

WASHING MACHINE

BACKGROUND

1. Technical Field

5 [0001] The present disclosure relates to a washing machine.

2. Description of the Related Art

[0002] There has been proposed a conventional washing machine that includes a liquid agent container configured to hold a detergent.

10 [0003] This washing machine includes: the liquid agent container accommodated in a washing machine main body configured to be pulled in and out of the washing machine main body; a liquid agent container cover configured to cover the top face of the liquid agent container; and a water feeding unit configured to feed water into the liquid agent container from above. The liquid agent container cover includes an opening, the opening
15 being located below the water feeding unit when the liquid agent container is accommodated in the washing machine main body. The water feeding unit is configured to feed water into the liquid agent container through the opening.

Citation List

20 [0004] Patent Literature 1: Chinese Utility Model Registration No. 20644806

SUMMARY

[0005] The conventional configuration has a problem that, when a washing operation is started with the liquid agent container pulled out of the washing machine main body, water
25 supplied into the liquid agent container leaks out of the washing machine.

[0006] The present disclosure provides a washing machine capable of preventing water leaks from a liquid agent container in a simple configuration.

[0007] The washing machine according to the present disclosure includes: a liquid agent container accommodated in an accommodating unit in a manner capable of being pulled in
30 and out of the accommodating unit; a liquid agent container cover configured to cover the top face of the liquid agent container; and a water feeding unit configured to feed water into the liquid agent container from above. The liquid agent container cover includes: an opening located below the water feeding unit in a state in which the liquid agent container is accommodated in the accommodating unit; and a first rib formed in the top face of the

liquid agent container cover. The first rib is disposed to cover a lateral side of the water feeding unit when the liquid agent container is pulled out of the accommodating unit.

[0008] The washing machine according to the present disclosure is capable of preventing water leaks from the liquid agent container in the simple configuration.

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BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a longitudinal cross-sectional diagram of a front-loading washing machine according to a first embodiment.

10 FIG. 2 is an exploded perspective view of a liquid agent container unit of the front-loading washing machine according to the first embodiment.

FIG. 3 is a perspective view of the liquid agent container unit of the front-loading washing machine according to the first embodiment.

FIG. 4 is an exploded perspective view of an accommodating unit of the front-loading washing machine according to the first embodiment.

15 FIG. 5A is a perspective view of the back side of a water feeding cover of the front-loading washing machine according to the first embodiment.

FIG. 5B is an enlarged view of section A in FIG. 5A.

20 FIG. 6 is a cross-sectional diagram illustrating a state in which the liquid agent container unit of the front-loading washing machine according to the first embodiment is accommodated in the accommodating unit.

FIG. 7 is a cross-sectional diagram taken along line 7-7 in FIG. 6.

FIG. 8 is a cross-sectional diagram illustrating a state in which the liquid agent container unit of the front-loading washing machine according to the first embodiment is pulled out of the accommodating unit.

25 FIG. 9A is a cross-sectional diagram taken along line 9A-9A in FIG. 8.

FIG. 9B is an enlarged view of section B in FIG. 9A.

FIG. 10A is a cross-sectional diagram of a third rib in a state in which the liquid agent container unit of the front-loading washing machine according to the first embodiment is pulled out of the accommodating unit.

30 FIG. 10B is an enlarged view of section C in FIG. 10A.

DETAILED DESCRIPTIONS

[0010] Hereinafter, embodiments will be described in detail with reference to the drawings. Note that the present invention is not limited by the accompanying drawings

and the following descriptions.

[0011] (First Embodiment)

(Configuration of Washing Machine)

FIG. 1 is a longitudinal cross-sectional diagram of a front-loading washing machine according to a first embodiment. FIG. 2 is an exploded perspective view of a liquid agent container unit of the front-loading washing machine according to the first embodiment. FIG. 3 is a perspective view of the liquid agent container unit of the front-loading washing machine according to the first embodiment. FIG. 4 is an exploded perspective view of an accommodating unit of the front-loading washing machine according to the first embodiment. FIG. 5A is a perspective view of the back side of a water feeding cover of the front-loading washing machine according to the first embodiment. FIG. 5B is an enlarged view of section A in FIG. 5A. Note that cover 43 described later is omitted in FIG. 4.

