

WASHING MACHINE

Field of the Invention

5 Embodiments of the present invention relate to a washing machine having a lint trap filter, a fabric softener dispenser and the like installed at a liquid balancer of a washing/dewatering tub and also having a brake mechanism for exerting a braking force on a rotation of the
10 washing/dewatering tub.

Background of the Invention

 In a conventional washing machine, a lint trap filter,
15 a fabric softener and the like are installed at a liquid balancer of a washing/dewatering tub (see, for example, Japanese Patent Laid-open Application No. H7-328277), and when the washing machine is in a power-off state or only powered on but no operation input is made, a braking force
20 is kept exerted on the washing/dewatering tub to prevent a rotation of the tub for safety (see, for example, Japanese Patent Laid-open Application No. 2004-135955).

 Fig. 8 is a side cross sectional view of a conventional washing machine. As shown in Fig. 8, the
25 washing machine includes outer frame 1, water tub 3 suspended in outer frame 1 by suspension rods 2, and

washing/dewatering tub 4 rotatably disposed in water tub 3. Further, pulsator 5 is rotatably disposed at a bottom portion of washing/dewatering tub 4, and agitation blade 6 is formed below pulsator 5 integrally therewith. Motor (driving unit) 7 serves to drive pulsator 5 or washing/dewatering tub 4 via V-belt 8 and reduction mechanism 9.

Water circulation passageway 10 for lint and water circulation passageway 11 for water spray nozzle are configured to be extended from pumping space 12 around agitation blade 6 of pulsator 5 to an upper portion of washing/dewatering tub 4. Lint trap filter 13 is detachably installed at an upper end portion of water circulation passageway 10 for lint and water spray nozzle 14 is disposed at an upper end portion of water circulation passageway 11 for water spray nozzle. Water drain valve 15 is operated to drain soiled wash water from water tub 3, and water supply valve 16 serves to supply fresh wash water into water tub 3. Lid 18 is openably installed at upper frame 17 forming an upper part of outer frame 1. Further, control unit 19 is disposed at a front portion of upper frame 17 in front of lid 18. Also, liquid balancer 20 is installed at top of washing/dewatering tub 4 to reduce vibration thereof during a dewatering operation, and fabric softener dispenser 21 is provided at liquid balancer 20.

In the conventional washing machine, water inlet 16a

communicating with water supply valve 16 is provided at a position directly above a part of opening 20a of liquid balancer 20 installed at washing/dewatering tub 4 in order to securely supply water from water supply valve 16 into washing/dewatering tub 4 in water tub 3. Further, rear surface 17b of opening portion 17a of upper frame 17 is provided to hide opening 20a of liquid balancer 20. When a series of washing operations are completed, lint trap filter 13 and fabric softener dispenser 21 provided at the inner surface of liquid balancer 20 may be located at any positions. In case lint trap filter 13 is positioned at the rear portion of the washing machine, i.e., below rear surface 17b of upper frame 17's opening portion 17a, it is difficult to separate lint trap filter 13 from the washing machine for cleaning it because lint trap filter 13 is hidden by rear surface 17b. Furthermore, in case fabric softener dispenser 21 is located at the rear portion of the washing machine, i.e., below rear surface 17b of upper frame 17's opening portion 17a, it is difficult to input a fabric softener thereinto.

In such cases, a user may intend to manually rotate washing/dewatering tub 4 until lint trap filter 13 or fabric softener dispenser 21 comes to a position where cleaning of filter 13 or input of fabric softener can be easily carried out. However, if the washing machine is powered off or just powered on with no operation input made, a braking force is

kept exerted on a rotation of washing/dewatering tub 4. Thus, it is almost impossible to rotate washing/dewatering tub 4 manually, and, even if possible, it is required a great effort of the user, which has been troublesome.

5

Summary of the Invention

Embodiments of the present invention seek to provide a washing machine capable of improving user convenience for
10 manipulability and workability when performing a work of cleaning a lint trap filter or inputting fabric softener.

