US 20080276659A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2008/0276659 A1**

(43) **Pub. Date: Nov. 13, 2008**

Bae et al.

(54) **CLOTHES TREATING APPARATUS**

(76) Inventors: **Sang Hun Bae**, Changwon-Si (KR); **Dong Geun Lee**, Changwon-Si (KR); **Seon Il Heo**, Changwon-Si (KR); **Yeon Sik Choi**, Changwon-Si (KR); **Sang Jin Kim**, Changwon-Si (KR); **Ju Han Yoon**, Changwon-Si (KR)

Correspondence Address:
MCKENNA LONG & ALDRIDGE LLP
1900 K STREET, NW
WASHINGTON, DC 20006 (US)

(21) Appl. No.: **12/149,017**

(22) Filed: **Apr. 24, 2008**

(30) **Foreign Application Priority Data**

Apr. 25, 2007 (KR) 2007-0040316
Apr. 25, 2007 (KR) 2007-0040319
Sep. 27, 2007 (KR) 2007-0097258

Publication Classification

(51) **Int. Cl.**
D06F 21/00 (2006.01)

(52) **U.S. Cl.** ..... **68/5 C**

(57) **ABSTRACT**

A clothes treating apparatus is disclosed. The clothes treating apparatus includes a drum to hold laundry, a steam generating device to supply steam to the drum, a water supply source to supply water to the steam generating device, and a backflow inhibiting unit to inhibit water from flowing back from the steam generating device when the water supply source is removed. Accordingly, the clothes treating apparatus can inhibit or remove wrinkles generated at clothes, and can collect water from the steam generating device after operation of the steam generating device is terminated.

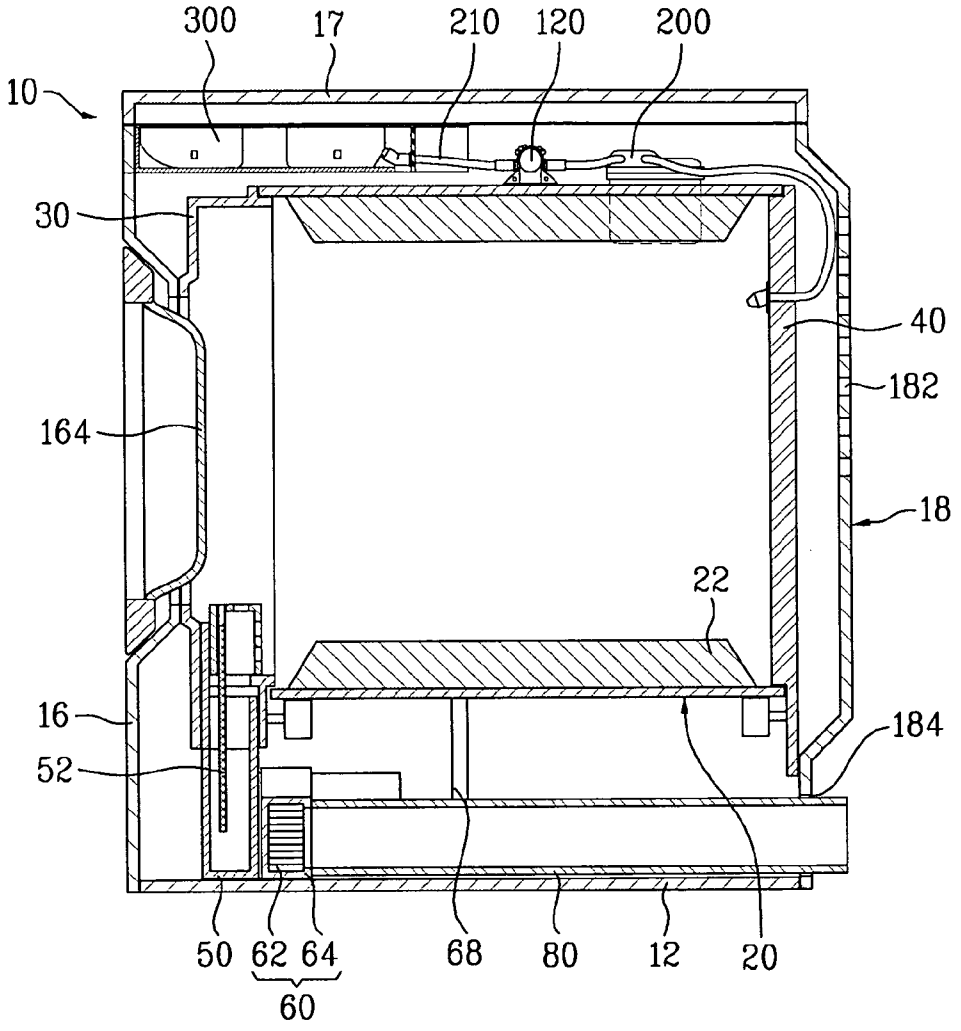


FIG.1

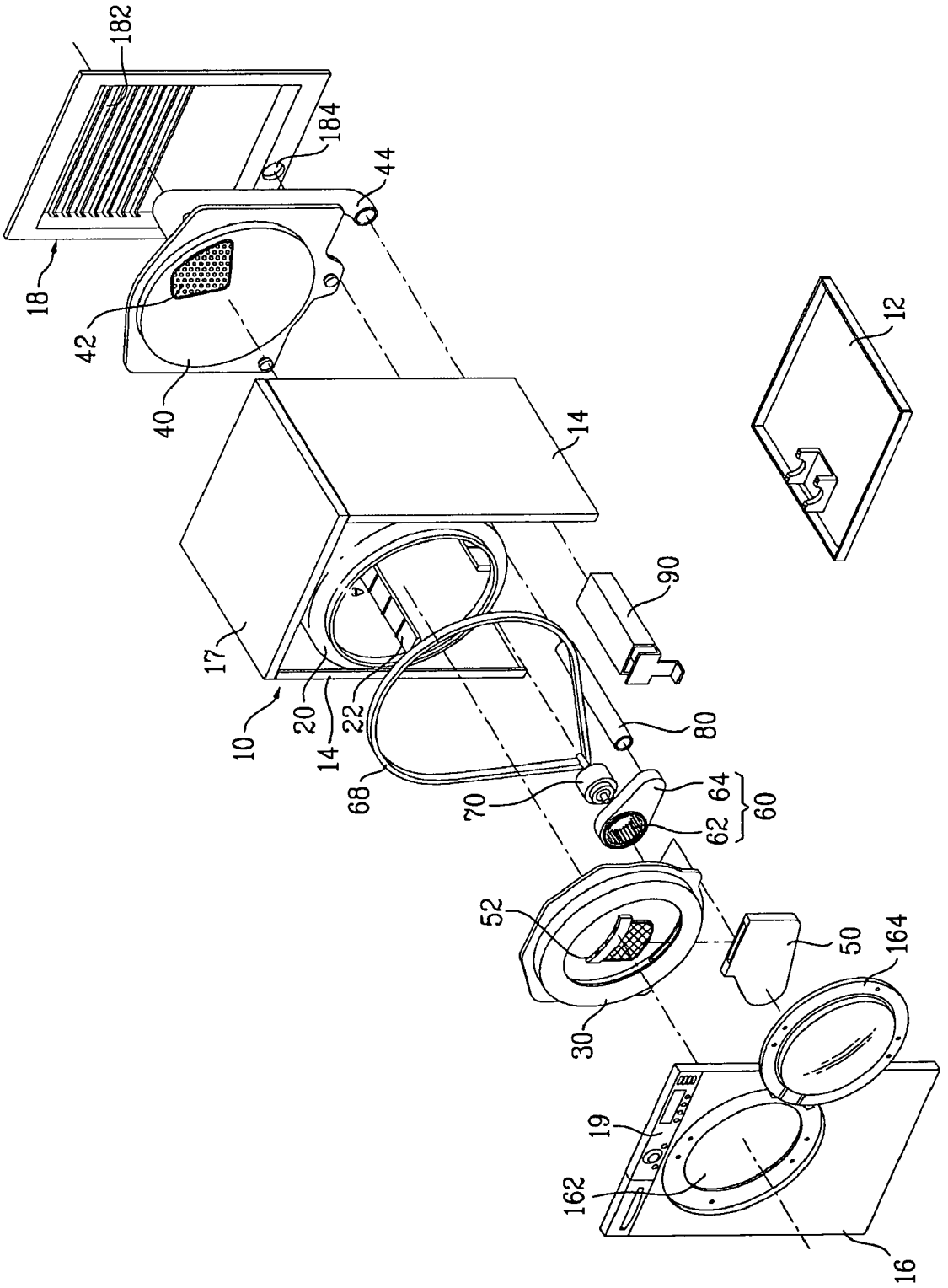

182
184
44
18
42
40
14
12
90
17
10
20
22
14
80
68
70
64
62
60
52
50
164
30
19
162
16

