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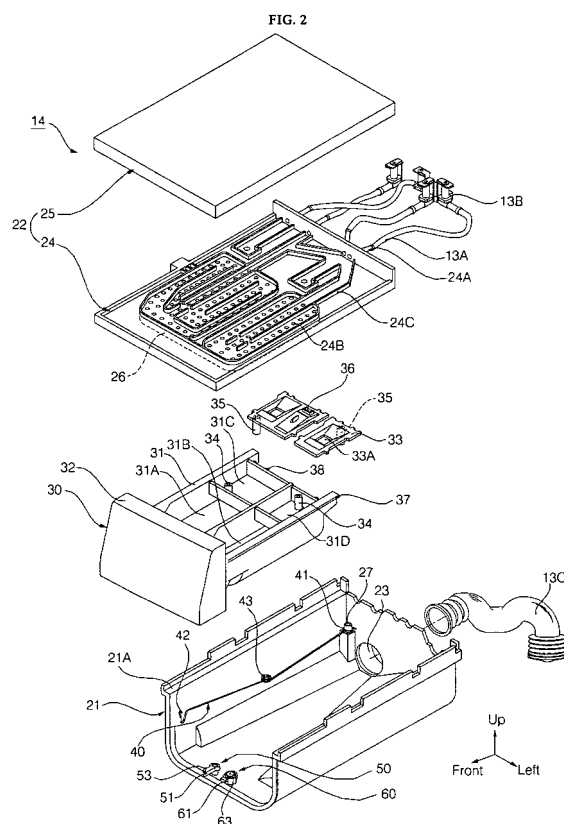
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(54) **Washing machine**

(57) A washing machine (1) includes a dispenser (20) having an opening (20A), a detergent box (30) movable within the dispenser (20) through the opening (20A), a locking unit (50) for locking or unlocking the detergent box (30) in the dispenser (20), and an elastic member (40), between the detergent box (30) and the dispenser (20), to apply an elastic force to the detergent box (30) in a withdrawal direction when the locking unit (50) unlocks the detergent box (30).



Description

BACKGROUND

1. Field

[0001] One or more embodiments disclosed herein relate to a machine or appliance for washing objects.

2. Background

[0002] Traditionally, a washing machine has a washing bath for retaining wash water and laundry, and a motor for rotating the washing bath. The washing machine may also include a water supplying unit for supplying water to the bath, and a water discharging unit for discharging wash water from the bath.

[0003] A detergent supplying unit may also be provided to supply detergent to the bath. The detergent supplying unit includes a dispenser provided on the water supply flow, and a detergent box which can be withdrawn from the dispenser, and if withdrawn too far can be completely disengaged from the washing machine.

[0004] Related-art washing machines of the aforementioned type have drawbacks. For example, the detergent box is very inconvenient to withdraw, e.g., a user must withdraw the detergent box from the dispenser, put detergent to the detergent box, and insert the box back again into the dispenser. Also, the detergent box must be incompletely inserted into or withdrawn from the dispenser which may cause malfunction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The embodiments will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:

[0006] FIG. 1 is a partial view of one embodiment of a drum-type washing machine;

[0007] FIG. 2 is an exploded view of a detergent supplying unit shown in FIG. 1;

[0008] FIG. 3 is a perspective view of a dispenser housing shown in FIG. 2;

[0009] FIG. 4 is an exploded view of a detergent box shown in FIG. 2;

[0010] FIG. 5 is a view of the detergent box in FIG. 2 in a withdrawal state;

[0011] FIG. 6 is a view of the detergent box in FIG. 2 in an insertion state;

[0012] FIG. 7 is a view of an operational state of a locking unit shown in FIG. 2;

[0013] FIG. 8 is a view of one embodiment of a dispenser housing that may be included in a detergent supplying unit of a drum-type washing machine;

[0014] FIG. 9 is a view of an embodiment of a detergent box in a detergent supplying unit of a drum-type washing machine;

[0015] FIG. 10 is a view of the detergent box in FIGS.

8 and 9 in a withdrawal state; and

[0016] FIG. 11 is a view of the detergent box in FIGS. 8 and 9 in an insertion state.

5 DETAILED DESCRIPTION

[0017] FIG. 1 shows one embodiment of a drum-type washing machine 1 which includes a cabinet 2 having left and right surfaces, a tub 4, a drum 5, a lifter 6, and a driving unit 7. The tub is provided inside the cabinet and dampened by a spring 3 and a damper (not shown), and serves to retain wash water. The drum is rotatably provided inside the tub for holding laundry, and includes a plurality of water holes 5A for allowing passage of the wash water. The lifter is inside the drum and serves to draw up and then drop down the wash water at a predetermined height within the drum. And, the driving unit 7 is provided in rear of the tub to apply a rotary force to the drum.

[0018] A cabinet cover 8 is in front of the cabinet 2 and has a laundry opening 8A at its center. A top plate 9 and a base 10 are provided on upper and lower surfaces of the cabinet, respectively. A door 11 is rotatably provided at the cabinet cover to open and closes the laundry opening 8A. And, a control panel 12 is provided at an upper side of the cabinet cover 8, and operates to display and control the drum-type washing machine.

[0019] A water discharging unit (not shown) is located between base 10 and tub 4 to discharge wash water from the tub.

[0020] A water supplying unit 13 includes a water supply hose 13A, a water supply valve 13B, and a water supply bellows 13C. The water supplying unit is located between top plate 9 and the tub and operates to supply water into the tub.

[0021] A detergent supplying unit 14 is provided on a water supply path of the water supplying unit 13, to supply detergent to the tub with water. The detergent supplying unit is connected between water supply hose 13A and water supply bellows 13C, and is mounted on cabinet 2 and cabinet cover 8. A detergent box 30 is withdrawn and inserted through a doorway hole part 12A at one side of the control panel 12.

[0022] Referring to FIGS. 2 to 4, the detergent supplying unit 14 includes a dispenser 20 connected to water supply hose 13A and water supply bellows 13C, and is provided to communicate with front opening 20A to the doorway hole part 12A of the control panel. The detergent box 30 inserted into the dispenser to move in front-rear directions. The box is withdrawn frontwardly via opening 20A of the dispenser and doorway hole part 12A. The detergent box has a plurality of detergent retaining parts 31A, 31B, 31C, and 31D for retaining detergent and/or other substances. An elastic member 40 is located between the detergent box and dispenser, and applies an elastic force to the front when the detergent box is withdrawn. A locking unit 50 locks or unlocks the detergent box inserted into the dispenser, and a damping unit 70

limits the withdrawal speed of the box therefrom.

[0023] The dispenser 20 further includes a dispenser housing 21 which communicates with doorway hole part 12A of the control panel, and which is opened at a front side and an upper side thereof. A dispenser cover 22 is mounted at the opened upper side and has a water supply hole 24B for supplying water into the detergent box.

[0024] The dispenser housing 21 also includes a water discharge port 23 in a rear thereof and connects with the water supply bellows 13C. Water and detergent falling from the detergent box are supplied to the tub through the water supply bellows. The dispenser housing has step parts 21A at both side and upper ends and mounting flange parts of the detergent box to be described later. Step parts 21A provide groove parts spaced up and down from dispenser cover 22 and movably insert the flange part.

[0025] The dispenser cover 22 includes a bottom panel 24 mounted at the opened upper side of the dispenser housing 21, and a top panel 25 mounted on the bottom panel 24. Together, the top and bottom panels form a flow path. Further, bottom panel 24 has a plurality of hose connecting parts 24A in a rear thereof and connects with the water supply hose 13A. The bottom panel further has a plurality of water supply holes 24B for supplying water corresponding to the plurality of detergent retaining parts 31A, 31B, 31C, and 31D. A flow path 24C is also provided within the top and bottom panels to guide water from the hose connecting parts 24A to the water supply holes 24B.

[0026] The detergent box 30 includes a detergent box body 31, a front panel 32, and a detergent box cap 33. The detergent box body is inserted into a space between dispenser housing 21 and dispenser cover 22 such that it can be withdrawn frontwardly. The front panel 32 is provided in front of the detergent box body 31, and the detergent box cap 33 is mounted on the detergent box body 31.

[0027] The detergent box body is opened at an upper side and a rear side, and has the plurality of detergent retaining parts 31A, 31B, 31C, and 31D for retaining detergent and/or other substances therein. The detergent box body further has flange parts 37 located on both sides and is movably and safely mounted on the stepped part 21A of the dispenser housing.

[0028] The plurality of detergent retaining parts include: first and second powder detergent retaining parts 31A and 31B, each provided in front-rear directions at left and right sides of the detergent box body 31, for retaining powder detergent used for washing and pre-washing. The detergent retaining parts further include a bleacher retaining part 31C and a softener retaining part 31D provided at inner and rear sides of the first and second powder detergent retaining parts 31A and 31B, and are spaced a predetermined distance apart from a bottom for retaining bleacher and softener, respectively.