In accordance with an aspect of the present invention, there is provided a washing machine including: a water tub installed in an outer frame; a washing/dewatering tub
15 rotatably disposed in the water tub; a pulsator rotatably disposed at an inner bottom portion of the washing/dewatering tub; a driving unit for driving the washing/dewatering tub and the pulsator; a dewatering shaft connected to the washing/dewatering tub; a brake mechanism
20 for exerting a braking force on a rotation of the dewatering shaft; a brake release mechanism for releasing the braking force of the brake mechanism; a setting input unit for setting at least one of operations including a washing, a rinsing and a dewatering operation; and a controller for
25 controlling rotations of the pulsator and the washing/dewatering tub

based on information set by the setting input unit, wherein the controller performs a brake release process for operating the brake release mechanism to make the washing/dewatering tub rotatable after a lapse of a predetermined time period from a time when a power is inputted by a power input unit.

In such configurations, even if the lint trap filter or the fabric softener is hidden by the rear surface of the opening portion of the upper frame at a time of, for example, initiating a washing operation, the washing/dewatering tub can be easily rotated manually with a little effort such that the lint trap filter or the fabric softener dispenser can be moved to a position where manipulation thereof can be carried out with ease. Thus, user convenience for manipulability and workability can be improved.

Brief Description of the Drawings

The above and other objects and features of the present invention will become apparent from the following description of preferred embodiments given in conjunction with the accompanying drawings, in which:

Fig. 1 is a side cross sectional view of a washing machine in accordance with a preferred embodiment of the present invention;

Fig. 2 sets forth a partially cut-away cross sectional

view of a reduction mechanism of the washing machine;

Fig. 3A presents a partially cut-away bottom view of major components near the reduction mechanism of the washing machine upon a washing operation; and Fig. 3B shows a partially cut-away bottom view of major components near the reduction mechanism upon a water-draining and a dewatering operation;

Fig. 4 provides a horizontal cross sectional view of major components of a fabric softener dispenser of the washing machine;

Fig. 5A depicts a vertical cross sectional view of the fabric softener dispenser illustrating fabric softener flowing into a second chamber of the dispenser; Fig. 5B offers a vertical cross sectional view of the fabric softener dispenser illustrating the fabric softener flowing into a fourth chamber of the dispenser; and Fig. 5C provides a vertical cross sectional view of the fabric softener dispenser illustrating a discharge of the fabric softener;

Fig. 6 is a circuit block diagram of the washing machine;

Fig. 7 presents a flowchart of the operation of the washing machine; and

Fig. 8 depicts a side cross sectional view of a conventional washing machine.

Detailed Description of the Preferred Embodiments

Hereinafter, a preferred embodiment of the present invention will be described with reference to the accompanying drawings, but it is to be noted that the
5 present invention is not limited thereto.

Fig. 1 is a side cross sectional view of a washing machine in accordance with a preferred embodiment of the present invention. As shown in Fig. 1, the washing machine
10 includes outer frame 1, water tub 3 suspended in outer frame 1 by suspension rods 2, and washing/dewatering tub 4 rotatably disposed in water tub 3. Further, pulsator 5 is rotatably disposed at the bottom of washing/dewatering tub 4, and agitation blade 6 is formed below pulsator 5 integrally
15 therewith. Motor (driving unit) 7 serves to drive pulsator 5 or washing/dewatering tub 4 via V-belt 8 and reduction mechanism 9.