FIG.2

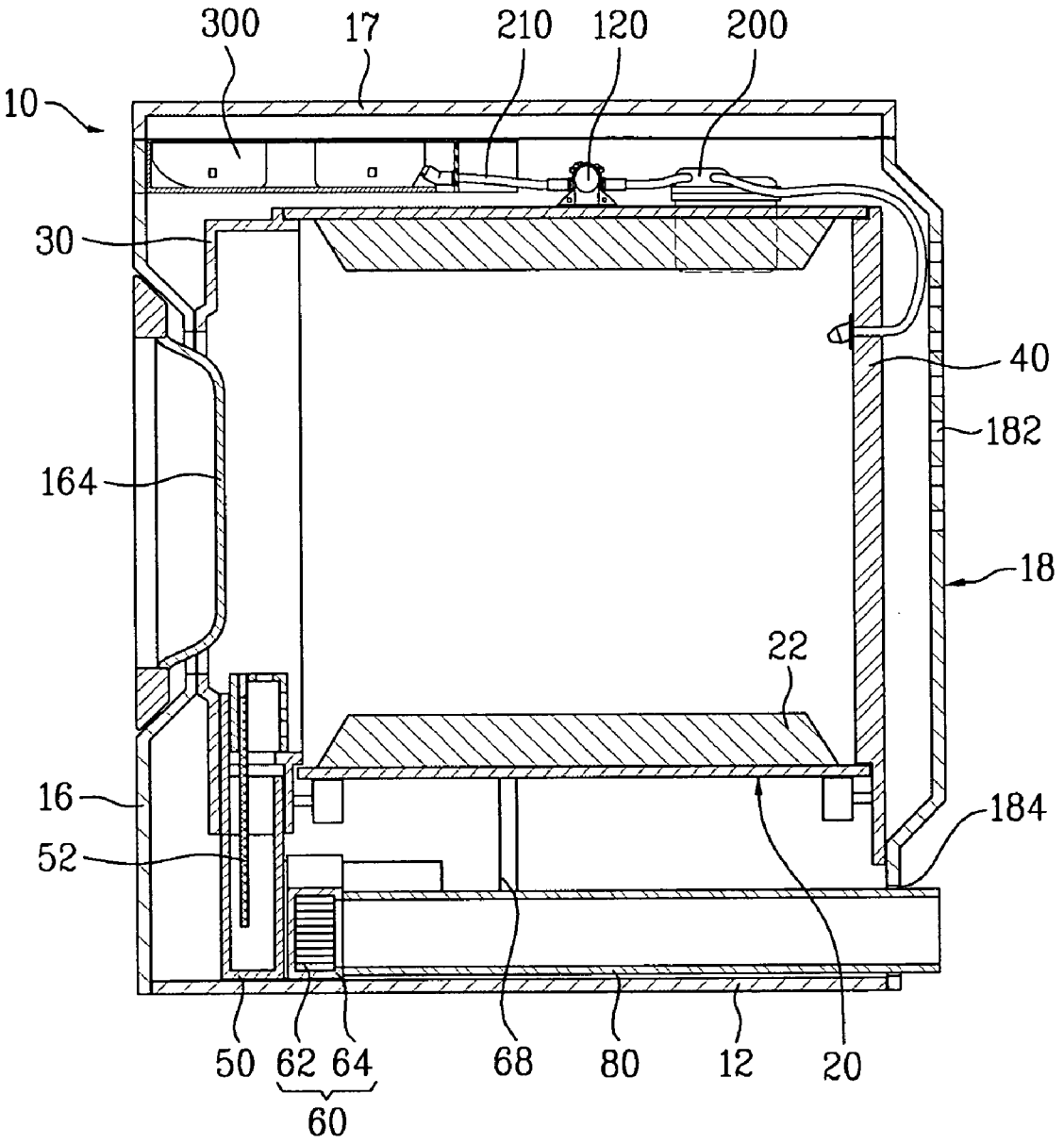

300
17
210
120
200
10
30
40
182
164
18
22
16
184
52
50
62
64
60
68
80
12
20

FIG.3

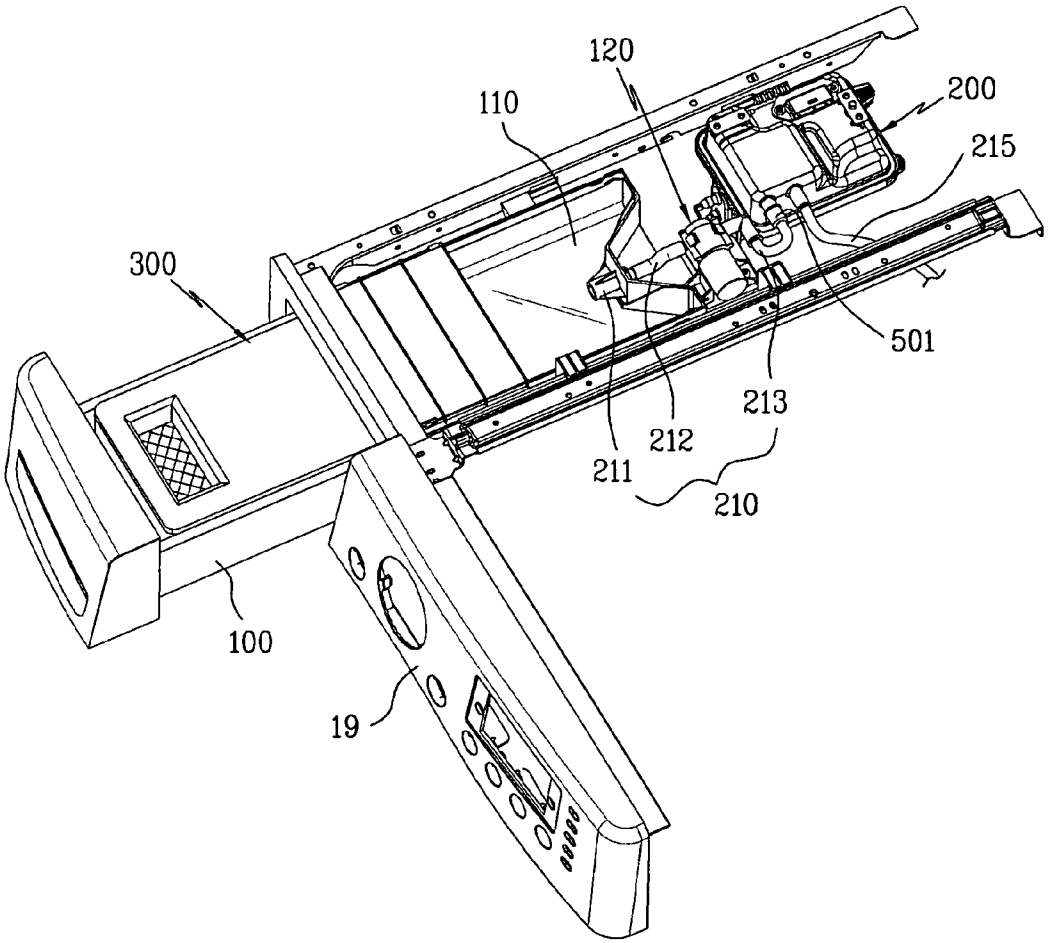


FIG.4

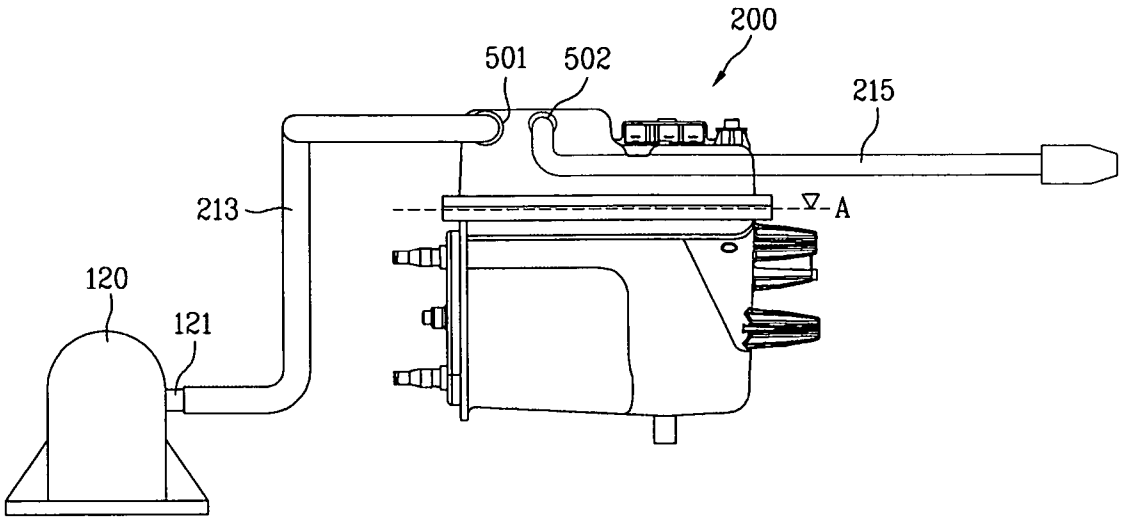


FIG.5

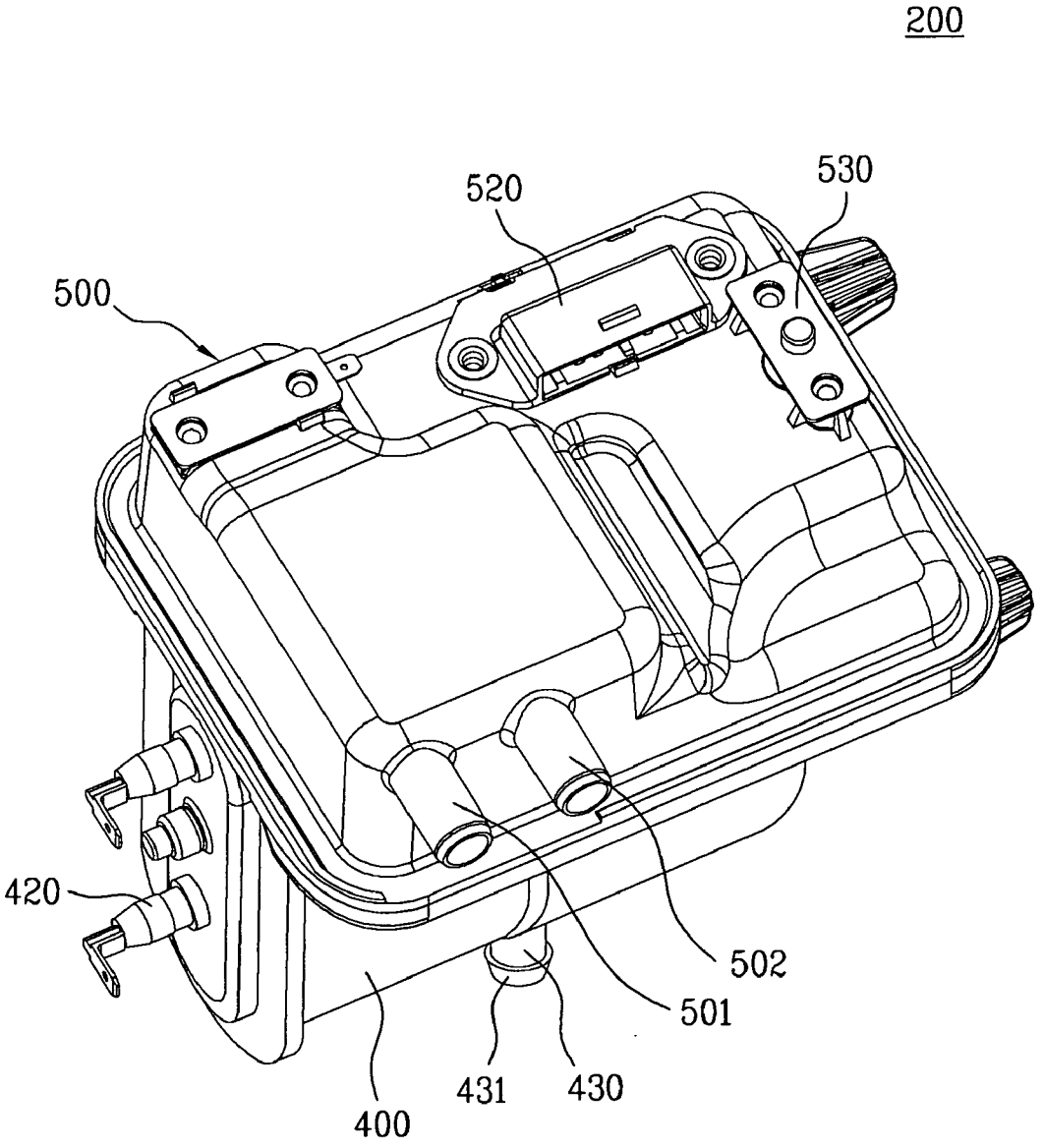


FIG.6

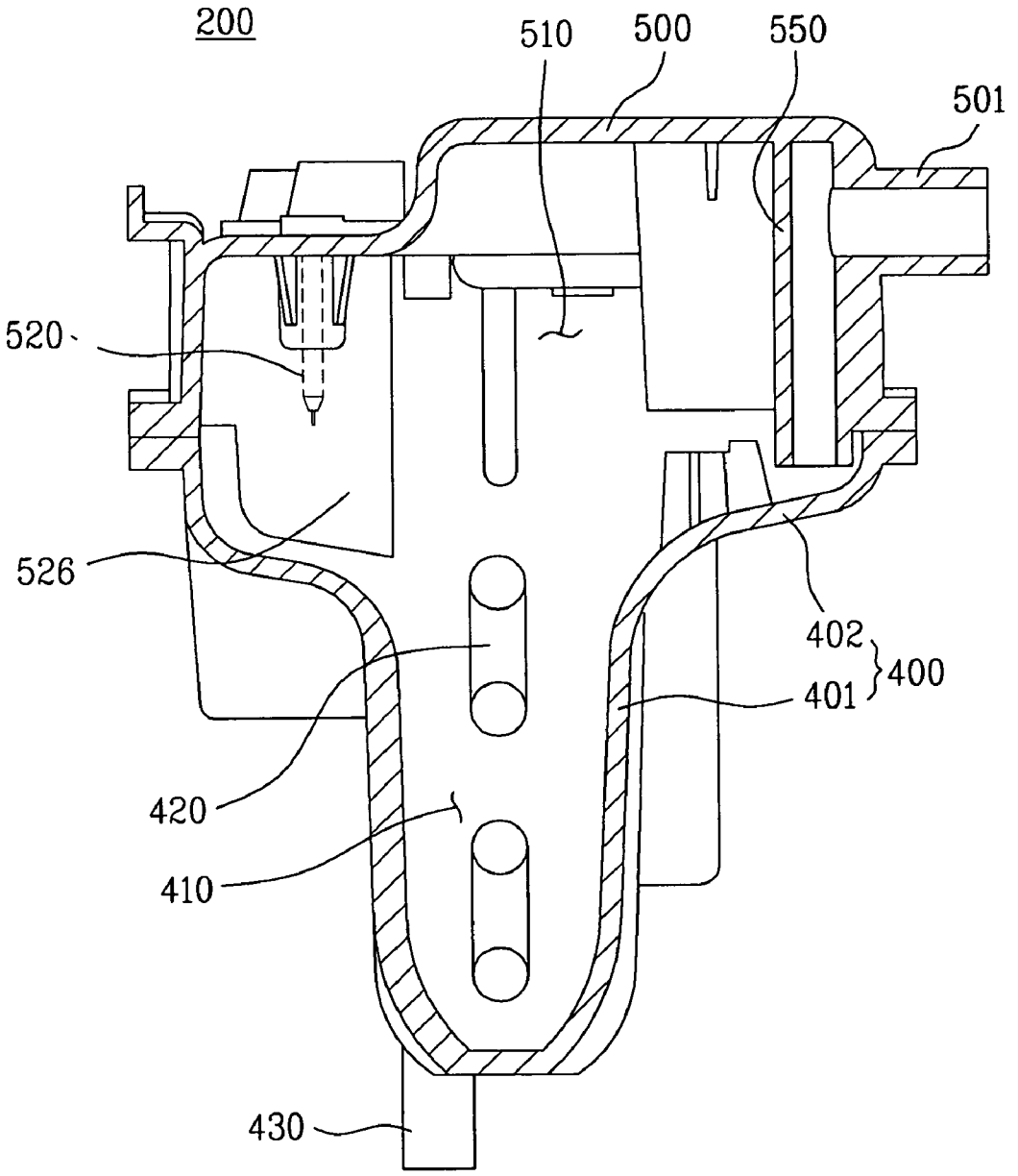


FIG.7

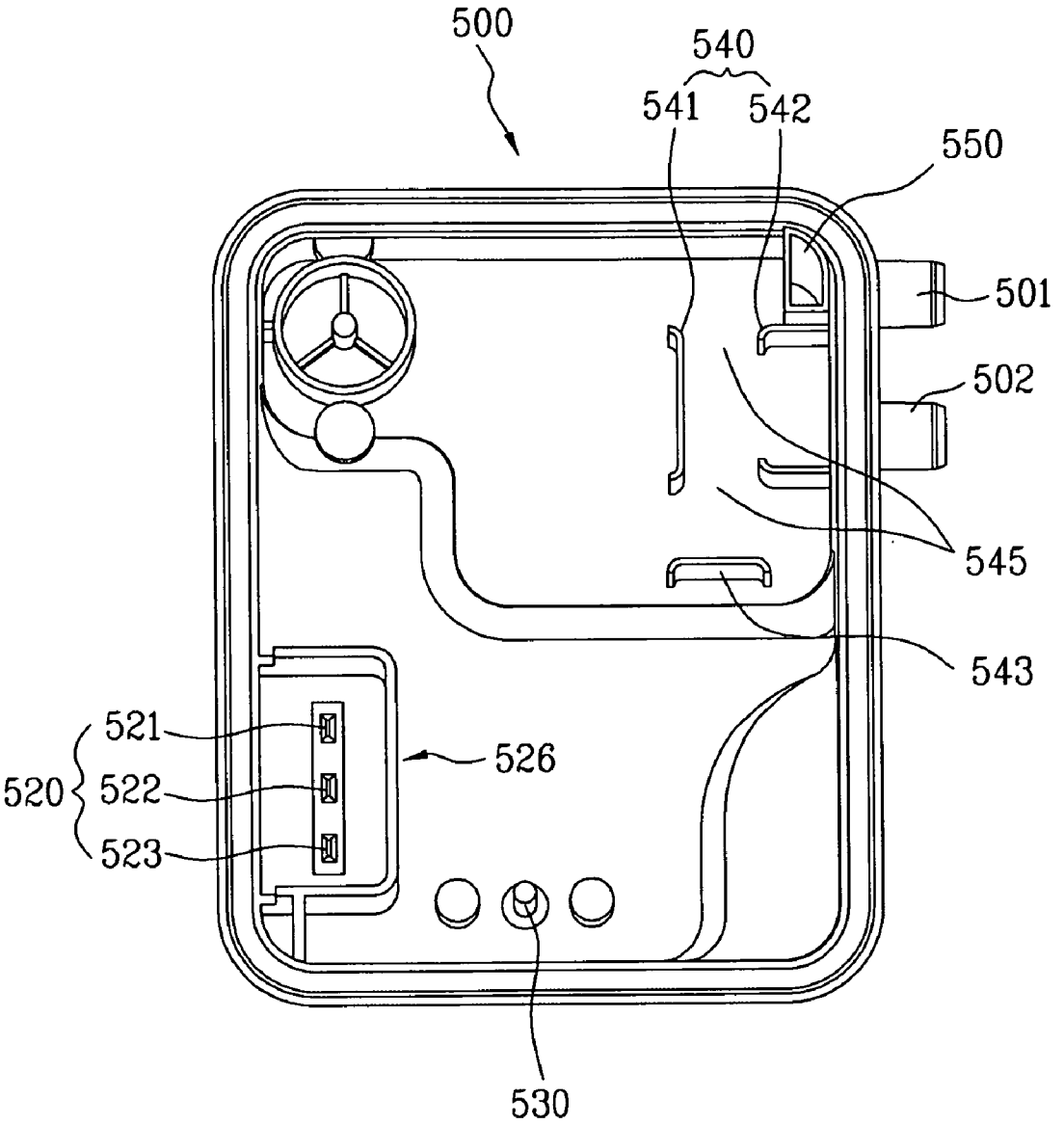


FIG.8

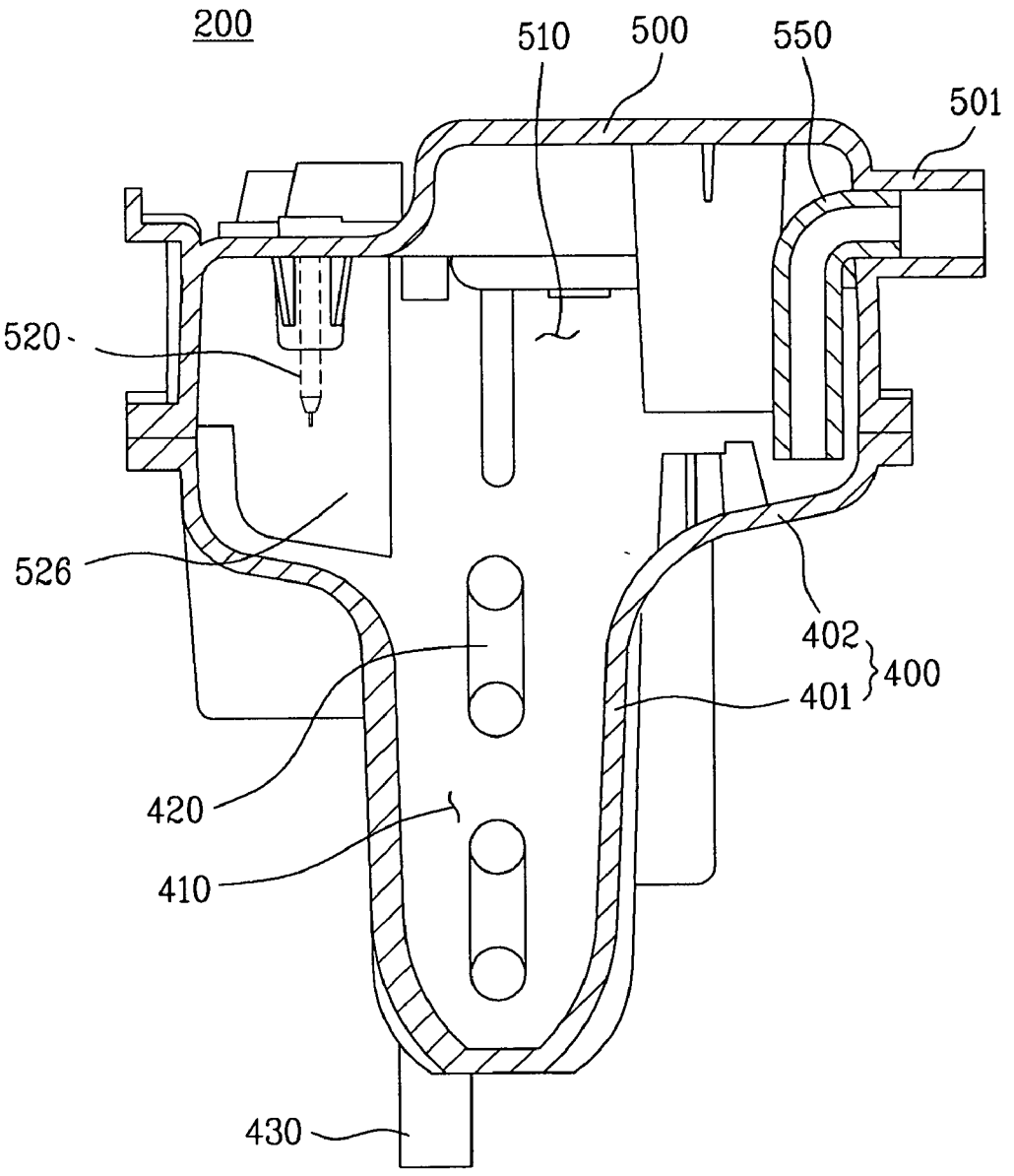


FIG.9

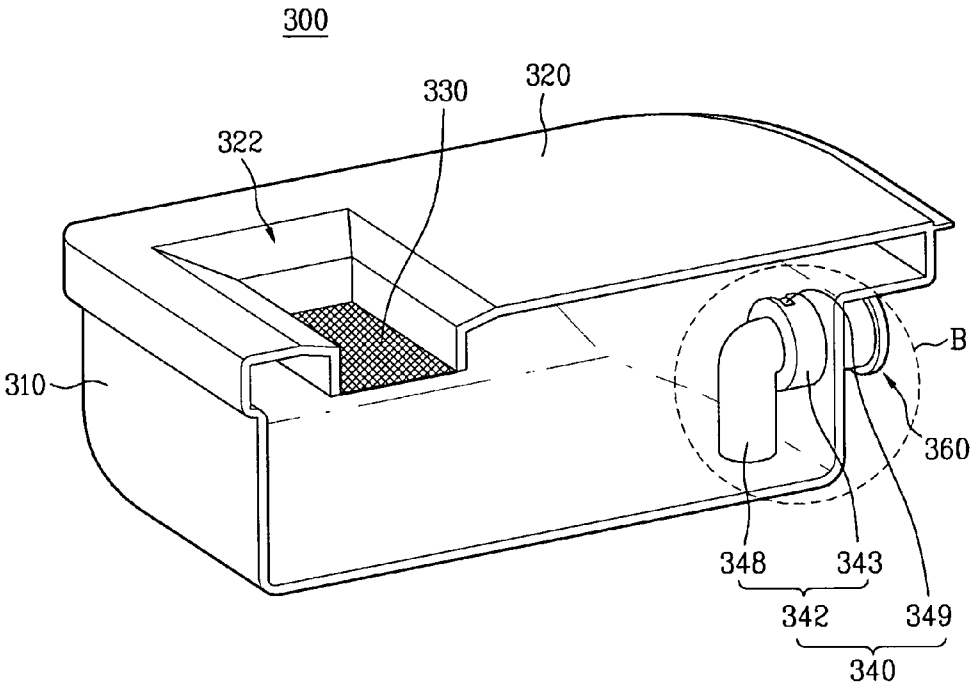


FIG.10

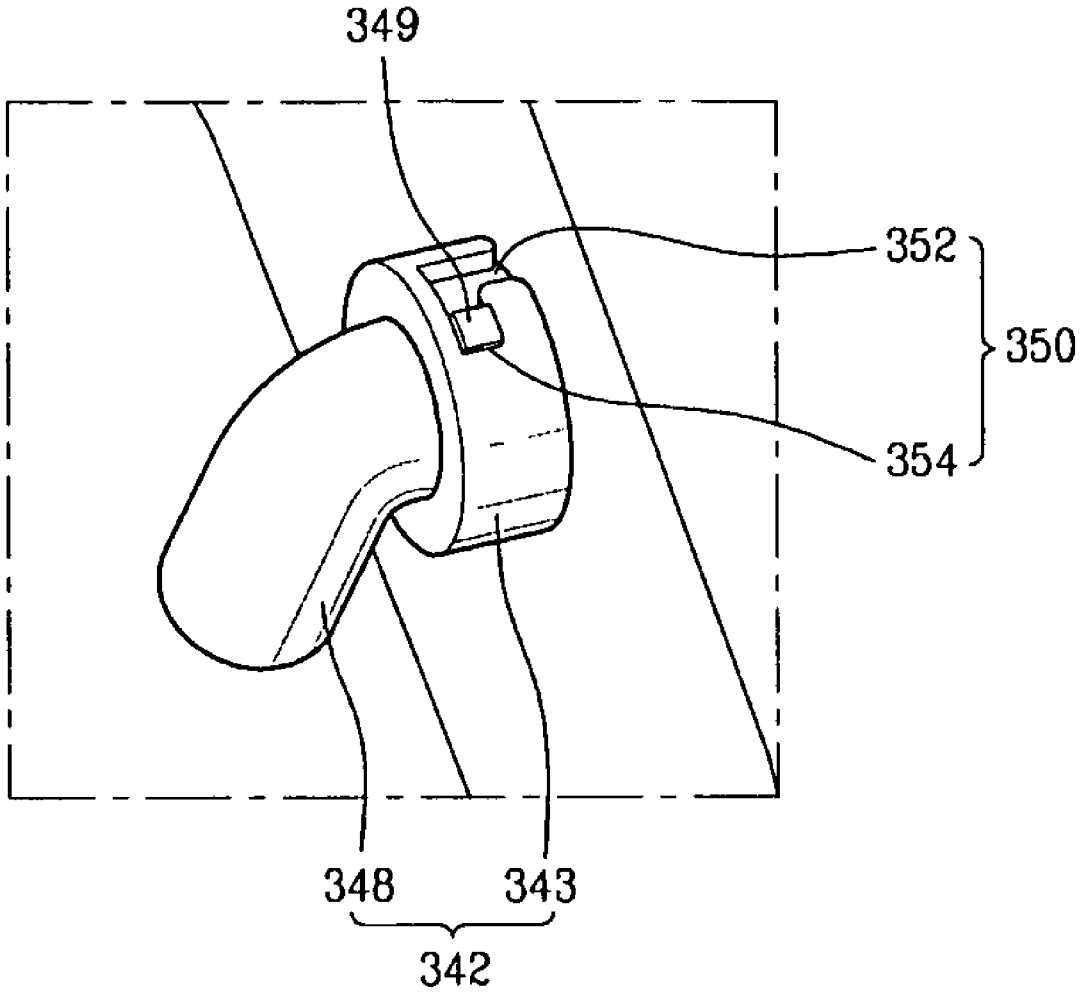


FIG.11

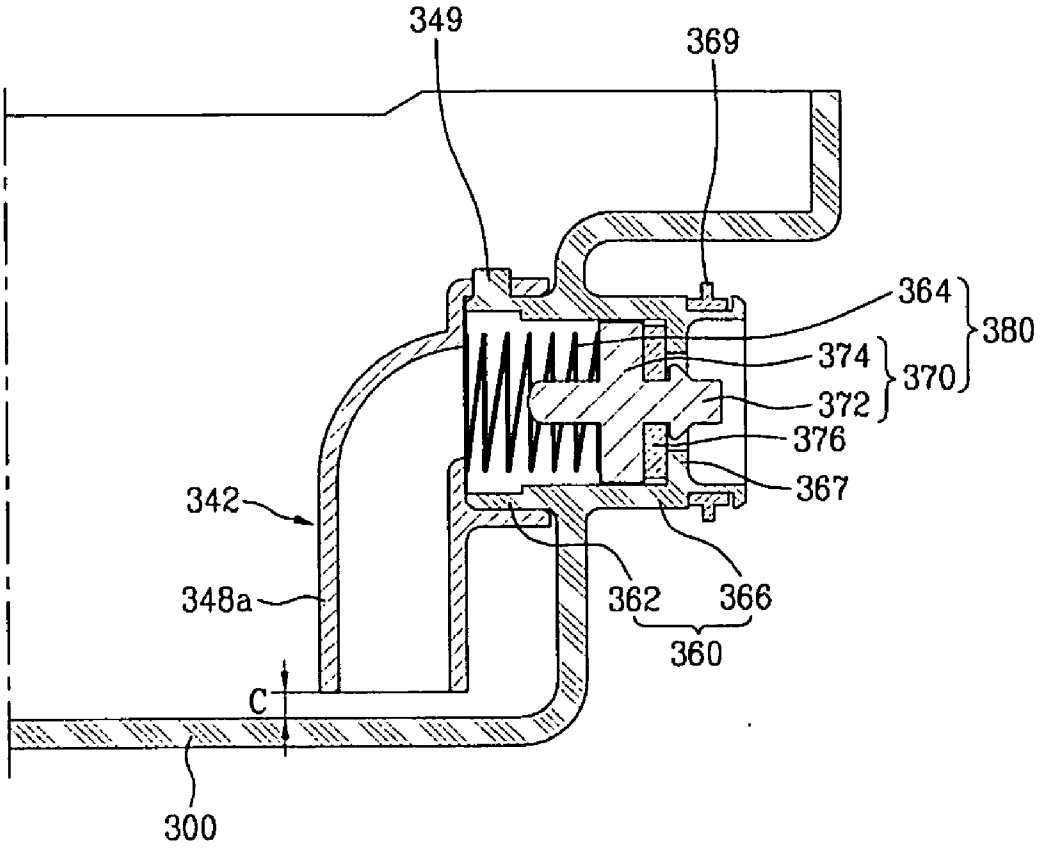


FIG.12

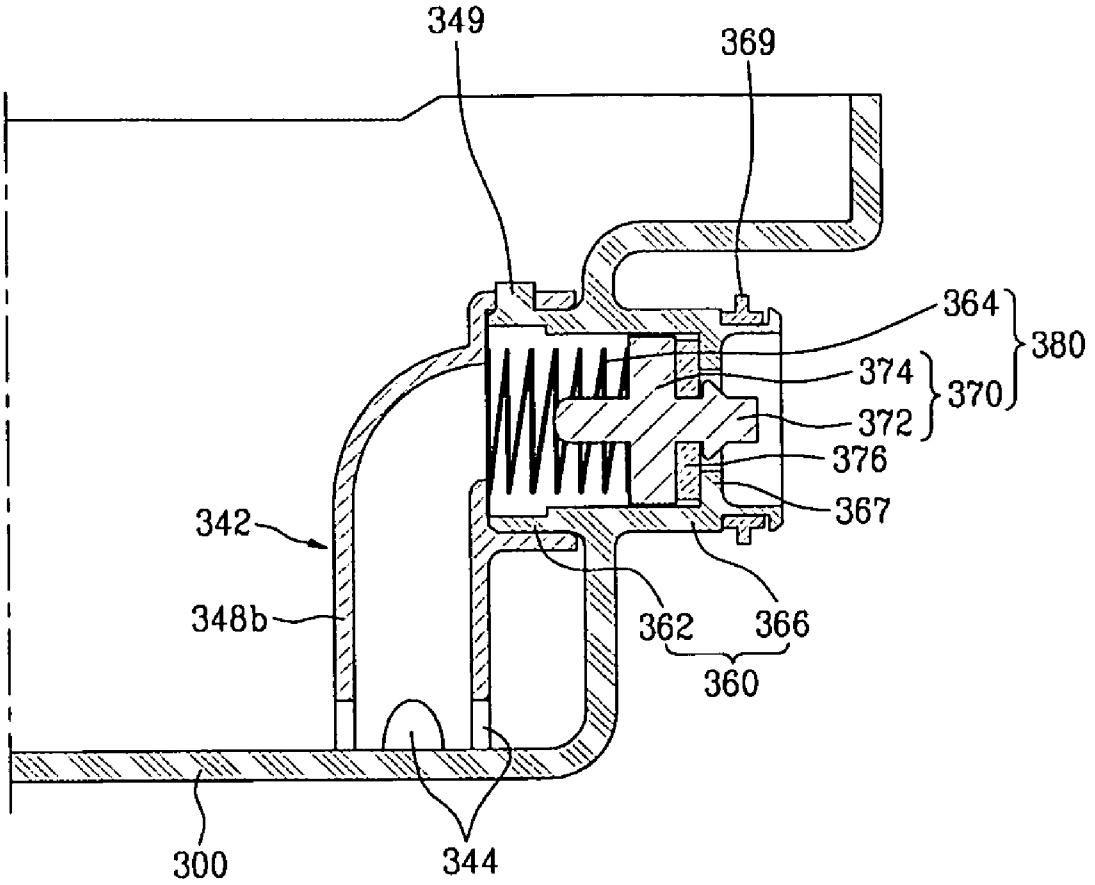


FIG.13

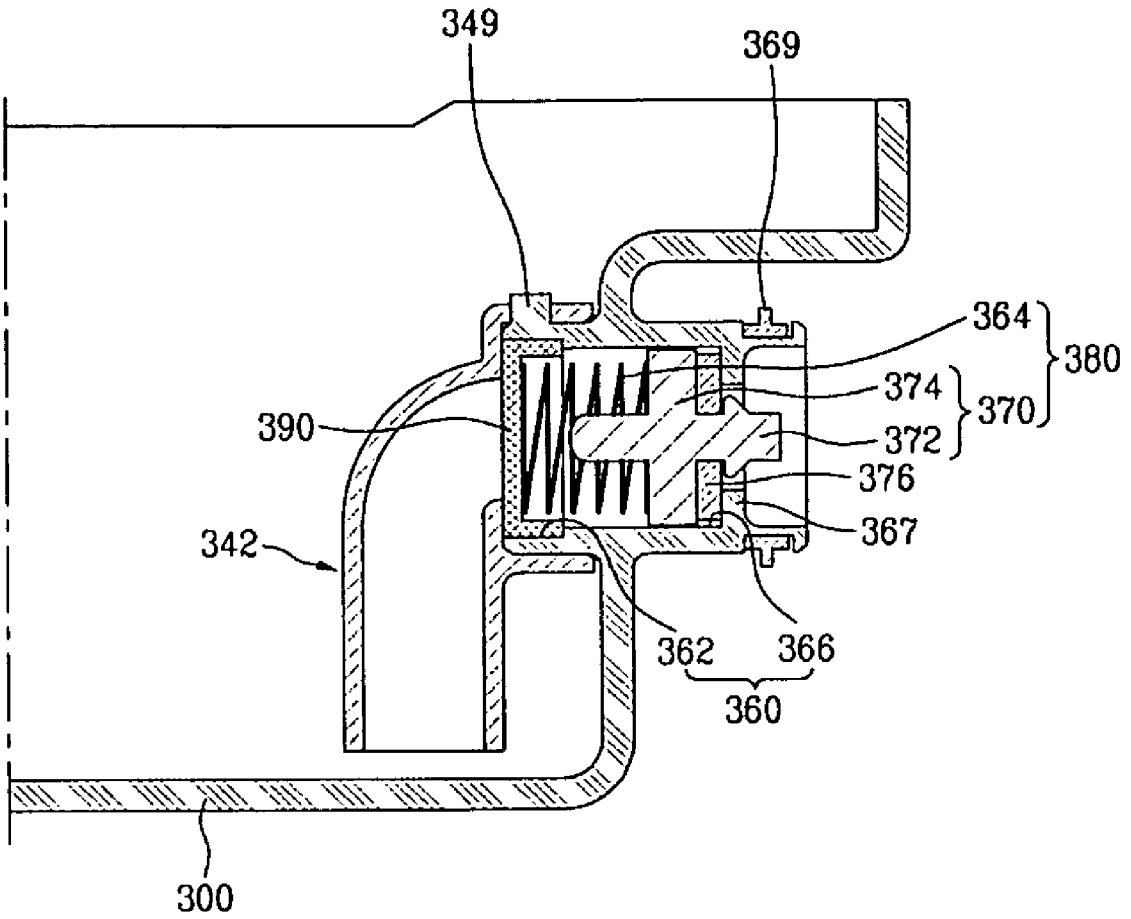


FIG.14

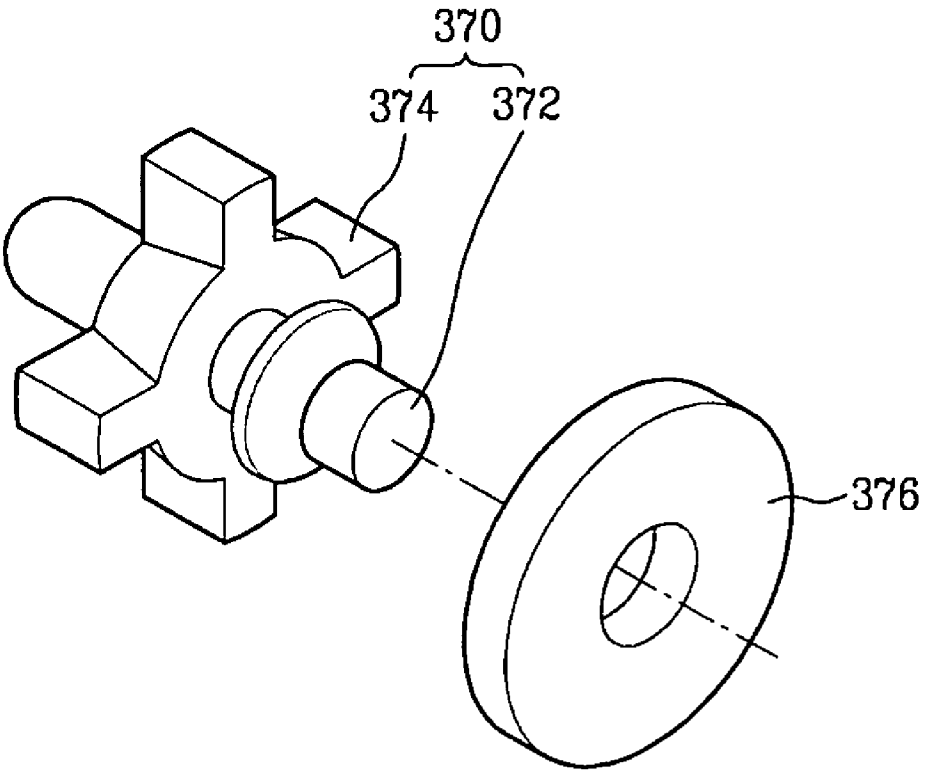
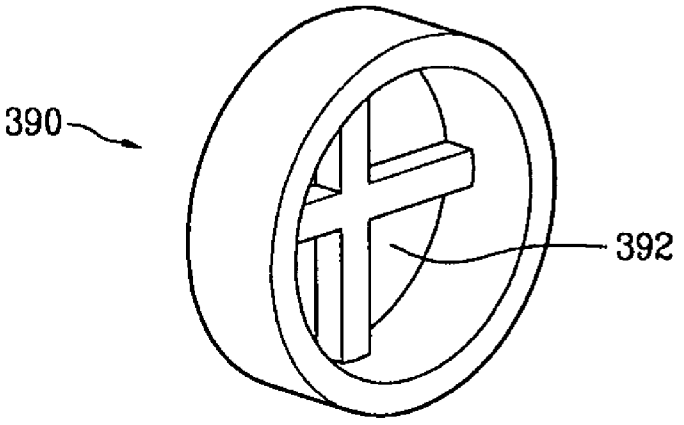


FIG.15



CLOTHES TREATING APPARATUS

[0001] This application claims the benefit of Korean Patent Application No. 2007-0040316, filed on Apr. 25, 2007; Korean Patent Application No. 2007-0040319, filed on Apr. 25, 2007 and Korean Patent Application No. 2007-0097258, filed on Sep. 27, 2007, which is hereby incorporated by reference as if fully set forth herein.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a clothes treating apparatus, and more particularly, to a clothes treating apparatus capable of collecting water from a steam generating device which generates steam.

[0004] 2. Discussion of the Related Art

[0005] Clothes treating apparatuses are apparatuses for treating clothes through washing, drying, refreshing and other processes. Such clothes treating apparatuses include washing machines, laundry dryers, clothes refreshers, and so on.

[0006] Specifically, a washing machine is operated to wash laundry by use of water. In view of a principle of water washing, the washed laundry has wrinkles, and the wrinkles are not removed during a drying process in a laundry dryer.

[0007] Thus, in order to remove wrinkles from the dried laundry, a user should iron out the dried laundry.

[0008] Besides the washed laundry, when clothes are kept and used, the clothes may have wrinkles, crumples and fold marks (hereinafter, commonly referred to as "wrinkles"). Accordingly, there have been demands for development of devices capable of also easily removing wrinkles generated by common usage and storage of the clothes.

