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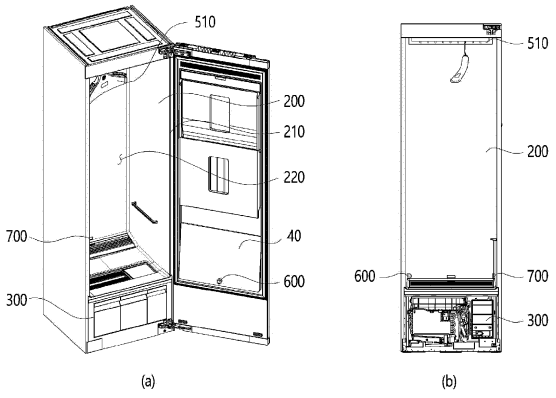
(54) CLOTHES TREATMENT APPARATUS

(57) The present disclosure relates to a clothes treatment apparatus comprising: a light-emitting part which is provided in any one from among an inner case, a door and a machine room, and which emits light into the inner case; and a sensor part which is provided in any one from among the inner case, the door and the machine room, and which senses blocking, by clothes dropped from a hanger part, of at least some of the light emitted from the light-emitting part, wherein the light-emitting part and the sensor part are arranged at a portion below the hanger part.

【Fig 16】



EP 4 516 980 A1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to a clothing treatment apparatus. More particularly, the present disclosure relates to a clothing treatment apparatus capable of determining whether clothes have fallen through an illuminance sensor.

BACKGROUND ART

[0002] In general, clothing treatment apparatuses conceptually include a washer that wets clothes in water to make it wet and then removes foreign substances through chemical action of detergent and physical action, such as drum rotation, and a dryer that dries the wet clothes using hot air and steam.

[0003] However, recently, a clothing care system that keeps dry clothes comfortable and clean without wetting thereof has appeared. This clothing care system may perform a refreshing cycle of removing odors from the clothes and drying or sterilizing the clothes by supplying steam or hot air to the clothes in a state in which the clothes are held.

[0004] This clothing care system may selectively add fragrance to the clothes, and has recently taken up an important role in clothing treatment apparatuses along with the washer and dryer.

[0005] FIG. 1 illustrates a conventional clothing treatment apparatus provided with a steam supply.

[0006] Referring to Korean Patent Laid-open Publication No. 10-2020-0057545, a conventional clothing treatment apparatus includes a cabinet 1 forming the appearance of the apparatus, and an inner case 2 provided in the cabinet 1 to accommodate clothes .

[0007] The clothing treatment apparatus may have a circulation duct 13 provided under the inner case 2 to circulate air of the inner case 2, a heat exchanger 15 provided in the circulation duct 13 to exchange heat with the air, and a compressor 14 configured to supply a high-temperature refrigerant to the heat exchanger 15. In addition, a hanger unit configured to hold clothes may be provided in the inner case 2. When the compressor 14 is operated, hot air may be supplied to the inner case 2 to raise the temperature of the clothes, and the clothes may be dried or sterilized.

[0008] In addition, referring to Korean Patent Laid-open Publication No. 10-2020-0065886, a clothing treatment apparatus that measures the material of clothes, the load of the clothes, etc. inside an inner case using an optical sensor is provided.

[0009] The conventional clothing treatment apparatus had advantages of efficiently performing clothing management and reducing a time required for the management by determining control parameters applied to a blower or a steam generator based on the estimated load of clothes.

[0010] However, in the conventional clothing treatment apparatus, when clothes fall off of the hanger unit in the inner case 2 during a clothing treatment process, a user may not recognize that the clothes have fallen off of a hanger during the clothing treatment process, and the clothes may be damaged if the fallen clothes block a steam or hot air injection hole.

[0011] Furthermore, since the user recognizes that the clothes have fallen and have not been properly treated after the clothing treatment process is over, there was a problem in that the user was not able to take active measures, resulting in low satisfaction with a clothing treatment apparatus product.

[0012] Accordingly, a clothing treatment apparatus that directly detects whether clothes have fallen by installing a load sensor on a hanger or the like has appeared. However, the load sensor may not properly detect whether clothes have fallen due to vibration occurring during the clothing treatment process and the light weight (1 kg or less) of the clothes.

[0013] Therefore, a need to provide a clothing treatment apparatus that may accurately determine whether clothes have fallen has arisen.

DISCLOSURE

TECHNICAL TASK

[0014] One technical task of the present disclosure is to provide a clothing treatment apparatus for detecting whether clothes have fallen during clothing treatment using an illuminance sensor.

[0015] Another technical task of the present disclosure is to provide a clothing treatment apparatus that may determine whether clothes have fallen from a change in the illuminance of light detected by a sensor unit when the clothes have fallen.

[0016] Another technical task of the present disclosure is to provide a clothing treatment apparatus that may determine whether clothes have fallen using an illuminance sensor that is less affected by shock and vibration and has no limit to the lifespan of a light source as long as power is supplied.

[0017] Another technical task of the present disclosure is to provide a clothing treatment apparatus that may indirectly and quickly determine whether clothes have fallen by detecting a change in the illuminance of light without direct contact of a sensor with the clothes.

[0018] Another technical task of the present disclosure is to provide a clothing treatment apparatus that may determine whether clothes have fallen by detecting a change in illuminance by a sensor unit as long as light emitted from a light emitting unit reaches the sensor unit regardless of where the light emitting unit and the sensor unit are provided.

TECHNICAL SOLUTIONS

[0019] In order to solve the above technical tasks, the present disclosure provides a clothing treatment apparatus including a light emitting unit provided in one of an inner case, a door, and a machine compartment to emit light toward the inside of the inner case, and a sensor unit provided in one of the inner case, the door, and the machine compartment to detect that clothes having fallen off of a hanger unit block at least a portion of the light emitted from the light emitting unit, wherein the light emitting unit and the sensor unit are disposed below the hanger unit.

[0020] The light emitting unit and the sensor unit may be disposed closer to the bottom surface of the inner case than the hanger unit.

[0021] The light emitting unit and sensor unit may be disposed in a width direction or forward and rearward directions with respect to the bottom surface of the inner case.

[0022] The sensor unit may be disposed on a rear surface of the inner case, and the light emitting unit may be disposed in front of the sensor unit.

[0023] The sensor unit may be disposed on one side surface of the inner case, and the light emitting unit may be disposed on one side surface of the sensor unit.

[0024] At least one of the light emitting unit or the sensor unit may be disposed in the machine compartment.

[0025] One of the light emitting unit and the sensor unit may be disposed in the machine compartment, and a remaining one of the light emitting unit and the sensor unit may be disposed in the inner case or the door.

[0026] The machine compartment may further include an inflow body configured to communicate with the bottom surface of the inner case to allow air to be introduced thereinto, a circulation duct provided with a heat exchanger configured to heat the air introduced from the inflow body to generate the hot air, and a discharge duct configured to allow the circulation duct to communicate with the inside of the inner case and disposed farther rearward than the inflow body, the light emitting unit may be provided on the inflow body, and the sensor unit may be provided on a rear surface of the inner case.

[0027] The sensor unit may be provided at a center of the rear surface of the inner case in the width direction, the inflow body may be disposed at one side on the bottom surface of the inner case, and the light emitting unit may be disposed at a position corresponding to the sensor unit in the inflow body.

[0028] The clothing treatment apparatus may further include a reflection unit disposed above the light emitting unit and provided to guide the light emitted from the light emitting unit to the sensor unit.

[0029] The machine compartment may further include a body filter mounted on the inflow body, and a filter cover disposed above the body filter, and the reflection unit may be disposed between the filter cover and the body filter.

[0030] The reflection unit may include side reflectors disposed on both sides of the filter cover.

[0031] The reflection unit may include a central reflector provided at a center of the filter cover in the width direction so as to face the light emitting unit, and the light emitting unit, the sensor unit, and the central reflector may be disposed in a straight line so that the central reflector guides the light to the sensor unit.

[0032] The light emitting unit and the sensor unit may be disposed above the bottom surface of the inner case.

[0033] The light emitting unit and the sensor unit may be provided to face each other.

[0034] The light emitting unit may be provided on one of side surfaces of the inner case, and the sensor unit may be provided on the other side surface of the inner case facing the one side surface.

[0035] The light emitting unit may be provided at a center of the one side surface in the width direction, and the sensor unit may be provided at a center of the other side surface in the width direction.

[0036] The light emitting unit may be provided on an inner surface of the door, and the sensor unit may be provided on a rear surface of the inner case.

[0037] The light emitting unit may be provided at a center of the rear surface of the inner case in the width direction, and the sensor unit may be provided at a center of the inner surface of the door in the width direction.

[0038] The present disclosure provides a clothing treatment apparatus including a controller provided to determine whether clothes have fallen depending on an amount of light emitted from a light emitting unit, detected by a sensor unit, wherein the sensor unit is disposed closer to the bottom surface of the inner case than a hanger unit, the sensor unit detects a first value when the clothes do not fall, and the controller determines that the clothes have fallen when the sensor unit detects a value smaller than the first value.

[0039] The clothing treatment apparatus may further include reflection units provided to disperse the light emitted from the light emitting unit in at least two directions so that the sensor unit detects that the clothes having fallen to the bottom surface block the light emitted from the light emitting unit.

[0040] The reflection units may be disposed on both sides of the sensor unit and the light emitting unit between the sensor unit and the light emitting unit.

[0041] The reflection units may be disposed closer to the light emitting unit than the sensor unit.

[0042] The sensor unit and the light emitting unit may be disposed in forward and rearward directions with respect to the bottom surface, and the reflection units may be disposed in a width direction with respect to the bottom surface.

[0043] The plurality of reflection units may be disposed symmetrically with respect to the sensor unit.

[0044] The plurality of reflection units may be disposed symmetrically with respect to the sensor unit and the light emitting unit.

[0045] The present disclosure provides a clothing treatment apparatus including a cabinet having an opening formed in a front portion thereof, an inner case provided in the cabinet to provide a space configured to accommodate clothes, a door coupled to the cabinet to open and close the opening, a hanger unit including at least one hanger configured to hold the clothes, a power transmission unit installed in the upper portion of the inner case and provided to shake the at least one hanger, and a driver connected to the power transmission unit to provide power to shake the at least one hanger, a machine compartment provided below a bottom surface of the inner case to supply at least one of hot air or steam into an inside of the inner case, a light emitting unit provided in one of the inner case, the door, and the machine compartment to emit light toward the inside of the inner case, and a sensor unit provided in one of the inner case, the door, and the machine compartment to detect that the clothes having fallen off of the hanger unit block at least a portion of the light emitted from the light emitting unit when the hanger unit, wherein the light emitting unit and the sensor unit are disposed below the hanger unit.

ADVANTAGEOUS EFFECTS

[0046] The present disclosure has the effect of accurately detecting whether clothes have fallen using an illuminance sensor.

[0047] The present disclosure has the effect of determining whether clothes have fallen using an illuminance sensor that is less affected by shock and vibration and has no limit to the lifespan of a light source as long as power is supplied.

[0048] The present disclosure has the effect of indirectly and quickly determining whether clothes have fallen by detecting a change in the illuminance of light without direct contact of a sensor with a filter.

[0049] The present disclosure has the effect of determining whether clothes have fallen by detecting a change in illuminance by a sensor unit as long as light emitted from a light emitting unit reaches the sensor unit regardless of where the light emitting unit and the sensor unit are provided.

DESCRIPTION OF DRAWINGS

[0050]

FIG. 1 illustrates a conventional clothing treatment apparatus.

FIG. 2 illustrates the appearance of a clothing treatment apparatus of the present disclosure.

FIG. 3 illustrates the structure of an upper portion of an inner case.

FIG. 4 illustrates the structure of a machine compartment of the clothing treatment apparatus of the present disclosure.

FIG. 5 illustrates the structure of a base of the machine compartment of the clothing treatment apparatus of the present disclosure.

FIG. 6 illustrates the structure of a circulation duct of the clothing treatment apparatus of the present disclosure.

FIG. 7 illustrates the shape of the circulation duct of the clothing treatment apparatus of the present disclosure.

FIG. 8 is a cross-sectional view of the circulation duct.

FIG. 9 illustrates the structure of a controller installation unit provided on the base of the clothing treatment apparatus of the present disclosure.

FIG. 10 illustrates the structure of an air discharge unit (323) of the clothing treatment apparatus of the present disclosure.

FIG. 11 illustrates the structure of a base cover of the clothing treatment apparatus of the present disclosure.

FIG. 12 illustrates the structure of an external air duct.

FIG. 13 illustrates the flow of air flowing through the circulation duct.

FIG. 14 illustrates the installation structure of a steam supply.

FIG. 15 illustrates the detailed structure of the steam supply.

FIG. 16 illustrates the clothing treatment apparatus of the present disclosure in which a light emitting unit and a sensor unit are installed.

FIG. 17 illustrates division of spatial areas of the inner case of the clothing treatment apparatus of the present disclosure.

FIG. 18 illustrates one embodiment of positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

FIG. 19 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

FIG. 20 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

FIG. 21 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

FIG. 22 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

FIG. 23 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

FIG. 24 illustrates one embodiment of a reflection

unit of the clothing treatment apparatus of the present disclosure.

FIG. 25 illustrates a filter unit of the clothing treatment apparatus of the present disclosure.

FIG. 26 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

FIG. 27 illustrates the structure of a first reflector.

FIG. 28 illustrates another embodiment of the reflection unit of the clothing treatment apparatus of the present disclosure.

FIG. 29 illustrates another embodiment of the reflection unit of the clothing treatment apparatus of the present disclosure.

FIG. 30 illustrates a clothes fall area of the clothing treatment apparatus of the present disclosure.

FIG. 31 illustrates the structure of a filter cover of the clothing treatment apparatus of the present disclosure.

BEST MODE FOR DISCLOSURE

[0051] Hereinafter, embodiments of the disclosure will be described in detail with reference to the accompanying drawings. In the present disclosure, the same or similar components are indicated by the same or similar reference numbers even in different embodiments, and the description thereof is replaced with the first description. In the following description of the present disclosure, singular expressions encompass plural expressions unless the context clearly indicates otherwise. In addition, in describing the embodiments of the present disclosure, if it is determined that the detailed descriptions of related known technologies may obscure the gist of the embodiments of the present disclosure, the detailed descriptions will be omitted. Further, it should be understood that the accompanying drawings are provided only for ease of understanding the embodiments of the present disclosure, and the technical idea of the present disclosure is not limited by the accompanying drawings.

[0052] FIG. 2 illustrates the appearance of a clothing treatment apparatus 1 of the present disclosure.

[0053] Referring to FIG. 2(a), the clothing treatment apparatus of the present disclosure may include a cabinet 100 forming the appearance of the clothing treatment apparatus, and a door 40 rotatably coupled to the cabinet 100.

[0054] The door 40 may include a main body 410 forming the front surface of the cabinet 100, and an installation body 420 extending from one side of the main body 410 so that a display configured to display information of the clothing treatment apparatus may be installed thereon.

[0055] The installation body 420 may be provided to form a step 43 toward the rear of the cabinet 100 from the main body 410.

[0056] Further, at least a portion of the installation body 20 may be disposed to overlap the main body 410 in the forward and rearward directions at the rear of the main body 410. Thereby, the step 43 may function as a handle.

[0057] The installation body 420 may be formed of a different material or in a different color from the main body 410. In addition, the installation body 420 may be formed of a translucent material that transmits light emitted from the display.

[0058] Referring to FIG. 2(b), an inner case 200 having an accommodation space 220 to accommodate clothes may be provided within the cabinet 100. The inner case 200 may be provided with an opening 210 formed at the front portion thereof so that the clothes enter and exit the inner case 200 therethrough, and the opening 210 may be shielded by the door 40.

[0059] The inner case 200 may be formed of a plastic resin-based material, and may be formed of a reinforced plastic resin-based material that is not deformed even by air of a higher temperature than room temperature, heated air (hereinafter, hot air), steam, or moisture.

[0060] The inner case 200 may be provided such that the length thereof is longer than the width thereof. Accordingly, the clothes may be accommodated in the accommodation space 220 without being folded and wrinkled.

[0061] The clothing treatment apparatus 1 of the present disclosure may include a holding unit 500 that may hold the clothes in the accommodation space 220 of the inner case 200.

[0062] The holding unit 500 may include a hanger unit 510 provided on the upper surface of the inner case 200 to hold the clothes.

[0063] When the clothes are held on the hanger unit 510, the clothes may be disposed in a state of floating in the air within the accommodation space 220.

[0064] Further, the holding unit 500 may further include a pressing unit 520 coupled to the inner surface of the door 40 to fix the clothes.

[0065] The hanger unit 510 may be provided in a bar shape arranged in the width direction of the inner case 200 to support hangers on which clothes are held. Further, as illustrated, the hanger unit 510 may be provided in a hanger shape to allow clothes to be directly held thereon.

[0066] The clothing treatment apparatus of the present disclosure may further include a vibration unit that vibrates the hanger unit 510 to remove foreign substances, such as fine dust, attached to the clothes.

[0067] The holding unit 500 may include the pressing unit 520 provided on the door 40 to press and fix the clothes. The pressing unit 520 may include a support 522 fixed to the inner surface of the door 40 to one surface of the clothes, and a presser 521 configured to press the clothes supported by the support 522.

[0068] The presser 521 may be provided to move toward the support 522 or away from the support 522. For example, the presser 521 may be rotatably provided on the inner surface of the support 522 or the door 40.

[0069] As such, the presser 521 and the support 522 may press both sides of the clothes to remove wrinkles from the clothes and create intended creases.

[0070] The clothing treatment apparatus of the present disclosure may have a machine compartment 300 equipped with various devices that may supply at least one of hot air or steam to the accommodation space 220 or purify or dehumidify external air of the cabinet 100.

[0071] The machine compartment 300 may be disposed to be separated or partitioned from the inner case 200, but may be provided to communicate with the inner case 200.

[0072] The machine compartment 300 may be disposed below the inner case 200. Accordingly, when hot air and steam with low specific gravity are supplied to the inner case 200, the hot air and steam may be naturally supplied to the clothes.

[0073] The machine compartment 300 may include a heat supply 340 that may supply hot air to the inside of the inner case 200. The heat supply 340 may be provided as a heat pump system, or may be provided as a heater that directly heats air with electric energy.

[0074] If the heat supply 340 is provided as a heat pump system, it may be provided to dehumidify and heat air discharged from the inner case 200 again and supply the air to the inner case 200. The detailed structure of the heat supply 340 will be described later.

[0075] The machine compartment 300 may include a steam supply 800 that may supply steam to the inside of the inner case 200. The steam supply 800 may be provided to directly supply steam to the inside of the inner case 200. The detailed structure of the steam supply 800 will be described later.

[0076] For this purpose, the inner case 200 may have a plurality of through holes 230 formed through one surface of the inner case 200 to communicate with the machine compartment 300.

[0077] Through the through holes 230, air inside the accommodation space 220 may be supplied to the machine compartment 300, and at least one of hot air or steam generated in the machine compartment 300 may be supplied to the accommodation space 200.

[0078] The through holes 230 may include an inflow hole 231 formed through the lower surface of the inner case 200 so that the air inside the inner case 200 is suctioned or discharged to the machine compartment 300 therethrough, and a discharge hole 232 formed through the lower surface of the inner case 200 so that the hot air generated in the machine compartment 300 is discharged therethrough.

[0079] The discharge hole 232 may be disposed in a portion of the lower surface of the inner case 200 close to the rear surface thereof. For example, the discharge hole 232 may be disposed to be inclined from the ground between the lower surface and the rear surface of the inner case 200 to face the hanger unit 510.

[0080] In addition, the inflow hole 231 may be disposed in a portion of the lower surface of the inner case 200 close to the front thereof. Accordingly, the inflow hole 231 may be disposed to be spaced apart from the discharge hole 232.

[0081] The through holes 230 may include a steam hole 233 through which steam generated in the steam supply 800 is supplied. The steam hole 233 may be disposed on one side of the discharge hole 232.

[0082] Further, a water supply tank 3 capable of supplying water to the steam supply 800 and a drain tank 4 that collects condensed water from the heat supply 340 may be provided in a front portion of the machine compartment 300.

[0083] The water supply tank 3 and the drain tank 4 may be detachably provided in the front portion of the machine compartment 300. Accordingly, the clothing treatment apparatus 1 of the present disclosure may be freely installed without being restricted by a water supply source or a drain source.

[0084] Meanwhile, a drawer 5 that is withdrawn from and inserted into the front portion of the machine chamber 300 and has a separate storage space may be further provided in the front portion of the machine chamber 300. A steam generator or an iron may be stored in the drawer 5.

[0085] FIG. 3 illustrates the structure of the upper portion of the inner case.

[0086] The hanger unit 510 of the clothing treatment apparatus of the present disclosure may include power transmission units 513 disposed in the upper portion of the inner case 200 and provided to shake the hangers 511.

[0087] A hook 512 on which the hanger 511 is placed or held may be provided at the lower portion of the power transmission unit 513.

[0088] Accordingly, when the power transmission units 513 move, the hooks 512 move, and the hangers 511 held on the hooks 512 shake, thereby exhibiting the effect of shaking off the clothes.

[0089] The power transmission units 513 may be provided in plural, and the hooks 512 coupled to the power transmission units 513 may be provided in plural. Accordingly, a large number of pieces of clothes corresponding to the number of the power transmission units 513 may be held in the inner case 200 to be refreshed.

[0090] FIG. 3 illustrates that the hanger unit 510 and the power transmission units 513 are arranged in the width direction of the inner case 200.

[0091] The hanger unit 510 and the power transmission units 513 may be arranged in a direction in which the clothes are arranged in the accommodation space. For example, if the clothes are arranged in the forward and rearward directions in the inner case 200, the hanger unit 510 and the power transmission units 513 may be arranged in the forward and rearward directions of the inner case 200.

[0092] Hereinafter, the hanger unit 510, the plurality of power transmission units 513, and the plurality of hooks 512 will be described as being arranged in the width

direction of the inner case 200, but this is only an example, and the hanger unit 510, the plurality of power transmission units 513, and the plurality of hooks 512 may be arranged in a direction designed so that a plurality of pieces of clothes are held or arranged in the accommodation space.

[0093] The hanger unit 510 may further include a driver 514 that provides power to move the power transmission units 513.

[0094] The driver 514 may be provided to be exposed to the inside of the inner case 200 as long as the driver 514 is capable of transmitting power to the power transmission units 513. However, since the driver 514 is provided to be operated by receiving electric energy, exposure of the driver 514 to steam or hot air is preferably prevented.

[0095] Therefore, the driver 514 may be disposed between the upper surface of the inner case 200 and the cabinet 100 so that exposure of the driver 514 to the accommodation space 210 may be prevented.

[0096] The power transmission units 513 may penetrate the upper surface of the inner case 200 to receive power from the driver 514. The power transmission units 513 penetrate the upper surface of the inner case 200 and extend downward so that the lower ends of the power transmission units 513 may be exposed to the accommodation space 210.

[0097] The power transmission units 513 may be provided in a rod shape, a tube shape, a plate shape, or the like in which the length thereof is longer than the thickness thereof.

[0098] FIG. 4 illustrates the structure of the machine compartment of the clothing treatment apparatus of the present disclosure.

[0099] FIG. 4(a) is a front view of the machine compartment 300, and FIG. 4(b) is a rear view of the machine compartment 300.

[0100] Components configured to supply hot air to a clothing treatment space, circulate air inside the clothing treatment space, supply steam to the clothing treatment space, or purify air outside the cabinet may be disposed within the machine compartment 300.

[0101] The machine compartment 300 may include a base unit 310 configured such that various devices are supported thereby or installed thereon. The base unit 310 may provide an area where the various devices are installed.

[0102] A circulation duct 320 through which air introduced from the inner case 200 or the outside of the cabinet 100 moves may be installed on the base unit 310.

[0103] The circulation duct 320 may be provided in a case shape with an open upper surface, and some of the components of the heat supply 340 may be installed in the circulation duct 320.

[0104] If the heat supply 340 is provided as a heat pump system, it may include heat exchangers 341 and 343, which will be described later, and a compressor 342 that supplies a high-temperature and high-pressure refrigerant to the heat exchangers in the circulation duct 320.

[0105] The heat exchangers 341 and 343 may be accommodated in the circulation duct 320 to cool and dehumidify the air flowing through the circulation duct 320 or heat the air to generate hot air.

[0106] If the circulation duct 320 is provided to draw in air from the outside of the cabinet 100, an external air duct 370 configured to draw in external air may be installed in front of the circulation duct 320.

[0107] The circulation duct 320 may be provided to communicate with the external air duct 370 to selectively draw in external air.

[0108] The water supply tank and the drain tank may be detachably connected to the front of the circulation duct 320. The water supply tank 3 and the drain tank 4 may be disposed to be placed above the external air duct 370.

[0109] The circulation duct 320 may be provided to be coupled to the base unit 310, or may be provided integrally with the base unit 310. For example, the base unit 310 and the circulation duct 320 may be manufactured by injection molding.

[0110] The machine compartment 300 may include a base cover 360 provided to allow the circulation duct 320 to communicate with the inflow hole 231.

