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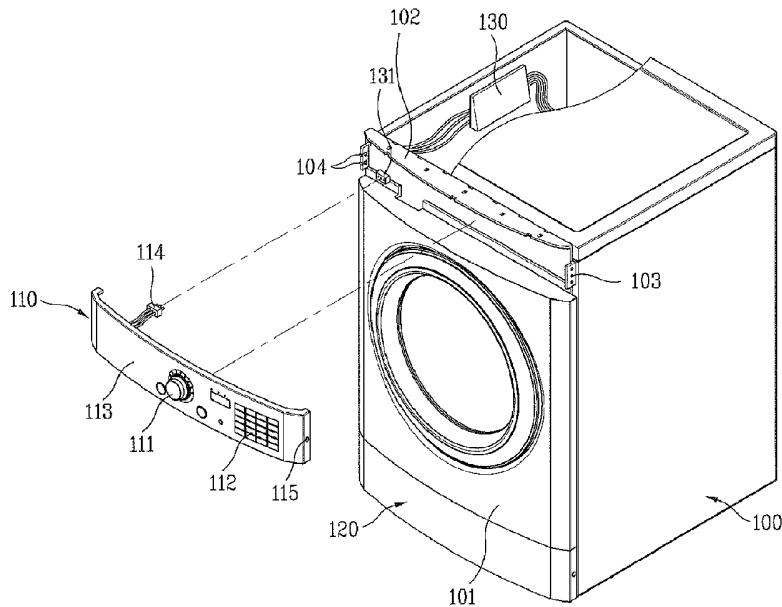
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[Continued on next page]

(54) Title: WASHING OR DRYING MACHINE HAVING POSITION CHANGEABLE CONTROLLER



(57) Abstract: A washing or drying machine includes a main body; and a controller comprising an input unit, a main control unit for performing determining and controlling operations according to signals transmitted from the input unit, and a display unit for displaying a controlled state of the machine according to signals transmitted from the main control unit, wherein an upper input unit mounting structure is formed on the upper portion of the main body and a lower input unit mounting structure is formed on the lower portion of the main body, so that the input unit is detachably installed selectively on the upper or lower portion of the main body.

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Description

WASHING OR DRYING MACHINE HAVING POSITION CHANGEABLE CONTROLLER

Technical Field

[1] The present invention relates to an apparatus for washing or drying laundry, such as a washing or drying machine, and more particularly, to a washing or drying machine, in which at least an input unit of a controller is installed selectively on the upper or lower portion of a main body of the machine.

[2] This application claims the benefit of Korean Patent Application Nos. 10-2005-0043181, 10-2005-0057737, 10-2005-0057849, and 10-2005-0057850, filed in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

Background Art

[3] Generally, washing machines perform a washing operation, a rinsing operation, and a dehydrating operation by rotating a rotary tub and a pulsator using driving force of a motor. The washing machines wash laundry using friction between the laundry, washing water, and the rotary tub generated by agitating the washing water and the laundry in the rotary tub.

[4] The washing machines are divided into pulsator washing machines, agitating-type washing machines, and drum washing machines.

[5] Generally, a drum washing machine washes laundry using friction between the laundry and a washing drum rotated by driving force of a driving unit under the condition that a detergent, washing machine, and the laundry are put into the washing drum. The drum washing machine does not cause damage to the laundry, prevents the laundry from being entangled, and has a beating and rubbing effect on the laundry.

[6] FIG. 1 illustrates a conventional drum washing machine. A controller 3 having function keys for allowing a user to input functions for control the washing of laundry and a display unit for displaying remaining time, etc. is provided on the upper portion of the front surface of a main body.

[7] The controller 3 comprises a plurality of buttons 31, a display window 32, LED windows 33, and a rotary knob 50. The buttons 31 and the rotary knob 50 serve as an input unit for operating the washing machine. When the user selects a washing time, a washing method, a dehydrating method, and a drying method, the user inputs a desired washing course and a desired time by manipulating the input unit.

[8] In order to notify the user of various washing data, such as a washing state and a remaining time, the LED windows 33 are switched on and off and the display window

32 displays characters or symbols.

[9] A general drying machine is an apparatus for drying wet objects to be dried, for example clothing. As in the drum washing machine of FIG. 1, a controller is installed on the upper portion of a main body of the drying machine.

[10] Since the conventional washing or drying machine comprises a controller installed on the upper portion of the main body thereof, when the washing or drying machine is installed at a position higher than the user's position, a user cannot easily reach the controller and thus feels inconvenience to use the washing or drying machine. Further, the user cannot easily view the display unit for displaying the state of the machine according to the control of the main body of the controller.

[11] In a combined washing apparatus having washing and drying machines, which are disposed side by side, controllers of the washing and drying machines are conveniently installed respectively on the upper portions of main bodies of the machines. However, in a combined washing apparatus having washing and drying machines, which are vertically stacked, the operation of a controller of the upper washing or drying machine causes inconvenience to the user.

Disclosure of Invention

Technical Problem

[12] An object of the present invention devised to solve the problem lies on a washing or drying machine having a controller, which is conveniently manipulated, when the washing or drying machine is installed on a comparatively low level ground or at a high position, i.e., on another washing or drying machine.

[13] Another object of the present invention lies on a washing or drying machine having a controller, at least an input unit of which is detachably installed selectively on the upper or lower portion of a main body.

Technical Solution

[14] The object of the present invention can be achieved by providing a washing or drying machine comprising a main body; and a controller comprising an input unit, a main control unit for performing determining and controlling operations according to signals transmitted from the input unit, and a display unit for displaying a controlled state of the machine according to signals transmitted from the main control unit, wherein mounting structures are installed on the main body or the input unit, so that the input unit is detachably installed selectively on the upper or lower portion of the main body.

[15] Preferably, an upper input unit mounting structure is formed on the upper portion of the main body and a lower input unit mounting structure is formed on the lower portion of the main body, so that the input unit is detachably installed selectively on

the upper or lower portion of the main body, thereby easily and simply achieving the change of the selective position of the input unit.

- [16] A mounting structure corresponding to the upper and lower input unit mounting structures may be formed on the input unit, thereby firmly installing the input unit on the main body.
- [17] An upper display unit mounting structure may be formed on the upper portion of the main body and a lower display unit mounting structure may be formed on the lower portion of the main body, so that the display unit is detachably installed selectively on the upper or lower portion of the main body.
- [18] The upper and lower display unit mounting structures may be integrated with the upper and lower input mounting structures on the main body, or, if necessary, only the upper and lower display unit mounting structures may be formed on the main body.
- [19] In case that the controller is not manipulated using the input unit installed on the main body but is manipulated using an external input unit, only the upper and lower display unit mounting structures are used to operate the controller.
- [20] Preferably, in case that the upper and lower input unit mounting structures and the upper and lower display unit mounting structures are installed on the main body, the input unit and the display unit are integrated into one united body.
- [21] Preferably, in this case, the upper input unit mounting structure and the upper display unit mounting structure are integrated into an upper operating unit mounting structure, and the lower input unit mounting structure and the lower display unit mounting structure are integrated into a lower operating unit mounting structure.
- [22] More preferably, the washing or drying machine may further comprise a cover panel, which, when the operating unit installed on one of the upper and lower portions of the main body, is installed on the other one of the upper and lower portions of the main body. The cover panel may be installed on the main body using the upper operating unit mounting structure or the lower operating unit mounting structure, or, if necessary, using other structures, such as separate screw connection holes. It is important to install the cover panel on the upper or lower portion of the main body, on which the operating unit is not installed.
- [23] Here, the integration of the input unit and the display unit means that the input unit and the display unit move together, but does not mean that PCBs of the input unit and the display unit are integrated into one body.
- [24] For example, panels, i.e., housings, of the input unit and the display unit, serving to respectively receive elements of the input unit and the display unit, are integrated so that the input unit and the display unit move together.
- [25] Preferably, elements of the input unit and the display unit may be integrated. For example, PCBs of the input unit and the display unit are integrated into one body.