SUMMARY OF THE INVENTION

[0009] Accordingly, the present invention is directed to a clothes treating apparatus that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0010] An object of the present invention is to provide a clothes treating apparatus capable of inhibiting or removing wrinkles generated at clothes.

[0011] Another object of the present invention is to provide a clothes treating apparatus capable of collecting water from a steam generating device mounted in the clothes treating apparatus after operation of the steam generating device is terminated.

[0012] A further object of the present invention is to provide a clothes treating apparatus capable of inhibiting back flow of water even when a water supply source for supplying water to the clothes treating apparatus is demounted.

[0013] A further object of the present invention is to provide a clothes treating apparatus capable of inhibiting erroneous operation of a water level sensor mounted in a steam generating device and damage of a heater.

[0014] Yet another object of the present invention is to provide a clothes treating apparatus capable of using as much water as possible supplied from a water supply source.

[0015] 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 may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0016] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a clothes treating apparatus comprises: a drum to hold laundry; a steam generating device to supply steam to the drum; a water supply source to supply water to the steam generating device; and a backflow inhibiting unit to inhibit water from flowing back from the steam generating device when the water supply source is removed.

[0017] The backflow inhibiting unit may be configured as a water supply hose, the water supply hose having an end connected to a water supply port formed at an upper portion of the steam generating device.

[0018] Preferably, the water supply port is positioned above a highest water level of the steam generating device.

[0019] The clothes treating apparatus may further comprise a pump provided between the water supply source and the steam generating device to selectively supply or collect water through the water supply port. The water supply hose may further have the other end connected to an outlet port of the pump.

