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Kim(10) **Pub. No.: US 2009/0165504 A1**(43) **Pub. Date: Jul. 2, 2009**(54) **WASHING MACHINE**(30) **Foreign Application Priority Data**(75) Inventor: **Chang Hoo Kim**, Gyeong-gu
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CORPORATION, SEOUL (KR)(57) **ABSTRACT**

Disclosed herein is a washing machine. The washing machine includes tub receiving wash water, a heater heating the wash water, and a heater cover surrounding the heater. The washing machine can prevent damage of a tub even when the heater is separated from the tub during operation.

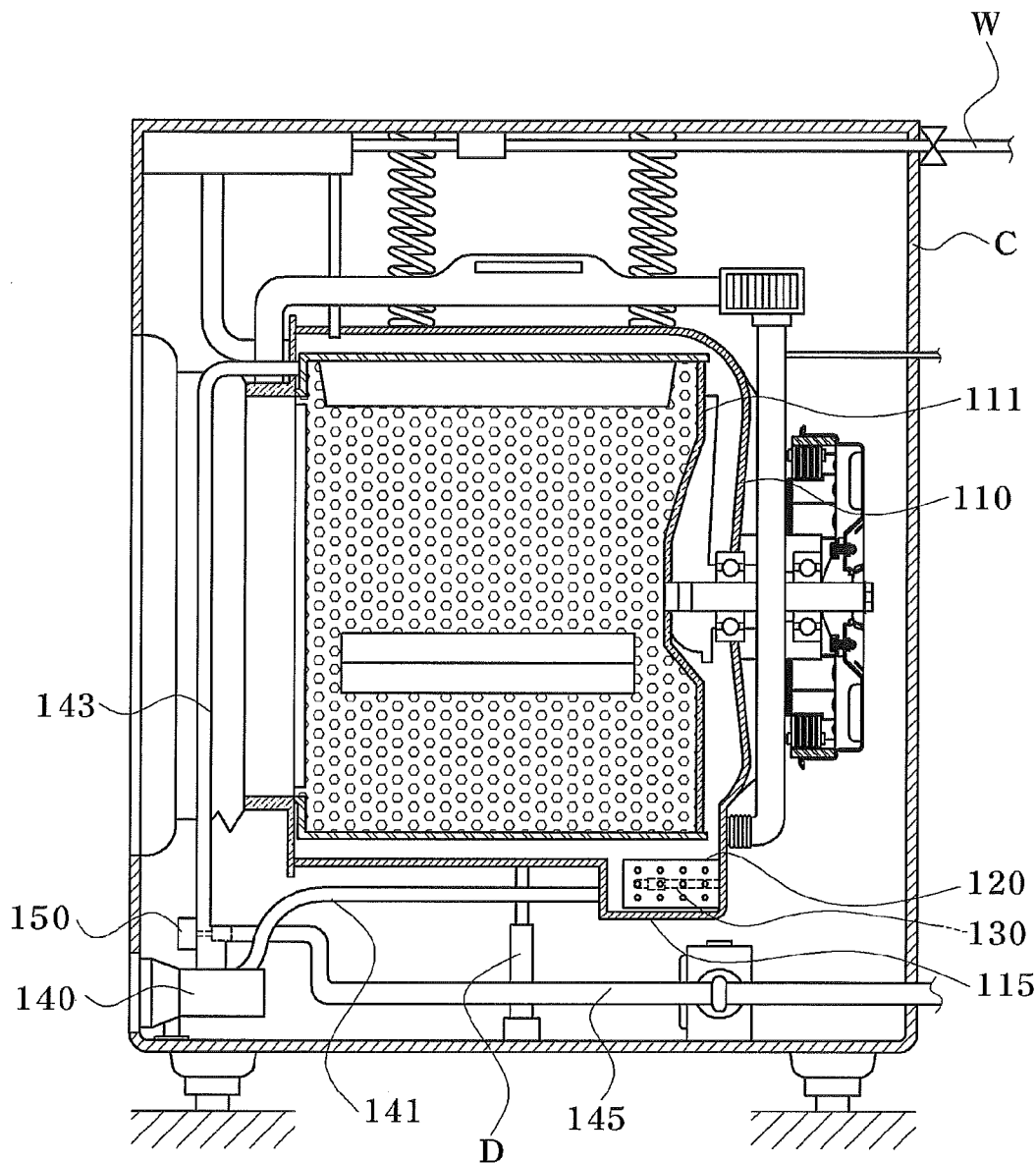
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FIG. 1