- [26] In case that the input unit is a touch screen input unit using an LCD window, the LCD window may be used to display the operating state of the washing or drying machine. Accordingly, in this case, the input unit and the display unit are integrated into one body.
- [27] The main control unit of the controller for electrically controlling elements of the main body may be detachably installed selectively on the upper or lower portion of the main body. The installation of the main control unit on the main body may be easily and simply achieved using an upper main control unit mounting structure, which is formed on the upper portion of the main body, and a lower main control unit mounting structure, which is formed on the lower portion of the main body.
- [28] The mounting structure may have any shape, as long as the mounting structure can mount an object, for example, the input unit, on the main body. The mounting structure is not limited in shape, and conventional mounting structures may be used as the mounting structure of the present invention. That is, the mounting structure may have any shape. However, preferably, the mounting structure is easily detachably installed on the main body.
- [29] Accordingly, mounting structures are provided on the input unit or the main body so that the input unit is mounted selectively on the upper or lower portion of the main body. If necessary, mounting structures are not provided on the main body, but magnets corresponding to the mounting structures are provided on the input unit so that the input unit can be mounted on the main body using the magnets. However, in this case, it is preferable that mounting structures for mounting the input unit are provided on the main body so that the input unit can be mounted on the main body using the mounting structures of the input unit and the main body.
- [30] The main body of the washing or drying machine of the present invention is a unit, which performs the original function of the washing or drying machine under the control of the controller. For example, the main body of the washing machine comprises a washing tub for containing objects to be washed, and a driving unit, for example, a motor, for driving the washing tub so that the objects in the tub are washed under the control of the controller. Further, the main body of the drying machine comprises a drum for containing objects to be dried, and a driving unit for driving the drum so that the objects in the drum are dried.
- [31] In another aspect of the present invention, provided herein is a combined washing apparatus having a washing machine, which is provided with an opening formed through the front surface thereof for putting and taking objects, to be washed, into and out of the washing machine, and a drying machine, which is installed on or beside the washing machine, the drying machine comprising a main body; and a controller comprising an input unit, a main control unit for performing determining and

controlling operations according to signals transmitted from the input unit, and a display unit for displaying a controlled state of the machine according to signals transmitted from the main control unit, wherein an upper input unit mounting structure is formed on the upper portion of the main body and a lower input unit mounting structure is formed on the lower portion of the main body, so that the input unit is detachably installed selectively on the upper or lower portion of the main body.

- [32] Generally, the washing machine contains objects to be washed and washing water, thus having a weight heavier than that of the drying machine and a vibration degree higher than that of the drying machine. Accordingly, in a combined washing apparatus having a washing machine and a drying machine, particularly, in a stack-type combined washing apparatus in which one of a washing machine and a drying machine is installed on the other one of the washing machine and the drying machine, it is preferable that the drying machine is installed on the washing machine.

Advantageous Effects

- [33] Although the washing or drying machine of the present invention is installed at a high position as well as a low position, a user can easily reach the controller, and thus the installation position of the washing or drying machine is not limited.
- [34] Particularly, the combined washing apparatus of the present invention includes a drying machine and a washing machine, which are disposed side by side or are vertically stacked. The installation position and place of the combined washing apparatus having diversity in disposition of the drying and washing machines have few limits.
- [35] The washing or drying machine and the combined washing apparatus of the present invention can be applied to laundrettes, which require a large amount of washing and drying machines. For example, in case that a controller of one drying machine is out of order, a controller of another drying machine can be substituted for the failed controller, thus temporarily solving the failure of the drying machine. Further, in case that a main body of one drying machine is out of order and a controller of another drying machine is out of order, a controller of the former can be installed on a main body of the latter.

Brief Description of the Drawings

- [36] The accompanying drawings, which are included to provide a further understanding of the invention, illustrate embodiments of the invention and together with the description serve to explain the principle of the invention.
- [37] In the drawings:
- [38] FIG. 1 is a perspective view of a conventional drum washing machine;
- [39] FIG. 2 is a perspective view of a drying machine in accordance with one preferred

embodiment of the present invention;

[40] FIG. 3 is an exploded perspective view of the drying machine of FIG. 2, in which an operating unit is separated from a main body;

[41] FIG. 4 is a partial enlarged view of the drying machine of FIG. 2, in which the operating unit is mounted on the main body;

[42] FIG. 5 is an exploded perspective view of the drying machine of FIG. 2, in which a cover panel is separated from the main body;

[43] FIG. 6 is a perspective view of a combined washing apparatus in accordance with another preferred embodiment of the present invention;

[44] FIG. 7 is a perspective view of a combined washing apparatus of FIG. 6, in which a drying machine is installed on a washing machine;

[45] FIGS. 8 to 13 are views illustrating a drying machine in accordance with another embodiment of the present invention; and

[46] FIGS. 14 to 17 are views illustrating a drying machine in accordance with yet another embodiment of the present invention.

Best Mode for Carrying Out the Invention

[47] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[48] FIG. 2 is a perspective view of a drying machine in accordance with one preferred embodiment of the present invention. As shown in FIG. 2, an operating unit 110 of a controller is installed on the upper portion of a main body 100 of the drying machine, and a cover panel 120 is installed on the lower portion of the main body 100 of the drying machine.

[49] The operating unit 110 and the cover panel 120 are detachably installed on the main body 100, thus being easily separated from the main body 100. The positions of the operating unit 110 and the cover panel 120 may be exchanged. That is, the operating unit 110 may be installed on the lower portion of the main body 100, and the cover panel 120 may be installed on the upper portion of the main body 100.

[50] FIG. 3 is an exploded perspective view of the drying machine of FIG. 2, in which the operating unit 110 is separated from the upper portion of the main body 100. In this embodiment, a main control unit 130 of the controller is installed in the main body 100, and the operating unit 110 of the controller includes an input unit and a display unit, which are formed integrally with each other.

[51] Although this embodiment describes the main control unit 130 separated from the operating unit 110 and installed in the main body 100, the main control unit 130 may be formed integrally with the operating unit 110.

[52] As shown in FIG. 3, the input unit of the operating unit 110 for allowing a user to

input drying conditions for drying laundry includes various buttons and a knob, and the display unit of the operating unit 110 for receiving signals from the main control unit 130 and displaying a drying state according to the signals includes an LCD window and LEDs.

- [53] The above-described various buttons, knob, LCD window and LEDs are installed on an operating unit PCB (not shown), and the operating unit PCB is installed on an operating unit panel 113. Here, the operating unit PCB may include an input unit PCB for the input unit and a display unit PCB for the display unit, which are separated from each other. Preferably, the input unit PCB and the display unit PCB are integrated into one operating unit PCB.
- [54] In order to connect the operating unit panel 113 to upper mounting structures 103 and 104 or lower mounting structures 143 and 144 of the main body 100, a screw connection hole 115 is formed in one end of the operating unit panel 113 and protrusions 117 are formed on the other end of the operating unit panel 113.
- [55] The upper mounting structures 103 and 104 of the main body 100 include a screw connection hole 103 formed in one end of an upper frame 102 of the main body 100, and slots 104 formed on the other end of the upper frame 102 of the main body so that the protrusions 117 formed on the operating unit panel 113 are connected to the slots 104.
- [56] FIG. 4 is a partial enlarged view of the drying machine, in which the operating unit 110 is connected to the upper portion of the main body 100.
- [57] Hereinafter, with reference to FIGS. 3 and 4, the mounting of the operating unit 110 on the main body 100 will be described.
- [58] First, the upper frame 102 is connected to a front cabinet 101 of the main body 100. Under the above state of the main body 100, when the operating unit 110 deviates from the upper frame 102 slightly to the left and then slides to the right, the protrusions 117 formed on the operating panel 113 are inserted into the slots 104 formed in the upper frame 102. As shown in FIG. 4, since ends of the protrusions 117 are bent and ends of the slots 104 are also bent corresponding to the protrusions 117, the operating unit 110 is not separated forwardly from the main body 100 after the protrusions 117 are inserted into the slots 104.
- [59] Thereafter, when a screw is inserted into the screw connection hole 103 of the upper frame 102 and the screw connection hole 115 of the operating unit panel 113 under the condition that the protrusions 117 of the operating panel 113 are inserted into the slots 104 of the upper frame 102, the mounting of the operating unit 110 on the main body 100 is firm.
- [60] Thereafter, a decorative plate 105 for improving the external appearance of the drying machine is installed on the upper surface of the main body 100.

