



(11)

EP 1 967 635 A2

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.09.2008 Bulletin 2008/37

(51) Int Cl.:
D06F 35/00 (2006.01)

(21) Application number: **07123821.6**

(22) Date of filing: **20.12.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(30) Priority: **06.03.2007 KR 20070022212**

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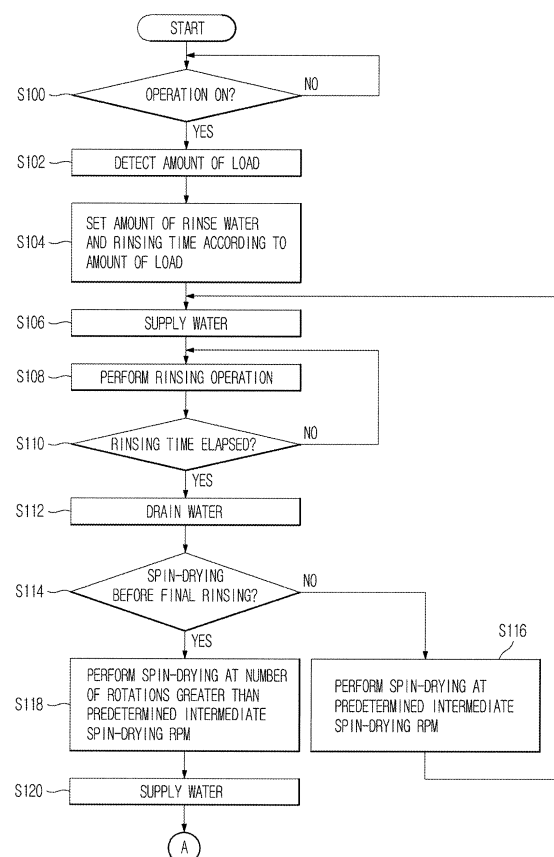
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(54) **Washing machine and rinsing control method of the same**

(57) Disclosed herein are a washing machine and a rinsing control method of the same that is capable of increasing spin-drying RPM before the final rinsing, such that the spin-drying RPM before the final rinsing is higher by a specific percentage than a predetermined RPM, to strongly squeeze out residual detergent, contained in laundry, from the laundry, and adding soaked rinsing time, during the final rinsing, to completely dissolve residual detergent contained in laundry, thereby improving the rinsing efficiency. The washing machine includes a rotary drum to receive laundry and a motor to rotate the rotary drum. The rinsing control method includes determining whether a current operation is a rinsing operation, and, when the current operation is the rinsing operation, controlling intermediate spin-drying RPM and rinsing time to remove residual detergent from the laundry.

Fig. 3a



Description

BACKGROUND

1. Field

[0001] Embodiments relate to a washing machine and a rinsing control method of the same, and, more particularly, to a washing machine and a rinsing control method of the same that is capable of controlling spin-drying revolutions per minute (RPM) during rinsing and rinsing time, thereby improving the rinsing efficiency.

2. Description of the Related Art

[0002] Generally, a washing machine (normally, a drum type washing machine) is a machine, including a water tub to receive water (wash water or rinse water) and a cylindrical rotary drum rotatably mounted in the water tub to receive laundry, that washes the laundry by lifting and dropping the laundry in the rotary drum along the inner surface of the rotary drum during the rotation of the rotary drum.

[0003] This washing machine detects the weight of laundry (the amount of load) to decide the amount of wash water and rinse water according to a user's selection of a washing course, supplies water (specifically, wash water) having an amount sufficient to wash the laundry and detergent into the water tub according to the decided amount of wash water, and performs a washing operation while detergent water (water + detergent) is forwarded to the laundry and the laundry is dropped by the rotation of the rotary drum.

[0004] After the completion of the washing operation, the washing machine performs drainage and intermediate spin-drying. Subsequently, the washing machine supplies water (specifically, rinse water) having an amount sufficient to rinse the laundry into the water tub according to the decided amount of rinse water, and performs a rinsing operation while water is brought into contact with the laundry and the laundry is dropped by the rotation of the rotary drum.

[0005] After the completion of the rinsing operation, the washing machine performs drainage and intermediate spin-drying in the same manner as the washing operation. At this time, the intermediate spin-drying RPM is set to be a predetermined number of rotations. The rinsing operation is repeated with a predetermined basic rinsing time (approximately 1 minute to 1 minute and 30 seconds) for a predetermined number of times (or a number of times selected by a user).

[0006] While the washing machine performs washing, however, the detergent, supplied into the rotary drum, may be settled on the bottom of the rotary drum, with the result that the detergent is not sufficiently dissolved or mixed with the water. During the rinsing operation of the washing machine, the rinsing is performed with the predetermined rinsing time and at the intermediate spin-dry-

ing RPM without considering the above-mentioned problem. As a result, the detergent, contained in the laundry, is not separated from the laundry, and therefore, the laundry has residual detergent, whereby the rinsing efficiency is lowered.

SUMMARY

[0007] In an aspect of embodiments, there is provided a washing machine and a rinsing control method of the same that is capable of controlling spin-drying RPM during rinsing and rinsing time, thereby improving the rinsing efficiency.