[0111] The base cover 360 may be provided to be coupled to the upper portion of the circulation duct 320 so as to guide air suctioned through the inflow hole 231 into the inside of the circulation duct 320.

[0112] The base cover 360 may shield the upper surface of the circulation duct 320 to prevent discharge of air inside the circulation duct 320 to the outside. The lower portion of the base cover 360 and the upper surface of the circulation duct 20 may form one surface of the flow path of the circulation duct 320.

[0113] The base cover 360 may include an inflow part 362 that connects the inflow hole 231 and the circulation duct 320. The inflow part 362 may be provided in a duct shape and serve as an intake duct that delivers air inside the inner case 200 to the circulation duct 320.

[0114] The steam supply 800 connected to the water supply tank 3 to receive water, generate steam, and supply the generated steam to the inner case 200 may be installed in the machine compartment 300. The steam supply 800 may be disposed to be placed on the base cover 360.

[0115] The steam supply 800 may be disposed at the rear of the inflow part 362.

[0116] The machine compartment 300 may include a fan installation unit 350 provided to allow the circulation duct 320 to communicate with the inner case 200. The fan installation unit 350 may include a blower fan 353 that provides power to move air inside the circulation duct 320 in one direction, and a fan housing 351 that accommodates the blower fan 353 and is coupled to or extends toward the circulation duct 320.

[0117] The fan installation unit 350 may further include a discharge duct 352 provided to allow the circulation

duct 320 to communicate with the discharge hole 232.

[0118] The discharge duct 352 may be provided to extend from lower portion of the fan housing 351 toward the discharge hole 232 to have a cross-sectional shape and a cross-sectional area corresponding to the discharge hole 232.

[0119] As a result, the air inside the inner case 200 may be introduced through the base cover 360, pass through the circulation duct 320, and then be supplied back to the inside of the inner case 200 through the fan installation unit 350.

[0120] FIG. 5 illustrates the structure of the base of the machine compartment of the clothing treatment apparatus of the present disclosure. The base unit 310 may be provided with a compressor installation unit 313 in which the compressor 342 configured to supply the refrigerant to the heat exchangers 341 and 343 is installed. The compressor installation unit 313 may be disposed outside the circulation duct 320.

[0121] In addition, a controller or a control panel C that controls the clothing treatment apparatus of the present disclosure may be installed on the base unit 310.

[0122] The base unit 310 may be provided with a controller installation unit 313 that forms a space into which the controller C is inserted below the circulation duct 320.

[0123] The controller C may be provided to control all electronically controlled components, such as the compressor 342, the steam supply 800, and the blower fan 353.

[0124] Since the controller C is inserted into the base unit 310 to be supported thereby, and vibration or shock applied to the controller C may be buffered. In addition, since the controller C is disposed close to all electronic components, occurrence of control errors, such as noise, may be minimized.

[0125] In addition, the steam supply is disposed above the circulation duct 320, and the controller C is disposed below the circulation duct 320. Therefore, the circulation duct 320 may be provided in a straight duct shape between the steam supply 800 and the controller C. Accordingly, the flow resistance of air passing through the circulation duct 320 may be minimized.

[0126] The circulation duct 320, the external air duct 370, the steal supply 800, the controller C, and the steam supply 340 may be provided in a module format on the base unit 310.

[0127] Thereby, the base unit 310 may be easily installed and maintained while being withdrawn from or inserted into the machine compartment 300 forwards or rearwards.

[0128] FIG. 5(a) is a perspective view of the base unit 310 viewed from the front, and FIGs. 5(b) and 5(c) are perspective views of the base unit 310 viewed from the rear.

[0129] The base unit 310 may be installed on a base plate forming the lower surface of the clothing treatment apparatus. The base unit 310 may itself form the lower surface of the clothing treatment apparatus.

[0130] The base unit 310 may include a base bottom 311 forming a support surface. The base bottom 311 may form the lower surface of the clothing treatment apparatus. Further, the base bottom 311 may be installed on the upper surface of the bottom surface of the cabinet 100 forming the lower surface of the clothing treatment apparatus.

[0131] The base unit 310 may be provided integrally with the circulation duct 320 forming at least a portion of a flow path in which air flows. The circulation duct 320 may be formed to extend upward from the base bottom 311.

[0132] The circulation duct 320 may include a duct body 321 that extends from the base bottom 311 to form the flow path, a heat exchanger installation unit 3212 that provides a space in which an evaporator 341 or a condenser 343 is installed in the duct body 321, and an air discharge unit 323 that is provided at the rear of the duct body 321 and through which air inside the duct body 321 is discharged.

[0133] The air discharge unit 323 may be provided in a pipe shape that extends rearward from the duct body 321. The diameter of the air discharge unit 323 may be smaller than the width of the duct body 321.

[0134] The air discharge unit 323 may be connected to the fan housing 350. The air discharged from the air discharge unit 323 may be guided into the inner case 200 through the fan housing 350.

[0135] The circulation duct 320 may include an external air intake part 322 formed to penetrate the front surface of the duct body 321.

[0136] The external air intake part 322 may be provided to communicate with the external air duct 370. The external air duct 370 may be placed in front of the external air intake part 322 to be supported.

[0137] The circulation duct 320 may be provided with a damper that opens and closes the external air intake part 322. Inflow of external air into the circulation duct 320 may be allowed or blocked by opening and closing the damper.

[0138] The base unit 310 may include a compressor installation unit 312 that provides a space in which the compressor 342 is installed. The compressor installation unit 312 may be formed on one side of the base bottom 311, and may be formed integrally with the base bottom 311.

[0139] The compressor installation unit 312 may have a protrusion that supports the compressor 342. The compressor installation unit 312 may be disposed on the rear portion of the base unit 310. The compressor installation unit 312 may be disposed such that at least a portion thereof overlaps the air discharge unit 323 in the width direction.

[0140] A buffer member that reduces vibration transmitted from the compressor 342 may be installed in the compressor installation unit 312. The buffer member may be fixed to the protrusion.

[0141] The base unit 310 may include the controller

installation unit 313 in which the controller C is installed. The controller installation unit 313 may be formed between the base bottom 311 and the circulation duct 320. The controller installation unit 313 may be formed between the base bottom 311 and the bottom surface of the circulation duct 320. The controller installation unit 313 may be provided in a duct shape configured such that one of the front portion and the rear portion thereof is open below the circulation duct 320.

[0142] The structure of the controller installation unit 313 will be described later.

[0143] FIG. 6 illustrates the structure of the circulation duct of the clothing treatment apparatus.

[0144] The circulation duct 320 may extend upward from the base bottom to form the flow path in which air flows. The circulation duct 320 may include the heat exchanger installation unit 3212 that provides the space in which the evaporator 341 and the condenser 343 are installed. The heat exchanger installation unit 3212 may be provided within the duct body 321.

[0145] The duct body 321 may be provided with an open upper surface. The condenser 343 and the evaporator 341 may be inserted through the opening of the duct body 321 to be installed.

[0146] The opening of the duct body 321 may be shielded by the base cover 360, and the base cover 360 and the duct body 321 may form the flow path of the circulation duct 320.

[0147] The front surface of the duct body 321 may disposed to be spaced apart rearward from the front end of the base bottom 311.

[0148] Thereby, the base bottom 311 may secure a support surface 3111 on which one or more of the above-described water supply tank 3 or drain tank 4 and the external air duct 370 are installed and supported.

[0149] Meanwhile, the heat supply 340 may include the evaporator 341 provided as a heat exchanger installed in the circulation duct 320 to cool and dehumidify the air introduced into the circulation duct 320, the condenser 343 provided as a heat exchanger configured to heat the air having passed through the evaporator 341 to generate hot air, the compressor 342 configured to supply the refrigerant that exchanges heat with the air to the condenser 343 and disposed outside the circulation duct 320, and an expansion valve 344 configured to expand and cool the refrigerant having passed through the condenser 343.

[0150] Further, since the duct body 321 is formed integrally with the base unit 310, the heat exchanger installation unit 3212 may secure a great height, and the heights of the condenser 343 and the evaporator 341 may be increased.

[0151] As a result, the widths of the condenser 343 and the evaporator 341 in the forward and rearward directions may be reduced, and thus the number of refrigerant pipes passing through the condenser and the evaporator may be reduced. Accordingly, an effect of reducing the flow loss of air passing through the condenser and evaporator may be exhibited.

[0152] Further, the sum of the length of the evaporator 341 and the length of the condenser 343 may be smaller than the length of the heat exchanger installation unit 3212. Accordingly, the length of the heat exchanger installation unit 3212 in the forward and rearward directions may be equal to or smaller than half the length of the duct body 321.

[0153] Therefore, since the heat exchanger installation unit 3212 may be sufficiently separated from the external air intake part 322, a sufficient space into which external air and the air inside the inner case 200 are introduced may be secured in the circulation duct 320.

[0154] Further, the inside of the duct body 321 may include an installation partition 3211 that separates the heat exchanger installation unit 3212 from the outside of the heat exchanger installation unit 3212. The installation partition 3211 may be provided to protrude from the side surface of the duct body 321 to support the front portion of the evaporator 341.

[0155] In addition, the duct body 321 may be expanded in width based on the installation partition 3211, and extend rearward.

[0156] As a result, the width of the heat exchanger installation unit 3212 may be greater than half the width of the base unit 310. In addition, the width of the circulation duct 320 may be greater than half the width of the base unit 310.

[0157] The width of the condenser 343 and the width of the evaporator 341 may also be greater than half the entire width of the base unit 310.

[0158] When the widths of the condenser 343 and the evaporator 341 are secured, as described above, there may be an effect of sufficiently securing a heat exchange capacity.

[0159] In addition, the fan housing 350 may be disposed to overlap the condenser 343 or the evaporator 341 in the forward and rearward directions. Accordingly, air having passed through the condenser 343 and the evaporator 341 may be introduced into the fan housing 350 without bending the flow path. That is, the air introduced into the circulation duct 320 has an effect of minimizing flow loss because the flow path is not bent during the process of moving the air to the fan housing.

[0160] FIG. 7 illustrates the shape of the circulation duct of the clothing treatment apparatus of the present disclosure.

[0161] The base bottom 310 and the circulation duct 320 of the base unit 310 may be formed as a single body by injection molding.

[0162] A mold configured to form the inner surface of the duct body 321 may be withdrawn upward from the inside of the duct body 21 to be removed. Here, in order to facilitate withdrawal of the mold, the wall surface of the duct body 321 may be inclined at a predetermined angle with respect to the removal direction of the mold.

[0163] The width of a lower surface 321a of the duct body 321 may be longer than the width of an upper

surface 321b of the duct body 321.

[0164] Specifically, a distance between the wall surfaces of the duct body 321 facing each other may increase as the duct body gets farther from the base bottom 311. A distance between the left and right surfaces of the circulation duct facing each other may increase in the withdrawal direction of the mold. Accordingly, the mold may be easily removed.

[0165] Meanwhile, the discharge unit 323 may include an air extension pipe 3231 that extend from the rear portion of the duct body 321 to have a reduced diameter or width, and an air discharge pipe 3232 that extends from the air extension pipe 3231 in a pipe shape having a uniform diameter to form a hollow 3233 formed therein. The air extension pipe 3231 may function as a nozzle and thus increase the rate of discharged air.

[0166] In addition, a mold for forming the air discharge unit 323 may be removed a shown in the figure above. The mold may be withdrawn forward from the inside of the air discharge unit 323 toward the inside of the circulation duct 320, and then be removed toward the open upper surface of the circulation duct 320. In this process, the air discharge unit 323 may be formed in a structure that facilitates withdrawal of the mold.

[0167] FIG. 8 is a cross-sectional view of the circulation duct.

[0168] The installation partition 3211 may protrude inward from the inner wall of the duct body 321, or be formed by indenting the outer wall of the circulation duct inward.

[0169] The heat exchanger installation unit 3212 may be formed between the heat exchanger installation partition 3211 and the air discharge unit 323.

[0170] The mold for forming the air discharge unit 323 may be withdrawn forward from the air discharge unit 323 and then withdrawn upward to be removed. It is necessary to prevent the mold for forming the air discharge unit 323 from interfering with the heat exchanger installation partition when the mold is withdrawn forward from the inside of the air discharge unit 323. For this purpose, the design values of the air discharge unit 323 may be adjusted.

[0171] Specifically, when forming the air discharge unit 323, a mold for forming the front portion of the air discharge unit 323 and a mold for forming the rear portion of the air discharge unit 323 based on a parting line 3233 of the air discharge unit 323 of this figure may be separately provided. Accordingly, the removal directions of the molds may be different from each other. The mold for forming the front portion of the air discharge unit 323 based on the parting line of the air discharge unit 323 may be withdrawn forward, and the mold for forming the rear portion of the air discharge unit 323 based on the parting line of the air discharge unit 323 may be withdrawn rearward.

[0172] That is, in order to prevent the mold withdrawn forward from interfering with the heat exchanger installation partition during the withdrawal process, a distance 1 321a may be smaller than a distance 2 321c in the figure. The distance 1 321a may mean a distance between the parting line of the air discharge unit 323 and the front end of the air discharge unit 323. In addition, the distance 1 321a may mean a distance between the parting line of the air discharge unit 323 and the rear opening of the circulation duct. The distance 2 321c may mean a distance between the front end of the air discharge unit 323 and the heat exchanger installation partition. In addition, the distance 2 323c may mean a distance between the rear opening of the circulation duct and the heat exchanger installation partition 3211.

[0173] FIG. 9 illustrates the structure of the controller installation unit provided on the base unit of the clothing treatment apparatus of the present disclosure.

[0174] FIG. 9(a) illustrates an embodiment in which the controller C is installed in the controller installation unit 313.

[0175] The controller C may be provided so that the clothing treatment apparatus of the present disclosure is capable of controlling all devices necessary to perform an arbitrary course for performing the refreshing cycle on clothes. The controller C may be provided as a PCB substrate, but is not limited thereto, and may be provided as various devices for control.

[0176] The controller C may be inserted into the controller installation unit 313 to be placed therein.

[0177] The controller installation unit 313 may be disposed below the circulation duct 320.

[0178] The bottom surface of the circulation duct 320 may form the upper surface of the controller installation unit 313. The controller installation unit 313 may be disposed below the air discharge unit 323.

[0179] The controller installation unit 313 may be formed integrally with the base bottom 311. The controller installation unit 313 may be formed as a sunken space under the circulation duct during a process of molding the circulation duct 320 in the base unit 310.

[0180] The controller C may be introduced into the controller installation unit 313 forward from the rear in a sliding manner.

[0181] Brackets 3131 provided to surround the controller may be provided on the surface of the controller C. The brackets 3131 may be disposed on the upper and lower portions of the controller to prevent foreign substances from entering the controller.

[0182] In addition, the brackets 3131 may prevent damage to a circuit board in the controller C due to heat or vibration transmitted to the controller C. The brackets 3131 may be formed of a metal material.

[0183] FIG. 9(b) illustrates a state in which the controller is installed in the controller installation unit.

[0184] As shown in this figure, the controller C may be installed at a predetermined angle with the base bottom 311.

[0185] For example, the controller C may be disposed to be inclined toward a water reservoir 326. Accordingly, if water leaks to the upper portion of the controller C, the

water may quickly escape the controller C, and the bottom surface of the circulation duct 320 may be molded to be inclined toward the water reservoir 326.

[0186] The controller C may include supporters 3132 that are formed to protrude from the side surface of the controller C.

[0187] The controller installation unit 313 may include ribs 3134 that protrude from both side surfaces of the installation unit. The supporters 3132 of the controller may be held on the upper portions of the ribs 3134.

[0188] The supporters 3132 of the controller may support the entire load of the controller C. When the supporters 3132 of the controller are supported by the upper surfaces of the ribs 3134, the controller C may be spaced apart from the base bottom 311 by a predetermined distance.

[0189] The ribs 3134 may be formed integrally with the base unit 310. The ribs 3134 may be formed together with the base unit 310 when the base unit 310 is injection-molded, and may be provided integrally with the base bottom 311, the circulation duct 320, etc.

[0190] A protrusion 3133 formed to protrude may be provided on the front surface of the controller C. In addition, a guide that protrudes rearward may be provided on the inner surface of the controller installation unit 313. The protrusion may be coupled to the guide. The protrusion may be inserted into the guide. When the controller is inserted into the controller installation unit, the controller may be aligned in the correct position by coupling the protrusion to the guide.

[0191] In addition, the positions of both side surfaces of the controller may be determined in the above-described manner in which the supporters are placed on the ribs. The controller may be coupled to the correct position of the controller installation unit without a separate fastening member using the above coupling process.

[0192] FIG. 10 illustrates the structure of the air discharge unit 323 of the clothing treatment apparatus of the present disclosure.

[0193] The base unit 310 may include the air discharge unit 323 that discharges treated air toward the fan housing.

[0194] The air discharge unit 323 may be provided to allow the fan housing 350 to communicate with the inside of the circulation duct 320 or the duct body 321. The air discharge unit 323 may be provided in a bell mouth shape. The air discharge unit 323 provided in the bell mouth shape may reduce air flow loss and improve air circulation efficiency.

[0195] The air discharge pipe 3232 of the air discharge unit 323 may be provided in a pipe shape, and during the mold removal process based on the parting line 3233, the mold disposed in front of the parting line 3233 may be withdrawn forward and the mold disposed at the rear of the parting line 3233 may be withdrawn rearward.

[0196] The fan installation unit 350 may be coupled to the air discharge pipe 3232 to be supported thereby. The fan housing 351 may have a coupling hole coupled to the outer circumferential surface of the air discharge pipe 3232, and the blower fan 353 may be disposed in the coupling hole.

[0197] The fan housing 351 may include the discharge duct 352 that extends from the outer circumferential surface of the blower fan 353 or the outside to the discharge hole 232.

[0198] The fan housing 351 and the discharge duct 352 may form a flow path in which the blower fan 353 is accommodated and air moves.

[0199] A motor that rotates the blower fan 353 may be coupled to the outside of the fan housing 351 to be supported thereby.

[0200] FIG. 11 illustrates the structure of the base cover of the clothing treatment apparatus of the present disclosure.

[0201] The base cover 360 may be provided to be coupled to the upper surface of the circulation duct 320 so as to prevent the inside of the circulation duct 320 from being exposed.

[0202] The base cover 360 may include an inflow body 361 coupled to the upper surface of the circulation duct 320 to allow the inner case 200 to communicate with the circulation duct 320, and a shielding body 363 extending from the inflow body 361 to shield the circulation duct 320.

[0203] The inflow body 361 may be provided in a duct shape to allow the inflow hole 231 of the inner case to communicate with the inside of the circulation duct 320. The inflow body 361 may be provided to protrude farther upward than the shielding body 363.

[0204] The inflow body 361 may be disposed ahead of the evaporator 341 so as not to face the evaporator 341 and the condenser 343, and may be disposed ahead of the partition 3211.

[0205] The inflow body 361 may serve as an inflow duct that moves air of the inner case 200 to the circulation duct 320.

[0206] The inflow body 361 may be provided with the inflow part 362 through which the air of the inner case 200 may pass.

[0207] Specifically, the base cover 360 may include a first rib 362a extending in the width direction of the inflow body 361, and a second rib 362b spaced apart rearward from the first rib 362a and extending in the width direction of the inflow body 361.

[0208] The first rib 362a and the second rib 362b may be provided in parallel. The first rib 362a and the second rib 362b may be provided in a plate shape extending in the vertical direction, and the height thereof may correspond to the height of the inflow body 361.

[0209] The front surface of the inflow body 361 and the first rib 362a may form a first inlet 3621, the first rib 362a and the second rib 362b may form a second inlet 3623, and the second rib 362b and the rear surface of the inflow body 361 may form a third inlet 3622.

[0210] The first inlet 3621 and the third inlet 3622 may be provided with the same area, and the second inlet 36222 may be provided with a smaller area than the first

inlet 3621 and the third inlet 3622.

[0211] The base cover 360 may include a damper unit 364 provided to open and close the inflow part 362, and a driver 365 coupled to the damper unit 364 to control opening and closing of the damper unit 364.

[0212] The damper unit 364 may include a first damper 3641 provided to open and close the first inlet 3621, and a second damper 3642 provided to open and close the third inlet 3622.

[0213] The first damper 3641 may be provided in a plate shape with an area corresponding to the first inlet 3621, and may be rotatably coupled to both side surfaces of the inflow body 361 within the first inlet 3621.

[0214] The second damper 3642 may be provided in a plate shape with an area corresponding to the third inlet 3622, and may be rotatably coupled to both side surfaces of the inflow body 361 within the third inlet 3622.

[0215] The second inlet 3623 may be provided with a cut-off filter 366 that allows air to pass therethrough but may filter out foreign substances, such as fine dust and lint.

[0216] The cut-off filter 366 may be provided to be inserted into the second inlet 3623 to divide the first inlet 3621 and the third inlet 3622. The cut-off filter 366 may be disposed to extend from the second inlet 3623 to come into contact with the bottom surface of the circulation duct 320.

[0217] The cut-off filter 366 may be provided as a filter capable of filtering moisture. For example, the cut-off filter 366 may be provided as a HEPA filter, or the like.

[0218] A shielding member that shields the second inlet 3623 when the cut-off filter 366 is inserted thereinto may be further coupled to the second inlet 3623.

[0219] The driver 365 may include a motor that provides power to selectively rotate the first damper 364 and the second damper 365, and a plurality of gear members that is engaged with the motor and rotates to selectively rotate the first damper 364 and the second damper 365.

[0220] The first inlet 3611 and the third inlet 3622 may be selectively opened due to the driver 365.

[0221] Due to the driver 365, air accommodated in the inner case 200 may be introduced into the circulation duct 320 along the first inlet 3621, or may be introduced into the circulation duct 320 along the third inlet 3622.

[0222] Of course, the driver 365 may control the first damper 3641 and the second damper 3642 to open both the first inlet 3611 and the third inlet 3622, and may control the first damper 3641 and the second damper 3642 to shield both the first inlet 3611 and the third inlet 3622.

[0223] The driver 365 may be provided in any structure as long as it may be provided to rotate the first damper 3641 and the second damper 3642. For example, the driver 365 may be provided as a combination of a motor, a driving gear rotated by the motor, and driven gears coupled to the first damper and the second damper and rotated due to rotation of the driving gear.

[0224] The base cover 360 may include the shielding body 363 that extends from the inflow body 361 and is capable of shield the evaporator 341 and the condenser 343. The shielding body 363 may be provided in a plate shape.

[0225] The base cover 360 may be detachably coupled to the upper surface of the circulation duct 320 through an inflow hook 3612 extending from the lower surface of the inflow body 361.

[0226] The circulation duct 320 may be provided with a coupling part detachably coupled to the inflow hook 3612.

[0227] FIG. 12 illustrates the structure of the external air duct.

[0228] Referring to FIG. 12(a), the external air duct 370 may be coupled to the base unit 310.

[0229] The external air duct 370 may be provided to communicate with the external air intake part 322.

[0230] The external air duct 370 may include an external air damper 373 that opens and closes the external air intake part 322, and an external air driver 374 that rotates the external air damper 373 to selectively open the external air intake part 322.

[0231] The external air damper 373 may be provided in a plate shape that may seal the external air intake part 322, and may be rotatably coupled to both side surfaces of the external air intake part 322.

[0232] The external air driver 374 may be provided as an actuator coupled to the external air duct 370 or the circulation duct 320 to rotate the external air damper 373.

[0233] The outdoor air duct 370 may include an extension duct 372 that extends forward from the external air intake part 322 in front of the external air intake part 322, and an intake duct 371 that extends forward from the extension duct 372 and allows external air to be introduced.

[0234] The intake duct 371 may be provided to extend from the lower portion of the extension duct 372, and the water supply tank 3 and the drain tank 4 may be disposed on the upper portion of the intake duct 371. The water supply tank 3 and the drain tank 4 may be coupled to or placed on the intake duct 371.

[0235] The intake duct 371 may include an external air hole 3711 formed at one end or a free end thereof so that external air is suctioned through the external air hole 3711, and a partition rib 3712 provided to partition the external air hole 3711.

[0236] The external air hole 3711 may be provided to be disposed below the door 40 so as not to be shielded by the door 40.

[0237] The partition rib 3712 may be provided to partition the inside of the external air hole 3711 so as to prevent foreign substances or a user's body from being inserted into the external air hole 3711.

[0238] Referring to FIG. 12(b), when the external air driver 374 rotates the external air damper 373 to open the external air intake part 322, the intake duct 371 and the circulation duct 320 may communicate with each other.

[0239] At this time, when the blower fan 352 is operated, air outside the cabinet may be introduced into the

circulation duct 320. When the compressor 342 is operated, the external air may be dehumidified while passing through the circulation duct 320, and be supplied to the inside of the inner case 200.

[0240] The door 40 may further include a discharge hole through which air inside the inner case 200 is discharged to the outside, and a discharge damper that selectively opens and closes the discharge hole. The discharge hole may be provided to face the accommodation space of the inner case 200.

[0241] Thereby, the dehumidified air may be discharged through the discharge hole.

[0242] In addition, the external air may be filtered while passing through the cut-off filter 366, and be discharged again to the outside of the cabinet 100.

