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JE et al.(10) **Pub. No.: US 2008/0078211 A1**(43) **Pub. Date: Apr. 3, 2008**(54) **WASHING MACHINE**(30) **Foreign Application Priority Data**(75) Inventors: **Byoung Soo JE**, Seoul (KR);
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D06F 39/02 (2006.01)(52) **U.S. Cl.** **68/17 R; 68/212**(57) **ABSTRACT**

A washing machine includes a dispenser with a detergent box, a locking unit, and an automatic withdrawing unit. The locking unit acts to lock or unlock the detergent box as it is inserted into and withdrawn from the dispenser. The automatic withdrawing unit biases the detergent box to the withdrawal position.

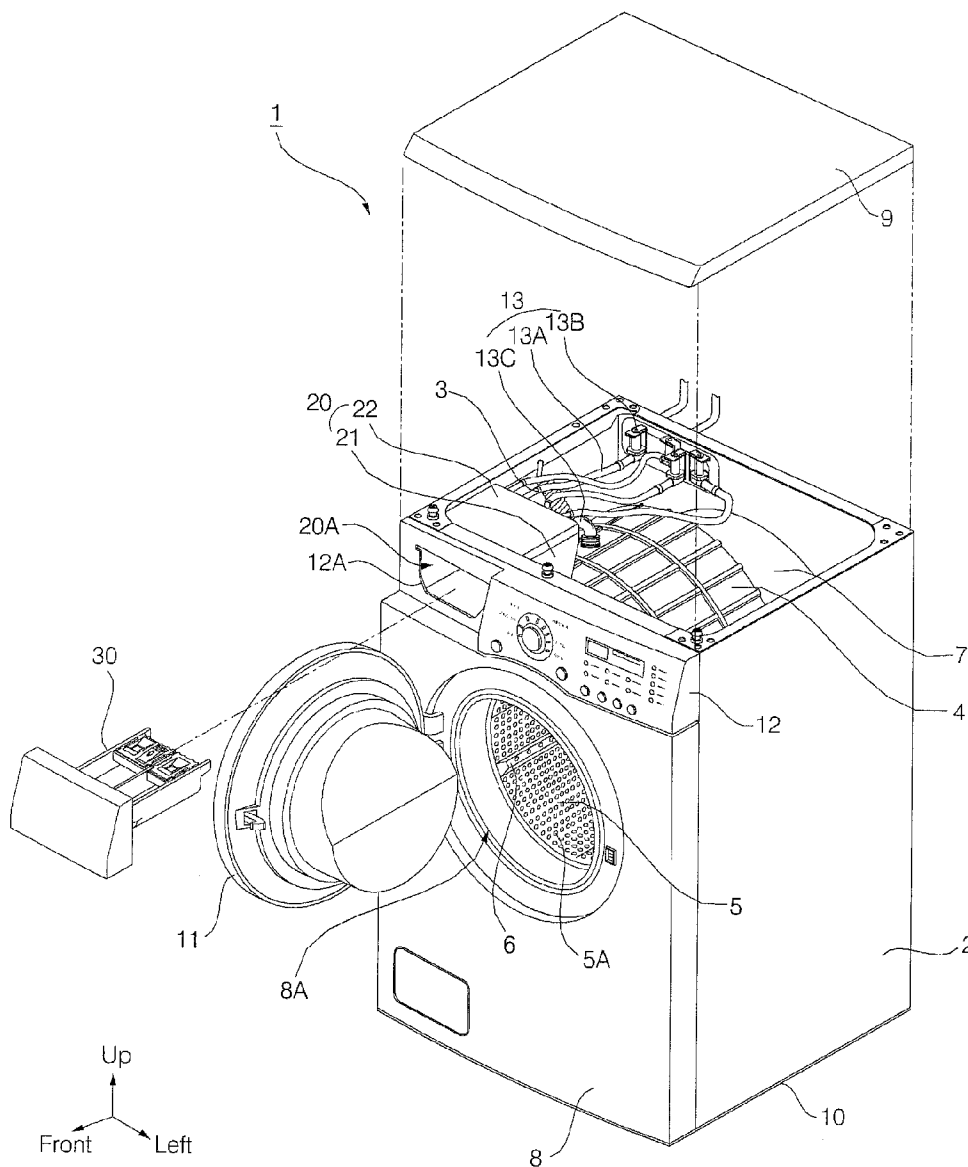
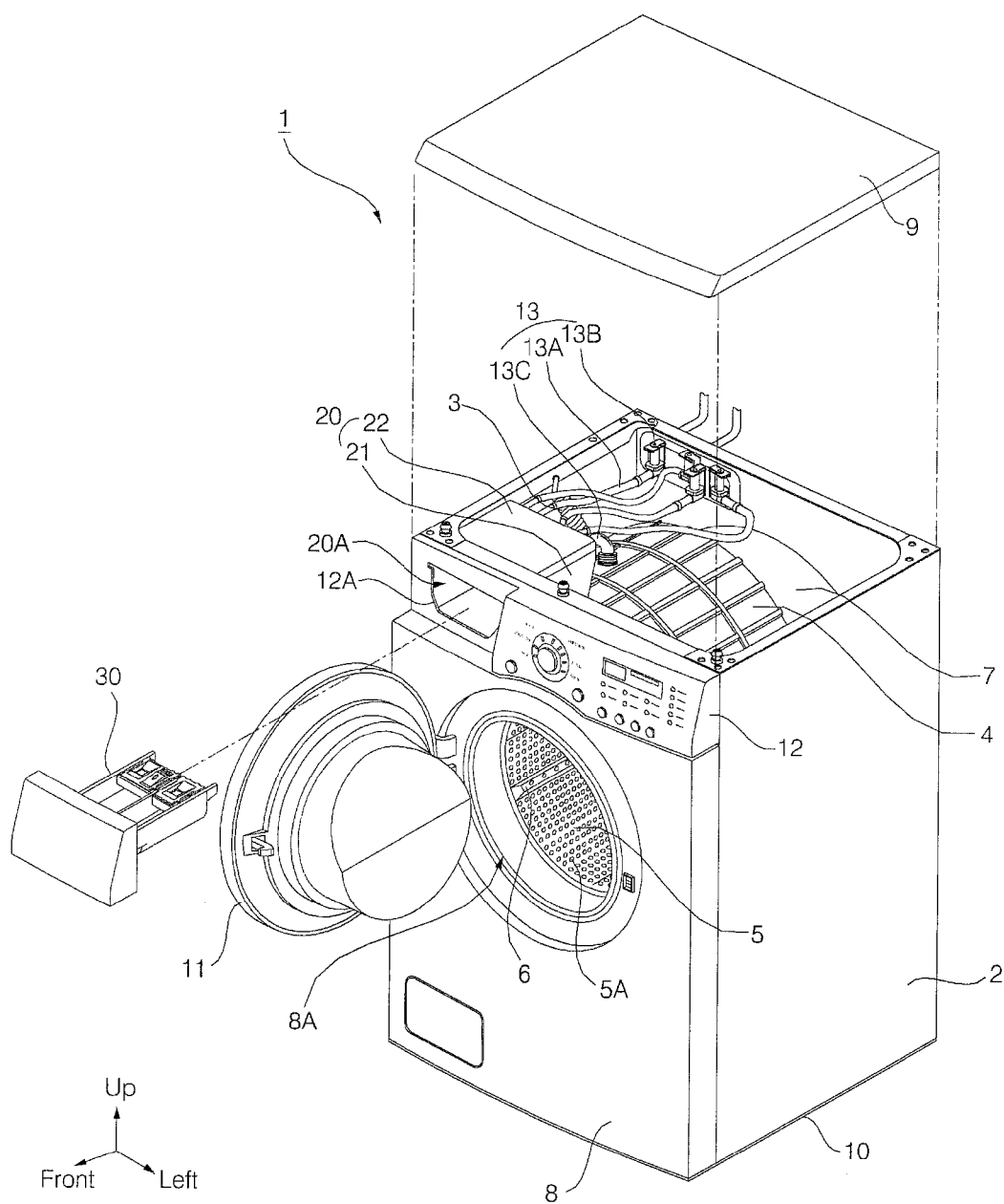
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Chantilly, VA 20153-1200(73) Assignee: **LG ELECTRONICS INC.**(21) Appl. No.: **11/857,779**(22) Filed: **Sep. 19, 2007**