Water circulation passageway 10 for lint and water circulation passageway 11 for water spray nozzle are
20 configured to be extended from pumping space 12 around agitation blade 6 of pulsator 5 to an upper portion of washing/dewatering tub 4. Lint trap filter 13 is detachably installed at an upper end portion of water circulation passageway 10 for lint and water spray nozzle 14 is disposed
25 at an upper end portion of water circulation passageway 11 for water spray nozzle. Water drain valve 15 is operated to

drain soiled wash water from water tub 3, and water supply valve 16 serves to supply fresh wash water into water tub 3. Lid 18 is openably installed at upper frame 17 forming an upper part of outer frame 1. Further, control unit 19 is
5 disposed at a front portion of upper frame 17 in front of lid 18. Also, liquid balancer 20 is installed at top of washing/dewatering tub 4 to reduce vibration thereof during a dewatering operation, and fabric softener dispenser 21 is provided at liquid balancer 20.

10 Fig. 2 shows a partially cut-away side cross sectional view of reduction mechanism 9 of the washing machine in accordance with the preferred embodiment of the present invention. Further, Fig. 3A is a partially cut-away bottom view showing major components near reduction mechanism 9 of
15 the washing machine upon a washing operation and Fig. 3B sets forth a partially cut-away bottom view showing the major components near reduction mechanism 9 upon a water-draining and a dewatering operation.

As shown in Fig. 2, reduction mechanism 9 is operated
20 to rotate both washing shaft 22 for rotating pulsator 5 and dewatering shaft 23 for rotating washing/dewatering tub 4 at the same time during a dewatering operation, whereas, during a washing operation, only washing shaft 22 is rotated via reduction gear 25 by an operation of conversion clutch 24.
25 Brake wheel 26 is configured to surround reduction gear 25, and brake band (brake mechanism) 27 is disposed

concentrically with brake wheel 26. Brake band 27 has brake shoe (brake mechanism) 27a for preventing washing/dewatering tub 4 from making a free rotation in the rotational direction of the dewatering operation during the washing operation and also serving to stop the rotation of washing/dewatering tub 4 upon the completion of the dewatering operation. Dewatering shaft 23 is fitted into the top portion of brake wheel 26, while gear case 28 is fitted into the bottom portion of brake wheel 26.

Brake wheel 26 is axially supported by cover case 30 press-fitted onto upper bearing 29 surrounding dewatering shaft 23 and by shaft support case 32 press-fitted onto lower bearing 31 surrounding gear case 28, so that brake wheel 26 and dewatering shaft 23 can be rotated relative to cover case 30 and shaft support case 32.

Clutch lever 33 is installed so as to be freely rotated about clutch shaft 34 disposed at shaft support case 32. Further, clutch spring 35 for urging clutch lever (brake mechanism) 33 to be engaged with conversion clutch 24 is concentrically disposed on clutch shaft 34. Brake lever (brake mechanism) 36 serves to make brake band 7 come into close contact with brake wheel 26 or released therefrom, and brake lever 36 is configured so as to be freely rotated about brake shaft 37 disposed at shaft support case 32. Further, brake spring 38 for urging brake shoe 27a of brake band 27 to come into close contact with brake wheel 26 is

concentrically disposed on brake shaft 37.

Referring to Figs. 3A and 3B, water drain valve 15 disposed at a bottom surface of water tub 3 is connected to operating lever 40a of electromagnetic driving unit (brake releasing unit) 40 via cock rod 39 such that water drain valve 15 is opened and closed by electromagnetic driving unit 40.

Cock rod 39 is provided with brake lever operating portion 41. Brake lever 36 is made to contact with brake lever operating portion 41 by a spring force of brake spring 38 and clutch lever 33 is made to contact with brake lever 36 by a spring force of clutch spring 35. In this way, when electromagnetic driving unit 40 is actuated, the opening or closing of water drain valve 15 and the operations of brake lever 36 and clutch lever 33 are simultaneously carried out.

Hereinafter, there will be described the operations of the washing machine constructed as described above. During a washing operation, electromagnetic driving unit 40 is turned off, and cock rod 39 is moved in the direction indicated by arrow "a" of Fig. 3A by the spring force of clock spring 15a of water drain valve 15, thus rendering water drain valve 15 closed. At the same time, brake lever 36 is moved in the direction indicated by arrow "b" of Fig. 3A by the spring force of brake spring 38 while being kept in contact with brake lever operating portion 41. As a result, clutch lever 33 is moved in the direction indicated

by arrow "c" of Fig. 3 by the spring force of clutch spring 35 while maintaining its contact with brake lever 36.

