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WASHING FUNCTION AND CONTROL
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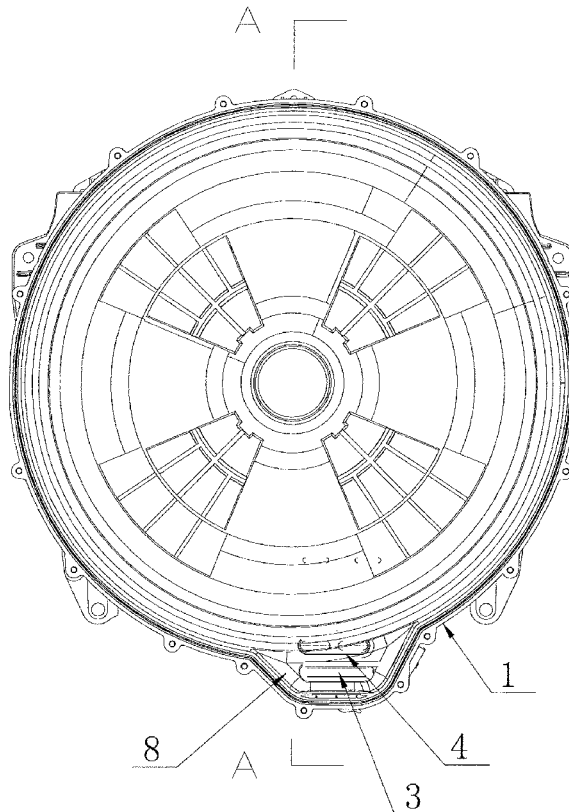
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(57) **ABSTRACT**

A washing machine with a steam washing function and a control method are provided. The washing machine includes an outer drum, wherein a heater is arranged inside the outer drum; the washing machine further includes a spray thrower used for spraying water to the heater, and the heater heats and vaporizes the water sprayed onto the surface to form high-temperature steam. When the heater is provided with a spray thrower which sprays water to the heater, the heater in a heating state can rapidly heat and vaporize the sprayed water to form a large amount of steam, then the steam generated in the outer drum can be utilized to heat and wet the clothes in the inner drum, such that the washing machine has the functions of steam washing, clothes drying, sterilization and disinfection, deodorization and ironing.