FIG. 1



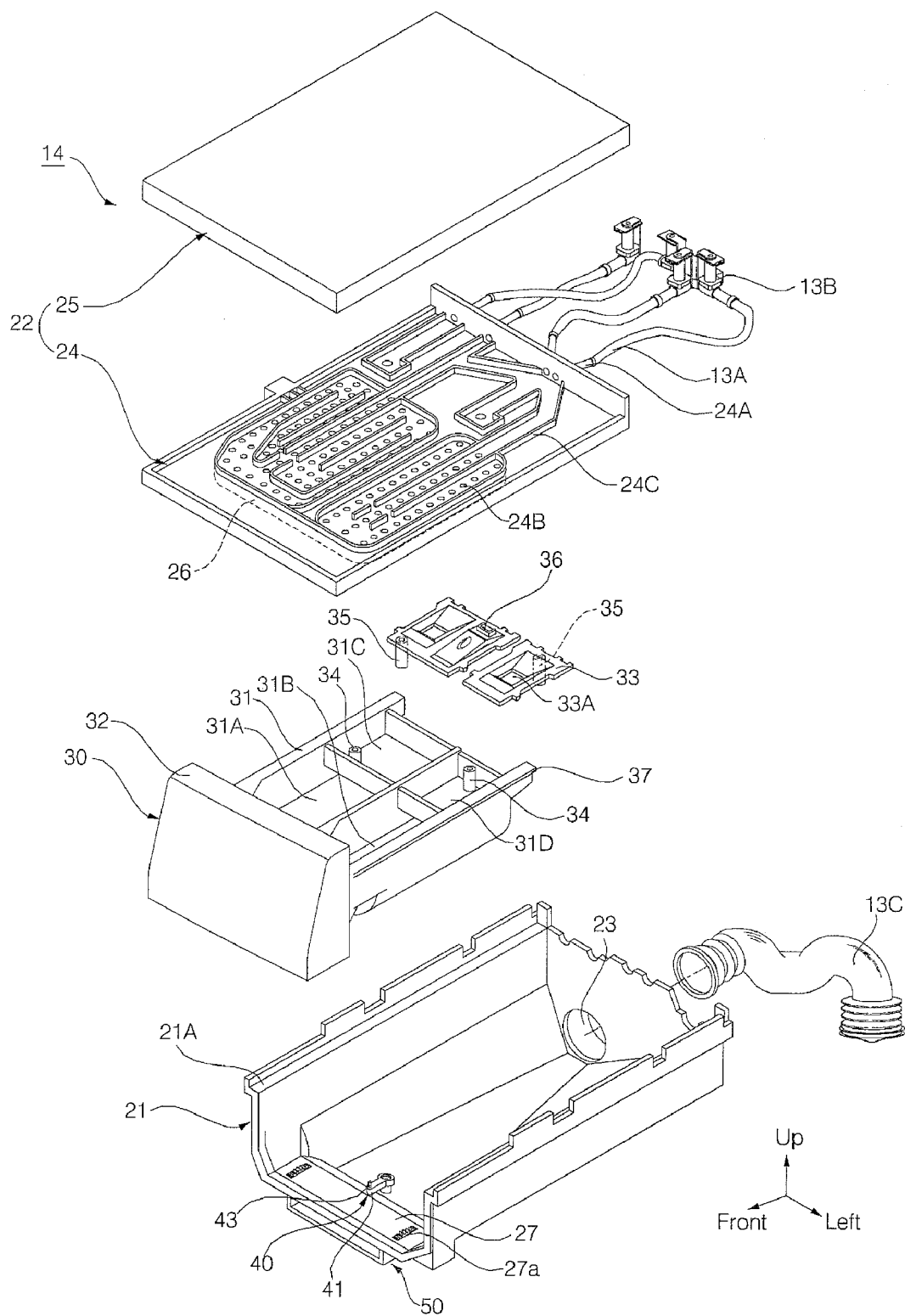


FIG. 3

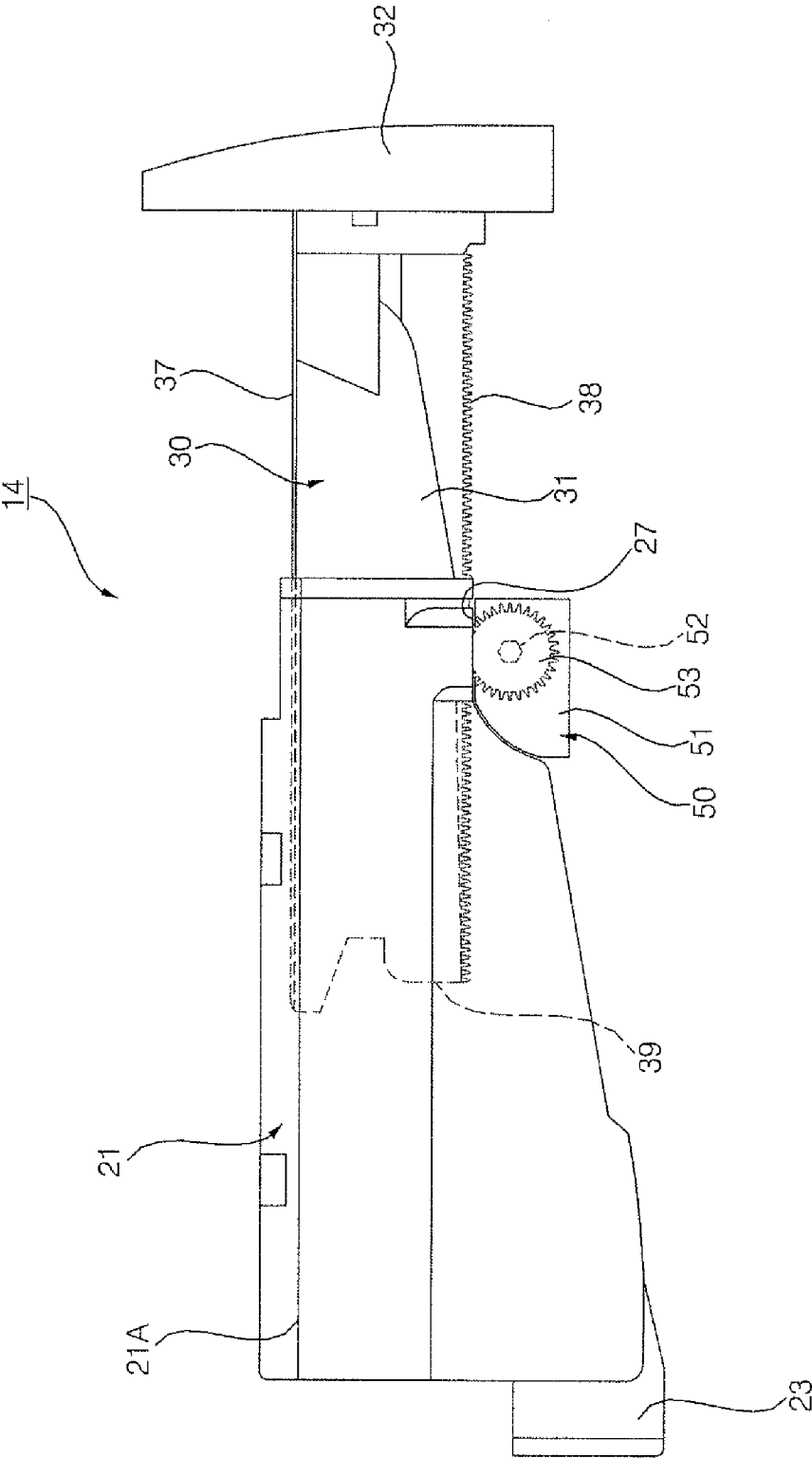


FIG. 4

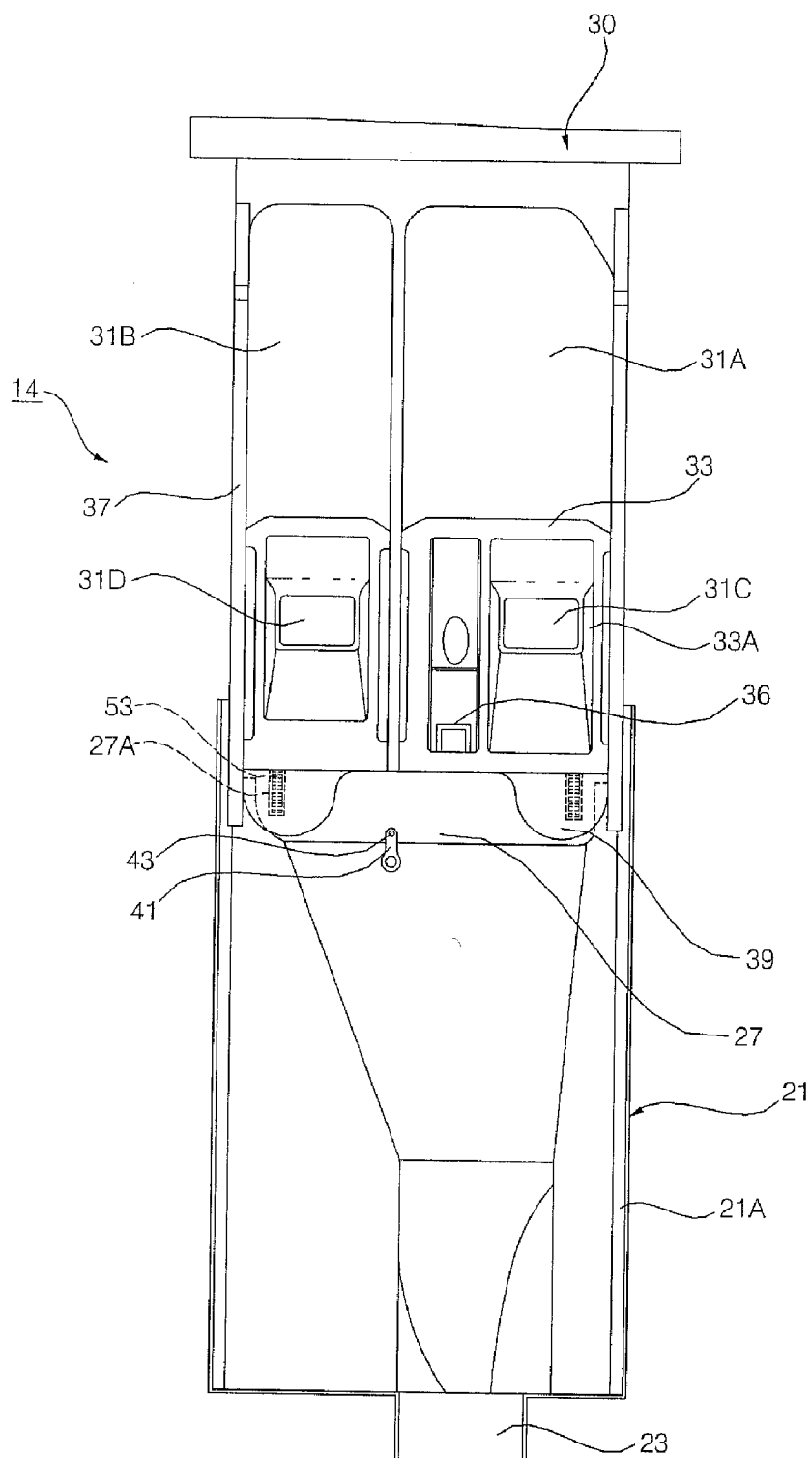


FIG. 5

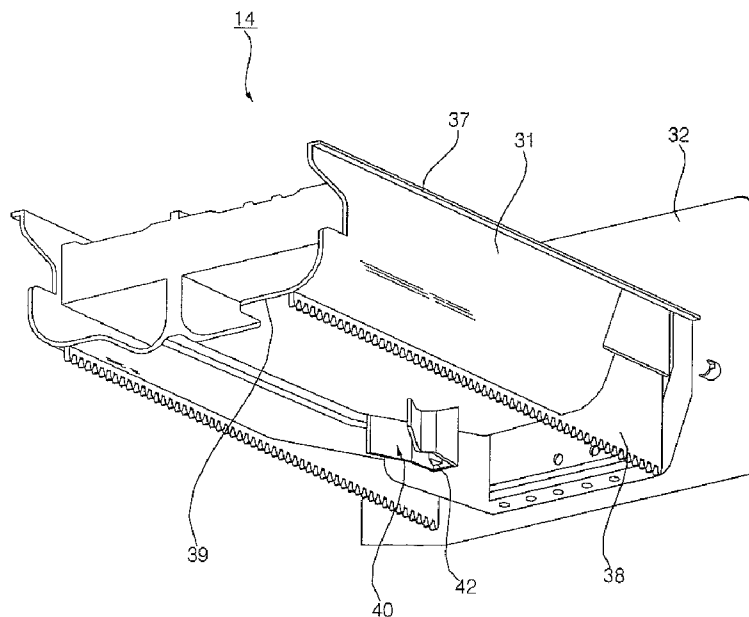


FIG. 6

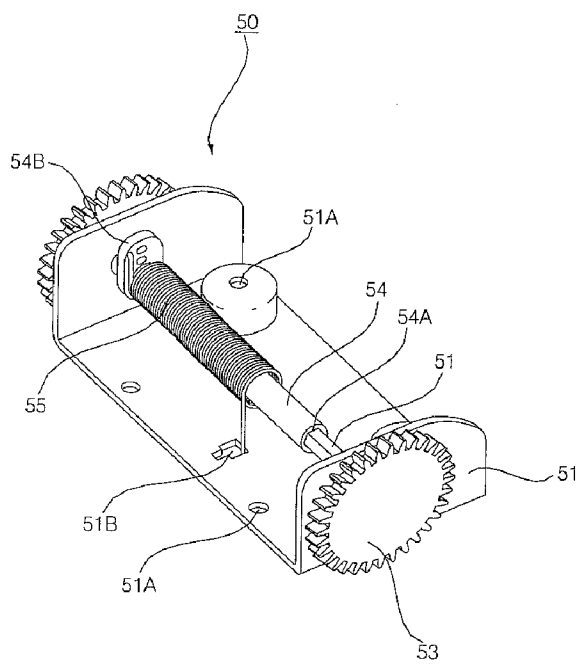


FIG. 7

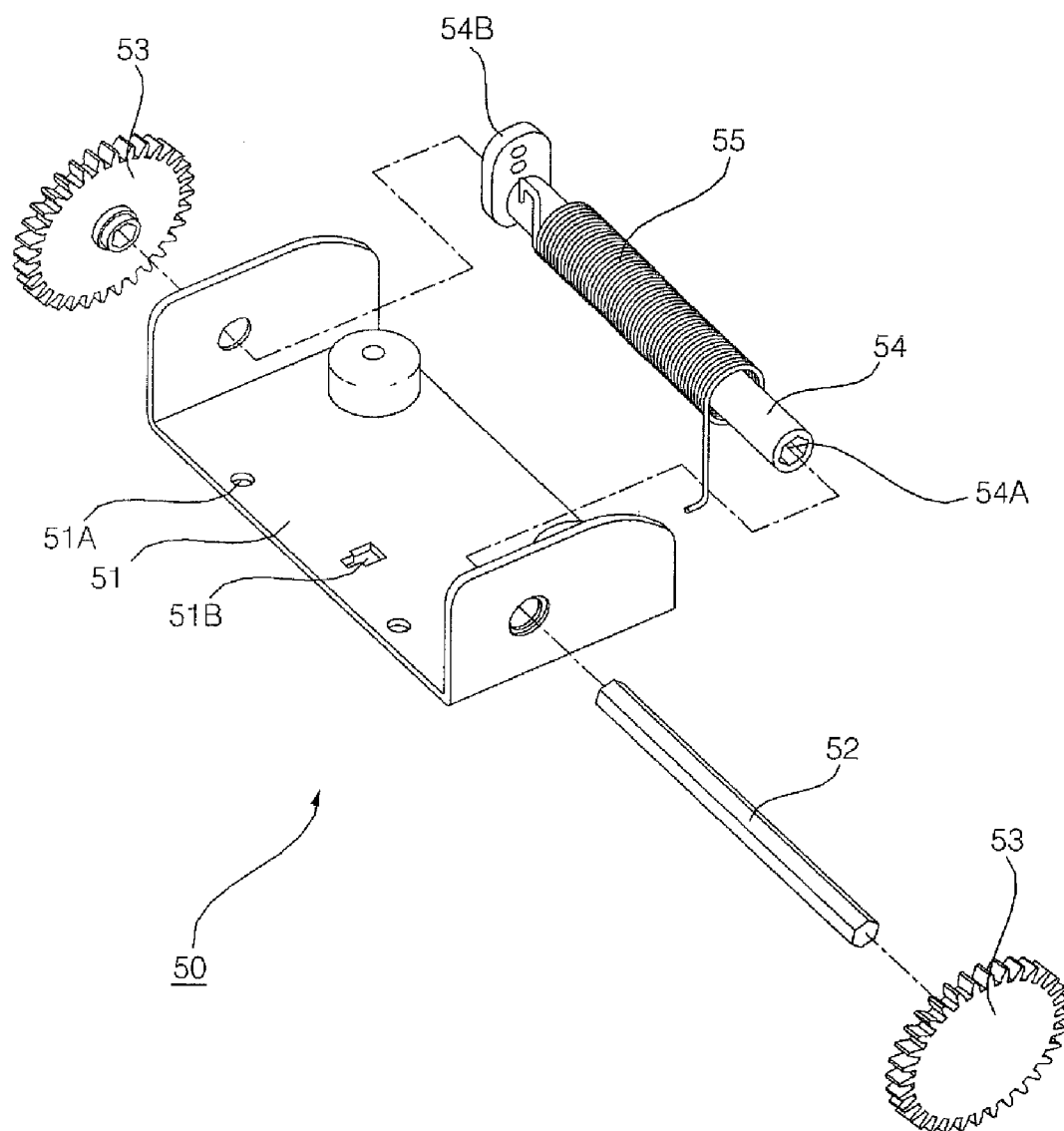


FIG. 8

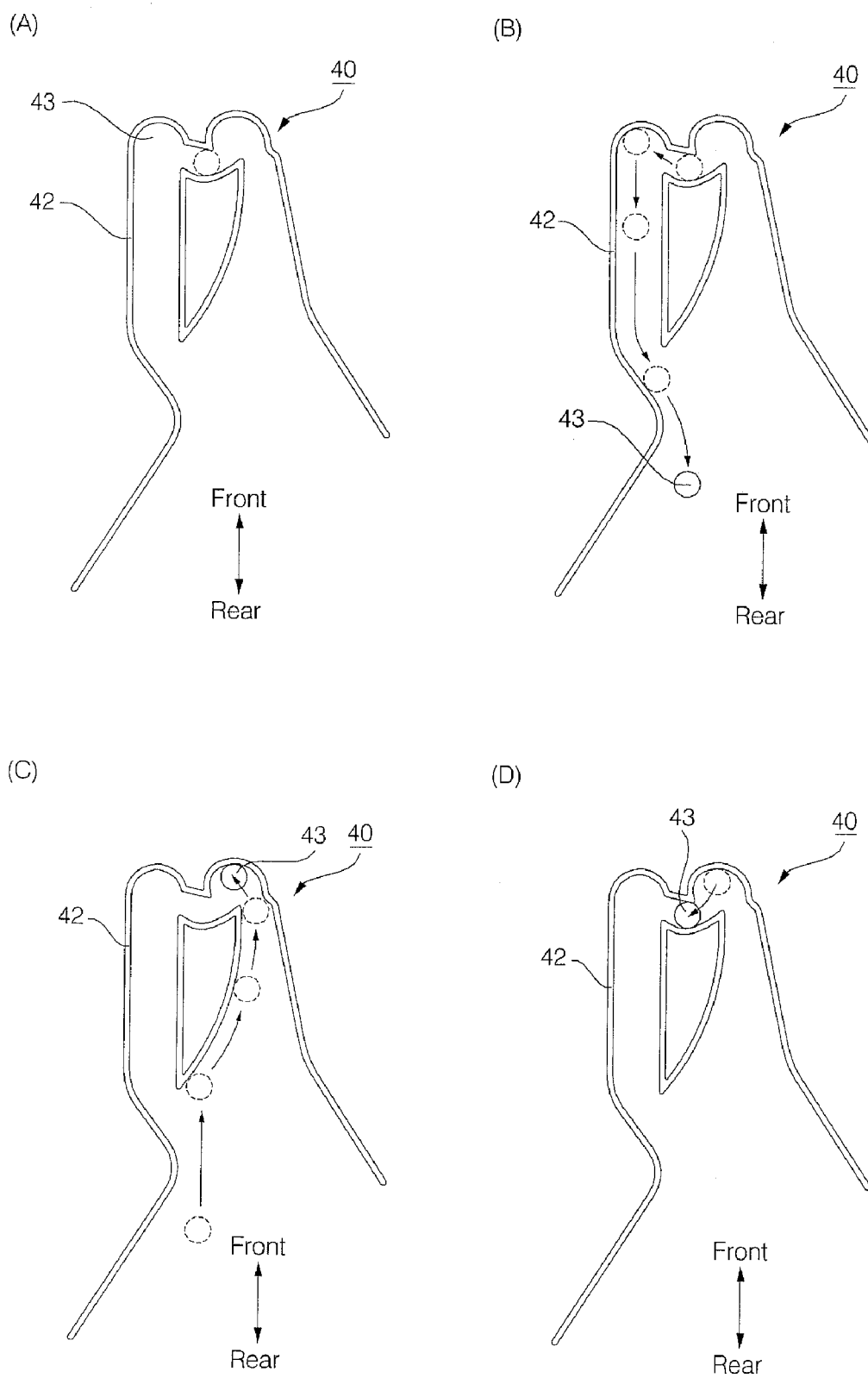


FIG. 9

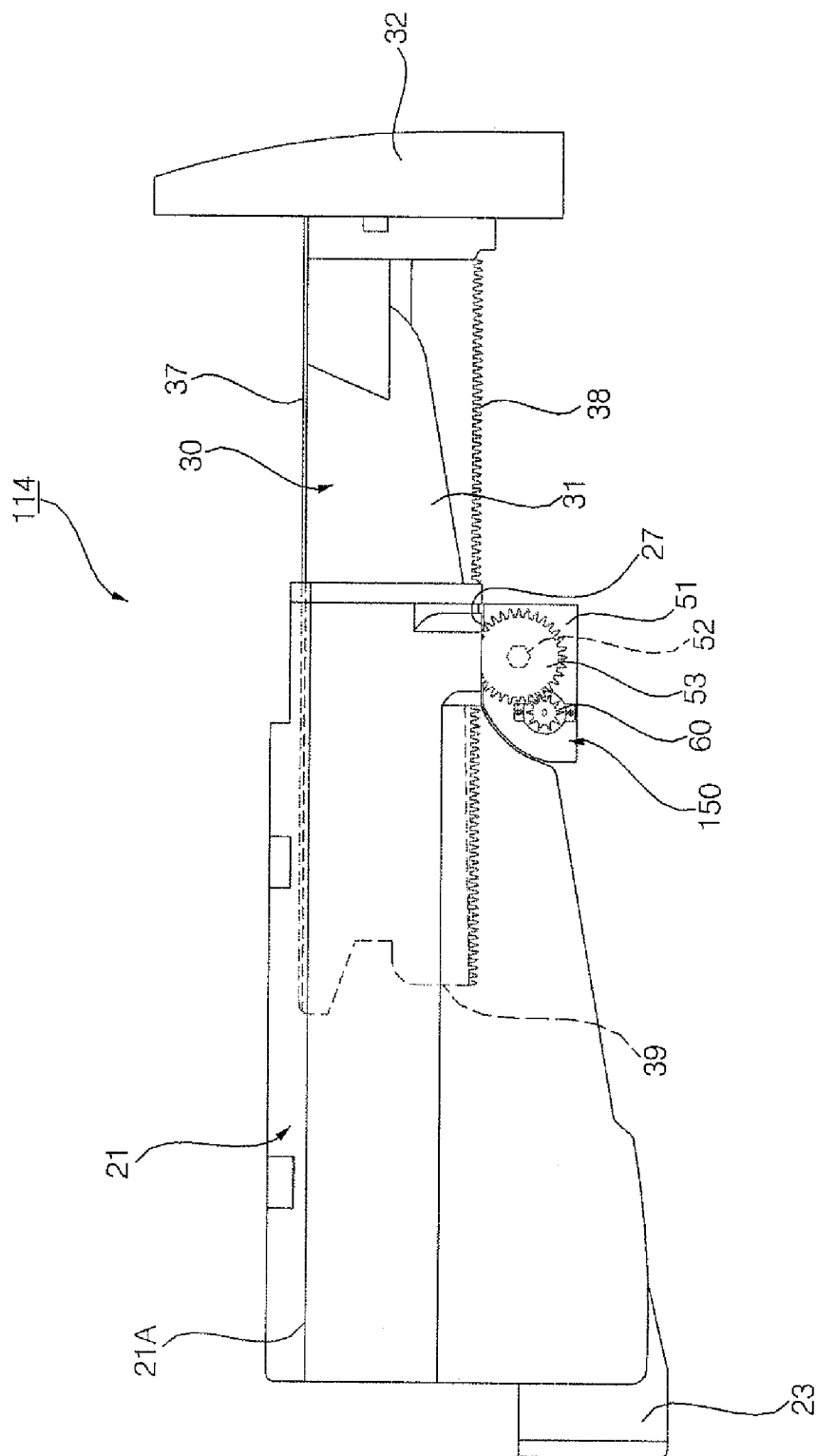
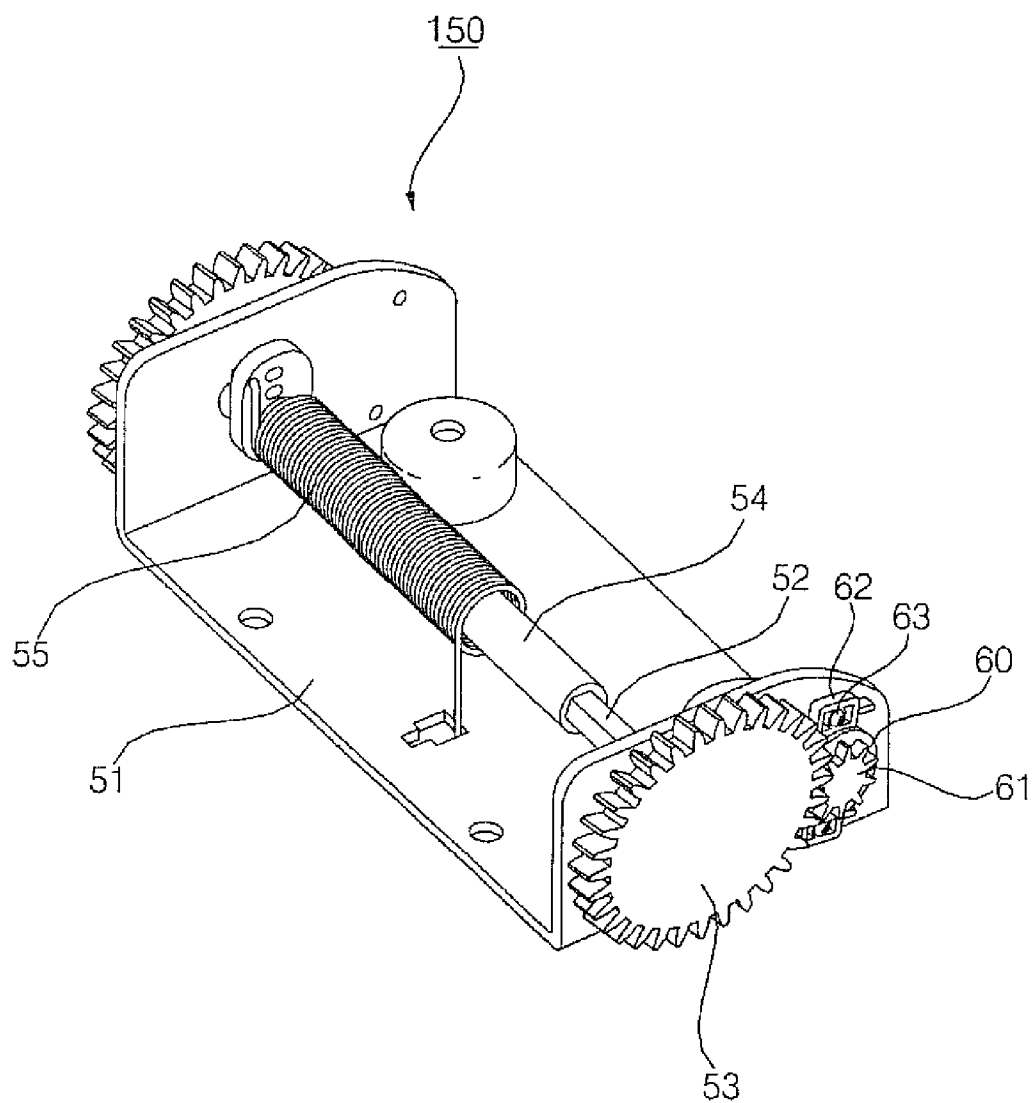


FIG. 10



WASHING MACHINE

[0001] This application claims priority under 35 U.S.C. §119(a) to Korean Patent Application No. 10-2006-0095819, filed on Sep. 29, 2006, the entire contents of which are hereby incorporated by reference.

BACKGROUND

[0002] 1. Field

[0003] The present invention relates to a washing machine, and more particularly, to a detergent box of a washing machine.

[0004] 2. Background

[0005] In general, a washing machine refers to an apparatus for washing clothes and sheets (hereinafter, referred to as "laundry") via a wash, rinse, and dehydration process to remove dirt from the laundry using water, detergent, and a mechanical action. The washing machine typically includes a tub and drum that is rotatably provided therein and that holds wash water and laundry. A driving motor is provided at one side of the tub and drum. The washing machine activates a wash operation by power of the driving motor, and performs a laundry washing operation. The washing machine further includes a water supplying unit and a water discharging unit. A detergent supplying unit is often provided in the water supply system so that incoming water washes detergent in the unit into the washing bath.

[0006] The detergent supplying unit may include a dispenser provided on the water supply unit; and a detergent box provided within the dispenser. The detergent box may be designed to be withdrawn from the dispenser, and be completely disengaged outside the washing machine.

