surface 9a of water pouring case 9 to the downstream side, so as to be fed to the washing tub.

Citation List

Patent Literature

PTL 1: Unexamined Japanese Patent Publication No. 2001-314692

SUMMARY

Unfortunately, with the configuration of the conventional detergent dissolving device, the detergent solution may remain in the meshes of strainers 5 and 7 due to surface tension, and may be dried and solidified, which may cause clogging in the meshes of strainers 5 and 7. Due to the clogging, the filtering action may not work, and accordingly the detergent may remain in detergent container 1, disadvantageously. Furthermore, due to the configuration of strainers 5 and 7 making use of the filtering action, the type of detergent allowed to be placed into detergent container 1 is limited to powdered detergent.

The present disclosure provides a washing machine including containers into which washing preparations such as powdered detergent, liquid detergent, and softener are placed and which are positioned in a single location to provide enhanced convenience for a user, the washing machine being capable of suppressing or reducing leakage of the washing preparations from the containers and/or overflow of foam from the containers.

In one aspect, the present disclosure refers to a washing machine comprising: a body; a washing tub disposed inside the body; a detergent dissolving device configured to supply water into the washing tub; and a control device for performing a washing operation including a series of steps including a washing step, a

rinsing step, and a spin-drying step, the detergent dissolving device

includeing a storage case including a powdered detergent container, a liquid detergent container, and a softener container, a powdered detergent agitator disposed in the powdered detergent container, a liquid detergent agitator disposed in the liquid detergent container, siphon channels respectively formed in the liquid detergent container and the softener container, a water flow surface holding the storage case extractably and retractably, a water pouring case configured to pour water into the storage case, a first water channel disposed in the water pouring case and designed to pour water to the powdered detergent container, and a first water supply valve communicating with the first water channel, a second water channel disposed in the water pouring case and designed to pour water to the powdered detergent container and the liquid detergent container, a second water supply valve communicating with the second water channel, a third water channel disposed in the water pouring case and designed to pour water to the softener container, a third water supply valve communicating with the third water channel, and nozzles which are disposed in the first, second, and third water channels and designed to supply water to the powdered detergent container, the liquid detergent container, and the softener container.

Thus, the detergent dissolving device is configured such that the softener container, into which a washing preparation is placed, as well as the powdered detergent container and the liquid detergent container are disposed together in the storage case. With this configuration, the user can place the washing preparations into these containers at a time. Consequently, it is

possible to enhance convenience for the user. In addition, the powdered

detergent container and the liquid detergent container internally include the respective agitators each configured to agitate detergent and water together to dissolve the detergent in the water. Furthermore, the water channels in the water pouring case have the nozzles. With this configuration, it is possible to prevent the washing preparations from remaining undissolved in the containers, thereby making it possible to improve the reliability of the washing machine.

The washing machine according to the present disclosure is configured such that the liquid detergent agitator includes a rotational shaft extending horizontally, and one of the nozzles being disposed in the second water channel and being designed to supply water to the liquid detergent container supplies water toward blades of the liquid detergent agitator.

With this configuration, the user can place the washing preparations into these containers at a time, since the softener container, into which softener is placed, as well as the powdered detergent container and the liquid detergent container are disposed together in the storage case. Consequently, it is possible to enhance convenience for the user. In addition, the powdered detergent container and the liquid detergent container internally include the respective agitators each configured to agitate detergent and water together to dissolve the detergent in the water. Furthermore, the water channels in the water pouring case have the nozzles. With this configuration, it is possible to prevent the washing preparations from remaining undissolved in the containers, thereby making it possible to improve the reliability of the washing machine.

Furthermore, by the liquid detergent agitator, the liquid detergent, water, and air can be agitated together so that the liquid detergent is dissolved in the water to give a foamed washing liquid. Then, the foamed washing

liquid can be caused to flow downstream.

The washing machine according to the present disclosure is configured such that the powdered detergent agitator includes a rotational shaft extending vertically and blades extending radially from the rotational shaft, and one of the nozzles designed to supply water to the powdered detergent container supplies water toward the blades of the powdered detergent agitator.

Since this configuration includes the storage case into which a washing preparation such as softener is placed together with powdered detergent and liquid detergent, the user can place the powdered detergent, the liquid detergent, and the washing preparation into the storage case at a time. Consequently, it is possible to enhance convenience for the user. In addition, the detergent container includes the powdered detergent agitator configured to agitate detergent and water together to dissolve the detergent in the water. Furthermore, the water channels in the water pouring case have the nozzles. With this configuration, it is possible to prevent the washing preparations from remaining undissolved in the container, thereby making it possible to improve the reliability of the washing machine.

