

DESCRIPTION

WASHING MACHINE

5 TECHNICAL FIELD

The present invention relates to washing machines each of which is equipped with a lid detection unit to detect opening and closing of its lid body.

BACKGROUND ART

10 Conventionally, a washing machine of this type includes a washing-cum-dewatering tub disposed in an inside of a washing machine body, an outer shell disposed in an upper part of the washing machine body, and a lid detection unit. The outer shell includes a clothes put-in port through which clothes are put in and taken out, and a lid body which covers the clothes
15 put-in port openably and closably. The lid detection unit detects opening and closing of the lid body, thereby preventing a clearance from being caused between the lid body and the outer shell during rotation of the washing-cum-dewatering tub (see Patent Literature 1, for example).

Hereinafter, descriptions will be made regarding the configuration of a
20 conventional washing machine which is disclosed in Patent Literature 1, with reference to FIGS. 10 and 11.

FIG. 10 is a cross-sectional side elevation view of a principal part of the conventional washing machine in a state in which a lid body is closed. FIG. 11 is an enlarged cross-sectional view of a principal part of the conventional
25 washing machine.

Washing machine body 102 rotatably houses washing-cum-dewatering tub 101 in an inside of the body. Washing machine body 102 is equipped with

outer shell 103 that covers substantially the whole of an upper part of washing machine body 102. In outer shell 103, clothes put-in port 104 is disposed in an approximately center portion of the shell. Outer shell 103 is equipped with lid body 105, openably and closably, which covers the whole of an upper part of clothes put-in port 104.

Lid body 105 is configured with front lid body 110 that configures a front part of lid body 105, and rear lid body 111 that configures a rear part of the lid body. Front lid body 110 and rear lid body 111 are rotatably supported by each other via third bearing 113.

Outer shell 103 includes lid detection unit 106 that detects opening and closing of lid body 105 housed in case 108. Lid detection unit 106 is configured with two terminals, that is, upper terminal plate 106a and lower terminal plate 106b. Between lid body 105 and lid detection unit 106, transmission part 107 is disposed. Transmission part 107 transmits an opening/closing state of lid body 105 to lid detection unit 106.

Case 108 is equipped with first bearing 109. First bearing 109 is rotatably coupled with transmission part 107 so as to support it. Outer shell 103 is equipped with second bearing 112. Second bearing 112 rotatably supports one end part of lid body 105.

Transmission part 107 includes first lever 116 that extends toward the lid body 105 side. Lid body 105 includes second lever 117 that extends from the proximity of second bearing 112 of outer shell 103 toward the transmission part 107 side. Transmission part 107 further includes lower-terminal-plate contacting part 122. When lid body 105 is closed, lower-terminal-plate contacting part 122 biases lower terminal plate 106b of lid detection unit 106, upward from the downward side.

Next, detection operation of lid detection unit 106 is described.

First, before either putting or taking clothes in or out of washing-cum-dewatering tub 101, a user opens lid body 105. At this time, lid body 105 rotates, clockwise (upward) in the Figure, around second bearing 112 serving as the rotation center. Following the rotation, second lever 117 as well
 5 of lid body 105 rotates clockwise, with the second lever biasing, from below, first lever 116 of transmission part 107. In this case, second lever 117 rotates downward because it is disposed on the transmission part 107 side with respect to second bearing 112. This eliminates the bias force to support first lever 116 of transmission part 107, upward from the downward side.

10 Moreover, as shown in FIG. 11, when lid body 105 is closed, first lever 116 of transmission part 107 is biased downward by lower terminal plate 106b of lid detection unit 106. For this reason, when lid body 105 is opened, first lever 116 rotates around first bearing 109 serving the rotation center, counterclockwise (downward) in the Figure. This separates upper terminal
 15 plate 106a and lower terminal plate 106b of lid detection unit 106 from each other. As a result, lid detection unit 106 can detect the opening of lid body 105.

Upon separation of the two terminals of lid detection unit 106, a not-shown controller halts drive of a not-shown washing motor. This, in turn,
 20 halts rotation of washing-cum-dewatering tub 101. That is, when the user opens lid body 105, transmission part 107 acts to separate the two terminals of lid detection unit 106 from each other, which thereby causes the controller to halt the washing motor. This operation prevents a clearance from being caused between lid body 105 and outer shell 103, in a state of
 25 washing-cum-dewatering tub 101 being rotating. As a result, it is possible to prevent a user's hand and the like from being inserted into washing-cum-dewatering tub 101 while the tub is rotating.

Moreover, lid body 105 includes magnet 130 in an end part on the front side of front lid body 110. On the other hand, magnetic sensor 131 is disposed in an inside part of outer shell 103 so as to measure a distance to magnet 130, with the inside part facing magnet 130. This configures second lid detection unit 132 for detecting the opening and closing of lid body 105. Second lid detection unit 132 detects a state in which the user has closed lid body 105, with front lid body 110 having been bent by rotating it around third bearing 113, serving as the rotation center, through an angle of approximately 180 degrees, vertically downward relative to a horizontal plane. In this case, at least rear lid body 111 of lid body 105 has been rotated around second bearing 112, serving as the rotation center, so as to cover clothes put-in port 104. This causes second lever 117 of lid body 105 to bias, upward, first lever 116 of transmission part 107. With this operation, the two terminals of lid detection unit 106 come into contact with each other, which permits the rotary drive of the washing motor. In this case, if a clearance is caused between thus-bent front lid body 110 and outer shell 103, it makes it possible to insert something, such as a user's hand, into washing-cum-dewatering tub 101 while the tub is rotating.

In this state described above, the distance between magnet 130 and magnetic sensor 131, which both configure second lid detection unit 132, becomes larger than a predetermined distance (in a state of rear lid body 111 being horizontally extended and closed). In this state, second lid detection unit 132 detects that front lid body 110 has been bent. As a result, based on the result of the detection by second lid detection unit 132, the controller (not shown) halts the drive of the washing motor. This can prevent something, such as a user's hand, from being inserted into washing-cum-dewatering tub 101, while the tub is rotating, through the clearance caused between thus-bent

front lid body 110 and outer shell 103.

Unfortunately, there are cases where upper terminal plate 106a and lower terminal plate 106b, both serving as the two terminals of lid detection unit 106, have been welded together due to an overcurrent and the like. In these cases, the two terminals, being fastened together, are not separated from each other even when lid body 105 is opened. That is, lid detection unit 106 cannot detect the opening of lid body 105.

