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(54) **CLOTHING DRYING APPARATUS**

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APPAREIL DE SÉCHAGE DE VÊTEMENTS

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EP 3 559 331 B1

Description

[Technical Field]

[0001] Apparatuses and methods consistent with the present invention relate to a clothing drying apparatus, and more particularly, to a dual type clothing drying apparatus in which dryers are disposed in a stacked arrangement.

[Background Art]

[0002] In general, a clothing drying apparatus is an apparatus for drying laundry by applying dry hot air to wet item to be dried (referred to as "laundry" hereinafter) to evaporate moisture of the laundry.

[0003] The related art clothing drying apparatus performs a dry operation by supplying hot air to the inside of a drum with the laundry introduced therein and circulating the hot air. Also, the related art clothing drying apparatus moves the laundry such that hot air may be evenly applied to the entirety of the laundry through rotation of the drum.

[0004] However, because the related art clothing drying apparatus performs a dry operation, regardless of size and amount of the laundry, the same amount of energy as that for drying a large amount of laundry is consumed even when a small amount of laundry is intended to be dried. Also, due to rotation of the drum, the laundry present within the drum may be entangled to cause damage to the laundry such as stretching or tearing a portion of the laundry, and laundry that should retain a shape, such as sneakers, or the like, should be separated from general clothing and dried.

[0005] Also, in the case of implementing a set of dual-clothing drying apparatuses disposed in a stacked manner using the related art clothing drying apparatus, the set of the clothing drying apparatuses becomes too high for an installation space, degrading usability.

[0006] Drying apparatuses stacked with other drying or with washing apparatuses are disclosed e.g. in KR 2014 0058763 A, US 2007/151120 A1, US 2009/320314 A1, US 2004/134088 A1 and US 2011/067457 A1. EP 3 543 394 A1 discloses a dryer / washing machine assembly, in which the drying chamber is independently usable from a washing machine, wherein EP 3 543 394 A1 is a document published after the priority date of the present invention.

[Disclosure]

[Technical Problem]

[0007] The invention overcomes the above disadvantages and other disadvantages not described above. Also, the present invention is not required to overcome the disadvantages described above, and an exemplary embodiment of the present disclosure may not overcome any of the problems described above.

[Technical Solution]

[0008] The present invention provides a clothing drying apparatus with improved usability by minimizing a restriction in an installation space, while maintaining dry quality, by applying a new dry system flow channel (or flow path) to a dual-clothing drying apparatus including both an integral type in which upper and lower portions are integrated and a separation type in which upper and lower portions are separated.

[0009] According to the invention of the present disclosure, a clothing drying apparatus includes: a first drying apparatus configured to supply hot air to an inside of a rotary drum of the first drying apparatus to dry laundry in the rotary drum and a second drying apparatus configured to be coupled to the first drying apparatus, wherein the second drying apparatus includes: a dry chamber configured to receive laundry and including a discharge hole; a hot air unit configured to supply hot air to an inside of the dry chamber through the discharge hole; and a cover shelf disposed in the dry chamber and having a plurality of through holes configured to allow the hot air, supplied by the hot air unit to a lower side of the cover shelf, to flow, through the plurality of through holes, from the lower side of the cover shelf to an upper side of the cover shelf to dry the laundry received in the dry chamber and supported on the upper side of the cover shelf, wherein the cover shelf includes a plurality of ribs communicating with the plurality of through holes and protruding toward a bottom surface of the dry chamber, and wherein a height of the plurality of ribs decreases toward the discharge hole.

[0010] The dry chamber may further include a plurality of guide protrusions protruding from a bottom surface of the dry chamber and configured to change flow of the hot air supplied by the hot air unit below the cover shelf.

[0011] The discharge hole may be disposed to be adjacent to the bottom surface and each of the plurality of guide protrusions may include a sloped surface upwardly sloped from the bottom surface of the dry chamber.

[0012] Each of the plurality of guide protrusions may be disposed to be adjacent to a side wall of the dry chamber adjacent to the bottom surface and configured to guide the hot air supplied by the hot air unit moving along the side wall toward the cover shelf.

[0013] The sloped surface may be disposed to be upwardly sloped toward the inner side of the dry chamber.

[0014] The plurality of guide protrusions may be disposed respectively to be adjacent to corner parts of the bottom surface and the sloped surface of each of the plurality of guide protrusions may be upwardly sloped toward a center of the bottom surface.

[0015] The sloped surface may include an inlet border connected to the bottom surface and configured to allow the hot air supplied by the hot air unit to be introduced therethrough and an outlet border higher than the inlet

border and configured to allow the introduced hot air to be discharged therethrough, and the sloped surface may have a radial shape increasing in width from the inlet border to the outlet border.

[0016] The side wall may include a front surface, a rear surface facing the front surface, and first and second side surfaces connecting the front surface and the rear surface, and the discharge hole may be formed at a central lower end portion of the rear surface and configured to discharge the hot air supplied by the hot air unit toward the front surface.

[0017] The plurality of guide protrusions may include first and second guide protrusions adjacent to first and second corner parts formed between the front surface and the first and second side surfaces, respectively.

[0018] The first and second guide protrusions may include first and second sloped surfaces disposed to be upwardly sloped toward the center of the bottom surface and outlet borders of the first and second sloped surfaces may have an arc shape convex toward the center of the bottom surface.

[0019] The dry chamber may include a first guide member protruding toward the discharge hole from a central portion of the front surface and configured to guide hot air from a direction toward the front surface to a direction toward the first and second side surfaces.

[0020] The plurality of guide protrusions may further include a third guide protrusion disposed on a rear side of the first guide protrusion and a fourth guide protrusion disposed on a rear side of the second guide protrusion.

[0021] The third guide protrusion may be disposed to be adjacent to the first side surface to guide hot air moving along the first side surface toward the cover shelf, and the fourth guide protrusion may be disposed to be adjacent to the second side surface to guide hot air moving along the second side surface toward the cover shelf.

[0022] The third and fourth guide protrusions may be disposed to be adjacent to third and fourth corner parts formed between the rear surface and the first and second side surfaces.

[0023] The third and fourth guide protrusions may include third and fourth sloped surfaces disposed to be upwardly sloped toward the center of the bottom surface, and outlet borders of the third and third sloped surfaces may have an arc shape convex toward the center of the bottom surface.

[0024] The bottom surface may include a sloped part upwardly sloped in a direction toward the front surface from the rear surface.

[0025] The bottom surface may be downwardly sloped toward the first and second side surfaces with respect to a central line connecting the rear surface and the front surface.

[0026] The dry chamber may include first and second reservoirs adjacent to the rear surface and recessed downwardly from the bottom surface.

[0027] The dry chamber may include an exhaust hole extending in a lengthwise direction of the rear surface, and the second drying apparatus may further include an exhaust duct coupled to the exhaust hole and configured to discharge hot air from the dry chamber through the exhaust hole.

[0028] The exhaust duct may include a first opening connected to the exhaust hole, a second opening disposed to face the first opening and configured to discharge hot air introduced into the first opening, and a bypass hole formed adjacent to the hot air unit.

[0029] The bypass hole may be disposed to be adjacent to the first opening.

[0030] The clothing drying apparatus may further include a pair of injection units respectively disposed on both sides of the dry chamber and configured to inject hot air toward an inside of the dry chamber.

[0031] The pair of injection units may include a duct part extending in a discharge direction of the discharge hole; and a plurality of injection nozzles disposed on the duct part in a length direction of the duct part.

[0032] The duct part may include an intake duct having an intake formed at one end thereof and an injection duct connected to the other end of the intake duct, wherein the intake may be disposed below the cover shelf, the injection duct may be disposed above the cover shelf and extending in the discharge direction of the discharge hole, and the plurality of injection nozzles may be disposed in a length direction of the injection duct.

[0033] The injection nozzle may protrude toward the inside of the dry chamber from the duct part and include a first nozzle pipe having a sectional area of a flow channel formed therein is gradually decreased; and a second nozzle pipe coupled to a side surface of the first nozzle pipe.

[0034] The second drying apparatus may include a rack member disposed above the cover shelf within the dry chamber and having a plurality of parallel poles.

[0035] The dry chamber may include an upwardly opened opening, and the second drying apparatus may include a door opening and closing the opening of the dry chamber.

[0036] Additional and/or other aspects and advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

[Description of Drawings]

[0037] The above and/or other aspects of the present disclosure will be more apparent by describing certain exemplary embodiments of the present disclosure with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view illustrating an appearance of a clothing drying apparatus according to an exemplary embodiment of the present disclosure;

FIG. 2 is an exploded perspective view of the clothing drying apparatus illustrated in FIG. 1;

FIG. 3 is a perspective view illustrating a state in which a second door of a second drying apparatus illustrated in FIG. 2 is open;

FIG. 4 is an exploded perspective view of the second drying apparatus illustrated in FIG. 2;

FIG. 5 is an exploded perspective view illustrating a configuration in which a dry chamber, a hot air unit, and an exhaust duct of the second drying apparatus illustrated in FIG. 4 are disassembled;

FIG. 6 is a front perspective view of the dry chamber illustrated in FIG. 5;

FIG. 7 is a rear perspective view of the dry chamber illustrated in FIG. 6;

FIG. 8 is a plan view of the dry chamber illustrated in FIG. 6;

FIG. 9 is a cross-sectional view of the dry chamber, taken along line I-I of FIG. 6;

FIG. 10 is a cross-sectional view of the dry chamber, taken along line II-II of FIG. 6;

FIG. 11 is a perspective view of a cover shelf illustrated in FIG. 5;

FIG. 12 is a bottom perspective view of the cover shelf illustrated in FIG. 11;

FIG. 13 is a cross-sectional view illustrating a configuration in which a cover shelf is coupled to the dry chamber illustrated in FIG. 9;

FIG. 14 is a front view of an exhaust duct illustrated in FIG. 5;

FIG. 15 is a side view of the exhaust duct illustrated in FIG. 14;

FIG. 16 is a bottom perspective view of a dry chamber to which the hot air unit and the exhaust duct illustrated in FIG. 4 are coupled, viewed from a rear side.

FIG. 17 is a perspective view illustrating a configuration in which a pair of injection units are coupled to the dry chamber illustrated in FIG. 6;

FIG. 18 is a perspective view of the injection unit illustrated in FIG. 17;

FIG. 19 is a perspective view illustrating a modification of an injection nozzle of the injection unit illustrated in FIG. 18;

FIG. 20 is a cross-sectional view of the injection unit, taken along line III-III of FIG. 19;

FIG. 21 is a perspective view illustrating a modification of the pair of injection units illustrated in FIG. 17; and

FIG. 22 is a perspective view of the injection unit illustrated in FIG. 21.

[Best Mode]

[0038] The exemplary embodiments of the present disclosure will now be described in greater detail with reference to the accompanying drawings. In the following description, the same drawing reference numerals are used for the same elements even in different drawings. Thus, description of the same elements is not repeated.

[0039] Hereinafter, exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. The exemplary embodiments most appropriate to help understand the technical features of the present disclosure will be described, and the technical features of the present disclosure are not limited by the described exemplary embodiments and merely illustrate the implementation of the present disclosure through the exemplary embodiments described hereinafter.

[0040] Thus, the present disclosure may be variably modified within the scope of the present invention as defined by the claims through the exemplary embodiments described below, and such modifications are within the scope of the present disclosure. In order to help understand the exemplary embodiments described hereinafter, similar reference numerals are used for relevant components among the components having the same function in the respective exemplary embodiments in the accompanying drawings.

[0041] FIG. 1 is a perspective view illustrating an appearance of a clothing drying apparatus 1 according to an exemplary embodiment of the present disclosure, and FIG. 2 is an exploded perspective view of the clothing drying apparatus 1 illustrated in FIG. 1.

[0042] Referring to FIGS. 1 and 2, the clothing drying apparatus 1 according to an exemplary embodiment of the present disclosure includes a first drying apparatus 10 and a second drying apparatus 20.

[0043] Hereinafter, for the purposes of description, with respect to the clothing drying apparatus 1 illustrated in FIG. 1, an X axis direction is defined as a front side, a direction opposite to the front side is defined as a rear side, and a horizontal direction (Y axis direction) and a vertical direction (Z axis direction) are defined on the basis of the front side.

[0044] The first drying apparatus 10 includes a first case 11 forming an appearance of the first drying apparatus 10 and a first door 12 opening and closing an opening formed on a front surface of the first case 11. The

first case 11 has a substantially hexahedral shape.

[0045] A drum (not shown) accommodating laundry, a driver (not shown) rotating the drum, a heater (not shown) supplying hot air to the inside of the drum, and a blow fan (not shown) are disposed within the first case 11.

[0046] The drum of the first drying apparatus 10 has a cylindrical shape having an opening opened to one side and is disposed to be connected to an opening of the first case 11.

[0047] In the first drying apparatus 10, wet laundry may be introduced into the inside of the drum through the first door 12, and as hot air is introduced to the inside of the rotating drum from a heater and a blow fan, the laundry may be dried.

[0048] The heater disposed within the first case 11 may include an electric heater heating air introduced from outside the first case 11 using electrical resistance heating and a gas heater heating air introduced from outside the first case 11 using heat generated through gas combustion.

[0049] However, because an interior portion of the first drying apparatus 10 has as similar structure as that of the related art drying apparatus, a detailed description thereof will be omitted.

[0050] As illustrated in FIGS. 1 and 2, the second drying apparatus 20 is coupled to an upper portion of the first drying apparatus 10.

[0051] The second drying apparatus 20 may dry wet laundry, separately from the first drying apparatus 10.

[0052] The second drying apparatus 20 includes a second case 21 forming an exterior, an operating part 22 disposed on a front surface of the second case 21, and a second door 23 disposed on an upper surface of the second case 21. The second case 21 may have a substantially hexahedral shape and has a height from a lower portion of the second case 21 to an upper portion of the second case 21 less than that of the first case 11.

[0053] The second case 21 may have an opening opened to an upper side, and laundry may be introduced to an internal accommodation space (24S of FIG. 3) through the second door 23.

[0054] As illustrated in FIGS. 1 and 2, the second drying apparatus 20 may have a size smaller than that of the first drying apparatus 10. For example, because the second drying apparatus 20 does not include a separate drum therein, the second drying apparatus 20 does not have a separate driver for rotating the drum, and thus, a size thereof may be smaller than that of the first drying apparatus 10. Accordingly, the clothing drying apparatus 1 may be compact in overall size and structure.

[0055] In the clothing drying apparatus 1 according to an exemplary embodiment of the present disclosure, laundry may be dried simultaneously through the first and second drying apparatuses 10 and 20, or may be dried by selecting any one of the first and second drying apparatuses 10 and 20.

[0056] An accommodation space in which the laundry may be dried in the second drying apparatus 20 may be smaller than an accommodation space within the drum of the first drying apparatus 10. Thus, a large amount of laundry may be dried through the first drying apparatus 10, and a small amount of laundry may be dried through the second drying apparatus 20. Accordingly, energy consumed using the second drying apparatus 20 may be smaller than energy consumed using the first drying apparatus 10.

[0057] Thus, in the case where a large amount of laundry is intended to be dried, the first drying apparatus 10 may be used, and in case where a small amount of laundry is intended to be dried, the second drying apparatus 20 may be used.

[0058] Also, general laundry may be dried using the first drying apparatus 10, and laundry requiring gentler treatment may be dried using the second drying apparatus 20, thereby preventing damage to the laundry that may occur during a drying process.

[0059] Because the first and second drying apparatuses 10 and 20 are selectively used according to sizes, types, and amounts of laundry, energy efficiency according to the use of the clothing drying apparatus 1 may be enhanced, and damage to the laundry which may occur during a drying process may be prevented as well. A specific structure of the second drying apparatus 20 and a dry scheme of laundry will be described hereinafter.

[0060] Referring to FIG. 2, a mounting part 11S to which the second drying apparatus 20 may be coupled is provided on an upper surface of the first case 11.

[0061] The mounting part 11S may have a shape corresponding to a shape of a lower surface of the second drying apparatus 20, whereby the second drying apparatus 20 may be stably coupled to an upper portion of the first drying apparatus 10.

[0062] The operating part 22 includes an input part (not shown) receiving an operation command of a user, a display part (not shown) displaying an operational state of the clothing drying apparatus 1, and a controller (not shown).

[0063] The operating part 22 disposed on a front surface of the second case 21 may be electrically connected to the first drying apparatus 10 through a signal, and accordingly, both the first drying apparatus 10 and the second drying apparatus 20 may be controlled through the single operating part 22 disposed on the front surface of the second case 21.

[0064] The operating part 22 may input an operating command to each of the first and second drying apparatuses 10 and 20 through the input part, and display an operational state of each of the first and second drying apparatuses 10 and 20 through the display part.

[0065] The first drying apparatus 10 and the second drying apparatus 20 may be integrally coupled, or the first and second drying apparatuses 10 and 20 may be configured as modules so that the first drying apparatus 10 and the second drying apparatus 20 may be coupled or separated as necessary.

[0066] Also, the second drying apparatus 20 may be

coupled to a lower portion, rather than to the upper portion, of the first drying apparatus 10.

[0067] In an example, which is not part of the invention, the first drying apparatus 10 of the clothing drying apparatus 1 described above may be replaced with a washing apparatus such as a drum type washing machine.

[0068] In an example, which is not part of the invention, the first drying apparatus 10 may be replaced with a washing apparatus including a washing tub rotating within a water tank, and by coupling the second drying apparatus 20 to an upper portion of the washing apparatus, the aforementioned clothing drying apparatus 1 may be replaced with a clothing processing apparatus capable of performing both washing and drying on clothes within the single device.

[0069] For example, the washing apparatus may wash laundry, and washing-finished wet laundry may be dried through the second drying apparatus 20 coupled to the washing apparatus.

[0070] In addition, recently, washing apparatuses allowing both washing and drying to be performed within a washing tub have also been commonly used, and thus, it may also be configured such that washing and drying a large amount of laundry may be sequentially performed through the washing apparatus and drying a small amount of laundry may be performed through the second drying apparatus 20 coupled to an upper portion of the washing apparatus.

[0071] FIG. 3 is a perspective view illustrating a state in which a second door 23 of a second drying apparatus 20 illustrated in FIG. 2 is open.

[0072] Referring to FIG. 3, the second case 21 may include an opening opened to an upper side, and the second door 23 may be hinge-coupled to an upper portion of the second case 21 to open and close the opening of the second case 21.

[0073] The second door 23 includes a main door 231 hinge-coupled to the second case 21 and a sub-door 232 hinge-coupled to the main door 231. The main door 231 is coupled to a rear end portion of the second case 21, and the sub-door 232 is disposed on a front side of the main door 231.

[0074] The main door 231 may include a pair of main hinge parts 2311 respectively disposed on opposing sides of one end portion thereof, and as the pair of main hinge parts 2311 are pivotably coupled to a rear end portion at an upper side of the second case 21, the main door 231 may rotate to open and close the opening of the second case 21.

[0075] Also, the sub-door 232 may be coupled to the other end portion opposite to the one end portion coupled to the second case 21 of the main door 231 to pivot through a pair of sub-hinge parts 2321.

