

DESCRIPTION

TITLE OF INVENTION: RICE WASHING AND COOKING MACHINE

TECHNICAL FIELD

5 [0001]

The present invention relates to a rice washing and cooking machine that automatically washes and cooks rice.

BACKGROUND ART

10 [0002]

The following technique has been known for a rice washing and cooking machine. In the rice washing and cooking machine in which two rice washing and cooking machines are provided side by side and one rice storage 1 and a rice washer move laterally for sequential rice cooking, a soaking step is performed in both the rice washer and a rice cooking pot (for example, see Patent Document 1).

PRIOR ART DOCUMENT

PATENT DOCUMENT

20 [0003]

Patent Document 1: Japanese Unexamined Patent Application Publication No. Hei 5-15444

SUMMARY OF INVENTION

25 TECHNICAL PROBLEM

[0004]

An object of the present invention is to further shorten a total time of a rice washing step and a rice cooking step in the rice washing and cooking machine described above.

30

SOLUTION TO PROBLEM

[0005]

The present invention is a rice washing and cooking machine including: a single rice storage that stores rice; a single rice washer that washes the rice; and a plurality of rice cooking pots, the rice storage and the rice washer integrally moving above the rice cooking pots, and the rice and
5 water being supplied from the rice washer to a predetermined rice cooking pot, in which a series of rice washing and cooking operation including a measuring step of supplying a measured amount of the rice to be cooked to the rice washer, a rice washing step of washing the rice by the rice washer, a soaking step after the rice washing step, a rice cooking
10 step by the rice cooking pot, and a steaming step by the rice cooking pot after the rice cooking step is performed, and a normal continuous mode, in which the rice washing and cooking operation is continuously performed using a set number of the pots, or a time-saving continuous mode, in which the steaming step in the series of rice washing and
15 cooking operation is omitted and the rice washing and cooking operation is continuously performed using a set number of the pots in a shorter cycle than that in the normal continuous mode, can be selected.

ADVANTAGEOUS EFFECTS OF INVENTION

20 [0006]
According to the present invention, it is possible to shorten a total time of the rice washing step and the rice cooking step.

BRIEF DESCRIPTION OF DRAWINGS

25 [0007]
FIG. 1 illustrates a rice washing and cooking machine that is seen from front.
FIG. 2 is a side view illustrating that a rice cooking pot is pulled out, a lid and an inner pot are removed therefrom, and the rice cooking pot is
30 moved into a warming pot.
FIG. 3 is a side view of inside of a rice storage.
FIG. 4 is a plan view of the rice washing and cooking machine.

FIG. 5 is a view illustrating inside of a rice washer.

FIG. 6A is a chart illustrating a normal continuous mode and FIG. 6B is a chart illustrating a time-saving continuous mode.

FIG. 7 is a control block diagram.

5 FIG. 8 is a view illustrating remote management.

FIG. 9 is a view of an operation panel.

DESCRIPTION OF EMBODIMENTS

[0008]

10 A description will be made on a configuration of a rice washing and cooking machine T.

[0009]

A rice washer M that is formed by a conical rice washing tank 2 is provided under a rice storage 1 that has a rice storage hopper 3 therein.

15 [0010]

The rice storage 1 and the rice washer M are integrally supported by a machine frame 4.

[0011]

20 A rice cooking pot S is provided at a position under the rice washing tank 2. In the present embodiment, the two right and left rice cooking pots S are provided side by side, and the rice storage 1 and the rice washing tank 2 are configured to slide above the right and left rice cooking pots S along the machine frame 4.

[0012]

25 FIG. 1 illustrates a state where a right rice cooking pot SR assumes a normal rice cooking posture and a left rice cooking pot SL faces the front with a lid 5L for covering an upper portion of the rice cooking pot SL being removed.

[0013]

30 On a front wall of the rice storage 1, switches for various operations and an operation panel B for setting operation conditions are provided. A control unit C is built in the operation panel B.

