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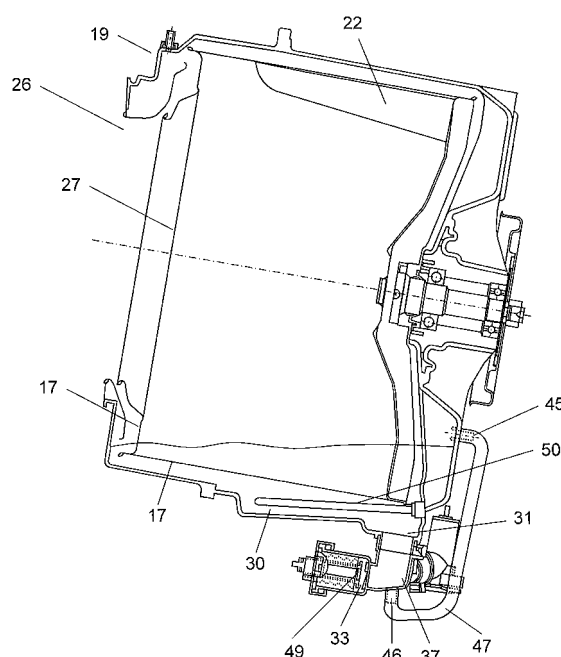
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(54) **Drum-type washer**

(57) A drum-type washer includes a water circulation channel (47) which is extended from an opening (45) in the rear side of the washing tub (19) and communicated with the drain space (37) in the downstream of the drain outlet (31). In the washer, in order to prevent detergent from accumulating in the drain space (37), the controller (38) performs the following operations in this order: water starts to be fed with the drain valve (49) open; the drain valve (49) is closed when a predetermined water level is reached; detergent is poured into the washing tub (19); the rotating drum (17) is rotated for a predetermined time to perform washing; and the drain valve (49) is opened and closed.

FIG. 3



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a drum-type washer for washing laundry in a rotating drum.

2. Background Art

[0002] Conventional drum-type washers have a structure shown in Fig. 8, which will be described as follows.

[0003] As shown in Fig. 8, a drum-type washer includes drum 1 rotatably mounted in washing tub 3. Drum 1 has a large number of water-through-holes 2 in the entire outer peripheral surface. The washer also includes rotating shaft 4 fixed at one end to the rotation center of drum 1 and at the other end to drum pulley 5. The washer also includes motor 6, which is connected to drum pulley 5 via belt 7 so as to rotate drum 1. Drum 1 has an opening with lid 8. Washing tub 3 is suspended inside washer body 9 by spring 10 and vibro-isolatedly supported by vibration free damper 11. Vibration of washing tub 3 during spin cycle is prevented from being transmitted to washer body 9 by vibration free damper 11 and is reduced by amount 12. Washing tub 3 has drain outlet 17a at its bottom. The washer also includes feed valve 13 for feeding water into washing tub 3, drainage pump 14 for draining water from washing tub 3, and heater 15 for heating water in washing tub 3. The washer also includes control device 16, which controls the operations of motor 6, feed valve 13, drainage pump 14, heater 15, and the like so as to perform a series of cycles including wash, rinse, and spin cycles. An example of a conventional technique related to the present invention is shown in Japanese Patent Unexamined Publication No. H10-201988.

[0004] The following is a description of the operation of the above-described drum-type washer.

[0005] First, the user opens lid 8, loads laundry into drum 1, and turns the washer on to start a wash cycle. As a result, feed valve 13 is opened to feed water into washing tub 3. When the water reaches a predetermined level, feed valve 13 is closed to stop feeding water. Then, drum 1 is rotated by motor 6 at low speed, raising the laundry in drum 1 and then dropping it into the water during the wash cycle. When the wash cycle is performed for a predetermined time, the water in washing tub 3 is drawn into drainage pump 14 via drain outlet 17a. Then, drainage pump 14 is operated to drain the water as intermediate spinning so as to start a rinse cycle. The rinse cycle includes the same operation as the wash cycle. In a subsequent spin cycle, drum 1 is rotated at high speed to centrifugally dehydrate the laundry.

[0006] In the wash cycle, the detergent poured into a detergent container (not shown) is supposed to be poured into washing tub 3 together with the water flowing through feed valve 13 immediately after washing is start-

ed. This operation is done manually or by other means. When the cleaning water comes into contact with laundry stains, the detergent cleans and removes stains, providing a high cleaning effect. In the above-described conventional structure, however, the detergent poured at the start of washing often drops directly through drain outlet 17a as detergent aggregates before it is completely dissolved in the water in washing tub 3. This causes the detergent to get into the drain space and then to be discharged without fulfilling its function.

SUMMARY OF THE INVENTION

[0007] In view of the above-described problem, the present invention provides a drum-type washer which improves the solubility of detergent so as to allow the detergent to provide an excellent cleaning effect in the following manner. In a feed-water cycle, water is first fed into the drain space with the drain valve open; the drain valve is closed; detergent is poured into the washing tub; the laundry is stirred for a predetermined time; and the drain valve is opened and closed to produce the convection of water. The convection of water functions, even if the detergent drops through drain outlet 17a and accumulates in the drain space, to stir up the accumulated detergent so as to accelerate to return it into washing tub 3.

[0008] The drum-type washer of the present invention includes a rotating drum rotatable in a washing tub, the rotating drum having a rotation axis horizontal or inclined from a horizontal; a drain outlet in a bottom of the washing tub; a motor for rotating the rotating drum; a feed-water unit for feeding water into the washing tub; a drainage unit for draining water from the washing tub; a water circulation channel extended from an opening in a rear side of the washing tub, the water circulation channel being communicated with a drain space in a downstream of the drain outlet; a drainage channel communicated with the drain space having a drain valve, the drainage channel being extended upward via a drainage pump; and a controller for controlling the motor, the feed-water unit, and the drainage unit so as to perform at least wash, rinse, and spin cycles. The controller performs the following operations in this order: water starts to be fed with the drain valve open; the drain valve is closed when a predetermined water level is reached; detergent is poured into the washing tub; the rotating drum is rotated for a predetermined time to perform washing; and the drain valve is opened and closed.

[0009] With this structure, the drain valve is opened and closed to produce the convection of water. The convection of water functions, even if the detergent drops through the drain outlet and accumulates in the drain space, to stir up the accumulated detergent so as to accelerate to return it into the washing tub. This achieves a drum-type washer which improves the solubility of detergent, thereby allowing the detergent to provide an excellent cleaning effect.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is a sectional view of a side of a drum-type washer according to a first embodiment of the present invention.

Fig. 2 is a rear view of a washing tub of the washer according to the first embodiment.

Fig. 3 is a sectional view of a side of the washing tub, including a drain space, of the washer according to the first embodiment.

Fig. 4 is a front view of the washer according to the first embodiment.

Fig. 5 is an operation flow of the washer according to the first and second embodiments of the present invention.

Fig. 6 is an operation flow of a drum-type washer according to a third embodiment of the present invention.

Fig. 7 is an operation flow of a drum-type washer according to a fourth embodiment of the present invention.

