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Title: STEAM GENERATOR HAVING PRESSURE SENSOR FOR DRUM WASHING MACHINE AND CONTROL METHOD AS THE SAME

Abstract: A steam generator of a drum washing machine is disclosed which includes a pressure sensor for controlling an internal pressure of the steam generator, so as to prevent an excessive steam-pressure or water-pressure inside the steam generator, the steam generator comprising a housing which holds water therein; a heater that generates steam by heating the water held in the housing; and a pressure sensor that senses an internal pressure of the housing.
Description

STEAM GENERATOR HAVING PRESS-SENSOR FOR DRUM WASHING MACHINE AND CONTROL METHOD AS THE SAME

Technical Field

[1] The present invention relates to a drum washing machine, and more particularly, to a steam generator of a drum washing machine which includes a pressure sensor for controlling an internal pressure of the steam generator, so as to prevent the steam generator from being damaged due to an excessive steam-pressure or water-pressure.

Background Art

[2] In general, a washing machine is largely classified into a pulsator type washing machine, and a drum type washing machine. The pulsator type washing machine washes the laundry using a frictional force generated between water current and the laundry by rotating a pulsator, and the drum type washing machine washes the laundry using a drop of the laundry as well as the frictional force.

[3] In recent days, it is thus seen that there has been provided a drum type washing machine using the steam.

[4] FIG. 1 is a perspective view of schematically illustrating a related art drum type washing machine.

[5] Referring to FIG. 1, a related art drum type washing machine includes a cabinet 10 defining the exterior thereof; a cylindrical tub 20 vertically suspended within the cabinet 10 for holding washing water; a drum 30 rotatably mounted within the tub 20; and a driving motor (not shown) axially connected with the drum 30 so as to drive the drum 30.

[6] In addition, a steam generator 50 is provided in the related art drum washing machine of FIG. 1, so as to supply the steam to the inside of the drum 30.

[7] In front of the cabinet 10, a laundry introduction opening 13 for loading and unloading the laundry is provided in communication with the inside of the drum 30. Also, a door 11 is provided for opening and shutting of the laundry introduction opening 13. That is, the door 11 turns on its hinge toward the front side of the drum washing machine.

[8] Also, a water supplying valve 15 and a water supplying hose 25 are provided at one side of the drum washing machine, and are connected with an external water pipe (not
shown) so as to supply the washing water to the tub 20.

[9] The steam generator 50 is connected with the water supplying hose 25. As the washing water is supplied to the steam generator 50, the steam generator 50 heats the washing water, and then supplies the heated washing water to the drum 30.

[10] Also, a steam supplying pipe 53 is provided at one side of the steam generator 50, whereby the steam supplying pipe 53 serves as a passage for guiding and injecting the steam generated in the steam generator 50 to the inside of the drum 30.

[11] Preferably, one end of the steam supplying pipe 53 is provided with a nozzle for the smooth injection of the steam to the inside of the drum 30. Preferably, the end of the steam supplying pipe 53 for discharging the steam is exposed to the inside of the drum 30.

[12] Referring to FIGs. 2 and 3, the structure of the steam generator 50 will be explained in detail.

[13] As shown in FIG. 2, the steam generator 50 includes a lower housing 81 for defining the exterior thereof as well as the space to hold the washing water; an upper housing 82 connected to an upper surface of the lower housing 81; and a heater 55 for heating the washing water held within the steam generator 50.

[14] Then, an inlet 82a is provided at one side of the upper housing 82, wherein the inlet 82a for drawing the washing water into the steam generator 50 is connected with the water supplying valve 15. Also, an outlet 82b is provided at the other side of the upper housing 82, wherein the outlet 82b is connected with the steam supplying pipe 53 for supplying the generated steam to the drum 30.

[15] Referring to FIG. 3, the heater 55 is provided in the lower side of the lower housing 81. As the water is supplied to the steam generator 50, the heater 55 is completely sunk in the water so as to directly heat the water.

[16] Also, a water level sensor 60 and a temperature sensor 57 are provided at one side of the upper housing 82, wherein the water level sensor 60 senses a water level held in the upper housing 82, and the temperature sensor 57 senses the temperature of water as well as steam heated by the heater 55.

[17] The water level sensor 60 senses the water level held within the steam generator 50 for maintaining the appropriate amount of the water in the steam generator 50.