Moreover, in the event of fastening of transmission part 107 to first bearing 109 due to intrusion of foreign matters and the like, transmission part 107 sometimes hardly rotate even though the transmission part is biased downward by lower terminal plate 106b. That is, even though the user opens lid body 105 to rotate second lever 117 downward, first lever 116 of transmission part 107 hardly moves downward. This allows lower-terminal-plate contacting part 122 of transmission part 107 to keep the state in which the two terminals are in contact with each other. As a result, lid detection unit 106 cannot detect the opening of lid body 105.

To prevent the occurrence of the cases described above, a controller has been proposed which determines that lid body 105 is opened when either lid detection unit 106 or second lid detection unit 132 detects the opening of lid body 105. Then, the controller performs control based on the determination. With this controller, the washing machine should be designed such that the detection of the opening and closing of lid body 105 can be correctly determined even in either of the cases as follows: That is, one case where either lid detection unit 106 or second lid detection unit 132 suffers a failure and the other case where neither of the detection units suffers a failure. For this reason, design of the controller and the like of the washing machine tends to be complicated.

Citation List

Patent Literature

PTL 1: Japanese Patent Unexamined Publication No. H06-63287

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SUMMARY

A washing machine is provided which is capable of more reliably detecting opening and closing of its lid body, with a simple configuration.

That is, the washing machine according to an aspect includes: a washing
10 machine body; a washing-cum-dewatering tub that is rotatably disposed in an
inside of the washing machine body; an outer shell that is disposed in an upper
part of the washing machine body so as to cover the washing-cum-dewatering
tub; and a clothes put-in port that is disposed in the outer shell and
communicates with an inside of the washing-cum-dewatering tub. The
15 washing machine further includes: a lid body that covers the clothes put-in port
openably and closably; a lid detection unit that is configured with at least two
terminals so as to detect an opening/closing state of the lid body; and a
transmission part that is disposed between the lid body and the lid detection
unit so as to operate the lid detection unit in tandem with an opening and a
20 closing of the lid body. Then, the lid detection unit provides a first state in
which the two terminals are in contact with each other, and a second state in
which the two terminals are separated from each other. When the lid body is
opened, the transmission part biases at least one of the two terminals toward a
direction in which the two terminals are brought into the second state from the
25 first state.

In accordance with this configuration, even in cases where the two
terminals of the lid detection unit have been fastened together, opening of the

lid body causes the two terminals to be detached and separated from each other. As a result, in a state of the lid body being opened, it is possible to prevent the lid detection unit from erroneously detecting that the lid body must be closed.

5 BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a cross-sectional side elevation view of a washing machine according to a first embodiment of the present invention.

FIG. 2 is a cross-sectional view of a principal part of the washing machine in a state in which a lid body is closed.

10 FIG. 3 is a cross-sectional view of the principal part of the washing machine in a state in which the lid body is opened.

FIG. 4 is a cross-sectional view of the principal part of the washing machine in a state in which the lid body is opened with a contact point being fastened.

15 FIG. 5 is a cross-sectional view of the principal part of the washing machine in a state in which the lid body is further opened with the contact point being fastened.

FIG. 6 is a perspective view of a principal part of the washing machine.

20 FIG. 7 is a cross-sectional view of a principal part of the washing machine in the state in which the lid body is closed.

FIG. 8 is a cross-sectional view of the principal part of the washing machine in the state in which the lid body is opened.

FIG. 9 is a cross-sectional view of a principal part of a washing machine according to a second embodiment of the present invention.

25 FIG. 10 is a cross-sectional side elevation view of a principal part of a conventional washing machine.

FIG. 11 is an enlarged cross-sectional view of a principal part of the

conventional washing machine.

DESCRIPTION OF EMBODIMENTS

Hereinafter, embodiments of the present invention will be described
5 with reference to the accompanying drawings. It is noted that these
embodiments are not intended to be construed as limiting the present
invention.

FIRST EXEMPLARY EMBODIMENT

10 Hereinafter, a washing machine according to a first embodiment will be
described with reference to FIGS. 1 to 8.

FIG. 1 is a cross-sectional side elevation view of the washing machine
according to the first embodiment of the present invention. FIG. 2 is a
cross-sectional view of a principal part of the washing machine in a state in
15 which a lid body is closed. FIG. 3 is a cross-sectional view of the principal part
of the washing machine in a state in which the lid body is opened. FIG. 4 is a
cross-sectional view of the principal part of the washing machine in a state in
which the lid body is opened with a contact point being fastened. FIG. 5 is a
cross-sectional view of the principal part of the washing machine in a state in
20 which the lid body is further opened with the contact point being fastened.
FIG. 6 is a perspective view of a principal part of the washing machine. FIG. 7
is a cross-sectional view of a principal part of the washing machine in the state
in which the lid body is closed. FIG. 8 is a cross-sectional view of the principal
part of the washing machine in the state in which the lid body is opened.

25 Note that, hereinafter, arrangements of constituent elements will be
described using the following terms throughout the drawings. That is, a
direction toward the upper side in each of the drawings is referred to as an

“upward” direction; a direction toward the lower side as a “downward” direction; a direction toward the left side as a “forward” direction; and a direction toward the right side as a “backward” direction.

As shown in FIG. 1, the washing machine according to the embodiment is configured including: washing machine body 2, water tub 28, washing-cum-dewatering tub 1, washing motor 15, outer shell 3, lid body 5, and suspension members 30. Washing machine body 2 houses water tub 28 in an inside of the machine body via suspension members 30, in a capable-of-freely-vibrating manner. Water tub 28 rotatably houses washing-cum-dewatering tub 1 in an inside of the water tub. Water tub 28 is equipped with the washing motor (electrical component) at the bottom part of the water tub. Washing motor 15 is coupled with the bottom part of washing-cum-dewatering tub 1 via a rotary shaft, and drives washing-cum-dewatering tub 1.

Outer shell 3 is formed with polypropylene or the like, for example, and is fitted so as to cover the whole of the upper part of washing machine body 2. Outer shell 3 includes clothes put-in port 4 in a substantially central portion (including the center) of the shell, with the clothes put-in port having an opening that extending downward toward the upper part of washing-cum-dewatering tub 1.

Lid body 5 is fitted to outer shell 3, openably and closably, so as to cover the whole of the upward direction of clothes put-in port 4.

Lid detection unit 6 is housed in case 8, and is included in outer shell 3 on the backward side of the outer shell. Lid detection unit 6 is configured with two terminals and the like, i.e. upper terminal plate 6a and lower terminal plate 6b each of which is formed with a thin plate made of a copper alloy, for example. Lid detection unit 6 detects opening and closing of lid body 5,

through operations of contacting and separating the two terminals. Details of their operations will be described later.

