

DESCRIPTION

WASHING MACHINE

5 TECHNICAL FIELD

The present invention relates to a washing machine that washes clothes.

BACKGROUND ART

10 A conventional washing machine includes a washing tub that is open at a top, a housing that houses the washing tub, and an operation panel that receives an operation command concerning an operation content of the washing machine. The housing includes a front wall that faces a user and a top wall provided with a load opening that allows the user to load clothes into
15 the washing tub. The top wall includes a front end which forms a corner part with a front wall, and a rear end at an opposite side of the front end. An operation panel may be provided on the front wall of the top wall.

When the operation panel is provided on the front wall, the washing machine has to be designed such that the distance between the front end of the
20 top wall and the load opening is increased. Thus, the load opening on the top wall is away from the front wall. Therefore, when loading clothes into the washing tub and/or removing clothes out of the washing tub, the user may suffer inconvenience. Further, wet clothes are transferred across the region where the operation panel is provided. As a result, an electric failure might
25 occur in a circuit provided in the operation panel due to water dripping from the clothes.

To solve the above problem, a washing machine including an operation

panel provided near a rear end of a top wall has conventionally been proposed (see, for example, PTL 1). Since the operation panel is provided near the rear end, a washing tub can be provided near a front wall of the top wall. Thus, the user can easily load clothes into the washing tub, and easily remove clothes out of the washing tub.

However, a washing machine is generally configured such that a water supply port for supplying water to a washing tub is provided near a rear end of a top wall. Therefore, the configuration in which an operation panel is provided near the rear end of the top wall as in the washing machine described in PTL 1 has a problem of being likely to cause an electric failure in a circuit provided in the operation panel due to leaked water from the water supply port.

Citation List

Patent Literature

PTL 1: Unexamined Japanese Patent Publication No. 2005-519712

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SUMMARY OF THE INVENTION

The present invention provides a washing machine that hardly causes an electric failure.

Specifically, the washing machine according to the present invention washes clothes. The washing machine includes: a housing including a top wall, the top wall having a front end and a rear end at an opposite side of the front end; a cover member that partially covers the top wall; a receiving unit that receives an operation command concerning an operation content of the washing machine; and a water supply port to supply water into the housing. The cover member has an opening from which the water supply port is exposed. The receiving unit is mounted on the cover member.

With this configuration, the opening from which the water supply port

is exposed is formed in the cover member that partially covers the top wall. Therefore, water leaked from the water supply port is deposited on the cover member and/or the top wall. Since the receiving unit is mounted on the cover member, water deposited on the cover member and/or the top wall does not
5 enter the receiving unit. Thus, a washing machine that hardly causes an electric failure can be implemented.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1A is a schematic perspective view of a washing machine
10 according to a first exemplary embodiment of the present invention.

FIG. 1B is a schematic perspective view of the washing machine according to the first exemplary embodiment.

FIG. 2 is a schematic sectional view of the washing machine illustrated in FIGS. 1A and 1B.

15 FIG. 3 is an enlarged sectional view of a portion around a cover member of the washing machine illustrated in FIG. 2.

FIG. 4 is a schematic perspective view of a washing machine according to a second exemplary embodiment of the present invention.

20 FIG. 5 is a schematic front view of an upper housing of the washing machine illustrated in FIG. 4.

FIG. 6 is a schematic perspective view of the upper housing illustrated in FIG. 5.

FIG. 7 is a schematic perspective view of a lid mounted on the upper housing illustrated in FIG. 5.

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DESCRIPTION OF EMBODIMENTS

A washing machine according to the exemplary embodiments of the

present invention will be described below with reference to the drawings. Note that the present invention is not limited by the present exemplary embodiments. In addition, the terms used below and indicating directions such as “upper,” “lower,” “left,” and “right” are merely used for clarifying the description. Therefore, these terms should not be construed to be limitative. Further, the washing machine according to the present exemplary embodiments may have a drying function as well as a washing function for washing clothes. In addition, various functions accompanying the washing function are not intended to limit the principle of the exemplary embodiments described below.

FIRST EXEMPLARY EMBODIMENT

A washing machine according to a first exemplary embodiment of the present invention will be described below with reference to FIGS. 1A and 1B.

