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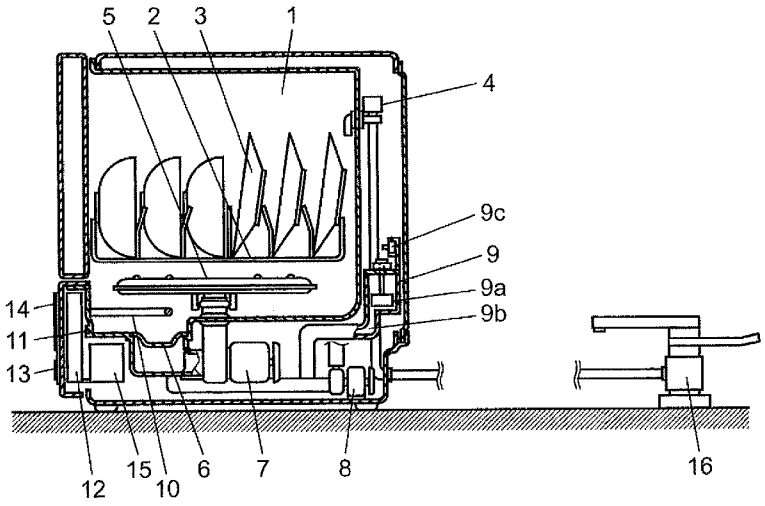
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(54) DISHWASHING MACHINE

(57) A dishwashing machine of the present invention comprises a water feed valve as a water supply unit for supplying water into a washing tub, a water level detector for detecting a water level of the washing water supplied in the washing tub, and a controller unit. The controller unit measures a time of supplying the water until the water level detector detects the water level after the start of water supply through the water feed valve. The controller unit supplies supplemental water by continuing supply of water for a predetermined time period after the water level detector detects the water level, and changes a time of supplying the supplemental water for a rinsing step based on a difference in the time of supplying water between a washing step and the rinsing step.

FIG. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to a dishwashing machine for washing dishes.

BACKGROUND ART

[0002] Dishwashing machines of a type hitherto known have a structure as shown in Fig. 4. Description is provided hereinafter of the structure.

[0003] As shown in Fig. 4, washing tub 1 has dish basket 2 disposed therein, and dishes 3 are placed in dish basket 2. Water feed valve 4 as a part of water supply unit supplies washing water, and contains it in washing tub 1. Spray nozzle 5 as a part of washing unit is rotatably supported inside washing tub 1, and sprays the washing water toward dishes 3. The sprayed washing water flows into drain port 6 in a bottom surface of washing tub 1, and it is delivered to nozzle 5 and sprayed again by wash pump 7. Both of wash pump 7 and drain pump 8 for draining the washing water are installed in a space below washing tub 1. Water level detector 9 is for detecting a water level in washing tub 1 as to whether the water reaches a predetermined level, and it detects the water level with movement of float 9a. Heater 10 is disposed in a bottom portion of washing tub 1 to heat up the washing water. There is thermistor 11 attached to an outer wall in the bottom portion of washing tub 1 for detecting a washing temperature. A main body is also equipped with controller unit 12 and operation unit 13 for controlling wash pump 7, drain pump 8, water level detector 9, heater 10, thermistor 11 and the like components, display 14 for indicating an operating condition, and power supply circuit 15 for generating power supplied to controller unit 12 and the like. Note that the washing water referred to here means a liquid used for washing and rinsing the items to be washed, or dishes 3, etc.

[0004] The above structure operates in a manner as described hereinafter. A user places dirty dishes 3 in dish basket 2, pours detergent into washing tub 1, and starts the operation by manipulating operation unit 13. In a washing step, tap water is supplied via water feed valve 4 until water level detector 9 detects the water to reach the predetermined level in the bottom portion of washing tub 1, and wash pump 7 and heater 10 are energized when the water reaches the predetermined level. The tap water is supplied through a feeder line branched off from a water faucet with branch valve 16 or the like. The washing water, while being heated, is sprayed from spray nozzle 5 toward dishes 3 by the operation of wash pump 7 to wash off dirt adhering to dishes 3. The temperature of the washing water is sensed by the thermistor 11 and controlled. Upon completion of a predetermined operation, drain pump 8 is energized to drain once the washing water containing the adhering dirt removed from dishes 3. The next in order is a rinsing process, which begins with supply of new tap water, and repeats a number of rinsing steps by using water without energizing heater 10 and heated rinsing steps by using hot water while energizing heater 10 to wash off ingredients of the detergent and dirt adhering to dishes 3.

[0005] In the above structure of conventional dishwashing machine, however, there are cases where bubbles are formed in the washing water due to the detergent and the dirt adhering to dishes during the washing step for washing the dirt off the dishes, and some of the bubbles remain inside the float of the water level detector and around the drain port in the tub when the washing water is drained at the end of the washing step. When this occurs in the water level detector for detecting a water level responsive to vertical movement of the float, the bubbles floating on the washing water interfere with the movement of the float. In addition, the bubbles exert an influence upon the performance of the drain pump since it is forced to drive out the washing water containing the bubbles, which tends to result in incomplete draining and leave a large amount of the water inside the washing tub. In the subsequent rinsing step, there are thus cases where the float detects the bubbles floating on the washing water, and makes a false detection that water being supplied has reached the predetermined level even before a given amount of the water has accumulated, thereby resulting in a less amount of the supplied water than what is necessary for rinsing and the like operation.