[0008] In another aspect of embodiments, there is provided a washing machine and a rinsing control method of the same that is capable of increasing spin-drying RPM before the final rinsing, such that the spin-drying RPM before the final rinsing is higher by a specific percentage than a predetermined RPM, to separate residual detergent, contained in laundry, from the laundry, thereby accomplishing effective rinsing.

[0009] In a further aspect of embodiments, there is provided a washing machine and a rinsing control method of the same that is capable of adding soaked rinsing time, during the final rinsing, to completely dissolve residual detergent contained in laundry, thereby further improving the rinsing efficiency.

[0010] In an aspect of embodiments, there is provided a rinsing control method of a washing machine including a rotary drum to receive laundry and detergent and a motor to rotate the rotary drum, the rinsing control method including determining whether a current spin-drying process is an intermediate spin-drying during rinsing, and, when the current spin-drying process is the intermediate spin-drying, operating the motor at the number of rotations greater than a predetermined spin-drying revolutions per minute (RPM) to perform high-speed spin-drying through the high-speed rotation of the rotary drum.

[0011] The intermediate spin-drying during rinsing may be spin-drying before a final rinsing.

[0012] The number of rotations of the motor may be greater by at least 10 % than the predetermined spin-drying RPM.

[0013] The number of rotations of the motor may be greater by 10 to 20 % than the predetermined spin-drying RPM.

[0014] In an aspect of embodiments, an operation of performing high-speed spin-drying may include rotating the motor at a high speed to squeeze out residual detergent, contained in the laundry, from the laundry during the intermediate spin-drying before the final rinsing.

[0015] In accordance with another aspect of embodiments, there is provided a rinsing control method of a washing machine including a rotary drum to receive laundry and detergent and a motor to rotate the rotary drum, the rinsing control method including determining whether a current rinsing process is a final rinsing, and, when the current rinsing process is the final rinsing, controlling rins-

ing time to remove residual detergent from the laundry.

[0016] In an aspect of embodiments, an operation of controlling the rinsing time may include adding soaked rinsing time to a predetermined rinsing time to increase the rinsing time.

[0017] In an aspect of embodiments, rinsing and soaking processes may be repeated at regular intervals, during the soaked rinsing time, to dissolve the residual detergent in the laundry.

[0018] The soaked rinsing time may be at least 5 minutes.

[0019] The soaked rinsing time may be 5 to 10 minutes.

[0020] The soaked rinsing time may be variable depending upon the amount of laundry.

[0021] In accordance with another aspect of embodiments, there is provided a rinsing control method of a washing machine including a rotary drum to receive laundry and detergent and a motor to rotate the rotary drum, the rinsing control method including determining whether a current operation is a rinsing operation, and, when the current operation is the rinsing operation, controlling intermediate spin-drying revolutions per minute (RPM) and rinsing time to remove residual detergent from the laundry.

[0022] In an aspect of embodiments, an operation of controlling the intermediate spin-drying RPM includes operating the motor at the number of rotations greater than a predetermined spin-drying RPM, during a spin-drying process before the final rinsing, to perform high-speed spin-drying through the high-speed rotation of the rotary drum.

[0023] In an aspect of embodiments, an operation of controlling the rinsing time includes adding soaked rinsing time to a predetermined rinsing time, during the final rinsing, to increase the rinsing time.

[0024] In an aspect of embodiments, there is provided a washing machine including a rotary drum to receive laundry and detergent, a motor to rotate the rotary drum, and a control unit to control a spin-drying process, during rinsing to remove residual detergent from the laundry, by operating the motor at the number of rotations greater than a predetermined spin-drying RPM to perform high-speed spin-drying through the high-speed rotation of the rotary drum.

[0025] In an aspect of embodiments, a control unit may control the motor to perform the high-speed spin-drying during an intermediate spin-drying process before the final rinsing.

[0026] In an aspect of embodiments, a motor may be operated at the number of rotations greater by at least 10 % than the predetermined spin-drying RPM.

[0027] In an aspect of embodiments, a motor may be operated at the number of rotations greater by 10 to 20 % than the predetermined spin-drying RPM.

[0028] In accordance with a further aspect of embodiments, there is provided a washing machine including a rotary drum to receive laundry and detergent, a motor to rotate the rotary drum, and a control unit to determine

whether a current rinsing process is a final rinsing, and, when the rinsing process is the final rinsing, control rinsing time to remove residual detergent from the laundry.

[0029] In an aspect of embodiments, a control unit may add soaked rinsing time, during which rinsing and soaking processes are repeated, to a predetermined rinsing time, to increase the rinsing time.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] These and/or other aspects, features, and advantages will become apparent and more readily appreciated from the following description of exemplary embodiments, taken in conjunction with the accompanying drawings, of which:

FIG. 1 is a sectional view illustrating a structure of a washing machine according to an exemplary embodiment;

FIG. 2 is a control block diagram of the washing machine according to an exemplary embodiment; and FIGS. 3A and 3B are flow charts illustrating a rinsing control method of the washing machine according to an exemplary embodiment.

DETAILED DESCRIPTION OF EMBODIMENTS

[0031] Reference will now be made in detail to exemplary embodiments, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. Exemplary embodiments are described below by referring to the figures.