[0029] The first and second powder detergent retaining parts 31A and 31B are opened at upper sides to allow powder detergent or water to be input. Parts 31A and

31B are also opened at rear sides to discharge the powder detergent or water to dispenser housing 21.

[0030] The bleacher retaining part 31C and softener retaining part 31D are spaced from each other by a predetermined height from bottoms of the first and second powder detergent retaining parts 31A and 31B. The bleacher retaining part and softener retaining part may have box shapes which are opened at upper sides to receive bleach and softener. The bleacher retaining part and softener retaining part may also have siphon pipes 34 that protrude upwardly from their bottoms to communicate with spaces below bleacher retaining part 31C and softener retaining part 31D.

[0031] The front panel 32 is located in front of doorway hole part 12A and preferably has a same structure as control panel 12. The front panel forms a front surface of the drum-type washing machine together with control panel 12 and cabinet cover 8.

[0032] The detergent box cap 33 is mounted on the upper side of the detergent box body 31 to cover upper sides of bleacher retaining part 31C and softener retaining part 31D. The detergent box cap has holes 33A for receiving bleach and softener. Each hole is provided to correspond to bleacher retaining part 31C and softener retaining part 31D, respectively. A siphon cap 35, which caps siphon pipe 34, protrudes down from a bottom of the detergent box cap. Input bleach and softener is discharged from bleacher retaining part 31C and softener retaining part 31D due to a siphon phenomenon.

[0033] A height control protrusion 36 has a height controllable structure on an upper surface of detergent box cap 33. The height control protrusion is caught by a catch jaw 26 on front and lower surfaces of lower panel 24, when the detergent box is withdrawn. Thus, a withdrawal distance of the detergent box may be set by the height control protrusion 36 and catch jaw 26. If desired, the height control protrusion can avoid being caught by the catch jaw, and thus the detergent box can be completely disengaged from the dispenser.

[0034] Referring to FIGS. 2, 5, and 6, elastic member 40 includes a torsion spring 40. The torsion spring has one end connected to and supported by a support part 27 at inner and rear sides of the dispenser housing 21. The other end of the torsion spring is at a rear part of the detergent box body 31. According to one embodiment, a plurality of torsion springs 40 may be provided between detergent box body 31 and dispenser housing 21. These springs may have the same or different heights. In an exemplary embodiment, the torsion springs are provided at left and right sides between the detergent box body 31 and dispenser housing 21.

[0035] Referring to FIGS. 2 and 3, each torsion spring 40 may be elastically twisted and may include a first coil part 41 connected to support part 27; a contact part 42 in contact with the rear part of the detergent box body 31; and a second coil part 43 elastically twisted and located between the first coil part and the contact part 42. The first coil part 41 and second coil part 43 may be wired

to be twistable in left and right directions. The first coil part is in contact with an inner surface of dispenser housing 21 at one end, and connects to the second coil part 43 at the other end. The second coil part is then connected to contact part 42.

[0036] The support part 27 is a cylinder shaped protrusion protruding upward within the dispenser housing 21. The support part is fitted to pass through a center of the first coil part 41 and twistably supports the first coil part 41. Contact part 42 extends frontward from the other end of the second coil part 43, to contact a rear surface of the bleacher retaining part 31C or the softener retaining part 31D.

[0037] The contact part 42 may be vertically bent at its end, upwardly or downwardly, to stably contact the rear surface of the bleacher retaining part 31C or the softener retaining part 31D. The contact part 42 has a groove part 42A partially bent at its contact part.

[0038] Referring to FIGS. 3, 4, 5, and 6, release prevention members 38 are each provided at rear surfaces of bleacher retaining part 31C and softener retaining part 31D, to prevent arbitrary release of the contact part 42. The release prevention member includes first and second release prevention protrusions 38A and 38B. The first release prevent protrusion(s) 38A protrudes from rear surfaces of bleacher retaining part 31C and softener retaining part 31D, and are inserted into the bent groove part 42A of the contact part 42.

[0039] The second release prevention protrusions 38B are provided around the first release prevention protrusions 38A such that the contact part 42 is caught when moving. The support part 27 and release prevention member 38 may have different heights relative to the first coil part 41 and the contact part 42, because the torsion springs 40 may have heights different from each other at left and right sides between detergent box 30 and dispenser 20.

[0040] Referring to FIGS. 3 and 4, locking unit 50 is provided at dispenser 20 and detergent box 30 to lock the detergent box when the detergent box is inserted into the dispenser. The locking unit may also unlock the locked detergent box when the locked detergent box moves into the dispenser a predetermined distance.

[0041] The locking unit 50 includes a locking protrusion part 51 rotatably provided at one side on a bottom surface of the dispenser housing 21, and a locking groove part 52 provided at the other side on a lower surface of the detergent box body 31. The locking protrusion part 51 may be caught and fixed when inserted, and may be released when again moving in an insertion direction. The locking protrusion part 51 is provided on the bottom surface of the dispenser housing 21 for rotation at one end. The locking protrusion part 51 has a locking protrusion 53 which protrudes upward at the other end, and is inserted into the locking groove part 52.

[0042] The locking groove part 52 is integrally provided on the lower surface of the detergent box body 31. As shown in FIG. 7, the locking protrusion 53 is caught at

one side of the locking groove part 52 when detergent box 30 is inserted into the doorway hole part 12A. The locking protrusion 53 is released from its catch state when the detergent box is again pressed rearwardly.

[0043] Referring to FIGS. 3 and 4, the damping unit 60 includes a rotary damper part 61, a rear gear part 62, and a pinion gear 63. The rotary damper part is provided on the bottom surface of dispenser housing 21, and pinion gear 63 damply rotates on its upper surface. The rack gear part 62 is provided on an opening side on the lower surface of the detergent box body 31, and is geared to the pinion gear 63.

[0044] The rotary damper part 61 is further coupled and fixed by a coupling member to a coupling boss which protrudes from the bottom surface of the dispenser housing 21. The pinion gear 63 is horizontally and rotatably provided on an upper surface of the rotary damper part 61. The rack gear part 62 is provided on the lower surface of the detergent box body 31 in a movement direction of detergent box 30. The gear part 64 meshes with pinion gear 63 and may be provided on the left side surface or right side surface of the rack gear part.

[0045] Operation of the drum type washing machine will now be described. First, a user inputs laundry inside drum 5 through laundry opening 8A and closes laundry opening 8A using door 11. The user then puts powder detergent, bleach, and softener into detergent box 30, sets a washing course by manipulating control panel 12, and activates the washing machine.

[0046] Upon activation, water and detergent are supplied to the tub using water supplying unit 13 and detergent supplying unit 14. More specifically, the water supplying unit 13 opens the water supply valve 13B and supplies water into the tub 4 via the water supply hose 13A and the water supply bellows 13C. The detergent supplying unit 14 squirts the water, introduced into the water supply hose 13A, to the first and second powder detergent retaining parts 31A and 31B or the bleacher retaining part 31C of the detergent box via the water supply hole 24B of the dispenser cover 22. At this time, the powder detergent or bleach in the detergent box is washed away by the water squirted from the water supply hole 24B to the bottom of the dispenser housing 21, and is supplied into the tub via water supply bellows 13C connecting to the dispenser housing 21.

[0047] When the powder detergent and bleach are introduced into the tub by the water supplying unit 13 and detergent supplying unit 14, the drum is rotated by motor 7. As the drum rotates, laundry is lifted up by lifter 6 and falls down, thereby implementing laundry washing.

[0048] Upon completion of a wash cycle, the motor is stopped and the wash water in the tub is discharged by the water discharging unit. Water is again supplied to the tub to a predetermined level using water supplying unit 13, and the drum is again rotated by the motor, thereby implementing laundry rinsing. At this time, the detergent supplying unit 14 supplies water to softener retaining part 31D of the detergent box, and supplies the softener in

softener retaining part 31D to the tub. Upon completion of a laundry rinse cycle, the wash water is discharged by the water discharging unit.

[0049] When water discharge is executed in the wash and rinse cycles, a dehydration cycle in which the drum is rotated by the motor at high speed is implemented, to remove wash water from the laundry.

[0050] A procedure for withdrawing or inserting detergent box 30 to input detergent into detergent retaining parts 31A, 31B, 31C, and 31D will now be described. The detergent box 30 is withdrawn when a user pushes, with slight force, front panel 32 of the detergent box located inside doorway hole part 12A of the control panel. The applied force is then removed from the front panel.

[0051] More specifically, FIG. 7A shows that the detergent box is inserted into the dispenser and is locked by locking unit 50. If the detergent box is slightly pushed rearwardly, the locking groove part 52 of the detergent box slightly moves in a corresponding direction. The locking protrusion 53 of locking protrusion part 51 then moves relatively in an unlock direction because of a position change of the locking groove part 52, as shown in FIG. 7B. If the locking protrusion part 51 and locking groove part 52 are released from an unlock state, the elastic force of elastic member 40 induces withdrawing of the detergent box 30 from doorway hole part 12A of the control panel to the front, thereby disengaging the locking protrusion 53 from the locking groove part 52.