[0006] Because of this difficulty in detecting the amount of water accurately, an additional time is provided to continue supplying supplemental water for a predetermined time period after the float has detected the water level to ensure without fail that the amount of water necessary for the washing or rinsing. In addition, it has been a normal practice to use an extra time to supply water in consideration of a margin of error attributable to standing water and bubbles. It hence has the drawback of wasting extra amount of water.

Citation List

Patent Literature

[0007]

PTL 1: Unexamined Japanese Patent Publication No. 2001-57957

SUMMARY OF THE INVENTION

[0008] A dishwashing machine of the present invention comprises a washing tub provided with an opening for putting in and taking out an object to be washed, a washing unit for spraying washing water to the object placed in the washing tub, a water supply unit for supplying water into the washing tub, a water level detector for detecting a water level of the washing water supplied in the washing tub, and a controller unit for measuring a time of supplying

the water until the water level detector detects the water level after the water supply unit starts supplying the water. The controller unit continues water supply for a predetermined time period after the water level detector detects the water level for supplying supplemental water, and also changes a time of supplying the supplemental water for a rinsing step based on a difference in the time of supplying water between a washing step and the rinsing step.

[0009] When bubbles are formed in the washing step due to the effect of detergent and dirt adhering to dishes, some of the bubbles may remain inside a float of the water level detector and around a drain port in the tub. If the remaining bubbles interfere with movement of the float, it results in a difference in the time of supplying water until detection of the water level, and this difference can be used to determine as to whether the bubbles have had any influence on it. It hence becomes possible to save water as well as energy for heating an extra amount of the water by adjusting the time of supplying supplemental water after the detection of water level based on the presence or absence of the influence of bubbles.

BRIEF DESCRIPTION OF DRAWINGS

[0010]

Fig. 1 is a vertically sectioned view of a dishwashing machine according to an exemplary embodiment of the present invention.

Fig. 2 is a circuit block diagram of the dishwashing machine of the exemplary embodiment of this invention.

Fig. 3 is an operational flow chart of the dishwashing machine of the exemplary embodiment of this invention.

Fig. 4 is a vertically sectioned view of a conventional dishwashing machine.

DESCRIPTION OF EMBODIMENT

[0011] Description is provided hereinafter of an exemplary embodiment of the present invention with reference to the accompanying drawings. The present embodiment is to be considered as illustrative and not restrictive of the present invention.

[0012] Fig. 1 is a vertically sectioned view of a dishwashing machine according to this exemplary embodiment of the invention, Fig. 2 is a circuit block diagram of the dishwashing machine of this embodiment, and Fig. 3 is an operational flow chart of the dishwashing machine of this embodiment.

[0013] The present embodiment of the invention is described hereinafter by referring to Figs. 1 to 3.

[0014] Washing tub 1 has dish basket 2 disposed therein in a movable manner, and dishes 3 are placed in dish basket 2. Water feed valve 4 as a part of water supply unit is operated to supply and store washing water in washing tub 1. Spray nozzle 5 as a part of washing unit is rotatably supported on a bottom surface inside washing tub 1, and sprays the washing water toward dishes 3 while rotating. The sprayed washing water flows into drain port 6 in the bottom surface of washing tub 1, the washing water is then pressurized by wash pump 7 and delivered to nozzle 5, and it is sprayed again from spray nozzle 5. Wash pump 7 is installed on an outer wall of the bottom surface of washing tub 1 together with drain pump 8 for draining the washing water. Water level detector 9 is for detecting a water level in washing tub 1 as to whether the water reaches a predetermined level, and it detects the water level by a vertical movement of float 9a. Water level detector 9 may instead be comprised of a pair of electrodes, and detects the water level by means of electrical conduction between the electrodes.

[0015] Heater 10 is disposed in a bottom portion of washing tub 1, and it heats up the washing water. There is thermistor 11 attached to the outer wall in the bottom portion of washing tub 1 for detecting temperatures of the washing water and air through the wall. A main body is also equipped with controller unit 12 and operation unit 13 for controlling wash pump 7, drain pump 8, heater 10 and the like components and receiving signals from water level detector 9, thermistor 11, etc., display 14 for indicating an operating condition, and power supply circuit 15 for generating power supplied to controller unit 12 and the like. Note that the washing water referred to in here generally means all liquids used for washing and rinsing the items to be washed such as dishes 3, chopsticks and the like cutlery.

[0016] Water level detector 9 in this exemplary embodiment of the invention is connected to washing tub 1 through communicating tube 9b constituting a water path, and it is disposed on the outside of the side wall of washing tub 1. Water level detector 9 comprises micro switch 9c, which turns on and off responsive to vertical movement of float 9a.

