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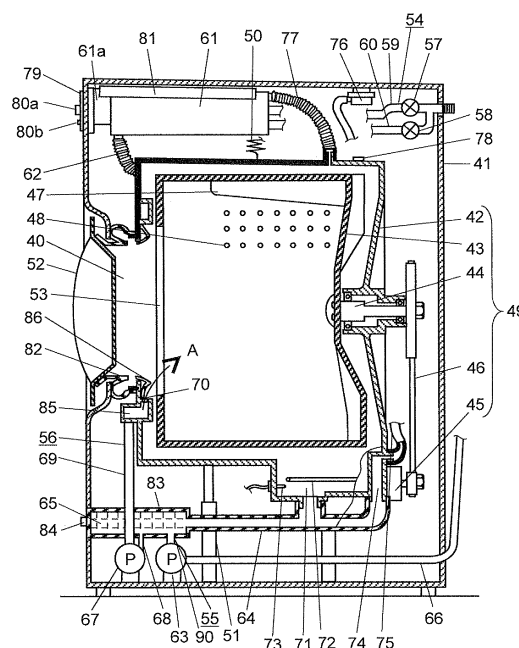
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(54) **DRUM-TYPE WASHING MACHINE**

(57) A front-loading-type washing machine of the invention includes a rotary drum; a water tub; a motor; a filter case that communicates with the water tub via a drain pipe connected to the bottom of the water tub and has a filter provided therein; a circulating pump that communicates with the filter case via a circulating water suction pipe connected to the filter case; a channel that communicates with the circulating pump via a circulating water discharge pipe connected to the circulating pump, and is formed on the front inner side of the water tub; a plurality of jetting ports that are provided on the inner peripheral side of the channel and discharge washing water into the water tub; and a control device. The opening area of the jetting port provided at the farthest position from a connecting portion between the circulating water discharge pipe and the channel is larger than the opening area of the jetting port provided at the nearest position from the connecting portion.

FIG. 1



Description

TECHNICAL FIELD

[0001] The present invention relates to a front-loading-type washing machine that washes laundry contained within a rotary drum.

BACKGROUND ART

[0002] In the related art, front-loading-type washing machines that improve washing performance by discharging washing water to laundry are suggested (for example, refer to PTL 1).

[0003] Hereinafter, the configuration of a front-loading-type washing machine of the related art shown in PTL 1 will be described using Fig. 4.

[0004] Fig. 4 is a cross-sectional view of the front-loading-type washing machine of the related art.

[0005] As shown in Fig. 4, the front-loading-type washing machine of the related art is equipped with at least drum 21, water-receiving tub 23 that is a water tub, heater 36, and a circulation device.

[0006] Drum 21 is provided inside water-receiving tub 23 so as to be rotatable in the horizontal direction. Lid 31 that allows laundry, such as clothing, to be taken into and out of drum 21, is openably and closably provided in the front surface of the water-receiving tub 23 so as to face an opening portion of the front surface of drum 21.

[0007] Heater 36 that is a heating portion that heats the washing water stored within water-receiving tub 23 is provided on the bottom side of water-receiving tub 23.

[0008] The circulation device is constituted by circulating pump 37 that suctions the washing water from opening portion 34 provided at the bottom of water-receiving tub 23, circulation hose 38 that is connected to a discharge port side of circulating pump 37, and discharge port 39 that is connected to one end side of circulation hose 38.

[0009] Discharge port 39 is provided on upside of drum 21 at a position that faces a front opening portion of drum 21, and as shown by B in the drawing, discharges the washing water toward the central portion of drum 21.

[0010] The front-loading-type washing machine of the related art configured as described above lifts the laundry contained within drum 21 by the rotation of drum 21, and stirs the laundry within drum 21. At this time, the washing water heated by heater 36 can be jetted onto the laundry within drum 21 by circulating pump 37, thereby enhancing the cleaning effect on the laundry.

[0011] However, the front-loading-type washing machine of the related art causes the washing water to be jetted from one discharge port 39 of upside of drum 21. Therefore, when the laundry has fallen within drum 21 due to its own weight, the washing water can be sprayed onto the laundry. However, in a case where the laundry sticks to drum 21 and is rotating, the washing water is not easily sprayed onto the laundry. As a result, the wash-

ing water cannot be uniformly sprayed onto the laundry within the water tub, and a stable cleaning effect is not easily obtained.

5 Citation List

Patent Literature

[0012] PTL 1 Japanese Patent Unexamined Publication No. 9-215893

SUMMARY OF THE INVENTION

[0013] The invention provides a front-loading-type washing machine including a rotary drum that is formed in the shape of a bottomed cylinder; a water tub that rotatably includes the rotary drum; a motor that rotationally drives the rotary drum; a filter case that communicates with the water tub via a drain pipe connected to the bottom of the water tub and has a filter provided therein; a circulating pump that communicates with the filter case via a circulating water suction pipe connected to the filter case; a channel that communicates with the circulating pump via a circulating water discharge pipe connected to the circulating pump, and is formed on the front inner side of the water tub; a plurality of jetting ports that are provided on the inner peripheral side of the channel and discharge washing water into the water tub; and a control device that controls at least steps of washing, rinsing, and spin-drying. The opening area of the jetting port provided at the farthest position from a connecting portion between the circulating water discharge pipe and the channel is larger than the opening area of the jetting port provided at the nearest position from the connecting portion.