FIGS. 1A and 1B are schematic perspective views of the washing machine according to the first exemplary embodiment of the present invention.

As illustrated in FIGS. 1A and 1B, washing machine 100 according to the present exemplary embodiment includes at least housing 200, washing tub 300, cover member 400, operation unit 500, lid 600, hinge structure 700, water supply port 800, and the like. Housing 200 includes front wall 210, rear wall 220, left wall 230, right wall 240, and top wall 250. Front wall 210 is disposed to face a user using washing machine 100. Rear wall 220 erects at an opposite side of front wall 210. Left wall 230 erects between front wall 210 and rear wall 220. Right wall 240 erects at an opposite side of left wall 230. Top wall 250 is enclosed by upper ends of front wall 210, rear wall 220, left wall 230, and right wall 240.

Further, top wall 250 of housing 200 includes front end 251, rear end 252, left end 253, and right end 254. Note that front end 251 of top wall 250

may be a corner line formed between top wall 250 and front wall 210. Rear end 252 may be a corner line formed between top wall 250 and rear wall 220. Left end 253 may be a corner line formed between top wall 250 and left wall 230. Right end 254 may be a corner line formed between top wall 250 and
5 right wall 240.

Washing tub 300 is open at a top in housing 200, and is housed in housing 200. Washing tub 300 performs a washing operation for washing clothes. It is to be noted that the washing operation is not limited to a particular washing operation, so long as it is an operation performed by a
10 washing tub of a known washing machine.

Further, load opening 255 is formed in top wall 250 of housing 200. A user can load clothes into washing tub 300 from load opening 255.

Lid 600 is provided on top wall 250 so as to be vertically pivotable through hinge structure 700. That is, hinge structure 700 pivotally supports
15 lid 600. It is to be noted that lid 600 illustrated in FIG. 1A is in an open position for exposing top wall 250. Lid 600 illustrated in FIG. 1B is in a close position for covering top wall 250 between cover member 400 and front end 251.

Cover member 400 partially covers top wall 250 between load opening
20 255 in top wall 250 and rear end 252. Cover member 400 includes rear region 410, front region 420, left region 430, and right region 440.

Water supply port 800 is formed to be exposed from opening 410a formed in rear region 410 of cover member 400, and a hose or the like attached to a faucet is connected thereto. Water supplied to water supply port 800 flows
25 into washing tub 300 in housing 200, and clothes are washed with the water.

Front region 420 of cover member 400 is formed closer to rear end 252 than to front end 251 of top wall 250, thereby forming ridge line 401 in

conjunction with rear region 410. Rear region 410 of cover member 400 is extended between ridge line 401 and rear end 252 of top wall 250. In this case, rear region 410 is disposed to tilt downward from ridge line 401 to rear end 252 of top wall 250 by about 30°, for example. In addition, front region 420 of
5 cover member 400 is disposed to tilt downward from ridge line 401 to front end 251 of top wall 250. Note that, in the present exemplary embodiment, a first region is illustrated as rear region 410, and a second region is illustrated as front region 420.

Operation unit 500 includes a plurality of buttons 510 and display 520.
10 The plurality of buttons 510 and display 520 are provided on front region 420 constituting the first region of cover member 400 so as to be exposed in front region 420.

Further, operation unit 500 receives an operation command concerning an operation content of washing machine 100. Therefore, a user can issue
15 various operation commands to washing machine 100 by inputting the commands through the plurality of buttons 510. Display 520 displays an input content issued by the user, for example. Therefore, the user can instruct washing machine 100 to start the washing operation by operating the plurality of buttons 510. The operation command that can be issued to washing
20 machine 100 by the user may be similar to an operation command that can be issued to a known washing machine, and it is not limited to a specific operation command. In the present exemplary embodiment, a receiving unit is illustrated as operation unit 500, and an input unit is illustrated as the plurality of buttons 510.

25 Hinge structure 700 includes left rib 710 and right rib 720. Left rib 710 protrudes from top wall 250 of housing 200 at a left of cover member 400. Right rib 720 protrudes from top wall 250 of housing 200 at a right of cover

member 400.

