

## DESCRIPTION

### DRUM-TYPE WASHING MACHINE

#### 5 TECHNICAL FIELD

[0001]

The present disclosure relates to a drum-type washing machine that carries out at least one of a washing process, a rinsing process, and a spin-drying process.

10

#### BACKGROUND ART

[0002]

A conventional drum-type washing machine of this kind has an operation display unit provided at a front part of an upper face of a main body.

15 The operation display unit has input means and display means. There is a proposal to make the operation display unit larger for improvements in visibility of the display means and operability when a user uses the input means to input types of process such as a washing process, a rinsing process, and a spin-drying process (refer to PTL 1).

20 [0003]

However, because the above conventional drum-type washing machine has the operation display unit disposed at the front part of the upper face of the main body, an opening where clothing is unloaded is provided below the operation display unit. For this reason, a heightwise space is required  
25 between the operation display unit and a water tub provided inside the main body. Accordingly, the water tub is disposed in a position that is lowered by a height of the operation display unit. Consequently, in cases where the main

body as a whole is reduced in size, the opening where clothing is unloaded is in a lower position of a front of the main body, so that ease of clothing unloading is problematically impaired.

#### Citation List

##### 5 Patent Literature

[0004]

PTL 1: Unexamined Japanese Patent Publication No. 2012-75685

#### SUMMARY OF THE INVENTION

10 [0005]

The present disclosure has been made to solve the above conventional problem and aims to provide a drum-type washing machine that can bring an opening where clothing is unloaded to a higher position for improvement of ease of clothing unloading.

15 [0006]

To solve the above conventional problem, a drum-type washing machine of the present disclosure includes a main body that has, in its front, an opening where laundry is loaded and unloaded, and a lid body that openably covers the opening of the main body. The lid body is provided with an operation display unit having an input unit and a display.

[0007]

In such a configuration, the lid body is provided with the operation display unit, so that the opening of the main body can be provided in a higher position as compared with a conventional opening. Thus, improved ease of clothing unloading is achieved.

[0008]

According to the configuration of the drum-type washing machine of

the present disclosure, the opening where laundry is loaded can be provided in the higher position, so that improved ease of laundry unloading is achieved.

## BRIEF DESCRIPTION OF DRAWINGS

5 [0009]

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

FIG. 2 is a perspective general view illustrating the drum-type washing machine with a lid body opened.

10 FIG. 3 illustrates a longitudinal section of the drum-type washing machine.

FIG. 4 is a perspective general view illustrating the drum-type washing machine with the lid body removed.

15 FIG. 5 is a perspective view of an essential part of a connection part between the lid body and a main body of the drum-type washing machine.

FIG. 6 is a perspective view of an essential part of the connection part.

FIG. 7 is a perspective view of an essential part that shows a peripheral structure of the connection part.

FIG. 8 is a perspective view of a lead wire cover.

20 FIG. 9 is a perspective view of the essential part of the connection part.

FIG. 10 is a perspective view of the essential part that shows the peripheral structure of the connection part.

FIG. 11 is a see-through perspective view of the essential part of the connection part.

25 FIG. 12 is a perspective view of the essential part of the connection part.

FIG. 13 is a sectional view of the essential part of the connection part.

FIG. 14 is a sectional view of the essential part of the connection part.

FIG. 15 is a perspective view of an operation display unit.

FIG. 16 is a perspective view of an essential part of the lid body with the operation display unit and sash members removed.

5           FIG. 17 is a perspective view of the essential part of the lid body with the sash members removed.

FIG. 18 is a perspective view of an essential part of the lid body.

FIG. 19A illustrates a longitudinal section of a peripheral structure of a protrusion.

10           FIG. 19B illustrates a longitudinal section of an essential part of the lid body.

FIG. 20 is an exploded perspective view illustrating main components of the lid body.

FIG. 21 is an exploded perspective view of the lid body.

15           FIG. 22 is an exploded perspective view illustrating an essential part of the lid body.

FIG. 23 illustrates a sectional view of an essential part of the lid body.

FIG. 24 is a plan view illustrating a handle, a coupling rod, and a latch.

FIG. 25 is a perspective view of an essential part of the lid body.

20           FIG. 26 is a perspective view of an essential part of the lid body.

FIG. 27 is a perspective view of a peripheral structure of the handle.

FIG. 28 illustrates a longitudinal section of the peripheral structure of the handle.

25           FIG. 29 is a perspective view of the drum-type washing machine with a lower panel opened.

FIG. 30 is an exploded perspective view illustrating a connection part of the lower panel.

FIG. 31 is an exploded perspective view illustrating a connection part of the lower panel.

FIG. 32 is a perspective view illustrating the connection part of the lower pipe in an assembled state.

5           FIG. 33 is a plan view illustrating the connection part of the lower pipe in the assembled state.

FIG. 34 is a perspective general view of a conventional drum-type washing machine.

## 10   DESCRIPTION OF EMBODIMENT

[0010]

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 invention.

15   [0011]

FIG. 1 is a perspective general view of a drum-type washing machine according to the exemplary embodiment of the present disclosure. FIG. 2 is a perspective general view illustrating the drum-type washing machine with a lid body opened. FIG. 3 illustrates a longitudinal section of the drum-type washing machine. A forward and rearward direction and an upward and downward direction that are defined in FIG. 3 are used below.

[0012]

In FIG. 3, water tub 2 is supported by shock-absorbing means, which is not shown, to be rockable inside main body 1 of the drum-type washing machine. Rotary drum 3 having the shape of a bottomed cylinder is rotatably provided inside water tub 2 with its axis being inclined downward heading from a front side of rotary drum 3 toward a rear side of rotary drum 3. Water

tub 2 includes, in its front side, clothing entrance 4 that communicates with an open end of rotary drum 3. Front frame body 5 forms a front of main body 1. Front frame body 5 includes forward opening 6. With lid body 9 being open, laundry is loaded from opening 6 into and unloaded from rotary drum 3 through clothing entrance 4.

[0013]

Rotary drum 3 is formed with, in its peripheral surface, many through holes 10 that open into water tub 2. Rotary drum 3 is rotationally driven in a normal and reverse direction by motor 11 that is mounted to a rear of water tub 2. Water filling pipe 12 and drain pipe 13 are connected to water tub 2, and water is filled into and drained from water tub 2 through control of water filling valve 14 and drain valve 15.

[0014]

Main body 1 is provided with detergent loading case 17 at its top. By being disposed along a side face of main body 1, detergent loading case 17 enables water tub 2 to be disposed in a higher position. Prior to operation, a user opens detergent loading case lid 18 disposed at an upper face of main body 1 and loads detergent and fabric softener into detergent loading case 17.

[0015]

Front frame body 5 of main body 1 is formed to have a perpendicular plane (including a substantially perpendicular plane). Lid body 9 is turnably supported at front frame body 5. Lid body 9 is of rectangular shape (including substantially rectangular shape) and has the same width dimension (including substantially the same width dimension) as main body 1. Lid body 9 is formed to have its upper face flush with (this includes substantially flush with) the upper face of main body 1 and to have its both side faces flush with (this includes substantially flush with) respective side faces of main body 1 when

closed.