[0076] Accordingly, the sub-door 232 coupled to the main door 231 may rotate, and as the user lifts the sub-door 232 disposed on a front side of the main door 231, the main door 231 may rotate through the sub-hinge parts 2321 and be opened. Accordingly, the user may easily open the second door 23.

[0077] FIG. 4 is an exploded perspective view of the second drying apparatus 20 illustrated in FIG. 2, and FIG. 5 is an exploded perspective view illustrating a configuration in which a dry chamber 24, a hot air unit 25, and an exhaust duct 26 of the second drying apparatus 20 illustrated in FIG. 4 are disassembled.

[0078] Hereinafter, a configuration of the second drying apparatus 20 will be described in detail with reference to FIGS. 3 to 5.

[0079] As illustrated in FIGS. 3 to 5, the second drying apparatus 20 includes a second case 21, a display part 22, a second door 23, a dry chamber 24, a hot air unit 25, an exhaust duct 26, a cover shelf 27, and a rack member 28.

[0080] The second case 21 includes an internal space 21S, and the dry chamber 24, the hot air unit 25, the exhaust duct 26, the cover shelf 27, and the rack member 28 may be disposed on an inner side of the second case 21.

[0081] As illustrated in FIGS. 4 and 5, the second case 21 may include a main case 2101 having a space 21S in which the dry chamber 24, the hot air unit 25, and the exhaust duct 26 are disposed and a rear case 2102 coupled to a rear side of the main case 2101 to cover the hot air unit 25 and the exhaust duct 26 coupled to the rear surface of the dry chamber 24.

[0082] The dry chamber 24 may be a hexahedral basket having an accommodation space 24S to which laundry is introduced, and the laundry may be introduced to the accommodation space 24S through the opening opened to an upper side.

[0083] Also, the opening of the dry chamber 24 may be opened and closed through the second door 23 described above.

[0084] The dry chamber 24 may include a bottom surface 241 and a side wall 242 surrounding the bottom surface 241, and the accommodation space 24S may be located between the bottom surface 241 and the side wall 242.

[0085] Discharge holes 2401H and 2402H injecting hot air to an inner side of the dry chamber 24 are provided on a rear surface of the dry chamber 24, and an exhaust hole 2403H allowing hot air which has finished drying the laundry to be discharged therethrough is provided above the discharge holes 2401H and 2402H.

[0086] As illustrated in FIGS. 4 and 5, the discharge holes 2401H and 2402H may be formed at a central lower end portion of a rear surface (2422 of FIG. 6) of the dry chamber 24.

[0087] Also, the exhaust hole 2403H may extend in a length direction of the rear surface 2422 and may be longer than the discharge holes 2401H and 2402H. Also, the exhaust hole 2403H is formed on a rear surface 2422 such that it is disposed on an upper side of the cover shelf 27.

[0088] The dry chamber 24 may be formed of a synthetic resin material to facilitate formation of multiple com-

ponents as provided. A specific configuration of the dry chamber 24 will be described with reference to FIGS. 6 to 10 hereinafter.

[0089] The hot air unit 25 includes a heater (not shown) and a blow fan (not shown) disposed therein, and includes blow holes 2501H and 2502H through which hot air is discharged and an intake 2503H (2504H of FIG. 16) intaking ambient air.

[0090] The hot air unit 25 may include a pair of intakes 2503H and 2504H respectively formed on opposing sides thereof, that intake ambient air through the pair of intakes 2503H and 2504H, heat the intaken air through a heater, and subsequently inject heated hot air from the blow holes 2501H and 2502H to an inner side of the dry chamber 24 through the blow fan.

[0091] Also, when the hot air within the hot air unit 25 is discharged from the blow holes 2501H and 2502H, pressure within the hot air unit 25 may be lower than outside the hot air unit 25, and thus, ambient air may be easily intaken through the pair of intakes 2503H and 2504H.

[0092] The hot air unit 25 is coupled to a rear surface of the dry chamber 24, and the discharge holes 2401H and 2402H of the dry chamber 24 and the blow holes 2501H and 2502H of the hot air unit 25 are connected to each other. Accordingly, hot air heated through the heater may be discharged to the inner side of the dry chamber 24 through the discharge holes 2501H and 2402H of the dry chamber 24.

[0093] The hot air unit 25 is disposed within the second case 21. The second case 21 includes a blow hole 2102H disposed on a rear surface of the second case 21 to intake ambient air to the inside of the second case 21, and discharge hot air which has finished drying the laundry within the dry chamber 24 to the outside.

[0094] In detail, the blow hole 2102H may be formed on a rear surface of the rear case 2102. The blow hole 2102H has a grill shape having a plurality of through holes, and the plurality of through holes may be disposed in a width direction on the rear surface of the rear case 2102.

[0095] The pair of intakes 2503H and 2504H formed on both ends of the hot air unit 25 may be disposed to be adjacent to both end portions of the blow hole 2102H of the rear case 2102, whereby ambient air introduced from the both end portions of the blow hole 2102H may be easily intaken to the pair of intakes 2503H and 2504H of the hot air unit 25.

[0096] Also, a second opening 2602H (to be described hereinafter) of the exhaust duct 26 is disposed to be adjacent to a central portion of the blow hole 2102H. Accordingly, hot air discharged from the second opening 2602H of the exhaust duct 26 may be discharged to the outside of the second drying apparatus 20 through the central portion of the blow hole 2102H.

[0097] A specific configuration of the exhaust duct 26 will be described in detail with reference to FIGS. 14 to 16.

[0098] Referring to FIGS. 3 to 5, the cover shelf 27 and the rack member 28 are disposed within the dry chamber 24.

[0099] The cover shelf 27 is disposed above the discharge holes 2401H and 2402H within the dry chamber 24 and faces a bottom surface 241 of the dry chamber 24.

[0100] The cover shelf 27 may include a shelf body 271 having a plate shape corresponding to a shape of the bottom surface 241 of the dry chamber 24 and a plurality of through holes 272 formed on the shelf body 271, and upwardly inject hot air from below the cover shelf 27 through the plurality of through holes 272.

[0101] Accordingly, the wet laundry disposed on an upper side of the cover shelf 27 may be dried by hot air upwardly injected through the plurality of through holes 272.

[0102] In detail, the cover shelf 27 is disposed between the discharge holes 2401H and 2402H and the exhaust hole 2403H within the dry chamber 24. Accordingly, the accommodation space 24S of the dry chamber 24 may be located above the cover shelf 27.

[0103] Hot air, which is discharged to an inner side of the dry chamber 24 through the discharge holes 2401H and 2402H to flow between the bottom surface 241 of the dry chamber 24 and the cover shelf 27, may pass through the plurality of through holes 272 and be injected to an upper side of the cover shelf 27.

[0104] The plurality of through holes 272 of the cover shelf 27 are formed in the entire region of the shelf body 271, and thus, hot air upwardly injected through the plurality of through holes 272 of the cover shelf 27 may be injected to the entire region of the accommodation space 24S at the upper side of the cover shelf 27.

[0105] Wet laundry to be dried is introduced to an upper portion of the cover shelf 27. Hot air upwardly injected through the plurality of through holes 272 of the cover shelf 27 may be directly injected to the laundry introduced to the upper portion of the cover shelf 27 to absorb moisture included in the laundry.

[0106] In addition, hot air injected through the plurality of through holes 272 may circulate within the accommodation space 24S on an upper side of the cover shelf 27 to easily absorb moisture from the entirety of the laundry.

[0107] Also, the rack member 28 may be disposed on an upper side of the cover shelf 27.

[0108] The rack member 28 includes a tray 281 and a plurality of poles 282 coupled to be parallel to each other on an inner side of the tray 281.

[0109] The tray 281 may have a shape corresponding to a shape of the bottom surface 241 of the dry chamber 24. For example, the tray 281 may have a quadrangular annular shape corresponding to a shape of edges of the bottom surface 241 of the dry chamber 24, and may be coupled to the side wall 242 of the dry chamber 24 from an upper side of the cover shelf 27.

[0110] The wet laundry introduced to the dry chamber 24 may be placed on the plurality of poles 282. Accordingly, the laundry placed on the plurality of poles 282 may be disposed to be spaced apart from the cover shelf 27

at a predetermined interval. That is, the laundry placed on the plurality of poles 282 may be held in a space above the cover shelf 27 within the dry chamber 27.

[0111] Hot air upwardly injected from the plurality of holes 272 of the cover shelf 27 may pass through a predetermined space formed above the cover shelf 27 and may be injected to a lower side of the laundry held on the plurality of poles 282. Accordingly, hot air may be uniformly applied to the laundry held on the plurality of poles 282, effectively drying the laundry.

[0112] In addition, hot air discharged from the plurality of through holes 272 of the cover shelf 27 may circulate within the dry chamber 24, and the circulating hot air may be applied to the laundry held on the plurality of poles 282 in every direction, further effectively drying the laundry.

[0113] Also, because the rack member 28 includes the plurality of poles 282, a plurality of pieces of laundry may be held on the plurality of poles 282, respectively, easily drying the plurality of pieces of laundry. For example, a relatively small item of laundry such as socks, or handkerchiefs may be held on the plurality of poles 282, whereby hot air may be easily applied to the entire area of the laundry.

[0114] Also, the rack member 28 may be detachably coupled to the inside of the dry chamber 24. By configuring the rack member 28 to be smaller than a size of the opening of the dry chamber 24, the rack member 28 may be selectively disposed within the dry chamber 24.

[0115] For example, in case where laundry is required to be rapidly dried by directly injecting hot air to the entire area of cloth at a high speed, the laundry may be disposed on an upper surface of the cover shelf 27 without the rack member 28, whereby hot air may be directly injected to the laundry through the plurality of through holes 271. Also, as described above, by disposing the rack member 28 within the dry chamber 24 and holding laundry on the rack member 28, circulation of hot air within the dry chamber 24 may be increased, and accordingly, circulating hot air may be applied to the entire area of the laundry held on the rack member 28.

[0116] However, the aforementioned rack member 28 may be replaced by various structures in which laundry may be held to be spaced apart from an upper portion of the cover shelf 27 at a predetermined interval.

[0117] FIG. 6 is a front perspective view of the dry chamber 24 illustrated in FIG. 5, FIG. 7 is a rear perspective view of the dry chamber 24 illustrated in FIG. 6, and FIG. 8 is a plan view of the dry chamber 24 illustrated in FIG. 6.

[0118] Hereinafter, a detailed configuration of the dry chamber 24 will be described with reference to FIGS. 6 to 8.

[0119] The dry chamber 24 may include a plurality of components circulating hot air discharged through the discharge holes 2401H and 2402H and guiding hot air toward the cover shelf 27, whereby an amount and strength of hot air injected to the laundry through the plurality of through holes 272 of the cover shelf 27 may be increased and a distribution of hot air injected through the plurality of through holes 272 may be uniformly formed.

[0120] In FIG. 8, flow of hot air circulating between the bottom surface 241 of the dry chamber 24 and the cover shelf 27 is indicated by the arrows F.

[0121] As described above, the dry chamber 24 may have a quadrangular basket shape having the upwardly opened accommodation space 24S, and include the bottom surface 241 forming an appearance and the side wall 242 surrounding the bottom surface 241.

[0122] In more detail, the side wall 242 includes a front surface 2421 disposed on a front side, a rear surface 2422 facing the front surface 2421, and first and second side surfaces 2423 and 2424 connecting the front surface 2421 and the rear surface 2422.

[0123] As described above, the discharge holes 2401H and 2402H and the exhaust hole 2403H may be formed on the rear surface 2422 of the dry chamber 24, and the discharge holes 2401H and 2402H may be formed at a central lower end portion of the rear surface 2422 and discharge hot air toward the front surface 2421 of the dry chamber 24.

[0124] In addition, the discharge holes 2401H and 2402H may be provided in plurality and, as illustrated in FIG. 6, the discharge holes 2401H and 2402H may include a first discharge hole 2401H and a second discharge hole 2402H disposed on both sides with respect to the center of the rear surface 2422. Also, the hot air unit 25 may include the first and second blow holes 2501H and 2502H respectively coupled to the first and second discharge holes 2401H and 2402H.

[0125] The first and second discharge holes 2401H and 2402H may be disposed to be adjacent to each other at a central lower end portion of the rear surface 2422 and discharge hot air toward the central lower end portion of the front surface 2421. For example, the first and second discharge holes 2401H and 2402H may be disposed on both sides with respect to a central line CL connecting the front surface 2421 and the rear surface 2422 on the bottom surface 241 to discharge hot air from both sides with respect to the central line CL toward the front surface 2421.

[0126] Thus, as illustrated in FIG. 8, hot air F discharged from the first discharge hole 2401H movers to the front surface 2421 along a side of the central line CL adjacent to the first side surface 2423 and hot air F discharged from the second discharge hole 2402H moves to the front surface 2421 along a side of the central line CL adjacent to the second side surface 2424. Accordingly, hot air F injected from the first and second discharge holes 2401H and 2402H may circulate along the bottom surface 24 and may be upwardly injected uniformly through the plurality of through holes 272 of the cover shelf 27.

[0127] The dry chamber 24 includes a plurality of guide protrusions 2431, 2432, 2433, and 2434 protruding from

the bottom surface 241 to change a flow of hot air below the cover shelf 27.

[0128] The plurality of guide protrusions 2431, 2432, 2433, and 2434 include sloped surfaces 24310, 24320, 24330, and 24340 upwardly sloped from the bottom surface 241, respectively.

[0129] As described above, because the discharge holes 2401H and 2402H are disposed on the rear surface 2422 and adjacent to the bottom surface 241 and inject hot air toward the front surface 2421, hot air injected from the display holes 2401H and 2402H is changed in a path through the sloped surfaces 24310, 24320, 24330, and 24340 of the plurality of guide protrusions 2431, 2432, 2433, and 2434, and is upwardly guided toward the cover shelf 27.

[0130] The plurality of guide protrusions 2431, 2432, 2433, and 2434 may change a flow of hot air moving between the bottom surface 241 of the dry chamber 24 and the cover shelf 27 to thereby circulate hot air below the cover shelf 27.

[0131] Also, because hot air circulated through the plurality of guide protrusions 2431, 2432, 2433, and 2434 is upwardly guided uniformly in the entire area below the cover shelf 27, strength of hot air upwardly injected through the plurality of through holes 272 of the cover shelf 27 may become uniform.

[0132] The plurality of guide protrusions 2431, 2432, 2433, and 2434 may be disposed on the bottom surface 241 of the dry chamber 24 and adjacent to the side wall 242.

[0133] Hot air injected toward the front surface 2421 from the discharge holes 2401H and 2402H formed on the rear surface 2422 of the dry chamber 24 may be reflected from the front surface 2421 or changed in flow in a direction toward the first and second side surfaces 2423 and 2424 along the front surface 2421. Also, hot air moving in a direction toward the first and second side surfaces 2423 and 2424 along the front surface 2421 may be changed in direction and move toward the rear side along the first and second side surfaces 2423 and 2424.

[0134] In this manner, hot air moving in a horizontal direction along the side wall 242 may be upwardly guided toward the cover shelf 27 through the plurality of guide protrusions 2431, 2432, 2433, and 2434 disposed to be adjacent to the side wall 242. Accordingly, because hot air below the cover shelf 27 circulates along the entire area of the bottom surface 241, an amount and strength of hot air upwardly injected from the plurality of through holes 272 of the cover shelf 27 may be uniform and increased to increase drying performance of the laundry.

[0135] The respective sloped surfaces 24310, 24320, 24330, and 24340 of the plurality of guide protrusions 2431, 2432, 2433, and 2434 disposed to be adjacent to the side wall 242 of the dry chamber 24 may be upwardly sloped toward the inner side of the dry chamber 24. Thus, hot air moving along the side wall 242 of the dry chamber 24 may be upwardly guided toward the inner side of the dry chamber 24 and more easily circulate.

[0136] In addition, the plurality of guide protrusions 2431, 2432, 2433, and 2434 are disposed to be adjacent to respective corner parts 2411, 2412, 2413, and 2414, respectively, and sloped surfaces 24310, 24320, 24330, and 24340 of the plurality of guide protrusions 2431, 2432, 2433, and 2434 may upwardly be sloped toward the center of the bottom surface 241.

[0137] Accordingly, hot air reduced in flow rate as it collides with the corner of the side wall adjacent to the corner parts 2411, 2412, 2413, and 2414 of the bottom surface 241 may be upwardly guided toward the center of the bottom surface 241 and hot air may be further circulated below the cover shelf 27.

[0138] Hereinafter, a detailed structure of the plurality of guide protrusions 2431, 2432, 2433, and 2434 will be described.

[0139] As illustrated in FIGS. 6 to 8, the plurality of guide protrusions 2431, 2432, 2433, and 2434 include first to fourth guide protrusions 2431, 2432, 2433, and 2434 disposed to be adjacent to the corner parts 2411, 2412, 2413, and 2414 of the bottom surface 241, respectively.

[0140] In detail, the bottom surface 241 includes first and second corner parts 2411 and 2412 formed between the front surface 2421 and the first and second side surfaces 2423 and 2424.

[0141] The first guide protrusion 2431 is disposed to be adjacent to the first corner part 2411, and the second guide protrusion 2432 may be disposed to be adjacent to the second corner part 2412, and the first guide protrusion 2431 and the second guide protrusion 2432 may be disposed to be symmetrical with respect to the central line CL of the bottom surface 241.

[0142] The first and second guide protrusions 2431 and 2432 include first and second sloped surfaces 24310 and 24320, respectively, and the first and second sloped surfaces 24310 and 24320 are disposed to be upwardly sloped toward the center of the bottom surface 241.

[0143] Accordingly, flow of hot air which may be stagnant in the vicinity of the first and second corner parts 2411 and 2412 may be changed toward the center of the bottom surface 241 and spread to increase circulation of hot air, and an even larger amount of hot air may be effectively upwardly guided toward the cover shelf 27.

[0144] The first and second sloped surfaces 24310 and 24320 include inlet borders 24311 and 24321 connected to the bottom surface 241 to allow hot air flowing along the bottom surface 241 to be introduced therethrough and outlet borders 24312 and 24322 disposed to be higher than the inlet borders 24311 and 24321 and allowing hot air introduced to the inlet borders 24311 and 24321 to be discharged therethrough, respectively.

[0145] The inlet borders 24311 and 24321 and the outlet borders 24312 and 24322 may be disposed to face each other.

[0146] The first and second sloped surfaces 24310 and 24320 may have a radial shape having a width increased

from the inlet borders 24311 and 24321 toward the outlet borders 24312 and 24322 and may have a substantially fan shape, respectively.

[0147] Thus, hot air introduced to the inlet borders 24311 and 24312 of the first and second sloped surfaces 24310 and 24320 may be upwardly guided along the first and second sloped surfaces 24310 and 24320 and spread along the first and second sloped surfaces 24310 and 24320 and may be discharged from the outlet borders 24312 and 24322, respectively.

[0148] The respective outlet borders 24312 and 24322 of the first and second sloped surfaces 24310 and 24320 may have an arc shape convex toward the center of the bottom surface 241, and the inlet borders 24311 and 24321 may also have an arc shape convex toward the center of the bottom surface 241.