[0012] As illustrated in FIG. 1, water tub 103 swingably and elastically supported by a vibration isolator (not illustrated) is disposed inside casing 102 constituting an outer shell of the front-loading washing machine according to the present embodiment, and rotating drum 104 configured to be loaded with the laundry is rotatably disposed inside water tub 103.

[0013] In the upper part of casing 102, detergent supply pipe 2 is disposed. Detergent supply pipe 2 includes: liquid agent container unit 22 configured to hold a detergent; water supply channel 131 connected to water supply valve 107 and configured to supply water to liquid agent container unit 22; and accommodating unit 21 configured to accommodate liquid agent container 23 constituting liquid agent container unit 22 so that liquid agent container 23 can be freely pulled out from the front. Detergent supply pipe 2 is formed so that the longitudinal direction of detergent supply pipe 2 is in agreement with the front-rear direction of casing 102.

[0014] The upper part of accommodating unit 21 is coupled to water feeding cover 25. Accommodation space 24 is formed between the bottom of water feeding cover 25 and frame 44 (see FIG. 4). Liquid agent container unit 22 is accommodated inside accommodation space 24 configured to be pulled in and out of accommodation space 24. Note that liquid agent container unit 22 is configured not to be allowed to be pulled out of accommodating unit 21 in excess of a degree that a detergent can be charged into liquid agent compartment 29 (see FIG. 8). This is because, if liquid agent container unit 22 is configured to be allowed to be pulled out in excess of that degree, liquid agent container

unit 22 comes off accommodating unit 21, and makes a user feel inconvenient.

[0015] In the front bottom part of accommodating unit 21, outlet port 26 through which a detergent fed into liquid agent container unit 22 is discharged is disposed. Outlet port 26 communicates with water tub 103 via detergent supply channel 141 and water-tub water supply channel 126. Together with supplied water, the detergent is supplied to water tub 103 via outlet port 26, detergent supply channel 141, and water-tub water supply channel 126.

[0016] Liquid agent container unit 22 includes: liquid agent container 23; and liquid agent container cover 31 disposed to cover the upper part of liquid agent container 23.

Liquid agent container 23 includes: liquid agent compartment 29 into which a liquid agent in the amount required for one washing operation is charged; and tank 50 configured to store the liquid agent in the amount required for a plurality of washing operations. The liquid agent stored in tank 50 is charged into water tub 103 by a liquid agent automatic feeding device which is not illustrated.

[0017] Liquid agent container cover 31 includes: opening 35 facing liquid agent compartment 29; and tank cover 51 configured to openably and closably cover the top of tank 50.

[0018] On the top face of liquid agent container cover 31, first ribs 32 are disposed to stand in two columns along the longitudinal direction of liquid agent container cover 31.

First ribs 32 in two columns are formed respectively at the lateral sides of inner recess 34 having a recess shape and disposed behind opening 35.

[0019] On the top face of liquid agent container cover 31, a plurality of third ribs 33 is disposed to stand in outer part 36, which is the outside face of each of first ribs 32 in two columns, in the direction approximately perpendicular to first ribs 32.

[0020] Accommodating unit 21 includes: connection port 27a, 28a to water supply channel 131 connected to water supply valve 107; approximately U-shaped frame 44; coupling ports 27b, 28b configured to connect to and communicate with connection ports 27a, 28a, respectively; and water feeding cover 25. Water feeding cover 25 includes cover 43 (omitted in FIG. 4, see FIG. 6 and FIG. 7) integrally joined to water feeding cover 25, and a space formed by this joining serves as a water channel from water supply channel 131.