[0016]

Lower panel 40 is turnably supported at front frame body 5 of main body 1 in a position below lid body 9. Lower panel 40 covers drain filter 79 that filters water drained from water tub 2 (see FIG. 29). Lid body 9 and lower panel 40 are formed to have their respective front faces flush with each other (this includes substantially flush with each other) when closed. Similarly to lid body 9, lower panel 40 has the same width dimension (including substantially the same width dimension) as main body 1. Moreover, lower panel 40 is formed so that its both side faces are respectively flush with (this includes substantially flush with) the side faces of main body 1.

[0017]

Lid body 9 has operation display unit 16 disposed at its upper part. Operation display unit 16 includes an input unit and a display. The user can set desired contents of operation, start the operation and bring the operation to a temporary stop by operating the input unit of operation display unit 16 as required. The user can also check settings and progress of the operation with the display of operation display unit 16. With operation display unit 16 disposed at the upper face of lid body 9, main body 1 can have its top freed of an operation display unit. Accordingly, water tub 2 can be disposed in a higher position, thus enabling improved ease of laundry loading/unloading into/from rotary drum 3.

[0018]

Lid body 9 of quadrangular shape (including substantially quadrangular shape) is opened, laundry is loaded into rotary drum 3, and operation display unit 16 is operated to start operation. As the operation

starts, water filling valve 14 opens, and water is filled into detergent loading case 17. While detergent loaded into detergent loading case 17 is flushed down with the water, the water is filled into water tub 2 in a predetermined amount through water filling pipe 12. Subsequently, rotary drum 3 is rotationally driven by motor 11 to start a washing process. During the washing process, the laundry is washed by undergoing such repeated agitations associated with rotation of rotary drum 3 as to be lifted and dropped in a rotation direction.

[0019]

After a lapse of time required for washing, drain valve 15 opens, then dirty washing liquid is discharged through drain pipe 13. The laundry containing washing liquid undergoes spin-drying that is effected by high-speed rotation of rotary drum 3. Thereafter, water is filled into water tub 2 through water filling pipe 12, and a rinsing process is carried out. Even in the rinsing process, the laundry undergoes repeated agitations associated with rotation of rotary drum 3, thus being rinsed.

[0020]

(Description of connection part)

With reference to FIGS. 4 to 14, a detailed structural description is provided hereinafter of a connection part that turnably supports lid body 9 at front frame body 5 of main body 1.

[0021]

As shown in FIG. 4, upper coupling member 21 is provided at an upper left end of front frame body 5 of main body 1. Lower coupling member 22 is provided at a lower left end of front frame body 5. Upper coupling member 21 and lower coupling member 22 are fixed to a frame structure (not shown) of main body 1, pass through front frame body 5 and project forward from main

body 1.

[0022]

As shown in FIG. 5, upper coupling member 21 includes upper arm 23 that is extended forwardly of main body 1. Upper arm 23 is provided with, at its leading end (including the leading end's proximity), upper support shaft 24 that extends upward along main body 1. As shown in FIG. 6, similarly to upper coupling member 21, lower coupling member 22 includes lower arm 25 that is extended forwardly of main body 1. Lower arm 25 is provided with, at its leading end (including the leading end's proximity), lower support shaft 26 that extends upward along main body 1.

[0023]

As shown in FIG. 1, lid body 9 is of quadrangular shape (including substantially quadrangular shape) and has width dimension W1 that is equal to (this includes substantially equal to) width dimension W2 of main body 1. Lid body 9 is formed to have its both side faces flush with (this includes substantially flush with) the respective side faces of main body 1 when closed.

[0024]

As shown in FIG. 12, upper support shaft 24 is inserted into upper bearing member 27 that is fastened to the upper part of lid body 9. It is to be noted that lid body 9 is omitted from FIG. 12 that shows upper bearing member 27 only.

[0025]

As shown in FIG. 11, lower support shaft 26 is inserted into lower bearing member 28 that is fastened to a lower part of lid body 9. Thus, two bearing members 27, 28 respectively provided at the upper part and a lower side of lid body 9 are respectively supported from below by two coupling members 21 and 22 that are positioned away from each other, and lid body 9

turnably covers opening 6 of main body 1.

[0026]

FIG. 13 is a sectional view illustrating a peripheral structure of upper coupling member 21 with lid body 9 closed. FIG. 14 is a sectional view illustrating the peripheral structure of upper coupling member 21 with lid body 9 being open.

[0027]

Upper arm 23 is formed into a curved shape so that a leading end of sidewall 29 of lid body 9 does not abut front frame body 5 when lid body 9 is opened. Upper support shaft 24 is provided inside lid body 9 in a position that is near to front face 31 and sidewall 29 of lid body 9. This is for the purpose of suppressing fore-and-aft clearance a (see FIG. 13) between sidewall 29 of lid body 9 and front frame body 5 when lid body 9 is closed and suppressing widthwise allowance b (see FIG. 13) for projection of front-face end 76 of lid body 9 from sidewall 29 in a turning locus of lid body 9 from an opened position to a closed position. Fore-and-aft clearance a is a seeming clearance when the drum-type washing machine is viewed obliquely. With the above configuration, fore-and-aft clearance a can be reduced, thus enabling improved design quality. With the above configuration, widthwise allowance b for projection also can be reduced, so that a product can be installed nearer to a wall of a house. As such, installation is possible also in a small place.

[0028]

On the other hand, lower arm 25 of lower coupling member 22 is formed, as shown in FIG. 6, to be extended forwardly of main body 1 and not formed into a curved shape like upper arm 23. This is because as shown in FIG. 9, lower coupling member 22 supports lower side 32 of lid body 9 from below, thus not being required to release the turning locus of sidewall 29 of the

lid body.

[0029]

When lid body 9 closes, as shown in FIG. 3, window glass 33 of lid body 9 abuts in a water sealing manner against window packing 34 that is mounted to water tub 2. In this way, washing liquid in water tub 2 is prevented from leaking out of the machine. When open lid body 9 closes, latch 35 provided to lid body 9 as shown in FIG. 2 engages lid lock hole 36 that is provided in main body 1. During operation, lid body 9 is electrically locked and is not opened.

[0030]

As shown in FIG. 2, in cases where downward external force  $F_1$  is applied to lid body 9 while lid body 9 is open, a load that is placed is supported by upper coupling member 21 and lower coupling member 22. Unless upper coupling member 21 and lower coupling member 22 are of sufficient strength, upper coupling member 21 and lower coupling member 22 are deformed, thus rendering lid body 9 out of position. Accordingly, a water seal between lid body 9 and window packing 34 is broken when lid body 9 is closed. Consequently, washing liquid in water tub 2 may leak out of the machine, or lid body 9 may be difficult to close because of displacement of latch 35 from lid lock hole 36 when lid body 9 is closed.