[0243] FIG. 13 illustrates the flow of air flowing through the circulation duct.

[0244] Referring to FIG. 13(a), the external air damper 373 may be controlled to shield the external air intake part 322, the first damper 3641 may be controlled to open the first inlet 3621, and the second damper 3642 may be controlled to shield the third inlet 3622.

[0245] When the blower fan 352 is operated, the air inside the inner case 200 may be introduced into the first inlet 3621 to be filtered while passing through the cut-off filter 366.

[0246] When the compressor 342 is operated, the air having passed through the cut-off filter 366 may be dehumidified and heated while passing through the evaporator 341 and the condenser 343.

[0247] The air having passed through the heat exchangers may pass through the fan installation unit 350 and be supplied to the inside of the inner case 200.

[0248] This state may be a state in which steam is not supplied to the inner case 200. This is because, if steam is supplied to the inner case 200, the moisture wets the cut-off filter 366, and the performance of the cut-off filter 366 may not be guaranteed.

[0249] As a result, in a state in which steam is not supplied to the inner case 200, before steam is supplied to the inside of the inner case 200, or if the humidity is low even after steam is supplied to the inside of the inner case 200, the air inside the inner case 200 may pass through the first inlet 3641 and the cut-off filter 366 to filter out foreign substances, such as lint.

[0250] Referring to FIG. 13(b), the external air damper 373 may be controlled to shield the external air intake part 322, the first damper 3641 may be controlled to shield the first inlet 3621, and the second damper 3642 may be controlled to open the third inlet 3622.

[0251] When the blower fan 352 is operated, the air inside the inner case 200 may be introduced into the third inlet 3622. Since the third inlet 3622 is provided downstream from the cut-off filter 366, the air introduced into the third inlet 3622 may not pass through the cut-off filter 366.

[0252] When the compressor 342 is operated, the air having passed through the cut-off filter 366 may be dehumidified and heated while passing through the evaporator 341 and the condenser 343.

[0253] The air having passed through the heat exchangers may pass through the fan installation unit 350 and be supplied to the inside of the inner case 200.

[0254] As a result, in a state in which steam is supplied to the inner case 200 or if the humidity inside the inner case 200 is very high, the air inside the inner case 200 may be introduced into the third inlet 3622, and be prevented from being introduced into the first inlet 3621, thereby preventing the cut-off filter 366 from being exposed to moisture.

[0255] Referring to FIG. 13(c), the external air damper 373 may be controlled to open the external air intake part 322, the first damper 3641 may be controlled to shield the first inlet 3621, and the second damper 3642 may be controlled to shield the third inlet 3622.

[0256] When the blower fan 352 is operated, the air inside the inner case 200 may be prevented from being introduced into the inflow part 362, and only the air outside the cabinet 100 may be introduced into the circulation duct 320 and pass through the cut-off filter 366. Thereby, foreign substances, such as fine dust, contained in the external air may be filtered out by the cut-off filter 366.

[0257] When the compressor 342 is operated, the air having passed through the cut-off filter 366 may be dehumidified and heated while passing through the evaporator 341 and the condenser 343.

[0258] The air having passed through the heat exchangers may pass through the fan installation unit 350 and be supplied to the inside of the inner case 200, thereby supplying fresh hot air to clothes.

[0259] At this time, if a device for discharging the air inside the inner case 200 to the outside is provided, the air outside the cabinet may be discharged in a purified and dehumidified state while passing through the cut-off filter 366 and the heat supply 340.

[0260] As a result, the clothing treatment apparatus of the present disclosure may determine the flow directions of the air inside the inner case 200 and the air outside the cabinet by controlling the external air driver 374 and the inflow drier 365 through the controller C.

[0261] FIG. 14 illustrates the installation structure of the steam supply.

[0262] The steam supply 800 may be placed on the base cover 360 to be supported thereby.

[0263] The steam supply 800 may include a steam case 810 that is placed on the base cover 360 and stores water to generate steam.

[0264] The steam supply 800 may further include an installation bracket 870 that may fix the steam case 810 to the base cover 360.

[0265] The installation bracket 870 may be coupled to the base cover 360 to fix the steam case 810.

[0266] The installation bracket 870 may include a lower panel 871 that supports the lower surface of the steam case 810, and side panels 872 that support both side

surfaces of the steam case 810 on the lower panel 871.

[0267] The installation bracket 870 may further include one or more fixing clips 873 that extend from the side panels 872 to prevent the steam case 810 from being detached.

[0268] The fixing clips 873 may be detachably provided on the upper portion or the side surfaces of the steam case 810.

[0269] The compressor 342 may be disposed below the steam supply 800.

[0270] The installation bracket 870 may be provided to block transfer of heat generated from the compressor or heat generated from the refrigerant compressed by the compressor to the steam supply 800.

[0271] The installation bracket 870 may also block transfer of fire to the steam supply 800 in the event of a fire occurring in the compressor 342.

[0272] Meanwhile, the base cover 360 may include a fastener 3631 that is provided on the shielding body 360 and detachably coupled to the steam supply 800. The fastener 3631 may be provided in a structure that is detachably coupled to a protrusion protruding from the lower portion of the steam case 810.

[0273] Accordingly, even if a large amount of water is accommodated in the steam case 810, the steam case 810 may be stably placed on the base cover 360.

[0274] In addition, since the steam case 810 is disposed above the circulation duct 320 and a distance from the inner case 200 is shorter, condensation of steam generated in the steam case 810 before reaching the inner case 200 may be minimized.

[0275] FIG. 15 illustrates the detailed structure of the steam supply.

[0276] Referring to FIG. 15(a), the steam supply 800 may include the steam case 810 that may receive and store water to generate steam, and a heater unit 840 accommodated in the steam case 810 to heat water to generate steam.

[0277] The steam case 810 may be provided in the form of a case with an open upper portion to accommodate the heater unit 840.

[0278] The steam supply 800 may further include a case cover 820 coupled to the steam case 810 to prevent the heater unit 840 from being exposed to the outside and prevent the water from leaking.

[0279] A water level sensor 850 that detects the water level of the steam case 810 and a steam sensor 60 that detects the temperature inside the steam case 810 or detects whether steam is generated in the steam case 810 may be installed on the case cover 820.

[0280] Referring to FIG. 15(b), the steam case 810 may include a case body 811 that provides a space configured to store the water and accommodate the heater unit 840.

[0281] The case body 811 is provided with an open upper portion so that various parts may be easily installed in the case body 811.

[0282] The case body 811 may include a heater insertion hole 8111 formed through one side thereof so that the heater unit 840 may be inserted into or withdrawn from the heat insertion hole 8111.

[0283] The case body 811 may include a recovery pipe 814 configured to discharge water accommodated in the case body 811 to the outside.

[0284] The recovery pipe 814 may be kept closed by a shielding plug 8141 so as to be opened only when removing residual water in the steam case 810, and may include a shielding clip 8142 that maintains the coupled state of the shielding plug 8141 to the recovery pipe 814 to prevent the shielding plug 8141 from being separated arbitrarily.

[0285] Accordingly, when repairing the steam case 800 or preventing freezing of the steam case 800, water inside the steam case 800 may be discharged through the recovery pipe 814.

[0286] Meanwhile, a heater fixing unit 830 that may support or fix the heater unit 840 may be installed in the case body 811. The heater fixing unit 830 may include a fixing clip 831 that fixes the heater unit 840, and a clip fastening member 833 that fixes the fixing clip 831 to the case body 811.

[0287] The fixing clip 831 may be provided to accommodate or surround at least a portion of the heater unit 840.

[0288] The steam supply 800 may be provided with a water supply pipe 815 that supplies water. The water supply pipe 815 may be provided to communicate with the water supply tank 30 to receive water therefrom.

[0289] The water supply pipe 815 may be provided on the case cover 820, or may be disposed on the upper portion of the steam case 810. Accordingly, counterflow of water through the water supply pipe 815 may be prevented.

[0290] The steam supply 800 may be provided with a steam pipe 813 that discharges steam generated by operation of the heater unit 840 to the outside. The steam pipe 813 may be provided on the upper portion of the case cover 820 to prevent water from being discharge into the steam pipe 813. The steam pipe 813 may communicate with the steam hole 233 of the inner case 200.

[0291] The case cover 820 may be provided with a water level sensor hole 854 in which the water level sensor may be installed.

[0292] The water level sensor 850 may include one or more contact protrusions 852 that are inserted into the water level sensor hole 854 and immersed in water to detect the water level, and a sensor body 851 that is coupled to the water level sensor hole 854 or supported by the case cover 820 to maintain the contact protrusions 852 in a floating state within the steam case 810.

[0293] The sensor body 851 may be coupled to the case cover 820 through a sensor fastening member 853.

[0294] Meanwhile, the case cover 820 may be provided with an insertion hole 64 in which the steam sensor 860 may be installed. The steam sensor 860 may include a detection device 861 inserted into the insertion hole 864 to detect whether steam is generated in the steam case

810, a support 863 that fixes the detection device 861 to the case cover 20, and a coupling member 862 that couples the support 863 to the case cover 820.

[0295] The detection device 861 may be provided as a humidity sensor or a temperature sensor to detect whether steam is generated in the steam case 810.

[0296] Further, the case cover 820 may be provided with cover hooks 821 that may extend forward and be coupled to the base cover 860.

[0297] In addition, fixing protrusions 822 that may fix the lower portion of the inner case 200 or a separate discharge unit 900 may be provided at the rear portion of the case cover 820.

[0298] The heater unit 840 may be inserted into the heater insertion hole 8111 to be accommodated in the steam case 810, and be provided to receive power to heat water.

[0299] The heater unit 840 may be provided as a sheath heater, etc., and may be controlled by a controller 700 to be repeatedly operated and stopped.

[0300] The heater unit 840 may include a first heater 841 that receives first power to heat water, and a second heater 842 that receives power greater than the first power to heat water.

[0301] As a result, the second heater 842 may be provided to heat a larger amount of water than the first heater 841 to generate a larger amount of steam.

[0302] The first heater 841 and the second heater 842 may be provided to consume respective power amounts divided from the maximum heater power amount allowed for the heater unit 840. That is, if the first heater 841 is provided to consume a portion of the maximum heater power amount, the second heater 842 may be provided to consume the remainder of the maximum heater power amount.

[0303] For example, if the maximum heater power amount generally allowed for the heater unit 840 is 1,500 W, the first heater 841 may be provided to consume 600 W, and the second heater 842 may be provided to consume 880 W. 20 W may be left considering errors, etc.

[0304] Of course, the heater unit 840 may include three or more heaters. For example, the heater unit 840 may include the first heater 841, the second heater 842, and a third heater 843, and the first heater 841, the second heater 842, and the third heater 843 may be provided to consume respective power amounts divided from the maximum heater power amount.

[0305] Hereinafter, the heater unit 340 will be described as including the first heater 841 and the second heater 842.

[0306] The first heater 841 and the second heater 842 may be formed as a U-shaped metal pipe.

[0307] The heater unit 840 may include a heater sealer 843 that may fix the first heater 841 and the second heater 842 and seal the heater insertion hole 8111, and may include a terminal unit 844 that supplies current to the first heater 841 and the second heater 842.

[0308] The terminal unit 844 may include a first terminal 844a that supplies current to the first heater 841, and a second terminal 844b that supplies current to the second heater 842.

[0309] The first heater 841 and the second heater 842 may be disposed at the same height. Therefore, the first heater 841 and the second heater 842 may be provided to heat water of the same water level to generate steam.

[0310] Accordingly, the controller 700 may control a steam amount generated using both or selectively the first heater 841 and the second heater 842, and a power amount consumed.

[0311] FIG. 16 illustrates the clothing treatment apparatus of the present disclosure in which a light emitting unit and a sensor unit are installed.

[0312] In the conventional clothing treatment apparatuses, there was a problem in that clothes fell off of a hanger during the clothing treatment process.

[0313] As a result, a user was not able to recognize the clothes having fallen off of the hanger during the clothing treatment process, and if the fallen clothes blocked a steam or hot air injection hole, the clothes were damaged.

[0314] Furthermore, the user was not able to take active measures because the user could recognized that the clothes had fallen off after the clothing treatment process had been completed and thus the clothes were not properly treated, and product satisfaction was lowered.

[0315] In order to solve these problems, the present disclosure may provide the clothing treatment apparatus including the cabinet 100 having the opening in the front portion thereof, the inner case 200 provided in the cabinet 100 to provide the space configured to accommodate clothes, the door 40 coupled to the cabinet to open and close the opening, the hanger unit 510 provided in the upper portion of the inner case to hold the clothes, the machine compartment 300 provided below the bottom surface of the inner case 200 to supply at least one of hot air or steam to the inside of the inner case 200, a light emitting unit 600 provided in one of the inner case 200, the door 40, and the machine compartment 300 to emit light to the inside of the inner case 200, and a sensor unit 700 provided in one of the inner case 200, the door, and the machine compartment to detect whether the clothes having fallen off of the hanger unit 510 block at least a portion of the light emitted from the light emitting unit 600.

[0316] The clothing treatment apparatus of the present disclosure may determine whether the clothes have fallen by utilizing the sensor unit 700 detecting a change in illuminance as long as the light emitted from the light emitting unit 600 reaches the sensor unit 700 regardless of where the light emitting unit 600 and the sensor unit 700 are provided.

[0317] The clothing treatment apparatus may include the light emitting unit 600 provided to emit light toward the inside of the inner case 200.

[0318] The light emitting unit 600 may emit any wavelength of light as long as the sensor unit 700 can detect the same. For example, the wavelength of the light

emitted from the light emitting unit 600 may be in the ultraviolet spectrum, the visible spectrum, or the like.

[0319] The wavelength of the light emitted from the light emitting unit 600 is most preferably in the visible spectrum rather than the infrared spectrum, the ultraviolet spectrum, etc. Infrared light may penetrate objects, and thus pass through clothes even if the clothes have fallen, whereas visible light is electromagnetic waves that are visible to the human eye, and is not capable of penetrating objects. In addition, use of visible light is more appropriate for detecting clothes having fallen using blocking of light, and may protect user eyesight.

[0320] The light source of the light emitting unit 600 may be provided as any device that emits light, such as an LED or a light bulb.

[0321] The clothing treatment apparatus may include the sensor unit 700 that receives the light emitted from the light emitting unit 600.

[0322] The sensor unit 700 may be provided as an illuminance sensor that detects a change in the illuminance of the light emitted from the light emitting unit 600. Illuminance is a measure of brightness, and when a large amount of light is incident, the illuminance increases, and conversely, when a small amount of light is incident, the illuminance decreases.

[0323] The sensor unit 700 may detect at least one of whether the light emitted from the light emitting unit 600 is received or the intensity of the light.

[0324] The sensor unit 700 may be provided at a position where it is capable of completely receiving the light emitted from the light emitting unit 600. The detailed installation positions of the light emitting unit 600 and the sensor unit 700 will be described later.

[0325] At least one light emitting unit 600 and at least one sensor unit 700 may be provided.

[0326] If two or more light emitting units 600 are provided, the amount of light received by the sensor unit 700 increases, and thus, it is possible to more accurately determine whether clothes have fallen.

[0327] The clothing treatment apparatus of the present disclosure may determine whether clothes have fallen from a change in the illuminance of light detected by the sensor unit 700 when the clothes have fallen during the clothing treatment process.

[0328] For example, the sensor unit 700 is disposed closer to the bottom surface of the inner case 200 than the hanger unit, the sensor unit 700 detects a first value when the clothes have not fallen, and the controller C may determine that the clothes have fallen when the sensor unit 700 detects a value smaller than the first value.

[0329] FIG. 17 illustrates division of spatial areas of the inner case of the clothing treatment apparatus of the present disclosure.

[0330] The inner case 200 may include a first spatial area V1, a second spatial area V2, and a third spatial area V3 that are divided depending on height.

[0331] The first spatial area V1 may be defined as a space between a first position a and a second position b.

[0332] The first position a may be an area corresponding to the upper surface of the inner case 200 or the lower surface of the hanger unit 510.

[0333] The second position b may be spaced apart downward from the first position a by a first height h1.

[0334] The second position b may be spaced apart downward from the first position a by 1/3 of a length from the first position a to a fourth position d or the height of the inner case 200.

[0335] The height of the first spatial area V1 may be a first height h1.

[0336] The first height h1 may be greater than or equal to the length of the hanger in the height direction.

[0337] The first height h1 may be 1/3 of the length from the first position a to the fourth position d.

[0338] The hanger unit 150 may be installed in the first spatial area V1.

[0339] Clothes that are shorter and smaller than the first height when held on the hanger unit 510, such as a top, baby's clothes, or a skirt, may be disposed in the first spatial area V1.

[0340] The second spatial area V2 may be disposed below the first spatial area V1 and may be defined as a space between the second position b and a third position c provided below the second position b.

[0341] The second spatial area V2 may include the central portion of the inner case 200 in the height direction.

[0342] Clothes having a relatively normal length, such as a shirt or a jacket, may be disposed in the first spatial area V1 and the second spatial area V2 when held on the hanger unit 510.

[0343] The third spatial area V3 may be disposed below the second spatial area V2 and may be defined as a space between the third position c and the fourth position d.

[0344] Clothes having a long length, such as a coat or pants, may be disposed in the first spatial area V1, the second spatial area V2, and the third spatial area V3 when held on the hanger unit 510.

[0345] Fallen clothes may be disposed in the lower portion of the third spatial area V3 below the second spatial area V2. Specifically, the fallen clothes may be disposed in the lower portion of the third spatial area V3.

[0346] The light emitting unit 600 and the sensor unit 700 may be provided in at least one of the first spatial area V1, the second spatial area V2, or the third spatial area V3.

[0347] The sensor unit 700 may be provided below the first position a.

[0348] The sensor unit 700 may be provided above the fourth position d.

[0349] Accordingly, when the light emitting unit 600 maintains the ON state, if the sensor unit 700 detects that the light emitting unit 600 is blinking, it may be determined that the clothes have fallen.

[0350] FIG. 18 illustrates one embodiment of the positions of the light emitting unit and the sensor unit of the

clothing treatment apparatus of the present disclosure.

[0351] The clothing treatment apparatus or the controller C of the present disclosure may determine whether clothes have fallen by detecting an increase in illuminance by the sensor unit 700.

[0352] If the clothes are hung on the hanger unit 510, the clothes block light emitted from the light emitting unit 600 to prevent the light from reaching the sensor unit 700. If the clothes have fallen, the light blocked by the clothes reaches the sensor unit 700 due to the falling of the clothes. As a result, the clothing treatment apparatus or the controller C may determine whether the clothes have fallen by detecting an increase in illuminance.

[0353] One light emitting unit 600 and one sensor unit 700 may be provided.

[0354] The light emitting unit 600 and the sensor unit 700 may be provided in the same spatial area.

[0355] If the light emitting unit 600 and the sensor unit 700 are provided below the position (hereinafter, blocking position) e of the inner surface of the inner case 200 or the inner surface of the door 40 corresponding to the height corresponding to the lower end of clothes when the clothes are held by the hanger unit 510, the light emitted from the light emitting unit 600 is not blocked from the beginning and reaches the sensor unit 700, and therefore the sensor unit 700 may not detect a change in illuminance.

[0356] For example, if the light emitting unit 600 and the sensor unit 700 are disposed in the second spatial area V2 or the third spatial area V3, short and small clothes are provided only in the first spatial area V1, and even if the clothes have fallen, the sensor unit 700 may not detect an increase in illuminance.

[0357] Therefore, the light emitting unit 600 and the sensor unit 700 are preferably provided at least above the blocking position e.

[0358] The blocking position e is provided in at least one of the first spatial area V1, the second spatial area V2, or the third spatial area V3. Even if the blocking position e is in the first spatial area V1, the light emitting unit 600 and the sensor unit 700 are preferably provided in the upper portion of the first spatial area V1 in order to detect falling of clothes.

[0359] In addition, the light emitting unit 600 and the sensor unit 700 are preferably provided below the hanger unit 510. Accordingly, the sensor unit 700 may detect a change in the illuminance of light using the fact that when clothes block the light emitted from the light emitting unit 600 while minimizing influence of the hanger unit 510.

[0360] FIG. 19 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

[0361] The sensor unit 700 and the light emitting unit 600 may be provided in different spatial areas. As a result, the sensor unit 700 and the light emitting unit 600 may be disposed at different heights.

[0362] For example, the light emitting unit 600 may be provided in the second spatial area V2, and the sensor unit 700 may be provided in the first spatial area V1.

[0363] The light emitting unit 600 may be provided to radiate light toward the sensor unit 700 so that the sensor unit 700 may detect the light.

[0364] The light emitting unit 600 may be provided to emit light into an area where the sensor unit 700 may detect the light. The sensor unit 700 may be disposed on the inner surface of the inner case 200 within the maximum angle of inclination of the light radiated by the light emitting unit 600.

[0365] The light emitting unit 600 and the sensor unit 700 may be provided on the surfaces of the inner case 200 that face each other.

[0366] The light emitting unit 600 may be provided so that the light emitted from the light emitting unit 600 may pass through the first spatial area V1. Accordingly, even if short clothes are hung, the sensor unit 700 may detect an increase in the illuminance of light using the fact that clothes block the light emitted from the light emitting unit 600.

[0367] A reflection unit 400, etc. may be additionally installed to guide the light emitted from the light emitting unit 600 to the sensor unit 700 provided in a different spatial area.

[0368] FIG. 20 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

[0369] At least one light emitting unit 600 and at least one sensor unit 700 may be provided.

[0370] The number of the light emitting units 600 and the number of the sensor units 700 may not be the same, and if two or more light emitting units 600 are provided, two or more sensor units 700 may be also provided.

[0371] Even if two or more light emitting units 600 are provided, only one sensor unit 700 may be provided.

[0372] The two or more light emitting units 60 may be provided in different spatial areas. For example, the light emitting units 600 may include a first light emitting unit 610 provided in the first spatial area V1 and a second light emitting unit 620 provided in the second spatial area V2.

[0373] The first light emitting unit 610 and the second light emitting unit 620 may be provided on one surface of the inner case 200.

[0374] The first light emitting unit 610 and the second light emitting unit 620 may be provided in parallel in the height direction of one surface of the inner case 200.

[0375] The sensor unit 700 may be provided on a surface facing the surface on which the light emitting units 600 are provided so as to face at least one of the first light emitting unit 610 or the second light emitting unit 620.

[0376] The first light emitting unit 610 may be provided so that light emitted from the first light emitting unit 610 passes through the first spatial area V1 and the second spatial area V2 and reaches the sensor unit 700.

[0377] The second light emitting unit 620 may be provided so that light emitted from the second light emitting

unit 620 passes through the second spatial area V2 and reaches the sensor unit 700.

[0378] Thereby, the clothing treatment apparatus or the controller C may detect falling of clothes provided in the first spatial area V1 using blocking of light emitted from the first light emitting unit 610, and may detect falling of clothes provided in the second spatial area V2 using blocking of light emitted from the second light emitting unit 620.

[0379] Accordingly, regardless of where the blocking position e is provided, the sensor unit 700 may determine whether clothes have fallen by detecting a change in the illuminance of light.

[0380] In addition, since the sensor unit 700 receives the light emitted from the light emitting units 600 all at once, the clothing treatment apparatus or the controller C may easily control the sensor unit 700 at once.

[0381] FIG. 21 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

[0382] A plurality of pieces of clothes may be held on the hanger units 510 provided in the first spatial area V1 from one side surface of the inner case 200 toward the other side surface facing the side surface. For example, the clothes may be held in the width direction of the inner case 200.

[0383] In this case, the light emitting unit 600 and the sensor unit 700 may be provided on both side surfaces of the inner case 200, respectively. However, in the case in which a plurality of pieces of clothes is provided, even if some pieces of the clothes have fallen, blocking of the light emitted from the light emitting unit 600 by hanging clothes provided on at least one of both sides of the fallen clothes may be maintained, and thus the sensor unit 700 may not detect a change in illuminance.

[0384] Therefore, the light emitting units 600 and the sensor units 700 may be provided on at least one of the rear surface of the inner case 200 or the door.

[0385] For example, the light emitting units 600 may be provided on the door so that light emitted from the light emitting units 600 is directed toward the inside of the inner case 200.

[0386] In this case, the sensor units 700 may be provided on the rear surface of the inner case 200 so as to face the light emitting units 600.

[0387] Unlike the above description, the light emitting units 600 may be provided on the rear surface of the inner case 200, and the sensor units 700 may be provided on the door.

[0388] When the hanger units 510 are disposed in the forward and rearward directions of the inner case 200, the sensor units 700 and the light emitting units 600 may be disposed on both side surfaces of the inner case 200.

[0389] As a result, the light emitting units 600 and the sensor units 700 may be disposed in the direction in which the hanger units 510 are disposed on the inner surface of the inner case 200 and the inner surface of the door 40, and may be disposed at positions corresponding to the positions where the hanger units 510 are disposed, respectively.

[0390] The light emitting units 600 and the sensor units 700 may be provided on the same line as the width direction of the hanger units 510 formed longer than the thickness direction of the hanger units 510 or the width direction of clothes hung on the hanger unit 510.