In this way, clutch lever 33 is engaged with conversion clutch 24 to make clutch spring 24a released from pulley metal 42, so that the rotation of motor 7 is transmitted via pulley metal 42 to gear shaft 43, reduction gear 25, washing shaft 22 and pulsator 5.

At this time, brake shoe 27a of brake band 27 is brought into close contact with brake wheel 26 by the spring force of brake spring 33, thus preventing washing/dewatering tub 4 from being co-rotated by a rotation of laundry loaded in tub 4 in the rotational direction of dewatering operation. Further, one-way clutch 31a disposed above lower bearing 31 prevents washing/dewatering tub 4 from being rotated by the rotation of the laundry in the direction opposite to the rotational direction of dewatering operation, and, therefore, it is prevented that the released clutch spring 24a comes into close contact with pulley metal 42 to render the latter connected to gear case 28 as in a dewatering operation mode, which results in a lock of motor 7 due to overload imposed thereon.

During a dewatering operation, as shown in Fig. 3B, electromagnetic driving unit 40 is turned on, so that cock rod 39 is moved in the direction indicated by arrow "d" of Fig. 3B to open water drain valve 15 and, at the same time, by brake lever operating portion 41 disposed at cock rod 39,

brake lever 36 is moved in the direction indicated by arrow "e" of Fig. 3B against the spring force of brake spring 38. As a result, clutch lever 33 is moved in the direction indicated by arrow "f" against the spring force of clutch spring 35.

Accordingly, clutch lever 33 is separated from conversion clutch 24 and clutch spring 24 is brought into close contact with pulley metal 42, whereby the rotation of motor 7 can be transmitted to both of pulsator 5 and washing/dewatering tub 4 at the same time. Meanwhile, as brake lever 36 is moved in the direction of arrow "e", brake shoe 27a of brake band 27 is moved in the direction indicated by arrow "g" of Fig. 3B to be released from brake wheel 10, thus making washing/dewatering tub 4 rotatable.

Fig. 4 shows a horizontal cross sectional view of a fabric softener dispenser of the washing machine in accordance with the preferred embodiment of the present invention. Further, Fig. 5A is a vertical cross sectional view illustrating an inflow of fabric softener into a second chamber of the fabric softener dispenser; Fig. 5B sets forth a vertical cross sectional view illustrating an inflow of the fabric softener into a fourth chamber of the fabric softener dispenser; and Fig. 5C presents a vertical cross sectional view illustrating a discharge of the fabric softener from the fabric softener dispenser.

As shown in Figs. 4 to 5C, first chamber 46 of the

5 fabric softener dispenser is detachably installed between
outer wall 44 and inner wall 45 of liquid balancer 20 which
is disposed at top of washing/dewatering tub 4. Further,
second chamber 48 is provided to communicate with first
10 chamber 46 via first passageway 47, and third chamber 50 is
provided to communicate with second chamber 49 via second
passageway 49. Also, fourth chamber 52 is provided to
communicate with third chamber 50 via third passageway 51,
and fabric softener outlet port 55 is provided to
15 communicate with fourth chamber 52 via fourth passageway 53
and outlet passageway 54.

The operation of the fabric softener dispenser having
the above configuration will be explained hereinafter.
First, fabric softener is inputted into first chamber 1 at a
15 time when a washing operation is started, and the fabric
softener is made to flow into second chamber 48 through
first passageway 47 by a centrifugal force during a first
dewatering operation after the completion of the washing
operation, as indicated by arrows "a" in Fig. 4. The fabric
20 softer flown into second chamber 48 is kept stuck to outer
sidewall 56 of second chamber 48 by the centrifugal force
until the first dewatering operation is finished, as
indicated by "b" in Fig. 4. Upon the completion of the
first dewatering operation, i.e., upon the initiation of a
25 first rinsing operation, the fabric softener flows into
third chamber 50 through second passageway 49, as indicated

by arrows "c" in Fig. 4.

