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(54) **CLOTHES TREATING APPARATUS AND CONTROL METHOD OF CLOTHES TREATING APPARATUS**

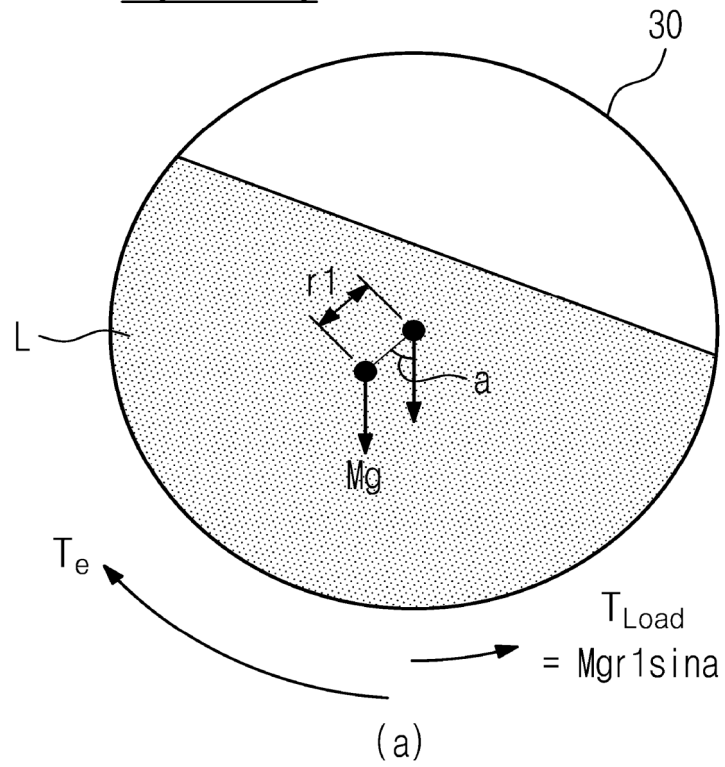
(57) The present invention relates to a cloths treating apparatus, wherein, when a person or animal steps into a drum, a drive unit is controlled to rotate the drum when a power supply unit is turned on or a sensing unit senses

opening and closing of a door, and then stop the drum, and a display part unit indicates an abnormal state after the drum stops.

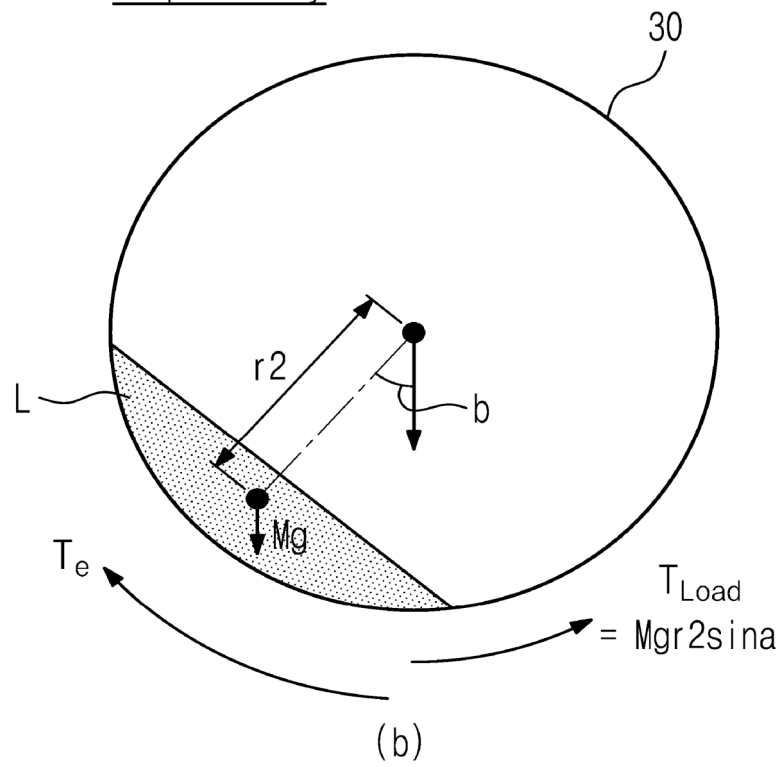
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【FIG 26】

Dry Laundry



Damp Laundry



Description

[Technical Field]

[0001] The present disclosure relates to a laundry treating apparatus and a method of controlling the same. More specifically, it relates to a laundry treating apparatus capable of supplying steam and hot air to laundry to perform a drying cycle including sterilization, wrinkle removal, deodorization, and drying, and a control method thereof.

[Background Art]

[0002] Generally, a laundry treating apparatus refers to an apparatus capable of performing one or more of washing, drying, or managing laundry. Here, the laundry treating apparatus may perform only the washing, drying, or management function, or may perform all the washing, drying, and management functions.

[0003] Such a laundry treating apparatus includes any course for washing, drying, or managing laundry, and the execution time of the course is calculated based on the weight of the laundry. For example, when the weight of the laundry is large, the execution time is set relatively long. When the weight of the laundry is small, the execution time is set relatively short.

[0004] FIG. 1 illustrates a method of performing a course by a conventional laundry treating apparatus (see, for example, Korean Patent Application Publication Nos. 10-2009-0077097 and 10-2008-0102611).

[0005] FIG. 1-(a) illustrates a control method in which a conventional laundry treating apparatus performs a course.

[0006] Referring to FIG. 1-(a), the conventional laundry treating apparatus may include a power supply step S1 of supplying power to the laundry treating apparatus by turning on the power button, a selection step S2 of selecting an appropriate course or option on the control panel of the laundry treating apparatus, and a start step S3 of pressing an execution button to execute the course in which multiple options are set.

[0007] When the start step S3 is performed, a door locking step S4 may be performed to lock the door to the cabinet.

[0008] The conventional laundry treating apparatus performs a weight detection step S5 of detecting the weight based on the applied electrical current while rotating the drum that accommodates the laundry. Once the weight of the laundry is calculated, the controller of the conventional laundry treating apparatus performs a time display step S6 of displaying the expected execution time of the selected course to the user, and an execution step (S7) of automatically executing the course.

[0009] As a result, the weight detection step S5 and the time display step S6 of the conventional laundry treating apparatus are performed after the user has input the start step S3 of executing the course. Therefore, the user is

forced to input the execution of the course without receiving information about the weight of the laundry or the expected execution time.

[0010] Consequently, the user cannot actively control the execution time of the course or option, and the time display step S6 can only provide simple information to the user as a service.

[0011] Further, when the execution time displayed in the time display step S6 is not suitable for the user's current intention or situation, the user is not given the opportunity to actively take action by adding or removing laundry.

[0012] Also, in conventional laundry treating apparatuses, when the execution time of the selected course or option does not meet the intention, the user cannot cancel or change the course unless they actively take measures, such as turning off the power of the washing machine.

[0013] This inconvenience becomes more pronounced when remotely controlling the conventional laundry treating apparatus.

[0014] FIG. 1-(b) illustrates the rotation state of the drum when the conventional laundry treating apparatus senses weight.

[0015] Referring to FIG. 1-(b), the conventional laundry treating apparatus rotates the drum D in direction I for at least one full revolution to detect the weight of the laundry L.

[0016] Specifically, while rotating the drum D in direction I, the conventional laundry treating apparatus measures the current applied to or output from the driver that rotates the drum, thereby calculating the weight of the laundry L.

[0017] When the conventional laundry treating apparatus rotates the drum D to detect the weight, the laundry L on the bottom surface of the drum rises inside the drum D and falls in direction II due to gravity, colliding with the inner wall of the drum and affecting the current of the driver.

[0018] Therefore, in order to accurately detect the weight of the laundry L despite variations in the driver current, the conventional laundry treating apparatus must rotate the drum D continuously in direction I for at least one full revolution and align the applied or output current values, which is a limitation.

[0019] As a result, the time required for the conventional laundry treating apparatus to detect the weight of the laundry may inevitably exceed the time needed to rotate the drum continuously.

[0020] In addition, in conventional laundry treating apparatuses, because the time required for the weight detection step S5 is set relatively long, the time display step S6 of displaying the execution time of the course or option may not quickly provide information to the user.

[0021] Further, in conventional laundry treating apparatuses, weight detection is performed only after the user selects a course or option and the start step S3 of pressing the execution button is performed.

[0022] As a result, the user cannot check the weight in advance to select a course or option, and by the time the weight was detected, the user has usually already left the laundry treating apparatus at the time the weight is detected.

[0023] Therefore, conventional laundry treating apparatuses have a fundamental problem in that the user cannot check or actively utilize information about the weight.

[0024] In a conventional laundry treating apparatus, abnormal vibration generated as the drum rotates is sensed to sense the presence of a living creature, such as an animal or a person, inside the drum. In such cases, measures such as shaking the drum or temporarily supplying water are taken to wake up the sleeping creature.

[0025] However, the conventional laundry treating apparatus may not sense a living creature inside the drum before the course starts because the drum starts to rotate after an input is provided through an execution button for execution of a course and the door is locked.

[0026] In particular, even if the living creature wakes up due to execution of the course, it cannot escape because the door remains locked.

[0027] Furthermore, when the course is executed, the drum rotates one or more full revolutions to sense the weight, during which a living creature placed inside the drum is at a very high risk of injury.

[0028] As a result, the conventional laundry treating apparatus has a fundamental problem in that it cannot sense or rescue a living creature placed inside the drum before the course is executed.

[Disclosure]

[Technical Problem]

[0029] An object of the present disclosure is to provide a laundry treating apparatus capable of sensing whether a living creature is present inside the drum before a course is executed.

[0030] Another object of the present disclosure is to provide a laundry treating apparatus capable of performing living body sensing while the door remains unlocked.

[0031] Another object of the present disclosure is to provide a laundry treating apparatus capable of preventing injury to a living creature by preventing the drum from rotating one full revolution or more while the door remains unlocked before a course is executed.

[0032] Another object of the present disclosure is to provide a laundry treating apparatus capable of blocking any changes in the internal condition of the drum, such as the temperature or water level, when a living creature is sensed.

[0033] Another object of the present disclosure is to provide a laundry treating apparatus capable of sensing not only the weight of the laundry but also whether a living creature has been placed inside the drum while the door remains unlocked before a course is executed.

[Technical Solution]

[0034] The objects of the present disclosure can be achieved by providing a laundry treating apparatus. The laundry treating apparatus may include a cabinet having an opening at a front side, a door coupled to the cabinet to open and close the opening, a sensor provided in the cabinet to sense whether the door closes the opening, a drum accommodated inside the cabinet to accommodate laundry, a driver connected to the drum to rotate the drum, a controller configured to control the driver to sense a weight of the laundry or an abnormal condition an abnormal condition indicating that an animal or a person is placed inside the drum, or to execute any course for treating the laundry, and a control panel including a power part configured to receive an input of a power command to supply power to one or more of the sensor, the driver, and the controller, and a display part configured to display information about the weight of the laundry.

[0035] Based on that the person or the animal is placed inside the drum, the driver may be controlled to rotate the drum and then stop the drum when the power part receives the input or when the sensor senses the door opened and closed. The display part may display the abnormal condition after the drum stops.

[0036] The laundry treating apparatus may further include a locker provided on the cabinet to lock the door to the cabinet to make the door keep the opening closed. The driver may be controlled to rotate the drum and then stop the drum with the door unlocked by the locker.

[0037] The driver may be controlled to rotate the drum less than one full revolution and then stop the drum with the door unlocked.

[0038] The display part may display the abnormal condition after the drum stops.

[0039] The display part may display the abnormal condition while the locker keeps the door unlocked.

[0040] The control panel may further include a selection part configured to receive an input of a selection command to select one of the courses. Based on the abnormal condition being displayed on the display part, the selection part may be deactivated to disable the input of the selection command from being received.

[0041] The control panel further includes a selection part configured to receive an input of a selection command to select one of the courses, and an execution part configured to receive an execution command to execute the selected course.

[0042] Based on the abnormal condition being displayed on the display part, the execution part may be deactivated to disable the input of the execution command from being received.

[0043] The laundry treating apparatus may further include a locker provided on the cabinet to lock the door to the cabinet to make the door keep the opening closed.

[0044] Based on the abnormal condition being displayed on the display part, the locker may be controlled to block the door from being locked.

[0045] The laundry treating apparatus may further include a supplier configured to supply water or steam into the drum.

[0046] Based on the abnormal condition being displayed on the display part, the supplier may be controlled to block supply of the water or steam into the drum.

[0047] The laundry treating apparatus may further include a communication module provided inside the cabinet and configured to communicate with an external terminal or a server.

[0048] Based on the abnormal condition being displayed on the display part, the communication module may transmit the abnormal condition to the external terminal or the server.

[0049] The controller may be configured to sense the weight of the laundry while the driver rotates and stops the drum. Based on the sensed weight being greater than or equal to 10 kg, the display part may display the abnormal condition.

[0050] Based on that a time taken for the drum to stop while the driver rotates and stops the drum is less than a specific time, the display part may display the abnormal condition.

[0051] Based on that the drum rotates by an angle less than a specific angle while the driver rotates and stops the drum, the display part may display the abnormal condition.

[0052] Based on only laundry being accommodated in the drum, the display part may display information about the weight, wherein, based on the person or the animal being placed inside the drum, the display part may display the abnormal condition.

[Advantageous Effects]

[0053] According to the present disclosure, it may be sensed whether a living creature is present inside the drum before a course is executed.

[0054] According to the present disclosure, living body sensing may be performed while the door remains unlocked.

[0055] According to the present disclosure, before a course is executed, the drum may be prevented from rotating one full revolution or more while the door remains unlocked, thereby preventing injury to a living creature.

[0056] According to the present disclosure, when a living creature is sensed, any changes in the internal condition of the drum, such as the temperature or water level may be blocked.

[0057] According to the present disclosure, before a course is executed, not only the weight of the laundry but also whether a living creature has been placed inside the drum may be sensed while the door remains unlocked.

[Description of Drawings]

[0058]

FIG. 1 illustrates a control method of a conventional laundry treating apparatus.

FIG. 2 illustrates one embodiment of a laundry treating apparatus according to the present disclosure.

FIG. 3 illustrates an embodiment of an internal structure of the laundry treating apparatus according to the present disclosure that is provided as a washing machine.

FIG. 4 illustrates an embodiment of an internal structure of the laundry treating apparatus according to the present disclosure that is provided as a dryer.

FIG. 5 illustrates an embodiment of a control panel according to the present disclosure.

FIG. 6 illustrates the laundry treating apparatus according to the present disclosure provided as a tower type (hereinafter, a wish tower) in which a washing machine and a dryer are stacked.

FIG. 7 illustrates an embodiment of the control panel provided as a shared panel according to the present disclosure.

FIG. 8 illustrates another embodiment of the laundry treating apparatus according to the present disclosure.

FIG. 9 illustrates an embodiment of an internal structure of an integrated apparatus 4.

FIG. 10 illustrates an embodiment of the structure of an integrated panel.

FIG. 11 illustrates the laundry treating apparatus according to the present disclosure provided as a mini apparatus.

FIG. 12 illustrates an embodiment of the internal structure of the laundry treating apparatus according to the present disclosure provided as a mini apparatus.

FIG. 13 illustrates an embodiment of a control panel when the laundry treating apparatus according to the present disclosure is provided as a mini apparatus.

FIG. 14 illustrates an embodiment of the laundry treating apparatus according to the present disclosure provided as a top-load type washing machine.

FIG. 15 illustrates an embodiment of the internal structure of the laundry treating apparatus according to the present disclosure provided as a top-load type washing machine.

FIG. 16 illustrates embodiments in which the laundry treating apparatus according to the present disclosure senses the weight of laundry.

FIG. 17 illustrates an embodiment in which the laundry treating apparatus according to the present disclosure provided as a top-load type washing machine senses the weight of laundry.

FIG. 18 illustrates an embodiment in which a controller of the laundry treating apparatus according to the present disclosure senses the weight of laundry through a driver.

FIG. 19 illustrates an embodiment in which the laundry treating apparatus according to the present disclosure utilizes a weight detection method based on

the above-described structure and method.

FIG. 20 illustrates an embodiment in which weight detection is performed depending on whether a door is opened or closed.

FIG. 21 illustrates another embodiment in which the laundry treating apparatus according to the present disclosure determines whether to additionally perform weight detection.

FIG. 22 illustrates an embodiment of a control method of the laundry treating apparatus according to the present disclosure implemented on a washing panel or a drying panel.

FIG. 23 illustrates an embodiment of a control method of the laundry treating apparatus according to the present disclosure implemented on a shared panel.

FIG. 24 illustrates an embodiment of a control method of the laundry treating apparatus according to the present disclosure implemented on an integrated panel, and FIG. 25 illustrates an embodiment of the control method of the laundry treating apparatus according to the present disclosure implemented on a mini panel.

FIG. 26 illustrates a method by which the laundry treating apparatus according to the present disclosure determines the total moisture content of laundry while sensing the weight of the laundry.

FIG. 27 illustrates an embodiment in which the laundry treating apparatus according to the present disclosure senses whether a living creature has been placed into the drum.

FIG. 28 illustrates an additional embodiment in which the laundry treating apparatus according to the present disclosure performs living body sensing.

FIG. 29 illustrates a case where the control method is implemented when a living body is sensed while the control panel is provided as a washing panel or a drying panel.

FIG. 30 illustrates a case where the control method is implemented when a living body is sensed while the control panel is provided as an integrated panel.

[Mode for Disclosure]

[0059] Hereinafter, embodiments disclosed herein will be described in detail with reference to the accompanying drawings. In the present disclosure, the same or similar reference numerals are assigned to the same or similar elements in different embodiments, and each of them will be described only once. As used herein, the singular forms include plural forms unless the context clearly indicates otherwise. In addition, in describing the embodiments disclosed herein, when it is determined that the detailed description of the related known technology may obscure the gist of the embodiments, the detailed description thereof will be omitted. In addition, it should be noted that the accompanying drawings are merely intended to provide a further understanding of the embodiments disclosed in the present disclosure and are

not to be construed as limiting the technical ideas disclosed herein.

[0060] FIG. 2 illustrates one embodiment of a laundry treating apparatus according to the present disclosure.

[0061] The laundry treating apparatus of the present disclosure may include at least one of a washing machine 1 configured to wash laundry and a dryer 2 configured to dry laundry. For example, the laundry treating apparatus according to the present disclosure may include both the washing machine 1 and the dryer 2.

[0062] The washing machine 1 of the present disclosure may be provided as either a front-load type washing machine with an opening at the front for loading laundry or a top-load type washing machine with an opening at the top.

[0063] However, the dryer 2 of the present disclosure is preferably provided as a front-load type with an opening at the front, as laundry must rise from the bottom of the drum and be evenly exposed to hot air.

[0064] The laundry treating apparatus of the present disclosure may be provided as either the washing machine 1 or the dryer 2 alone, or may include both the washing machine 1 and the dryer 2. In any case, it may include a cabinet 10 defining the exterior and a drum 30 rotatably accommodated in the cabinet 10 to store laundry.

[0065] The cabinet 10 is provided with an opening communicating with the drum 30. Thus, laundry may be loaded into or removed from the drum 30.

[0066] The laundry treating apparatus of the present disclosure may further include a door 11 rotatably coupled to the cabinet 10. The door 11 may be configured to open or close the opening.

[0067] The laundry treating apparatus of the present disclosure may further include a sensor 13 configured to sense whether the door 11 has closed the opening. Thus, the drum 30 may be prevented from rotating while the door 11 is open.

[0068] The sensor 13 may be provided in any form as long as it can sense whether the door 11 has opened or closed the opening. For example, the sensor 13 may include a magnet coupled to the door 11 and a Hall sensor coupled to the cabinet 10 to sense the magnet.

[0069] To prevent laundry or water inside the drum 30 from being ejected through the opening, the door 11 needs to be selectively fixed to the cabinet 10. To this end, the laundry treating apparatus according to the present disclosure may further include a locker 12 capable of selectively locking the door 11 to the cabinet 10.

[0070] The locker 12 may be provided in any form as long as it can selectively fix the door 11 to the cabinet 10 to prevent the door 11 from arbitrarily opening the opening. For example, the locker 12 may include a hook provided on the door 11 to be inserted into the cabinet 10, a fastening member provided on the cabinet 10 to selectively fasten the hook, and a fixing member configured to selectively maintain the coupling of the fastening member and the hook. The fixing member may include a

solenoid and magnet, or may be configured as a mechanical structure such as a push button.

[0071] The laundry treating apparatus of the present disclosure is configured to perform a course for treating laundry. For example, when the laundry treating apparatus according to the present disclosure is provided as the washing machine 1, it may perform a washing course to remove foreign substances from the laundry. When provided as the dryer 2, it may perform a drying course to evaporate moisture from the laundry.

[0072] The laundry treating apparatus of the present disclosure may further include a control panel 100 configured to receive a command to perform the course or to display the status of performing the course or information necessary to perform the course.

[0073] The control panel 100 may include one or more of multiple buttons or a touch panel configured to receive user commands, a microphone configured to receive the user's voice, a camera or proximity sensor configured to receive the user's motion or state, a display part configured to display visual information to the user, and a speaker configured to provide auditory information to the user.

[0074] When the laundry treating apparatus according to the present disclosure is provided as a front-load type with an opening at the front of the cabinet, the control panel 100 may be disposed above the door 11 on the front of the cabinet 10, thereby ensuring accessibility and visibility.

[0075] When the laundry treating apparatus according to the present disclosure is provided as a top-load type with an opening at the top of the cabinet, the control panel 100 may be disposed in front of the door 11 on the top surface of the cabinet 10.

[0076] When the laundry treating apparatus according to the present disclosure is provided as the washing machine 1, the cabinet 10 may include a washing cabinet 10a defining the exterior of the washing machine 1, and the door 11 may include a washing door 11a arranged to open and close the opening formed in the washing cabinet 10a.

[0077] The sensor 13 may include a washing sensor 12a configured to sense whether the washing door 11a has opened or closed the opening.

[0078] The locker 13 may include a washing locker 13a configured to fix the washing door 11a to the washing cabinet 10a.

[0079] The drum 30 may include a washing drum 30a configured to accommodate laundry.

[0080] Additionally, the washing machine 1 of the present disclosure may further include a tub 20 accommodating the washing drum 30a and accommodated in the washing cabinet 10a to store water.

[0081] The control panel 100 may include a washing panel 100a configured to receive commands to control the washing machine 1 or to display information about the washing machine 1.

[0082] When the laundry treating apparatus according

to the present disclosure is provided as the dryer 2, the cabinet 10 may include a drying cabinet 10b defining the exterior of the dryer 2, and the door 11 may include a drying door 11b arranged to open and close the opening formed in the drying cabinet 10b.

[0083] The sensor 13 may include a drying sensor 12b configured to sense whether the drying door 11b has opened or closed the opening.

[0084] The locker 13 may include a drying locker 13b configured to fix the drying door 11b to the drying cabinet 10b.

[0085] The drum 30 may include a drying drum 30b arranged to accommodate laundry.

[0086] Unlike the washing drum 30a, the drying drum 30b may not have through holes in an outer circumferential surface thereof.

[0087] The control panel 100 may include a drying panel 100b configured to receive commands to control the dryer 2 or to display information about the dryer 2.

[0088] FIG. 3 illustrates an embodiment of the internal structure of the laundry treating apparatus according to the present disclosure that is provided as the washing machine 1.

[0089] The laundry treating apparatus of the present disclosure may include a water supply part 50 arranged to supply water to the tub 20 and a drainage part 60 arranged to discharge water from the tub 20.

[0090] The water supply part 50 may include a water supply valve 51 coupled to the washing cabinet 10a and connected to an external water source to selectively supply water, a water supply pipe 52 extending from the water supply valve 51 to deliver water supplied from the external water source, and a detergent box 53 arranged to store detergent and to receive water supplied from the water supply pipe 52 and deliver the water to the tub 20.

[0091] The drainage part 60 may include a discharge pipe 61 connected to a lower portion of the tub 20 to discharge water from the tub 20, a drain pump 62 providing power to discharge the water supplied from the discharge pipe 61 to the outside of the washing cabinet 10a, and a drain pipe 63 extending from the drain pump 62 to the outside of the washing cabinet 10a to discharge the water.

[0092] The laundry treating apparatus of the present disclosure may further include a water level sensor 21 configured to sense the water level in the tub 20.

[0093] The water level sensor 21 may be provided in any form as long as it can sense the water level inside the tub 20. The water level sensor 21 may include a communication pipe communicating with the tub 20 and having a closed end, and a sensor disposed at an upper portion of the communication pipe to sense a change in pressure inside the communication pipe.

[0094] The washing machine 1 of the present disclosure may further include a support 70 arranged to support the tub 20 in the washing cabinet 10a.

[0095] The support 70 may include one or more of a

suspension supporting the lower portion of the tub 20 and a spring supporting the upper portion of the tub 20.

[0096] The laundry treating apparatus of the present disclosure may include a driver 40 configured to rotate the drum 30.

[0097] The driver 40 may include a washing driver 40a configured to rotate the washing drum 30a.

[0098] The washing driver 40a may include a washing stator 41a coupled to the tub 20 to generate a rotating magnetic field, a washing rotor 42a rotated by the washing stator 41a, and a washing rotation shaft 43a coupled to the washing rotor 42a and extending through the tub 20 to be connected to the washing drum 30a.

[0099] The laundry treating apparatus of the present disclosure may further include a controller configured to control one or more of the driver 40, the water supply valve 51, the drain pump 62, the locker 13, and the water level sensor 21. The controller may be embedded in the control panel 100 or arranged separately from the control panel 100.

[0100] The controller may be configured to provide commands to control one or more of the driver 40, the water supply valve 51, the drain pump 62, the locker 13, and the water level sensor 21 to perform any washing course for washing laundry.

[0101] FIG. 4 illustrates an embodiment of the internal structure of the laundry treating apparatus according to the present disclosure that is provided as the dryer 2.

[0102] The drying cabinet 10c may further include a base disposed under the drum 30 to support the dryer 2. A heat supplier 90, described below, may be installed on the base.

[0103] The laundry treating apparatus of the present disclosure may include a heat supplier 90 arranged to supply air into the drum 30 to dry laundry accommodated in the drum 30.

[0104] For example, the heat supplier 90 may include a circulator 90b arranged to cause air in the drum 30 to circulate below the drum 30 and be resupplied.

[0105] The circulator 90b may include a circulation duct 91b arranged on the base, which is disposed under the drying drum 30b, to provide a flow path along which air discharged from the drying drum 30b is circulated, an evaporator 92b disposed in the circulation duct 91b to cool the air and condense moisture, a condenser 93b disposed downstream of the evaporator to heat the air, a compressor 94b configured to supply refrigerant to the condenser 93b to heat the air, an expansion valve configured to expand the refrigerant discharged from the condenser 93b to cool the same, and a circulation fan 96b disposed inside the circulation duct 91b to provide power for circulating the air.

[0106] The circulator 90b may further include a water collector 97b communicating with the circulation duct 91b to collect water condensed by the evaporator 92b, and a storage tank 98b arranged to store the water collected in the water collector 97b.

[0107] The laundry treating apparatus of the present

disclosure may further include a support 70 rotatably supporting the drying drum 30b. The support 70 may include one or more rotating rollers 70b rotatably supporting one or more of the front and rear of the drying drum 30b.

[0108] The driver 40 of the laundry treating apparatus may further include a drying driver 40b configured to rotate the drying drum 30b.

[0109] The drying driver 40b may be seated on the base, on which the circulation duct 91b is installed, to rotate the drying drum 30b. In this case, the drying driver 40b may include a motor seated on the base, a pulley connected to the motor so as to rotate, and a belt connecting the pulley and the outer circumferential surface of the drum.

[0110] However, when the drying driver 40b is provided with a pulley/belt, it may be difficult to change the rotation speed and rotation direction of the drying drum 30b.

[0111] Therefore, in the laundry treating apparatus according to the present disclosure, the drying driver 40b may be disposed at the rear of the drying drum 30b, similar to the washing machine 1. That is, the drying driver 40b may include a drying stator 41b disposed at the rear of the drying drum 30b, a drying rotor 42b rotated by the drying stator, and a drying rotation shaft 43b coupled to the drying rotor 42b and extending to the rear of the drying drum 30b.

[0112] Accordingly, the drying driver 40b may freely change the rotation direction and rotation speed of the drying drum 30b.

[0113] The laundry treating apparatus of the present disclosure may further include a reducer 406b configured to reduce the rpm of the drying rotation shaft 43b and increase torque.

[0114] The reducer 406b may be disposed between the drying driver 40b and the drying drum 30b to transmit power generated by the drying driver 40b to the drying drum 30b.

[0115] The reducer 406b may be connected to and rotate with the drying rotation shaft 43b and include a complex gearbox connected to the drying drum 30b. Accordingly, the reducer 406b may reduce the rpm compared to the drying rotation shaft 43b but increase the torque delivered to the drying drum 30b.

[0116] As a result, while the drying drum 30b rotates, the laundry may rise and fall inside the drying drum 30b without sticking to the inner wall and be evenly exposed to the hot air supplied into the drying drum 30b.

[0117] The laundry treating apparatus of the present disclosure may further include a drying controller configured to control one or more of the driver 40, the heat supplier 90, the sensor 11, and the locker 12. The drying controller may be embedded in the control panel 100 or arranged separately from the control panel 100.

[0118] The drying controller may be configured to provide commands to control one or more of the driver 40, the heat supplier 90, the locker 13, and the sensor 11 to perform any drying course for drying the laundry.