- [61] FIG. 5 is an exploded perspective view of the drying machine, in which a cover panel 120 is separated from the lower portion of the main body 100. Preferably, in this embodiment, as in the operating unit panel 113, a screw hole 121 and protrusions (not shown) are formed in and on the cover panel 120. However, the mounting structures of the cover panel 120 may be different from those of the operating unit panel 113.
- [62] As shown in FIG. 5, a lower frame is installed on the lower portion of the main body 100, correspondingly to the upper frame 102. As in the upper frame 102, slots 144 and a screw connection hole 143 are formed on and in the lower frame of the main body 100.
- [63] A method for installing the cover panel 120 on the lower frame is the same as the method for installing the operating unit 110, particularly, the operating unit panel 113, on the upper frame 102, and a detailed description thereof will be thus omitted. Further, in case that the operating unit 110 is installed on the lower frame, a method for installing the operating unit 110 on the lower frame is the same as the method for installing the operating unit 110 on the upper frame 102, and a detailed description thereof will be thus omitted.
- [64] Hereinafter, with reference to FIGS. 3 and 5, electrical connection between the operating unit 110, which is detachably installed selectively on the main body 100, and the main control unit 130, which is installed in the main body 100, will be described.
- [65] Signal lines and a power line for electrically connecting the main control unit 130 to the operating unit 110 are extended from the main control unit 130, and are connected to main control unit connectors 131 and 141, which are respectively installed on the upper frame 102 and the lower frame.
- [66] Further, as shown in FIG. 3, signal lines and a power line are extended from the operating unit 110, and are connected to an operating unit connector 114.
- [67] The main control unit 130 and the operating unit 110 are electrically connected to each other by the connection between the main control unit connectors 131 and 141 and the operating unit connector 114.
- [68] Under the above condition that the main control unit 130 and the operating unit 110 are electrically connected to each other, when a user inputs drying conditions through the input unit, such as the buttons, of the operating unit 110, the main control unit 130 transmits data regarding the inputted drying conditions to the display unit, such as the LCD window and the LEDs, so that the display unit displays the drying conditions, and controls various devices in the drying machine.
- [69] The main control unit 130 generally includes a microcomputer and a memory, and controls a motor for driving a drum, a heater for heating air supplied to the drum, and a blower for blowing air heated by the heater to the inside of the drum according to conditions, which are inputted by the user, thereby allowing the drying machine to

perform a drying operation.

[70] The above embodiment, which is shown in the accompanying drawings, only illustrates the present invention. It will be apparent to those skilled in the art that various embodiments can be made in the present invention without departing from the spirit or scope of the invention.

[71] For example, although this embodiment describes the operating unit 110 detachably installed selectively on the main body 100, the display unit of the operating unit 110 may be fixedly installed on the upper portion of the main body 100 and the input unit of the operating unit 110 may be detachably installed selectively on the main body 100. Further, the input unit of the operating unit 110 may be fixedly installed on the upper portion of the main body 100 and the display unit of the operating unit 110 may be detachably installed selectively on the main body 100

[72] If necessary, the input unit and the display unit may be separated from each other, and be separately detachably installed on the main body 100.

[73] FIGS. 6 and 7 illustrate a combined washing apparatus in accordance with the present invention.

[74] FIG. 6 is a perspective view of the combined washing apparatus, in which a drying machine 150 and a washing machine 160 are installed side by side, and FIG. 7 is a perspective view of the combined washing apparatus, in which the drying machine 150 is installed on the washing machine 160.

[75] The drying machine 150 of FIGS. 6 and 7 is the same as the drying machine of FIG. 2 and the washing machine 160 of FIGS. 6 and 7 is the same as the conventional washing machine, and a detailed description thereof will be thus omitted.

[76] In case that the drying machine 150 and the washing machine 160 are installed side by side, as shown in FIG. 6, the operating unit 110 of the drying machine 150 is installed on the upper portion of the main body 100, and in case that the drying machine 150 is installed on the washing machine 160, as shown in FIG. 7, the operating unit 110 of the drying machine 150 is installed on the lower portion of the main body 100.

[77] Accordingly, in case that the drying machine 150 is installed beside the washing machine 160 or installed on the washing machine 160, a user can conveniently manipulate the operating unit 110.

Mode for the Invention

[78] FIGS. 8 to 13 are views illustrating a drying machine in accordance with another embodiment of the present invention.

[79] In this embodiment, a door 222 is installed on the front surface of the drying machine 220, and a control panel 223 for controlling the operation of the drying

machine 220 is detachably connected to the lower end of the front surface of a cabinet 221 forming the external appearance of the drying machine 220. A controller 227 for controlling the operation of the drying machine is mounted on the rear surface of the control panel 223.

[80] Various operating buttons and/or a knob for allowing a user to operate the controller 227, and a display window for displaying operating states of the drying machine 220 are installed on the front surface of the control panel 223.

[81] Further, a cover panel 224 is detachably connected to the upper end of the front surface of the cabinet 221 of the drying machine 220.

[82] Hereinafter, with reference to FIGS. 9 and 10, the connection of the control panel 223 and the cover panel 224 to the cabinet 221 will be described in more detail.

[83] An upper frame 225 connected to the control panel 223 and a lower frame 226 connected to the cover panel 224 are respectively fixed to the upper and lower portions of the front surface of the cabinet 221 of the drying machine 220.

[84] A plurality of connection holes 225a are formed through the upper end and the side surfaces of the upper frame 225, and a plurality of connections holes 223a and 224a are formed through the upper ends and the side surfaces of the control panel 223 and the cover panel 224 at positions corresponding to the connection holes 225a. Accordingly, the control panel 223 or the cover panel 224 is fixed to the upper frame 225 by inserting screws into the connection holes 225a of the upper frame 225 and the connection holes 223a or 224a of the control panel 223 or the cover panel 224.

[85] Further, a plurality of connection holes 226a are formed through the lower end and the side surfaces of the lower frame 226, and a plurality of connections holes 223a and 224a are formed through the lower ends and the side surfaces of the control panel 223 and the cover panel 224 at positions corresponding to the connection holes 226a. Preferably, the connection holes 223a and 224a formed through the side surfaces of the control panel 223 and the cover panel 224 correspond to the connection holes 225a formed through the side surfaces of the upper frame 225 as well as the connection holes 226a formed through the side surfaces of the lower frame 226.

[86] In this embodiment, the control panel 223 and the cover panel 224 are detachably connected respectively to the upper frame 225 and the lower frame 226 by the screws 228, respectively. However, as shown in FIGS. 11 to 13, the control panel 223 and the cover panel 224 may be hooked respectively to the upper frame 225 and the lower frame 226.

[87] That is, lower hooks 223b and upper hooks 223c are formed on edges of lower and upper surfaces of the control panel 223, and connection holes 223d are formed in the end of the upper surface of the control panel 223. Hook connection holes 226b, into which the lower hooks 223b of the control panel 223 are inserted, are formed through

the lower portion of the lower frame 226, and hooks 226d, which are inserted into the connection holes 223d of the control panel 223, are formed on the upper portion of the lower frame 226.

[88] Further, lower hooks 224b and upper hooks 224c are formed on edges of lower and upper surfaces of the cover panel 224, and connection holes 224d are formed in the end of the upper surface of the cover panel 224. Hook connection holes 225c, into which the upper hooks 224c of the cover panel 224 are inserted, are formed through the upper portion of the upper frame 225.

[89] Preferably, the control panel 223 and the cover panel 224 are firmly fixed to the upper and lower frames 225 and 226 by connecting both side surfaces of the control panel 223 and the cover panel 224 and the both side surfaces of the upper and lower frames 225 and 226 using screws 229.

[90] FIGS. 14 to 17 are views illustrating a drying machine in accordance with yet another embodiment of the present invention.

[91] As shown in FIGS. 14 to 17, in this embodiment, a door 322 is installed on the front surface of the drying machine 320, and a control panel 323 for controlling the operation of the drying machine 320 is detachably connected to the lower end of the front surface of a cabinet 321 forming the external appearance of the drying machine 320. A controller 535 for controlling the operation of the drying machine 320 is mounted on the rear surface of the control panel 323. Various operating buttons and/or a knob for allowing a user to operate the controller 535, and a display window for displaying operating states of the drying machine 320 are installed on the front surface of the control panel 323.

[92] Further, a cover panel 324 is detachably connected to the upper end of the front surface of the cabinet 321 of the drying machine 320.

[93] The control panel 323 and the cover panel 324 are detachably connected selectively to the upper or lower portion of the front surface of the drying machine 320.

[94] Hereinafter, with reference to FIGS. 15 to 17, the connection of the control panel 323 and the cover panel 324 to the cabinet 321 will be described in more detail.

[95] First, as shown in FIG. 15, a lower frame 326, to which the control panel 323 or the cover panel 324 is connected, is fixed to the lower portion of the front surface of the cabinet 321 of the drying machine 320.

[96] Hooks 531 are formed on the inner end of the lower surface of the control panel 323, and lower guide ribs 532 are formed on the lower surface of the control panel 323 at positions separated from the hooks 531 by a designated distance. Fixing holes 533 are formed through the rear end of the upper surface of the control panel 323.

[97] Hook connection holes 561, into which the hooks 531 of the control panel 323 are inserted, are formed through the front end of the rear surface of the lower frame 326.

Further, L-shaped guide ribs 562, which are inserted into the fixing holes 533 of the control panel 323, are formed on the front end of the upper surface of the lower frame 326.