[0020] Preferably, the outlet port of the pump is positioned below the water supply port of the steam generating device.

[0021] Preferably, the pump is capable of being rotated in forward and reverse directions.

[0022] The steam generating device may include a housing formed with the water supply port, and a water pipe having a first end communicating with the water supply port and a second end positioned below the water supply port.

[0023] The steam generating device may further include a water level sensor to sense a water level in the housing, and a heater. Preferably, the water pipe has a lower end positioned below a lower end of the water level sensor and above an upper end of the heater.

[0024] The housing may include an upper housing formed with the water supply port, and a lower housing mounted with the heater. The lower housing may include a main portion mounted with the heater, and an expanded portion coupled to the upper housing, the expanded portion having a width larger than the main portion.

[0025] Preferably, the lower end of the water pipe is positioned on a left side or a right side of the heater.

[0026] Preferably, the water pipe is formed integrally with the housing. Preferably, the water pipe is extended from the water supply port, and is bent downward.

[0027] The clothes treating apparatus may further comprise a water supply unit capable of supplying water from the water supply source to the steam generating device while leaving little water in the water supply source.

[0028] The water supply unit may include a pipe member removably connected to a water path through which water is discharged from the water supply source, and a fixing member to selectively fix the pipe member.

[0029] The pipe member may include a connecting part removably connected to the water path of the water supply source, and an extended part extended from the connecting part.

[0030] Preferably, the extended part is bent from the connecting part.

[0031] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a clothes treating apparatus comprising: a drum to hold laundry; a steam generating device including a housing having a water supply port, and a water pipe having a first end communicating with the water supply port and a second end positioned below the water supply port; and a pump to selectively supply or collect water to/from the steam generating device through the water supply port.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] 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:

