

HOT LINER

BACKGROUND OF THE INVENTION

(a) Field of the Invention

5 The present invention relates to a hot liner, and more particularly to a hot liner that hot water in an outlet piping can flow back into the hot liner after the hot water has been discharged, in order to reduce effectively the residual of hot water inside the outlet piping, thereby avoiding that the hot water is still being extruded out continuously after the hot water has been
10 discharged.

(b) Description of the Prior Art

 For an ordinary hot water supplying device such as a drinking fountain or a water dispenser, a hot liner (or the so-called heat tank) is mostly disposed in the device to store the hot water. The water stored in
15 the hot liner is heated up primarily by a heater inside or at a bottom of the hot liner, and the room-temperature water which has not been heated up yet will enter from one end of the hot liner by natural extrusion; whereas, the hot water that has been heated up by the hot liner will be outputted for use from another end opposite to the water inlet.

20 Moreover, in an ordinary hot water supplying device, the hot water at

an outlet end of the hot liner will normally be directed out of the hot liner by a piping (outlet pipe), and a faucet or valve device will be further disposed at the outlet pipe to facilitate operating by a user. However, for an ordinary hot water supplying device, the hot water in the outlet pipe cannot be discharged completely after the hot water has been discharged.

As the hot liner is still full of water, the hot water left in the outlet pipe will not be able to flow back into the hot liner and still keep staying in the outlet piping. Thus, when the hot liner heats up again, the water that was left in the outlet pipe previously will be extruded out which results in the phenomenon of dripping water at the faucet, according to the principle of thermal expansion.

Therefore, it has always been an issue to be solved by the industry to develop a hot water supplying device which is able to avoid that the hot water is still being extruded out continuously after the hot water has been discharged using a more economic and reliable means.

SUMMARY OF THE INVENTION

Accordingly, the primary object of the present invention is to provide a hot water supplying device with a hot liner which allows the hot water in the outlet pipe to flow back into the hot liner after the hot water has been

discharged, in order to reduce effectively the residual of hot water in the outlet piping, thereby avoiding that the hot water is still being extruded out continuously after the hot water has been discharged.

To achieve the abovementioned object, the present invention
5 discloses a hot liner, wherein an interior of the hot liner is provided with a baffle which divides the entire internal space into a first chamber at a lower side and a second chamber at an upper side. A lower side of the hot liner is provided with a water inlet which is connected with the first chamber, a top of the hot liner is provided with an air vent which is
10 connected with the second chamber and a water pumping tube which is extended into the second chamber. The water pumping tube is extended into an end of the second chamber and kept at a pre-determined spacing from the baffle. The present invention is characterized in that the baffle is provided with a water outlet which is connected with the water pumping
15 tube correspondingly, the aperture diameter of the water outlet is smaller than the inner diameter of the water pumping tube, and the rim of the water outlet is protruded out of the surface of baffle at a periphery of the water outlet.

By the abovementioned structural characteristics, when the hot liner
20 of the present invention is to be used, the hot liner can be installed in a

machine body of the hot water supplying device to which the hot liner is applied. The hot liner is connected with a heating module of a hot water supplying module, the water inlet of the hot liner is connected with an inlet piping of the hot water supplying device, and the water pumping tube of the hot liner is connected with an outlet piping of the hot water supplying device. Then, the water entering into the hot liner can be heated up by the heating module. When the hot water supplying device discharges the water, the hot water that is heated up in the hot liner will enter into the water pumping tube from the water outlet on the baffle, and then be expelled out for use from the outlet piping connected to the water pumping tube. When the hot water supplying device finishes discharging the water, the hot water in the outlet piping can be expelled into the second chamber from the spacing between the water pumping tube and the water outlet. When the heating module that is connected to the hot liner heats up again, the hot water will no longer be extruded out. In addition, under the structure design of water outlet and water pumping tube, a more reliable Venturi tube suction effect can be formed between the water outlet and the water pumping tube to expel out effectively the recycled hot water that is stored in the second chamber when the hot water supplying device discharges the water.

By the abovementioned structural characteristics, the said baffle is concaved with a sump pit corresponding to the water pumping tube on a baffle surface at a side opposite to the second chamber. An interior of the sump pit is protruded with a first short tube which is connected with the water pumping tube correspondingly, and the water outlet is disposed at a tail end of the first short tube.

By the abovementioned structural characteristics, the baffle is protruded with a second short tube which is connected with the water pumping tube correspondingly, and the water outlet is disposed at a tail end of the second short tube. On the other hand, a water pumping collar is disposed between the second short tube and the water pumping tube. The water pumping collar is provided with a coupling part which surrounds the spacing between the water pumping tube and the second short tube, and a skirt part which is extended integrally toward the baffle and keeps at a pre-determined spacing from the baffle. A bottom of the skirt part is provided with a water pumping hole.

The said hot liner further includes a heating module that is disposed in the first chamber.