[0007] The related art washing machine described above has a drawback in that it may be inconvenient and complicated to use. Typically, the user must withdraw the detergent box from the dispenser, put detergent into the detergent box, and then insert the detergent box back into the dispenser. During these procedures, the detergent box may be incompletely inserted into or withdrawn from the dispenser due to a malfunction occurring when a user directly withdraws or inserts the detergent box.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The embodiments will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:

[0009] FIG. 1 is an exploded perspective view illustrating a drum type washing machine;

[0010] FIG. 2 is an exploded perspective view illustrating a detergent supplying unit of the washing machine shown in FIG. 1;

[0011] FIG. 3 is a side view illustrating the detergent box and dispenser housing shown in FIG. 2;

[0012] FIG. 4 is a plan view illustrating the detergent box shown in FIG. 3;

[0013] FIG. 5 is a bottom perspective view illustrating the detergent box shown in FIG. 3;

[0014] FIG. 6 is a perspective view illustrating an automatic withdrawing unit of the detergent supplying unit shown in FIG. 3;

[0015] FIG. 7 is an exploded perspective view illustrating the automatic withdrawing unit shown in FIG. 6;

[0016] FIG. 8 is a schematic view illustrating an operation state of a locking unit of the detergent supplying unit shown in FIG. 3;

[0017] FIG. 9 is a side view illustrating another embodiment of a detergent box and a dispenser housing; and

[0018] FIG. 10 is a perspective view illustrating an automatic withdrawing unit of the detergent supplying unit shown in FIG. 9.

DETAILED DESCRIPTION

[0019] Referring to FIG. 1, the drum type washing machine 1 includes a cabinet 1 having a left surface, a right surface, and a rear surface. A tub 4 is mounted inside the cabinet 2 by one or more springs 3 and a damper (not shown). A drum 5 is rotatably provided inside the tub 4. The drum holds laundry and has a plurality of water holes 5A for allowing passage of the wash water into and out of the tub. A lifter 6 is provided inside the drum 5 to draw up the wash water and drop the drawn-up wash water at a predetermined height within the drum 5. A driving unit 7 is provided behind the tub 4 to apply a rotary force to the drum 5.

[0020] A cabinet cover 8 is provided 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 an upper surface and a lower surface of the cabinet 2, respectively. A door 11 is rotatably mounted on the cabinet cover 8, and opens and closes the laundry opening 8A. A control panel 12 is provided at an upper side of the cabinet cover 8, and displays and controls operation of the drum type washing machine 1.

[0021] A water discharging unit (not shown) is provided between the base 10 and the tub 4, and discharges wash water from the tub 4. 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 13 is provided between the top plate 9 and the tub 4, and supplies water into the tub 4.

[0022] As shown in more detail in FIGS. 2-5, a detergent supplying unit 14 is provided on a water supply path of the water supplying unit 13, and supplies detergent to the tub 4 together with water. The detergent supplying unit 14 connects between the water supply hose 13A and the water supply bellows 13C. The detergent supplying unit 14 is mounted on the cabinet 2 and the cabinet cover 8 such that the detergent box 30 is withdrawn and inserted through a doorway hole part 12A provided at one side of the control panel 12.

[0023] The detergent supplying unit 14 includes a dispenser 20 connecting with the water supply hose 13A and the water supply bellows 13C. A detergent box 30 is inserted into the dispenser 20 and can be withdrawn frontward via the opening 20A of the dispenser 20 and the doorway hole part 12A. Flange parts 37 are provided at both sides of the detergent box, and extend along a movement direction. A locking unit 40 acts to lock or unlock the detergent box 30 when it is inserted into the dispenser 20. An automatic withdrawing unit 50 moves the detergent box 30 to the front within the dispenser 20 when the locking unit 40 unlocks the detergent box 30.

[0024] The dispenser 20 includes a dispenser housing 21 provided to communicate with the doorway hole part 12A of the control panel 12. The dispenser 20 is open at a front side and an upper side. A dispenser cover 22 is mounted at the opened upper side, and has water supply holes 24B for supplying water into the detergent box 30.

[0025] The dispenser housing 21 has a water discharge port 23 provided at a rear thereof which is connected with the water supply bellows 13C such that water and detergent falling from the detergent box 30 are supplied to the tub 4 through the water supply bellows 13C. The dispenser housing 21 has step parts 21A provided at both upper sides thereof. The flange parts 37 of the detergent box 30 are mounted on and slide along the step parts 21A. The step parts 21A, together with the dispenser cover 22 provide slots in which the flange parts 37 move.

[0026] 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, and forming a flow path together with the bottom panel 24. The bottom panel 24 has a plurality of hose connecting parts 24A provided in rear thereof and connecting with the one or more water supply hoses 13A. The bottom panel 24 has a plurality of water supply holes 24B supplying water and provided in positions corresponding to detergent retaining parts of the detergent box 30. A flow path 24C is formed between the top panel 25 and the bottom panel 24, and the flow paths guide water from the hose connecting parts 24A to the water supply holes 24B.

[0027] The detergent box 30 includes a detergent box body 31 inserted into a space between the dispenser housing 21 and the dispenser cover 22 such that it can be withdrawn frontward. The detergent box includes a plurality of detergent retaining parts 31A, 31B, 31C, and 31D for retaining detergent. A front panel 32 is provided in front of the detergent box body 31. A detergent box cap 33 is mounted on the detergent box body 31.

[0028] The detergent box body 31 is of a box shape and is opened at an upper side and a rear side thereof. As mentioned above, the flange parts 37 are movably mounted on the stepped parts 21A of the dispenser housing.

[0029] The plurality of detergent retaining parts 31A, 31B, 31C, and 31D include first and second powder detergent retaining parts 31A and 31B, each provided so that they extend along the box on left right sides of the detergent box body 31. These retaining parts are used to hold powder detergent used for washing and pre-washing. A bleach retaining part 31C and a softener retaining part 31D are provided at inner rear sides of the first and second powder detergent retaining parts 31A and 31B. Typically, bottom surfaces of these retaining parts are spaced above the bottom surface of the detergent box so that they hold less volume.

[0030] The first and second powder detergent retaining parts 31A and 31B are opened at upper sides to allow for the input of powder detergent and water. They are opened at rear sides to discharge the powder detergent and water to the dispenser housing 21. The bleach retaining part 31C and the softener retaining part 31D are of box shapes that are also opened at upper sides to allow for the input of bleach and softener. The bleach retaining part 31C and the softener retaining part 31D have siphon pipes 34 that protrude up from their bottoms to communicate with spaces below the bleach retaining part 31C and the softener retaining part 31D.

[0031] The front panel 32 is provided in front of the doorway hole part 12A in the same structure as the control panel 12, and forms a front surface of the drum type washing machine 1 together with the control panel 12 and the cabinet cover 8. The detergent box cap 33 is mounted on the upper side of the detergent box body 31 to cover upper sides of the

bleach retaining part 31C and the softener retaining part 31D. The detergent box cap 33 has input holes 33A for inputting the bleach and the softener, each provided correspondingly to the bleach retaining part 31C and the softener retaining part 31D. A siphon cap 35 capping the siphon pipe 34 protrudes downward from a bottom of the detergent box cap 33 such that the input bleach and softener are discharged from the bleach retaining part 31C and the softener retaining part 31D due to a siphon phenomenon.

[0032] Referring to FIG. 2, the dispenser 20 includes a catch jaw 26 protruding inward from a front and lower surface of the bottom panel 24. The detergent box 30 includes a height control protrusion 36 protruding from an upper surface of the detergent box cap 33 to be caught by the catch jaw 26 when the detergent box 30 is withdrawn. The height control protrusion 36 can be controlled in height to avoid interference from the catch jaw 26. Thus, a withdrawal distance of the detergent box 30 is set by the catch jaw 26 and the height control protrusion 36. If the height control protrusion 36 is lowered, it can avoid being caught by the catch jaw 26 and thus, the detergent box 30 can be completely disengaged from the dispenser 20.

[0033] Referring to FIGS. 2 and 5, the locking unit 40 is provided at the dispenser 20 and the detergent box 30 such that it locks the detergent box 30 when the detergent box 30 is inserted into the dispenser 20, and unlocks the detergent box 30 when the detergent box 30 moves into the dispenser 20 by a predetermined distance. The locking unit 40 includes a locking protrusion part 41 that is rotatably mounted at one side of a bottom surface of the dispenser housing 21. A locking groove part 42 is provided on the facing lower surface of the detergent box body 31 such that the locking protrusion part 41 is caught and fixed when the detergent box is being inserted, and is released when the detergent box is again moved in an insertion direction.

