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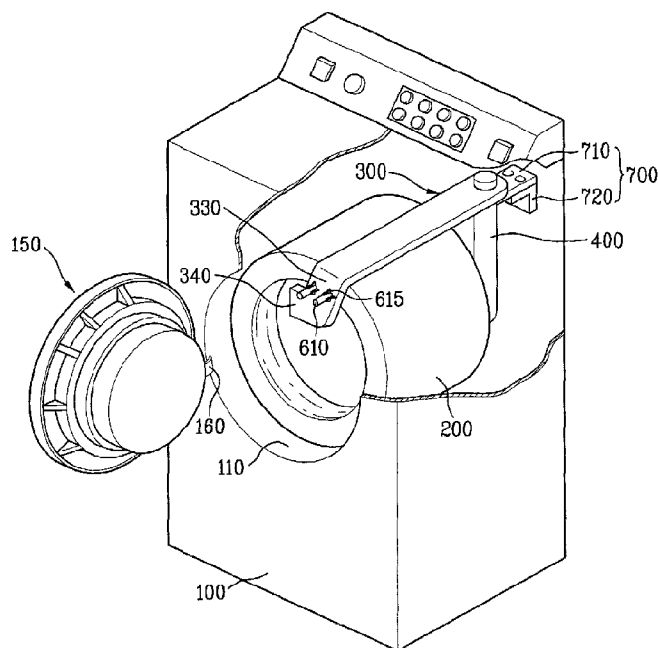
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(54) Title: A WASHING MACHINE AND DRYER HAVING BEING IMPROVED DUCT STRUCTURE THEREOF



(57) Abstract: The present invention relates to a washing machine and dryer with an improved duct structure. A cabinet (100) forms an outer shell of the washing machine and dryer, and a tub (200) is installed within the cabinet (100). A drum (250) is rotatably installed within the tub (200). Since a drying duct (300) is installed in an upper portion of the tub (200) that is eccentric toward one side when viewed from the front of the tub (200), an internal space utilization of the cabinet (100) is enhanced and the equipment can be compact. The drying duct (300) is manufactured with two bodies that are a lower part (310) and an upper part (320) formed by extending a discharge part (330) from one end portion of the drying duct (300), so that the number of parts and the number of assemble processes are reduced and the productivity is improved. Since the discharge part (330) and the lower part (310) are formed in one body, it can prevent the damage and the air leakage, caused in a connection portion due to vibration, and the flowing noise caused by them. The discharge part (330) is extended to be slant in a rotation direction of the drum (250) and a guidance part is extended in a tangential direction with respect to a rotation direction of the drum (250) at one end portion of the discharge part (330), thus

smoothly supplying air to the drum (250). A condensation duct (400) has one end connected to the drying duct (300) and the other end connected to an inside of the tub (200). A heater (800) is installed within the drying duct (300) and a circulation fan (350) is installed in the other end of the drying duct (300) to which the condensation duct is connected.



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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

5 The present invention relates to a washing machine and dryer with a drying function, and more particularly, to a washing machine and dryer with an improved drying duct structure, which dried air whose moisture is removed flows through.

10

 Generally, a washing machine is an apparatus which performs washing, rinsing and dewatering so as to separate dirt from clothes by the interaction of detergent and
15 water, and is classified into agitator type, pulsator type and drum type washing machines.

 Among them, in the drum type washing machine, water, detergent and laundry are loaded into a drum with a plurality of protruded tumbling ribs installed in an inner
20 surface of the drum and the drum is rotated at a low speed. Then, the laundry is washed due to an impact caused when the laundry is lifted by the tumbling ribs and then drops. The drum type washing machine has an advantage in that the laundry is not damaged. In addition, a small amount of
25 water is consumed and the laundry is not tangled with each

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other.

Meanwhile, a dryer is a machine for automatically drying a wet laundry after completing a washing operation. In general, the wet laundry is loaded into a drum installed in
5 an inner side of a cabinet and the drum is rotated. Then, a hot wind is supplied to an inside of the drum to thereby dry the wet laundry.

A combination dryer and drum washing machine, in which a dryer function as well as a washing machine function is
10 added to the drum type washing machine, has been developed.

According to one aspect of the present invention, there is provided a washing machine and dryer comprising:

a cabinet;

a cylinder-shaped tub installed within the cabinet;

15 a drum rotatably installed within the tub;

a drying duct having one end connected to an inner side of the tub, and an upper portion arranged along a longitudinal direction of the tub, the upper portion being arranged to be eccentric towards one side of the tub when viewed from the front
20 of the tub;

a condensation duct having one end connected to the drying duct and the other end connected to an inner side of the tub;

a circulation fan for circulating air existing within the tub through the condensation duct and the drying duct; and

25 a heater for heating the air.

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Preferably, the upper portion of the drying duct is disposed below a top of the tub.

Preferably, a surface of the drying duct, which is adjacent to the tub, is formed to be slant. For example,
5 the adjacent surface of the drying duct may be formed in a curved surface with the same curvature as an outer surface of the tub.

The drying duct may include a lower part of which an upper portion is opened, in which a discharge part
10 connected to a front side of the tub is downwardly extended from one end in one body and a communication hole for connecting the lower part with the condensation duct is formed in a lower portion of the other end; and an upper part covering the opened upper portion of the lower part.
15 The other end of the lower part in which the communication hole is formed may be widely formed. The circulation fan may be inserted into the other end of the lower part. A surface of the lower part, which is adjacent to the outer surface of the tub, may be formed to be slant. The
20 adjacent surface of the lower part may be formed in a curved surface with the same curvature as an outer surface of the tub. A portion in which the discharge part is extended from one end of the lower part may be formed roundly so as to smoothly guide air.

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The discharge part may be extended to be slant from the lower part in a downward direction. In this case, for example, the discharge part may be formed to be slant when viewed from the front of the tub so as to discharge air in a rotation direction of the drum.

The washing machine and dryer according to an embodiment of the present invention can further comprise a guidance part extended from one end portion of the discharge part in a tangential direction with respect to the rotation direction of the tub when viewed from the front of the tub so as to discharge air in the tangential direction with respect to the rotation direction of the drum.

The drying duct may have both ends fixed and supported to an inner surface of the cabinet by a first fixing member and a second fixing member.

The first fixing member may include a plurality of brackets protruded at one portion of an inner surface of the cabinet; and a fixing load protruded at one end portion of the drying duct and fixedly inserted between the plurality of brackets. The brackets and the fixing load may be connected with each other by bolts and nuts. In addition, the washing machine and dryer may further comprise a plurality of reinforcement ribs for connecting a

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side surface of the fixing load with the drying duct, thereby reinforcing the fixing load.

The second fixing member may include a fixing projection protruded at the other end of the drying duct; and a fixing angle protruded at the other portion of an inner surface of the cabinet, for supporting the fixing projection at a lower portion. The fixing projection and the fixing angle may be fixedly connected with each other by a bolt and a nut.

10 In a washing machine and dryer according to an embodiment of the present invention, the heater may be installed in an inside of the drying duct. The condensation duct may have one end connected to the drying duct and the other end connected to a rear lower portion of
15 the tub.

In the washing machine and dryer according to an embodiment of the present invention, the tub and the drum can be installed in parallel with a horizontal plane or can be installed to be slant, such that openings of the tub and
20 the drum are disposed at an upper portion with respect to a horizontal plane.

