



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
25.03.2009 Bulletin 2009/13

(51) Int Cl.:
D06F 58/04 ^(2006.01) **D06F 39/00** ^(2006.01)

(21) Application number: **08011437.4**

(22) Date of filing: **24.06.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

- **Choi, Chul Jin**
Changwon-si
Gyeongsangnam-do 641-71 (KR)
- **Yoon, Ju Han**
Changwon-si
Gyeongsangnam-do 641-71 (KR)
- **Lee, Tae Hee**
Changwon-si
Gyeongsangnam-do 641-71 (KR)

(30) Priority: **21.09.2007 KR 20070096565**

(71) Applicant: **LG Electronics Inc.**
Seoul 150-721 (KR)

(72) Inventors:
• **Bae, Sang Hun**
Changwon-si
Gyeongsangnam-do 641-71 (KR)

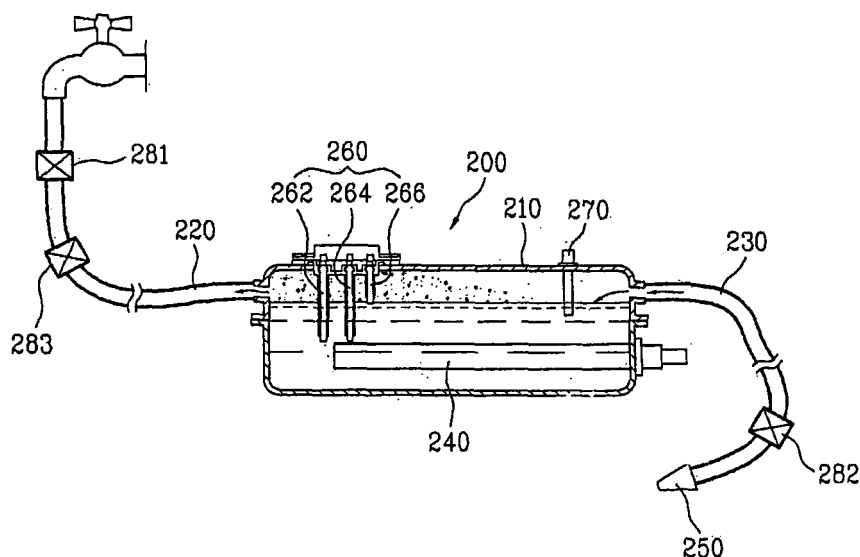
(74) Representative: **Urner, Peter**
ter Meer Steinmeister & Partner GbR
Mauerkircherstrasse 45
D-81679 München (DE)

(54) **Laundry machine**

(57) A laundry machine is disclosed. The laundry machine includes a drum in which laundry is put, a steam generator to generate steam, a water supply line connected to the steam generator, a steam line connected

to the steam generator, and a valve placed in the steam line, wherein the valve is controlled to block the steam line to prevent water from flowing from the steam generator to the drum.

Fig. 3



Description

BACKGROUND

Field of the disclosure

[0001] this application claims the benefit of Korean Patent Application No. 10-2007-0096565, filed on September 21 2007, which is hereby incorporated by reference in its entirety.

[0002] The disclosure relates to a laundry machine to wash or dry laundry. The laundry machine may be a washing machine, a dryer, a drying and washing machine or the like. Recently, the laundry machine includes a steam generator. The disclosure relates more particularly to a laundry machine having a steam generator.

Discussion of the Related Art

[0003] Generally, there are a pulsator type washing machine and a drum washing machine. There is also a drying and washing machine which can perform both washing and drying function.

[0004] A dryer may be an electric home appliance which generally dries washed laundry, mainly, clothes using high-temperature air. The dryer generally includes a drum which accommodates the laundry therein, a driving device which drives the drum, a heating unit which heats air introduced into the drum, a blower unit to make the heated air to flow into the drum, and the like.