Fig. 8 is a longitudinal sectional view of a side of a conventional drum-type washer.

DETAILED DESCRIPTION OF THE INVENTION

[0011] First to fourth embodiments of the present invention will be described as follows with reference to drawings. In the drawings, the dimensions of some components are exaggerated for clarity. In the second to fourth embodiments, like components are labeled with like reference numerals with respect to the first embodiment, and the description thereof will be sometimes omitted. Note that the present invention is not limited to these embodiments.

FIRST EMBODIMENT

[0012] Fig. 1 a sectional view of a side of a drum-type washer according to a first embodiment of the present invention. Fig. 2 is a rear view of a washing tub of the washer. Fig. 3 is a sectional view of a side of the washing tub, including a drain space, of the washer. Fig. 4 is a front view of the washer. Fig. 5 is an operation flow of the washer.

[0013] As shown in Fig. 1, the drum-type washer includes rotating drum 17 rotatably mounted in washing tub 19. Rotating drum 17 is formed in a bottomed cylindrical shape and has a large number of water-through-holes 18 in the entire outer periphery. Rotating drum 17 has rotating shaft 20 as its rotation axis, which is either horizontal or slightly inclined from the horizontal. More specifically, the rotation axis is inclined downward from the front side to the rear side of rotating drum 17. Rotating shaft 20 is connected via belt 44 to motor 21, which is fixed on the bottom of washing tub 19 so that rotating

drum 17 can be rotated by motor 21 in the forward and reverse directions. Rotating drum 17 is provided on its inner circumference wall with several projection boards 22. One of projection boards 22 can be provided with fabric amount detector 80 for measuring the laundry amount in rotating drum 17.

[0014] The washer also includes body 23 having opening 24, which is formed on the front side of washing tub 19 and in the direction perpendicular to an upwardly inclined surface of body 23. Opening 24 is covered with openable lid 25. When washing laundry, the user opens lid 25 and loads the laundry into rotating drum 17 through opening 24, laundry loading-unloading opening 26 of washing tub 19, and laundry loading-unloading opening 27 of drum 17. When washing is over, the user unloads the laundry from rotating drum 17 through these openings. Providing lid 25 in the direction perpendicular to the upwardly inclined surface of body 23 allows the user to load and unload laundry without bending over too much.

[0015] Washing tub 19 is swingably suspended from body 23 by spring 28 and damper 29. Washing tub 19 is provided on its inside bottom with long U-shaped drainage ditch 30 along the direction of rotating shaft 20. Drainage ditch 30 is equipped with heater 50, and has drain outlet 31 at a position to its bottom rear side. Drain outlet 31 is connected to drain space 37, which is connected at its outlet with drainage channel 32 via drain valve 49 as a component of drainage unit 60. Drainage channel 32 is connected at the other end thereof with drainage pump 33 as another component of drainage unit 60, so that drainage pump 33 drains water from washing tub 19. The washer also includes feed-water unit 65, which has first feed valve 34a and second feed valve 34b. First feed valve 34a feeds water directly into washing tub 19 through feed-water channel 36, and second feed valve 34b feeds water into washing tub 19 via detergent container 35 and feed-water channel 36. The washer also includes water level detector 48 for detecting the water level in washing tub 19.

[0016] The washer also includes control device 39, which has controller 38 composed of a microcomputer. Controller 38 controls the operations of motor 21, drainage pump 33, feed valves 34a and 34b, drain valve 49, and other components via a power switching unit (not shown) so as to control wash, rinse, spin, and dry cycles.

[0017] Control device 39 receives information from an input setting unit (not shown) for setting an operation course and other conditions, and displays the information on a display unit (not shown) provided therein. The display unit is on the front side of body 23, so that the user can see it easily. Control device 39 also has storage unit 75, which stores data required for controller 38 to control. Storage unit 75 and the display unit can be provided in control device 39 together with controller 38.

[0018] As shown in Fig. 2, washing tub 19 of the washer is provided on its rear side with rear-side opening 45. Rear-side opening 45 and opening 46 of drain space 37 shown in Fig. 3 are connected to water circulation chan-

nel 47 so that water or air in washing tub 19 can circulate there.

[0019] In general conventional drum-type washers, drainage channel 32 is extended directly from the bottom of washing tub 19 and connected to the outside from the bottom of body 23 of the washer. Therefore, drainage is discharged directly to an outside drainage channel with gravitational effects.

[0020] Drum-type washers used to be installed in or near bathrooms or other places where water is used frequently, but now are often installed as part of built-in kitchens, and therefore, are required to reduce odor of drainage so as not to ruin food in the kitchens. To reduce the odor, as shown in Fig. 4, drainage channel 32 is designed in such a manner that water is once raised before being discharged outside through drainage pump 33. This structure provides a water seal between drainage channel 32 and the outside drain outlet, thereby preventing the water in drainage channel 32 and the water in the outside drainage channel from coming into mutual contact when the washer is in a normal operation such as a wash cycle.

[0021] The operation of the washer having the above-described structure will be described as follows based on the flow of Fig. 5.

[0022] In Step 100, the user opens lid 25, loads laundry into rotating drum 17, and closes lid 25 so that the drum-type washer can be started. In Step 101, the user turns on the power switch (not shown). In Step 102, the user selects a course and cycles. In Step 103, the selected program is displayed on the operation panel. In Step 104, the user presses the start button (not shown) to start the program. In Step 105, lid 25 of the washer is locked.

[0023] Next, in a feed-water cycle, in Step 106, drainage unit 60 is turned on so as to open drain valve 49. In Step 107, first feed valve 34a is turned on to feed water. In Step 108, the water is fed into washing tub 19 through first feed-water channel 36. In Step 109, it is determined whether the water in washing tub 19 has reached a predetermined water level S1 which is, for example, 0 mm or the reset water level.

[0024] When it is affirmatively determined, the process proceeds to Step 110 where first feed valve 34a is turned off to stop feeding water; otherwise, the process returns to Step 108 to continue to feed water. In Step 111, drainage unit 60 is turned off so as to close drain valve 49. In Step 112, second feed valve 34b is turned on to feed water. In Step 113, the water is made to pass through detergent container 35. In Step 114, the water is made to pass through feed-water channel 36a. In Step 115, the water is fed into washing tub 19 together with detergent. As a result, the detergent is poured into washing tub 19.

[0025] In Step 116, it is determined whether the water has reached a predetermined water level S2 which is, for example, 60 mm. When it is affirmatively determined, the process proceeds to Step 117 where second feed valve 34b is turned off to stop feeding water; otherwise, the process returns to Step 112 to continue to feed water.

In Step 118, motor 21 is driven to start stirring the laundry. In Step 119, it is determined whether a predetermined stirring time T1 has been reached. When it is affirmatively determined, the process proceeds to Step 120; otherwise, the process returns to Step 118 to continue stirring the laundry.

[0026] In Step 120, drainage unit 60 is turned on for a short time, for example, about one second so as to open drain valve 49, and then is turned off so as to close drain valve 49 quickly. This opening and closing of drain valve 49 causes a stream of water so as to stir up the detergent accumulated in drain space 37. In Step 121, the stirring of the laundry is restarted. In Step 122, it is determined whether a predetermined stirring time T2 has been reached. When it is affirmatively determined, the stirring of the laundry is stopped in Step 123 and the process proceed to the next cycle; otherwise, the process returns to Step 121 to restart the stirring of the laundry.