Transmission part 7 is disposed between lid body 5 and lid detection unit 6, and transmits an opening/closing state of lid body 5 to lid detection unit 6. Note that transmission part 7 is formed with polyacetal or the like, for example.

Case 8 is formed with polyacetal or the like, for example, and houses lid detection unit 6. Case 8 is fixed to outer shell 3 with a not-shown coupling member. Moreover, first bearing 9 is formed in case 8. First bearing 9 is rotatably coupled with supports transmission part 7, thereby supporting the transmission part.

Lid body 5 is configured with front lid body 10 that configures a forward part of lid body 5 and rear lid body 11 that configures a backward part of lid body 5. In rear lid body 11, second bearing 12 is disposed in a backward end part of the rear lid body. The second bearing is rotatably supported by outer shell 3. Moreover, in rear lid body 11, third bearing 13 that rotatably supports front lid body 10 is formed in a forward end part of the rear lid body. That is, lid body 5 is configured with second bearing 12, rear lid body 11, third bearing 13, and front lid body 10 which are arranged in this order, from the backward part of outer shell 3 to the forward part of the outer shell.

Front lid body 10 is equipped with handle 14. When opening lid body 5, a user pulls handle 14 up in a direction in which lid body 5 is opened, i.e. in an approximately upward direction (including the upward direction). With this operation, lid body 5 is rotated around second bearing 12 to open.

Transmission part 7 includes first lever 16 and third lever 18 which both extend toward lid body 5 side (on the forward side). Third lever 18 is disposed in a downward direction, with the third lever facing first lever 16 with a

predetermined space therebetween. That is, first lever 16 and third lever 18 are arranged in a U-shape (horseshoe-shape) having the predetermined space, for example. Lid body 5 is equipped with second lever 17 which extends from the proximity of second bearing 12 toward the transmission part 7 side located backward. In the state of lid body 5 being closed, second lever 17 is disposed in a space between first lever 16, which is disposed on the upward side of transmission part 7, and third lever 18, which is disposed on the downward side of the transmission part. Note that third lever 18 disposed on the downward side of transmission part 7 is formed to be smaller in length than first lever 16 disposed on the upward side of the transmission part. That is, these levers are formed such that the length to the distal end of first lever 16 from the rotation center of first bearing 9, which rotatably supports transmission part 7, is larger than the length to the distal end of third lever 18 from the rotation center of the first bearing. The reason for this will be described later.

Upper terminal plate 6a and lower terminal plate 6b, which both configure lid detection unit 6, are disposed substantially in parallel (including parallel) with each other. Moreover, upper terminal plate 6a and lower terminal plate 6b are disposed side by side in a widthwise direction, as shown in FIG. 6. Consequently, lower terminal plate 6b is formed in an L-shape, for example, such that end part 6b1 of the lower terminal plate is formed to face the end part of upper terminal plate 6a. Moreover, each of upper terminal plate 6a and lower terminal plate 6b is disposed to have a portion, serving as an open end, on the transmission part 7 side (first bearing 9 side), with the portion being bent downward in the Figure. Note that upper terminal plate 6a and lower terminal plate 6b are each formed with an electrically conductive thin plate made of a copper alloy, for example. Moreover, upper terminal plate 6a and lower terminal plate 6b are configured such that they are elastically

deformed, upon being subjected to an applied external force, as will be described later.

Moreover, as shown in FIG. 3, in the proximity of the forward end part of upper terminal plate 6a, upper electrode 19 is welded. In end part 6b1 of L-shape of lower terminal plate 6b, lower electrode 20 is welded at a position facing upper electrode 19. Note that upper terminal plate 6a and lower terminal plate 6b are disposed substantially in parallel with each other, as described above. Therefore, without any applied external force, upper terminal plate 6a and lower terminal plate 6b are disposed in a state in which these terminal plates are separated from each other. As a result, upper terminal plate 6a and lower terminal plate 6b are in a state in which they are not electrically coupled (not electrically conducted) with each other. On the other hand, the other end part on the backward side of each of upper terminal plate 6a and lower terminal plate 6b is fixed to case 8, and coupled with an internal wiring, a controller (not-shown) of the washing machine, or the like. Then, through operations of contacting and separating upper terminal plate 6a with and from lower terminal plate 6b, the controller controls the rotation and halt operations of washing motor 15.

Moreover, transmission part 7 includes two protrusion parts on the backward side thereof. The protrusion parts are disposed to extend and protrude upward, in the proximity of first bearing 9, toward first lever 16 and third lever 18. The two protrusion parts extending upward from transmission part 7 are disposed such that the protrusion parts pass through hole 8a, which is opened in the downward part of case 8, into the inside of case 8. Note that the two protrusion parts are formed side by side in the widthwise direction as shown in FIG. 6, for example, to configure upper-terminal-plate contacting part 21 and lower-terminal-plate contacting part 22, which are described below.

That is, one of the protrusion parts extending upward from transmission part 7 protrudes upward from the backward side of end part 6b1 of L-shape of lower terminal plate 6b, thereby configuring upper-terminal-plate contacting part 21 that comes into contact with the lower surface of upper terminal plate 6a. Upper-terminal-plate contacting part 21 biases, upward, upper terminal plate 6a that is arranged and bent downward. On the other hand, the other of the protrusion parts extending upward from transmission part 7 configures lower-terminal-plate contacting part 22 that comes into contact with the lower surface of end part 6b1, for example, of lower terminal plate 6b. Lower-terminal-plate contacting part 22 biases, upward, lower terminal plate 6b that is arranged and bent downward. Moreover, as shown in FIGS. 2 to 5 and the like, upper-terminal-plate contacting part 21 is disposed to protrude at a position on the backward side of lid body 5 with respect to first bearing 9, while lower-terminal-plate contacting part 22 is disposed to protrude at a position on the lid body 5 side with respect to first bearing 9.

In this way, the washing machine according to the embodiment is configured.

Hereinafter, descriptions will be made regarding operations of lid body 5, lid detection unit 6, and transmission part 7 when lid body 5 is opened and closed.

First, with reference to FIG. 2, a description is made regarding a state in which lid body 5 has rotated to the most counterclockwise position, i.e. a state in which the lid body has closed clothes put-in port 4.

