Citation List

Patent Literature

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SUMMARY OF THE DISCLOSURE

The present disclosure provides a washing machine that can accurately determine sufficiency or insufficiency of a remaining amount of liquid agent in a wide range.

A washing machine according to an aspect of the present disclosure includes a housing, a water tub supported in the housing, a tank containing a liquid agent, a liquid supply device configured to automatically supply the liquid agent inside the tank to the water tub, a remaining amount detector configured to detect a remaining amount of liquid agent in the tank, and a controller configured to control a washing operation of the washing machine. The remaining amount detector includes a float portion floating on a surface of the liquid agent in the tank, a plurality of to-be-detected portions provided on the float portion, and a detector configured to detect the to-be-detected portions. The plurality of to-be-detected portions are disposed apart from each other at positions along a moving direction of the float portion in accordance with changes in level of the liquid agent, and the to-be-detected portion at a lowest position of the plurality of to-be-detected portions is provided at a position higher than the detector while the tank is filled with the liquid agent.

According to an embodiment, there is provided a washing machine comprising:a housing;

a water tub supported in the housing;

a tank having an opening in an upper portion and containing a liquid agent;

a tank lid provided on an upper portion of the tank and configured to open and close the opening;

a liquid supply device configured to automatically supply the liquid agent inside the tank to the water tub;

a to-be-detected portion floating on a surface of the liquid agent in the tank;

a detector configured to detect the to-be-detected portion;

a storage unit configured to store a detection value from the detector; and

a controller configured to control a washing operation,

wherein the controller further includes a trouble determination unit, and

the trouble determination unit calculates a difference between a detection value from the detector after the liquid agent is discharged from the tank and detection value from the detector after the liquid agent has been previously discharged, the detection value being stored in the storage unit, and determines that the liquid agent is fixed in the tank if a value of the calculated difference is less than a predetermined value.

According to an embodiment, there is provided a washing machine comprising:a housing;

a water tub supported in the housing;

a tank having an opening in an upper portion and containing a liquid agent;

a tank lid provided on an upper portion of the tank and configured to open and close the opening;

a liquid supply device configured to automatically supply the liquid agent inside the tank to the water tub;

a to-be-detected portion floating on a surface of the liquid agent in the tank;

a detector configured to detect the to-be-detected portion;

a liquid agent injection amount calculator configured to calculate an injection amount of liquid agent into the water tub;

a storage unit configured to store a detection value from the detector; and

a controller configured to control a washing operation,

wherein the controller further includes a trouble determination unit, and

the trouble determination unit calculates a difference between a detection value from the detector when an accumulated liquid agent discharge amount from the tank exceeds a predetermined value and a detection value from the detector when a previous accumulated liquid agent discharge amount exceeds a predetermined value, the detection value being stored in the storage unit, and determines that the liquid agent is fixed in the tank if a value of the calculated difference is less than a predetermined value.

This configuration allows the detector to detect magnetic force from the to-be-detected portions in a wide moving range of the float portion when the to-be-detected portions of the float portion pass through the detector. This makes it possible to improve detection accuracy as well as expanding a detection range for the remaining amount of liquid agent.

CLAIMS

1. A washing machine comprising:

a housing;

a water tub supported in the housing;

a tank containing a liquid agent;

a liquid supply device configured to automatically supply the liquid agent inside the tank to the water tub;

a remaining amount detector configured to detect a remaining amount of liquid agent in the tank; and

a controller configured to control a washing operation of the washing machine,

wherein the remaining amount detector includes

a float portion floating on a surface of the liquid agent in the tank,

a plurality of to-be-detected portions provided on the float portion, and

a detector configured to detect the to-be-detected portions, and

the plurality of to-be-detected portions are disposed apart from each other at positions along a moving direction of the float portion in accordance with changes in level of the liquid agent, and the to-be-detected portion at a lowest position of the plurality of to-be-detected portions is provided at a position higher than the detector while the tank is filled with the liquid agent.

2. The washing machine according to claim 1, wherein the controller is configured to detect the remaining amount of liquid agent in the tank based on a detection value from the detector, and notify the remaining amount of liquid agent.

3. The washing machine according to claim 1 or 2, further comprising a display unit,

wherein the controller causes the display unit to display the remaining amount of liquid agent in the tank.

4. The washing machine according to claim 1, wherein the controller determines, based on a detection value detected by the to-be-detected portion, whether the remaining amount of liquid agent in the tank is smaller than a predetermined amount.

5. The washing machine according to claim 4, further comprising a display unit,

wherein upon determining that the remaining amount of liquid agent in the tank is smaller than the predetermined amount, the controller displays corresponding information on the display unit.

6. The washing machine according to claim 1, further comprising a tank lid configured to open and close an opening formed in an upper portion of the tank,

wherein the float portion is pivotally disposed on a lower surface of the tank lid.

7. The washing machine according to claim 1, wherein

the plurality of to-be-detected portions are constituted by a plurality of magnetic force generators, and

the detector is constituted by a magnetic force sensor.

8. The washing machine according to claim 7, wherein

the plurality of magnetic force generators are constituted by a plurality of magnets, and

the plurality of magnets are disposed so as to make adjacent magnets of the plurality of magnets have different polarities with respect to the magnetic force sensor.