[0032] FIG. 1 is a sectional view illustrating the structure of a washing machine according to an exemplary embodiment.

[0033] Referring to FIG. 1, the washing machine includes a drum-type water tub 11 mounted in a machine body 10 to receive water (wash water or rinse water) and a cylindrical rotary drum 12 rotatably mounted in the water tub 11.

[0034] The water tub 11 is mounted at a predetermined angle α to the installation surface of the washing machine such that a front part 11a, having an inlet 11b formed therein, is located at a higher position than a rear part 11c. The rotary drum 12 is mounted in the water tub 11 at the same inclination angle as the water tub 11 such that a front part 12a, having an inlet 12b formed therein, is located at a higher position than a rear part 12c.

[0035] Specifically, the rotary drum 12 is mounted such that a rotation axis A of the rotary drum 12 is at the predetermined angle α to the installation surface of the washing machine while the front part 12a, having the inlet 12b formed therein, is directed forward. In this case, a rotary shaft 13, coupled to the center of the rear part 12c of the rotary drum 12, is rotatably supported at the rear central part of the water tub 11 such that the rotary drum 12 can be rotated in the water tub 11.

[0036] The reason why the rotation axis A of the rotary

drum 12 is at the predetermined angle α to the installation surface of the washing machine is that, when water is supplied into the rotary drum 12, a predetermined amount of water necessary for washing and rinsing is gathered in the rotary drum 12 such that laundry is wetted by the water.

[0037] In the circumference of the rotary drum 12 are formed a plurality of through-holes 12d. Inside the rotary drum 12 are mounted a plurality of lifters 14 to raise and drop laundry in the rotary drum 12 during the rotation of the rotary drum 12.

[0038] Outside the rear part 11c of the water tub 11 is mounted a drive unit, such as a motor 15, to rotate the rotary shaft 13, connected to the rotary drum 12, such that washing, rinsing, and spin-drying operations are performed. The motor 15 includes a stator 15a fixed to the rear part 11c of the water tub 11, a rotor 15b rotatably disposed around the stator 15a, and a rotary plate 15c connected between the rotor 15b and the rotary shaft 13.

[0039] At the inside bottom of the water tub 11 is mounted a washing heater 16 to heat water (specifically, detergent water) supplied into the water tub 11.

[0040] In the front of the machine body 10 is formed an inlet 17b corresponding to the inlet 12b of the rotary drum 12 and the inlet 11b of the water tub 11 such that laundry can be put into or taken out from the rotary drum 12. At the machine body 10, adjacent to the inlet 17b, is mounted a door 17 to open and close the inlet 17b. Between the inlet 10b of the machine body 10 and the inlet 11b of the water tub 11 is mounted a cylindrical diaphragm 11d to prevent the leakage of wash water.

[0041] Above the water tub 11 are mounted a detergent supply unit 18 to supply detergent and a water supply unit 20 to supply water (wash water or rinse water). Below the water tub 11 is mounted a drainage unit 19 to drain water in the water tub 11 to the outside. The drainage unit 19 includes a drainage pipe 19a, a drainage valve 19b, and a drainage pump 19c.

[0042] The detergent supply unit 18 has several partitioned spaces. The detergent supply unit 18 is mounted at the front side of the machine body 10 such that a user easily puts detergent and rinse in the respective partitioned spaces. The detergent supply unit 18 includes a preliminary washing detergent box to store detergent used for preliminary washing, a main washing detergent box to store detergent used for main washing, and a rinse box to store rinse used for rinsing. The details of the detergent supply unit 18 are disclosed in Korean Patent Application No. 2003-0011317, which has been filed in the name of the applicant of the present application. Of course, other well-known technologies may be applied to the detergent supply unit 18.

[0043] The water supply unit 20 includes a first water supply pipe 22 connected between an external water supply pipe 21, through which water (wash water or rinse water) is supplied into the water tub 11, and the detergent supply unit 18, a second water supply pipe 23 connected between the detergent supply unit 18 and the water tub

11, and a water supply valve 24 mounted on the first water supply pipe 22 to control the supply of water. Consequently, water is supplied into the water tub 11 via the detergent supply unit 18 such that detergent is supplied into the water tub 11 together with the water.

[0044] FIG. 2 is a control block diagram of the washing machine according to an exemplary embodiment. In addition to the components shown in FIG. 1, the washing machine further includes a signal input unit 50, a water level detection unit 52, a temperature detection unit 54, a control unit 56, and a drive unit 58.

[0045] The signal input unit 50 inputs operation information, such as a washing course, a washing temperature, spin-drying RPM, and the addition of rinsing, which are selected by a user, to the control unit 56. The water level detection unit 52 detects the water level of water supplied into the water tub 11, and the temperature detection unit 54 detects the temperature of water supplied into the water tub 11.

[0046] The control unit 56 is a computing device (e.g., a microcomputer) to control the washing machine based on the operation information inputted from the signal input unit 50. The control unit 56 stores the amount of rinse water, spin-drying RPM, and rinsing time set according to the amount of load (the weight of laundry) in the selected washing course. The control unit 56 controls the intermediate spin-drying RPM before the final rinsing and rinsing time during the final rinsing to completely remove residual detergent from the laundry.