In this case, second lever 17 of rear lid body 11 of lid body 5 rotates, around second bearing 12 serving as the rotation center, to reach the most counterclockwise position, i.e. the most upward position for the second lever to be disposed. This causes second lever 17 to bias, upward from the downward

side, first lever 16 of transmission part 7. With this operation, first lever 16 rotates clockwise (upward) around first bearing 9 serving as the rotation center. Likewise, lower-terminal-plate contacting part 22 of transmission part 7 also rotates clockwise, with the lower-terminal-plate contacting part being formed
 5 on the forward side with respect to first bearing 9. Then, lower-terminal-plate contacting part 22 moves upward, thereby biasing lower terminal plate 6b of lid detection unit 6, toward the upper terminal plate 6a side (i.e. in an upper right direction in FIG. 2), with the lower terminal plate being bent downward.

On the other hand, upper-terminal-plate contacting part 21 as well of
 10 transmission part 7 rotates clockwise in the same way. However, upper-terminal-plate contacting part 21 is disposed on the opposite (backward) side with respect to first bearing 9. Accordingly, upper-terminal-plate contacting part 21 rotates toward a lower right direction in FIG. 2. With this configuration, upper terminal plate 6a which is bent downward is displaced
 15 toward the lower terminal plate 6b side, i.e. in a downward direction in FIG. 2.

As described above, when lid body 5 is closed, upper terminal plate 6a and lower terminal plate 6b of lid detection unit 6 move closer to each other in tandem with the movement of lower-terminal-plate contacting part 22 and upper-terminal-plate contacting part 21 of transmission part 7. Then, upper
 20 electrode 19 and lower electrode 20 come into contact with each other. Hereinafter, the state in which upper electrode 19 and lower electrode 20 are in contact with each other is referred to as the “first state” in the descriptions. With this operation, the circuit configured with lid detection unit 6 is closed. As a result, lid detection unit 6 detects that lid body 5 has been closed.

25 Next, a description is made regarding a state in which lid body 5 has rotated clockwise (in an upward direction) to open clothes put-in port 4, with reference to FIG. 3.

Note that, in the embodiment, spring 23 which configures a biasing part is disposed, on an upward side of transmission part 7, between first lever 16 and lower-terminal-plate contacting part 22. One end of spring 23 is attached to case 8, while the other is attached to transmission part 7. Therefore, spring 23 always biases first lever 16 of transmission part 7 in a direction in which the first lever comes into contact with second lever 17, i.e. in which the first lever rotates counterclockwise (in a downward direction) around first bearing 9.

That is, as shown in FIG. 3, when lid body 5 is rotated clockwise to open, second lever 17 of rear lid body 11 rotates clockwise around second bearing 12 serving as the rotation center. At this time, as described above, spring 23 biases first lever 16 of transmission part 7 in the direction toward second lever 17. Accordingly, first lever 16 rotates in a direction toward second lever 17 side, i.e. counterclockwise around first bearing 9 serving as the rotation center. At this time, lower-terminal-plate contacting part 22 of transmission part 7 also rotates counterclockwise in the same way to move in a lower left direction, with the lower-terminal-plate contacting part being formed on the forward side with respect to first bearing 9. This eliminates the bias applied, by lower-terminal-plate contacting part 22, to lower terminal plate 6b, upward from the downward side. With this operation, lower terminal plate 6b, being bent downward, is displaced in a direction in which the lower terminal plate is separated from the upper terminal plate 6a side, i.e. in a downward direction in FIG. 3.

On the other hand, upper-terminal-plate contacting part 21 as well of transmission part 7 rotates counterclockwise in the same way. However, upper-terminal-plate contacting part 21 is disposed on the backward side with respect to first bearing 9. Accordingly, upper-terminal-plate contacting part 21 rotates toward an upper left direction. Then, upper-terminal-plate

contacting part 21 pushes, upward, upper terminal plate 6a. With this operation, upper terminal plate 6a is displaced in a direction in which the upper terminal plate is separated from lower terminal plate 6b, i.e. in an upward direction.

5 As described above, when lid body 5 is opened, upper terminal plate 6a and lower terminal plate 6b of lid detection unit 6 are separated from each other in tandem with the movement of lower-terminal-plate contacting part 22 and upper-terminal-plate contacting part 21 of transmission part 7. Hereinafter, the state in which upper electrode 19 and lower electrode 20 are
10 separated from each other is referred to as the “second state” in the descriptions. With this operation, the circuit configured with lid detection unit 6 is opened (interrupted). That is, lid detection unit 6 detects that lid body 5 has been opened. As a result, based on the result of the detection, the controller halts the rotation of washing motor 15.

15 Next, descriptions will be made regarding operations of transmission part 7 and lid detection unit 6 in response to the rotation operation of lid body 5, in a state in which detection unit 6 has been welded or fastened, with reference to FIGS. 4 and 5.

 Here, in the embodiment, as shown in FIGS. 4 and 5,
20 upper-terminal-plate contacting part 21 of transmission part 7 further includes detaching part 24. Detaching part 24 is disposed between upper terminal plate 6a and lower terminal plate 6b. Moreover, detaching part 24 includes wedge-shaped part 25 that tapers off, with an acute taper angle, toward both the end part of upper terminal plate 6a and end part 6b1 of lower terminal
25 plate 6b. Note that, in the embodiment, wedge-shaped part 25 is formed such that its end part has a taper angle of approximately 30 degrees, for example. Needless to say, however, the taper angle is not limited to this.

As described above, there are cases where upper electrode 19 of upper terminal plate 6a and lower electrode 20 of lower terminal plate 6b are difficult to separate from each other. For example, welding due to an overcurrent, fastening due to adhesion of foreign matters, or the like is responsible for this.

5 Usually, when lid body 5 is operated to change its state from closed to open, second lever 17 of lid body 5 starts rotating clockwise around second bearing 12 serving as the rotation center. However, in cases where upper electrode 19 and lower electrode 20 of lid detection unit 6 have been fastened together, upper terminal plate 6a cannot be separated from lower terminal
10 plate 6b, which causes their relative positions to remain unchanged. For this reason, first lever 16 cannot be rotated around first bearing 9, with the first lever remaining at a position with which upper-terminal-plate contacting part 21 of transmission part 7 is in contact with upper terminal plate 6a.

Like this, there are also cases where first lever 16 is difficult to rotate
15 because of increased frictional resistance or fastening of transmission part 7 to first bearing 9, which is due to adhesion of foreign matters and the like, for example.