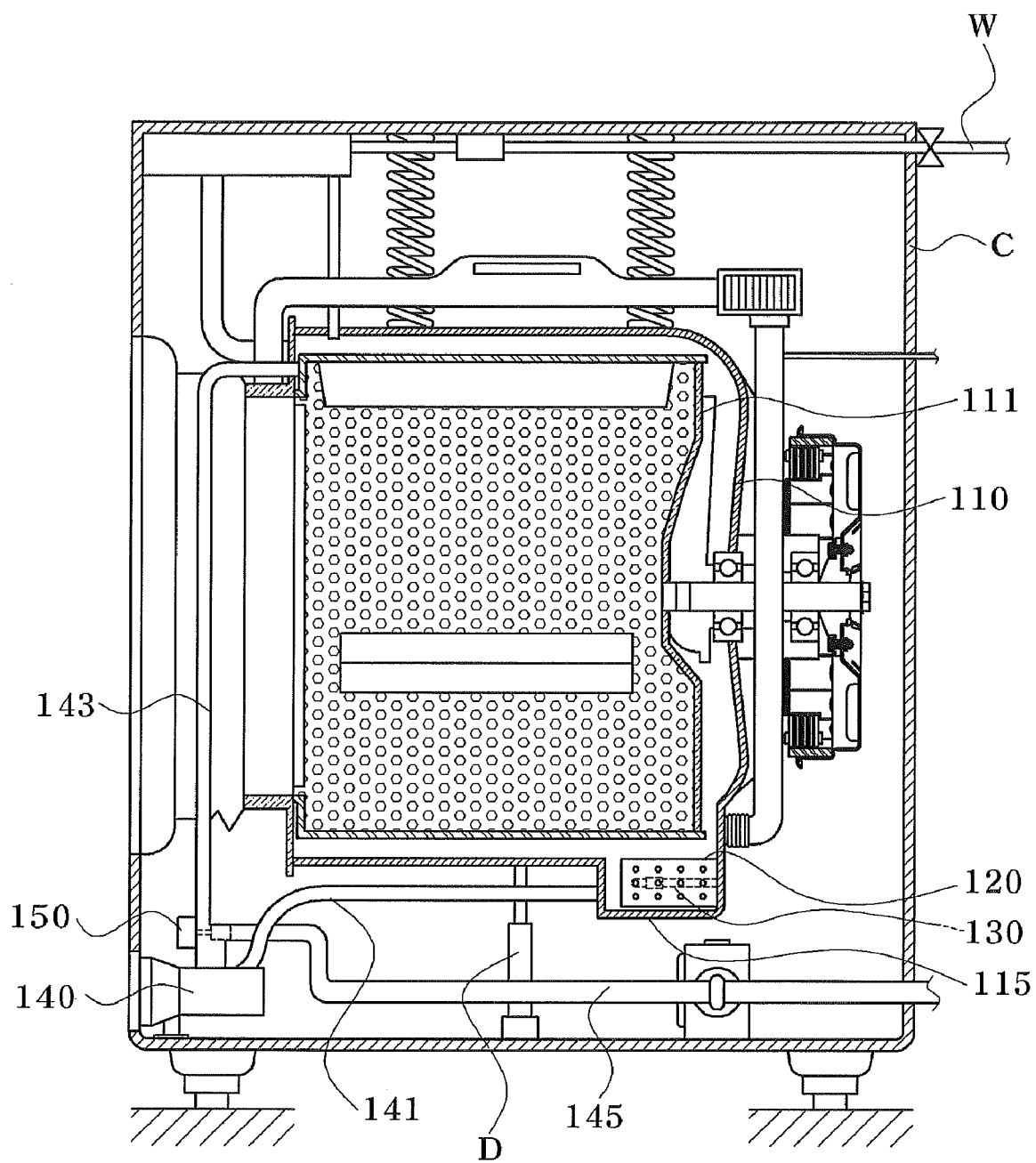


FIG. 2

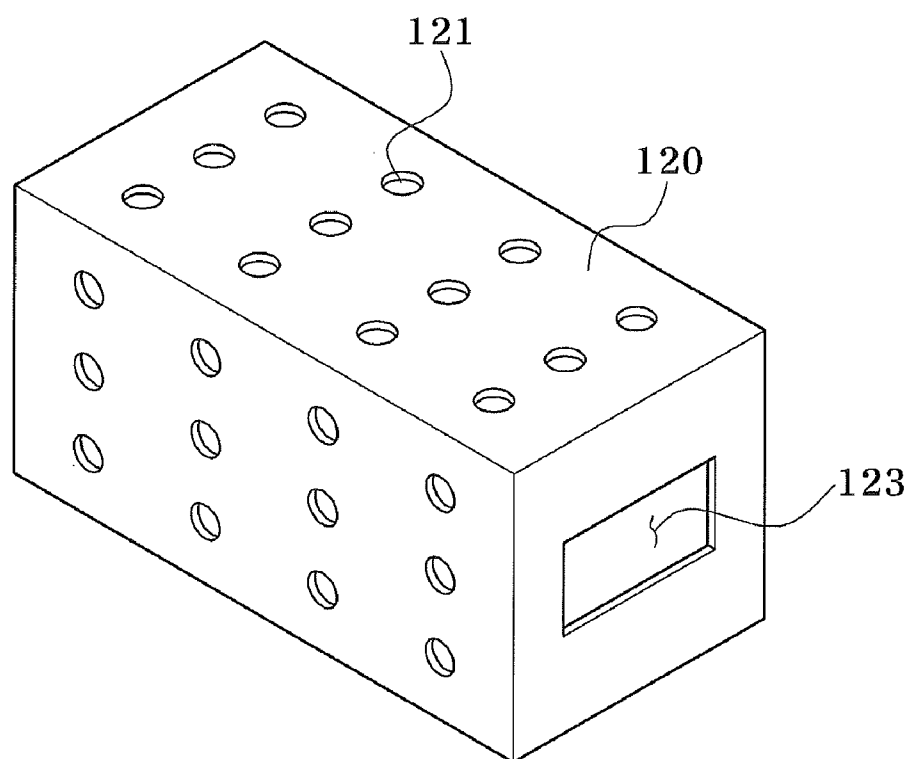


FIG. 3

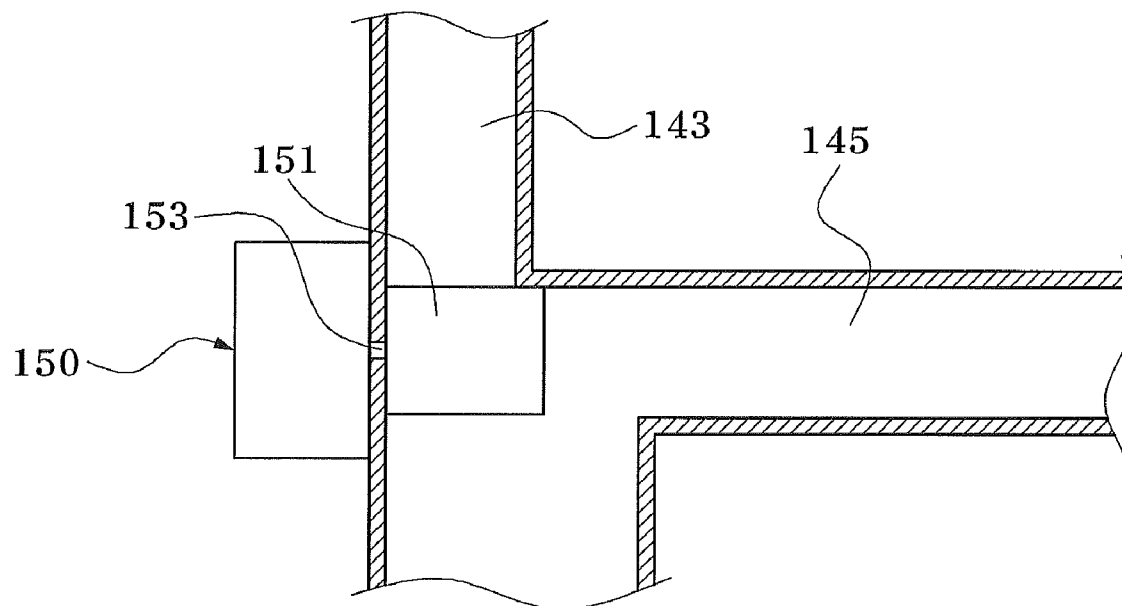
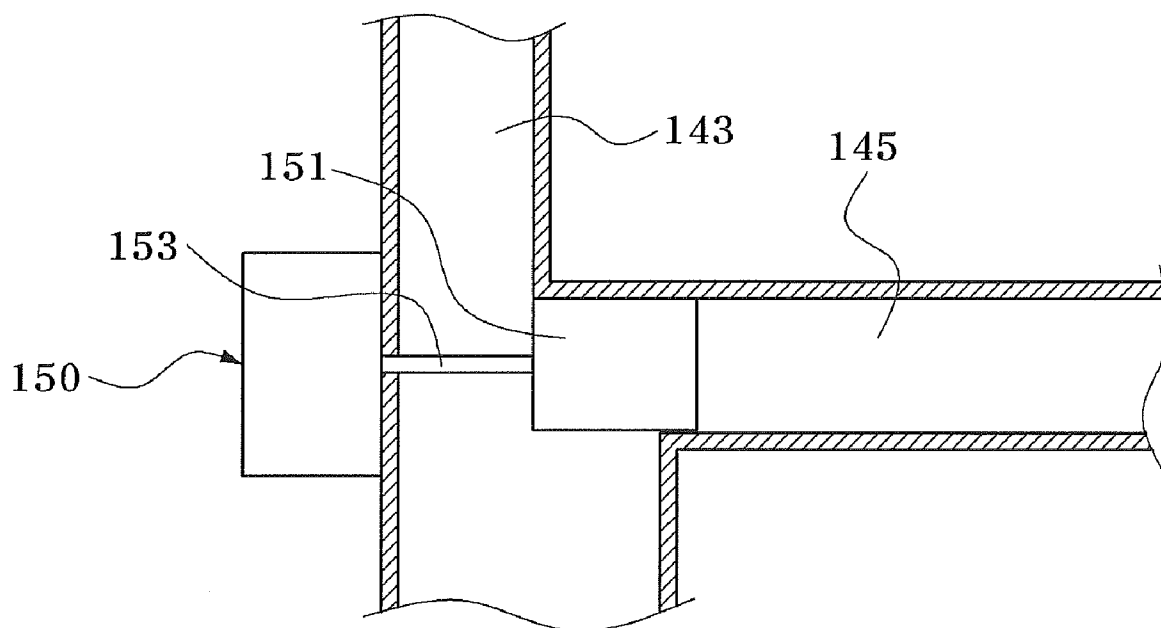


FIG. 4



WASHING MACHINE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to washing machines, and more particularly to a washing machine that can prevent damage of a tub.

[0003] 2. Description of the Related Art

[0004] A washing machine includes a tub within a cabinet, which defines an appearance of the washing machine. The tub is supported by a damper connected to a lower side of the cabinet and has a drum rotatably disposed therein. The drum is formed at lower and lateral sides thereof with a plurality of holes through which wash water in the tub can freely flow between the drum and the tub to remove dirt from laundry.

[0005] The washing machine includes a heater located near the bottom of the tub to heat wash water. Further, the washing machine is provided with a controller which controls operation of the heater by turning the heater on or off based on the temperature of wash water detected by a temperature sensor.

[0006] During a washing operation, the heater can be dropped to the bottom of the tub. As a result, the heater damages the tub and electric wires on the bottom of the tub, thereby causing malfunction of the washing machine and fire.

[0007] Since wash water is heated by the heater, the operation of the heater is limited by the temperature to which the wash water is heated. In a conventional washing machine, heated wash water is circulated only by convection, so that the temperature of the wash water received in the tub cannot be accurately detected. Since such circulation of the wash water causes the wash water around the heater to be overheated, the heater is repetitiously turned-on and off to heat the wash water to a preset temperature.

SUMMARY OF THE INVENTION

[0008] The present invention is conceived to solve the problems of the conventional washing machine as described above, and an aspect of the present invention is to provide a washing machine that can prevent damage of a tub even when a heater is separated from the tub.