[98] A plurality of connection holes, into which screws 329 are inserted, are formed through both side surfaces of the control panel 323, and a plurality of connection holes are formed through both side surfaces of the lower frame 326 at positions corresponding to the connection holes of the control panel 323.

[99] The control panel 323 is pre-assembled with the lower frame 326 by inserting the guide ribs 562 of the lower frame 326 into the fixing holes 533 of the control panel 323 and inserting the hooks 531 of the control panel 323 into the hook connection holes 561 of the lower frame 326. After the preassembly is completed, a worker inserts the screws 329 into the connection holes (not shown) formed through both side surfaces of the control panel 323 and the lower frame 326, thereby stably fixing the control panel 323 to the lower frame 326.

[100] As shown in FIGS. 16 and 17, an upper frame 325 is fixedly connected to the upper portion of the front surface of the cabinet 321 of the drying machine 320, and a decorative plate 327 made of synthetic resin, such as plastic, is fixedly connected to the upper end of the upper frame 325. The decorative plate 327 covers a region between the front end of the upper surface of the cabinet 321 and the upper end of the control panel 323 or the cover panel 324, and serves to prevent internal structures from being exposed to the outside and as a supporter for supporting the upper end of the control panel 323 or the cover panel 324.

[101] The upper end of the upper frame 325 is horizontally bent to have an approximately L shape. A plurality of fixing holes 551 are formed through a horizontally bent portion of the upper end of the upper frame 325, and a plurality of screw connection holes 552 are formed through a vertical portion of the upper end of the upper frame 325.

[102] The decorative plate 327 is stacked on the horizontally bent portion of the upper end of the upper frame 325, and L-shaped guide ribs 571 are formed on the decorative plate 327 at positions corresponding to the fixing holes 551 of the upper frame 325. Further, L-shape front guide ribs 574 are formed integrally with the front end of the decorative plate 327. A connection portion 572 contacting the vertical portion of the upper end of the upper frame 325 is extended perpendicularly from the rear end of the decorative plate 327, and screw connection holes 573 corresponding to the screw connection holes 552 of the upper frame 325 are formed through the connection portion 572.

[103] As in the control panel 323, hooks 541 are formed on the inner end of the lower surface of the cover panel 324, and lower guide ribs 542 are formed on the lower surface of the cover panel 324 at positions separated from the hooks 541 by a

designated distance. Fixing holes 543, into which the front guide ribs 574 of the decorative plate 327 are inserted, are formed through the rear end of the upper surface of the cover panel 324.

[104] Insertion holes 511, into which the lower guide ribs 542 of the cover panel 324 are inserted, are formed through the upper portion of the front surface of the cabinet 321.

[105] A plurality of connection holes, into which screws 329 are inserted, are formed through both side surfaces of the cover panel 324, and a plurality of connection holes are formed through both side surfaces of the decorative plate 327 at positions corresponding to the connection holes of the cover panel 324.

[106] Hereinafter, a method for assembling the decorative plate 327 and the cover frame 324 with the upper frame 325 will be described.

[107] First, when a worker inserts the guide ribs 571 of the decorative plate 327 into the fixing holes 551 of the upper frame 325 and pulls the guide ribs 571 inserted into the fixing holes 551 under the condition that the upper frame 325 is fixed to the upper end of the front surface of the cabinet 321, the guide ribs 571 are connected to the fixing holes 551. Then, the connection portion 572 of the decorative plate 327 contacts the vertical portion of the upper end of the upper frame 325, and the screw connection holes 552 of the upper frame 325 and the screw connection holes 573 of the decorative plate 327 align with each other. Thereafter, the worker inserts screws 575 into the screw connection holes 552 of the upper frame 325 and the screw connection holes 573 of the decorative plate 327, thereby fixing the decorative plate 327 to the upper frame 325.

[108] Thereafter, the worker pulls the cover panel 324 from the front part of the decorative plate 327 and inserts the lower guide ribs 542 into the insertion holes 511 formed through the upper portion of the cabinet 321, thereby inserting the front guide ribs 574 of the decorative plate 327 into the fixing holes 543 of the cover panel 324. Thus, the cover panel 324 is preassembled with the decorative plate 327.

[109] Thereafter, the worker inserts the screws 329 into the connection holes (not shown) formed through both side surfaces of the cover panel 324 and the connection holes (not shown) formed through both side surfaces of the decorative plate 327, thereby stably fixing the cover panel 324 to the decorative plate 327.

[110] In order to separate the cover panel 324 from the decorative plate 327, the above process is performed in reverse order.

Industrial Applicability

[111] The present invention provides a washing or drying machine, in which at least an input unit of a controller for controlling the machine is detachably installed selectively on the upper or lower portion of a main body of the machine.

- [112] Although the washing or drying machine of the present invention is installed at a high position as well as a low position, a user can easily reach the controller, and thus the installation position of the washing or drying machine is not limited.
- [113] Particularly, a combined washing apparatus includes a drying machine and a washing machine, which are disposed side by side or are vertically stacked. The installation position and place of the combined washing apparatus having diversity in disposition of the drying and washing machines have few limits.
- [114] The washing or drying machine and the combined washing apparatus of the present invention can be applied to laundrettes, which require a large amount of washing and drying machines. For example, in case that a controller of one drying machine is out of order, a controller of another drying machine can be substituted for the failed controller, thus temporarily solving the failure of the drying machine. Further, in case that a main body of one drying machine is out of order and a controller of another drying machine is out of order, a controller of the former can be installed on a main body of the latter.
- [115] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Claims

- [1] A washing or drying machine comprising:
a main body; and
a controller comprising an input unit, a main control unit for performing determining and controlling operations according to signals transmitted from the input unit, and a display unit for displaying a controlled state of the machine according to signals transmitted from the main control unit,
wherein an upper input unit mounting structure is formed on the upper portion of the main body and a lower input unit mounting structure is formed on the lower portion of the main body, so that the input unit is detachably installed selectively on the upper or lower portion of the main body.
- [2] The washing or drying machine as set forth in claim 1, wherein an upper display unit mounting structure is formed on the upper portion of the main body and a lower display unit mounting structure is formed on the lower portion of the main body, so that the display unit is detachably installed selectively on the upper or lower portion of the main body.
- [3] The washing or drying machine as set forth in claim 2, wherein the input unit and the display unit are integrated into an operating unit, the upper input unit mounting structure and the upper display unit mounting structure are integrated into an upper operating unit mounting structure, and the lower input unit mounting structure and the lower display unit mounting structure are integrated into a lower operating unit mounting structure.
- [4] The washing or drying machine as set forth in claim 1 or 2, wherein an upper main control unit mounting structure is formed on the upper portion of the main body and a lower main control unit mounting structure is formed on the lower portion of the main body, so that the main control unit is detachably installed selectively on the upper or lower portion of the main body.
- [5] A washing or drying machine comprising:
a main body; and
a controller comprising an input unit, a main control unit for performing determining and controlling operations according to signals transmitted from the input unit, and a display unit for displaying a controlled state of the machine according to signals transmitted from the main control unit,
wherein an upper display unit mounting structure is formed on the upper portion of the main body and a lower display unit mounting structure is formed on the lower portion of the main body, so that the display unit is detachably installed selectively on the upper or lower portion of the main body.