Lid 600 includes left arm plate 610, right arm plate 620, and main plate 630. Left arm plate 610 is provided between left rib 710 of hinge structure 700 and cover member 400. Right arm plate 620 is provided between
5 right rib 720 of hinge structure 700 and cover member 400. Main plate 630 includes front plate 631 and rear plate 632. Rear plate 632 is connected to left arm plate 610 and right arm plate 620 of lid 600. Front plate 631 is pivotally connected to rear plate 632.

When lid 600 is in the close position illustrated in FIG. 1B, main plate
10 630 of lid 600 closes load opening 255 of top wall 250. When lid 600 is in the open position illustrated in FIG. 1A, the plurality of buttons 510 on operation unit 500 is exposed in a space enclosed by left arm plate 610 and right arm plate 620 of lid 600 and rear plate 632 of main plate 630.

Next, the configuration of the washing machine according to the
15 present exemplary embodiment will further be described with reference to FIGS. 2 and 3.

FIG. 2 is a schematic sectional view of the washing machine illustrated in FIGS. 1A and 1B. FIG. 3 is an enlarged sectional view of a portion around the cover member of the washing machine illustrated in FIG. 2.

As illustrated in FIG. 2, washing tub 300 includes outer tub 310, inner tub 320, and a motor (not illustrated). The motor rotates inner tub 320 provided in outer tub 310. Front region 420 of cover member 400 is provided to partially overlap washing tub 300.
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As illustrated in FIG. 3, front region 420 of cover member 400 on which
25 operation unit 500 is mounted is disposed further away from top wall 250 of housing 200 than rear region 410 of cover member 400 from which water supply port 800 in opening 410a is exposed. Therefore, even if water is leaked

from water supply port 800, the leaked water hardly enters operation unit 500 and comes into contact with circuit board 530. Consequently, the occurrence of an electric failure of operation unit 500 can be prevented.

Further, operation unit 500 includes circuit board 530 and holding
5 cover 540. Circuit board 530 converts an operation command, which is input by a user's operation on the plurality of buttons 510, into an electric signal. Holding cover 540 is attached to front region 420 of cover member 400 between cover member 400 and top wall 250 of housing 200 to hold circuit board 530. Holding cover 540 also forms, in conjunction with front region 420 of cover
10 member 400, closed space 541. Circuit board 530 is fixed in closed space 541. Note that, in the present exemplary embodiment, a holding unit is illustrated as holding cover 540, and an accommodation space is illustrated as closed space 541.

With the above configuration, the washing machine according to the
15 present exemplary embodiment can prevent an occurrence of an electric failure of an operation panel, even if water is leaked from the water supply port. Consequently, a washing machine having excellent reliability can be implemented.

SECOND EXEMPLARY EMBODIMENT

20 A configuration of a washing machine according to a second exemplary embodiment of the present invention will be described with reference to FIG. 4.

FIG. 4 is a schematic perspective view of the washing machine according to the second exemplary embodiment of the present invention. Note that the reference numerals commonly used in the first and second exemplary
25 embodiments indicate that the elements with the common reference numerals have the same function as those in the first exemplary embodiment. Therefore, the descriptions for the similar elements in the first exemplary embodiment

are used for the descriptions of the second exemplary embodiment.

As illustrated in FIG. 4, washing machine 100A according to the present exemplary embodiment includes operation unit 500, housing 200A, projection section 270, and the like. Various operation commands are input to washing machine 100A by a user's operation on operation unit 500.

Further, housing 200A includes upper housing 201 and lower housing 202. Upper housing 201 is mounted on lower housing 202. Upper housing 201 includes top wall 260. Operation unit 500 is mounted on projection section 270 formed at a rear of load opening 265 formed in top wall 260.

The configuration of the washing machine according to the present exemplary embodiment will further be described below with reference to FIGS. 5 and 6, also with reference to FIG. 4.

FIG. 5 is a schematic front view of the upper housing of the washing machine illustrated in FIG. 4. FIG. 6 is a schematic perspective view of upper housing 201 illustrated in FIG. 4.

As illustrated in FIGS. 4 to 6, washing machine 100A according to the present exemplary embodiment includes lid 600A and hinge structure 700A. Hinge structure 700A is provided on top wall 260 of upper housing 201.