[0014]

A rotary valve 6 for drawing a predetermined amount of rice into the rice washing tank 2 is provided in a lower end portion of the rice storage hopper 3. An elevation shaft 7 and a rotary shaft 8 are provided in the
5 rice washing tank 2. The elevation shaft 7 extends in an up-down direction and is elevated/lowered in the up-down direction. The rotary shaft 8 rotates about a vertical axis with respect to the elevation shaft 7. A conical drop valve 9 is provided in a lower end portion of the elevation shaft 7. A discharge port 10 in a lower end portion of the rice
10 washing tank 2 is configured to be opened/closed when the drop valve 9 is elevated/lowered. A stirring rod 11 that stirs the rice in the rice washing tank 2 is attached to the rotary shaft 8.

[0015]

A water drain unit Y is attached to a lower portion of the rice washing
15 tank 2. The water drain unit Y includes: a water drain pipe 12 through which water drained from the inside of the rice washing tank 2 passes; a water drain valve 13 that opens/closes the water drain pipe 12; and an overflow pipe 14 through which water overflowing from an upper portion of the rice washing tank 2 passes.

20 [0016]

In order to supply water to the rice washing tank 2, a water supply pipe 15 is provided to supply water to the lower portion of the rice washing tank 2 while assuming a posture along a side wall of the rice washing tank 2.

25 [0017]

The operation panel B is provided with: various setting switches for setting an amount of rice to be cooked and an adjusted amount of water; a normal continuous mode setting switch r for setting a normal continuous mode described below; and a time-saving continuous mode
30 setting switch j for setting a time-saving continuous mode described below. The operation panel B further includes: a full-automatic mode switch 70 for performing a full-automatic operation once (one cycle) of a

basic operation including a measuring step, a rice washing step, a soaking step, a dropping step, a rice cooking step, and a steaming step described below; a manual mode switch 71 for allowing an operator to manually perform the steps; and a measuring switch 72, a rice washing switch 73, a dropping switch 74, and a rice cooking switch 75 as manual
5 switches for the respective steps.

[0018]

The rice cooking pot S is provided with the lid 5 on the upper portion, and includes an inner pot 20 therein. A part of the lid 5 is formed with a shutter 22 that slides in a right-left direction in conjunction with sliding
10 movement of an opening/closing arm 21, which is engaged with a knob 5a on the upper portion of the lid 5, in the left-right direction. When the shutter 22 is opened, the rice and water to be dropped and discharged from the discharge port 10 of the rice washing tank 2 can be supplied.

15 Then, when the shutter 22 is closed, a rice cooking operation is enabled. The lid 5 can be taken out when being disengaged from the opening/closing arm 21.

[0019]

In the present embodiment, when the right and left sides are not specified in the description, the rice cooking pot is referred to as the rice
20 cooking pot S. Otherwise, the rice cooking pot is referred to as the rice cooking pot that is specified to either the right or left side (the right rice cooking pot SR or the left rice cooking pot SL). Similarly, the lid 5 is described as 5R or 5L, and the inner pot 20 is described as 20R or 20L.

25 As illustrated in FIG. 8, each store U includes the rice washing and cooking machine T and a warming pot H, and weight of cooked rice in the warming pot H is measured by a weight scale W. The rice washing and cooking machine T and the weight scale W at each of the stores U are connected to a management terminal P at a head office A by
30 communication. The weight scale W measures the weight of the cooked rice in the warming pot H at all times or at set time intervals, and transmits the weight data to the management terminal P. In this way, a

weight change in the warming pot H during business hours of each of the stores U is displayed, is compared or matched with data such as the number of customers, and can thereby be used as store operation data.

[0020]

- 5 For example, data on the number of the visitors per day, the amount of the cooked rice per day, and an amount of the cooked rice wasted and discarded from the warming pot H per day is stored in the management terminal P. Then, an amount of the cooked rice per unit number of the customers (a consumed amount of the cooked rice) is calculated, for
10 example.