[0033] FIG. **1** is an exploded perspective view of a laundry dryer in accordance with an exemplary embodiment of the present invention;

[0034] FIG. **2** is a sectional view of the laundry dryer shown in FIG. **1**;

[0035] FIG. **3** is a perspective view of a steam generating device to supply steam to the laundry dryer shown in FIG. **1**, and a water supply source to supply water to the steam generating device;

[0036] FIG. **4** is a side view of the steam generating device and the water supply source shown in FIG. **3**;

[0037] FIG. **5** is an enlarged perspective view of the steam generating device shown in FIG. **3**;

[0038] FIG. **6** is a sectional view of the steam generating device shown in FIG. **5**;

[0039] FIG. **7** is a rear perspective view of an upper housing of the steam generating device shown in FIG. **5**;

[0040] FIG. **8** is a sectional view of a modified example of the steam generating device shown in FIG. **5**;

[0041] FIG. **9** is a partially cut-away perspective view of the water supply source;

[0042] FIG. **10** is an enlarged view of a "B" portion in FIG. **9**;

[0043] FIG. **11** is a sectional view illustrating a first embodiment of the pipe member in FIG. **9**;

[0044] FIG. **12** is a sectional view illustrating a second embodiment of the pipe member in FIG. **9**;

[0045] FIG. **13** is a partial sectional view of a water supply source in accordance with another exemplary embodiment of the present invention;

[0046] FIG. **14** is a perspective view illustrating an opening/closing pin and an inner sealing member in FIG. **13**; and

[0047] FIG. **15** is a perspective view of a separation inhibiting member for inhibiting separation of an elastic member in FIG. **13**.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

[0048] Reference will now be made in detail to the preferred embodiments of the present invention associated with a clothes treating apparatus and a steam generating device mounted in the clothes treating apparatus, 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.