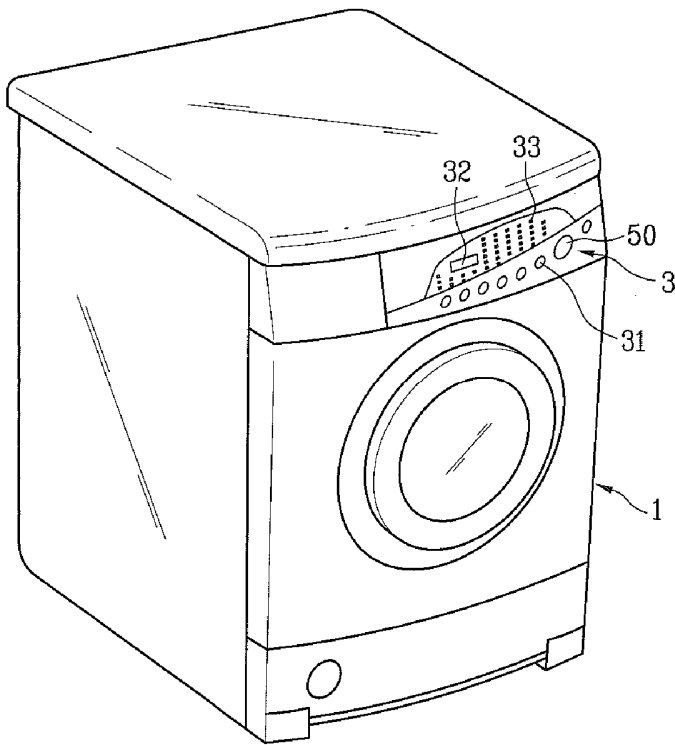
- [6] A washing or drying machine comprising:
a main body; and
a controller comprising an input unit, a main control unit for performing determining and controlling operations according to signals transmitted from the input unit, and a display unit for displaying a controlled state of the machine according to signals transmitted from the main control unit,
wherein an upper main control unit mounting structure is formed on the upper portion of the main body and a lower main control unit mounting structure is formed on the lower portion of the main body, so that the main control unit is detachably installed selectively on the upper or lower portion of the main body.
- [7] The washing or drying machine as set forth in claim 3, further comprising a cover panel, which, when the operating unit installed on one of the upper and lower portions of the main body, is installed on the other one of the upper and lower portions of the main body.
- [8] A washing or drying machine comprising:
a main body; and
a controller comprising an input unit, a main control unit for performing determining and controlling operations according to signals transmitted from the input unit, and a display unit for displaying a controlled state of the machine according to signals transmitted from the main control unit,
wherein mounting structures are installed on the main body or the input unit, so that the input unit is detachably installed selectively on the upper or lower portion of the main body.
- [9] A combined washing apparatus having a washing machine, which is provided with an opening formed through the front surface thereof for putting and taking objects, to be washed, into and out of the washing machine, and a drying machine, which is installed on or beside the washing machine, said drying machine comprising:
a main body; and
a controller comprising an input unit, a main control unit for performing determining and controlling operations according to signals transmitted from the input unit, and a display unit for displaying a controlled state of the machine according to signals transmitted from the main control unit,
wherein an upper input unit mounting structure is formed on the upper portion of the main body and a lower input unit mounting structure is formed on the lower portion of the main body, so that the input unit is detachably installed selectively on the upper or lower portion of the main body.
- [10] A washing or drying machine comprising:

- a cabinet for forming the external appearance of the machine;
a control panel detachably installed selectively on the upper or lower portion of the cabinet; and
a cover panel detachably installed selectively on the upper or lower portion of the cabinet, in opposition to the control panel.
- [11] The washing or drying machine as set forth in claim 10, wherein the control panel is connected to the cabinet by screws.
- [12] The washing or drying machine as set forth in claim 10, wherein hooks are formed on the control panel and hook connection holes, into which the hooks are inserted, are formed through the upper and lower portions of the front surface of the cabinet, so that the control panel is connected to the upper or lower portion of the cabinet by inserting the hooks into the hook connection holes.
- [13] A washing or drying machine comprising:
a cabinet for forming the external appearance of the machine;
an upper frame fixed to the upper end portion of the front surface of the cabinet;
a lower frame fixed to the lower end portion of the front surface of the cabinet;
a decorative plate horizontally fixed to the upper end portion of the upper frame;
a control panel detachably connected selectively to a decorative plate of the upper end portion of the front surface of the cabinet or the lower frame of the lower end portion of the front surface of the cabinet; and
a cover panel detachably connected selectively to the decorative plate of the upper end portion of the front surface of the cabinet or the lower frame of the lower end portion of the front surface of the cabinet, in opposition to the control panel.
- [14] The washing or drying machine as set forth in claim 13, wherein the upper end of the upper frame is horizontally bent, and the decorative plate is stacked on the upper surface of a horizontally bent portion of the upper end of the upper frame.
- [15] The washing or drying machine as set forth in claim 14, wherein:
a plurality of fixing holes are formed through the horizontally bent portion of the upper end of the upper frame, and a plurality of screw connection holes are formed through a vertical portion of the upper end of the upper frame; and
guide ribs, which are inserted into the fixing holes, are formed on the lower surface of the decorative plate, and a connection portion having a plurality of screw connection holes, which correspond to the plurality of the screw connection holes of the upper frame, is extended perpendicularly from the rear end of the decorative plate.
- [16] The washing or drying machine as set forth in claim 13, wherein first and second L-shaped front guide ribs are respectively formed through the front end of the

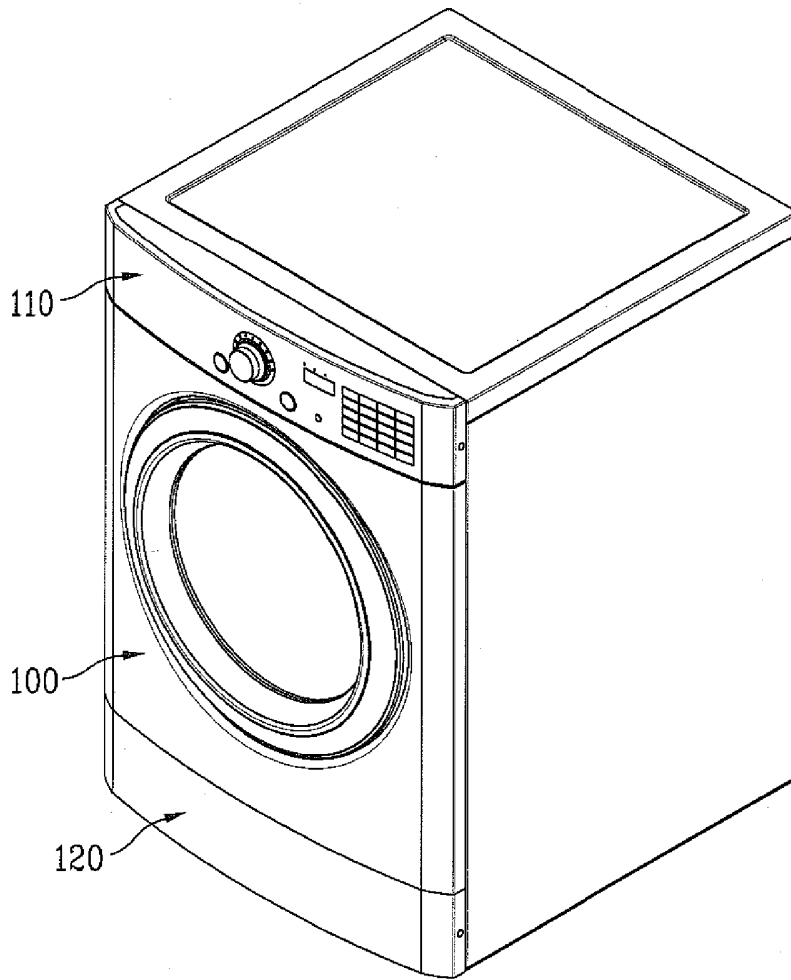
decorative plate and the front end of the upper portion of the lower frame, and fixing holes, into which the first and second front guide ribs are inserted, are formed through the rear ends of the upper surfaces of the control panel and the cover panel.

- [17] The washing or drying machine as set forth in claim 13, wherein insertion holes are formed through the upper end of the front surface of the cabinet, and lower guide ribs, which are inserted into the insertion holes, are formed on the lower surfaces of the control panel and the cover panel.
- [18] The washing or drying machine as set forth in claim 13, wherein hook connection holes are formed through the lower end portion of the lower frame, and hooks, which are inserted into the hook connection holes, are formed on the rear ends of the lower surfaces of the control panel and the cover panel.
- [19] The washing or drying machine as set forth in claim 13, wherein a plurality of connection holes are formed through both side surfaces of the control panel and both side surfaces of the cover panel and a plurality of connection holes are formed through both sides surfaces of the lower frame at positions corresponding to the connection holes of the control panel and the cover panel, so that both side surfaces of the control panel or the cover panel are fixed to both side surfaces of the lower frame by inserting screws into the connection holes of the control panel or the cover panel and the connection holes of the lower frame.
- [20] The washing or drying machine as set forth in claim 13, wherein a plurality of connection holes are formed through both side surfaces of the control panel and both side surfaces of the cover panel and a plurality of connection holes are formed through both sides surfaces of the decorative plate at positions corresponding to the connection holes of the control panel and the cover panel, so that both side surfaces of the control panel or the cover panel are fixed to both side surfaces of the decorative plate by inserting screws into the connection holes of the control panel or the cover panel and the connection holes of the decorative plate.

