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(54) Washing/drying machine

(57) A washing machine includes a drum and a condensing duct that communicates with the drum. The condensing duct includes an air inlet unit, a condensing unit and an air outlet unit which are connected sequentially. A condensed water jetting member is provided inside the condensing unit and a flow blocking guide is provided inside the condensing unit. The condensing unit has a flow width larger than the air inlet unit and the air outlet unit.

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Description

[0001] The present invention relates to a washing and/or drying machine comprising a drum, a condensing duct in communication with the drum for the circulation of air therethrough and condensing means within the condensing duct to condense air therein.

[0002] One known type of washing machine is a drum type washing machine in which laundry is washed within a rotating washing tank within a drum. In addition to a washing function, known drum type washing machines are capable of performing various other functions such as rinsing/spinning, dehydrating and drying.

[0003] In the drying function of the drum type washing machine, heated air is supplied to the inside of a drum to heat the laundry therein which causes high temperature and humid air to be generated. The hot and humid air then undergoes a condensing process in order to optimise the drying efficiency of the drying process.

[0004] Most conventional drum type washing machines comprise a drum, a condensing duct in communication with the drum, and a condensed water jetting member provided inside the condensing duct. An elevation limiting projection may be mounted inside the condensing duct to prevent condensing water from being carried with internally circulating air back to the drum and a condensing water collecting projection may be provided on the elevation limiting projection to guide dispersion of the condensing water. Such a known drum type washing machine is disclosed in Korean Patent Application No. 10-2002-0054390.

[0005] However, the drum type washing machine as described above has a limited effectiveness in blocking the condensing water from passing back to the drum as it uses only the elevation limiting projection provided on the internal wall face of the condensing duct. Furthermore, the condensing water collecting projection is partially mounted on a side of the condensing duct and does not effectively scatter and disperse the condensing water as it flows down from the elevation limiting projection.

[0006] It is an object of the present invention to provide an improved washing and/or drying machine that overcomes the above disadvantages.

[0007] A washing and/or drying machine according to the present invention is characterised by a baffle plate in the duct to prevent condensate from escaping from the condensation duct in the flow of air passing through the duct.

[0008] In a preferred embodiment, the condensation duct includes an inlet at its lower section and an outlet at its upper section and a condensing section therebetween, the width of the condensing section being greater than the width of the inlet and of the outlet and preferably a condensation dispersion plate is provided across the condensation duct at the inlet comprising a plate with a hole therethrough such that air passing through the inlet can pass through the hole in the condensation plate to disperse water thereon.

[0009] Conveniently, the hole is formed in the centre of the condensation dispersion plate and preferably the width of the hole is greater than the width of the inlet.

[0010] In a preferred embodiment, the outlet is bent at an angle such that condensation in air flowing out of the outlet may contact the outlet surface and flow back into the condensation duct.

[0011] Advantageously, a first air flow collection section is formed in the condensing section adjacent to the outlet having a first condensation collection surface such that air flowing through the condensation duct may flow to the first air flow collection section and condensation within the air flow may impinge on the first condensation collection surface and flow back into the condensation duct. More preferably, a second air flow collection section is formed in the outlet having a second condensation collection surface such that air flowing through the condensation duct may flow to the second air flow collection section and condensation within the air flow may impinge on the second condensation collection surface and flow back into the condensation duct through the outlet.

[0012] A downwardly depending lip may be provided adjacent to the outlet to disrupt the flow of air passing through the condensation duct in order to collect condensation from the air flow so that it can flow back into the condensation duct.

[0013] Preferably, the condensing duct includes a flow blocking plate extending from at least one inside wall thereof around which air flowing through the condensing duct must pass and conveniently the flow blocking plate includes an upstanding projection along an edge thereof remote from the inside wall of the condensing duct to which the flow blocking plate is attached. In one embodiment, a space is provided between the flow blocking plate and the upstanding projection.

[0014] However, alternatively, a space is provided between at least one side of the upstanding projection and the adjacent internal wall of the condensing duct.

[0015] Conveniently, the flow blocking plate is angled downward away from the inside wall of the condensing duct and preferably the condensing duct is narrower at its lower section than at its upper section, the flow blocking plate being disposed in the upper section.