As in the first exemplary embodiment, lid 600A includes main plate 630. Lid 600A also includes left arm plate 610A and right arm plate 620A. Left arm plate 610A and right arm plate 620A are provided to protrude toward hinge structure 700A from rear plate 632 of main plate 630.

Hinge structure 700A includes left rib 710 and right rib 720. Left arm plate 610A of lid 600A is inserted between projection section 270 and left rib 710. Right arm plate 620A of lid 600A is inserted between projection section 270 and right rib 720.

Hinge structure 700A further includes left shaft 711 and right shaft

721. Left shaft 711 is provided to protrude toward left rib 710 from left region 280 of projection section 270. Right shaft 721 is provided to protrude toward right rib 720 from right region 290 of projection section 270.

Left arm plate 610A of lid 600A includes left opposed surface 611 facing
5 left region 280 of projection section 270. Right arm plate 620A includes right opposed surface 621 facing right region 290 of projection section 270.

Washing machine 100A according to the present exemplary embodiment is configured as described above.

A connection technique of the lid in the washing machine according to
10 the present exemplary embodiment will be described below with reference to FIG. 7, also with reference to FIGS. 5 and 6.

FIG. 7 is a schematic perspective view of the lid mounted on the upper housing illustrated in FIG. 5.

As illustrated in FIGS. 5 to 7, left slit 612 is formed in left opposed
15 surface 611 of left arm plate 610A of lid 600A. A lower end of left slit 612 is open. Left shaft 711 of hinge structure 700A is inserted into left slit 612. It is to be noted that in the present exemplary embodiment, a left slit surface is illustrated as left opposed surface 611.

In addition, right slit 622 is formed in right opposed surface 621 of
20 right arm plate 620A of lid 600A. A lower end of right slit 622 is open. Right shaft 721 of hinge structure 700A is inserted into right slit 622. It is to be noted that in the present exemplary embodiment, a right slit surface is illustrated as right opposed surface 621.

As described above, lid 600A in the present exemplary embodiment is
25 connected to upper housing 201.

In the above exemplary embodiment, left shaft 711 and right shaft 721 of hinge structure 700A are respectively provided on left region 280 and right

region 290 of projection section 270 formed on top wall 260 of upper housing 201. However, the configuration is not limited thereto. For example, left shaft 711 and right shaft 721 of hinge structure 700A may respectively be provided on left region 430 and right region 440 of cover member 400 in the first
5 exemplary embodiment. This configuration can provide a similar effect.

As described above, the washing machine according to the present invention includes: a housing including a top wall, the top wall having a front end and a rear end at an opposite side of the front end; a cover member that partially covers the top wall; a receiving unit that receives an operation
10 command concerning an operation content of the washing machine; and a water supply port to supply water into the housing. The cover member has an opening from which the water supply port is exposed. The receiving unit may be mounted on the cover member.

With this configuration, the opening from which the water supply port
15 is exposed is formed in the cover member that partially covers the top wall. Therefore, water leaked from the water supply port is deposited on the cover member and/or the top wall. Since the receiving unit is mounted on the cover member, water deposited on the cover member and/or the top wall does not enter the receiving unit. Thus, a washing machine that hardly causes an
20 electric failure in the receiving unit or the like can be implemented.

In addition, in the washing machine according to the present invention, the receiving unit includes an input unit to which the operation content is input, a circuit board that converts the operation content into an electric signal, and a holding unit that holds the circuit board. The holding unit may form, in
25 conjunction with a front region of the cover member, an accommodation space in which the circuit board is accommodated.

With this configuration, the circuit board that converts the operation

content into an electric signal is disposed in the accommodation space formed by the holding unit and the front region of the cover member. Thus, the circuit board is protected from water, which may enter from an outside, by the holding unit and the front region of the cover member.

5 In addition, in the washing machine according to the present invention, the receiving unit is provided closer to the rear end than to the front end on the top wall, the water supply port is provided between the receiving unit and the rear end, and the cover member includes a first region in which the opening is formed and a second region that forms a ridge line in conjunction
10 with the first region. The holding unit may be mounted on the second region, and the first region may tilt downward toward the rear end.

 With this configuration, the second region forms a ridge line in conjunction with the first region, and the first region is provided to tilt downward toward the rear end of the top wall. Thus, water is hardly
15 deposited on the second region on which the holding unit is mounted.