[0119] FIG. 5 illustrates an embodiment of a control panel according to the present disclosure.

[0120] The control panel 100 of the laundry treating apparatus may include a power part 110 configured to receive a power command to supply power to all components of the laundry treating apparatus, a course selection part 130 configured to receive a selection command to select a course for treating laundry, an option selection part 140 configured to receive a course intensity, an execution time, and a selection command to select an option for adjusting or selecting one or more additional functions when performing the course, an execution part 120 configured to receive an execution command to execute the selected course and options, and a display part 150 configured to display one or more of the state of the course and options being performed, weight information about the laundry, or information displayed by the laundry treating apparatus.

[0121] The additional functions selectable through the option selection part 140 when performing the course may include one or more of steam supply, water temperature control, turbo shot by high-speed drum rotation, reservation setting for course execution, and mode switching to control another laundry treating apparatus or an external device.

[0122] The weight information about the laundry displayed on the display part 150 may include one or more of the weight of the laundry, the amount of detergent required for the weight of laundry to be treated, or the expected execution time of the course for treating the laundry.

[0123] The control panel 100 may be provided as any one of the washing panel 100a, the drying panel 100b, or other panels. However, in any form of the control panel 100, the functions of the power part 110, execution part 120, course selection part 130, option selection part 140, and display 150 may remain the same.

[0124] Hereinafter, the control panel 100 is illustrated as provided as the washing panel 100a. The washing panel 100a and the drying panel 100b may be configured to receive different commands or display different information, but may have the identical structure.

[0125] The washing panel 100a may include a rotary knob as the course selection part 130. The display part 150 may include a main display 151 disposed inside the course selection part 130 and a sub-display 152 disposed outside the course selection part 130.

[0126] The main display 151 may be circular and configured to display the course selected through the course selection part 130 by rotating the course selection part 130.

[0127] The main display 151 may also display sensed weight information about the laundry.

[0128] The main display 151 may include a screen displaying the selected course and weight information. As a result, the language displayed on the main display 151 may be freely changed according to settings. Therefore, it may be omitted to print the names or descriptions

of the courses provided by the laundry treating apparatus on the washing panel 100a. In addition, the main display 151 may freely display the information intended to be conveyed by the controller in different languages, characters, images, figures, icons, or the like.

[0129] The course selection part 130 may be configured to rotate 360 degrees or more in both directions around the outer periphery of the main display 151, and the course displayed on the main display 151 may be set to change according to the rotation angle of the course selection part 130. The washing panel 100a may include an encoder configured to sense rotation of the course selection part 130 and determine the corresponding command according to the rotation angle, and a control panel configured to determine the content to be displayed on the main display 151 based on the encoder.

[0130] The option selection part 140 may be disposed outside the course selection part 130.

[0131] The option selection part 140 may be partitioned into areas for inputting commands to determine the intensity of each cycle constituting the course, such as a first option, a second option, and a third option, or to input additional functions for the course.

[0132] For example, the first, second, and third options may correspond to determining the intensity of washing, rinsing, and dehydration, respectively. The areas may be provided with touch buttons or physical buttons, or may be provided with a touch panel or touch scheme to receive commands on a display part screen.

[0133] The sub-display 152 may be disposed within the option selection part 140.

[0134] The sub-display 152 may be configured to display information about the options selected or activated through the option selection part 140 to the outside.

[0135] In addition, the sub-display 152 may be arranged spaced apart from the main selection part 151. The sub-display 152 may be disposed outside the course selection part 130 to intuitively indicate that content different from the content displayed on the main selection part 151 is displayed.

[0136] The option selection part 140 may be provided in a rectangular shape.

[0137] The sub-display 152 may include multiple lights intuitively indicating the set level of the intensity of the first, second, and third options.

[0138] For example, when more lights are illuminated or lights in higher positions are on, this indicates a higher intensity of the corresponding option.

[0139] The power part 110 may be disposed between one side of the course selection part 130 and the detergent box 53.

[0140] The execution part 120 may be disposed between the opposite side of the course selection part 130 and the sub-display 152.

[0141] The power part 110 and the execution part 120 may be provided as touch buttons or physical buttons and may selectively emit light to indicate activation or availability for input.

[0142] For example, when the power part 110 is input, the power part 110, the execution part 120, and the display part 150 may illuminate.

[0143] FIG. 6 illustrates the laundry treating apparatus according to the present disclosure provided as a tower type (hereinafter, a wash tower 3) in which the washing machine 1 and the dryer 2 are stacked.

[0144] The wash tower 3 may have the washing machine 1 disposed at the bottom and the dryer 2 disposed at the top. Except that the washing machine 1 and the dryer 2 share the same cabinet 10, the configuration may be identical to the configurations of the washing machine 1 and the dryer 2.

[0145] Generally, the washing machine 1 having the tub 20 is heavier than the dryer 2, and thus the washing machine 1 may be disposed under the dryer 2. However, depending on design, the dryer 2 may be disposed under the washing machine 1.

[0146] In the wash tower 3, the control panel 100 may include a shared panel 100c disposed between the washing door 11a of the washing machine 1 and the drying door 11b of the dryer 2.

[0147] The shared panel 100c may receive all control commands for the washing machine 1 and the dryer 2 and display all information displayed on the washing machine 1 and the dryer 2.

[0148] As a result, for the wash tower 3 including both the washing machine 1 and the dryer 2, the user may control both the washing machine 1 and the dryer 2 through the shared panel 100c.

[0149] FIG. 7 illustrates an embodiment of the control panel provided as a shared panel according to the present disclosure.

[0150] The shared panel 100c may include an upper portion and a lower portion, wherein one of the portions may be configured to control one of the washing machine and the dryer, and the other one may be configured to control the other one of the washing machine and the dryer.

[0151] The arrangement of the upper and lower portions of the shared panel 100c may correspond to the arrangement of the washing machine 1 and the dryer 2.

[0152] A main display 151 to display the weight information about the laundry may be arranged at the center of the shared panel 100c. A course selection part 130 configured to select a course may be disposed on one side of the main display 151, and an option selection part 140 configured to select an option may be disposed on the opposite side of the main display 151.

[0153] The main display 151 may be partitioned into upper and lower portions. The main display 151 may include a washing main display 151a disposed in the lower portion and having one or more icons or images indicating the weight information about the washing machine 1 and the state information about the washing machine 1, and a drying main display 151b disposed in the upper portion and having one or more icons or images indicating the weight information about the dryer 2 and

the state information about the dryer 2.

[0154] The course selection part 130 may be disposed on the left side of the main display 151 and be partitioned into upper and lower portions.

[0155] The course selection part 130 may include a washing course selection part 130a configured to select multiple washing courses for removing foreign substances or germs from laundry, and a drying course selection part 130b disposed above the washing course selection part 130a and configured to select multiple drying courses for removing moisture from the laundry or supplying steam and hot air for laundry care.

[0156] The option selection part 140 may be disposed on the right side of the main display 151 and be partitioned into upper and lower portions.

[0157] The option selection part 140 may include a washing option selection part 140a configured to select multiple options for setting the intensity, execution time, or additional functions of a washing course, and a drying option selection part 140b disposed below the washing option selection part 140a and configured to select multiple options for setting the intensity, execution time, or additional functions of a drying course.

[0158] The option selection part 140 may indicate whether additional functions, such as steam supply, turbo shot, water temperature control, drum sterilization, or cleaning of the heat supplier, are selected by turning light of the selection part on or off.

[0159] In addition, the sub-display 152 may be configured to indicate the intensity of an option selected through the option selection part 140. The sub-display 152 may be disposed in areas corresponding to the intensity or execution time that may be adjusted with the option selection part 140.

[0160] The sub-display may include a washing sub-display 151a disposed above the washing option selection part 140a to indicate the intensity of the set washing option, and a drying sub-display 151b disposed above the washing sub-display 151a to indicate the intensity of the set drying option.

[0161] The power part 110 may be disposed at one end of the shared panel 110 and be partitioned into upper and lower portions.

[0162] The power part may include a washing power part 110a configured to receive a washing power command to supply power to the washing machine 1, and a drying power part 110b configured to receive a drying power command to supply power to the dryer 2.

[0163] The execution part 120 may be disposed at an opposite end of the shared panel 110 and be partitioned into upper and lower portions.

[0164] The execution part 120 may include a washing execution part 120a configured to receive a washing execution command to perform the selected washing course and options, and a drying execution part 120b disposed above the washing execution part 120a configured to receive a drying execution command to perform the selected drying course and options.

[0165] FIG. 8 illustrates another embodiment of the laundry treating apparatus according to the present disclosure

[0166] The laundry treating apparatus of the present disclosure may include an integrated apparatus 4 capable of performing both washing and drying courses.

[0167] When the laundry treating apparatus according to the present disclosure is configured as the integrated apparatus 4, the cabinet 10 may include an integrated cabinet 10c defining the exterior of the integrated apparatus, and the door 11 may include an integrated door 11d arranged to open and close an opening formed in the integrated cabinet 10c.

[0168] The sensor 13 may include an integrated sensor 12d configured to sense whether the integrated door 11d has opened or closed the opening.

[0169] The locker 13 may include an integrated locker 13d arranged to fix the integrated door 11d to the integrated cabinet 10d.

[0170] The integrated apparatus 4 may perform both the function of the washing machine and the function of the dryer, and a drawer-type laundry treating apparatus (hereinafter referred to as a mini apparatus) may be additionally installed under the integrated apparatus.

[0171] The control panel 100 of the laundry treating apparatus may include an integrated panel 100d capable of simultaneously controlling one or more of the washing machine 1, the dryer 2, or the lower mini apparatus 5.

[0172] FIG. 9 illustrates an embodiment of the internal structure of the integrated apparatus 4.

[0173] Referring to FIG. 9, the integrated apparatus 4 may include an integrated tub 20d rotatably accommodated in the integrated cabinet 10d to store water, and an integrated drum 30d rotatably accommodated in the integrated tub 20d to store water.

[0174] The laundry treating apparatus of the present disclosure may include a water supply part 50 arranged to supply water to the tub 20 and a drainage part 60 arranged to discharge water from the tub 20.

[0175] When the laundry treating apparatus according to the present disclosure is provided as the integrated apparatus 4, the water supply part 50 may include an integrated water supply valve 51d coupled to the integrated cabinet 10d and connected to an external water source to selectively supply water, an integrated water supply pipe 52d extending from the integrated water supply valve 51d to deliver water supplied from the external water source, and an integrated detergent box 53d arranged to store detergent and to receive water supplied from the integrated water supply pipe 52d and deliver the water to the integrated tub 20d.

[0176] The drainage part 60 may include an integrated discharge pipe 61d connected to a lower portion of the integrated tub 20d to discharge water from the integrated tub 20d, an integrated drain pump 62d providing power to discharge the water supplied from the integrated discharge pipe 61d to the outside of the integrated cabinet 10d, and an integrated drain pipe 63d extending from the

integrated drain pump 62d to the outside of the integrated cabinet 10d to discharge the water.

[0177] The laundry treating apparatus of the present disclosure may further include an integrated water level sensor 21d configured to sense the water level in the integrated tub 20d.

[0178] The integrated water level sensor 21d may be provided in any form as long as it can sense the water level inside the integrated tub 20d. The integrated water level sensor 21d may include a communication pipe communicating with the integrated tub 20d and having a closed end, and a sensor disposed at an upper portion of the communication pipe to sense a change in pressure inside the communication pipe.

[0179] The integrated apparatus 4 of the present disclosure may further include an integrated support 70d arranged to support the integrated tub 20d in the integrated cabinet 10d.

[0180] The integrated support 70d may include one or more of a suspension supporting the lower portion of the integrated tub 20d and a spring supporting the upper portion of the integrated tub 20d.

[0181] The integrated apparatus 4 of the present disclosure may include a driver 40 having the same structure as that of the washing machine 1.

[0182] The integrated apparatus 4 may be configured such that the heat supplier 90 communicates with the integrated tub 20d.

[0183] The cabinet 10d of the integrated apparatus 4 may have a base at a lower portion thereof, similar to the dryer 2, and the heat supplier 90 may be arranged on the base.

[0184] Alternatively, since the integrated apparatus 4 may include the integrated tub 20d that is firmly supported inside the cabinet 10d, and the integrated tub 20d is positioned closest to the integrated drum 30d, the heat supplier 90 may be seated on the integrated tub 20d.

[0185] The heat supplier 90 may include an integrated supplier 90d seated on the upper portion of the integrated tub 20d. This configuration may prevent interference or collision with the drainage part 60 arranged at the lower portion of the integrated tub 20d.

[0186] The integrated supplier 90d may include an integrated duct 91d seated along the front-rear direction of the integrated tub 20d to circulate air inside the integrated tub 20d, an evaporator 92d accommodated in the integrated duct 91d to cool the air and condense moisture, a condenser 93d disposed downstream of the evaporator 92d to heat the air, a compressor 94d arranged to supply refrigerant to the condenser 93d to heat the air, an expansion valve that expands and cools the refrigerant discharged from the condenser 93d, and a circulation fan 96d disposed inside the circulation duct 91d to provide power to circulate the air.

[0187] Since the integrated supplier 90d is arranged on the tub 20, the water collector and the storage tank may be omitted. That is, water condensed inside the integrated duct 91d may flow back to the tub 20 and be

discharged through the drainage part 60.

[0188] As a result, the integrated apparatus 4, which is configured by integrating the washing machine 1 and the dryer 2, may perform both the washing course and the drying course.

[0189] The integrated apparatus 4 of the present disclosure may include an integrated controller that integrates the washing controller and the drying controller. The integrated controller may be embedded in the control panel 100 or may be arranged inside the cabinet 10, separately from the control panel 100.

[0190] The integrated panel 100d may switch to either a washing mode configured to receive commands to perform a washing course or display the status of the washing course, or a drying mode configured to receive commands to perform a drying course or display the status of the drying course.

[0191] In addition, when a mini apparatus is provided as described below, the integrated panel may switch to a mini mode configured to receive commands to execute the mini apparatus or display the status of the mini apparatus.

[0192] FIG. 10 illustrates an embodiment of the structure of the integrated panel.

[0193] The integrated panel 100d should implement the washing mode for performing a washing course, the drying mode for performing a drying course, and the mini mode for executing the mini apparatus on a single panel. Therefore, the integrated panel 100d may be entirely a touch panel without physical buttons, displaying the washing, drying, and mini modes selectively.

[0194] The integrated panel 100d may be entirely in the form of a screen or a touch panel.

[0195] The integrated panel 100d may have an oval or track shape with a width longer than the height, and may be provided with a display part 150 in the central rectangular portion thereof.

[0196] A power part 110 and an execution part 120 may be arranged on one side of the display part 150. The power part 110 and execution part 120 may be configured as touch areas that light up when touch input is allowed and turn off when touch input is not allowed.

[0197] The display part 150 may be configured to display weight information and status information about the selected course and options. Further, the display part 150 may be provided as a touch panel to serve as the course input unit 130 and option selection part 140.

[0198] The display part 150 may display a course selection part 130 for selection of a course, and display the currently selected course C1 prominently, while the other selectable courses C2 and C3 in smaller form on the left and right sides.

[0199] The display part 150 may further include a status display 153 configured to indicate the status of the laundry treating apparatus. The status display 153 may display one or more of an internal water level, an internal temperature, a lock status, a sound emission status, and a course progress status in the form of icons

or similar indicators.

[0200] The option selection part 140 may be arranged outside the course selection part 130 or the area where the course is displayed. The option selection part 140 may be spaced apart from and arranged below the status display 153.

[0201] When the option selection part 140 is input, the display part 150 may display selectable or adjustable options. In this process, the display part of the course selection part 130 and the course C may disappear.

[0202] FIG. 11 illustrates the laundry treating apparatus according to the present disclosure provided as a mini apparatus.

[0203] The laundry treating apparatus of the present disclosure may further include a mini apparatus 5. The mini apparatus may have a smaller height and volume than the washing machine 1 and dryer 2 or than the integrated apparatus 4.

[0204] The mini apparatus, which serves as an auxiliary laundry treating apparatus, may be installed in addition to the washing machine 1, dryer 2, or integrated apparatus 4. Of course, the mini apparatus 5 can be arranged independently.

[0205] When the laundry treating apparatus according to the present disclosure includes the mini apparatus 5, the cabinet 10 may include a mini cabinet 10b having a height less than the width in the lateral direction and the depth in the front-rear direction.

[0206] Since the mini cabinet 10e has a low height, it may be arranged under the washing machine 1, dryer 2, or integrated apparatus 4.

[0207] Of course, the mini apparatus 5 may be arranged on the washing machine 1, dryer 2, or integrated apparatus 4. For simplicity, it is assumed in the following description that the mini apparatus 5 is arranged under or independently of the washing machine 1, dryer 2, or integrated apparatus 4.

[0208] The mini cabinet 10e may have an opening at the front.

[0209] The mini apparatus 5 may further include a drawer 80 arranged to be inserted into and withdrawn from the mini cabinet 10e through the opening.

[0210] The drawer 80 may include a drawer body 82 arranged to accommodate a tub accommodating water or a rotating drum, a drawer panel 81 arranged at the front of the drawer body 82 to open and close the opening, and rails 83 arranged to allow the drawer body 82 to be inserted into and withdrawn from the mini cabinet 10e.

[0211] The drawer body 82 may be formed in the shape of a case with an open top and may include a mini door 29 arranged inside to open or close the tub or drum.

[0212] As the mini apparatus 5 has the drawer 80, it may be prevented from interference with any other laundry treating apparatus or home appliance placed thereon.

[0213] FIG. 12 illustrates an embodiment of the internal structure of the laundry treating apparatus according to the present disclosure provided as a mini apparatus.

[0214] The mini apparatus 5 may include a mini tub 20e arranged to accommodate water in the drawer 80, and a mini drum 30e rotatably provided in the mini tub 20e to accommodate laundry.

[0215] The mini tub 20e and mini drum 30e may have a height smaller than the diameter thereof, and a loading inlet for loading laundry may be formed at the top thereof.

[0216] The mini door 29 may be coupled to the top of the mini tub 20e to prevent water or laundry inside the mini tub 20e from spilling arbitrarily.

[0217] The driver 40 may be arranged at the bottom of the mini tub 20e to rotate the mini drum 30e.

[0218] The driver 40 may include a mini stator 41e coupled to the bottom of the mini tub 20d to generate a rotating magnetic field, a mini rotor 42e rotated by the mini stator 41e, and a mini rotation shaft 43e rotated by the mini rotor 42e and coupled to the bottom of the mini drum 30e.

[0219] The water supply part 80 may include a mini water supply valve 51e coupled to the mini cabinet 10e, a mini water supply pipe 52e extending from the mini water supply valve 51e to the drawer to supply water, and a mini box 53e arranged to guide water supplied through the mini water supply pipe 52e to the tub.

[0220] The mini water supply pipe 52e may extend forward as far as the distance by which the drawer 80 is withdrawn from the mini cabinet 10e. The mini box 53e may be configured to receive and store detergent.

[0221] The drainage part 80 may include a mini discharge pipe 61e arranged to discharge water from the mini tub 20e, a mini pump 62e coupled to the mini discharge pipe 61e to provide power to discharge the water, and a mini drain pipe 63e extending from the mini pump 62e to the outside of the mini cabinet 10e.

[0222] The mini drain pipe 63e may extend forward as far as the distance by which the drawer 80 is withdrawn from the mini cabinet 10e.

[0223] The support 70 may include a mini suspension 70d connecting the inner lateral surface of the drawer 80 and the outer lateral surface of the mini tub 20e.

[0224] FIG. 13 illustrates an embodiment of a control panel when the laundry treating apparatus according to the present disclosure is provided as a mini apparatus.

[0225] The control panel 100 may include a mini panel 100e installed on the drawer 80 to control the mini apparatus 5.

[0226] The mini panel 100e may include a display part 150 at the center thereof, and a power part 110 and an execution part 120 may be arranged on the left and right sides of the display part 150.

[0227] A course selection part 130 may be arranged between the power part 110 and the display part 150 to select a course, and an option selection part 140 may be arranged between the display part 150 and the execution part 120 to select an option.

[0228] The display part 150 may include a main display 151 configured to display weight information or the status of a selected course. A sub-display 152 may be disposed

on both sides of the main display 151 to indicate the type of the course selected by the course selection part 130 and the option selected by the option selection part 140.

[0229] The main display 151 may be one of an LCD, a lamp, or a screen, and the sub-display 152 may be one of an LCD, a lamp, or a screen.

[0230] FIG. 14 illustrates an embodiment of the laundry treating apparatus according to the present disclosure provided as a top-load type washing machine.

[0231] The laundry treating apparatus of the present disclosure may include a washing machine 1. The washing machine 1 may be a top-load type washing machine.

[0232] When the washing machine 1 is of the top-load type, most components thereof may correspond to those of the washing machine 1 shown in FIGS. 2 and 3.

[0233] To avoid redundant descriptions, only the differences from the washing machine shown in FIGS. 2 and 3 are described.

[0234] When the laundry treating apparatus according to the present disclosure includes a top-load type washing machine, the cabinet 10 may have an opening at the top, and the washing door 11 may be rotatably coupled to the top of the cabinet 10. The control panel 100 may be disposed in front of the washing door 11 at the top of the cabinet 10.

[0235] The laundry treating apparatus of the present disclosure may further include a sensor 11 configured to sense whether the washing door 11 has opened or closed the opening, and a locker 12 arranged to fix the position of the washing door 11 with the opening closed.

[0236] FIG. 15 illustrates an embodiment of the internal structure of the laundry treating apparatus according to the present disclosure provided as a top-load type washing machine.

[0237] The top-load type washing machine may similarly include a tub 20, a drum 30, a driver 40, a water supply part 50, and a drainage part 60.

[0238] The tub 20 and drum 30 may have a cylindrical shape with a loading inlet arranged at the top thereof.

[0239] Unlike in the case of the mini apparatus, the tub 20 and drum 30 may have a height greater than the diameter or width thereof.

[0240] The laundry treating apparatus of the present disclosure may further include a pulsator 35 arranged under the drum 30 to rotate independently of the drum 30.

[0241] Although the pulsator 35 may rotate together with the drum 30, it may be arranged to rotate separately from the drum 30. As a result, the laundry may be agitated, or a water flow may be formed inside the drum 30.

[0242] The driver 40 may further include a clutch 44 configured to determine whether to rotate the pulsator 35 independently of the drum 30.

[0243] The clutch 44 may be configured to determine whether to transmit rotational power from the rotation shaft 43 to both the pulsator 35 and the drum 30 or to only one of the pulsator 35 and the drum 30.

[0244] The rotation shaft 43 is coupled to the clutch 44, and the clutch 44 may include a separate drive shaft 45

that transmits the power of the rotation shaft 43.

[0245] The drive shaft 45 may be coupled to the pulsator 35, and the housing of the clutch 44 may be coupled to the drum 30.

[0246] As a result, the pulsator 35 and drum 30, which are coupled to different components, may selectively receive power from the driver 40.

[0247] The control panel 100 may control the clutch 44 to rotate the pulsator 35 independently of the drum 30 during washing and rinsing, while rotating the pulsator 35 and drum 30 together during dehydration.

[0248] As a result, during the washing and rinsing, laundry may be twisted or agitated by the water flow, enhancing washing and rinsing performance. During the dehydration, the pulsator 35 and drum 30 may be prevented from rotating at different speeds to cause friction or damage to the laundry.

[0249] FIG. 16 illustrates embodiments in which the laundry treating apparatus according to the present disclosure senses the weight of laundry.

[0250] The laundry treating apparatus of the present disclosure may sense the weight of laundry and perform washing and drying courses according to the sensed weight. For heavier laundry, which requires more time and energy for washing and drying, and thus the execution time of the washing and drying courses is set longer. As a result, this may prevent the courses from ending with the laundry being washed insufficiently or dried insufficiently, thereby ensuring washing performance and drying performance.

[0251] Conversely, when the weight of laundry sensed by the laundry treating apparatus according to the present disclosure is light, it may require a small amount of time and energy for washing and drying, and thus the execution time of the washing and drying courses is set short.

[0252] As a result, over-washing or over-drying of the laundry may be prevented. Thereby, the laundry may be protected from damages and energy may be saved.

[0253] The laundry treating apparatus of the present disclosure may sense the weight of the laundry by rotating the drum containing the laundry. By measuring the current or load applied to or generated by the driver 40 when rotating the drum 30, the weight of the laundry may be calculated.

[0254] Even when laundry is placed in the drum 30 before power is supplied to the driver 40, the laundry treating apparatus according to the present disclosure may normally sense the weight of the laundry based on the current output or generated by the driver 40 after power is supplied to the driver 40. Thus, whether the user opens the door 11 and loads laundry with power supplied to the driver 40 by the user by providing an input through the power part 110, or the user provides an input through the power part 110 after opening the door 11 and loading laundry, the laundry treating apparatus according to the present disclosure may sense the weight of the laundry in any scenarios.

[0255] Consequently, although the time required to sense the weight of the laundry may be longer than when sensing the weight through a load sensor that directly senses the load of the drum, the laundry treating apparatus according to the present disclosure may sense the weight of the laundry in any situations where the user opens the door 11, loads the laundry, and then provides an input through the power part 110.

[0256] FIG. 16-(a) illustrates an embodiment in which the laundry treating apparatus according to the present disclosure senses the weight of laundry. The laundry treating apparatus of the present disclosure may normally sense the weight of the laundry by rotating the drum less than one full revolution.

[0257] In other words, rotating the drum 30 for a longer time may increase accuracy of sensing of the weight of the laundry. However, even when the drum 30 is rotated by a certain angle, the weight of the laundry may be sensed sufficiently by calculating the necessary inertia or current for the rotation, or torque and energy generated during the brief rotation and stop.

[0258] Therefore, although the laundry treating apparatus according to the present disclosure can sense the weight of the laundry by rotating the drum one full revolution or more, it may sense the weight of the laundry by rotating the drum less than one full revolution.

[0259] The laundry treating apparatus of the present disclosure may sense the weight of the laundry by rotating the drum at an angle of 360 degrees or less. The laundry treating apparatus of the present disclosure may sense the weight of the laundry during the process of rotating the drum at an angle of 360 degrees or less, or it may calculate the weight of the laundry after the process in which the drum rotates and then stops. The process in which the drum rotates and then stops also includes the concept of the drum rotating in reverse to return to its original position.

[0260] In any case, the laundry treating apparatus according to the present disclosure may completely determine the weight of the laundry within three seconds after the drum begins to rotate.

[0261] As a result, when an input is provided through the power part 110 or the opening and closing of the door 11 is sensed by the sensor 13, the laundry treating apparatus according to the present disclosure may sense the weight by rotating the drum 30 less than one full revolution by driving the driver 40 before an input is provided through the course selection part 130 or the execution part 120.

[0262] When the weight is sensed, the controller may display the laundry weight information on the display part 150 before an input is provided through the course selection part 130 or the execution part 120. As a result, the user may check the displayed weight information and select and execute an appropriate course.

[0263] The locker 12 is controlled to lock the door 11 to the cabinet 10 only when an input is provided through the execution part 120. Consequently, the laundry treating

apparatus of the present disclosure may sense the weight of the laundry by rotating the drum 30 while the door remains unlocked, and the weight information about the laundry may be displayed on the display part 150.

[0264] Therefore, the user may check the weight information, open the door 11, and then add more laundry or remove laundry in an appropriate direction.

[0265] FIG. 16-(b) illustrates another embodiment in which the laundry treating apparatus according to the present disclosure senses the weight of laundry.

[0266] Of course, the laundry treating apparatus according to the present disclosure may sense the weight of the laundry by rotating the drum one full revolution or more. However, when sensing the weight of the laundry by rotating the drum less than one full revolution, the rotation angle of the drum may need to be controlled.

[0267] For example, as shown in FIG. 16-(a), the drum may be rotated to angle A, which is 90 degrees or more, and then stopped. During this operation, the controller may sense the weight of the laundry through the driver 40.

[0268] However, in a front-load type laundry treating apparatus, when the drum 30 rotates to angle A, the arrangement and shape of the laundry may vary due to the laundry falling or rolling to the lower part of the drum 30 by gravity. As a result, additional current may be applied to or generated by the driver 40 due to the movement or impact of the laundry, which may reduce the accuracy of the controller in sensing the weight of the laundry.

[0269] Therefore, the laundry treating apparatus according to the present disclosure may sense the weight of the laundry by rotating the drum 30 to angle B, which is less than 90 degrees. As a result, changes in the arrangement and shape of the laundry may be minimized or completely prevented, and the controller may accurately sense the weight of the laundry through the current measured by the driver 40.

[0270] Preferably, the angle B may be set to be less than 45 degrees. Most preferably, it may be set to be less than 15 degrees. As a result, the controller may accurately sense the weight of the laundry by eliminating situations in which the shape or arrangement of the laundry changes.

[0271] In addition, since the laundry rotates that much less, the user may hardly notice that the drum 30 rotates arbitrarily, and thus will not suspect the performance of the laundry treating apparatus, and the laundry treating apparatus may display the weight information more quickly.

[0272] FIG. 17 illustrates an embodiment in which the laundry treating apparatus according to the present disclosure provided as a top-load type washing machine senses the weight of laundry.

[0273] Referring to FIG. 17-(a), until the washing course and the drying course are performed, and while the door is in an unlocked position, the laundry loaded in the drum 30 may remain seated on the pulsator 35.

[0274] Even in this process, the laundry treating apparatus according to the present disclosure may sense the weight of the laundry through the driver 40 by rotating the drum 30 less than one full revolution.