[0016] The present invention also provides a washing machine comprising: a drum, a condensing duct that communicates with the drum, comprising an air inlet unit, a condensing unit and an air outlet unit which are connected sequentially, a condensed water jetting member provided inside the condensing unit, a backward flow blocking guide provided inside the condensing unit and the condensing unit being provided with a flow width larger than the air inlet unit and the air outlet unit.

[0017] Preferably, a condensed water scattering unit in which the condensed water is collected and then scattered is formed on a lower portion of the condensing unit and a condensed water collecting unit to block backward flowing of the condensed water is formed on an upper portion of the condensing unit.

[0018] In a preferred embodiment, the condensing unit has an upper flow width larger than a lower flow width thereof, and the backward flow blocking guide is projected on an upper internal wall face of the condensing unit.

[0019] The washing machine may further comprise a backward flow blocking projection to block the condensed water formed on an edge portion of the backward water blocking guide from being flown backward by internally circulated air.

[0020] Conveniently, a space portion is formed between the backward flow blocking guide and the backward flow blocking projection.

[0021] The backward flow blocking guide and the backward flow blocking projection are preferably integrally connected, and a space portion may be formed between the backward flow blocking projection and an internal wall face of the condensing duct.

[0022] Preferably, condensed water scattering plate is provided which is supported by a lower internal wall face of the condensing unit to be positioned on an upper part of the condensed water scattering unit, having an air passing hole communicating with the air inlet unit in a centre region thereof.

[0023] The air passing hole is preferably sized larger than the air inlet unit.

[0024] The condensed water scattering plate is preferably arranged perpendicularly to a flowing direction of internally circulated air passing through the condensing duct.

[0025] Conveniently, the air outlet unit has a bent flow path.

[0026] A backward flow blocking projection may be formed on a boundary region of the condensed water collecting unit and the air outlet unit.

[0027] The condensing duct is preferably formed with an auxiliary condensed water collecting unit which is protruded to collect condensed water backwardly flowing after passing through the condensed water collecting unit.

[0028] The present invention also provides a washing machine comprising a drum; a condensing duct that communicates with the drum, a condensed water jetting member provided inside of the condensing duct and a backward flow blocking guide provided inside the condensing duct, wherein the condensing duct comprises at least one condensed water collecting unit which is protruded to collect condensed water backwardly flowing by internally circulated air.

[0029] Preferably, the condensed water collecting unit is provided on top of the backward flow blocking guide.

[0030] In a preferred embodiment of the present invention, the condensing duct comprises an air inlet unit through which internal air of the drum is flown, a condensing unit through which air flown through the air inlet unit passes, and an air outlet unit through which the air having passed through the condensing unit passes, further comprising an auxiliary condensed water collecting unit which is protruded to collect condensed water backwardly flowing after passing through the condensed water collecting unit.

[0031] The present invention further provides a dryer comprising a drum, a condensing duct that communicates with the drum, comprising an air inlet unit, a condensing unit and an air outlet unit which are connected sequentially, a condensed water jetting member provided inside the condensing unit, a backward flow blocking guide provided inside the condensing unit; and the condensing unit being provided with a flow width larger than the air inlet unit and the air outlet unit.

[0032] The condensing duct preferably comprises at least one condensed water collecting unit which is protruded to collect condensed water backwardly flown by internally circulated air.

[0033] Preferred embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view illustrating a washing machine according to the present invention;
Figure 2 is a sectional view illustrating the washing machine according to the present invention;
Figure 3 is a perspective view illustrating a condensing duct of the washing machine according to the present invention;
Figures 4A and 4B are sectional view partially illustrating two embodiments of a backward flow blocking guide and a backward flow blocking projection, provided inside the condensing duct of the washing machine according to the present invention;
Figure 5 is a perspective view illustrating a condensed water scattering plate provided inside the condensing duct of the washing machine according to the present invention; and
Figure 6 is a schematic diagram illustrating flows of internally circulated air passing through the condensing duct of the washing machine according to the present invention and the condensed water backward flown.

