Citation List

Patent Literature

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SUMMARY ~~OF THE INVENTION~~

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

According to an aspect, there is 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 a 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 aspect, 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.

A washing machine according to the present disclosure ~~invention~~ includes a housing, a water tub supported in the housing, a tank containing a liquid agent, a liquid supply device (automatic liquid agent injection device) configured to automatically supply the liquid agent inside the tank to the water tub, a remaining amount detector configured to detect the 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 surface.

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.

BRIEF DESCRIPTION OF DRAWINGS

CLAIMS

1. 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 second detection value from the detector after the liquid agent is discharged from the tank and a first detection value from the detector after the liquid agent has been previously discharged, the first 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.

2. 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 second detection value from the detector when an accumulated liquid agent discharge amount from the tank exceeds a predetermined value and a first detection value from the detector when a previous accumulated liquid agent discharge amount exceeds a predetermined value, the first 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.

3. The washing machine according to claim 1 or 2, wherein the controller is configured so as not to perform trouble determination in the tank via the trouble determination unit when a detection value from the detector coincides with a detection value in a state in which the tank is filled with the liquid agent.

4. The washing machine according to claim 1 or 2, further comprising a float portion pivotally provided on a lower surface of the tank lid,

wherein the to-be-detected portion is constituted by a magnet provided in the float portion, and

the detector is constituted by a magnetic force sensor.

5. The washing machine according to claim 4, wherein a plurality of the magnets are provided apart from each other at positions along a pivoting direction of the float portion.

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

wherein upon determining occurrence of a trouble in the tank via the trouble determination unit, the controller displays corresponding information on the display unit.