[0275] However, when sensing the weight of the laundry, the laundry treating apparatus according to the present disclosure may rotate the drum 30 and the pulsator 35 simultaneously. As a result, damage or twisting of the laundry or changes in the shape or position of the laundry, which may be caused by friction between the drum 30 and the pulsator 35 may be minimized.

[0276] Referring to FIG. 17-(b), in the top-load type washing machine, even when if the drum 30 rotates nearly one full revolution, the probability that the shape or arrangement of the laundry will change is lower than in the front-load type washing machine.

[0277] Therefore, when the laundry treating apparatus according to the present disclosure is provided as a top-load type washing machine, in order to sense the weight of the laundry, one or both of the drum 30 and the pulsator 35 may be rotated 90 degrees or more and stopped before reaching 360 degrees.

[0278] For example, the laundry treating apparatus according to the present disclosure may rotate the drum 30 and the pulsator 35 simultaneously to less than 180 degrees and then stop the same. Then, it may measure the load applied the driver 40 to sense the weight of the laundry.

[0279] As a result, before an input is provided through the execution part 120, the laundry treating apparatus according to the present disclosure may display the weight information about the laundry with the door unlocked.

[0280] FIG. 18 illustrates an embodiment in which a controller of the laundry treating apparatus according to the present disclosure senses the weight of laundry through a driver.

[0281] Referring to FIG. 18-(a), before performing the washing cycle, rinsing cycle, or dehydration cycle, the laundry treating apparatus according to the present disclosure may perform a sensing operation F of sensing the weight of the laundry inside the drum 30, with the door unlocked.

[0282] To this end, the controller may perform an acceleration operation F1 of starting to rotate the drum 30, a deceleration operation F2 of stopping the drum 30, and a weight sensing operation F3 of sensing the weight of the laundry accommodated in the drum based on a measured acceleration of the driver 40 during the acceleration operation and a measured deceleration of the driver 40 during the deceleration operation.

[0283] While driving the driver 40, the laundry treating apparatus according to the present disclosure senses the measured acceleration value measured by the driver 40 or applied to the driver 40. While decelerating the driver 40, the laundry treating apparatus senses a measured deceleration value measured by the driver 40 or applied to the driver 40. Thereafter, the weight of the laundry

accommodated in the drum 30 may be sensed by calculating the measured acceleration value and the measured deceleration value.

[0284] The measured acceleration value and the measured deceleration value may be command values applied to the driver 40 while the driver 40 is driven, or may be values measured by the driver 40 while the driver 40 is driven.

[0285] The sensing operation F may further include a preparation operation F0 of checking the position of the driver 40 to set a reference value for performing the acceleration operation F1 and the deceleration operation F2. In the preparation operation F0, the drum 30 may remain stopped.

[0286] In the acceleration operation F1, the drum that is stopped in the preparation operation F0 may be accelerated to a first rpm. In the deceleration operation F2, the drum may be decelerated from the first rpm. In other words, the acceleration operation F1 and the deceleration operation F2 may be performed consecutively. The deceleration operation F2 is performed simply by reducing the current command value to the driver 40 or cutting off the voltage applied to the driver 40 in the acceleration operation F1, and therefore there is no risk of damage to the controller P or the circuitry.

[0287] In this case, the measured acceleration value and the measured deceleration value may be measured between the first rpm and a second rpm lower than the first rpm. In other words, the weight may be sensed by measuring the value of the current in the section including the peak point in the speed graph. Since the value of the current is measured in a continuous situation, the possibility of errors may be minimized in sensing the weight.

[0288] The measured acceleration value and the measured deceleration value may be measured between the second rpm lower than the first rpm and a third rpm higher than the second rpm but lower than the first rpm. In other words, the weight may be sensed by measuring the value of the current in a section where the same speed is maintained, other than the section including the peak point. Since the change in speed is greatest at the peak point, the accuracy of the weight calculation may be improved by measuring a stabilized current.

[0289] The first rpm may be set to be lower than the fixed rpm at which the laundry accommodated inside the drum 30 is attached to the inner wall of the drum 30. That is, the first rpm may be lower than the rpm applied during the washing, rinsing, and dehydration cycles.

[0290] The acceleration operation F1 may correspond to the operation of rotating the drum, and the deceleration operation F2 may correspond to the operation of restoring the drum to the original position thereof. As a result, the restoration operation D2 may be the operation of actively applying current by the controller P to rotate the driver 40 in the reverse direction.

[0291] The weight sensing operation F3 may involve an operation in which the controller P directly calculates the moment of inertia, but the operation of comparing and

extracting the moment of inertia with weight data about the laundry stored in a storage part linked with the controller may be skipped.

[0292] The amount of current applied in the acceleration operation F1 may be defined as a first current amount, and the amount of current applied in the deceleration operation F2 may be defined as a second current amount. The controller P may sense the weight based on the first current amount and the second current amount.

[0293] FIG. 18-(b) illustrates another embodiment in which the controller calculates the weight of the laundry.

[0294] The figure illustrates that the deceleration operation F2 does not correspond to a deceleration operation in which current is applied to the driver 40 to rotate the drum 30 in the reverse direction, but rather correspond to a stopping operation in which power supplied to the driver 40 is cut off, allowing the driver 40 to be decelerated by the weight of the laundry to be restored.

[0295] The controller P may sense the counter electromotive force generated during the stopping operation and measure the value of current corresponding to the counter electromotive force to sense the weight of the laundry.

[0296] The amount of current applied in the acceleration operation F1 may be defined as the first current amount, and the amount of current applied in the stopping operation F2 may be defined as a third current amount. The controller P may sense the weight based on the first current amount and the third current amount.

[0297] FIG. 19 illustrates an embodiment in which the laundry treating apparatus according to the present disclosure utilizes a weight detection method based on the above-described structure and method.

[0298] FIG. 19A illustrates an embodiment in which the aforementioned weight sensing method is basically used.

[0299] When an input is provided through the power part 110 of the laundry treating apparatus according to the present disclosure is, power may be supplied to the water supply part 50, the driver 40, the drainage part 60, and the controller P.

[0300] The controller P may be configured to sense the weight of the laundry when power is supplied according to the input provided through the power part 110. For example, in the laundry treating apparatus according to the present disclosure, the input through the power part 110 may be a prerequisite for sensing the weight of the laundry.

[0301] Therefore, even when the user opens the door 11, places the laundry into the drum 30, and closes the door 11 before providing an input through the power part 110, the controller P may immediately sense the weight of the laundry.

[0302] The controller P may calculate the expected time required for execution of a specific course or option, based on the weight of the laundry.

[0303] To this end, the controller P may recognize the expected time corresponding to the weight of the laundry.

[0304] In addition, the controller P may have data organized for the amount of detergent required when performing any course or option according to the weight of the laundry. The controller P may calculate the amount of detergent required to wash the laundry according to the course or option.

[0305] For example, the laundry treating apparatus according to the present disclosure may perform a power supply operation A1 of supplying power by inputting the power part 110, and a weight sensing operation A2 of sensing the weight of the laundry accommodated in the drum 3 when the power supply operation A1 is performed.

[0306] In other words, the laundry treating apparatus according to the present disclosure may sense the weight before an input is provided through the execution part 120.

[0307] When the weight of the laundry is sensed in the weight sensing operation A2, an information display operation A3 may be performed in which the display part 150 displays weight information including at least one of the weight of the laundry, the expected execution time of a course or option for performing washing of the laundry, and the amount of detergent required for the course or option.

[0308] In the information display operation A3, the execution time corresponding to a preset standard course or standard option corresponding to the weight of the laundry may be displayed.

[0309] The user may check the weight of the laundry and the execution time of the preset course or option displayed in the information display operation A3, compare the same with their schedule, and check the amount of the detergent.

[0310] In other words, the laundry treating apparatus according to the present disclosure may allow the user to check the weight-related information before an input is provided through the execution part 120, and the user may select a desired course and option and provide an input through the execution part 120. That is, when the information displayed in the information display operation A3 is satisfactory, the user may provide an input through the execution part 120. The controller P may perform an execution input operation A6 of sensing the input provided through the execution part 120.

[0311] When the execution input operation A6 is performed, the controller P may control the locker 12 to lock the door 11 to the cabinet 10 to prevent the door 11 from being arbitrarily opened.

[0312] When the execution input operation A6 is performed, the controller P may perform one or more of a washing cycle, a rinsing cycle, and a dehydration cycle according to the setting of the course or option.

[0313] However, after the user checks at least one of the weight of the laundry, the execution time of the preset course or option, or the amount of the detergent in the information display operation A3, a course setting operation A4 of selecting a course and an option through the

course selection part 130 and the option selection part 140 may be further performed.

[0314] That is, the user may select any course or option instead of the standard course that is performed by default.

[0315] For example, through the course setting operation A4, the user may provide an input through one or more of the course selection part 130 and the option selection part 140 after checking the weight of the laundry. After checking the execution time linked with the weight, the user may provide an input through one or more of the course selection part 130 and the option selection part 140 to change the course or option.

[0316] When the course setting operation A4 is performed, the controller P may perform a change display operation A5 of recalculating the expected execution time or detergent amount of the changed course or option corresponding to the weight of the laundry and transmitting the same to the display part 150.

[0317] In the change display operation A5, the display part 150 may display at least one of the expected execution time of the changed course or option and the changed detergent amount.

[0318] When the user determines that the expected execution time or detergent amount is appropriate, the user may provide an input through the execution part 120. When the expected execution time or detergent amount is not appropriate, the user may re-provide an input through one or more of the course selection part 130 and the option selection part 140.

[0319] The controller P may perform the execution input operation A6 of sensing the input provided through the execution part 120.

[0320] However, when the input re-provided through one or more of the course selection part 130 and the option selection part 140 is sensed, the course setting operation A4 and the change display operation A5 may be performed again.

[0321] As a result, the laundry treating apparatus according to the present disclosure may complete weight sensing before the user selects and executes the final course and option. Further, by rotating the drum less than one revolution and calculating the weight within three seconds, information related to the weight may be provided before an input is provided through one or more of the course selection part 130 and the option selection part 140.

[0322] For example, weight sensing may already be completed at the time when the display part 150 is booted according to the input provided through the power part 110, and thus information corresponding to the weight may be provided to the user.

[0323] Therefore, the user may check the information related to the weight, check the expected time of the most suitable course and option at the current time, and then set the optimal course and option or introduce the optimal amount of detergent.

[0324] FIG. 19B illustrates an extended embodiment of

the control method of FIG. 19A.

[0325] The laundry treating apparatus according to the present disclosure may perform a power input operation A1 of supplying power to one or more of the controller P, the driver 40, the water supply part 50, the drainage part 60, and the control panel 100 when a command is input through the power part 110.

[0326] Once the power input operation A1 is performed, the laundry treating apparatus may perform a weight sensing operation A2 of sensing the weight of the laundry.

[0327] To sense the weight in the weight sensing operation A2, the drum may be rotated less than one revolution, as described above.

[0328] At this time, the controller P may also perform a laundry sensing operation A2-1 of sensing whether the laundry is accommodated in the drum 30. When there is laundry in the drum 30 in the laundry sensing operation A2-1, the control method of FIG. 19A may be performed.

[0329] However, when the laundry is not accommodated in the drum 30, the controller P may perform a door opening/closing sensing operation A2-2 of waiting until the door 11 is opened and closed.

[0330] That is, when the controller P does not sense the weight of the laundry, it may wait until it senses the opening and closing of the door.

[0331] Once the door opening/closing sensing operation A2-2 is performed, the controller P may perform the weight sensing operation A2 again to additionally sense the weight of the laundry.

[0332] Thus, for the laundry treating apparatus, in the case where laundry is accommodated in the drum 30 before an input is provided through the power part 110, the weight may be immediately sensed. However, in the case where laundry is not accommodated in the drum 30 before an input is provided through the power part 110, the weight of the laundry may be sensed when the laundry is put into the drum 30.

[0333] In other words, when an input is provided through the power part 110 and power is supplied to the controller P, the laundry treating apparatus according to the present disclosure may, in principle, immediately perform weight sensing.

[0334] Accordingly, the user may first put laundry into the drum 30 before providing an input through the power part 110. Then, when the input is provided through the power part 110, the controller P may perform weight sensing.

[0335] However, when there is no laundry inside the drum 30 before the input is provided through the power part 110, the controller P may perform weight sensing only when the door is opened and closed. Of course, whether laundry is present or not may be sensed by sensing the weight. In this case, when no weight is sensed, the weight may not be displayed on the display part 150.

[0336] Upon sensing the opening and closing of the door 11 is sensed after the input is provided through the

power part 110, the controller P may determine that laundry has been loaded, and may perform the weight sensing. Of course, when no weight is sensed, the display part 150 may not display the weight, or may display information indicating that no laundry is present inside.

[0337] When weight is sensed, the laundry treating apparatus according to the present disclosure may display on the display part 150 at least one of the weight information about the laundry, the execution time of a course or option corresponding to the weight, or the required amount of detergent.

[0338] As a result, the laundry treating apparatus according to the present disclosure may sense the weight of the laundry may be sensed before an input is provided through the execution part 120, and may provide information such as the execution time of a course or option or the required amount of detergent to the user.

[0339] Consequently, sensing and displaying the weight information about the laundry before the input is provided through the execution part 120 means that the drum 30 rotates with the door 11 unlocked, and the weight information is displayed on the display part 150.

[0340] FIG. 20 illustrates an embodiment in which weight detection is performed depending on whether a door is opened or closed.

[0341] Referring to FIG. 20A, the controller P may be configured to sense the weight of the laundry upon sensing the opening and closing of the door 11. That is, the condition for sensing the weight of the laundry may be the opening and closing of the door 11.

[0342] The opening and closing of the door 11 may mean that laundry is highly likely to have been loaded into the drum 30. In addition, the opening and closing of the door 11 may mean that the amount of laundry in the drum 30 has increased or decreased.

[0343] Thus, upon sensing the opening and closing of the door 11, the laundry treating apparatus according to the present disclosure may immediately sense the weight of the laundry and inform the user of the weight of the laundry, the expected or changed execution time of a course or option, or the required or changed amount of detergent.

[0344] The laundry treating apparatus of the present disclosure may perform an opening/closing operation B1 of sensing the opening and closing of the door 11. When the opening and closing of the door 11 is sensed in the opening/closing operation B1, the controller P may perform a weight sensing operation B2 of sensing the weight of the laundry, and perform an information display operation B3 of displaying at least one of the weight of the laundry, the execution time of a preset course or option, and the required amount of detergent according to the sensed weight.

[0345] In other words, the laundry treating apparatus according to the present disclosure may sense and display the weight of the laundry within three seconds in the above-described manner when the opening and closing of the door 11 is sensed, even before inputs are provided

through the course selection part 130 and the execution part 120.

[0346] After the information display operation B3, the controller P may sense whether the user provides an input through the execution part 120 to perform an execution input operation B6, and may sense whether the user changes the course or option to perform a course setting operation B4 and a change display operation B5.

[0347] The information display operation B3, the course setting operation B4, the change display operation B5, and the execution input operation B6 may be the same as those in the previous embodiment.

[0348] FIG. 20B illustrates an extended embodiment of FIG. 20A.

[0349] The laundry treating apparatus of the present disclosure may further perform a power input operation B0 of sensing whether power has been input before the opening/closing operation B1.

[0350] The power input operation B0 should be performed to allow power to be supplied to the controller P to enable the controller P to sense whether the door 11 is opened and closed.

[0351] Therefore, when the controller P senses that the door 11 is opened and closed after the power input operation B0, it may perform the weight sensing operation B2.

[0352] Once the opening and closing of the door 11 is sensed in the opening/closing operation B1, the controller P may perform the weight sensing operation B2 of sensing the weight of the laundry, and perform the information display operation B3 of displaying at least one of the weight of the laundry, the execution time of a preset course or option, and the required amount of detergent according to the sensed weight.

[0353] After the information display operation B3, the controller P may sense whether the user provides an input through the execution part 120 to perform the execution input operation B6, and may sense whether the user changes the course or option to perform the course setting operation B4 and the change display operation B5.

[0354] The information display operation B3, the course setting operation B4, the change display operation B5, and the execution input operation B6 may be the same as those in the previous embodiment.

[0355] Thus, upon sensing the opening and closing of the door 11 with power supplied to the laundry treating apparatus according to the present disclosure, the laundry treating apparatus may immediately sense the weight of the laundry and inform the user of the weight of the laundry, the expected or changed execution time of a course or option, or the required or changed amount of detergent.

[0356] FIG. 20C illustrates another extended embodiment of FIG. 20A.

[0357] The laundry treating apparatus of the present disclosure may be configured to store the history of the door 11 being opened and closed in a storage unit P2.

That is, even when no input is provided through the power part 110, standby power may be supplied to the control panel P, allowing the history of the door 11 being opened and closed to be stored.

[0358] Therefore, even before the input is provided through the power part 110, the laundry treating apparatus according to the present disclosure may perform a history storage operation B11 of storing the history of opening/closing of the door 11 in the controller P when the door 11 is opened and closed.

[0359] Subsequently, when the power input operation B0 is performed in which an input is provided through the power part 110 and power is supplied to the controller P, the controller P may perform the weight sensing operation B2.

[0360] When the opening and closing of the door 11 are sensed in the opening/closing operation B1, the controller P may perform the weight sensing operation B2 of sensing the weight of the laundry, and perform the information display operation B3 of displaying at least one of the weight of the laundry, the execution time of a preset course or option, and the required amount of detergent according to the sensed weight.

[0361] After the information display operation B3, the controller P may sense whether the user provides an input through the execution part 120 to perform the execution input operation B6, and may sense whether the user changes the course or option to perform the course setting operation B4 and the change display operation B5.

[0362] The information display operation B3, the course setting operation B4, the change display operation B5, and the execution input operation B6 may be the same as those in the previous embodiment.

[0363] Thus, even when the user opens the door 11 and pre-loads laundry into the drum 30 before an input is provided through the power part 110, the laundry treating apparatus according to the present disclosure may sense the weight of the laundry by checking the opening/closing of the door 11 once the input is provided through the power part 110.

[0364] Accordingly, the laundry treating apparatus according to the present disclosure may assist the user in selecting an optimal course, option, or amount of detergent before an input is provided through the execution part 120.

[0365] Therefore, the controller P may be configured to sense the weight of the laundry when an input is provided through the power part 110 or when the sensor 13 senses that the door closing the opening.

[0366] The controller P may be configured to sense the weight only when both the input provided through the power part 110 and the opening and closing of the door 11 are sensed, or to sense the weight when either the input is provided through the power part 110, or the door 11 is opened and closed.

[0367] In the laundry treating apparatus according to the present disclosure, the locker 12 may fix the door 11 to

the cabinet 1 only when an input is provided through the execution part 120 and a course and option are started. Therefore, when weight sensing is performed before an input is provided through the execution part 120, the door 11 may remain unlocked by the locker 12.

[0368] Thus, the user may open the door 11 during or even after the weight sensing to additionally load or remove laundry.

[0369] Upon sensing further opening and closing of the door 11, the laundry treating apparatus according to the present disclosure may re-perform weight sensing to sense whether the weight of the laundry has changed and may display information related to the changed weight on the display part 150.

[0370] That is, sensing the opening and closing of the door as described above for weight sensing may include re-sensing the weight when opening and closing of the door is additionally sensed after the initial weight sensing.

[0371] FIG. 21 illustrates another embodiment in which the laundry treating apparatus according to the present disclosure determines whether to additionally perform weight detection.

[0372] As described above, the laundry treating apparatus according to the present disclosure performs weight sensing again when the door 11 is re-opened and closed or when an input is provided again through the power part 110 such that power supply to the controller P is interrupted and then restored.

[0373] However, in the case where the time during which the door 11 is opened and closed is much shorter than a limited time T required to load laundry into the drum 3, the internal state of the drum 3 is unlikely to change. Similarly, in the case where the time during which an input is re-provided through the power part 110 and power is re-supplied to the controller P is much shorter than the limited time T required to load laundry, the internal state of the drum 3 is unlikely to change.

[0374] Accordingly, when the re-opening/closing time of the door 11 or the re-input time of the power part 110 is shorter than the limited time T, the laundry treating apparatus according to the present disclosure may not additionally perform weight sensing.

[0375] Thus, when the user mistakenly opens and quickly closes the door 11 or mistakenly provides an input through the power part 110 and then re-provides an input, the laundry treating apparatus according to the present disclosure may block weight sensing, thereby preventing unnecessary energy consumption.

[0376] The controller P may be configured to sense the time interval between an input and a re-input provided through the power part 110, and may also be configured to sense the time interval between the opening and closing of the opening 111 performed by the door 11 through the sensor 13 or the locker 12.

[0377] The limited time T may be, for example, shorter than one second.

[0378] The sensor 13 may be provided in the cabinet 1 to face the door 11 or be adjacent to the door 11, and may

be configured as a Hall sensor or reed switch configured to sense signals such as a magnetic field generated by the door 11. It may also sense the opening angle of the door 11 by sensing the strength of the magnetic field.

[0379] For example, when the sensor 13 does not sense the magnetic field, it may be determined that the door 11 has been opened beyond a loading gap, which is a minimum distance sufficient to load laundry through the opening 111. When the sensor senses the magnetic field, it may be determined that the door 11 has opened the opening 111 by a distance shorter than or equal to the loading gap.

[0380] In addition, the sensor 13 may be provided at a hinge that rotatably couples the door 11 to the cabinet 1 so as to sense the opening angle of the door 11.

[0381] As such, when the door 11 opens and closes the opening 111 within the loading gap, the laundry treating apparatus according to the present disclosure senses that may determine that the internal state of the drum 3 has not changed and may skip weight sensing.

[0382] The loading gap may be set, for example, to less than 10 cm.

[0383] Specifically, the laundry treating apparatus according to the present disclosure may perform a power input operation M1 of inputting a power command for supplying power to the controller P as an input of the power part 110. Subsequently, a door sensing operation M2 of sensing whether the door 11 has closed the opening 111 may be performed.

[0384] When the door 11 closes the opening 111, a weight sensing operation M3 of sensing the weight by rotating the drum less than one revolution may be performed.

[0385] The weight sensing operation M3 may be sensing the weight based on a current applied or output when the drum rotates less than one revolution. In this regard, the rotation angle of the drum may be set to be less than or equal to the angle at which laundry is separated from the inner wall of the drum or the arrangement of the laundry varies.

[0386] After the drum is rotated, the controller P may calculate the weight within two seconds in the weight sensing operation M3, and an information display operation M4 of displaying information related to the sensed weight on the display part 150 may be performed within three seconds.

[0387] Subsequently, before an input is provided through the execution part 120, the controller P may perform a state sensing operation M5 of sensing whether the door 11 has opened and closed the opening 111, or whether an input has been re-provided through the power part 110.

[0388] In the state sensing operation L5, when it is sensed that the door 11 has re-opened and closed the opening 111, or that an input has been provided through the power part 110 again to supply interrupted power to the controller P again, the controller P may perform a limit determination operation M6 of determining whether the

time during which the door 11 has re-opened and closed the opening or the time during which an input is repeatedly provided through the power part 110 is within a limited time.

[0389] When the time during which the door 11 has re-opened and closed the opening or the time during which an input is repeatedly provided through the power part 110 is the limited time or longer than the limited time in the limit determination operation M6, the weight sensing operation M3 may be performed again, and the information display operation M4 may be performed again to correct the existing information to information corresponding to the newly sensed weight.

[0390] On the other hand, when the time during which the door 11 has re-opened and closed the opening or the time during which an input is repeatedly provided through the power part 110 is shorter than the limited time in the limit determination operation M6, the controller P may perform an ignore operation M7 in which weight sensing is no longer performed even when the door re-opens and closes the opening or an input is re-provided through the power part.

[0391] In the limit determination operation M6, it may also be determined whether the degree, interval, or angle at which the door 11 opens the opening 111 is smaller than a loading interval that allows the laundry to be loaded.

[0392] For example, the sensor 13 provided in the cabinet 1 may be configured to calculate the degree of opening of the door 11 based on the sensing value sensed by a Hall sensor, or a hinge provided on the door 11 may be configured to sense the opening angle.

[0393] While the ignore operation M7 is being performed, or while the information display operation M4 is being performed, an execution input operation M8 may be performed, in which an input is provided through the execution part 120 and an execution command for executing the course and option selected by the course selection part 130 is input.

[0394] Once the execution input operation M8 is performed, the locker 12 may perform a door locking operation M9 of locking the door 11 to the cabinet 1 to block the opening 111 from being opened.

[0395] Hereinafter, a description will be given of how the control method of the laundry treating apparatus according to the present disclosure is implemented.

[0396] FIG. 22 illustrates an embodiment of a control method of the laundry treating apparatus according to the present disclosure implemented on a washing panel or a drying panel.

[0397] Since the washing panel 100a and the drying panel 100b have the same structure, an embodiment applied to the washing panel 100a will be described for the sake of avoiding redundant description.

[0398] Referring to FIG. 22-(a), when a user provides an input through the power part 100, power is supplied to the main display 150 disposed inside the course display 130.

[0399] The main display 150 displays booting information G1 indicating that the washing machine 1 is in a preparation state.

[0400] The booting information may include a welcome message such as "Hello," or one or more of an icon, pictogram, or hologram indicating that booting is being performed.

[0401] While the booting information is displayed, the laundry treating apparatus according to the present disclosure may immediately control the driver 40 to rotate the drum 30 and sense the weight of laundry. To quickly sense the weight of the laundry, the drum 30 may be rotated less than one revolution.

[0402] At this time, since an input has not yet been provided through the execution part 120, the locker 12 may keep the door unlocked.

[0403] When the booting of the washing panel 100a is completed, the controller may have already completed the sensing of the weight of the laundry.

[0404] Referring to FIG. 22-(b), one or more of weight information I and a selected course C may be displayed on the display part 150. The selected course C may correspond to a course that is automatically selected when the washing panel 100a is booted, even when the user does not select the same through the course selection part 130. For example, the automatically selected course C may correspond to a standard course.

[0405] The weight information I may include one or more of information on the weight of the laundry, an expected time I2 for treating the laundry of the weight in the course, and a required detergent amount I3 for treating the laundry of the weight in the course.

[0406] The display part 150 may display the weight information I even when the user has not input a separate command after providing an input through the power part 110. Thus, the user may recognize the amount of detergent required to treat the loaded laundry and the expected execution time of the course for treating the laundry.

[0407] During this process, the user may change the course by rotating the course selection part 130. At this time, the execution time I2 may be changed to an expected execution time corresponding to the changed course and displayed.

[0408] Referring to FIG. 22-(c), after checking one or more of the weight information I and the selected course C, the user may provide an input through the execution part 120. At the time when the user provides the input through the execution part 120, it is highly likely that the user has already recognized the expected execution time I2.

[0409] Therefore, when the user provides an input through the execution part 120, the user may recognize the time at which the course will be completed, and then accurately make a plan to return to the washing machine 1 after that time elapses. After providing the input through the execution part 120, the user may immediately leave the washing machine 1 and carry out personal sche-

dules.

[0410] Referring to FIG. 22-(d), when an input is provided through the execution part 120, the locker 12 may fix the door 11 to the cabinet 10 to block the opening from being arbitrarily opened.

[0411] The display part 150 may display state information about the course that is being executed.

[0412] The state information may include one or more of a guide text indicating that the course is being executed and the remaining time.

[0413] Once an input is provided through the execution part 120, the laundry treating apparatus according to the present disclosure may execute the selected course. For example, when the course is a washing course, water supply may start immediately, or the drum may rotate to agitate the laundry and then the water supply may start.

[0414] In the case where it is sensed that the door 11 is not closed, the course may be executed after the door 11 is closed.

[0415] FIG. 23 illustrates an embodiment of a control method of the laundry treating apparatus according to the present disclosure implemented on a shared panel.

[0416] Referring to FIG. 23-(a), when the input is provided through one or more of the washing power part 110 and the drying power part 110, one or more of the washing display 150a and the drying display 150b may display booting information G1.

[0417] The booting information may include a welcome message such as "Hello," or one or more of an icon, pictogram, or hologram indicating that booting is being performed.

[0418] While the booting information is displayed, the laundry treating apparatus according to the present disclosure may immediately control the driver 40 of the washing machine 1 or the dryer 2 for which the input is provided through the power part 110 to rotate the drum 30 and sense the weight of laundry. To quickly sense the weight of the laundry, the drum 30 of the washing machine 1 or the dryer 2 for which the input is provided through the power part 110 may be rotated less than one revolution.

[0419] At this time, since an input has not yet been provided through the execution part 120, the locker 12 may keep the door unlocked.

[0420] When the booting of the washing machine 1 or the dryer 2 for which the input is provided through the power part 110 is completed, the controller may have already completed the sensing of the weight of the laundry.

[0421] Referring to FIG. 23-(b), one or more of weight information I and a selected course C may be displayed on the display part 150 of the washing machine 1 or the dryer 2 for which the input is provided through the power part 110. The selected course C may correspond to a course that is automatically selected when the control panel 100 is booted, even when the user does not select the same through the course selection part 130. For example, the automatically selected course C may cor-

respond to a standard course.

[0422] The weight information I may include one or more of information on the weight of the laundry, an expected time I2 for treating the laundry of the weight in the course, and a required detergent amount I3 for treating the laundry of the weight in the course.

[0423] When the weight of laundry in the drum is not sensed, the display part 150 may display information indicating that laundry is not present. In this case, the controller may wait for the opening and closing of the door 11, and then re-sense the weight of laundry in the manner described above.