[0034] Referring to Figures 1 and 2, a drum type washing machine according to the present invention comprises a main casing 10, a cylindrical drum 20 mounted inside the main casing 10 and a cylindrical washing tank 22 rotatably mounted within the drum 20, having dehydrating/drainage holes formed through the curved outer wall. A driving motor 23 is provided below a lower part of the drum 20 to rotate the washing tank 22 forwardly or backwardly during washing, rinsing and dehydrating/spinning operations, and a door 24 is installed in an opening in the front of the main casing 10, for opening and closing the opening in the body casing 10.

[0035] Water supplying units are provided over the top of the drum 20 including water supplying valves 25, water supply tubes 26, a detergent dissolving unit 27, which supply water for washing and also dissolve the detergent in the supplied water.

[0036] A drying unit is also provided on the top of the drum 20 to dry the laundry after a dehydrating/spinning operation has been completed. The drying unit comprises a blowing fan 70 mounted on the top of the drum 20, a discharging duct 80 connecting the blowing fan 70 to an air inlet 21 a of the drum 20, a heater 60 mounted inside the discharge duct 80 and a condensing duct 30 connecting an air outlet 21b of the drum 20 to the blowing fan 70. A condensing water jetting member 40 is provided in the condensing duct 30 and a condensing water supply tube 42 is connected to the condensing water jetting member 40, supplying the condensing water to the condensing water jetting member 40. In use, air blown through the blowing fan 70 is heated by the heater 60 while passing through the discharging duct 80 and is then supplied to the inside of the drum 20 through the air inlet 21 a, thereby heating and drying the laundry.

[0037] The high temperature and high humidity air generated in the course of drying the laundry passes into the inside of the condensing duct 30 through the air outlet 21b of the drum 20, and water contained in the air is condensed by the condensing water jetted downward from the condensing water jetting member 40 as the air passes upwards to the blowing fan 70.

[0038] A draining unit is provided below the lower part of the drum 20 comprising a draining tube 28 and a draining pump 29 to drain the water to outside the washing machine.

[0039] A backward flow blocking guide 50 is provided inside the condensing duct 30 to block the condensing water jetted from the condensing water jetting member 40 from passing into the drum 20 in suspension in the fast moving circulated air passing upwards through the condensing duct 30. This backward flow may occur when the speed of the internally circulated air is increased in order to enhance the drying efficiency of the washing machine.

[0040] As illustrated in Figures 3 to 6, the condensing duct 30 of the washing machine comprises an air inlet unit 32 through which air from the drum 20 (refer to Figure 2) is supplied, a condensing unit 34 through which air supplied from the air inlet unit 32 passes, and an air outlet unit 36 through which the air having passed through the condensing unit 34 passes.

[0041] The condensing unit 34 has a flow passage area which is larger than that of the air inlet unit 32 and the air outlet unit 36. This allows the condensed water to be prevented from passing upwards with the air flow and back into the drum 20 and guides the dropping condensing water to be dispersed in the condensing unit. This is achieved by a condensing water scattering unit 34a formed on the bottom of the condensing unit 34 around the air inlet unit 32 which provides a ledge onto which the condensing water is collected and then dispersed in the upwardly flowing air and also by a condensing water collecting unit 34b formed at the top of the condensing unit 34 which provides an abutment surface against which the upwardly circulating air hits to prevent the condensing water passing into the drum 20 by suspension in the air flow.

[0042] In use, the above configuration causes the majority of the condensing water jetted through the condensing water jetting member 40 and dispersed in the internally circulated air to be blocked from passing into the drum 20 the backward flow blocking guide 50. The condensing water that does pass and is not blocked by the backward flow blocking guide 50 then collides with the condensing water collecting unit 34b formed at the top of the condensing duct 30, and is dropped downwards as the internally circulated air is consequently caused to change in its flow direction.

[0043] The shape of the condensing water collecting unit 34b may vary within the scope of the invention as necessary to enhance the efficiency of preventing the condensing water passing back into the drum 20, by extending a region where the condensing water collides with an internal wall face of the condensing unit 34 or the number of such regions or units formed may also be varied as appropriate.

[0044] The condensing unit 34 has an upper flow area that is larger than its lower flow area width so as to change the flow path of the internally circulated air and the backward flow blocking guide 50 projects from an upper internal wall face of the condensing unit 34.