An embodiment of the present invention seeks to provide a washing machine and dryer with an improved drying

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duct structure, in which an internal space utilization of a cabinet is enhanced and an entire height of the equipment is reduced.

5 An embodiment of the present invention further seeks to provide a washing machine and dryer, in which the number of elements of a drying duct is reduced and thus the productivity is improved.

10 An embodiment of the present invention still further seeks to provide a washing machine and dryer with an improved drying duct structure, in which a damage and an air leakage, caused by vibration of a tub, and a flowing noise caused by the air leakage are prevented.

15

 In one form of the invention the washing machine and dryer preferably includes a top surface of the duct disposed below a top surface of the tub.

20 In one form of the invention the washing machine and dryer preferably includes a duct having an upper portion disposed over the tub, and the top surface of the tub disposed between a top surface of the upper portion and a bottom surface of the upper portion when viewed from a side

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of the tub.

In accordance with a further aspect of the present invention, there is provided a washing machine and dryer
5 comprising:

a cabinet;

a tub provided in the cabinet;

a drum rotatably provided in the tub; and

a duct connected to the tub for allowing an air in the
10 tub to introduce therein and discharge to the tub in order
to remove moisture in the air, the duct having an upper
portion arranged along a longitudinal direction of the tub
and to be eccentric with respect to an uppermost top of the
tub.

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It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

10

The present invention will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

FIG. 1 is a partial cross-sectional perspective view showing a duct structure of a washing machine and dryer developed by the applicant;

FIG. 2 is a cross-sectional view showing an internal structure of the washing machine and dryer of FIG. 1;

FIG. 3 is an exploded perspective view showing the drying duct structure of the washing machine and dryer of FIG. 1;

FIG. 4 is a partial cross-sectional perspective view showing a duct structure of a washing machine and dryer in accordance with an embodiment of the present invention;

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FIG. 5 is a cross-sectional view showing an internal structure of the washing machine and dryer in accordance with an embodiment of the present invention;

FIG. 6 is an exploded perspective view of the drying
5 duct in accordance with an embodiment of the present invention;

FIG. 7 is a cross-sectional perspective view of the drying duct installed in accordance with an embodiment of the present invention;

10 FIG. 8 is a partial cross-sectional perspective view showing a duct structure of a washing machine and dryer in accordance with another embodiment of the present invention;

FIG. 9 is a cross-sectional view showing the drying
15 duct fixed to the cabinet by the first fixing member; and

FIG. 10 is a cross-sectional view showing the drying duct fixed to the cabinet by the second fixing member.

FIG. 1 is a cross-sectional perspective view showing a
20 duct structure of a washing machine and dryer that has been developed by the applicant, and FIG. 2 is a cross-sectional view showing an internal structure of the washing machine and dryer. Referring to FIGS. 1 and 2, the washing machine and dryer includes a cabinet 10, a tub 20, a drum 25, a

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condensation duct 40, a motor 5, a heater 50, a circulation fan 35 and a drain pump 6.

The cabinet 10 constitutes an outer shell of the washing machine and dryer, and includes a loading portion 5 11 and a door 15 for opening/closing the loading portion 11, which are formed at one portion thereof. The tub 20 is formed in a cylinder shape. The tub 20 is installed within the cabinet 10 and supported by a spring 3 and a damper 4. The drum 25 is rotatably installed within the tub 20 and 10 the motor 5 is installed in order to enable the drum 25 to be rotated.

The condensation duct 40 is connected with the tub 20, and a drying duct 30 has one end connected to the tub 20 and the other end connected to the condensation duct 40. 15 Here, as shown in FIGs. 1 and 2, the drying duct 30 is disposed at a middle upper portion of the tub 20. One end of the drying duct 30 is connected to a discharge part 33 at a lower portion, in which the discharge part 33 is directly connected with an inside of the tub 20. The 20 drying duct 30 installed as above is fixedly connected to a support bar 35 using a fastener member such as a bolt, in which the support bar 35 crosses an upper portion of an inner space of the cabinet 10.

The heater 50 is installed within the drying duct 30,

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and the circulation fan 35 is installed in a portion to which the drying duct 30 and the condensation duct 40 are connected. In addition, the drain pump 6 is installed so as to drain water gathered in a lower portion of the tub 5 20. A reference numeral 9 denotes a cooling-water supplying unit for supplying cooling water to an inside of the condensation duct 40.

Meanwhile, as shown in Fig. 3, in the washing machine and dryer constructed as above, the drying duct 30 includes 10 a lower part 31 whose upper portion is opened, an upper part 32 covering the opened upper portion of the lower part 31, and the discharge part 33 connected to a lower portion of one end of the lower part 31. Further, a communication hole 31a is formed at a lower portion of the other end of 15 the lower part 31 in order to connect the drying duct 30 with the condensation duct 40.

Hereinafter, a drying operation of the washing machine and dryer will be described in detail.

First, a wet laundry is loaded into the drum 25 and 20 the drum 25 is rotated. Then, the circulation fan 35 is rotated to circulate internal air of the drum 25 via the condensation duct 40 and the drying duct 30. The heater is operated to heat air. The air heated by the heater 50 dries the laundry within the drum 25. At this time,

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moisture evaporated from the laundry is contained in air and introduced into the condensation duct 40. In the condensation duct 40, a heat exchange happens between the cooling water supplied from the cooling-water supplying unit 9 and air, so that moisture contained in the air is condensed and removed. The dried air whose moisture is removed is introduced into the drying duct 30. The air introduced into the drying duct 30 is heated by the heater 50 and then again introduced into the drum 25. By repeatedly performing the above procedures, the washing machine and dryer removes the moisture of the wet laundry loaded into the drum 25, thus drying the wet laundry.

However, the developed washing machine and dryer with the above-described duct structure has following problems.

First, because the drying duct is disposed at the middle upper portion of the tub, the internal space utilization of the cabinet is degraded and the equipment generally increases in height.

Second, after the lower part, the upper part and the discharge part contained in the drying duct are separately manufactured, the respective parts are assembled so that the number of parts increases. Further, the number of assembly processes also increases, thereby causing a degradation of productivity.

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Third, when the drum is rotated, the tub and the drying duct connected thereto are vibrated together. In this case, the connection portion between the lower part and the discharge part perpendicularly connected thereto
5 may be loose and a gap therebetween may occur. In an excessive case, the connection portion between the lower part and the discharge part may be broken.

Fourth, because the vibration causes a gap in the connection portion between the lower part and the discharge
10 part, air flowing in the drying duct may be leaked out and thus noise may occur.

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in Figures 4 to 10 of the accompanying
15 drawings.

In embodiments of the present invention, the same reference numerals and symbols denote the same elements and structures and the duplicate descriptions will be omitted below.

20 In FIGs. 4 and 5, there is shown an internal structure of a washing machine and dryer in accordance with an embodiment of the present invention. Referring to FIGs. 4 and 5, the washing machine and dryer in accordance with an embodiment of the present invention includes a cabinet 100,

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a tub 200, a drum 250, a motor 130, a condensation duct 400, a drying duct 300, a heater 800 and a circulation fan 350.