[0005] Clothes dryers may be categorized based on a method of heating air. For example, a dryer may be categorized by its heating means into electric type dryers and gas type dryers. In the electric dryer, air is heated by using ohmic heating. In the gas type dryer, air is heated by heat generated by gas exhaustion. Dryers may be categorized into condensation type (circulation type) dryers and exhaustion type dryers. In the condensation type dryer, air is heat exchanged with laundry in the drum and the heat exchanged humid air is circulated, not discharged outside. The air is heat exchanged in a condenser and the condensed water is discharged outside. In the exhaustion type dryer, air is heat exchanged with laundry in the drum and the heat exchanged humid air is exhausted outside directly. Furthermore, dryers may be categorized based on a method of loading laundry into top loading type dryers and front loading type dryers. In the top loading type dryer, laundry is loaded through a top of the dryer. In the front loading type dryer, laundry is loaded through a front of the dryer.

[0006] Recently, steam dryers for drying laundry and using steam are being released. Steam is used to release or remove wrinkles from the laundry.

SUMMARY

[0007] When water is supplied into the steam generator over a required level, water may overflow through a

steam line. Particularly, when water is supplied into the steam generator through a faucet and a water supply valve, if the water supply valve is out of order, water can continuously flow into the steam generator, thereby causing overflow. In case of a dryer, overflowing water may be introduced into the drum and wet the laundry. Further, since the dryer generally does not have a drain line for discharging water out of a drum or a tub, differently from the washing machine, the problem becomes worse.

[0008] Also in the washing machine, water can overflow the steam generator due to an error in the water supply to flow into the tub, thereby causing a problem.

[0009] The present invention is related to a laundry machine that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0010] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or can be learned from practice of the invention. The objectives and other advantages of the invention can be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0011] An embodiment of the present invention comprises a drum in which laundry is put; a steam generator to generate steam; a water supply line connected to the steam generator; a steam line connected to the steam generator; and a valve placed in the steam line, wherein the valve is controlled to block overflowing water from the steam generator.

[0012] In the above embodiment, water can be prevented from flowing to the drum through the steam line.

[0013] The water supply line can be connected to a faucet and a water supply valve. In this case, even though water is over supplied to the steam generator due to a malfunction of the water supply valve or the like, the water does not flow into the drum by the valve installed on the steam line. However, when water is intended to be supplied to the drum through the steam line after passing through the steam generator, the valve installed on the steam line can be controlled according to the conditions.

[0014] The valve installed on the steam line can be controlled according to a temperature of the steam generator. In this case, the temperature of the steam generator can be one of a temperature of a body of the steam generator, a temperature of atmosphere in the steam generator, and a temperature of water in the steam generator.

[0015] When the temperature of the steam generator is equal to or larger than a preset temperature, the valve installed on the steam line can be controlled to be kept open. For example, the valve installed on the steam line which maintains a closed state can be controlled to be opened when the temperature of the steam generator reaches 100 °C. When water is over supplied to the steam generator and overflows the steam generator, the tem-

perature of the steam generator would be lower than the preset temperature. In this case, since the valve installed on the steam line is in a closed state, overflowing water does not flow into the drum through the steam line.

[0016] Meanwhile, the valve installed on the steam line can be controlled to be opened after a predetermined period of time after the heater of the steam generator is turned on, instead of being controlled according to a temperature as described above.

[0017] In this case, the valve installed on the steam line can be controlled to be closed at the same time when the water supply valve is closed as water supply into the steam generator is completed. Even though the water supply valve is not closed due to a malfunction, water is not introduced into the drum by being blocked by the valve installed on the steam line.

[0018] Further, the valve installed on the steam line can be controlled according to an amount of water to be supplied into the steam generator. For example, if the amount of water supplied into the steam generator is equal to or larger than a preset amount, the valve is controlled to be closed. In this case, the preset amount can be set to be equal to or larger than an allowable water supply amount of the steam generator. Further, the preset amount can be set to be larger than a set amount by which water is supplied into the steam generator.

[0019] The laundry machine can further include an instrument to measure an amount of water supplied into the steam generator. The instrument can be any device capable of detecting an amount of water supplied into the steam generator.

[0020] For example, the instrument can include an impeller installed on the water supply line and a detection unit to detect the number of rotation of the impeller. Accordingly, if the impeller rotates by a preset number or more, the valve installed on the steam line is closed.