[0034] The locking protrusion part 41 is provided on the bottom surface of the dispenser housing 21 such that it can be rotated. The locking protrusion part 41 has a locking protrusion 43 that protrudes upward and that is inserted into and removed from the locking groove part 42. The locking groove part 42 is integrally provided on the lower surface of the detergent box body 31. Thus, the locking groove part 42 moves in the front-rear direction together with the detergent box body 31 when the detergent box 30 is withdrawn or inserted.

[0035] As shown in FIG. 8, the locking groove part 42 is of a structure in which the locking protrusion 43 is caught when the detergent box 30 moves rearward and is being inserted into the washing machine. The locking protrusion 43 is released from a catch state in the locking groove part 42 when the detergent box 30 is again pressed slightly rearward, thereby allowing the detergent box to be pulled out.

[0036] FIGS. 8A-8D illustrate how the locking protrusion 43 and the locking groove part 42 interact to control the movement of the detergent box. Note, for ease of illustration, the locking protrusion 43 is illustrated at various positions within the locking groove part. In actuality, the locking protrusion is fixed and the locking groove part, which is part of the detergent box, moves with respect to the locking protrusion.

[0037] FIG. 8A shows a state, where the detergent box is fully inserted into the washing machine. The locking protrusion is caught in a depression in the locking groove part.

As will be explained, the detergent box is biased towards the opened position. Thus, the locking protrusion being caught in the depression of the locking groove part is what holds the detergent box in the washing machine.

[0038] When the detergent box is pushed slightly into the washing machine, as shown in FIG. 8B, the protrusion is freed from the depression, and the detergent box can be moved frontward to allow detergent, bleach and softener to be inserted into the detergent box. FIG. 8C shows the progress of the locking groove part relative to the protrusion as the detergent box is pushed all the way into the machine. When the user releases the detergent box, after pushing it all the way in, the biasing mechanism causes the detergent box to move slightly out, which results in the protrusion being caught once again in the depression, as shown in FIG. 8D.

[0039] Referring to FIGS. 2 to 5, a mounting part 27 stepwise protrudes upward from a front and lower part of the dispenser housing 21 such that the detergent box body 31 is movably mounted on the mounting part 27 when the detergent box 30 is withdrawn or inserted. The automatic withdrawing unit 50 is provided under the mounting part 27. The automatic withdrawing unit 50 includes a second gear part 53 that interacts with a first gear part 38 provided on the detergent box 30. The automatic withdrawing unit 50 tends to push the detergent box in the withdrawal direction so that it can be easily withdrawn when the locking unit 40 unlocks the detergent box 30.

[0040] The first gear part 38 includes a rack gear along the bottom surface of the detergent box 30. The second gear part 53 includes a pinion gear 53 provided on the automatic withdrawing unit 50. The second gear part is biased to rotate in a direction that will cause withdrawal of the detergent box 30. However, in alternate embodiments, the first gear part 38 can be provided as a pinion gear, and the second gear part 53 can be provided as a rack gear. In the embodiment described below, a pair of spaced apart rack gears 38, and the pinion gear 53 are formed on opposite sides of the detergent box and the dispenser.

[0041] The mounting part 27 has a pair of slit holes 27A provided at positions corresponding to the pair of rack gears 38 provided on the bottom of the detergent box 30. The pinion gears 53 of the automatic withdrawing unit 50 pass through the pair of slit holes 27A, and are meshed with the rack gears 38. A shielding part 39 protrudes rearward from a rear part of the detergent box body 31. The shielding part 39 shields the pair of slit holes 27A to prevent water leakage through the slit holes 27A.

[0042] Referring to FIGS. 3, 6, and 7, the automatic withdrawing unit 50 includes a bracket 51 provided at a lower side of the mounting part 27. A rotary shaft 52 is mounted on the bracket 51. The pinion gears 53 are coupled to ends of the rotary shaft 52. A holder 54 is coupled to a circumference of the rotary shaft 52 and rotates together with the rotary shaft 52. An elastic member 55 is provided around the holder 54 and has one end thereof attached to the bracket 51. The elastic member provides a biasing force which tends to rotate the pinion gears 53 so that they cause the detergent box to be withdrawn.

[0043] The bracket 51 can be installed under the dispenser housing 21 using various installation methods such as fusion, a hook, an adhesive, and a coupling bolt. However, a description will be made based on the assumption that it is installed using one or more coupling bolts. Thus, the bracket 51 has a receiving hole 51A for coupling the coupling bolt,

and the dispenser housing 21 has a coupling hole or a coupling boss in a position corresponding to the coupling hole 51A.

[0044] The rotary shaft 52 is rotatably supported by the bracket 51. The rotary shaft 52 may have a polygonal cross section, and connects at its ends with the pinion gears 53. The holder 54 includes a hollow shaft 54 with a hollow part 54A having the same cross sectional shape as the rotary shaft 52. The holder 54 is coupled to the rotary shaft 52 by fitting the rotary shaft 52 into the hollow part 54A such that the holder 54 rotates together with the rotary shaft 52.

[0045] In this embodiment, the elastic member 55 includes a coil spring 55 provided around the holder 54. The elastic member 55 has one end connected to a stopper 54B provided to the holder 54, and has its other end inserted into a catch hole 51B provided on the bracket 51. In other embodiments, other types of elastic members could be used to provide a biasing force that tends to rotate the shaft 52 in a particular direction, and thus tends to push the detergent box in the withdrawal direction.

[0046] A user would first input laundry inside the drum 5 through the laundry opening 8A, and then closes the laundry opening 8A by the door 11. After that, the user inputs powder detergent, and possibly bleach, and softener into the detergent box 30, and sets a desired washing cycle by manipulating the control panel 12.

[0047] Upon activation, water and detergent are supplied into the tub 4 using the water supplying unit 13 and the detergent supplying unit 14. In detail, 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, into the first and second powder detergent retaining parts 31A and 31B or into the bleach retaining part 31C via the water supply hole 24B of the dispenser cover 22. At this time, the powder detergent and/or the bleach in the detergent box 30 will be washed out of the detergent box by the water squirted in from the water supply hole 24B. The mixed water and detergent and bleach would exit the bottom of the dispenser housing 21, and would be supplied into the tub 4 via the water supply bellows 13C connecting to the dispenser housing 21. Once the water, the powder detergent, and the bleach are in the tub 4, the drum 5 is rotated using the driving unit. As the drum 5 rotates, the laundry is lifted up by the lifter 6 and falls down, thereby implementing laundry washing.

[0048] Upon completion of a wash cycle, the motor 7 is stopped, and the wash water retained in the tub 4 is discharged outside using the water discharging unit. After that, water is again supplied into the tub 4 up to a predetermined water level using the water supplying unit 13, and the drum 5 is again rotated using the motor 7, thereby implementing laundry rinsing. At this time, the detergent supplying unit 14 may also supply water to the softener retaining part 31D of the detergent box 30. This would cause the softener to be dispensed from the softener retaining part 31D into the tub 4. Upon completion of a laundry rinse cycle, the rinse water is discharged outside using the water discharging unit. When water discharge is executed in the rinse cycle, a dehydration cycle in which the drum 4 is rotated by the motor 5 at high speed is implemented, thereby removing the wash water from the laundry.

[0049] A procedure for withdrawing or inserting the detergent box 30 so as to input detergent, bleach and/or softener into the detergent retaining parts 31A, 31B, 31C, and 31D will be described in more detail below.

[0050] As explained above, the detergent box 30 is withdrawn by slightly pushing the front panel 32 of the detergent box 30 inside the doorway hole part 12A of the control panel 12, and then removing an applied force from the front panel 32. When the detergent box 30 is slightly pushed to the rear, as shown in FIG. 8B, the locking groove part 42 of the detergent box 30 slightly moves to the rear, and a locking protrusion 43 of a locking protrusion part 41 moves to an unlock position.

[0051] The elastic member 55 of the automatic withdrawing unit 50 then induces rotation of the rotary shaft 52 in the withdrawal direction, thereby rotating the pinion gears 53 together with the rotary shaft 52. The rotation of the pinion gears 53 moves the rack gears 38 of the detergent box 30 to the front. As the rack gears 38 move, the detergent box 30 is withdrawn from the doorway hole part 12A of the control panel 12 to the front.