[0049] A clothes treating apparatus includes a washing machine, a laundry dryer, a clothes refresher, and so on. Hereinafter, a laundry dryer will be exemplarily explained. However, the present invention is not limited to a laundry dryer, and can also be applied to other types of clothes treating apparatuses, such as a washing machine or a clothes refresher.

[0050] As shown in FIGS. **1** and **2**, a laundry dryer according to an exemplary embodiment of the present invention comprises a cabinet **10** defining an exterior appearance of the laundry dryer, a drum **20** rotatably mounted in the cabinet **10**, and a motor **70** and a belt **68** to drive the drum **20**.

[0051] A heater **90** (hereinafter, referred to as "hot air heater") is mounted in a predetermined portion of the cabinet **10** to create air of high temperature (hereinafter, referred to as "hot air") by heating the air. A hot air supply duct **44** is mounted in a predetermined portion of the cabinet **10** to supply the hot air generated from the hot air heater **90** to the drum **20**.

[0052] Also, there are provided an exhaustion duct **80** and a blower unit **60** in the cabinet **10**. The damp air heat-exchanged with the laundry in the drum **20** is discharged outside the drum **20** through the exhaustion duct **80**, and the damp air is sucked by the blower unit **60**.

[0053] For convenience of explanation, this embodiment shows and describes an indirect drive type laundry dryer in which the drum **20** is rotated by the motor **70** and the belt **68**, however the present invention is not limited to the indirect drive type. The present invention can also be applied to a direct drive type laundry dryer in which the drum **20** is directly rotated by directly connecting the motor to a rear surface of the drum **20**.

[0054] Hereinafter, the aforementioned components will be explained in more detail.

[0055] The cabinet **10** defining the exterior appearance of the laundry dryer includes a base **12** forming a bottom surface, a pair of side covers **14** vertically mounted to the base **12**, a front cover **16** mounted to front surfaces of the side covers **14**, a rear cover **18** mounted to rear surfaces of the side covers **14**, and a top cover **17** mounted to top surfaces of the covers **16** and **18**.

[0056] A control panel **19** having various operational switches is generally positioned on the top cover **17** or the front cover **16**. This embodiment shows that the control panel **19** is positioned on the front cover **16**.

[0057] An air inlet **182** and an air outlet **184** are provided at the rear cover **18**. External air is drawn through the air inlet **182**, and the air in the drum **20** is discharged outside through the air outlet **184**. It is preferred that a lifter **22** is mounted in the drum **20** so that the laundry is turned over to enhance drying efficiency.

[0058] A front supporter **30** and a rear supporter **40** are provided between the drum **20** and the cabinet **10**. More particularly, the front supporter **30** is provided between the drum **20** and the front cover **16**, and the rear supporter **40** is provided between the drum **20** and the rear cover **18**.

[0059] The drum **20** is rotatably mounted between the front supporter **30** and the rear supporter **40**, and sealing members (not shown) for inhibiting water leakage are provided between the front supporter **30** and the drum **20** and between the drum **20** and the rear supporter **40**.

[0060] The front supporter **30** and the rear supporter **40** shield a front surface and a rear surface of the drum **20**, respectively, to form a drying chamber, and support a front end and a rear end of the drum **20**.

[0061] An opening **162** is formed at the front cover **16** to communicate the drum **20** with the outside of the laundry dryer. The opening **162** is selectively opened and closed by a door **164**. A lint duct **50**, through which the air in the drum **20** is discharged outside, is connected to the front supporter **30**, and a lint filter **52** is mounted in the lint duct **50**.

[0062] A portion of the blower unit **60** is connected to the lint duct **50**, and an opposite portion of the blower unit **60** is connected to the exhaustion duct **80**. The exhaustion duct **80** is in communication with the air outlet **184** provided at the rear cover **18**.

[0063] Accordingly, if the blower unit **60** operates, the air in the drum **20** flows through the lint duct **50**, the exhaustion duct **80** and the air outlet **184** in order, and is discharged outside. At this time, foreign substances including lint are filtered out by the lint filter **52**.

[0064] The blower unit **60** typically includes a blower **62** and a blower housing **64**. The blower **62** is commonly connected to the motor **70** for driving the drum **20** to be driven.

[0065] An opening portion **42** including a plurality of through-holes is formed at the rear supporter **40**, and the hot air supply duct **44** is connected to the opening portion **42**. The hot air supply duct **44** is in communication with the drum **20**, and serves as a path for supplying hot air to the drum **20**. For this, a hot air heater (not shown) is mounted in a predetermined portion of the hot air supply duct **44**.

[0066] The steam generating device **200** is mounted in a predetermined portion of the cabinet **10** to generate steam and supply the steam to the drum **20**.

[0067] As shown in FIG. **3**, this embodiment shows that a water supply source **300** storing water is removably mounted in the laundry dryer to supply water to the steam generating device **200** (the steam generating device **200** is not directly connected to a water tap).

[0068] The reason for supplying water to the steam generating device **200** by use of the water supply source **300** is that the laundry dryer having no water washing process is not necessarily needed to be directly connected to a water tap, which might cause increase in installing costs due to an additional water supply hose, control unit and so on.

[0069] The water supply source **300** is removably mounted in the laundry dryer to supply water to the steam generating device **200**. The water supply source **300** is positioned at the front side of the cabinet **10**. Also, a water supply path **210** is mounted in the laundry dryer so as to supply water from the water supply source **300** to the steam generating device **200**.

[0070] The water supply source **300** is formed with a space to hold water thereinside, and an outlet hole (not shown) at a predetermined portion, through which water flows out to the water supply path **210**. The outlet hole is separably connected with the water supply path **210**.

[0071] Preferably, the water supply source **300** is mounted in a drawer **100** so as to be put in or drawn out of the laundry dryer at the front surface of the front cover **16**.

[0072] Also, a guide part **110** is mounted in the laundry dryer so as to guide the drawer **100** toward the water supply path **210**.

[0073] The water supply path **210** serves as a path for supplying water flowing out of the water supply source **300** to the steam generating device **200**, and is mounted between the water supply source **300** and the steam generating device **200**. Preferably, a pump **120** is mounted in the water supply path **210**, so as to smoothly supply water from the water supply source **300** to the steam generating device **200**.

[0074] The laundry dryer may be designed such that water is supplied from the water supply source **300** to the steam generating device **200** by use of a height difference between the water supply source **300** and the steam generating device **200**. However, because standardized components are employed in the laundry dryer and the laundry dryer designed to be compact, an inner space of the laundry dryer is structurally limited. Thus, if the size of the components is not changed, the water supply using a height difference between the water supply source **300** and the steam generating device **200** is, in fact, impossible. In this regard, it is preferable to mount the compact pump **120** in the water supply path **210** so as to smoothly supply water to the steam generating device **200**.

[0075] Moreover, if the pump **120** capable of being rotated in forward and reverse directions is mounted, there is an advantage such that water is not only supplied from the water supply source **300** to the steam generating device **200** but also can be easily collected from the steam generating device **200** to the water supply source **300**.

[0076] The reason for collecting water from the steam generating device **200** when the steam generating device **200** is in a non-operating state is to inhibit a problem such that residual water in the steam generating device **200** may be rotten and the rotten water may be supplied into the laundry dryer.

[0077] The water supply path **210** includes a connecting port **211** mounted to the guide part **110**, corresponding to the outlet hole of the water supply source **300**, a water supply hose **213** to connect the pump **120** and the steam generating device **200**, and a connecting pipe **212** to connect the pump **120** and the connecting port **211**.

[0078] As shown in FIG. **4**, the steam generating device **200** is formed with a water supply port **501** at an upper portion thereof, and one end portion of the water supply hose **213** is connected to the water supply port **501**. Accordingly, the water supply hose **213** connected to the water supply port **501** formed at the upper portion of the steam generating device **200** forms a backflow inhibiting means.

[0079] Preferably, the water supply port **501** formed at the upper portion of the steam generating device **200** is positioned above a highest water level (A) to which water can be supplied to the steam generating device **200**. This is for inhibiting the water in the steam generating device **200** from flowing back due to a hydraulic pressure and leaking through the pump **120** when the water supply source **300** is removed from the cabinet **10**. In other words, since the water supply port **501** is formed above the highest water level of the steam generating device **200**, although water remains in the steam generating device **200**, a hydraulic pressure of the residual water is inhibited from being exerted to the water supply hose **213** through the water supply port **501**.

[0080] The other end portion of the water supply hose **213** is connected to the pump **120**. Preferably, an outlet port **121**, through which water is supplied from the pump **120** to the steam generating device **200**, is formed at the pump **120**, below the water supply port **501** of the steam generating device **200**. Therefore, when the pump **120** is rotated in the forward direction and stops the water supply to the steam generating device **200**, water always remains in the water supply hose **213** which connects the outlet port **121** of the pump **120** and the water supply port **501** of the steam generating device **200**. The residual water in the water supply hose **213** inhibits deformation or damage of the pump **120**, which might be caused by operation of the pump **120** without water.

[0081] Hereinafter, the steam generating device according to an exemplary embodiment of the present invention will be explained in detail with reference to FIGS. **5** and **6**.

[0082] The steam generating device **200** has a T-shape overall.

[0083] Describing in more detail, the steam generating device **200** includes a lower housing **400** which holds water and has a water chamber **410** mounted with a heater **420** for heating the water, and an upper housing **500** which is provided above the water chamber **410** and has a steam chamber **510** for storing steam generated by heating the water. The lower housing **400** and the upper housing **500** of the steam generating device **200** may be provided separately from each other as described above, or may be formed unitarily with each other.

[0084] The lower housing **400** includes a first portion **401** which is mounted with the heater **420** and has a predetermined horizontal length and a vertical length larger than the horizontal length (hereinafter, the first portion will be referred to as a "main portion"), and a second portion **402** which is extended upward from a top of the main portion **401** to be coupled to the upper housing **500** and has a width larger than the main portion **401** (hereinafter, the second portion will be referred to as an "expanded portion").

[0085] Because the heater **420** is mounted in the main portion **401** of the water chamber **410**, the relatively small amount of water is held in the main portion **401**, and the relatively large amount of water is held in the expanded portion **402** and the upper housing **500**. Preferably, the expanded portion **402** is formed to be slanted downward toward a center portion thereof. This is for inhibiting foreign substances such as lime from being deposited to an electrode of a water level sensor **520** mounted in the steam generating device **200**.

[0086] The lower housing **400** is provided with a drain part **430** through which the water in the water chamber **410** is discharged outside. The drain part **430** is provided with an opening/closing member **431** to open or close the drain part **430**. If the opening/closing member **431** opens the drain part **430**, the water in the water chamber **410** can be discharged outside. Generally, if the steam generating device **200** is used successively, foreign substances such as lime are accumulated in the steam generating device **200**. Since the foreign substances are discharged together with the water when the water in the water chamber **410** is discharged outside through the opened drain part **430**, the foreign substances can be inhibited from being accumulated in the steam generating device **200**.

[0087] The opening/closing member **431** may be configured as a drain cap which is manually handled to open or close the drain part **430** by a user or a repairman, or may be configured as a device which is automatically operated to perform the opening/closing operation. For example, the opening/closing member **431** may be configured as a solenoid valve. Also, the opening/closing member **431** may be formed by using a siphon principle.

[0088] Since the steam generating device **200** of this embodiment has a T-shape overall, a horizontal length of the steam generating device **200** can be reduced while the steam generating device **200** holds the same amount of water as a conventional one. Accordingly, interference between the drum **20** and the steam generating device **200** can be decreased.