[0021] Further, the instrument can include a water level sensor which senses a water level in the steam generator. The water level sensor senses a maximum allowable water level of the steam generator. If the maximum allowable water level is sensed by the water level sensor, the valve installed on the steam line can be controlled to be closed. In this case, the maximum allowable water level can be determined as a water level over which water is supplied to cause overflow through the steam line.

[0022] The water level sensor can be configured to sense another preset level in the steam generator. For example, the water level sensor can be configured to sense a first water level, a second water level and the maximum allowable water level. If a water level reaches the second water level, the water supply valve is controlled to be closed. The first water level is provided to prevent the heater installed in the steam generator from being exposed above the surface of the water. For example, if a water level in the steam generator gradually decreases and then reaches the first water level, the heater can be controlled to be turned off in order to prevent from being overheated.

[0023] Further, the valve installed on the steam line can be controlled according to time. For example, the valve can be controlled to be closed within a preset period of time after the water supply valve is closed as water supply into the steam generator is completed and, then, opened after a preset period of time.

[0024] According to the present invention, even though water is over-supplied to the steam generator, the water can be prevented from flowing into the drum. Particularly, even when there is an error in the water supply, the water can be prevented from overflowing the steam generator and flowing into the drum.

[0025] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

[0027] FIG. 1 illustrates a laundry machine according to an embodiment of the present invention;

[0028] FIG. 2 illustrates a cross-sectional view of the laundry machine shown in FIG. 1; and

[0029] FIG. 3 illustrates an enlarged configuration view showing essential portions of the laundry machine shown in FIG. 1.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

[0030] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0031] Hereinafter, a laundry machine according to an embodiment of the present invention will be described with reference to FIGs. 1 to 3. For convenience, a top-loading, electric, condensation dryer is explained as an example, but the present invention is not limited thereto.

[0032] A rotatable drum 20, a motor 70 which drives the drum 20 and a belt 68 are installed inside a cabinet 10 forming an external appearance of the dryer. Further, a heater 90 (hereinafter, simply referred to as a "hot air heater") which heats air to produce high-temperature air (hereinafter, referred to as "hot air") and a hot air supply duct 44 which supplies hot air produced in the hot air heater 90 to the drum 20 are installed at specific positions of the cabinet 10. Further, an exhaust duct 80 which discharges humid air that has been heat-exchanged with

laundry in the drum 20, and a blower unit 60 which sucks the humid air are installed in the cabinet 10. Meanwhile, a steam generator 200 is installed at a specific position of the cabinet 10 to generate high-temperature steam. Although an indirect drive type dryer which rotates the drum 20 using the motor 70 and the belt 68 is shown and described in this embodiment, the present invention is not limited thereto. That is, a direct drive type dryer which directly rotates the drum 20 by a motor directly connected to the rear surface of the drum 20 can be applied to the present invention.

[0033] The respective components are described in detail below.

[0034] The cabinet 10 forming an external appearance of the dryer includes a base 12 forming a bottom surface, a pair of side covers 14 vertically installed on the base 12, a front cover 16 and a rear cover 18 respectively installed on the front and rear surfaces of the side covers 14, and a top cover 17 positioned at an upper portion of the side covers 14. A control panel 19 having various control switches and the like is generally disposed on the top cover 17 or the front cover 16. A door 164 is installed on the front cover 16. The rear cover 18 includes a suction port 182 which introduces outside air and an exhaust hole 184 serving a final passage to discharge air in the drum 20 to the outside.

[0035] An inner space of the drum 20 serves as a drying chamber to perform a drying operation, and the drum 20 has a lift 22 therein.

[0036] Meanwhile, a front supporter 30 and a rear supporter 40 are installed between the drum 20 and the cabinet 10 (the front cover 16 and the rear cover 18). The drum 20 is rotatably installed between the front supporter 30 and the rear supporter 40. Sealing members (not shown) are installed between the front supporter 30 and the drum 20 and between the rear supporter 40 and the drum 20, respectively, to prevent leakage. That is, the front supporter 30 and the rear supporter 40 close the front and rear surfaces of the drum 20 to form the drying chamber and serve to support a front end and a rear end of the drum 20.