The ratio of the inner diameter of the water pumping tube to the aperture diameter of the water outlet is between 1.5 and 2.

The spacing between the bottom surface of the skirt part of the water pumping collar and the baffle is between 0.5mm and 2mm.

More specifically, by the hot liner disclosed by the present invention, the hot water in the outlet piping can flow back into the hot liner, after the
5 water has been discharged. This can reduce effectively the residual of hot water in the outlet piping, avoiding that the hot water is still being extruded out continuously after the water has been discharged. Besides that, under the structure design of water outlet and water pumping tube, a more reliable Venturi tube suction effect can be formed between the
10 water outlet and the water pumping tube to expel out effectively the recycled hot water stored in the second chamber when the hot water supplying device discharges the water. In addition, the effect of exhausting the hot water in the second chamber can be improved effectively under the function of sump pit or water pumping collar, which
15 can assure the quality of the use of water using a more active and reliable means.

To enable a further understanding of the said objectives and the technological methods of the invention herein, the brief description of the drawings below is followed by the detailed description of the preferred
20 embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a cutaway view of a hot liner structure, according to a first embodiment of the present invention.

FIG. 2 shows a cutaway view of the hot liner structure, according to a
5 second embodiment of the present invention.

FIG. 3 shows a schematic view of a state of the hot liner of the second embodiment of the present invention, when a hot water supplying device to which the hot liner is applied discharges the water.

FIG. 4 shows a schematic view of a state of the hot liner of the second
10 embodiment of the present invention, when a hot water supplying device to which the hot liner is applied finishes discharging the water.

FIG. 5 shows a cutaway view of the hot liner structure, according to a third embodiment of the present invention.

FIG. 6 shows a local enlarged view of a portion of a water pumping collar
15 of the hot liner of the third embodiment of the present invention, when a hot water supplying device to which the hot liner is applied discharges the water.

FIG. 7 shows a local enlarged view of a portion of a water pumping collar
of the hot liner of the third embodiment of the present invention, when a
20 hot water supplying device to which the hot liner is applied finishes

discharging the water.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention provides primarily a hot water supplying device with a hot liner structure, wherein hot water in an outlet piping can
5 flow back into the hot liner after the water has been discharged to reduce effectively the residual of hot water in the outlet piping, thereby avoiding that the hot water is still being extruded out after the water has been discharged. Referring to FIG. 1, it shows a cutaway view of the hot liner structure, according to a first embodiment of the present invention. The
10 hot liner 10 of the present invention is provided with a baffle 11 in the hot liner 10.

The baffle 11 divides the entire internal space into a first chamber 121 at a lower side, and a second chamber 122 at an upper side. A lower side of the hot liner 10 is provided with a water inlet 13 which is connected
15 with the first chamber 121, and a top of the hot liner 10 is provided with an air vent 14 which is connected with the second chamber 122 as well as a water pumping tube 15 which is extended into the second chamber 122. The water pumping tube 15 is extended into an end of the second chamber 122 and kept at a pre-determined spacing from the baffle 11.
20 The present invention is characterized in that the baffle 11 is provided

with a water outlet 16 which is connected with the water pumping tube 15 correspondingly, the aperture diameter of the water outlet 16 is smaller than the inner diameter of the water pumping tube 15, and the rim of the water outlet 16 is protruded out of the surface of the baffle 11 at a periphery of the water outlet 16. The ratio of the inner diameter of the water pumping tube 15 to the aperture of the water outlet 16 is preferably between 1.5 and 2.

In principle, when the hot liner 10 of the present invention is to be used, the hot liner 10 is installed in a machine body of the hot water supplying device to which the hot liner 10 is applied. The hot liner 10 is connected with a heating module of a hot water supplying module, the water inlet 13 of the hot liner 10 is connected with an inlet piping of the hot water supplying device, and the water pumping tube 15 of the hot liner 10 is connected with an outlet piping of the hot water supplying device.

After that, the water that enters into the hot liner 10 can be heated up under the function of heating module. When the hot water supplying device discharges the water, the hot water that is heated up in the hot liner 10 will enter into the water pumping tube 15 from the water outlet 16 on the baffle 11, and then be expelled out for use from the outlet piping that is connected to the water pumping tube 15.

When the hot water supplying device finishes discharging the water, the hot water in the outlet piping can be expelled into the second chamber 122 of the hot liner 10 from the spacing between the water pumping tube 15 and the water outlet 16, and when the heating module that is
5 connected to the hot liner 10 heats up again, no hot water will be extruded out.

Furthermore, under the structure design of water outlet 16 and water pumping tube 15, a more reliable Venturi tube suction effect can be formed between the water outlet 16 and the water pumping tube 15, such
10 that when the hot water supplying device discharges the water, the recycled hot water stored in the second chamber 122 can be expelled out effectively.