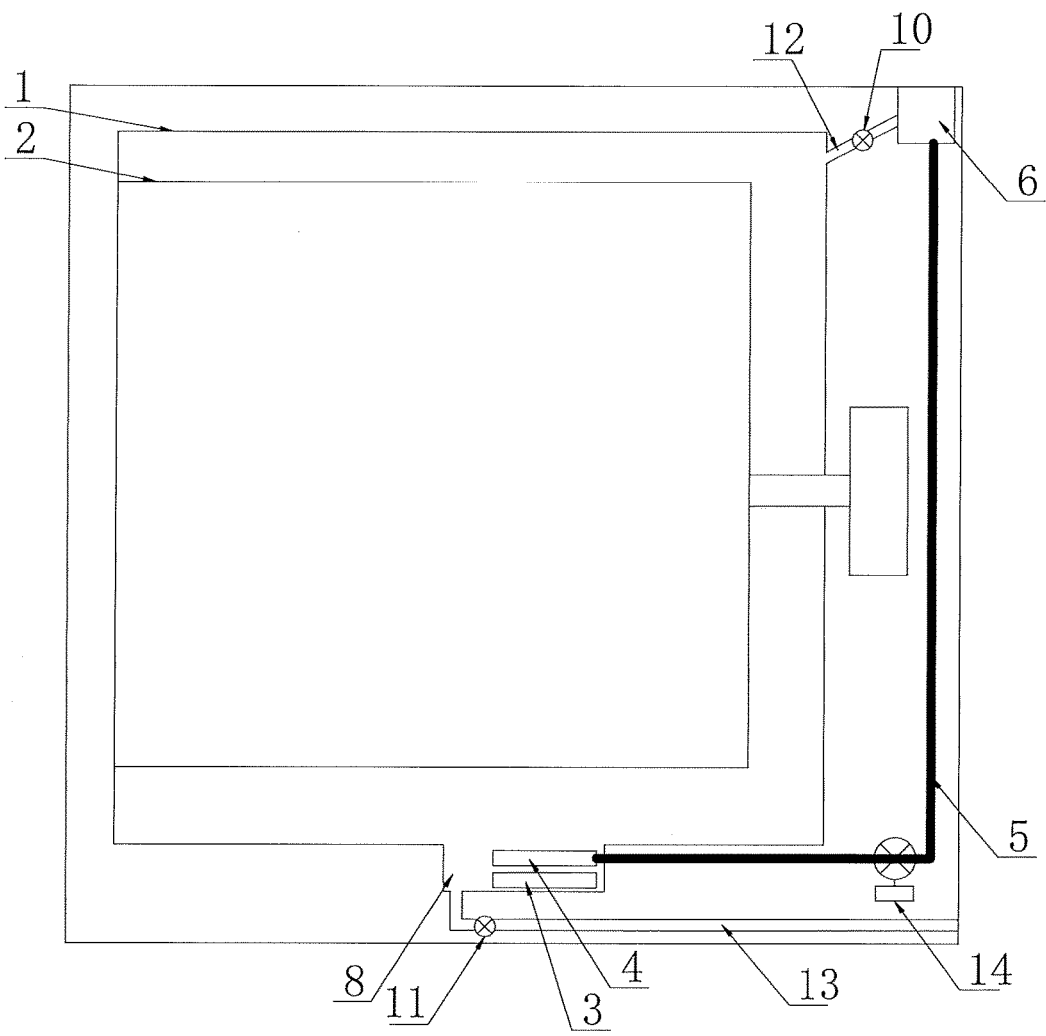


Fig. 1

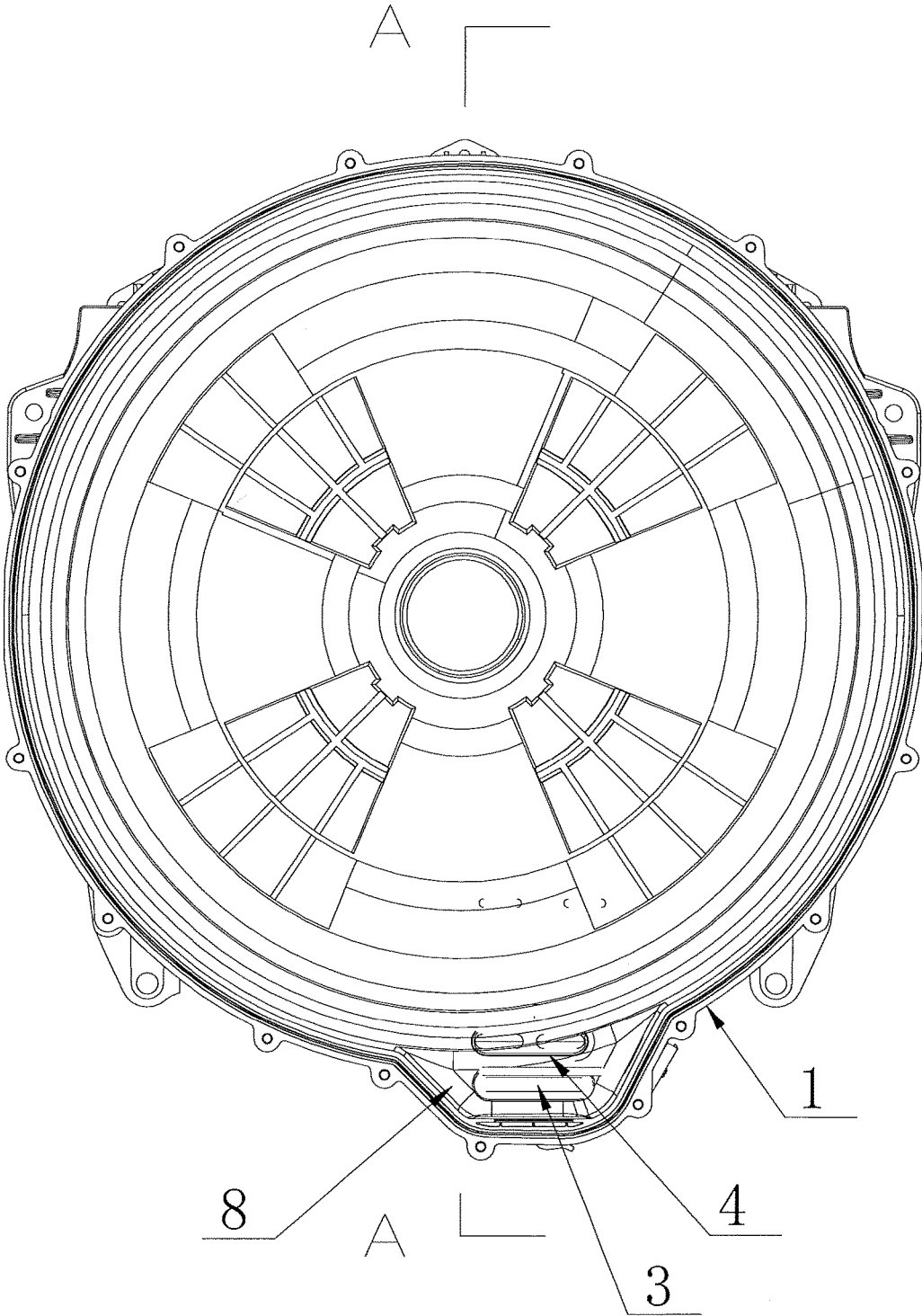


Fig. 2

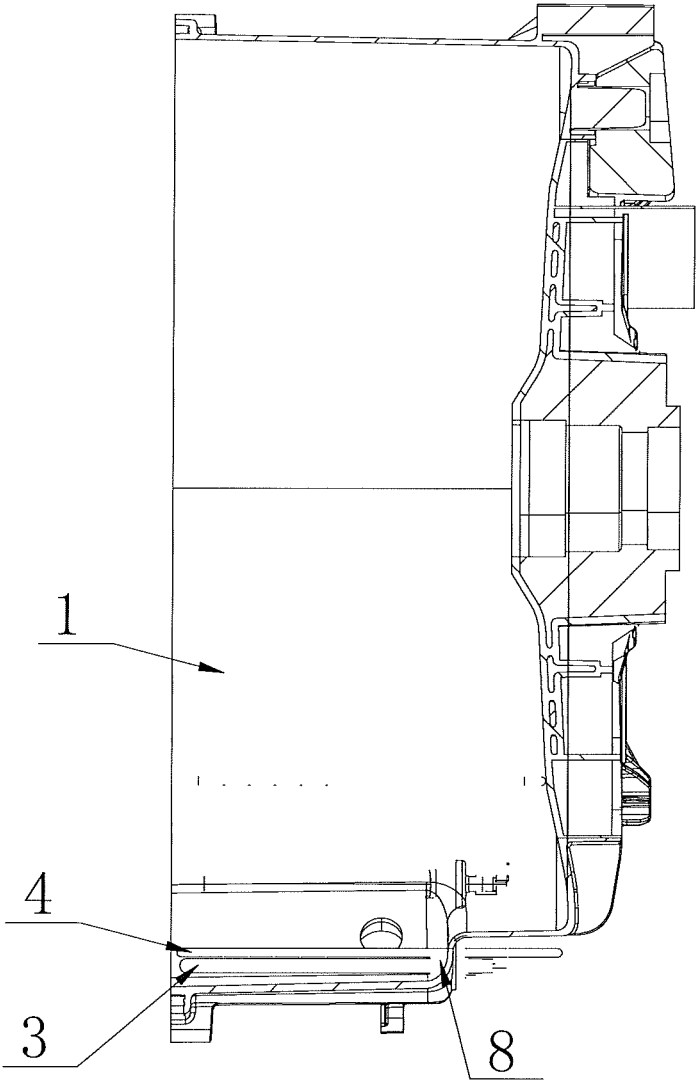


Fig. 3

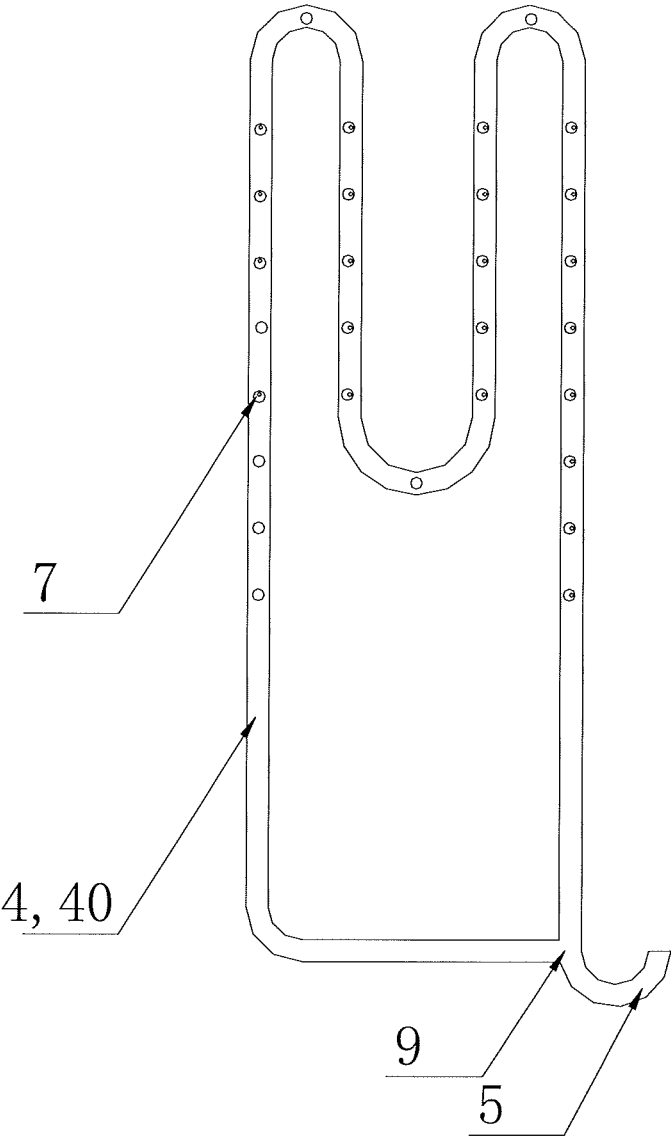


Fig. 4

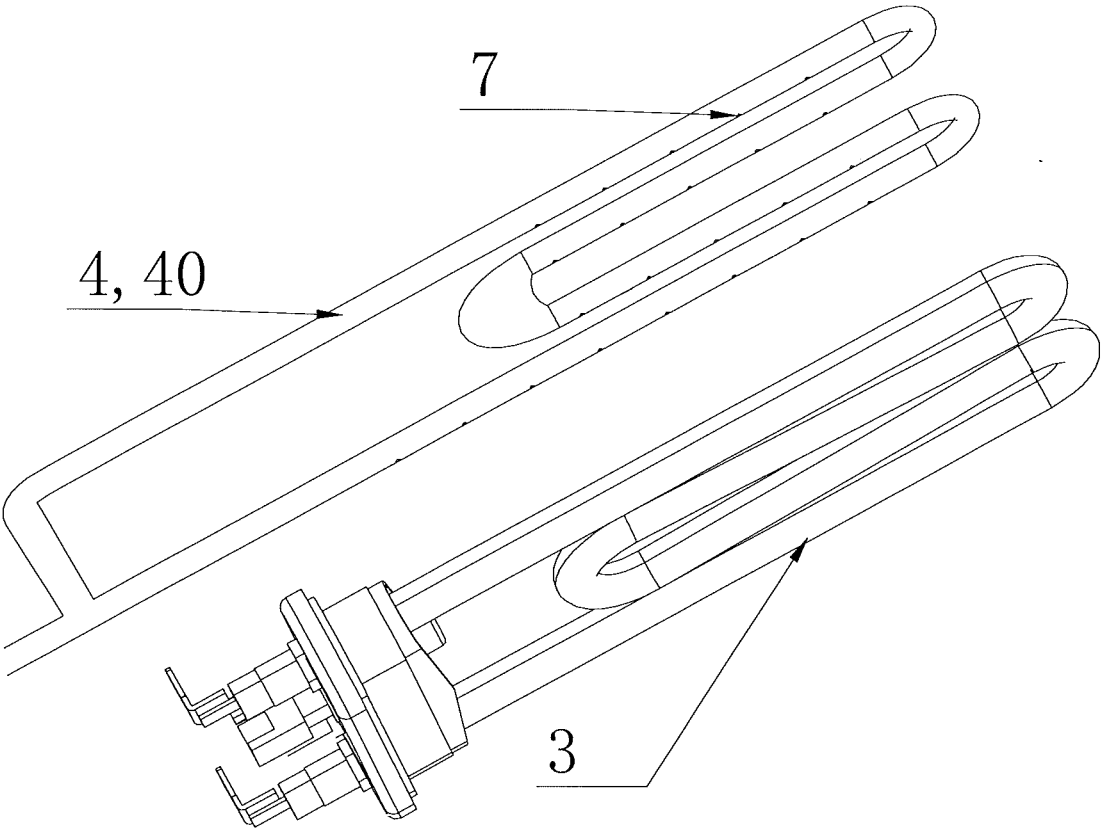


Fig. 5

WASHING MACHINE WITH STEAM WASHING FUNCTION AND CONTROL METHOD

TECHNICAL FIELD

[0001] The present disclosure relates to a washing machine in a washing field, and in particular to a washing machine with a steam washing function, and relates to a control method of the above washing machine.

BACKGROUND ART

[0002] To cater to the demands of consumers, additional functions of the washing machine emerge endlessly, such as the functions including steam washing, sterilization and deodorization. In the existing washing machine products, the function of steam washing is realized in the following two manners:

[0003] In the first manner, the heater in the outer drum of a washing machine is immersed into the washing water of an outer drum, and the washing water is heated so as to generate steam. However, for the washing machine which adopts this manner, since