However, in the embodiment, when lid body 5 is further opened, second lever 17 of lid body 5 rotates downward, with the second lever being in contact
20 with third lever 18 of transmission part 7, as shown in FIG. 4. Then, following the opening of lid body 5, second lever 17 forcibly causes third lever 18 to rotate counterclockwise around first bearing 9. At this time, the end part on the upper electrode 19 side of detaching part 24 biases upper terminal plate 6a, in an upper left direction. On the other hand, the end part (a lower surface of
25 wedge-shaped part 25) on the lower electrode 20 side of detaching part 24 biases end part 6b1 of lower terminal plate 6b, in a lower left direction.

Then, wedge-shaped part 25 of detaching part 24 rotates

counterclockwise, thereby moving so as to be inserted, from the backward direction, into the proximity of both upper electrode 19 in the end part of upper terminal plate 6a and lower electrode 20 in end part 6b1 of lower terminal plate 6b.

5 In this configuration, maximum height h_3 of wedge-shaped part 25 shown in FIG. 5 is set to be larger than a sum of height h_1 of upper electrode 19 and height h_2 of lower electrode 20. As a result, the insertion of wedge-shaped part 25 of detaching part 24 causes detachment of upper electrode 19 of upper terminal plate 6a from lower electrode 20 of lower terminal plate 6b, even
10 though these electrodes have been fastened together, so that the two terminals are separated from each other.

 Moreover, in the embodiment, as shown in FIG. 6, cross-sectional area S_2 of first lever 16 is set to be larger than cross-sectional area S_1 of first bearing 9. Furthermore, cross-sectional area S_3 of third lever 18 is set to be
15 larger than cross-sectional area S_2 of first lever 16. With this configuration, second lever 17 and transmission part 7 of lid body 5 have a high mechanical strength that is durable enough to cause upper electrode 19 and lower electrode 20 to be detached from each other, against a fastening force between them caused by welding or fastening.

20 Moreover, spring 23 that configures the biasing part of transmission part 7 is set to provide a bias force smaller than the fastening force. In general, even without the configuration according to the present application, such fastened electrodes can be detached as long as the bias force caused by spring 23 is larger than the fastening force. Unfortunately, such a larger bias force
25 requires spring 23 to have a large spring constant. This, in turn, requires a further increased strength of transmission part 7, which causes a factor in increasing cost of spring 23 and transmission part 7. Hence, the present

application is aimed at reducing their cost by reducing the bias force of spring 23 to a smaller force than the fastening force.

Moreover, in the embodiment, the shapes and arrangement of lid detection unit 6, transmission part 7, and second lever 17 are set such that, when a user changes lid body 5 from the closing state to the opening state, the shapes and arrangement are held in the following manner, at any point in time during the changing, from the “first state” where upper electrode 19 and lower electrode 20 are in contact with each other, to the “second state” where the electrodes are separated. Specifically, when lid body 5 is opened, the clearance between lid body 5 and outer shell 3 in the proximity of clothes put-in port 4 is smaller than a clearance through which an accidentally-inserted finger or hand of the user can reach washing-cum-dewatering tub 1. This allows washing machines to be realized with high safety.

Moreover, in the embodiment, as shown in FIG. 1, water tub 28 which houses washing-cum-dewatering tub 1 is held by washing machine body 2 via suspension members 30, in a capable-of-freely-vibrating manner. Moreover, water-tub vibration detecting lever 29 which detects vibrations of water tub 28 is rotatably supported by case 8 via an elastic member such as coil spring 29b, for example. Water-tub vibration detecting lever 29 detects the amount of displacement of water tub 28, through use of a lever extending toward the water tub 28 side.

On the other hand, the other end part 29a of water-tub vibration detecting lever 29 is extended and inserted into the inside of case 8, through hole 8b formed in the downward part of case 8, thereby being disposed at a position that faces the lower surface of upper terminal plate 6a of lid detection unit 6. Then, when the amount of displacement of water tub 28 exceeds a predetermined amount of displacement, end part 29a of water-tub vibration

detecting lever 29 biases upper terminal plate 6a upward from the downward side, such that the two terminals are separated from each other. Specifically, if water tub 28 violently vibrates, water tub 28 hits water-tub vibration detecting lever 29. At this time, water-tub vibration detecting lever 29, which
5 is rotatably supported, rotates backward around rotary shaft 29d shown in FIG. 2. Then, end part 29a of water-tub vibration detecting lever 29 moves upward, thereby pushing, upward, upper terminal plate 6a of lid detection unit 6. This separates upper electrode 19 and lower electrode 20 of lid detection unit 6 from each other. As a result, the rotation of washing motor 15 is halted to ensure
10 the safety.

That is, for a vibration of water tub 28, water-tub vibration detecting lever 29 is capable of detecting the vibration that is greater in magnitude than a predetermined value, through shared use of lid detection unit 6 that is intended to detect the opening and closing operations of lid body 5.

15 Hereinafter, descriptions will be made regarding operations, functions and effects of the washing machine thus-configured as described above.

First, as shown in FIGS. 4 and 5, in cases where upper terminal plate 6a and lower terminal plate 6b have been fastened together due to welding and the like, second lever 17 is rotated to forcibly rotate third lever 18 of transmission
20 part 7, in accordance with the state of opening of lid body 5. At this time, the end part of detaching part 24 on the upper electrode 19 side biases upper electrode 19 upward, while the end part of detaching part 24 on the lower electrode 20 side biases lower electrode 20 downward. Therefore, it is possible to separate, more reliably, upper terminal plate 6a from lower terminal plate
25 6b even though these plates have been fastened together. This can bring about the “second state” in which upper terminal plate 6a is not in contact with lower terminal plate 6b. As a result, lid detection unit 6 can detect that lid

body 5 has been opened.

In the same way, also in cases where transmission part 7 and first bearing 9 have been fastened together due to foreign matters and the like, second lever 17 is rotated to forcibly rotate third lever 18 of transmission part 7, in accordance with the state of opening/closing of lid body 5. With this configuration, the rotary drive of transmission part 7 can bring about the “second state” in which upper terminal plate 6a and lower terminal plate 6b of lid detection unit 6 are not in contact with each other. As a result, lid detection unit 6 can detect that lid body 5 has been opened.

Moreover, transmission part 7 and case 8 are formed with polyacetal which is excellent in lubricity and durability. This makes it possible for transmission part 7 to transmit the operation of opening/closing of lid body 5 to lid detection unit 6, more reliably and smoothly for the long term.