[0052] If the detergent box is withdrawn frontwardly by a predetermined distance or more, the catch jaw of dispenser cover 22 catches height control protrusion 36 of the detergent box cap 33, thereby stopping withdrawal of the detergent box. Height control protrusion 36 and catch jaw 26, therefore, serve to automatically limit a maximum distance the detergent box is able to be withdrawn. If the detergent box is withdrawn outside dispenser 20, powder detergent can be put into the first and second powder detergent retaining parts 31A and 31B, bleach can be put into bleacher retaining part 31C, and softener can be put into the softener retaining part 31D. A withdrawal state of the detergent box is shown in FIG. 5.

[0053] At this time, the pinion gear 63 rotates gearing with the rack gear part 62 when detergent box 30 is withdrawn. This is because the rack gear part 62 on the lower surface of the detergent box is geared to pinion gear 63 of the rotary damper part 61 at the dispenser housing 21. Thus, detergent box 30 is prevented from suddenly moving and is softly and smoothly withdrawn, because a damping action of the rotary damper part 61 limits the withdrawal speed of the detergent box.

[0054] The detergent box is inserted by pushing the detergent box into dispenser 20 until front panel 32 contacts doorway hole part 12A of the control panel. More specifically, if the detergent box is pushed in a rearward direction, detergent box body 31 of the detergent box is inserted into the dispenser as shown in FIG. 7C. If the front panel 32 of the detergent box contacts doorway hole part 12A, locking protrusion 50 of locking protrusion part

51 is inserted into locking groove part 52. As when the detergent box is withdrawn, the detergent box is prevented from suddenly moving by rack gear part 62 and rotary damper part 61, and is inserted softly and smoothly.

[0055] As shown in FIG. 7D, if the applied force is removed from the detergent box, locking protrusion 53 is caught by locking groove part 52 and the detergent box is fixedly inserted into the dispenser. An insertion state of the detergent box 30 is shown in FIG. 6.

[0056] Accordingly, the detergent box is not only improved in terms of its convenience of use, but also the embodiments described herein serve to provide a solution to the problem of detergent box becoming incompletely withdrawn from or inserted into the washing machine. This is because the detergent box may be automatically withdrawn or inserted by action of pressing the box inside the doorway hole part 12A of the control panel.

[0057] Moreover, damage and impact noise of the detergent box that occurs in other washing machines due to sudden withdrawal or insertion of the box is prevented, and the detergent box may be elegantly and smoothly withdrawn or inserted, due to dampening unit 60, to improve product performance.

[0058] The detergent box can be disengaged from dispenser 20 by pressing down the height control protrusion 36, to thereby prevent it from being caught by catch jaw 26 in a state where detergent box 30 is withdrawn from the dispenser. The detergent box may then be replaced and washed simply and conveniently.

[0059] FIGS. 8 to 11 show another embodiment of a detergent supplying unit 114 of a drum-type washing machine. This embodiment is different from other embodiments in that elastic member 140 is located between dispenser housing 121 and detergent box 130 of the detergent supplying unit 114, unlike elastic member 40.

[0060] Referring to FIGS. 8, 10, and 11, elastic member 140 includes a plate spring 140. The plate spring has one end connected and supported by a support part 127 within the dispenser housing 121, and another end at a rear part of a detergent box body 131. In an alternative embodiment, a plurality of plate springs 140 may be provided between the detergent box body 131 and dispenser housing 121. The plate springs may have the same or different heights. The plate springs are provided at left and right sides between detergent box body 131 and dispenser housing 121, respectively.

[0061] Support part 127 includes first and second protrusions 127A and 127B. The first protrusion has a cylinder shape and protrudes upward within the dispenser housing 121. The second protrusion 127B is provided on an inner surface of the dispenser housing 121 and is spaced apart from the first protrusion.

[0062] Each plate spring 140 includes a connecting part 141 connected to support part 127 and a contact part 142 connected to connecting part at one side. Each plate spring is further in contact with the rear part of the detergent box at its other side. The connecting part 141 may be bent toward the second protrusion 127B center-

ing on the first protrusion 127A, such that its end is in elastic contact with an inner surface of the dispenser housing 121. The end of the connecting part 114 has a shape which surrounds the second protrusion 127B, and is coupled to an outer surface of the second protrusion 127B.

[0063] The contact part 142 contacts the rear part of the detergent box 130 and is partially bent in a groove shape. The contact part may further be bent into an "S" shape as seen from a top view. Positioning protrusions 128 for safely mounting the contact part 142 are provided at both sides on an inner surface of the dispenser housing. These protrusions the plate spring 140 from inclining centering on the connecting part 141.

[0064] Referring to FIGS. 8 and 9, release prevention members 138 each are provided at left and right sides of the rear part of the detergent box 130, to prevent arbitrary release of contact parts 142. The release prevention member 138 includes a release prevention protrusion 138A which protrudes rearwardly from side parts of the detergent box 130, such that it is inserted into the groove part of the contact part 142. The release prevention member also includes a release prevention groove part 138B at the release prevention protrusion 140. Contact part 142 is caught when moving in up and down directions. The release prevention protrusions 138A protrude rearwardly from ends of the side parts of the detergent box, such that they are caught in left and right directions after being inserted into the bent groove part of the contact part 142.

[0065] The release prevention member 138B is provided at a portion of the release prevention protrusion 138A at which contact part 142 contacts. This member prevents contact part 142 from moving up and down. The support part and the release prevention groove part 138B may also be provided at heights different from each other corresponding to connecting part 141 and contact part 142, because plate springs 140 are provided at heights different from each other at left and right sides between detergent box 130 and dispenser housing 121.

[0066] One or more embodiments described herein therefore facilitate withdrawal and insertion of a detergent box from a washing machine and improve the detergent box in terms of convenience of use. The washing machine also prevents incomplete withdrawal and insertion of the detergent box.

[0067] To achieve these and other advantages, a washing machine according to one embodiment includes a dispenser, a detergent box, a locking unit, and an elastic member. The dispenser has an opening provided in its front. The detergent box is provided to be movable within the dispenser through the opening. The locking unit locks or unlocks the detergent box inserted into the dispenser. The elastic member is provided between the detergent box and the dispenser, and applies an elastic force to the detergent box in a withdrawal direction when the locking unit unlocks the detergent box.

[0068] The elastic member may connect to any one of

the detergent box and the dispenser at its one side, and get in elastic contact with the other one of the detergent box and the dispenser at the other side. The elastic member may be provided in plurality by heights different from each other between the detergent box and the dispenser.

[0069] The elastic member may include a torsion spring. The torsion spring may include a first coil part connecting to a support part provided within the dispenser, and elastically twisted, a contact part getting in contact with a rear part of the detergent box, and a second coil part provided between the first coil part and the contact part, and elastically twisted.

[0070] A release prevention member may be provided at the rear part of the detergent box, and prevent arbitrary release of the contact part. The contact part may be partially bent at its part, and the release prevention member may include a first release prevention protrusion provided at the rear part of the detergent box, and inserted into the bent part of the contact part. The release prevention member may include a second release prevention protrusion provided around a portion with which the contact part gets in contact on the rear part of the detergent box, and preventing movement of the contact part. Positioning protrusions may be provided at both-side parts on an inner surface of the dispenser housing, and mount the contact part and prevent sag of the coil spring.

[0071] The elastic member may include a plate spring. The plate spring may include a connecting part connecting to a support part provided within the dispenser, and a contact part connecting to the connecting part at one side, and getting in contact with the rear part of the detergent box at the other side. A release prevention member may be provided at a rear part of the detergent box, and prevent arbitrary release of the contact part.

[0072] The contact part may be partially bent at its part. The release prevention member may include a release prevention protrusion protruding from the rear part of the detergent box, and inserted into the bent part of the contact part. The contact part may be bent in an 'S' shape. The release prevention member may include a release prevention groove part provided at the rear part of the detergent box, and inserting the contact part. Positioning protrusions may be provided at both-side parts on an inner surface of the dispenser housing, and mount the contact part and prevent sag of the plate spring.

[0073] The washing machine may further include a damping unit provided at the dispenser and the detergent box, and limiting a withdrawal speed of the detergent box. The damping unit may include a rotary damper part provided at any one of the dispenser and the detergent box, and having a pinion gear damply rotating at its one side, and a rack gear part provided at the other one of the dispenser and the detergent box in a movement direction of the detergent box such that it is geared with the pinion gear of the rotary damper part.

[0074] The locking unit may be provided at the dispenser and the detergent box such that it locks the detergent box when the detergent box is inserted into the

dispenser, and unlocks the locked detergent box when the detergent box is again pressed into the dispenser.