[0045] The backward flow blocking guide 50 is sufficiently sized to cover the area of the air outlet unit 36 to minimize back flow of the condensing water jetted through the condensing water jetting member 40, and is installed on an incline, so as to allow the condensing water collected in the top face thereof to flow off it.

[0046] A backward flow blocking projection 52 is provided on the top of the backward flow blocking guide 50 to block the condensing water formed on an edge portion of the backward flow blocking guide 50 from passing back into the drum 20 with the internally circulated air as the air passes through the condensing duct 30.

[0047] The backward flow blocking projection 52 is sufficiently sized to cover the edge portion of the backward flow blocking guide 50, and its size and shape may also be varied within the scope of the invention to prevent the condensing water formed on the edge portion of the backward flow blocking guide 50 from passing into the drum with the internally circulated air passing through the condensing duct 30. The backward flow blocking projection 52 is preferably arranged perpendicularly to the backward flow blocking guide 50.

[0048] As illustrated in Figure 4A, a space 53a is formed between the backward flow blocking guide 50 and the backward flow blocking projection 52 to allow the condensing water that flows down the top face of the backward flow blocking guide 50 to drop to the lower part of the condensing duct 30 to pass therethrough. The space 53a is such that the condensing water collects in the edge portion of the backward flow blocking guide 50 until a predetermined amount of water is present at which point the weight of the water causes it to flow out through

the space 53a.

[0049] An alternative arrangement is illustrated in Figure 4B in which the backward flow blocking guide 50 and the backward flow blocking projection 52 may be constructed so that they are integrally connected along their adjacent edges and a space 53b is formed between the backward flow blocking projection 52 and the internal wall face of the condensing duct 30. This construction allows the condensing water that flows downwards along the top face of the backward flow blocking guide 50 to drop to the lower part of the condensing duct 30 through the space 53b. In such an embodiment, the backward flow blocking guide 50 is preferably installed on an incline in lateral and longitudinal directions to guide the flow of condensing water towards the pace 53b.

[0050] A condensed water scattering plate 90 is mounted on a lower internal wall face of the condensing unit 34 to enhance the scattering and dispersion of the condensed water in the upward air flow. An outer peripheral edge of the condensed water scattering plate 90 maintains a close contact with the internal wall face of the condensing unit 34 so that the condensing water jetted through the condensing water jetting member 40 can be collected on the ledge forming the top face of the plate 90.

[0051] An air passing hole 94 is formed in the central region of the condensing water scattering plate 90 and is located above the air inlet unit 32. The internally circulated air passes through the air inlet unit 32 and then through the air passing hole 94 wherein the condensing water collected on the condensing water scattering plate 90 is scattered and dispersed in the air flow. The condensing water scattered in this way is prevented from rising out of the condensing unit 34 by the backward flow blocking guide 50.

[0052] Preferably, the size of the air passing hole 94 of the condensing water scattering plate 90 is larger than the size of the air inlet unit 32 of the condensing duct 30, and it is installed perpendicularly to a flowing direction of air passing through the condensing duct 30.

[0053] The air outlet unit 36 has a bent flow path such that any condensing water which may have managed to reach the air outlet unit 36, not having been caught by the backward flow blocking guide 50 or the condensing water collecting unit 34b, can be caught at the bend in the air outlet unit 36 to prevent being recirculated back to the drum 20. As necessary, an auxiliary condensing water collecting unit 36b may be formed with the air outlet unit 36 on top of the condensing unit 34.

[0054] Another backward flow blocking projection 37 (see Figure 6) is formed on the boundary region of the auxiliary condensing water collecting unit 36b and the air outlet unit 36 to block the condensing water from passing into the air outlet unit 36 through the auxiliary condensed water collecting unit 36b.

[0055] A condensing operation of the washing machine as described above will be briefly described with reference to Figure 6.

[0056] The condensing water jetted through the condensed water jetting member 40 and scattered/dispersed by the internally circulated air is primarily blocked by the backward flow blocking guide 50 and the condensing water which does pass the backward flow blocking guide 50, is then blocked by the condensing water collecting unit 34b on the upper portion of the condensing unit 34.

