

DESCRIPTION

DRUM-TYPE WASHING MACHINE

5 TECHNICAL FIELD

[0001]

The present disclosure relates to a drum-type washing machine that washes laundry contained in a rotary drum.

10 BACKGROUND ART

[0002]

In a conventional drum-type washing machine of this kind, a configuration having a packing member provided for connection between a front opening of a water tub and an opening provided in a front of a main body
15 has been proposed (refer to, for example, PTL 1). With this configuration, water collected in the water tub is prevented from leaking into or out of the washing machine body during washing and spin-drying.

[0003]

FIG. 6 is an enlarged sectional view of surroundings of the packing
20 member in the conventional drum-type washing machine described in PTL 1.

[0004]

In FIG. 6, front plate 43 positioned inwardly of front panel member 37 that is a front-side member of the main body (not shown) includes front-plate opening (front opening) 44 that is circular. Front-plate opening (front
25 opening) 44 is disposed in opposed relationship with a drum opening of a rotary drum. Front plate 43 is covered with front panel member 37 at its front side.

[0005]

Water tub 35 including water-tub opening 45 at its front side contains the rotary drum. Water-tub opening 45 is positioned inwardly of opening member 38 that has front opening 38a where laundry is loaded. Moreover, 5 water-tub opening 45 is disposed in opposed relationship with front-plate opening 44. A gap between water-tub opening 45 of water tub 35 and front-plate opening 44 of front plate 43 is sealed with packing member 46 that is annular and cylindrical and is made of elastic material such as rubber. In this way, water is prevented from entering the main body through the gap.

10 [0006]

When lid body 39 is closed, an outer periphery of inner lid 53 of lid body 39 abuts against an inner peripheral surface of lip 46a of packing member 46, and thus sealing is performed between the outer periphery of inner lid 53 and the inner peripheral surface of lip 46a. In this way, water 15 and vapor are prevented from leaking from an outer periphery of lid body 39.

[0007]

A side end of water tub 35 of packing member 46 is mounted at an outer periphery of water-tub opening 45 and is fixed by wire 52. A side end of front plate 43 of packing member 46 is provided with flange 46b. Flange 46b 20 is fixedly held between recess 43a provided in front plate 43 and projection 47a provided at mounting plate 47 when mounting plate 47 is screw-fixed to front plate 43 from a front side by screws 51.

[0008]

In the above conventional configuration, however, laundry can partly 25 be caught between the outer periphery of inner lid 53 and lip 46a of packing member 46 by an oversight when a user loads the laundry into the rotary drum and closes lid body 39. In cases where the user starts operation in this

condition, a problem can possibly arise as stated below. In other words, water leakage can possibly result from detachment or tear of the packing member that is pulled into the rotary drum with great force by the laundry that twines around the lip of the packing member in association with rotation of the rotary drum. A detailed description is hereinafter provided of cases where the packing member is partly detached or torn.

[0009]

FIGS. 7A to 7C illustrate respective states when operation of the conventional drum-type washing machine is started with laundry being partly caught between the outer periphery of inner lid 53 and lip 46a of packing member 46.

[0010]

When the operation is started with laundry 54 being partly caught between the outer periphery of inner lid 53 and lip 46a of packing member 46, as shown in FIG. 7A, twisted part 54a is gradually generated in laundry 54 with rotation of rotary drum 41. As the operation continues further, lip 46a gets caught in twisted part 54a as shown in FIG. 7B. Laundry 54 is eventually pulled into rotary drum 41, and this is when lip 46a caught in twisted part 54a of laundry 54 is torn from packing member 46 as shown in FIG. 7C and gets into rotary drum 41 together with laundry 54. Because packing member 46 loses lip 46a, sealing is not performed between the outer periphery of inner lid 53 and packing member 46, thus problematically resulting in water leakage.

Citation List

Patent Literature

[0011]

PTL 1: Unexamined Japanese Patent Publication No. 2005-143795

SUMMARY OF THE INVENTION

[0012]

To solve the above conventional problem, in a drum-type washing machine according to the present disclosure, surroundings of a lip of a packing member are configured to prevent the packing member from being detached or torn even when operation is started with laundry being caught between an inner lid and the packing member. Accordingly, damage from significant water leakage can be prevented.

