 715 inserted in the air discharge pipe 72. The discharge pipe connecting pipe 715 may be upwardly projected from a top surface of the pump housing 71 to communicate with the chamber 71a.

[0085] Also, a tub water discharge pipe connecting portion 711 may be provided in a rear surface of the pump housing 71 and the tub water discharge pipe connecting portion 711 may have an open surface communicating with the chamber 71a. A circulation pump coupling portion 717 having an open surface in communication with the chamber 71a may be provided in one lateral surface of the pump housing 71. A water discharge pump coupling portion 716 having an open surface in communication with the chamber 71a may be provided in the other surface of the pump housing 71.

[0086] A first pump water discharge pipe connecting portion 712 connected with the first pump water discharge pipe 65 may be provided between the circulation pump coupling portion 717 and the pump housing 71. A second pump water discharge pipe connecting portion 713 may be provided between the water discharge pump coupling portion 716 and the pump housing 71.

[0087] The filter member 77 mentioned above may be provided in a front surface of the pump housing 71 and coupled to a filter coupling portion 718 having an open surface in communication with the chamber 71a. A cabinet securing portion 719 provided to secure the pump housing 71 to the cabinet 1 may be provided in an upper area of the filter coupling portion 718.

[0088] Hereinafter, referring to FIG. 5, another embodiment of the air discharge pipe 72 will be described, focusing on a difference from the above-noted embodiment.

[0089] As this embodiment, the air discharge pipe 72 may be provided to guide air inside the chamber 71a towards the second pump water discharge pipe 67.

[0090] The air discharge pipe 72 may connect a circumferential surface of the second pump water discharge pipe 67 with an upper area of the horizontal line passing the axis of the circulation impeller 753 out of the space defined by the pump housing 71.

[0091] More specifically, the air discharge pipe 72 may extend from an outer circumferential surface of the sec-

ond pump water discharge pipe 67 along a lateral direction and then downwardly bend towards a top surface of the pump housing 71 to be connected to the top surface of the pump housing 71.

[0092] Similarly, the area where the air discharge pipe 72 is connected out of the circumferential surface of the second pump water discharge pipe 67 may be higher than the upper end of the chamber 71a.

[0093] Accordingly, the air inside the chamber 71a of the pump housing 71 may be discharged via the air discharge pipe 72 smoothly enough to facilitate the water circulation efficiently.

[0094] Here, when the water is discharged towards the second pump water discharge pipe 67 by driving the water discharge pump 73, the water might flow backward via the air discharge pipe 72 by the pressure difference.

[0095] Accordingly, a valve (not shown) may be provided in the air discharge pipe 72 to open and close the air discharge pipe selectively. The air discharge pipe 72 may be shut off by using the valve.

[0096] Hereinafter, referring to FIG. 6, a further embodiment of the air discharge pipe 72 will be described, focusing on a different feature from the embodiments mentioned above.

[0097] As a further embodiment, the air discharge pipe 72 may be provided to guide air inside the chamber 71a towards the tub 2.

[0098] The air discharge pipe 72 may connect a circumferential surface of the tub 2 with the upper area of the horizontal surface passing the axis of the circulation impeller 753 out of the space defined by the pump housing 71.

[0099] More specifically, the air discharge pipe 72 may extend from the outer circumferential surface of the tub 2 and then downwardly extend to be connected with the top surface of the pump housing 71.

[0100] In this instance, the air discharge pipe 72 may be connected from the outer circumferential surface of the tub 2 to an upper area of a horizontal surface passed by the shaft 85 of the drum 3. Accordingly, the water held in the tub 2 may be prevented from being drawn into the air discharge pipe 72.

[0101] This embodiment may be applied to the laundry apparatus including no water circulation structure (e.g., the first pump water discharge pipe and water discharge pump).

[0102] Hereinafter, referring to FIG. 7, one embodiment proposed to prevent the water accumulation by modifying the inner structure of the tub 2 will be described.