[0057] Any remaining condensing water which reaches the air outlet unit 36, having managed to pass the condensing water collecting unit 34b, is finally blocked by the bent flow path of the air outlet unit 36 and the auxiliary condensing water collecting unit 36b formed on the bent flow path, thereby minimizing a possibility of the condensing water being able to pass back into the inside of the drum 20.

[0058] In Figure 6, solid-lined arrows represent a direction of the condensing water dispersed in the internally circulated air and dotted arrows represent a flowing direction of the internally circulated air.

[0059] Although the present invention has been described in connection with a drum type washing machine having a drying unit, by way of example, it may be applicable by those in the art to other apparatuses such as a dryer to dry the laundry. In this case, the drums of the drum type washing machine and of the dryer perform the same function, and other construction elements may be identical.

[0060] Further, it should be understood that the present invention is not limited to any exemplary embodiment described above and those skilled in the art may make various modifications and changes without departing from the scope of the invention defined by the claims attached hereto and their equivalents.

Claims

1. A washing and/or drying machine comprising a drum, a condensing duct in communication with the drum for the circulation of air therethrough and condensing means within the condensing duct to condense air therein, **characterised by** a baffle plate in the duct to prevent condensate from escaping from the condensation duct in the flow of air passing through the duct.

2. A washing and/or drying machine according to claim 1 wherein the condensation duct includes an inlet at its lower section and an outlet at its upper section and a condensing section therebetween, the width of the condensing section being greater than the width of the inlet and of the outlet.

3. A washing and/or drying machine according to claim 1 or claim 2 wherein a condensation dispersion plate is provided across the condensation duct at the inlet comprising a plate with a hole therethrough such that air passing through the inlet passes through the hole

in the condensation plate to disperse water thereon.

4. A washing and/or drying machine according to claim 2 or 3 wherein the outlet is bent at an angle such that condensation in air flowing out of the outlet contacts the outlet surface and flows back into the condensation duct.

5. A washing and/or drying machine according to claims 2, 3 or 4 wherein the baffle plate protrudes from a wall of the duct and extends into a path between the inlet and the outlet so as to redirect the flow of air around the baffle plate.

6. A washing and/or drying machine according to claim 3 wherein the baffle plate includes a lip upstanding from a free edge thereof remote from the wall of the duct.

7. A washing and/or drying machine according to claim 6 wherein a space is provided between the ends of the lip and the walls of the duct to allow condensate to flow from the baffle plate via said space.

8. A washing and/or drying machine according to any of claims 5 to 7 wherein the flow blocking plate is angled downwardly from the wall of the condensing duct.

9. A washing machine comprising a drum, a condensing duct that communicates with the drum, comprising an air inlet unit, a condensing unit and an air outlet unit which are connected sequentially, a condensed water jetting member provided inside the condensing unit, a backward flow blocking guide provided inside the condensing unit and the condensing unit has a flow width larger than the air inlet unit and the air outlet unit.

10. The washing machine as claimed in claim 9 wherein a condensed water scattering unit in which the condensed water is collected and then scattered is formed on a lower portion of the condensing unit and a condensed water collecting unit to block backward flowing of the condensed water is formed on an upper portion of the condensing unit.

11. The washing machine as claimed in claim 9 wherein the condensing unit has an upper flow width larger than a lower flow width thereof, and the backward flow blocking guide is projected on an upper internal wall face of the condensing unit.

12. The washing machine as claimed in claim 11 further comprising a backward flow blocking projection to block the condensed water formed on an edge portion of the backward flow blocking guide from being backward flown by internally circulated air.

13. The washing machine as claimed in claim 12 wherein a space portion is formed between the backward flow blocking guide and the backward flow blocking projection.

14. The washing machine as claimed in claim 12 wherein the backward flow blocking guide and the backward flow blocking projection are integrally connected, and a space portion is formed between the backward flow blocking projection and an internal wall face of the condensing duct.

15. The washing machine as claimed in claim 10 further comprising a condensed water scattering plate supported by a lower internal wall face of the condensing unit to be positioned on an upper part of the condensed water scattering unit, having an air passing hole communicating with the air inlet unit in a centre region thereof.