Subsequently, the fabric softener is made to flow into fourth chamber 52 through third passageway 51 by the centrifugal force during a second dewatering operation, as indicated by arrows "d". The fabric softener in fourth chamber 52 is kept stuck to outer sidewall 57 of fourth chamber 52 until the second dewatering operation ends, as illustrated by "e". After the completion of the second dewatering operation, i.e., upon the initiation of a final rinsing operation, the fabric softener flows through fourth passageway 53 as shown by arrows "f" and then through outlet passageway 54 as shown by arrows "g" to be discharged from fabric softener outlet port 55 as shown by arrows "h", thus finally being dropped through the gap between water tub 3 and washing/dewatering tub 4.

Fig. 6 is a circuit block diagram of the washing machine in accordance with the preferred embodiment. Control unit 19 is configured as shown in Fig. 6, and controller 58 sequentially controls a series of operations including a washing, a rinsing and a dewatering operation based on information set by setting input unit 59. Specifically, controller 58 sequentially controls operations of motor 7, electromagnetic driving unit 40 for opening or closing water drain valve 15, water supply valve 16 and so forth through power switching unit 60. Storage unit 61 stores therein data necessary for the sequential control of

controller 58. Display unit 62 displays control status executed by controller 58. Water level detector 63 detects a water level in water tub 3 and outputs a detection result thereof to controller 58. Rotational speed detector 64
5 detects a rotational speed of motor 7 and outputs a detection result thereof to controller 58. Further, rotational speed detector 64 may be configured to detect a rotational speed of washing/dewatering tub 4. Reference numeral 65 represents a phase advancing capacitor of motor 7,
10 and reference numerals 66 and 67 represent a power switch and a commercial power source, respectively.

Controller 58 controls at least two cycles of dewatering operations to be conducted at a rotational speed (e.g., 300 rpm) required to allow fabric softener remaining
15 in fabric softener dispenser 21 to flow out of it.

Fig. 7 is a flowchart of the washing machine in accordance with the preferred embodiment of the present invention. The operation of the washing machine will be described with reference to Fig. 7.

20 If the operation of controller 58 is initiated in step 100, it is determined in step 101 whether or not power is inputted by power switch 66. If power switch 66 is found to be turned on in step 101, a timer is operated to measure an elapsed time.

25 Then, it is determined in step 103 whether or not a start switch for starting a series of washing processes is

pressed, wherein the start switch is provided at setting
input unit 59. If it is found in step 103 that the start
switch is not pressed, a water level in water tub 3 is
detected by water level detector 63 to determine whether
5 water is present or absent in water tub 3. If it is
determined in step 104 that there is water in water tub 3,
the process proceeds to step 105 where electromagnetic
driving unit 40 is kept off to maintain a brake state of
washing/dewatering tub 4. The steps 104 and 105 are
10 repeated until the start switch provided at setting input
unit 59 is pressed in step 103.

If it is found in step 104 that there is no water in
water tub 3, however, it is detected by rotational speed
detector 64 whether or not motor 7, i.e., washing/dewatering
15 tub 4 is rotating in step 106. If it is found in step 106
that washing/dewatering tub is rotating, the process
proceeds to step 105 where electromagnetic driving unit 40
is kept off to maintain the brake state of
washing/dewatering tub 4. Thereafter, the steps 104 to 106
20 are repeated until the start switch provided at setting
input unit 59 is pressed in step 103.

If it is found in step 106 that washing/dewatering tub
4 is not rotating, however, it is determined in step 107
whether or not the elapsed time t (measured by the timer)
25 after the input of power is less than a predetermined time
period t_1 (e.g., 15 seconds). If the elapsed time t is less

than the predetermined time period t_1 , the process proceeds to step 105 where electromagnetic driving unit 40 is kept off to maintain the brake state of washing/dewatering tub 4.