[0014] Thereby, the jetting amounts of the washing water from the individual jetting ports are made almost equal, and the washing water is uniformly jetted onto laundry within the water tub. As a result, the front-loading-type washing machine with stable washing performance can be realized.

BRIEF DESCRIPTION OF DRAWINGS

45 **[0015]**

Fig. 1 is a cross-sectional view of a front-loading-type washing machine in an embodiment of the invention. Fig. 2 is a cross-sectional view when the front of the rotary drum of the front-loading-type washing machine is viewed from the inside.

Fig. 3 is an exploded perspective view of main portions of the front-loading-type washing machine.

Fig. 4 is a cross-sectional view of a front-loading-type washing machine of the related art.

DESCRIPTION OF EMBODIMENTS

[0016] Hereinafter, an embodiment of the invention will be described, referring to the drawings. The invention is not limited by the present embodiment.

(Embodiment)

[0017] Fig. 1 is a cross-sectional view of a front-loading-type washing machine in the embodiment of the invention.

[0018] As shown in Fig. 1, the front-loading-type washing machine of the embodiment is equipped with rotary drum 43, water tub 42, motor 45, filter case 83 that communicates with water tub 42, circulating pump 67 that communicates with filter case 83, channel 85 that communicates with circulating pump 67, jetting ports 70, and control device 81.

[0019] Water tub 42 is swingably provided inside main body 41, and rotary drum 43 is rotatably provided inside water tub 42. Rotary drum 43 is rotated in normal and reverse directions around rotating shaft 44 that is provided in the horizontal direction and is a rotation center shaft that is coupled via belt 46 to motor 45 attached to a lower portion of water tub 42 on the back side.

[0020] The inner wall surface of rotary drum 43 is provided with a plurality of, for example, projection plates 47 that stir laundry, and a number of water passing holes 48 that communicate with the inside of water tub 42.

[0021] Water tub unit 49 is constituted by the above-described water tub 42, rotary drum 43, motor 45, and belt 46. Water tub unit 49 is supported in a vibration-absorbing manner by a plurality of spring bodies 50 from an upper portion of main body 41, and by a plurality of vibration-absorbing dampers 51 from a lower portion of main body 41.

[0022] An upper rear portion of water tub 42 is provided with vibration detector 78 including, for example, an acceleration sensor or the like, which detects the vibration of water tub unit 49. Vibration detector 78 detects vibration in triaxial directions of front and rear, left and right, and upper and lower. The operation of water tub unit 49 is controlled on the basis of the vibration information detected by vibration detector 78. Since the vibration of water tub unit 49 is not necessarily in one direction, the vibration of water tub unit 49 is detected with high precision by using a multi-axial acceleration sensor as vibration detector 78.

[0023] Openable and closable lid body 52 is provided at the front surface of main body 41 so as to face main body opening portion 40 of rotary drum 43. Lid body 52 seals water tub 42 via seal packing 82 that connects a front portion of water tub 42 and main body opening portion 40 for vibration-absorbing and water sealing.

[0024] Control device 81 is provided above water tub 42. A front upper portion of main body 41 is equipped with operation panel 79 having input setting unit 80a and display unit 80b.

[0025] If a control method is input via input setting unit 80a of operation panel 79, the input information is displayed on display unit 80b of operation panel 79. A control unit (not shown) of control device 81 automatically controls motor 45, water supply device 54, drainage device 55, and water circulation device 56 according to input setting information or a control program. Thereby, control device 81 controls a series of steps, such as washing, rinsing, and spin-drying.

[0026] First water supply valve 57, second water supply valve 58, first water supply pipe 59, second water supply pipe 60, water level detector 76, detergent supply device 61, water supply connecting pipe 62, water tub air vent pipe 77, and control device 81 are provided above water tub 42.

[0027] Detergent supply device 61 stores, for example, detergents and a fabric softener and houses detergent case 61a therein that is drawable from main body 41. In a rear upper portion of detergent supply device 61, water tub air vent pipe 77 constituted by a flexible hose is connected to detergent supply device 61. For example, during a washing step, the air within water tub 42 pressurized by the formation of bubbles is released via water tub air vent pipe 77.

[0028] Water supply device 54 timely supplies water into water tub 42 from water supply connecting pipe 62 via detergent supply device 61 through first water supply pipe 59 or second water supply pipe 60 by the opening and closing of first water supply valve 57 or second water supply valve 58.

[0029] Drain pipe 64, filter case 83, drain pump 63, circulating pump 67, and drain hose 66 are provided at the bottom of water tub 42.

[0030] Filter case 83 houses filter 65 that traps, for example, lint or the like. Filter 65 is detachably provided from main body 41 by knob 84 provided at filter 65.

[0031] Filter case 83 communicates with water tub 42 via drain pipe 64 connected to the bottom of water tub 42. Drain pump 63 communicates with filter case 83 via drainage suction pipe 90 connected to filter case 83. Circulating pump 67 communicates with filter case 83 via circulating water suction pipe 68 connected to filter case 83. Circulating pump 67 further communicates with channel 85 annularly (including a circular-arc shape) formed on the front inner side of water tub 42 via circulating water discharge pipe 69 connected to circulating pump 67.