[0021] In the back face of water feeding cover 25, that is, the bottom face of water feeding cover 25, a plurality of water feeding holes 41 is formed in two columns in the longitudinal direction of water feeding cover 25. Around each of water feeding holes 41,

second rib 42 stands to surround the three sides of water feeding hole 41. Second rib 42 is formed so that a lateral-side face thereof is inclined. Water feeding hole 41 and second rib 42 constitute a water feeding unit. Note that the water feeding unit according to the present disclosure is not limited to a configuration including a rib (second rib 42 in the present embodiment) configured to guide water passing through a water feeding hole (water feeding hole 41 in the present embodiment).

[0022] FIG. 6 is a cross-sectional diagram illustrating a state in which the liquid agent container unit of the front-loading washing machine according to the first embodiment is accommodated in the accommodating unit. FIG. 7 is a cross-sectional diagram taken along line 7-7 in FIG. 6.

[0023] As illustrated in FIG. 6 and FIG. 7, with liquid agent container unit 22 accommodated in accommodating unit 21, water feeding holes 41 of water feeding cover 25 are disposed above opening 35. With this configuration, water fed through water feeding holes 41 is smoothly fed into liquid agent compartment 29 via opening 35 of liquid agent container cover 31. Furthermore, second rib 42 constituting the water feeding unit together with water feeding hole 41 guides water to the center of opening 35 through the use of the inclined face on the lateral side of second rib 42.

[0024] Water feeding holes 41 are disposed in two columns so that the faces, toward the open side, of second ribs 42 face each other. First ribs 32 formed in liquid agent container cover 31 are located outside second ribs 42. The upper edges of first ribs 32 are located above the lower edges of second ribs 42.

[0025] Operations of the front-loading washing machine having the above-described configuration will be described below.

[0026] (Water Feeding Operation)

FIG. 8 is a cross-sectional diagram illustrating a state in which the liquid agent container unit of the front-loading washing machine according to the first embodiment is pulled out of the accommodating unit. FIG. 9A is a cross-sectional diagram taken along line 9A-9A in FIG. 8. FIG. 9B is an enlarged view of section B in FIG. 9A. FIG. 10A is a cross-sectional diagram of the third rib in a state in which the liquid agent container unit of the front-loading washing machine according to the first embodiment is pulled out of the accommodating unit. FIG. 10B is an enlarged view of section C in FIG. 10A.

[0027] When a water feeding operation is carried out, water fed through water feeding holes 41 is guided by second ribs 42 each surrounding three sides of a corresponding one of water feeding holes 41, and thereby falls into opening 35.

[0028] When the operation is carried out in a state in which liquid agent container unit 22 is pulled out of accommodating unit 21, water feeding holes 41 of water feeding cover 25 are located behind opening 35 of liquid agent container cover 31 of liquid agent container unit 22.

5 [0029] When water is fed in a state in which liquid agent container unit 22 is pulled out of accommodating unit 21, fed water is guided by second ribs 42 and falls into inner recess 34. Second ribs 42 regulate the direction of water to prevent the water from scattering around the perimeter of inner recess 34. Furthermore, each of first ribs 32 is disposed so as to cover the lower portion of the lateral side of a corresponding one of second ribs 42 when
10 liquid agent container unit 22 is pulled out of accommodating unit 21. In other words, each of first ribs 32 formed in liquid agent container cover 31 is located outside a corresponding one of second ribs 42, and the upper edge of first rib 32 is located above the lower edge of second rib 42. Accordingly, two first ribs 32 disposed to stand on liquid agent container cover 31 in the longitudinal direction of liquid agent container cover 31
15 substantially prevent water having fallen into inner recess 34 from getting over first ribs 32 and flowing out toward the lateral side. Water having fallen into inner recess 34 disposed between first ribs 32 flows down to liquid agent compartment 29 of liquid agent container 23 via opening 35.

[0030] Note that, even when water fed through water feeding holes 41 flows out to outer
20 part 36 located outside first ribs 32, the water is dammed up by a plurality of third ribs 33 disposed to stand in a direction approximately perpendicular to first rib 32. The dammed-up water is guided to the lateral sides, that is, the right and left sides by third ribs 33, and flows from accommodation space 24 of accommodating unit 21 to outlet port 26.