the washing water in the outer drum is large in quantities, the heating efficiency is relatively slow, therefore, the generated steam is small in quantity and the effect is not ideal.

[0004] In the second manner, a special steam generator is additionally arranged on the washing machine, after water is vaporized into high-temperature steam in a generator, then the steam flows into the outer drum, so as to realize the functions of rapid washing, sterilization and deodorization of clothes.

[0005] The Chinese patent with the application number of CN200510083626 introduces a steam generation device of a washing machine. The steam generation device includes a shell of an accommodation space for storing water, and a heater which is arranged in the shell for heating the water stored in the shell. Through additionally arranging a separate steam generation device on the washing machine, then water can be utilized to generate steam, and steam can flow into the outer drum of the washing machine, so as to realize the aim of performing high-temperature disinfection on the clothes in the inner drum by utilizing the steam.

[0006] In the above scheme in which a steam generator is separately and additionally arranged on a washing machine, although the generated steam is large in quantity, and the effects of cleaning and disinfection of clothes are favorable. However, since a separate steam generator needs to be additionally arranged, the production cost of the washing machine is increased; meanwhile, the separately arranged steam generator also occupies the inside space of the washing machine, such that the overall size of the washing machine becomes large, and the volume of the inner drum becomes small.

[0007] In view of this, the present disclosure is hereby proposed.

SUMMARY OF THE DISCLOSURE

[0008] The technical problem to be solved by the present disclosure is to overcome the shortcomings in the prior art, provide a washing machine with a steam washing function, so as to realize the aim of generating steam in the outer drum to perform high-temperature disinfection and rapid wetting

on clothes. And another aim is to utilize the heater in the outer drum to rapidly generate a large amount of steam.