[0149] Accordingly, hot air may easily be introduced to the respective inlet borders 24311 and 24321 of the first and second sloped surfaces 24310 and 24320, and hot air which is upwardly guided, while being spread along the first and second sloped surfaces 24310 and 24320, may be radially discharged from the outlet borders 24312 and 24322, respectively.

[0150] Also, the respective inlet borders 24311 and 24312 of the first and second sloped surfaces 24310 and 24320 may be disposed to be spaced apart from the front surface 2421 at a predetermined interval. Accordingly, hot air which is reflected from the front surface 2421 of the dry chamber 24 and moves along the front surface 2421 in a direction toward the first and second side surfaces 2423 and 242 may easily be introduced to the inlet borders 24311 and 24321 of the first and second sloped surfaces 24310 and 24320, respectively.

[0151] Also, third and fourth guide protrusions 2433 and 2434 are disposed on rear sides of the first and second guide protrusions 2431 and 2432, respectively.

[0152] As illustrated in FIGS. 6 to 8, the third guide protrusion 2433 is disposed to be adjacent to the first side surface 2423 on the rear side of the first guide protrusion 2431, and the fourth guide protrusion 2434 is disposed to be adjacent to the second side surface 2424 on the rear side of the second guide protrusion 2432.

[0153] The third and fourth guide protrusions 2433 and 2434 include third and fourth sloped surfaces 24330 and 24340 upwardly sloped toward the inner side of the bottom surface 241, respectively, to circulate hot air moving along the first and second side surfaces 2423 and 2424 and upwardly guide hot air toward the cover shelf 27.

[0154] In detail, the third and fourth guide protrusions 2433 and 2434 may upwardly guide hot air, which has not been upwardly guided by the first and second guide protrusions 2431 and 2432 but moves backwards along the first and second side surfaces 2423 and 2424, toward the cover shelf 27.

[0155] Also, a partial amount of hot air injected toward the front surface 2421 of the dry chamber 24 from the discharge holes 2401H and 2402H may directly collide with the outlet borders 24312 and 24322 of the first and second guide protrusions 2431 and 2432, rather than the front surface 2421, and may be changed in flow in a direction toward the first and second side surfaces 2423 and 2424. This hot air may also be upwardly guided toward the cover shelf 27 through the third and fourth sloped surfaces 24330 and 24340 of the third and fourth guide protrusions 2433 and 2434.

[0156] Also, the bottom surface 241 includes third and fourth corner parts 2413 and 2414 formed between the rear surface 2422 and the first and second side surfaces 2423 and 2424. In addition, the third guide protrusion 2433 is disposed to be adjacent to the third corner part 2413, and the fourth guide protrusion 2434 is disposed to be adjacent to the fourth corner part 2414.

[0157] Also, the third guide protrusion 2433 and the fourth guide protrusion 2434 are disposed to be symmetrical to each other with respect to the central line CL of the bottom surface 241.

[0158] Because the third and fourth sloped surfaces 24330 and 24340 of the third and fourth guide protrusions 2433 and 2434 are disposed to be upwardly sloped toward the center of the bottom surface 241, flow of hot air, which may be stagnant in the vicinity of the third and fourth corner parts 2413 and 2414, toward the center of the bottom surface 241. Accordingly, hot air may be effectively upwardly guided toward the cover shelf 27.

[0159] In addition, as illustrated in FIGS. 6 to 8, the third and fourth sloped surfaces 24330 and 24340 may each have a radial fan shape.

[0160] In detail, the third and fourth sloped surfaces 24330 and 24340 include the inlet borders 24331 and 24341 and the outlet borders 24332 and 24342, respectively, and the outlet borders 24332 and 24342 of the third and fourth sloped surfaces 24330 and 24340 have an arc shape convex toward the center of the bottom surface 241.

[0161] Accordingly, hot air upwardly guided along the third and fourth sloped surfaces 24330 and 24340 may be spread from the outlet borders 24332 and 24342, and thus, circulation of hot air below the cover shelf 27 may be further increased.

[0162] The first to fourth guide protrusions 2431, 2432, 2433, and 2434 of the dry chamber 24 described above may be modified to various structures and layouts to increase circulation of hot air and upwardly guide flow of hot air toward the cover shelf 27 according to a structure of the bottom surface 241 and the side wall 242 of the dry chamber 24 and a layout and a shape of the discharge holes 2401H and 2402H.

[0163] Also, the bottom surface 241 of the dry chamber 24 includes first and second reservoirs 2461 and 2462 respectively disposed to be adjacent to the third and fourth corner parts 2413 and 2414.

[0164] The first and second reservoirs 2461 and 2462 may be recessed downwards from the bottom surface 241 to allow water dropped or flowing down to the bottom surface 241 from wet laundry to gather therein.

[0165] Also, as illustrated in FIGS. 6 to 8, the third and

fourth guide protrusions 2433 and 2434 may be disposed on a front side of the first and second reservoirs 2461 and 2462, respectively.

[0166] The third and fourth guide protrusions 2433 and 2434 include third and fourth reflective walls 24333 and 24343 disposed on a front side of the first and second reservoirs 2461 and 2462 and coupled to rear ends of the third and fourth sloped surfaces 24330 and 24340, respectively.

[0167] The third and fourth reflective walls 24333 and 24343 may protrude upwards from the bottom surface 241 to block the first and second reservoirs 2461 and 2462 and the third and fourth sloped surfaces 24330 and 24340 from each other, and reflect hot air, which moves toward the rear surface 2422 along the first and second side surfaces 2423 and 2424, toward the third and fourth sloped surfaces 24330 and 24340.

[0168] Accordingly, hot air moving backwards along the first and second side surfaces 2423 and 2424 is prevented from moving to the first and second reservoirs 2461 and 2462, and flow of hot air moving backwards along the first and second side surfaces 2423 and 2424 may be upwardly guided through the third and fourth sloped surfaces 24330 and 24340, without being delayed by the first and second reservoirs 2461 and 2462.

[0169] Also, the dry chamber 24 includes a first guide member 2441 protruding toward the discharge holes 2401H and 2402H from a central portion of the front surface 2421 to guide hot air colliding with the front surface 2421 in a direction toward the first and second side surfaces 2423 and 2424.

[0170] The first guide member 2441 may have a shape in which a sectional area thereof is gradually decreased toward the discharge holes 2401H and 2402H from the front surface 2421 of the dry chamber 24. Accordingly, hot air injected toward the front surface 2421 from the discharge holes 2401H and 2402H may be divided into hot air moving along the front surface 2421 in a direction toward the first side surface 2423 by the first guide member 2441 and hot air moving along the front surface 2421 in a direction toward the second side surface 2424.

[0171] In detail, the first guide member 2441 includes a pair of first guide surfaces 2441a and 2441b sloped toward the front surface 2421 from a front end portion facing the discharge holes 2401H and 2402H.

[0172] As illustrated in FIG. 8, the pair of first guide surfaces 2441a and 2441b may have a shape protruding upwards from the bottom surface 241 and include a curved surface.

[0173] Hot air injected toward the front surface 2421 from the first discharge hole 2401H flows to the front surface 2421 along the first guide surface 2441a of the first guide member 2441 and subsequently moves toward the first side surface 2423 along the front surface 2421. Also, hot air injected toward the front surface 2421 through the second discharge hole 2402H flows to the front surface 2421 along the second guide surface 2441b of the first guide member 2441 and subsequently moves toward the second side surface 2424 along the front surface 2421.

[0174] In this manner, because the first guide member 2441 guides hot air injected from the discharge holes 2401H and 2402H to flow the front surface 2421 along the first and second guide surfaces 2441a and 2441b, hot air injected from the discharge holes 2401H and 2402H is prevented from colliding with the front surface 2421 in a direction perpendicular to the front surface 2421 and becoming stagnant.

[0175] Also, the first and second guide protrusions 2431 and 2432 disposed to be adjacent to the front surface 2421 of the dry chamber 24 are disposed on a rear side relative to the first guide member 2441. Accordingly, hot air guided toward the first and second side surfaces 2423 and 2424 from the first guide member 2441 may easily be introduced to the inlet borders 24312 and 24322 of the first and second sloped surfaces 24310 and 24320, respectively.

[0176] Also, the dry chamber 24 includes a pair of second guide members 2442a and 2442b respectively disposed on both sides of the discharge holes 2401H and 2402H to spread hot air discharged from the discharge holes 2401H and 2402H.

[0177] As described above, the discharge holes 2401H and 2402H are formed at a central lower end portion of the rear surface 2422 of the dry chamber 24 to discharge hot air toward the front surface 2421, a flow amount of hot air may be small on both side portions adjacent to the first and second side surfaces 2423 and 2424 with respect to the central line CL of the bottom surface 241.

[0178] The pair of second guide members 2442a and 2442b include a pair of second guide surfaces 2442a1 and 2442b1 protruding toward the front surface 2421 from the rear surface 2422 of the dry chamber 24 and sloped toward the first and second side surfaces 2423 and 2424 from both ends of the discharge holes 2401H and 2402H, respectively.

[0179] The pair of second guide surfaces 2442a1 and 2442b1 may protrude upwards from the bottom surface 241 and include a curved surface.

[0180] Accordingly, hot air injected from the discharge holes 2401H and 2402H may be spread along the pair of second guide surfaces 2442a1 and 2442b1 from both ends of the discharge holes 2401H and 2402H.

[0181] As illustrated in FIG. 8, the pair of second guide members 2442a and 2442b may be disposed at one end of the first discharge hole 2401H adjacent to the first side surface 2423 and at one end of the second discharge hole 2402H adjacent to the second side surface 2424. Accordingly, hot air discharged from the first discharge hole 2401H may be spread in a direction toward the first side surface 2423 along the second guide surface 2442a1 disposed to be adjacent to the first side surface 2423, and hot air discharged from the second discharge hole 2402H may be spread in a direction toward the second side surface 2424 along the second guide surface 2442b1 disposed to be adjacent to the second side surface 2424.

[0182] In addition, the dry chamber 24 includes a third guide member 2443 disposed at a central portion of the discharge holes 2401H and 2402H, e.g., between the first discharge hole 2401H and the second discharge hole 2402H.

[0183] The third guide member 2443 may protrude toward the front surface 2421 from the rear surface 2422 of the dry chamber 24 between the first discharge hole 2401H and the second discharge hole 2402H, and may have a shape in which a sectional area thereof is gradually decreased toward the front surface 2421 from the rear surface 2422.

[0184] Also, the third guide member 2443 includes a rib member 24431 perpendicular to the bottom surface 241.

[0185] As illustrated in FIG. 8, the rib member 24431 may extend along a portion of the central line CL of the bottom surface 241. Accordingly, hot air discharged from the first and second discharge holes 2401H and 2402H may move toward the front surface 2421, without interfering with each other, so that hot air discharged from the discharge hole 2401H and hot air discharged from the discharge hole 2402H are prevented from being slowed in flow rate or from being rapidly changed in flow due to interference with each other.

[0186] The first guide member 2441, the pair of second guide members 2442a and 2442b, and the third guide member 2443 may be modified to various structures and layouts for circulating flow of hot air below the cover shelf 27.

[0187] Also, the dry chamber 24 includes a plurality of support protrusions 247 disposed on the bottom surface 241. The plurality of support protrusions 247 may support the cover shelf 27 disposed to face the bottom surface 241 from above the bottom surface 241.

[0188] Because the cover shelf 27 is supported by the plurality of support protrusions 247, although wet laundry is introduced to an upper portion of the cover shelf 27, the cover shelf 27 may support the laundry without a change in shape thereof.

[0189] However, the cover shelf 27 may be configured to have hardness sufficient for supporting laundry even without the plurality of support protrusions 247, and as the cover shelf 27 is firmly supported on the side wall 242 of the dry chamber 24, the plurality of support protrusions 247 of the dry chamber 24 may be omitted.

[0190] FIG. 9 is a cross-sectional view of the dry chamber 24, taken along line I-I of FIG. 6, and FIG. 10 is a cross-sectional view of the dry chamber 24, taken along line II-II of FIG. 6.

[0191] Hereinafter, a drain structure of the dry chamber 24 will be described with reference to FIGS. 6 to 10.

[0192] As illustrated in FIG. 9, the bottom surface 241 of the dry chamber 24 includes first and second sloped parts 241c1 and 241c2 upwardly sloped in a direction toward the front surface 2421 from the rear surface 2422.

[0193] The first sloped part 241c1 may be a curved surface upwardly sloped from a lower end of the discharge holes 2401H and 2402H.

[0194] The first sloped part 241c1 may be disposed to be adjacent to the discharge holes 2401H and 2402H and may be upwardly sloped at a sharp angle from the lower end of the discharge holes 2401H and 2402H. For example, the first sloped part 241c1 may be a curved surface forming a substantial slope at an angle equal to or greater than 60° from the lower end of the discharge holes 2401H and 2402H.

[0195] Thus, hot air discharged from the discharge holes 2401H and 2402H may be upwardly guided along the first sloped part 241c1 and introduced to the inner side of the dry chamber 24, and accordingly, hot air introduced to the inner side of the dry chamber 24 may easily upwardly be guided to the cover shelf 27.

[0196] Also, a height of a flow channel between the bottom surface 241 and the cover shelf 27 is configured to be lower than a height of the discharge holes 2401H and 2402H through the first sloped part 241c1, whereby hot air discharged from the discharge holes 2401H and 2402H may be accelerated in flow rate, while passing through the first sloped part 241c1. Accordingly, flow of hot air below the cover shelf 27 is accelerated, and thus, a speed and strength of hot air upwardly injected through the plurality of through holes 272 of the cover shelf 27 may be increased.

[0197] The second sloped part 241c2, a part of the bottom surface 241 upwardly sloped from the rear surface 2422 toward the front surface 2421, may be a part downwardly sloped toward the rear surface 2422 from one end of the bottom surface 241 coupled to the front surface 2421 of the dry chamber 24.

[0198] The second sloped part 241c2 may be upwardly sloped at a first angle $\alpha 1$ toward a front side from a horizontal plane.

[0199] Thus, because the bottom surface 241 is disposed to be sloped upwards from the rear side to the front side through the second sloped part 241c2, water dropped or flowing down from wet laundry to the bottom surface 241 may flow down toward the rear surface 2422 of the bottom surface 241.

[0200] Also, because the flow channel between the bottom surface 241 and the cover shelf 27 is gradually decreased in height from the rear surface 2422 of the dry chamber 24 to the front surface 2421 due to the second sloped part 241c2, a sectional area of the flow channel is reduced. Accordingly, a reduction in rate of hot air as hot air discharged from the discharge holes 2401H and 2402H moves toward the front surface 2421 may be prevented. Thus, because hot air discharged from the discharge holes 2401H and 2402H moves to the front surface 2421, while maintaining the rate thereof, hot air may be upwardly injected at the same rate and with the same strength from the plurality of through holes 272 of the cover shelf 27.

[0201] Also, as illustrated in FIG. 10, the bottom surface 241 of the dry chamber 24 is downwardly sloped toward opposing sides with respect to the central line CL

connecting the front surface 2421 and the rear surface 2422. For example, the bottom surface 241 of the dry chamber 24 is downwardly sloped at a second angle $\alpha 2$ in both directions toward the first and second side surfaces 2423 and 2424 from the central line CL.

[0202] Thus, water dropped or flowing down to the bottom surface 241 from wet laundry may flow down toward the first and second side surfaces 2423 and 2424, and here, because the bottom surface 241 is downwardly sloped toward the rear side from the front side as described above, water flowing down to the first and second side surfaces 2423 and 2424 on the bottom surface 241 flows down toward the rear surface 2422. That is, water on the bottom surface 241 may flow down toward the third and fourth corner parts 2413 and 2414.

[0203] As illustrated in FIG. 8, the dry chamber 24 includes first and second drains 2451 and 2452 extending along edges respectively connected to the first and second side surfaces 2423 and 2424 of the bottom surface 241.

[0204] As illustrated in FIG. 10, the first and second drains 2451 and 2452 may be downwardly concave between the bottom surface 241 and the first and second side surfaces 2423 and 2424. Thus, water flowing down toward the first and second side surfaces 2423 and 2424 on the bottom surface 241 may be introduced to the first and second drains 2451 and 2452, and water introduced to the first and second drains 2451 and 2452 may flow down toward the third and fourth corner parts 2413 and 2414 along the first and second drains 2451 and 2452.

[0205] Also, as described above, the first and second reservoirs 2461 and 2462 may be formed on both sides adjacent to the third and fourth corner parts 2413 and 2414 of the bottom surface 241 and, because the first and second drains 2451 and 2452 are connected to the first and second reservoirs 2461 and 2462, respectively, water flowing down along the first and second drains 2451 and 2452 may be stored in the first and second reservoirs 2461 and 2462.

[0206] The first and second angles $\alpha 1$ and $\alpha 2$, sizes allowing water on the bottom surface 241 to easily flow down to the first and second reservoirs 2461 and 2462, may be angles of 5° to 10° with respect to the horizontal surface.

[0207] FIG. 11 is a perspective view of the cover shelf 27 illustrated in FIG. 5, FIG. 12 is a bottom perspective view of the cover shelf 27 illustrated in FIG. 11, and FIG. 13 is a cross-sectional view illustrating a configuration in which the cover shelf 27 is coupled to the dry chamber 24 illustrated in FIG. 9.

[0208] Hereinafter, a structure of the cover shelf 27 and a structure of the plurality of through holes 272 upwardly injecting hot air from a lower side of the cover shelf 27 through the cover shelf 27 will be described in detail.

[0209] As described above, the cover shelf 27 includes the shelf body 271 corresponding to a shape of the bottom surface 241 of the dry chamber 24 and disposed to face the bottom surface 241 and the plurality of through holes 272 distributed in the shelf body 271.

[0210] The cover shelf 27 is disposed between the discharge holes 2401H and 2402H of the dry chamber 24 and the exhaust hole 2403H of the dry chamber 24 to upwardly inject hot air, which is introduced to the dry chamber 24 through the discharge holes 2401H and 2402H and circulates below the cover shelf 27, through the plurality of through holes 272.

[0211] As illustrated in FIG. 12, the cover shelf 27 includes a plurality of ribs 273 communicating with the plurality of through holes 272 and protruding toward the bottom surface 241 of the dry chamber 24.

[0212] The plurality of ribs 273 may increase a rate of hot air introduced to the plurality of through holes 272 from a lower side of the cover shelf 27 and passing through the cover shelf 27. Accordingly, strength of hot air applied to the laundry disposed on an upper side of the cover shelf 27 may be increased, increasing drying efficiency of the laundry. The plurality of ribs 273 may have a height of 5 mm.

[0213] Also, the plurality of ribs 273 is modified in height or shape depending on a position thereof on the shelf body 271. The plurality of ribs 273 is decreased in height toward the discharge holes 2401H and 2402H. That is, a height of the plurality of ribs 273 is increased as they are away from the discharge holes 2401H and 2402H to further increase a rate of hot air upwardly injected through the through holes spaced apart from the discharge holes 2401H and 2402H. Accordingly, a rate of hot air injected through the plurality of through holes 272 may be uniformly maintained, regardless of distance to the discharge holes 2401H and 2402H.