[0424] The display part 150 of the washing machine 1 or the dryer 2 for which the input is provided through the power part 110 may display the weight information I even when the user has not input a separate command after providing an input through the power part 110. Thus, the user may recognize the amount of detergent required to treat the loaded laundry and the expected execution time of the course for treating the laundry.

[0425] During this process, the user may change the course by pressing the course selection part 130. At this time, the execution time I2 may be changed to an expected execution time corresponding to the changed course and displayed.

[0426] Referring to FIG. 23-(c), after checking one or more of the weight information I and the selected course C, the user may provide an input through the execution part 120. At the time when the user provides the input through the execution part 120, it is highly likely that the user has already recognized the expected execution time I2.

[0427] Therefore, when the user provides an input through the execution part 120, the user may recognize the time at which the course will be completed, and then accurately make a plan to return to the wish tower 3 after that time elapses. After providing the input through the execution part 120, the user may immediately leave the wish tower 3 and carry out personal schedules.

[0428] Referring to FIG. 23-(d), when an input is provided through the execution part 120, the locker 12 of the washing machine 1 or the dryer 2 for which the input is provided through the power part 110 may fix the door 11 to the cabinet 10 to block the opening from being arbitrarily opened.

[0429] The display part 150 of the washing machine 1 or the dryer 2 for which the input is provided through the power part 110 may display state information about the course that is being executed.

[0430] The state information may include one or more of a guide text indicating that the course is being executed and the remaining time.

[0431] Once an input is provided through the execution part 120, the laundry treating apparatus according to the present disclosure may execute the selected course. For example, when the course is a washing course, water supply may start immediately, or the drum may rotate to agitate the laundry and then the water supply may start.

When the course is a drying course, a blower fan may rotate or a compressor may be driven.

[0432] In the case where it is sensed that the door 11 is not closed, the course may be executed after the door 11 is closed.

[0433] FIG. 24 illustrates an embodiment of a control method of the laundry treating apparatus according to the present disclosure implemented on an integrated panel, and FIG. 25 illustrates an embodiment of the control method of the laundry treating apparatus according to the present disclosure implemented on a mini panel.

[0434] Since the integrated panel and the mini panel only differ in structure but retain the configuration of the control panel 100, the above-described control method may be applied as it is. Therefore, a description with reference to the figures is omitted.

[0435] The figures illustrate that the laundry treating apparatus according to the present disclosure senses even additional information while sensing the laundry.

[0436] The laundry treating apparatus according to the present disclosure may acquire a large amount of information based on the current generated in the driver 40 or applied to the driver 40 while rotating the drum less than one full revolution.

[0437] As described above, when the laundry treating apparatus of the present disclosure rotates the drum 30 less than one full revolution to sense the weight of the laundry, it may also determine whether the laundry is wet or dry and whether a non-laundry object, such as an animal or a person, has been placed inside the drum 30.

[0438] As a result, before an input is provided through the execution part 120, the laundry treating apparatus of the present disclosure may determine the weight information about the laundry, whether the laundry is wet or dry, and whether a living creature has been placed inside the drum 30. Therefore, the laundry treating apparatus of the present disclosure may acquire a large amount of information before the door 11 is locked and before a course is executed, thereby enabling adjustment of the course settings for optimal execution of the course, or enabling the user to execute an appropriate course or to rescue a living creature without injury based on the information.

[0439] FIG. 26 illustrates a method by which the laundry treating apparatus according to the present disclosure determines the total moisture content of laundry while sensing the weight of the laundry.

[0440] FIG. 26-(a) illustrates a case where loaded laundry of the same weight is dry laundry, and FIG. 26-(b) illustrates a case where loaded laundry of the same weight is wet laundry.

[0441] The laundry treating apparatus according to the present disclosure may determine whether the laundry is wet laundry containing water or dry laundry by rotating the drum, and may calculate the moisture content of the laundry when the laundry is wet laundry.

[0442] For example, even when wet laundry and dry laundry have the same weight, the volumes thereof may

differ. In the case of the dry laundry, the proportion of the weight contributed by the laundry itself is large, and thus the volume is large. In the case of the wet laundry, the proportion of the weight contributed by the laundry is small, and thus the volume is small.

[0443] Accordingly, when the drum 30 is rotated by the same angle, the distance between the center of gravity of the laundry and the center of gravity of the drum corresponds to a first length r_1 for the dry laundry, while the distance between the center of gravity of the laundry and the center of gravity of the drum corresponds to a second length r_2 , much longer than the first length r_1 , for wet laundry.

[0444] Therefore, the torque T_{load} applied by the wet laundry to the drum is set greater than the torque T_{load} applied by the dry laundry.

[0445] The controller of the laundry treating apparatus according to the present disclosure may measure the weight in the drum and the torque generated on the drum to determine whether the laundry is dry or wet.

[0446] Moreover, in the case of the wet laundry, the controller of the laundry treating apparatus according to the present disclosure may immediately determine the moisture content of the laundry based on the torque difference caused by the moisture. For this purpose, the controller may have a table correlating torque with changes in weight and moisture content.

[0447] As shown in the figure, the laundry treating apparatus according to the present disclosure may rotate the drum 30 with a constant force T_e and determine whether the laundry is dry or wet based on at least one of the difference in angle of rotation of the drum 30 or the difference in torque generated when the drum 30 returns to the original position thereof. When the laundry is wet laundry, the device may also calculate the moisture content.

[0448] When the laundry is dry laundry L1, the drum 30 rotates by angle a when a specific force T_e is applied to rotate the drum 30. In the case of the wet laundry, even when the weight of the laundry is the same as that of the dry laundry, the drum 30 rotates by angle b smaller than the angle a when the specific force T_e is applied to rotate the drum 30. Further, the laundry is wet laundry L2, the torque applied by the laundry to the drum 30 differs from the case of the dry laundry due to the center of gravity of the wet laundry different from that of the dry laundry.

[0449] Based on this principle, the laundry treating apparatus according to the present disclosure may rotate the drum less than one full revolution to determine whether the laundry is dry laundry or wet laundry and to calculate the moisture content.

[0450] As a result, while rotating the drum less than one full revolution to sense the weight of the laundry, the laundry treating apparatus according to the present disclosure may not only sense the weight of the laundry but also calculate whether the laundry is wet and the moisture content of the laundry.

[0451] FIG. 27 illustrates an embodiment in which the

laundry treating apparatus according to the present disclosure senses whether a living creature has been placed into the drum (for a small animal, a smaller rotation angle and shorter time).

[0452] Before an input is provided through the power part 110 or before the door 11 is locked, an animal or a small creature *i*, such as a small child, may be placed inside the drum 30. The term "small creature *i*" may refer to a living creature whose body weight falls within the range of the weight of laundry generally loaded in a washing machine.

[0453] In this case, it may be difficult to distinguish, based solely on the sensed weight *m*, whether a small creature *A* has been placed inside the drum 30.

[0454] Of course, since the density of the small creature *i* is generally greater than that of dry laundry, it may be distinguished from the laundry using the same method applied to distinguish between dry laundry and wet laundry. However, the density of wet laundry having a high moisture content may be similar to that of the small creature *i* with a low density, making it difficult to distinguish between the wet laundry and the small creature *i*.

[0455] Therefore, the laundry treating apparatus according to the present disclosure may sense whether a small creature *i* has been placed in the drum by identifying structural differences between the small creature *i* and the wet laundry *L2*.

[0456] Referring to FIG. 27-(a), the wet laundry *L2* having a first weight *m* may be placed inside the drum 30. In this case, as the wet laundry *L2* absorbs more water, it tends to sink further toward the lower portion of the drum 30, thereby increasing the distance between the center of gravity of the wet laundry and the rotational center of the drum. The increased distance is set as a second length *r2*. The second length *r2* may be greater than the first length *r1* because the density of the small creature *i* is greater than that of dry laundry.

[0457] When the drum is rotated by a specific force *Te*, the drum 30 may rotate by an angle *b*. At this time, the torque generated when the rotation of the drum 30 ends and the drum returns to the original position thereof may be measured as $m_{gr}2\sin b$.

[0458] In this process, the controller 30 may sense the weight of the laundry using the method described above and calculate the second length *r2* based on the torque value. The angle *b* may be directly identified from the driver 40 or calculated by the controller based on the rotation time or return time of the drum 30.

[0459] Referring to FIG. 27-(b), a small living creature *i* having the first weight *m* may be placed inside the drum 30. Even when the small creature *i* has the same weight as the wet laundry *L2*, the body structure thereof causes the center of gravity to be positioned higher than that of the wet laundry *L2* on the bottom surface of the drum 30. Therefore, even when the small creature *i* has a density similar to that of the wet laundry *L2*, the distance between the center of gravity of the small creature *i* and the rotational center of the drum 30 is set to a third length

r3, which is less than the second length *r2*.

[0460] When the drum is rotated with a specific force *Te*, the drum 30 may rotate by an angle *c*. Since the center of gravity of the small creature *i* is positioned higher, the angle *c* may be set larger than the angle *b*. The torque generated when the rotation of the drum 30 ends and the drum returns to the original position thereof may be measured as $m_{gr}3\sin c$.

[0461] In this process, the controller 30 may sense the weight of the laundry using the method described above and calculate the third length *r3* based on the torque value. The angle *c* may be directly identified from the driver 40 or calculated by the controller based on the rotation time or return time of the drum 30.

[0462] The controller 30 may determine that at least one of the third length *r3* and the angle *c* cannot correspond to laundry such as dry or wet laundry. As a result, the laundry treating apparatus according to the present disclosure may determine the presence of the small creature *i*, even when the weight and density the small creature *i* are similar to those of the wet laundry *L2*.

[0463] Although FIG. 27 illustrates the sensing of the small creature *i* whose weight falls within the weight range of typical laundry, a larger creature *II* whose weight exceeds the weight range of typical laundry may also be sensed using the same method. That is, while the drum 30 returns to the original position thereof after the drum 30 is rotated with a specific force *Te* to measure the weight, the laundry treating apparatus according to the present disclosure may sense a living body based on a difference in the distance between the center of the drum and the center of gravity, a difference in rotation angle of the drum, or a difference in torque generated in the drum between the laundry *A* and the living creature *H*.

[0464] FIG. 28 illustrates an additional embodiment in which the laundry treating apparatus according to the present disclosure performs living body sensing.

[0465] When a large living creature *II* corresponding to a human like a small child or a large animal is placed inside the drum 30, it may be sensed during the aforementioned weight sensing process.

[0466] The large creature *II* may refer to a living creature whose body weight is greater than that of normal laundry loaded into the laundry treating apparatus. Therefore, when the laundry treating apparatus according to the present disclosure senses the weight inside the drum 30 as a second weight *M2* during the weight sensing process, it may immediately determine that a living creature has been placed inside the drum 30. Since the sensed weight greater than or equal to the second weight *M2* may clearly indicate that the load is not laundry, the apparatus may determine that a living body has been sensed and prompts the user to check the drum 30.

[0467] The large creature *II* has a body weight exceeding than the weight range of normal laundry and a relatively large volume, and accordingly the center of gravity thereof may be positioned very close to, or higher than, the rotational center of the drum. Thus, the distance

between the center of gravity of the large creature II and the center of the drum may be set to a fourth length r_4 . The fourth length r_4 may be greater than the first length r_1 but less than the third length r_3 .

[0468] Accordingly, when sensing the weight of the laundry, the laundry treating apparatus according to the present disclosure may rotate the drum with a specific force T_e , causing the drum 30 to rotate by an angle d . As the center of gravity of the large creature II is positioned higher, the drum may be expected to rotate further. However, the large mass of the creature may generate an opposing torque. Thus, the angle may be set smaller than the angle b .

[0469] The torque generated when the rotation of the drum 30 ends and the drum returns to the original position thereof may be measured as $m_{gr4} \sin d$. In this process, the controller 30 may sense the weight of the laundry using the method described above and calculate the fourth length r_4 based on the torque value. The angle d may be directly identified from the driver 40 or calculated by the controller based on the rotation time or return time of the drum 30.

[0470] The controller may determine that at least one of the fourth length r_4 and the angle d cannot correspond to typical laundry, such as dry or wet laundry, thereby recognizing that a large creature II has been placed inside the drum 30.

[0471] The laundry treating apparatus according to the present disclosure may rotate the drum less than one full revolution to sense the laundry weight, thereby measuring various parameters such as the rotation angle of the drum, the specific force required to rotate the drum, and the torque generated during return of the drum. The controller may have stored data corresponding to the angles, forces, and torques for dry laundry, wet laundry, and different moisture content levels of wet laundry. Thus, the controller may distinguish between dry laundry and wet laundry and even determine the moisture content level in the case of wet laundry.

[0472] Furthermore, when the computed angle, force, or torque deviates from the possible ranges for dry or wet laundry, the controller may immediately sense that a living creature has been placed inside the drum 30.

[0473] Using the same method, the controller may also sense whether foreign objects such as stones or metal have been loaded into the drum 30.

[0474] The loading of a living creature that is not laundry into the drum 30 corresponds to an abnormal condition. The laundry treating apparatus according to the present disclosure may sense the abnormal condition by rotating the drum 30. Moreover, when the abnormal condition is sensed, the laundry treating apparatus according to the present disclosure may take actions to preserve the life of the living creature inside the drum 30 or prompt the user to safely rescue the living creature.

[0475] Hereinafter, a description will be given of a control method of the laundry treating apparatus according to the present disclosure that is used when the

laundry treating apparatus senses a living creature through weight sensing.

[0476] FIG. 29 illustrates a case where the control method is implemented when a living body is sensed while the control panel is provided as a washing panel or a drying panel.

[0477] Referring to FIG. 29-(a), when an input is received through the power part 110 and power is supplied to the control panel 100, the controller, and the driver 40, the display part 150 may display booting information G1.

[0478] Since the power part 110 and the operation unit 120 are implemented as physical buttons, they may be illuminated to indicate that they are ready to receive additional power or execution commands.

[0479] Referring to FIG. 29-(b), when an input is received through the power part 110 or the opening and closing of the door 11 is sensed, the laundry treating apparatus according to the present disclosure may automatically rotate the drum 30 to sense the weight of the laundry. The driver 40 may control the drum 30 to rotate less than one full revolution and then return to the original position thereof.

[0480] The controller may not only sense the weight of the laundry but also sense whether the laundry is wet, the moisture content level of the laundry, and even sense the presence of a living creature inside the drum 30 while the drum 30 rotates less than one full revolution and returns the original position thereof.

[0481] The display part 150 may display measurement information G2 to indicate that the internal condition of the drum 30 is being sensed.

[0482] Referring to FIG. 29-(c), when a living creature or a foreign object is sensed inside the drum 30, indicating an abnormal condition, the display part 150 may display abnormality information A indicating the occurrence of an abnormal condition.

[0483] The abnormality information A may include a warning message A1 indicating that an abnormal condition has occurred and a request message A2 prompting the user to take action to resolve the abnormal condition.

[0484] The warning message A1 may include one or more characters, pictograms, holograms, or icons that may indicate "Caution!", "Warning!", or "Emergency!".

[0485] The request message A2 may include a guidance text such as "Please check inside the drum 30."

[0486] By displaying the warning message A1, the display part 150 may inform the user that a problem has occurred due to the abnormal condition. Also, by displaying the request message A2, it may prompt the user to rescue the living creature I, II.

[0487] Referring to FIG. 29-(d), the laundry treating apparatus according to the present disclosure may take emergency measures to preserve the life of the living creature inside the drum 30 and display an action message indicating that such measures are being taken.

[0488] Specifically, when a living body is sensed, the laundry treating apparatus according to the present disclosure may deactivate at least one of the power part 110

and the execution part 120 to disable the input from being received.

[0489] By disabling the input from being received by the power part 110, the laundry treating apparatus according to the present disclosure may prevent power from being cut off to suddenly stop displaying the abnormality information.

[0490] By disabling the input from being received by the execution part 120, the laundry treating apparatus according to the present disclosure may prevent a course from being executed while a living creature is inside the drum 30. As a result, the locker 12 may maintain the door in an unlocked state, allowing the living creature I, II to escape at any time. Furthermore, the apparatus may prevent the drum 30 from rotating one or more full revolutions, thereby preventing the living creature I, II from being injured. The apparatus may also block the water supply valve 51 from being opened and the heat supplier 90 from being operated, thereby preventing any change in the internal conditions of the drum 30 and avoiding situations in which the life of the living creature I, II could be endangered.

[0491] The abnormality information A display part on the display part 150 may include emergency information A3 indicating that the laundry treating apparatus has taken emergency measures.

[0492] The emergency information A3 may include one or more of escape information A31 indicating that the door remains unlocked, maintenance information A32 indicating that all components that may change the water level, air, or temperature inside the drum are blocked from operating, and transmission information A33 indicating that the abnormal condition is reported externally to request immediate rescue.

[0493] When the control panel 100 includes a speaker, various sounds indicating the abnormal condition may be emitted. Thereby, the laundry treating apparatus may actively prompt a user outside the apparatus to take rescue action or encourage the living creature inside the drum 30 to escape on its own.

[0494] The laundry processing apparatus of the present disclosure may include a communication module configured to communicate with an external server or external terminal controlling the laundry processing apparatus. The laundry processing apparatus of the present disclosure may transmit the abnormality information to the server and the external terminal using the communication module.

[0495] FIG. 30 illustrates a case where the control method is implemented when a living body is sensed while the control panel is provided as an integrated panel.

[0496] The integrated panel shown in FIG. 30 differs from the panel of FIG. 29 only in that the power part 110 and the execution part 120 are implemented as touch areas rather than physical buttons. Therefore, the same control method described in FIG. 29 may be applied.

[0497] Referring to FIG. 30-(a), when an input is received through the power part 110, the areas correspond-

ing to the power part 110, the display part 150, and the execution part 120 are all illuminated.

[0498] In FIGS. 30-(b) and 30-(c), the display part 150 may display the measurement information G2 or the abnormality information A in the same manner.

[0499] Referring to FIG. 30-(d), when the laundry treating apparatus according to the present disclosure senses an abnormal condition, the power part 110 and the execution part 120 may remain unlit, and the display part 150 may display the emergency information A3.

[0500] When the integrated panel 100d controls even the mini wash, the display part 150 may additionally indicate whether the abnormal condition has occurred in the integrated apparatus 4 or the mini apparatus 5.

[0501] In addition, emergency measures may be taken only in the apparatus (either the integrated apparatus 4 or the mini apparatus 5) where the abnormal condition has occurred. Alternatively, emergency measures may be applied to both the integrated apparatus 4 and the mini apparatus 5 to ensure that the user may clearly recognize that an abnormal condition has occurred.

[0502] Although not illustrated, when the laundry treating apparatus according to the present disclosure includes a shared apparatus and a mini apparatus, the same control method described above may be applied. In the case of the shared apparatus, the shared panel 100c may take emergency measures only for the washing machine 1 or the dryer 2, i.e., the apparatus where the abnormal condition is sensed, and the abnormality information A may be displayed in the corresponding area of the display part 150 of the apparatus.

[0503] Alternatively, to prompt the user to take actively rescue action, the abnormality information A may be displayed across the entire display 150, and emergency measures may be taken on both the washing machine 1 and the dryer 2. For example, when water has been supplied to the washing machine 1 but the dryer 2 remains in a normal condition, the user may notice that the execution part 120 of the dryer 2 is disabled or that the abnormality information A is displayed even on the dryer 2, and may thus check the washing machine 1.

[0504] It will be apparent to those skilled in the art that various modifications and variations may be made in the present disclosure without departing from the spirit and scope of the disclosure. Thus, it is intended that the present disclosure cover the modifications and variations of this disclosure provided they come within the scope of the appended claims and their equivalents.

Claims

1. A laundry treating apparatus comprising:

- a cabinet having an opening at a front side;
- a door coupled to the cabinet to open and close the opening;
- a sensor configured to sense whether the door

closes the opening;
 a locker arranged to lock the door to the cabinet;
 a drum accommodated inside the cabinet to
 accommodate laundry;
 a driver connected to the drum to rotate the
 drum; and
 a control panel comprising:

a power part configured to receive an input
 of a power command to supply power;
 a display part configured to display weight
 information about the laundry and an ab-
 normal condition indicating that an animal or
 a person is placed inside the drum; and
 an execution part configured to receive an
 input of an execution command to execute a
 course for treating the laundry,
 wherein:

the driver is configured to rotate the
 drum with the door unlocked by the
 locker when the power part receives
 the input of the power command;
 the display part is configured to display
 the weight information after the drum
 starts to rotate; and
 the execution part is configured to re-
 ceive the input of the execution com-
 mand while the display part displays the
 weight information after the drum starts
 to rotate,
 wherein, based on that the person or
 the animal is placed inside the drum,
 the driver is configured to rotate the
 drum and then stop the drum when
 the power part receives the input of
 the command or when the sensor
 senses the door opened and closed,
 wherein the display part is configured to
 display the abnormal condition after the
 drum stops.

2. The laundry treating apparatus of claim 1, wherein
 the driver is configured to rotate the drum and then
 stops the drum with the door unlocked by the locker.
3. The laundry treating apparatus of claim 2, wherein
 the driver is configured to rotate the drum less than
 one full revolution and then stops the drum with the
 door unlocked,
 wherein the display part is configured to display the
 abnormal condition after the drum stops.
4. The laundry treating apparatus of claim 3, wherein
 the display part is configured to display the abnormal
 condition while the locker keeps the door unlocked.
5. The laundry treating apparatus of claim 1, wherein

the control panel further comprises:

a selection part configured to receive an input of
 a selection command to select one of a plurality
 of courses,
 wherein, based on the abnormal condition being
 displayed on the display part, the selection part
 is deactivated to disable the input of the selec-
 tion command from being received.

6. The laundry treating apparatus of claim 1, wherein
 the control panel further comprises:

a selection part configured to receive an input of
 a selection command to select one of a plurality
 of courses; and
 an execution part configured to receive an ex-
 ecution command to execute the selected
 course,
 wherein, based on the abnormal condition being
 displayed on the display part, the execution part
 is deactivated to disable the input of the execu-
 tion command from being received.

7. The laundry treating apparatus of claim 1, wherein,
 based on the abnormal condition being displayed on
 the display part, the locker keeps the door unlocked.

8. The laundry treating apparatus of claim 1, further
 comprising:

a supplier configured to supply water or steam
 into the drum,
 wherein, based on the abnormal condition being
 displayed on the display part, the supplier blocks
 supply of the water or steam into the drum.

9. The laundry treating apparatus of claim 1, further
 comprising:

a communication module provided inside the
 cabinet and configured to communicate with
 an external terminal or a server,
 wherein, based on the abnormal condition being
 displayed on the display part, the communica-
 tion module is configured to transmit the abnor-
 mal condition to the external terminal or the
 server.

10. The laundry treating apparatus of claim 1, wherein,
 based on a sensed weight of the laundry being
 greater than or equal to 10 kg, the display part is
 configured to display the abnormal condition.

11. The laundry treating apparatus of claim 1, wherein,
 based on that a time taken for the drum to stop while
 the driver rotates and stops the drum is less than a
 specific time, the display part is configured to display

the abnormal condition.

12. The laundry treating apparatus of claim 1, wherein,
based on that the drum rotates by an angle less than
a specific angle while the driver rotates and stops the 5
drum, the display part is configured to display the
abnormal condition.
13. The laundry treating apparatus of claim 1, wherein, 10
based on only laundry being accommodated in the
drum, the display part is configured to display the
weight information,
wherein, based on the person or the animal being
placed inside the drum, the display part is configured
to display the abnormal condition. 15

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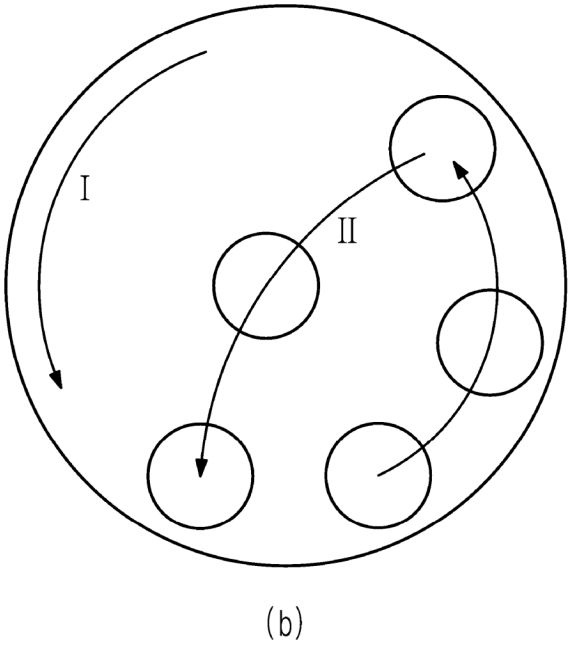
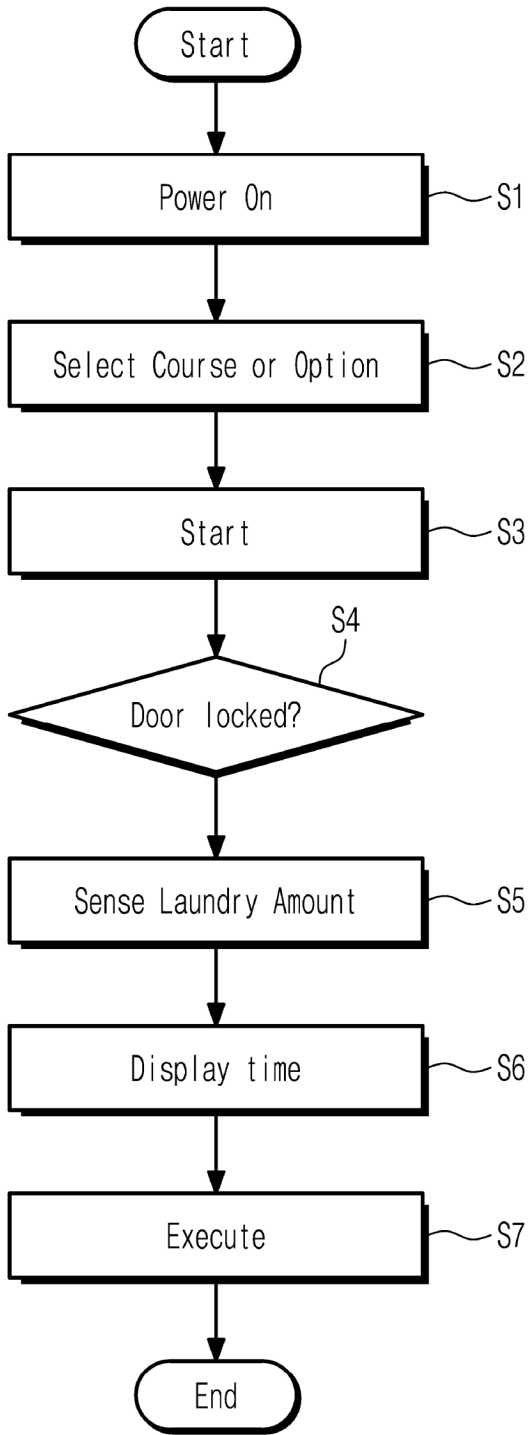
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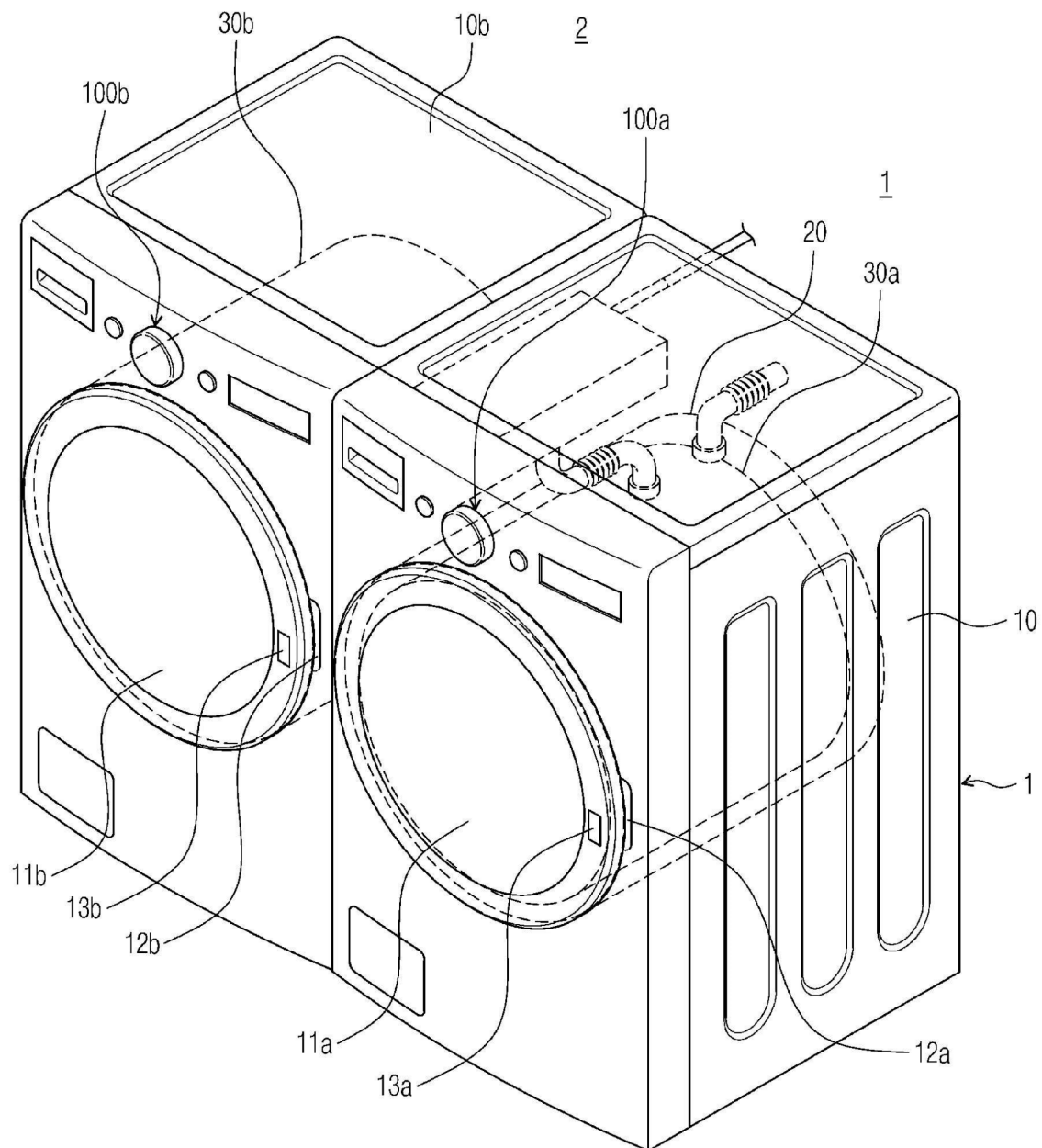
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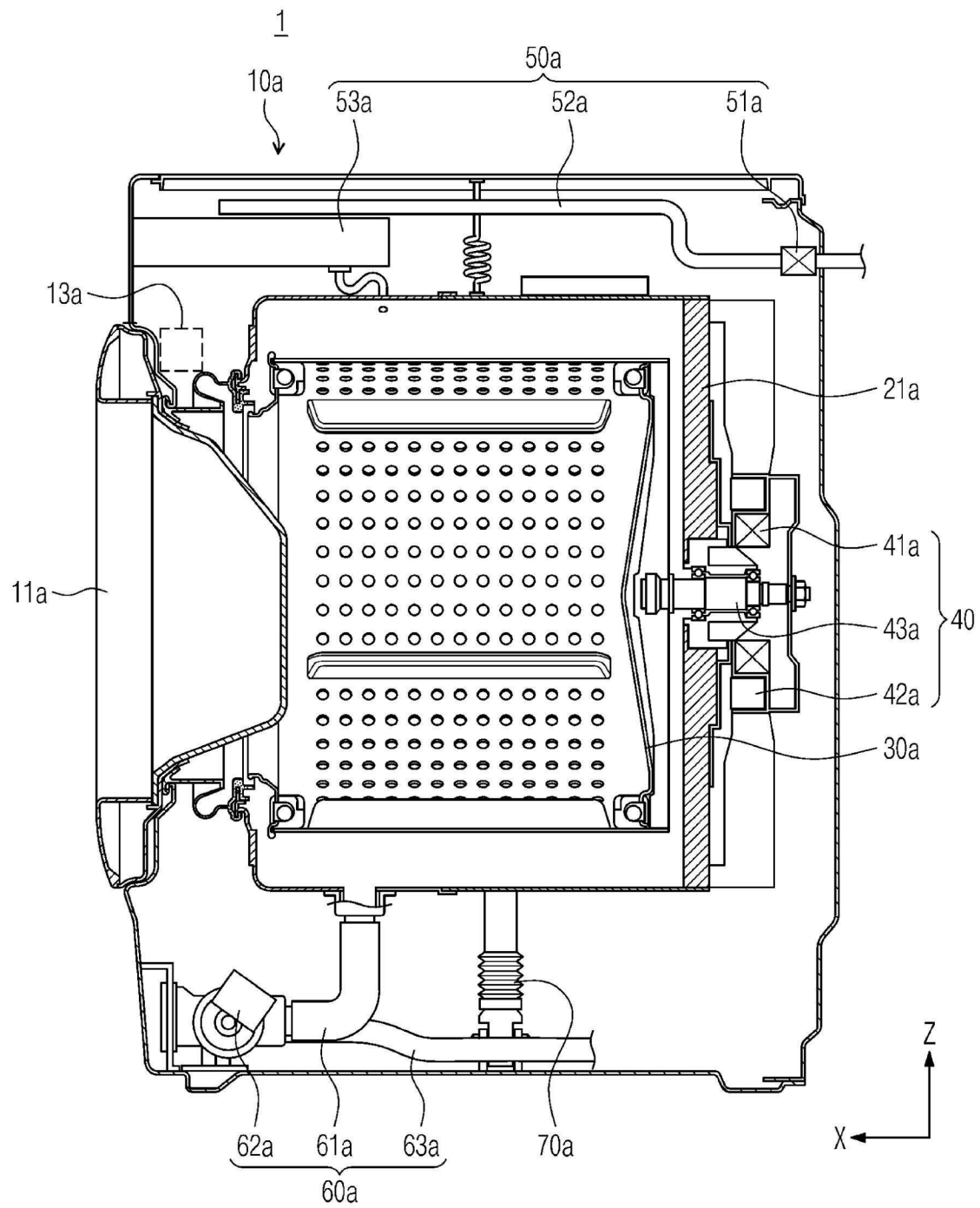
【FIG 1】