[0075] A catch jaw may be provided on an inner surface of the dispenser. The detergent box may have a height control protrusion controllable in height, provided corresponding to the catch jaw such that it can be caught by the catch jaw to set a withdrawal distance and can avoid being caught by the catch jaw to be disengaged from the opening.

[0076] As described above, one or more embodiments of the washing machine described herein may have an advantage that when the locking unit unlocks the detergent box, the detergent box is easily withdrawn because of the elastic member. These features improve the convenience of use of the washing machine.

[0077] Also, when the detergent box is withdrawn or inserted, the withdrawal distance and an insertion distance are set by the elastic member and the locking unit. This prevents incomplete withdrawal and insertion of the detergent box.

[0078] The embodiments described herein may be varied in many ways. For example, in addition to a drum-type washing machine, the embodiments are applicable to a steam-type or dish washing machines having a detergent box. Also, the locking and damping units can be applied in various ways besides the above-described exemplary embodiments. Also, the elastic member may connect to the support part provided at the rear part of the detergent box at one end, and may contact the inner surface of the dispenser at the other end.

[0079] Any reference in this specification to "one embodiment," "an embodiment," "example embodiment," etc., means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the invention. The appearances of such phrases in various places in the specification are not necessarily all referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with any embodiment, it is submitted that it is within the purview of one skilled in the art to effect such feature, structure, or characteristic in connection with other ones of the embodiments.

[0080] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

Claims

1. A washing machine (1) comprising:
 - a dispenser (20) having an opening (20A);
 - a detergent box (30; 130) movable within the dispenser (20) through the opening (20A);
 - a locking unit (50) for locking or unlocking the detergent box (30; 130) in the dispenser (20); and
 - an elastic member (40; 140), between the detergent box (30; 130) and the dispenser (20), to apply an elastic force to the detergent box (30; 130) in a withdrawal direction when the locking unit (50) unlocks the detergent box (30; 130).
2. The washing machine as claimed in claim 1, wherein one side of the elastic member (40) is connected to one of the detergent box (30) or the dispenser (20), and another side of the elastic member (40) is in elastic contact with the other of the detergent box (30) or the dispenser (20).
3. The washing machine as claimed in claim 2, wherein the elastic member comprises at least one torsion spring (40), the at least one torsion spring (40) comprises:
 - a first coil part (41) which is elastically twisted and connected to a support part (27) within the dispenser (20);
 - a contact part (42) in contact with a rear part of the detergent box (30); and
 - a second coil part (43) which is elastically twisted and provided between the first coil part (41) and the contact part (42).
4. The washing machine as claimed in claim 3, further comprising:
 - a release prevention member (38), at the rear part of the detergent box (30), to prevent arbitrary release of the contact part (42).
5. The washing machine as claimed in claim 4, wherein the contact part (42) is partially bent, and wherein the release prevention member (38) includes a first release prevention protrusion (38A) provided at the rear part of the detergent box (30) and inserted into the bent part (42A) of the contact part (42).
6. The washing machine as claimed in claim 4, wherein the release prevention member (38) includes a second release prevention protrusion (38B) around a portion with which the contact part (42) contacts on the rear part of the detergent box (30), the second release prevention protrusion (38B) preventing movement of the contact part (42).

7. The washing machine as claimed in claim 2, wherein the elastic member comprises a plate spring (140), the plate spring (140) comprises:

a connecting part (141) connected to a support part (127) within the dispenser (20); and
a contact part (142) connected to the connecting part (141) at one side and in contact with the rear part of the detergent box (130) at another side.

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8. The washing machine as claimed in claim 7, wherein a release prevention member (138) is provided at a rear part of the detergent box (130) to prevent arbitrary release of the contact part (142).

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9. The washing machine as claimed in claim 8, wherein the contact part (142) is partially bent, and wherein the release prevention member (138) comprises:

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a release prevention protrusion (138A) which protrudes from the rear part of the detergent box (130) and which is inserted into the bent part of the contact part (142).

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10. The washing machine as claimed in claim 8, wherein the release prevention member (138) comprises a release prevention groove part (138B) which is provided at the rear part of the detergent box (130) and which is inserted into the contact part (142).

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11. The washing machine as claimed in one of claims 1 to 10, wherein a plurality of elastic members (40) with different heights are provided between the detergent box (30) and dispenser (20).

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12. The washing machine as claimed in one of claims 1 to 10, further comprising:

a damping unit (60), located at the dispenser (20) and detergent box (30; 130), to limit a withdrawal speed of the detergent box (30; 130).