The cabinet 100 forms an outer shell of the washing
5 machine and dryer and has a loading portion 110 formed on one side (e.g., a predetermined front side). The laundry is loaded/unloaded through the loading portion 110. A door 150 is installed near the loading portion 110 and rotates around a hinge 160 to open/close the loading portion 110.

10 The tub 200 is formed in a cylinder shape and

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installed in an inner side of the cabinet 100. An opening of the tub 200 is disposed corresponding to the loading portion 110. The tub 200 installed as above can be installed in parallel with a horizontal plane. In addition, for the sake of user's convenience, the tub 200 can be installed to be slant with respect to the horizontal plane such that its opening faces slightly upwardly.

Both ends of the tub 200 is supported by a plurality of springs 115 and a damper 116, which are connected to an outer face of the tub 200 and an inner face of the cabinet 100, respectively. The springs 115 and the damper 116 attenuate a vibration transferred from the drum 250.

The drum 250 is formed in a cylinder shape and disposed corresponding to the loading portion 110 of the cabinet 100 so that the drum 250 can be rotatable in an inner side of the cabinet 100. As shown in FIG. 5, a plurality of tumbling ribs 251 are protruded in an inner side of the drum 250. The tumbling ribs 251 functions to lift and drop the laundry while the drum 250 is rotated. Further, although not shown, a plurality of passage holes are formed in a circumference face of the drum 250. By way of the passage holes, washing water required for the washing operation or water dropped from the laundry in the dehydrating and drying operations moves between the drum

250 and the tub 200.

The motor 130 is installed to rotate the drum 250, and a drain pump 120 is installed to drain water from the inside of the tub 200 to the outside of the cabinet 100 via a drain hose 125.

In the washing machine and dryer in accordance with an embodiment of the present invention, the drying duct 300 is installed to have one end connected to the inside of the tub 200. As shown in FIG. 4, when viewed from the front of the tub 200, the drying duct 300 is installed in an upper portion of the tub 200 disposed to be eccentric toward one side from left and right central lines of the tub 200. A more detailed construction of the drying duct 300 installed as above will be described with reference to FIGs. 6 and 7.

In accordance with an embodiment of the present invention, as shown in FIG. 6, the drying duct 300 is divided into two bodies, i.e., a lower part 310 and an upper part 320

The lower part 310 is formed in a channel shape, in which an upper portion of the lower part 310 is opened and both ends thereof are closed. A discharge part 330 is downwardly extended in one body at one end of the lower part 310. Here, as shown in FIG. 6, the portion in which the discharge part 330 is extended, i.e., a connection portion between the lower part 310 and the discharge part

330 is formed roundly so as to reduce a fluid resistance and smoothly guide air.

As shown in FIG. 4, the discharge part 330 constructed as above can be formed extended downwardly in a vertical direction. Meanwhile, it is desirable to form the discharge part 330 to be slant toward one side thereof so as to smoothly guide air toward the inside of the tub 200, as shown in FIG. 6. At this time, when viewed from the front of the tub 200, the slant direction is formed in a direction in which air can be discharged in the rotation direction of the drum 250. If the discharge part 330 is formed to be slant as above, it is possible to reduce a turbulent air and a flowing noise, which are caused by a collision between air discharged from the discharge part 330 and other air existing within the rotating drum 250.

Meanwhile, disposed at an opposite side of the discharge part 330, the other end of the lower part 310 is widely formed roughly in a cylinder shape. A communication hole 311 is formed at a lower bottom portion of the other end of the lower part 310 so as to connect the drying duct 300 to the condensation duct 400. The circulation fan 350 is installed in the other end of the lower part 310 formed widely as above.

The upper part 320 is formed in a channel shape whose lower portion is opened. The upper part 320 is connected

to an upper portion of the lower part 310 to cover the opened upper portion of the lower part 310. At this time, the lower part 310 and the upper part 320 are connected to each other with a screw or a bolt and nut.

5 The drying duct 300 assembled with the separately manufactured lower and upper parts 310 and 320 is disposed at a position that is eccentric from the left and right center of the tub 200, and the drying duct 300 is installed in the upper portion of the tub 200. At this
10 time, the drying duct 300 enhances the space utilization of the cabinet in the washing machine and dryer, and the upper face of the drying duct 300 is installed in a lower portion than that of the tub 200 so as to reduce an entire height of the equipment. However, in case of designing
15 the above structure in consideration of a correlation between the condensation duct 400 and all other components, it is desirable to design the arrangement to have a small difference in height between the upper face of the tub 200 and that of the drying duct 300 if it is not easy to make
20 the above arrangement, as shown in FIG. 5.

Meanwhile, as shown in FIGs. 6 and 7, in order to reduce an interference between the drying duct 300 and the circumference surface of the tub 200 and enhance the space utilization, the drying duct 300 disposed eccentrically to
25 one side from the left and right center of the tub 200 is

formed to have a surface, which is adjacent to the circumference surface of the tub 200 (e.g., a surface adjacent to the circumference surface of the lower part 310), to be slant. At this time, for example, the slant surface 315 is formed to have a curved surface and it is desirable that the curved surface should have the same curvature as the outer surface of the tub 200.

A drying duct 300 in accordance with another embodiment of the present invention further includes a guidance part 340 and the guidance part 340 will be described with reference to FIG. 8. When the drying duct 300 in accordance with another embodiment of the present invention is described, the same description as FIGs. 6 and 7 will be omitted and only the description related to the guidance part 340 will be made below.

As shown in FIG. 8, the guidance part 340 is extended from one end portion of the discharge part 330. When viewed from the front of tub 200, it is desirable that the guidance part 340 be extended in a tangential direction with respect to the rotation direction of the drum 250. The reason is that the flowing resistance and the flowing noise can be effectively reduced because air is discharged via the guidance part 340 in the tangential direction with respect to the rotation direction of the drum 250 and thus its direction is more similar to the flowing direction of

air existing within the drum 250.

Meanwhile, the drying duct 300 of the washing machine and dryer in accordance with an embodiment of the present invention has both ends fixed and supported to the inner
5 surface of the cabinet 100 by a first fixing member 600 and a second fixing member 700. The first and second fixing members 600 and 700 will be described below in detail with reference to the drawings.

Referring to FIGs. 5, 8 and 9, the first fixing
10 member 600 fixes one end of the drying duct 300, in which the discharge part 330 is formed, to the inner side of the cabinet 100. The first fixing member 600 includes a plurality of brackets 620 and a fixing load 610. Here, a plurality of the brackets 620 are protruded at one portion
15 of the inner surface of the cabinet 100. As shown in FIG. 8, the fixing load 610 is protruded at one end of the drying duct 300 in which the discharge duct 330 is formed. As shown in FIG. 9, the loading load 610 is inserted between the plurality of brackets 620 and rigidly fixed to
20 the brackets 620 by a screw or a bolt and nut. Meanwhile, in order to reinforce the strength of the prolongedly protruded fixing load 610, a plurality of reinforcement ribs 615 are formed to connect a side surface of the fixing load 610 with an outer surface of the drying duct
25 300, as shown in FIG. 9.