10 [0013]

The drum-type washing machine according to the present disclosure includes: a main body having a front panel member disposed at a front side of the main body, the front panel member having a front opening; a water tub elastically supported to be rockable inside the main body, the water tub having a water-tub opening near the front side; a rotary drum rotatably contained in the water tub, the rotary drum having a drum opening near the front side; and a motor that rotationally drives the rotary drum. The drum-type washing machine further includes: a lid body that openably covers the front opening, the lid body having an inner lid projecting toward an interior of the water tub; and a packing member connecting the front opening and the water-tub opening. The packing member includes: a cylinder extending rearward from the front opening; a bulge that is turned back in a forward and outward direction from a rear end of the cylinder to bulge toward an outer periphery of the packing member and to connect with the water-tub opening; a lip that is provided at a front end of the cylinder and abuts the inner lid when the lid body is closed; and a rib provided to the cylinder to be nearer to the water-tub opening than the lip is. The rib has a greater thickness and a greater height than the lip.

The rib is free from contact with the inner lid when the lid body is closed.

[0014]

In cases where the washing machine is operated with laundry being caught between the inner lid and the packing member by an oversight, the laundry tends to twine around the rib before twining around the lip, thus pulling the packing member into the rotary drum with great force. However, in the washing machine having the above configuration, the rib is formed to have the greater thickness, so that the laundry cannot sufficiently twine around the rib and thus slips from the rib. As such, water leakage that might otherwise result from detachment or tear of the packing member is prevented.

[0015]

Even when operated with laundry being caught in the inner lid by an oversight, the drum-type washing machine of the present disclosure can prevent detachment or tear of the packing member that might be caught by the laundry and thus can prevent water leakage.

BRIEF DESCRIPTION OF DRAWINGS

[0016]

FIG. 1 is an external perspective view of a drum-type washing machine according to a first exemplary embodiment of the present disclosure.

FIG. 2 is a longitudinal sectional view of the drum-type washing machine.

FIG. 3A is an enlarged sectional view of surroundings of a packing member in the drum-type washing machine.

FIG. 3B is an enlarged sectional view of a part of the packing member in the drum-type washing machine.

FIG. 4A is a schematic view of a rib, as viewed in direction A of FIG.

3A.

FIG. 4B is a schematic view of the rib, as viewed in direction B of FIG.

3A.

FIG. 5A illustrates a state when operation of the drum-type washing
5 machine is started with laundry being partly caught between an outer
periphery of an inner lid and a lip of the packing member.

FIG. 5B illustrates a state when the operation of the drum-type
washing machine is started with the laundry being partly caught between the
outer periphery of the inner lid and the lip of the packing member.

10 FIG. 6 is an enlarged sectional view of surroundings of a packing
member in a conventional drum-type washing machine.

FIG. 7A illustrates a state when operation of the conventional
drum-type washing machine is started with laundry being partly caught
between an outer periphery of an inner lid and a lip of a packing member.

15 FIG. 7B illustrates a state when the operation of the conventional
drum-type washing machine is started with the laundry being partly caught
between the outer periphery of the inner lid and the lip of the packing member.

FIG. 7C illustrates a state when the operation of the conventional
drum-type washing machine is started with the laundry being partly caught
20 between the outer periphery of the inner lid and the lip of the packing member.

DESCRIPTION OF EMBODIMENT

[0017]

A drum-type washing machine according to a first aspect includes: a
25 main body having a front panel member that is disposed at a front side of the
main body and has a front opening; a water tub that is elastically supported to
be rockable inside the main body and has a water-tub opening near the front

side; a rotary drum that is rotatably contained in the water tub and has a drum opening near the front side; and a motor that rotationally drives the rotary drum. The drum-type washing machine further includes: a lid body that openably covers the front opening and has an inner lid projecting toward
5 an interior of the water tub; and a packing member connecting the front opening and the water-tub opening. The packing member includes: a cylinder extending rearward from the front opening; a bulge that is turned back in a forward and outward direction from a rear end of the cylinder to bulge toward an outer periphery of the packing member and to connect with the water-tub
10 opening; a lip that is provided at a front end of the cylinder and abuts the inner lid when the lid body is closed; and a rib provided to the cylinder to be nearer to the water-tub opening than the lip is. The rib has a greater thickness and a greater height than the lip. The rib is free from contact with the inner lid when the lid body is closed. It is to be noted here that
15 “extending rearward from the front opening” includes “extending rearward from the front opening’s proximity”.