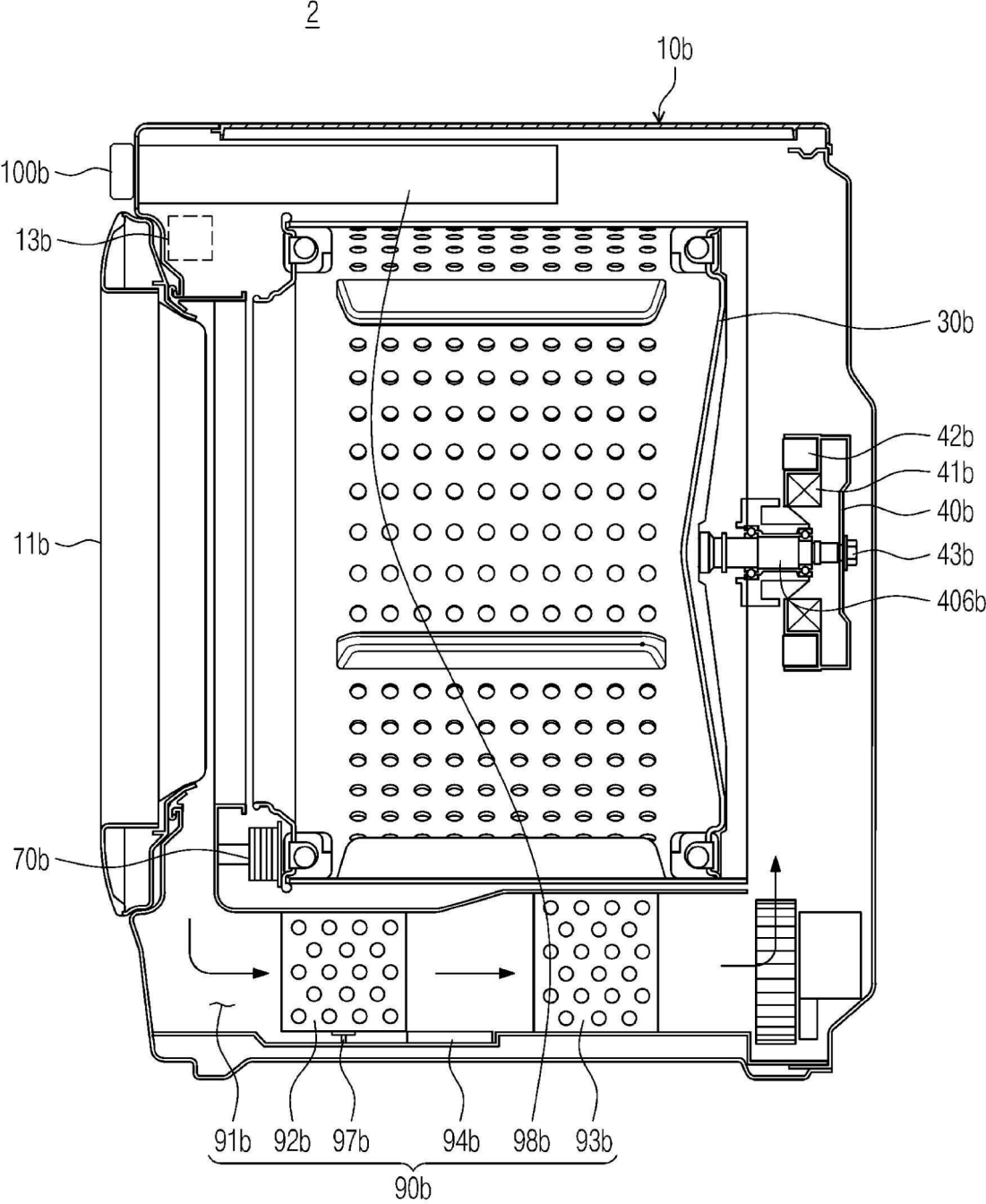
【FIG 2】



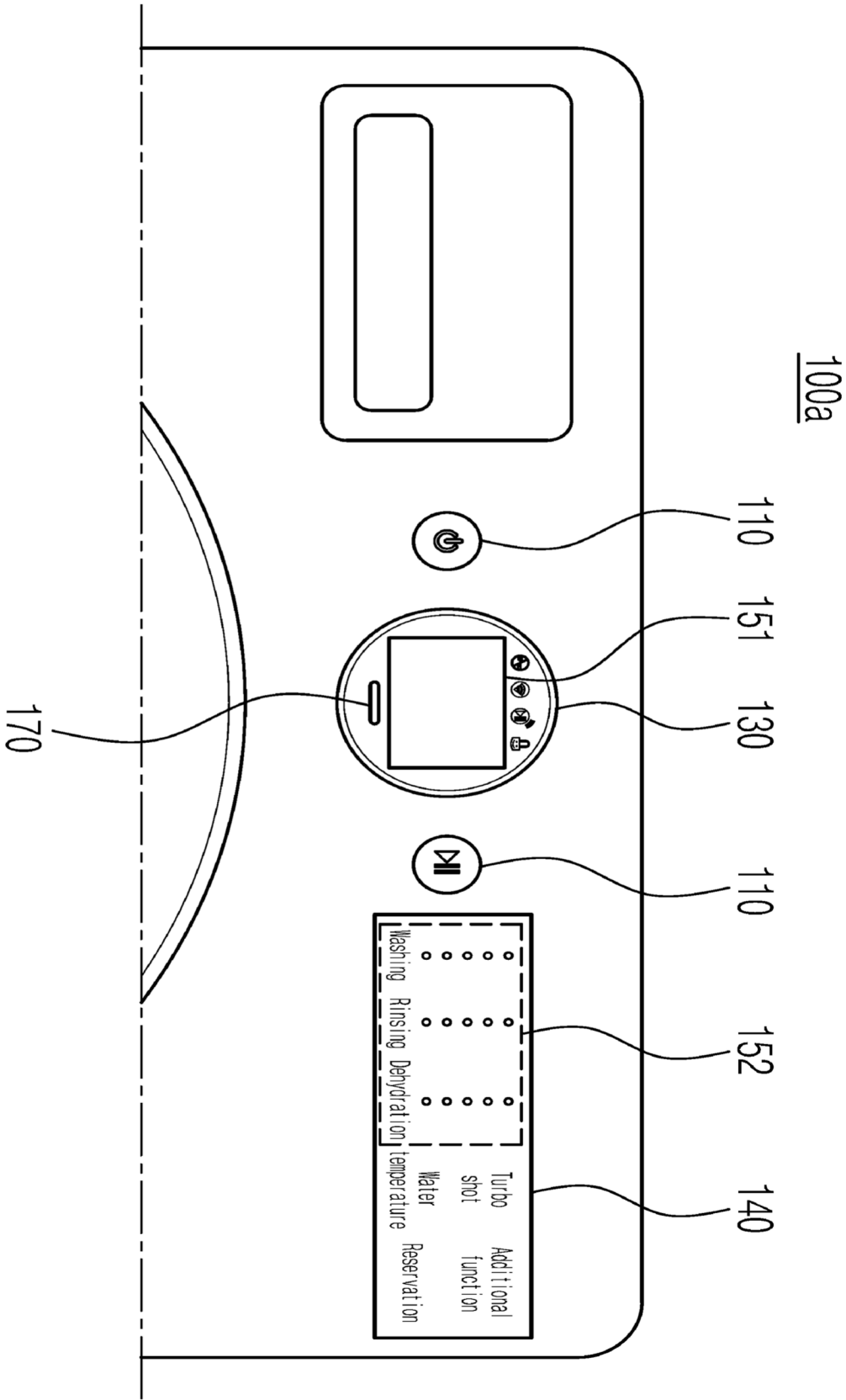
【FIG 3】



【FIG 4】

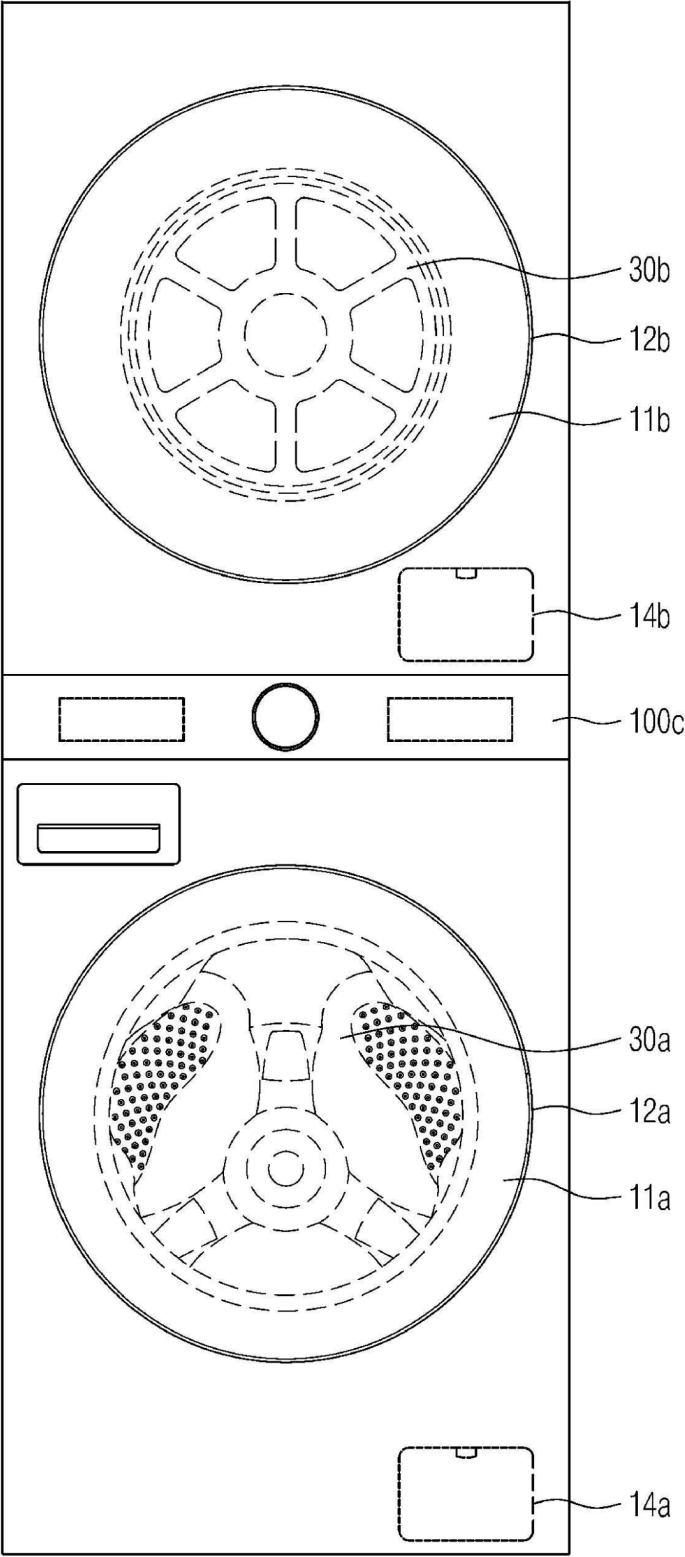


【FIG 5】



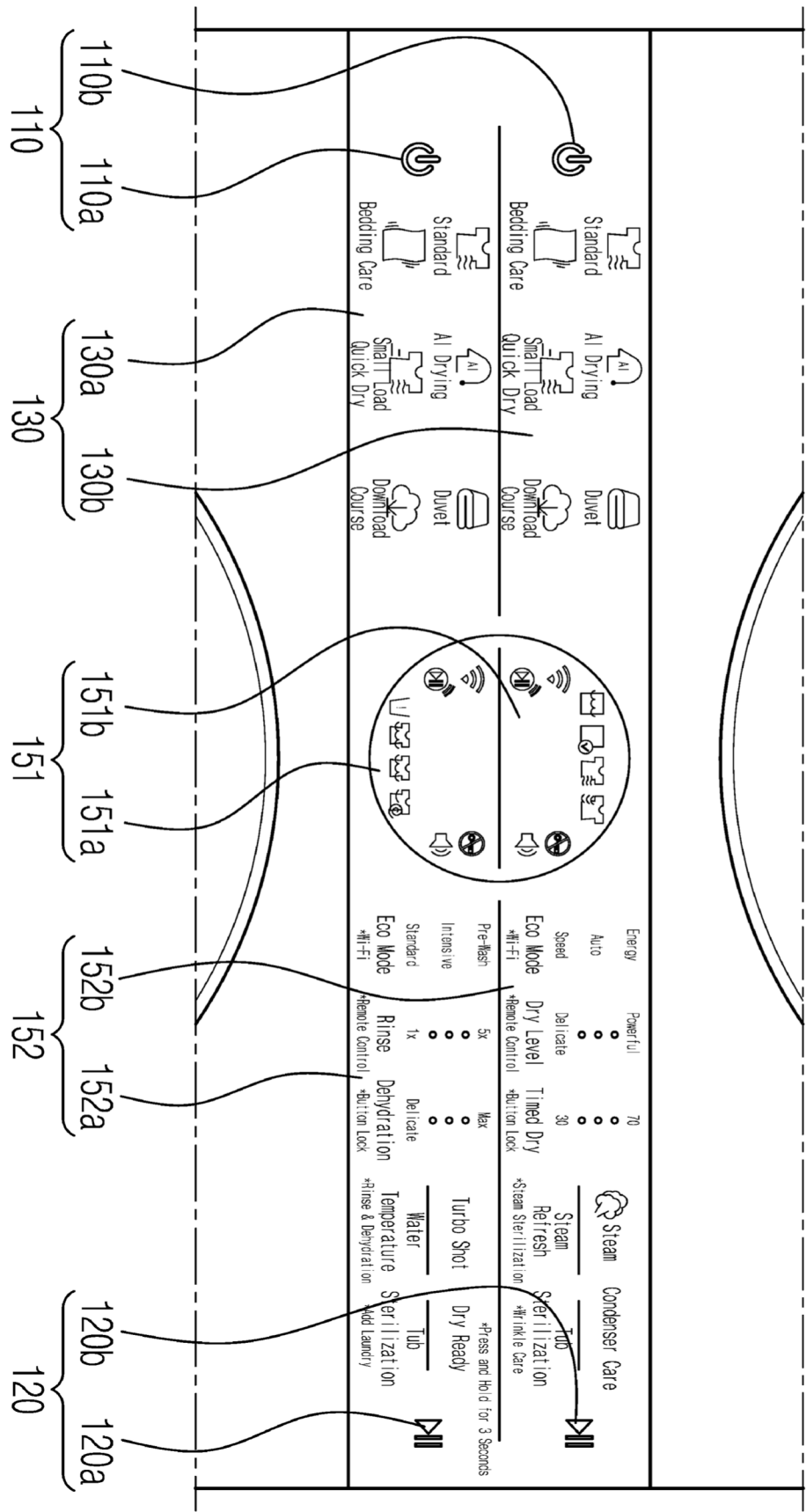
【FIG 6】

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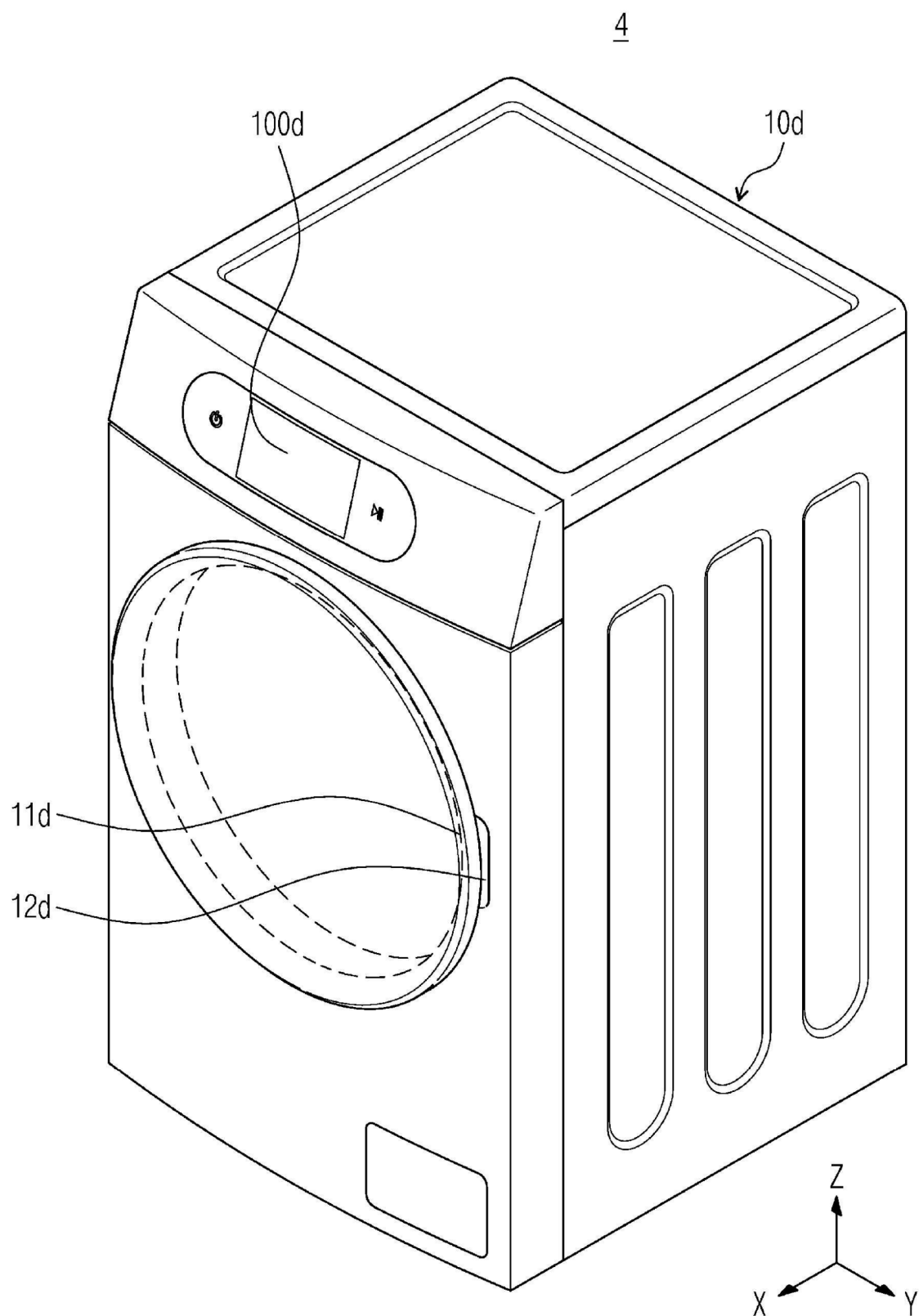