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FIG. 1

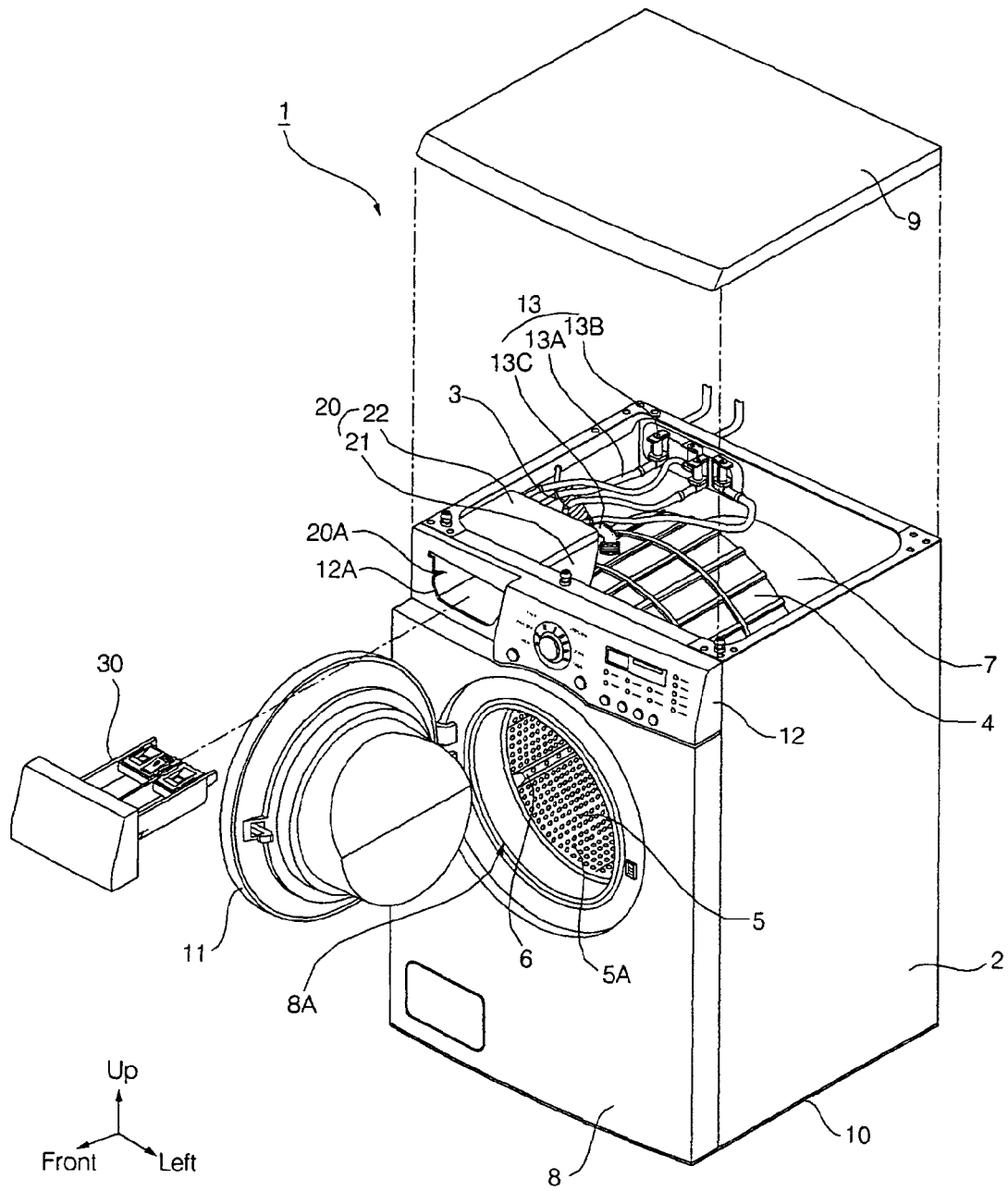


FIG. 2

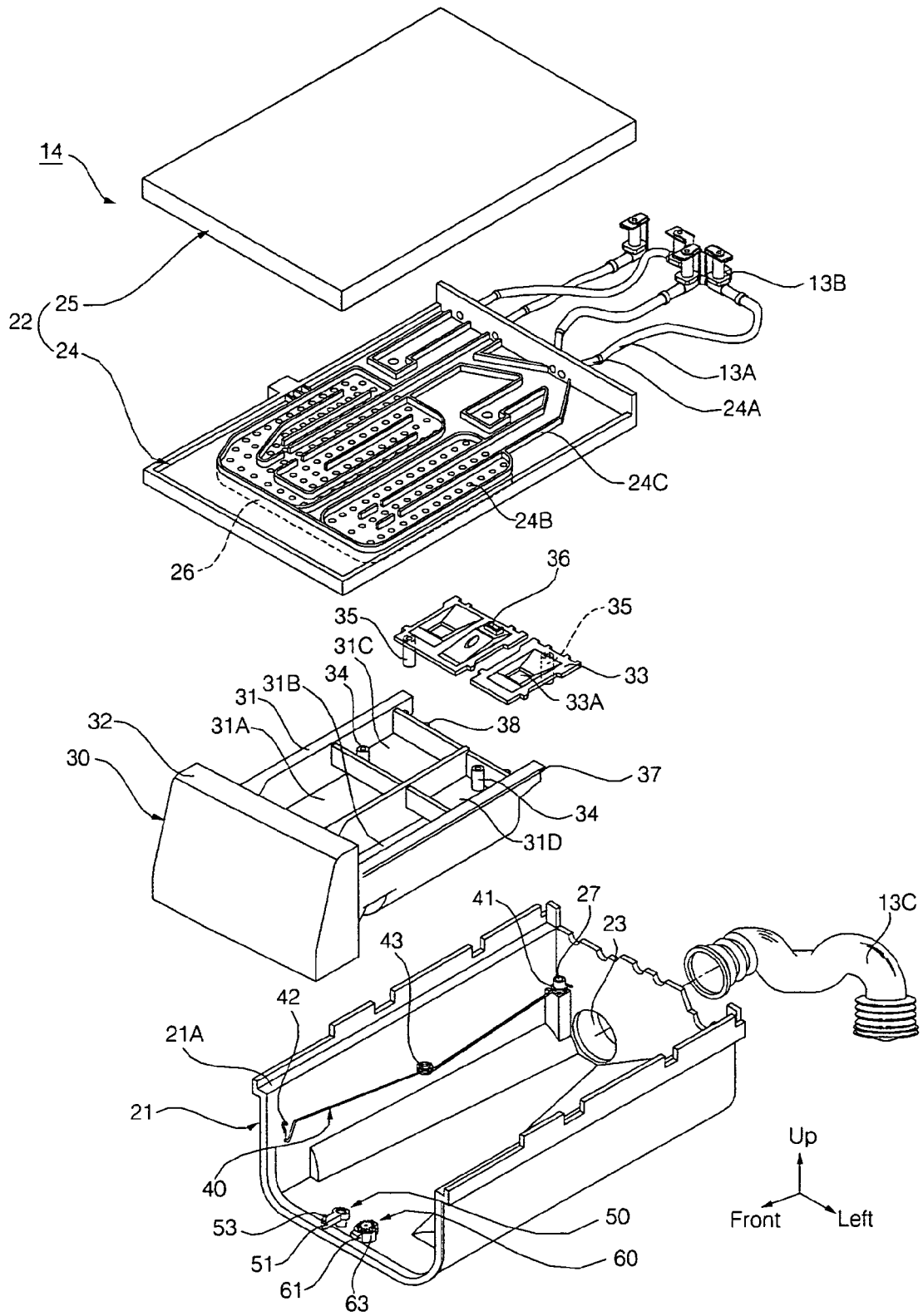


FIG. 3

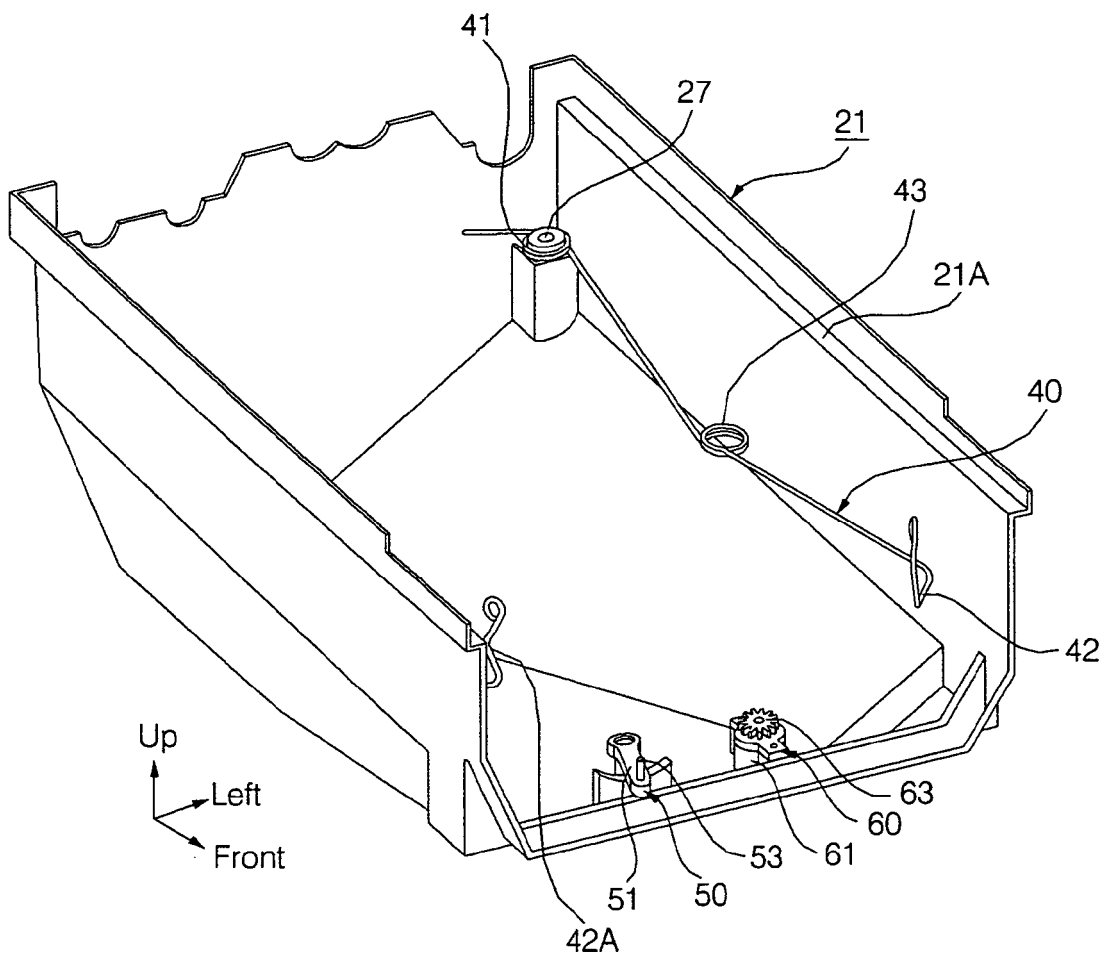


