

DESCRIPTION

WASHING MACHINE

5 TECHNICAL FIELD

[0001]

The present disclosure relates to a washing machine that performs a washing step, a rinsing step, and spin-drying step.

10 BACKGROUND ART

[0002]

Conventionally, a washing machine has been proposed in which washing water in a water tub is circulated by a circulating pump, and the washing water is uniformly supplied from a plurality of nozzles to laundry in a rotary drum (see PTL 1, for example).

[0003]

This allows a detergent to dissolve quickly in a washing step and penetrate into clothes, whereby stains on the clothes can be efficiently removed.

20 [0004]

A washing machine in which washing water stored in a water tub is circulated by a pump and air is introduced in a water-introducing channel to generate foam (see PTL 2, for example).

[0005]

25 With this configuration, foamy washing water containing detergent dissolved therein is distributed over the laundry, and a high concentration of detergent component (mainly surfactant) can reach every part of the laundry

as the volume of the detergent increases. As a result, stains on the clothes can be efficiently removed.

[0006]

A washing machine having both of the functions disclosed in PTL 1 and
5 PTL 2, i.e., the function of supplying washing water to the laundry and the function of supplying foam to the laundry, has been desired.

Citation List

Patent Literature

[0007]

10 PTL 1: Unexamined Japanese Patent Publication No. 2011-250921

PTL 2: Unexamined Japanese Patent Publication No. 2015-43798

SUMMARY OF THE INVENTION

[0008]

15 A washing machine according to the present disclosure includes: a storage tub configured to store laundry; a foam generation unit provided on the storage tub, and configured to supply generated foam into the storage tub; a water supply path provided on the storage tub, and configured to supply washing liquid to the foam generation unit; a circulating water path provided
20 on the storage tub, and configured to circulate the washing liquid in the storage tub around the storage tub; and a circulating pump configured to supply the washing liquid in the storage tub to the foam generation unit and the circulating water path. The water supply path and the circulating water path are arranged in a stacked manner in an axial direction of the storage tub.

25 [0009]

The washing machine according to the present disclosure supplies the foam and the detergent liquid to the storage tub to efficiently wash the

laundry with a simple configuration.

BRIEF DESCRIPTION OF DRAWINGS

[0010]

5 FIG. 1 is a block diagram schematically showing a washing machine according to a first exemplary embodiment of the present disclosure.

FIG. 2 is a schematic perspective view of the washing machine.

FIG. 3 is a schematic sectional view of the washing machine.

FIG. 4 is a schematic perspective view of the washing machine.

10 FIG. 5 is a schematic plan view of the washing machine.

FIG. 6 is a schematic sectional view of the washing machine.

FIG. 7 is a schematic plan view of the washing machine.

FIG. 8 is a schematic transparent view of a foam generation unit of the washing machine.

15 FIG. 9 is a schematic diagram of a casing of a circulating pump of the washing machine.

DESCRIPTION OF EMBODIMENT

[0011]

20 According to a first aspect, there is provided a washing machine including: a storage tub configured to store laundry; a foam generation unit provided on the storage tub, and configured to supply generated foam into the storage tub; a water supply path provided on the storage tub, and configured to supply washing liquid to the foam generation unit; a circulating water path
25 provided on the storage tub, and configured to circulate the washing liquid in the storage tub around the storage tub; and a circulating pump configured to supply the washing liquid in the storage tub to the foam generation unit and

the circulating water path. The water supply path and the circulating water path are arranged in a stacked manner in an axial direction of the storage tub. With this configuration, a washing machine with high detergency can be achieved without reducing an opening area of a loading port for putting in the laundry.

[0012]

According to a second aspect, in the washing machine according to the first aspect, the storage tub includes an outer ring-shaped wall, and a holder is provided on a back surface of the outer ring-shaped wall such that the foam generation unit and the water supply path are formed between the outer ring-shaped wall and the holder. The washing machine further includes a cover that covers the back surface of the outer ring-shaped wall and the holder. The circulating water path is disposed between the back surface of the outer ring-shaped wall and the cover and between the holder and the cover.

[0013]

According to a third aspect, in the washing machine according to the first or second aspect, a foam outflow unit of the foam generation unit and a discharge unit of the circulating water path are provided at positions to avoid a collision between foam supplied from the foam generation unit to the storage tub and the washing liquid supplied from the circulating water path to the storage tub.