[0391] That is, the light emitting units 600 and the sensor units 700 may be disposed on both sides of the clothes held by the hanger units 510.

[0392] For example, the light emitting units 600 may be provided to emit light toward the side surfaces of the clothes hung on the hanger units 510. Therefore, if any clothes have not fallen, the clothes hung on the hanger units 510 may block the light emitted from the light emitting units 600.

[0393] The light emitting units 600 and the sensor units 700 may be provided as many as the hanger units 510. For example, if the number of the hanger units 510 is five, five light emitting units 600 and five sensor units 700 may be provided.

[0394] The light emitting units 600 may further include a first light emitting unit 610, a second light emitting unit 620, a third light emitting unit 630, a fourth light emitting unit 640, and a fifth light emitting unit 650.

[0395] The first light emitting unit 610, the second light emitting unit 620, the third light emitting unit 630, the fourth light emitting unit 640, and the fifth light emitting unit 650 may be provided in a line such that the interval therebetween is the same as the interval between the hanger units 510.

[0396] The sensor units 700 may further include a first sensor unit 710, a second sensor unit 720, a third sensor unit 730, a fourth sensor unit 740, and a fifth sensor unit 750.

[0397] The first sensor unit 710, the second sensor unit 720, the third sensor unit 730, the fourth sensor unit 740, and the fifth sensor unit 750 may be provided such that the interval therebetween is the same as the interval between the hanger units 510.

[0398] That is, the first sensor unit 710, the second sensor unit 720, the third sensor unit 730, the fourth sensor unit 740, and the fifth sensor unit 750 may be provided in a line such that the interval therebetween is the same as the interval between the first light emitting unit 610, the second light emitting unit 620, the third light emitting unit 630, the fourth light emitting unit 640, and the fifth light emitting unit 650.

[0399] The first sensor unit 710, the second sensor unit 720, the third sensor unit 730, the fourth sensor unit 740, and the fifth sensor unit 750 may be provided to face the first light emitting unit 610, the second light emitting unit 620, the third light emitting unit 630, the fourth light emitting unit 640, and the fifth light emitting unit 650, respectively.

[0400] If clothes between the first light emitting unit 610 and the first sensor unit 710 have fallen, light emitted from

the first light emitting unit 610 may reach the first sensor unit 710 due to the falling of the clothes, and the first sensor unit 710 may detect an increase in illuminance of light.

[0401] The light emitting units 600 and the sensor units 700 may be provided in one of the first spatial area V1, the second spatial area V2, and the third spatial area V3.

[0402] If the blocking position e is located above the sensor units 700, clothes may not block the light emitted from the light emitting units 600, thus making it difficult to determine whether clothes have fallen. Therefore, the light emitting units 600 and the sensor units 700 are most preferably provided in the first spatial area V1.

[0403] If at least one of pieces of clothes hung on the hanger units 510 has fallen, the sensor units 700 detect light emitted from the light emitting unit 600 provided on the same line as the fallen clothes. As a result, the clothing treatment apparatus or the controller C may detect an increase in the illuminance of the light emitted from the light emitting unit 600.

[0404] Therefore, even if a plurality of pieces of clothes is provided, the clothing treatment apparatus may determine not only whether clothes have fallen but also which clothes have fallen by detecting an increase in the illuminance of light by the sensor units 700.

[0405] FIG. 22 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

[0406] The clothing treatment apparatus or the controller C may determine whether clothes have fallen by detecting a decrease in illuminance by the sensor unit 700. If clothes have fallen, the fallen clothes block light emitted from the light emitting unit 600. Therefore, the light emitted from the light emitting unit 600 does not reach the sensor unit 700, and thus the sensor unit 700 may detect an abnormal decrease in illuminance.

[0407] That is, the sensor unit 700 may be disposed closer to the bottom surface of the inner case 200 than the hanger unit, and the sensor unit 700 may detect the first value with the light emitted from the light emitting unit 600 when the clothes do not fall.

[0408] If the sensor unit 700 detects a value smaller than the first value, the controller C may determine that the clothes have fallen.

[0409] The light emitting unit 600 and the sensor unit 700 may be arranged in the width direction or the forward and rearward directions based on the bottom surface of the inner case 200. Accordingly, a portion of the light emitted from the light emitting unit 600 may be blocked by the clothes fallen on the bottom surface of the inner case 200.

[0410] For example, the sensor unit 700 may be disposed on the rear surface of the inner case 200 and the light emitting unit 600 may be disposed in front of the sensor unit 700, or the sensor unit 700 may be disposed on one side surface of the inner case 200 and the light emitting unit 600 may be disposed on one side surface of the sensor unit 700.

[0411] The sensor unit 700 and the light emitting unit 600 may be provided on different surfaces of the inner case 200.

[0412] The sensor unit 700 may be provided on a surface facing the surface on which the light emitting unit 600 is provided.

[0413] Here, since the light emitted from the light emitting unit 600 should not reach the sensor unit 700 due to the fallen clothes, the light emitting unit 600 and the sensor unit 700 are preferably provided to face each other.

[0414] For example, the light emitting unit 600 and the sensor unit 700 may be provided on both side surfaces of the inner case 200 to face each other.

[0415] Alternatively, each of the light emitting unit 600 and the sensor unit 700 may be provided on at least one of the rear surface of the inner case 200 or the door so as to face each other.

[0416] One embodiment of the clothing treatment apparatus in which the light emitting unit 600 is provided on the door and the sensor unit 700 is provided on the rear surface of the inner case 200 is described.

[0417] The light emitting unit 600 may be disposed in the middle of the door in the width direction. Accordingly, a non-detectable area may be reduced as much as possible regardless of the position of the sensor unit 700, and thus the sensor unit may detect the fallen clothes regardless of the position of the fallen clothes, and may receive more light emitted from the light emitting unit 600.

[0418] The light emitting unit 600 and the sensor unit 700 may be provided in the same spatial area. For example, the light emitting unit 600 and the sensor unit 700 may be provided in the third spatial area V3. Since clothes are located in the third spatial area V3 when the clothes have fallen, the light emitting unit 600 and the sensor unit 700 are preferably provided in the third spatial area V3.

[0419] The light emitting unit 600 and the sensor unit 700 may be disposed below the hanger unit 510. Further, the light emitting unit 600 and the sensor unit 700 may be provided below the height e of the lowest end of the clothes. That is, the light emitting unit 600 and the sensor unit 700 may be disposed closer to the bottom surface of the inner case 200 than the hanger unit 510. Accordingly, the clothing treatment apparatus or the controller C may determine whether clothes have fallen while minimizing influence of clothes hanging above.

[0420] Therefore, if the sensor unit 700 may determine whether clothes have fallen by detecting a decrease in the illuminance of light due to the fallen clothes, it is possible to determine whether the clothes have fallen using only the decrease of the illuminance of the light blocked by the fallen clothes without being affected by the length of the clothes, etc.

[0421] In addition, if the sensor unit 700 determines whether clothes have fallen by detecting a decrease in

the illuminance of light due to the fallen clothes, it is possible to determine whether the clothes have fallen more easily and accurately even when a plurality of pieces of clothes is provided.

[0422] Further, usage of the light emitting unit 600 and the sensor unit 700 may be minimized, thereby being capable of reducing material costs, etc.

[0423] FIG. 23 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

[0424] Each of the light emitting unit 600 and the sensor unit 700 may be provided on at least one of the upper portion or the lower portion of the inner case 200 so as to face each other.

[0425] The light emitting unit 600 may be provided on the upper surface of the inner case 200.

[0426] Otherwise, the light emitting unit 600 may be provided below the hanger unit 510.

[0427] The sensor unit 700 may be provided on the bottom surface of the inner case 200 so as to be shielded by clothes when the clothes have fallen.

[0428] Alternatively, the sensor unit 700 may be provided in the machine compartment or the inflow body. This may be advantageous in repair and power supply.

[0429] Unlike the above description, the light emitting unit 600 may be provided below the inner case 200, and the sensor unit 700 may be provided in the upper portion of the inner case 200. In this case, the light emitting unit 600 may be provided in the machine compartment, or may be provided in the inflow body.

[0430] The light emitting unit 600 and the sensor unit 700 may be provided in a straight line to face each other.

[0431] Specifically, when clothes have fallen, the sensor unit 700 is shielded thereby, and the light emitted from the light emitting unit 600 is blocked. As a result, the clothing treatment apparatus or the controller C may determine whether clothes have fallen by detecting a decrease in the illuminance of light by the sensor unit 700.

[0432] At least one light emitting unit 600 and at least one sensor unit 700 may be provided. Particularly, the more sensor units 700 there are, the more preferable it is. In most cases, since when clothes have fallen, they have fallen around an area where they were hung due to gravity, a plurality of sensor units 700 may be provided to more accurately determine whether the clothes have fallen.

[0433] For example, three sensor units 700 may be provided on the bottom surface of the inner case 200. The sensor units 700 may include a first sensor unit 710, a second sensor unit 720, and a third sensor unit 730.

[0434] The first sensor unit 710, the second sensor unit 720, and the third sensor unit 730 may be provided in a line.

[0435] At least one of the first sensor unit 710, the second sensor unit 720, or the third sensor unit 730 may be provided to face the light emitting unit 600.

[0436] When clothes have fallen, the clothes may have fallen on at least one of the first sensor unit 710, the second sensor unit 720, or the third sensor unit 730 and thus shield the at least one of the first sensor unit 710, the second sensor unit 720, or the third sensor unit 730.

[0437] Accordingly, the clothing treatment apparatus or the controller C may determine whether clothes have fallen by detecting a decrease in the illuminance of light by at least one of the first sensor unit 710, the second sensor unit 720, or the third sensor unit 730.

[0438] In addition, it is possible to determine whether clothes have fallen using only the decrease of the illuminance of the light blocked by the fallen clothes without being affected by the length and number of the clothes, etc.

[0439] FIG. 24 illustrates one embodiment of the reflection unit of the clothing treatment apparatus of the present disclosure.

[0440] Further, if the light emitting unit 600 and the sensor unit 700 are provided to face each other, light emitted from the light emitting unit 600 travels straight and reaches the sensor unit 700. Therefore, if clothes have fallen into an area other than an area where the light emitted from the light emitting unit 600 travels straight toward the sensor unit 700, the sensor unit 700 may not detect a change in illuminance because the light is not blocked by the clothes.

[0441] The clothing treatment apparatus may include a first fall area S1 provided between the light emitting unit 600 and the sensor unit 700, and a non-detectable area X defined as an area other than the first fall area S1.

[0442] If the clothes have fallen into the first fall area S1, the fallen clothes block the light emitted from the light emitting unit 600 and the sensor unit 700 may detect a decrease in illuminance, but if the clothes have fallen into the non-detectable area, the fallen clothes do not block the light emitted from the light emitting unit 600 and the sensor unit 700 may not detect a decrease in illuminance.

[0443] However, if even a small portion of the fallen clothes is within the first fall area S1, the light emitted from the light emitting unit 600 is blocked by the portion of the clothes and the sensor 700 may detect a decrease in illuminance.

[0444] In order to determine whether clothes have fallen regardless of where the clothes have fallen by minimizing the non-detectable area X, the clothing treatment apparatus may further include the reflection unit 400.

[0445] The reflection unit 400 may be provided as at least one reflector that reflects light emitted from the light emitting unit 600.

[0446] The reflector may be provided on a surface other than the surfaces on which the light emitting unit 600 and the sensor unit 700 are provided among the inner surfaces of the inner case 200.

[0447] For example, the reflection unit 400 may include a first reflector 410 provided on one side surface of the inner case 200, and a second reflector 420 provided on a surface facing the surface on which the first reflector 410 is provided.

[0448] Each of the first reflector 410 and the second reflector 420 may be provided on the center of one surface of the inner case 200 in the width direction. Accordingly, a second fall area S2 and a third fall area S3 may be additionally secured to reduce the non-detectable area X.

[0449] For example, the first reflector 410 and the second reflector 420 may be provided to face each other.

[0450] Each of the first reflector 410 and the second reflector 420 may be provided on the center of one surface of the inner case 200 in the width direction.

[0451] The clothing treatment apparatus may further include the second fall area S2 formed by the light emitted from the light emitting unit 600 that is reflected by the first reflector 410 and reaches the sensor unit 700, and the third fall area S3 formed by the light emitted from the light emitting unit 600 that is reflected by the second reflector 420 and reaches the sensor unit 700. If the reflection unit 400 is provided, the area of the non-detectable area X is reduced compared to if the reflection unit 400 is not provided. If clothes have fallen and a portion of the clothes is located in one of the first fall area S1, the second fall area S2, and the third fall area S3, the light emitted from the light emitting unit 600 may be blocked by the fallen clothes and the sensor unit 700 may detect a decrease in the illuminance of the light emitting unit 600.

[0452] Accordingly, the clothing treatment apparatus may determine whether clothes have fallen even if the clothes have fallen into any area of the bottom surface of the inner case 200 by minimizing the non-detectable area X.

[0453] FIG. 25 illustrates a filter unit of the clothing treatment apparatus of the present disclosure.

[0454] The clothing treatment apparatus 1 may further include a filter unit 380 in the upper portion of the machine compartment 300 to prevent dust from entering the inside of the circulation duct 320.

[0455] The filter unit 380 may be mounted on the inflow body 361 to filter out dust introduced into the inflow body 361.

[0456] The filter unit 380 may include a body filter 386 mounted on the upper portion of the inflow body 361 of the base cover 360 to shield a portion of the upper surface of the inflow body 361. The body filter 386 may be formed of a mesh material that may block large dust particles and allow light to pass therethrough.

[0457] The filter unit 380 may further include a body cover 385 on which the body filter 386 is placed. The body cover 385 may be mounted on the upper portion of the inflow body. The body cover 385 may shield one surface of each of the upper portions of the first inlet 3621 and the third inlet 3622. Portions of the body cover 385 that shield the upper surfaces of the first inlet 3621 and the third inlet 3622 may be provided through perforation. The body cover 385 may block large dust particles when the body filter 386 is not installed, thereby being capable of preventing dust from entering the inside of the circulation duct 320.

[0458] The filter unit 380 may further include a filter fixing unit 384 to fix the body cover 385 and the body filter 386. The filter fixing unit 384 may be provided on the upper portion of the base cover 360. The circumferential surface of the body cover 385 may be coupled to the filter fixing unit 384, and may be attached to or detached from the filter fixing unit 384.

[0459] The clothing treatment apparatus may further include a filter cover 382 on the upper portion of the body cover 385. The filter cover 382 may be provided to have a larger width than the width of the body cover 385. The filter cover 382 may shield one surface of the body filter 386. The lower surface of the filter cover 382 may be formed as a lattice-shaped injection molded product. The filter cover 382 may be provided to be spaced apart from the bottom surface of the inner case 200 so that air inside the inner case 200 may be introduced into the circulation duct 320.

[0460] A blocking cover 381 may be provided on the upper portion of the filter cover 382. The blocking cover 381 may completely shield the open upper surface of the machine compartment 300.

[0461] FIG. 26 illustrates another embodiment of the positions of the light emitting unit and the sensor unit of the clothing treatment apparatus of the present disclosure.

[0462] The light emitting unit 600 and the sensor unit 700 may be installed at any positions as long as the sensor unit 700 does not detect the light emitted from the light emitting unit 600 due to fallen clothes.

[0463] Therefore, the light emitting unit 600 and the sensor unit 700 are preferably provided below the hanger unit 510. An area below the hanger unit 510 includes the second spatial area V2 and the third spatial area V3 in the inner case 200, and the machine compartment 300.

[0464] Therefore, one of the light emitting unit 600 and the sensor unit 700 may be disposed in the machine chamber, and the other of the light emitting unit 600 and the sensor unit 700 may be disposed in the inner case 200 or the door 40.

[0465] The light emitting unit 600 may be provided below the inner case 200, particularly in the machine compartment 300. Accordingly, power supply and repair may be facilitated, and when determining whether clothes have fallen, influence of clothes hanging in the inner case 200 may be minimized.

[0466] The light emitting unit 600 may be provided to face the sensor unit 700 so that the light emitted from the light emitting unit 600 is received by the sensor unit 700. Here, the filter cover 382 may not be provided.

[0467] Since when clothes have fallen, the clothes are present in the third spatial area, and the sensor unit 700 detects that light is blocked by the fallen clothes, the sensor unit 700 is preferably provided in the lower portion of the inner case 200, i.e., the third special space V3.

[0468] In order for the sensor unit 700 to detect the light emitted from the light emitting unit 600 disposed in the machine compartment 300, the light emitting unit 600 and the sensor unit 700 are preferably disposed in the width

direction or the forward and rearward directions with respect to the bottom surface of the inner case 200.

[0469] That is, a portion of the path of the light emitted from the light emitting unit 600 should pass in the width direction or the forward and rearward directions in parallel to the bottom surface of the inner case 300.

[0470] Therefore, the sensor unit 700 may be disposed on the rear surface of the inner case 200 and the light emitting unit 600 may be disposed in front of the sensor unit 700, or the sensor unit 700 may be disposed on one side surface of the inner case 200 and the light emitting unit 600 may be disposed on one side surface of the sensor unit 700.

[0471] Since the clothes are likely to fall to the rear portion of the inner case 200 when the clothes have fallen, the light emitted from the light emitting unit 600 is preferably provided to traverse the inner case 200 in the forward and rearward directions.

[0472] For example, the light emitting unit 600 may be provided so that the light emitted therefrom is directed to the rear portion of the inner case 200. Accordingly, the sensor unit 700 is also preferably provided on the rear surface of the inner case 200 to face the inside of the inner case 200.

[0473] If clothes have fallen, the fallen clothes block the light emitted from the light emitting unit 600. Therefore, the sensor unit 700 may detect an abnormal decrease in illuminance, and the clothing treatment apparatus or the controller C may determine whether clothes have fallen.

[0474] The light emitting unit 600 may be provided on the front or rear surface of the body cover 385 below the body filter 386.

[0475] The light emitting unit 600 may be provided below the body filter 386 in the machine compartment. Accordingly, deterioration of the performance of the light emitting unit 600 due to dust, etc. filtered out by the body filter 386 may be prevented, and exposure of the user's eyes to light may be prevented.

[0476] The light emitting unit 600 and the sensor unit 700 may be provided with the body filter 386 interposed therebetween. Thereby, the light emitting unit 600 may be provided so that the light emitted from the light emitting unit 600 may penetrate the body filter 386 and be detected by the sensor unit 700.

[0477] The light emitting unit 600 may be provided on one surface of the inflow body 361. The light emitting unit 600 may be provided on the front or rear surface of the inflow body 361 to emit light toward the upper portion of the inflow body 361. That is, the light emitting unit 600 may be provided to emit light to the upper portion of the first inlet 3621 or the third inlet 3622. The shielding member configured to shield the second inlet 3623 may be further coupled to the second inlet 3623 of the inflow body 361. Therefore, the light emitting unit 600 may be provided so that the light may not be emitted to the upper portion of the second inlet 3623, and is thus preferably provided on the front or rear surface rather than the side surface of the inflow body 361.

[0478] The light emitting unit 600 may further include a light installation unit in which a light source may be installed. The light installation unit may be provided by penetrating the front or rear surface of the inflow body 361.

[0479] Since the light emitting unit 600 is provided below the body filter 386, the clothing treatment apparatus or the controller C may determine not only whether clothes have fallen but also whether the body filter 386 is attached or detached and the contamination level of the body filter 386 using the fact that the sensor unit 700 detects a change in the illuminance of the light emitted from the light emitting unit 600.

[0480] Meanwhile, the machine compartment 300 may be provided to be located in the left side of the clothing treatment apparatus. The center of the machine compartment 300 in the width direction and the center of the clothing treatment apparatus in the width direction may not be the same. The center of the clothing treatment apparatus in the width direction may be provided on the right side of the machine compartment 300.

[0481] Therefore, the light emitting unit 600 may be provided on the same line as the center of the clothing treatment apparatus in the width direction not the center of the machine compartment 300 in the width direction.

[0482] The sensor unit 700 may be provided at the center of the rear surface of the inner case 200 in the width direction. Accordingly, the sensor unit 700 and the light emitting unit 600 may be provided in a straight line at the center of the inner case 200 in the width direction.

[0483] That is, the sensor unit 700 may be provided at the center of the rear surface of the inner case in the width direction, the inflow body 361 may be disposed at one side on the bottom surface of the inner case, and the light emitting unit 600 may be disposed at a position corresponding to the sensor unit 700 in the inflow body 361.

[0484] Unlike the above description, the positions of the light emitting unit 600 and the sensor unit 700 may be interchanged.

[0485] One light emitting unit 600 and one sensor unit 700 may be provided. Accordingly, material costs and manufacturing costs of the clothing treatment apparatus may be reduced, and the clothing treatment apparatus may efficiently detect whether clothes have fallen using one sensor unit 700.

[0486] If the light emitting unit 600 is provided below the body filter 386, the light emitted from the light emitting unit 600 may not reach the sensor unit 700 provided on the rear surface of the inner case 200 due to the angle of the light and a step between the body cover 385 and the inner case 200.

[0487] In order for the sensor unit 700 to detect a change in the illuminance of the light emitted from the light emitting unit 600, the light emitted from the light emitting unit 600 should be guided toward the lower portion of the inner case 200 and ultimately reach the sensor unit 700.

[0488] Therefore, if the light emitting unit 600 is pro-

vided in the machine compartment 300, in order to guide the light emitted from the light emitting unit 600 to the sensor unit 700 and secure the amount of illuminance required for detection, the reflection unit 400 that is disposed above the light emitting unit 600 to guide the light emitted from the light emitting unit 600 to the sensor unit 700 may be further provided.

[0489] The reflection unit 400 may be provided in a number and at a position and angle that enable the reflection unit 400 to reflect the light emitted from the light emitting unit 600 so that the sensor unit 700 may detect the reflected light.

[0490] The reflection unit 400 may be provided to reflect the light emitted from the light emitting unit 600 to guide the reflected light to the sensor unit 700, regardless of where the light emitting unit 600 and the sensor unit 700 are provided.

[0491] The reflection unit 400 is provided above the light emitting unit 600 to be disposed in a straight line with the light emitting unit 600. The reflection unit 400 may be provided so that the light emitted from the light emitting unit 600 directly reaches the reflection unit 400.

[0492] The reflection unit 400 may be provided between the light emitting unit 600 and the sensor unit 700.

[0493] The reflection unit 400 may be provided above the body filter 386 to be disposed between the body filter 386 and the light emitting unit 600. The reflection unit 400 may be provided on one surface of the body cover 385. Accordingly, the light emitted from the light emitting unit 600 is guided to the reflection unit 400 so that the contamination level of a local area of the body filter 386 may be detected.

[0494] The reflection unit 400 may be disposed between the filter cover 382 and the body filter 386. The reflection unit 400 may be provided on the lower surface of the filter cover 382. In order to overcome the step between the body cover 385 and the bottom surface of the inner case 200 and allow the reflection unit 400 to guide the light emitted from the light emitting unit 600 to the sensor unit 700 provided on the rear surface of the inner case 200, the reflection unit 400 is preferably provided on the lower surface of the filter cover 382.

[0495] If the reflection unit 400 is provided on the lower surface of the filter cover 382, the filter cover 382 may further include a reflection unit 400 installation unit for installing the reflection unit 400 on the lower surface of the filter cover 382. The detailed structure of the filter cover 382 will be described later.

[0496] Accordingly, the light emitted from the light emitting unit 600 through a space between the filter cover 382 and the both surface of the inner case 200 may be guided to the sensor unit 700 so that the sensor unit 700 may detect a decrease in illuminance due to fallen clothes.

[0497] FIG. 27 illustrates the structure of the first reflector.

[0498] The reflection unit 400 may include the first reflector 410 provided on the same line in the height direction as the light emitting unit 600.

[0499] The first reflector 410 may be provided on the lower surface of the filter cover 382.

[0500] The first reflector 410 may be provided at the center of the filter cover 382 in the width direction.

[0501] The light emitting unit 600, the sensor unit 700, and the first reflector 410 may be disposed in a straight line, and the first reflector 410 may be provided with a first reflective surface 411 that directly reflects the light emitted from the light emitting unit 600 to the sensor unit 700.

[0502] The first reflective surface 411 may be provided to face the rear portion of the clothing treatment apparatus.

[0503] The first reflector 410 may be provided with hooks 414 that may be coupled to the filter cover 382.

[0504] The clothing treatment apparatus may further include a first route R1 in which the light emitted from the light emitting unit 600 is guided to the sensor unit 700 via the first reflective surface 411.

[0505] The first route R1 may pass through the lower portion of the inner case 200. The first route R1 may be close to the bottom surface of the inner case 200.

[0506] If clothes have fallen, the fallen clothes block light passing through the first route R1. Accordingly, the sensor unit 700 may detect an abnormal decrease in illuminance, and the clothing treatment apparatus or the controller C may determine that the clothes have fallen.

[0507] FIG. 28 illustrates another embodiment of the reflection unit of the clothing treatment apparatus of the present disclosure.

[0508] FIG. 28(a) is an exploded perspective view of the filter unit 380, and FIG. 28(b) is a cross-sectional view of the machine compartment cut in the horizontal direction.