[0031]

With a circular lid body such as in a conventional example, for example, coupling members cannot be disposed far away from a centerline of the lid body although the coupling members are separated from each other. For this reason, a considerable amount of cost is required for increasing strength of the coupling members of the lid body, such as increasing thickness of each of the coupling members or providing reinforcing members.

[0032]

In the present exemplary embodiment, however, with lid body 9 being of quadrangular shape (including substantially quadrangular shape), upper coupling member 21 and lower coupling member 22 can be disposed to be sufficiently separated from each other. As such, in cases where external force F1 is applied to lid body 9 as shown in FIG. 2, force that acts on upper coupling member 21 and lower coupling member 22 can be suppressed.

[0033]

Although there is a concern that upper coupling member 21 may be weak against downward external force F1 because of its curved shape, lid body 9 can be held by sufficient strength of lower coupling member 22 against the downward load. Thus, deformation of upper coupling member 21 and lower coupling member 22 can be prevented without the need for a special reinforcing measure. In this way, a detrimental effect such as leakage of washing liquid that might otherwise result from lid body 9 being out of position or deterioration of operability when lid body 9 is closed can be prevented.

[0034]

There are also conceivable cases where, as shown in FIG. 2, external force F2 is applied to lid body 9 in a direction that opens lid body 9 further while lid body 9 is open. When lid body 9 is fully open, stopper piece 37 of upper bearing member 27 abuts projection 38 of upper coupling member 21, thus forming a stopper in the direction that drives further opening (see FIG. 14). As such, in cases where a load of F2 is placed on lid body 9 in the direction that drives further opening, a direction of force that acts on upper arm 23 is a leftward direction with respect to main body 1 in FIG. 14, that is to say, a direction in which upper bearing member 27 is hard to deform. A strong connection structure is thus achieved for lid body 9 with relative ease

without incurring an additional cost for increased thicknesses of upper coupling member 21 and lower coupling member 22 or adoption of a special configuration including, for example, reinforcing members.

[0035]

5           It is to be noted that, although not shown, a stopper may be provided even at lower coupling member 22 in the direction that drives further opening as in the case of upper coupling member 21. In this way, the force that acts on upper coupling member 21 and lower coupling member 22 is halved, so that lower bearing member 28 becomes hard to deform.

10   [0036]

(Description of front shape of drum-type washing machine)

As shown in FIG. 1, lid body 9 is of quadrangular shape (including substantially quadrangular shape) and has width dimension W1 that is equal to (this includes substantially equal to) width dimension W2 of main body 1.

15   Lower panel 40 that covers drain filter 79 (see FIG. 29) included in a lower part of main body 1 has the width dimension that is equal to (this includes substantially equal to) width dimension W2 of main body 1. The drum-type washing machine thus has a front of flat shape when viewed from a front side of the product. The front of the drum-type washing machine is seen to have

20   partition clearance 41 between lid body 9 and lower panel 40. Since lid body 9 only turns horizontally, partition clearance 41 can be limited to not more than 5 mm and thus is inconspicuous. It is to be noted that a depression is made in main body 1 below lower panel 40 to reach front frame body 5 of main body 1 and has no component disposed therein, thus allowing the user to step foot

25   below lower panel 40. As such, the user can stand in a position nearer to main body 1 to load and unload laundry.

[0037]

As shown in FIG. 1, main body 1 and lid body 9 are formed to have their respective upper faces flush with each other (this includes substantially flush with each other). The product thus has a top of flat shape, thus enabling improved design quality.

5 [0038]

With a circular lid body such as in a conventional example, for example, a gap between a periphery of the lid body and a main body needs to be larger to some extent, and the lid body needs to have a surface in protruded form with respect to the main body for the purpose of preventing interference  
10 between the lid body and the main body when the lid body is opened/closed. The interference between the lid body and the main body is greatest at a spot where an open/close supporting point of the lid body and an outer periphery of the lid body meet. Interference avoidance involves a larger gap or step between the lid body and the main body, so that it is difficult to configure the  
15 lid body and the main body in the same form from a design point of view.

[0039]

In the present exemplary embodiment, with width dimension W1 of lid body 9 being equal to (this includes substantially equal to) width dimension W2 of main body 1, front frame body 5 of main body 1 is covered by lid body 9.  
20 In this way, a partition between a periphery of lid body 9 and main body 1 is eliminated, and the front of the product can be made flat with fewer partition clearances. Consequently, improved design quality can be achieved.

[0040]

With lid body 9 being open, upper coupling member 21 is exposed as  
25 shown in FIG. 2 because upper coupling member 21 is extended forwardly of front frame body 5. On the other hand, lower coupling member 22 is barely exposed as a result of being hidden by lower side 32 of lid body 9 (see FIG. 9).

As such, neat and clear appearance is obtained even when lid body 9 is open, thus enabling improved design quality. It is conceivable that laundry hangs down to partly touch lower coupling member's 22 proximity when loaded and unloaded from opening 6. In the present exemplary embodiment, lower  
5 coupling member 22 is covered by lid body 9, so that laundry is prevented from being caught on lower coupling member 22. Moreover, lower coupling member 22 can be prevented from making contact with water that drips from laundry, thus being protected from corrosion by the washing liquid contained in the laundry.

10 [0041]

(Description of mounting of lid body 9 to main body 1)

FIG. 5 is a perspective view of upper coupling member 21 with lid body 9 removed. FIG. 6 is a perspective view of lower coupling member 22 with lid body 9 removed.

15 [0042]

With main body 1 not yet being mounted with lid body 9, upper coupling member 21 and lower coupling member 22 are extended forwardly of front frame body 5 as shown in FIGS. 5 and 6, and upper support shaft 24 and lower support shaft 26 extend upwardly about 10 mm. As shown in FIG. 7,  
20 lid body 9 is provided with opening 42 in its rear position that corresponds to upper coupling member 21.

[0043]

In order for lid body 9 to be mounted to main body 1, upper arm 23 of upper coupling member 21 is inserted in opening 42 of lid body 9, and hold is  
25 thereafter loosened to allow lid body 9 to go down under its own weight. In this way, upper support shaft 24 is inserted into upper bearing member 27. Lid body 9 is thus turnably mounted to main body 1 while being supported

from below by upper coupling member 21. It is to be noted that it is not necessary to insert lower coupling member 22 in an opening because lower coupling member 22 supports lower side 32 of lid body 9 from below. This means that in the process of insertion of upper arm 23 of upper coupling member 21 in opening 42, lower support shaft 26 also is inserted into lower bearing member 28. In this way, lid body 9 is mounted to main body 1.

[0044]

Upper support shaft 24 and lower support shaft 26 extend upwardly only about 10 mm, so that lid body 9 moves downwardly only a distance of about 10 mm under its own weight after upper coupling member 21 is inserted in opening 42. Since lid body 9 can be mounted to main body 1 with a seemingly single motion, improved ease of assembly can be achieved.