[0103] Respective ribs 27 projected from respective upper ends of both sides of the sump towards a flat surface perpendicular to the ground and the front surface of the cabinet 1 may be provided in the sump 23.

[0104] The ribs 27 may prevent the water stored in the sump 23 from flowing out of the sump as the drum 3 is rotated.

[0105] Accordingly, the water accumulated in the

space between the tub 2 and the drum 3 may be reduced. Also, a water level may be maintained as a heater protecting level such that overheating of the heater 95 exposed outside the water may be prevented.

[0106] As the present features may be embodied in several forms without departing from the characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be considered broadly within its scope as defined in the appended claims.

[0107] Therefore, all changes and modifications that fall within the metes and bounds of the claims, or equivalents of such metes and bounds, are therefore intended to be embraced by the appended claims.

Claims

1. A laundry apparatus comprising:

a cabinet (1);
 a tub (2) provided in the cabinet (1) and configured to hold water;
 a drum (3) rotatably mounted in the tub (2) and configured to accommodate laundry;
 a through-hole (33) penetrating the drum (3) and configured to facilitate communication between the tub (2) and the drum (3);
 a pump housing (71) comprising a chamber (91a) defining a predetermined space in which water is stored;
 a tub water discharge pipe (61) provided to guide the water held in the tub (2) towards the chamber (91a);
 a pump water discharge pipe (65, 67) provided to guide the water stored in the chamber (91a) outside the chamber (91a);
 an impeller (753) rotatably provided in the chamber (91a) and configured to flow the water stored in the chamber (91a) towards the pump water discharge pipe; (65) and
 an air discharge pipe (72) provided to guide air inside the chamber (91a) towards the tub (2) or the pump water discharge pipe (65, 67).

2. The laundry apparatus of claim 1, wherein the air discharge pipe (72) is connected to an uppermost area out of an outer circumferential surface of the pump housing (71).

3. The laundry apparatus of claim 1 or 2, wherein the pump water discharge pipe (65, 67) comprises a first pump water discharge pipe (65) provided to guide the water held in the chamber (91a) towards the tub (2), and
 the impeller (733, 753) comprises a circulation impeller (753) configured to flow the water stored in the

chamber (91a) towards the first pump water discharge pipe (65), and
 the air discharge pipe (72) connects a circumferential surface of the first pump water discharge pipe (65) to an upper area of a horizontal line passing a rotation axis of the circulation impeller (753) out of a space defined by the pump housing (71).

4. The laundry apparatus of claim 3, wherein an area connected with the air discharge pipe (72) out of the circumferential surface of the first pump water discharge pipe (65) is higher than an upper end of the pump housing (71).

5. The laundry apparatus of any one of claims 1 to 4, wherein the air discharge pipe (72) connects a circumferential surface of the tub (2) with an upper area of a horizontal line passing a rotation axis of the impeller (733, 753) out of the space defined by the pump housing (71).

6. The laundry apparatus of any one of claims 1 to 5, wherein the pump water discharge pipe (65, 67) comprises a second pump water discharge pipe (67) provided to guide the water stored in the chamber (91a) outside the cabinet (1), and
 the impeller (733, 753) comprises a water discharge impeller (733) configured to flow the water stored in the chamber (91a) towards the second pump water discharge pipe (67), and
 the air discharge pipe (72) connects a circumferential surface of the second pump water discharge pipe (67) with an upper area of a horizontal line passing a rotation axis of the water discharge impeller (733) out of the space defined by the pump housing (71).

7. The laundry apparatus of claim 6, wherein an area connected with the air discharge pipe (72) out of the circumferential surface of the second pump water discharge pipe (67) is higher than an uppermost area of the chamber (91a).

8. The laundry apparatus of any one of claims 1 to 7, further comprising:
 a discharge pipe connecting pipe (715) projected from a top surface of the pump housing (71) and connected with the air discharge pipe (72).