16. The washing machine as claimed in claim 15 wherein the air passing hole is sized larger than the air inlet unit.

17. The washing machine as claimed in claim 15 wherein the condensed water scattering plate is arranged perpendicularly to a flowing direction of internally circulated air passing through the condensing duct.

18. The washing machine as claimed in claim 9 wherein the air outlet unit has a bent flow path.

19. The washing machine as claimed in claim 10 wherein a backward flow blocking projection is formed on a boundary region of the condensed water collecting unit and the air outlet unit.

20. The washing machine as claimed in claim 10 wherein the condensing duct is formed with an auxiliary condensed water collecting unit which is protruded to collect condensed water backwardly flowing after passing through the condensed water collecting unit.

21. A washing machine comprising a drum, a condensing duct that communicates with the drum, a condensed water jetting member provided inside of the condensing duct and a backward flow blocking guide provided inside of the condensing duct wherein the condensing duct comprises at least one condensed water collecting unit which is protruded to collect condensed water backwardly flown by internally circulated air.

22. The washing machine as claimed in claim 21 wherein the condensed water collecting unit is provided on an upper portion of the backward flow blocking guide.

23. The washing machine as claimed in claim 21 wherein

the condensing duct comprises an air inlet unit through which internal air of the drum is flown, a condensing unit through which air flown through the air inlet unit passes, and an air outlet unit through which the air having passed through the condensing unit passes, further comprising an auxiliary condensed water collecting unit which is protruded to collect condensed water backwardly flowing after passing through the condensed water collecting unit.

24. A dryer comprising a drum, a condensing duct that communicates with the drum, comprising an air inlet unit, a condensing unit and an air outlet unit which are connected sequentially, a condensed water jetting member provided inside the condensing unit, a backward flow blocking guide provided inside the condensing unit and the condensing unit has a flow width larger than the air inlet unit and the air outlet unit.

25. The dryer as claimed in claim 24 wherein the condensing duct is formed with at least one condensed water collecting unit which is protruded to collect condensed water backwardly flown by internally circulated air.