[0214] As illustrated in FIG. 13, the cover shelf 27 is disposed below the exhaust hole 2403H of the dry chamber 24, whereby hot air F upwardly injected through the plurality of through holes 272 of the cover shelf 27 is discharged to the outside of the dry chamber 24 through the exhaust hole 2403H. That is, hot air F upwardly injected toward laundry from the plurality of through holes 272 of the cover shelf 27 absorbs moisture included in the laundry and is subsequently discharged outwardly from the dry chamber 24 through the exhaust hole 2103H.

[0215] Also, because hot air circulating below the cover shelf 27 is upwardly guided toward the cover shelf 27 through the first to fourth guide protrusions 2431, 2432, 2433, and 2434, uniform hot air may be upwardly injected through the plurality of through holes 272 in the entire area of the cover shelf 27.

[0216] In FIG. 13, illustration of the second door 23 closing the opening of the dry chamber 24 is omitted for the purposes of description.

[0217] Also, as described above, because the bottom surface 241 of the dry chamber 24 includes the first sloped part 241c1 upwardly sloped from the lower end of the discharge holes 2401H and 2402H, flow of hot air F introduced to the inner side of the cover shelf 24 may be accelerated.

[0218] FIG. 14 is a front view of the exhaust duct 26 illustrated in FIG. 5, FIG. 15 is a side view of the exhaust duct 26 illustrated in FIG. 14, and FIG. 16 is a bottom perspective view of the dry chamber 24 to which the hot air unit 25 and the exhaust duct 26 illustrated in FIG. 4 are coupled, viewed from a rear side.

[0219] Hereinafter, a structure in which hot air discharged from the exhaust hole 2103H of the dry chamber 24 is discharged outwardly from the second drying apparatus 20 through the exhaust duct 26 will be described.

[0220] The exhaust duct 26, a duct having a flow channel therein, includes a first opening 2601H connected to the exhaust hole 2403H of the dry chamber 24, a second opening 2602H disposed to face the first opening 2601H and outwardly discharging hot air introduced to the first opening 2601H, and a bypass holes 2603H and 2604H formed on one side adjacent to the hot air unit 25.

[0221] In detail, the exhaust duct 26 includes an upper surface part 261, a lower surface part 262 disposed on the opposite side of the upper surface part 261, first and second side parts 263 and 264 connecting the upper surface part 261 and the lower surface part 262 to each other from both sides, and a rear surface part 265 disposed to face the first opening 2601H and having the second opening 2602H formed therein.

[0222] As illustrated in FIG. 14, the first opening 2601H of the exhaust duct 26 may form a front surface part facing the rear surface part 265.

[0223] As illustrated in FIGS. 14 and 15, the upper surface part 261 and the lower surface part of the exhaust duct 26 may be configured to be reduced in width w from the first opening 2601H toward the second opening 2602H, and the lower surface part 262 of the exhaust duct 26 may be disposed to be downwardly sloped from one end portion adjacent to the first opening 2601H toward the other end portion adjacent to the second opening 2602H.

[0224] Thus, the flow channel toward the second opening 2602H from the first opening 2601H of the exhaust duct 26 is reduced in width w and increased in height H from the first opening 2601H toward the second opening 2602H.

[0225] Also, because the first and second side parts 263 and 264 of the exhaust duct 26 connects a portion of the upper surface part 261 adjacent to the first opening 2601H and a portion of the lower surface part 262 and the rear surface part 265 is sloped toward a front side from both sides of the second opening 2602H, thereby connecting another portion of the upper surface part 261 adjacent to the second opening 2602H and another portion of the lower surface part 262 to each other.

[0226] The bypass holes 2603H and 2604H may be formed as a pair on both sides of the exhaust duct 26, and the pair of bypass holes 2603H and 2605H may be formed to be adjacent to the first opening 2601H between the first and second side parts 263 and 264 and the rear surface part 265.

[0227] Also, as described above, the second opening 2602H of the exhaust duct 26 is disposed to be adjacent to a central portion of the blow hole 2102H of the second case 21. Thus, hot air introduced to the inside of the exhaust duct 26 through the first opening 2601H may be discharged outwardly from the second drying apparatus 20 through the second opening 2602H.

[0228] Also, as illustrated in FIGS. 14 to 16, because the pair of bypass holes 2603H and 2604H are disposed to be adjacent to the first opening 2601H and are relatively spaced apart from the second opening 2602H, a partial amount of hot air introduced to the inside of the exhaust duct 26 through the first opening 2601H may be discharged outwardly from the exhaust duct 26 through the pair of bypass holes 2603H and 2604H.

[0229] Because the pair of bypass holes 2603H and 2604H are spaced apart from the blow hole 2102H within the second case 21, hot air discharged through the pair of bypass holes 2603H and 2604H is discharged to the inside of the second case 21.

[0230] As illustrated in FIG. 16, because the hot air unit 25 is disposed below the exhaust duct 26, hot air F discharged to the inside of the second case 21 through the pair of bypass holes 2603H and 2604H may be introduced to the pair of intakes 2503H and 2504H of the hot air unit 25.

[0231] The pair of bypass holes 2603H and 2604H of the exhaust duct 26 may be disposed to be adjacent to the pair of intakes 2503H and 2504H of the hot air unit 25, and accordingly, hot air F discharged outwardly from the exhaust duct 26 through the pair of bypass holes 2603H and 2604H may easily be introduced to the pair of intakes 2503H and 2504H of the hot air unit 25.

[0232] Thus, a partial amount of hot air F discharged from the exhaust hole 2403H of the dry chamber 24 and introduced to the first opening 2601H of the exhaust duct 26 may pass through the blow hole 2102H through the second opening 2602H and is discharged outwardly, and the other remaining amount of hot air may be introduced to the pair of intakes 2503H and 2504H of the hot air unit 25 through the pair of bypass holes 2603H and 2604H.

[0233] The pair of intakes 2503H and 2504H of the hot air unit 25 intake ambient air introduced through both end portions of the blow hole 2102H of the second case 21, and also, re-intake a partial amount of hot air F which has absorbed moisture of the laundry through the bypass holes 2603H and 2604H.

[0234] Hot air F discharged from the exhaust hole 2403H of the dry chamber 24 has increased moisture and lower temperature, compared with hot air discharged from the discharge holes 2401H and 2402H during a process of drying the laundry.

[0235] However, hot air F intaken to the pair of intakes 2503H and 2504H of the hot air unit 25 through the bypass holes 2603H and 2604H may have a temperature higher than that of ambient air introduced through both end portions of the blow hole 2102H of the second case 21.

[0236] Thus, because the hot air unit 25 re-absorbs a

partial amount of hot air F which has finished drying the laundry, through the bypass holes 2603H and 2604H, energy consumed to generate hot air having a temperature equal to or higher than a preset temperature through the hot air unit 25 may be reduced.

[0237] However, the amount of hot air F re-intaken to the hot air unit 25 through the bypass holes 2603H and 2604H may be adjusted according to a preset moisture value of hot air F discharged to the inner side of the dry chamber 24 through the discharge holes 2401H and 2402H to easily absorb moisture of the laundry.

[0238] FIG. 17 is a perspective view illustrating a configuration in which a pair of injection units 29 are coupled to the dry chamber 24 illustrated in FIG. 6.

[0239] The pair of injection units 29 injecting hot air toward the inside of the dry chamber 24 are disposed on both sides of the dry chamber 24. As illustrated in FIG. 17, the pair of injection units 29 may be disposed on a first side surface 2423 and a second side surface 2424, respectively, within the dry chamber 24.

[0240] The pair of injection units 29 are disposed to be symmetrical within the dry chamber 24 and each of the pair of injection units 29 includes a duct part 291 extending in a discharge direction of the discharge holes 2401H and 2402H, i.e., toward the front side of the dry chamber 24 from the rear side thereof, and a plurality of injection nozzles 292 disposed in the duct part 291 in a length direction of the duct part 291.

[0241] The pair of injection units 29 may inject hot air toward the inner side of the dry chamber 24 from the first and second side surfaces 2423 and 2424 through the plurality of injection nozzles 292, and accordingly, hot air may be uniformly injected in a horizontal direction of the wet laundry introduced to the inside of the dry chamber 24. That is, flow of hot air injected toward the inner side of the dry chamber 24 through the plurality of injection nozzles 292 may be perpendicular to flow of hot air injected to the inner side of the dry chamber 24 through the discharge holes 2401H and 2402H.

[0242] FIG. 18 is a perspective view of the injection unit 29 illustrated in FIG. 17.

[0243] Referring to FIGS. 17 and 18, the duct part 291 includes an intake duct 2911 and an injection duct 2912 connected to the intake duct 2911.

[0244] The intake duct 2911 includes an intake 291H formed at one end thereof, and the other end opposing one end of the intake duct 2911 where the intake 291H is formed is connected to the injection duct 2912.

[0245] Because the intake 291H of the intake duct 2911 is disposed below the cover shelf 27, a partial amount of hot air discharged to the inner side of the dry chamber 24 through the discharge holes 2401H and 2402H may be introduced to the intake 291H of the intake duct 2911.

[0246] The injection duct 2912 connected to the other end of the intake duct 2911 is disposed above the cover shelf 27 and extends in a discharge direction of the discharge holes 2401H and 2402H, i.e., from the rear side of the dry chamber 24 to the front side thereof.

[0247] As illustrated in FIGS. 17 and 18, the intake duct 2911 may be a pipe extending vertically from the inside of the dry chamber 24, and the injection duct 2912 may be a pipe extending in a horizontal direction within the dry chamber 24.

[0248] Also, one end portion of the intake duct 2911 where the intake 291H is formed is bent to be parallel to the bottom surface 241 of the dry chamber 24, the intake 291H of the intake duct 2911 may be disposed to be parallel to the bottom surface 241 of the dry chamber 24. Accordingly, a partial amount of hot air discharged from the discharge holes 2401H and 2402H may easily be introduced to the intake 291H of the intake duct 2911.

[0249] Also, the intake duct 2911 and the injection duct 2912 may be integrally formed.

[0250] FIG. 19 is a perspective view illustrating a modification of the injection nozzle 292 of the injection unit 29 illustrated in FIG. 18, and FIG. 20 is a cross-sectional view of the injection unit 29, taken along line III-III of FIG. 19.

[0251] The duct part 291 of the injection unit 29 illustrated in FIGS. 19 and 20 has the same structure as that of the duct part 291 of the injection unit 29 illustrated in FIGS. 17 and 18, and thus, a redundant description thereof will be omitted and a modification of the injection nozzle 292a will be described.

[0252] Referring to FIG. 20, an injection nozzle 292a according to a modification may be a venturi tube.

[0253] In detail, the injection nozzle 292a includes a first nozzle pipe 292a1 protruding toward the inside of the dry chamber 24 from the duct part 291 and a second nozzle pipe 292a2 coupled to a side surface of the first nozzle pipe 292a1.

[0254] As described above, the duct part 291 may include the intake duct 2911 and the injection duct 2912, and hot air F introduced through the intake 291H of the intake duct 2911 may move to the inside of the injection duct 2912 and may be injected in a horizontal direction toward the inner side of the dry chamber 24 through the plurality of injection nozzles 292a disposed in a length direction of the injection duct 2912.

[0255] The first nozzle pipe 292a1 may have a cylindrical shape opened in a horizontal direction toward the inner side of the dry chamber 24 and may be configured such that a sectional area of a flow channel formed therein is gradually decreased.

[0256] In detail, as illustrated in FIG. 20, the first nozzle pipe 292a1 includes a first flow channel 292a11 connected to the injection duct 2922 and a second flow channel 292a12 connected to the first flow channel 292a11 and is connected to an opening of the first nozzle pipe 291a1.

[0257] A diameter of the first flow channel 292a11 may be smaller than a diameter of a flow channel within the injection duct 2912. Also, the diameter of the first flow channel 292a11 is smaller than a diameter of the second flow channel 292a12. Thus, first hot air F1, which has been introduced to the first flow channel 292a11 passing

through the inside of the injection duct 2912 through the intake 291H of the intake duct 2911, is increased at rate when passing through the second flow channel 292a12 according to the Bernoulli's law.

[0258] Also, the second nozzle pipe 292a2 having a diameter smaller than that of the first flow channel 292a11 is coupled to the side surface of the first nozzle pipe 292a1. The second nozzle pipe 292a1 is vertically connected to the second flow channel 292a12 of the first nozzle pipe 292a1, whereby a partial amount of second hot air F2 circulating on an upper side of the cover shelf 27 may rapidly be introduced to the second nozzle pipe 292a2.

[0259] Accordingly, a rate at which third hot air F3 injected to the inner side of the dry chamber 24 from the first nozzle pipe 292a1 may be increased.

[0260] In this manner, because the injection nozzle 292a has the venturi structure, the rate of the hot air F3 injected to the inner side of the dry chamber 24 through the first nozzle pipe 292a1 may be increased, and because the rate and strength of the hot air F3 applied to the laundry are increased, drying efficiency of the laundry may be increased.

[0261] Also, the first nozzle pipe 292a1 may include a single flow channel, and by forming a sectional area of the single flow channel connected to the inside of the injection duct 2922 to be increased from one end connected to the injection duct 2922 toward the other end adjacent to the opening of the first nozzle pipe 292a1, a rate of hot air injected to the inside of the dry chamber 24 through the first nozzle pipe 292a1 may be increased.

[0262] FIG. 21 is a perspective view illustrating a modification of the pair of injection units 29 illustrated in FIG. 17, and FIG. 22 is a perspective view of the injection unit 29' illustrated in FIG. 21.

[0263] Hereinafter, a structure of an injection unit 29' according to a modification will be described with reference to FIGS. 21 and 22. Here, because a partial structure of the injection unit 29' illustrated in FIGS. 21 and 22 is similar to that of the injection unit 29 illustrated in FIGS. 18 to 20, a redundant description will be omitted.

[0264] As illustrated in FIG. 21, a pair of injection units 29' injecting hot air toward the inside of the dry chamber 24 according to a modification are disposed on both sides of the dry chamber 24.

[0265] The pair of injection units 29' are disposed to be symmetrical within the dry chamber 24 and inject hot air in a horizontal direction toward the inner side of the dry chamber 24 from the first and second side surfaces 2123 and 2124 through the plurality of injection nozzles 292' disposed in the length direction of the duct part 291'.

[0266] As illustrated in FIG. 22, the injection unit 29' includes a duct part 291' and a plurality of injection nozzles 292' coupled to the duct part 291'.

[0267] The duct part 291' includes an intake duct 2911' and an injection duct 2912' connected to the intake duct 2911'.

[0268] An intake 291H' is formed at one end of the intake duct 2911', and the other end of the intake duct 2911' opposing the one end where the intake 291H' is formed is connected to the injection duct 2912'.

[0269] The intake 291H' of the intake duct 2911' is disposed below the cover shelf 27, whereby a partial amount of hot air F discharged to the inner side of the dry chamber 24 through the discharge holes 2401H and 2402H may be introduced to the intake 291H' of the intake duct 2911'.

[0270] With one end connected to the intake duct 2911', the injection duct 2912' may have a closed loop shape. Accordingly, hot air F introduced to the intake 291H' of the intake duct 2911' may circulate in the flow channel formed within the injection duct 2912'.

[0271] In detail, the injection duct 2912' includes first and second injection ducts 29121' and 29122' branched from the other end of the intake duct 2911'.

[0272] The first and second injection ducts 29121' and 29122' may be a pipe extending in a discharge direction of the discharge holes 2401H and 2402H, i.e., toward the front side of the dry chamber 24 from the rear side thereof, and are disposed to be parallel to each other within the dry chamber 24.

[0273] Also, a plurality of injection nozzles 292a' may be disposed on the first and second injection ducts 29121' and 29122' in a length direction of the first and second injection ducts 29121' and 29122'.

[0274] Thus, because the plurality of injection nozzles 292a' disposed in the length direction of the first injection duct 29121' and the plurality of injection nozzles 292a' disposed in the length direction of the second injection duct 29122' are disposed to be parallel to each other on the first and second side surfaces 2123 and 2124 to inject hot air F toward the inner side of the dry chamber 24, an area of the hot air F injected in a horizontal direction toward the laundry introduced to the inside of the dry chamber 24 may be increased.

[0275] Also, because the other ends of the first and second injection ducts 29121' and 29122' opposing the end ends thereof connected to the intake duct 2911' are connected to each other, the first and second injection ducts 29121' and 29122' may form a closed loop.

[0276] Accordingly, hot air introduced to the first and second injection ducts 29121' and 29122' through the intake duct 2911' may be injected through the plurality of injection nozzles 292a', while circulating within the first and second injection ducts 29121' and 29122'.

[0277] Accordingly, a rate and strength of hot air F injected from the plurality of injection nozzles 292a' may be uniform.

[0278] Also, it is illustrated that the plurality of injection nozzles 292a' illustrated in FIG. 22 are venturi tubes having the same structure as that of the injection nozzle 292a illustrated in FIG. 20, as an example, but the plurality of injection nozzles 292a may be replaced with a general tube or a plurality of injection holes formed in a length direction of the injection duct 2912'.

[0279] As described above, because the clothing drying apparatus 1 according to an exemplary embodiment

of the present disclosure includes the first drying apparatus 10 and the second drying apparatus 20 independently performing drying on wet laundry, the first and second drying apparatuses 10 and 20 may be selectively used according to amounts and types of laundry, increasing efficiency of energy used for drying the laundry through the clothing drying apparatus 1.

[0280] Also, because hot air below the cover shelf 27 is circulated and upwardly guided through the plurality of guide protrusions 2431, 2432, 2433, and 2434, the first guide member 2441, the pair of second guide members 2442a and 2442b, and the third guide member 2443 of the dry chamber 24 of the second drying apparatus 20, uniform and strong hot air may be injected to the laundry disposed above the cover shelf 27, whereby performance of drying the laundry through the second drying apparatus 20 may be enhanced.

[0281] Also, water dropped or flowing from the laundry may easily be removed from the bottom surface 241 through the sloped part applied to the dry chamber 24, the first and second drains 2451 and 2452, and the first and second reservoirs 2461 and 2462.

[0282] In addition, because the second drying apparatus 20 further includes the pair of injection units 29 disposed on the first and second side surfaces 2423 and 2424 on an inner side of the dry chamber 24, hot air may be injected in a horizontal direction toward the laundry from an upper side of the cover shelf 27, whereby performance of drying the laundry may be further increased.

[0283] In this manner, although the second drying apparatus 20 is configured to be compact and have a small size, compared with the related art drying apparatus, circulation of hot air may be increased to effectively dry the laundry introduced thereto.

Claims

1. A clothing drying apparatus (1) comprising:

a first drying apparatus (10) configured to supply hot air to an inside of a rotary drum of the first drying apparatus (10) to dry laundry in the rotary drum; and
a second drying apparatus (20) configured to be coupled to the first drying apparatus (10),
wherein the second drying apparatus (20) includes:

a dry chamber (24) configured to receive laundry and including a discharge hole (2401H);
a hot air unit (25) configured to supply hot air to an inside of the dry chamber (24) through the discharge hole (2401H); and
a cover shelf (27) disposed in the dry chamber (24) and having a plurality of through holes (272) configured to allow the hot air, supplied by the hot air unit (25) to a lower side of the cover shelf (27), to flow, through the plurality of through holes (272), from the lower side of the cover shelf (27) to an upper side of the cover shelf (27) to dry the laundry received in the dry chamber (24) and supported on the upper side of the cover shelf (27),
wherein the cover shelf (27) includes a plurality of ribs (273) communicating with the plurality of through holes (272) and protruding toward a bottom surface (241) of the dry chamber (24),
characterized in that,
a height of the plurality of ribs (273) decreases toward the discharge hole (2401H).