[0037] An opening is formed on the front supporter 30 such that the drum 20 communicates with the outside of the dryer. The opening is selectively opened and closed by the door 164. Further, a lint duct 50 serving as a passage for discharging air of the drum 20 to the outside is connected to the front supporter 30, and a lint filter 52 is installed in the lint duct 50. The lint duct 50 is connected to one side of the blower unit 60, and the other side of the blower unit 60 is connected to the exhaust duct 80. The exhaust duct 80 communicates with the exhaust hole 184 disposed on the rear cover 18. Accordingly, when the blower unit 60 is operated, air in the drum 20 is discharged to the outside through the lint duct 50, the exhaust duct 80 and the exhaust hole 184. In this case, foreign matter such as nap is filtered by the lint filter 52. Generally, the blower unit 60 includes a blower 62 and a blower housing 64, and the blower 62 is connected to

and driven by the motor 70 for driving the drum 20.

[0038] An opening 42 generally having a number of through holes is formed on the rear supporter 40. The opening 42 is connected to the hot air supply duct 44. The hot air supply duct 44 communicates with the drum 20 to serve as a passage for supplying hot air to the drum 20. Accordingly, the hot air heater 90 is installed at a specific position of the hot air supply duct 44.

[0039] Meanwhile, the steam generator 200 is installed at a specific position of the cabinet 10 to generate steam and supply the steam into the drum 20. The steam generator 200 is described in detail below with reference to FIG. 3.

[0040] The steam generator 200 includes a water tank 210 for accommodating water therein, a heater 240 mounted in the water tank 210, a water level sensor 260 which measures a water level of the steam generator 200, and a temperature sensor 270 which measures a temperature of the steam generator 200. The water level sensor 260 includes a common electrode 262, a low water level electrode 264 and a high water level electrode 266. The water level sensor 260 detects a high water level and a low water level according to whether the common electrode 262 is electrically connected to the high water level electrode 266 or whether the common electrode is electrically connected to the low water level electrode 264.

[0041] A water supply hose 220 for supplying water is connected to one side of the steam generator 200 and a steam hose 230 for discharging steam is connected to the other side of the steam generator 200. It is preferable to provide a nozzle 250 at a leading end of the steam hose 230. A faucet and a water supply valve 281 are connected to one end of the water supply hose 220. A leading end portion of the steam hose 230 or the nozzle 250, that is, a steam discharge port, is disposed at a specific position of the drum 20 to spray steam into the drum 20. Although the nozzle 250 is disposed at the front of the drum 20 in this embodiment, the nozzle 250 can be installed on the rear supporter 40.

[0042] Further, a valve 282 is installed on the steam hose 230. A controller opens the water supply valve 282 to supply water to the steam generator 200. When it is determined that the water level in the steam generator 200 reaches a high water level based on a signal of the water level sensor 260, the controller closes the water supply valve 282. In this case, the valve 282 installed on the steam hose is also closed.

[0043] Then, the controller turns on the heater 240 to heat water in the steam generator 200. As time goes by, when an inner temperature of the steam generator 200 increases and reaches a preset temperature, the valve 282 installed on the steam hose 230 is opened. The steam generated in the steam generator 200 is supplied to the drum 20 through the steam hose 230.

[0044] Meanwhile, a flowmeter can be installed on the water supply hose to detect an amount of water supplied into the steam generator. Generally, the flowmeter is a

conventional well-known impeller flowmeter. The amount of water supplied through the water supply hose is detected using the rotation number of the impeller. The controller receives a signal of the flowmeter and closes the water supply valve when the amount of water reaches a preset amount.

[0045] Further, the water level sensor can be used. For example, if a high water level is sensed by a high water level terminal of the water level sensor, the valve installed on the steam hose is closed. In another way, a terminal capable of sensing a water level higher than the water level sensed by the high water level terminal (so-called 'critical water level terminal') can be further provided and used. If a critical water level is sensed by the critical water level terminal, the valve of the steam hose is closed. In this case, the critical water level can be set as a maximum allowable water level of the steam generator.