[0014]

An exemplary washing machine is described below with reference to the drawings. Note that the terms showing directions, such as “above”, “below”, “left”, and “right” used in the following description are only for the purpose of clarification of the description. Therefore, these terms should not be construed as any limitation on the principles of the washing machine.

Although a washing machine without a drying function is disclosed hereinafter as an example, the washing machine may be a laundry processing apparatus having a drying function for drying the laundry.

[0015]

5 FIRST EXEMPLARY EMBODIMENT

Washing Machine

FIG. 1 is a block diagram schematically showing washing machine 100 according to a first exemplary embodiment. Washing machine 100 is described below with reference to FIG. 1. Note that solid arrows in FIG. 1 indicate flows of water. Dashed-line arrows in FIG. 1 indicate transmission routes of control signals.

[0016]

Washing machine 100 includes main housing 200, controller 300, water supply mechanism 400, washing mechanism 500, and circulating mechanism 600. Main housing 200 accommodates controller 300, water supply mechanism 400, washing mechanism 500, and circulating mechanism 600. Controller 300 controls water supply mechanism 400, washing mechanism 500, and circulating mechanism 600.

[0017]

Washing machine 100 may perform a washing step to wash laundry, a rinsing step to rinse the laundry, and a spin-drying step to spin-dry the laundry in sequence.

[0018]

Washing mechanism 500 includes storage tub 510 configured to contain the laundry and motor 520 configured to drive storage tub 510. Motor 520 is controlled by controller 300 to drive storage tub 510. In the washing step, storage tub 510 agitates the laundry in a liquid containing detergent.

As a result, the laundry is washed appropriately. In the rinsing step, storage tub 510 agitates the laundry in the water of which detergent concentration is lower than in the washing step. In the rinsing step, water supply to storage tub 510 and drainage of water from storage tub 510 are repeated. As a result, the detergent is appropriately removed from the laundry. In the spin-drying step, storage tub 510 spin-dries the laundry by using centrifugal forces. As a result, drying of the laundry is accelerated.

[0019]

Water supply mechanism 400 supplies water to storage tub 510 in the above-described washing step and rinsing step. Water supply mechanism 400 includes water supply port 410 connected to a faucet, switch valve 420, and detergent accommodating unit 430 configured to accommodate detergent. The water supplied to water supply port 410 is led to switch valve 420. Switch valve 420 switches a water supply route between first water supply path 421 that directly supplies water to storage tub 510 and second water supply path 422 that supplies water to storage tub 510 through detergent accommodating unit 430. First water supply path 421 may be used in the rinsing step, for example. As a result, tap water is supplied directly to storage tub 510. Second water supply path 422 may be used in the washing step, for example. When switch valve 420 opens second water supply path 422, water flows in detergent accommodating unit 430. Water and detergent are mixed in detergent accommodating unit 430. As a result, water containing the detergent flows in storage tub 510. According to the present exemplary embodiment, a pipeline defining second water supply path 422 is exemplified as water supply pipe. Water supply mechanism 400 is exemplified as a water supply unit.

[0020]

Circulating mechanism 600 includes circulating pump 610 and foam generation unit 620. Circulating mechanism 600 may circulate water between circulating pump 610 and storage tub 510 in the above-described washing step and rinsing step. According to the present exemplary
5 embodiment, circulating mechanism 600 includes first circulating path 611 and second circulating path 612 for circulating water between circulating pump 610 and storage tub 510. When first circulating path 611 is used, water flows in storage tub 510 through foam generation unit 620. When second circulating path 612 is used, water is led directly to storage tub 510 from
10 circulating pump 610. To switch the circulating paths of water, a switch valve or other elements capable of selectively prescribing a flowing direction of water may be used. According to the present disclosure, water is supplied simultaneously to first circulating path 611 and second circulating path 612 to obtain a high detergency by efficiently supplying foam and detergent liquid in
15 a short period of time with a simple configuration. Since the water is supplied to foam generation unit 620 and storage tub 510 by a single circulating pump 610, a space in main housing 200 is effectively used, and washing machine 100 can be fabricated at moderate costs. In addition, the usage of a single circulating pump 610 results in an increase in the degree of
20 freedom of a layout design in main housing 200.