100c

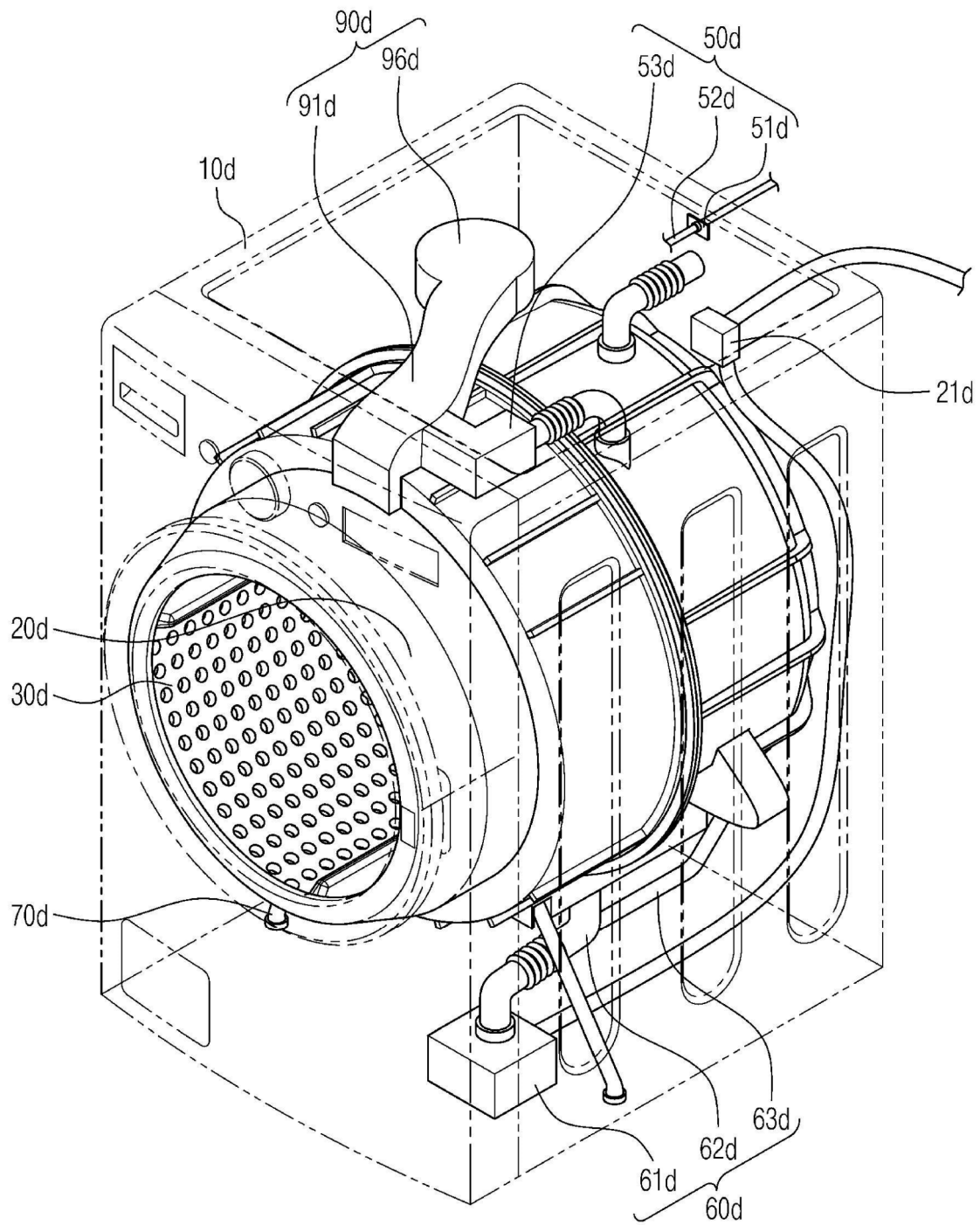
【FIG 7】



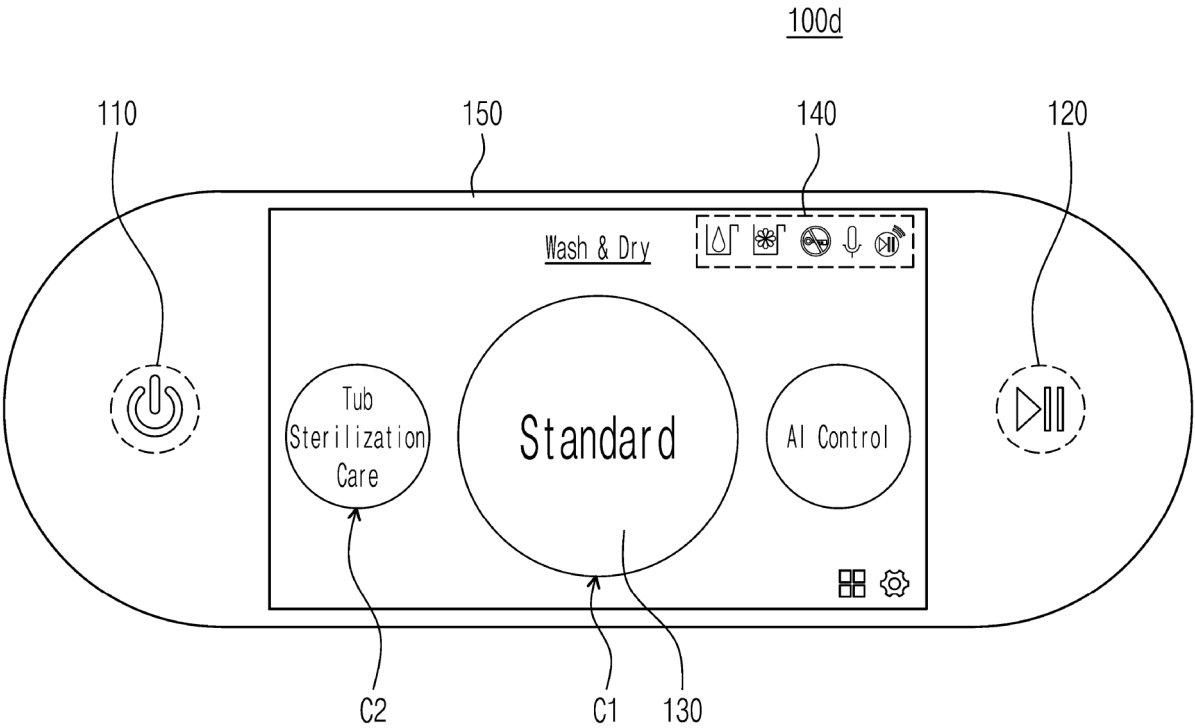
【FIG 8】



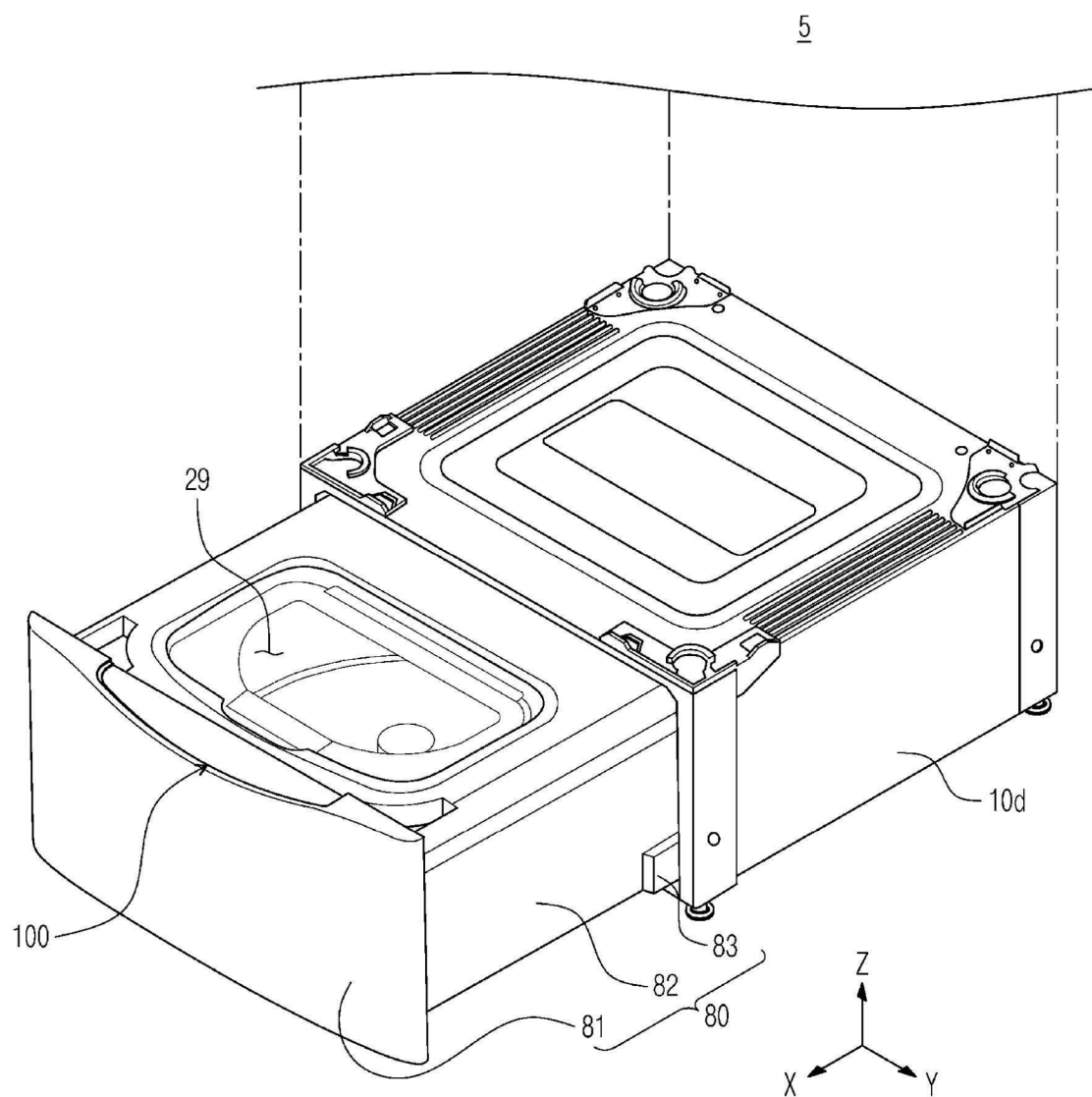
【FIG 9】



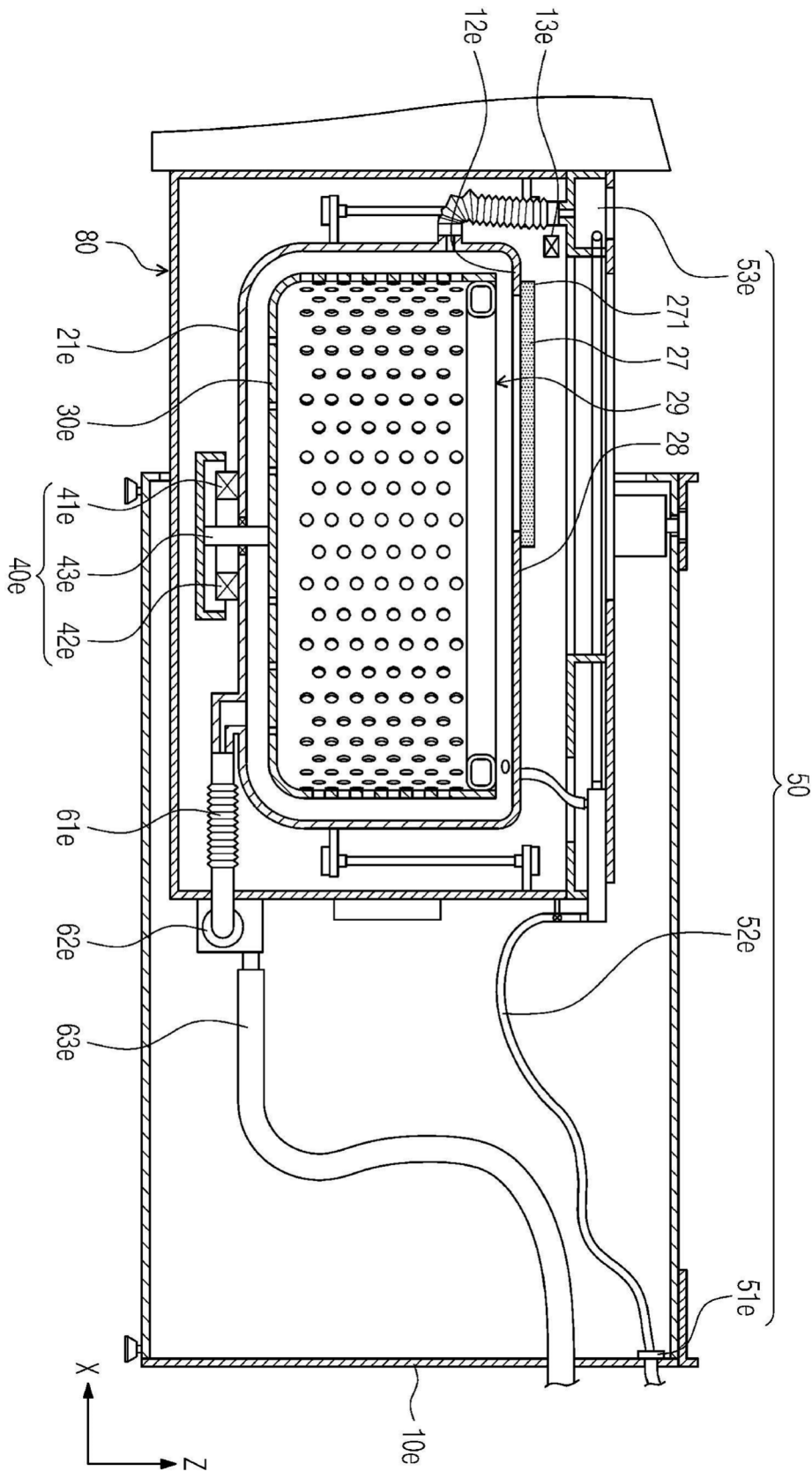
【FIG 10】



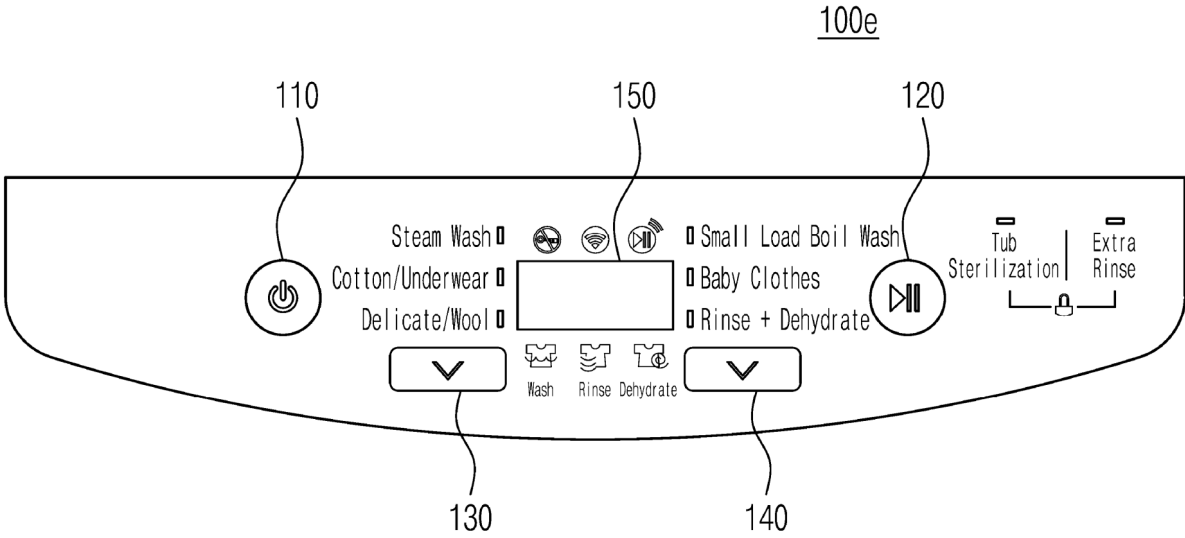
【FIG 11】



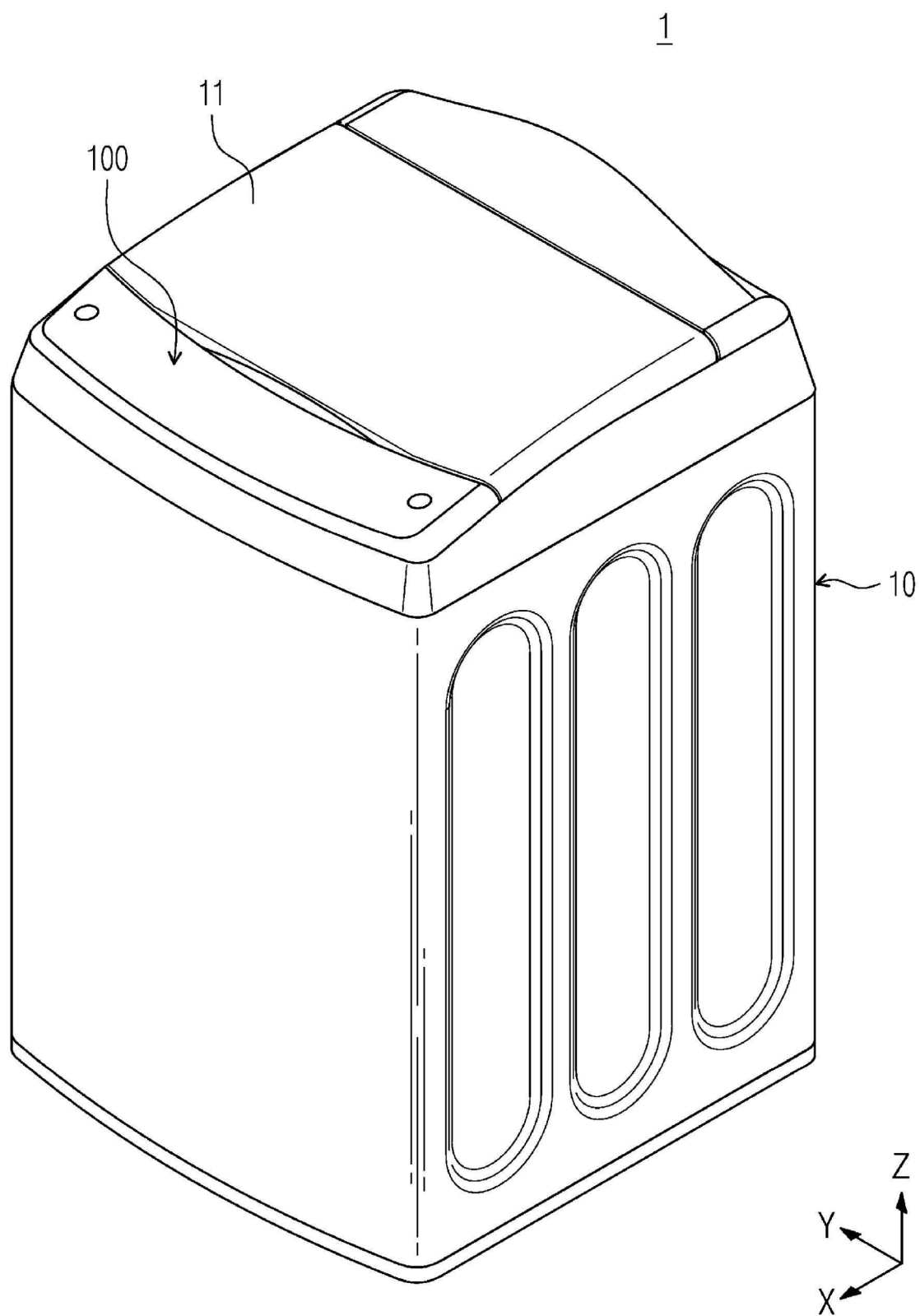
【FIG 12】



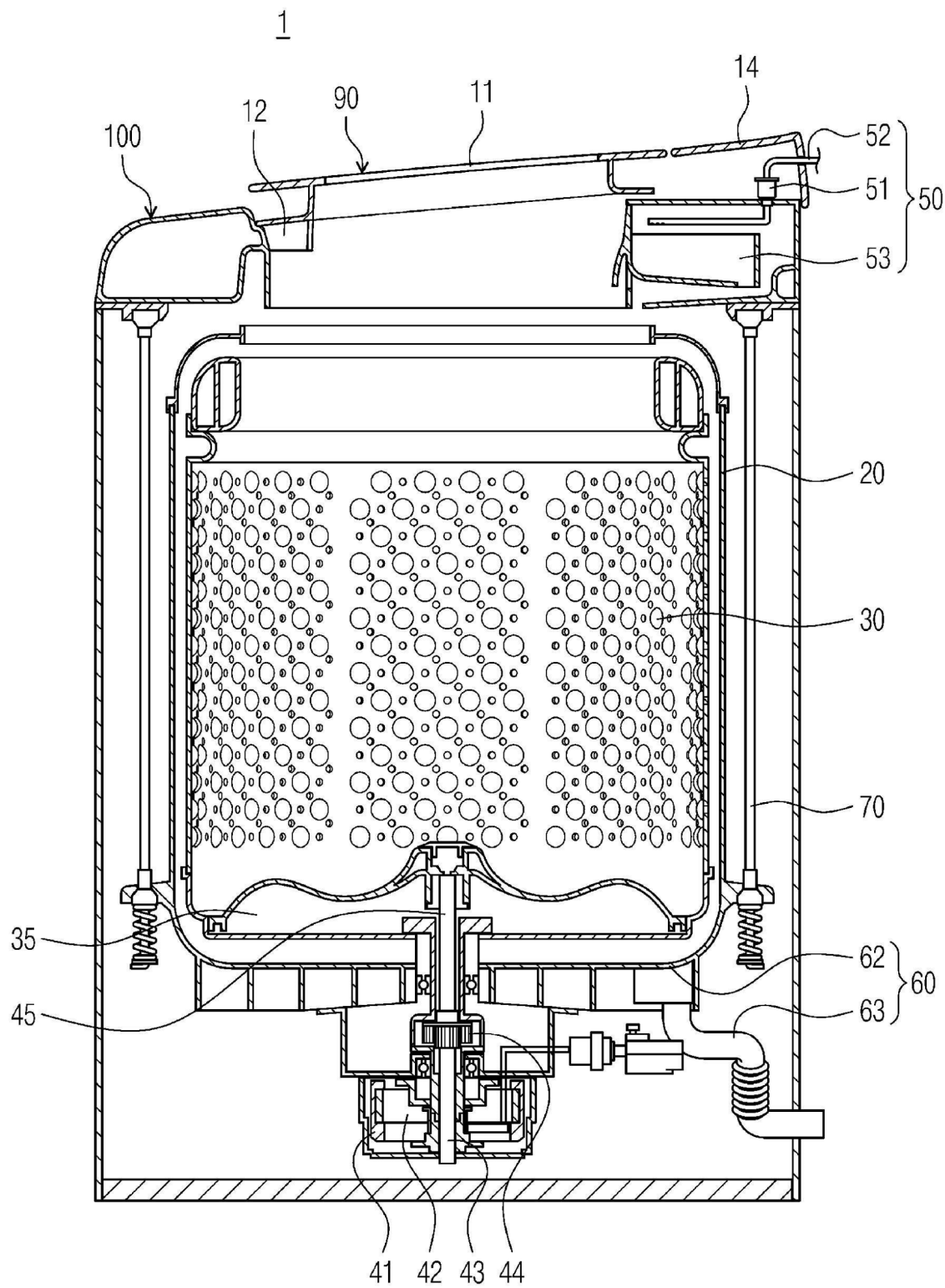
【FIG 13】



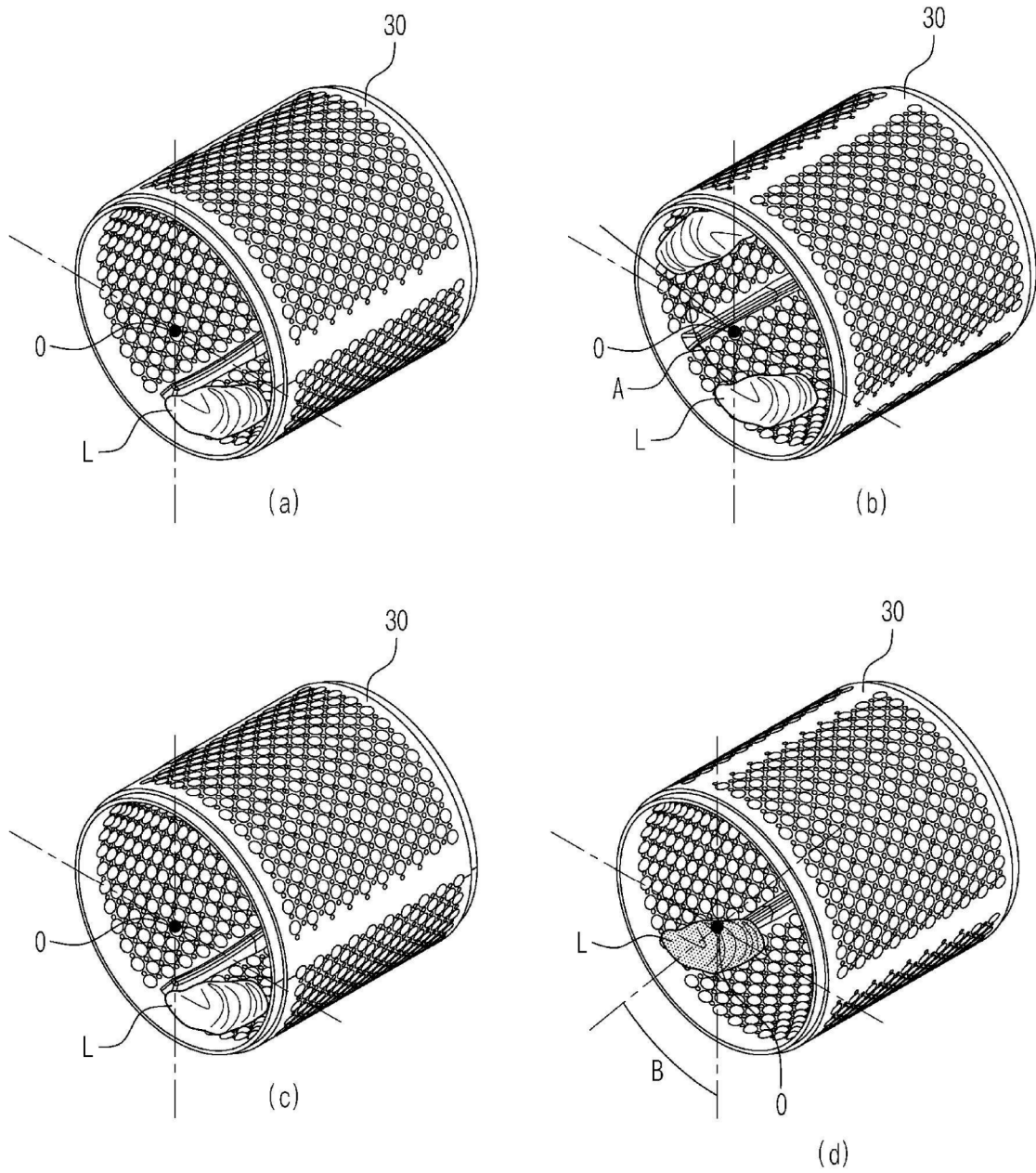
【FIG 14】



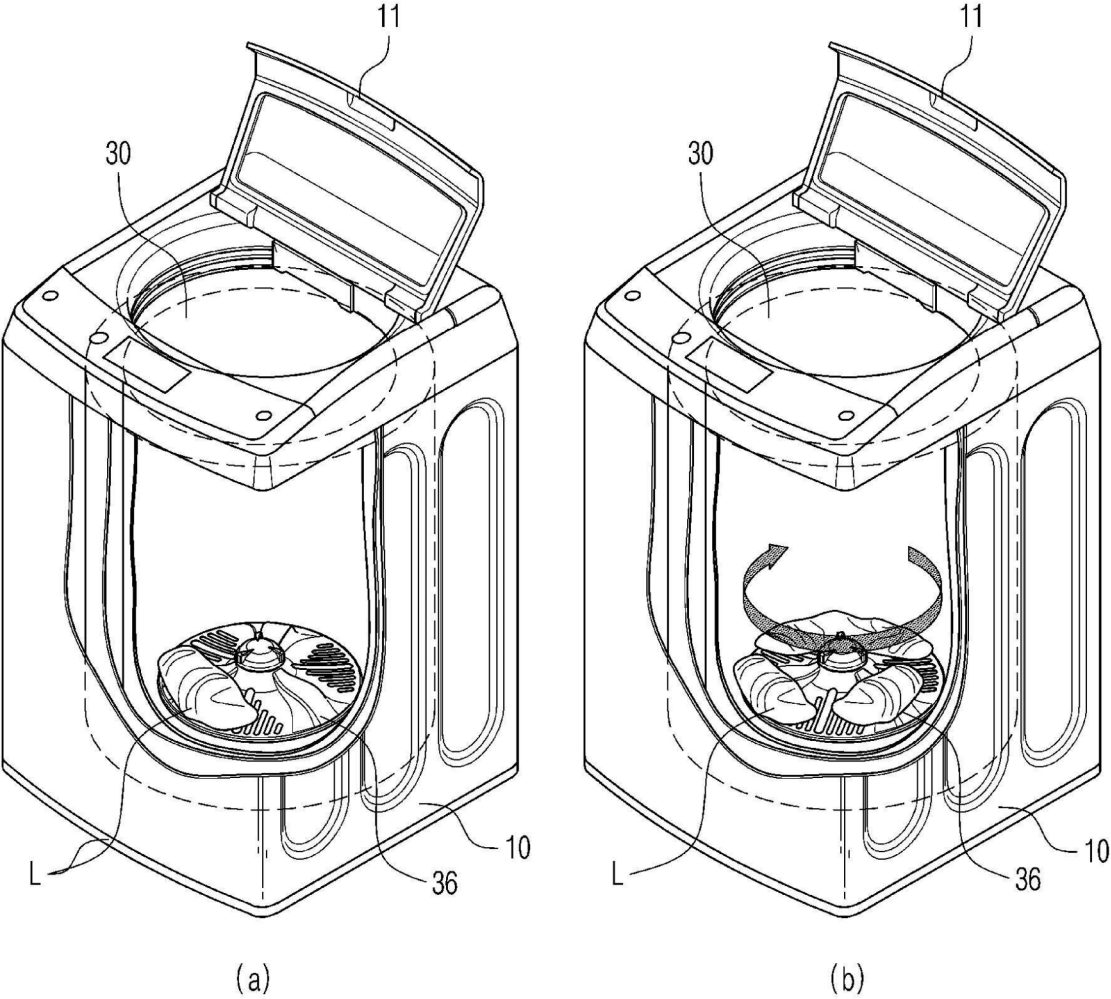
【FIG 15】



【FIG 16】

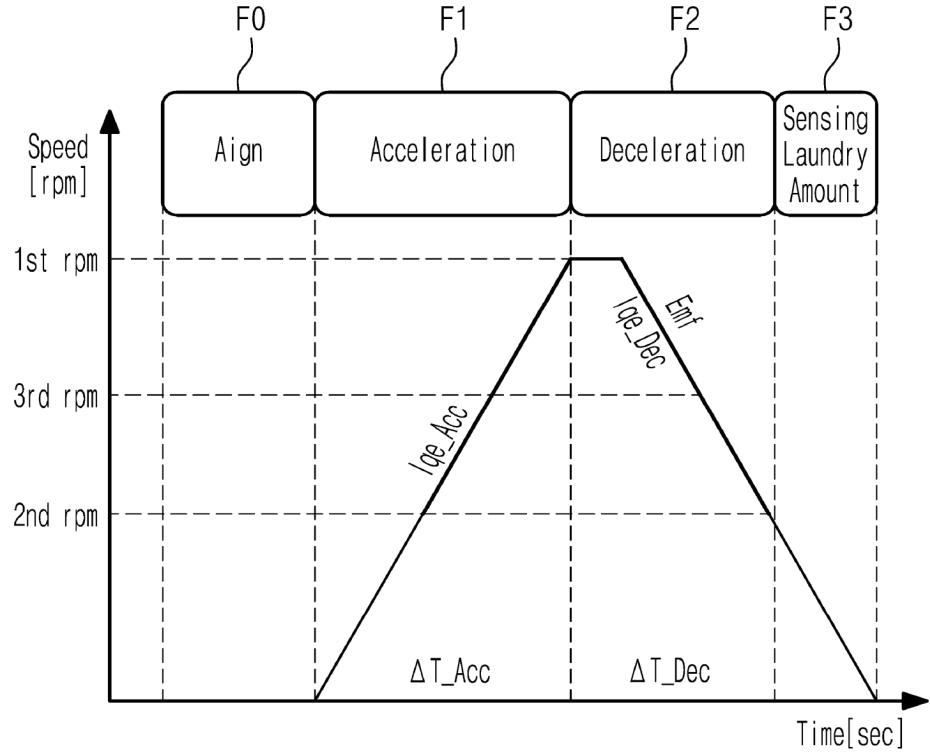


【FIG 17】

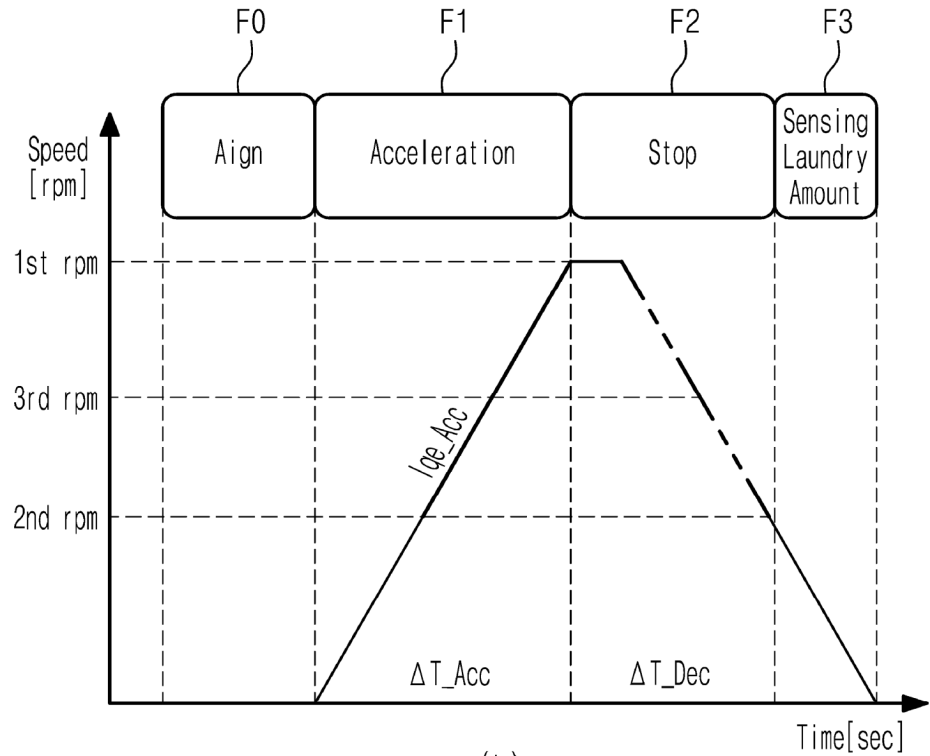


【

FIG 18】

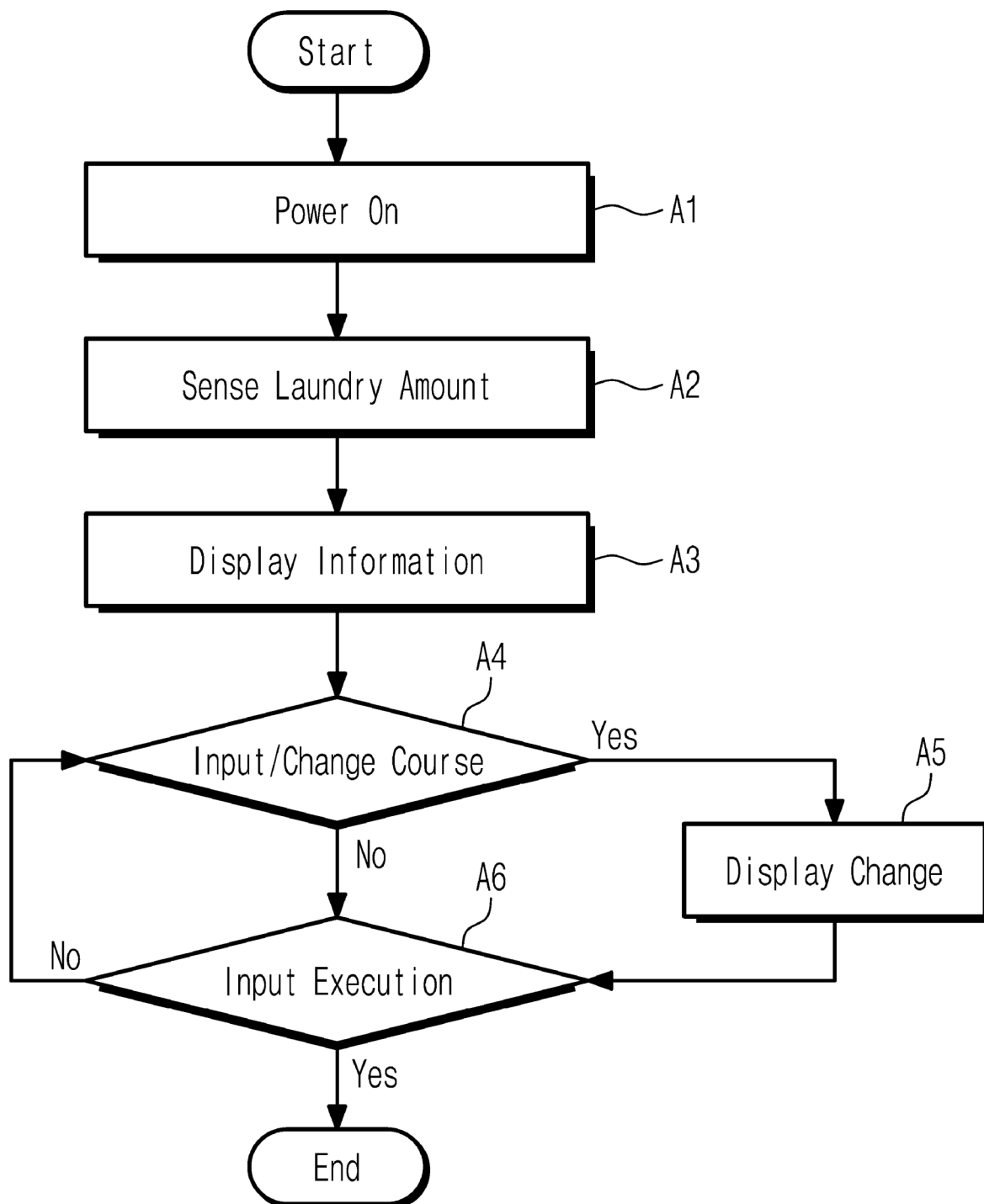


(a)