[0009] To solve the above technical problem, the basic concept of the technical solution adopted in the present disclosure is as follows: A washing machine with a steam washing function includes an outer drum, wherein a heater is arranged inside the outer drum, and the washing machine further includes a spray thrower used for spraying water to the heater, wherein the heater heats to vaporize the water sprayed onto the surface to form high-temperature steam.

[0010] Furthermore, the spray thrower and the heater are correspondingly arranged jointly or at a distance, the corresponding side of the spray thrower is distributed with multiple spray holes used for spraying water to the heater.

[0011] Furthermore, the heater is able to heat air or respectively heat water and air. Preferably, the heater is a heater which heats the washing water in the existing washing machine.

[0012] Furthermore, the spray thrower is constituted by a pipe which is of the same shape as the heater, and the spray holes are distributed at intervals along the axial direction of the pipeline

[0013] Furthermore, the heater and the spray thrower are both arranged between the outer drum and the inner drum of the washing machine. The heater is arranged at the bottom of the outer drum, and the spray thrower is arranged at the corresponding upper side of the heater. Preferably, the bottom of the outer drum is provided with a groove which sinks downwards, and the heater and the spray thrower are both arranged in the groove.

[0014] Furthermore, the spray thrower is communicated with a water inlet structure of the washing machine via a connecting pipe, and the connecting pipe is provided with a control valve used for controlling the flow rate of the sprayed water.

[0015] Preferably, the two ends of the pipe which constitute the spray thrower are both communicated with the connecting pipe via a three-way valve, such that water can be fed into the spray thrower in two directions simultaneously, so as to improve the spraying efficiency.

[0016] Another objective of the present disclosure is to provide a control method of a washing machine of any of the above items, wherein the heater in the outer drum is heated for vaporization, so that vaporized steam is generated in the outer drum, and the steam heats and wets the clothes in the inner drum.

[0017] Furthermore, the heater needs to be powered on first to enable it to be in a heating state, the spray thrower then sprays water to the heater, so as to avoid inability of the heater in a non-heating state in timely vaporization of the sprayed water, and avoid water accumulation in the outer drum.

[0018] Before the washing machine executes normal washing procedure, firstly water is sprayed to the heater which is in a heating state, then high-temperature steam is generated in the outer drum, after the clothes are heated and wetted for a certain time, the execution of normal washing procedure then begins. The normal washing procedure includes one or the combination of the steps of water intaking, washing, rinsing, dehydration and drying. Therefore, the clothes are firstly rapidly wetted by steam and disinfected by high temperature, and then normal washing begins, so as to improve the washing efficiency of clothes.

[0019] Furthermore, in the process of spraying water to the heater to form high-temperature steam, the inner drum rotates simultaneously at a certain rotation halt ratio, so as to increase the contact area between clothes and steam.

[0020] Furthermore, in the process of spraying water to the heater to form high-temperature steam, the heater needs to stop working for a certain time t_2 after working for a certain time t_1 , so as to avoid dry burning caused by overheated heater. Preferably, t_1 is 20s, and t_2 is 20s.

[0021] Furthermore, in the process of spraying water to the heater to form high-temperature steam, the water inlet pipe and water outlet pipe of the outer drum are both in a disconnected state, to enable the high-temperature steam to be filled into the airtight inner space of the outer drum.

[0022] Furthermore, before water is sprayed to the heater, water is firstly filled into the outer drum, and the height of the water inlet level is lower than the heater, so as to avoid burning loss of the bottom of a washing machine caused by the overheated heater.

[0023] After the above technical solution is adopted, the present disclosure has the following beneficial effects compared with the prior art.

[0024] 1. A spray thrower which sprays water to the heater is arranged at the heater, to enable the heater to rapidly heat and vaporize the sprayed water to form a large amount of steam, the aim of generating steam in the outer drum is realized. And the washing machine has the functions of steam washing, clothes drying, sterilization and disinfection, deodorization and ironing, and the effect is dramatic.

[0025] 2. Through the above setting, the heater has double effects of heating the washing water in the outer drum and rapidly generating a large amount of steam, then the addition of special steam generation device is avoided, thereby not only reducing the cost of the washing machine, but also reducing the power consumption of the washing machine.

[0026] 3. The heater is arranged at the bottom of the outer drum, by utilizing the principle that hot air rises up, the generated steam is filled into the whole area of the airtight outer drum, such that clothes can be in full contact with steam. In addition, when the outer drum is filled with steam, the inner drum is rotated, such that clothes can roll over to increase the contact area of clothes and steam and improve the washing efficiency.

[0027] 4. Also, the present disclosure is simple in structure, concise in method, dramatic in effect, and suitable for popularization and use.