[0017] A control program for detecting the water level is composed as follows. The water is supplied into washing tub 1 when water feed valve 4 in the water supply unit operates. Controller unit 12 for controlling wash pump 7, drain pump 8 and heater 10, i.e., a heating unit, receives a signal from water level detector 9, and measures a time taken to supply the water after water feed valve 4 starts supplying the water until water level detector 9 detects the water level. Controller unit 12 also controls to supply supplemental water by continuing the water supply for a predetermined time period after water level detector 9 detects the water level. In addition, controller unit 12 executes control so that it supplies the supplemental water only for a second predetermined time having a shorter duration than a first predetermined time when a difference in the time of supplying water between a washing step and a rinsing step is within a range between a first determination time and a second determination time. Or, controller unit 12 performs the control of supplying the supplemental water for the first predeter-

mined time when the difference in the time of supplying water between the washing step and the rinsing step, that is, a value obtained by subtracting the time of supplying water in the rinsing step from the time of supplying water in the washing step, is either not smaller than the first determination time or not larger than the second determination time. In this embodiment, the time for supplying the supplemental water is derived on the assumption that formation of bubbles has an influence, the difference in the time of supplying water is the value given by subtracting the time of supplying water in the rinsing step from the time of supplying water in the washing step, and that the first determination time is a positive value and the second determination time is a negative value.

[0018] Description is provided about how the above structure operates. When the dishwashing machine starts operating, controller unit 12 opens water feed valve 4 to make it supply tap water for use as washing water in the bottom space of washing tub 1. Since water level detector 9 and washing tub 1 are in continuity through communicating tube 9b, the tap water is supplied simultaneously into water level detector 9. As the step of water supply goes on, a water level inside water level detector 9 rises in a manner to lift float 9a and make switching contacts of micro switch 9c turn on or off for detection of a predetermined water level. Supplemental water is supplied at this moment for only the first predetermined time. Upon completion of the water supply, water feed valve 4 is shut off and the washing step is started. Wash pump 7 pressurizes and circulates the washing water dissolved with a detergent in this washing step. There are cases during this step that bubbles are formed due to the influence of dirt adhering to dishes 3. When draining the washing water containing bubbles after the washing step, a mass of the bubbles collecting around drain port 6 reduces a flowing speed of the washing water. The washing water containing bubbles also decreases the discharging performance of drain pump 8. This is because the flowing speed becomes slower when the washing water containing a mass of bubbles is pressurized and drained by drain pump 8 as compared to a faster speed attained by pressurizing and draining the washing water without bubbles.

[0019] When control of drain pump 8 is programmed to operate for a predetermined period of time, there arise variations in the amount of washing water that remains inside washing tub 1 due to the influence of bubbles even when drain pump 8 is operated for the predetermined time. In addition, the bubbles are left to stay inside water level detector 9 even after the draining of the washing water since the washing water containing the bubbles gets into water level detector 9 through communicating tube 9b. Because of this reason, an absolute amount of fresh water supplied in the subsequent rinsing step decreases even when the water is supplied to the predetermined water level where water level detector 9 operates since relatively a large amount of washing water has been left remaining inside washing tub 1. It is also likely due to the bubbles left in water level detector 9 that float 9a detects erroneously the bubbles floating on the washing water and makes a false determination that the water has reached the predetermined level even before the water comes to that level. It is thus possible to determine whether or not formation of bubbles is present by way of measuring time duration of the water supply since the water supply time until detection of the water level becomes shorter when bubbles are present than when not present due to these effects. In other words, it is known that formation of bubbles is present when a difference in the time of supplying water between the washing step and the rinsing step is a positive value. Or, the water supply time does not change when formation of bubbles is not present since the water supply time becomes the same as a reference value.

[0020] It therefore becomes possible to avoid supplying an extra amount of water by setting the time of supplying the supplemental water after detection of the water level to be the first predetermined time when the bubbles have exerted the influence, and to be the second short predetermined time shorter than the first predetermined time when there is no influence of the bubbles. In other words, this can achieve conservation of energy since it reduces the amount of water used and there is no need to heat an extra amount of the washing water with heater 10.

[0021] On the other hand, there is a possibility of making a false determination that formation of bubbles is present even when there are no bubbles in the actual use situation, if any positive value in the time difference of supplying water is always determined as to be the absence of bubbles. This is because the time required for water supply varies depending on a number of different factors of variations such as a change in pressure of the water supply when another water-consuming apparatus is used in the proximity of the dishwashing machine at the same time when water is being supplied to the dishwashing machine, a change in buoyancy of float 9a inside water level detector 9 due to accumulation of dirt on it, an operational variation of water feed valve 4, and the like. It is for the above reason that the determination is made by setting the time taken in the absence of the influence of bubbles to be in a range from the second determination time to the first determination time, and the time taken in the presence of the influence of bubbles to be equal to or longer than the first determination time, so as to correct these factors of variations and improve accuracy of making the determination of time difference in the water supply. It is also effective for determining formation of a small amount of bubbles when setting the value of determination according to the difference in the time of supplying water to not only zero but also to the range between the first determination time and the second determination time. This is because there is no need to shorten the time to supply the supplemental water even if a predetermined amount of water supply cannot be secured due to the presence of bubbles so far as the amount of water is sufficient not to influence on the op-

eration of wash pump 7, and it is therefore suitable for such a determination. Accordingly, the determination can be made accurately that there is an influence exerted by formation of bubbles when the difference in the time of supplying water is equal to or larger than a positive value of the first determination time.