 The washing machine according to the present invention further includes a washing tub that is open at a top in the housing and performs a washing operation for washing clothes; a lid that vertically pivots between a close position and an open position, the close position being a position for
20 covering the top wall between the cover member and the front end, and the open position being a position for exposing the top wall; and a hinge structure that pivotally supports the lid. The top wall may have a load opening from which clothes are loaded into the washing tub, and the first region may tilt downward toward the front end of the top wall and may be provided to
25 partially overlap the washing tub.

 With this configuration, the first region tilts downward toward the front end, and partially overlaps the washing tub. Thus, water deposited on

the first region of the cover member directly flows down into the washing tub. Consequently, intrusion of water into the receiving unit can be prevented.

Further, in the washing machine according to the present invention, the hinge structure has a left rib protruding from the top wall at a left of the cover member and a right rib protruding from the top wall at a right of the cover member. In addition, the lid includes a left arm plate disposed between the left rib and the cover member, a right arm plate disposed between the right rib and the cover member, and a main plate connected to the left arm plate and the right arm plate. The washing machine may be configured such that, when the lid is in the close position, the main plate closes the load opening, and when the lid is in the open position, the input unit is exposed in a space enclosed by the right arm plate, the left arm plate, and the main plate.

With this configuration, when the lid is in the open position, the input unit is exposed in the space enclosed by the right arm plate, the left arm plate, and the main plate. Thus, a user can input an operation command through the operation unit independently of the position of the lid.

Further, in the washing machine according to the present invention, the hinge structure has a left shaft protruding from the cover member toward the left rib and a right shaft protruding from the cover member toward the right rib. The left arm plate opposes the cover member, and includes a left slit surface having a left slit into which the left shaft is inserted. In addition, the right arm plate opposes the cover member, and includes a right slit surface having a right slit into which the right shaft is inserted. The left slit and the right slit may each have an opening end.

With this configuration, the left slit and the right slit each have an opening end. Accordingly, the lid can easily be attached to the housing during the manufacture of the washing machine. Thus, productivity can be enhanced.

In addition, the washing machine according to the present invention includes: a housing including a top wall, the top wall having a front end and a rear end at an opposite side of the front end and being provided with an load opening from which clothes are loaded; and a receiving unit that receives an
5 operation command concerning an operation content of the washing machine. The washing machine also includes a water supply port to supply water into the housing; a lid that vertically pivots between a close position for closing the load opening and an open position for opening the load opening; and a hinge structure that pivotally supports the lid. The top wall has a raised projection
10 section between the load opening and the rear end. The receiving unit is provided on the projection section. The hinge structure has a left rib protruding from the top wall at a left of the projection section, a right rib protruding from the top wall at a right of the projection section, a left shaft protruding from the projection section toward the left rib, and a right shaft
15 protruding from the projection section toward the right rib. The lid includes a left arm plate disposed between the left rib and the projection section, and a right arm plate disposed between the right rib and the projection section. The left arm plate opposes the projection section, and includes a left slit surface having a left slit into which the left shaft is inserted. The right arm plate
20 opposes the projection section, and includes a right slit surface having a right slit into which the right shaft is inserted. The left slit and the right slit may each have an opening end.

With this configuration, the left slit and the right slit each have an opening end. Accordingly, the lid can easily be attached to the housing during
25 the manufacture of the washing machine. Thus, productivity can be enhanced.

INDUSTRIAL APPLICABILITY

The present invention is preferably applicable to various devices having a washing function.

REFERENCE MARKS IN THE DRAWINGS

5	100, 100A	washing machine
	200, 200A	housing
	201	upper housing
	202	lower housing
	210	front wall
10	220	rear wall
	230	left wall
	240	right wall
	250, 260	top wall
	251	front end
15	252	rear end
	253	left end
	254	right end
	255, 265	load opening
	270	projection section
20	280, 430	left region
	290, 440	right region
	300	washing tub
	310	outer tub
	320	inner tub
25	400	cover member
	401	ridge line
	410	rear region (first region)

