

INSTANTANEOUS WATER HEATERS

This invention relates to electrically-heated instantaneous water heaters such as can be used to supply hot water to a shower.

5 In a proposed electrically heated water heater, a water tank has an electric wire heating element such as a sheath heater coiled round the tank. For such a heater, a modification can be considered that the tank is provided in its bottom surface with a hot water
10 discharge opening, and in its peripheral side surface with a water supply opening, to enable the heater to be used as an instantaneous water heater. Such a modified heater is inconvenient, however, in that, when the water in the tank is heated, an upper portion thereof
15 becomes high in temperature comparatively rapidly, and thus it is difficult to obtain hot water of high temperature quickly at the hot water discharge opening located in the bottom surface. For removing this inconvenience, such an arrangement can be considered
20 that a hot water discharge pipe is provided in the tank in communication with the hot water discharge opening, this pipe being extended upwards to open at a level near the top of the tank. With this arrangement, however, there is an inconvenience that, when
25 drawing-off of hot water is stopped, the upper portion of the water is extraordinarily raised in temperature by an afterheating phenomenon, and consequently such an extraordinary heated upper portion thereof is discharged at its extraordinary high temperature upon
30 subsequent use of the heater.

 According to the present invention there is provided an instantaneous water heater comprising a water tank having an electric heating element coiled therearound, the water capacity of the tank and the
35 heating capacity of the element being such that in combination they can provide for instantaneous heating

of water at a given flow rate to a desired temperature; the tank having in its bottom surface a hot water discharge opening and in its peripheral side surface a water supply opening, and there being a hot water
5 discharge pipe in the tank that is in communication with the hot water discharge opening and that extends upwards therefrom to be open at a level near the top of the tank, this pipe having at its middle portion a communication opening in a peripheral side surface
10 thereof. Thus there is provided an instantaneous water heater that is suitable for supply hot water to a shower, in which the hot water is discharged through the hot water discharge pipe which is in communication with the hot water discharge opening in the bottom
15 surface of the water tank, which is extended upwards, so that an opening thereof is positioned near the top of the tank, and which is provided in its middle portion with the communication opening so that when the water heater is used again after a previous use thereof
20 has ceased, high temperature hot water caused by afterheating phenomenon can be mixed with comparatively low temperature hot water introduced through the communication opening, and thus there can be avoided discharge of the very high temperature water at its
25 very high temperature. In addition the whole of the water heater is comparatively simple in construction, small in size and low in price.

For a better understanding of the invention and to show how the same may be carried into effect, reference
30 will now be made, by way of example, to the accompanying drawings, in which:-

Figure 1 is a side view, partly in section, of a water heater, and

Figure 2 is a sectional view taken along line
35 II-II in Figure 1.

In the Figures, numeral 1 denotes a water tank and

numeral 2 denotes an electric wire heating element such as a sheath heater coiled round the water tank 1. The tank 1 comprises a cylindrical drum body of, for instance, 50 mm in diameter and 120 mm in height, and the heater 2 comprises, for instance, an upper stage heater 2a of 1KW and a lower stage heater 2b of 2KW so that water in the tank 1 may be raised in temperature comparatively rapidly. The water capacity of the tank and the heating capacity of the element are such that in combination they can provide for instantaneous heating of water at a given flow rate to a desired temperature.

The upper stage heater 2a is connected to an electric power source (not illustrated) through its connecting terminals 2c, 2c on both ends thereof, and the lower stage heater 2b is similarly connected to an electric power source through its connecting terminals 2d, 2d on both ends thereof.

As so far described, the construction is not significantly different from that of previous proposals. In the present construction, the tank 1 is provided in its bottom surface with a hot water discharge opening 3 and in its peripheral side surface with a water supply opening 4 so that water introduced from an external water supply source (not illustrated) may be supplied into the tank 1 through the water supply opening 4 and then passed to an external shower or other outlet of hot water (not illustrated) through the hot water discharge opening 3. In other words, the whole construction serves as an instantaneous water heater.