[0031] (Effects)

25 As described above, the front-loading washing machine according to the present embodiment includes: liquid agent container 23 accommodated in accommodating unit 21 configured to be pulled in and out of accommodating unit 21; liquid agent container cover 31 configured to cover the top face of liquid agent container 23; and water feeding holes 41 through which water is fed into liquid agent container 23 from above. Liquid agent
30 container cover 31 includes: opening 35 located below water feeding holes 41 when liquid agent container 23 is accommodated in accommodating unit 21; and first ribs 32 formed in the top face of liquid agent container cover 31. First ribs 32 are disposed to cover the lateral side of water feeding holes 41 when liquid agent container 23 is pulled out of accommodating unit 21.

[0032] With this configuration, first ribs 32 prevent water fed through water feeding holes 41 from flowing out to the lateral sides of liquid agent container cover 31 when liquid agent container 23 is pulled out of accommodating unit 21.

[0033] Accordingly, water leaks from liquid agent container 23 can be substantially prevented in a simple configuration.

[0034] As described in the present embodiment, first ribs 32 may be formed along a direction in which liquid agent container 23 is pulled out, and may extend toward opening 35.

[0035] With this configuration, first ribs 32 can guide water fed into the liquid agent container cover to opening 35 when liquid agent container 23 is pulled out of the accommodating unit.

[0036] Accordingly, water leaks from liquid agent container 23 can be substantially prevented in a simple configuration.

[0037] As described in the present embodiment, second ribs 42 formed, as a part of the water feeding unit, to cover at least the lateral side may be provided.

[0038] With this configuration, second ribs 42 can substantially prevent water fed through water feeding holes 41 from flowing out to the lateral side, and guide the water to fall inside first ribs 32.

[0039] Accordingly, water leaks from liquid agent container 23 can be substantially prevented in a simple configuration.

[0040] As described in the present embodiment, the lower edge of second rib 42 may extend below the upper edge of first rib 32 and be located inside the upper edge of first rib 32.

[0041] With this configuration, it is difficult for fed water to get over first ribs 32, whereby the water can be substantially prevented from flowing out to the top face of liquid agent container cover 31.

[0042] Accordingly, water leaks from liquid agent container 23 can be substantially prevented in a simple configuration.

[0043] As described in the present embodiment, in the top face of liquid agent container cover 31, third rib 33 may be disposed at a position on the lateral side of first rib 32 so as to be non-parallel to the direction along which first rib 32 extends.

[0044] With this configuration, third rib 33 dams up water having got over first rib 32 and flown to the top face of liquid agent container cover 31, and also causes the water to flow toward the lateral side, whereby the water flowing out to the top face of liquid agent

container cover 31 can be prevented from flowing out of the washing machine.

[0045] Accordingly, water leaks from liquid agent container 23 can be substantially prevented in a simple configuration.

[0046] As described in the present embodiment, liquid agent container 23 may include:

5 tank 50 configured to store a liquid agent in the amount required for a plurality of washing operations; and liquid agent compartment 29 into which the liquid agent in the amount required for one washing operation is charged. Liquid agent container cover 31 may cover the top face of tank 50, and opening 35 may be disposed to face liquid agent compartment 29.

10 [0047] With this configuration, the top face of tank 50 configured to store a liquid agent in the amount required for a plurality of washing operations can be covered with liquid agent container cover 31, and furthermore water can be fed into liquid agent compartment 29 through opening 35.

[0048] Accordingly, integrally-structured liquid agent container 23 can be provided with
15 tank 50 configured to store a liquid agent in the amount required for a plurality of washing operations and liquid agent compartment 29 into which the liquid agent in the amount required for one washing operation is charged.

[0049] (Other Embodiments)

The first embodiment was described above to illustrate the technology of the
20 present disclosure. However, the technology of the present disclosure is not limited by the first embodiment.

[0050] Therefore, other embodiment will be described below.