[0509] The first reflector 410 alone may not sufficiently transmit the light emitted from the light emitting unit 400 to the sensor unit 700.

[0510] Accordingly, as shown in FIG. 28(a), the reflection unit 400 may further include the second reflector 420 and a third reflector 430 disposed symmetrically on both sides of the first reflector 410 in order to sufficiently transmit the light emitted from the light emitting unit 600 to the sensor unit 700.

[0511] The second reflector 420 and the third reflector 430 may be provided on the lower surface of the filter cover 382 close to both side surfaces of the filter cover 382.

[0512] Here, the first reflector 410 may further include a second reflective surface 412 that reflects the light from the light emitting unit 600 to the second reflector 420, and a third reflective surface 413 that reflects the light from the light emitting unit 600 to the third reflector 430.

[0513] In addition, the second reflector 420 may have a fourth reflective surface 421 that reflects the light reflected by the second reflective surface 412 toward the sensor unit 700. The third reflector 430 may have a fifth reflective surface 431 that reflects the light reflected by the third reflective surface 413 toward the sensor unit

700. Thus, the light reflected by the fourth and fifth reflective surfaces 421 and 431 may be detected by the sensor unit 700.

[0514] That is, the first reflector 410 may reflect the light emitted from the light emitting unit 600 toward the second reflector 420 and the third reflector 430. The light reflected by the second reflector 420 and the third reflector 430 may be detected by the sensor unit 700.

[0515] The clothing treatment apparatus may further include a second route R2 in which the light emitted from the light emitting unit 600 is guided to the sensor unit 700 via the second reflective surface 412 of the first reflector 410 and the fourth reflective surface 421 of the second reflector 420.

[0516] The clothing treatment apparatus may further include a third route R3 in which the light emitted from the light emitting unit 600 is guided to the sensor unit 700 via the third reflective surface 413 of the first reflector 410 and the fifth reflective surface 431 of the third reflector 430.

[0517] If the clothes have fallen, the fallen clothes block the light passing through the second route R2 and the third route R3. Accordingly, the sensor unit may detect an abnormal decrease in illuminance, and the clothing treatment apparatus or the controller C may determine that the clothes have fallen.

[0518] In addition, the light emitted from the light emitting unit 600 may be guided along the first, second, and third routes R1, R2, and R3, so that the contamination level of a local area of the body filter 386 may be detected.

[0519] FIG. 29 illustrates another embodiment of the reflection unit of the clothing treatment apparatus of the present disclosure.

[0520] If the reflection unit 400 includes the first reflector 410, the second reflector 420, and the third reflector 430, as shown in FIG. 28, when the clothes have fallen to block at least one of the first route R1, the second route R2, or the third route R3, the sensor unit 700 may detect about 0-66% of the light emitted from the light emitting unit 600. However, when the body filter 386 is installed and the clothes do not fall, the sensor unit 700 may detect about 60-70% of the light emitted from the light emitting unit 600. Therefore, there is an overlapping range of the amounts of light detected by the sensor unit 700 when the clothes have fallen and when the clothes do not fall, and if about 66% or less of the light is detected, it is not possible to detect whether clothes have fallen, and thus there is a possibility that the accuracy of determining whether the clothes have fallen will decrease.

[0521] Therefore, in order to eliminate the overlapping range, the clothing treatment apparatus may be provided such that, if the light emitting unit 600 is provided below the body filter 386 and the sensor unit 700 is provided in the inner case 200 or the door 40 to be disposed closer to the filter unit 380 than the hanger unit 510, the reflection unit 400 includes only the second reflector 420 and the third reflector 430 without the first reflector 410.

[0522] The second reflector 420 and the third reflector 430 are provided so that the light emitted from the light emitting unit 600 may pass through the second route R2 and the third route R3 via the body filter 386.

[0523] If the clothes have fallen onto the bottom surface of the inner case 200, the clothes may block at least one of the second route R2 or the third route R3.

[0524] Therefore, the controller C may determine whether the clothes have fallen by detecting a change in the illuminance of the light emitted from the light emitting unit 600 by the sensor unit 700.

[0525] Specifically, when the body filter 386 is installed and the clothes do not fall, the sensor unit 700 may detect about 60-70% of the light emitted from the light emitting unit 600. At this time, if the clothes have fallen and block at least one of the second route R2 or the third route R3, the sensor unit 700 may detect about 0-50% of the light.

[0526] Thereby, there is no overlapping range of the amounts of light detected by the sensor unit 700 when the clothes have fallen and when the clothes do not fall, and thus the controller C may accurately determine whether the clothes have fallen and whether the body filter 386 is attached or detached with only the second reflector 420 and the third reflector 430 disposed on both sides of the filter cover 382.

[0527] FIG. 30 illustrates the clothes fall area of the clothing treatment apparatus of the present disclosure.

[0528] If the light emitting unit 600 is installed in the machine compartment or below the body filter, the light emitted from the light emitting unit 600 is emitted to the rear portion of the inner case 200, and thus, an area that is covered by the filter cover 382 and is not detectable by the sensor unit 700, i.e., the non-detectable area X, may be created. If clothes have fallen into the non-detectable area X, the fallen clothes may not block the light emitted from the light emitting unit 600 and the sensor unit 700 may not detect a decrease in illuminance.

[0529] Therefore, the reflection unit 400 that disperses the light emitted from the light emitting unit 600 in at least two directions so that the sensor unit 700 detects that the clothes having fallen onto the bottom surface block the light emitted from the light emitting unit 600 may be further provided.

[0530] As shown in FIG. 30(a), since clothes may have fallen into the rear portion of the inner case or the area of the fallen clothes is greater than the non-detectable area X and thus the possibility that the clothes have fallen only into a portion of the non-detectable area X is higher, even if the light emitting unit 600 is installed in the machine compartment 300 or below the body filter 366, the sensor unit 700 may detect a change in the illuminance of the light emitted from the light emitting unit 600.

[0531] However, as shown in FIG. 30(b), if clothes having a very small volume, such as a scarf, have fallen or clothes have fallen into the front portion of the inner case 200, the area of the fallen clothes is narrower than the non-detectable area X, and thus the clothes may have fallen into the non-detectable area X.

[0532] Therefore, as shown in FIG. 30(c), in order to

minimize the non-detectable area X of the sensor unit 700, the reflection units 400 may be disposed on both sides of the sensor unit 700 and the light emitting unit 600 between the sensor unit 700 and the light emitting unit 600.

[0533] The second reflector 420 and the third reflector 430 may be disposed close to both side surfaces of the filter cover 382. In addition, the second reflector 420 and the third reflector 430 may be disposed close to the rear surface of the filter cover 382 to minimize the non-detectable area X of the sensor unit 700.

[0534] Accordingly, the second reflector 420 and the third reflector 430 may be disposed as close to the sides and rear surface of the filter cover 382 as possible to minimize the non-detectable area X.

[0535] The reflection units 400 may be disposed closer to the light emitting unit 600 than the sensor unit 700.

[0536] The sensor unit 700 and the light emitting unit 600 may be disposed in the forward and rearward directions with respect to the bottom surface, and the reflection units 400 may be disposed in the width direction with respect to the bottom surface.

[0537] The plurality of reflection units 400 may be disposed symmetrically with respect to the sensor unit 700.

[0538] The plurality of reflection units 400 may be disposed symmetrically with respect to the sensor unit 700 and the light emitting unit 600.

[0539] FIG. 31 illustrates the structure of the filter cover of the clothing treatment apparatus of the present disclosure.

[0540] FIG. 31(a) is a lower perspective view of the filter cover 382, and FIG. 31(b) is a bottom view of the filter cover 382 provided with the reflection units 400.

[0541] The filter cover 382 may have a first reflector installation unit 3821a configured to install the first reflector 410 on the lower surface of the filter cover 382.

[0542] The filter cover 382 may further include a second reflector installation unit 3821b configured to install the second reflector 420 on the lower surface of the filter cover 382, and a third reflector installation unit 3821c configured to install the third reflector 430 on the lower surface of the filter cover 382. The second reflector installation unit 3821b and the third reflector installation unit 3821c may be provided symmetrically on both sides of the first reflector installation unit 3821a.

[0543] The filter cover 382 may have link installation units 3822 configured to install links 383 detachably coupled to the filter fixing unit 384 on the lower surface of the filter cover 382.

[0544] The filter cover 382 may have hooks 3823 supported by the filter fixing unit 384 on the lower surface of the filter cover 382.

[0545] The filter cover 382 may have an aroma sheet installation unit 3824 configured to install an aroma sheet capable of deodorizing air on the lower surface of the filter cover 382.

[0546] Although the present disclosure has been illustrated and described in relation to specific embodiments, it will be apparent to those skilled in the art that the present disclosure may be variously improved and changed without departing from the technical idea of the present disclosure provided by the following claims.

Claims

1. A clothing treatment apparatus comprising:

   a cabinet having an opening formed in a front portion thereof;
   an inner case provided in the cabinet to provide a space configured to accommodate clothes;
   a door coupled to the cabinet to open and close the opening;
   a hanger unit provided in an upper portion of the inner case to hold the clothes;
   a machine compartment provided below a bottom surface of the inner case to supply at least one of hot air or steam into an inside of the inner case;
   a light emitting unit provided in one of the inner case, the door, and the machine compartment to emit light toward the inside of the inner case; and
   a sensor unit provided in one of the inner case, the door, and the machine compartment to detect that the clothes having fallen off of the hanger unit block at least a portion of the light emitted from the light emitting unit,
   wherein the light emitting unit and the sensor unit are disposed below the hanger unit.

2. The clothing treatment apparatus according to claim 1, wherein the light emitting unit and the sensor unit are disposed closer to the bottom surface of the inner case than the hanger unit.

3. The clothing treatment apparatus according to claim 2, wherein the light emitting unit and sensor unit are disposed in a width direction or forward and rearward directions with respect to the bottom surface of the inner case.

4. The clothing treatment apparatus according to claim 3, wherein:

   the sensor unit is disposed on a rear surface of the inner case; and
   the light emitting unit is disposed in front of the sensor unit.

5. The clothing treatment apparatus according to claim 3, wherein:

   the sensor unit is disposed on one side surface of the inner case; and

the light emitting unit is disposed on one side surface of the sensor unit.

6. The clothing treatment apparatus according to claim 3, wherein at least one of the light emitting unit or the sensor unit is disposed in the machine compartment.

7. The clothing treatment apparatus according to claim 3, wherein:

one of the light emitting unit and the sensor unit is disposed in the machine compartment; and
a remaining one of the light emitting unit and the sensor unit is disposed in the inner case or the door.

8. The clothing treatment apparatus according to claim 7, wherein:

the machine compartment further comprises an inflow body configured to communicate with the bottom surface of the inner case to allow air to be introduced thereinto, a circulation duct provided with a heat exchanger configured to heat the air introduced from the inflow body to generate the hot air, and a discharge duct configured to allow the circulation duct to communicate with the inside of the inner case and disposed farther rearward than the inflow body;
the light emitting unit is provided on the inflow body; and
the sensor unit is provided on a rear surface of the inner case.

9. The clothing treatment apparatus according to claim 8, wherein:

the sensor unit is provided at a center of the rear surface of the inner case in the width direction;
the inflow body is disposed at one side on the bottom surface of the inner case; and
the light emitting unit is disposed at a position corresponding to the sensor unit in the inflow body.

10. The clothing treatment apparatus according to claim 8, further comprising a reflection unit disposed above the light emitting unit and provided to guide the light emitted from the light emitting unit to the sensor unit.

11. The clothing treatment apparatus according to claim 10, wherein the machine compartment further comprises:

a body filter mounted on the inflow body; and
a filter cover disposed above the body filter,
wherein the reflection unit is disposed between the filter cover and the body filter.

12. The clothing treatment apparatus according to claim 11, wherein the reflection unit comprises side reflectors disposed on both sides of the filter cover.

13. The clothing treatment apparatus according to claim 11, wherein:

the reflection unit comprises a central reflector provided at a center of the filter cover in the width direction so as to face the light emitting unit; and
the light emitting unit, the sensor unit, and the central reflector are disposed in a straight line so that the central reflector guides the light to the sensor unit.

14. The clothing treatment apparatus according to claim 3, wherein the light emitting unit and the sensor unit are disposed above the bottom surface of the inner case.

15. The clothing treatment apparatus according to claim 14, wherein the light emitting unit and the sensor unit are provided to face each other.

16. The clothing treatment apparatus according to claim 14, wherein the light emitting unit is provided on one of side surfaces of the inner case, and the sensor unit is provided on the other side surface of the inner case facing the one side surface.

17. The clothing treatment apparatus according to claim 16, wherein the light emitting unit is provided at a center of the one side surface in the width direction, and the sensor unit is provided at a center of the other side surface in the width direction.

18. The clothing treatment apparatus according to claim 17, wherein the light emitting unit and the sensor unit are provided in at least one, and are disposed in a height direction.

19. The clothing treatment apparatus according to claim 18, wherein the at least one light emitting unit and the at least one sensor unit are disposed to face each other.

20. The clothing treatment apparatus according to claim 14, wherein the light emitting unit is provided on an inner surface of the door, and the sensor unit is provided on a rear surface of the inner case.

21. The clothing treatment apparatus according to claim 20, wherein the light emitting unit is provided at a center of the rear surface of the inner case in the width direction, and the sensor unit is provided at a center of the inner surface of the door in the width direction.

22. A clothing treatment apparatus comprising:

a cabinet having an opening formed in a front portion thereof;
an inner case provided in the cabinet to provide a space configured to accommodate clothes;
a door coupled to the cabinet to open and close the opening;
a hanger unit provided in an upper portion of the inner case to hold the clothes;
a machine compartment provided below a bottom surface of the inner case to supply at least one of hot air or steam into an inside of the inner case;
a light emitting unit provided in one of the inner case, the door, and the machine compartment to emit light toward the inside of the inner case;
a sensor unit provided in one of the inner case and the door to detect the light emitted from the light emitting unit; and
a controller provided to determine whether the clothes have fallen depending on an amount of the light emitted from the light emitting unit, detected by the sensor unit,
wherein:

the sensor unit is disposed closer to the bottom surface of the inner case than the hanger unit;
the sensor unit detects a first value when the clothes do not fall; and
the controller determines that the clothes have fallen when the sensor unit detects a value smaller than the first value.

23. The clothing treatment apparatus according to claim 22, wherein the light emitting unit is disposed closer to the sensor unit than the hanger unit.

24. The clothing treatment apparatus according to claim 23, wherein:

the sensor unit is disposed on a rear surface of the inner case; and
the light emitting unit is disposed closer to the door than the sensor unit.

25. A clothing treatment apparatus comprising:

a cabinet having an opening formed in a front portion thereof;
an inner case provided in the cabinet to provide a space configured to accommodate clothes;
a door coupled to the cabinet to open and close the opening;
a hanger unit provided in an upper portion of the inner case to hold the clothes;
a machine compartment provided below a bottom surface of the inner case to supply at least one of hot air or steam into an inside of the inner case;
a light emitting unit provided in one of the inner case, the door, and the machine compartment to emit light toward the inside of the inner case; and
a sensor unit provided in one of the inner case and the door to detect the falling of the clothes by blocking at least a portion of the light emitted from the light emitting unit; and
further comprising reflection units provided to disperse the light emitted from the light emitting unit in at least two directions so that the sensor unit detects that the clothes having fallen to the bottom surface block the light emitted from the light emitting unit.

26. The clothing treatment apparatus according to claim 25, wherein the reflection units are disposed on both sides of the sensor unit and the light emitting unit between the sensor unit and the light emitting unit.

27. The clothing treatment apparatus according to claim 26, wherein the reflection units are disposed closer to the light emitting unit than the sensor unit.

28. The clothing treatment apparatus according to claim 26, wherein:

the sensor unit and the light emitting unit are disposed in forward and rearward directions with respect to the bottom surface; and
the reflection units are disposed in a width direction with respect to the bottom surface.

29. The clothing treatment apparatus according to claim 28, wherein the plurality of reflection units is disposed symmetrically with respect to the sensor unit.

30. The clothing treatment apparatus according to claim 28, wherein the plurality of reflection units is disposed symmetrically with respect to the sensor unit and the light emitting unit.

31. A clothing treatment apparatus comprising:

a cabinet having an opening formed in a front portion thereof;
an inner case provided in the cabinet to provide a space configured to accommodate clothes;
a door coupled to the cabinet to open and close the opening;
a hanger unit provided in an upper portion of the inner case to hold the clothes;
a vibration unit provided on the hanger unit to vibrate the hanger unit;
a machine compartment provided below a bottom surface of the inner case to supply at least

one of hot air or steam into an inside of the inner case;
a light emitting unit provided in one of the inner case, the door, and the machine compartment to emit light toward the inside of the inner case; and
a sensor unit provided in one of the inner case, the door, and the machine compartment to detect that the clothes having fallen off of the hanger unit block at least a portion of the light emitted from the light emitting unit when the hanger unit vibrates,
wherein the light emitting unit and the sensor unit are disposed below the hanger unit.

32. The clothing treatment apparatus according to claim 31, wherein:

the machine compartment further comprises an inflow body configured to communicate with the bottom surface of the inner case to allow air to be introduced thereinto, a circulation duct provided with a heat exchanger configured to heat the air introduced from the inflow body to generate the hot air, and a discharge duct configured to allow the circulation duct to communicate with the inside of the inner case and disposed farther rearward than the inflow body;
the light emitting unit is provided on the inflow body; and
the sensor unit is provided on a rear surface of the inner case.

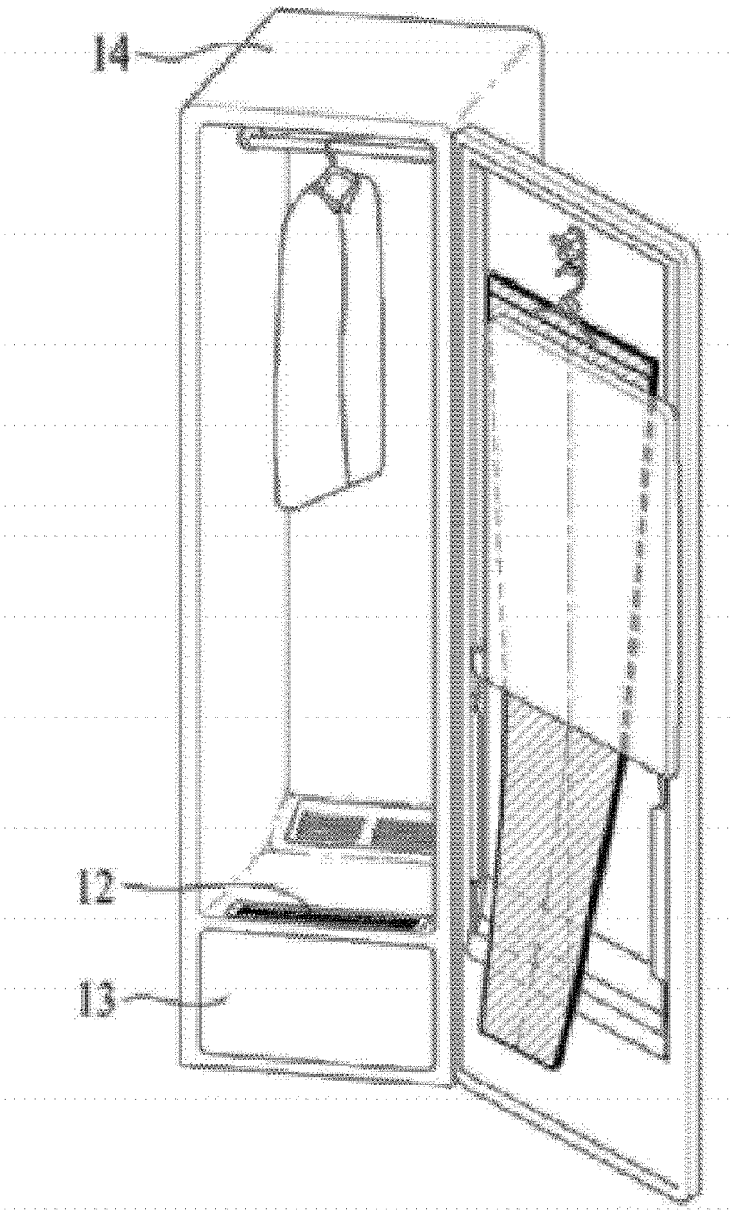
33. The clothing treatment apparatus according to claim 32, wherein:
the machine compartment further comprises:

a body filter mounted on the inflow body; and
a filter cover disposed above the body filter; and
the clothing treatment apparatus further comprises a reflection unit disposed above the light emitting unit and provided to guide the light emitted from the light emitting unit to the sensor unit,
wherein the reflection unit comprises side reflectors disposed on both sides of the filter cover.

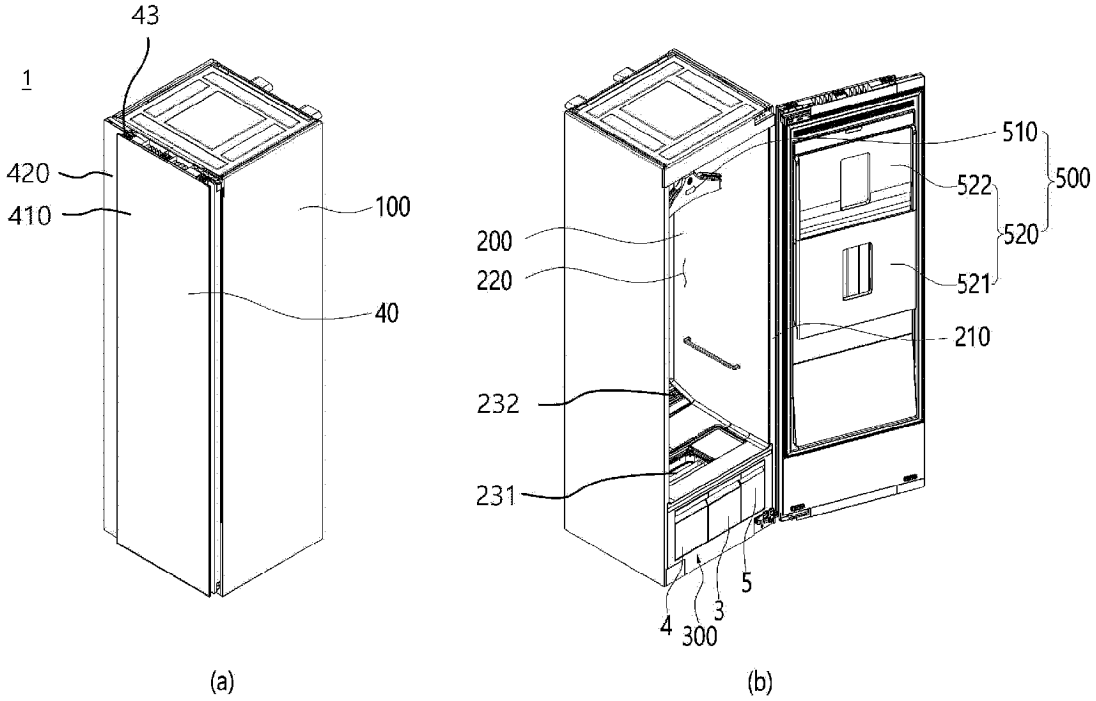
34. A clothing treatment apparatus comprising:

a cabinet having an opening formed in a front portion thereof;
an inner case provided in the cabinet to provide a space configured to accommodate clothes;
a door coupled to the cabinet to open and close the opening;
a hanger unit comprising at least one hanger configured to hold the clothes, a power transmission unit installed in the upper portion of the inner case and provided to shake the at least one hanger, and a driver connected to the power transmission unit to provide power to shake the at least one hanger;
a machine compartment provided below a bottom surface of the inner case to supply at least one of hot air or steam into an inside of the inner case;
a light emitting unit provided in one of the inner case, the door, and the machine compartment to emit light toward the inside of the inner case; and
a sensor unit provided in one of the inner case, the door, and the machine compartment to detect that the clothes having fallen off of the hanger unit block at least a portion of the light emitted from the light emitting unit when the hanger unit,
wherein the light emitting unit and the sensor unit are disposed below the hanger unit.