[0052] When the detergent box 30 is withdrawn frontward by a predetermined distance, the catch jaw of the dispenser cover 22 catches the height control protrusion 36 of the detergent box cap 33, thereby stopping the withdrawal of the detergent box 30. In other words, the height control protrusion 36 and the catch jaw 26 automatically limit a maximum distance by which the detergent box 30 is withdrawn. With the detergent box 30 withdrawn outside the dispenser 20, powder detergent can be put into each of the first and second powder detergent retaining parts 31A and 31B, bleach can be put into the bleach retaining part 31C, and softener can be put into the softener retaining part 31D. A withdrawal state of the detergent box 30 is shown in FIG. 4.

[0053] The detergent box 30 is inserted by pushing the detergent box 30 into the dispenser 20 until the front panel 32 gets in contact with the doorway hole part 12A of the control panel 12. As the detergent box 30 is inserted into the dispenser 20, the pinion gears 53, which are meshed with the rack gear 38 of the detergent box 30, are reverse rotated along with the rotary shaft 52. This twists or compresses the elastic member 55.

[0054] When the detergent box 30 is fully inserted, the locking protrusion 43 of the locking protrusion part 41 is inserted into the locking groove part 42 to the position shown in FIG. 8D. If the applied closing force is then removed, the locking protrusion 43 is caught by the locking groove part 42, and the detergent box 30 is held in the inserted position, as shown in FIG. 8A.

[0055] Accordingly, the detergent box 30 is not only improved in use convenience but also a solution to a problem of incompletely withdrawing or inserting the detergent box 30 is provided. The detergent box 30 is automatically withdrawn or is inserted only by an action of pressing the detergent box 30 inside the doorway hole part 12A of the control panel 12.

[0056] The detergent box 30 can be fully removed from the dispenser 20 by pressing downward on the height control protrusion 36 so that it will not be caught by the catch jaw 26. Thus, the detergent box 30 can be replaced and washed with simplicity and convenience.

[0057] FIG. 9 is a side view illustrating a detergent box 30 and a dispenser housing 21 according to an alternate embodiment. FIG. 10 is a perspective view illustrating an

automatic withdrawing unit 150 of the device shown in FIG. 9. Like reference numerals denote like elements in FIGS. 9 and 10. The following description will concentrate on the differences in the alternate embodiment.

[0058] The automatic withdrawing unit 150 shown in FIGS. 9 and 10 is different from the automatic withdrawing unit 50 shown in FIGS. 6 and 7 in that it further includes a rotary damper 60 for limiting a withdrawal speed of the detergent box 30. The rotary damper 60 includes a rotary gear 61 mounted on the bracket 51, and meshed with the pinion gear 53. A flange 62 having a hole is provided at an outer side of the rotary damper 60, and is coupled and fixed to the bracket 51 by a coupling member 63. However, the rotary damper 60 can be also mounted on the bracket 51 by a hook, an adhesive, and fusion.

[0059] The automatic withdrawing unit 150 having the rotary damper 60, limits the withdrawal speed and an insertion speed of the detergent box 30 using a damping action of the rotary damper 60. Therefore, the detergent box 30 is prevented from suddenly moving and thus is withdrawn or inserted slowly. Accordingly, damage and impact noise of the detergent box 30 happening due to sudden withdrawal and insertion of the detergent box 30 are prevented. The slow movement also helps to prevent detergent, bleach and softener from being spilled out of their containers in the detergent box.

[0060] A washing machine as described above has an advantage in that when the locking unit unlocks the detergent box, the detergent box is easily withdrawn by the automatic withdrawing unit. Also, when the detergent box is withdrawn or inserted, the withdrawal distance and an insertion distance are set by the automatic withdrawing unit and the locking unit, thereby preventing incomplete withdrawal and insertion of the detergent box.

[0061] 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.

[0062] Although a number of illustrative embodiments have been described, 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, variations and modifications are possible in the component parts and/or arrangements of the subject combinations which would fall 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.

What is claimed is:

1. A washing machine, comprising:
 - a dispenser that dispenses washing aids into a tub of the washing machine;
 - a detergent box that is movably mounted in the dispenser, wherein the detergent box can be withdrawn from the

dispenser to an open position at which washing aids can be placed in the detergent box;
 a locking unit that operates to lock the detergent box in a closed position within the dispenser; and
 an automatic withdrawing unit that biases the detergent box to the open position.

2. The washing machine of claim 1, wherein the automatic withdrawing unit includes a first gear part that is formed on the detergent box, and a second gear part that is formed on the dispenser, and wherein the first gear part interacts with the second gear part to move the detergent box to the open position.

3. The washing machine of claim 2, wherein one of the first and second gear parts comprises a rack gear, and wherein the other of the first and second gear parts comprises a pinion gear.

4. The washing machine of claim 3, wherein the automatic withdrawing unit further comprises an elastic unit that biases the pinion gear to rotate in a direction that causes the detergent box to move to the open position.

5. The washing machine of claim 4, wherein the elastic unit comprises a coil spring.

6. The washing machine of claim 4, wherein the pinion gear is mounted on a rotational shaft, and wherein a first end of the elastic member is coupled to the rotational shaft.

7. The washing machine of claim 6, wherein the automatic withdrawing unit further comprises a frame, wherein the rotational shaft is mounted on the frame, and wherein a second end of the elastic member is coupled to the frame.

8. The washing machine of claim 7, wherein the elastic member comprises a spring mounted around the rotational shaft.

9. The washing machine of claim 7, wherein the frame is coupled to the dispenser, and wherein the rack is formed on the detergent box.

10. The washing machine of claim 9, wherein a mounting part is formed on a front lower portion of the dispenser, wherein at least one slit is formed in the mounting part, and wherein the frame and the pinion gear are mounted under the mounting part such that the slit allows the pinion gear to mesh with the rack.

11. The washing machine of claim 2, wherein the first gear part comprises two rack gears mounted on opposite sides of the detergent box, and wherein the second gear part comprises two pinion gears mounted on the dispenser such that each pinion gear meshes with one of the rack gears.

12. The washing machine of claim 2, further comprising a damper that dampens movements of at least one of the first and second gear parts.

13. The washing machine of claim 12, wherein at least one of the first and second gear parts comprises a pinion gear, and wherein the damper dampens rotational movement of the pinion gear.

14. The washing machine of claim 13, wherein the damper comprises a damping gear that is meshed with the pinion gear.

15. The washing machine of claim 1, further comprising a stopper mechanism for limiting withdrawal of the detergent box from the dispenser such that the detergent box is stopped at the open position.

16. The washing machine of claim 15, wherein the stopper mechanism comprises:

- a catch portion formed on the detergent box; and
- a protrusion on the dispenser, wherein the catch portion is blocked from further movement in the withdrawal direction by the protrusion when the detergent box has reached the open position.

17. The washing machine of claim 16, wherein one of the catch portion and the protrusion can be moved by the user such that the catch portion is no longer blocked by the protrusion, to thereby allow the detergent box to be completely removed from the dispenser.

18. The washing machine of claim 1, wherein the locking unit is operates such that when a user presses the detergent box into the dispenser and releases the detergent box, the locking unit holds the detergent box in the closed position against the bias of the automatic withdrawing unit.

19. The washing machine of claim 18, wherein the locking unit is also configured such that when the detergent box is locked in the closed position, and a user pushes the detergent box further into the dispenser and then releases the detergent box, the locking unit releases the detergent box such that the automatic withdrawing unit causes the detergent box to move to the open position.

20. A dispenser for a washing machine that dispenses washing aids into a tub of the washing machine, comprising:

- a housing;
- a detergent box that is movably mounted on the housing, wherein the detergent box can be at least partially withdrawn from the housing to an open position at which washing aids can be placed in the detergent box;
- a locking unit that operates to lock the detergent box in a closed position within the housing; and
- an automatic withdrawing unit that biases the detergent box toward the open position.

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