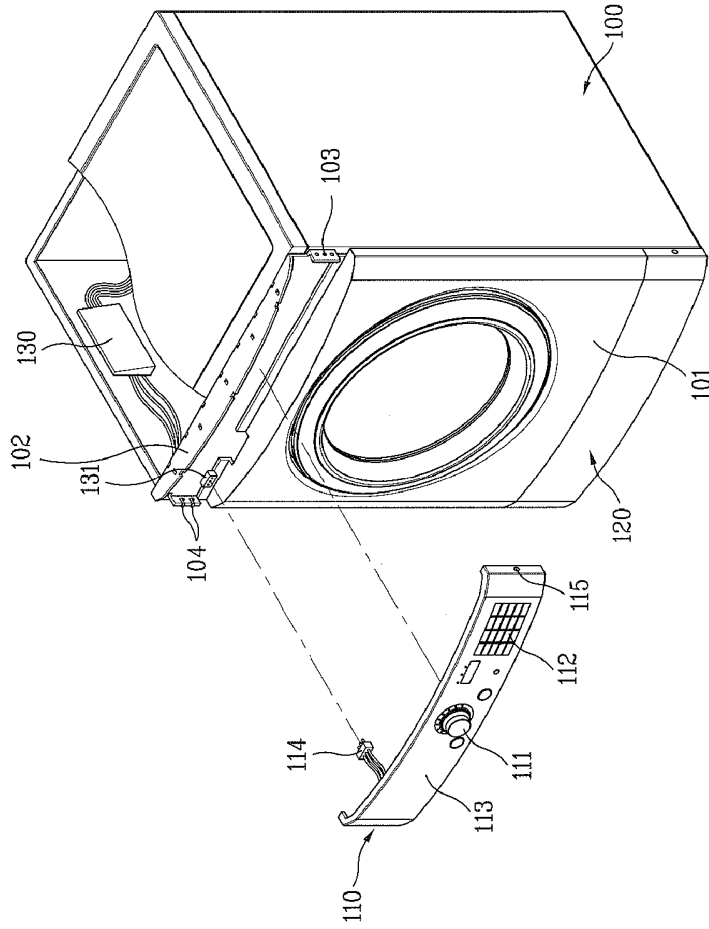
[Fig. 1]



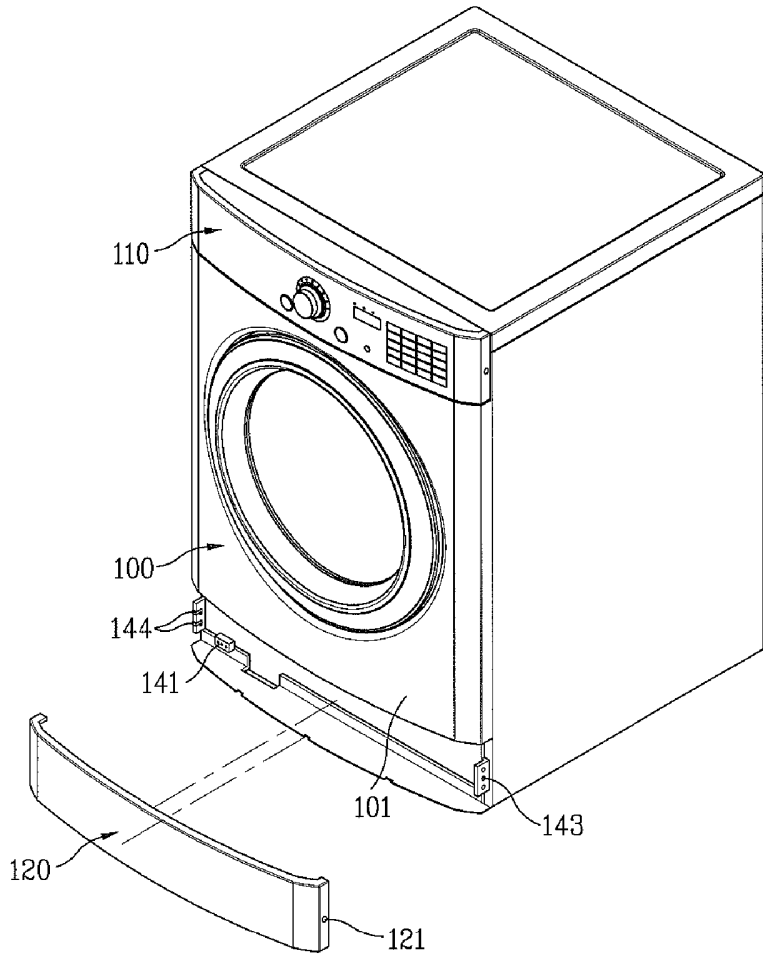
[Fig. 2]



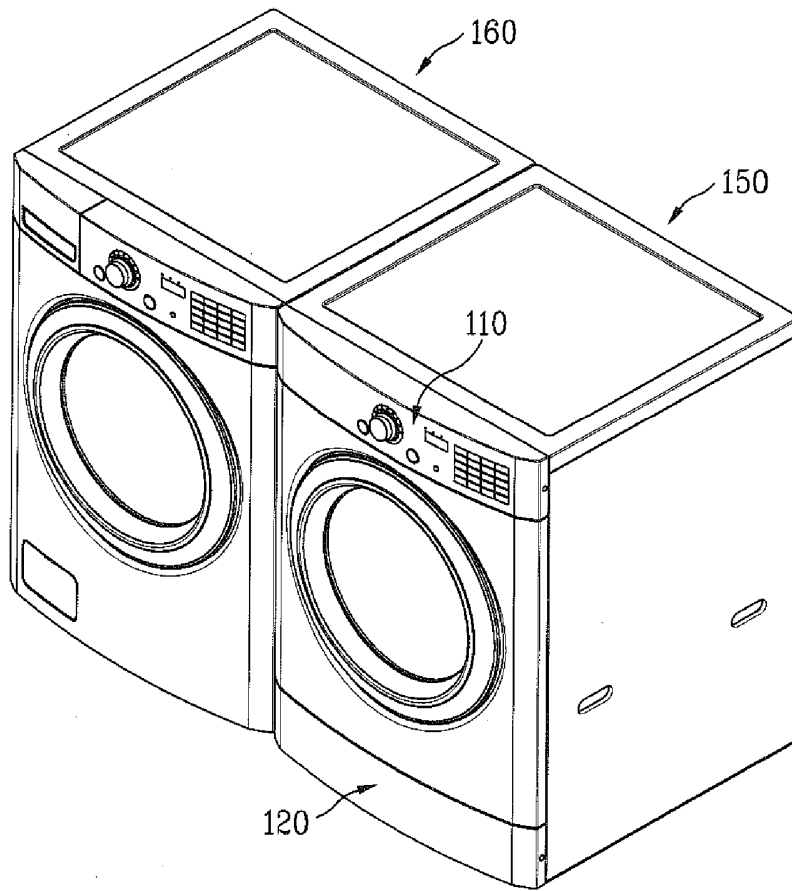
[Fig. 3]



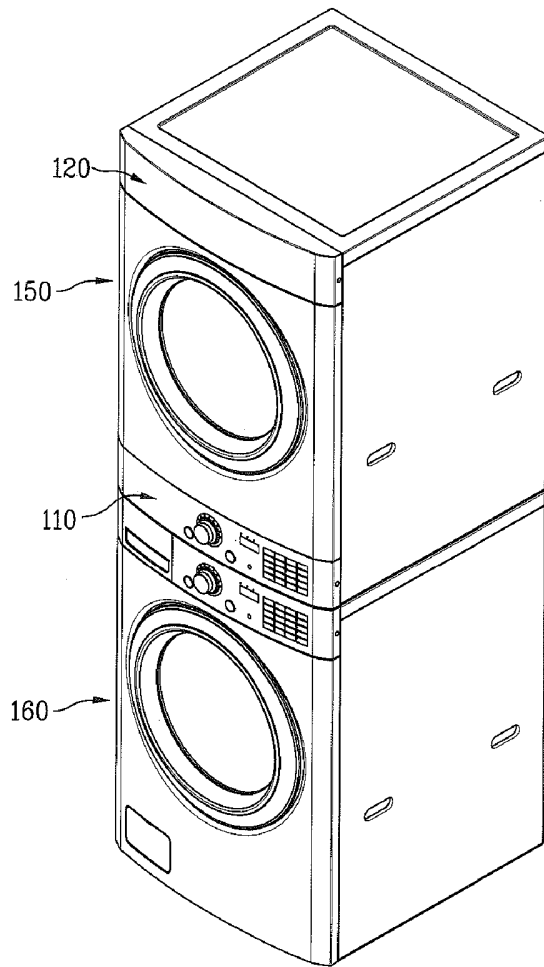
[Fig. 5]