[0045]

FIG. 10 is a perspective view of a peripheral structure of the connection part with cover 43 detached. FIG. 11 is a see-through perspective view illustrating the main body and the lower part of the lid body. Cover 43 is mounted to lid body 9 to cover opening 42 with upper support shaft 24 and lower support shaft 26 inserted into upper bearing member 27 and lower bearing member 28, respectively. Upper face 44 of cover 43 is positioned in proximity to lower surface 45 of upper coupling member 21. With this configuration, upward movement of lid body 9 can be restricted, and even when lid body 9 is lifted up, lid body 9 can be prevented from being disengaged from upper coupling member 21 and lower coupling member 22.

[0046]

As shown in FIG. 1, lid body 9 is provided with operation display unit 16 at its upper face. Lead wire 46 from main body 1 and lead wire 47 from operation display unit 16 are connected by connector 48 inside opening 42 (see

FIG. 10). As such, cover 43 also functions as a waterproof protector of lead wires 46 and 47. Lead wires 46 and 47 are each formed of a bundle of a plurality of lead wires.

[0047]

5           Lead wire 46 from main body 1 is received in lead wire cover 49 that is shown in FIG. 8. Lead wire cover 49 is mounted to upper arm 23 of upper coupling member 21 from below upper coupling member 21, thus protecting lead wire 46 in a waterproof manner.

[0048]

10           As shown in FIGS. 7 and 8, lead wire cover 49 has face 49a that mates with upper arm 23 and conforms in shape to (this includes substantially conforms in shape to) upper arm 23. Lead wire cover 49 includes, at face 49a that mates with upper arm 23, lead wire storage part 49b that receives lead wire 46 from main body 1. Retainer 77 is provided at lead wire storage part  
15 49b to retain lead wire 46 received in lead wire storage part 49b. Lead wire 46 is received in lead wire storage part 49b and is retained by retainer 77, thus being prevented from moving. With lead wire 46 being in this state, lead wire cover 49 is locked to a lower surface of upper arm 23.

[0049]

20           With lead wire cover 49 being locked to the lower surface of upper arm 23, there is a clearance of about 2 mm between lead wire 46 and the lower surface of upper arm 23. Lead wire 46 that is drawn from lead wire storage part 49b is extended near central axis 24a of upper support shaft 24 inside opening 42 of lid body 9 (see FIG. 7). Lead wire 46 extended inside opening  
25 42 is locked in opening 42 by fixing pin 78 at an arbitrary position (for example, at a position 100 mm away from its leading end). Fixing pin 78 locks lead wire 46 in opening 42 at a position at a distance from a position near central

axis 24a of upper support shaft 24. Lead wire 46 fixed by fixing pin 78 has its leading end connected to lead wire 47 from operation display unit 16 by connector 48 inside opening 42. Cover 43 is locked to lid body 9, so that opening 42 is closed.

5 [0050]

Retainer 77 is formed so that a distance between retainer 77 and a bottom of lead wire storage part 49b is of the same dimension (including substantially the same dimension) as a radius of lead wire 46. Retainer 77 is provided near central axis 24a of upper support shaft 24. Lead wire cover 49  
10 includes, near retainer 77, draw-out part 99 where lead wire 46 is drawn from lead wire storage part 49b. Draw-out part 99 is positioned near central axis 24a. As such, lead wire 46 drawn from lead wire storage part 49b can be brought into close proximity to central axis 24a of upper support shaft 24 with ease in area B (see FIG. 7) between its bend and the position where lead wire  
15 46 is locked in opening 42 by fixing pin 78. Lead wire 46 thus has no part where lead wire 46 is drawn perpendicularly (including in a direction substantially perpendicular) to central axis 24a of upper support shaft 24 in area B between its bend and the position where lead wire 46 is locked in opening 42 by fixing pin 78. Stress that is loaded on lead wire 46 when lid  
20 body 9 is opened/closed is not concentrated bending stress that has a great effect on wire breakage, but torsional stress, thus enabling less concern for breaking of lead wire 46.

[0051]

In section C (see FIG. 7) where lead wire 46 is received in lead wire  
25 cover 49 and in the section between section C and the position where lead wire 46 is locked in opening 42 by fixing pin 78, lead wire 46 is not subjected to stress even when lid body 9 is opened/closed and thus does not move.

Concern for breaking of lead wire 46 that might be caused by application of stress can thus be eliminated. Because of being hidden from outside, lead wire 46 can be protected from corrosion and deterioration that might otherwise be caused by adhesion of water that enters from outside or dirt such as a  
5 foreign substance.

[0052]

Lead wires 46 and 47 are each formed by winding a tape around the bundled plurality of lead wires. It is to be noted that there are cases where a plurality of lead wires 46 and a plurality of lead wires 47 are provided.  
10 Opening 42 in which lead wire 46 is routed is provided in upper sideward part 65 where window glass 33 is not present, so that size reduction of window glass 33 is not required for lead wire 46 to be routed. Since window glass 33 abuts in the water sealing manner against window packing 34 (see FIG. 3) mounted to water tub 2 so that opening 6 is covered, size reduction of window  
15 packing 34 and opening 6 also is not required. Consequently, ease of laundry loading/unloading is not impaired.

[0053]

Upper face 44 of cover 43 is in proximity to lead wire cover 49 (see FIG. 10). In the present exemplary embodiment, cover 43 turns together with lid  
20 body 9, thus having a clearance of about 2 mm so as not to be rubbed against secured lead wire cover 49 during opening/closing of lid body 9. With the above configuration, even when lid body 9 is lifted up, lid body 9 can be prevented from being disengaged from upper coupling member 21 and lower coupling member 22 because upper support shaft 24 and lower support shaft  
25 26 each have an engaging allowance of about 10 mm. In addition, lead wires 46 and 47 can be prevented from corrosion and deterioration that might otherwise be caused by adhesion of dirt such as detergent that enters from

outside.

[0054]

(Description of configuration of lid body 9)

FIG. 20 is an exploded perspective view of lid body 9. Based on FIG.  
5 20, configuration of lid body 9 is detailed below.

[0055]

Lid 50 is of quadrangular shape (including substantially quadrangular  
shape) and includes a circular hole in its center. Similarly to lid 50, lid  
backing 51 that is fastened to a rear face of lid 50 is of quadrangular shape  
10 (including substantially quadrangular shape) and includes circular hole 52 in  
its center. Lid backing 51 is a box-shaped skeletal component having  
sidewalls and a lower wall. Window glass 33 that is transparent is held  
between lid backing 51 and lid 50 so as to fit into circular hole 52 of lid backing  
51. Upper bearing member 27 and lower bearing member 28 are respectively  
15 fastened to an upper left part and a lower left part of lid backing 51.