Meanwhile, referring to FIGs. 5, 8 and 10, the second fixing member 700 includes a fixing projection 710 and a fixing angle 720. Here, the fixing projection 710 is protruded at the other end of the drying duct 300, which is disposed at an opposite side of the discharge part 330. The fixing angle 720 is protruded at other portions of the inner surface of the cabinet 100 such that the fixing projection 710 can be supported at a lower portion. As shown in FIGs. 10, the fixing projection 710 and the fixing angle 720 can be fixed by a bolt 730 and a nut 735 or can be fixed to each other by a screw and so on.

If both ends of the drying duct 300 is fixed and supported to the cabinet 100 by the first and second fixing members 600 and 700, a height of the washing machine and dryer can be reduced much more.

Meanwhile, in the washing machine and dryer in accordance with an embodiment of the present invention, a heater 800 is formed in an inner side of the drying duct 300.

As shown in FIGs. 4 and 5, the condensation duct 400 has one end connected to the drying duct 300 and the other end connected to a rear lower portion of the tub 200. A cooling-water supplying unit 160 is provided to supply a cooling water to an inside of the condensation duct 400 installed as above.

Hereinafter, a drying operation of the washing

machine and dryer constructed as above in accordance with an embodiment of the present invention will be described in detail, in which the wet laundry is loaded into the drum 250.

First, the wet laundry is loaded into the drum 250
5 and the motor 130 is operated to rotate the drum 250. Simultaneously, the circulation fan 350 is rotated and the heater 800 is operated.

Then, air existing within the drum 250 sequentially passes through the condensation duct 400 and the drying
10 duct 300 and is again introduced into the inside of the drum 250. At this time, air passing through the drying duct 300 is hotly heated by the heater 800 and the heated air dries the laundry loaded into the drum 250. In addition, moisture contained in the laundry is evaporated
15 in an internal air of the drum 250.

Moist air containing moisture evaporated from the laundry is introduced into the condensation duct 400. Meanwhile, the cooling-water supplying unit 160 keeps on supplying a cooling water to the inside of the
20 condensation duct 400. Thus, a heat exchange occurs between the moist air passing through the condensation duct 400 and the cooling water. At this time, moisture contained in air is condensed and removed, so that the air becomes dry.

25 The dried air passing through the condensation duct

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400 passes through the circulation fan 350 and then is introduced into the drying duct 300. The dried air introduced into the drying duct 300 is again heated hotly by the heater 800 and supplied to the drum 250.

5 Meanwhile, the drying duct 300 in accordance with an embodiment of the present invention has a structure in which the discharge part 330 is extended from the lower part 310 in one body. Therefore, even when vibration occurs in the rotation of the drum 250, air is not leaked
10 out and a loud flowing noise does not occur.

In addition, since air passing through the drying duct 300 of the present invention is exhausted in a tangential direction with respect to the rotation direction of the drum 250 while passing through the discharge part 330 and
15 the guidance part 340, it is possible to prevent a turbulent air and a flowing noise, which are caused by a collision with air existing within the rotating drum 250.

Meanwhile, the washing machine and dryer in accordance with an embodiment of the present invention repeatedly
20 performs the above procedures to dry the laundry loaded into the drum 250.

The washing machine and dryer in accordance with an embodiment of the

present invention has following advantages.

First, unlike the related art in which the drying duct is installed in the middle upper portion of the tub, the drying duct of an embodiment according to the present invention is installed to be eccentric from the left and right center, so that the internal space utilization of the cabinet is improved and the washing machine and dryer becomes compact. Meanwhile, it is much more effective if the structure in which the drying duct is installed to be eccentric toward one side of the tub is applied to a washing machine and dryer in which the tub and the drum are installed to be slant.

Second, since the surface of the drying duct, which is adjacent to the tub, is formed to be slant, it is possible to minimize interference between the drying duct and the tub and effectively guide the surface through which air flows into the drying duct.

Third, unlike the related art in which the drying duct is separately manufactured and assembled with three bodies, the drying duct of an embodiment according to the present invention is manufactured with two bodies, so that the number of parts and the number of assemble processes are reduced and the productivity is improved.

Fourth, since the discharge part and the lower part are formed in one body, it can fundamentally prevent the

damage and the air leakage, caused in the connection portion due to vibration, and the flowing noise caused by them. Accordingly, the life of the equipment is prolonged.

5 Fifth, since the discharge part is formed to be slant and the guidance part is extended in the tangential direction with respect to the rotation direction of the drum, collision between air exhausted into the drum via the drying duct and air existing within the drum can be minimized, so that the occurrence of the turbulent air and
10 the flowing noise is minimized.

While the present invention has been described and illustrated herein with reference to the preferred embodiments thereof, it will be apparent to those skilled in the art that various modifications and variations can
15 be made therein without departing from the spirit and scope of the invention. Thus, it is intended that the present invention covers the modifications and variations of this invention that come within the scope of the appended claims and their equivalents.

20 Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" and "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but

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not the exclusion of any other integer or step or group of integers or steps.

The reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or
5 any form of suggestion that that prior art forms part of the common general knowledge in Australia.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A washing machine and dryer comprising:

a cabinet;

a cylinder-shaped tub installed within the cabinet;

5 a drum rotatably installed within the tub;

a drying duct having one end connected to an inner side of the tub, and an upper portion arranged along a longitudinal direction of the tub, the upper portion being arranged to be eccentric towards one side of the tub when viewed from the front
10 of the tub;

a condensation duct having one end connected to the drying duct and the other end connected to an inner side of the tub;

a circulation fan for circulating air existing within the tub through the condensation duct and the drying duct; and

15 a heater for heating the air.

2. The washing machine and dryer of claim 1, wherein the upper portion of the drying duct is disposed below a top of the tub.

20

3. The washing machine and dryer of claim 1, wherein a surface of the drying duct, which is adjacent to the tub, is formed to be slant.

25 4. The washing machine and dryer of claim 3, wherein

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the adjacent surface of the drying duct is formed in a curved surface with the same curvature as an outer surface of the tub.

5 5. The washing machine and dryer of claim 1, wherein the drying duct includes:

 a lower part of which an upper portion is opened, in which a discharge part connected to a front side of the tub is downwardly extended from one end in one body and a
10 communication hole for connecting the lower part with the condensation duct is formed in a lower portion of the other end; and

 an upper part covering the opened upper portion of the lower part.

15

 6. The washing machine and dryer of claim 5, wherein the other end of the lower part in which the communication hole is formed is widely formed.

20 7. The washing machine and dryer of claim 6, wherein the circulation fan is inserted into the other end of the lower part.

 8. The washing machine and dryer of claim 5, wherein
25 a surface of the lower part, which is adjacent to the

outer surface of the tub, is formed to be slant.

9. The washing machine and dryer of claim 5, wherein the adjacent surface of the lower part is formed in a curved surface with the same curvature as an outer surface of the tub.

10. The washing machine and dryer of claim 5, wherein a portion in which the discharge part is extended from one end of the lower part is formed roundly so as to smoothly guide air.

11. The washing machine and dryer of claim 5, wherein the discharge part is extended to be slant from the lower part in a downward direction.

12. The washing machine and dryer of claim 11, wherein the discharge part is formed to be slant when viewed from the front of the tub so as to discharge air in a rotation direction of the drum.

13. The washing machine and dryer of claim 12, further comprising a guidance part extended from one end portion of the discharge part in a tangential direction with respect to the rotation direction of the tub when

viewed from the front of the tub so as to discharge air in the tangential direction with respect to the rotation direction of the drum.