[0021]

Foam generation unit 620 is configured to generate foam. The detergent liquid of which volume is increased by air bubbles is supplied to storage tub 510 and spreads over the laundry. When the detergent liquid
25 comes in contact with and penetrates into the laundry, the air bubbles become a foam film to cover the laundry. The foam film includes a high concentration of surfactant, and thus efficiently removes stains on the laundry. At the same

time, the detergent liquid is discharged from second circulating path 612 to storage tub 510, whereby wetness of the laundry is increased and the detergent liquid can be sprayed uniformly over the laundry. This increases penetration capability of high-concentration foam and also provides high
5 detergency in a short period of time.

[0022]

FIG. 2 is a schematic perspective view of washing machine 100. Washing machine 100 is further detailed with reference to FIGS. 1 and 2.

[0023]

10 Main housing 200 includes front wall 210, back wall 220 opposite to front wall 210, left wall 230 standing between front wall 210 and back wall 220, right wall 240 opposite to left wall 230, top wall 250 surrounded by upper edges of front wall 210, back wall 220, left wall 230, and right wall 240, and bottom wall 260 opposite to top wall 250. Water supply port 410 described
15 above with reference to FIG. 1 is exposed on top wall 250. A user can connect water supply port 410 to a faucet (not shown) by using a hose, for example.

[0024]

Washing machine 100 includes door 101 attached to front wall 210. Door 101 rotates between a closing position along front wall 210 and an
20 opening position protruded from front wall 210. Door 101 shown in FIG. 2 is in the opening position. When door 101 is in the opening position, loading port 511 defined by storage tub 510 is exposed. Rotating door 101 to the opening position, a user can put the laundry to storage tub 510 through loading port 511.

25 [0025]

FIG. 3 is a schematic sectional view of washing machine 100. Washing machine 100 is further detailed with reference to FIGS. 1 and 3. In

the following description, a side on which loading port 511 of storage tub 510 is provided is referred to as a front side of washing machine 100, and a far side of storage tub 510 is referred to as a back side of washing machine 100, as shown in FIG. 3.

5 [0026]

Storage tub 510 includes rotary drum 530 configured to store the laundry and water tub 540 accommodating rotary drum 530. Rotary drum 530 includes inner ring-shaped wall 531 defining loading port 511, inner bottom wall 532 opposite to inner ring-shaped wall 531, and cylindrical-shaped
10 inner peripheral wall 533 disposed between inner ring-shaped wall 531 and inner bottom wall 532. Water tub 540 includes outer ring-shaped wall 541 disposed between front wall 210 and inner ring-shaped wall 531, outer bottom wall 542 disposed between back wall 220 and inner bottom wall 532, and outer peripheral wall 543 disposed between outer ring-shaped wall 541 and outer
15 bottom wall 542 and surrounding inner peripheral wall 533. According to the present exemplary embodiment, rotary drum 530 is exemplified as an inner tub. Water tub 540 is exemplified as an outer tub.

[0027]

Motor 520 includes main body 521 configured to generate a driving
20 force, driving shaft 522 configured to transfer the driving force to rotary drum 530, and belt 523 and pulley 524 configured to transfer rotation of main body 521 to driving shaft 522. Driving shaft 522 penetrates outer bottom wall 542, and is connected to inner bottom wall 532.

[0028]

25 Circulating mechanism 600 includes, in addition to circulating pump 610 and foam generation unit 620 (see FIG. 1), drain valve 690, upstream circulating pipe 640 defining a water route from water tub 540 to circulating

pump 610, downstream circulating pipe 650 defining water route for returning from circulating pump 610 to water tub 540, and drain pipe 660 defining drainage route to an outside of main housing 200. Drain valve 690 is mounted on drain pipe 660. Controller 300 (see FIG. 1) is configured to
5 control drain valve 690. While water is circulated between storage tub 510 and circulating pump 610, controller 300 closes drain valve 690. Controller 300 opens drain valve 690 to drain unnecessary water.

[0029]

Downstream circulating pipe 650 includes first branch pipe 651
10 connected to foam generation unit 620, and second branch pipe 652 connected to outer ring-shaped wall 541. First branch pipe 651 defines first circulating path 611 described above with reference to FIG. 1. Second branch pipe 652 defines second circulating path 612 described above with reference to FIG. 1. Controller 300 may control a rotation direction and a rotation speed of
15 circulating pump 610, and may selectively perform water-circulation through first branch pipe 651 or water-circulation through second branch pipe 652. According to the present exemplary embodiment, downstream circulating pipe 650 is exemplified as branch pipes through circulating pump 610.