[0018]

In cases where operation is started with laundry being caught between the inner lid and the packing member by an oversight, the laundry tends to
20 twine around the rib that is positioned nearer to the laundry than the lip is, thus pulling the packing member into the rotary drum with great force. In the above configuration, the rib is formed to have the greater thickness, so that the laundry cannot sufficiently twine around the rib and thus slips from the rib. As such, detachment or tear of the packing member is prevented, and
25 thus significant water leakage can be prevented.

[0019]

According to a second aspect, the rib is disposed in a predetermined

area of a lower half of the cylinder.

[0020]

Only a possible part where laundry actually gets caught is thus dealt with for prevention of detachment or tear of the packing member, so that
5 significant water leakage can be prevented.

[0021]

According to a third aspect, minimum clearance i between a leading edge of the rib and the inner lid has a setting range of $0 \text{ mm} < i \leq 5 \text{ mm}$.

[0022]

10 Accordingly, laundry is held between the leading edge of the rib and the inner lid, so that the laundry can be prevented without fail from reaching the lip. Consequently, the laundry can be prevented from twining around the lip, and the packing member can be prevented from being detached or torn. As such, significant water leakage can be prevented.

15 [0023]

According to a fourth aspect, the rib includes, in a lowermost position of its central portion, a drain hole communicating between a front and a rear of the rib. It is to be noted here that “central portion” includes substantially central portion. In addition, “lowermost position” includes substantially
20 lowermost position.

[0024]

In this way, water is prevented from being collected as is between the lip and the rib after completion of washing, and thus laundry can be prevented from getting wet again with the water when taken out after the completion of
25 washing.

[0025]

According to a fifth aspect, the cylinder includes a recessed groove over

the longitudinal direction of the drain hole.

[0026]

Water collected between the lip and the rib thus can pass along the drain hole and the recessed grooves and run down smoothly into the water tub
5 via the bulge.

[0027]

An exemplary embodiment of the present disclosure is described hereinafter with reference to the accompanying drawings. It is to be noted that this exemplary embodiment is not restrictive of the present disclosure.

10 [0028]

FIRST EXEMPLARY EMBODIMENT

FIG. 1 is an external perspective view of a drum-type washing machine according to the first exemplary embodiment of the present disclosure. FIG. 2 is a longitudinal sectional view of the drum-type washing machine. Forward
15 and rearward directions that are defined in FIG. 2 are used below.

[0029]

In FIG. 1, main body 1 is formed of left and right side plate 2 that are divided and are each formed of a sheet metal, detachable rear plate 3, a plurality of connecting plates that is formed of a sheet metal and connects left
20 and right side plates 2, top plate 4 made of synthetic resin, and front panel member 5. Main body 1 includes, at its front, a curved surface that inclines rearward heading upward. Provided above front panel member 5 is operation panel 8 where switch operation part 6 for various settings and display 7 that displays contents that are set are disposed.

25 [0030]

Water tub 9 is elastically supported by a suspension structure (not shown) to be rockable inside main body 1. Rotary drum 10 shaped into a

bottomed cylinder is rotatably supported inside water tub 9 with its axis being inclined downward heading from a front side of rotary drum 10 toward a rear side of rotary drum 10.

[0031]

5 Rotary drum 10 includes a plurality of holes 10a in its peripheral wall. The plurality of holes 10a enables inflow and outflow of water between water tub 9 and rotary drum 10 during washing. Rotary drum 10 is provided with, on its inner side, a plurality of baffles 11 that projects inward for agitating laundry. Rotary drum 10 is rotationally driven in normal and reverse
10 directions by motor 12 that is mounted to a rear of water tub 9. Feed water pipe 13 and drain pipe 14 are connected to water tub 9, and water is supplied into and drained from water tub 9 through control of a water feed valve and a drain valve that are not shown.

[0032]

15 During washing operation, laundry housed in rotary drum 10 is lifted upward by baffle 11 and separates from baffle 11 in a predetermined position, thus falling to a surface of water collected in rotary drum 10. In this way, so-called "beat-washing" is carried out.