BRIEF DESCRIPTION OF THE DRAWINGS

[0028] FIG. 1 is a structural schematic diagram of the washing machine in the embodiment of the present disclosure;

[0029] FIG. 2 is a structural schematic diagram of an outer drum in the embodiment of the present disclosure;

[0030] FIG. 3 is a structural schematic diagram of the A-A section in FIG. 2;

[0031] FIG. 4 is a structural schematic diagram of the spray browser in the embodiment of the present disclosure;

[0032] FIG. 5 is an explosive structural schematic diagram of the spray thrower and the heater in the embodiment of the present disclosure;

[0033] Reference numerals of major elements: 1—outer drum, 2—inner drum, 3—heater, 4—spray thrower, 5—connecting pipe, 6—water inlet structure, 7—spray hole, 8—groove, 9—three-way valve, 10—water inlet pump,

11—drainage pump, 12—water inlet pipe, 13—water outlet pipe, 14—control valve, 40—pipeline.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0034] The specific implementation of the present disclosure will be described in detail below in combination with the accompanying drawings.

[0035] As shown in FIG. 1 to FIG. 5, the embodiment of the present disclosure introduces a washing machine with a steam washing function which includes an outer drum (1) and an inner drum (2), and a heater (3) is arranged between the outer drum (1) and the inner drum (2). The heater (3) heats the washing water which flows into the outer drum (1) so as to improve the temperature of the washing water. The washing machine further includes a spray thrower (4) used for spraying water to the heater (3), the heater (3) heats and vaporizes the water sprayed onto the surface to form high-temperature steam, and the steam heats and wets the clothes in the inner drum (2).

[0036] When the heater (3) is provided with a spray thrower (4) which sprays water to the heater (3), then the heater (3) is able to rapidly heat and vaporize the sprayed water to form a large amount of steam, then the steam generated in the outer drum (1) can be utilized to heat and wet the clothes in the inner drum (2), such that the washing machine has the functions of steam washing, clothes drying, sterilization and disinfection, deodorization and ironing, and the effect is dramatic. Meanwhile, the heater (3) has double effects of heating the washing water in the outer drum (1) and rapidly generating a large amount of steam, then the addition of special steam generation device is avoided, thereby not only reducing the cost of the washing machine, but also reducing the power consumption of the washing machine.

Embodiment 1

[0037] As shown in FIG. 1 to FIG. 4, in the present embodiment, the spray thrower (4) and the heater (3) are correspondingly arranged jointly or at a distance, the corresponding side of the spray thrower (4) is distributed with multiple spray holes (7) used for spraying water to the heater (3). Preferably, the spray thrower (4) and the heater (3) are spaced by a certain distance in order to improve the cover area of the spray holes (7). Meanwhile, the distance between adjacent spray holes (7) is made to be smaller than the diameter of the area covered by the sprayed water, such that each part of the heater (3) can be in contact with the sprayed water, so as to improve the generation efficiency of steam.

[0038] As shown in FIG. 4 and FIG. 5, in the present embodiment, the heater (3) is constituted by multiple heating pipes which are spirally arranged in an S shape; the spray thrower (4) is constituted by the pipeline (40) which is of the same shape as the heater (3), and multiple spray holes (7) which spray water to the heater (3) are distributed on the pipeline (40) at intervals along the axial direction. The sprayer thrower and the heater are arranged to be in the same shape, so as to enlarge the cover area of the sprayed water flow on the heater, improve the generation efficiency of the steam, and avoid the dead angles existing in the heater and inability of complete coverage of the sprayed water flow.

[0039] As shown in FIG. 4, in the present embodiment, the two ends of the pipeline (40) constituting the spray thrower

(4) are both connected with the connecting pipe (5) via the same three-way valve (9). The connecting pipe (5) is communicated with the water inlet structure (6) of the washing machine, such that the water flow can enter via the two ends of the pipeline (40) simultaneously. So as to reduce the length of the flow path of the water flow, enable the water outlet pressure of each spray hole (7) to be relatively balanced, and achieve the aim of improving the water spraying stability of the sprayer and accelerate the generation rate of the steam.

[0040] In the present embodiment, the connecting pipe (5) is provided with a control valve (14) for controlling the water flow, so as to adjust the water inlet flow of the spray thrower and achieve the aim of indirectly adjusting the area covered by the sprayed water flow.

Embodiment 2

[0041] As shown in FIG. 1, in the present embodiment, the heater (3) and the spray thrower (4) are both arranged between the outer drum (1) and the inner drum (2), the steam generated at the heater (3) can flow into the space inside the inner drum (2) via a dehydration hole arranged on the inner drum (2), so as to perform steam washing, sterilization and disinfection, deodorization and the like on the clothes in the inner drum (2).

[0042] As shown in FIG. 2 and FIG. 3, in the present embodiment, the heater (3) is arranged at the bottom of the outer drum (1), the spray thrower (4) is arranged at the corresponding upper side of the heater (3), and the spray holes (7) are arranged on the lower surface of the spray thrower (4). The steam will move upwards in the outer drum (1) due to its low density, and the heater (3) is arranged at the bottom of the outer drum (1), such that the steam generated in the outer drum (1) is uniformly distributed inside the outer drum (1), and the clothes can be in full contact with the steam.