5 14. The washing machine and dryer of claim 1, wherein the drying duct has both ends fixed and supported to an inner surface of the cabinet by a first fixing member and a second fixing member.

10 15. The washing machine and dryer of claim 14, wherein the first fixing member includes:

 a plurality of brackets protruded at one portion of an inner surface of the cabinet; and

 a fixing load protruded at one end portion of the
15 drying duct and fixedly inserted between the plurality of brackets.

 16. The washing machine and dryer of claim 15, wherein the brackets and the fixing load are connected to
20 each other by bolts and nuts.

 17. The washing machine and dryer of claim 15, further comprising a plurality of reinforcement ribs for connecting a side surface of the fixing load with the
25 drying duct, thereby reinforcing the fixing load.

18. The washing machine and dryer of claim 14,
wherein the second fixing member includes:

a fixing projection protruded at the other end of the
5 drying duct; and

a fixing angle protruded at other portion of an inner
surface of the cabinet, for supporting the fixing
projection at a lower portion.

10 19. The washing machine and dryer of claim 18,
wherein the fixing projection and the fixing angle are
fixedly connected with each other by a bolt and a nut.

20. The washing machine and dryer of claim 1, wherein
15 the heater is installed in an inside of the drying duct.

21. The washing machine and dryer of claim 1, wherein
the condensation duct has one end connected to the drying
duct and the other end connected to a rear lower portion
20 of the tub.

22. The washing machine and dryer of claim 1, wherein
the tub and the drum are installed in parallel with a
horizontal plane.

25 23. The washing machine and dryer of claim 1, wherein

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the tub and the drum are installed to be slant, such that openings of the tub and the drum are disposed at an upper portion with respect to a horizontal plane.

5 24. A washing machine and dryer comprising:

a cabinet;

a tub provided in the cabinet;

a drum rotatably provided in the tub; and

10 a duct connected to the tub for allowing an air in the tub to introduce therein and discharge to the tub in order to remove moisture in the air, the duct having an upper portion arranged along a longitudinal direction of the tub and to be eccentric with respect to an uppermost top of the tub.

15

25. The washing machine and dryer of claim 24, wherein the top surface of the duct is disposed below a top surface of the tub.

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26. The washing machine and dryer of claim 24, wherein the
duct has an upper portion disposed over the tub, and the top
surface of the tub is disposed between a top surface of the
upper portion and a bottom surface of the upper portion when
5 viewed from a side of the tub.

DATED this 5th day of April, 2005.

LG Electronics Inc.

