fact that the number of inertial rotation of pulsator 46 caused after rotation is varied in accordance with the volume of laundry is utilized. More specifically, a variation of the number of inertial rotation is detected, and then a predetermined water level is determined in accordance with the volume of the laundry based on a table showing a correlation of volumes of laundry and water levels. Subsequently, water is continuously supplied from water supply valve 52 into washing and spin-drying tub 45 to reach the predetermined water level. At the predetermined water level, controller 56 rotates pulsator 46 so as to clean the laundry by a water flow due to rotation of pulsator 46.

[0008]

With the configuration of the conventional washing machine described above, the detergent supplied into pump chamber 62 is pushed outward by an effect of rotation of lower blade 61, and rises through circulation lint channel 58 from pump chamber 62, so that the detergent is supplied into washing and spin-drying tub 45 via discharge ports. However, the detergent may be supplied into washing and spin-drying tub 45 together with the cleaning solution before the detergent is completely dissolved. When the undissolved detergent adheres to the laundry, the adhering detergent may remain in an undissolved state. Moreover, since the cleaning solution that contains a small amount of bubbles is supplied to the laundry, there arises a problem that the cleaning performance is low.

Citation List

Patent Literature

[0009]

PTL 1: Unexamined Japanese Patent Publication No. 63-117798

SUMMARY

[0010]

Embodiments have been developed to solve the aforementioned conventional problems. The present invention aims to provide a washing machine capable of prevent remaining of undissolved detergent and improving cleaning performance.

[0011]

A washing machine according to one aspect includes a main body, a water tub supported inside the main body in an anti-vibration state, a washing and spin-drying tub rotatably accommodated in the water tub, and a pulsator rotatably disposed on a central inner bottom portion of the washing and spin-drying tub. The washing machine further includes a pump chamber formed at a position below the pulsator in the water tub, a blade formed integrally with the pulsator and disposed in the pump chamber, a motor for rotating the pulsator and the washing and spin-drying tub. The washing machine further includes a water supply valve for supplying water into the water tub, a circulation channel provided in the washing and spin-drying tub and for circulating washing liquid in the pump chamber to the washing and spin-drying tub, an upper discharge port formed in an upper portion of the circulation channel and for supplying the washing liquid into the washing and spin-drying tub, and a lower discharge port formed at a position below the upper discharge port in the circulation channel. The washing machine further includes a controller for controlling operations of the motor, the water supply valve and others to control respective steps of washing, rinsing, and spin-drying. The controller performs a first step of supplying water to a first predetermined water level, and rotating the pulsator and the blade to dissolve detergent and generate bubbles of the washing liquid within the pump chamber. The controller further performs a second step of supplying water to

a second predetermined water level higher than the first predetermined water level, and rotating the pulsator and the blade to supply the bubbles and the washing liquid within the pump chamber into the washing and spin-drying tub from the lower discharge port through the circulation channel. The controller further performs a third step of supplying water to a third predetermined water level higher than the second predetermined water level, and rotating the pulsator and the blade to supply the bubbles and the washing liquid within the pump chamber into the washing and spin-drying tub from the lower discharge port and the upper discharge port through the circulation channel.

[0012]

Accordingly, the first step can prevent undissolved residue of detergent by agitating the washing liquid containing the detergent at a place spaced from the laundry. Moreover, bubbles can be favorably generated by agitation with a small amount of water. In the second step, high-concentration cleaning liquid containing bubbles is discharged toward the laundry from the lower discharge port. Accordingly, this step can promote a permeation effect of the bubbles and the high-concentration cleaning liquid into the laundry, thereby improving the cleaning performance and shortening the cleaning time. In the third step, cleaning liquid containing bubbles is discharged toward the laundry from the upper discharge port. Accordingly, this step can improve the cleaning performance for an upper part of the laundry, for which conventional cleaning performance has been limited, and enhance uniform cleaning performance.

[0013]

A washing machine according to various embodiments is capable of improving cleaning performance, and preventing uneven washing.