[0021]

- Alternatively, it is possible to keep, in a remote management system, a record on whether the rice that remains in the warming pot H after the end of the business hours is used next day or discarded. It may be
15 configured that a period from the last rice cooking of the day using the rice washing and cooking machine T to storing of the cooked rice in the warming pot H is recorded and the management terminal P issues a discarding alert when a predetermined time or longer (a discarding reference time) elapses.

20 [0022]

When a discarded amount is input, the remaining amount of the cooked rice in the warming pot H is manually or automatically stored, in the management terminal P, as a discarded amount per day. Then, a total may be calculated on a monthly basis.

- 25 It may be configured that an amount obtained by subtracting the remaining amount of the cooked rice in the warming pot H from the amount of the cooked rice per day is automatically stored as the consumed amount per day, that the remaining amount of the cooked rice to be used next day is carried over to the next day, and the total is
30 calculated on the monthly basis.

[0023]

It may be configured that, in the case where the weight of the warming pot H is reduced to a set value or lower while the rice washing and cooking machine T is not operated or there is no rice in the rice washer M during the business hours, the management terminal P issues a
5 command to the rice washing and cooking machine T, and the rice washing and cooking machine T then starts operation to perform the rice washing and cooking operation. In this case, the weight scale W and the control unit C of the rice washing and cooking machine T may be connected by communication, and the weight scale W may issue a
10 command to the rice washing and cooking machine T to start the rice washing and cooking operation. In this way, it is possible to reduce such a risk that an operator at the store U cannot provide the cooked rice to users because the rice in the warming pot H runs out. This function is not used in a mode in which the rice washing and cooking operation is
15 continuously performed using a set number of the pots as in the normal continuous mode or the time-saving continuous mode described below, but is used in a manual mode in which the rice washing and cooking operation is performed per pot, and thus can exert such an effect that the operator can perform the rice washing and cooking operation according
20 to the actual number of the users (customers) of the store.

[0024]

The management terminal P in the present embodiment can not only obtain information from the rice washing and cooking machine T and the warming pot H, but also make various settings. For example, the
25 management terminal P can set, in advance, rice washing and cooking operation start time of the rice washing and cooking machine T at the certain store U. Furthermore, the management terminal P can change the settings per rice washing and cooking machine T. A range where the settings can be changed includes a planned number of the pots in each of
30 the various operation modes (the normal continuous mode and the time-saving continuous mode described below), rice cooking menus (white rice and rice porridge), the amount of the rice to be cooked, a washing

method, a soaking time, water adjustment, an ignition mode (automatic or manual) of the rice cooking pot S, a steaming time, and various maintenance switches (for example, a tank cleaning mode). However, the operation of the various operation switches (72 to 75) of the rice washing and cooking machine T from the management terminal is inhibited. In this way, it is possible to prevent a safety risk caused by the operator who starts the operation unexpectedly at the store U.

[0025]

<Normal Continuous Mode and Time-Saving Continuous Mode>

A description will be made on the normal continuous mode with reference to FIG. 6A. The normal continuous mode is a mode in which the right rice cooking pot SR and the left rice cooking pot SL alternately and continuously cook the rice.

[0026]

In the measuring step, the rotary valve 6 is driven to supply the rice in the rice storage 1 to the rice washer M.

[0027]

Water is supplied to the rice washer M, and the stirring rod 11 performs rice washing work. When the rice washing work is finished, the stirring rod 11 is stopped, the water drain valve 13 is then opened to drain water in the rice washer M from the water drain unit Y, and the rice washing step is finished.

[0028]

After the completion of the rice washing step, water is newly supplied, and the rice is soaked in a soaking step a.