[0032] At the time of the completion of the washing step, at the time of the completion of a rinsing step, or the like, the washing water within water tub 42 is drained via drainage device 55 if necessary. Specifically, drainage device 55 passes the washing water within water tub 42 through filter 65 within filter case 83 via drain pipe 64 by the driving of drain pump 63, sends the washing water into drain pump 63 via drainage suction pipe 90, and then drains the washing water to the exterior of the front-loading-type washing machine via drain hose 66.

[0033] In a prewashing step, the washing step, the rinsing step, or the like, the washing water within water tub

42 circulates via water circulation device 56 if necessary. Specifically, water circulation device 56 passes the washing water within water tub 42 through filter 65 within filter case 83 via drain pipe 64 by the driving of circulating pump 67, and further sends the washing water into circulating pump 67 via circulating water suction pipe 68. Thereafter, the washing water sent into circulating pump 67 is sent into channel 85 via circulating water discharge pipe 69. The washing water sent into channel 85 is jetted into rotary drum 43, as shown by arrow A in Fig. 1, from jetting ports 70 provided on the inner peripheral side of channel 85 that faces clothing entrance 53 of rotary drum 43. At this time, the washing water is jetted from jetting ports 70 to rotary drum 43, for example in predetermined directions, such as a radial direction and in a predetermined shape by jetting guide plate 86 provided on the front inner surface side of water tub 42. The details will be described below using Fig. 2.

[0034] Thereby, a detergent loaded into water tub 42 is quickly dissolved in the washing water, biasing of the detergent that comes into contact with laundry is prevented, and the detergent is activated. As a result, the washing or rinsing performance is improved.

[0035] Heating heater 72 including, for example, a sheathed heater or the like is provided in the horizontal direction in recess 71 formed at the bottom within water tub 42 to heat the washing water within water tub 42. For example, a temperature detector 73, such as a thermistor, which detects the water temperature of the washing water within water tub 42, is provided in the vicinity of heating heater 72.

[0036] The washing water within water tub 42 heated by heating heater 72 is circulated via water circulation device 56 and discharged into rotary drum 43 by the aforementioned circulating pump 67. At this time, the washing water is heated and the activity of water molecules increases. The washing performance of the front-loading-type washing machine is improved by scattering the washing water containing the activated detergent onto laundry.

[0037] A rear side wall of the bottom of the outer periphery of water tub 42 is formed with air trap 74 that communicates with drain pipe 64. Air trap 74 is connected to water level detector 76 including, for example, a pressure sensor or the like, by air pipe 75. Water level detector 76 detects water levels at a plurality of steps by the hydraulic pressure of the washing water supplied into water tub 42.

[0038] Hereinafter, channel 85 and its peripheral structure of the embodiment will be described using Fig. 2, referring to Fig. 1.

[0039] Fig. 2 is a cross-sectional view when the front of the rotary drum of the front-loading-type washing machine in the embodiment of the invention is viewed from the inside.

[0040] As shown in Fig. 2, jetting ports 70 are constituted by a plurality of jetting ports 70a to 70e provided on the inner peripheral side of annular (including a circu-

lar-arc shape) channel 85. Jetting ports 70a to 70e are provided, for example, in a circle shape at regular angles in the circumferential direction with respect to rotating shaft 44 of rotary drum 43.

[0041] At this time, jetting port 70a and jetting port 70b are provided with the equal opening area, at positions where the distances within channel 85 from connecting portion 69a that connects a lowermost portion of channel 85 and circulating water discharge pipe 69 are equal, in the vertical direction of Fig. 2, at almost the same (including the same) height in the vertical direction of channel 85. Here, the opening area means the area of the inflow surface of the washing water that passes through jetting ports 70 by operating circulating pump 67.

[0042] Similarly, jetting ports 70c and 70d at higher positions than jetting port 70a and jetting port 70b are also provided with the equal opening area, at positions where the distances within channel 85 from connecting portion 69a are equal, at almost the same (including the same) height in the vertical direction. Jetting port 70e is provided at an uppermost portion in the vertical direction. That is, jetting port 70a and jetting port 70b, jetting port 70c, jetting port 70d, and jetting port 70e are provided in this order so as to be away from connecting portion 69a.

[0043] At this time, the opening area of jetting port 70e provided at the farthest position from connecting portion 69a is formed so as to be larger than the opening areas of jetting ports 70a and 70b provided at the nearest position from connecting portion 69a. Thereby, the jetting amounts of the washing water from individual jetting ports 70 are made almost equal, and the washing water is uniformly jetted onto laundry within water tub 42. As a result, the front-loading-type washing machine with stable washing performance can be realized.

[0044] The opening area of jetting ports 70a and 70b, the opening area of jetting ports 70c and 70d, and the opening area of jetting port 70e are formed so as to be larger than the latter one in this order. That is, the opening area of jetting port 70e is formed so as to be the largest among a plurality of jetting ports 70a to 70e provided on the inner peripheral side of channel 85, and jetting ports 70 are formed so that the opening area becomes larger as being away (provided on the upper side in the vertical direction) from connecting portion 69a. Thereby, the jetting amounts of the washing water from individual jetting ports 70 are efficiently made almost equal, and the washing water is uniformly jetted onto laundry within water tub 42. As a result, the front-loading-type washing machine with more stable washing performance can be realized.