[0009] Another aspect of the present invention is to provide a washing machine that can forcibly circulate heated wash water.

[0010] According to an aspect of the present invention, a washing machine includes: a tub receiving wash water; a heater heating the wash water; and a heater cover surrounding the heater.

[0011] The heater cover may be formed with an insertion hole into which the heater is inserted.

[0012] The heater cover may be formed to surround a lower side of the heater.

[0013] The heater cover may be formed to surround an entirety of the heater at a distance from the heater.

[0014] The heater cover may be formed with a penetration hole which is in communication with the tub.

[0015] The tub may have a protrusion formed outwardly on a lower side thereof to receive the heater cover inside the protrusion. The washing machine may further include a pump which is in communication with the protrusion. The washing machine may further include a circulation pipe which is in communication with the pump and an upper side of the tub, and a discharge pipe which is in communication with the pump and an outside of the washing machine. The washing

machine may further include a selective blocking part selectively blocking the circulation pipe and the discharge pipe.

[0016] The heater cover may be made of a thermally resistant material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The above and other aspects, features and advantages of the present invention will become apparent from the following description of a preferred embodiment given in conjunction with the accompanying drawings, in which:

[0018] FIG. 1 is a view of a washing machine according to an embodiment of the present invention;

[0019] FIG. 2 is a perspective view of a heater cover of the washing machine according to the embodiment of the present invention;

[0020] FIG. 3 is a view of a selective blocking part of the washing machine according to the embodiment of the present invention, in which the selective blocking part blocks a circulation pipe of the washing machine; and

[0021] FIG. 4 is a view of the selective blocking part of the washing machine according to the embodiment of the present invention, in which the selective blocking part blocks a discharge pipe of the washing machine.

DETAILED DESCRIPTION OF THE EMBODIMENT

[0022] Hereinafter, exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings. The drawings may be exaggerated in thickness of lines or scale of components for the purpose of descriptive convenience and clarity only. Furthermore, terms used herein should be defined in consideration of functions of components of the present invention and thus can be changed according to the custom or intention of users or operators. Therefore, definition of such terms should be determined according to overall disclosures set forth herein.

[0023] FIG. 1 is a view of a washing machine according to an embodiment of the invention, FIG. 2 is a perspective view of a heater cover of the washing machine according to the embodiment, FIG. 3 is a view of a selective blocking part of the washing machine according to the embodiment, in which the selective blocking part blocks a circulation pipe of the washing machine, and FIG. 4 is a view of the selective blocking part of the washing machine according to the embodiment, in which the selective blocking part blocks a discharge pipe.

[0024] Referring to FIGS. 1 to 4, the washing machine includes a tub 110 receiving wash water, a drum 111 within the tub 110, a heater 130 heating the wash water, a heater cover 120 surrounding the heater 130, a water supply part W supplying the wash water into the tub 110, and a controller (not shown) controlling operation of the washing machine.

[0025] A damper D is provided between a cabinet C and the tub 110 to absorb vibration or impact caused by rotation of the drum 111 or by laundry falling within the drum 111.

[0026] The tub 110 has a protrusion 115 formed on a lower side of the tub 110. That is, the protrusion 115 is formed on an outer lower surface of the tub 110. The heater cover 120 is located within the protrusion 115. The heater cover 120 is configured to surround the heater 130 while preventing the heater 130 from contacting the tub 110. The heater cover 120 may be formed to surround upper and lower sides of the heater 130, or to surround the entirety of the heater at a

distance from the heater **130**, as shown in FIG. 2. Since the heater **130** is located within the heater cover **120**, the heater cover **120** may be formed of a thermally resistant material. In this embodiment, the heater cover **120** is made from a SUS material which is resistant to moisture and heat.

[0027] The heater cover **120** is formed with a penetration hole **121** which is in communication with the tub **110**. Wash water flows into the heater cover **120** through the penetration hole **121** or flows from the heater cover **120** through the penetration hole **121** after being heated. Further, the heater cover **120** is formed with an insertion hole **123** into which the heater **130** is inserted.