Moreover, as shown in FIGS. 7 and 8, lid body 5 is rotatably supported by outer shell 3 via second bearing 12. Case 8 which supports transmission part 7 is also fixed to outer shell 3 with a coupling member. Therefore, the positional relation between lid body 5 and supports transmission part 7 is configured depending only on dimensions of outer shell 3. This configuration allows lid body 5 to be less prone to be out of position with respect to transmission part 7 and case 8. As a result, it is possible to transmit, more reliably, the operation of opening/closing of lid body 5 to lid detection unit 6.

Moreover, as shown in FIG. 4, second lever 17 arranged in the backward direction of lid body 5 is disposed to be interposed in a space between first lever 16 and third lever 18 of transmission part 7. As a result, even in cases where upper terminal plate 6a and lower terminal plate 6b have been fastened together or cases where a contact point therebetween has been welded, the operation of opening lid body 5 causes second lever 17 to forcibly rotate third

lever 18, which has discontinued rotating due to the fastening and the like, to be pressed downward. Likewise, even in cases where frictional resistance of transmission part 7 has increased due to degradation of the components configuring the transmission part or cases where fastening of the transmission part with first bearing 9 has occurred due to intrusion of foreign matters and the like, the operation of opening lid body 5 causes second lever 17 to forcibly rotate third lever 18, which has discontinued rotating due to the fastening and the like, to be pressed downward. These operations cause transmission part 7 to rotate by a force greater than the fastening between upper terminal plate 6a and lower terminal plate 6b. As a result, detaching part 24 of transmission part 7 can more reliably separate upper terminal plate 6a and lower terminal plate 6b from each other, which have been fastened together. Then, it is possible to transmit, more reliably, the operation of opening/closing of lid body 5 to lid detection unit 6.

Moreover, as shown in FIG. 3, third lever 18 disposed on the downward side of transmission part 7 is smaller in length than first lever 16 disposed on the upward side of the transmission part. With this configuration, second lever 17 forcibly rotates third lever 18 until upper terminal plate 6a and lower terminal plate 6b have come to be opened (separated) from each other. After upper terminal plate 6a and lower terminal plate 6b have been separated, further opening of lid body 5 results in breaking-off of the contact between second lever 17 and third lever 18. With this configuration, the user can easily open lid body 5 in order to put in and take out clothes, without being subjected to additional loads to further rotate third lever 18. As a result, the configuration brings about compatibility between ease of use and detection of opening/closing of lid body 5.

Moreover, as shown in FIG. 2, first lever 16 of transmission part 7 is

also biased from the upward side by spring 23, serving as a biasing part, while also being biased from the downward side by second lever 17. As a result, first lever 16 and second lever 17 are kept in contact with each other as long as lid body 5 is placed at a position between the closed position and a predetermined open position. With this operation, the position of lid body 5 can be reliably converted into a rotation angle of transmission part 7. Then, when lid body 5 is further opened beyond the predetermined open position, only second lever 17 is allowed to rotate and lid body 5 is fully opened.

Moreover, upper terminal plate 6a and lower terminal plate 6b, which both are bent downward and disposed, are respectively biased from the downward side by upper-terminal-plate contacting part 21 and lower-terminal-plate contacting part 22 of transmission part 7. This allows the transmission of variations in the rotation angle of transmission part 7 to lid detection unit 6. As a result, the opening/closing state of lid body 5 can be more reliably detected by lid detection unit 6.

Moreover, as shown in FIGS. 4 and 5, wedge-shaped part 25 disposed in upper-terminal-plate contacting part 21 is formed such that the end part of the wedge shape, toward the upper electrode 19 side and the lower electrode 20 side, has an acute taper angle. For this reason, even if the fastening between upper terminal plate 6a and lower terminal plate 6b has occurred, wedge-shaped part 25 can be easily inserted into a space between upper terminal plate 6a and lower terminal plate 6b, by a force smaller than that required to break the fastening. With this configuration, the fastening between upper terminal plate 6a and lower terminal plate 6b can be easily broken by such a small force. As a result, the opening/closing state of lid body 5 can be more reliably transmitted to lid detection unit 6, which allows the lid detection unit to detect the state.

Moreover, as shown in FIG. 5, maximum height h_3 of wedge-shaped part 25 is set to be larger than a sum of height h_1 of upper electrode 19 and height h_2 of lower electrode 20. Upon rotation of transmission part 7 following the operation of opening/closing lid body 5, wedge-shaped part 25 is inserted
 5 between upper electrode 19 and lower electrode 20 so as to separate these electrodes. With this operation, the space between upper electrode 19 and lower electrode 20 can be reliably opened to have a distance therebetween not smaller than at least height h_3 .

Moreover, as shown in FIG. 2, end part 29a of water-tub vibration
 10 detecting lever 29 is disposed at a position that faces the lower surface of upper terminal plate 6a. Water-tub vibration detecting lever 29 is set so as to bias upper terminal plate 6a, upward from the downward side, when the amount of vibrational displacement of water tub 28 exceeds the predetermined amount of displacement.

15 In general, when an abnormal vibration of washing-cum-dewatering tub 1 occurs due to an unevenly distributed loading of clothes and the like, the amount of displacement of water tub 28 becomes larger, with the water tub being suspended from washing machine body 2. Thus, when the amount of displacement exceeds the predetermined amount of displacement, water-tub
 20 vibration detecting lever 29 biases, upward from the downward side, upper terminal plate 6a of lid detection unit 6 so as to open (separate) upper terminal plate 6a and lower terminal plate 6b from each other. With this configuration, it is possible to detect both the opening/closing state of lid body 5 and the abnormal vibration of water tub 28, through the shared use of one unit of lid
 25 detection unit 6. As a result, the configuration of washing machine body 2 can be made compact.

Moreover, every time the user performs the operation of opening/closing

lid body 5, second lever 17 of lid body 5 and transmission part 7, both described above, rotate in tandem with each other. With this operation, even in the event of a failure of lid detection unit 6 due to fastening or the event of a failure of transmission part 7, the detection operation of lid detection unit 6 can be recovered every time the operation of opening/closing is performed. As a result, in addition to the operation of opening/closing of lid body 5, the abnormal vibration of water tub 28 can also be detected with high accuracy for the long term.

10 SECOND EXEMPLARY EMBODIMENT

Hereinafter, descriptions will be made regarding a washing machine according to a second embodiment, with reference to FIG. 9.

FIG. 9 is a cross-sectional view of a principal part of the washing machine according to the second embodiment of the present invention.

15 The washing machine according to the second embodiment is different from the washing machine according to the first embodiment in that the machine includes: a first rotation limiter that is configured in the front lid body, and a second rotation limiter that is configured in the rear lid body.