[0051] In the first embodiment, the front-loading washing machine was described as an example of a washing machine. The washing machine beneficially includes a liquid agent
25 container. Therefore, the washing machine is not limited to a front-loading washing machine, but may be a top-loading washing machine or may be a twin-tub washing machine.

[0052] In the first embodiment, a plurality of third ribs 33 extending approximately perpendicular to first rib 32 was described as an example of the third rib. The third ribs are
30 beneficially in non-parallel to the direction along which the first rib extends. Therefore, the structure of the third ribs is not limited to a linear structure approximately perpendicular to the first rib. For example, the third rib may have a bent structure or a curved structure. Note that the third ribs 33 extending approximately perpendicular to first rib 32 illustrated in the first embodiment is capable of preventing water from flowing

forward, and also capable of guiding water to the lateral sides, hence has a higher effect of substantially preventing water from going out of the washing machine.

INDUSTRIAL APPLICABILITY

- 5 **[0053]** The present disclosure is applicable to a washing machine including a liquid agent drawer. Specifically, the present disclosure is applicable to, for example, a top-loading washing machine, a front-loading washing machine, or a twin-tub washing machine.

REFERENCE MARKS IN THE DRAWINGS

- 10 **[0054]** 21...accommodating unit
 22...liquid agent container unit
 23...liquid agent container
 24...accommodation space
 25...water feeding cover
15 29...liquid agent compartment
 31...liquid agent container cover
 32...first rib
 33...third rib
 34...inner recess
20 35...opening
 36...outer part
 41...water feeding hole (water feeding unit)
 42...second rib (water feeding unit)
 50...tank
25 102...casing
 103...water tub
 104...rotating drum

WHAT IS CLAIMED IS:

1. A washing machine, comprising:

a liquid agent container accommodated in an accommodating unit included in the

5 washing machine, configured to be pulled in and out of the accommodating unit;

a liquid agent container cover configured to cover a top face of the liquid agent container; and

a water feeding unit configured to feed water into the liquid agent container from above,

10 wherein the liquid agent container cover includes:

a first rib formed in a top face of the liquid agent container cover; and

an opening located below the water feeding unit when the liquid agent container is accommodated in the accommodating unit, and

15 wherein the first rib is disposed at a position to cover a lateral side of the water feeding unit when the liquid agent container is pulled out of the accommodating unit.

2. The washing machine according to claim 1,

20 wherein the first rib is formed along a direction in which the liquid agent container is pulled out, and the first rib extends toward the opening.

3. The washing machine according to claim 1,

25 wherein the water feeding unit includes a second rib formed to cover the lateral side of the water feeding unit.

4. The washing machine according to claim 2,

30 wherein the water feeding unit includes a second rib formed to cover the lateral side of the water feeding unit.

5. The washing machine according to claim 3,

wherein a lower edge of the second rib extends below an upper edge of the first

rib, and is located inside the upper edge of the first rib.

6. The washing machine according to claim 4,
5 wherein a lower edge of the second rib extends below an upper edge of the first rib, and is located inside the upper edge of the first rib.

7. The washing machine according to any one of claims 1 to 6,
10 wherein, in the top face of the liquid agent container cover, a third rib is disposed at a position on a lateral side of the first rib to be non-parallel to a direction in which the first rib extends.

15 8. The washing machine according to any one of claims 1 to 6,
wherein the liquid agent container includes:
a tank configured to store a liquid agent in an amount required for a plurality of washing operations; and
a liquid agent compartment into which the liquid agent in an amount
20 required for one washing operation is charged,
wherein the liquid agent container cover covers a top of the tank, and the opening is disposed to face the liquid agent compartment.

25 9. The washing machine according to claim 7,
wherein the liquid agent container includes:
a tank configured to store a liquid agent in an amount required for a plurality of washing operations; and
a liquid agent compartment into which the liquid agent in an amount
30 required for one washing operation is charged,
wherein the liquid agent container cover covers a top of the tank, and the opening is disposed to face the liquid agent compartment.