The washing machine according to the present disclosure is configured such that the one of the nozzles designed to supply water toward the blades of the powdered detergent agitator is located ahead of the powdered detergent agitator in a state where the storage case is in an accommodated state.

With this configuration, at the time when the storage case is inserted into the accommodation space after detergent is placed in the storage case, a first one of the blades of the powdered detergent agitator comes in contact with the nozzle. Accordingly, while the powdered detergent agitator is rotating, the

storage case moves to the accommodation space. A second one of the blades is then brought to a position at which the second one of the blades is

perpendicular to a direction in which water is poured. A distance between the second one of the blades and the nozzle is uniquely defined. Thus, even when an amount of water supplied is small under low water pressure environment, the powdered detergent agitator is caused to rotate by the pressure of the water, and agitates the detergent and the water together. This can prevent the detergent from remaining undissolved.

Incidentally, according to the configuration of the conventional detergent dissolving device including no structure for suppressing or reducing the force of water supplied into the detergent dissolving device, if water is supplied to the detergent dissolving device from which the storage case has been removed, the supplied water collides with the water flow surface and splashes. As a result, the user and/or a floor on which the washing machine is installed may get wet, disadvantageously.

The washing machine according to the present disclosure is configured such that the water flow surface has a bottom surface including an inner portion having a plurality of protrusions facing at least one corresponding nozzle of the nozzles.

With this configuration including the plurality of protrusions for suppressing or reducing the force of the water supplied onto the water flow surface, it is possible to prevent splashing of the water from the water flow surface even in a state where the storage case for the washing preparations has been removed. Consequently, it is possible to improve the reliability of the washing machine.

The washing machine according to the present disclosure is configured such that the water flow surface has a bottom surface including an inner portion having an annular recess facing at least one corresponding nozzle of the nozzles.

With this configuration including the annular recess for suppressing or reducing the force of the water supplied onto the water flow surface, it is possible to prevent splashing of the water from the water flow surface even in a state where the storage case for the washing preparations has been removed. Consequently, it is possible to improve the reliability of the washing machine.

The washing machine according to the present disclosure is configured such that the annular recess, which is formed in the inner portion of the bottom surface of the water flow surface and which faces at least one corresponding nozzle of the nozzles, is formed in a shape including an inner recessed portion surrounded by an annular protruding rib that is partly cut out.

With this configuration including the annular recess for suppressing or reducing the force of the water supplied onto the water flow surface, it is possible to prevent splashing of the water from the water flow surface even in a state where the storage case for the washing preparations has been removed. Consequently, it is possible to improve the reliability of the washing machine.

The washing machine according to the present disclosure further includes a controller for controlling the first water supply valve, the second water supply valve, and the third water supply valve, wherein the controller alternately turns on the first water supply valve and the second water supply valve when water is initially supplied in the washing step.

Thus, the user can use both of the powder detergent and the liquid detergent, since the detergent dissolving device is provided with the storage case including the powdered detergent container, the liquid detergent container, and the softener container into which powdered detergent, liquid detergent, and softener are respectively placed and which are integrally molded. Consequently, it is possible to enhance convenience for the user. In addition, the powdered detergent container and the liquid detergent container internally

include the respective agitators each configured to agitate detergent and water together to dissolve the detergent in the water. With this configuration, it is possible to prevent detergent from remaining undissolved in the powdered detergent container and the liquid detergent container, thereby making it possible to improve the reliability of the washing machine.

With the above configuration, either of the powdered detergent and the liquid detergent can be used to be dissolved in the water. Meanwhile, simultaneously turning on the first and second water supply valves reduces a flow rate of the water flowing through each of the first and second water supply valves, thereby reducing the pressure of the water. This results in a reduction in rotational force of each of the agitators, thereby being likely to cause remaining of the detergent. On the other hand, with the configuration in which the controller alternately turns on the first water supply valve and the second water supply valve when water is initially supplied in the washing step, it is possible to maintain the rotational force of the agitators in the powdered detergent container and the liquid detergent container, thereby making it possible to cause all of the powdered detergent and the liquid detergent to flow out of the containers.

The washing machine according to the present disclosure is configured such that, at timing that is after main agitation and before water draining in each of the washing step and a final rinsing step, the controller opens the second water supply valve to introduce water into the second water pouring section.

Liquid detergent is typically higher in viscosity than water. Therefore, in low water pressure regions, it may sometimes be impossible to cause all of the liquid detergent to flow out of the container by alternately turning on the first and second water supply valves once. However, with the above