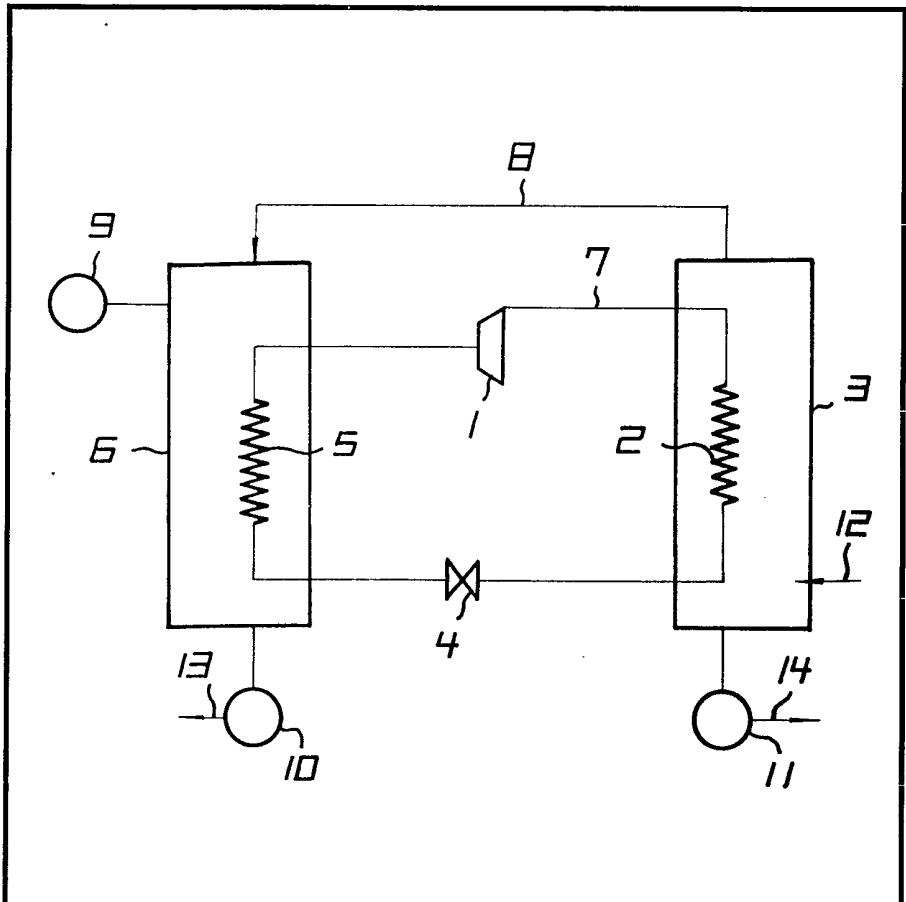


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(54) Heat pump type water distilling apparatus

(57) A heat pump type water distilling apparatus comprises a heat pump circuit including a compressor (1) for compressing organic fluid, a condenser (2) for heating water in the evaporator (3), a pressure-reducing valve (4) for reducing the pressure of organic fluid, and an evaporator (5) for condensing the water vapour received in the condenser (6) from evaporator (3) through pipe 8.



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SPECIFICATION

Heat pump type water distilling apparatus5 BACKGROUND OF THE INVENTION
FIELD OF THE INVENTION:

This invention relates to a water distilling apparatus depending on vapor compression system.

10 DESCRIPTION OF THE PRIOR ART:

The water distilling apparatus depending on vapor compression system have hitherto been utilizing evaporating vapor that having the temperature and pressure thereof raised by the compressor as a heat source. In distilling water from sea water, it is generally known that the lower the evaporation, the more effective the prevention of scale generation. However, in this case, there have been inconvenience and expensiveness, because fluid is steam and accordingly large in specific volume requiring a large compressor, high cost for not only installation but operation, and large area for installation.

SUMMARY OF THE INVENTION

In view of then drawbacks as described above, this invention is intended for eliminating these drawbacks and providing a heat pump type water distilling apparatus depending on vapor compression system in which organic fluid vapor whose pressure is raised by compression is utilized as a heat source, and, further, condensed organic fluid whose pressure is reduced is utilized as a cooling source for the condenser.