[18] That is, if the water level held within the steam generator 50 is lower than a preset value, the water supplying valve 15 is opened for filling up the water. Meanwhile, if the water level held within the steam generator 50 is higher than the preset value, the water supplying valve 15 is closed to stop supplying the water, and the heater 55 is
operated to generate the steam.

[19] The water level sensor 60 is provided with a receptacle housing 61; and electrodes 62, 63, and 64. The receptacle housing 61 defines the exterior of the water level sensor 60, and also fixes the water level sensor 60 to the steam generator 50. Each of the electrodes 62, 63, and 64 is provided in a lower portion of the receptacle housing 61 for sensing the water level within the steam generator 50.

[20] In the meantime, non-explained reference numbers 52a and 52b correspond to a portion for connecting the water supplying hose 25 with the steam supplying pipe 53.

[21] However, the related art drum washing machine has the following problems.

[22] Even though the outlet of the drum washing machine may be clogged by foreign substances, the heater of the steam generator doesn't stop the operation for generating the steam. Accordingly, the inside pressure increases due to the excessively generated steam, whereby the steam generator may have breakdown. Also, the excessively generated steam may leak out.

**Disclosure of Invention**

**Technical Problem**

[23] An object of the present invention is to provide a steam generator of a drum washing machine which includes a pressure sensor for controlling an internal pressure of the steam generator, so as to prevent the pressure sensor from being damaged due to an excessive steam-pressure or water-pressure.

**Technical Solution**

[24] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a steam generator of a drum washing machine comprises a housing which holds water therein; a heater which generates steam by heating the water held in the housing; and a pressure sensor which senses an internal pressure of the housing.

[25] At this time, the pressure sensor is electrically connected with the heater.

[26] Also, the housing includes a steam-filling part which is filled with the steam generated by the heater. The steam-filling part is upwardly protruding from one upper side of the housing.

[27] Also, the pressure sensor is provided in the steam-filling part.

[28] In another aspect of the present invention, a method for sensing a pressure inside a steam generator of a drum washing machine comprises previously setting a predetermined value of pressure; supplying water to the inside of the steam generator;
heating the water supplied to the steam generator; sensing a pressure inside the steam
generator on heating the water supplied; and comparing the sensed pressure with the
predetermined value set previously.

[29] In addition, the method includes stopping an operation of the heater if the sensed
pressure is higher than the predetermined value set previously.

Advantageous Effects

[30] The steam generator of the drum washing machine according to the present
invention includes the pressure sensor that controls the internal pressure. If the heater
keeps heating the water in state of that the supplying pipe of the steam generator is
clogged by the foreign substances, the internal pressure is increased. The pressure
sensor senses the internal pressure of the steam generator, and controls the operation of
the heater by the micom, to thereby prevent the internal pressure of the steam
generator from being excessive.

Brief Description of the Drawings

[31] The accompanying drawings, which are included to provide a further understanding
of the invention, illustrate embodiments of the invention and together with the description serve to explain the principle of the invention.

[32] In the drawings:

[33] FIG. 1 is a perspective view of schematically illustrating a structure of a drum
washing machine according to the related art.

[34] FIG. 2 is a perspective view of illustrating a steam generator of a drum washing
machine according to the related art.

[35] FIG. 3 is a perspective view of illustrating an inner structure of a steam generator
shown in FIG. 2.

[36] FIG. 4 is a perspective view of illustrating the exterior of a steam generator
according to the preferred embodiment of the present invention.

[37] FIG. 5 is a perspective view of illustrating an inner structure of a steam generator
according to the preferred embodiment of the present invention.

[38] FIG. 6 is a block diagram of illustrating a connection of components provided
inside a steam generator according to the preferred embodiment of the present
invention.

[39] FIG. 7 is a block diagram of illustrating a method for controlling a heater of a steam
generator according to the preferred embodiment of the present invention.

Best Mode for Carrying Out the Invention
Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

FIG. 4 is a perspective view of illustrating the exterior of a steam generator according to the preferred embodiment of the present invention.

Referring to FIG. 4, a steam generator 50 of a drum washing machine according to the preferred embodiment of the present invention includes a housing 80 comprised of lower and upper housings 81 and 82 connected to each other.