	410a	opening
	420	front region (second region)
	500	operation unit (receiving unit)
	510	button (input unit)
5	520	display
	530	circuit board
	540	holding cover (holding unit)
	541	closed space (accommodation space)
	600, 600A	lid
10	610, 610A	left arm plate
	611	left opposed surface (left slit surface)
	612	left slit
	620, 620A	right arm plate
	621	right opposed surface (right slit surface)
15	622	right slit
	630	main plate
	631	front plate
	632	rear plate
	700, 700A	hinge structure
20	710	left rib
	711	left shaft
	720	right rib
	721	right shaft
	800	water supply port
25		

CLAIMS

1. A washing machine for washing clothes, comprising:
a housing including a top wall, the top wall having a front end and a
5 rear end at an opposite side of the front end;
a cover member that partially covers the top wall;
a receiving unit that receives an operation command concerning an
operation content of the washing machine; and
a water supply port to supply water into the housing,
10 wherein the cover member has an opening from which the water
supply port is exposed, and
the receiving unit is mounted on the cover member.

2. The washing machine according to claim 1,
15 wherein the receiving unit includes an input unit to which the
operation content is input, a circuit board that converts the operation content
into an electric signal, and a holding unit that holds the circuit board, and
the holding unit forms, in conjunction with a front region of the cover
member, an accommodation space in which the circuit board is accommodated.

20 3. The washing machine according to claim 2,
wherein the receiving unit is provided closer to the rear end than to the
front end on the top wall,
the water supply port is provided between the receiving unit and the
25 rear end,
the cover member includes a first region in which the opening is
formed and a second region that forms a ridge line in conjunction with the first

region,

the holding unit is mounted on the second region, and

the first region tilts downward toward the rear end.

5 4. The washing machine according to claim 3, further comprising:

a washing tub that is open at a top in the housing and performs a washing operation for washing the clothes;

a lid that vertically pivots between a close position and an open position, the close position being a position for covering the top wall between
10 the cover member and the front end, and the open position being a position for exposing the top wall; and

a hinge structure that pivotally supports the lid,

wherein the top wall has a load opening from which the clothes are input into the washing tub, and

15 the first region tilts downward toward the front end of the top wall and is provided to partially overlap the washing tub.

5. The washing machine according to claim 4,

wherein the hinge structure has a left rib protruding from the top wall
20 at a left of the cover member and a right rib protruding from the top wall at a right of the cover member,

the lid includes a left arm plate disposed between the left rib and the cover member, a right arm plate disposed between the right rib and the cover member, and a main plate connected to the left arm plate and the right arm
25 plate,

the main plate closes the load opening when the lid is in the close position, and

the input unit is exposed in a space enclosed by the right arm plate, the left arm plate, and the main plate, when the lid is in the open position.

6. The washing machine according to claim 5,

5 wherein the hinge structure has a left shaft protruding from the cover member toward the left rib and a right shaft protruding from the cover member toward the right rib,

the left arm plate opposes the cover member, and includes a left slit surface having a left slit into which the left shaft is inserted,

10 the right arm plate opposes the cover member, and includes a right slit surface having a right slit into which the right shaft is inserted, and
the left slit and the right slit each have an opening end.

7. A washing machine for washing clothes, comprising:

15 a housing including a top wall, the top wall having a front end and a rear end at an opposite side of the front end and being provided with a load opening from which the clothes are loaded;

a receiving unit that receives an operation command concerning an operation content of the washing machine;

20 a water supply port to supply water into the housing,

a lid that vertically pivots between a close position for closing the load opening and an open position for opening the load opening; and

a hinge structure that pivotally supports the lid, wherein

25 the top wall has a raised projection section between the load opening and the rear end,

the receiving unit is provided on the projection section,

the hinge structure has a left rib protruding from the top wall at a left

of the projection section, a right rib protruding from the top wall at a right of the projection section, a left shaft protruding from the projection section toward the left rib, and a right shaft protruding from the projection section toward the right rib,

5 the lid includes a left arm plate disposed between the left rib and the projection section, and a right arm plate disposed between the right rib and the projection section,

 the left arm plate opposes the projection section, and includes a left slit surface having a left slit into which the left shaft is inserted,

10 the right arm plate opposes the projection section, and includes a right slit surface having a right slit into which the right shaft is inserted, and

 the left slit and the right slit each have an opening end.