[0047] Specifically, the control unit 56 increases the intermediate spin-drying RPM before the final rinsing, such that the spin-drying RPM before the final rinsing is higher by a specific percentage (10 to 20 %) than a predetermined RPM (approximately 800 RPM), to strongly squeeze out residual detergent, contained in laundry, from the laundry. Also, the control unit 56 adds soaked rinsing time (approximately 5 to 10 minutes) to the predetermined rinsing time, during the final rinsing, to completely dissolve residual detergent contained in laundry.

[0048] For the added soaked rinsing time, the rinsing operation is performed to separate detergent, contained in the laundry, from the laundry, without the increase of power consumption, through the on/off control of rinsing/soaking (e.g., rinsing for 30 seconds/soaking for 1 minute), whereby the rinsing is more effectively accomplished.

[0049] The drive unit 58 drives the motor 15, the washing heater 16, the drainage valve 19b, the drainage pump 19c, and the water supply valve 24 according to a drive control signal of the control unit 56.

[0050] Hereinafter, the operation of the washing machine with the above-stated construction and a rinsing control method of the washing machine will be described.

[0051] FIGS. 3A and 3B are flow charts illustrating a rinsing control method of the washing machine according to an exemplary embodiment.

[0052] Exemplary embodiments relate to a rinsing operation to improve the rinsing efficiency during the rinsing

of laundry. A washing operation performed through the supply of water and detergent is identical to that of a general washing machine, and therefore, a detailed description thereof will not be given.

[0053] When a user puts laundry in the rotary drum 12 and selects operation information, such as a washing course, washing temperature, spin-drying RPM, and the addition of rinsing, based on the kinds of the laundry, the operation information selected by the user is inputted to the control unit 56 through the signal input unit 54.

[0054] Subsequently, the control unit 56 determines whether the operation is on so as to perform a washing operation based on the operation information inputted from the signal input unit 54 (S100).

[0055] When the operation is on, the control unit 56 detects the amount of load (the weight of laundry) put in the rotary drum 12 (S102), and sets the amount of wash water and rinse water to be supplied, motor operation rate (motor on-off time), and rinsing time based on the detected amount of load (S104).

[0056] Subsequently, the control unit 56 supplies water (specifically, wash water) having an amount sufficient to wash the laundry and detergent into the water tub 11 so as to supply the amount of water set based on the amount of load, and performs a washing operation to wash the laundry by the frictional force between the laundry and the rotary drum 12 and the dropping force of the laundry while detergent water (water + detergent) uniformly permeates into the laundry through the rotation of the rotary drum 12.

[0057] After the completion of the washing operation, drainage and intermediate spin-drying are performed, and then a rinsing operation, which is a characteristic of exemplary embodiments, is performed.

[0058] First, the control unit 56 controls the water supply unit 20 to supply the amount of rinse water set for each washing course based on the amount of load. As a result, the water supply valve 24 is opened, and water (rinse water) flows through the water supply pipes 21 and 22 and the second water supply pipe 23, whereby the rinse water is supplied into the water tub 11 (S106).

[0059] During the supply of rinse water for rinsing, the water level detection unit 52 detects the water level of the rinse water supplied into the water tub 11. When the detected water level is a predetermined water level (a water level decided according to the set amount of rinse water), the control unit 56 controls the water supply valve 24 to be turned off such that the water supply is interrupted.

[0060] After the interruption of the water supply, the control unit 56 operates the motor 15 at a predetermined motor RPM (less than a washing RPM) and operation rate to rotate the rotary drum 12 such that the laundry is rinsed by the rinse water supplied into the water tub 11. As the rotary drum 12 is rotated, the rinse water is brought into contact with the laundry such that detergent, contained in the laundry, is separated from the laundry, and the control unit 56 performs a rinsing operation to rinse

the laundry by the frictional force between the laundry and the rotary drum 12 and the dropping force of the laundry (S108).

[0061] During the rinsing operation, the control unit 56 determines whether a predetermined rinsing time (basic rinsing time; approximately 1 minute to 1 minute and 30 seconds) has elapsed (S110). When the rinsing time has not elapsed, the procedure returns to S108 to continuously perform the rinsing operation.

[0062] When it is determined at S110 that the rinsing time has elapsed, the control unit 56 controls the drainage valve 19b and the drainage pump 19c to drain the rinse water in the water tub 11 to the outside through the drainage pipe 19a (S112), and determines whether the spin-drying process is spin-drying before the final rinsing prior to the performance of spin-drying after the rinsing (S114).

[0063] The number of rinsing processes is set to be approximately 2 to 5, which is set depending upon the amount of load or the operation information, such as the addition of rinsing, selected by the user.

[0064] When it is determined at S114 that the spin-drying process is not the spin-drying before the final rinsing, the control unit 56 performs spin-drying at a predetermined intermediate spin-drying RPM (approximately 800 RPM) (S116), and the procedure returns to S108 to perform a subsequent rinsing process.