The first and second rotation limiters place a restriction on the rotation of the front lid body as follows: In a case where the front lid body rotates around the third bearing serving as the rotation center, the front lid body halts the rotation by the time it is completely bent, i.e. by the time it rotates through an angle of approximately 180 degrees (including an angle of 180 degrees) relative to the rear lid body. Note that, since the other configurations are the same as those of the first embodiments, the same configurations are designated by the same numerals and symbols and their detailed descriptions are omitted.

25 Here, let us assume that the rotation angle of third bearing 13 which

couples front lid body 10 to rear lid body 11 is 0 (zero) degree in a state in which lid body 5 closes clothes put-in port 4, i.e. in which lid body 5 is stretched out straight, as shown FIGS. 1 and 7, for example.

FIG. 9 is a view illustrating a state in which the rotation of front lid body 10 is restricted at a rotational position at which the front body has rotated counterclockwise around third bearing 13 through an angle of approximately 110 degrees.

That is, when front lid body 10 rotates counterclockwise through an angle of approximately 110 degrees, first rotation limiter 26 disposed in front lid body 10 comes into contact with second rotation limiter 27 disposed in rear lid body 11. At this time, in the embodiment, the maximum open angle of lid body 5 when it has rotated clockwise around second bearing 12 is set to approximately 90 degrees, for example. Thus, the rotation angle of third bearing 13 until first rotation limiter 26 comes into contact with second rotation limiter 27 is set equal to an angle as follows: That is, such an angle (about 110 degrees in the embodiment) is larger than the maximum open angle of lid body 5 that has rotated around second bearing 12 and is smaller than 180 degrees.

When lid body 5 is closed in the state in which front lid body 10 has rotated through an angle of 110 degrees with first rotation limiter 26 being in contact with second rotation limiter 27, forward end part 10a of front lid body 10 comes into contact with outer shell 3 at the proximity of clothes put-in port 4.

Thus, in the embodiment, the relation among second lever 17, transmission part 7, and lid detection unit 6, in terms of arrangement, rotation angle, etc., is set to provide the following configuration. That is, in the state of the front lid body being in contact with the outer shell, lid detection unit 6 is

brought into the “second state” in which the contact point is opened between upper terminal plate 6a and lower terminal plate 6b of the lid detection unit. With this configuration, even in the event that lid body 5 is closed with front lid body 10 of lid body 5 being bent with respect to rear lid body 11, for example, the washing motor is not driven. As a result, it becomes possible for someone to insert a hand and the like into the inside of washing-cum-dewatering tub 1, through a clearance between outer shell 3 and lid body 5.

Descriptions will be made regarding operations, functions, and effects of the washing machine thus-configured as described above.

First, as shown in FIG. 9, in cases where a user wants to operate the washing machine and starts by closing lid body 5 with front lid body 10 and rear lid body 11 having been bent, the rotation angle of third bearing 13 of front lid body 10 is restricted to 110 degrees. For this reason, distance L1 from the rotation center of third bearing 13 to the surface of outer shell 3 at the proximity of clothes put-in port 4 is can be made larger than thickness L2 of front lid body 10 and up to a distance equal to length L3 of front lid body 10. With this configuration, the rotation angle of second lever 17 can be made larger than the angle at which lid detection unit 6 detects the closing state of lid body 5. That is, in FIG. 9, the rotation angle of second lever 17 can be set equal to the maximum angle through which the second lever can be rotated clockwise around first bearing 9. For this reason, even if lid body 5 is closed with front lid body 10 having been bent, lid detection unit 6 is prevented from erroneously detecting that lid body 5 must be in the closing state. This eliminates the need for an additional lid detection unit that would be disposed to detect the bending of front lid body 10. As a result, the opening/closing state of lid body 5 can be detected by using only one unit of lid detection unit 6, resulting in the simplified configuration.

Moreover, the rotation angle of front lid body 10 is restricted to 110 degrees.

Therefore, even in the state of lid body 5 having been opened clockwise through an angle of 90 degrees, front lid body 10 can be disposed in a state of being inclined toward a front downward direction through an angle of 20 degrees (corresponding to the difference from the rotation angle of lid body 5) counterclockwise from the horizontal direction. This configuration eliminates the need for the user to greatly bent a user's wrist when the user holds handle 14 by hand to open or close lid body 5, resulting in a reduction in loads on the user. As a result, the washing machine can be realized which features compatibility between ease of use and the detection of opening/closing of lid body 5.

As described above, the washing machine according to the present invention includes: the washing machine body; the washing-cum-dewatering tub that is rotatably disposed inside the washing machine body; the outer shell that is disposed in the upper part of the washing machine body so as to cover the washing-cum-dewatering tub; and the clothes put-in port that is disposed in the outer shell and communicates with the inside of the washing-cum-dewatering tub. The washing machine further includes: the lid body that covers the clothes put-in port openably and closably; the lid detection unit that detects the opening/closing state of the lid body and is configured with at least the two terminals; and the transmission part that is disposed between the lid body and the lid detection unit so as to operate the lid detection unit in tandem with the operation of opening/closing of the lid body. Then, the lid detection unit provides the first state in which the two terminals are in contact with each other, and the second state in which the two terminals are separated from each other. The transmission part may be configured such that, when

the lid body is opened, the transmission part biases at least one of the two terminals toward the direction in which the terminals are brought into the second state from the first state.

According to the configuration, even in cases where the two terminals of
5 the lid detection unit have been fastened, the opening of the lid body causes the transmission part to bias one of the two terminals toward the side on which the terminals are opened, with the transmission part operating in tandem with the lid body. This causes the two terminals having been fastened to be detached and separated from each other. As a result, the lid detection unit can reliably
10 detect that the lid body has been opened.

Moreover, the washing machine according to the present invention may be configured such that the two terminals are disposed substantially in parallel with each other and that the transmission part is equipped with the detaching part disposed between the two terminals. With this configuration, when the
15 lid body is opened, the detaching part can easily detach the two terminals, which have been fastened together, from each other.

Moreover, the washing machine according to the present invention may be configured such that the detaching part has an approximately wedge shape which tapers off toward the open ends of the two terminals. With this
20 configuration, it is possible to insert the wedge-shape part, by a smaller force, into a gap between the two terminals which have been fastened together. As a result, the two terminals which have been fastened together can be easily detached from each other, thereby allows the lid detection unit to detect the opening/closing state of the lid body.