by DAVIES COLLISON CAVE
10 Patent Attorneys for the Applicant

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FIG.1

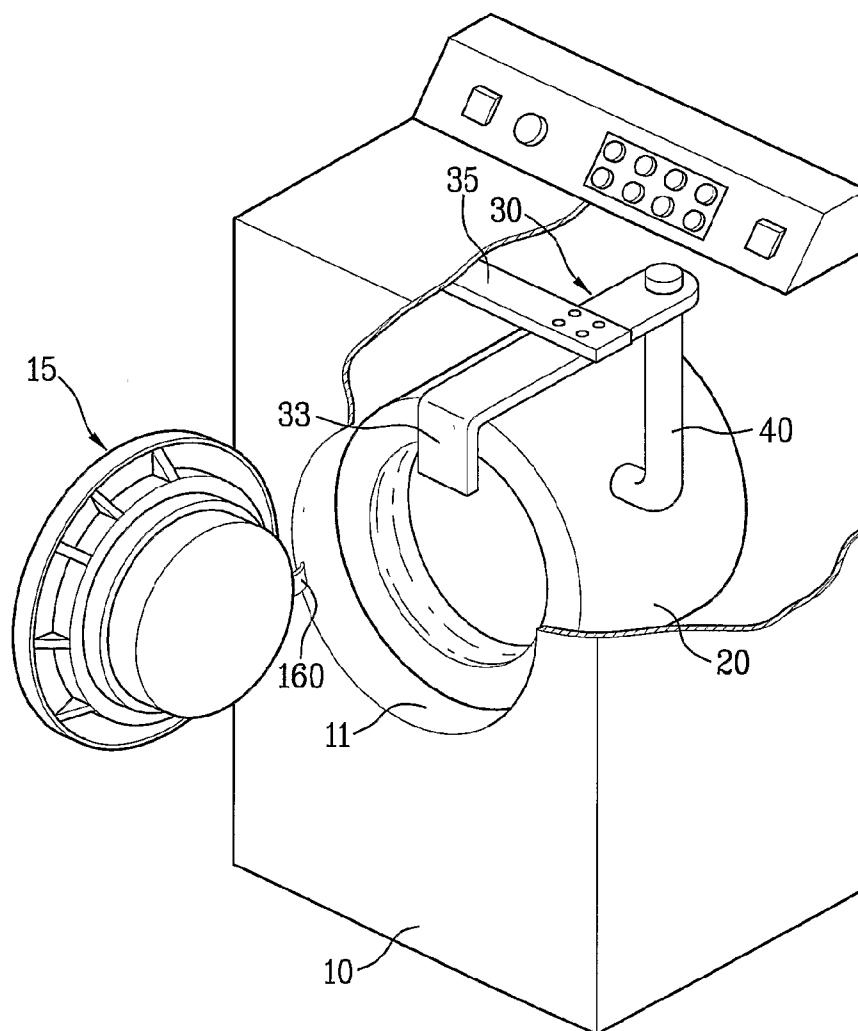


FIG.2

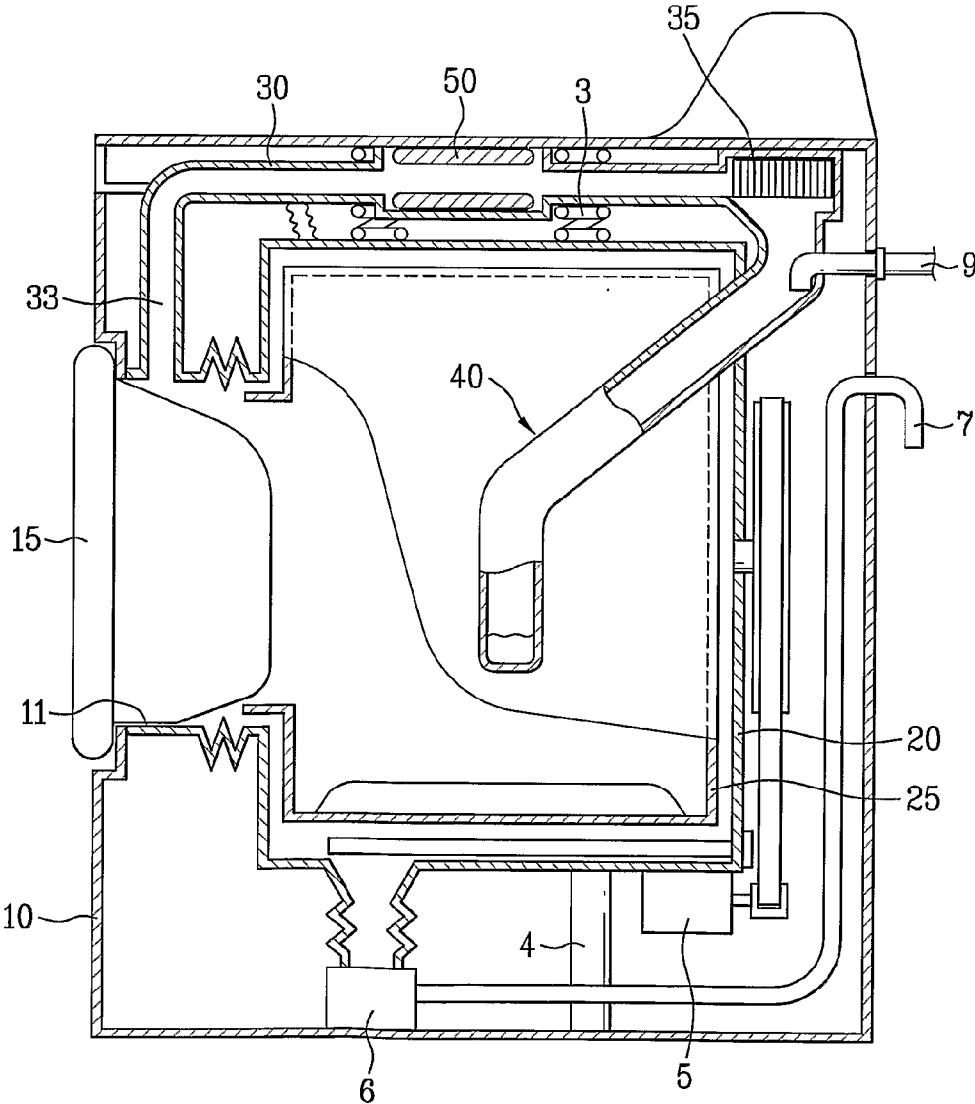
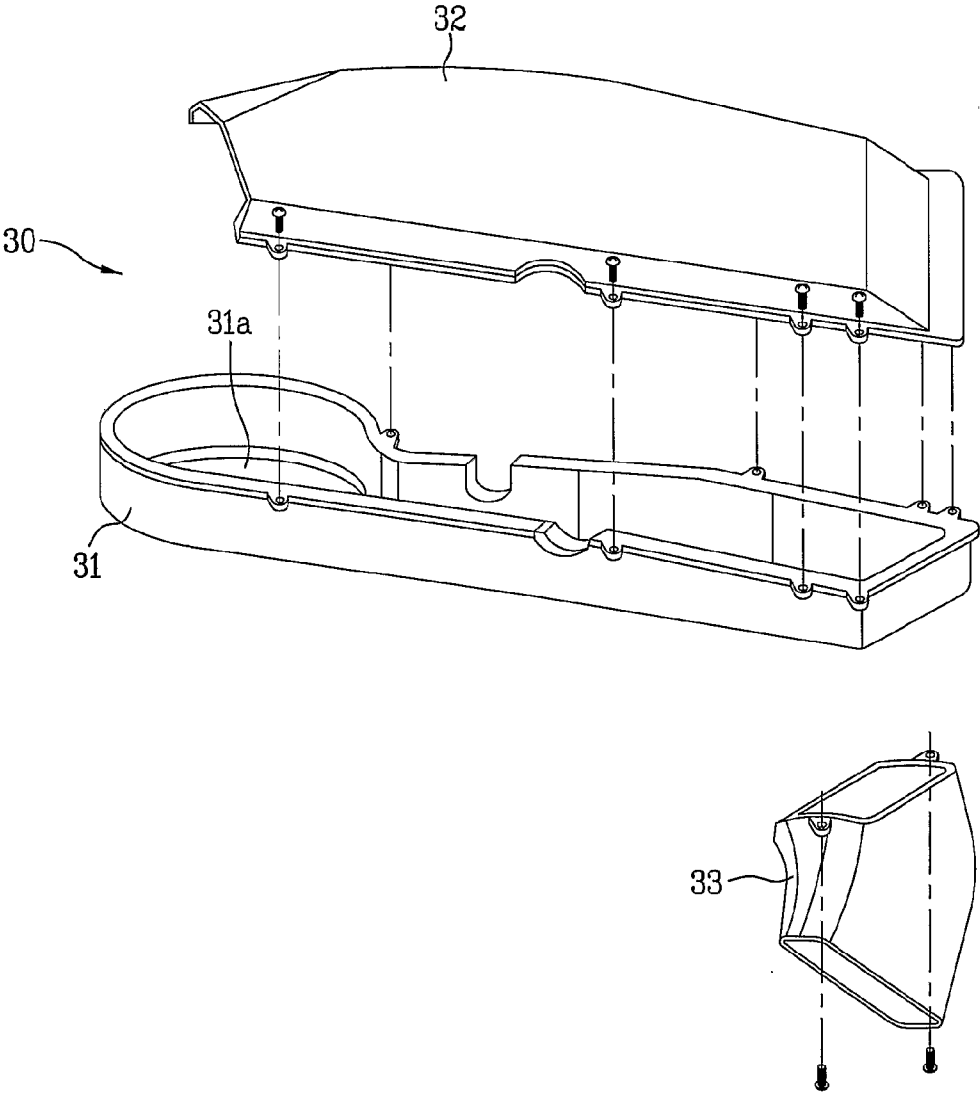