[0065] When it is determined at S114, on the other hand, that the spin-drying process is the spin-drying before the final rinsing, the control unit 56 operates the motor 15 at the number of rotations greater by a specific percentage (approximately 10 to 20 %) than the predetermined intermediate spin-drying RPM (approximately 800 RPM) (for example, the increased number of rotations is 880 to 960 RPM when the spin-drying RPM is 800 RPM). As a result, the rotary drum 12 is rotated at the RPM higher by approximately 10 to 20 % than the original spin-drying RPM, such that the spin-drying is rapidly performed, to strongly squeeze out residual detergent, contained in laundry, from the laundry (S118).

[0066] After the spin-drying process is performed at the number of rotations greater by approximately 10 to 20 % than the predetermined intermediate spin-drying RPM at the spin-drying before the final rinsing, the control unit 56 operates the water supply unit 20 such that the final rinsing is performed. As a result, the water supply valve 24 is opened, and water (rinse water) for the final rinsing flows through the water supply pipes 21 and 22 and the second water supply pipe 23, whereby the rinse water is supplied into the water tub 11 (S120).

[0067] After the supply of water (rinse water) into the water tub 11, the control unit 56 operates the motor 15 at the predetermined motor RPM and operation rate to perform the final rinsing in the same manner as the previous rinsing operation (S122).

[0068] During the final rinsing, the control unit 56 determines whether the predetermined rinsing time (basic rinsing time; approximately 1 minute to 1 minute and 30 seconds) has elapsed (S124). When the rinsing time has

not elapsed, the procedure returns to S122 to continuously perform the final rinsing.

[0069] When it is determined at S124 that the rinsing time has elapsed, the control unit 56 successively performs a soaked rinsing process including rinsing/soaking (e.g., rinsing for 30 seconds/ soaking for 1 minute), without the drainage of the rinse water, in addition to the predetermined rinsing time, to completely dissolve the residual detergent, not separated from the laundry (S126).

[0070] Subsequently, the control unit 56 counts the soaked rinsing time to determine whether a predetermined soaked rinsing time (time variable depending upon the amount of laundry; approximately 5 to 10 minutes) has elapsed (S128). When the soaked rinsing time has not elapsed, the procedure returns to S126 to continuously perform the soaked rinsing.

[0071] When it is determined at S128 that the soaked rinsing time has elapsed, the control unit 56 operates the drainage valve 19b and the drainage pump 19c to drain the final rinse water in the water tub 11 to the outside through the drainage pipe 19a (S130). After that, the control unit 56 performs spin-drying at a predetermined final spin-drying RPM (approximately 1100 to 1200 RPM) (S132).

[0072] As apparent from the above description, the washing machine according to exemplary embodiments and the rinsing control method of the same have the effect of increasing spin-drying RPM before the final rinsing, such that the spin-drying RPM before the final rinsing is higher by a specific percentage than a predetermined RPM, to strongly squeeze out residual detergent, contained in laundry, from the laundry, thereby accomplishing effective rinsing. Also, the washing machine according to exemplary embodiments and the rinsing control method of the same have the effect of adding soaked rinsing time, during the final rinsing, to completely dissolve residual detergent contained in laundry, thereby further improving the rinsing efficiency.

[0073] Although a few exemplary embodiments have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these exemplary embodiments, the scope of which is defined in the claims and their equivalents.

Claims

1. A rinsing control method of a washing machine including a rotary drum to receive laundry and detergent and a motor to rotate the rotary drum, the rinsing control method comprising:

determining whether a current spin-drying process is an intermediate spin-drying during rinsing; and
when the current spin-drying process is the intermediate spin-drying, operating the motor at

the number of rotations greater than a predetermined spin-drying revolutions per minute (RPM) to perform high-speed spin-drying through high-speed rotation of the rotary drum.

2. The rinsing control method according to claim 1, wherein the intermediate spin-drying during rinsing is spin-drying before a final rinsing.

3. The rinsing control method according to claim 1, wherein the number of rotations of the motor is greater by at least 10 % than the predetermined spin-drying RPM.

4. The rinsing control method according to claim 3, wherein the number of rotations of the motor is greater by 10% to 20 % than the predetermined spin-drying RPM.

5. The rinsing control method according to claim 2, wherein performing the high-speed spin-drying includes rotating the motor at a high speed to squeeze out residual detergent, contained in the laundry, from the laundry during the intermediate spin-drying before the final rinsing.

6. A rinsing control method of a washing machine including a rotary drum to receive laundry and detergent and a motor to rotate the rotary drum, the rinsing control method comprising:

determining whether a current rinsing process is a final rinsing; and
when the current rinsing process is the final rinsing, controlling rinsing time to remove residual detergent from the laundry.

7. The rinsing control method according to claim 6, wherein controlling the rinsing time includes adding soaked rinsing time to a predetermined rinsing time to increase the rinsing time.

8. The rinsing control method according to claim 7, wherein rinsing and soaking processes are repeated at regular intervals, during the soaked rinsing time, to dissolve the residual detergent in the laundry.

9. The rinsing control method according to claim 7, wherein the soaked rinsing time is at least 5 minutes.

10. The rinsing control method according to claim 9, wherein the soaked rinsing time is 5 to 10 minutes.

11. The rinsing control method according to claim 7, wherein the soaked rinsing time is variable depending upon the amount of laundry.