[0029]

When the soaking step a is finished, the dropping step is performed in which the drop valve 9 is opened, the shutter 22R is opened, and the rice and water in the rice washer M are supplied to the inner pot 20R of the right rice cooking pot SR. After a soaking step b for a predetermined time in the rice cooking pot SR, the rice cooking pot SR is ignited, and the rice cooking step is performed. In the present embodiment, the

soaking step is performed for a time set as a total of the soaking step a in the rice washer M and the soaking step b in the rice cooking pot S that are separately performed. However, after a lapse of the entire soaking time (the soaking step a + the soaking step b) in the rice washer M, the dropping step and the rice cooking step may be performed sequentially.
[0030]

After the completion of the rice cooking step, the steaming step (steaming step *indicated as "STEAM" in FIGs. 6A and 6B) is performed, and then all the steps of the first pot are finished. As illustrated in FIG. 2, a worker pulls out a pullout shelf 30 on which the rice cooking pot SR is placed, then takes out the lid 5R and the inner pot 20R, moves the inner pot 20R into the warming pot H, closes the warming pot H with a lid H1 of the warming pot H, and bring the warming pot H in a warming state.

[0031]

The rotary valve 6 is driven after the dropping step in the steps of the first pot, and the measuring step for supplying the rice in the rice storage 1 to the rice washer M is performed. Water is supplied to the rice washer M, and the stirring rod 11 performs the rice washing work. When the rice washing work is finished, the stirring rod 11 is stopped, water in the rice washer M is drained, and the rice washing step is finished. After the completion of the rice washing step, water is newly supplied, and the rice is soaked in the soaking step. The rice storage 1 and the rice washer M move to a position above the left pot SL before the soaking step a is finished. When the soaking step a is finished, the drop valve 9 is opened, the shutter 22L is opened, and the dropping step is performed in which the rice and water in the rice washer M is supplied to the inner pot 20L of the rice cooking pot SL. Then, the soaking step b and the rice cooking step are sequentially performed in the rice cooking pot SL. After the rice cooking step is finished, the steaming step is performed, and then all the steps of the second pot are finished. The worker pulls out the pullout shelf 30 on which the rice cooking pot SL is

placed, takes out the lid 5L and the inner pot 20L, and moves the inner pot 20L into the warming pot H. That is, some of the steps of the first pot and the second pot are performed simultaneously in parallel.

[0032]

- 5 Similarly, in regard to a third pot, the measuring step to the steaming step are performed in the right pot. Thereafter, the rice washing and cooking steps are continuously performed for the number of the pots that is set in the normal continuous mode.

[0033]

- 10 A description will be made on the time-saving continuous mode with reference to FIG. 6B. The time-saving continuous mode is a mode in which the right rice cooking pot SR and the left rice cooking pot SL alternately and continuously cook the rice in a shorter cycle than that in the normal continuous mode.

- 15 [0034]

In the rice washing and cooking operation of the first pot, the rotary valve 6 is driven, and the measuring step is performed in which the rice in the rice storage 1 is supplied to the rice washer M.

[0035]

- 20 Water is supplied to the rice washer M, and the stirring rod 11 performs the rice washing work. When the rice washing work is finished, the stirring rod 11 is stopped, water in the rice washer M is drained, and the rice washing step is finished.

[0036]

- 25 After the completion of the rice washing step, the dropping step is performed in which the drop valve 9 is opened, the shutter 22R is opened, and the rice and water in the rice washer M are supplied to the inner pot 20R of the rice cooking pot SR. In the rice cooking pot SR, the soaking step is performed for a set time, and then the rice cooking step
30 of the first pot is performed. In the present embodiment, upon completion, the worker takes out and moves the inner pot 20R into the

warming pot H, and the steaming step is performed in the warming pot H.

[0037]

5 The rotary valve 6 is driven during the soaking step of the first pot, and the measuring step of the second pot for supplying the rice in the rice storage 1 to the rice washer M is performed. Water is supplied to the rice washer M, and the stirring rod 11 performs the rice washing work.

When the rice washing work is finished, the stirring rod 11 is stopped, water in the rice washer M is drained, and the rice washing step is
10 finished. After the completion of the rice washing step, water is newly supplied. Then, the dropping step is performed in which the drop valve 9 is opened, the shutter 22R is opened, and the rice and water in the rice washer M are supplied to the inner pot 20L of the rice cooking pot SL. In the rice cooking pot SL, the soaking step is performed for a set time, and
15 then the rice cooking step of the second pot is performed.