[0028] In this embodiment, the heater **130** is secured to the tub **110** by a heater bracket (not shown). Such a securing manner is apparent to those skilled in the art and a detailed description thereof will be omitted herein. The heater **130** is inserted into the insertion hole **123** formed in the heater cover **120** and is disposed within the heater cover **120** to heat wash water flowing into the heater cover **120** through the penetration hole **121**.

[0029] The pump **140** forces wash water received in the tub **110** to move. The pump **140** is in communication with the protrusion **115** through a movement pipe **141**. Further, the pump **140** is in communication with an upper side of the tub **110** through a circulation pipe **143** and is in communication with the outside of the washing machine through a discharge pipe **145**. Wash water introduced into the pump **140** is selectively moved to the circulation pipe **143** or the discharge pipe **145** by a selective blocking part **150**.

[0030] Wash water heated during a washing cycle is moved to the tub **110** through the movement pipe **141**, pump **140** and circulation pipe **143** by operation of the pump **140**. Accordingly, the wash water heated by the heater **130** is circulated not only by convection, but is also forcibly circulated by the pump **140**. This circulation manner allows the heated wash water to be rapidly mixed with non-heated wash water, thereby preventing the wash water from being overheated while reducing heating time. Further, this circulation manner can prevent the controller from turning-off the heater **130** by preventing the wash water near the heater **130** from being rapidly overheated, and can reduce an amount of detergent deposits by helping to mix a detergent with the wash water through forcible circulation of the wash water.

[0031] The selective blocking part **150** selectively blocks the circulation pipe **143** and the discharge pipe **145**. In this embodiment, the selective blocking part **150** includes a blocking member **151** and an arm **153**. The blocking member **151** selectively blocks the circulation pipe **143** and the discharge pipe **145** to allow wash water to be introduced into the tub **110** through the circulation pipe **143** or to be discharged outside through the discharge pipe **145**. The arm **153** is mounted on the blocking member **151**, and selectively opens or closes the circulation pipe **143** or the discharge pipe **145** in association with a left or right movement of the blocking member **151**. In this embodiment, the selective blocking part **150** is a hydraulic cylinder. However, the selective blocking part **150** can be modified in various forms such as solenoid valves and the like.

[0032] As apparent from the above description, according to an embodiment of the invention, the washing machine may prevent fire and damage of a tub even when a heater is separated from the tub.

[0033] According to the embodiment of the invention, the washing machine heats wash water while circulating the wash water, thereby preventing the wash water from being rapidly overheated.

[0034] According to the embodiment of the invention, the washing machine heats wash water while circulating the wash water, thereby reducing heating time.

[0035] According to the embodiment of the invention, the washing machine heats wash water while circulating the wash water, so that the wash water around the heater can be prevented from being rapidly overheated and frequent on/off of the heater by rapid temperature variation can also be prevented, thereby preventing malfunction of the heater.

[0036] Although the present invention has been described with reference to the embodiments and the accompanying drawings, these are given by way of illustration only, and, it will be apparent to those skilled in the art that various modifications and other equivalent embodiments can be made without departing from the scope of the present invention. Therefore, the scope and spirit of the invention should be limited only by the claims set forth as follows.

What is claimed is:

1. A washing machine comprising:
a tub receiving wash water;
a heater heating the wash water; and
a heater cover surrounding the heater.
2. The washing machine according to claim 1, wherein the heater cover is formed with an insertion hole into which the heater is inserted.
3. The washing machine according to claim 1, wherein the heater cover is formed to surround a lower side of the heater.
4. The washing machine according to claim 1, wherein the heater cover is formed to surround an entirety of the heater at a distance from the heater.
5. The washing machine according to claim 1, wherein the heater cover is formed with a penetration hole which is in communication with the tub.
6. The washing machine according to claim 1, wherein the tub has a protrusion formed outwardly on a lower side thereof to receive the heater cover inside the protrusion.
7. The washing machine according to claim 6, further comprising: a pump which is in communication with the protrusion.
8. The washing machine according to claim 7, further comprising:
a circulation pipe which is in communication with the pump and an upper side of the tub; and
a discharge pipe which is in communication with the pump and an outside of the washing machine.
9. The washing machine according to claim 8, further comprising:
a selective blocking part selectively blocking the circulation pipe and the discharge pipe
10. The washing machine according to claim 1, wherein the heater cover is made of a thermally resistant material.

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