[0033]

20 Rotary drum 10 includes, at its front side, drum opening 10b where laundry is loaded and unloaded. Main body 1 includes, at its front side, front panel member 5 that is curved. Front panel member 5 is mounted with opening member 15 having forward opening (also referred to as front opening) 15a where laundry is loaded and unloaded. Drum opening 10b and forward
25 opening 15a are disposed in opposed relationship. Forward opening 15a of opening member 15 is opened and closed with lid body 16 that has inwardly positioned inner lid 16a made of hard transparent material (such as glass

material). Inner lid 16a is shaped to project toward rotary drum 10 and is formed to incline toward its central line, heading inward.

[0034]

Front plate 17 that is a component among the plurality of connecting
5 plates is disposed inwardly of (behind) front panel member 5. Front plate 17 includes, in a position that faces drum opening 10b of rotary drum 10, front-plate opening (also referred to as front opening) 17a that is circular. Front plate 17 is covered with front panel member 5 at its front side. Inner lid 16a projects toward an interior of rotary drum 10 as compared with
10 front-plate opening 17a.

[0035]

Water-tub opening 9a of water tub 9 is positioned inwardly of (behind) opening member 15 and is disposed in opposed relationship with front-plate opening 17a of front plate 17. A gap between water-tub opening 9a of water
15 tub 9 and front-plate opening 17a of front plate 17 is sealed with packing member 18 as a connection that is made of elastic material such as rubber. In this way, water is prevented from leaking out of water tub 9 into main body 1.

[0036]

FIG. 3A is an enlarged sectional view of surroundings of the packing
20 member in the drum-type washing machine according to the first exemplary embodiment of the present disclosure. FIG. 3B is an enlarged sectional view of a part of the packing member in the drum-type washing machine. FIG. 4A is a schematic view of a rib, as viewed in direction A of FIG. 3A. FIG. 4B is a schematic view of the rib, as viewed in direction B of FIG. 3A.

25 [0037]

In FIG. 3A, packing member 18 includes cylinder 18b that extends rearward from front-plate opening 17a (including the proximity of front-plate

opening 17a) of front plate 17, and bulge 18c that is turned back in forward and outward directions from a rear end of cylinder 18b to bulge toward an outer periphery of packing member 18 and to connect with water-tub opening 9a. Lip 18a formed along an inner circumference of a front end of cylinder 18b projects at an inner circumference of front-plate opening 17a of front plate 17. When lid body 16 is closed, lip 18a abuts an outer peripheral surface of inner lid 16a for sealing. In this way, water and vapor are prevented from leaking from an outer periphery of lid body 16. As shown in FIG. 3B, lip 18a is set to have, for example, height c of 9 mm above an inner surface of cylinder 18b and thickness d of 3 mm.

[0038]

Packing member 18 further includes, as shown in FIG. 3A, rib 18d that is provided to cylinder 18b to be nearer to water-tub opening 9a than lip 18a is. Rib 18d is set to have, for example, height e of 12 mm above the inner surface of cylinder 18b, leading-end thickness f of 11 mm, and root thickness g of 14 mm in its central portion. Height e (12 mm) of rib 18d is set at a height that permits presence of a clearance between inner lid 16a and rib 18d so that rib 18d is free from contact with inner lid 16a when lid body 16 is closed. Rib 18d provided is spaced about dimension h (e.g. 10 mm) away from lip 18a.

[0039]

In other words, rib 18d of packing member 18 is set to have the greater thickness and the greater height than lip 18a. Moreover, rib 18d is so formed as to be free from contact with inner lid 16a when lid body 16 is closed. It is to be noted here that minimum clearance i between a leading edge of rib 18d and inner lid 16a is set at 3 mm in the present exemplary embodiment. In this way, rib 18d prevents an uncomfortable feeling that is otherwise caused to a user when lid body 16 is opened/closed and also prevents influence on seal

performance between lip 18a and inner lid 16a.

[0040]

It is to be noted that it is not necessary to provide rib 18d along an entire circumference of cylinder 18b of packing member 18. As shown in FIG. 4B, rib 18d has only to be provided in an area covering left side α (e.g. 35°) and right side α (e.g. 35°) of a center line in a lower semicircle where laundry can possibly get caught when lid body 16 is closed.

[0041]

While rib 18d has, as described above, leading-end thickness f of 11 mm in its central portion in the present exemplary embodiment, rib 18d may get thinner heading toward its ends and may have thickness k (e.g. 6 mm) in each of left and right sides α as shown in FIG. 4A. In this way, rib 18d can suppress, for example, an uncomfortable feeling and an oppressive feeling that are caused to the user.