[0056]

Lid 50 has ring-shaped decorative plate 58 fitted into its hole on its  
front-face side. Cone-shaped slope 59 is thus formed on the front-face side of  
lid 50 by decorative plate 58. The front-face side of lid 50 is also provided  
20 with transparent window cover 60 of quadrangular shape (including  
substantially quadrangular shape). Window cover 60 includes a plurality of  
engagement holes 60c in its both side faces 60a (see FIG. 22). Engagement  
claws 51a formed on the sidewalls of lid backing 51 respectively engage in  
engagement holes 60c, so that window cover 60 is fixed temporarily.

25 [0057]

Side faces 60a of window cover 60 are respectively provided with steps  
60b along their respective front sides (see FIG. 23). Sash members 73, 76 are

respectively mounted to the side faces of lid body 9 to cover lid backing 51 and respective side faces 60a of window cover 60 by being slid from above. Steps 60b of window cover 60 are covered with sash members 73, 76, respectively. Having its fixed parts hidden from sight by sash members 73, 76, window cover 60 thus has such a shape as to form the entire front face of lid body 9. The front face of lid body 9 is thus flat in form, thus enabling improved design quality.

[0058]

A front face of window cover 60 is entirely flat in form. As shown in FIG. 19B, a rear face of window cover 60 abuts outer edge 61 of decorative plate 58 in a front to rear direction. Holding part 63 of transparent window glass 33 has its proximity covered by inner edge 62 of decorative plate 58. Outer edge 61 and inner edge 62 of decorative plate 58 are continuous with each other via cone-shaped slope 59.

[0059]

Substantially ring-shaped decorative plate 58 is provided between the rear face of window cover 60 and window glass 33. Protrusion 88 that is cylindrical (this includes substantially cylindrical) is provided on the rear face of window cover 60 in proximity to outer edge 61 of decorative plate 58 (see FIG. 19B). In the rear face of window cover 60, an area having a larger diameter than protrusion 88 is area 64 that is coated with opaque paint, while a part surrounded by protrusion 88 is area 82 of higher transparency (see FIGS. 19A and 19B). Decorative plate 58 is painted or plated with a color different from a color of coated area 64 of window cover 60, thus having appearance color that is seen through transparent window cover 60.

[0060]

In the present exemplary embodiment, main body 1 is white, coated

area 64 of the rear face of window cover 60 has the same white as main body 1, and decorative plate 58 is plated. As such, ring-shaped decorative plate 58 that is plated appears to surround transparent window glass 33, and such appearance that can be created is impactful from a design point of view.

5 Furthermore, forming decorative plate 58 of different paint color enables easy model development.

[0061]

Because of being a component of hidden appearance that does not require coating, lid 50 can be molded from resin that is an inexpensive  
10 material with no concern for corrosion by liquid detergent. In cases where coating is carried out, it is to be noted that an expensive material such as acrylonitrile-butadiene-styrene (ABS) resin needs to be used to ensure coating adhesion. In cases where ABS resin is used, a chemical-resistant composition is required for prevention of deterioration that might otherwise be caused by  
15 adhesion of a chemical agent such as liquid detergent, thus making the resin more expensive.

[0062]

In cases where lid body 9 is exposed to tap water or detergent, the water may enter lid body 9 from, for example, a fitting clearance around  
20 operation display unit 16 that is fitted at the upper part of lid body 9. In the present exemplary embodiment, protrusion 88 is disposed in proximity to outer edge 61 of decorative plate 58, so that although the water runs along an outer periphery of protrusion 88, the water is prevented from entering area 82 of higher transparency that is surrounded by protrusion 88. The water is thus  
25 prevented from running along a surface of cone-shaped slope 59. Consequently, a design of lid body 9 can be made strong against dirt from an appearance point of view as entry of water and others into area 82 of higher

transparency could result in dirt that impairs appearance quality.

[0063]

Protrusion 88 on the rear face of window cover 60 is also effective in facilitating masking work before coating. An area that should not be coated generally needs to have its periphery masked for prevention of entry of paint, and in this case, masking work is hard, thus resulting in a poorer yield rate. With a masking jig (not shown) abutting against protrusion 88, a narrow area can be masked without fail, so that improved ease of coating can be achieved.

[0064]

10 (Description of handle)

FIG. 24 is a plan view illustrating a handle, a coupling rod, and the latch with handle 55, coupling rod 57, and latch 35 assembled in lid backing 51. It is to be noted that lid 50 is not shown. Latch 35 is provided near a centerline of hole 52 to ensure water sealability. Handle 55 is provided at an upper right end of lid body 9. With handle 55 being in such a higher position, the user does not have to stoop down when opening lid body 9. Accordingly, improved opening/closing operability of lid body 9 is achieved.

[0065]

Since handle 55 is provided at the upper part of lid body 9, handle 55 and latch 35 are disposed away from each other. For this reason, coupling rod 57 is interposed between handle 55 and latch 35. Handle 55 turns toward the front face of lid body 9, and turning of handle 55 is transmitted by coupling rod 57 to latch 35. Accordingly, latch 35 turns inward along width of lid body 9. By turning, latch 35 disengages itself from main body 1, so that lid body 9 becomes turnable. Coupling rod 57 is formed of a high steel wire rod of high rigidity and is rotatably held by bearings 80, 81 that are formed on lid backing 51. Step 97 is provided at one end of coupling rod 57 and abuts handle 55,

and step 98 is provided at another end of coupling rod 57 and abuts latch 35.

[0066]

FIG. 25 is a perspective view of an essential part of the lid body with handle 55 and coupling rod 57 being mounted. FIG. 26 is a perspective view of an essential part of the lid body with latch 35 being mounted.

[0067]

On a right side of hole 52 of lid backing 51, latch 35 is mounted near the centerline of hole 52 to be turnable via latch axis 53a (see FIG. 7). Latch spring 54 is provided to urge latch 35. Latch 35 is urged by latch spring 54 so that an engagement claw of latch 35 turns outward along the width of lid body 9.

[0068]

Handle 55 is turnably mounted to a rear face of an upper right part of lid backing 51. Handle 55 is pushed downward by weak urging force of handle spring 56 (see FIG. 20). Coupling rod 57 is rotatably mounted to lid backing 51. Coupling rod 57 provided with bends has the one end abutting latch 35 and the other end abutting handle 55 and functions to transmit turning of handle 55 to latch 35. This means that when the user pulls handle 55 toward lid body 9 to open closed lid body 9, the latch's engagement claw engaging in lid lock hole 36 provided in main body 1 turns inward along the width of lid body 9, thus being released from its engaging position. Accordingly, lid body 9 becomes openable. It is to be noted that latch 35 and handle 55 are also shown in FIG. 2 that provides a view of lid backing 51 serving as a back of lid body 9.

[0069]

When the user pulls handle 55 toward the front face of lid body 9 to open lid body 9, handle 55 turns on shaft 84 toward the front face of lid body 9,

thus pressing step 97 that is an abutment of coupling rod 57. Accordingly, coupling rod 57 rotates around bearings 80, 81 and presses latch 35 at step 98. As shown in FIG. 26, latch 35 causes its engagement claw to turn around shaft 85 from lid body 9 toward main body 1 against urging force of latch spring 54, thus disengaging its engagement claw from lid lock hole 36. In this way, lid body 9 becomes openable.