FIG. 4

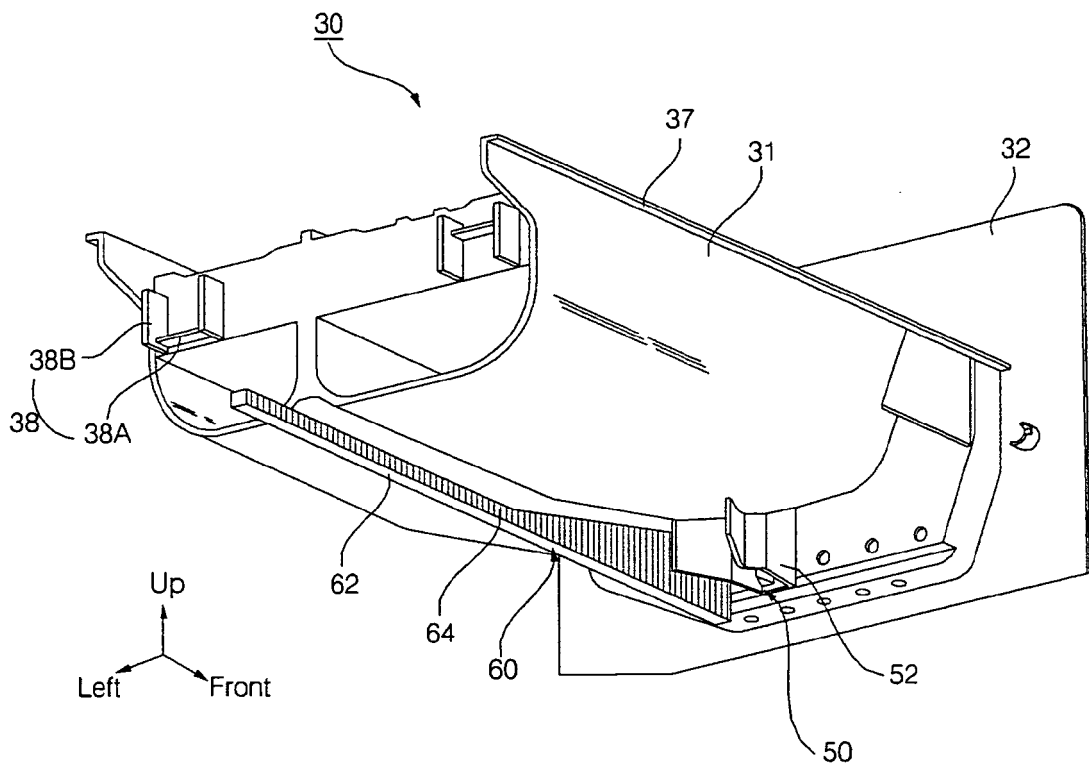


FIG. 5

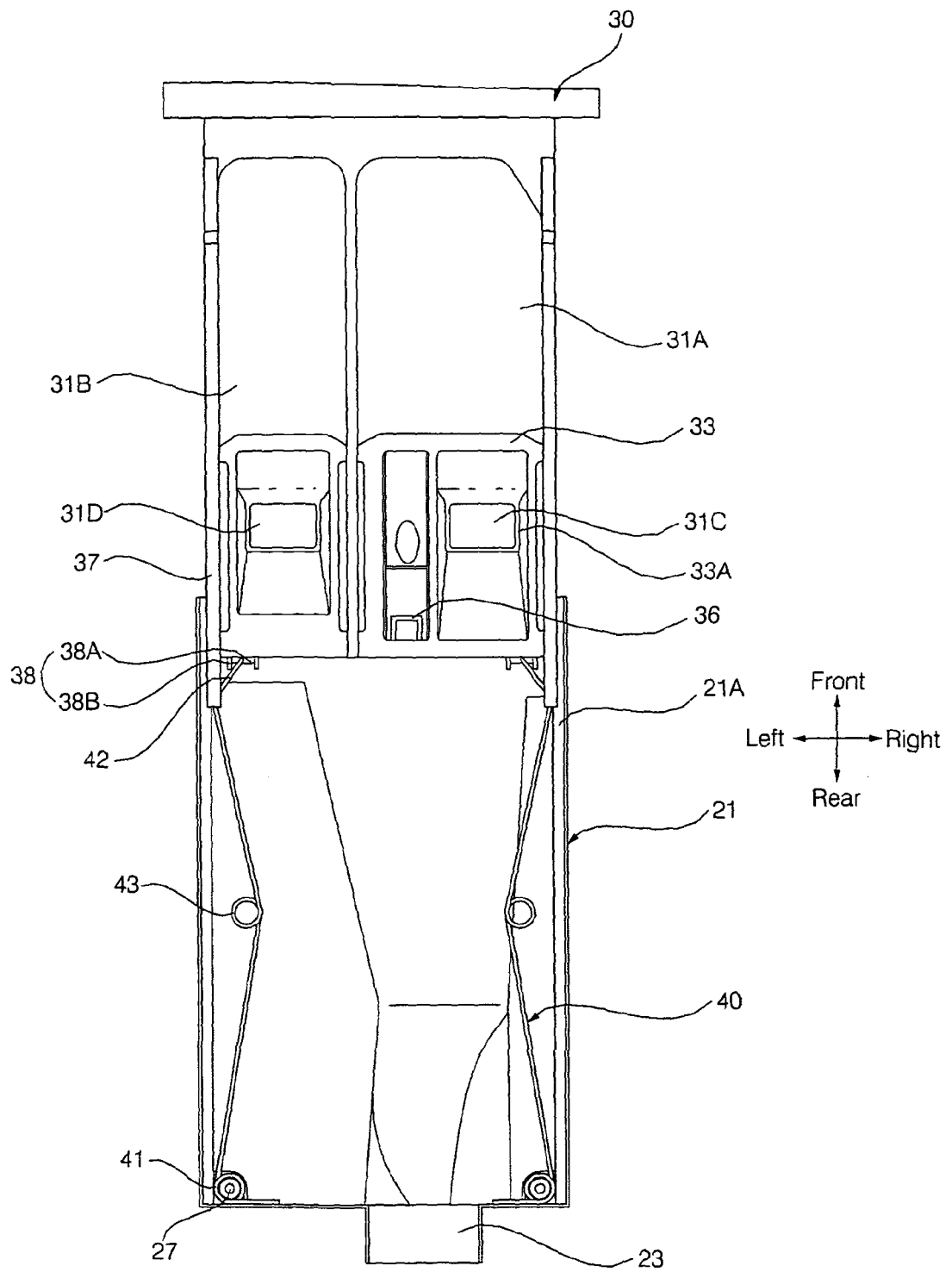


FIG. 6

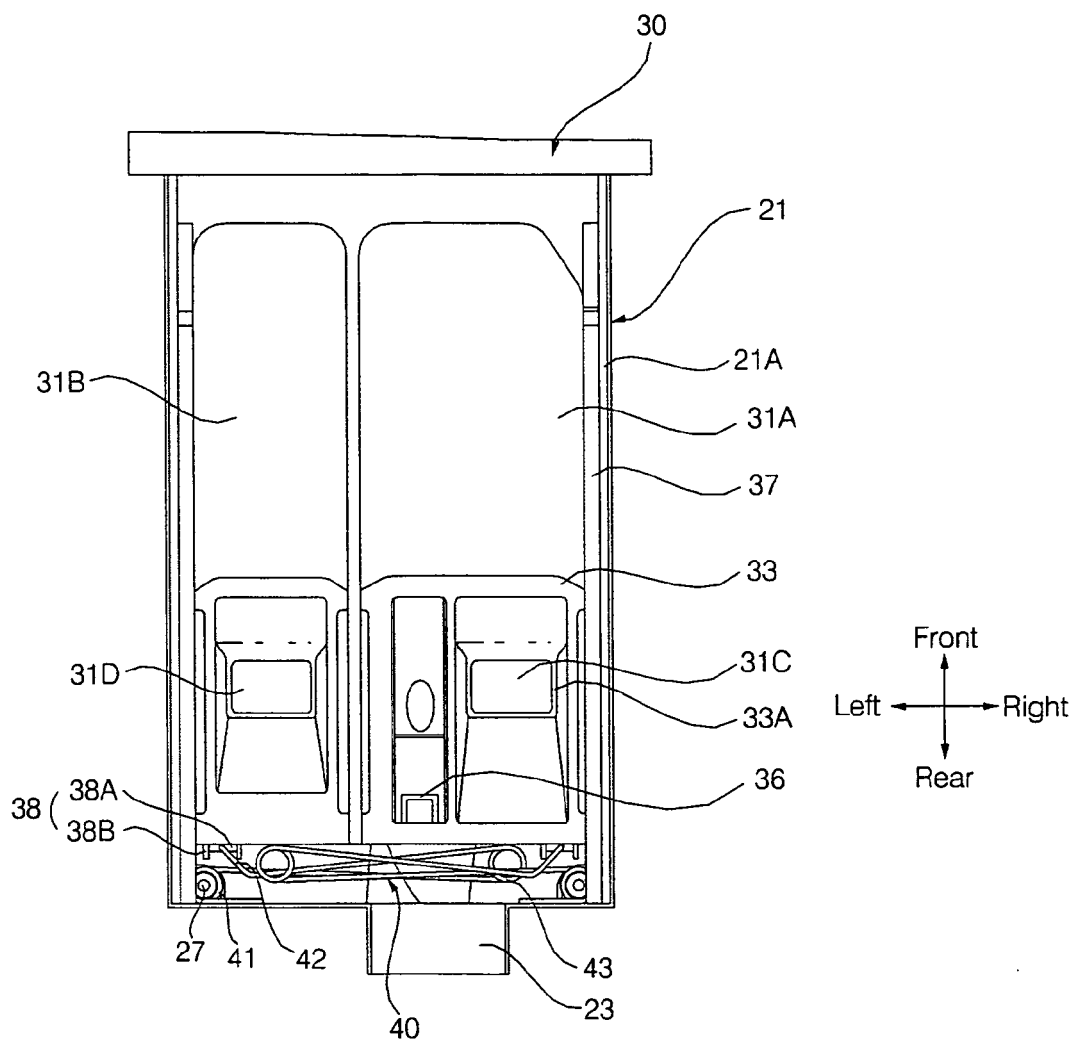


FIG. 7

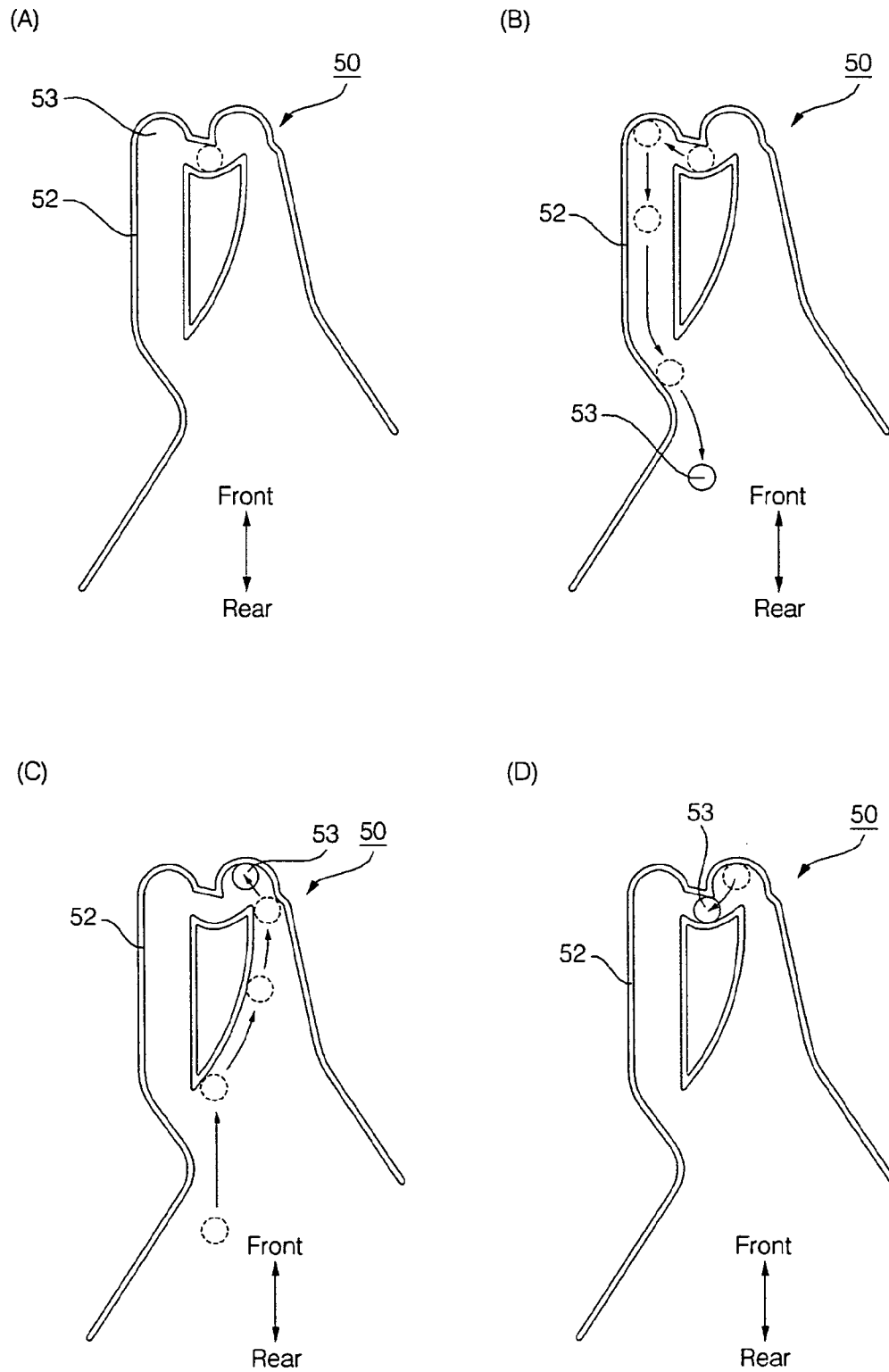


FIG. 8