FIG.3



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FIG. 4

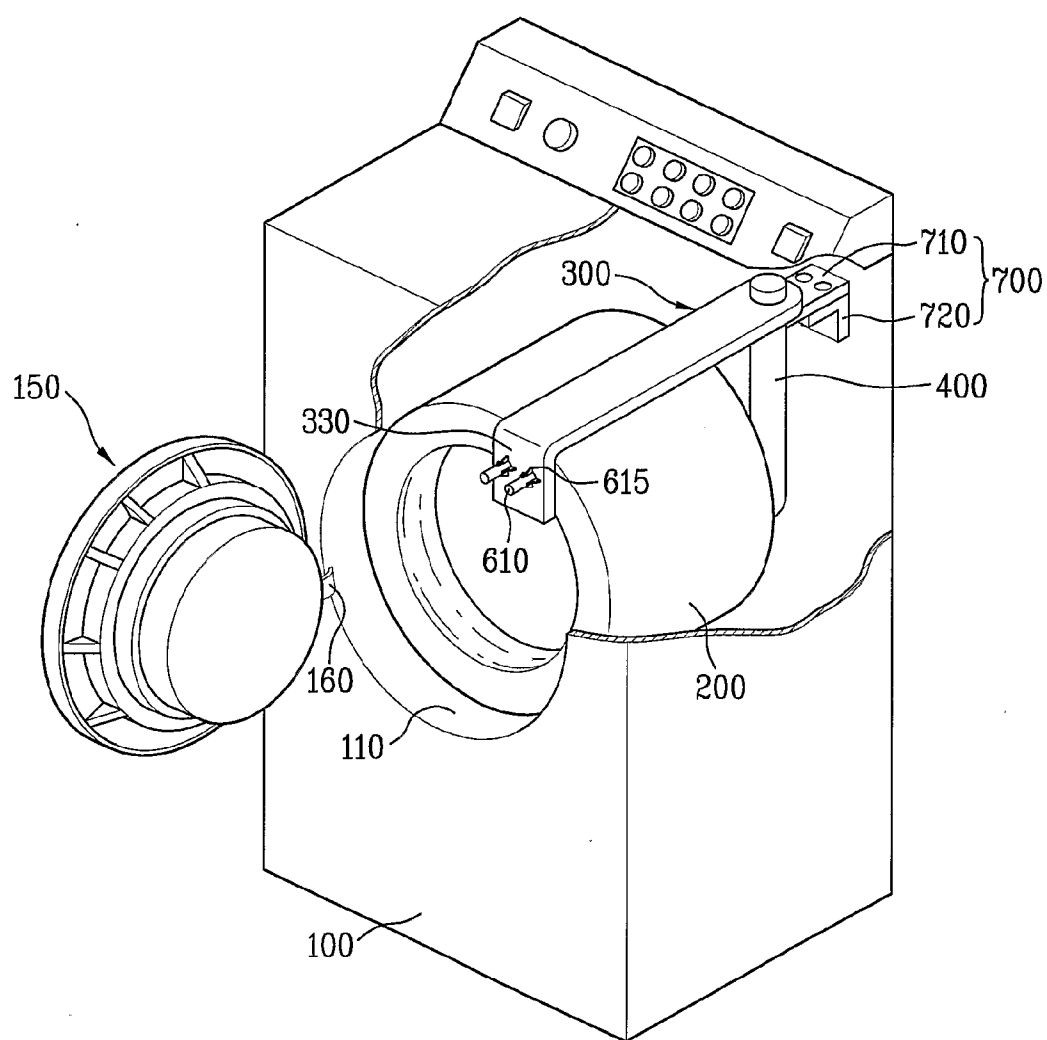


FIG.5

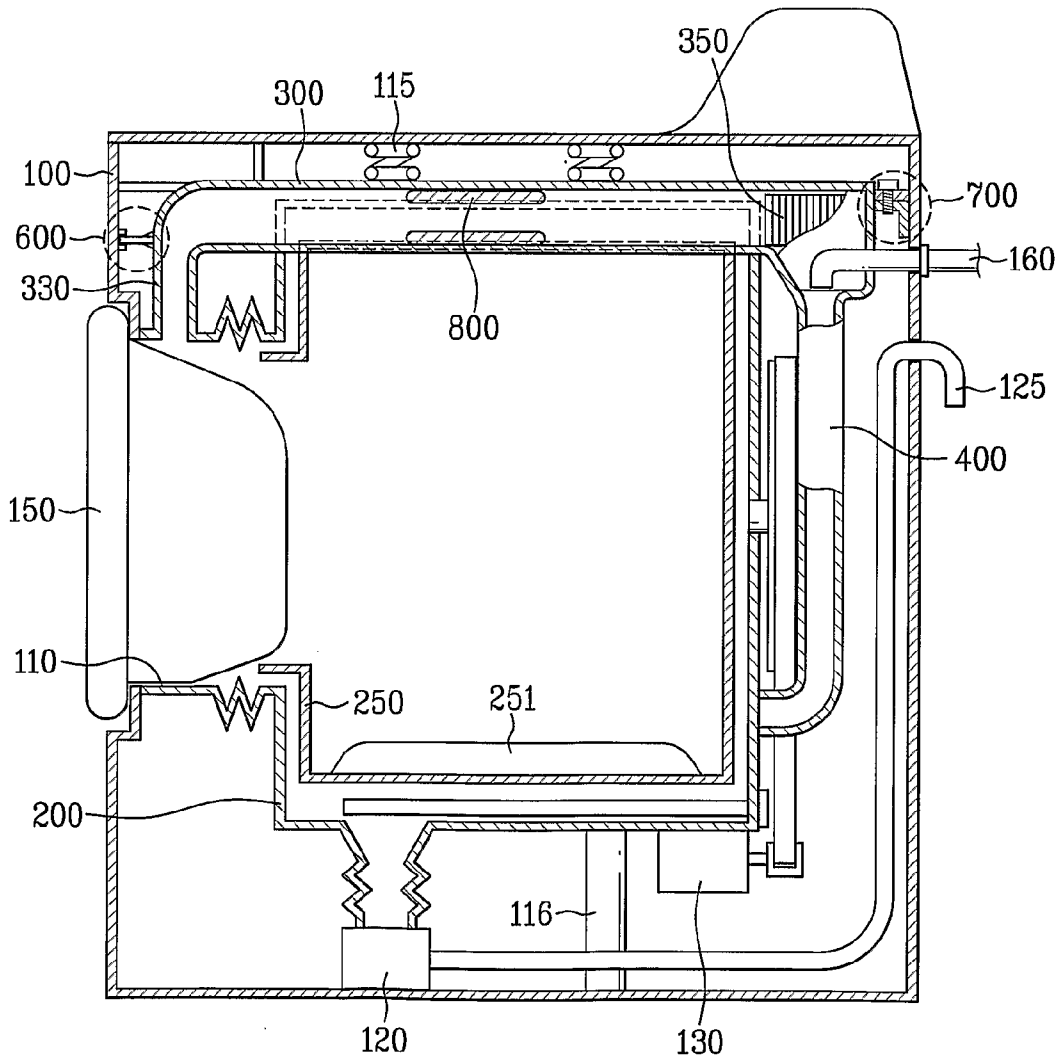
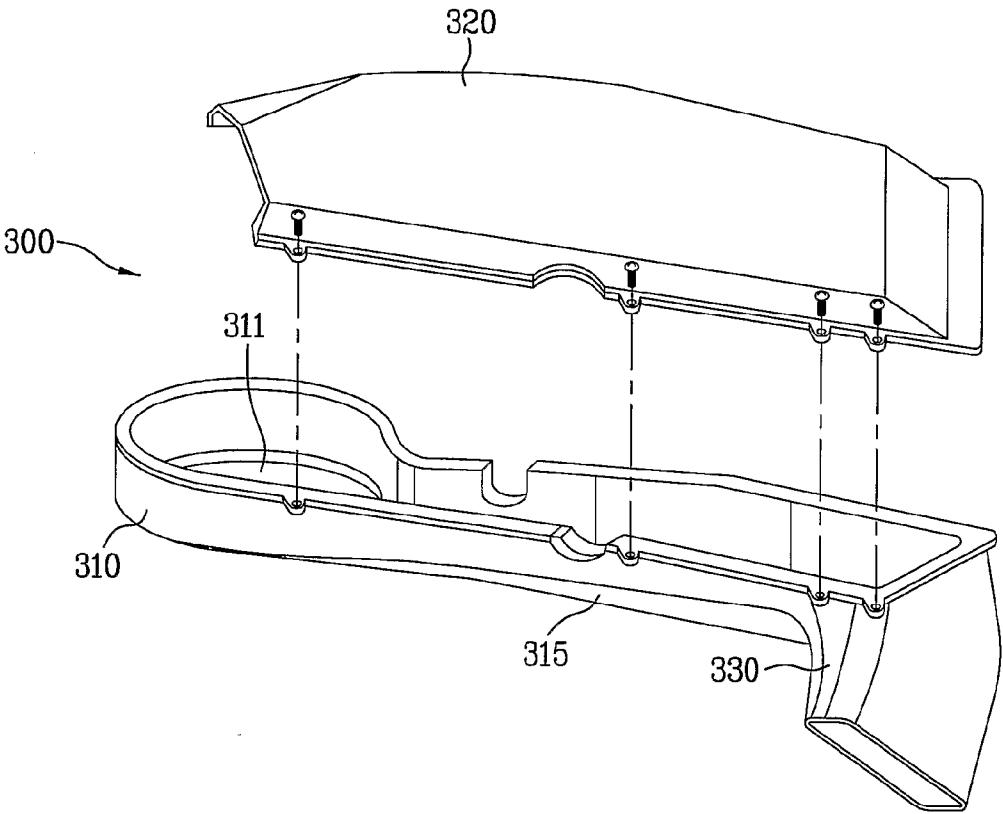