[0089] Moreover, when the steam generating device **200** of this embodiment is controlled to generate the same amount of steam as a conventional one, the amount of water and a time necessary to generate steam can be reduced.

[0090] Hereinafter, the upper housing **500** formed with the steam chamber **510** will be explained in detail with reference to FIG. **7**.

[0091] The upper housing **500** is provided with the aforementioned water supply port **501**, through which water is supplied to the upper housing **500**, and a steam discharge port **502**, through which steam is discharged out of the upper housing **500**, at predetermined portions. Preferably, the upper housing **500** has an upwardly-protruding portion, and the water supply port **501** and the steam discharge port **502** are provided at the protruding portion.

[0092] The aforementioned water supply hose **213** is connected to the water supply port **501** for water supply, and a steam hose **215** is connected to the steam discharge port **502** for steam supply. As such, because the upper housing **500** has the water supply port **501** connected with the water supply hose **213** and the steam discharge port **502** connected with the steam hose **215**, the water supply hose **213** and the steam hose **215** can be inhibited from interfering with other components mounted in the laundry dryer when the steam generating device **200** is mounted into the laundry dryer.

[0093] Also, the upper housing **500** is mounted with the aforementioned water level sensor **520** and a temperature sensor **530**.

[0094] The water level sensor **520** is positioned at a predetermined distance from the water supply port **501**. Preferably, the water level sensor **520** is disposed at a deviated position from the water supply port **501** in the water supply direction. This is for inhibiting water discharged from the water supply port **501** from splashing and touching the water level sensor **520**, thereby inhibiting erroneous operation of the water level sensor **520**.

[0095] It is preferred that the water level sensor **520** is mounted adjacent to an inner wall of the upper housing **500** and positioned above the expanded portion **402** of the lower housing **400** rather than above the main portion **401**. According to another aspect, it is also preferred that the water level sensor **520** is mounted at a predetermined distance from an inner wall of the main portion **401** defining the water chamber **410**.

[0096] Such a mounting structure of the water level sensor **520** can effectively inhibit water or bubbles scattered at the beginning of heating operation of the heater **420** mounted in the main portion **401** from splashing to the water level sensor **520** and causing erroneous operation of the water level sensor **520**.

[0097] Also, it is preferred that the steam generating device **200** of this embodiment has a receiving part **526** which protects the water level sensor **520**. The receiving part **526** surrounds electrode parts **521**, **522** and **523** of the water level sensor **520**, and has an opened bottom.

[0098] The electrode parts of the water level sensor **520** include a common electrode **521**, a low water level electrode **522** and a high water level electrode **523**. The water level sensor **520** senses a high water level or a low water level depending on whether electric current flows between the common electrode **521** and the high water level electrode **523** or electric current flows between the common electrode **521** and the low water level electrode **522**.

[0099] As described above, the upper housing **500** is provided with the steam discharge port **502** to discharge steam. The upper housing **500** is further provided with a separator **540** at a position adjacent to the steam discharge port **502** so as to separate a specific region, from which steam is discharged outside, from other regions.

[0100] When water is heated in the water chamber **410**, specifically at the beginning of heating, water and bubbles are scattered severely. The separator **540** inhibits the scattered water from being introduced into the drum **20** through the steam discharge port **502**. If water is introduced into the drum **20**, stains may be generated at the laundry. Such a problem can be inhibited by the separator **540**.

[0101] The separator **540** has a structure of accommodating the steam discharge port **502** and permitting steam to flow thereinto. It is preferred that the separator **540** is configured as a partition wall which is formed with openings **545** so that steam passes therethrough.

[0102] As described above, water is supplied to the water chamber **410** through the water supply hose **213**, and steam in the steam chamber **510** is discharged to the drum **20** through steam discharge lines including the steam discharge port **502** and the steam hose **215**.

[0103] When the steam generating device **200** is not used for a long period, water in the steam generating device **200** may be rotten. In order to inhibit the rotten water from being used in the steam generating device **200**, the water in the steam generating device **200** is required to be collected to the water supply source **300**. When collecting the water in the steam generating device **200** to the water supply source **300**, the pump **120** mounted in the water supply path **210** is rotated in a direction opposite to the direction in which the pump **120** is rotated to supply water to the steam generating device **200**.

[0104] So as to collect water existing in a region below the water supply port **501** when the water in the steam generating device **200** is collected to the water supply source **300** through the water supply port **501**, the steam generating device **200** is provided with a water pipe **550** which has one end communicating with the water supply port **501** and the other end positioned below the water supply port **501**. In this embodiment, because the water supply port **501** of the steam generating device **200** is formed above the highest water level (A) of the steam generating device **200**, the water pipe **550** is required in order to remove the residual water in the steam generating device **200**.

[0105] It is illustrated in FIGS. **6** and **7** that the water pipe **550** is extended from the top of the upper housing **500**. Preferably, the water pipe **550** is formed integrally with the upper housing **500** by injection molding or the like.

[0106] It is also preferred that the lower end of the water pipe **550** is positioned below the lower end of the low water level electrode **522** of the water level sensor **520**. This is for inhibiting the residual water in the steam generating device **200** after collected from the steam generating device **200** from touching the low water level electrode **522**, thereby inhibiting generation of scales on the low water level electrode **522**.

[0107] If scales are generated on the low water level electrode **522**, the water level sensor **520** may be operated erroneously when sensing a low water level by electric current flow between the common electrode **521** and the low water level electrode **522**.

[0108] As shown in FIG. **6**, it is also preferred that the lower end of the water pipe **550** is positioned above the upper end of the heater **420**. This is for leaving water to a certain extent in the steam generating device **200** so that the heater **420** can be immersed in water even after water is collected from the steam generating device **200**.

[0109] The reason for leaving a certain amount of water in the steam generating device **200** is to inhibit the heater **420** from being overheated, when water is collected from the steam generating device **200** at inadequate circumstances or the steam generating device **200** is operated unexpectedly before water is supplied to the steam generating device **200**.

[0110] The overheated heater **420** may cause a fire or damage of the heater **420** itself or other components mounted in the steam generating device **200**.

[0111] Preferably, the lower end of the water pipe **550** is positioned on the left side or right side of the heater **420**. This is for inhibiting steam or water boiled up by the heater **420** from flowing out through the water supply port **501**.

[0112] As shown in FIG. **8**, the water pipe **550** may be formed to be extended from the water supply port **501** and bent downward. In such a case, it is preferred that the water pipe **550** is provided separately from the upper housing **500** and connected to the water supply port **501**. Also, it is preferred that the water pipe **550** is made of a copper material which resists rust.

[0113] By providing the water pipe **550**, one end of which communicates with the water supply port **501** and the other end of which is positioned below the water supply port **501**, water can be collected from the steam generating device **200** while a certain amount of water is left behind in the steam generating device **200**, thereby inhibiting supply of steam generated from rotten water to the drum **20**.

[0114] Further, by positioning the lower end of the water pipe **550** below the lower end of the water level sensor **520**, generation of scales on the water level sensor **520** can be inhibited.

[0115] Further, by positioning the lower end of the water pipe **550** above the upper end of the heater **420**, damage of the heater **420** can be inhibited.

[0116] This embodiment of the present invention shows that the water supply source **300** is configured as a cartridge which holds a predetermined amount of water.

[0117] Hereinafter, the cartridge used as the water supply source **300** and the water supply unit mounted in the cartridge will be described in detail with reference to the drawings.

[0118] FIG. **9** is a partially cut-away perspective view showing the interior of the cartridge shown in FIG. **3**, and FIG. **10** is an enlarged view of a "B" portion in FIG. **9**.

[0119] As described above, the laundry dryer according to the present invention comprises the cartridge **300** which is removably connected to the pump **120**. Water is supplied to the cartridge **300** so as to be supplied to the steam generating device **200**.

[0120] First, the disassemblable constitution of the cartridge will now be explained in detail with reference to FIG. **9**.

[0121] The cartridge **300** includes a lower housing **310** to practically hold water, and an upper housing **320** removably coupled to the lower housing **310**. As such, if the cartridge **300** is constituted by the lower housing **310** and the upper housing **320** which can be disassembled from each other, it is easy to remove contaminants from the cartridge **300** and to separate a filter **330**, which will be described later, from the cartridge **300** to clean and reuse the filter **330**.

[0122] Preferably, the upper housing **320** is mounted with the first filter **330**. Particularly, the first filter **330** is mounted to a water inlet part **322** of the upper housing **320** so as to perform first-stage filtering operation for water supplied to the cartridge **300**.

[0123] The lower housing **310** is provided with a water path **360**, through which water in the cartridge **300** is selectively supplied outside. An opening/closing unit **380** (refer to FIG. **13**) is provided in the water path **360**, so as to inhibit the water in the cartridge **300** from flowing outside when the cartridge **300** is removed from the laundry dryer and permit the water in the cartridge **300** to flow outside when the cartridge **300** is mounted in the laundry dryer.

[0124] Preferably, a second filter (not shown) is connected to the water path **360** to filter the water flowing through the water path **360**. More preferably, the second filter is removably connected to the water path **360**. The concrete constitution of the opening/closing unit **380** mounted in the water path **360** will be explained in detail later.

[0125] Accordingly, by using the first filter **330** and the second filter (not shown), impurities such as fine dusts included in water can be doubly filtered out. A water-softening member (not shown) may be provided in the cartridge **300** to soften the water in the cartridge **300**. The water-softening member may be removably mounted in the cartridge **300**. When hardness of water supplied to the steam generating device **200** is large, the water-softening member serves to remove calcium ions and magnesium ions included in water beforehand, to thereby inhibit generation of lime.

[0126] Hereinafter, the water supply unit **340** will be explained in detail with reference to FIGS. **9** and **10**.

[0127] The water supply unit **340** includes a pipe member **342** which is removably connected to the water path **360** for communicating the interior of the cartridge **300** with the exterior to discharge water, and a fixing member **349** which selectively fixes the pipe member **342** to the water path **360**.

[0128] The water path **360** for communicating the interior of the cartridge **300** with the exterior includes an inner path **362** (refer to FIG. **11**) which is inserted into the cartridge **300** by a predetermined length, and an outer path **366** (refer to FIG. **11**) which communicates with the inner path **362** and is extended outside the cartridge **300** by a predetermined length.

[0129] The pipe member **342** is removably connected to the inner path **362**. Particularly, the pipe member **342** includes a connecting part **343** removably connected to the inner path **362**, and an extended part **348** extended from the connecting part **343**. The extended part **348** is bent from the connecting part **343**, preferably at an angle of 90°.

[0130] The fixing member **349** may be configured as a protrusion which is protruded from an outer peripheral surface of the inner path **362**, and the connecting part **343** of the pipe member **342** is formed with a slot **350** corresponding to the protrusion **349**. When the pipe member **342** is connected to the inner path **362**, the protrusion **349** is fitted into the slot **350**, and thus the pipe member **342** is fixed to the inner path **362**.

[0131] In order to inhibit separation of the protrusion **349** from the slot **350**, the slot **350** includes an insertion portion **352** into which the protrusion **349** is inserted, and a fixing portion **354** which is extended from the insertion portion **352** so as to fix the protrusion **349**. Preferably, as shown in FIG. **10**, the fixing portion **354** is formed to be bent from the insertion portion **352**. When the pipe member **342** is fixed to the inner path **362**, first, the pipe member **342** is put toward the inner path **362** so that the protrusion **349** is inserted into the insertion portion **352** of the slot **350**. Subsequently, the pipe member **342** is rotated so that the protrusion **349** is fixed to the fixing portion **354** of the slot **350**. Accordingly, unexpected separation of the protrusion **349** from the slot **350** is inhibited. Moreover, erroneous assembly of the pipe member **342** to the inner path **362** is inhibited.