[0043] As shown in FIG. 1, in the present embodiment, the outer drum (1) is communicated with the water inlet structure (6) via a water inlet pipe (12), and is communicated with the outside of the washing machine via a water outlet pipe (13). The water inlet pipe (12) is provided with a water inlet pump (10) used for controlling the on/off of the pipeline, and the water outlet pipe (13) is provided with a drainage pump (11) used for controlling the channel of the pipe. When the spray thrower (4) sprays water to the heater (3), the water inlet pump (10) and the drainage pump (11) are both turned off, then the inner space of the outer drum (1) is closed, such that the generated steam can be filled into the outer drum uniformly, and external flow of the steam is avoided. Preferably, as shown in FIG. 1 to FIG. 3, the bottom of the outer drum (1) is provided with a groove (8) which sinks downwards, and the heater (3) and the spray thrower (4) are both arranged in the groove (8). Thus, a certain interval is arranged between the heater (3) and the inner drum (2) and between the spray thrower (4) and the inner drum (2), thereby avoiding mutual contact friction. And in the working process of the washing machine, the shake of the inner drum (2) will not collide with the heater (3) and the spray thrower (4) in the groove (8), so as to reduce the probability of fault of the spray thrower and the heater.

Embodiment 3

[0044] In the present embodiment, the washing machine has a corresponding process of generating high-temperature steam, and the process specifically includes the following steps:

[0045] 1) the water inlet pipe and the water outlet pipe of the outer drum are disconnected, so that the inner space of the outer drum is arranged to be airtight;

[0046] 2) the washing machine fills water to the spray thrower, the spray thrower sprays water to the heater, and the heater begins to work to generate high-temperature steam, so as to enable the steam to be filled in the airtight inner space of the outer drum;

[0047] 3) when step 2) is executed, the inner drum rotates at a certain rotation halt ratio.

[0048] Through the above method, the inner space of the outer drum can be rapidly and uniformly filled with steam, and steam can be utilized to heat and wet the clothes, such that the washing machine has the functions of steam washing, clothes drying, sterilization and disinfection, deodorization and ironing, and the effect is dramatic.

[0049] In the present embodiment, the above steps 1) to 3) can be combined with the normal washing procedures of the existing washing machine, so as to improve the cleanliness of clothes and enrich the selection of users, and the specific mode is as follows:

[0050] 10) Placing clothes into a washing machine and starting the washing machine;

[0051] 20) Executing the above steps 1) to 3) by the washing machine firstly, so as to heat and wet the clothes for a certain time;

[0052] 30) Executing the normal washing procedure which is selected by users and/or automatically determined by the washing machine, wherein the procedure includes one or the combination of the steps of water intaking, washing, rinsing, dehydration and drying.

[0053] Therefore, besides the function of normal washing of clothes, the washing machine further has the functions of steam washing, clothes drying, sterilization and disinfection, deodorization and ironing, and the satisfaction degree of users is improved. Meanwhile, the washing machine can be set, so as to execute step 20) in selected or specific judgment conditions, in other conditions, step 20) will be skipped and normal washing procedures are directly executed.

Embodiment 4

[0054] In the present embodiment, in step 2) of the above embodiment 3, in order to avoid dry heating when the heater is overheated, the heater needs to stop working for a certain time t_2 after working for a certain time t_1 ; preferably, t_1 is 20s, and t_2 is 20s. Therefore, the temperature of the heater will not be too high, so as to protect the heater, and avoid loss due to dry heating.

[0055] In the present embodiment, when the heater is an electric heating device, power up and power down need to be performed on the heater alternately, then the above overheating protection procedure of the heater will be realized.

[0056] In the present embodiment, in the working time period of the above heater, the heater utilizes the heat generated by itself to heat and vaporize the sprayed water to form high-temperature steam. While in the time period in which the heater stops working, the heater utilizes its own

waste heat to heat and vaporize the sprayed water to form high-temperature steam, and the sprayed water reduces the temperature of the heater. Through the above manner, on the one hand, the temperature of the heater itself will not be too high, thereby avoiding dry heating and damage; on the other hand, the conditions of untimely heating of the sprayed water and water accumulation in the outer drum will be avoided.

Embodiment 5

[0057] In the present embodiment, the following difference exists compared with the above embodiment 3 and embodiment 4: before water is sprayed to the heater, water is firstly filled into the outer drum, and the height of the water inlet level is lower than the heater.

[0058] In the present embodiment, the specific steps of generating the high-temperature steam by the washing machine are as follows:

[0059] 21) a certain amount of water is filled into the outer drum, and the water inlet level needs to be lower than the height of the heating pipe;

[0060] 22) the water inlet pipe and the water outlet pipe of the outer drum are disconnected, such that the inner space of the outer drum is arranged to be airtight;

[0061] 23) the washing machine fills water into the spray thrower, the spray thrower sprays water to the heater, the heater begins to work to generate high-temperature steam, to enable the steam to be filled in the airtight inner space of the outer drum;

[0062] 24) while step 23) is executed, the inner drum rotates at a certain rotation halt ratio.