[0045] The "distances within channel 85 are equal" means that the distance from circulating water discharge pipe 69 to jetting port 70a in the clockwise direction within channel 85 and the distance from circulating water discharge pipe 69 to jetting port 70b in the counterclockwise direction are equal, with respect to a straight line that connects circulating water discharge pipe 69 and rotating shaft 44.

[0046] Although it is preferable that the cross-sectional

shape of jetting ports 70 in the horizontal direction has, for example, a circle shape, the invention is not limited to this. For example, the jetting port may be formed in a substantially triangular shape (including a triangular shape) or in a substantially quadrangular shape (including a quadrangular shape). Thereby, the washing water is jetted into water tub 42 from jetting ports 70.

[0047] The washing water discharged from circulating pump 67 is sent into channel 85 formed on the front inner side of water tub 42 from the bottom side of water tub 42 via circulating water discharge pipe 69. The washing water sent into channel 85 is radially jetted into rotary drum 43 from all directions of the circumference of annular (including a circular-arc shape) channel 85, from a plurality of jetting ports 70 formed in channel 85.

[0048] As described above, the jetting amounts from individual jetting ports 70a to 70e provided at almost equal angles (including equal angles) in the circumferential direction can be made almost equal by changing the opening areas of jetting ports 70a to 70e. Although the flow velocity of the washing water decreases as it goes to the upper side of channel 85, a decrease in the flow rate of the washing water jetted from jetting ports 70 is prevented by this configuration. As a result, the washing performance of the front-loading-type washing machine can be stabilized.

[0049] Hereinafter, filter case 83 and its peripheral structure of the embodiment will be described using Fig. 3.

[0050] Fig. 3 is an exploded perspective view of main portions of the front-loading-type washing machine in the embodiment of the invention.

[0051] As shown in Fig. 3, drain pump 63 is connected to an upper side portion of filter case 83 connected to drain pipe 64, via drainage suction pipe 90. Circulating pump 67 is connected to the other side portion of filter case 83 via circulating water suction pipe 68.

[0052] Filter 65 provided within filter case 83 is equipped with a plurality of opening portions 89. Opening portions 89 of filter 65 are constituted by a plurality of drain-side opening portions 88a sectioned by ribs of drain-side rib portion 88 that is a grid-like rib structure that is provided on drain pump 63 side, and a plurality of circulation-side opening portions 87a sectioned by ribs of circulation-side rib portion 87 that is a grid-like rib structure that is provided on circulating-pump 67 side. At this time, it is preferable that drain-side opening portions 88a be formed to be larger than circulation-side opening portions 87a. Thereby, for example, lint or foreign matter can be removed from the washing water circulated into water tub 42, and the cleaning effect can be further enhanced.

[0053] If drain pump 63 is driven during drainage, the washing water that has flowed into filter case 83 via drain pipe 64 from water tub 42 passes through drain-side rib portion 88 of filter 65, passes through drain pump 63, and is drained from drain hose 66. Here, lint or the like within the washing water that is larger than the openings of

drain-side opening portions 88a is trapped by meshes formed by drain-side rib portion 88 and drain-side opening portions 88a, and lint or the like that is smaller than the openings of drain-side opening portions 88a is discharged to the exterior of the front-loading-type washing machine.

[0054] If circulating pump 67 is driven during circulation, the washing water that has flowed into filter case 83 via drain pipe 64 from water tub 42 passes through circulation-side rib portion 87 of filter 65, and is sent to circulating pump 67 from circulating water suction pipe 68. Thereafter, the washing water is jetted into rotary drum 43 from jetting ports 70a to 70e via circulating water discharge pipe 69. Here, lint or the like within the washing water that is larger than the openings of circulation-side opening portions 87a is trapped by the meshes formed by circulation-side rib portion 87 and circulation-side opening portions 87a.

[0055] Then, as a user rotates knob 84 of filter 65 to detach the filter from the outside, the lint or the like trapped in filter 65 can be discarded, and filter 65 can be cleaned.

[0056] At this time, the individual opening areas of jetting ports 70a to 70e provided on the inner peripheral side of channel 85 are made larger than any of individual opening portions 89 that constitute the aforementioned filter 65 through which the washing water passes when circulating through water circulation device 56. Thereby, the lint or the like that has passed through the meshes of circulation-side rib portion 89 is reliably trapped by filter 65, and jetting ports 70a to 70e are prevented from being clogged. As a result, the individual jetting amounts of the washing water from jetting ports 70a to 70e are continuously kept almost equal, and decline in washing efficiency is prevented.

[0057] In the present embodiment, it is preferable that the opening area of jetting ports 70a and 70b, the opening area of jetting ports 70c and 70d, and the opening area of jetting port 70e be formed so as to be larger in this order. However, the invention is not limited to this. As long as the size of the opening area of at least jetting port 70e is the largest, the opening areas of jetting ports 70a to 70d may have arbitrary sizes if necessary. That is, for example, the opening area of jetting port 70e may be made to be the largest, and the opening areas of jetting ports 70a, 70b, 70c, and 70d other than jetting port 70e may be made to have the same size. Also, for example, the opening areas of jetting ports 70c, 70d, and 70e may be made to have the same size, and the opening areas of jetting ports 70a and 70b may be made to be smaller than that of jetting ports 70c, 70d, and 70e. This raises the degree of freedom in design.