[0027] Assume that in the feed-water cycle, detergent is poured into washing tub 19 after water is fed and kept in drain space 37 and some of the detergent drops through drain outlet 31 and accumulates in drain space 37. Even in such a case, the on-off operation of drainage unit 60 to open and close drain valve 49 can cause the convection of water, which stirs up the detergent accumulated in drain space 37 so as to accelerate to return it into washing tub 19. This improves the solubility of detergent, thereby allowing the detergent to provide an excellent cleaning effect.

[0028] As described above, the drum-type washer of the present invention includes rotating drum 17, drain outlet 31, motor 21, feed-water unit 65, drainage unit 60, water circulation channel 47, drainage channel 32, and controller 38. Rotating drum 17 is rotatably mounted in washing tub 19, and has rotating shaft 20 as its rotation axis, which is either horizontal or inclined from a horizontal. Drain outlet 31 is in the bottom of washing tub 19. Motor 21 rotates rotating drum 17. Feed-water unit 65 feeds water into washing tub 19. Drainage unit 60 drains water from washing tub 19. Water circulation channel 47 is extended from rear-side opening 45 in the rear side of washing tub 19 in such a manner as to be communicated with drain space 37 in the downstream of drain outlet 31. Drainage channel 32 is communicated with drain space 37 having drain valve 49, and extended upward via drainage pump 33. Controller 38 controls at least motor 21, feed-water unit 65, and drainage unit 60 so as to perform at least wash, rinse, and spin cycles.

[0029] Controller 38 performs the following operations in this order: water starts to be fed with drain valve 49 open; drain valve 49 is closed when a predetermined water level is reached; detergent is poured into washing tub 19; drum 17 is rotated for a predetermined time to perform washing; and then drain valve 49 is opened and closed.

[0030] With this structure, in the feed-water cycle, even if detergent poured into tub 19 after water is fed and kept in drain space 37 drops through drain outlet 31 and ac-

accumulates in drain space 37, the convection of water produced by opening and closing drain valve 49 stirs up the accumulated detergent so as to accelerate to return it into tub 19. This improves the solubility of detergent, thereby allowing the detergent to provide an excellent cleaning effect.

SECOND EMBODIMENT

[0031] A drum-type washer of a second embodiment of the present invention has the same structure as that of the first embodiment, and hence, will be described using Figs. 1 to 4.

[0032] The washer of the second embodiment is identical to that of the first embodiment except that controller 38 controls so that after rotating drum 17 is rotated for a predetermined time to perform washing, drain valve 49 is opened and closed a plurality of times.

[0033] The following is a description, with reference to the operation flow of Fig. 5, of the operation of the washer having the above-described structure of the second embodiment. The same steps as those in the first embodiment will not be described in the present embodiment.

[0034] In the feed-water cycle, in Step 120, drainage unit 60 is turned on for a short time, for example, about one second so as to open drain valve 49, and then is turned off so as to close drain valve 49 quickly. This opening and closing of drain valve 49 is performed a plurality of times, for example, four times, so that a stronger stream of water is caused a plurality of times, thereby vigorously stirring up the detergent accumulated in drain space 37.

[0035] As described above, in the feed-water cycle, even if detergent poured into washing tub 19 after water is fed and kept in drain space 37 drops through drain outlet 31 and accumulates in drain space 37, the convection of water stirs up the accumulated detergent so as to accelerate to return it into tub 19. The convection of water is produced in drain space 37 by opening and closing drain valve 49 a plurality of times. This improves the solubility of detergent, thereby allowing the detergent to provide an excellent cleaning effect.

[0036] Thus, according to the drum-type washer of the present invention, the opening and closing of drain valve 49 is performed a plurality of times.

[0037] With this structure, the detergent accumulated in drain space 37 can be stirred up and returned to washing tub 19 more easily. This further improves the solubility of detergent, thereby allowing the detergent to provide an excellent cleaning effect.

THIRD EMBODIMENT

[0038] Fig. 6 is an operation flow of a drum-type washer according to a third embodiment of the present invention. A sectional view of a side of the washer, and a rear view of washing tub 19 of the washer are identical to those in the first and second embodiments, and hence, will be

described with reference to Figs. 1 to 4.

[0039] The washer of the present third embodiment is identical to those of the first and second embodiments except for the following differences. The washer of the present embodiment includes water heater 50 for heating water in washing tub 19, and controller 38 controls so that drain valve 49 is opened and closed after water heater 50 is stopped.

[0040] The following is a description, with reference to the operation flow of Fig. 6, of the operation of the washer having the above-described structure of the third embodiment. The same steps as those in the first and second embodiments will not be described in the present embodiment. More specifically, the description of Steps 100 to 105 before in the feed-water cycle, and Steps 106 to 118 in the feed-water cycle will be omitted.

[0041] In feed-water cycle, in Step 118, the laundry starts to be stirred. In Step 201, water heater 50 is turned on to heat the water in tub 19. In Step 202, it is determined whether the water has reached a predetermined temperature X1. When it is affirmatively determined, the process proceeds to Step 203 where water heater 50 is turned off; otherwise, the process returns to Step 201 where water heater 50 is continued to be turned on so as to increase the temperature of the water.

[0042] When the predetermined temperature X1 is reached, water heater 50 is turned off in Step 203. In Step 120, drainage unit 60 is turned on for a short time, for example, about one second so as to open drain valve 49, and then is turned off so as to close drain valve 49 quickly.

[0043] Assume that in the feed-water cycle, detergent is poured into washing tub 19 after water is fed and kept in drain space 37, and some of the detergent drops through drain outlet 31 and accumulates in drain space 37. Even in such a case, the heated water is brought into contact with the detergent accumulated in drain space 37. This improves the solubility of the detergent stirred up by the convection of water produced in drain space 37, thereby allowing the detergent to provide an excellent cleaning effect.

[0044] As described above, the drum-type washer of the present invention includes water heater 50 for heating water in washing tub 19, and controller 38 controls so that the opening and closing of drain valve 49 is performed after water heater 50 is stopped.

[0045] With this structure, the heated water is brought into contact with the detergent accumulated in drain space 37, and the convection of water produced in drain space 37 stirs up the detergent. This improves the solubility of detergent, thereby allowing the detergent to provide an excellent cleaning effect.

FOURTH EMBODIMENT

[0046] Fig. 7 is an operation flow of a drum-type washer according to a fourth embodiment of the present invention. A sectional view of a side of the washer, and a rear

view of washing tub 19 of the washer are identical to those in the second and third embodiments, and hence, will be described with reference to Figs. 1 to 4.

[0047] The washer of the present fourth embodiment is identical to those of the second and third embodiments except for the following differences. The washer of the present embodiment includes fabric amount detector 80 for measuring the laundry amount in rotating drum 17, for example, near the outer periphery of washing tub 19, and controller 38 controls so that when the laundry amount is large, drain valve 49 is opened and closed a larger number of times than when the laundry amount is small.

