heavily applied to the shaft. The shaft is connected to the rear side of the rotary drum. Thus, when there is an unbalanced load at the rear side of the rotary drum, the shaft is not heavily loaded. On the other hand, when there is an unbalanced load at the front side of the rotary drum, the shaft is heavily loaded because a distance from the shaft to the front side of the rotary drum is long. This can possibly damage the shaft.

[0006]

PTL 1 discloses a drum-type laundry machine that determines a position of an unbalanced load and determines the unbalanced state of clothes from the vibration of the front part of the water tub and a correlation obtained in an experiment.

[0007]

The washing machine in PTL 1 includes a water tub supported inside or within a laundry housing, a rotary drum rotatably provided inside or within the water tub, and a vibration detecting means that is provided at a front part of an upper surface of the water tub and detects a vibration component in a three-dimensional direction. The washing machine identifies the unbalanced load in the water tub in a spin-drying operation, using a two-way vibration component detected at the front part of the water tub, and the correlation of the vibration component of the rear part of the water tub with the vibration component of the front part of the water tub obtained by the experiment.

Citation List

Patent Literature

[0008]

PTL 1: Unexamined Japanese Patent Publication No. 2010-136903

SUMMARY

[0009]

However, in the conventional configuration, the position of the unbalanced load is estimated based on the correlation obtained in the experiment, and therefore the accuracy of identifying the position of the unbalanced load is low. It may be therefore erroneously determined whether the unbalanced state exists at the front side or the rear side.

[0009a]

In an aspect, the present disclosure provides a drum-type laundry machine comprising: a housing; an outer tub swingably disposed in the housing; an inner tub rotatably disposed in the outer tub and having an axis of rotation that is horizontal or is inclined from a horizontal direction; a motor disposed in the housing and configured to rotate the inner tub around the axis of rotation; a vibration detector disposed in the outer tub and configured to detect motion information of the outer tub along a first axis and a second axis that intersect each other in a side view; and a controller configured to control the motor based on the motion information of the outer tub detected by the vibration detector, and to control a washing operation, a rinsing operation, and a spin-drying operation, wherein in the spin-drying operation, the controller is configured to compare (i) the motion information of the outer tub along another axis different from one axis among the first axis and the second axis when the motion information of the outer tub along the one axis is a maximum value with (ii) the motion information of the outer tub along the other axis when the motion information of the outer tub along the one axis is a minimum value, and the controller is configured to determine a position of an unbalanced load in the inner tub based on a result of the comparing, and to control the motor based on the position of the unbalanced load in the inner tub that has been determined.

[0010]

The present disclosure provides the drum-type laundry machine that detects vibration of the water tub and determines, based on a detected value, whether the unbalanced load of laundry in the rotary drum is at the front side or the rear side.

[0011]

The drum-type laundry machine of the present disclosure includes a housing, an outer tub swingably supported inside or within (in) the housing, an inner tub rotatably disposed inside or within the outer tub and provided such that an axis of rotation is horizontal or is inclined from a horizontal direction, a motor disposed inside or within the housing and configured to rotate the inner tub around the axis of rotation, a vibration detector disposed in the outer tub and configured to detect motion information of the outer tub along a first axis and a second axis intersecting each other in a side view, and a controller configured to control the motor based on the motion information of the outer tub detected by the vibration detector and control a washing operation, a rinsing operation, and a spin-drying operation.

[0012]

In a spin-drying operation, the controller is configured to compare motion information of the outer tub along another axis different from one axis when the motion information of the outer tub along one of a first axis or a