[0058] Although an example in which jetting ports 70 are provided in five locations at equal angles in the circumference direction has been described in the embodiment, the invention is not limited to this. For example, an arbitrary number of jetting ports may be arranged depending on the internal diameter, shape, or the like of

water tub 42. Thereby, the same effects are obtained.

INDUSTRIAL APPLICABILITY

[0059] As described above, since the front-loading-type washing machine of the invention can exhibit stable washing performance by virtue of the configuration of the water circulation device, this washing machine is useful for applications of other washing machines that have the function to circulate washing water.

REFERENCE NUMERALS IN THE DRAWINGS

[0060]

41: MAIN BODY
 42: WATER TUB
 43: ROTARY DRUM
 44: ROTATING SHAFT (ROTATION CENTER SHAFT)
 45: MOTOR
 46: BELT
 47: PROJECTION PLATE
 48: WATER PASSING HOLE
 49: WATER TUB UNIT
 50: SPRING BODY
 51: VIBRATION-ABSORBING DAMPER
 52: LID BODY
 53: CLOTHING ENTRANCE
 54: WATER SUPPLY DEVICE
 55: DRAINAGE DEVICE
 56: WATER CIRCULATING DEVICE
 63: DRAIN PUMP
 64: DRAIN PIPE
 65: FILTER
 66: DRAIN HOSE
 67: CIRCULATING PUMP
 68: CIRCULATING WATER SUCTION PIPE
 69: CIRCULATING WATER DISCHARGE PIPE
 70, 70a TO 70e: JETTING PORT
 81: CONTROL DEVICE
 83: FILTER CASE
 85: CHANNEL
 86: JETTING GUIDE PLATE
 87: CIRCULATION-SIDE RIB PORTION
 87a: CIRCULATION-SIDE OPENING PORTION
 88: DRAIN-SIDE RIB PORTION
 88a: DRAIN-SIDE OPENING PORTION
 89: OPENING PORTION
 90: DRAINAGE SUCTION PIPE

a water tub that rotatably includes the rotary drum;
 a motor that rotationally drives the rotary drum;
 a filter case that communicates with the water tub via a drain pipe connected to a bottom of the water tub, and has a filter provided therein;
 a circulating pump that communicates with the filter case via a circulating water suction pipe connected to the filter case;
 a channel that communicates with the circulating pump via a circulating water discharge pipe connected to the circulating pump, and is formed on a front inner side of the water tub;
 a plurality of jetting ports that are provided on an inner peripheral side of the channel, and discharge washing water into the water tub; and
 a control device that controls steps of at least washing, rinsing, and spin-drying, wherein an opening area of the jetting port provided at the farthest position from a connecting portion between the circulating water discharge pipe and the channel is larger than an opening area of the jetting port provided at the nearest position from the connecting portion.

2. The front-loading-type washing machine of Claim 1, wherein at least the opening area of the jetting port provided at the farthest position from the connecting portion is the largest among the plurality of jetting ports.
3. The front-loading-type washing machine of Claim 1, wherein the opening areas of the jetting ports are larger in an order of a distance from the connecting portion.
4. The front-loading-type washing machine of Claim 1, wherein the jetting ports provided at the same distance from the circulating water discharge pipe have a same opening area.
5. The front-loading-type washing machine of Claim 1 or 4, wherein the opening areas of the jetting ports are larger than opening portions that constitute the filter.
6. The front-loading-type washing machine of Claim 5, wherein the opening portions are constituted by circulation-side opening portions provided on a circulating pump side and drain-side opening portions provided on a drain pump side, and wherein the drain-side opening portions are larger than the circulation-side opening portions.