2. The clothing drying apparatus (1) as claimed in claim 1, wherein the dry chamber (24) further includes a plurality of guide protrusions (2431, 2432, 2433, 2434) protruding from the bottom surface (241) of the dry chamber (24) and configured to change a flow of the hot air supplied by the hot air unit (25) below the cover shelf (27).

3. The clothing drying apparatus (1) as claimed in claim 2, wherein the discharge hole (2401H) is disposed to be adjacent to the bottom surface (241) and each of the plurality of guide protrusions (2431, 2432, 2433, 2434) includes a sloped surface upwardly sloped from the bottom surface (241) of the dry chamber (24).

4. The clothing drying apparatus (1) as claimed in claim 3, wherein each of the plurality of guide protrusions (2431, 2432, 2433, 2434) is disposed to be adjacent to a side wall (242) of the dry chamber (24) adjacent to the bottom surface (241) and configured to guide the hot air supplied by the hot air unit (25) moving along the side wall (242) toward the cover shelf (27).

5. The clothing drying apparatus (1) as claimed in claim 4, wherein the sloped surface is disposed to be upwardly sloped toward the inner side of the dry chamber (24).

6. The clothing drying apparatus (1) as claimed in claim 5, wherein each of the plurality of guide protrusions (2431, 2432, 2433, 2434) is respectively disposed on a corner of the bottom surface (241) and the sloped surface of each of the plurality of guide protrusions (2431, 2432, 2433, 2434) is upwardly sloped toward a center of the bottom surface (241).

7. The clothing drying apparatus (1) as claimed in claim 5, wherein

the sloped surface (23410, 24320) includes an

inlet border (24311, 24321) connected to the bottom surface (241) and configured to allow the hot air supplied by the hot air unit (25) to be introduced therethrough and an outlet border (24312, 24322) higher than the inlet border (24311, 24321) and configured to allow the introduced hot air to be discharged therethrough, and
the sloped surface has a radial shape increasing in width from the inlet border to the outlet border.

8. The clothing drying apparatus (1) as claimed in claim 7, wherein the side wall (242) includes a front surface (2421), a rear surface (2422) facing the front surface, and first and second side surfaces (2423, 2424) connecting the front surface (2421) and the rear surface (2422), and the discharge hole (2401H) is formed at a central lower end portion of the rear surface (2422) and configured to discharge the hot air supplied by the hot air unit (25) toward the front surface (2421).

9. The clothing drying apparatus (1) as claimed in claim 8, wherein the bottom surface includes a sloped part upwardly sloped in a direction toward the front surface from the rear surface.

10. The clothing drying apparatus as claimed in claim 9, wherein the bottom surface (241) is downwardly sloped toward the first and second side surfaces (2423, 2424) with respect to a central line connecting the rear surface (2422) and the front surface (2421).

11. The clothing drying apparatus (1) as claimed in claim 10, wherein the dry chamber (24) includes first and second reservoirs (2461, 2462) adjacent to the rear surface (2422) and recessed downwardly from the bottom surface (241).

12. The clothing drying apparatus (1) as claimed in claim 8, wherein

the dry chamber (24) includes an exhaust hole (2304H) extending in a lengthwise direction of the rear surface (2422), and
the second drying apparatus (20) further includes an exhaust duct (26) coupled to the exhaust hole (2304H) and configured to discharge hot air from the dry chamber (24) through the exhaust hole (2304H).

13. The clothing drying apparatus (1) as claimed in claim 12, wherein the exhaust duct (26) includes a first opening (2601H) connected to the exhaust hole (2304H), a second opening (2602H) disposed to face the first opening (2601H) and configured to discharge hot air introduced into the first opening (2601H), and a bypass hole formed adjacent to the hot air unit (25).

14. The clothing drying apparatus (1) as claimed in claim 1, further comprising:
a pair of injection units (29) respectively disposed on both sides of the dry chamber (24) and configured to inject hot air toward an inside of the dry chamber (24).

Patentansprüche

1. Kleidertrockner (1), umfassend:

eine erste Trocknungsvorrichtung (10), die dazu ausgestaltet ist, dem Inneren einer Drehtrommel der ersten Trocknungsvorrichtung (10) Heißluft zuzuführen, um Wäsche in der Drehtrommel zu trocknen; und
eine zweite Trocknungsvorrichtung (20), die dazu ausgestaltet ist, mit der ersten Trocknungsvorrichtung (10) gekoppelt zu sein,
wobei die zweite Trocknungsvorrichtung (20) Folgendes aufweist:

eine Trockenkammer (24), die dazu ausgestaltet ist, Wäsche aufzunehmen, und eine Auslassöffnung (2401H) aufweist;
eine Heißlufteinheit (25), die dazu ausgestaltet ist, dem Inneren der Trockenkammer (24) durch die Auslassöffnung (2401H) Heißluft zuzuführen; und
eine Abdeckplatte (27), die in der Trockenkammer (24) angeordnet ist und eine Mehrzahl von Durchgangslöchern (272) aufweist, die dazu ausgestaltet sind, zu ermöglichen, dass die Heißluft, die durch die Heißlufteinheit (25) einer Unterseite der Abdeckplatte (27) zugeführt wird, durch die Mehrzahl von Durchgangslöchern (272) von der Unterseite der Abdeckplatte (27) zu einer Oberseite der Abdeckplatte (27) strömt, um die in der Trockenkammer (24) aufgenommene und auf der Oberseite der Abdeckplatte (27) getragene Wäsche zu trocknen,
wobei die Abdeckplatte (27) eine Mehrzahl von Rippen (273) aufweist, die mit der Mehrzahl von Durchgangslöchern (272) in Verbindung stehen und in Richtung einer Bodenfläche (241) der Trockenkammer (24) vorstehen,
dadurch gekennzeichnet, dass
eine Höhe der Mehrzahl von Rippen (273) in Richtung der Auslassöffnung (2401H) abnimmt.

2. Kleidertrockner (1) nach Anspruch 1, wobei die Trockenkammer (24) ferner eine Mehrzahl von Führungsvorsprüngen (2431, 2432, 2433, 2434) auf-

weist, die von der Bodenfläche (241) der Trockenkammer (24) vorstehen und dazu ausgestaltet sind, einen Strom der von der Heißlufteinheit (25) zugeführten Heißluft unter der Abdeckplatte (27) zu verändern.

3. Kleidertrockner (1) nach Anspruch 2, wobei die Auslassöffnung (2401H) so angeordnet ist, dass sie an die Bodenfläche (241) angrenzt, und jeder der Mehrzahl von Führungsvorsprüngen (2431, 2432, 2433, 2434) eine geneigte Oberfläche aufweist, die von der Bodenfläche (241) der Trockenkammer (24) nach oben geneigt ist.

4. Kleidertrockner (1) nach Anspruch 3, wobei jeder der Mehrzahl von Führungsvorsprüngen (2431, 2432, 2433, 2434) so angeordnet ist, dass er an eine an die Bodenfläche (241) angrenzende Seitenwand (242) der Trockenkammer (24) angrenzt, und dazu ausgestaltet ist, die durch die Heißlufteinheit (25) zugeführte Heißluft, die sich entlang der Seitenwand (242) bewegt, in Richtung der Abdeckplatte (27) zu leiten.

5. Kleidertrockner (1) nach Anspruch 4, wobei die geneigte Fläche so angeordnet ist, dass sie in Richtung der Innenseite der Trockenkammer (24) nach oben geneigt ist.

6. Kleidertrockner (1) nach Anspruch 5, wobei jeder der Mehrzahl von Führungsvorsprüngen (2431, 2432, 2433, 2434) jeweils an einer Ecke der Bodenfläche (241) angeordnet ist und die geneigte Fläche jedes der Mehrzahl von Führungsvorsprüngen (2431, 2432, 2433, 2434) in Richtung einer Mitte der Bodenfläche (241) nach oben geneigt ist.

7. Kleidertrockner (1) nach Anspruch 5, wobei

die geneigte Fläche (23410, 24320) einen Einlassrand (24311, 24321) aufweist, der mit der Bodenfläche (241) verbunden und dazu ausgestaltet ist, zu ermöglichen, dass die durch die Heißlufteinheit (25) zugeführte Heißluft durch selbigen hindurch eingeleitet wird, und einen Auslassrand (24312, 24322), der höher als der Einlassrand (24311, 24321) ist und dazu ausgestaltet ist, zu ermöglichen, dass die eingeleitete Heißluft durch selbigen hindurch abgeleitet wird, und
die geneigte Fläche eine radiale Form aufweist, die vom Einlassrand zum Auslassrand an Breite zunimmt.

8. Kleidertrockner (1) nach Anspruch 7, wobei die Seitenwand (242) eine vordere Fläche (2421), eine der vorderen Fläche gegenüberliegende hintere Fläche (2422) sowie eine erste und eine zweite Seitenfläche (2423, 2424), die die vordere Fläche (2421) und die hintere Fläche (2422) verbinden, aufweist und wobei die Auslassöffnung (2401H) an einem mittleren unteren Endabschnitt der hinteren Fläche (2422) ausgebildet und dazu ausgestaltet ist, die durch die Heißlufteinheit (25) zugeführte Heißluft in Richtung der vorderen Fläche (2421) auszulassen.

9. Kleidertrockner (1) nach Anspruch 8, wobei die Bodenfläche einen geneigten Teil, der von der hinteren Fläche in Richtung der vordere Fläche nach oben geneigt ist, aufweist.

10. Kleidertrockner nach Anspruch 9, wobei die Bodenfläche (241) in Richtung der ersten und der zweiten Seitenfläche (2423, 2424) in Bezug auf eine Mittellinie, die die hintere Fläche (2422) und die vordere Fläche (2421) verbindet, nach unten geneigt ist.

11. Kleidertrockner (1) nach Anspruch 10, wobei die Trockenkammer (24) einen ersten und einen zweiten Behälter (2461, 2462) aufweist, die an die hintere Fläche (2422) angrenzen und von der Bodenfläche (241) nach unten vertieft sind.

12. Kleidertrockner (1) nach Anspruch 8, wobei

die Trockenkammer (24) eine Abluftöffnung (2304H) aufweist, die sich in Längsrichtung der hinteren Fläche (2422) erstreckt, und
die zweite Trocknungsvorrichtung (20) ferner eine Abluftleitung (26) aufweist, die mit der Abluftöffnung (2304H) gekoppelt und dazu ausgestaltet ist, Heißluft aus der Trockenkammer (24) durch die Abluftöffnung (2304H) abzuleiten.

13. Kleidertrockner (1) nach Anspruch 12, wobei die Abluftleitung (26) eine mit der Auslassöffnung (2304H) verbundene erste Öffnung (2601H), eine zweite Öffnung (2602H), die der ersten Öffnung (2601H) gegenüberliegend angeordnet und dazu ausgestaltet ist, in die erste Öffnung (2601H) eingeleitete Heißluft abzuleiten, und eine an die Heißlufteinheit (25) angrenzende Umgehungsöffnung aufweist.

14. Kleidertrockner (1) nach Anspruch 1, ferner umfassend:
ein Paar Einblaseinheiten (29), die jeweils auf beiden Seiten der Trockenkammer (24) angeordnet und dazu ausgestaltet sind, Heißluft in das Innere der Trockenkammer (24) einzublasen.

Revendications

1. Appareil de séchage de vêtements (1) comprenant :

un premier appareil de séchage (10) conçu pour

alimenter en air chaud l'intérieur d'un tambour rotatif du premier appareil de séchage (10) afin de sécher le linge dans le tambour rotatif ; et
un second appareil de séchage (20) configuré pour être couplé au premier appareil de séchage (10),
dans lequel le second appareil de séchage (20) comporte :

une chambre sèche (24) conçue pour recevoir le linge et comportant un trou d'évacuation (2401H) ;
une unité d'air chaud (25) conçue pour alimenter en air chaud l'intérieur de la chambre de séchage (24) à travers le trou d'évacuation (2401H) ; et
une grille de protection (27) disposée dans la chambre de séchage (24) et présentant une pluralité de trous traversants (272) conçus pour permettre à l'air chaud, alimenté par l'unité d'air chaud (25) vers un côté inférieur de la grille de protection (27), de s'écouler, à travers la pluralité de trous traversants (272), depuis le côté inférieur de la grille de protection (27) vers un côté supérieur de la grille de protection (27) afin de sécher le linge reçu dans la chambre sèche (24) et supporté sur le côté supérieur de la grille de protection (27),
dans lequel la grille de protection (27) comporte une pluralité de nervures (273) communiquant avec la pluralité de trous traversants (272) et faisant saillie vers une surface de fond (241) de la chambre sèche (24),
caractérisé en ce qu'
une hauteur de la pluralité de nervures (273) diminue vers le trou d'évacuation (2401H).

2. Appareil de séchage de vêtements (1) selon la revendication 1, dans lequel la chambre sèche (24) comporte en outre une pluralité de saillies de guidage (2431, 2432, 2433, 2434) faisant saillie à partir de la surface de fond (241) de la chambre sèche (24) et conçues pour changer un écoulement d'air chaud alimenté par l'unité d'air chaud (25) en dessous de la grille de protection (27).

3. Appareil de séchage de vêtements (1) selon la revendication 2, dans lequel le trou d'évacuation (2401H) est disposé pour être adjacent à la surface de fond (241) et chacune de la pluralité de saillies de guidage (2431, 2432, 2433, 2434) comporte une surface en pente inclinée vers le haut à partir de la surface de fond (241) de la chambre sèche (24).

4. Appareil de séchage de vêtements (1) selon la revendication 3, dans lequel chacune de la pluralité de saillies de guidage (2431, 2432, 2433, 2434) est disposée pour être adjacente à une paroi latérale (242) de la chambre sèche (24) adjacente à la surface de fond (241) et conçue pour guider l'air chaud alimenté par l'unité d'air chaud (25) se déplaçant le long de la paroi latérale (242) vers la grille de protection (27).

5. Appareil de séchage de vêtements (1) selon la revendication 4, dans lequel la surface en pente est disposée pour être inclinée vers le haut vers le côté intérieur de la chambre sèche (24).

6. Appareil de séchage de vêtements (1) selon la revendication 5, dans lequel chacune de la pluralité de saillies de guidage (2431, 2432, 2433, 2434) est respectivement disposée sur un coin de la surface de fond (241) et la surface en pente de chacune de la pluralité de saillies de guidage (2431, 2432, 2433, 2434) est inclinée vers le haut vers un centre de la surface de fond (241).

7. Appareil de séchage de vêtements (1) selon la revendication 5, dans lequel

la surface en pente (23410, 24320) comporte un bord d'entrée (24311, 24321) relié à la surface de fond (241) et conçu pour permettre à l'air chaud alimenté par l'unité d'air chaud (25) d'être introduite à travers celui-ci et un bord de sortie (24312, 24322) plus haut que le bord d'entrée (24311, 24321) et conçu pour permettre à l'air chaud introduit d'être évacué à travers celui-ci, et
la surface en pente présente une forme radiale augmentant en largeur à partir du bord d'entrée vers le bord de sortie.

8. Appareil de séchage de vêtements (1) selon la revendication 7, dans lequel la paroi latérale (242) comporte une surface avant (2421), une surface arrière (2422) faisant face à la surface avant, et des première et seconde surfaces latérales (2423, 2424) reliant la surface avant (2421) et la surface arrière (2422), et le trou d'évacuation (2401H) est formé au niveau d'une portion d'extrémité inférieure centrale de la surface arrière (2422) et conçu pour évacuer l'air chaud alimenté par l'unité d'air chaud (25) vers la surface avant (2421).

9. Appareil de séchage de vêtements (1) selon la revendication 8, dans lequel la surface de fond comporte une partie en pente inclinée vers le haut dans une direction vers la surface avant à partir de la surface arrière.

10. Appareil de séchage de vêtements selon la revendication 9, dans lequel la surface de fond (241) est inclinée vers le bas vers les première et seconde surfaces latérales (2423, 2424) par rapport à une

ligne centrale reliant la surface arrière (2422) et la surface avant (2421).

11. Appareil de séchage de vêtements (1) selon la revendication 10, dans lequel la chambre sèche (24) comporte des premier et second réservoirs (2461, 2462) adjacents à la surface arrière (2422) et évidés vers le bas à partir de la surface de fond (241).

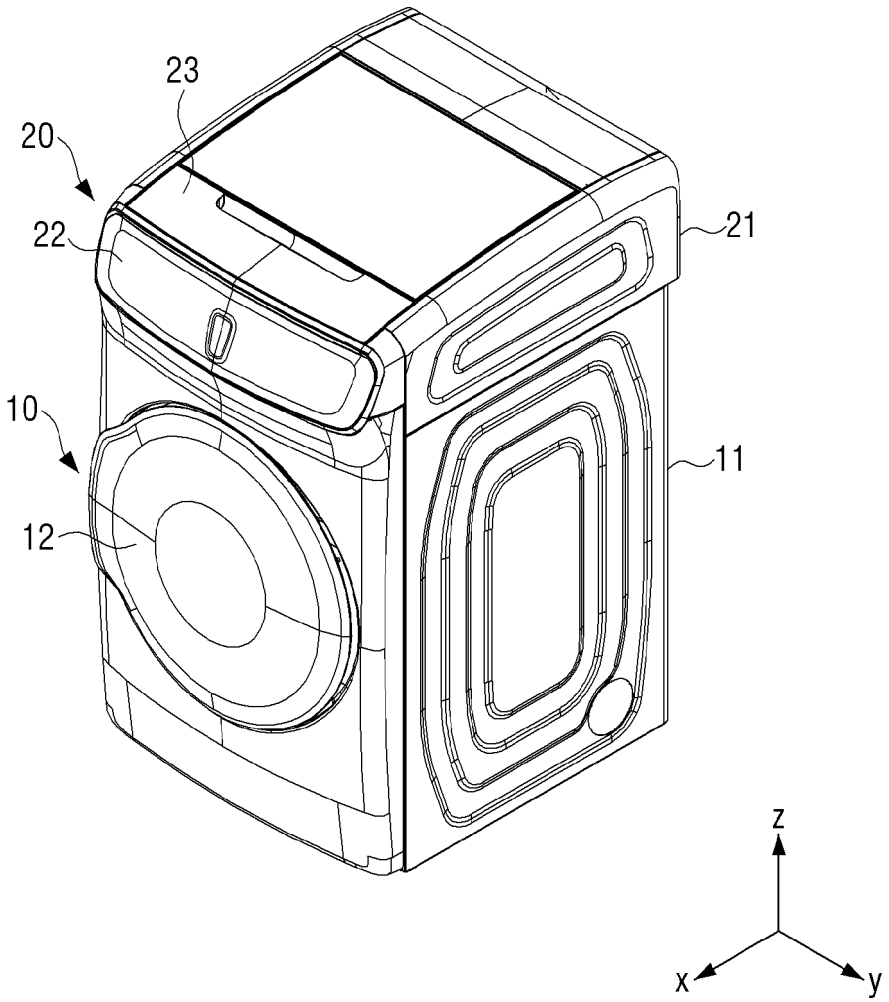
12. Appareil de séchage de vêtements (1) selon la revendication 8, dans lequel

la chambre sèche (24) comporte un trou d'échappement (2304H) s'étendant dans une direction longitudinale de la surface arrière (2422), et
le second appareil de séchage (20) comporte en outre un conduit d'échappement (26) couplé au trou d'échappement (2304H) et conçu pour évacuer l'air chaud à partir de la chambre sèche (24) à travers le trou d'échappement (2304H).