[0070]

In order to facilitate opening of lid body 9, the turning of handle 55 needs to be transmitted to latch 35 without any loss. With handle 55 and latch 35 being disposed away from each other, coupling rod 57 that connects handle 55 and latch 35 is longer and thus is susceptible to deformation such as torsion. This may adversely affect movement of coupling rod 57.

[0071]

In the present exemplary embodiment, with use of, for example, the high steel wire rod that is used for a spring or the like for coupling rod 57, sufficient torsional rigidity can be obtained even when coupling rod 57 is formed to have a relatively small diameter (e.g. a diameter of 3.2 mm). Moreover, coupling rod 57 can be made into such a simple shape as to be provided with steps 97, 98 at its respective ends, thus being also susceptible of easy work and low-cost production.

[0072]

Rotation angle  $\theta$  of coupling rod 57 needs to be, for example, about  $20^\circ$  to turn latch 35 until lid body 9 becomes openable. In cases where torque  $T = 220 \text{ Nmm}$  is caused by the urging force of latch spring 54 to act, torsion angle  $\phi$  of coupling rod 57 is derived from the equation:  $\phi = T \times L / (G \times IP)$ .

[0073]

In the present exemplary embodiment, length  $L$  of a rotating part of

coupling rod 57 is set at  $L = 242$  mm, modulus of transverse elasticity  $G$  of the high steel wire rod, which is a material for coupling rod 57, is set at  $G = 78500$  N/mm<sup>2</sup>, and polar moment of inertia of area  $IP$  of coupling rod 57 is set at  $IP = 10.3$  mm<sup>4</sup>. In this case, torsion angle  $\phi$  of coupling rod 57 falls within about 3.7° based on the above equation, so that a turning angle of handle 55 may be set with this amount of deformation taken into account.

[0074]

With torsion angle  $\phi$  of coupling rod 57 thus falling within about 20 percent of normal rotation angle  $\theta$ , movement of handle 55 can be suppressed, so that fore-and-aft thickness of lid body 9 can be reduced. An amount by which the thickness of lid body 9 could be reduced can be utilized as effective space of main body 1.

[0075]

Lid backing 51 is a component molded from resin, thus being warped as a result of molding. However, even when a warp of about 2 mm is caused with respect to a height of 240 mm in lid backing 51, coupling rod 57 of long and slender shape bends longitudinally with ease to fit readily, thus having no problem of rotation.

[0076]

(Description of main body as opposed to handle 55)

FIG. 27 is a top perspective view of the main body and the lid body, illustrating a peripheral structure of handle 55 with lid body 9 being closed. FIG. 28 illustrates a longitudinal section of the peripheral structure of handle 55 with lid body 9 being closed.

[0077]

Handle 55 is provided at an upper part of the back of lid body 9. Main body 1 is provided with recess 86 in its forward upper position that faces

handle 55.

[0078]

With lid body 9 being closed, handle 55 is not seen from the front face of lid body 9 but is slightly seen from above. Handle 55 thus can have suppressed presence in appearance. When the user places a hand on handle 55 to open lid body 9, recess 86 provided in the upper face of main body 1 ensures enough space for insertion of the hand. For this reason, impaired ease of use is not caused to the user. Recess 86 also is not seen from the front face of lid body 9, thus enabling a flat design of the entire face in appearance.

When viewed from above, recess 86 can be seen clearly, thus allowing the user to recognize the position of handle 55 when the user opens lid body 9.

[0079]

(Structural description of operation display unit)

As shown in FIG. 16, a space fenced by lid 50 and lid backing 51 is formed at upper face 66 of lid body 9. Operation display unit 16 is fitted into this space from above lid body 9 as shown in FIG. 17. Operation display unit 16 has, for example, an operation part and the display disposed. The operation part is input means where the user selects, from above, an operation course such as a "standard course" in which standard washing, rinsing, and spin-drying are carried out or an "intensive course" intended for washing of clothing having tough dirt. The display is display means that indicates an operation status by causing LEDs (light-emitting diodes) to illuminate for view from above.

[0080]

As shown in FIG. 19B, the upper face of lid body 9 is provided with operation display plate 67 where the operation part and the display are arranged and printed. Operation display substrate 68 is mounted with, for

example, tactile switches, the LEDs, and an electronic circuit and is fastened, as shown in FIG. 19B, to a rear face of operation display plate 67. Intermediate member 69 is held between operation display plate 67 and operation display substrate 68 to transmit the user's operation from the face to the tactile switches and to guide light emitted from the LEDs to the face. Thus, operation display unit 16 such as shown in FIG. 15 is formed.

[0081]

With a circular lid body such as in a conventional example, for example, operation display unit 500 is, as shown in FIG. 34, generally disposed in a forward position of an upper part of main body 100 in consideration of operability for the user and visual recognition by the user.

[0082]

However, with lid body 9 being of quadrangular shape (including substantially quadrangular shape) and having a width dimension that is equal to (this includes substantially equal to) a width dimension of main body 1 as in the present exemplary embodiment, operation display unit 16 can be provided at any one of an upper part of the front face of lid body 9, upper face 66 of lid body 9 and a front part of the upper face of main body 1.

[0083]

In cases where operation display unit 16 is disposed, for example, at the upper part of the front face of lid body 9, a plurality of indications associated with operation and display appears on a front of a product. With such a configuration, it is difficult to make the front face of lid body 9 entirely flat in form. It is also difficult to reduce as many fitting parts that can be seen from the product front as possible for a neat and clear structure.

[0084]

Disposing operation display unit 16 at the front part of the upper face

of main body 1 means moving back operation display unit 16 from a front of a product by the thickness of lid body 9, so that convenience of operation and display view by the user deteriorates. In other words, ease of use deteriorates.

5 [0085]

In the present exemplary embodiment, operation display unit 16 is disposed at upper face 66 of lid body 9. With this configuration, the front face of lid body 9 can be made entirely flat in form with partition clearance 41 between lid body 9 and lower panel 40 being the only fitting part that can be  
10 seen from the front of the product, so that neat and clear appearance can be achieved. Recently, there are increasing cases where a drum-type washing machine and a washstand are disposed side by side. Accordingly, the drum-type washing machine is required to have such a design as to produce an installation space that harmonizes with another equipment even when not in  
15 use. In the present exemplary embodiment, the above configuration of neat and clear appearance is susceptible of conformity to the installation space. Operation display unit 16 is disposed in the operable position that is nearest to the front face of lid body 9 and is susceptible of recognition at a natural glance from above when the user operates operation display unit 16, thus enabling  
20 improved ease of use.