[0048] The following is a description of the operation of the washer having the above-described structure of the present embodiment. The same steps as those in the second and third embodiments will not be described in the present embodiment.

[0049] In Step 104, the user presses the start button to start the program. In Step 105, lid 25 of the washer is locked. In Step 301, the fabric amount detector determines the laundry amount in rotating drum 17. Next, in the feed-water cycle, water is fed into washing tub 19 together with detergent in the same manner as in the second and third embodiment during Steps 106 to 117.

[0050] Step 117 is followed by Step 302 where the laundry starts to be stirred. In Step 303, it is determined whether a predetermined stirring time T1 has been reached. When it is affirmatively determined, the process proceeds to Step 304; otherwise, the process returns to Step 302 where the laundry is continued to be stirred. In Step 304, it is determined whether the laundry amount determined in Step 301 exceeds a predetermined fabric amount R1, for example, one half the rated capacity. When it is affirmatively determined, the process proceeds to Step 305 where drainage unit 60 is turned on for a short time, for example, about one second so as to open drain valve 49, and then is turned off so as to close drain valve 49 quickly. This opening and closing of drain valve 49 is performed a plurality of times, for example four times.

[0051] When the laundry amount determined in Step 301 is determined to be less than the predetermined fabric amount R1, on the other hand, the process proceeds to Step 306 where drainage unit 60 is turned on for a short time, for example, about one second so as to open drain valve 49, and then is turned off so as to close drain valve 49 quickly. In this manner, when the laundry amount or the fabric amount is low, the opening and closing of drain valve 49 is performed fewer times than in the case that the fabric amount is high. The fewer times can be, for example, only once.

[0052] As described above, when the laundry amount is large, the opening and closing of drain valve 49 is performed a large number of times. As a result, even when the amount of detergent is large, the detergent accumulated in drain space 37 can be stirred up and returned into washing tub 19 easily. This improves the solubility

of detergent, thereby allowing the detergent to provide an excellent cleaning effect.

[0053] When the laundry amount is small, the opening and closing of drain valve 49 is performed a small number of times, thereby preventing part of the small amount of detergent from dropping into drainage channel 32. As a result, the detergent provides an excellent cleaning effect.

[0054] As described hereinbefore, the washer of the present invention includes fabric amount detector 80 for measuring the laundry amount loaded into rotating drum 17, and controller 38 controls so that when the laundry amount is large, drain valve 49 is opened and closed a larger number of times than when the laundry amount is small.

[0055] With this structure, when the laundry amount is large, even if a large amount of detergent is accumulated in drain space 37, it can be stirred up and returned into washing tub 19 easily by repeating opening and closing drain valve 49. This improves the solubility of detergent, thereby allowing the detergent to provide an excellent cleaning effect.

[0056] When the laundry amount is small, on the other hand, the opening and closing of drain valve 49 is performed a small number of times, thereby preventing part of the small amount of detergent from dropping into drainage channel 32. As a result, the detergent provides an excellent cleaning effect.

[0057] As described hereinbefore, according to the drum-type washer of the present invention, in the feed-water cycle, even if detergent drops through the drain outlet and accumulates in the drain space, the drain valve is opened and closed to produce the convection of water in the drain space, and the convection of water stirs up the accumulated detergent so as to accelerate to return it into the washing tub. This achieves a drum-type washer which improves the solubility of detergent, thereby allowing the detergent to provide an excellent cleaning effect.

Claims

1. A drum-type washer comprising:

- a rotating drum rotatable in a washing tub, the rotating drum having a rotation axis horizontal or inclined from a horizontal;
- a drain outlet in a bottom of the washing tub;
- a motor for rotating the rotating drum;
- a feed-water unit for feeding water into the washing tub;
- a drainage unit for draining water from the washing tub;
- a water circulation channel extended from an opening in a rear side of the washing tub, the water circulation channel being communicated with a drain space in a downstream of the drain outlet;

a drainage channel communicated with the drain space having a drain valve, the drainage channel being extended upward via a drainage pump; and

a controller for controlling at least the motor, the feed-water unit, and the drainage unit so as to perform at least wash, rinse, and spin cycles, wherein

the controller performs the following operations in this order:

water starts to be fed with the drain valve open; the drain valve is closed when a predetermined water level is reached; detergent is poured into the washing tub; the rotating drum is rotated for a predetermined time to perform washing; and the drain valve is opened and closed.

2. The drum-type washer of claim 1, wherein the drain valve is opened and closed a plurality of times.

3. The drum-type washer of claim 1 or 2, further comprising:

a water heater for heating water in the washing tub, wherein

the controller controls so that the drain valve is opened and closed after the water heater is stopped.

4. The drum -type washer of claim 2, further comprising:

a fabric amount detector for measuring a laundry amount in the rotating drum, wherein

the controller controls so that when the laundry amount is large, the drain valve is opened and closed a larger number of times than when the laundry amount is small.

5. The drum -type washer of claim 3, further comprising:

a fabric amount detector for measuring a laundry amount in the rotating drum, wherein

the controller controls so that when the laundry amount is large, the drain valve is opened and closed a larger number of times than when the laundry amount is small.