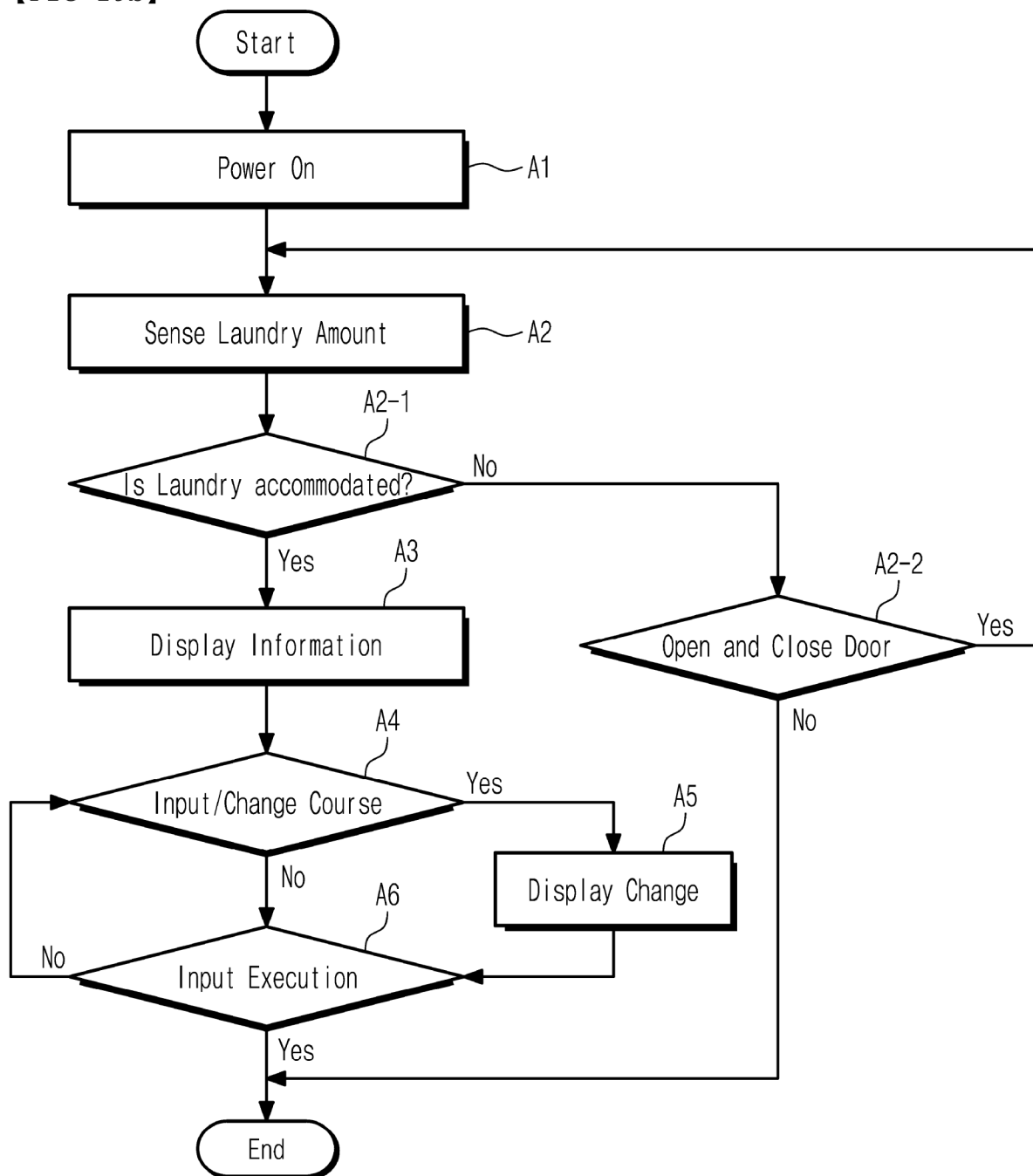


(b)