[0086]

With operation display unit 16 disposed at lid body 9, main body 1 can be freed of an operation display unit, so that water tub 2 can be disposed in a position that is elevated by a height (dimension) of the operation display unit.  
25 With water tub 2 disposed in the elevated position, improved ease of laundry loading/unloading into/from rotary drum 3 is achieved.

[0087]

It is to be noted that this configuration needs lead wires 46 and 47 for connection between lid body 9 at which operation display unit 16 is disposed and main body 1 in which an electrical component such as motor 11 is disposed. In the present exemplary embodiment, lead wire 47 from operation display unit 16 and lead wire 46 from main body 1 are connected by connector 48 at opening 42 in the back of lid body 9 as shown in FIGS. 7 and 10. This configuration thus improves ease of assembly. Moreover, cover 43 and lead wire cover 49 cover the lead wires in the waterproof manner, thus preventing the lead wires from deterioration that might otherwise be caused by, for example, entry of detergent.

[0088]

As shown in FIG. 15, operation display unit 16 is provided with a plurality of lock parts 70 at its bottom. As shown in FIG. 16, lid backing 51 is provided with lock parts 71 in respective positions that respectively correspond to lock parts 70. As shown in FIG. 18, lid 50 is provided with lock parts 72. It is to be noted that FIG. 18 is a perspective view of an essential part with window cover 60 removed. FIG. 17 is a perspective view of an essential part with operation display unit 16 inserted in the lid body from above. In FIG. 17, the pluralities of lock parts 70, 71, 72 are in their respective non-engaging positions, and operation display unit 16 is in a position that admits of no further downward movement. As operation display unit 16 is moved leftward (in direction c) from this position, lock part 70 and lock part 71 engage with each other, and lock part 70 and lock part 72 engage with each another, so that operation display unit 16 fits in place. Thereafter, sash member 73 is inserted over a right sidewall of lid body 9 from above. Sash member 73 restricts rightward movement of operation display unit 16, thus preventing disengagement of lock parts 70, lock parts 71, and lock parts 72.

[0089]

FIG. 18 a perspective view of the essential part, illustrating sash member 73 being set over the right sidewall of lid body 9 with lock parts 70 engaged to lock parts 72, respectively. Leftward movement of operation display unit 16 is restricted by lock parts 70, lock parts 71, and lock parts 72. The rightward movement of operation display unit 16 is restricted by sash member 73. Lock parts 70, 71, 72 have a satisfactory engaging allowance of about 5 mm, so that an amount of leftward movement of operation display unit 16 that is inserted from above is as small as about 5 mm, thus improving ease of assembly of operation display unit 16 to lid body 9.

[0090]

With the pluralities of lock parts 70, 71, 72 provided, operation display unit 16 is securely held in a predetermined position that admits of no further downward movement, thus being prevented from rising. Rise of operation display unit 16 causes fitting clearance 74 between operation display unit 16 and lid backing 51 and fitting clearance 75 between operation display unit 16 and window cover 60 that are shown in FIG. 19B to get larger. Larger fitting clearances 74, 75 not only impair appearance quality, but also allow entry of detergent and dirt through fitting clearances 74, 75 into lid body 9 and thus may problematically cause, for example, malfunction to operation display substrate 68. Accordingly, the pluralities of lock parts 70, 71, 72 are each provided at such intervals as to enable sufficient restriction of the rise throughout the whole width of lid body 9, that is to say, at intervals of, for example, about 100 mm. Consequently, fitting clearances 74, 75 can be suppressed throughout the whole width of lid body 9. As such, operation display unit 16 that can be provided has an excellent design and high reliability. It is to be noted that the left sidewall of lid body 9 also is provided

with sash member 73 that may have its color changed from a color of main body 1 by, for example, coating for configuration that is impactful from the design point of view.

[0091]

5           Operation display unit 16 has the width that is equal to (this includes substantially equal to) width W1 of lid body 9, thus occupying a relatively wide space. On the other hand, as shown in FIG. 15, only the thickness of lid body 9 is secured for length W3 of operation display unit 16. The thickness of lid body 9 has a limitation as to compactness to secure space for main body 1.

10   Moreover, for easy-to-see arrangement of displays including the plurality of operation courses and a washing time that corresponds to each select button, operation display unit 16 needs some thickness. The pluralities of lock parts 70, 71, 72 mentioned above can hold operation display unit 16 in a space-saving manner as compared with screws that are generally used for

15   fastening. The space-saving fastening members allow operation display unit 16 to be larger, thus enabling an arrangement that is easier to see. Without being fastened with screws, operation display unit 16 can be prevented by sash member 73 from sliding from lid body 9, so that a fitting clearance between operation display unit 16 and lid body 9 can be suppressed.

20   [0092]

(Description of lower panel 40)

FIG. 29 is a perspective view illustrating opened lower panel 40. FIG. 30 is a perspective view illustrating a left connection part of lower panel 40. FIG. 31 is a perspective view illustrating a right connection part of lower panel

25   40. FIG. 32 is a perspective view illustrating the left connection part of lower panel 40 in an assembled state. FIG. 33 is a perspective view illustrating the left connection part of lower panel 40 in the assembled state.

[0093]

Lower panel 40 is turnably supported at front frame body 5 of main body 1 in the position below lid body 9. Drain filter 79 that filters water drained from water tub 2 is provided in a lower part of front frame body 5 of main body 1. Lower panel 40 covers this drain filter 79. Lower panel 40 has the width dimension that is equal to (this includes substantially equal to) width dimension W2 of main body 1.

[0094]

As shown in FIG. 30, a lower left part of lower panel 40 is formed with left shaft 89 along a direction toward the side face of lower panel 40. Left shaft 89 has a non-circular outline and includes a damper device (not shown). L-shaped claw 90 having its leading end bent toward left shaft 89 is provided to adjoin left shaft 89. Inclined rib 91 that gradually falls toward the side face of lower panel 40 is positioned to face claw 90 across left shaft 89.

[0095]

Front frame body 5 of main body 1 is provided with left bearing 92 into which left shaft 89 of lower panel 40 is inserted. A flank of left bearing 92 is formed with slope 93 that gradually protrudes forward, heading outward. Restriction rib 94 is protrusively provided on an outer end face of left bearing 92.

[0096]

As shown in FIG. 31, a lower right part of lower panel 40 is provided with right shaft 95 that is cylindrical and protrudes toward left shaft 89. Front frame body 5 of main body 1 is provided with right bearing 96 into which right shaft 95 is inserted.

[0097]

Left shaft 89 and right shaft 95 of lower panel 40 are inserted into left

bearing 92 and right bearing 96, respectively, and lower panel 40 is slid leftward in FIGS. 30 and 31. As lower panel 40 is slid, claw 90 disposed to adjoin left shaft 89 is moved along the flank of left bearing 92 and is locked to the outer end face of left bearing 92 beyond slope 93. With claw 90 being  
5 locked to the outer end face of left bearing 92, lower panel 40 is prevented from moving in a direction of disengagement.