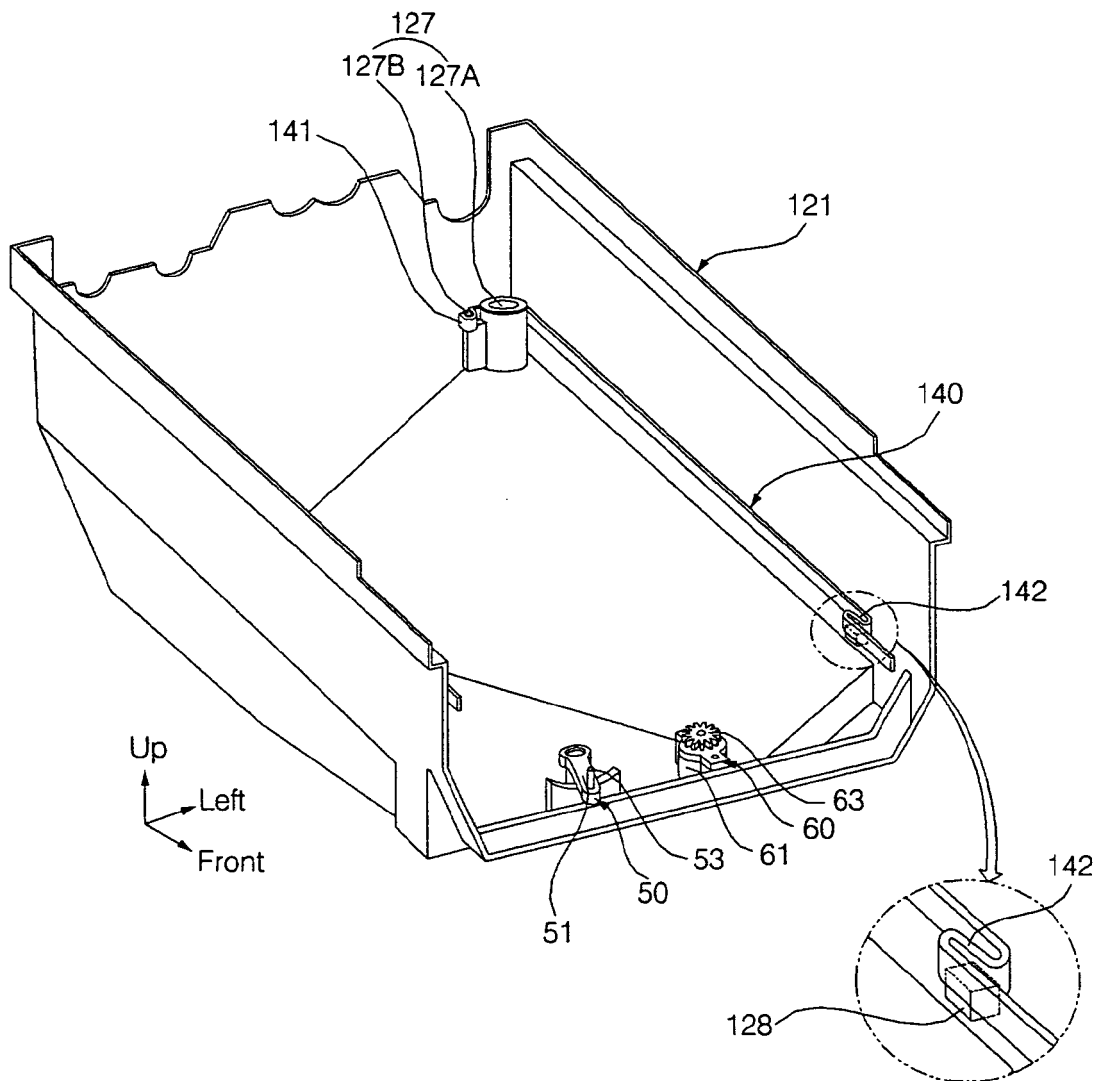


FIG. 9

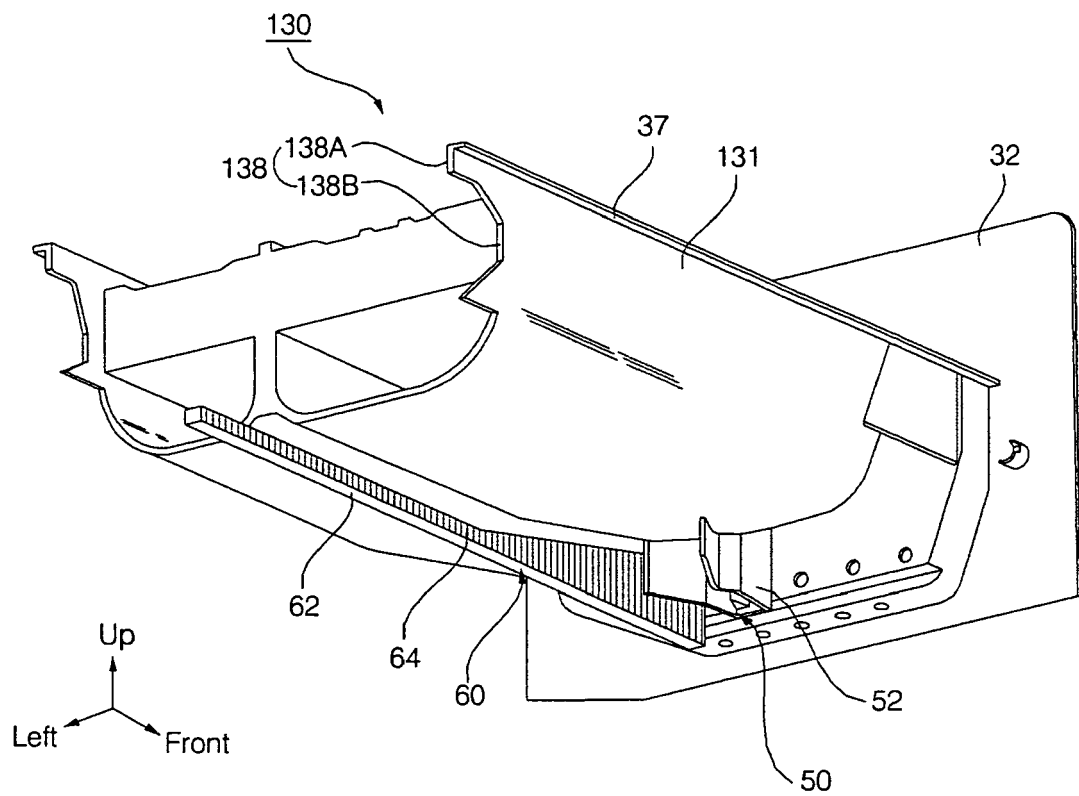


FIG. 10

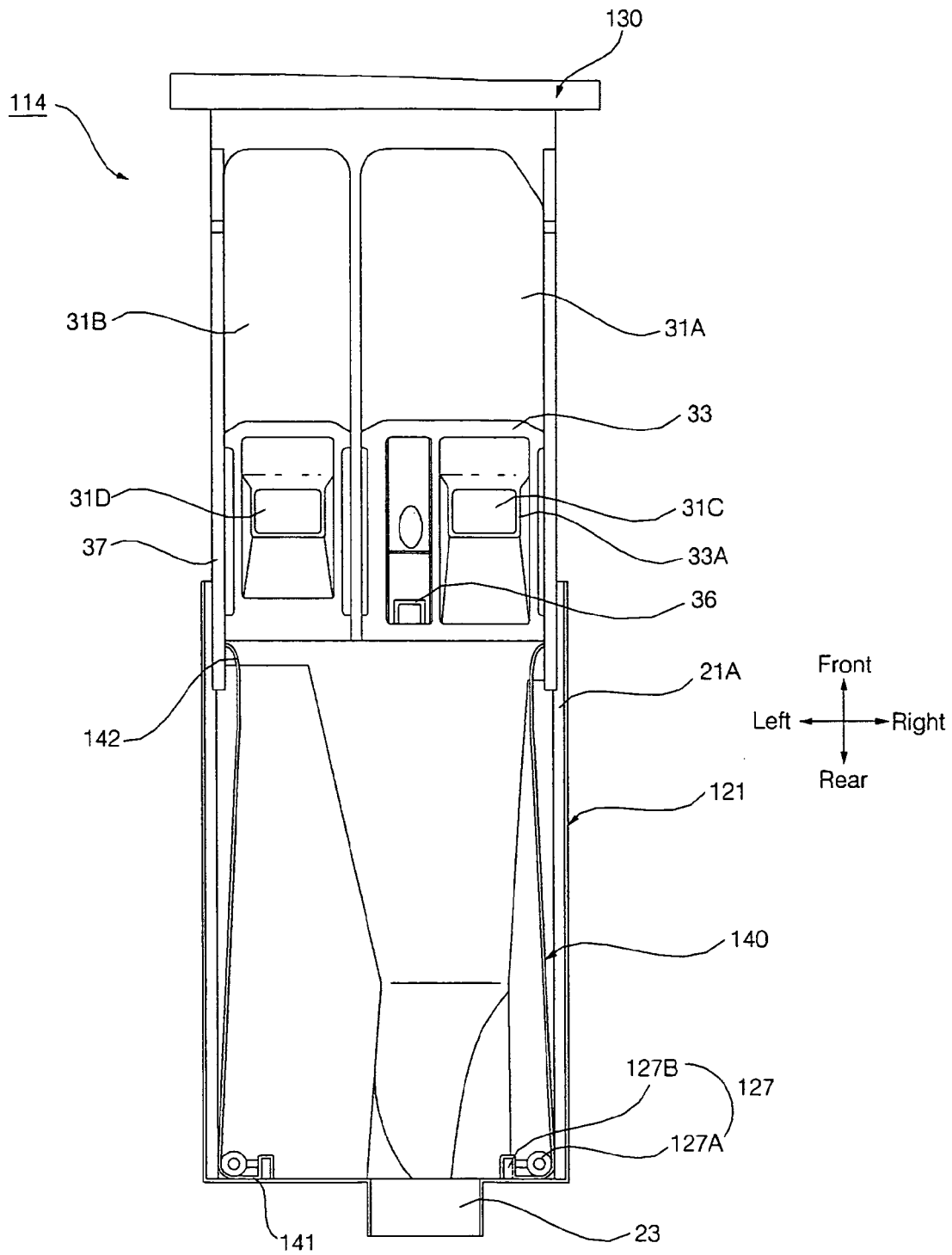
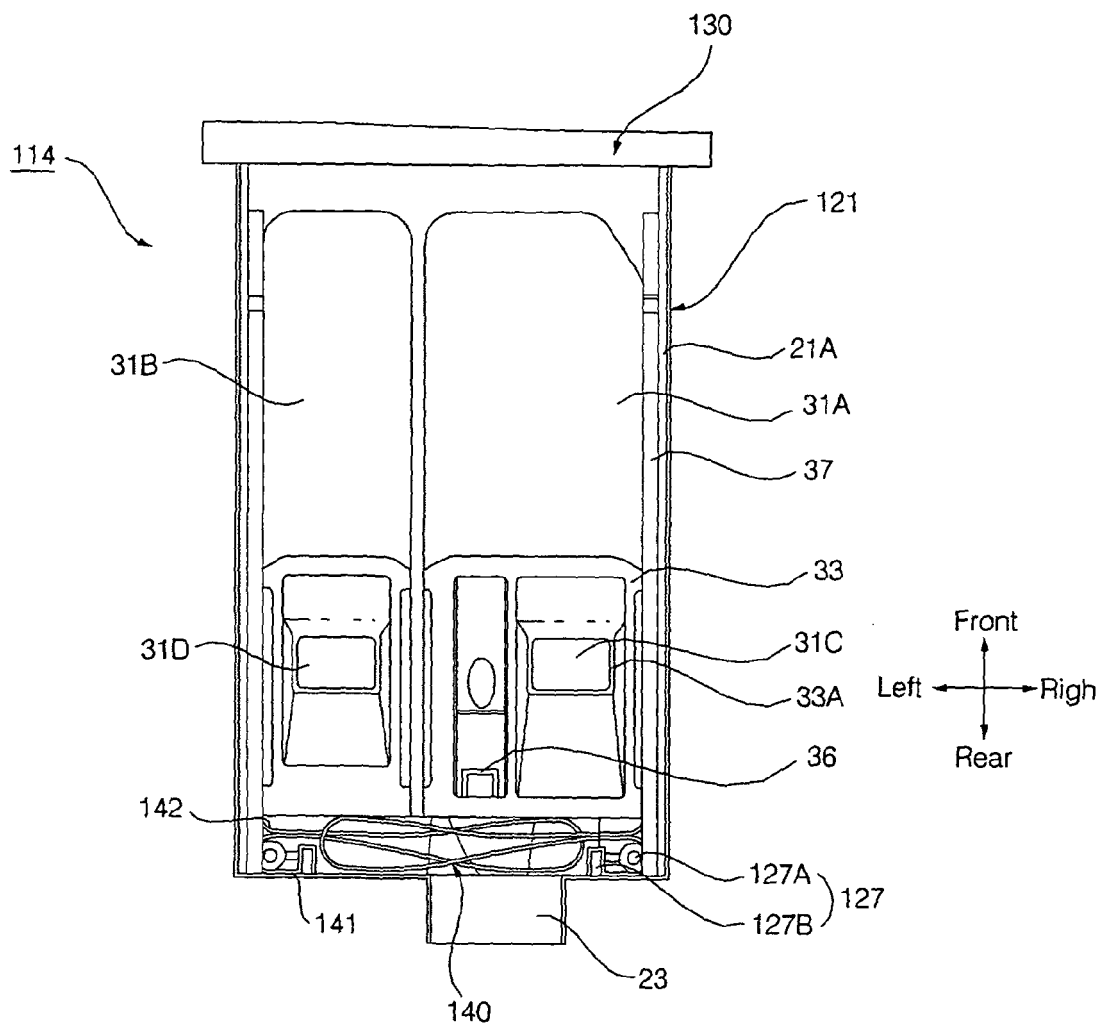


FIG. 11





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EUROPEAN SEARCH REPORT

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EPO FORM 1503 03 82 (P04C01)

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