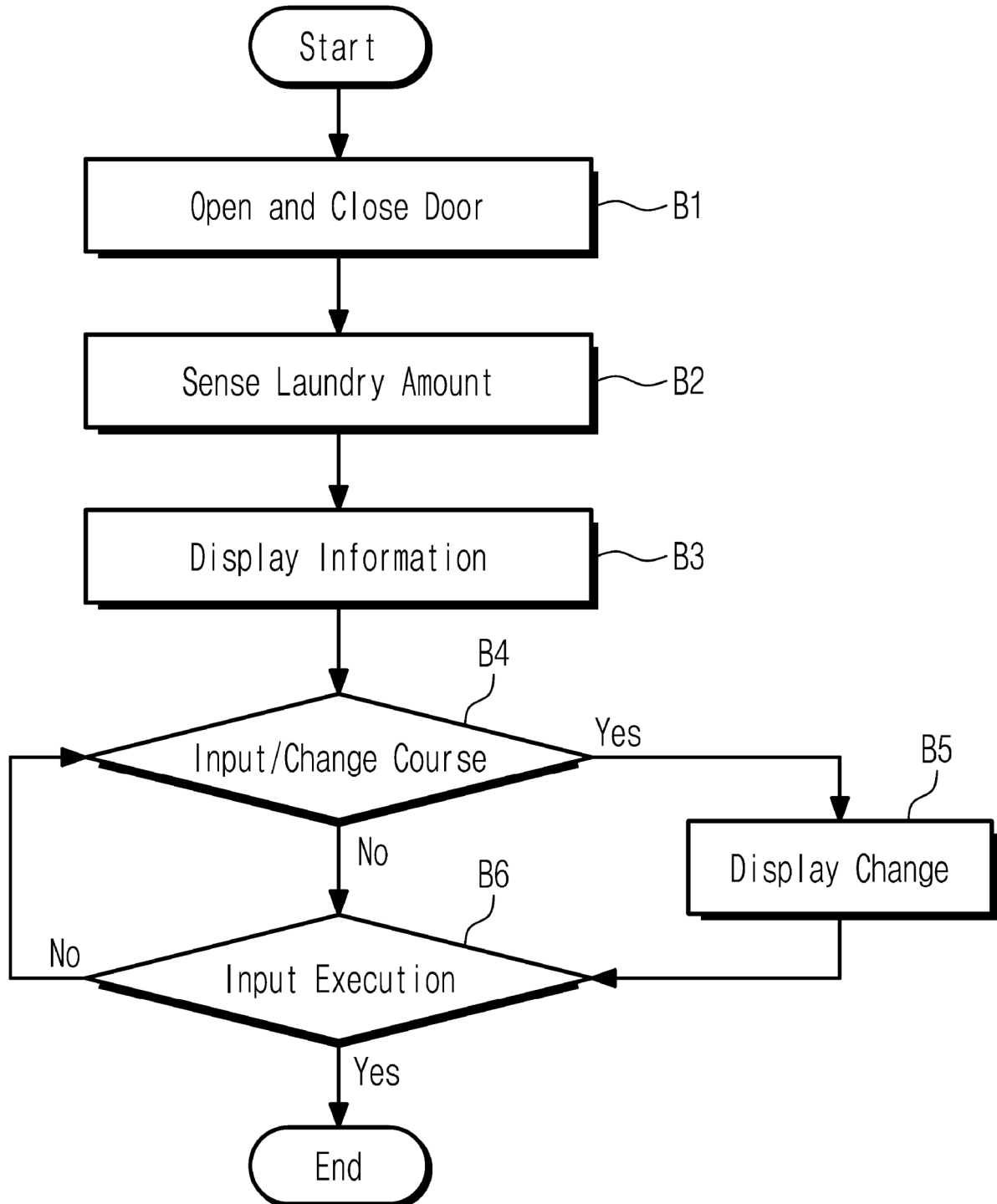
【FIG 19a】



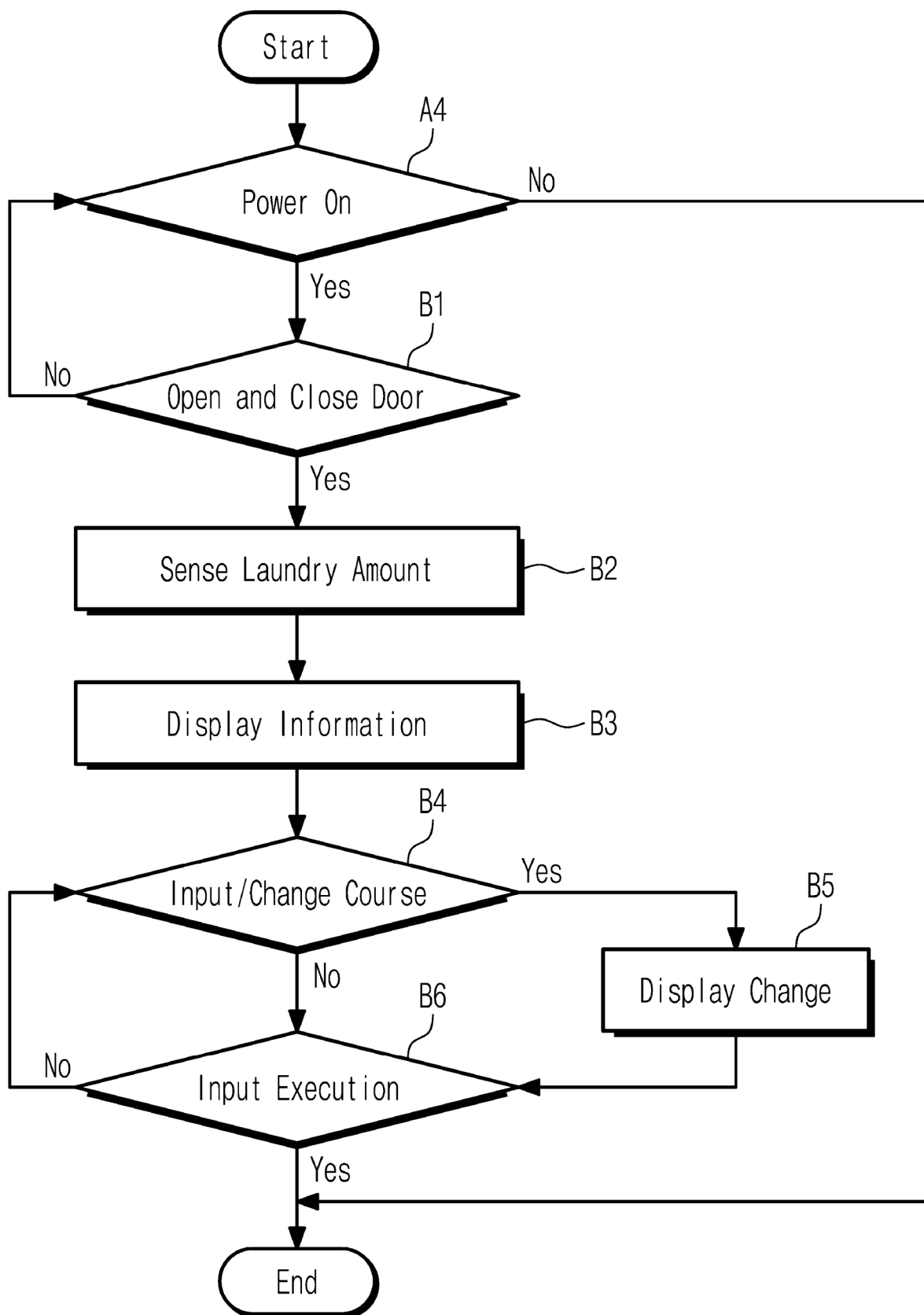
【FIG 19b】



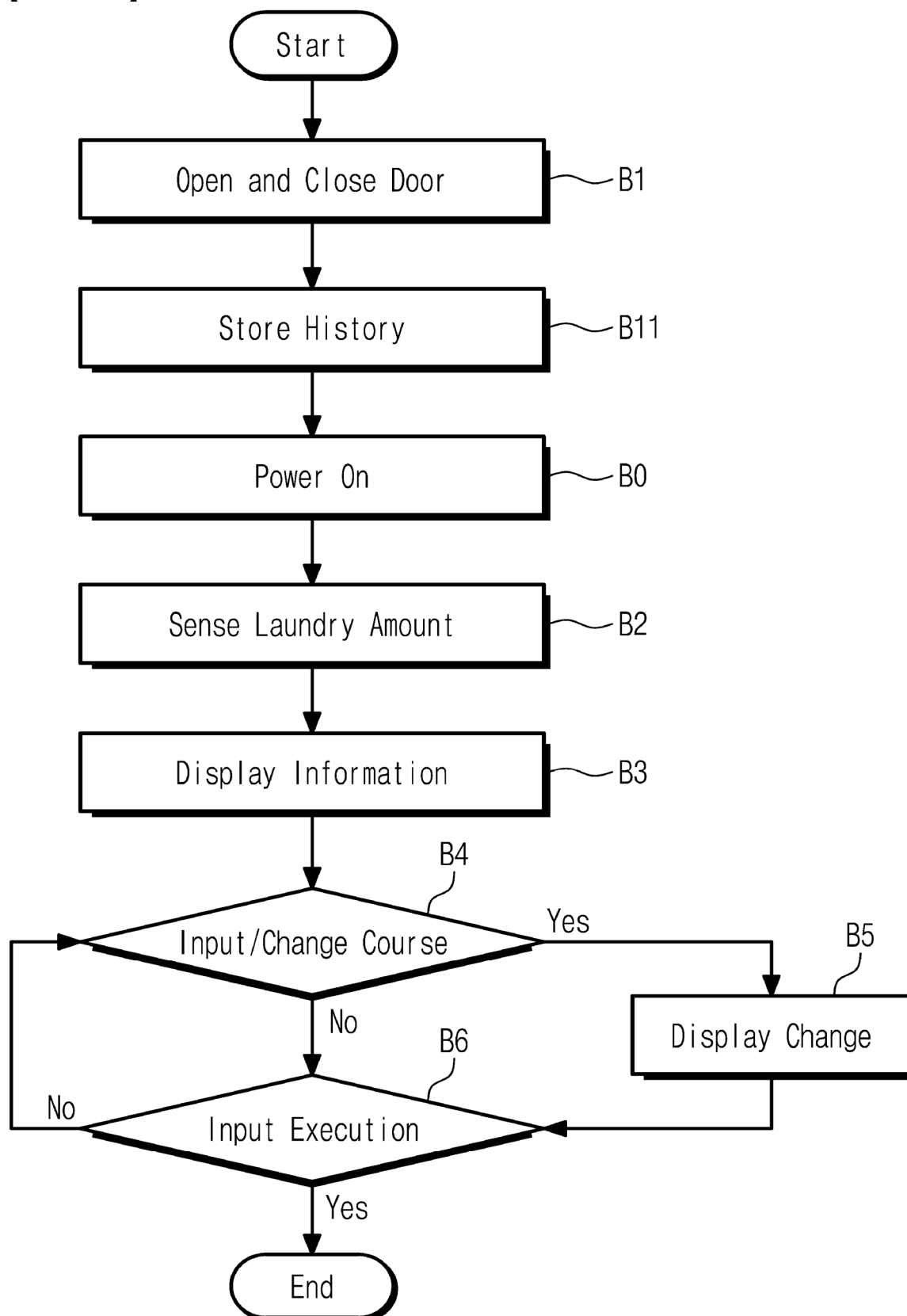
【FIG 20a】



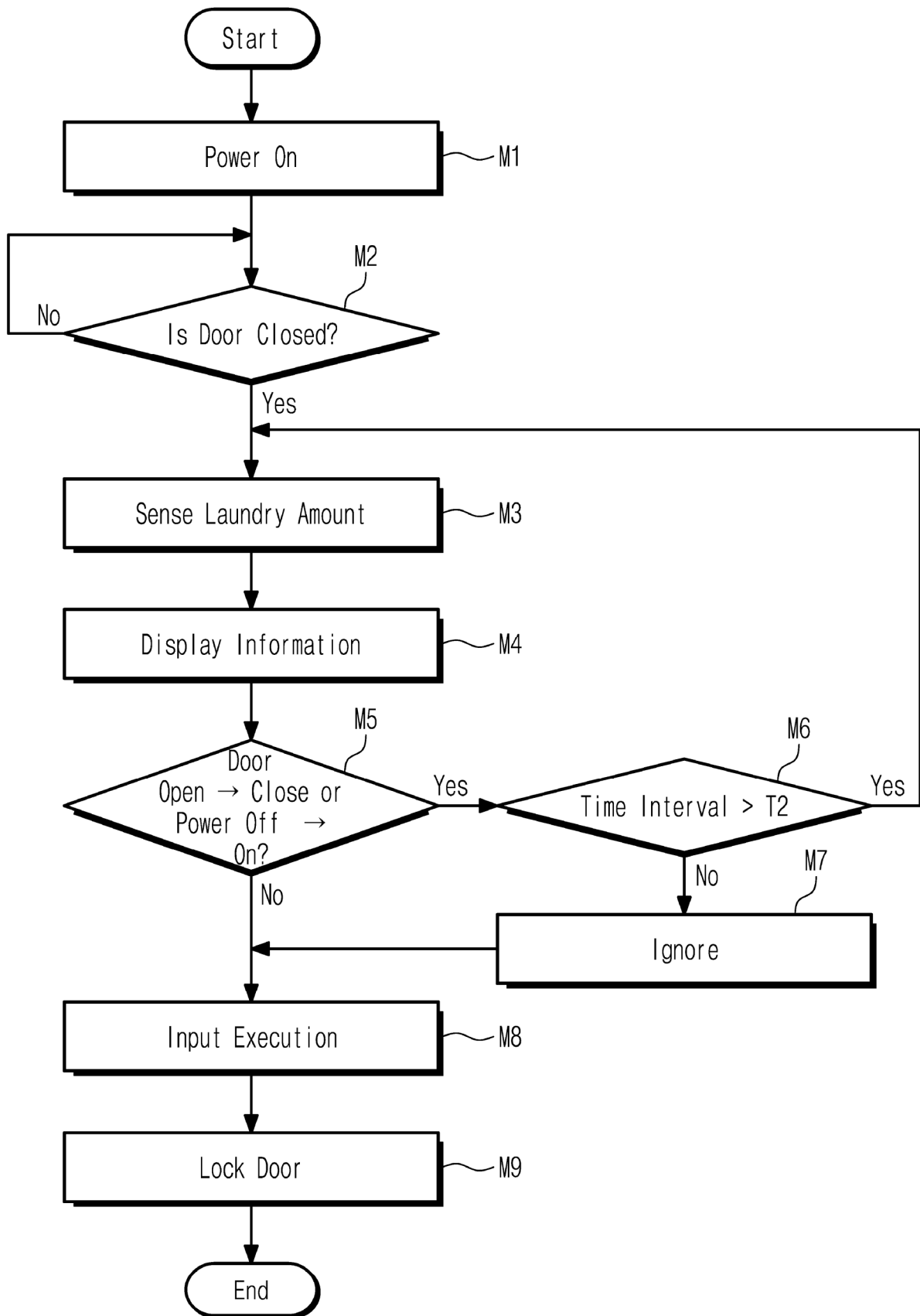
【FIG 20b】



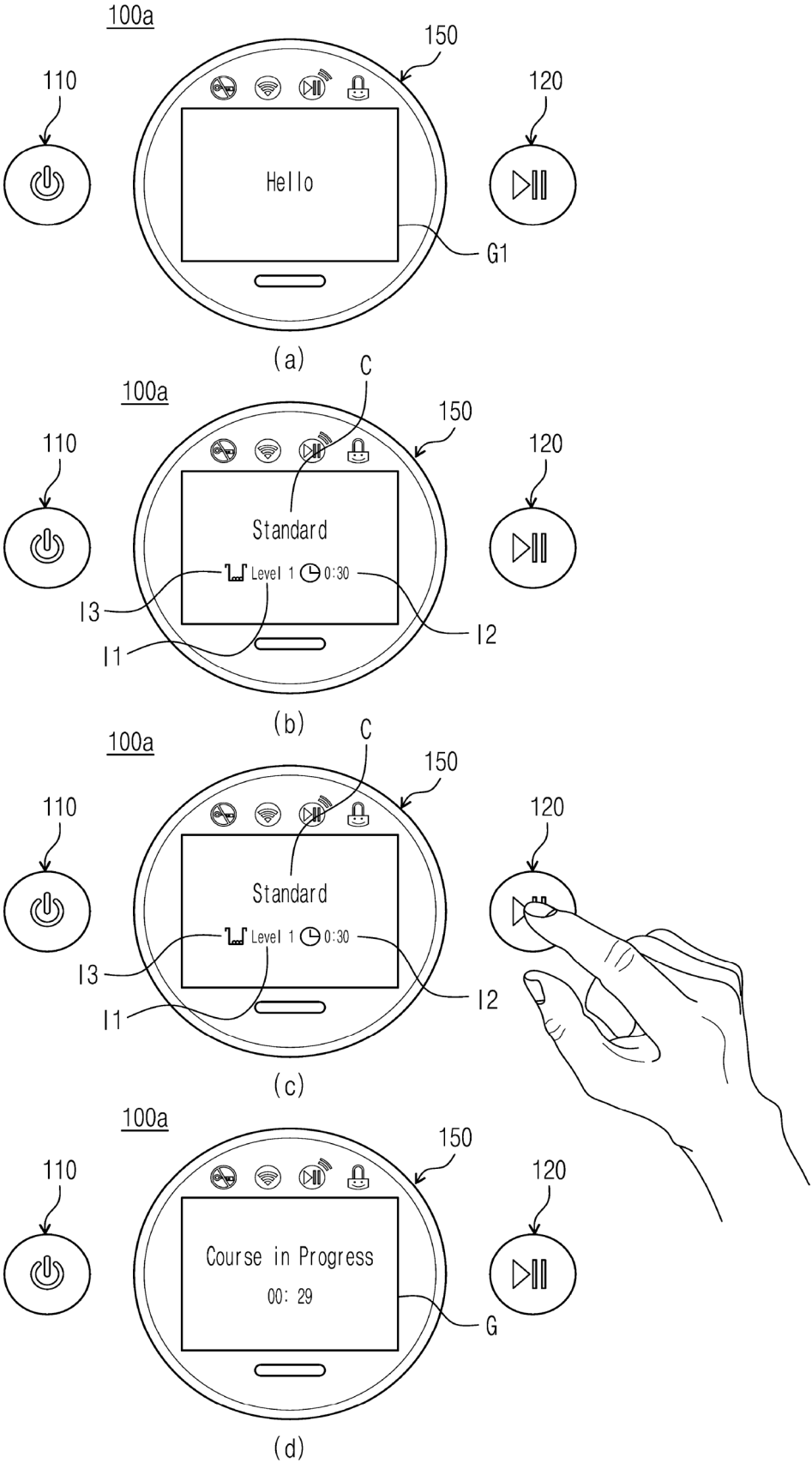
【FIG 20c】



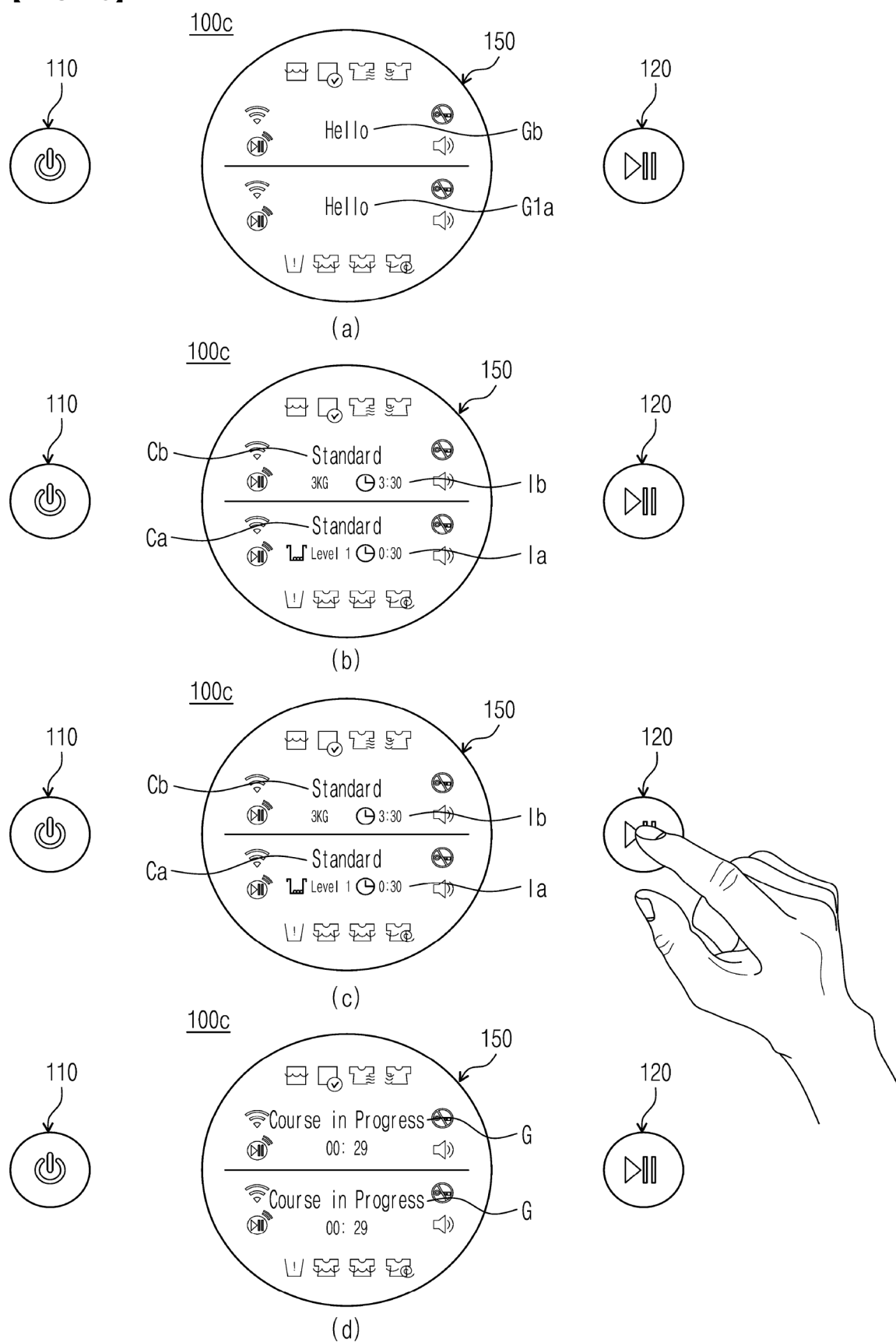
【FIG 21】



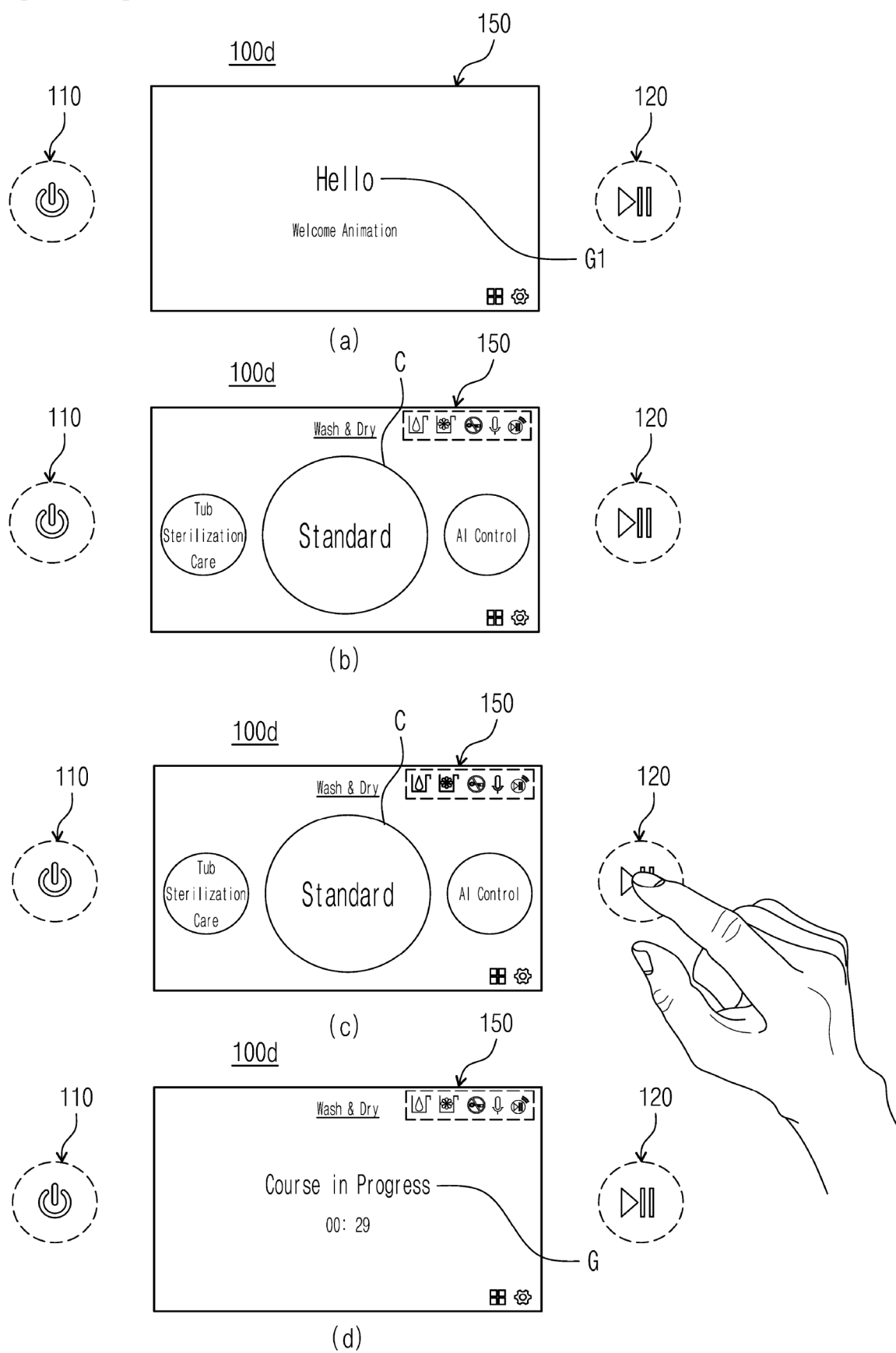
【FIG 22】



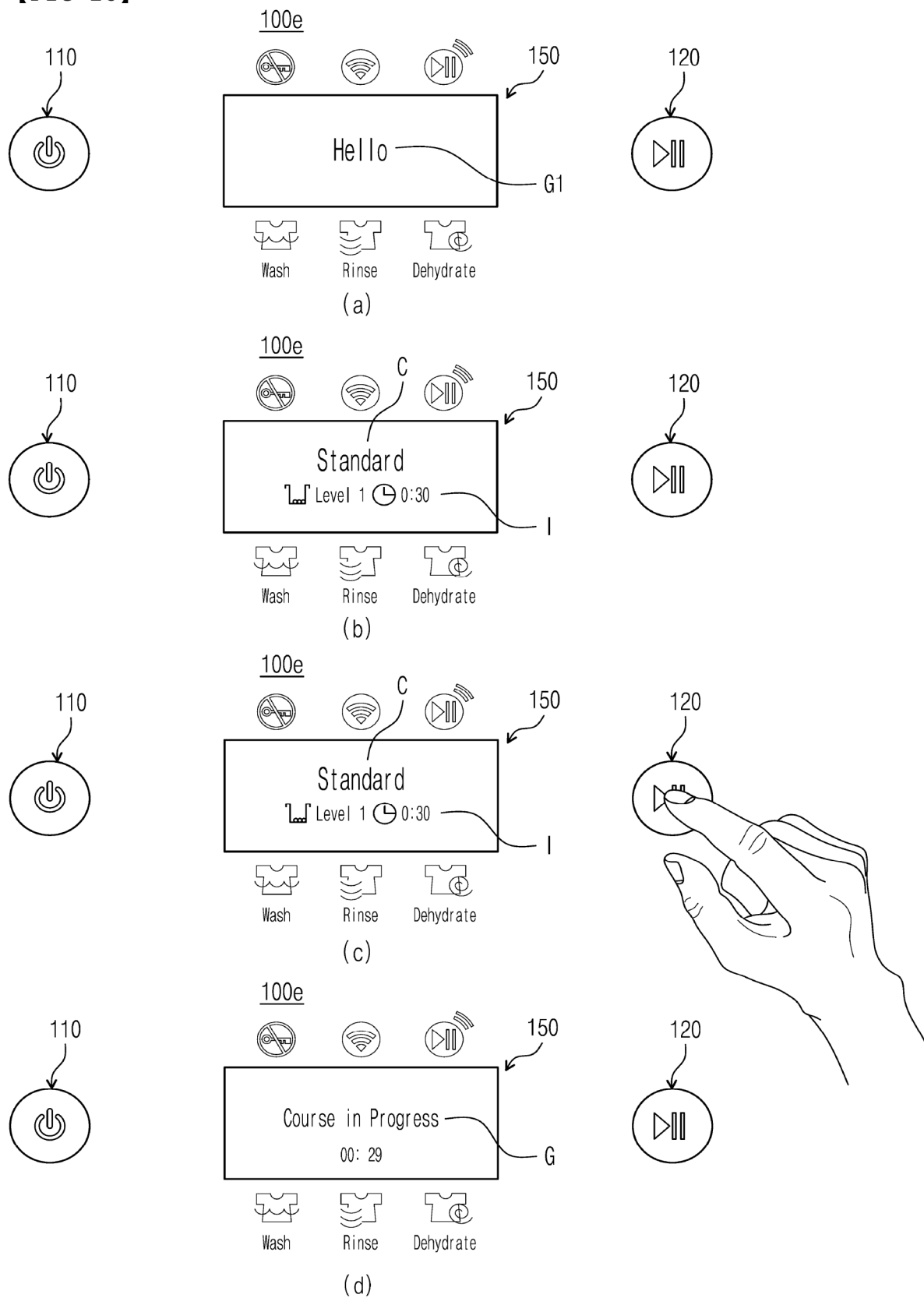
【FIG 23】



【FIG 24】

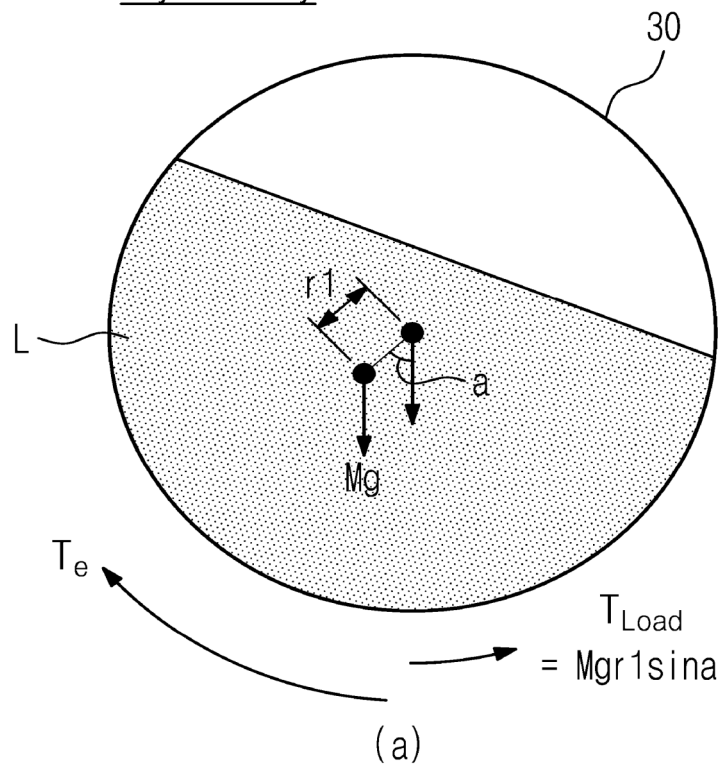


【FIG 25】

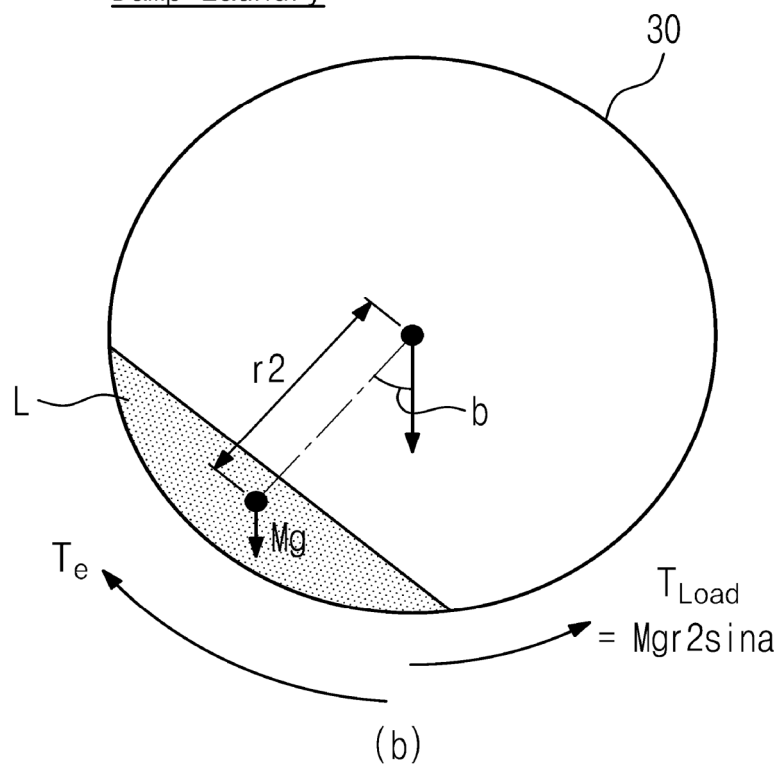


【FIG 26】

Dry Laundry

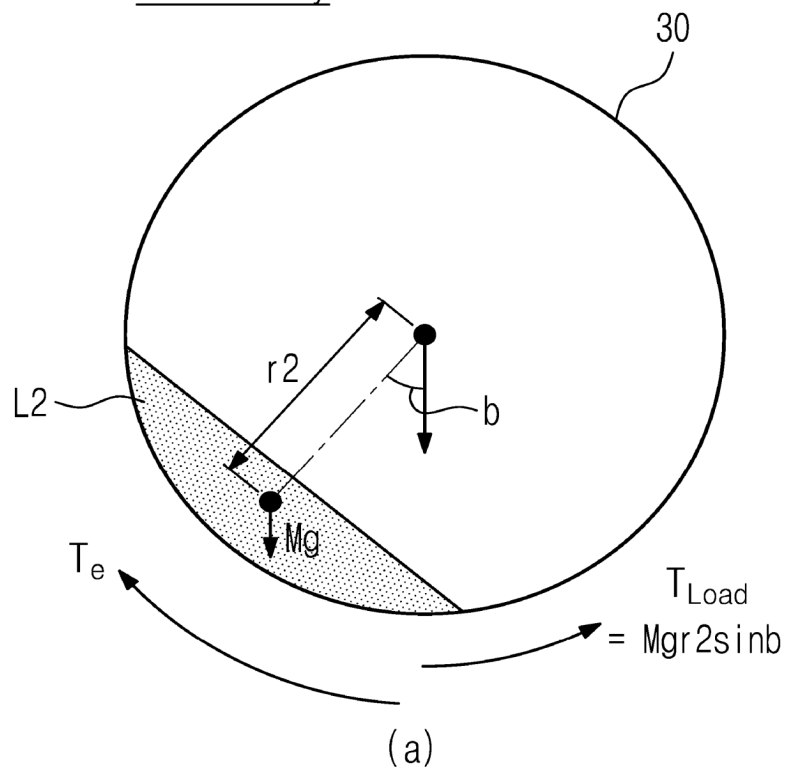


Damp Laundry

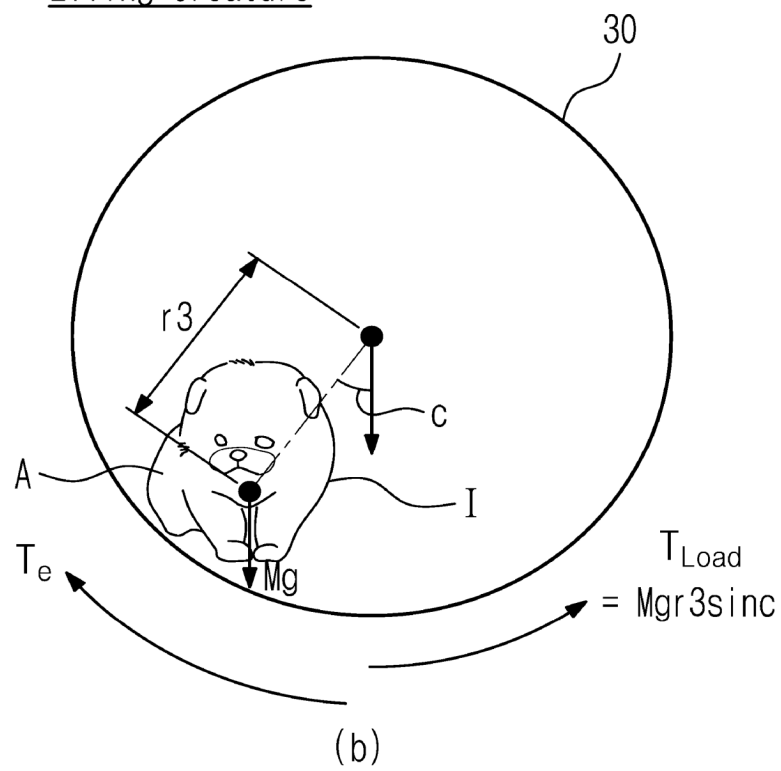


【FIG 27】

Wet Laundry

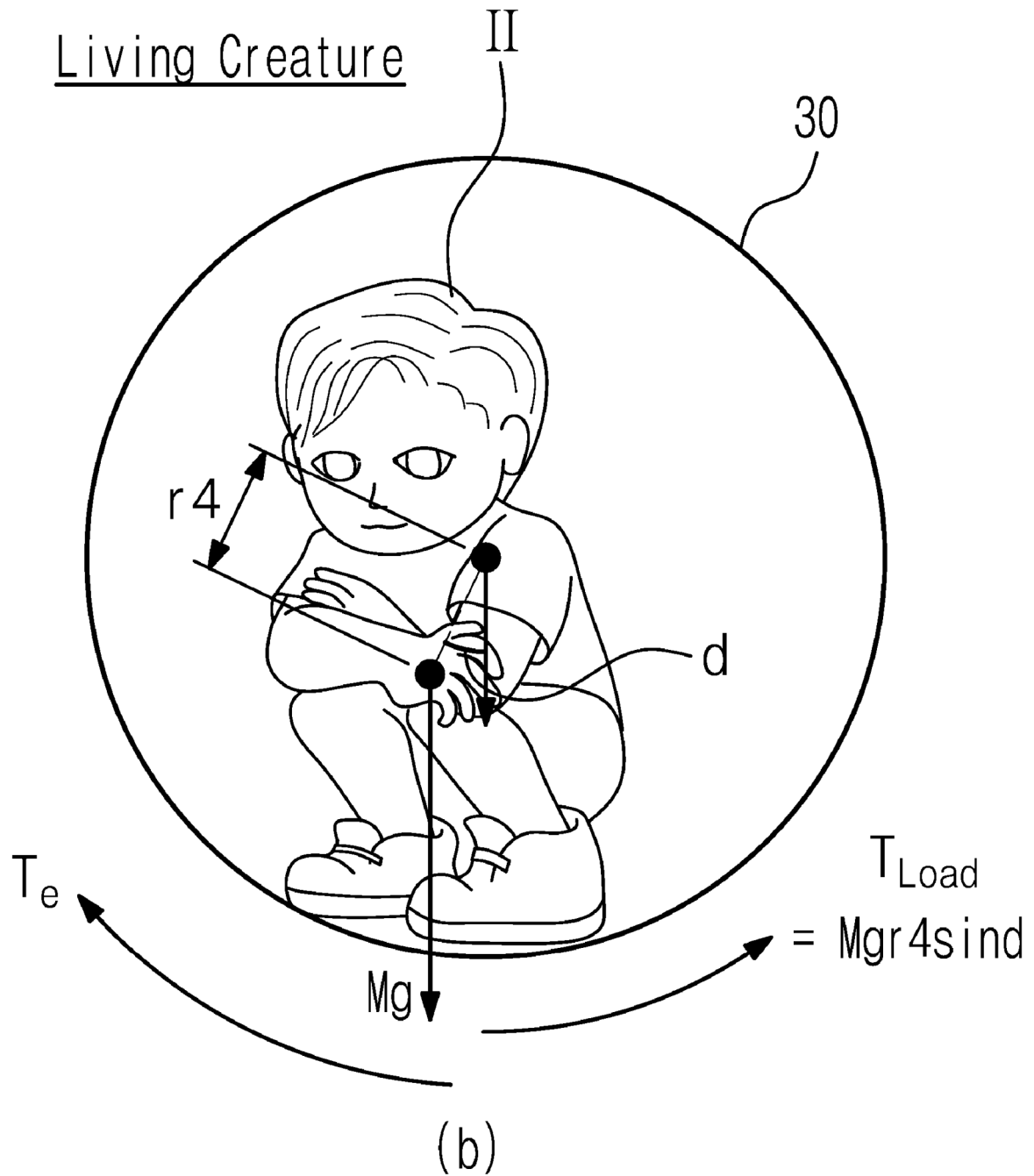


Living Creature

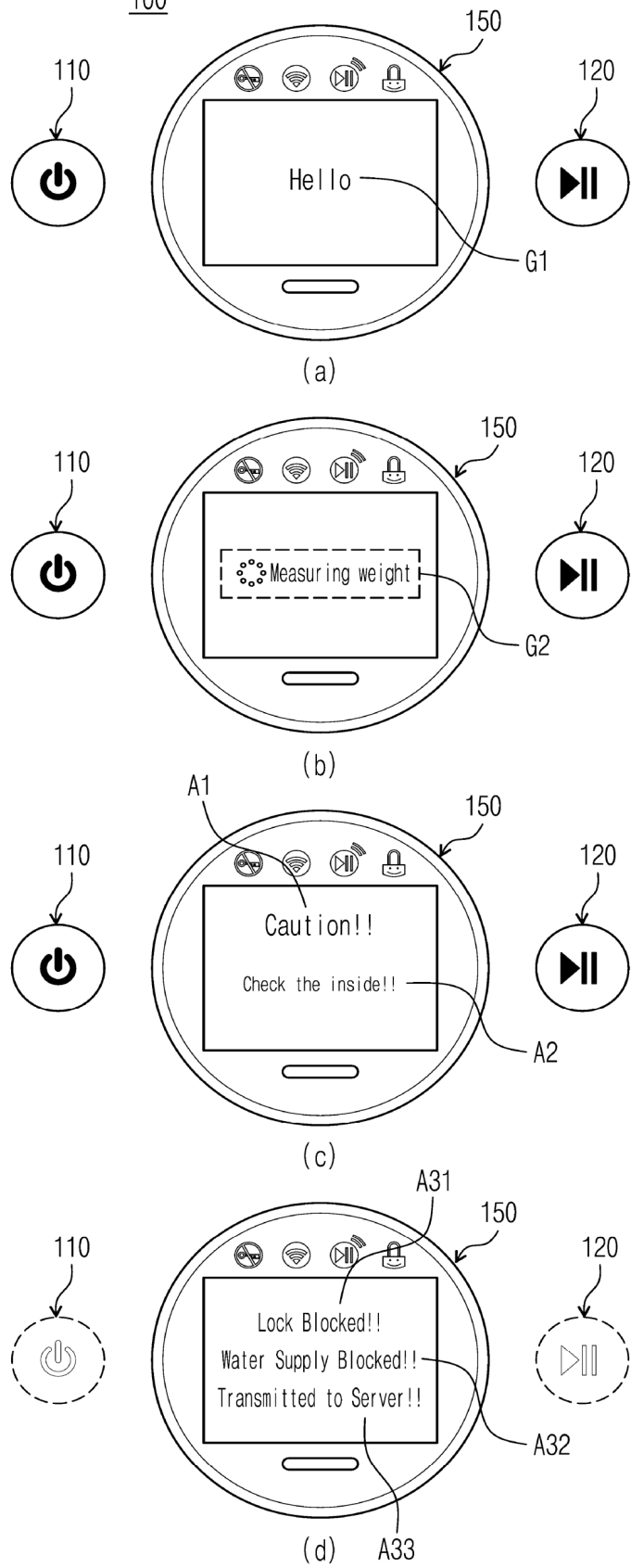


【FIG 28】

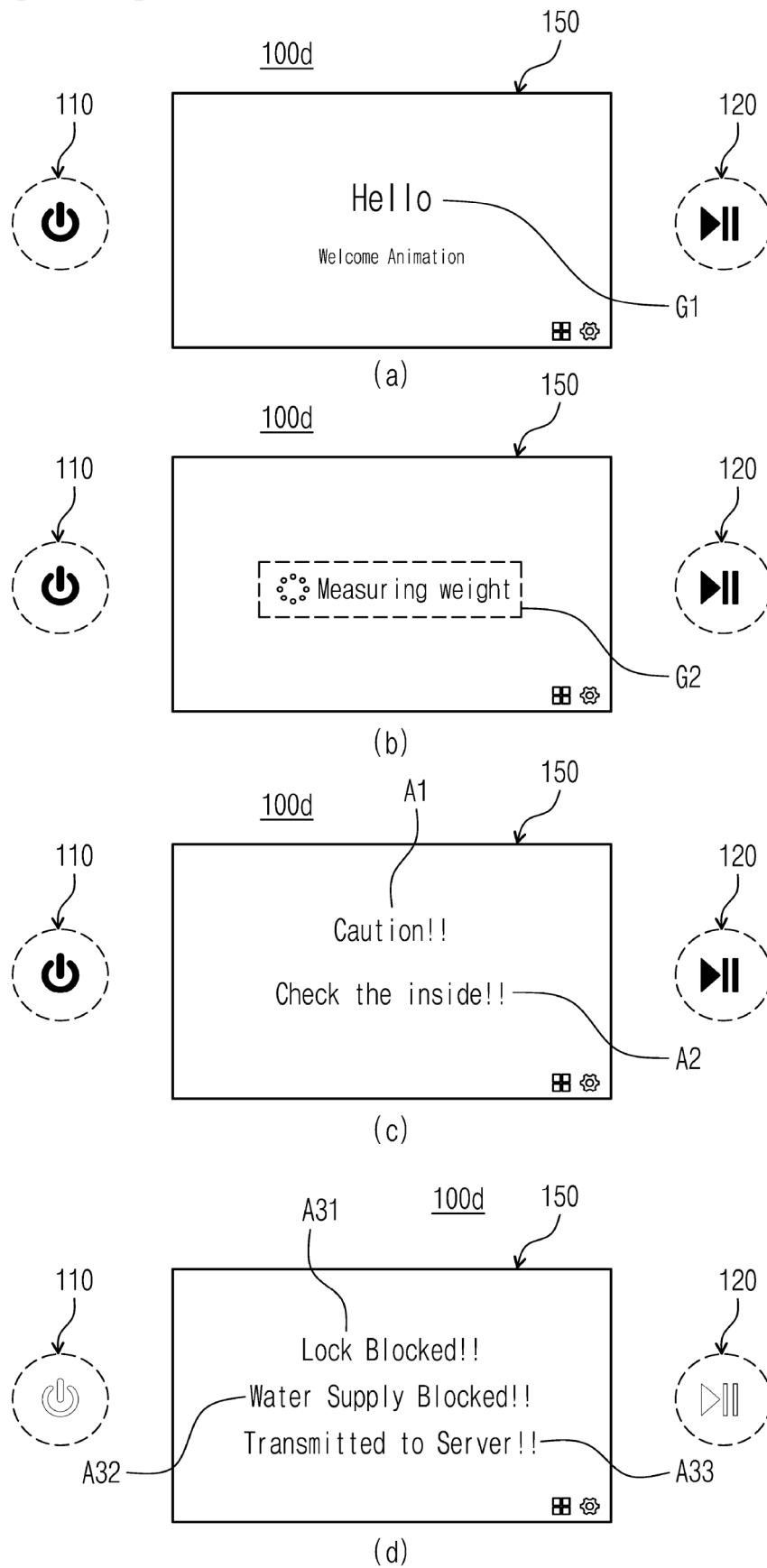
Living Creature



【FIG 29】
100



【FIG 30】



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2024/008685

A. CLASSIFICATION OF SUBJECT MATTER

D06F 58/50(2020.01)i; D06F 34/20(2020.01)i; D06F 34/28(2020.01)i; D06F 34/18(2020.01)i; D06F 105/58(2020.01)i;
D06F 103/40(2020.01)i; D06F 105/46(2020.01)i; D06F 103/04(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 58/50(2020.01); D06F 103/04(2020.01); D06F 33/02(2006.01); D06F 33/47(2020.01); D06F 34/05(2020.01);
D06F 34/06(2020.01); D06F 34/18(2020.01); D06F 37/26(2006.01); H02H 11/00(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: 의류처리(laundry treating), 사람(people), 감지(detection), 무게(weight), 표시
(display)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2003-0038249 A (LG ELECTRONICS INC.) 16 May 2003 (2003-05-16) See pages 2-3 and figures 1-2.	1-13
Y	KR 10-2023-0084385 A (LG ELECTRONICS INC.) 13 June 2023 (2023-06-13) See paragraphs [0060]-[0710] and figures 2-25.	1-13
A	KR 10-2022-0105782 A (SAMSUNG ELECTRONICS CO., LTD.) 28 July 2022 (2022-07-28) See paragraphs [0037]-[0126] and figures 1a-8.	1-13
A	US 2022-0243376 A1 (HAIER US APPLIANCE SOLUTIONS, INC.) 04 August 2022 (2022-08-04) See paragraphs [0019]-[0065] and figures 1-6.	1-13
A	US 2012-0235514 A1 (ASTRAUSKAS, Jurgis) 20 September 2012 (2012-09-20) See paragraphs [0016]-[0034] and figures 1-6.	1-13

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Date of the actual completion of the international search

11 October 2024

Date of mailing of the international search report

14 October 2024

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2024/008685

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
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KR 10-2022-0105782 A	28 July 2022	CN 116710608 A	05 September 2023
		EP 4239116 A1	06 September 2023
		US 2022-0228308 A1	21 July 2022
		WO 2022-158700 A1	28 July 2022
US 2022-0243376 A1	04 August 2022	US 12006611 B2	11 June 2024
US 2012-0235514 A1	20 September 2012	US 2012-0104873 A1	03 May 2012
		US 8791606 B2	29 July 2014
		US 9109319 B2	18 August 2015

REFERENCES CITED IN THE DESCRIPTION

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- KR 1020090077097 [0004]
- KR 1020080102611 [0004]