[0132] When the pipe member **342** is connected to the inner path **362** as described above, it is preferred that the extended part **348** of the pipe member **342** is arranged perpendicularly to the bottom of the cartridge **300**. This is for minimizing a flowing distance of the water moving through the pipe member **342**, thereby more easily discharging the water.

[0133] To achieve this, it is preferred that when the protrusion **349** of the fixing member is fitted into the fixing portion **354** of the slot **350**, the extended part **348** of the pipe member **342** is set to be located substantially perpendicularly to the bottom of the cartridge **300**.

[0134] In order to use the water held in the cartridge **300** as much as possible, the present invention may be constituted such that the end of the extended part **348** is located as close to the bottom of the cartridge **300** as possible (first embodiment), or the end of the extended part **348** is contacted with the bottom of the cartridge **300** (second embodiment) when the pipe member **342** is connected to the inner path **362**. FIG. **11** is a side view showing an extended part **348***a* according to the first embodiment of the pipe member **342**, and FIG. **12** is a side view showing an extended part **348***b* according to the second embodiment of the pipe member **342**.

[0135] The first embodiment of the pipe member **342** will now be described with reference to FIG. **11**. The pipe member **342** may be formed such that the end of the extended part **348***a* is located adjacent to the bottom of the cartridge **300** when the pipe member **342** is connected to the inner path **362**. In such a case, in order to communicate the interior of the extended part **348***a* with the interior of the cartridge **300**, as shown in FIG. **11**, the end of the extended part **348***a* is positioned at a predetermined gap (C) from the bottom of the cartridge **300**. Preferably, the gap (C) is set to be 1 to 2 mm, so as to smoothly discharge the water near the bottom of the cartridge **300** through the pipe member **342**. However, the gap (C) is not limited to 1 to 2 mm.

[0136] The second embodiment of the pipe member **342** will now be described with reference to FIG. **12**. The pipe member **342** may be formed such that the end of the extended part **348***b* is contacted with the bottom of the cartridge **300**. In such a case, in order to communicate the interior of the extended part **348***b* with the interior of the cartridge **300**, the end portion of the extended part **348***b* is formed with a plurality of holes **344**. Accordingly, the water in the cartridge **300** can flow into the pipe member **342** through the holes **344**, and can be discharged outside through the pipe member **342**. Since the end of the extended part **348***b* is contacted with the bottom of the cartridge **300**, the second embodiment can use a little more water near the bottom of the cartridge **300**, when compared to the above-described first embodiment.

[0137] In a case where the cartridge **300** is selectively connected to the pump **120** as described above, it is preferable to provide the opening/closing unit **380** which permits the water in the cartridge **300** to be discharged only when the cartridge **300** is connected to the pump **120**.

[0138] FIG. **13** is a sectional view showing the opening/closing unit provided in the water path of the cartridge according to the present invention.

[0139] Referring to FIG. **13**, the opening/closing unit **380** includes an opening/closing pin **370** which is mounted in the water path **360** to selectively open or close the water path **360** for communicating the interior of the cartridge **300** with the exterior, and an elastic member **364** to apply an elastic force to the opening/closing pin **370**. The opening/closing pin **370** is illustrated in FIG. **14** in detail.

[0140] The opening/closing pin **370** includes a moving part **374** and an opening/closing part **372** coupled to the moving part **374**. As shown in FIG. **14**, the moving part **374** has blades formed in a substantially cross shape. Water can flow through spaces between the blades of a cross shape. Preferably, the opening/closing part **372** is made of a rubber material.

[0141] An inner sealing member **376** is provided between the moving part **374** and a blocking wall **367** formed in the outer path **366**. An outer sealing member **369** is provided on the outer peripheral surface of the outer path **366**.

[0142] The elastic member **364** applies an elastic force to the opening/closing pin **370** in the water path **360** so that the opening/closing pin **370** is elastically biased to the outer path **366**, and the opening/closing part **372** of the opening/closing pin **370** and the inner sealing member **376** close the outer path **366**. As shown in FIG. **14**, the inner sealing member **376** is formed in a ring shape. The inner sealing member **376** comes into close contact with the blocking wall **367** by the elastic force of the elastic member **364**, and closes the outer path **366**.

[0143] When the connecting port **211** extended from the pump **120** is connected to the outer path **366**, the outer path **366** is inserted into the connecting port **211**, and thus the outer sealing member **369** is sealingly contacted with the inner surface of the connecting port **211**.

[0144] It is preferred that the connecting port **211** is provided with a protrusion at a center portion thereof. When the connecting port **211** and the outer path **366** are connected to each other, the protrusion provided in the connecting port **211** pushes the opening/closing pin **370** toward the interior of the cartridge **300**, and accordingly the opening/closing pin **370** is moved toward the inner path **362** against the elastic force of the elastic member **364**.

[0145] Since the opening/closing pin **370** is moved toward the inner path **362**, a space is generated between the inner sealing member **376** and the blocking wall **367**, and thus water can flow through the spaces between the blades of a cross shape of the moving part **374** and the space between the inner sealing member **376** and the blocking wall **367**.

[0146] It is also preferred that the opening/closing unit **380** is provided with a stopper **390** which inhibits separation of the elastic member **364** when the pipe member **342** is removed. The stopper **390** may be press-fitted in the end portion of the inner path **362**.

[0147] As shown in FIG. **13**, if the stopper **390** is fixed in the end portion of the inner path **362**, one end of the elastic member **364** is supported by the opening/closing pin **370**, and the other end of the elastic member **364** is supported by the stopper **390**. Therefore, even when the pipe member **342** is removed from the inner path **362**, separation of the elastic member **364** from the inner path **362** is inhibited.

[0148] If the stopper **390** is eliminated from the constitution shown in FIG. **13**, one end of the elastic member **364** is supported by the opening/closing pin **370**, and the other end of the elastic member **364** is supported by the pipe member **342** (not by the stopper **390**), as shown in FIG. **11** or **12**.

[0149] Thus, without the stopper **390**, when the pipe member **342** is removed from the inner path **362** to be cleaned or repaired, the other end of the elastic member **364** cannot be supported by the pipe member **342** any more, and as a result the elastic member **364** is separated from the inner path **362** by its own elastic force.

[0150] If the separation of the elastic member **364** occurs whenever the pipe member **342** is removed from the inner path **362**, the elastic member **364** may be easily damaged or missing. In this regard, it is preferable to provide the stopper **390** in the inner path **362**, so as to inhibit separation of the elastic member **364** from the inner path **362** even when the pipe member **342** is removed from the inner path **362**.

[0151] FIG. **15** is a perspective view showing the stopper **390**.

[0152] Referring to FIG. **15**, it is preferred that the stopper **390** has a diameter a little larger than an inner diameter of the inner path **362** so as to be press-fitted in the inner path **362**. Such press-fitting of the stopper **390** in the inner path **362** inhibits the stopper **390** from being easily separated from the inner path **362**.

[0153] The stopper **390** is formed with an opening **392**, through which water can flow.

[0154] Hereinafter, the operation of the laundry dryer as constituted above will be explained briefly.

[0155] Before driving the laundry dryer, a user dismantles the cartridge **300** from the cabinet **10**, and fills water into the cartridge **300**. Then, a user mounts the cartridge **300** to the cabinet **10**.

[0156] If a user operates the laundry dryer to perform a steam supply mode, water is supplied from the cartridge **300** to the steam generating device **200** by the pump **120**. The water in the steam generating device **200** is heated, and steam is supplied to the drum **20**.

[0157] At this time, since the water supply unit **340** is provided in the cartridge **300**, the water held in the cartridge **300**, even near the bottom of the cartridge **300**, can be used as much as possible.

[0158] When the operation of the steam generating device **200** is terminated, the pump **120** is rotated in a direction opposite to the direction in which the pump **120** is rotated to supply the water, so as to collect the residual water in the steam generating device **200** to the cartridge **300**. At this time, a certain amount of water corresponding to a water level between the heater **420** and the water level sensor **520** remains in the steam generating device **200** by the water pipe **500** provided in the steam generating device **200**.

[0159] Even when a user removes the cartridge **300** from the cabinet **10**, backflow of water from the steam generating device **200** to the cartridge **300** is inhibited by the backflow inhibiting means.

[0160] 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.

What is claimed is:

1. A clothes treating apparatus comprising:

a drum to hold laundry;

a steam generating device to supply steam to the drum;

a water supply source to supply water to the steam generating device; and

a backflow inhibiting unit configured to inhibit water from flowing back from the steam generating device when the water supply source is removed.

2. The clothes treating apparatus according to claim **1**, wherein the backflow inhibiting unit is configured as a water supply hose, the water supply hose having an end connected to a water supply port formed at an upper portion of the steam generating device.

3. The clothes treating apparatus according to claim **2**, wherein the water supply port is positioned above a highest water level of the steam generating device.

4. The clothes treating apparatus according to claim **3**, further comprising:

a pump provided between the water supply source and the steam generating device to selectively supply or collect water through the water supply port,

wherein the water supply hose further has the other end connected to an outlet port of the pump.

5. The clothes treating apparatus according to claim **4**, wherein the outlet port of the pump is positioned below the water supply port of the steam generating device.

6. The clothes treating apparatus according to claim **4**, wherein the pump is capable of being rotated in forward and reverse directions.

7. The clothes treating apparatus according to claim **2**, wherein the steam generating device includes a housing formed with the water supply port, and a water pipe having a first end communicating with the water supply port and a second end positioned below the water supply port.

8. The clothes treating apparatus according to claim **7**, wherein the steam generating device further includes a water level sensor to sense a water level in the housing, and

the water pipe has a lower end positioned below a lower end of the water level sensor.

9. The clothes treating apparatus according to claim **7**, wherein the steam generating device further includes a heater, and

the water pipe has a lower end positioned above an upper end of the heater.

10. The clothes treating apparatus according to claim **9**, wherein the housing includes an upper housing formed with the water supply port, and a lower housing mounted with the heater.

11. The clothes treating apparatus according to claim **10**, wherein the lower housing includes a main portion mounted with the heater, and an expanded portion coupled to the upper housing, the expanded portion having a width larger than the main portion.

12. The clothes treating apparatus according to claim **11**, wherein the lower end of the water pipe is positioned on a left side or a right side of the heater.

13. The clothes treating apparatus according to claim **7**, wherein the water pipe is formed integrally with the housing.

14. The clothes treating apparatus according to claim **7**, wherein the water pipe is extended from the water supply port, and is bent downward.

15. The clothes treating apparatus according to claim **1**, further comprising:

a water supply unit capable of supplying water from the water supply source to the steam generating device while leaving little water in the water supply source.

16. The clothes treating apparatus according to claim **15**, wherein the water supply unit includes a pipe member removably connected to a water path through which water is discharged from the water supply source, and a fixing member to selectively fix the pipe member.

17. The clothes treating apparatus according to claim **16**, wherein the pipe member includes a connecting part removably connected to the water path of the water supply source, and an extended part extended from the connecting part.

18. The clothes treating apparatus according to claim **17**, wherein the extended part is bent from the connecting part at a predetermined angle.

19. The clothes treating apparatus according to claim **18**, wherein the angle is substantially 90°.

20. A clothes treating apparatus comprising:

a drum to hold laundry;

a steam generating device including a housing having a water supply port, and a water pipe having a first end communicating with the water supply port and a second end positioned below the water supply port; and

a pump to selectively supply or collect water to/from the steam generating device through the water supply port.

* * * * *