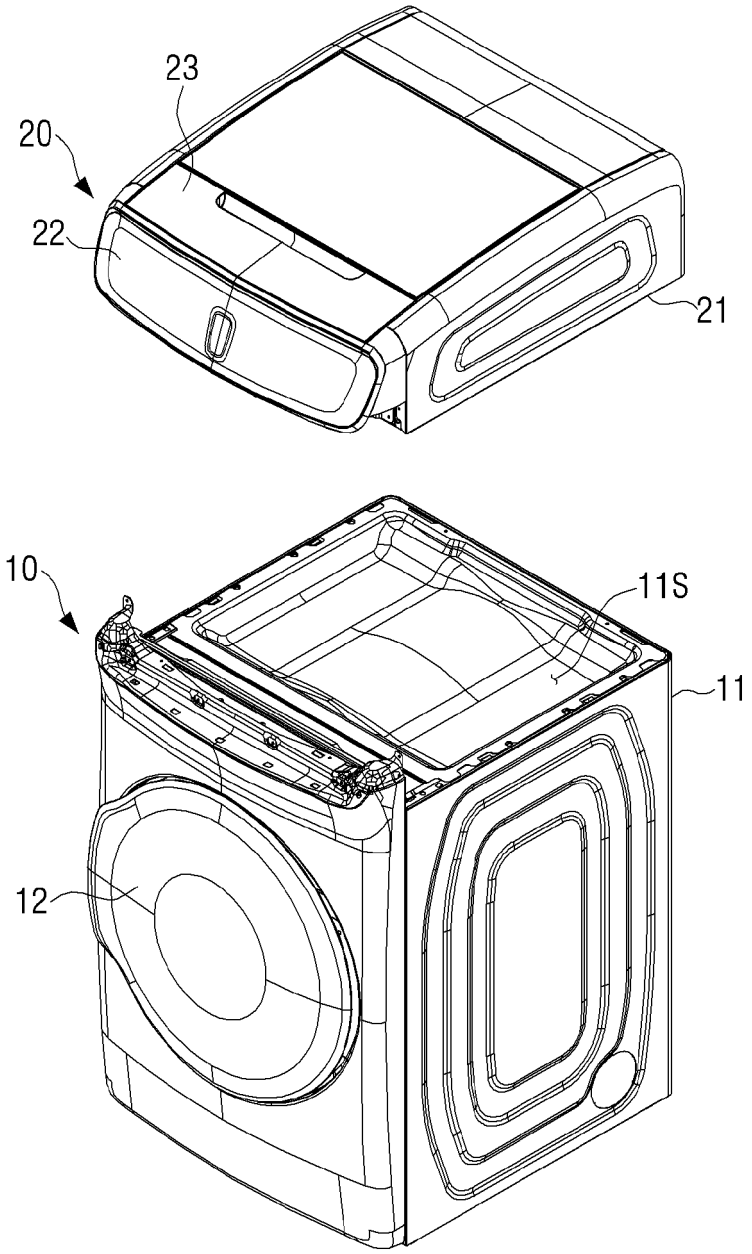
13. Appareil de séchage de vêtements (1) selon la revendication 12, dans lequel le conduit d'échappement (26) comporte une première ouverture (2601H) reliée au trou d'échappement (2304H), une seconde ouverture (2602H) disposée pour faire face à la première ouverture (2601H) et conçue pour évacuer l'air chaud introduit dans la première ouverture (2601H), et un trou de dérivation formé de manière adjacente à l'unité d'air chaud (25).

14. Appareil de séchage de vêtements (1) selon la revendication 1, comprenant en outre :
une paire d'unités d'injection (29) respectivement disposées des deux côtés de la chambre sèche (24) et conçues pour injecter de l'air chaud vers l'intérieur de la chambre sèche (24).

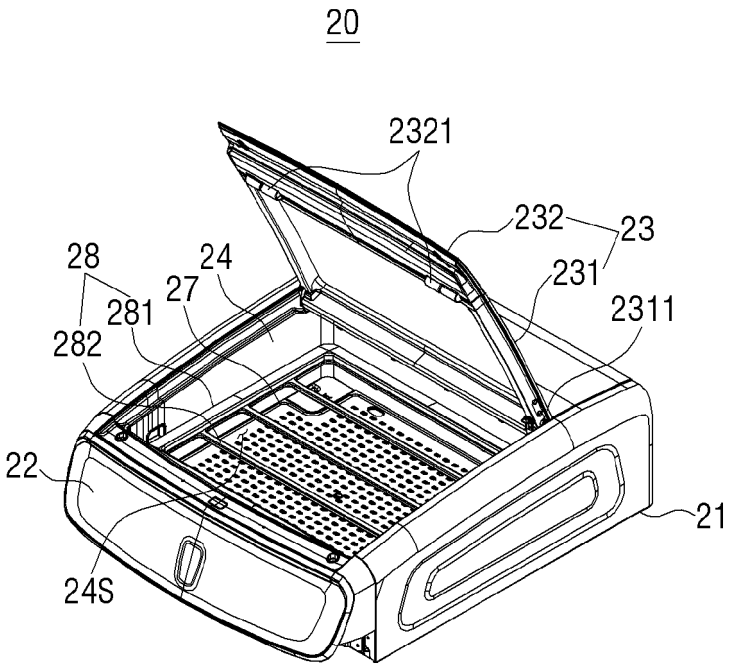
[Fig. 1]



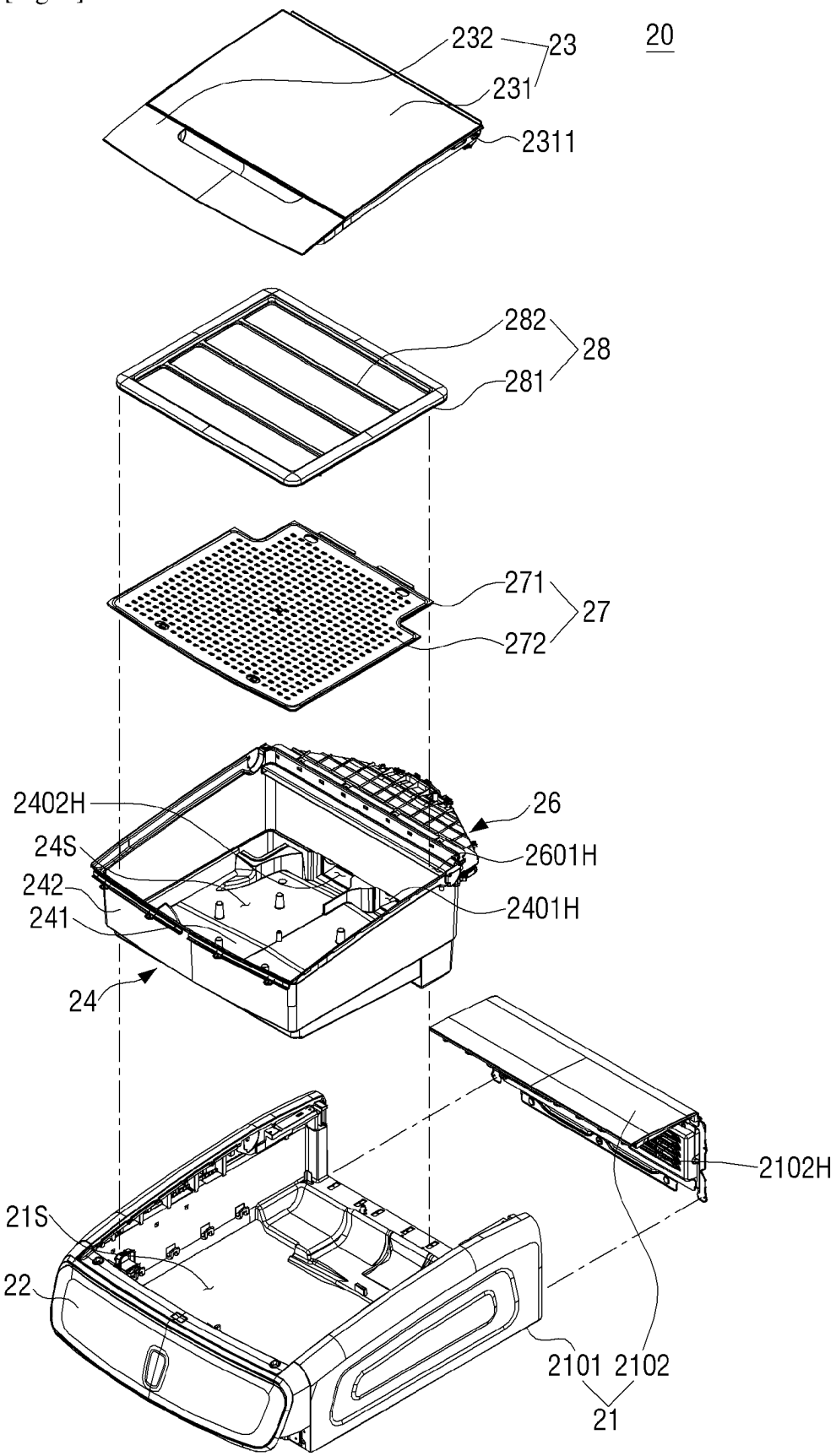
[Fig. 2]



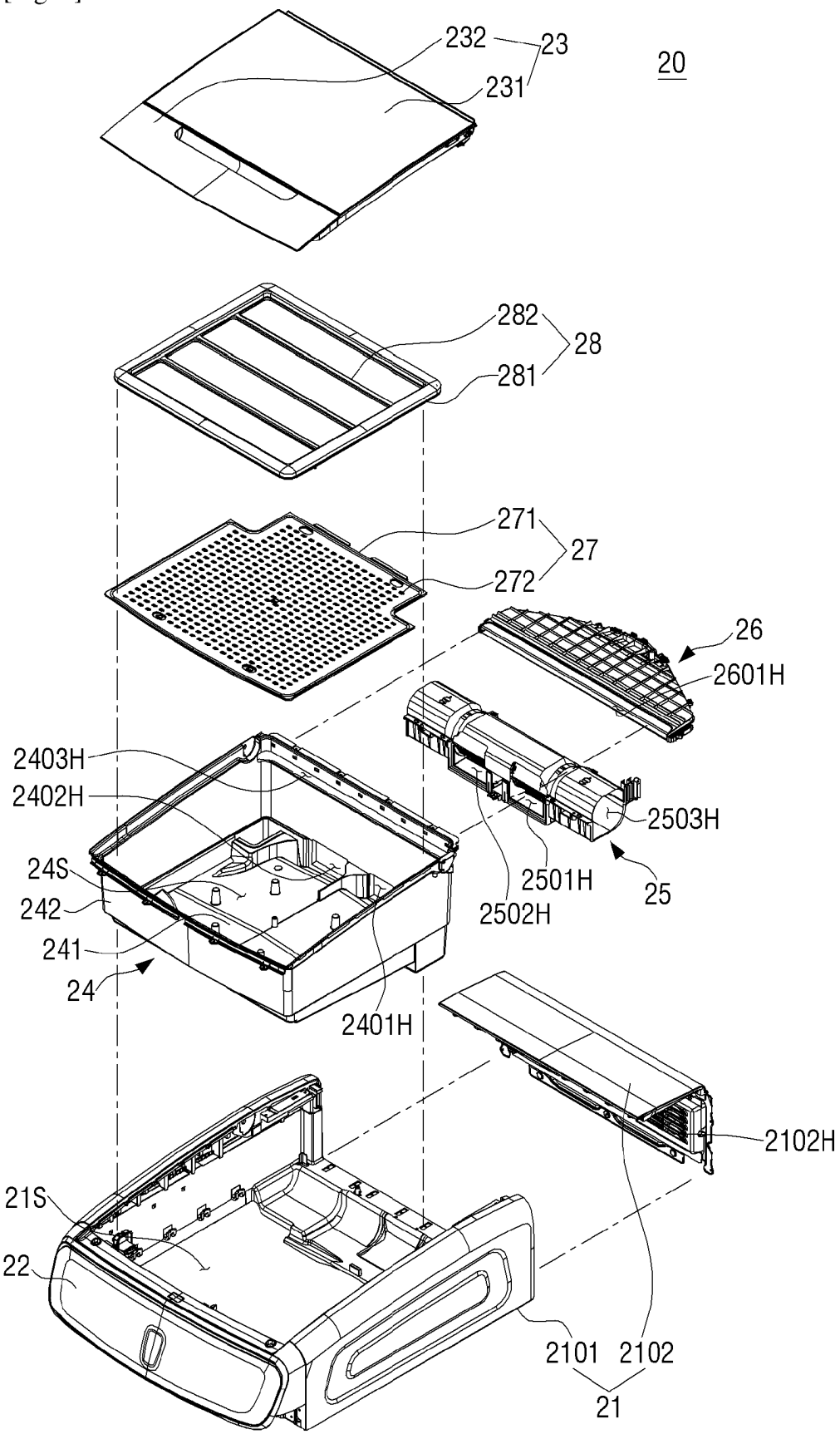
[Fig. 3]



[Fig. 4]


20
232
23
231
2311
282
28
281
271
27
272
2402H
26
24S
2601H
242
2401H
241
24
2102H
21S
22
2101
2102
21

[Fig. 5]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23
231
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282
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281
271
27
272
26
2601H
2403H
2402H
2503H
24S
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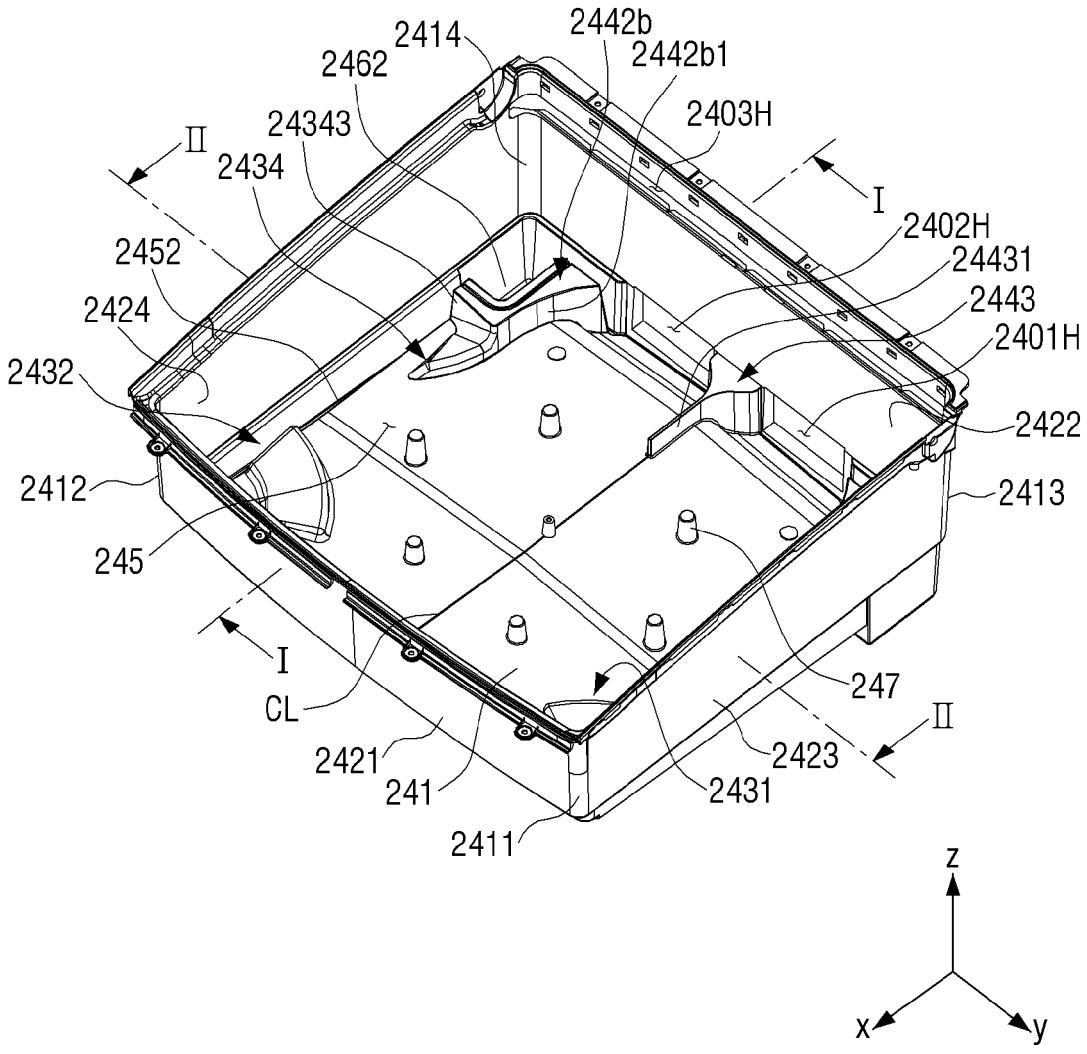
25
2401H
2102H
21S
22
2101
2102
21