9. The laundry apparatus of any one of claims 1 to 8, further comprising:

a sump (23) recessed from a lower area of a circumferential surface of the tub (2) towards a bottom surface of the cabinet (1) and configured to accommodate water;
 a water discharge hole (25) penetrating a bottom surface of the sump (23) and configured to communicate with the tub water discharge pipe (61);

and

a rib (27) projected from an upper end of a lateral surface of the sump (23) to be in parallel with the ground and configured to prevent the water stored in the sump (23) from flowing out of the sump (23). 5

10. The laundry apparatus of any one of claims 1 to 9, further comprising:

a lower supporter (91) connected with a circumferential surface of the tub (2) and configured to support the tub (2),
wherein the lower supporter (91) comprises a damper (91b) configured to damp vertical vibration of the tub (2). 10 15

11. The laundry apparatus of any one of claims 1 to 10, wherein the pump housing (71) is located in a lower area of the tub (2), and
the tub water discharge pipe (61) is extendible to have an adjustable length along the movement of the tub (2). 20

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FIG. 1

- Prior Art -

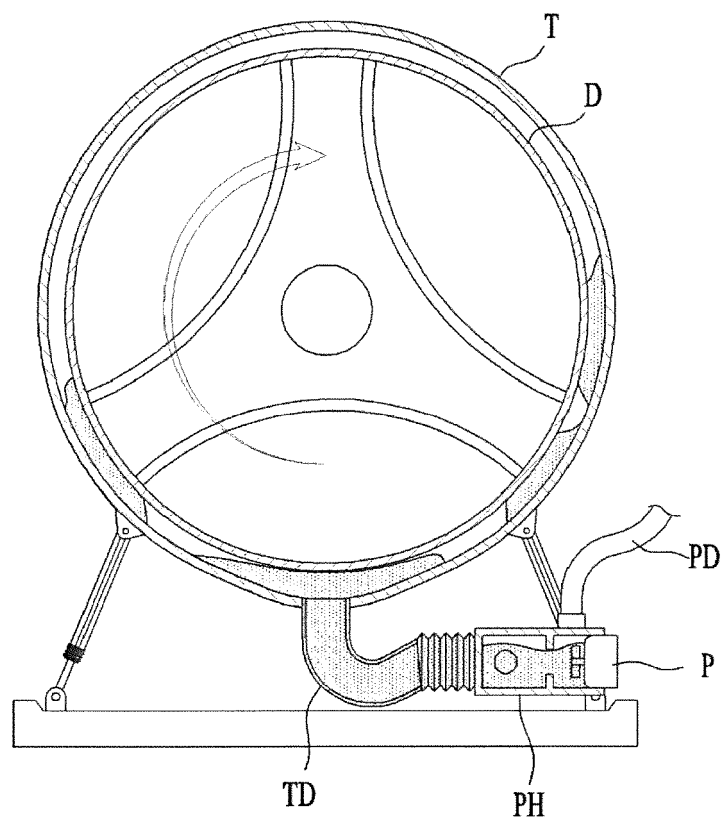


FIG. 2

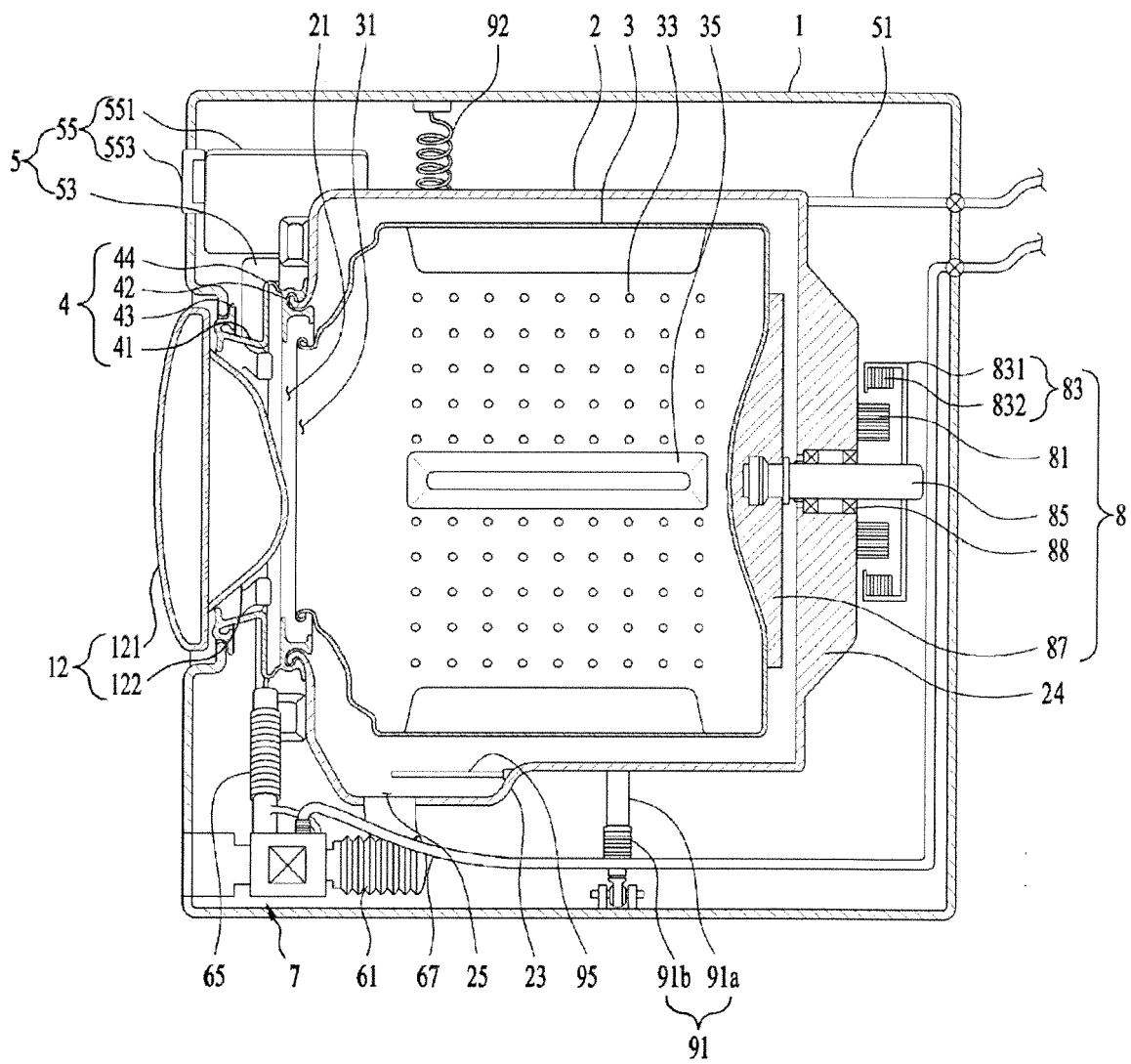


FIG. 3

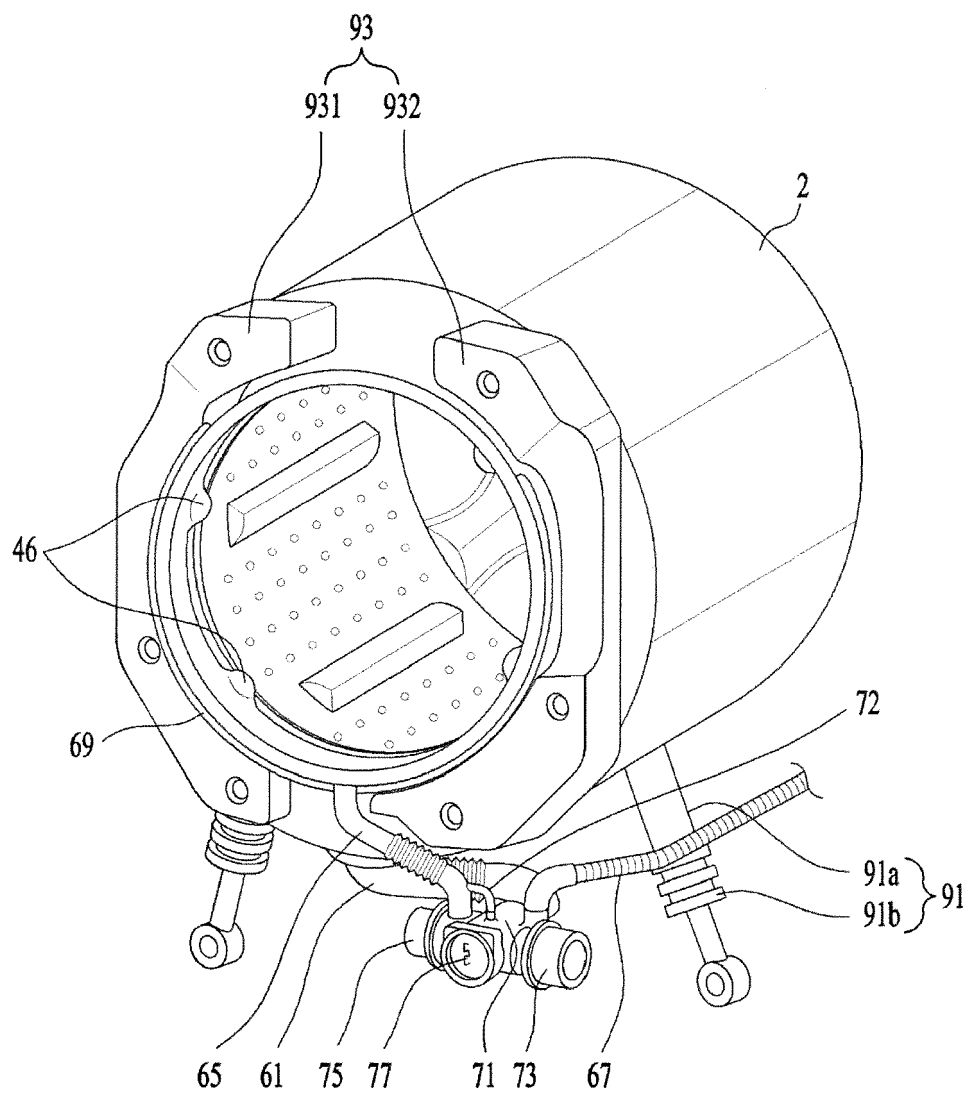


FIG. 4