[0030]

20 FIG. 4 is a schematic perspective view of water tub 540. Washing machine 100 is further detailed with reference to FIGS. 1, 3 and 4.

[0031]

Outer peripheral wall 543 of water tub 540 includes front peripheral wall 545 to which outer ring-shaped wall 541 is mounted, and back peripheral
25 wall 546 disposed between outer bottom wall 542 and front peripheral wall 545. Foam generation unit 620 is disposed on front peripheral wall 545. FIG. 3 shows rotation axis RX of rotary drum 530 defined by motor 520.

[0032]

According to the present exemplary embodiment, foam generation unit 620 is disposed at an upper position than rotation axis RX. Foam outflow port 684 configured to discharge high-concentration foam is also disposed at an upper position than rotation axis RX. Discharge units 811 configured to discharge detergent liquid, which is discharged simultaneously with foam, and foam outflow port 684 are disposed to avoid collision between high-concentration foam and detergent liquid, and discharge amounts of the detergent liquid and the foam are specified.

[0033]

According to the present exemplary embodiment, first branch pipe 651 of downstream circulating pipe 650 is exemplified as a configuration in which first branch pipe 651 is connected to front peripheral wall 545 of a water tub and goes through an inner circulating path inside front peripheral wall 545 to reach foam generation unit 620. With this configuration, a space inside main housing 200 can be used effectively, and washing machine 100 can be fabricated at moderate costs. In addition, this configuration results in an increase in the degree of freedom of a layout design inside main housing 200.

[0034]

Foam Generation Unit

FIG. 5 is a plan view of outer ring-shaped wall 541 as viewed from a back side thereof. FIG. 6 is a partial sectional view of outer ring-shaped wall 541. FIG. 7 is a plan view of outer ring-shaped wall 541 shown in FIG. 5 in a state in which cover 544 is removed. FIG. 8 is a schematic transparent view of foam generation unit 620. Foam generation unit 620 is described below with reference to FIGS. 3 to 8.

[0035]

Outer ring-shaped wall 541 of water tub 540 has a shape protruding forward. Foam generation unit 620, water supply path 622 configured to supply water to foam generation unit 620, and circulating water path 810 configured to supply washing water to storage tub 510 are provided on a back-surface side of outer ring-shaped wall 541. Foam generation unit 620 and water supply path 622 are divided by partition wall 621 protruded from the back-surface side of outer ring-shaped wall 541 (see FIG. 8). Holder 623 is disposed in contact with partition wall 621, so that foam generation unit 620 and water supply path 622 are surrounded by a back surface of outer ring-shaped wall 541, partition wall 621, and holder 623 (see FIG. 6). A watertight structure between partition wall 621 and holder 623 may be provided as required.

[0036]

Water supply path 622 includes inlet port 681 at an end thereof opposite to foam generation unit 620 (see FIG. 7). Discharge port 682 is provided at the other end of water supply path 622 (see FIG. 7). Discharge port 682 is provided in a horizontal direction (including substantially horizontal direction) toward foam generation unit 620. A sectional area of discharge port 682 is smaller than that of water supply path 622 so as to increase a flow rate of washing water discharged toward foam generation unit 620 through water supply path 622. A part of partition wall 621 includes opposing surface 621a that is provided in a vertical direction (including substantially vertical direction) ahead of a discharge direction of washing water from discharge port 682 (see FIG. 8).

[0037]

A side surface of holder 623 includes suction port 683 that is positioned at midpoint (including substantially midpoint) between discharge port 682 and

opposing surface 621a (FIG. 8 is a plan view in which holder 623 is made transparent and shows suction port 683).

[0038]

Foam generation unit 620 includes foam outflow port 684 at a position
5 opposite to discharge port 682. An outer wall surface that configures foam generation unit 620 includes inclined surface 621b that is inclined toward foam outflow port 684 (see FIG. 8). With this configuration, washing water supplied in foam generation unit 620 is exhausted from foam outflow port 684 without remaining in foam generation unit 620.

10 [0039]

First branch pipe 651 described with reference to FIGS. 3, 4, 5, 7, and 8 is connected to inlet port 681 through the inner circulating path in front peripheral wall 545 of water tub 540. When circulating pump 610 pumps detergent liquid to foam generation unit 620, the detergent liquid flowing into
15 water supply path 622 through inlet port 681 passes through water supply path 622 and is discharged from discharge port 682 toward foam generation unit 620.