【Fig 1】



【Fig 2】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4
3
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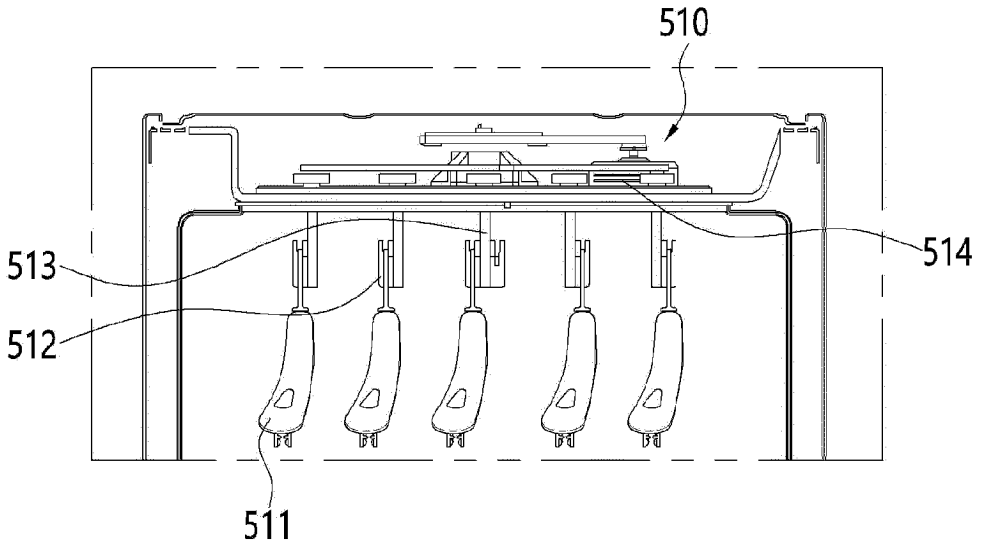
(b)

【Fig 3】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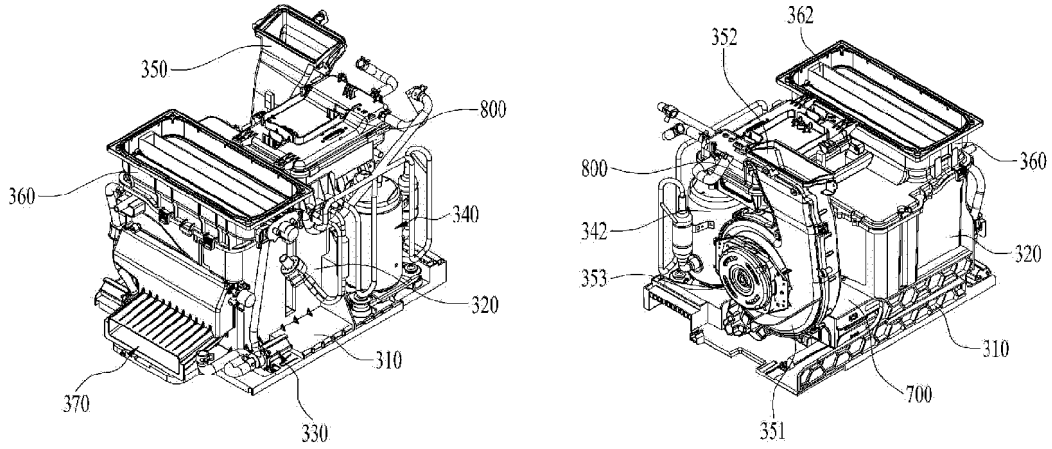
511

【Fig 4】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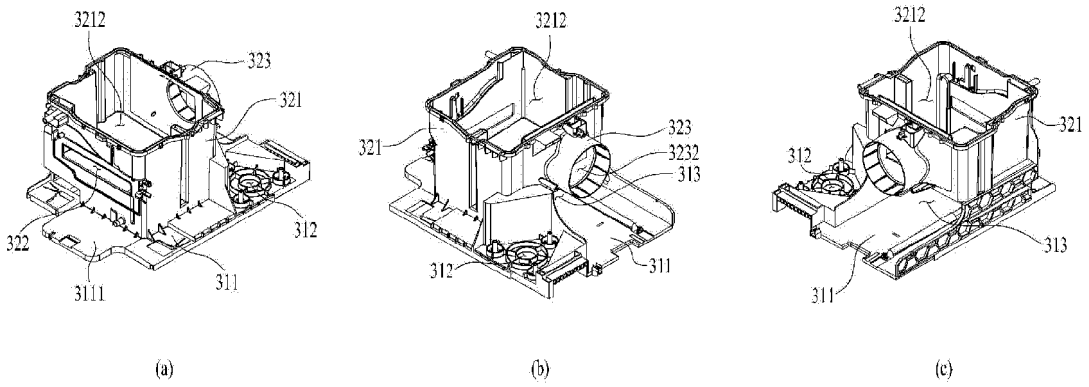
(a)
(b)

【Fig 5】


3212
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3111
311
3212
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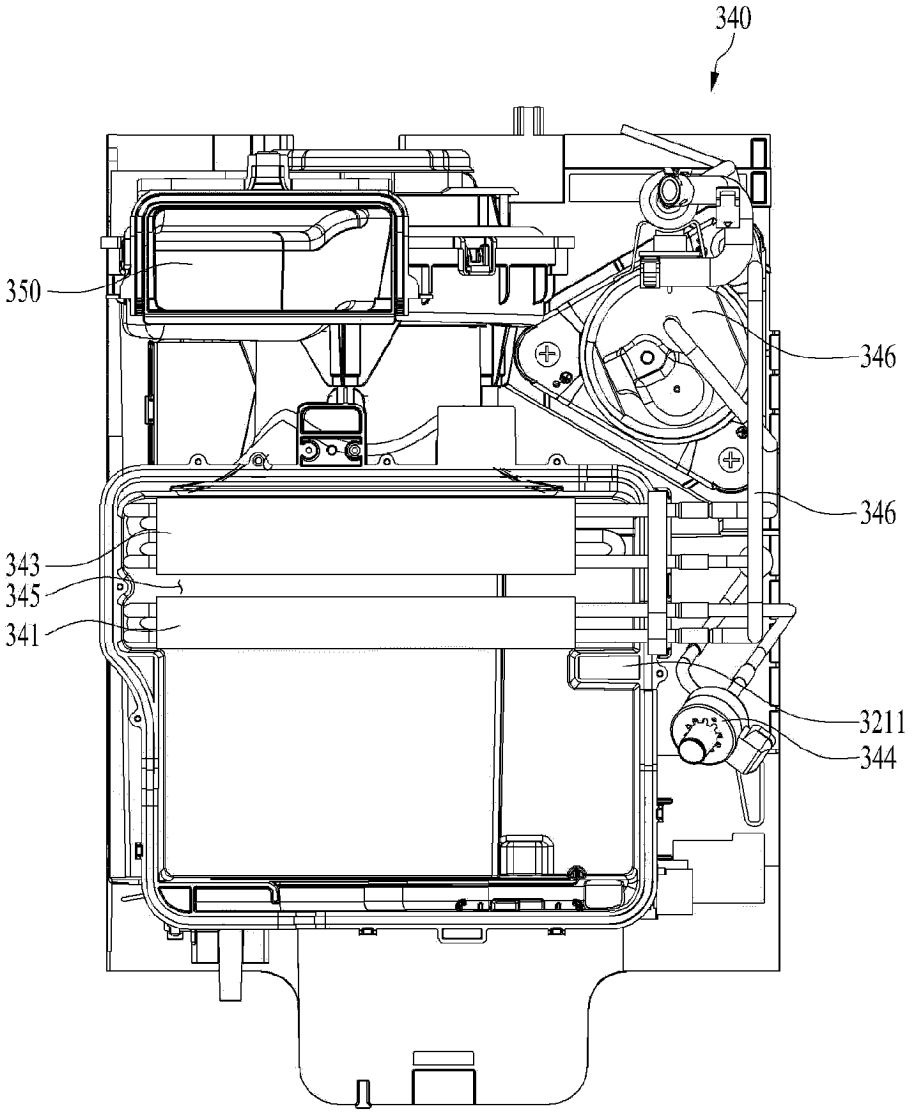
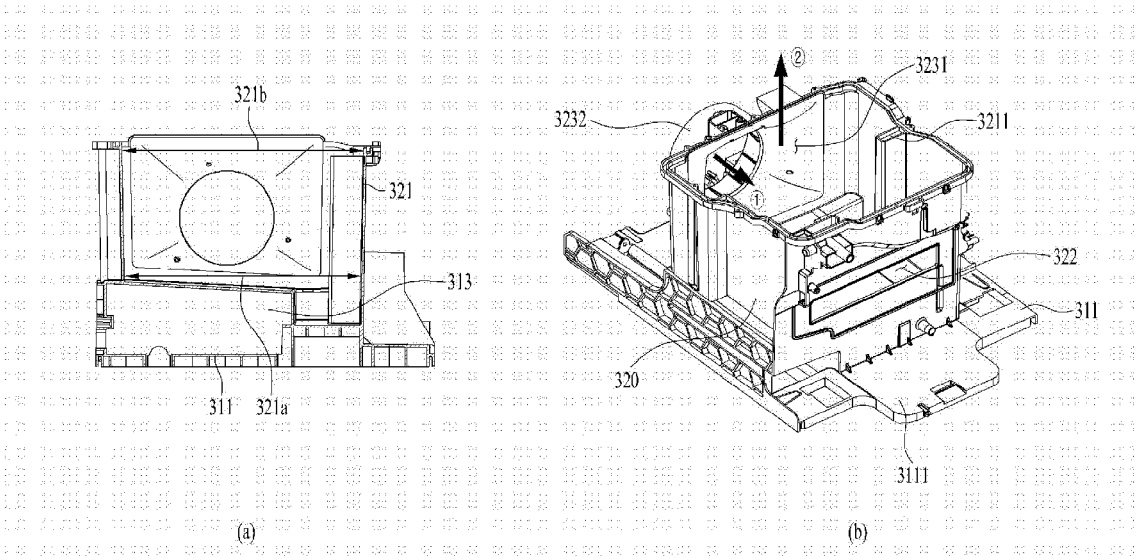
3232
313
312
311
3212
321
312
313
311
(a)
(b)
(c)

【Fig 6】



【Fig 7】


321b
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321a
(a)
②
①
3231
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311
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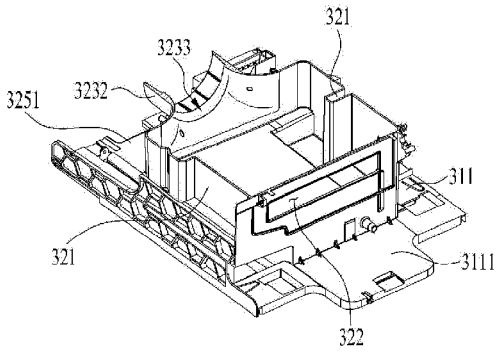
3111
(b)

【Fig 8】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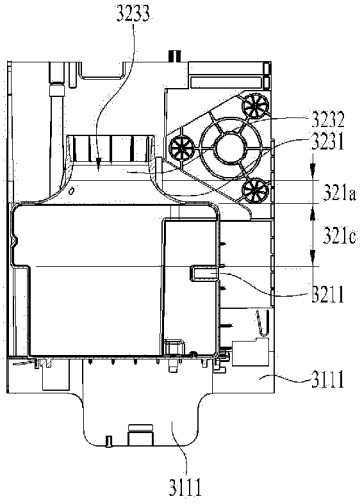
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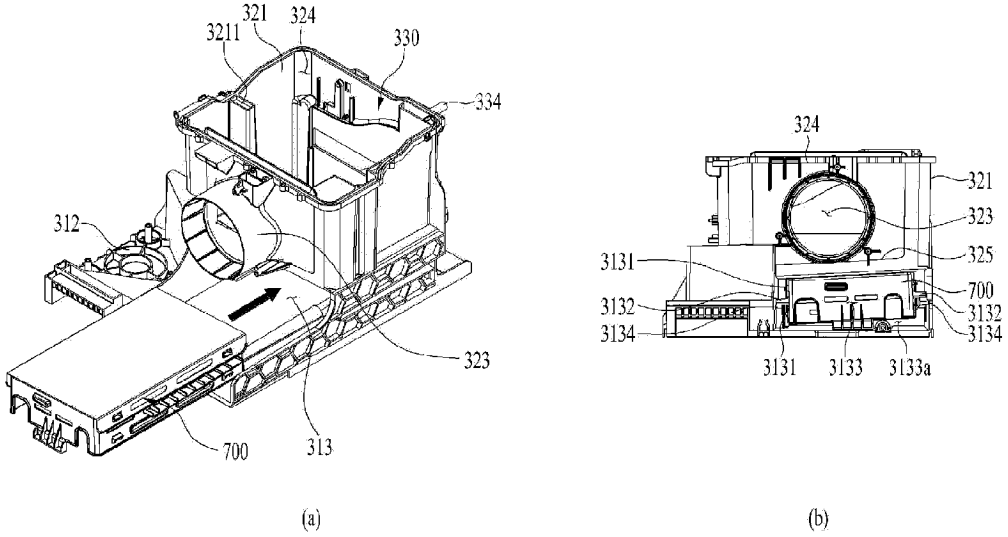
【Fig 9】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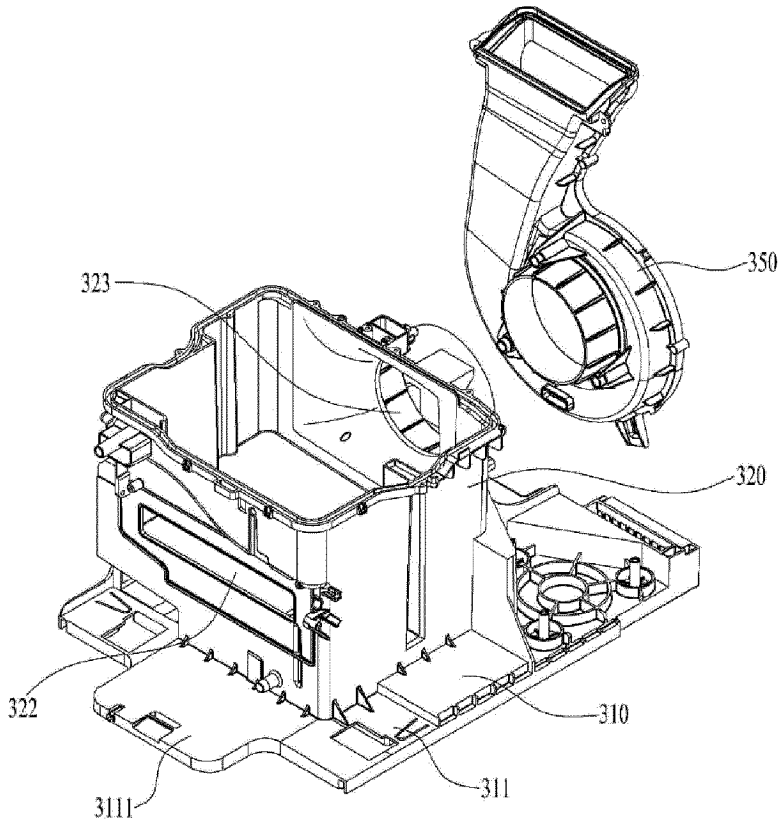
3134
3131
3133
3133a
(b)

【Fig 10】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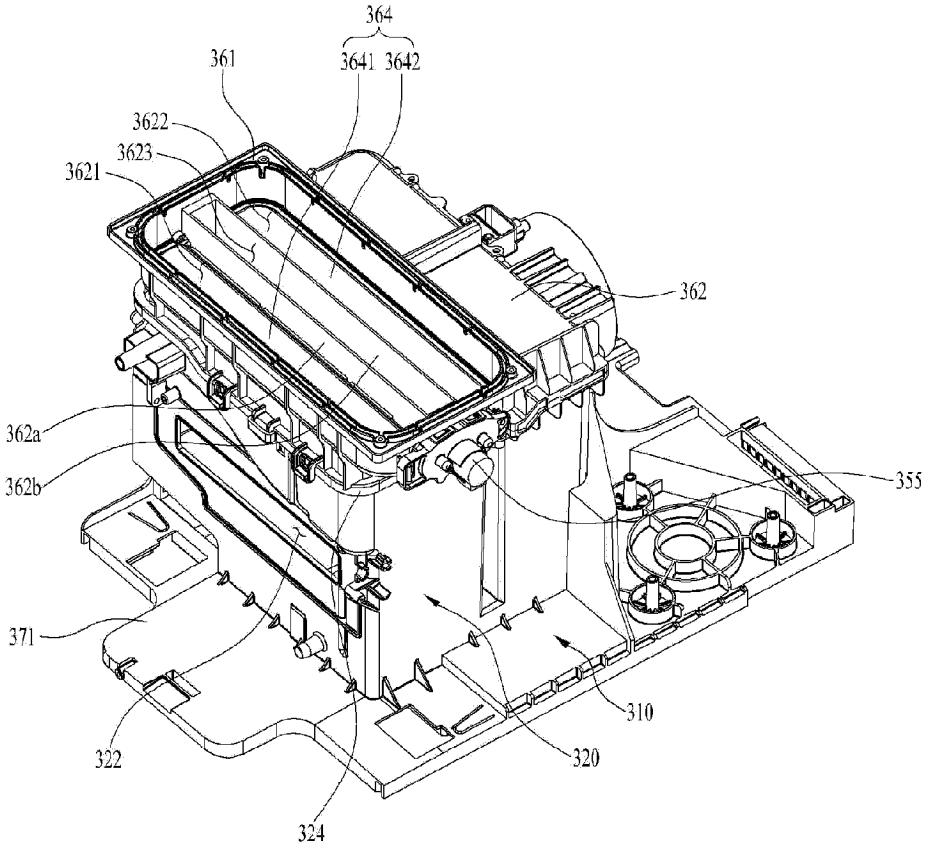
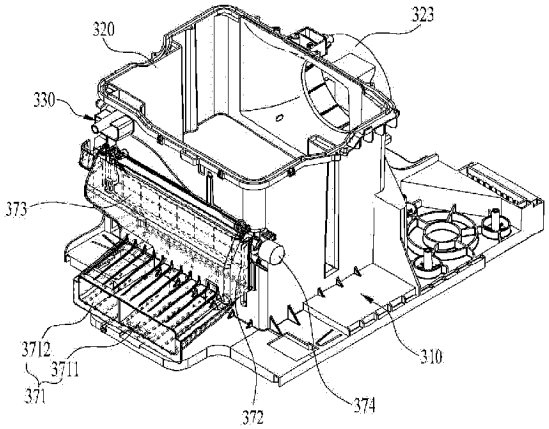
【Fig 11】



【Fig 12】



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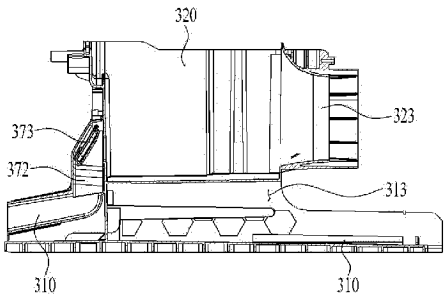

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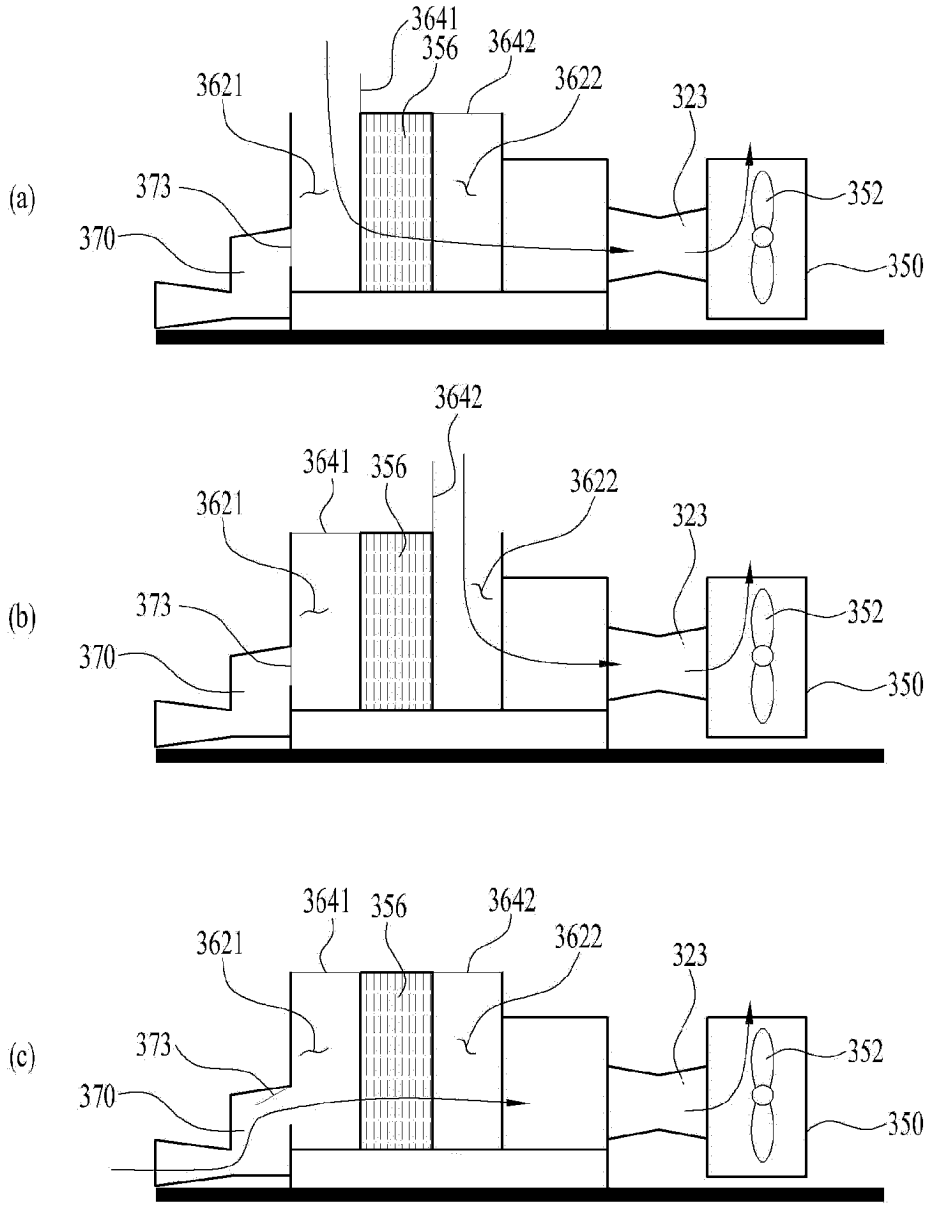
【Fig 13】