Claims

1. A front-loading-type washing machine comprising:
 a rotary drum that is formed in a shape of a bottomed cylinder;

FIG. 1

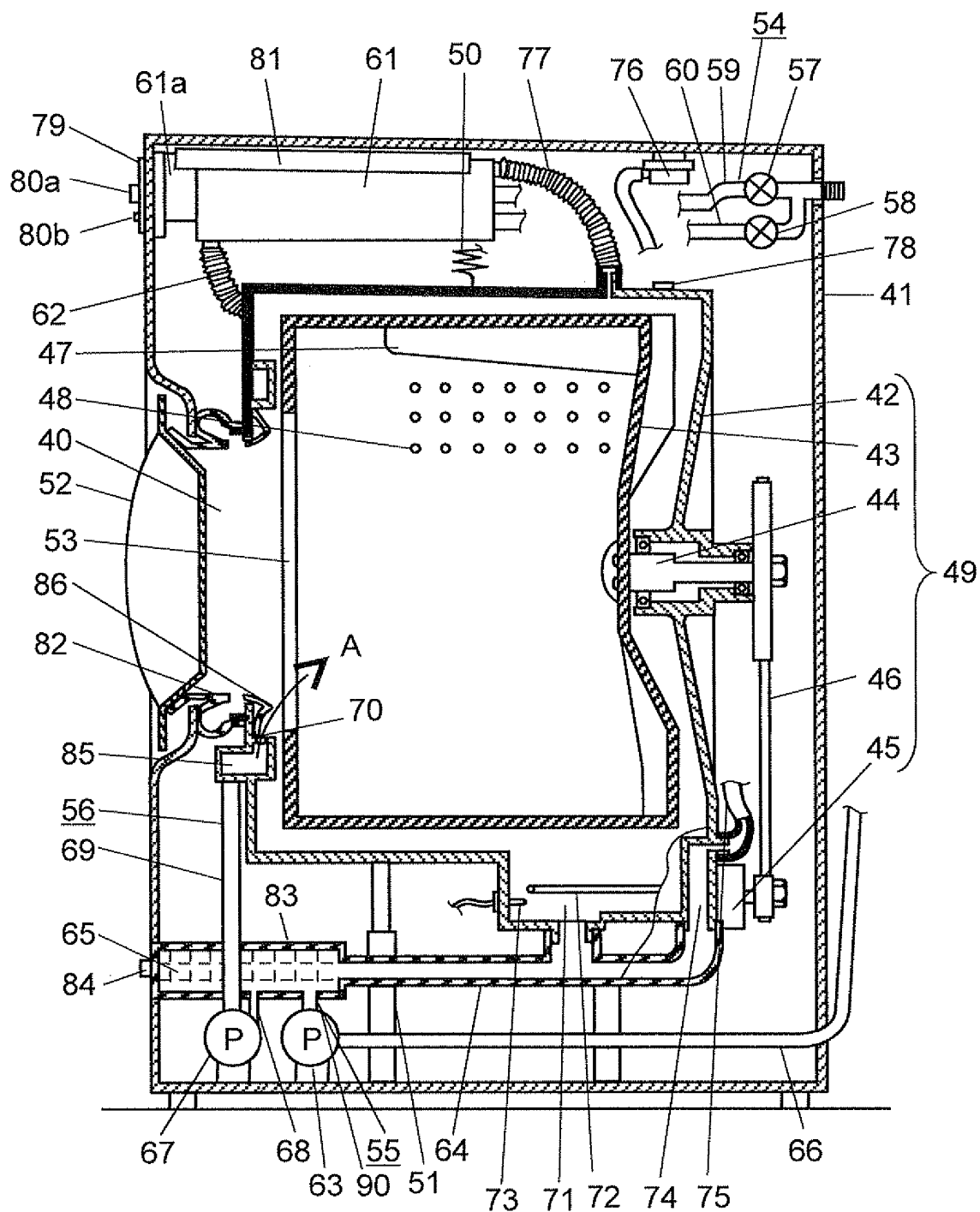


FIG. 2

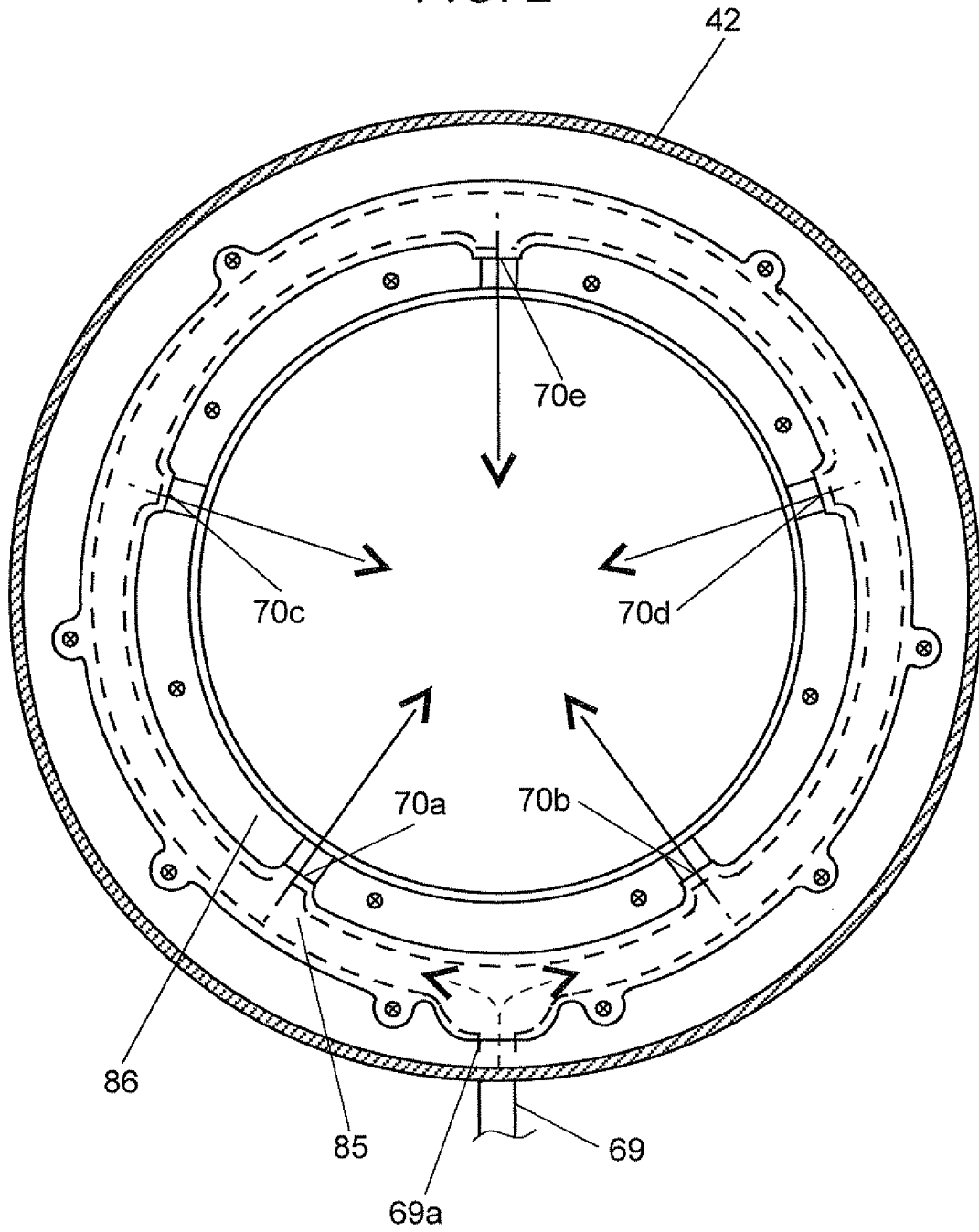


FIG. 3

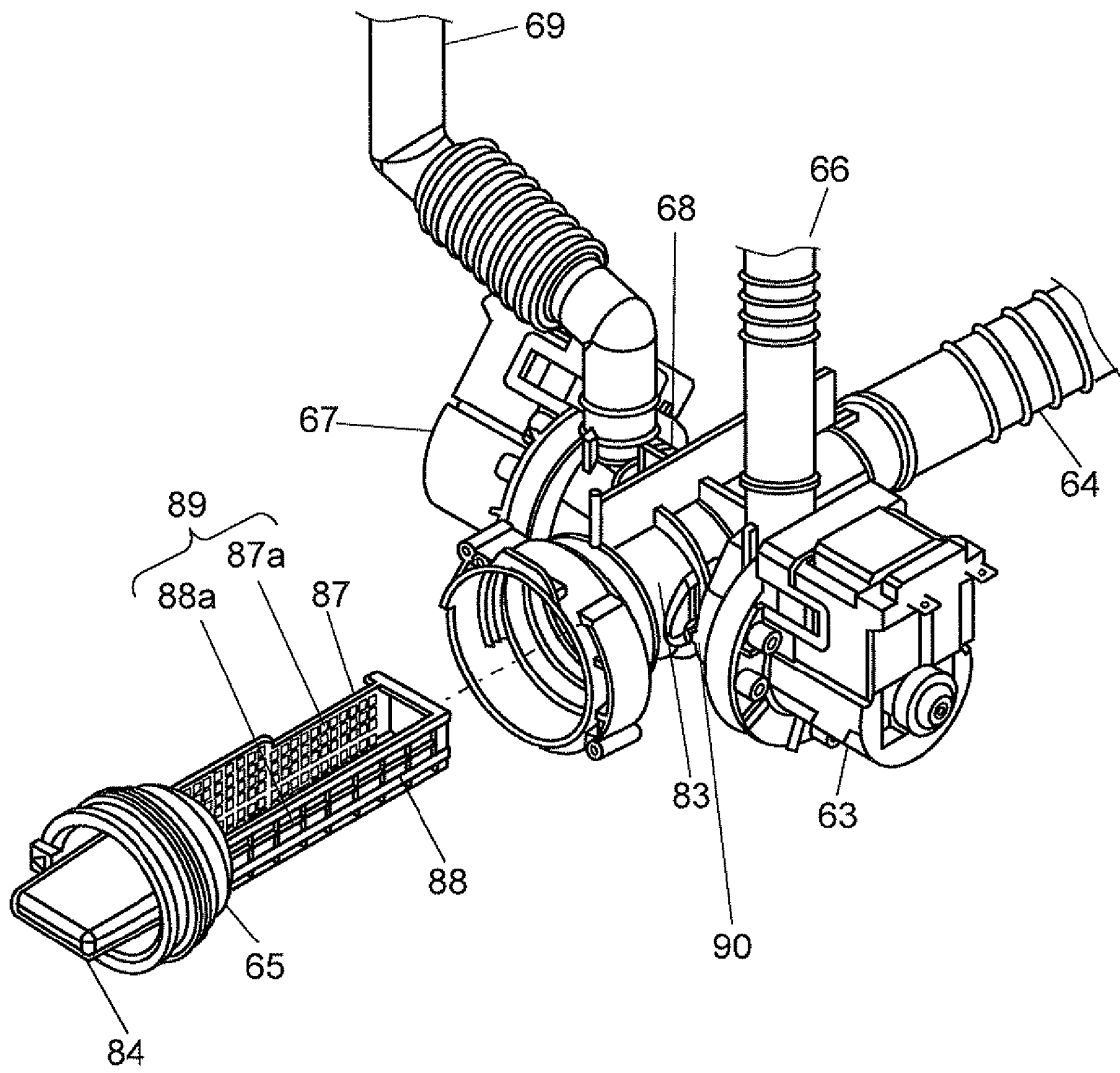
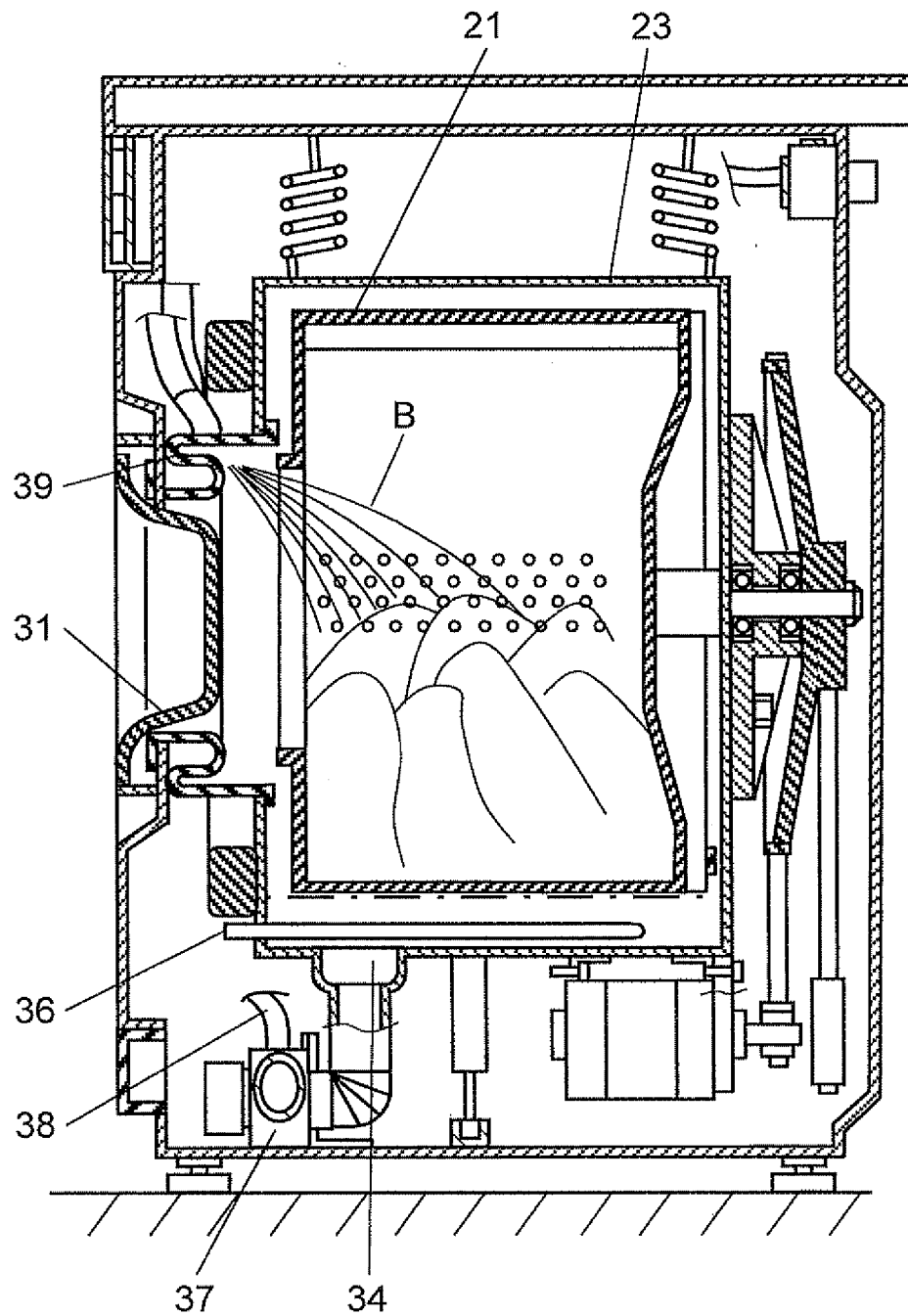


FIG. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/001189

A. CLASSIFICATION OF SUBJECT MATTER

D06F39/08(2006.01) i, D06F39/12(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)

D06F39/08, D06F39/12

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 1996-2012

Kokai Jitsuyo Shinan Koho 1971-2012 Toroku Jitsuyo Shinan Koho 1994-2012

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 2009-297139 A (Toshiba Corp.), 24 December 2009 (24.12.2009), paragraphs [0009] to [0022], [0041]; fig. 2, 3, 5 (Family: none)	1-6
Y	WO 2009/125952 A2 (LG ELECTRONICS INC.), 15 October 2009 (15.10.2009), fig. 3 & JP 2011-509139 A & US 2009/0249840 A1 & EP 2271800 A & KR 10-2009-0107164 A & CN 101925699 A	1-6



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

02 May, 2012 (02.05.12)

Date of mailing of the international search report

22 May, 2012 (22.05.12)

Name and mailing address of the ISA/
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2012/001189

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2006-68192 A (Matsushita Electric Industrial Co., Ltd.), 16 March 2006 (16.03.2006), paragraph [0026]; fig. 3, 4 (Family: none)	1-6

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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