[0046] The present invention relates to a laundry machine to wash or dry the laundry. According to the present invention, even though water is excessively supplied to the steam generator and overflow is generated, it is possible to prevent the water from flowing into the drum. Particularly, even when there is an error in the water supply, it is possible to prevent water from overflowing the steam generator and flowing into the drum.

[0047] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Claims

1. A laundry machine comprising:

a drum in which laundry is placed;
a steam generator to generate steam;
a water supply line through which water is supplied to the steam generator;
a steam line through which the generated steam is supplied to the drum; and
a valve positioned in the steam line, wherein the valve is controlled between an open and closed position such that when the valve is in the closed position, the valve prevents communication between the steam generator and the drum.

2. The laundry machine of claim 1, wherein the water supply line is connected to a water supply valve and the water supply valve is connected to a faucet.

3. The laundry machine of claim 1, wherein the valve is controlled based on a temperature of the steam generator.

4. The laundry machine of claim 3, wherein the valve is controlled to the open position when the temperature reaches a preset temperature.

5. The laundry machine of claim 4, wherein the valve is controlled to the closed position when an amount of water supplied to the steam generator reaches a preset amount.

6. The laundry machine of claim 2, wherein the valve is controlled to the closed position within a preset period of time after the water supply valve is closed and the valve is controlled to the open position when a temperature of the steam generator reaches a preset temperature.

7. The laundry machine of claim 1, wherein the valve is controlled based on an amount of water supplied to the steam generator.

8. The laundry machine of claim 7, further comprising an instrument to measure an amount of water flowing through the water supply line.

9. The laundry machine of claim 8, wherein the instrument includes an impeller flowmeter.

10. The laundry machine of claim 9, wherein the valve is controlled to the closed position when a rotation number of an impeller of the impeller flowmeter reaches a preset number.

11. The laundry machine of claim 8, wherein the instrument comprises a sensor to sense a water level of the steam generator.