FIG. 1

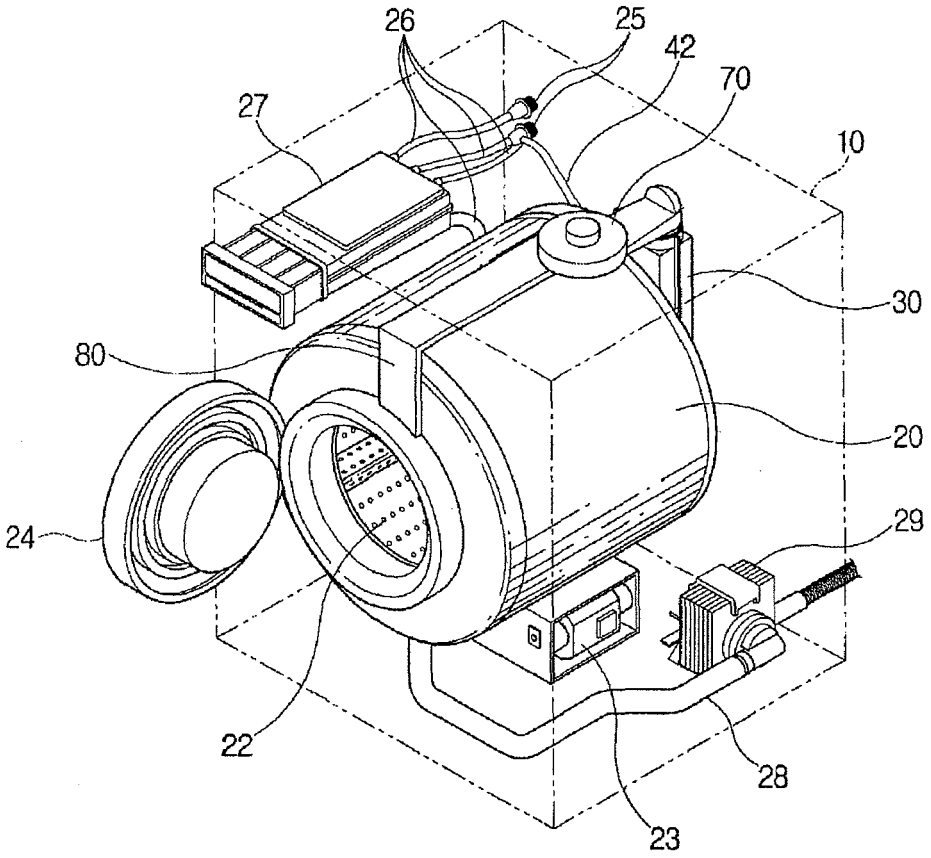

FIG. 2

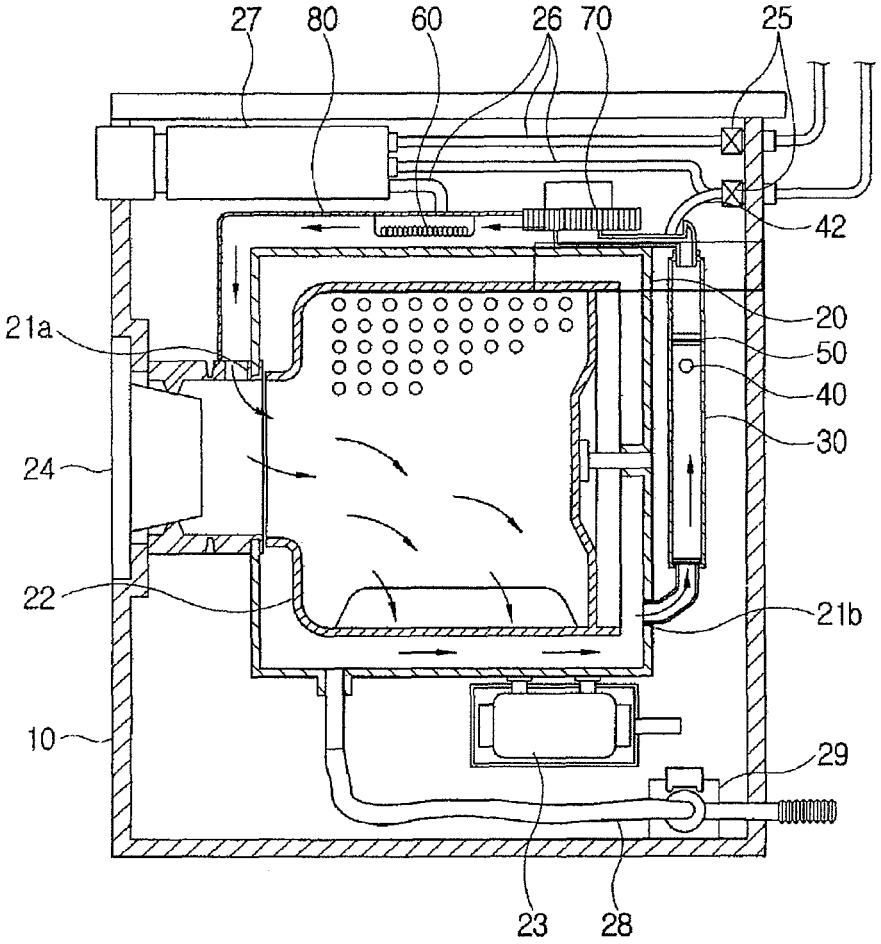

FIG. 3

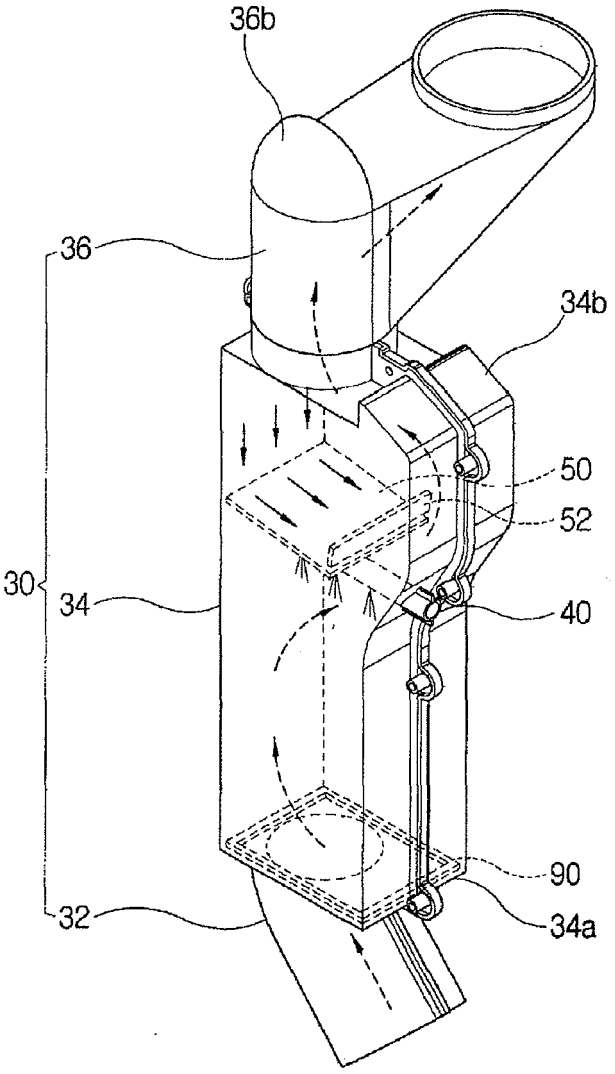