[Fig. 6]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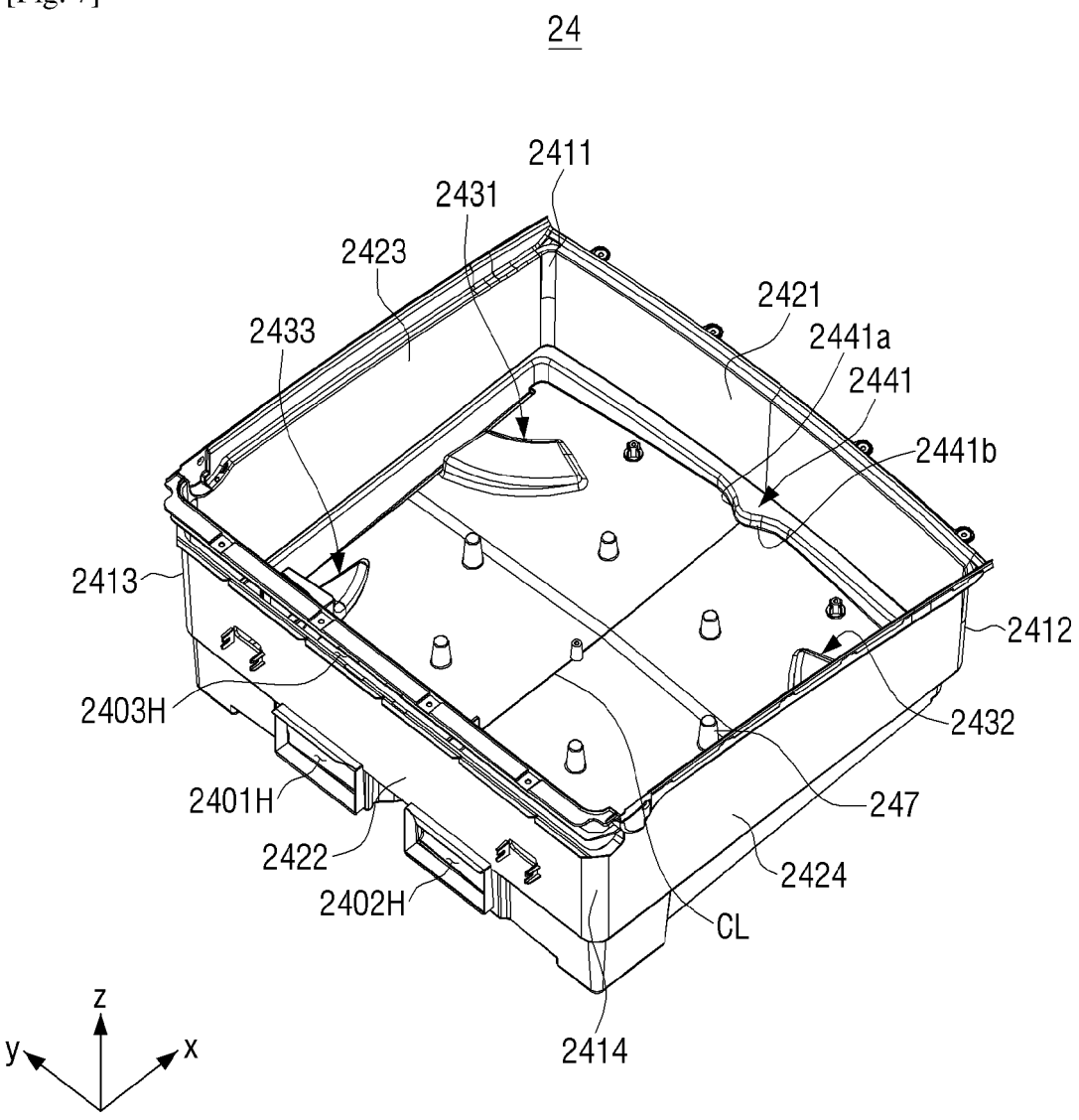
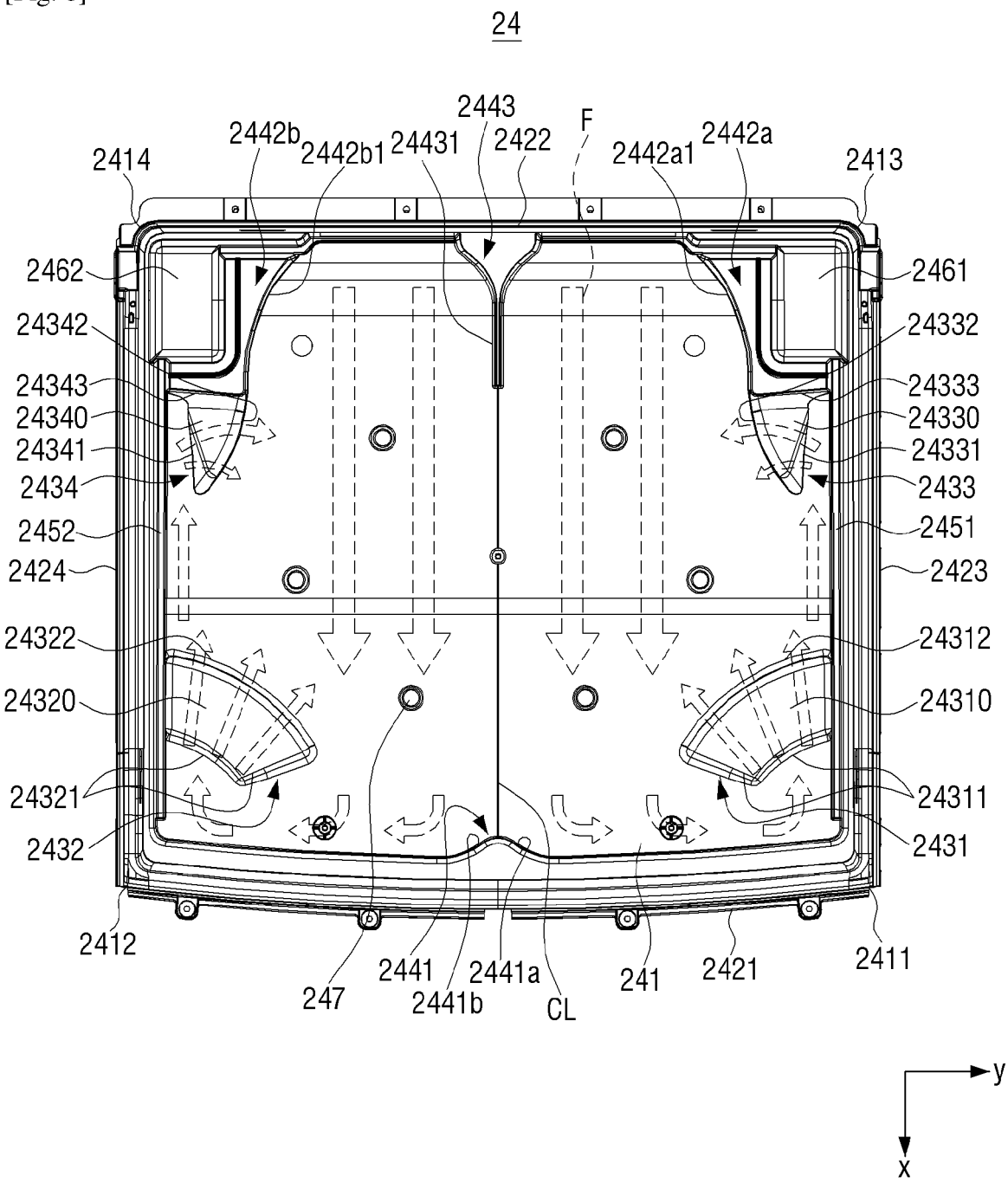
2442b
2462
2442b1
2403H
24343
II
2434
I
2402H
2452
24431
2424
2443
2401H
2432
2422
2412
2413
245
I
247
CL
II
2421
2423
241
2431
2411
z
x
y

[Fig. 7]


24
2411
2431
2423
2421
2433
2441a
2441
2441b
2413
2412
2403H
2432
2401H
247
2422
2424
2402H
CL
2414
z
y
x

[Fig. 8]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2443
F
2442b
2442b1
24431
2422
2442a1
2442a
2414
2413
2462
2461
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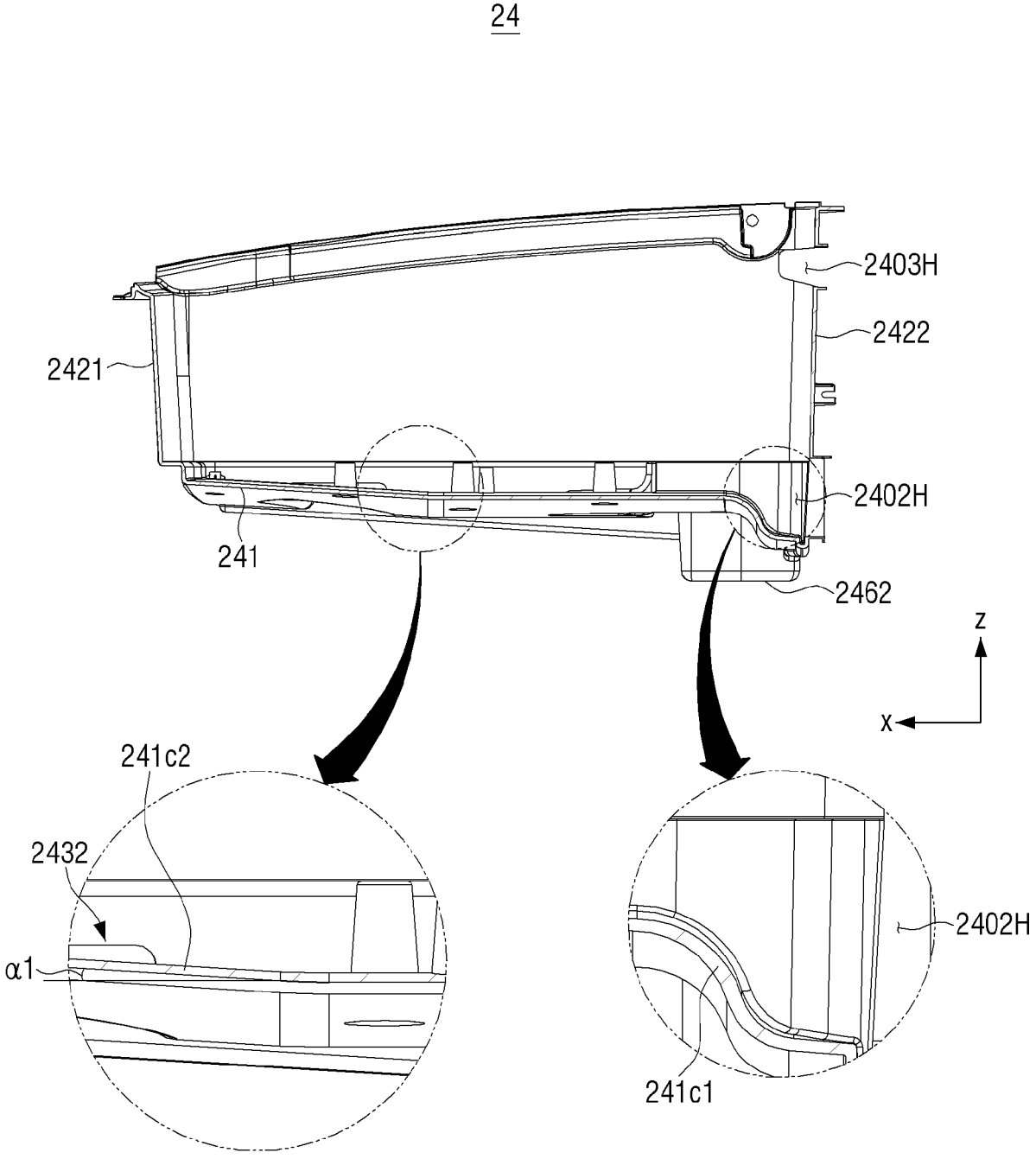
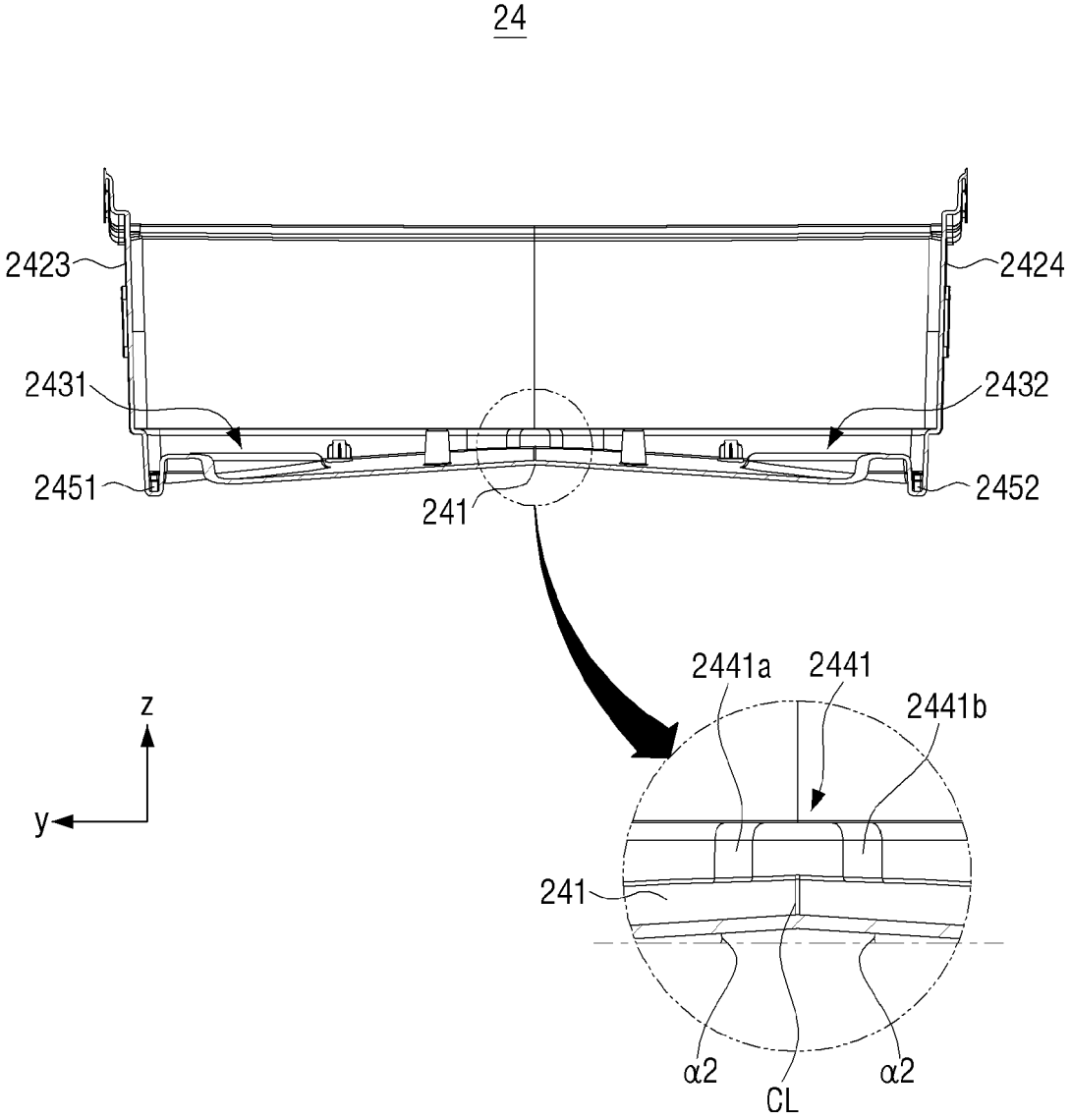
24332
24343
24333
24340
24330
24341
24331
2434
2433
2452
2451
2424
2423
24322
24312
24320
24310
24321
24311
2432
2431
2412
247
2441
2441a
2441b
CL
241
2421
2411
y
x

[Fig. 9]

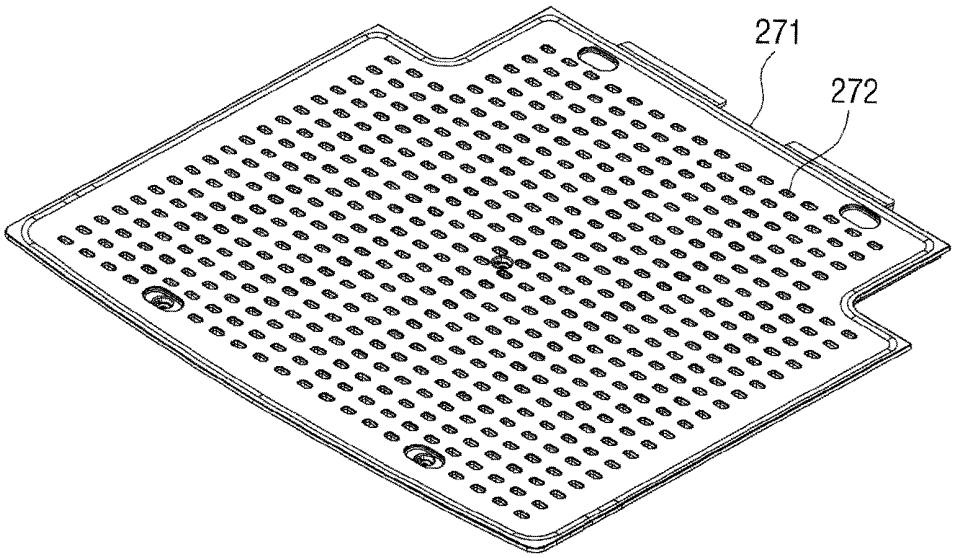

24
2403H
2422
2421
2402H
241
2462
z
x
241c2
2432
α1
2402H
241c1

[Fig. 10]


24
2423
2424
2431
2432
2451
2452
241
2441a
2441
2441b
z
y
241
α2
CL
α2

11]

27



[Fig. 12]