5 If the elapsed time t is not less than the predetermined time period t_1 , however, electromagnetic driving unit 40 is turned on in step 108, whereby cock rod 39 is moved in the direction of arrow "d" in Fig. 3B, to thereby open water drain valve 15. At the same time, by
10 brake lever operating portion 41 provided at cock rod 39, brake lever 36 is moved in the direction of arrow "e" in Fig. 3B against the spring force of brake spring 38. Accordingly, clutch lever 33 is made to move in the direction of arrow "f" in Fig. 3B against the spring force of clutch spring 35. At this time, brake lever 36 is moved in the direction of
15 arrow "e" in Fig. 3B, so that brake shoe 27a of brake band 27 is moved in the direction of arrow "g" in Fig. 3B to be released from brake wheel 10, thus making washing/dewatering tub 4 rotatable. In this way, a brake release process for washing/dewatering tub 4 is executed. The brake release
20 process is continued until the start switch is pressed in step 103.

In this case, since the brake of washing/dewatering tub 4 is released, washing/dewatering tub 4 can be manually rotated by a user with ease in case lint trap filter 13 or
25 fabric softener dispenser 21 is hidden by rear surface 17b of opening portion 17a of upper frame 17, thus locating lint

trap filter 13 and/or fabric softener dispenser 21 to a position where manipulation thereof can be performed easily (for example, in front of the user, at the left side of the user if the user is right-handed, or at the right side of the user if the user is left-handed). Thus, it becomes easy to separate lint trap filter 13 from the washing machine and input fabric softener into fabric softener dispenser 21, thereby improving user convenience for manipulability and workability thereof.

Then, if the start switch is pressed in step 103, it is determined in step 109 whether or not the brake release process is being performed. If the brake release process is being conducted, the process proceeds to step 110 where electromagnetic driving unit 40 is turned off, whereby water drain valve 15 is closed and, at the same time, brake shoe 27a of brake band 27 is made to come into close contact with brake wheel 10, thus braking washing/dewatering tub 4 and terminating the brake release process.

Then, a series of normal washing operations are conducted in step 111. Referring back to step 109, if it is found in step 109 that the brake release process is not being performed, the normal washing operations are immediately executed in step 111. Then, the whole processes are finished in step 112.

As described above, the brake release mechanism is operated after a lapse of a predetermined time period from

the input of power to perform the brake release process for making washing/dewatering tub 4 rotatable, so that separating the lint trap filter or inputting fabric softener into the fabric softener dispenser can be enabled by simply pressing a button once to turn on the washing machine, thereby improving user convenience.

Further, the predetermined time period t1 is just an example, and it can be set in various other ways. For example, without employing rotational speed detector 64, the predetermined time period t1 may be set to a time period required for washing/dewatering tub 4 accommodating therein a maximum load of laundry and rotating at its highest rotational speed to make a full stop by interrupting the supply of power to motor 7. In this case, it can be prevented that the brake release mechanism is operated to release the brake of washing/dewatering tub 4 before the dewatering rotation of tub 4 is completely stopped, for example, in case the washing machine is powered off in the middle of the dewatering operation and powered on again immediately. Accordingly, it is possible to prevent the risk that a user unintentionally puts the hands into washing/dewatering tub 4 which is not yet stopped due to the brake release operation, thereby enhancing the safety thereof.

Moreover, since the rotation or stop of washing/dewatering tub 4 can be positively detected by means

of rotational speed detector 64, the brake release process is carried out only when motor 7 or washing/dewatering tub 4 is stopped. Therefore, the safety can be further enhanced.

