PATENT DOCUMENT

[0006]

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SUMMARY OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0007]

An object of the present invention is to provide a molten salt circulation apparatus and circulation method that make it possible to facilitate handling of a molten salt by lowering the freezing point of the molten salt and reduce heating energy for maintaining the molten salt in a liquid state when operation is stopped.

MEANS FOR SOLVING THE PROBLEM

[0008]

A molten salt circulation apparatus of the present invention for achieving the above-described object comprises: a tank for reserving a molten salt composed of at least one of sodium nitrite, sodium nitrate, and potassium nitrate; a heater for heating the molten salt in the tank; a pump for sending out the molten salt from the tank; a circulation path for circulating the molten salt sent out from the tank and returning the molten salt to the tank; a water supply source for supplying water into the tank; and a gas supply source for supplying an air shutting gas composed of an inert gas or steam into the tank, wherein the amount of water to be added to the molten salt is 6% by weight to 50% by weight of the weight of the molten salt, and the tank has capacity for reserving the molten salt and the water added to the molten salt.

[0009]

In addition, a molten salt circulation method of the present invention for achieving the above-described object is a molten salt circulation method using a circulation apparatus including: a tank for reserving a molten salt composed of at least one of sodium nitrite, sodium nitrate, and potassium

nitrate; a heater for heating the molten salt in the tank; a pump for sending out the molten salt from the tank; a circulation path for circulating the molten salt sent out from the tank and returning the molten salt to the tank; a water supply source for supplying water into the tank; and a gas supply source for supplying an air shutting gas composed of an inert gas or steam into the tank wherein the amount of water to be added to the molten salt is 6% by weight to 50% by weight of the weight of the molten salt, and the tank has capacity for reserving the molten salt and the water added to the molten salt,

the molten salt circulation method comprising: diluting the molten salt with water supplied from the water supply source to lower the freezing point of the molten salt; heating the molten salt diluted with the water by using the heater to maintain a liquid state of the molten salt; and circulating the molten salt through the circulation path by driving the pump; and supplying the air shutting gas from the gas supply source into the tank when the pump is driven.

EFFECTS OF THE INVENTION

[0010]

In the present invention, a circulation apparatus comprising: a tank for reserving a molten salt (HTS) composed of at least one of sodium nitrite ($NaNO_2$), sodium nitrate ($NaNO_3$), and potassium nitrate (KNO_3); a heater for heating the molten salt in the tank; a pump for sending out the molten salt from the tank; a circulation path for circulating the molten salt sent out from the tank and returning the molten salt to the tank, and a water supply source for supplying water into the tank is configured, thus making it possible to supply water from the water supply source to dilute the molten salt with the water,

thus lowering the freezing point of the molten salt. Hence, it is possible to reduce heating energy for maintaining the diluted molten salt in a liquid state when operation is stopped. In addition, since the temperature of the molten salt is lowered when operation is started and when operation is stopped, the handling of the molten salt is facilitated. That is, since the circulation of the molten salt can be started at a relatively

CLAIMS

[Claim 1] A molten salt circulation apparatus comprising:

a tank for reserving a molten salt composed of at least one of sodium nitrite, sodium nitrate, and potassium nitrate;

a heater for heating the molten salt in the tank;

a pump for sending out the molten salt from the tank;

a circulation path for circulating the molten salt sent out from the tank and returning the molten salt to the tank;

a water supply source for supplying water into the tank; and

a gas supply source for supplying an air shutting gas composed of an inert gas or steam into the tank,

wherein the amount of water to be added to the molten salt is 6% by weight to 50% by weight of the weight of the molten salt, and the tank has capacity for reserving the molten salt and the water added to the molten salt.

[Claim 2] The molten salt circulation apparatus according to claim 1, wherein

a pipe of the circulation path is inclined toward the tank such that the molten salt in the circulation path returns to the tank when the pump is stopped.

[Claim 3] A molten salt circulation method using a circulation apparatus including: a tank for reserving a molten salt composed of at least one of sodium nitrite, sodium nitrate, and potassium nitrate; a heater for heating the molten salt in the tank; a pump for sending out the molten salt from the tank; a circulation path for circulating the molten salt sent out from the tank and returning the molten salt to the tank; a water supply

source for supplying water into the tank; and a gas supply source for supplying an air shutting gas composed of an inert gas or steam into the tank, wherein the amount of water to be added to the molten salt is 6% by weight to 50% by weight of the weight of the molten salt, and the tank has capacity for reserving the molten salt and the water added to the molten salt,

the molten salt circulation method comprising:

diluting the molten salt with water supplied from the water supply source to lower the freezing point of the molten salt;

heating the molten salt diluted with the water by using the heater to maintain a liquid state of the molten salt; and

circulating the molten salt through the circulation path by driving the pump; and

supplying the air shutting gas from the gas supply source into the tank when the pump is driven.

[Claim 4] The molten salt circulation method according to claim 3, wherein

in the circulation apparatus, a pipe of the circulation path is inclined toward the tank such that the molten salt in the circulation path returns to the tank when the pump is stopped,

the molten salt circulation method comprising:

recovering the molten salt into the tank when the pump is stopped.

[Claim 5] The molten salt circulation method according to claim 3, comprising:

when operation is stopped, maintaining the driving of the

pump, and when a temperature of the molten salt has been decreased to a threshold set in advance, supplying water from the water supply source into the tank.

[Claim 6] The molten salt circulation method according to claim 3, comprising:

measuring a concentration of sodium oxide in the molten salt periodically; and

when the concentration of sodium oxide in the molten salt has reached to a threshold set in advance, adding nitric acid to the molten salt.