12. A rinsing control method of a washing machine including a rotary drum to receive laundry and detergent and a motor to rotate the rotary drum, the rinsing control method comprising:

determining whether a current operation is a rinsing operation; and
when the current operation is the rinsing operation, controlling intermediate spin-drying revolutions per minute (RPM) and rinsing time to remove residual detergent from the laundry.

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rinsing process is a final rinsing, and, when the current rinsing process is the final rinsing, control rinsing time to remove residual detergent from the laundry.

20. The washing machine according to claim 19, wherein the control unit adds soaked rinsing time, during which rinsing and soaking processes are repeated, to a predetermined rinsing time, to increase the rinsing time when the current rinsing process in the final rinsing process.

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13. The rinsing control method according to claim 12, wherein controlling the intermediate spin-drying RPM includes operating the motor at a number of rotations greater than a predetermined spin-drying RPM, during a spin-drying process before a final rinsing, to perform high-speed spin-drying through high-speed rotation of the rotary drum.

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14. The rinsing control method according to claim 12, wherein controlling the rinsing time includes adding soaked rinsing time to a predetermined rinsing time, during a final rinsing, to increase the rinsing time.

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15. A washing machine comprising:

a rotary drum to receive laundry and detergent;
a motor to rotate the rotary drum; and
a control unit to control a spin-drying process, during rinsing to remove residual detergent from the laundry, by operating the motor at a number of rotations greater than a predetermined spin-drying revolutions per minute (RPM) to perform high-speed spin-drying through high-speed rotation of the rotary drum.

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16. The washing machine according to claim 15, wherein the control unit controls the motor to perform the high-speed spin-drying during an intermediate spin-drying process before a final rinsing.

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17. The washing machine according to claim 15, wherein the motor is operated at the number of rotations greater by at least 10 % than the predetermined spin-drying RPM.

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18. The washing machine according to claim 17, wherein the motor is operated at the number of rotations greater by 10% to 20 % than the predetermined spin-drying RPM.

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19. A washing machine comprising:

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a rotary drum to receive laundry and detergent;
a motor to rotate the rotary drum; and
a control unit to determine whether a current