According to this invention, a heat pump cycle is performed through a compressor for compressing organic fluid, a heating element of the evaporator having function of condensing organic fluid, a pressure-reducing valve for reducing organic fluid pressure, and a cooling element of the condenser having function of evaporating organic fluid which are adapted to communicate with one another by piping and through the evaporator communicating with the condenser by means of steam flow path, and, in addition, organic fluid vapor whose temperature is raised by compression is utilized as a heat source for the evaporator as well as condensed organic fluid whose pressure is reduced is utilized as a cooling source for the condenser. Therefore, a water distilling apparatus simple in structure, small in size, and inexpensive can be manufactured which ensures cost saving for operation and construction of the whole of apparatus, suppresses generation and growth of scale during the process of water distilling, prolongs the time of continuous operation, reduces the number of times of cleaning thereby greatly saving cleaning cost and labor power therefor, and serves for ideal performance of maintenance and safety.

BRIEF DESCRIPTION OF THE DRAWING

The drawing is a schematic flow sheet showing a heat pump type water distilling apparatus as an embodiment of this invention.

In the drawing, the representation of reference numerals is as follows: (1) a compressor for compressing organic fluid, (2) a heating element of the evaporator (3) having function of condensing organic fluid, (4) a pressure-reducing valve for reducing the pressure of organic fluid, (5) a cooling element of the condenser (6) having function of evaporating organic fluid, all of which are communicated with one another by piping for organic fluid, forming a heat pump cycle. Steam flow path is represented as (8) and works to feed steam present in the evaporator (3) to the condenser (6). The numerals (9) represents a vacuum pump, (10) a pump for taking out pure water, (11) a pump for taking out the condensed fluid, (12) a pipe for feeding sea water, (13) a pipe for taking out pure water, and (14) a pipe for taking out the condensed water.

90 A description will be made on the performance of the apparatus in such structure as above according to this invention.

Compressed fluid vapor whose pressure is raised in the compressor enters the evaporator (3) and condensed at the heating element (2), when organic fluid generates condensing heat and the heating element (2) heats the contained substance in the evaporator (3). Organic fluid condensed at the heating element (2) of the evaporator (3) having the pressure thereof reduced by the pressure-reducing valve (4) enters the condenser (6) while having the temperature thereof reduced, and evaporates at the cooling element (5). The cooling element cools the substance contained in the condenser (6) since organic fluid absorbs evaporation heat while evaporating. Organic fluid evaporating at the cooling element (5) of the condenser (6) returns to the condenser (1), again compressed, and discharged toward the heating element (2) of the evaporator (3). In this way, by repeated cycles as described above, heating in the evaporator (3) on the side of heating element (2) of the evaporator (3) and cooling in the condenser (6) on the side of cooling element (5) are performed.

In such a performance, sea water fed into the evaporator (3) through the sea water feed pipe is heated and turned into evaporating vapor by heating element (2), entering the condenser (6) that made vacuum by the vacuum pump (9). The evaporating steam that has entered the condenser (6) is cooled, condensed by the cooling element (5) and taken out as pure water by the pure water taking out pump from the pure water taking out pipe. The condensed fluid that has not evaporated in the evaporator (3) is taken out by the condensed fluid taking out pump (11) from

the condensed fluid taking out pipe (14).

CLAIMS

- 5 A heat pump type water distilling apparatus depending on vapor compression system comprising: forming a heat pump cycle through a compressor for compressing organic fluid, a heating element of the evaporator having function of condensing organic fluid, a pressure-reducing valve for reducing the pressure of organic fluid, and a cooling element of the condenser having function of evaporating organic fluid, all of them being adapted to communicate with one another by piping, and
- 10 through an evaporator communicated with a condenser by means of vapor flow path; and utilizing organic fluid vapor whose temperature is raised by compression as a heat source for the evaporator and, further, condensed
- 20 organic fluid whose pressure is reduced as a cooling source for the condenser.

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