Moreover, as shown in FIGS. 2 to 4, upon implementing the hot liner 10 of the present invention, the baffle 11 can be further concaved on the
15 surface at a side opposite to the second chamber 122 with a sump pit 111 corresponding to the water pumping tube 15. An interior of the sump pit 111 is protruded with a first short tube 112 which is connected with the water pumping tube 15 correspondingly, and the water outlet 16 is disposed at a tail end of the first short tube 112, such that by using a water
20 collection area which is formed at a lower point of the sump pit 111 on the

baffle 11, the effect of exhausting the hot water in the second chamber 112 can be improved, thereby assuring the quality of the use of water.

As shown in FIGS. 5 to 7, the baffle 11 of the hot liner 10 of the present invention can be also protruded with a second short tube 113 which is connected with the water pumping tube 15 correspondingly, and the water outlet 16 is disposed at a tail end of the second short tube 113. In addition, a water pumping collar 17 is disposed between the second short tube 113 and the water pumping tube 15.

The water pumping collar 17 is provided with a coupling part 171 which surrounds the spacing between the water pumping tube 15 and the second short tube 113, and a skirt part 172 which is extended integrally toward the baffle 11 and kept at a pre-determined spacing from the baffle 11. A bottom of the skirt part 172 is provided with a water pumping hole 173 which is connected with the coupling part 171.

Upon implementation, the spacing between the bottom of the skirt part 172 of the water pumping collar 17 and the baffle 11 is between 0.5mm and 2mm, such that the water level at which the recycled hot water is stored in the second chamber 122 can be increased under the function of the second short tube 113, and the effect of exhausting the hot water in the second chamber 122 can be improved under the function of

water pumping collar 17, thereby assuring the quality of the use of water.

It is worthy of notice that under all kinds of structural configurations of the hot liner 10 disclosed above, the hot liner 10 can be further provided with a heating module 18 disposed in the first chamber 121 to achieve a modularized hot liner 10 assembly, which not only simplifies the assembly operation of the hot water supplying device, but facilitates the modularized design of the hot water supplying device.

In comparison with the conventional structure, the hot liner disclosed by the present invention allows the hot water in the outlet piping to flow back into the hot liner after the water has been discharged, which reduces effectively the residual of hot water in the outlet piping to avoid that the hot water is still being extruded out continuously after the water has been discharged. In addition, under the structural design of water outlet and water pumping tube, a more reliable Venturi tube suction effect can be formed between the water outlet and the water pumping tube, such that the recycled hot water stored in the second chamber can be expelled out effectively when the hot water supplying device discharges the water. Besides that, under the function of sump pit or water pumping collar, the effect of exhausting the hot water in the second chamber can be improved effectively, thereby assuring the quality of the use of water in

a more active and reliable means.

It is to be understood that the above description and drawings are only used for illustrating some embodiments of the present invention, not intended to limit the scope thereof. Any variation and deviation from the
5 above description and drawings should be included in the scope of the present invention.

What is claimed is:

1. A hot liner, an interior of the hot liner being provided with a baffle to divide the entire internal space into a first chamber at a lower side, and a second chamber at an upper side, with a lower side of the hot liner being provided with a water inlet which is connected with the first chamber, a top of the hot liner being provided with an air vent which is connected with the second chamber, as well as a water pumping tube which is extended into the second chamber; the water pumping tube being extended into an end of the second chamber and keeping at a pre-determined spacing from the baffle; the hot liner being characterized in that the baffle is provided with a water outlet which is connected with the water pumping tube correspondingly, the aperture diameter of the water outlet is smaller than the inner diameter of the water pumping tube, and the rim of the water outlet is protruded out of the surface of baffle at a periphery of the water outlet.
2. The hot liner according to claim 1, wherein the baffle of the hot liner is concaved on the surface at a side opposite to the second chamber with a sump pit which is connected with the water pumping tube correspondingly, an interior of the sump pit is protruded with a first

short tube which is connected with the water pumping tube correspondingly, and the water outlet is disposed at a tail end of the first short tube.

3. The hot liner according to claim 1, wherein the baffle of the hot liner is protruded with a second short tube which is connected with the water pumping tube correspondingly, the water outlet is disposed at a tail end of the second short tube, a water pumping collar is disposed between the second short tube and the water pumping tube, and the water pumping collar is provided with a coupling part which surrounds a spacing between the water pumping tube and the second short tube, as well as a skirt part which is extended integrally toward the baffle and kept at a pre-determined spacing from the baffle, with a bottom of the skirt part being provided with a water pumping hole which is connected with the coupling part.
4. The hot liner according to claim 1, 2 or 3, wherein the hot liner further includes a heating module which is disposed in the first chamber.
5. The hot liner according to claim 1, 2 or 3, wherein the ratio of the inner diameter of the water pumping tube to the aperture diameter of the water outlet is between 1.5 and 2.
6. The hot liner according to claim 3, wherein the spacing between the

bottom of the skirt part of the water pumping collar and the baffle is between 0.5mm and 2mm.