Fig. 1

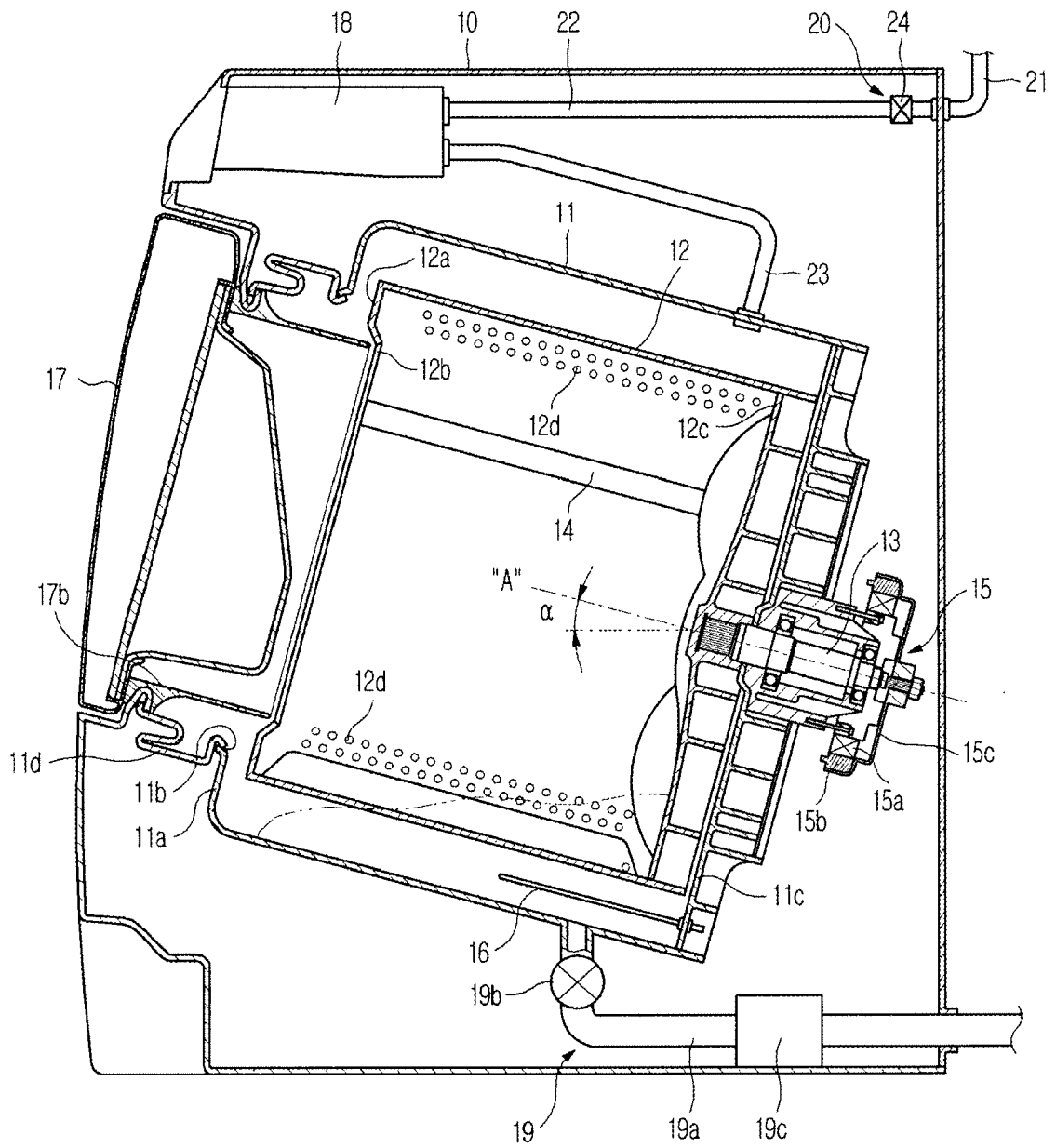


Fig. 2

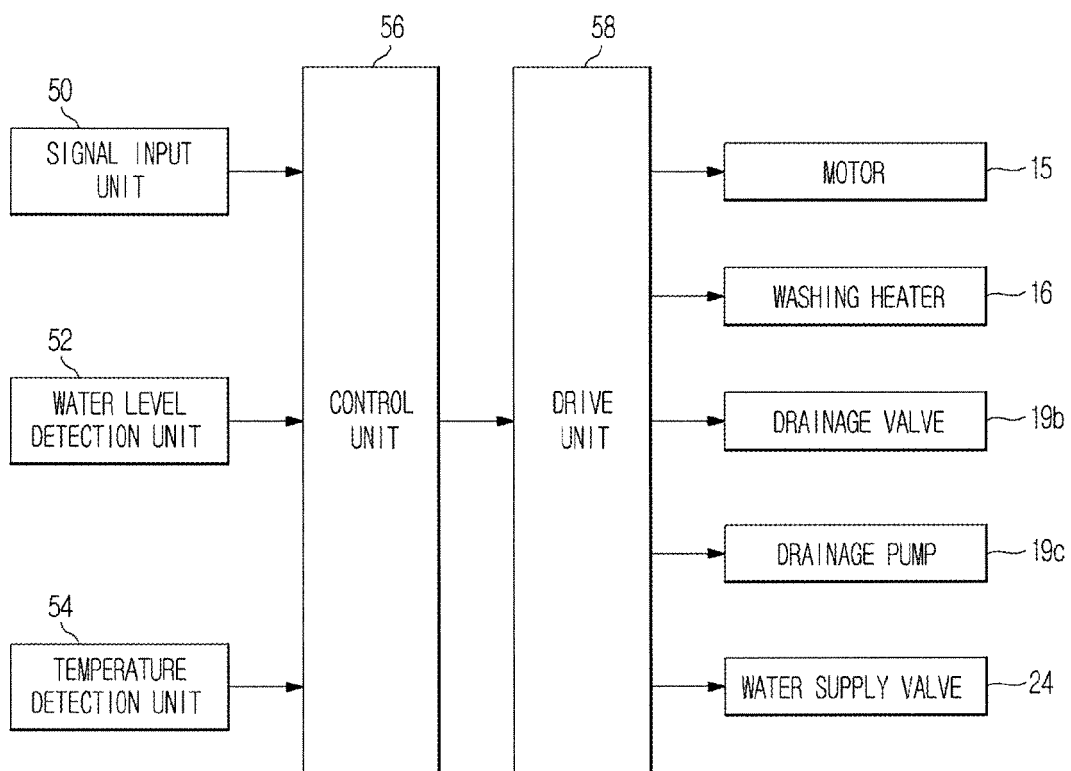


Fig. 3a

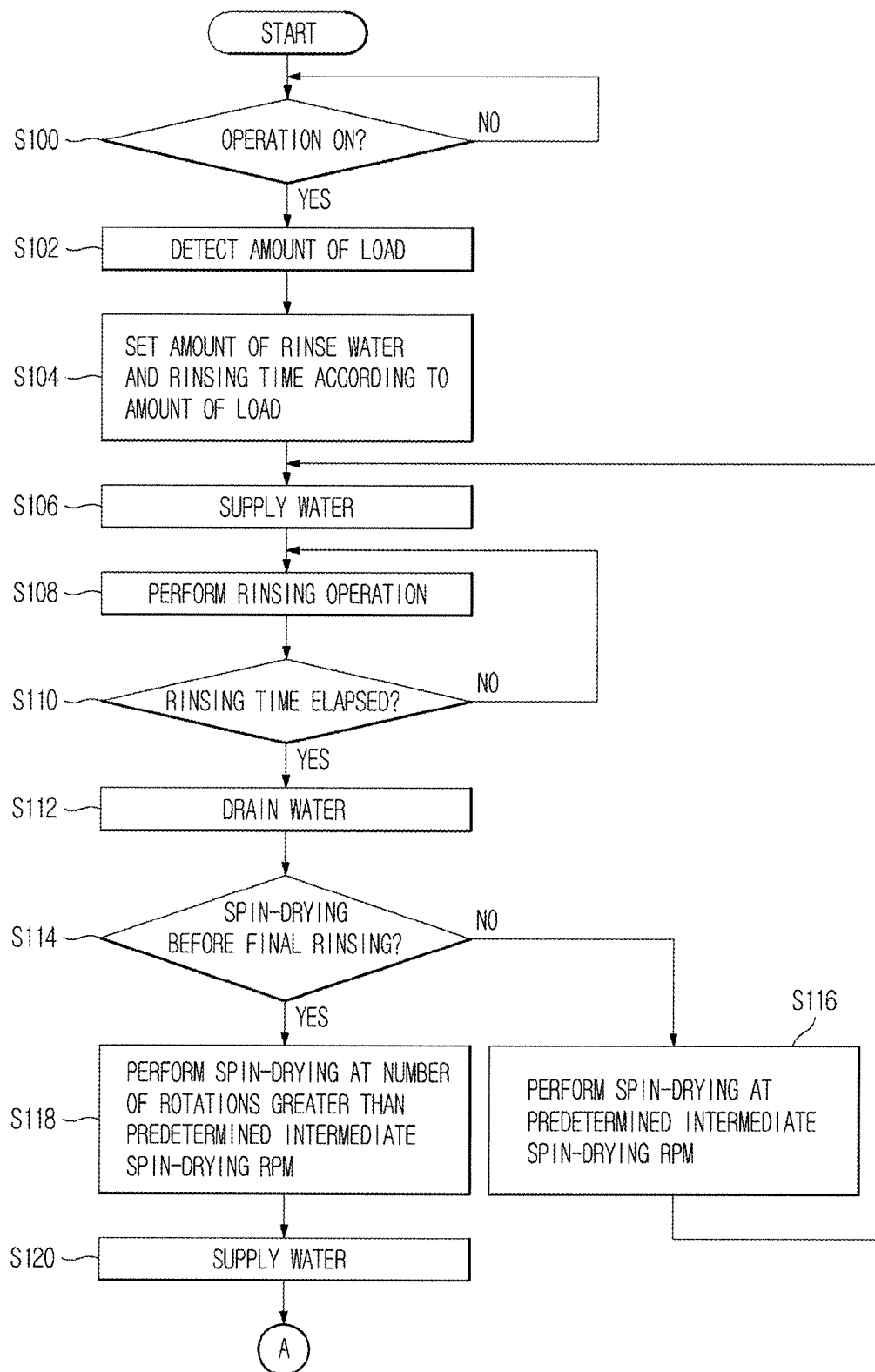