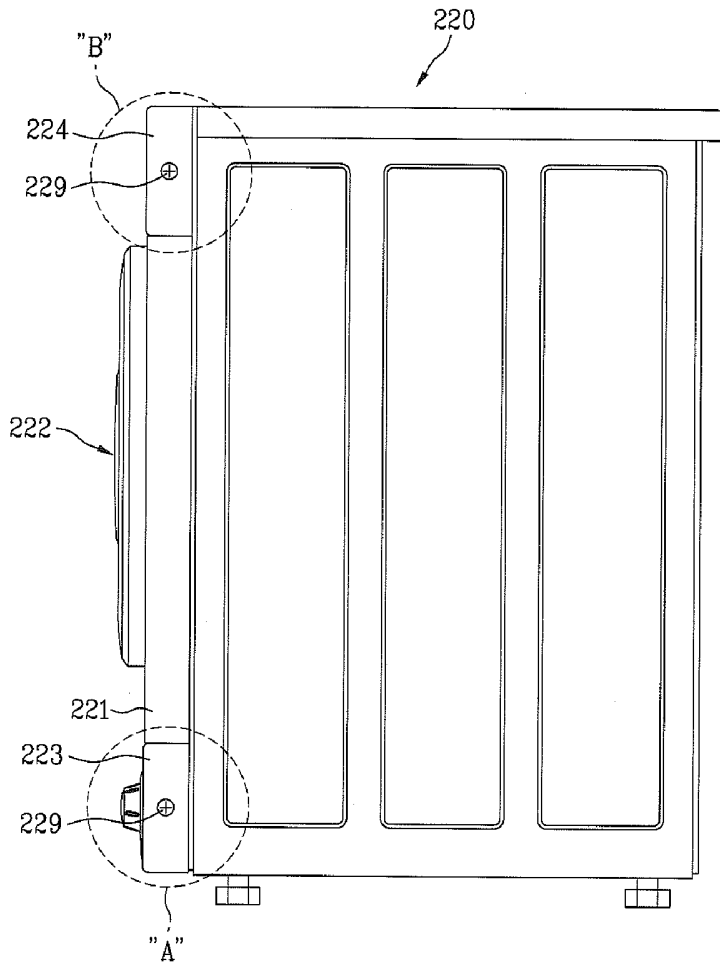
[Fig. 6]



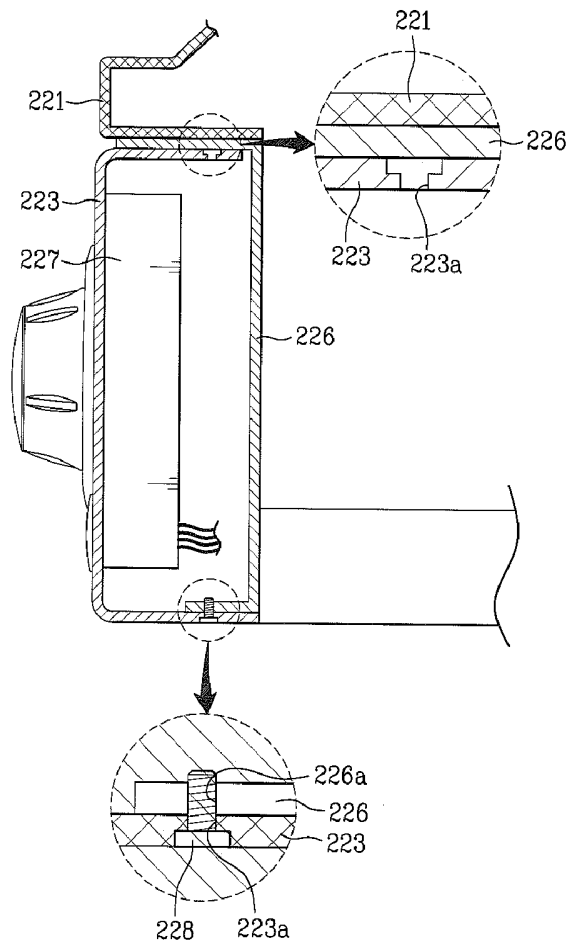
[Fig. 7]



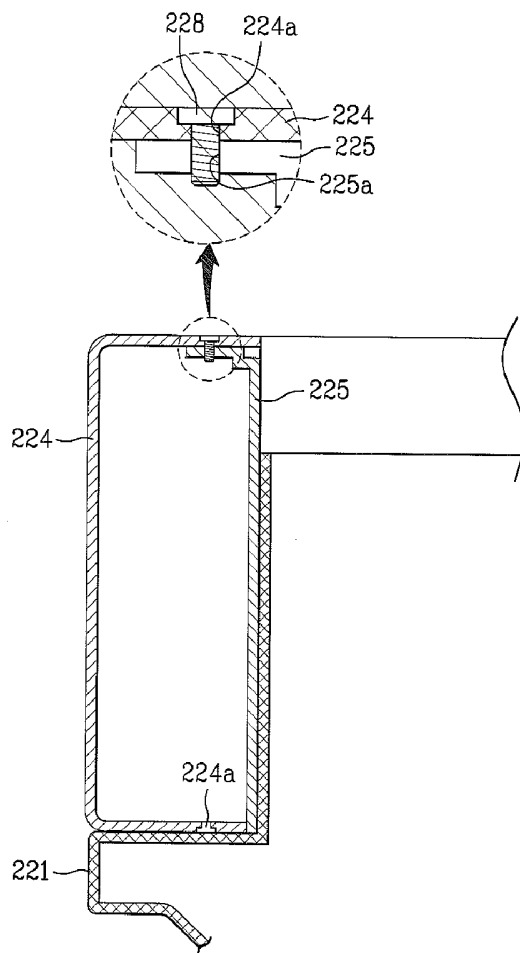
[Fig. 8]



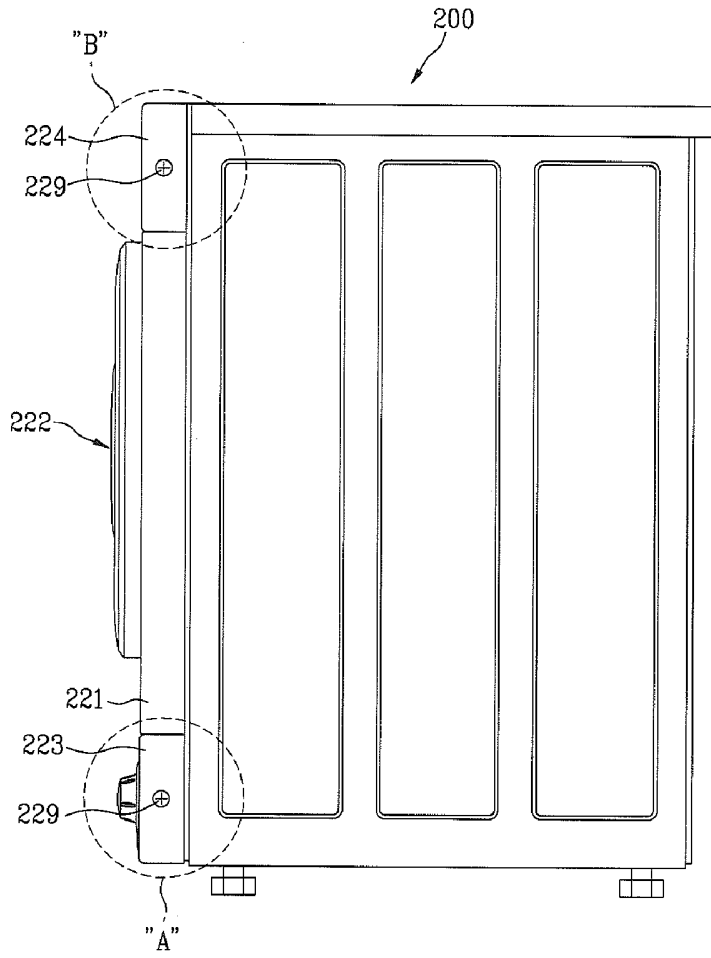
[Fig. 9]