FIG. 1

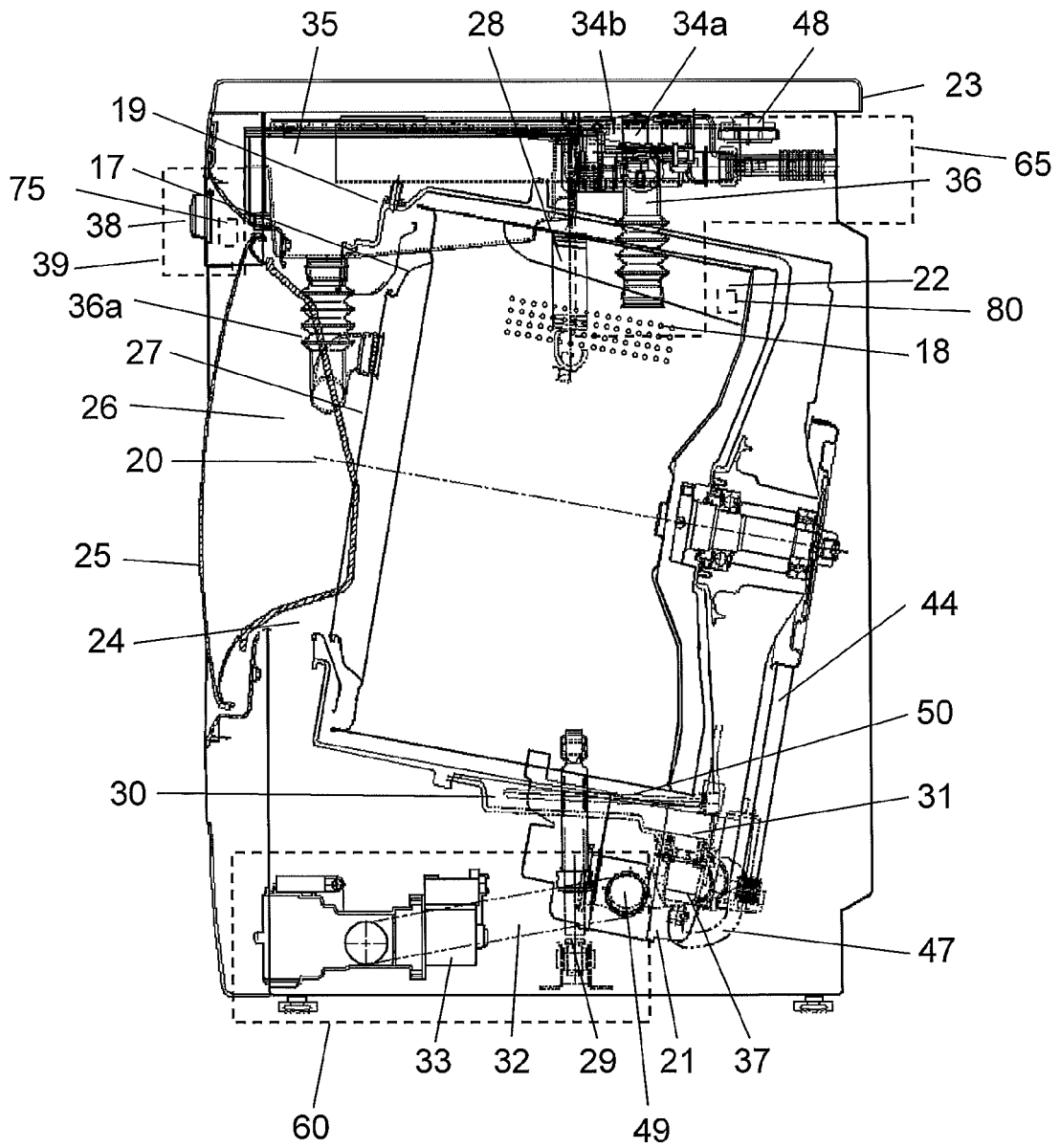


FIG. 2

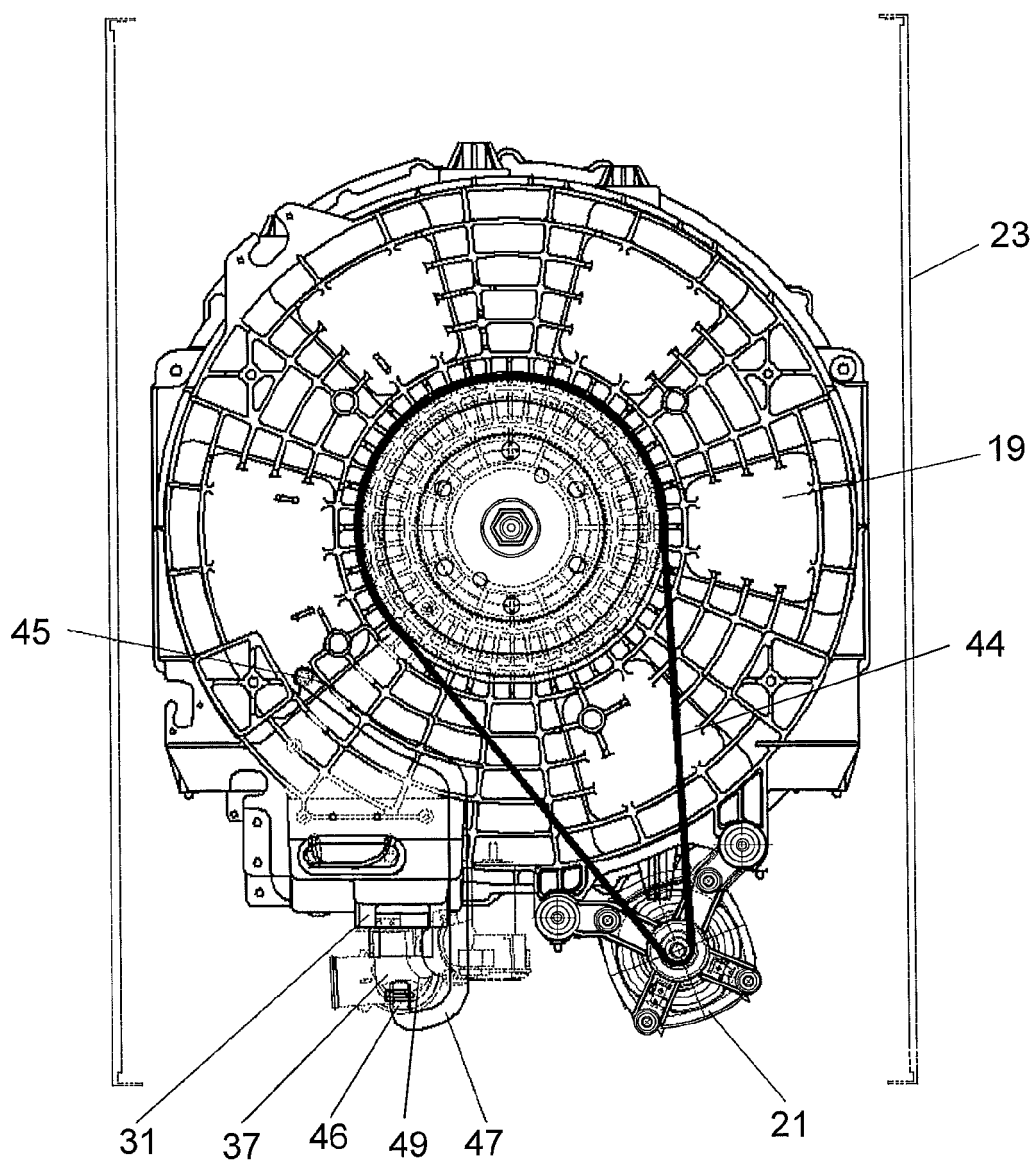


FIG. 3

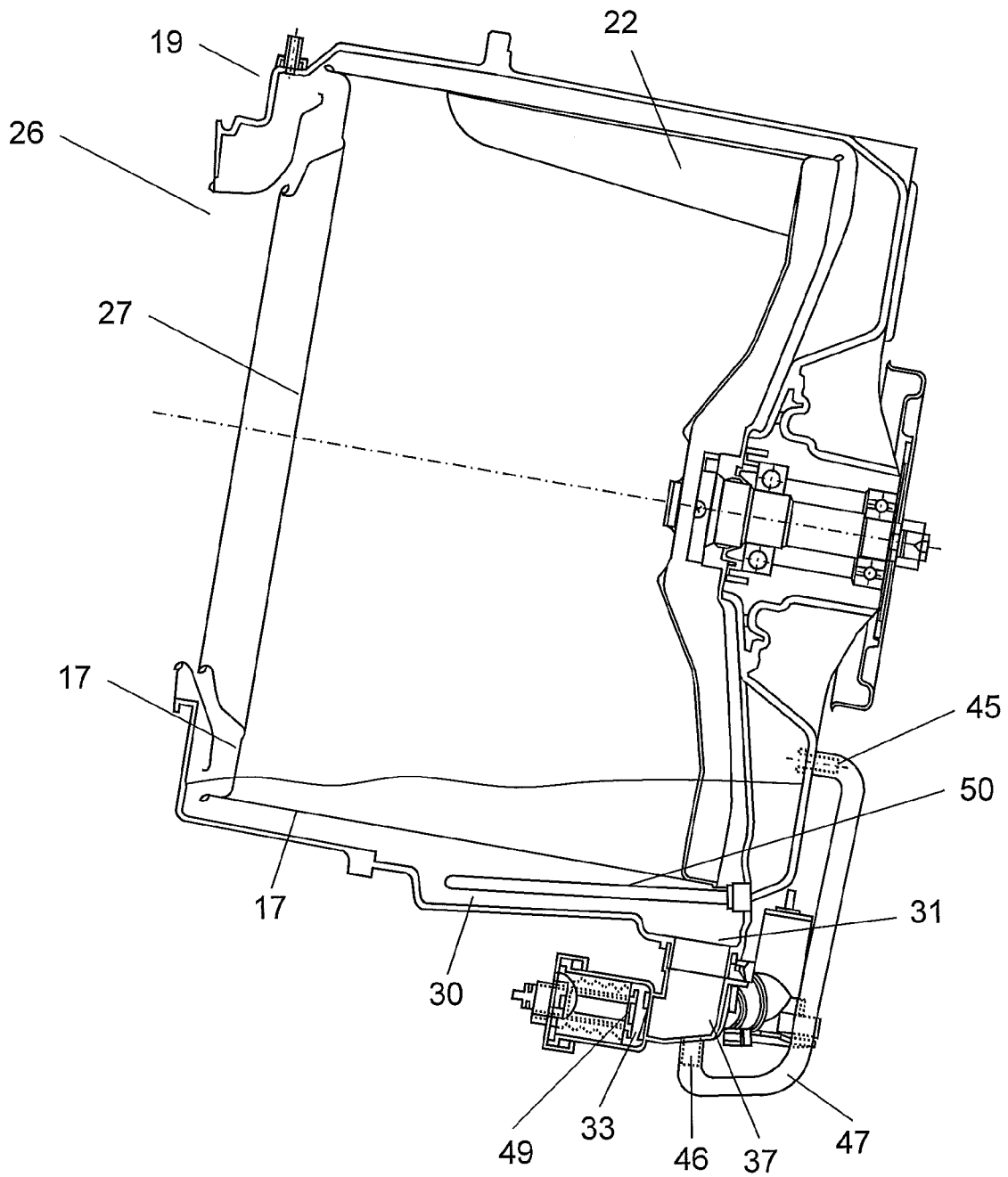


FIG. 4

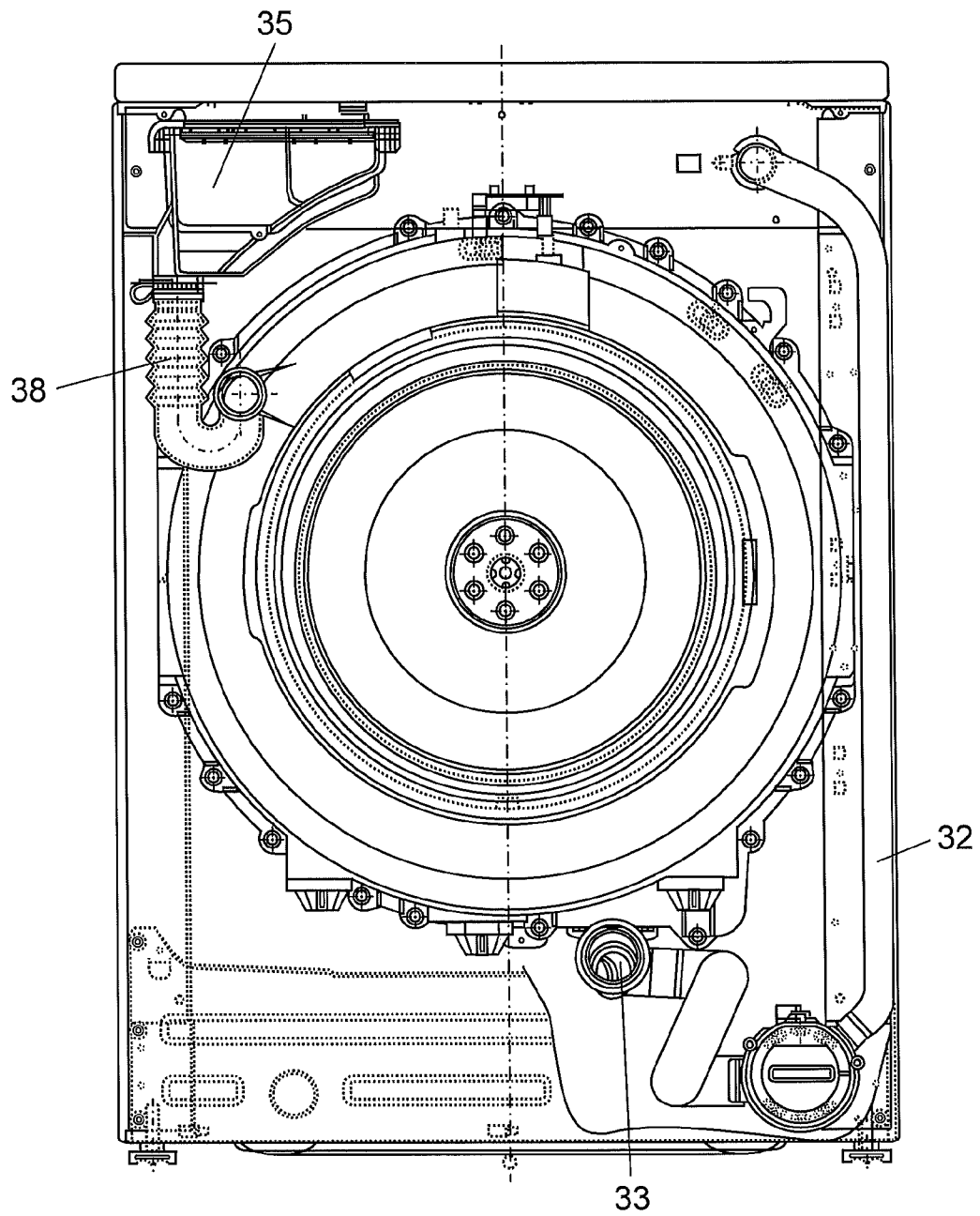