[0022] If the difference is a negative value of the second determination time or less, it is conceivable that the determination could not be made accurately of the difference in the time of supplying water for some reason. A typical example is a case where the time of water supply can not be made accurately when the water supply is halted temporarily during the rinsing step. When there are bubbles formed in the washing step, a time of water supply becomes shorter in the subsequent rinsing step. However, the time of water supply becomes longer on the contrary, if the water supply is temporarily halted during the operation. As a result, the difference in the time of water supply becomes negative of a large absolute value. For this reason, the time of water supply is assumed as not determinable in this case, and set it to the first predetermined time as in the case of having the influence of bubbles so as to avoid a decrease in the washing performance causing a false detection. On the other hand, it is not a problem to halt the water temporarily during the water supply step since it is determined as the presence of bubbles.

[0023] Description is provided next of an operational flow of the dishwashing machine of this embodiment of the invention according to the operational flow chart shown in Fig. 3. When the operation begins, supply of water is started and a time taken to supply the water to a predetermined water level is measured (Step S1). Following the above, supplemental water is supplied for a predetermined time (Step S2). The wash pump is operated to carry out a washing step (Step S3), and determination is made thereafter as to whether the washing step is finished (Step S4). The process returns to Step S3 if the washing step is not yet finished (in the case of "N" in Step S4). When the washing process is finished (in the case of "Y" in Step S4) the drain pump is operated to drain the washing water (Step S5). Next, supply of water is started for the first rinsing step, and a time taken to supply the water to the predetermined water level is measured (Step S6). The step goes on thereafter to a bubble determination sequence.

[0024] In the bubble determination sequence, a difference in the time of supplying water is obtained between the washing step and the first rinsing step (Step S7), and determination is made as to whether the difference in the time of supplying water is equal to or larger than a first determination time (Step S8). The process goes to Step 10 when the difference in the time of supplying water is equal to or larger than the first determination time (in the case of "Y" in Step S8), and supplemental water is supplied for a first predetermined time. On the other hand, when the difference in the time of supplying water is smaller than the first determination time (in the case of "N" in Step S8), the process goes to Step 9 and determination is made as to if the difference is equal to or smaller than a second determination time. The process goes to Step 10 when the difference in the time of supplying water is equal to or smaller than the second determination time (in the case of "Y" in Step S9), and supplemental water is supplied for the first predetermined time. On the other hand, when the difference in the time of supplying water is lager than the second determination time (in the case of "N" in Step S9), the process goes to Step 11 and supplemental water is supplied for a second predetermined time, which is less than the supplemental water in the first predetermined time. The bubble determination sequence is ended here.

[0025] Next, the wash pump is operated to carry out the rinsing step (Step S12), and determination is made thereafter as to whether the first rinsing step is finished (Step S13). The process goes back to Step S12 if the first rinsing step is not yet finished (in the case of "N" in Step S13). When the first rinsing process is finished (in the case of "Y" in Step S 13) the drain pump is operated to drain the water (Step S14). Next, water is supplied to the predetermined water level (Step S15), and supplemental water is added for the predetermined time (Step S16). Here, a time taken to supply the water is measured and the bubble determination sequence is also carried out in the same manner as that in the first rinsing step. The wash pump is then operated to carry out the rinsing step (Step S17), and determination is made thereafter as to whether the second rinsing step is finished (Step S18). The process goes back again to Step S17 if the second rinsing step is not finished (in the case of "N" in Step S18). When the second rinsing step is finished (in the case of "Y" in Step S18) the drain pump is operated to drain the water (Step S19).

[0026] Finally, heat-rinsing step is carried out according to Step S20 to Step S24, and the operation ends. Since the heat-rinsing step is an operation process similar to the second rinsing step, details of it will be skipped.

[0027] As has been described, the present invention relates to a dishwashing machine comprising a washing tub provided with an opening for putting in and taking out an object to be washed, a washing unit for spraying washing water to the object placed in the washing tub, a water supply unit for supplying water into the washing tub, a water level detector for detecting a water level of the washing water supplied in the washing tub, and a controller unit for measuring a time of supplying the water until the water level detector detects the water level after the water supply unit starts supplying the water. The controller unit supplies supplemental water by continuing the water supply for a predetermined time period after the water level detector detects the water level, and changes a time of supplying the supplemental water for the rinsing step based on a difference in the time of supplying water between the washing step and the rinsing step.