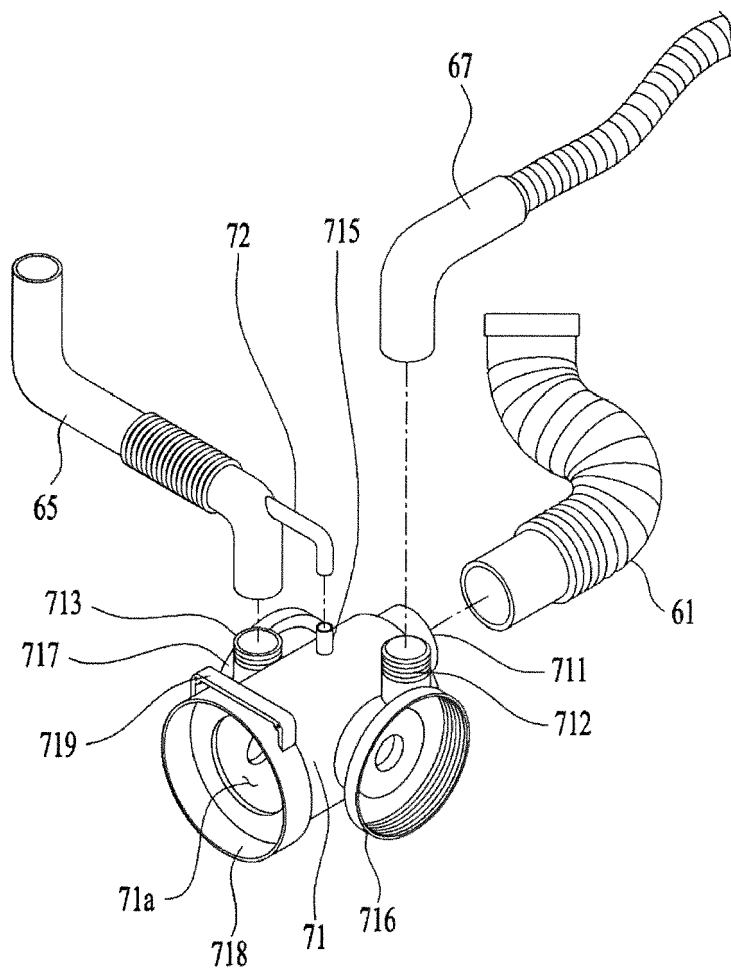


FIG. 5

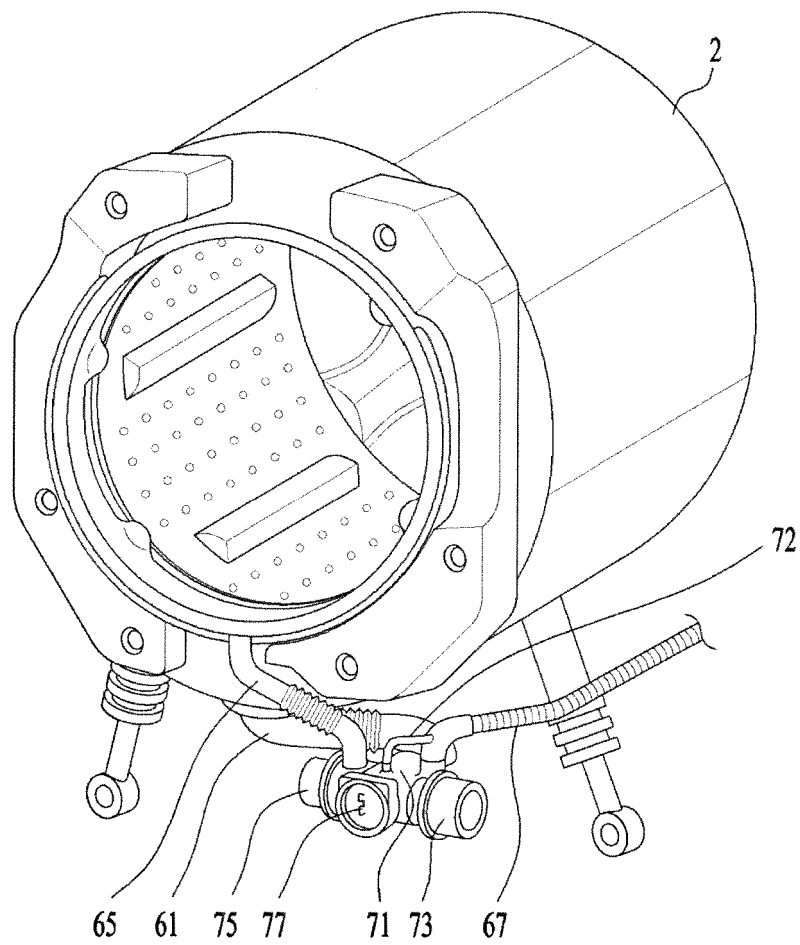


FIG. 6

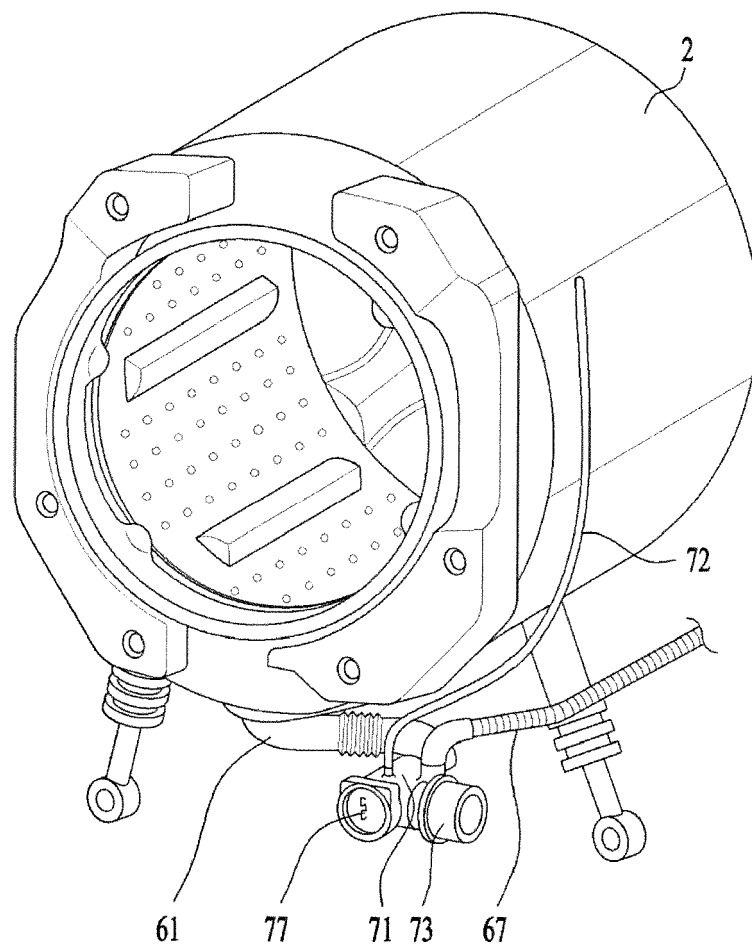
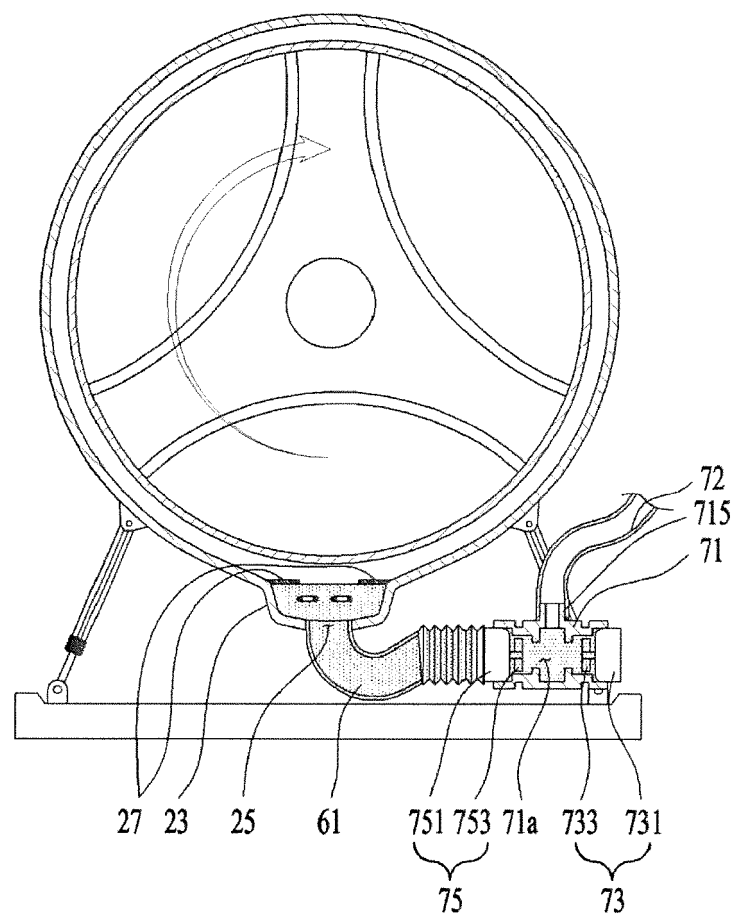


FIG. 7





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The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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