[0040]

When the detergent liquid is discharged from discharge port 682
20 toward foam generation unit 620, the detergent liquid collides with opposing surface 621a in foam generation unit 620. The detergent liquid is dispersed over every surface of foam generation unit 620 and is mixed with air in foam generation unit 620. As a result, high-concentration foam is generated. Since the detergent liquid is discharged from discharge port 682, the pressure
25 in a vicinity of suction port 683 on the side of foam generation unit 620 becomes negative, whereby air in water tub 540 is sucked through suction port 683. By incorporating air, the detergent liquid contains more air bubbles,

which enables generation of even more high-concentration foam. Note that a flow rate of the detergent liquid discharged from discharge port 682 is increased so that the detergent liquid collides with opposing surface 621a, which enables efficient generation of air bubbles inside foam generation unit 620.

[0041]

The detergent liquid of which volume is increased by air bubbles is distributed from foam outflow port 684 over the laundry in the storage tub while rotary drum 530 rotates to agitate the laundry, which allows the detergent liquid to be distributed uniformly over the laundry. A diameter of foam outflow port 684 may be adjusted depending on a pumping amount of the detergent liquid so that the detergent liquid achieves a flow rate at which air bubbles are mixed with the detergent liquid inside the foam generation unit. The flow rate may be adjusted by changing the rotation speed of the circulating pump.

[0042]

According to the present exemplary embodiment, partition wall 621 is integrally molded with a component of storage tub 510, thereby achieving a compact configuration and a simple structure.

[0043]

Water supply path 622 may have any configuration that can supply the detergent liquid to foam generation unit 620, and thus a configuration thereof is not limited to the present exemplary embodiment and may be configured as a hose or the like, for example.

[0044]

Circulating Water Route

Each of FIGS. 5, 7, and 8 shows an arrangement of water supply path

622 configured to supply the detergent liquid to foam generation unit 620, foam outflow port 684 configured to discharge high-concentration foam, circulating water path 810 configured to supply the detergent liquid to storage tub 510, and discharge units 811.

5 [0045]

Cover 544 having a ring shape is mounted on a back-surface side of outer ring-shaped wall 541 to cover holder 623 and circulating water path 810 (see FIG. 5). Circulating water path 810 is divided by partition wall 812 protruded from the back surface of outer ring-shaped wall 541. Cover 544 is
10 disposed in contact with the back surface of outer ring-shaped wall 541 and partition wall 812 through packings 545, 546, whereby circulating water path 810 is surrounded by the back surface of outer ring-shaped wall 541, partition wall 812, and cover 544.

[0046]

15 FIG. 7 is a sectional view taken at a position where water supply path 622 and circulating water path 810 are provided. Circulating water path 810 at this position is surrounded by cover 544 and holder 623, as cover 544 is disposed in contact with outer ring-shaped wall 541, partition wall 621, and holder 623 through packings 545, 546, 547, 548.

20 [0047]

According to the present exemplary embodiment, water supply path 622 and circulating water path 810 are arranged in a stacked manner in an axial direction of storage tub 510 as described above. More specifically, as shown in FIG. 6, water supply path 622 is disposed nearer to the front side
25 than circulating water path 810. This configuration increases an opening area of loading port of the laundry in comparison with a configuration in which water supply path 622 and circulating water path 810 are arranged in a

direction orthogonal to the axial direction of storage tub 510. Note that the present disclosure is not limited to the above configuration and water supply path 622 may be disposed nearer to the back side than circulating water path 810.

5 [0048]

Foam outflow port 684 for an outflow of the high-concentration foam is disposed at an upper position than rotation axis RX and distributes the high-concentration foam from above the laundry. The detergent liquid to be discharged simultaneously with the high-concentration foam is supplied from
10 second branch pipe 652 to pass through circulating water path 810 and is discharged from discharge units 811 into storage tub 510. Circulating water path 810 and discharge units 811 are provided at the front side of storage tub 510.

[0049]

15 According to the present exemplary embodiment, the detergent liquid is controlled to be discharged from discharge units 811 positioned substantially lower than rotation axis RX while the high-concentration foam is distributed. This prevents foam collapse caused by collision between the high-concentration foam and the detergent liquid to avoid reduction in a washing effect obtained
20 by foam.

[0050]

Circulating water path 810 and discharge units 811 of the detergent liquid are arranged also at an upper part so as to discharge circulating water entirely from the front side of storage tub 510 while circulating pump 610
25 rotates in direction B to circulate the detergent liquid.