[0028] Accordingly, it is by virtue of the above structure that makes determination possible as to whether bubbles

have any influence upon a time of supplying water, since the bubbles are formed in the washing step due to the effect of detergent and dirt adhering to dishes, some of the bubbles may remain inside a float of the water level detector and around a drain port in the tub, and the remaining bubbles cause a difference in the time of supplying water until detection of the water level when they interfere with movement of the float. It hence becomes possible to save water as well as energy to heat an extra amount of the water by adjusting the time of supplying supplemental water after the detection of water level based on the presence or absence of the influence of bubbles.

[0029] Moreover, the present invention is a dishwashing machine having a controller unit capable of making determination that formation of bubbles has no influence when a difference in the time of supplying water between the washing step and the rinsing step is within a first determination time and a second determination time. This feature is to make determination within a predetermined time even if the time of supplying the supplemental water varies only a little due to the effects of change in pressure of the water supply, deterioration with age of the water level detector and the like, thereby making correction of the variations, and improving accuracy of the determination according to the difference in the time of water supply.

[0030] The present invention is also the dishwashing machine having the controller unit capable of making determination that formation of bubbles has an influence when a difference in the time of supplying water between the washing step and the rinsing step is not smaller than the first determination time or not larger than the second determination time. It is this feature that enables it to replenish the water of an amount necessary for washing and rinsing even when the difference in the time of supplying water cnnnot be measured accurately for any reason. One such example is a case where a variation occurs when the water supply is halted temporarily during the rinsing step thereby resulting in a failure of making measurement of the time of water supply accurately. It is possible to carry out the water supply necessary for washing and rinsing and to avoid a decrease in the washing performance even in this case by ruling the time of water supply as not determinable, and set the time of supplemental water supply to the same predetermined time as in the case of having the influence of bubbles.

[0031] In this embodiment of the present invention, although an initial value of the time of supplying the supplemental water is set for the case having an influence of bubbles and another value smaller than the initial value for the case having no influence of bubbles, it is also practical on the contrary to set the initial value of the time of supplying the supplemental water for the case having no influence of bubbles.

[0032] In addition, although the operating process adapted in this embodiment of the invention is to make determination of a difference in the time of supplying water and adjust the time for supplying supplemental water in all of the rinsing steps including the second and a plural number of the subsequent steps as well as the final heat rinsing step, it is also possible to omit the bubble determination sequence in the second and the subsequent rinsing steps when not necessary.

INDUSTRIAL APPLICABILITY

[0033] As discussed above, there occurs a difference in the time of supplying water until a water level is detected if movement of a float is interfered with by the influence of bubbles. It is hence possible to solve a problem of consuming an extra amount of water by adjusting the time of supplying supplemental water after detection of the water level based on determination of the influence of bubbles, and the invention is therefore useful as measures of saving water of dishwashing machines.

REFERENCE MARKS IN THE DRAWINGS

[0034]

1	Washing tub
2	Dish basket
3	Dish
4	Water feed valve (water supply unit)
5	Spray nozzle (washing unit)
6	Drain port
7	Wash pump
8	Drain pump
9	Water level detector
9a	Float
9b	Communicating tube
9c	Micro switch
10	Heater
11	Thermistor
12	Controller unit
13	Operation unit
14	Display
15	Power supply circuit
16	Branch valve

Claims

1. A dishwashing machine for performing at least a washing step and a rinsing step, the dishwashing machine comprising:

a washing tub provided with an opening for putting in and taking out an object to be washed;
a washing unit for spraying washing water to the object to be washed and placed in the washing tub;
a water supply unit for supplying water into the washing tub;
a water level detector for detecting a water level

of the washing water supplied in the washing tub; and

a controller unit for measuring a time of supplying water until the water level detector detects the water level after the water supply unit starts supplying the water, wherein

the controller unit continues water supply for a predetermined time period after the water level detector detects the water level for supplying supplemental water, and changes a time of supplying the supplemental water for the rinsing step based on a difference in the time of supplying water between the washing step and the rinsing step.

2. The dishwashing machine of claim 1, wherein the controller unit makes determination that there is no influence causing formation of bubbles when the difference in the time of supplying water between the washing step and the rinsing step falls within a range between a first determination time and a second determination time.

3. The dishwashing machine of one of claim 1 and claim 2, wherein the controller unit makes determination that there is an influence causing formation of bubbles when the difference in the time of supplying water between the washing step and the rinsing step is not smaller than the first determination time or not larger than the second determination time.