[0038]

The measuring step of the third pot is performed during the soaking step of the second pot, and then the rice washing step is performed. In regard to the third pot, the soaking step is performed until the rice cooking step
20 of the first pot is finished. Then, when the rice cooking step of the first pot is finished, the step proceeds to the dropping step, and the soaked rice is dropped into the rice cooking pot SR (an n-line). In the rice cooking pot SR, the soaking step is performed for a remaining time such that the soaking step is performed for the set soaking time, and then the
25 step proceeds to the rice cooking step. That is, the soaking time itself is a total time of the soaking time a and the soaking time b described above.

[0039]

Thereafter, in regard to a fourth pot onward, as illustrated in FIG. 6B,
30 after the dropping step of the previous rice cooking pot is finished, the measuring step of the next rice cooking pot is started. Then, when the rice cooking step of the previous rice cooking pot is finished, the next

rice and water can be dropped into such a rice cooking pot (an o-line, a p-line, and a q-line).

[0040]

A characteristic of the time-saving continuous mode is that, when the
5 dropping step of the previous rice cooking pot S is finished, the
measuring step of the rice for the next rice cooking pot S is started.
Another characteristic is that, when the rice cooking step of the rice
cooking pot S is finished, the steaming step is not performed in the rice
cooking pot S, and the inner pot 20 is taken out and kept warm in the
10 different warming pot H.

[0041]

In this way, the rice washing and cooking steps can be performed
continuously in the shorter cycle than that in the normal continuous
mode, and a large amount of the cooked rice can be obtained.

15 [0042]

In the normal continuous mode and the time-saving continuous mode,
basically the same amount of the cooked rice is continuously cooked.
However, by performing control for reducing the amount of the cooked
rice in the last pot, the amount of the rice that is cooked once near the
20 store closing time is reduced. In this way, the white rice that remains
after the store closing can be minimized, and food waste can thereby be
reduced.

[0043]

In the present embodiment, the description has been made that water and
25 the rice that have undergone the soaking step are dropped. However,
after the soaking step, water used for soaking may be drained, the
adjusted amount of water may be supplied in a water adjusting step, and
then the dropping step may be performed.

[0044]

30 <Steaming Leaving Prevention>

Next, a description will be made on leaving prevention after the steaming
time.

[0045]

The rice washing and cooking machine in the present embodiment is mainly used at a place, such as a restaurant, where the cooked rice is provided to the users. In such a place, it is important to cook a large
5 amount of the rice, and taste and the like of the cooked rice are also important aspects. There is a disadvantage that, when the cooked rice is left as is after the completion of the steaming step, the taste thereof is deteriorated. In particular, it is desirable to use the freshly cooked rice when the cooked rice is processed to sushi rice or the like. Thus, it is
10 desirable that the cooked rice is not left more than necessary after the steaming step. In addition, in the case where the rice washing and cooking operation is performed continuously as in the present embodiment, the next rice cooking step cannot be performed unless the inner pot 20 is taken out after a lapse of the steaming time. Thus, the
15 following configuration is adopted in the present embodiment.

[0046]

A steaming leaving time starts being counted after the completion of the steaming step. Then, in the case where the inner pot 20 is not taken out after a lapse of a predetermined time (for example, 10 minutes), the
20 worker is notified by a notification means V of the control unit C. The notification is made by a buzzer or the like.

[0047]

This is a case where, as a means for detecting that the inner pot 20 is taken out, a lid detection sensor 5b that detects opening/closing of the
25 lid 5 detects opening of the lid 5 after the completion of the steaming step.

[0048]

The worker opens the lid 5, takes out and moves the inner pot 20 into the warming pot H, attaches another inner pot 20 to the rice cooking pot S,
30 and closes the lid 5. Then, when a pullout position sensor 30a detects that the pullout shelf 30 has been returned to an initial position, it is determined that the rice and water can be supplied from the rice washer

M to the rice cooking pot S, and the dropping step from the rice washer M into the rice cooking pot S is performed.

[0049]

Notification timing of the notification means V is controlled to
5 predetermined time after the completion of the steaming step in the normal continuous mode, and to predetermined time after the completion of the rice cooking step in the time-saving continuous mode.