The housing 80 is provided with a water level sensor 60; a heater 55; and a pressure sensor 100. At this time, the water level sensor 60 senses a level of water held in the steam generator 50. The heater 55 heats the water supplied to the housing 80. Then, the pressure sensor 100 senses a pressure inside the housing 80.

As shown in FIG. 4, a steam-filling part 88 of a protruding structure is provided at an upper portion of the housing 80.

The steam-filling part 88 is filled with not water but steam since the water level sensor 60 senses the water level. Accordingly, it is preferable to provide the pressure sensor 100 on the steam-filling part 88.

Also, a temperature sensor 57 is provided on an upper surface of the housing 80, so as to sense a temperature of the water supplied to the inside of the steam generator 50.

In this case, preferably, the pressure sensor 100 is provided in communication with the inside of the housing 80, so as to sense the inside pressure of the housing 80.

Also, the housing 80 includes a water supplying pipe 52a connected with a water supplying hose (25 of FIG. 1), and a supplying pipe 52b connected with a steam supplying pipe (53 of FIG. 1).

The pressure sensor 100 is electrically connected with the heater 55. Although not shown, the drum washing machine of the present invention includes a micom 200 for controlling the heater 55, wherein the micom 200 is electrically connected with the pressure sensor 100 and the heater 55.

A method for controlling the steam generator according to the preferred embodiment of the present invention will be explained as follows.

Referring to FIG. 5, as the washing water is supplied to the inside of the steam generator 50 by the water supplying hose (25 of FIG. 1), the heater 55 is operated to heat the washing water. As a result, the steam is generated, and the generated steam is guided to the inside of the drum 30 by the steam supplying pipe (53 of FIG. 1). Then,
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the washing stroke is performed.

According as the electrodes (62, 63 and 64 of FIG. 3) of the water level sensor 60 are completely sunk in the washing water held in the steam generator 50 and the electric current is applied thereto, the water level sensor 60 senses the water level.

In case the supplying pipe 52b of the steam generator 50 connected with the steam supplying pipe 53 is clogged with foreign substances, if the heater 55 keeps heating the supplied water, the internal pressure of the steam generator 50 becomes excessive.

To prevent the internal pressure of the steam generator 50 from being excessive, the pressure sensor 100 is provided inside the steam generator 50, so as to sense the pressure inside the steam generator 50. In state of that the pressure sensor 100 is electrically connected with the micom 200, the pressure sensor 100 sends electric signals to the micom 200. That is, if the pressure sensed by the pressure sensor 100 is higher than a preset value, the micom 200 stops the operation of the heater 55 by controlling the heater 55.

Accordingly, it is possible to lower the temperature of water supplied to the inside of the steam generator, and to stop the generation of steam, to thereby prevent the steam generator from being damaged.

It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

**Industrial Applicability**

The steam generator of the drum washing machine according to the present invention includes the pressure sensor that controls the internal pressure. If the heater keeps heating the water in state of that the supplying pipe of the steam generator is clogged by the foreign substances, the internal pressure is increased. The pressure sensor senses the internal pressure of the steam generator, and controls the operation of the heater by the micom, to thereby prevent the internal pressure of the steam generator from being excessive.
Claims

[1] A steam generator of a drum washing machine comprising:
a housing which holds water therein;
a heater which generates steam by heating the water held in the housing; and
a pressure sensor which senses an internal pressure of the housing.

[2] The steam generator of claim 1, wherein the pressure sensor is electrically
connected with the heater.

[3] The steam generator of claim 1, wherein the housing includes a steam-filling part
which is filled with the steam generated by the heater.

[4] The steam generator of claim 3, wherein the steam-filling part is upwardly
protruding from one upper side of the housing.

[5] The steam generator of claim 4, wherein the pressure sensor is provided in the
steam-filling part.

machine comprising:
previously setting a predetermined value of pressure;
supplying water to the inside of the steam generator;
heating the water supplied to the steam generator;
sensing a pressure inside the steam generator on heating the water supplied; and
comparing the sensed pressure with the predetermined value set previously.

[7] The method of claim 6, further comprising:
stopping an operation of the heater if the sensed pressure is higher than the pre-
determined value set previously.
[Fig. 7]

Start

S1: supply water to steam generator

S2: heat the water supplied

S3: sense pressure inside the steam generator

S4: sensed value of pressure ≥ preset value of pressure?
   - No
   - Yes: turn off heater

Finish