Further, if the start switch is pressed in step 103
5 before the lapse of the predetermined time t1, the process proceeds to step 111 to perform a normal operation without executing the break release process. Accordingly, electromagnetic driving unit (break release mechanism) 40 can be prevented from being operated unnecessarily, for
10 example, in a case where there is no need to rotate washing/dewatering tub 4. Thus, power consumption due to an unnecessary operation of electromagnetic driving unit 40 can be prevented, and, also, durability of electromagnetic driving unit 40 can be improved since the number of
15 operating electromagnetic driving unit 40 is reduced. In addition, it is possible to securely collect wash water in water tub 3 so that the washing process can be performed.

Moreover, if the presence of water in water tub 3 is detected by water level detector in step 104, the break
20 release process is not performed. Therefore, in case the user puts water in water tub 1 in advance by using a bucket, a bath pump or the like to use the water as wash water, it is possible to prevent the water from being unintentionally drained.

25 As described above, in the washing machine in accordance with the present invention, the break release

mechanism is operated to perform a brake release process for making the washing/dewatering tub rotatable after a lapse of a predetermined time from the input of power. Thus, a user can easily rotate the washing/dewatering tub manually with a little effort. Thus, when removing the lint trap filter or inputting fabric softener into the fabric softener dispenser, user convenience for manipulability or workability can be improved.

While the invention has been shown and described with respect to the preferred embodiments, it will be understood by those skilled in the art that various changes and modifications may be made without departing from the scope of the invention as defined in the following claims.

What is claimed is:

1. A washing machine comprising:

a water tub installed in an outer frame;

5 a washing/dewatering tub rotatably disposed in the water tub;

a pulsator rotatably disposed at an inner bottom portion of the washing/dewatering tub;

10 a driving unit for driving the washing/dewatering tub and the pulsator;

a dewatering shaft connected to the washing/dewatering tub;

a brake mechanism for exerting a braking force on a rotation of the dewatering shaft;

15 a brake release mechanism for releasing the braking force of the brake mechanism;

a setting input unit for setting at least one of operations including a washing, a rinsing and a dewatering operation; and

20 a controller for controlling rotations of the pulsator and the washing/dewatering tub based on information set by the setting input unit,

wherein the controller performs a brake release process for operating the brake release mechanism to make
25 the washing/dewatering tub rotatable after a lapse of a predetermined time period from a time when a power is

inputted by a power input unit.

- 5 2. The washing machine of claim 1, wherein the predetermined time period is set to be a time period required for the washing/dewatering tub to make a full stop upon the completion of the dewatering operation.
- 10 3. The washing machine of claim 1 or 2, further comprising a rotational speed detector for detecting a rotational speed of the driving unit or the washing/dewatering tub, wherein the brake release process is not performed when a rotation of the driving unit or the washing/dewatering tub is detected by the rotational speed
15 detector.
4. The washing machine of claim 1, 2, or 3, further comprising a water level detector for detecting a water level in the water tub, wherein the brake release process is not performed when a presence
20 of water in the water tub is detected by the water level detector.
5. The washing machine of any one of the claims 1 to 4, wherein the brake release process is not performed when one of the operations is set to be initiated by the setting input unit.

ABSTRACT

WASHING MACHINE

5 A washing machine includes water tub 3 installed in
outer frame 1, washing/dewatering tub 4 rotatably disposed
in water tub 3, pulsator 5 rotatably disposed at an inner
bottom portion of washing/dewatering tub 4, dewatering shaft
23 connected to washing/dewatering tub 4 and a brake
10 mechanism for exerting a braking force on a rotation of
dewatering shaft 23. The washing machine further includes
brake release mechanism 40 for releasing the braking force
of the brake mechanism, setting input unit 59 for setting a
series of operations including a washing, a rinsing and a
15 dewatering operation and controller 58 for controlling
rotations of pulsator 5 and washing/dewatering tub 4 based
on information set by setting input unit 59. Controller 58
performs a brake release process for operating brake release
mechanism 40 to make washing/dewatering tub 4 rotatable
20 after a lapse of a predetermined time period from a time
when a power is inputted by power input unit 66.

SUITABLE DRAWING: FIG. 7