FIG. 4A

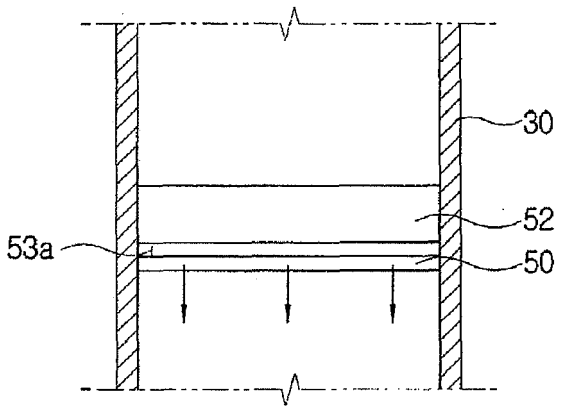

FIG. 4B

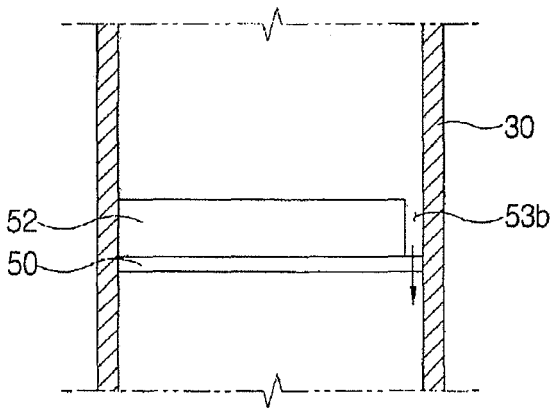

FIG. 5

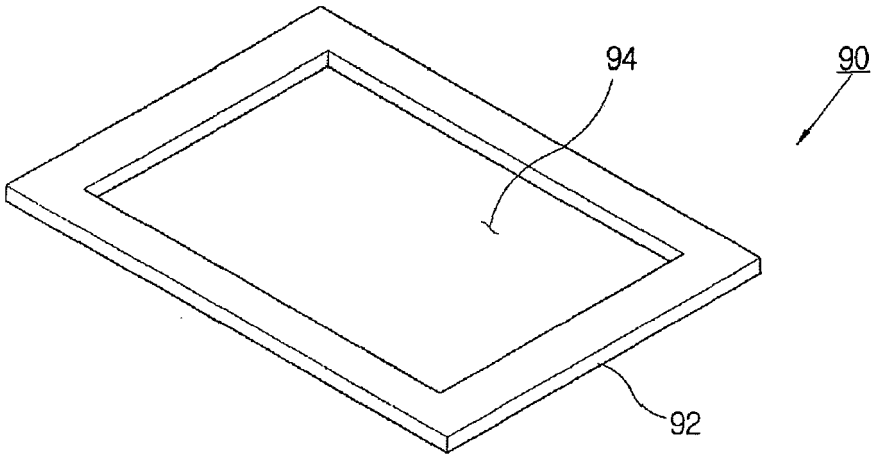

FIG. 6