A hot water discharge pipe 6 provided in the tank 1 is in communication with the hot water discharge opening 3 and extends upwards so that its opening 5 is positioned near the top of the tank 1. An upper portion of the water supplied into the tank 1 that

becomes comparatively high in temperature may be obtained at the hot water discharge opening 3 having passed through the opening 5 into the interior of the pipe 6. In this case, the pipe 6 is 10 mm, for instance, in its outer diameter and is 110 mm, for instance, in its length projecting upwards in the tank 1.

With the construction as so far described, when the water heater is stopped in operation after continuous use, the upper portion of the water in the tank 1 will be largely raised in temperature by afterheating phenomenon, and consequently hot water having an extraordinarily high temperature will be available for discharge at the initial stage of a subsequent use taking place before there is time for the water to cool. For example, after continuous use of the water heater with hot water at a temperature of 47°C being discharged, a discharged hot water temperature at an initial stage in subsequent use could be 63°C, which would not be desirable.

For removing this inconvenience, the pipe 6 has in its middle portion in the longitudinal directional a communication opening 7 in its peripheral side surface. At a time of subsequent use as just discussed, high temperature water introduced through the opening 5 into the interior of the pipe 6 becomes mixed with comparatively low temperature water introduced through the communication opening 7 so that the water temperature as a whole is lower. The communication opening 7 comprises, for example, four holes, each 3 mm in diameter, disposed circumferentially, at a position about 70 mm from the lower end of the projecting portion of the pipe 6, in the case where the projecting length of the pipe 6 is 110 mm as mentioned above. Thus, after use of the water heater is stopped under the use condition that the discharged hot water

temperature is 47°C, if the water heater is used again immediately the discharged hot water temperature is lowered from what could be a discharge temperature of 63°C as suggested above, to 56°C.

5 The operation of the heater is as already indicated, that is during usual use thereof, in a manner similar to previous proposals, water introduced from the water supply opening 4 is raised in temperature in the interior of the tank 1 and is discharged, as hot
10 water, from the hot water discharge opening 3 for supply to a shower or other hot water outlet.

 As water flows upwards in the tank 1, the water in the tank 1 becomes gradually higher in temperature, and the hot water discharge pipe 6 having the opening 5
15 positioned at a level corresponding to the higher temperature portion of the hot water serves effectively to discharge such a high temperature portion of the hot water.

 When the use of the water heater stops, the upper
20 portion of the hot water in the tank 1 is subjected to an extraordinary temperature rise owing to afterheating phenomenon. However, because the pipe 6 is provided at its middle portion with the communication opening 7, the higher temperature water is more or less lowered in
25 its temperature by low temperature water introduced through the communication opening 7 into the pipe 6. Therefore, if the water heater is used again there is no discharge of water at the extraordinary higher temperature.

30 Thus there is provided an instantaneous water heater that is suitable for supplying hot water to a shower, in which the hot water is discharged through the hot water discharge pipe which is in communication with the hot water discharge opening in the bottom
35 surface of the water tank, which is extended upwards, so that an opening thereof is positioned near the top.

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water heater is used again after a previous use thereof
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CLAIMS

1. An instantaneous water heater comprising a water tank having an electric heating element coiled therearound, the water capacity of the tank and the heating capacity of the element being such that in combination they can provide for instantaneous heating of water at a given flow rate to a desired temperature; the tank having in its bottom surface a hot water discharge opening and in its peripheral side surface a water supply opening, and there being a hot water discharge pipe in the tank that is in communication with the hot water discharge opening and that extends upwards therefrom to be open at a level near the top of the tank, this pipe having at its middle portion a communication opening in a peripheral side surface thereof.

2. A water heater as claimed in claim 1, wherein the communication opening comprises four holes disposed circumferentially around the discharge pipe.

3. An instantaneous water heater substantially as herein described with reference to the accompanying drawings.