[0051]

As shown in FIGS. 4, 5, and 7, circulating pump 610 is disposed below

storage tub 510. Foam generation unit 620 is disposed at an upper part than rotation axis RX of rotary drum 530 (i.e., upper than circulating pump 610). When rotating, circulating pump 610 pumps water toward foam generation unit 620 through first branch pipe 651.

5 [0052]

When circulating pump 610 rotates at a high speed, the detergent liquid flows into first branch pipe 651 and second branch pipe 652. First branch pipe 651 introduces the detergent liquid to foam generation unit 620. Foam generated inside foam generation unit 620 is discharged to storage tub

10 510.

[0053]

When circulating pump 610 rotates at a high speed, the detergent liquid flows into first branch pipe 651 and second branch pipe 652. First branch pipe 651 introduces the detergent liquid to foam generation unit 620.

15 Foam generated inside foam generation unit 620 is discharged to storage tub 510. Second branch pipe 652 introduces water directly to water tub 540. A flow-in route of the detergent liquid is selected by controlling a rotation direction of circulating pump 610.

[0054]

20 Circulating Pump Casing

FIG. 9 shows a shape of casing 900 of a circulating pump used as a driving measure for generating high-concentration foam and for supplying the detergent liquid to the storage tub.

[0055]

25 Rotation direction A of an impeller is a rotation direction to generate high-concentration foam and to supply the detergent liquid to a lower part, and rotation direction B is a rotation direction to supply the detergent liquid to

an entire area of the storage tub.

[0056]

At the time of generating high-concentration foam in rotation direction A, circulating water is discharged from pump casing discharge port A910 and casing discharge port B920 at a ratio of substantially 1:1. With this configuration, high-concentration foam is generated at foam generation unit 620 and the detergent liquid is discharged from discharge units 811. At this time, sectional areas of the discharge ports may satisfy a relation of: casing discharge port A910 (foam generation side) $\leq$ casing discharge port B920 (detergent liquid side). In addition, tongs-shaped member 930 to capture water relative to the rotation of the impeller may be provided in front of the casing discharge ports.

INDUSTRIAL APPLICABILITY

[0057]

A washing machine according to the present disclosure is utilized suitably for an apparatus having a function of washing laundry by utilizing foam.

REFERENCE MARKS IN THE DRAWINGS

[0058]

100	washing machine
300	controller
400	water supply mechanism
422	second water supply path
430	detergent accommodating unit
500	washing mechanism

	510	storage tub
	511	loading port
	530	rotary drum
	540	water tub
5	541	outer ring-shaped wall
	544	cover
	600	circulating mechanism
	610	circulating pump
	620	foam generation unit
10	621, 812	partition wall
	621a	opposing surface
	622	water supply path
	623	holder
	650	downstream circulating pipe
15	651	first branch pipe
	652	second branch pipe
	681	inlet port
	682	discharge port
	683	suction port
20	684	foam outflow port
	811	discharge unit

CLAIMS

1. A washing machine comprising:
 - a storage tub configured to store laundry;
 - 5 a foam generation unit provided on the storage tub, and configured to supply generated foam into the storage tub;
 - a water supply path provided on the storage tub, and configured to supply washing liquid to the foam generation unit;
 - a circulating water path provided on the storage tub, and configured to
 - 10 circulate the washing liquid in the storage tub around the storage tub; and
 - a circulating pump configured to supply the washing liquid in the storage tub to the foam generation unit and the circulating water path,
 - wherein the water supply path and the circulating water path are arranged in a stacked manner in an axial direction of the storage tub.
 - 15
2. The washing machine according to claim 1,
 - wherein the storage tub includes an outer ring-shaped wall, and a holder is provided on a back surface of the outer ring-shaped wall such that the foam generation unit and the water supply path are formed between the
 - 20 outer ring-shaped wall and the holder,
 - the washing machine further comprising a cover that covers the back surface of the outer ring-shaped wall and the holder,
 - wherein the circulating water path is disposed between the back surface of the outer ring-shaped wall and the cover and between the holder
 - 25 and the cover.
3. The washing machine according to claim 1 or 2, wherein a foam

outflow unit of the foam generation unit and a discharge unit of the circulating water path are provided at positions to avoid a collision between foam supplied from the foam generation unit to the storage tub and the washing liquid supplied from the circulating water path to the storage tub.

5