FIG. 1

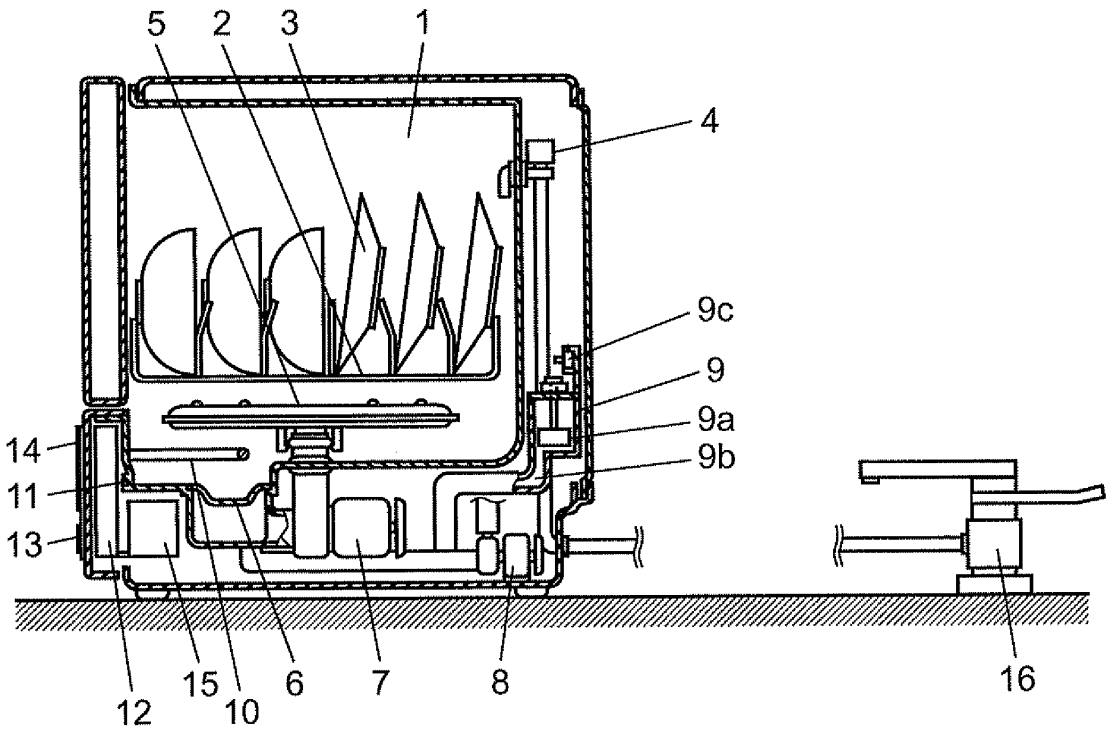


FIG. 2

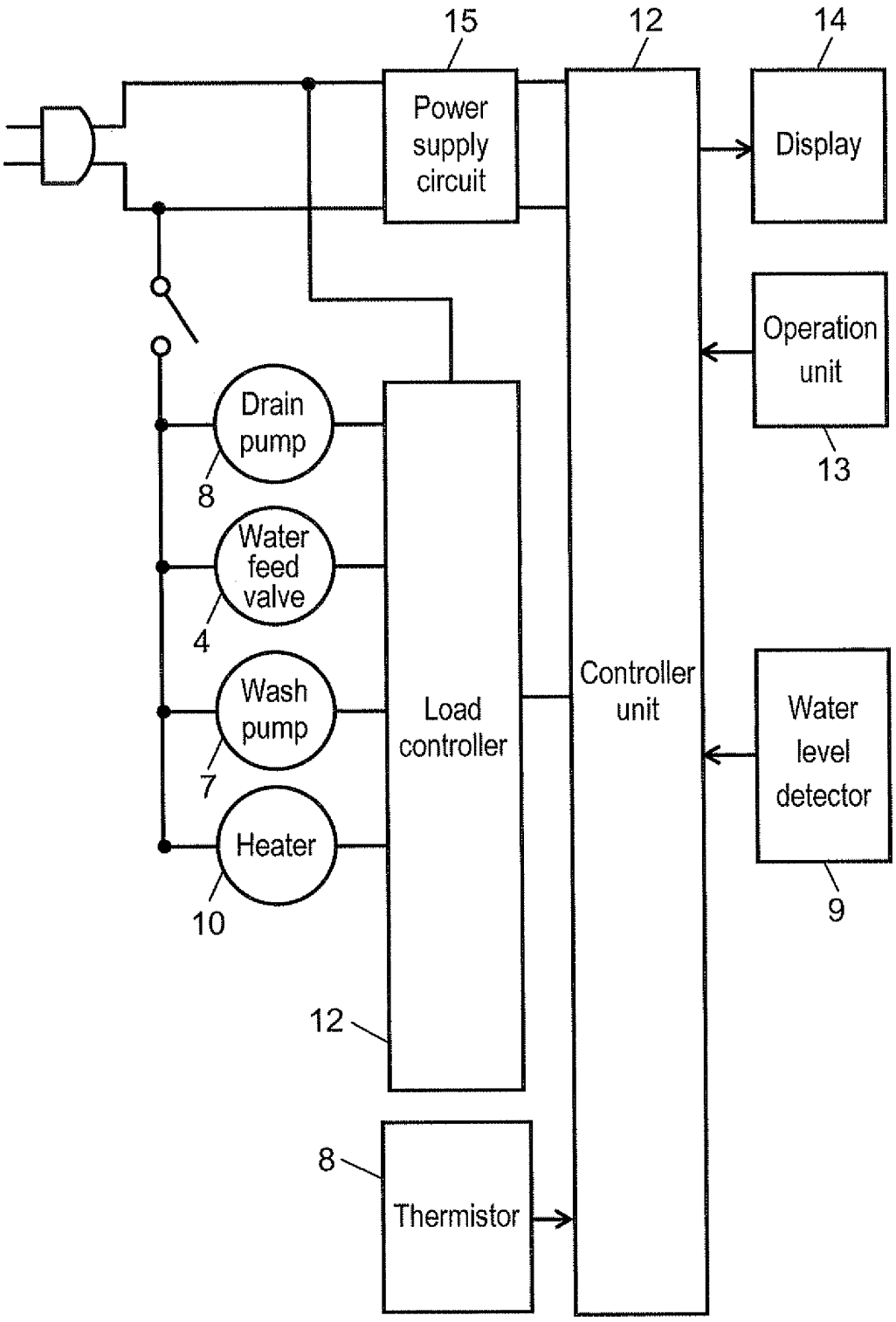

15
12
14
Power supply circuit
Display
Operation unit
13
Drain pump
8
Water feed valve