FIG. 6



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FIG. 7

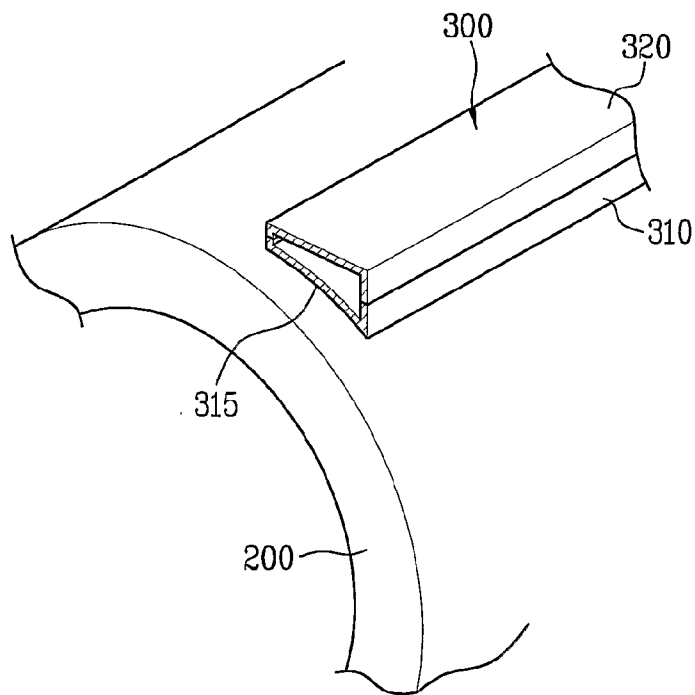


FIG. 8

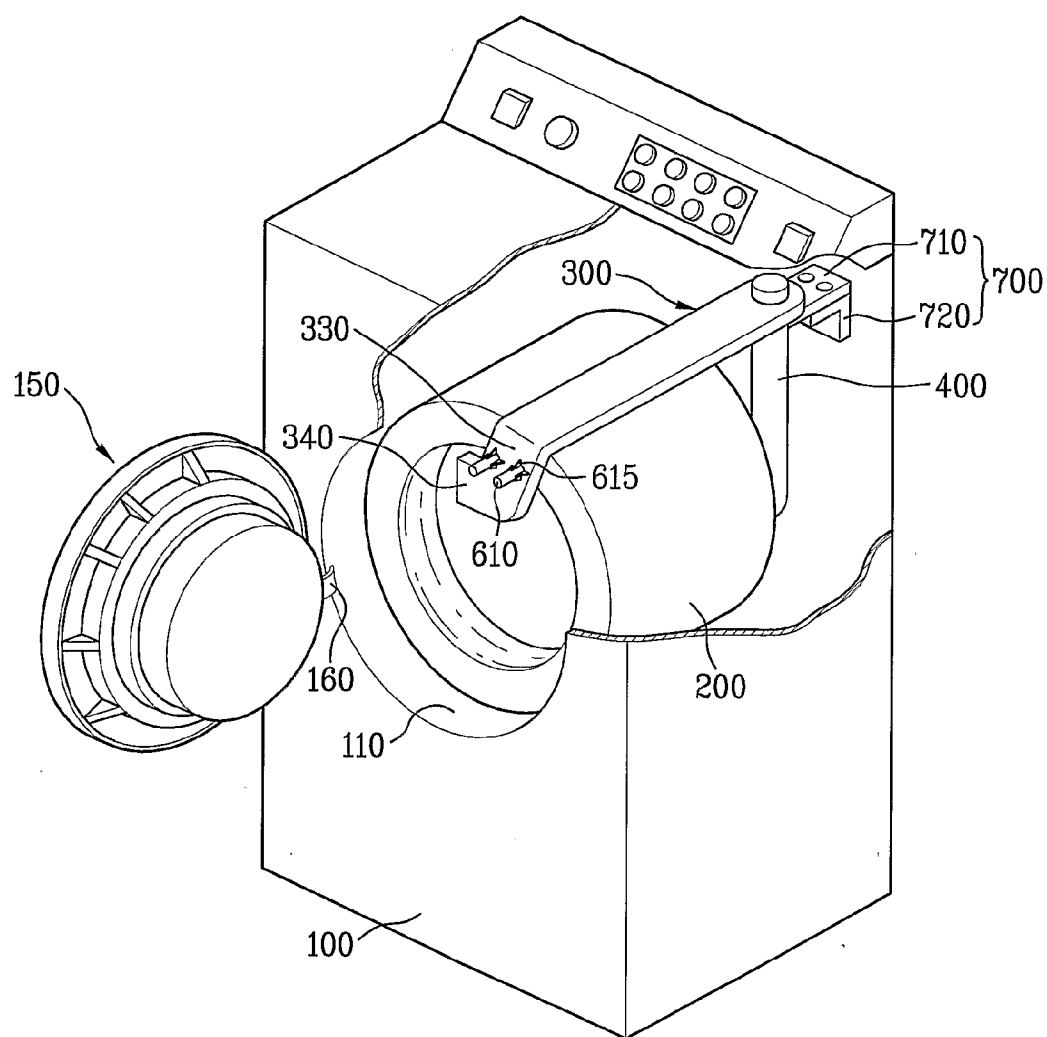


FIG. 9

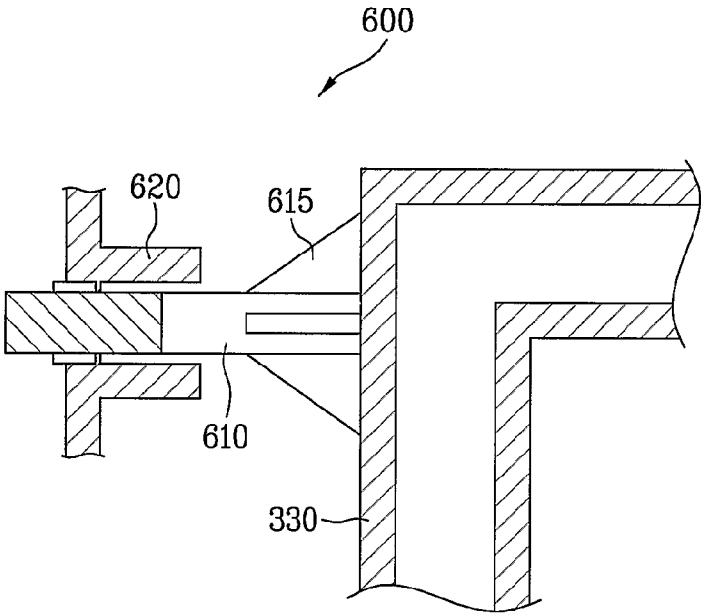


FIG. 10