25 Moreover, the washing machine according to the present invention includes: the first bearing that is disposed in the case, which houses the two terminals, so as to rotatably support the transmission part; and the second

bearing that is disposed in the outer shell so as to rotatably support the lid body. The washing machine further includes: the first lever that is disposed in the transmission part and extended toward the lid body side; the biasing part that biases the first lever toward a direction in which the first lever provides the second state; and the second lever that is disposed in the lid body and is extended from the proximity of the second bearing toward the transmission part side. Furthermore, the second lever may be configured to bias the first lever, when the lid body is closed, toward a direction in which the first lever provides the first state. With this configuration, when the lid body is opened, the first lever is biased by both the second lever and the biasing part, simultaneously from respective directions different from each other. For this reason, the first and second levers are disposed with the levers being in contact with each other. As a result, the opening/closing state of the lid body can be transmitted more reliably to the transmission part.

Moreover, the washing machine according to the present invention may be configured such that the transmission part includes the third lever. The third lever may be disposed to face downward toward the first lever with a predetermined space therebetween, and to extend toward the lid body side. Then, the second lever of the lid body may be disposed in a space between the first lever and the third lever, at least in a state of the lid body being closed. With this configuration, even in cases where the two terminals have been welded to each other or where the transmission part has been fastened, the third lever of the transmission part can be forcibly biased by the second lever, thereby rotating the third lever. As a result, such a simple configuration allows the lid detection unit to detect the opening/closing state of the lid body.

Moreover, the washing machine according to the present invention is such that the lid body is configured with the front lid body that configures the

forward part of the lid body; the rear lid body that configures the backward part of the lid body; and the third bearing that rotatably supports the front and rear lid bodies. Furthermore, the front lid body includes the first rotation limiter while the rear lid body includes the second rotation limiter. Then, the first and second rotation limiters may be disposed such that, when the front lid body rotates around the third bearing serving as the rotation center, the limiters restrict the rotation of the front lid body through not less than a predetermined angle.

With this configuration, even in cases where the washing machine is operated in a state of the lid body being closed with the front and rear lid bodies being bent, the rotation angle of the front lid body is restricted to an angle smaller than the predetermined angle. With this configuration, it is possible to increase the distance from the center of the third bearing to the surface of the outer shell at the proximity of the clothes put-in port. Therefore, the rotation angle of the second lever around the second bearing can be kept larger than the angle through which the lid detection unit detects the closing state of the lid body. As a result, even in cases where the lid body is closed with the front lid body having been bent, it is possible to prevent the lid detection unit from erroneously detecting that the lid body must be closed.

INDUSTRIAL APPLICABILITY

The washing machine according to the present invention is capable of recovering from a failure, even in the event of a failure of its lid detection unit, through a user's operation of opening the lid body of the washing machine. For this reason, the technology according to the present invention is useful for washing machines including not only household-use but also commercial-use washing machines which are each required to be able to reliably detect

opening/closing states of its lid body.

REFERENCE MARKS IN THE DRAWINGS

	1, 101	washing-cum-dewatering tub
5	2, 102	washing machine body
	3, 103	outer shell
	4, 104	clothes put-in port
	5, 105	lid body
	6, 106	lid detection unit
10	6a, 106a	upper terminal plate (terminal)
	6b, 106b	lower terminal plate (terminal)
	6b1	end part
	7, 107	transmission part
	8, 108	case
15	8a, 8b	hole
	9, 109	first bearing
	10, 110	front lid body
	10a, 29a	end part
	11, 111	rear lid body
20	12, 112	second bearing
	13, 113	third bearing
	14	handle
	15	washing motor
	16, 116	first lever
25	17, 117	second lever
	18	third lever
	19	upper electrode

	20	lower electrode
	21	upper-terminal-plate contacting part
	22, 122	lower-terminal-plate contacting part
	23	spring (biasing part)
5	24	detaching part
	25	wedge-shape
	26	first rotation limiter
	27	second rotation limiter
	28	water tub
10	29	water-tub vibration detecting lever
	29b	coil spring
	30	suspension member
	130	magnet
	131	magnetic sensor
15	132	second lid detection unit

CLAIMS

1. A washing machine, comprising:
 - a washing machine body;
 - a washing-cum-dewatering tub rotatably disposed in an inside of the washing machine body;
 - an outer shell disposed in an upper part of the washing machine body so as to cover the washing-cum-dewatering tub;
 - a clothes put-in port disposed in the outer shell so as to communicate with an inside of the washing-cum-dewatering tub;
 - a lid body openably and closably covering the clothes put-in port;
 - a lid detection unit configured with at least two terminals, for detecting an opening state and a closing state of the lid body; and
 - a transmission part disposed between the lid body and the lid detection unit, for operating the lid detection unit in tandem with opening and closing of the lid body,
 - wherein the lid detection unit provides a first state of the two terminals being in contact with each other and a second state of the two terminals being separated from each other; and,
 - when the lid body is opened, the transmission part biases at least one of the two terminals toward a direction in which the two terminals are brought into the second state from the first state.
2. The washing machine according to claim 1,
 - wherein the two terminals are disposed substantially in parallel with each other; and
 - the transmission part includes a detaching part disposed between the two terminals.
3. The washing machine according to claim 2, wherein the detaching part has an approximate wedge shape tapering toward open ends of the two terminals.

4. The washing machine according to claim 1, further comprising:

a first bearing disposed in a case so as to rotatably support the transmission part, the case housing the two terminals;

a second bearing disposed in the outer shell so as to rotatably support the lid body;

a first lever disposed in the transmission part so as to extend toward a lid body side;

a biasing part for biasing the first lever toward a direction in which the second state is provided; and

a second lever disposed in the lid body so as to extend toward a transmission part side from a proximity of the second bearing,

wherein, when the lid body is closed, the second lever biases the first lever toward a direction in which the first state is provided.

5. The washing machine according to claim 4,

wherein the transmission part includes a third lever facing a lower part of the first lever with a predetermined space between the first lever and the third lever, the third lever extending toward the lid body side; and,

at least in a state of the lid body being closed, the second lever of the lid body is disposed in the predetermined space.

6. The washing machine according to claim 1,

wherein the lid body includes:

a front lid body configuring a forward part of the lid body;

a rear lid body configuring a backward part of the lid body; and

a third bearing rotatably supporting the front body and the rear lid body;

the front lid body includes a first rotation limiter;

the rear lid body includes a second rotation limiter; and

the first and second rotation limiters are disposed such that, when the front lid body rotates around the third bearing serving as a rotation center, the

first and second rotation limiters restrict rotation of the front lid body through not less than a predetermined angle.