4
Wash pump
7
Heater
10
Load controller
Controller unit
Water level detector
9
12
8
Thermistor

FIG. 3

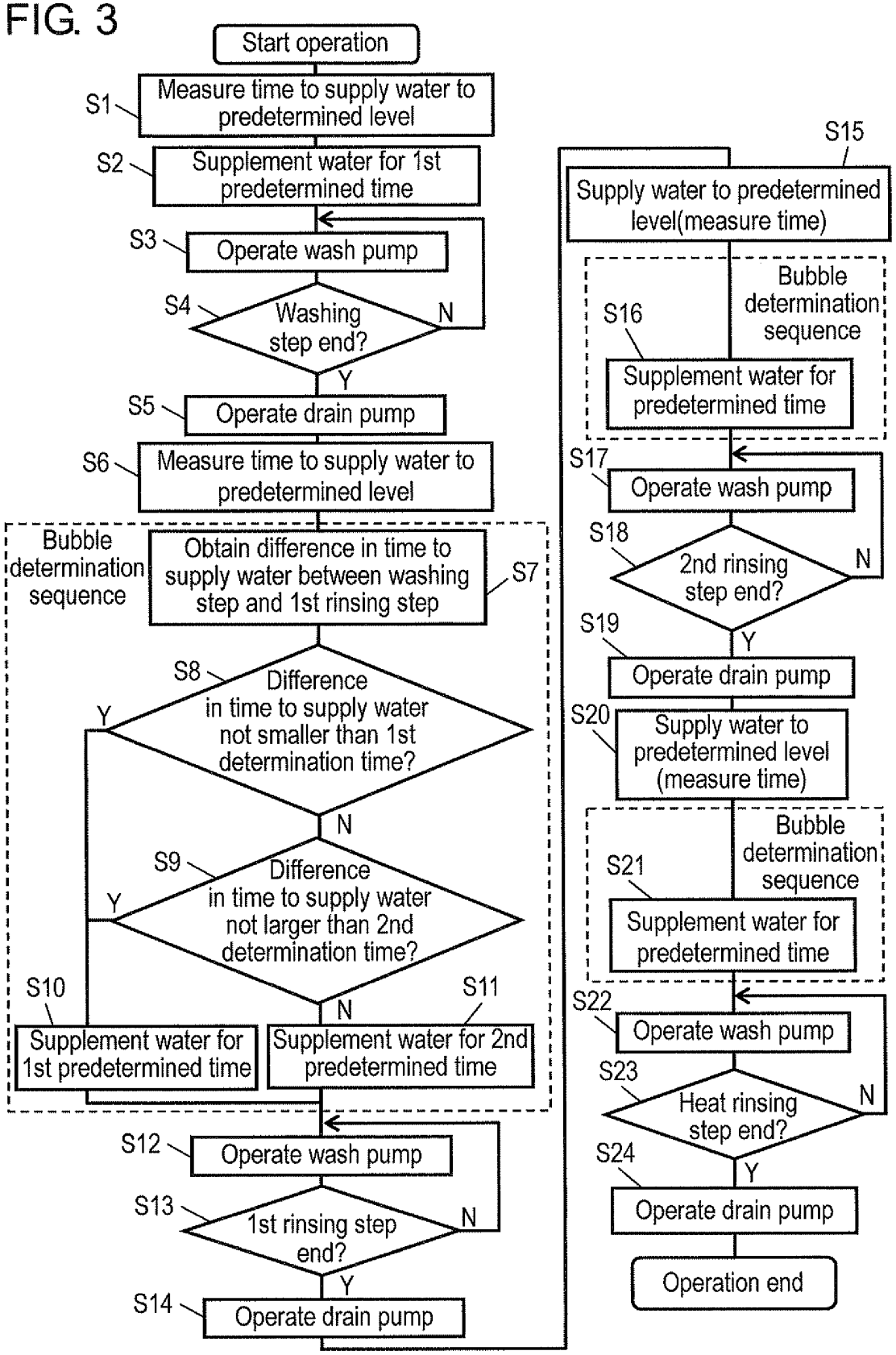
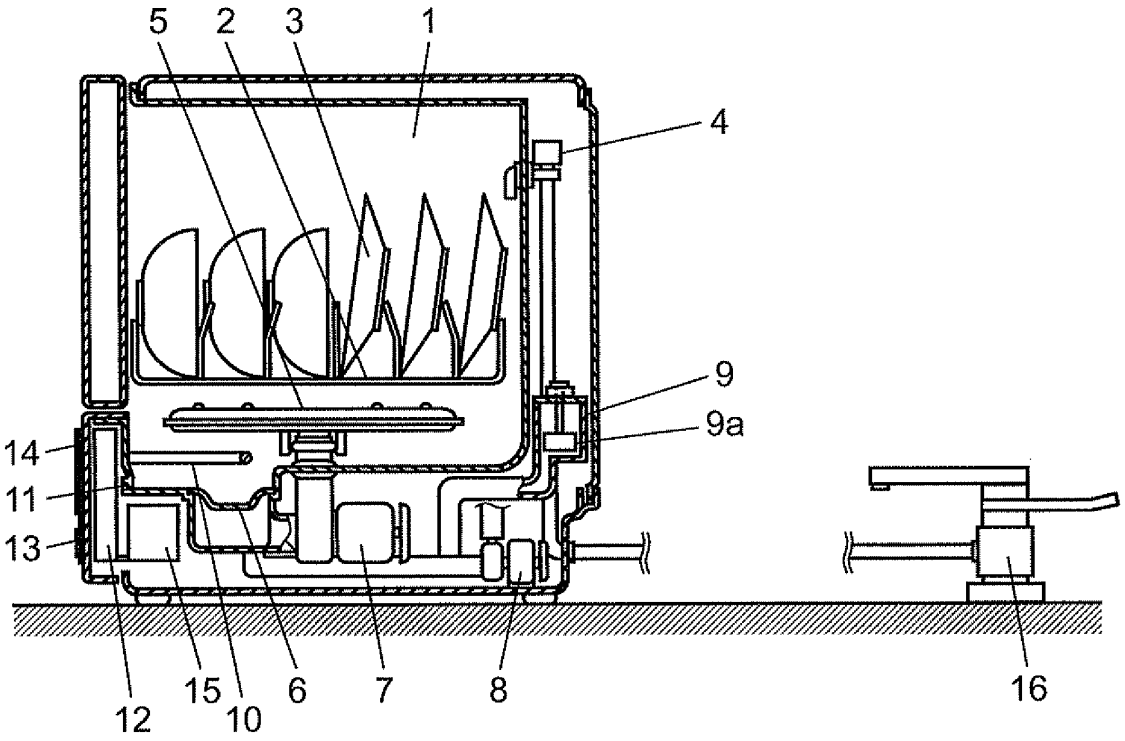