[0098]

Drain filter 79 is exposed when lower panel 40 turns. Drain filter 79 is detachable, so that lint and others that have adhered to drain filter 79 can  
10 be removed.

[0099]

Left shaft 89 of lower panel 40 includes the damper device. As such, when lower panel 40 turns, the damper device functions to apply a resistance to rotation of left shaft 89, so that open/close speed declines. With a decline in  
15 the open/close speed of lower panel 40, damage to lower panel 40 is prevented, so that lower panel 40 can be opened and closed safely.

[0100]

With lower panel 40 being open, claw 90 abuts restriction rib 94, and thus turning of lower panel 40 is restricted. In this state, inclined rib 91  
20 abuts left bearing 92. In cases where force is applied in such a direction as to turn lower panel 40 further with the turning of lower panel 40 being restricted, inclined rib 91 that abuts left bearing 89 causes lower panel 40 to move rightward in FIG. 32. Although claw 90 is locked to the outer end face of left bearing 92, as shown in FIG. 33, as lower panel 40 moves, claw 90 is yieldingly  
25 deformed to be disengaged from the outer end face of left bearing 92. As lower panel 40 turns further, claw 90 is deformed further and is disengaged from the outer end face of left bearing 83. Consequently, lower panel 40 is

detached from main body 1.

[0101]

In the present exemplary embodiment described above, in cases where force is applied in the direction that opens opened lower panel 40 further, lower panel 40 is detached from main body 1 without being damaged. As such, even when an excessive load is placed due to misuse or the like, lower panel 40 is protected from damage and can be reattached.

[0102]

In the present exemplary embodiment, lid body 9 is of quadrangular shape, but is not limited to this. For example, lid body 9 may be of partially cut-out shape or partially bulging shape.

[0103]

Although operation display unit 16 is disposed at the upper face of lid body 9, the present disclosure is not limited to this. Operation display unit 16 may be provided, for example, at the upper part of the front face of lid body 9.

[0104]

In the present exemplary embodiment, drain filter 79 that filters water drained from water tub 2 is provided in the lower part of front frame body 5 of main body 1 and is covered by lower panel 40; however, the present disclosure is not limited to this. For example, another component such as a control circuit may be provided in the lower part of front frame body 5 of main body 1 and may be covered by a lower panel. In this case, the lower panel may be formed so as not to be easy to open depending on the component that the lower panel covers.

25

## INDUSTRIAL APPLICABILITY

[0105]

As described above, a drum-type washing machine according to the present disclosure has, in its higher position, an opening where clothing is unloaded, thus enabling improved ease of clothing unloading.

## 5 REFERENCE MARKS IN THE DRAWINGS

[0106]

|    |        |                        |
|----|--------|------------------------|
|    | 1      | main body              |
|    | 2      | water tub              |
|    | 3      | rotary drum            |
| 10 | 5      | front frame body       |
|    | 6      | opening                |
|    | 9      | lid body               |
|    | 16     | operation display unit |
|    | 21     | upper coupling member  |
| 15 | 22     | lower coupling member  |
|    | 23     | upper arm              |
|    | 25     | lower arm              |
|    | 24     | upper support shaft    |
|    | 26     | lower support shaft    |
| 20 | 27     | upper bearing member   |
|    | 28     | lower bearing member   |
|    | 33     | window glass           |
|    | 40     | lower panel            |
|    | 42     | opening                |
| 25 | 43     | cover                  |
|    | 44, 66 | upper face             |
|    | 49     | lead wire cover        |

|   |        |                  |
|---|--------|------------------|
|   | 50     | lid              |
|   | 51     | lid backing      |
|   | 55     | handle           |
|   | 58     | decorative plate |
| 5 | 60     | window cover     |
|   | 73, 76 | sash member      |

## CLAIMS

1. A drum-type washing machine comprising:
  - a main body including, in a front of the main body, an opening where laundry is loaded and unloaded;
  - a lid body configured to openably cover the opening of the main body;
  - and
  - an operation display unit provided at the lid body, the operation display unit including an input unit and a display.
2. The drum-type washing machine according to claim 1, wherein
  - the lid body is of quadrangular shape; and
  - the operation display unit is provided at an upper face of the lid body.
3. The drum-type washing machine according to claim 1, further comprising:
  - a coupling member provided at the main body, the coupling member including a support shaft that turnably supports the lid body;
  - a controller provided at the main body, the controller being configured to control a washing process, a rinsing process, and a spin-drying process;
  - and
  - a lead wire through which an electric control signal is input and output between the controller and the operation display unit,
  - wherein the lead wire is extended near a central axis of the support shaft.
4. The drum-type washing machine according to claim 3, further comprising:
  - a storage part that receives the lead wire; and

a lead wire cover provided with a cutout near the central axis of the support shaft,

wherein the lead wire cover is locked to the coupling member, and the lead wire is drawn from the cutout.

5. The drum-type washing machine according to claim 3 or 4, wherein the lead wire is locked to the lid body by a fixing pin at a position at a predetermined spacing from a position near the central axis of the support shaft.

6. The drum-type washing machine according to claim 1, wherein the lid body has a width dimension that is equal to a width dimension of the main body.

7. The drum-type washing machine according to claim 6, wherein the lid body is quadrangular in external form.

8. The drum-type washing machine according to claim 7, wherein an upper face of the main body is flush with an upper face of the lid body.

9. The drum-type washing machine according to claim 1, wherein the lid body is provided with, in an upper part of the lid body, a lock part that locks the operation display unit;  
a sidewall of the lid body is mounted with a sash member; and  
the sash member restricts movement of the operation display unit.

10. The drum-type washing machine according to claim 1, wherein the main body is provided with a coupling member that turnably supports the lid body; and

the coupling member includes:

an arm extending toward the lid body; and

a support shaft provided at an end of the arm, the support shaft being configured to turnably support the lid body.

11. The drum-type washing machine according to claim 10, wherein the lid body includes:

an opening in which the coupling member is inserted, the opening being provided in a back of the lid body; and

a cover configured to cover the opening.

12. The drum-type washing machine according to claim 1, further comprising a lower panel provided in a position of the main body that is below the lid body to be turnable with respect to the main body,

wherein the lower panel has a width dimension that is equal to a width dimension of the main body.

13. The drum-type washing machine according to claim 1, wherein the lid body is of quadrangular shape; and

the lid body is provided with, at a side face of the main body of an upper part of the lid body, a handle that disengages the lid body from the main body.

14. The drum-type washing machine according to claim 1, wherein the lid body includes:

a window cover including a first area and a second area having lower transparency than the first area;

a window glass mounted on a rear face side of the window cover, the window glass being formed of transparent material and having a circular

outer periphery; and

a decorative plate provided along the circular outer periphery of the window glass on the rear face side of the window cover.

15. The drum-type washing machine according to claim 1, wherein the lid body has a width dimension that is equal to a width dimension of the main body,

the lid body is of quadrangular shape, and

the lid body has a front face formed of a window cover of flat shape.