Fig. 1

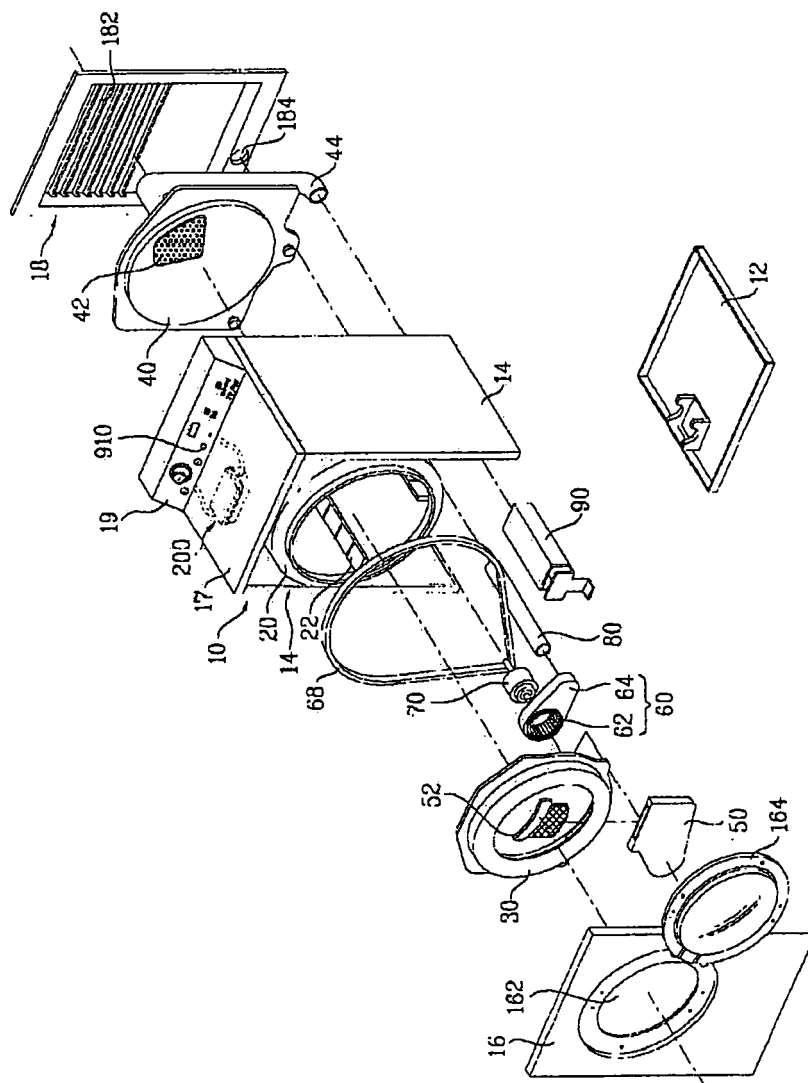


Fig. 2

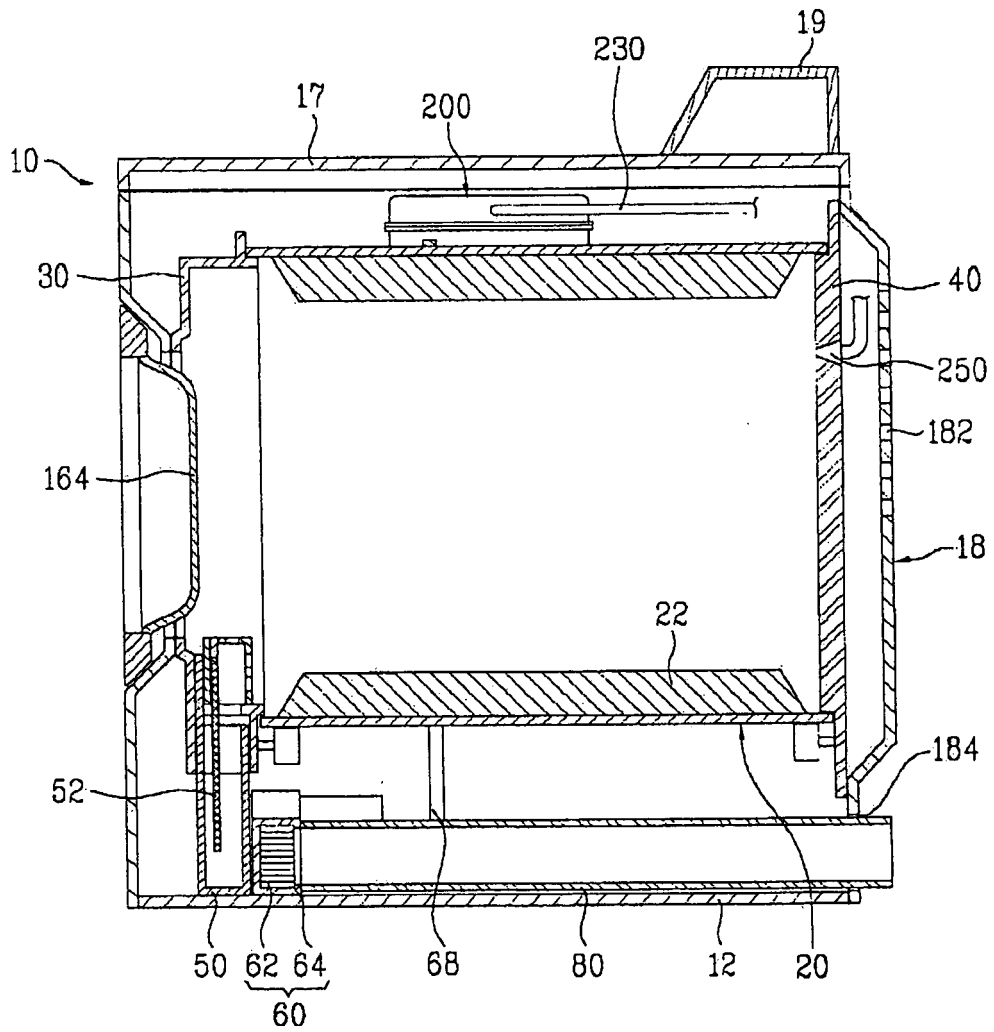


Fig. 3