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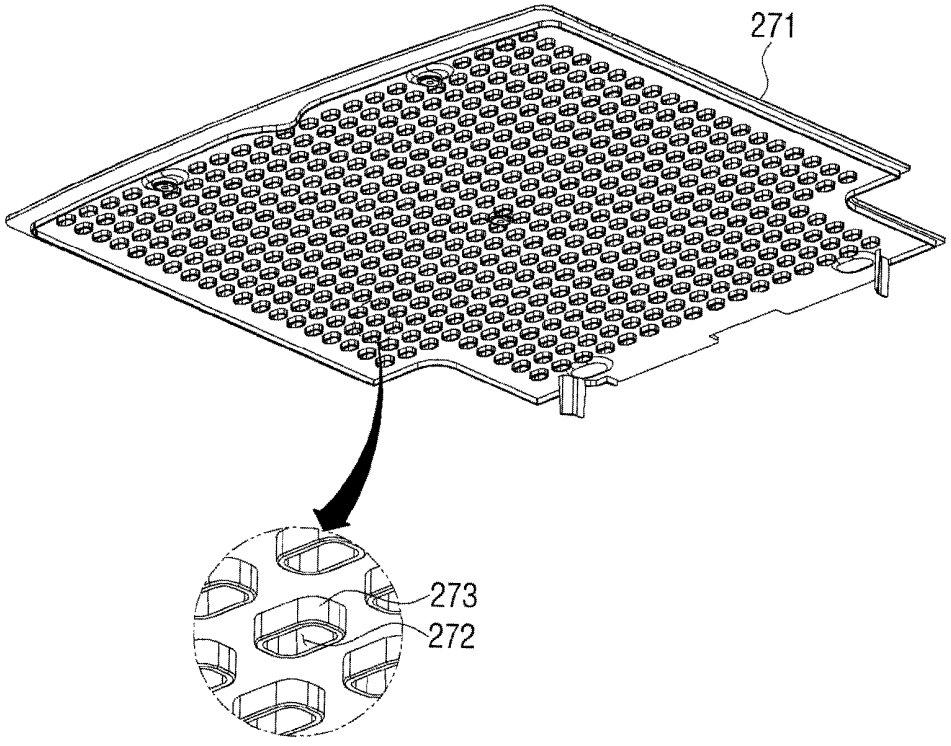
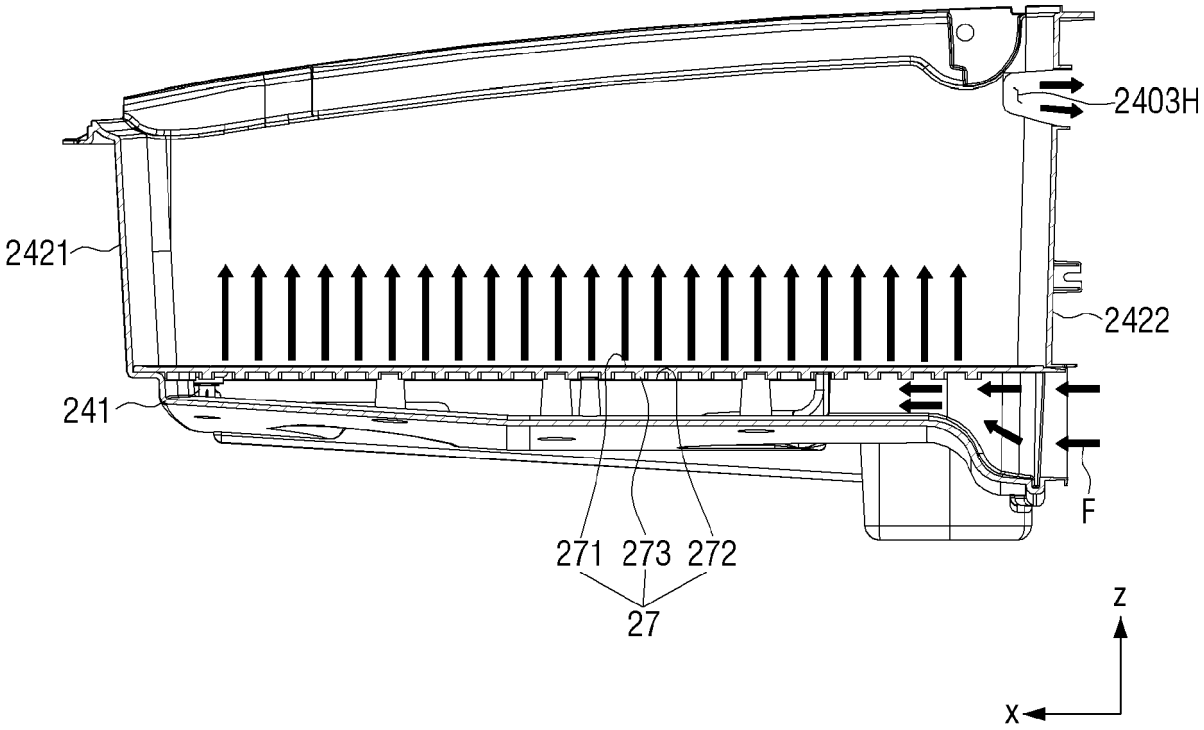
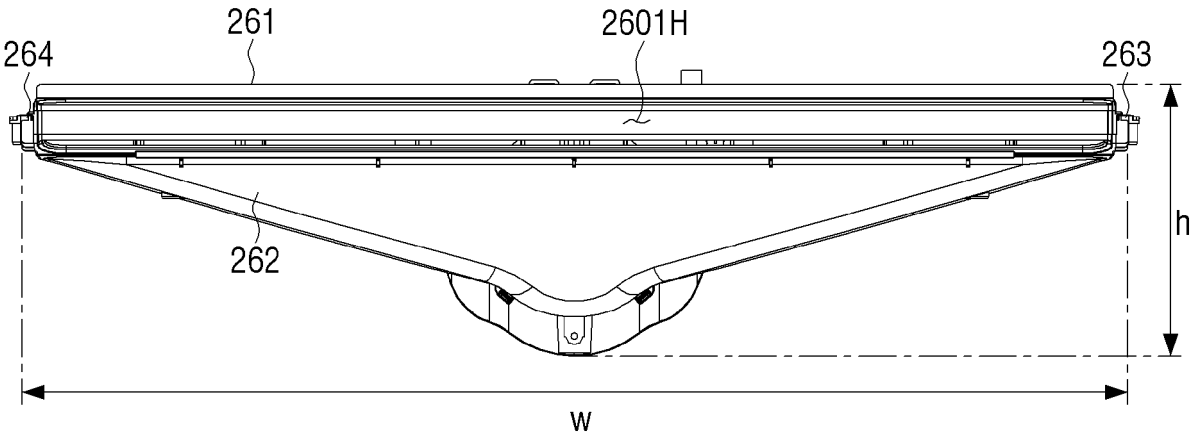


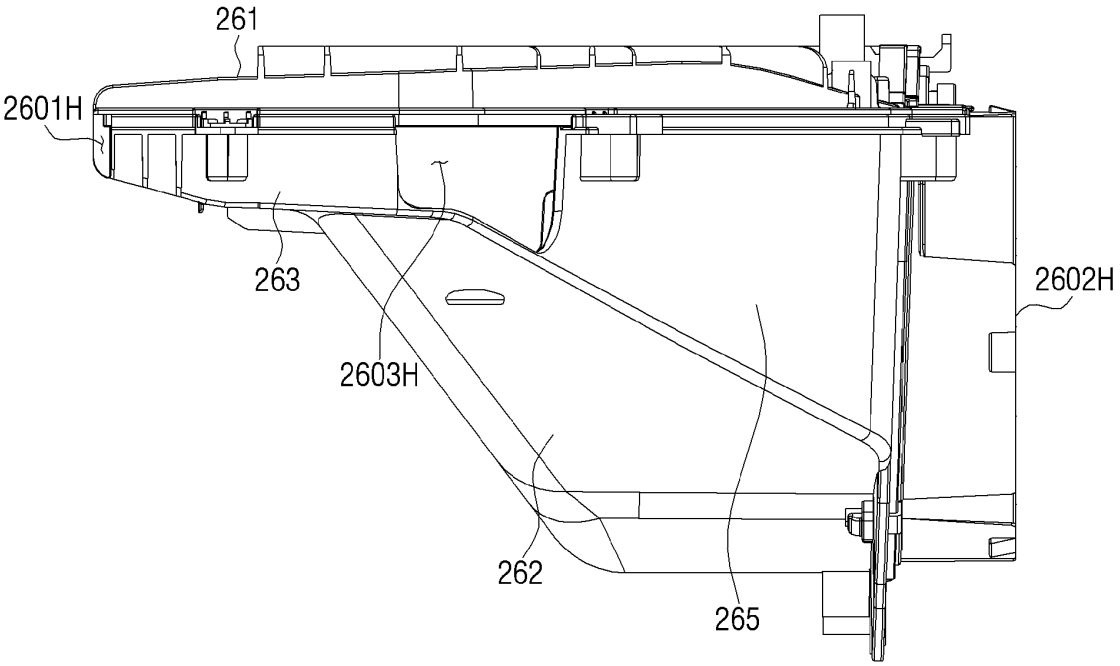
[Fig. 13]


2403H
2421
2422
241
F
271 273 272
27
z
x

[Fig. 14]


26
261
2601H
264
263
262
h
w

[Fig. 15]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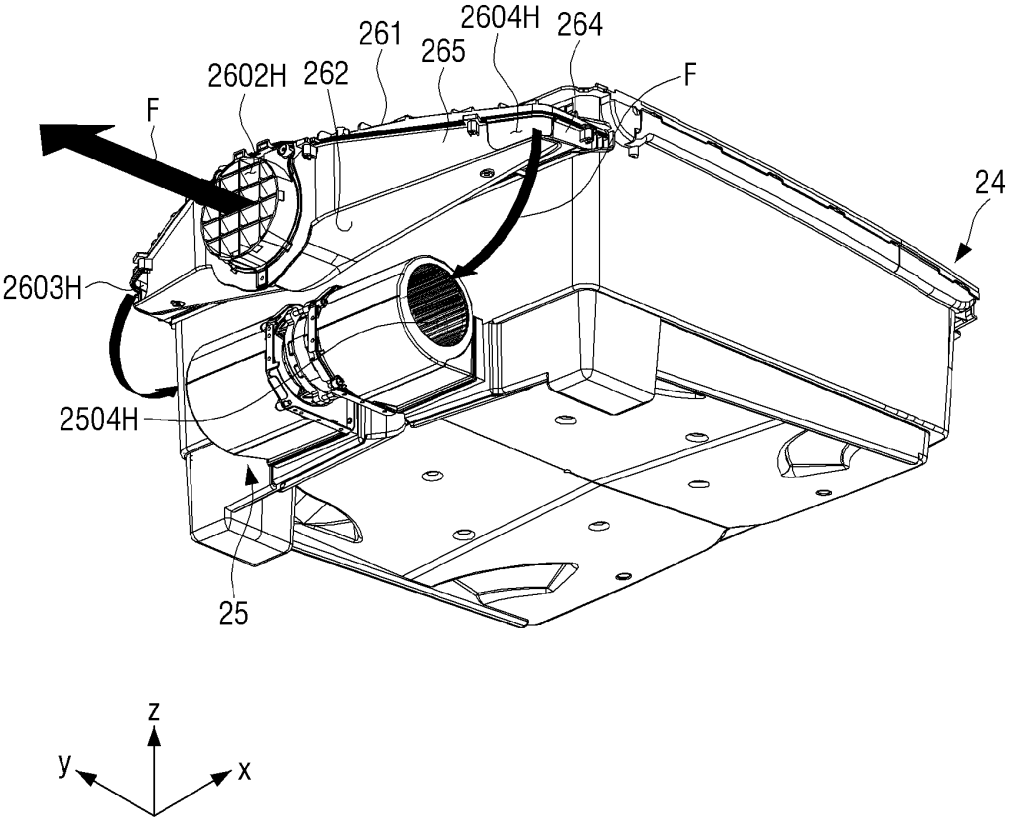
261
2601H
263
2603H
262
265
2602H

[Fig. 16]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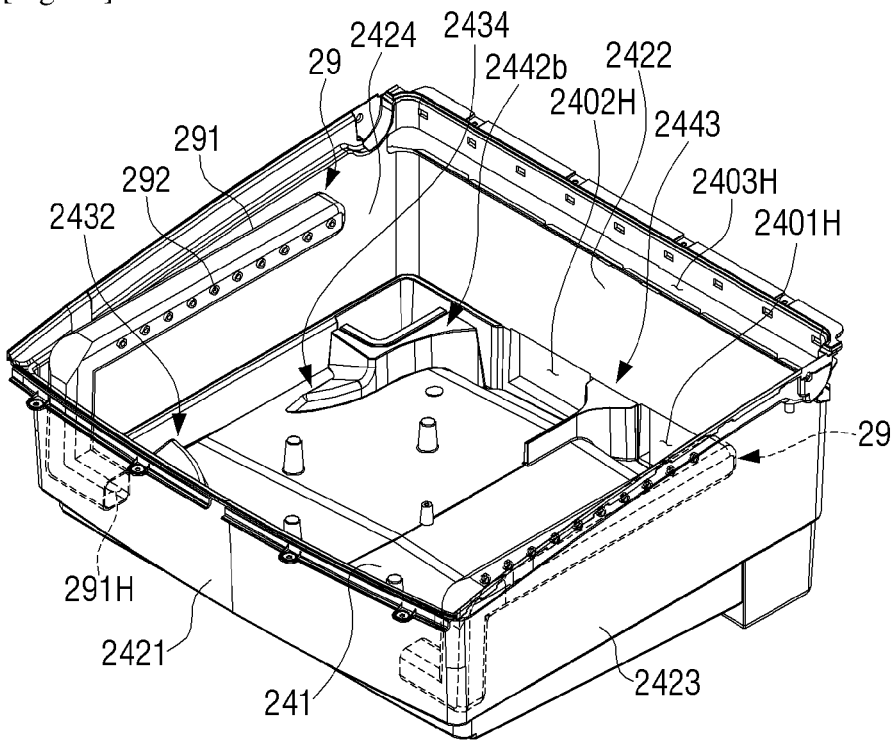
2602H
262
F
F
24
2603H
2504H
25
z
y
x

[Fig. 17]



[Fig. 18]

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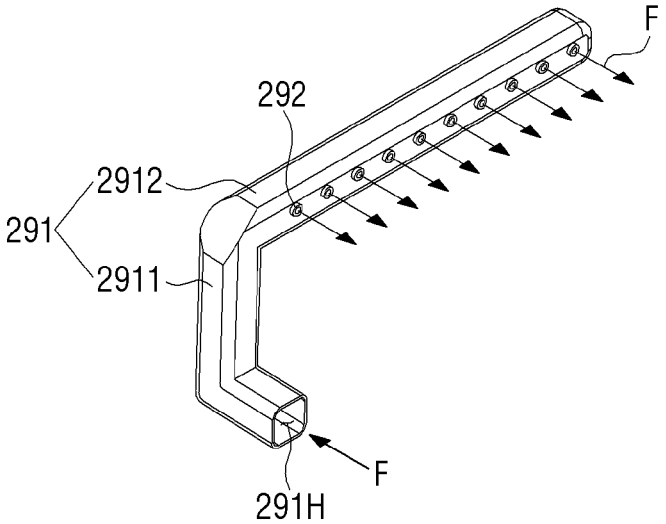
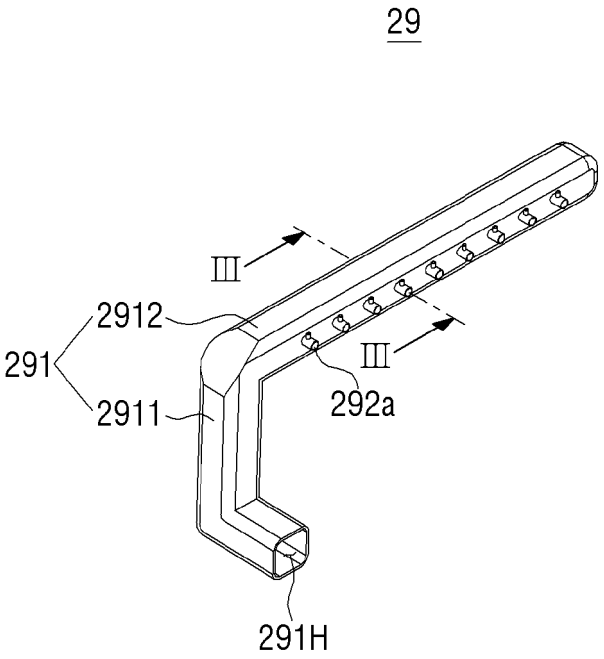


[Fig. 19]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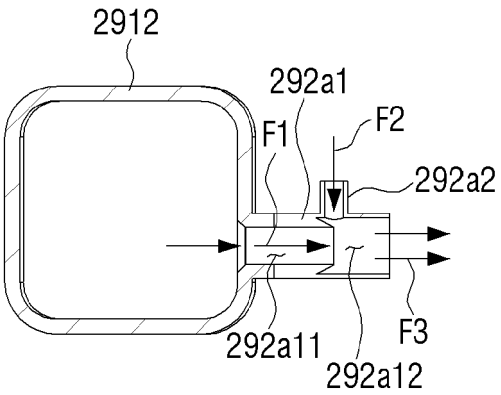
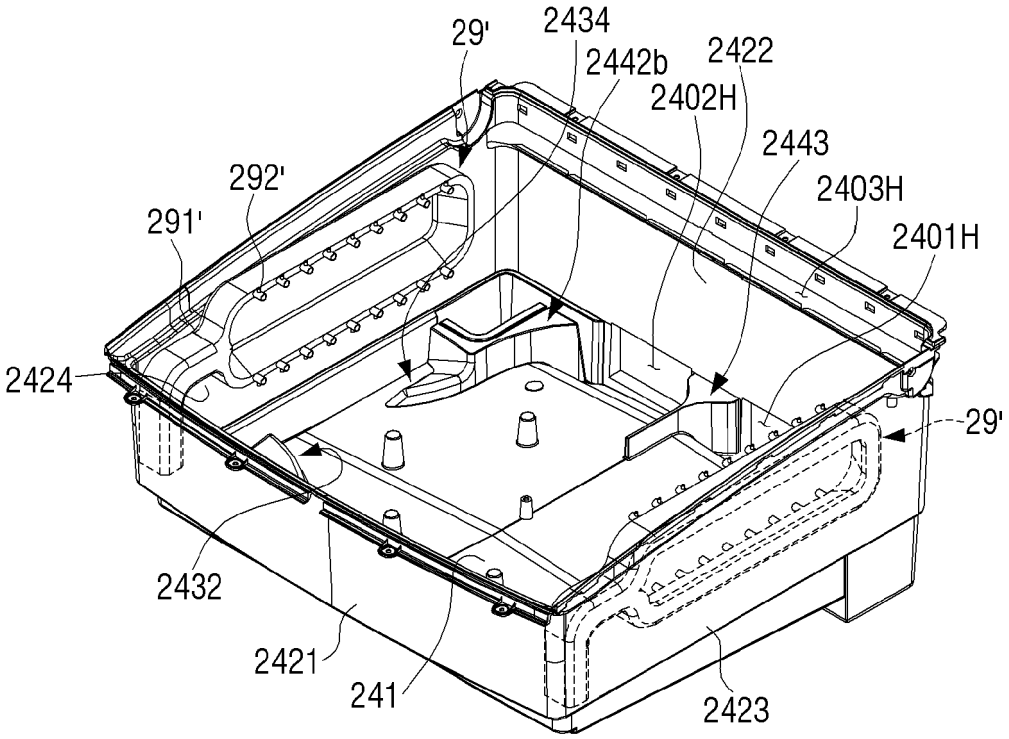
III
2912
291
2911
III
292a
291H

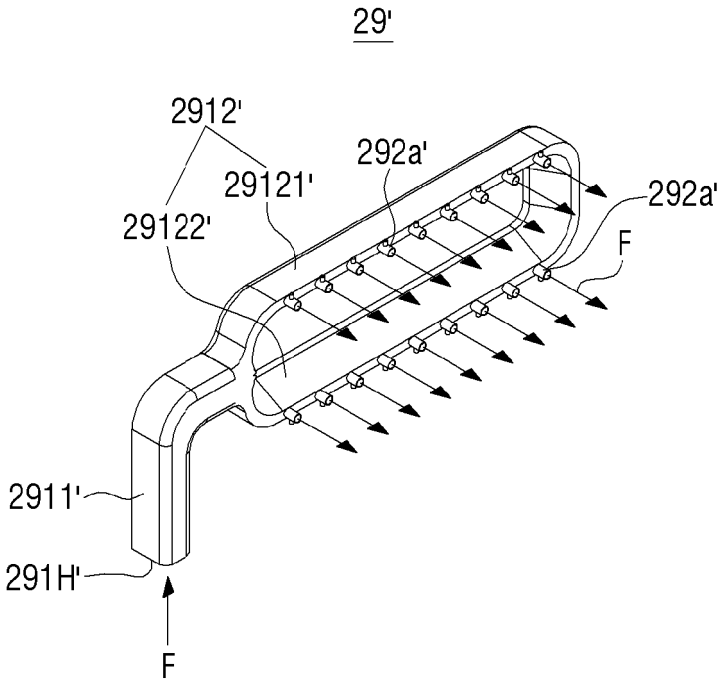
[Fig. 20]


29
2912
292a1
F1
F2
292a2
292a11
292a12
F3

[Fig. 21]


29'
2434
2442b
2422
2402H
2443
2403H
2401H
292'
291'
2424
29'
2432
2421
241
2423

[Fig. 22]


29'
2912'
292a'
29121'
292a'
29122'
F
2911'
291H'
F

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