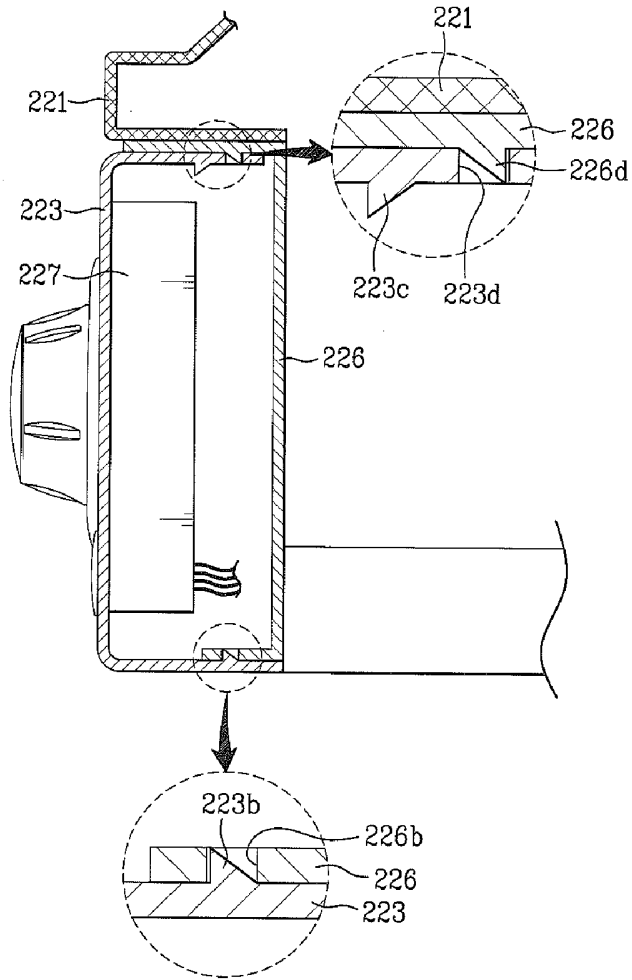
[Fig. 10]



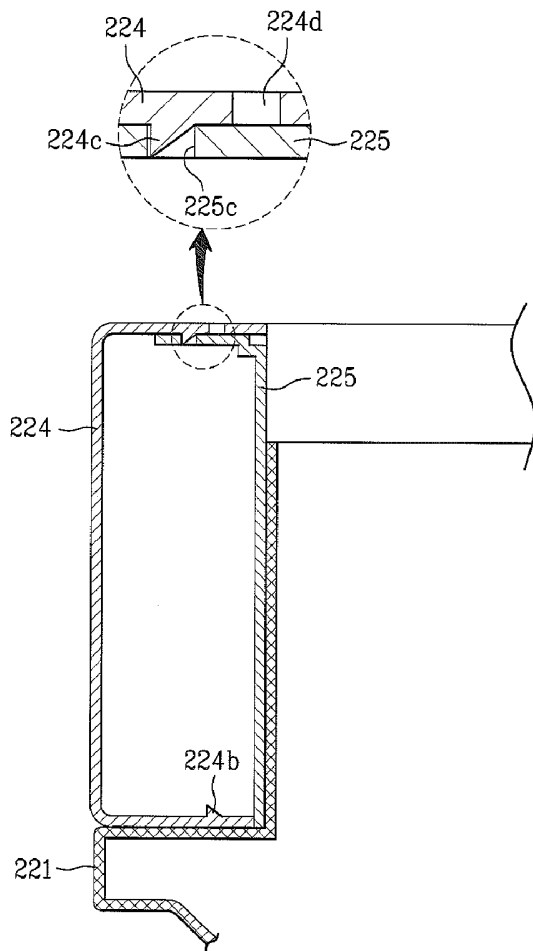
[Fig. 11]



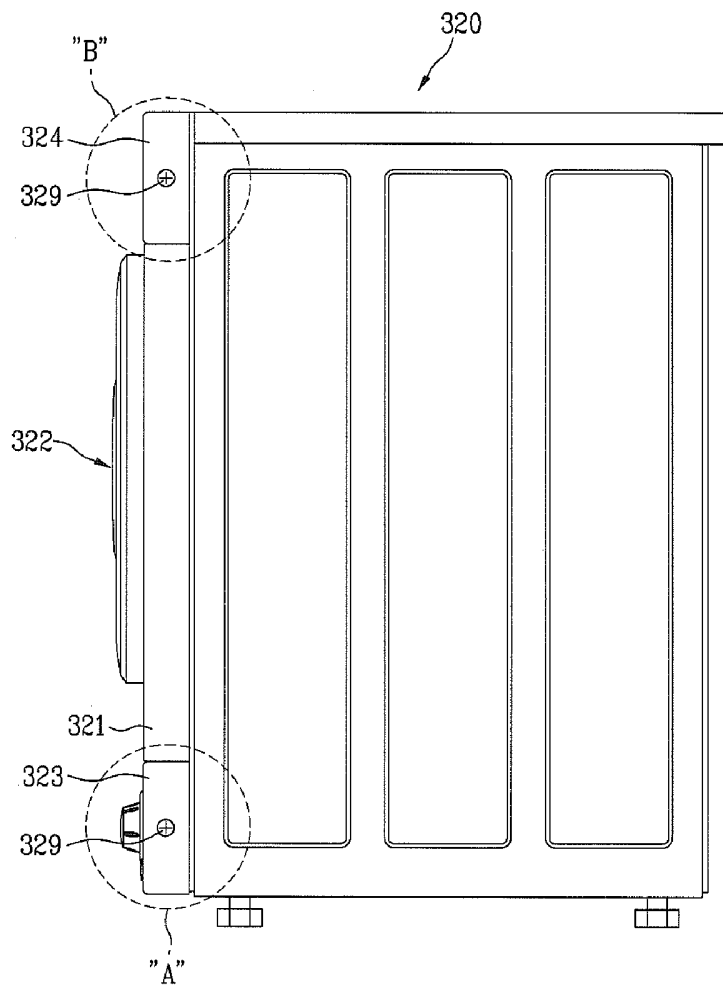
[Fig. 12]



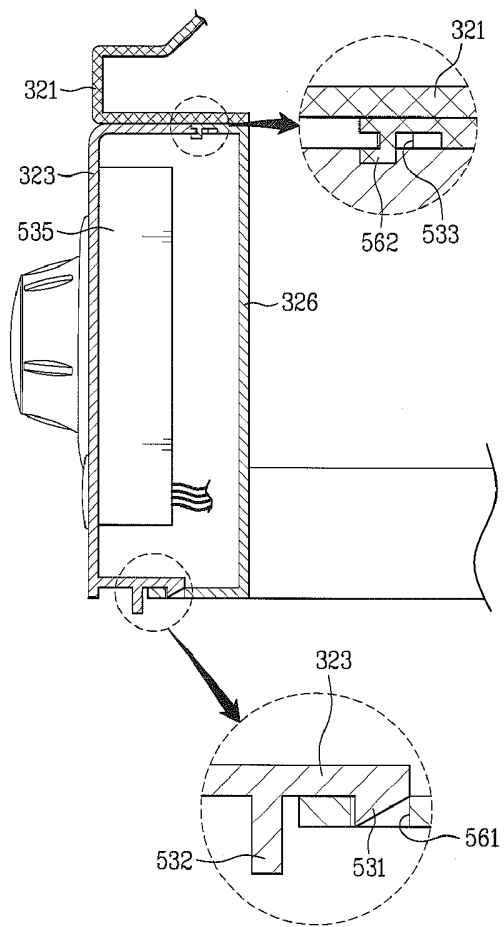
[Fig. 13]



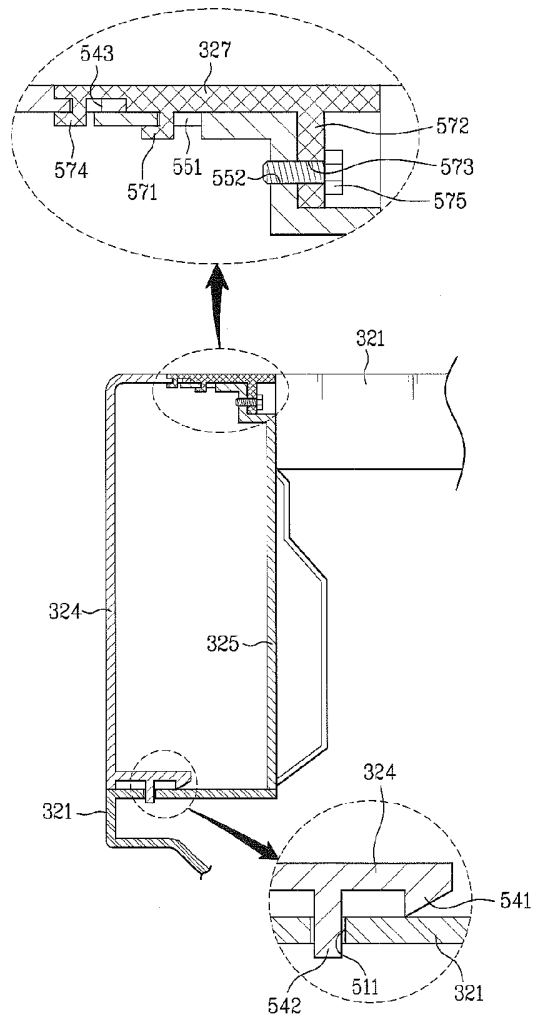
[Fig. 14]



[Fig. 15]



[Fig. 16]



[Fig. 17]