[0042]

Rib 18d is provided with, in a lowermost position (including a substantially lowermost position) of its central portion (including its substantially central portion), drain hole 18e that communicates between a front and a rear of rib 18d (see FIGS. 3A, 4A and 4B). In this way, water is prevented from being collected as is between lip 18a and rib 18d after completion of washing. Furthermore, cylinder 18b includes recessed groove 18f over the longitudinal direction of drain hole 18e. Water collected between lip 18a and rib 18d thus can pass along drain hole 18e and recessed grooves 18f and run down smoothly into water tub 9 via bulge 18c. In this way, water is prevented from being collected as is between lip 18a and rib 18d after completion of washing, and thus laundry is prevented from getting wet again with the water when taken out after the completion of washing.

[0043]

It is to be noted that lip 18a may have its dimensions, such as thickness, determined as appropriate based on verification of sealability with inner lid 16a, opening/closing force of lid body 16, or its relationship with durability.

[0044]

With reference to FIGS. 5A, 5B, a description is provided hereinafter of operation and effects of a drum-type washing machine that is formed as above.

[0045]

FIGS. 5A, 5B illustrate respective states when operation of the drum-type washing machine of the present exemplary embodiment is started with laundry being partly caught between the outer periphery of the inner lid and the lip of the packing member.

[0046]

At start of a washing process, the user loads laundry 19 into rotary drum 10. Here, in cases where the user starts the operation with the laundry being caught between inner lid 16a of lid body 16 and packing member 18 by an oversight, laundry 19 tends to rotate in association with rotation of baffles 11 provided inside rotary drum 10 while being caught between inner lid 16a and packing member 18.

[0047]

As shown in FIG. 5A, twisted part 19a is gradually generated in laundry 19 with rotation of rotary drum 10. Here, twisted part 19a is generated inwardly of rib 18d that is nearer to laundry 19 than lip 18a is and is taller than lip 18a. This twisted part 19a tends to twine around rib 18d. However, because rib 18d has the greater thickness, torsional shearing force does not act on rib 18d as shown in FIG. 5B. As twisted part 19a gradually

increases in size, laundry 19 itself is pulled into rotary drum 10 and slips from between inner lid 16a and packing member 18. Consequently, laundry 19 is agitated normally in rotary drum 10.

[0048]

5 In the present exemplary embodiment, rib 18d is set to have greater height e (12 mm) above the inner surface of cylinder 18b than height c (9 mm) of lip 18a above the inner surface of cylinder 18b but is not limited to this. Even when height e of rib 18d above the inner surface of cylinder 18b and height c of lip 18a above the inner surface of cylinder 18b are equal, effects
10 equal to the above effects can be obtained depending on the shape of inner lid 16a (i.e. depending on how inner lid 16a inclines toward its central line).

[0049]

 Height e of rib 18d above the inner surface of cylinder 18b has a setting range of $5\text{ mm} \leq e < 15\text{ mm}$, so that setting minimum clearance i between the
15 leading edge of rib 18d and inner lid 16a in a range of $0\text{ mm} < i \leq 10\text{ mm}$ can lead to a lower probability of twisted part 19a reaching lip 18a beyond the leading edge of rib 18d.

[0050]

 In cases where minimum clearance i between the leading edge of rib
20 18d and inner lid 16a is set in a range of $5\text{ mm} < i \leq 10\text{ mm}$, height e above the inner surface of cylinder 18b can be in a range of $5\text{ mm} \leq e < 10\text{ mm}$. In such cases, however, there is a higher possibility that twisted part 19a of laundry 19 may get over the leading edge of rib 18d and twine around lip 18a, while rib 18d can be made less conspicuous.

25 [0051]

 Accordingly, with minimum clearance i between the leading edge of rib 18d and inner lid 16a set in a range of $0\text{ mm} < i \leq 5\text{ mm}$, twisted part 19a is

held between the leading edge of rib 18d and inner lid 16a. Twisted part 19a can thus be prevented without fail from reaching lip 18a, and laundry 19 can be prevented from twining around lip 18a. Consequently, detachment or tear of packing member 18 is prevented, and thus significant water leakage can be prevented.