FIG. 5

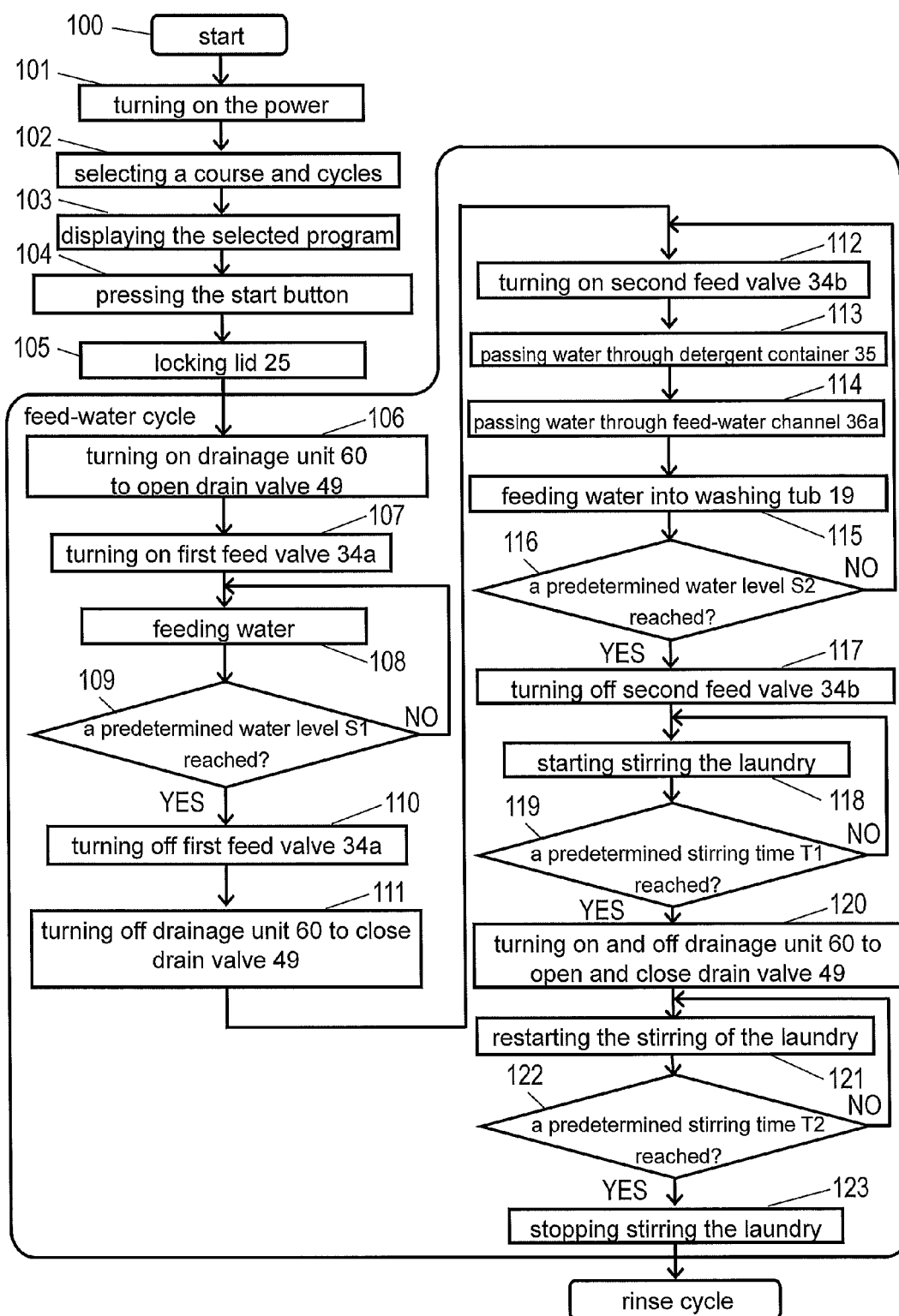


FIG. 6

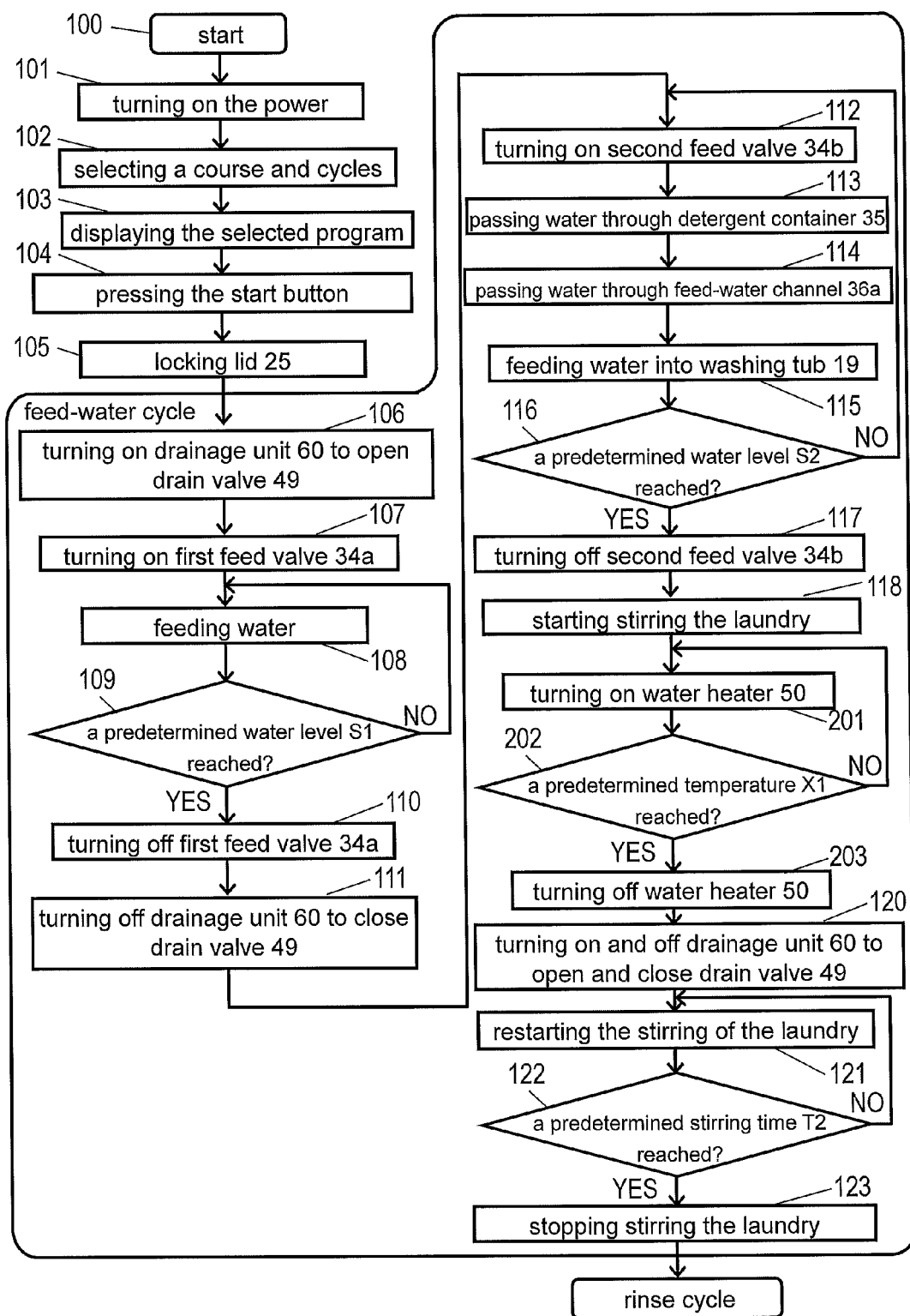


FIG. 7

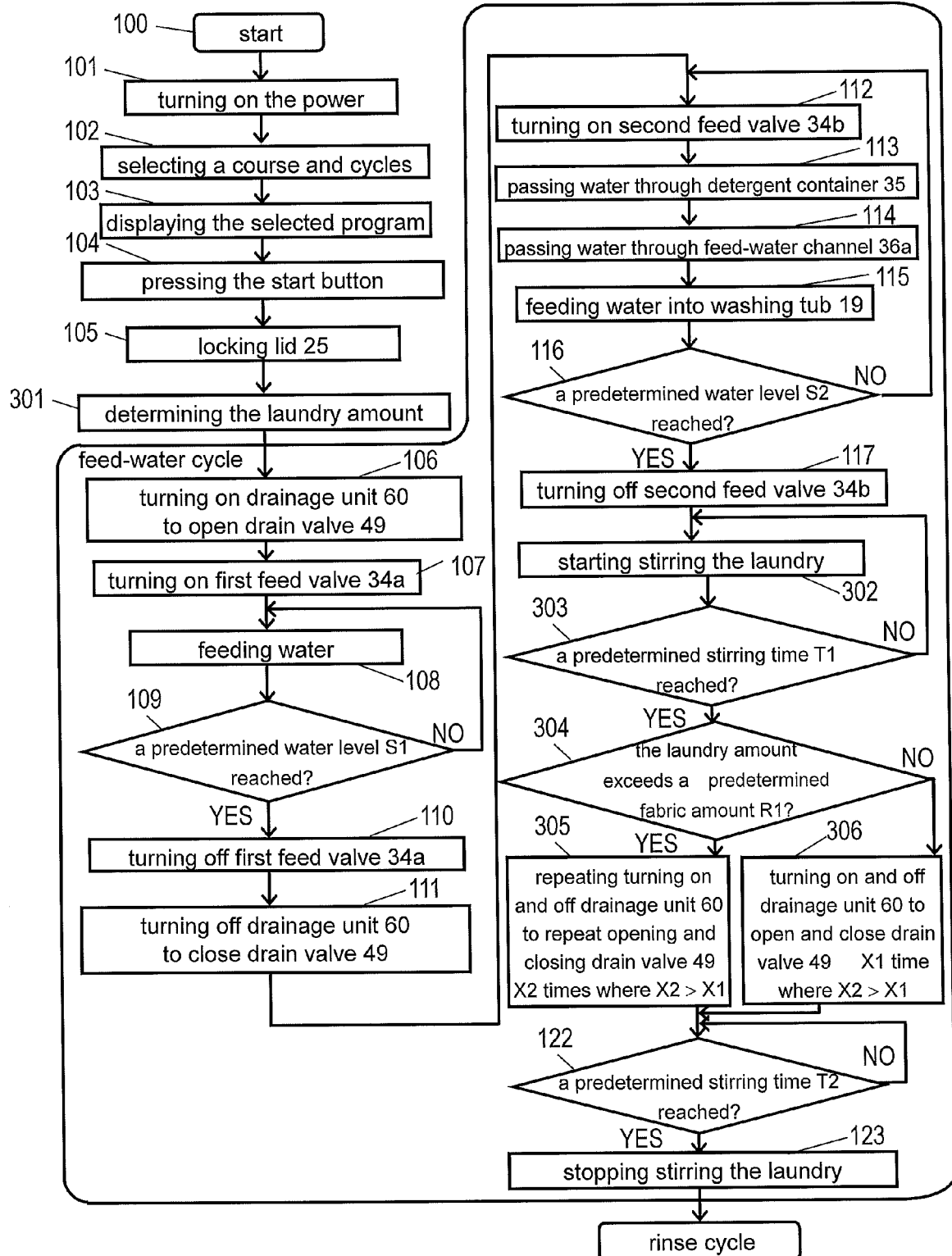