(a)
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(b)
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(c)
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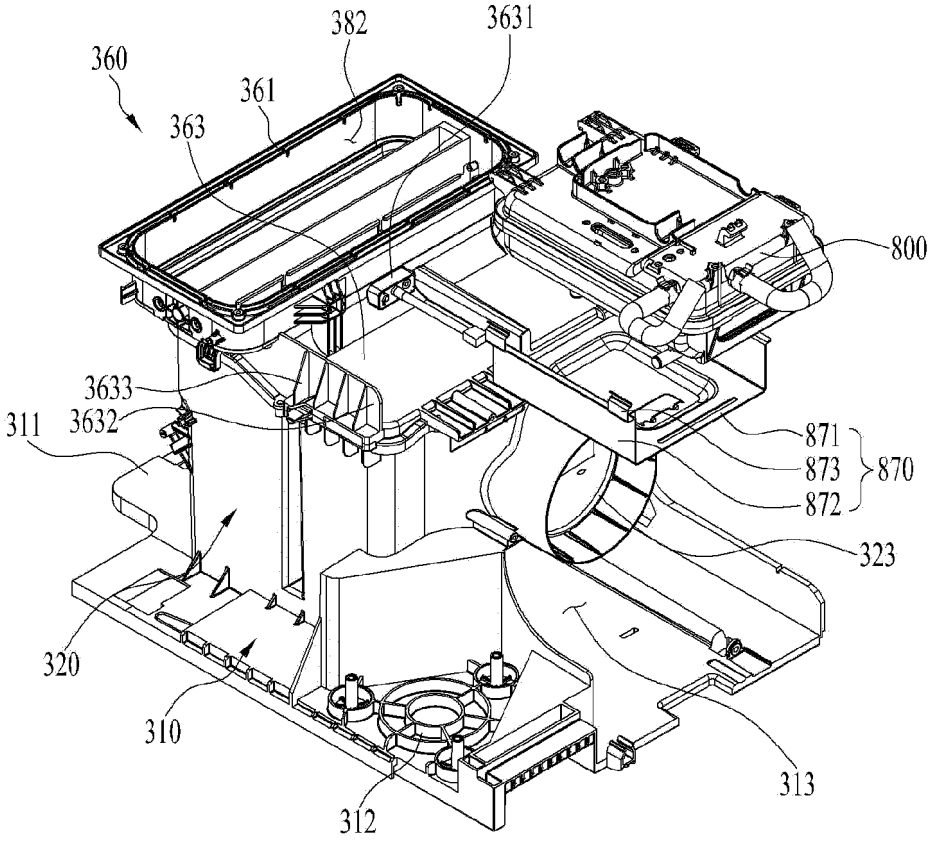
【Fig 14】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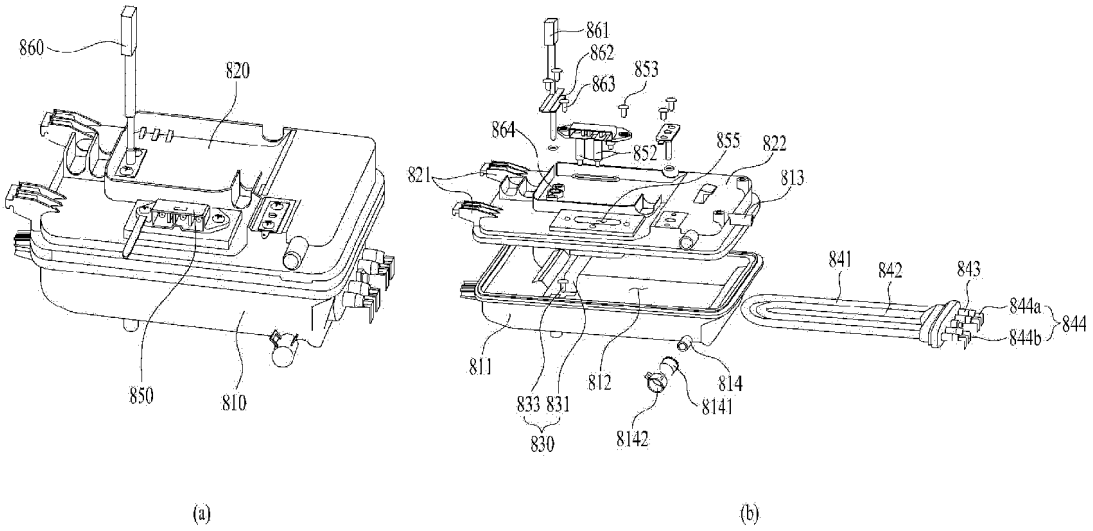
【Fig 15】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8142
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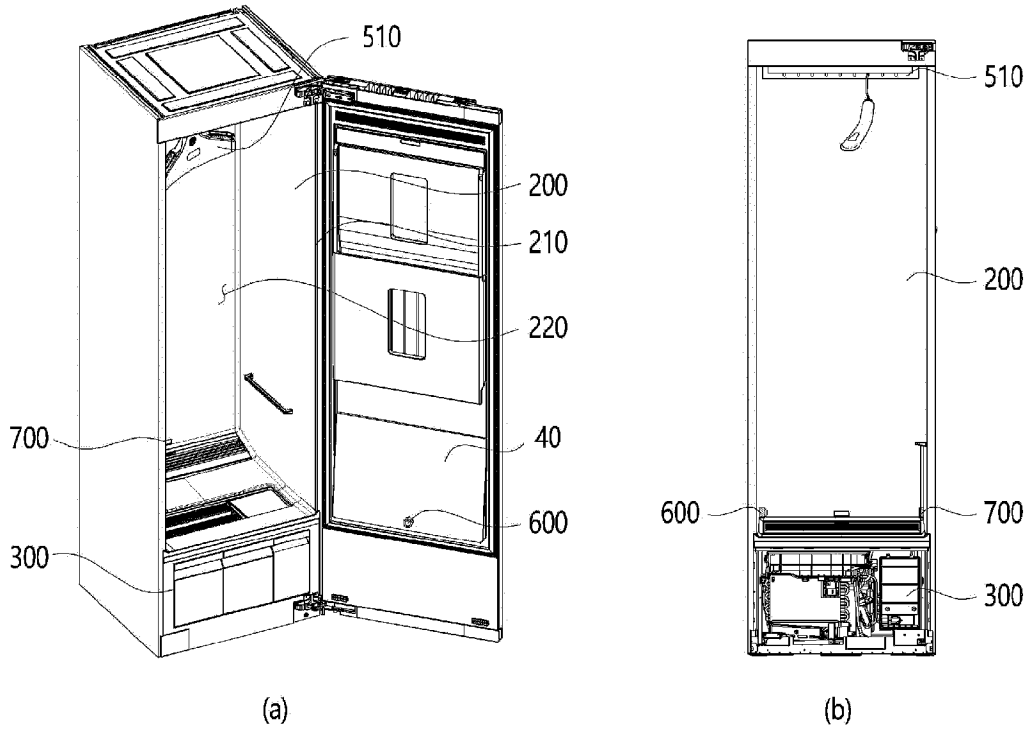
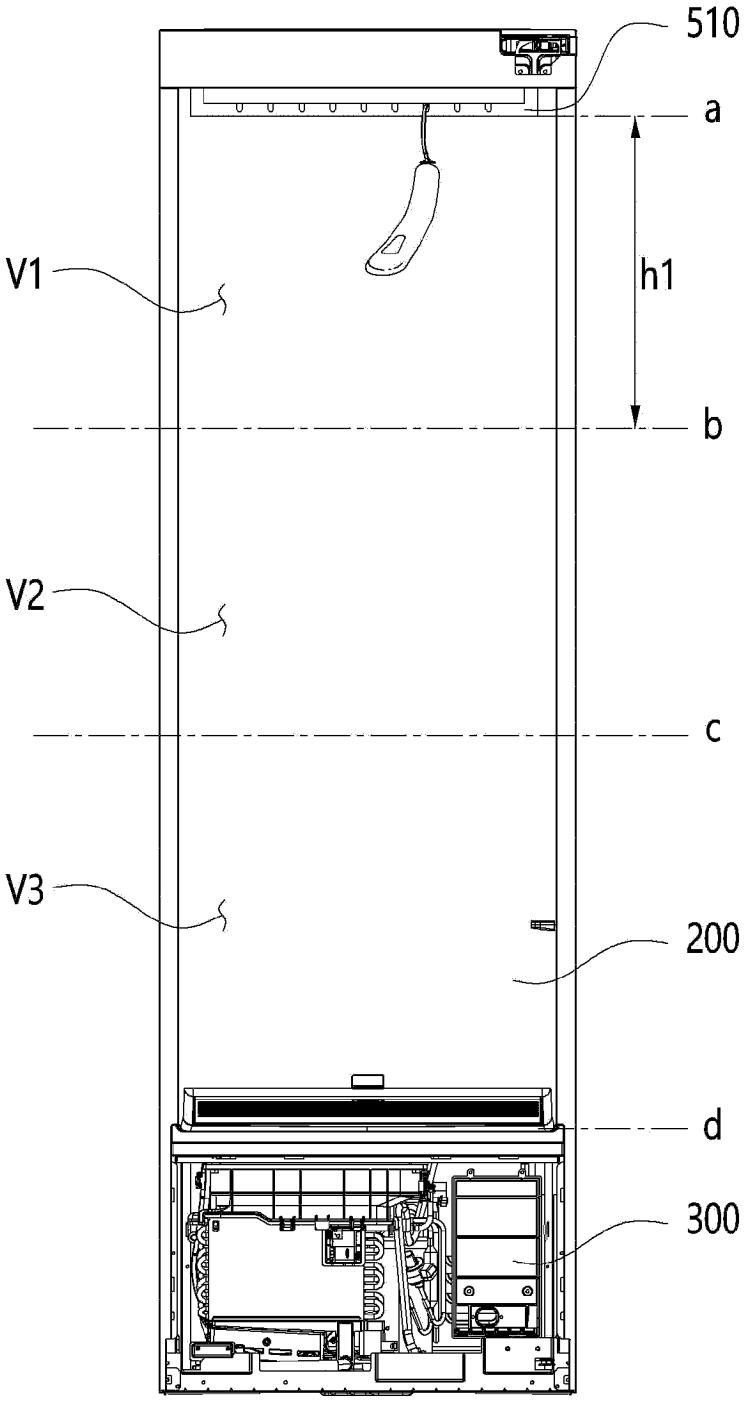
(b)

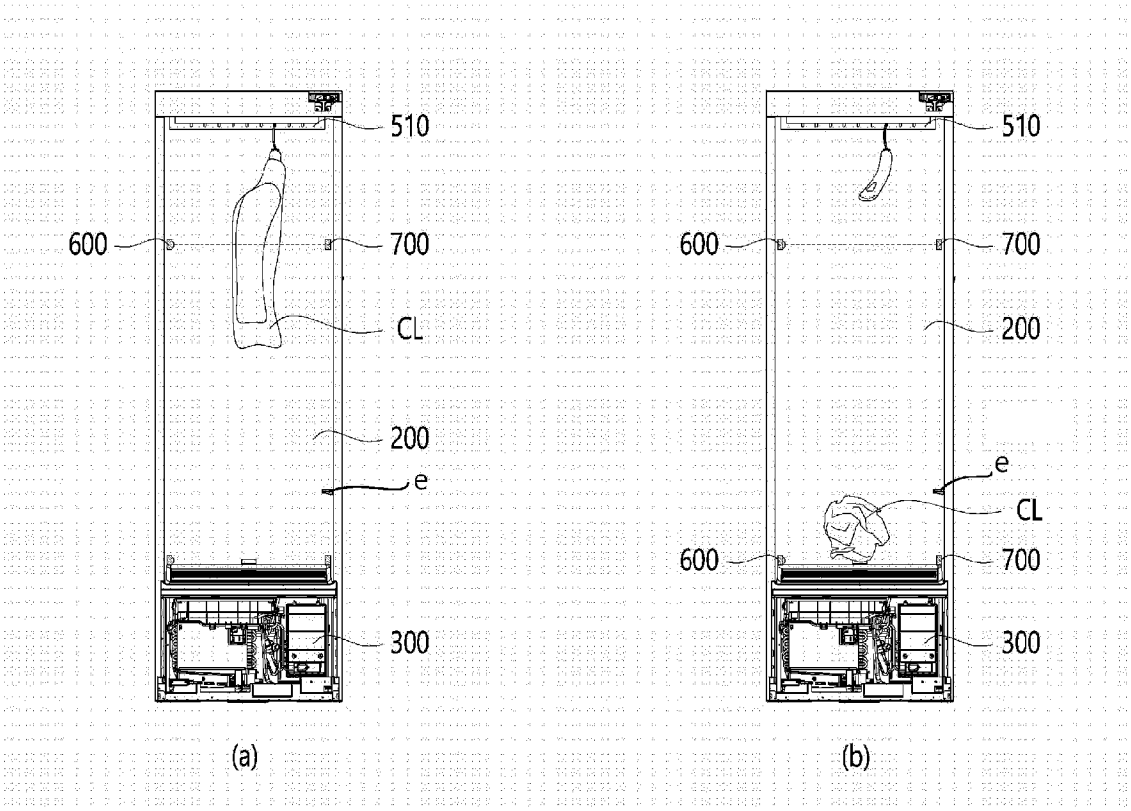
【Fig 16】



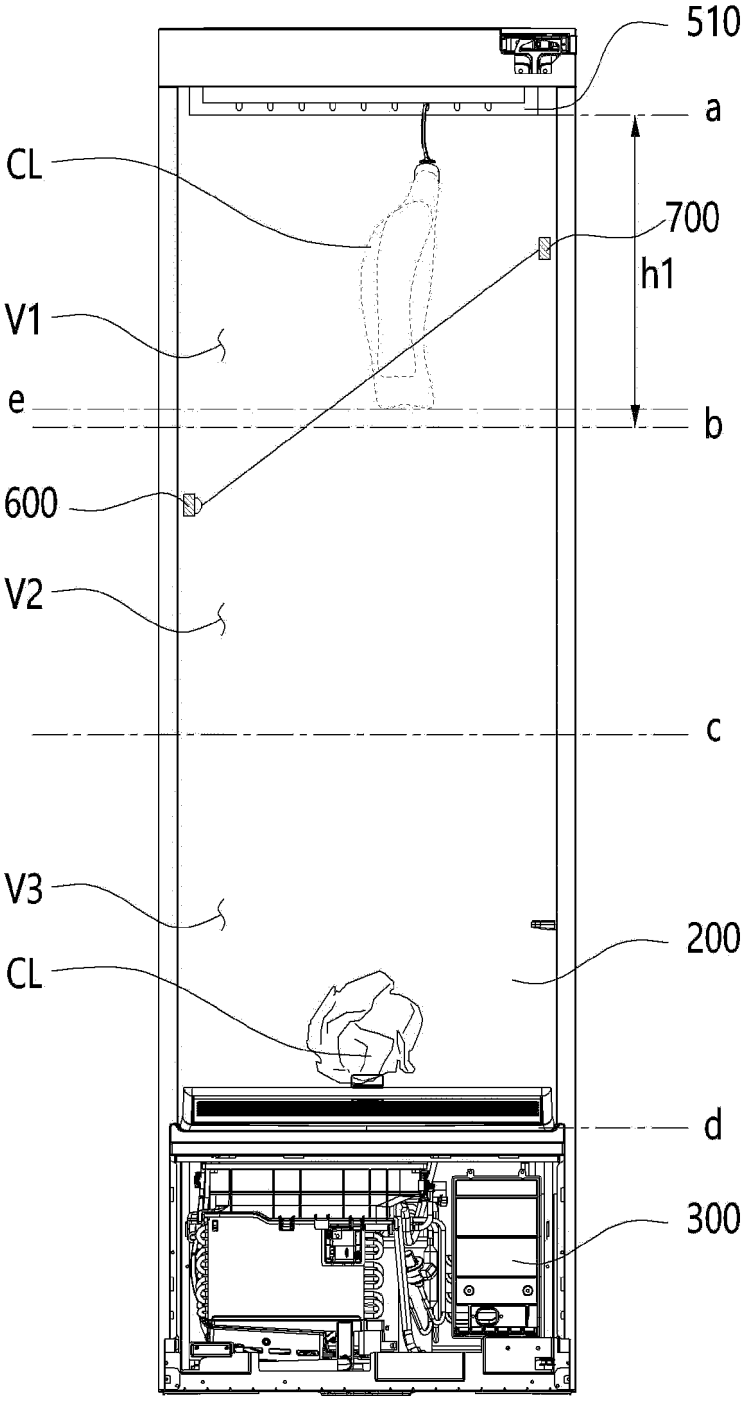
【Fig 17】



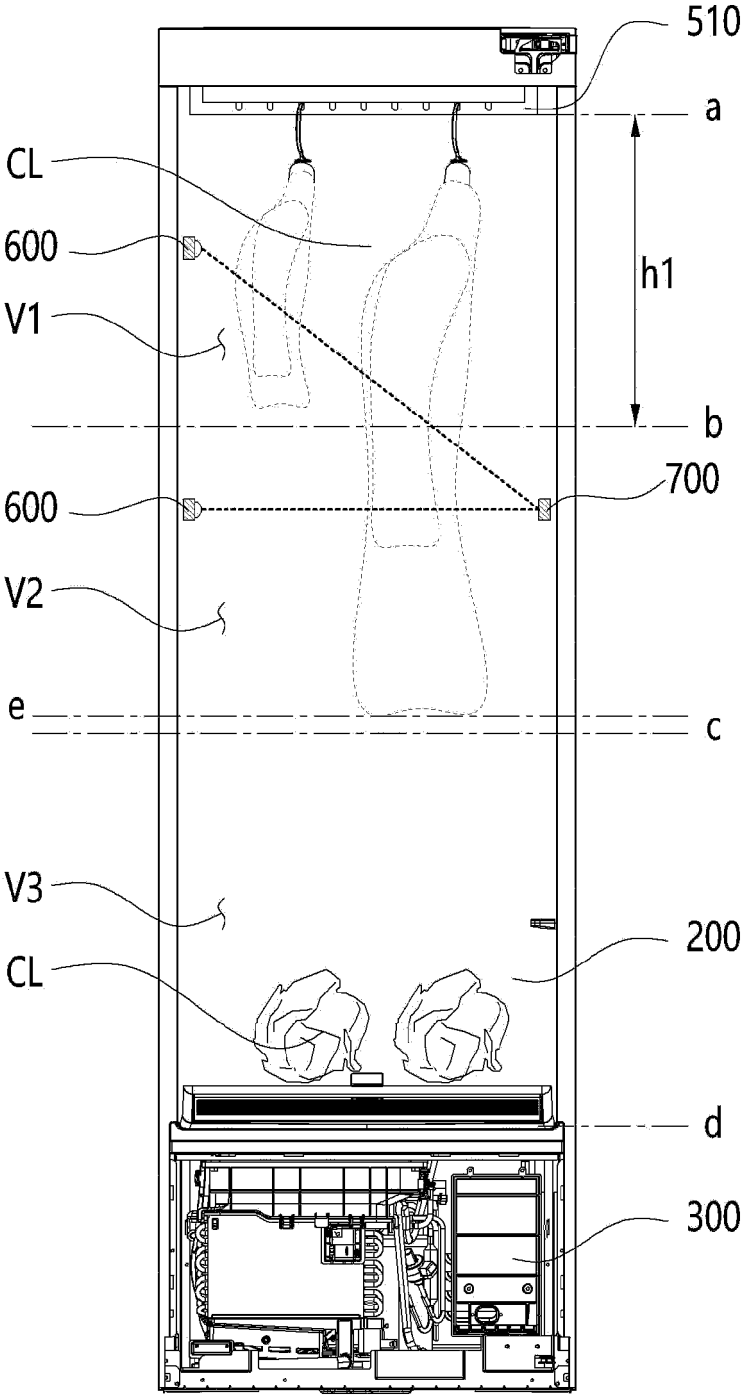
【Fig 18】



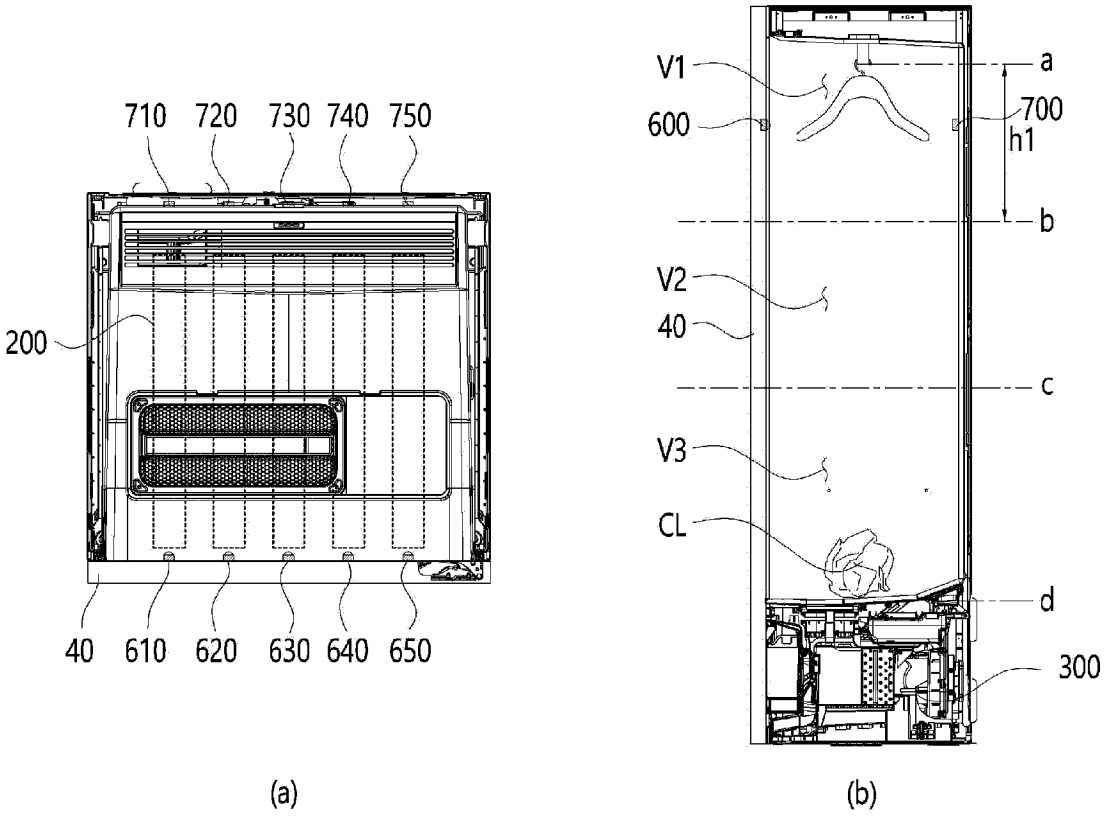
【Fig 19】



【Fig 20】



【Fig 21】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c
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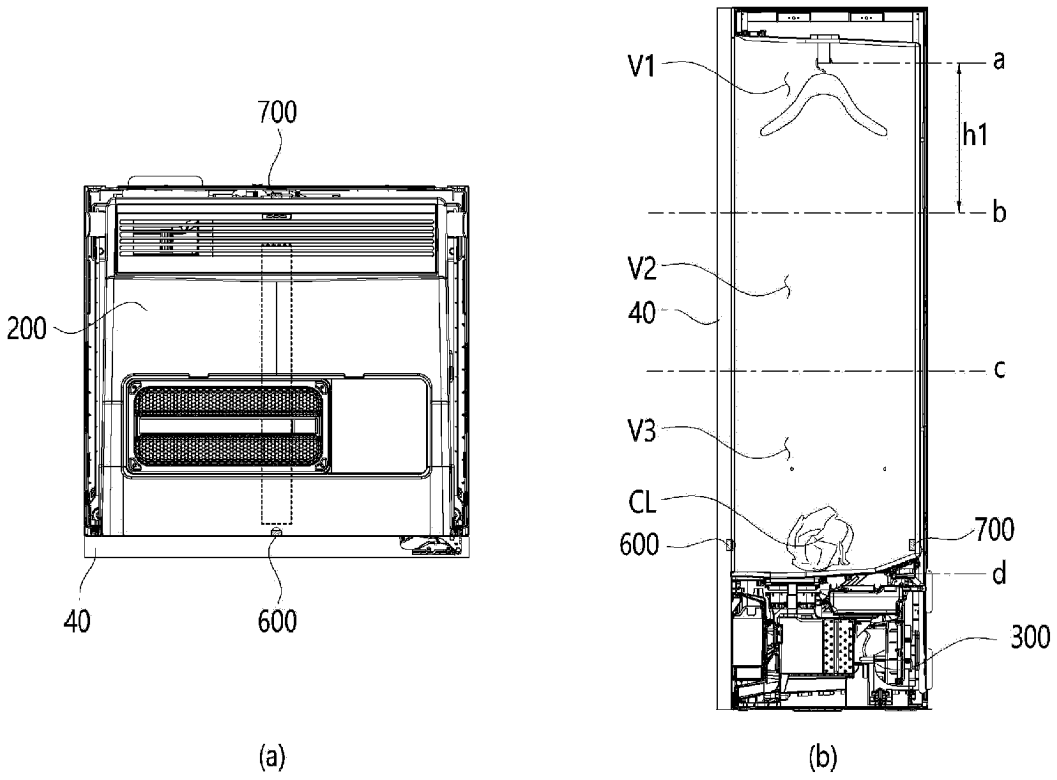
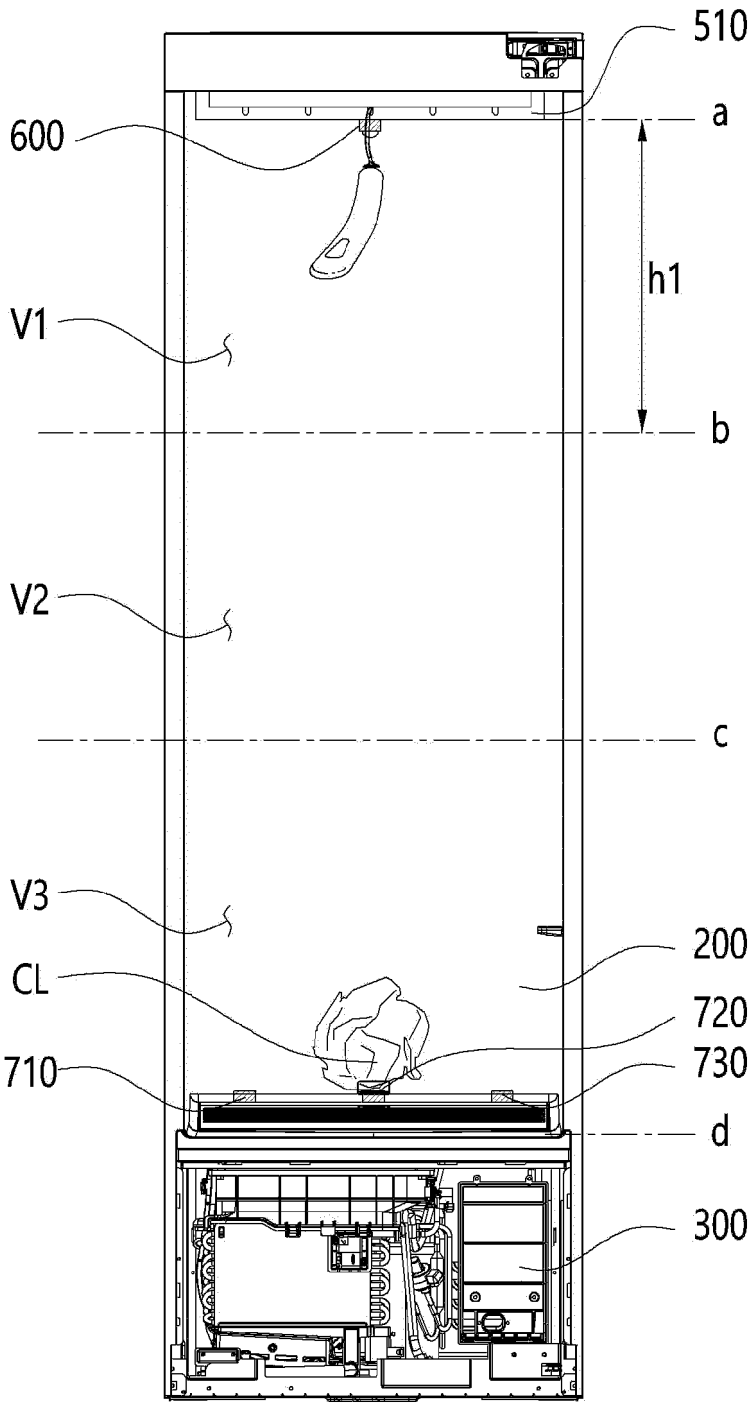
(b)