[0052]

As described above, in the present exemplary embodiment, packing member 18 includes: cylinder 18b that extends rearward from forward opening 15a (including the proximity of forward-opening 15a); bulge 18c that is turned back in the forward and outward directions from the rear end of cylinder 18b to bulge toward the outer periphery of packing member 18 and to connect with water-tub opening 9a; lip 18a that is provided at the front end of cylinder 18b and abuts inner lid 16a when lid body 16 is closed; and rib 18d that is provided to cylinder 18b to be nearer to water-tub opening 9a than lip 18a is. Rib 18d is set to have the greater thickness than lip 18a and the height that is not less than the height of lip 18a. Moreover, rib 18d is free from contact with inner lid 16a when lid body 16 is closed. In cases where operation is started with laundry 19 being caught between inner lid 16a and packing member 18 by an oversight, laundry 19 tends to twine around rib 18d that is positioned nearer to laundry 19 than lip 18a is, thus pulling packing member 18 into rotary drum 10 with great force. In the present exemplary embodiment, rib 18d is set to have the greater thickness, so that laundry 19 cannot sufficiently twine around rib 18d and thus slips from lip 18a and rib 18d. As such, detachment or tear of packing member 18 is prevented, and thus significant water leakage can be prevented.

INDUSTRIAL APPLICABILITY

[0053]

As described above, even when a user starts operation with laundry being caught in a lid body by an oversight, a drum-type washing machine according to the present disclosure can prevent detachment or damage of a packing member that might be caught by the laundry, thus preventing water leakage. Thus, the present disclosure can be applied to other washing machines each having a lid body and a rotation function.

REFERENCE MARKS IN THE DRAWINGS

10 [0054]

	1	main body
	5	front panel member
	9	water tub
	9a	water-tub opening
15	10	rotary drum
	10b	drum opening
	15	opening member
	15a	forward opening (front opening)
	16	lid body
20	16a	inner lid
	17	front plate
	17a	front-plate opening (front opening)
	18	packing member
	18a	lip
25	18b	cylinder
	18c	bulge
	18d	rib

- 18e drain hole
- 18f recessed groove
- 19 laundry

CLAIMS

1. A drum-type washing machine comprising:
 - a main body having a front panel member disposed at a front side of
 - 5 the main body, the front panel member having a front opening;
 - a water tub elastically supported to be rockable inside the main body, the water tub having a water-tub opening near the front side;
 - a rotary drum rotatably contained in the water tub, the rotary drum having a drum opening near the front side;
 - 10 a motor that rotationally drives the rotary drum;
 - a lid body that openably covers the front opening, the lid body having an inner lid projecting toward an interior of the water tub; and
 - a packing member connecting the front opening and the water-tub opening,
 - 15 wherein the packing member includes:
 - a cylinder extending rearward from the front opening;
 - a bulge that is turned back in a forward and outward direction from a rear end of the cylinder to bulge toward an outer periphery of the packing member and to connect with the water-tub opening;
 - 20 a lip that is provided at a front end of the cylinder and abuts the inner lid when the lid body is closed; and
 - a rib provided to the cylinder to be nearer to the water-tub opening than the lip is,
 - wherein the rib has a greater thickness and a greater height than the
 - 25 lip, and
 - wherein the rib is free from contact with the inner lid when the lid body is closed.

2. The drum-type washing machine according to claim 1, wherein the rib is disposed in a predetermined area of a lower half of the cylinder.

5 3. The drum-type washing machine according to claim 1, wherein a minimum clearance i between a leading edge of the rib and the inner lid has a setting range of $0 \text{ mm} < i \leq 5 \text{ mm}$.

4. The drum-type washing machine according to claim 1, wherein the
10 rib includes, in a lowermost position of a central portion of the rib, a drain hole communicating between a front and a rear of the rib.

5. The drum-type washing machine according to claim 2, wherein the
rib includes, in a lowermost position of a central portion of the rib, a drain hole
15 communicating between a front and a rear of the rib.

6. The drum-type washing machine according to claim 3, wherein the
rib includes, in a lowermost position of a central portion of the rib, a drain hole
communicating between a front and a rear of the rib.

20

7. The drum-type washing machine according to claim 4, wherein the cylinder includes a recessed groove over the longitudinal direction of the drain hole.

25 8. The drum-type washing machine according to claim 5, wherein the cylinder includes a recessed groove over the longitudinal direction of the drain hole.

9. The drum-type washing machine according to claim 6, wherein the cylinder includes a recessed groove over the longitudinal direction of the drain hole.