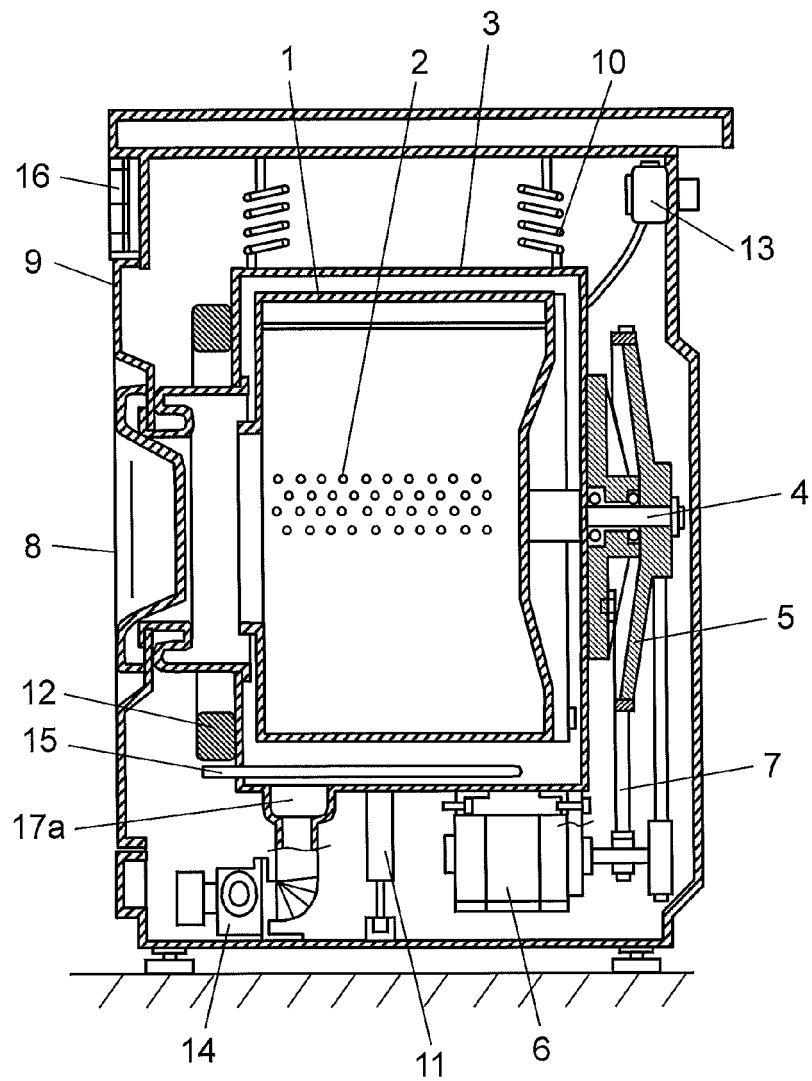


FIG. 8





EUROPEAN SEARCH REPORT

Application Number
EP 10 15 4239

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 198 10 221 A1 (AEG HAUSGERÄTE GMBH [DE]) 16 September 1999 (1999-09-16) * column 1, line 57 - column 2, line 49 * * claim 1; figure 1 *	1-3	INV. D06F39/08 D06F33/02
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