[0050]

For example, during the single rice washing and cooking operation other
10 than that in the normal continuous mode or the time-saving continuous mode, the steaming leaving time starts being counted after the completion of the steaming step. Then, in the case where the inner pot 20 is not taken out after the lapse of the predetermined time (for example, 10 minutes), the worker is notified by the notification means V of the
15 control unit C. Alternatively, a cooked rice leaving time starts being counted after the completion of the rice cooking step. Then, in the case where the inner pot 20 is not taken out after the lapse of the predetermined time (for example, 10 minutes), the worker is notified by the notification means V of the control unit C.

20 [0051]

<Soaking Leaving Prevention>

In the normal continuous mode and the time-saving continuous mode described above, the rice washer M and the rice cooking pot S are continuously and automatically operated. However, there is a case where
25 the operator wishes to perform the rice cooking operation at his/her own work timing and thus performs the rice cooking operation in the manual mode in which the dropping step from the rice washer M into the rice cooking pot S and the ignition (or power-on) of the rice cooking pot S are performed manually.

30 [0052]

In this case, even after a lapse of the set time for the soaking step in the rice washer M, the rice cannot be dropped into the rice cooking pot S

unless the dropping step is performed. There is also a case where the operator forgets the dropping step and the rice cooking step due to another work in a kitchen. In order to prevent this, in the case where the rice is left without the dropping step even after the lapse of the set time
5 for the soaking step, the notification means V notifies the operator of necessity to perform the dropping step.

CLAIMS

1. A rice washing and cooking machine comprising:
 - a single rice storage that stores rice;
 - 5 a single rice washer that washes the rice; and
 - a plurality of rice cooking pots, the rice storage and the rice washer integrally moving above the rice cooking pots, and the rice and water being supplied from the rice washer to a predetermined rice cooking pot, wherein
 - 10 a series of rice washing and cooking operation including a measuring step of supplying a measured amount of the rice to be cooked to the rice washer, a rice washing step of washing the rice by the rice washer, a soaking step after the rice washing step, a rice cooking step by the rice cooking pot, and a steaming step by the rice cooking pot after
 - 15 the rice cooking step is performed, and
 - a normal continuous mode, in which the rice washing and cooking operation is continuously performed using a set number of the pots, or a time-saving continuous mode, in which the steaming step in the series of rice washing and cooking operation is omitted and the rice
 - 20 washing and cooking operation is continuously performed using a set number of the pots in a shorter cycle than that in the normal continuous mode, can be selected.
2. The rice washing and cooking machine according to claim 1,
 - 25 wherein
 - the soaking step can be performed in either the rice washer or the rice cooking pot, and is performed in the rice cooking pot at a higher rate in the time-saving continuous mode than in the normal continuous mode.
 - 30
3. The rice washing and cooking machine according to claim 1 or 2, wherein

in the normal continuous mode, after completion of the steaming step in the rice cooking pot, a dropping step of dropping the rice and water already stored in the rice washer from the rice washer into the rice cooking pot is performed, and

5 the time-saving continuous mode enables the dropping step of dropping the rice and water already stored in the rice washer into the rice cooking pot after the rice cooking step.

4. A rice washing and cooking machine comprising:

10 a single rice storage that stores rice;

 a single rice washer that washes the rice; and

 a plurality of rice cooking pots, the rice storage and the rice washer integrally moving above the rice cooking pots, and the rice and water being supplied from the rice washer to a predetermined rice

15 cooking pot, wherein

 a rice washing and cooking operation including a measuring step of supplying a measured amount of the rice to be cooked to the rice washer, a rice washing step of washing the rice by the rice washer, a soaking step after the rice washing step, a rice cooking step by the rice cooking pot, and a steaming step by the rice cooking pot after the rice cooking step is performed, and the rice washing and cooking operation is performed in a continuous cycle using a set number of the pots, and

 control is executed to change a ratio of the soaking step performed in the rice washer and the rice cooking pot for each cycle.

25