Start operation
S1
Measure time to supply water to predetermined level
S2
Supplement water for 1st predetermined time
S3
Operate wash pump
S4
Washing step end?
N
Y
S5
Operate drain pump
S6
Measure time to supply water to predetermined level
Bubble determination sequence
Obtain difference in time to supply water between washing step and 1st rinsing step
S7
S8
Difference in time to supply water not smaller than 1st determination time?
Y
N
S9
Difference in time to supply water not larger than 2nd determination time?
Y
N
S10
Supplement water for 1st predetermined time
S11
Supplement water for 2nd predetermined time
S12
Operate wash pump
S13
1st rinsing step end?
N
Y
S14
Operate drain pump
S15
Supply water to predetermined level(measure time)
Bubble determination sequence
S16
Supplement water for predetermined time
S17
Operate wash pump
S18
2nd rinsing step end?
N
Y
S19
Operate drain pump
S20
Supply water to predetermined level (measure time)
Bubble determination sequence
S21
Supplement water for predetermined time
S22
Operate wash pump
S23
Heat rinsing step end?
N
Y
S24
Operate drain pump
Operation end

FIG. 4



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2011/000278

A. CLASSIFICATION OF SUBJECT MATTER
A47L15/42(2006.01)i, *A47L15/46*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A47L15/42, A47L15/46

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2011
Kokai Jitsuyo Shinan Koho 1971-2011 Toroku Jitsuyo Shinan Koho 1994-2011

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2001-57957 A (Matsushita Electric Industrial Co., Ltd.), 06 March 2001 (06.03.2001), entire text; all drawings (Family: none)	1-3
Y	JP 2001-327454 A (Mitsubishi Electric Home Appliance Co., Ltd.), 27 November 2001 (27.11.2001), entire text; all drawings (Family: none)	1-3

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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25 February, 2011 (25.02.11)	08 March, 2011 (08.03.11)
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