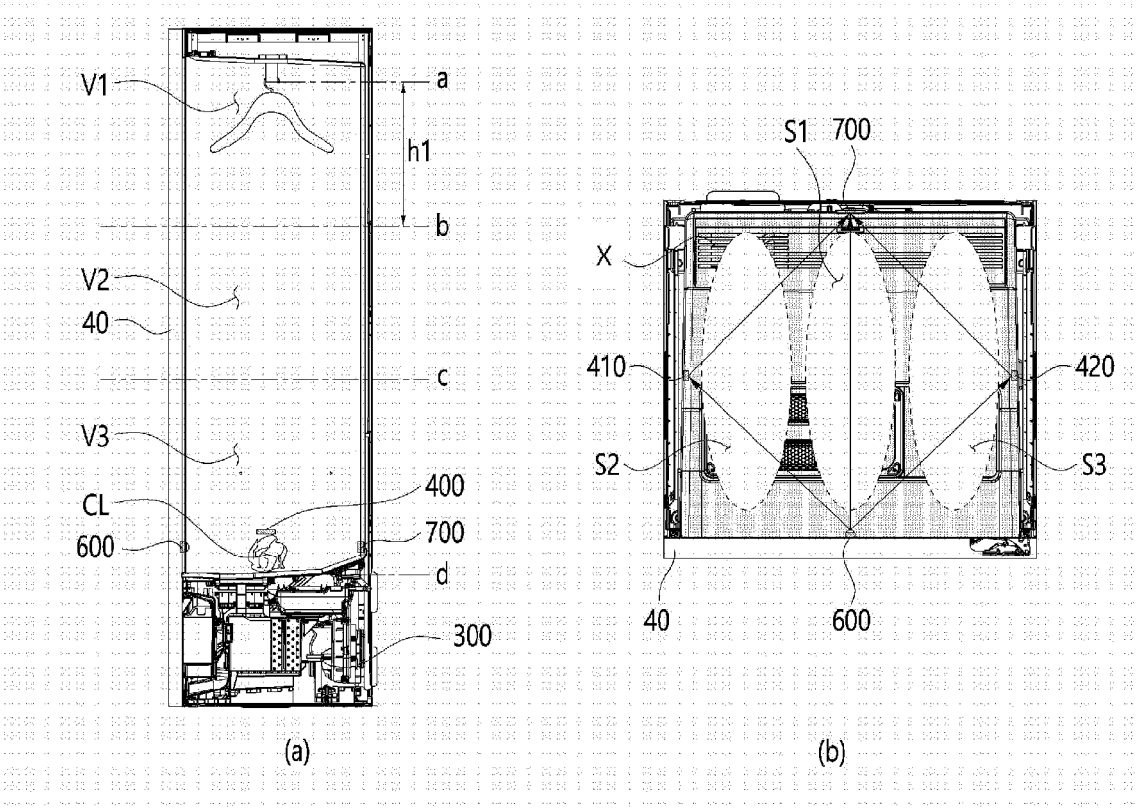
【Fig 22】



【Fig 23】



【Fig 24】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V3
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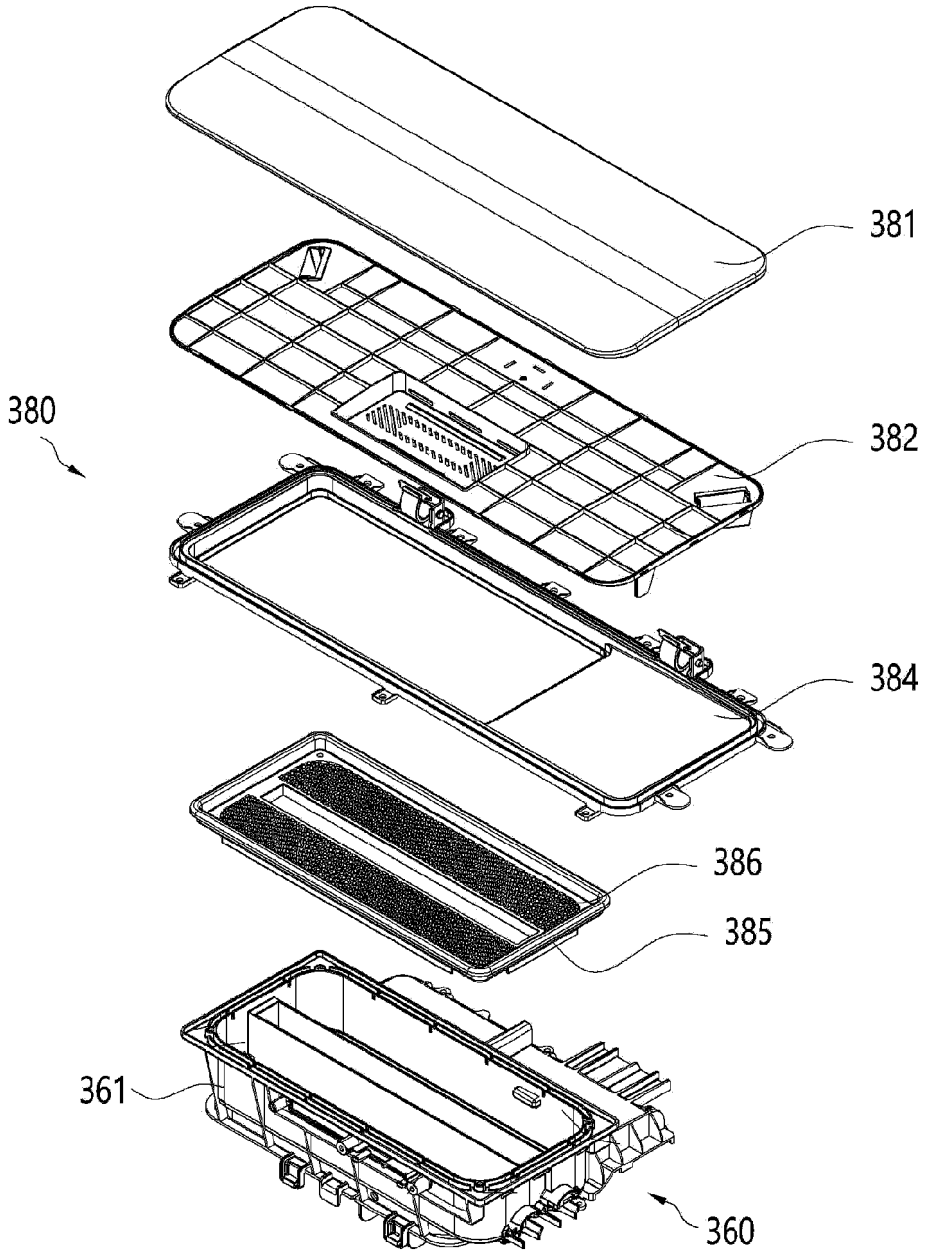
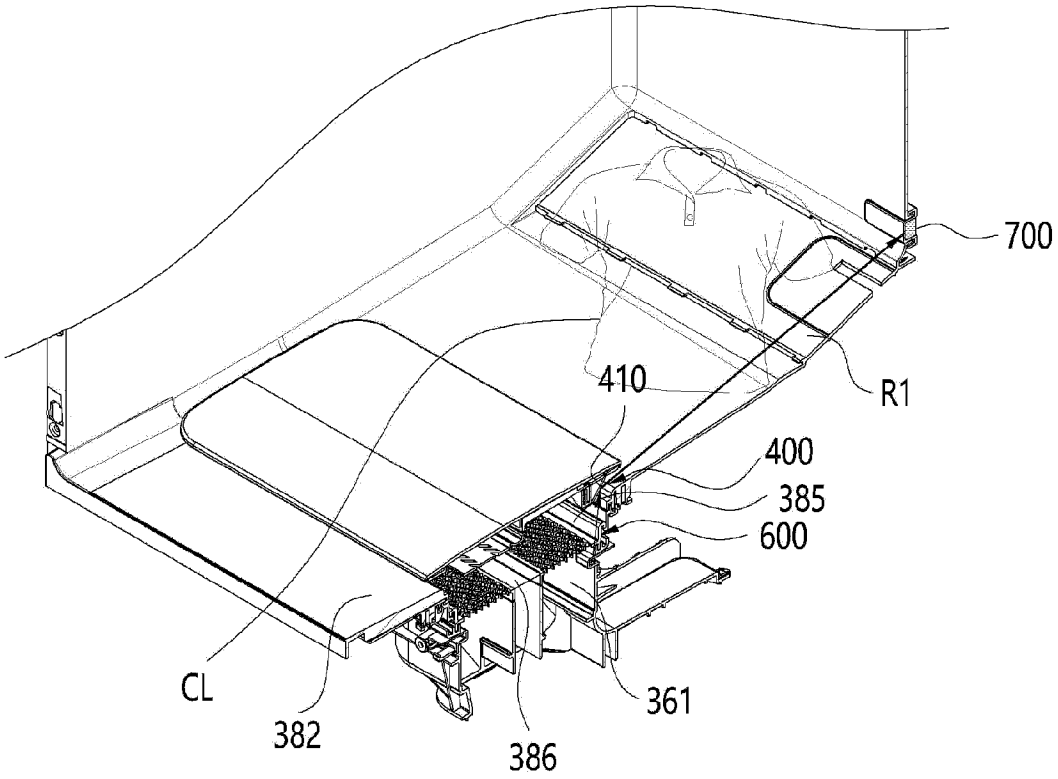
【Fig 25】



【Fig 26】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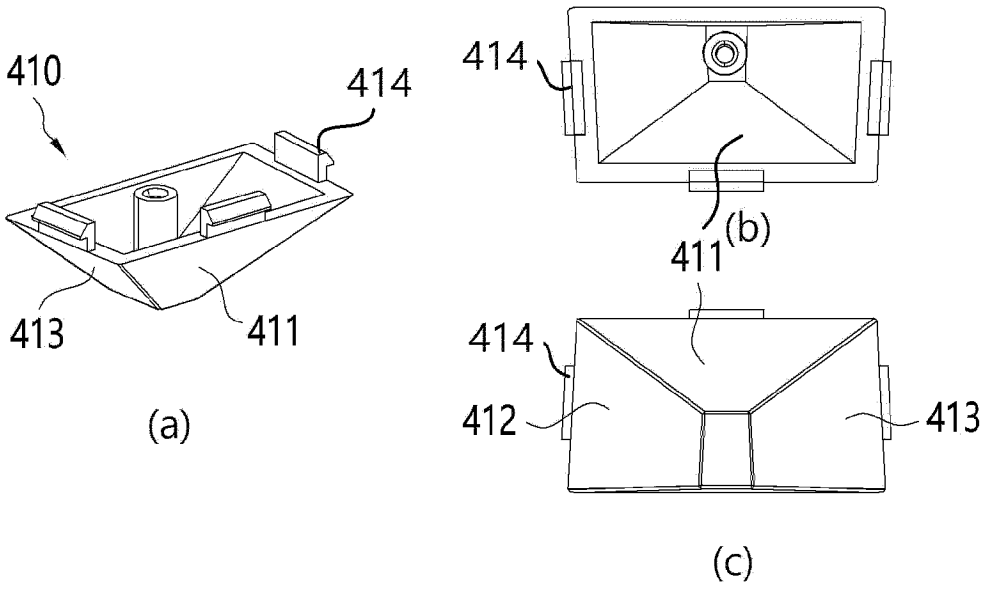
【Fig 27】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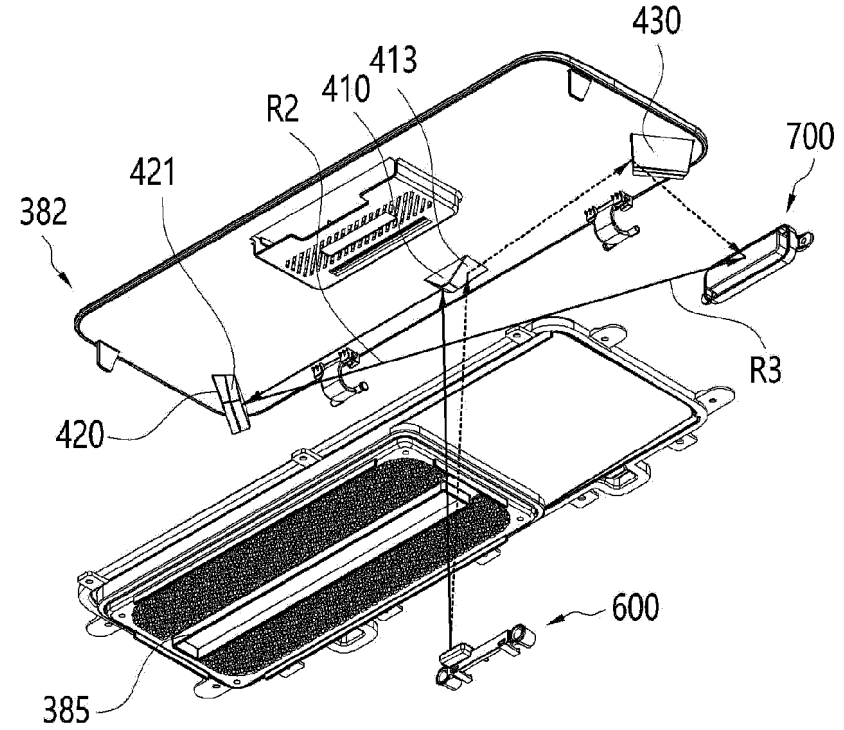
(c)

【Fig 28】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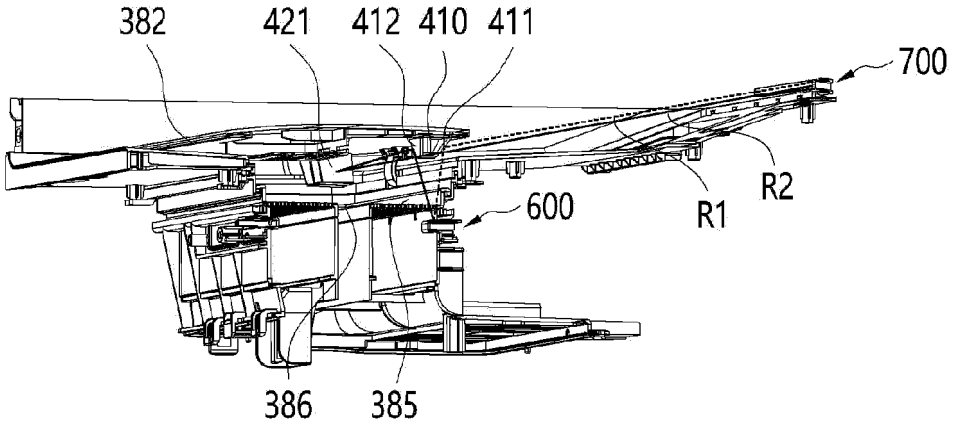
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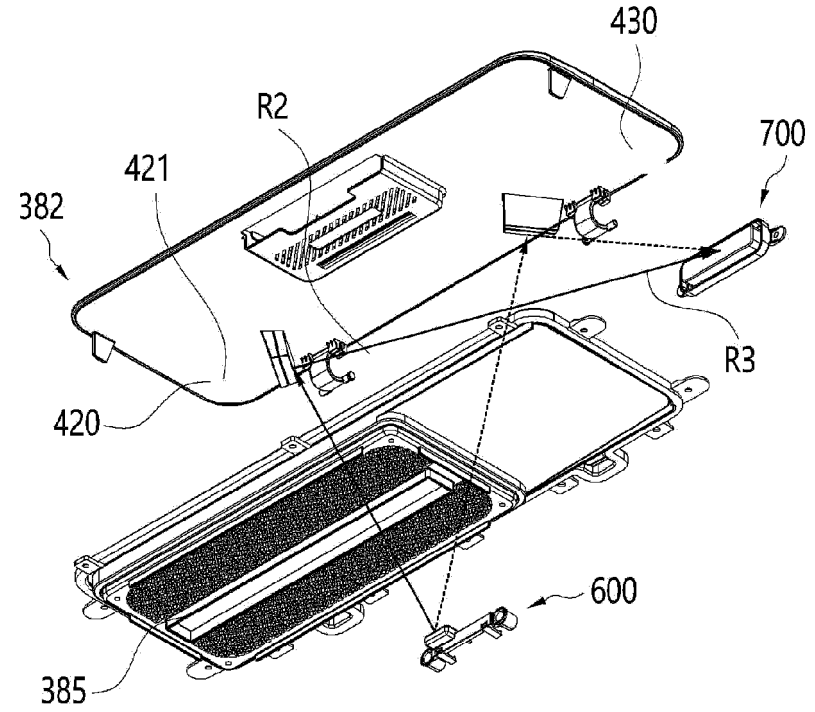
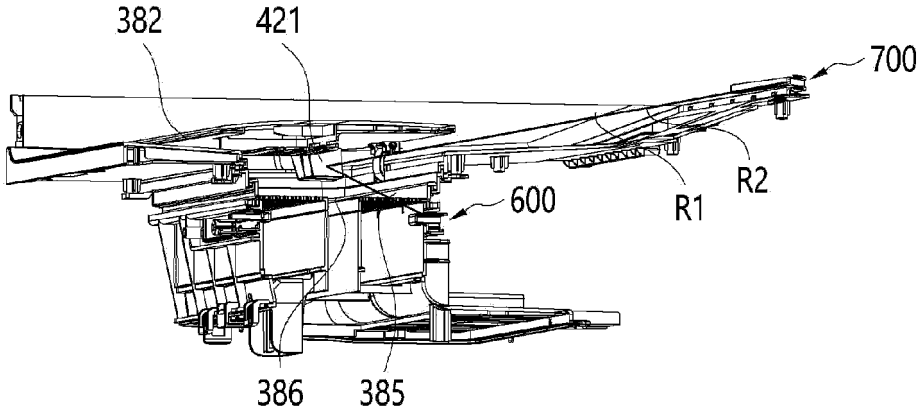
(b)

【Fig 29】

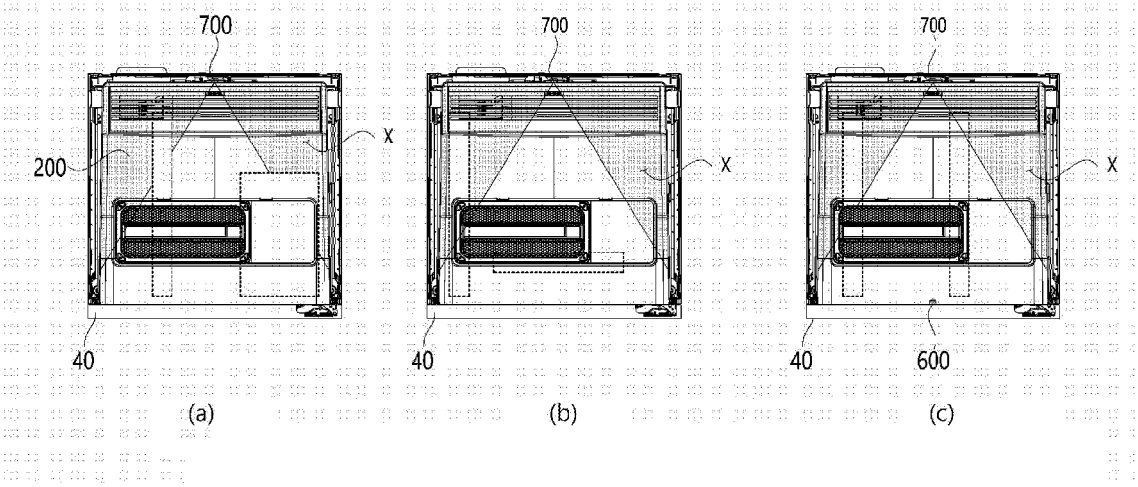


(a)



(b)

【Fig 30】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(b)
(c)

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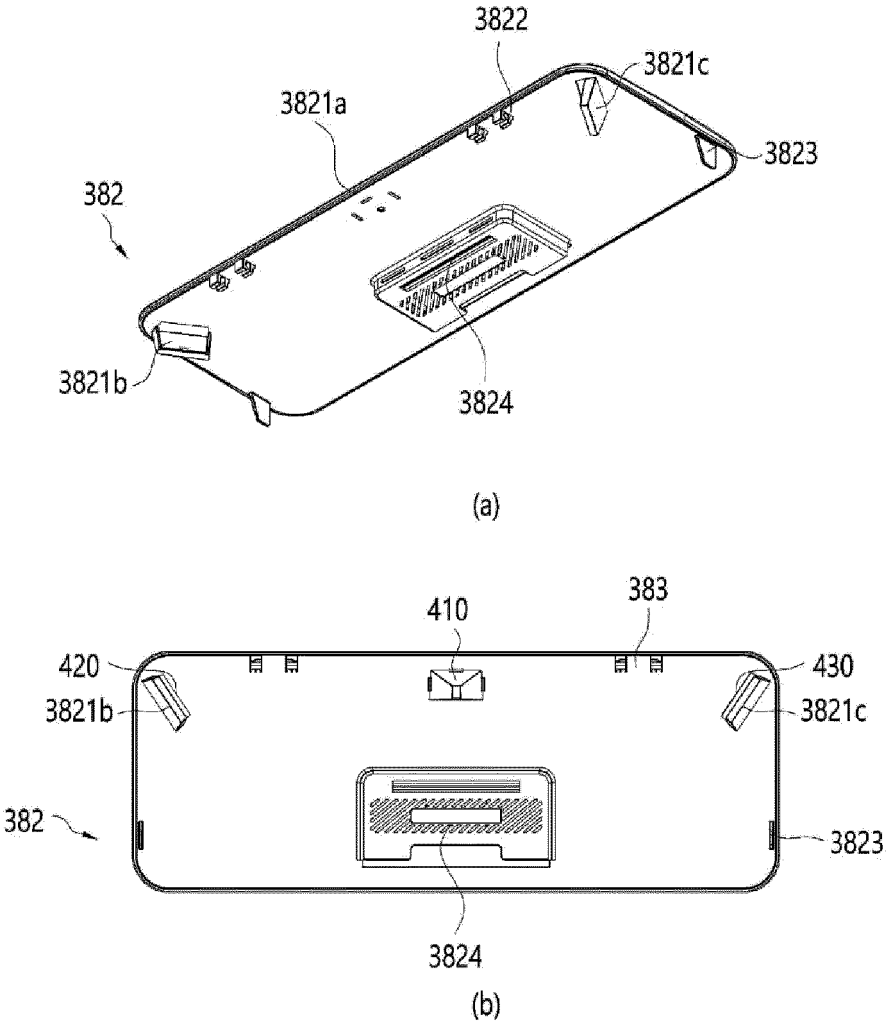
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3824
(b)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2023/008193

A. CLASSIFICATION OF SUBJECT MATTER

D06F 34/20(2020.01)i; **D06F 58/26**(2006.01)i; **D06F 58/24**(2006.01)i; **D06F 58/34**(2020.01)i; **D06F 58/10**(2006.01)i; **D06F 58/20**(2006.01)i; **D06F 34/34**(2020.01)i; **D06F 58/12**(2006.01)i; **D06F 19/00**(2006.01)i; **D06F 103/02**(2020.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06F 34/20(2020.01); D06F 34/26(2020.01); D06F 37/00(2006.01); D06F 58/10(2006.01); D06F 58/28(2006.01); D06F 58/30(2020.01); D06F 58/38(2020.01); G07C 9/00(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & keywords: 의류처리장치(clothes treatment apparatus), 캐비닛(cabinet), 이너케이스(inner case), 행어부(hanger), 기계실(machine room), 발광부(light emitting unit), 센서부(sensor), 낙하(fall)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
DY	KR 10-2020-0065886 A (SAMSUNG ELECTRONICS CO., LTD.) 09 June 2020 (2020-06-09) See paragraphs [0058], [0072] and [0096]; and figures 1-2 and 4.	1-6,14-31,34
DA		7-13,32-33
Y	KR 10-2207248 B1 (SOLUTION BANK) 25 January 2021 (2021-01-25) See paragraphs [0027], [0029], [0045]-[0048], [0050]-[0052] and [0057]-[0058]; and figures 1 and 3.	1-6,14-31,34
Y	KR 10-2017-0137503 A (LG ELECTRONICS INC.) 13 December 2017 (2017-12-13) See paragraphs [0064]-[0066]; claim 2; and figure 2a.	31,34
Y	KR 10-2344874 B1 (JANG, Kyoung Sook) 29 December 2021 (2021-12-29) See claim 1; and figures 2 and 7.	6

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 September 2023	**04 October 2023**
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2023/008193

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Form PCT/ISA/210 (second sheet) (July 2022)

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