[0063] Before the heater is sprayed with water to generate steam, a certain amount of water is filled into the outer drum to protect the bottom of the outer drum of the washing machine. Thus, it avoids burning loss of the bottom of the outer drum in a washing machine caused by the overheated heater due to misoperation.

[0064] In the present embodiment, in order to realize that the height of the water level of intake water is lower than the heater before water spraying, a certain distance is arranged between the heater and the bottom of the outer drum; or the heater is arranged at the bottom of the outer drum, and a water outlet is arranged at the bottom of the outer drum, such that the inlet water before water spraying flows into the drainage pipe (the part between the water outlet and the drain valve), then the aim that the water inlet height is lower than the heater can also be realized.

[0065] Also, in the present embodiment, in the process of executing the above step 23), the heater will stop working for a certain time t_2 after working for a certain time t_1 ; preferably, t_1 is 20s and t_2 is 20s. Therefore, the temperature of the heater will not be too high, so as to protect the heater, and avoid loss due to dry heating.

[0066] The implementation schemes in the above embodiments can be further combined or substituted, and the embodiments merely describe the preferred embodiments of the present disclosure, rather than limiting the concept and range of the present disclosure, under the premise of not departing from the design concept of the present disclosure, various changes and improvements made to the technical solution of the present disclosure by those of ordinary skill in the art shall all fall within the protection scope of the present disclosure.

1. A washing machine with a steam washing function, comprising an outer drum, a heater being arranged inside the outer drum, wherein the washing machine further comprises a spray thrower for spraying water to the heater, the heater vaporizes the water sprayed to a surface of the heater by heating to generate high-temperature steam.

2. The washing machine according to claim 1, wherein the spray thrower and the heater are arranged jointly or at a distance, a corresponding side to the heater of the spray thrower is distributed with multiple spray holes for spraying water to the heater;

the spray thrower is constituted by a pipeline which is of a same shape as the heater, and the spray holes are distributed at intervals along an axial direction of the pipeline.

3. The washing machine according to claim 1, wherein the heater is capable of heating air or respectively heating water and air.

4. The washing machine according to claim 1, wherein the heater is arranged at a bottom of the outer drum, and the spray thrower is arranged above the heater.

5. The washing machine according to claim 1, wherein the spray thrower is communicated with a water inlet structure of the washing machine via a connecting pipe, and the connecting pipe is provided with a control valve for controlling a flow rate of the sprayed water.

6. A control method of a washing machine with a steam washing function, comprising,

spraying water to a heater in an outer drum, the heater vaporizing the sprayed water by heating, generating vaporized steam in the outer drum, and the steam heating and wetting clothes in an inner drum.

7. The control method according to claim 6, wherein before the washing machine executes a normal washing procedure, firstly water is sprayed to the heater which is in a heating state, then high-temperature steam is generated in the outer drum,

after the clothes are heated and wetted for a certain time, then the washing machine executes the normal washing procedure.

8. The control method according to claim 6, wherein in a process of spraying water to the heater and generating high-temperature steam, the inner drum rotates simultaneously at a certain rotation halt ratio.

9. The control method according to claim 6, wherein in the process of spraying water to the heater and generating high-temperature steam, the heater stops working for a time t_2 after working for a time t_1 .

10. The control method according to claim 6, wherein in the process of spraying water to the heater and generating high-temperature steam, a water inlet pipe and a water outlet pipe of the outer drum are both in a disconnected state, to enable the high-temperature steam to be filled into an airtight inner space of the outer drum.

11. The control method according to claim 6, wherein before water is sprayed to the heater, water is filled into the outer drum firstly, and a height of an inlet water level is lower than the heater.

12. The washing machine according to claim 2, wherein the heater is capable of heating air or respectively heating water and air.

13. The washing machine according to claim 2, wherein the heater is arranged at a bottom of the outer drum, and the spray thrower is arranged above the heater.

14. The washing machine according to claim 3, wherein the heater is arranged at a bottom of the outer drum, and the spray thrower is arranged above the heater.

15. The washing machine according to claim 2, wherein the spray thrower is communicated with a water inlet structure of the washing machine via a connecting pipe, and the connecting pipe is provided with a control valve for controlling a flow rate of the sprayed water.

16. The washing machine according to claim 3, wherein the spray thrower is communicated with a water inlet structure of the washing machine via a connecting pipe, and the connecting pipe is provided with a control valve for controlling a flow rate of the sprayed water.

17. The control method according to claim 7, wherein in a process of spraying water to the heater and generating high-temperature steam, the inner drum rotates simultaneously at a certain rotation halt ratio.

18. The control method according to claim 7, wherein in the process of spraying water to the heater and generating high-temperature steam, the heater stops working for a time t_2 after working for a time t_1 .

19. The control method according to claim 7, wherein in the process of spraying water to the heater and generating high-temperature steam, a water inlet pipe and a water outlet pipe of the outer drum are both in a disconnected state, to enable the high-temperature steam to be filled into an airtight inner space of the outer drum.

20. The control method according to claim 7, wherein before water is sprayed to the heater, water is filled into the outer drum firstly, and a height of an inlet water level is lower than the heater.

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