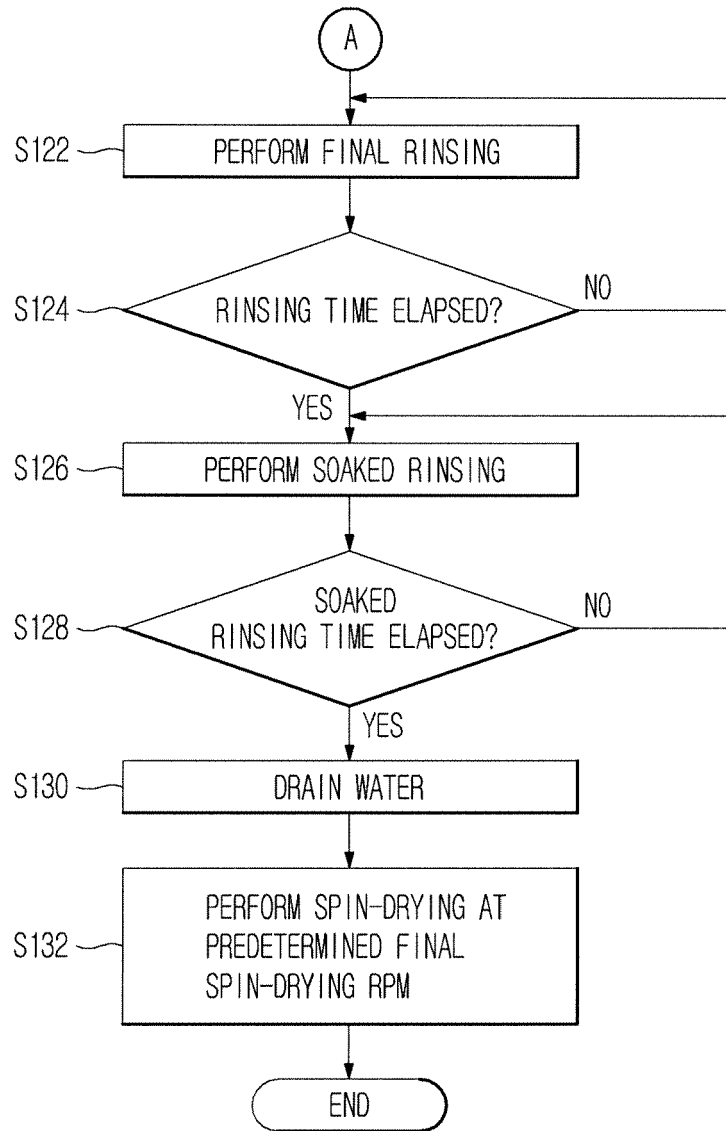


Fig. 3b



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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