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(54) **PASSIVE LOW TEMPERATURE HEAT SOURCES ORGANIC WORKING FLUID POWER GENERATION METHOD**

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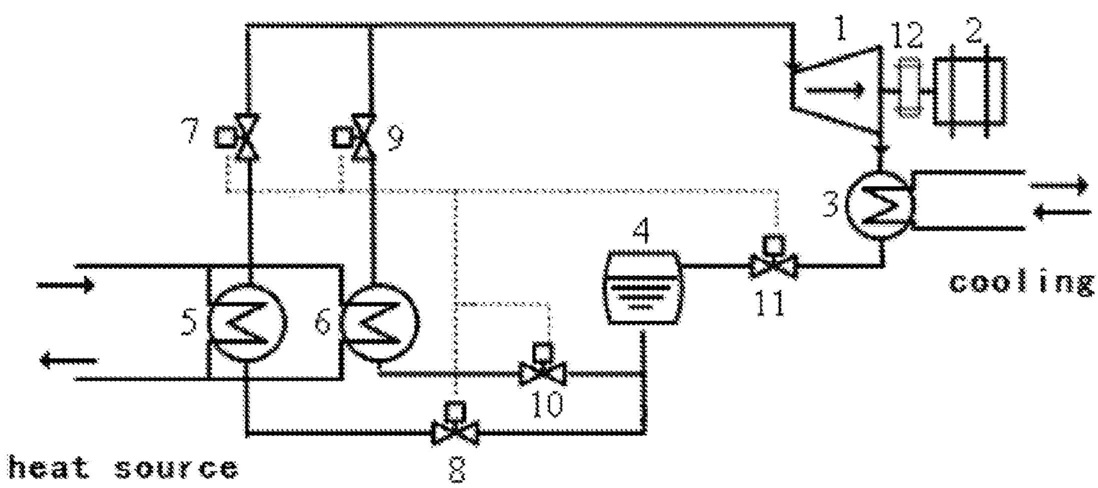
(57) **ABSTRACT**

The present invention relates to a passive type low-temperature heat sources organic working fluid power generation method. The organic working fluid absorbs heat and evaporates in the first evaporator and the second in turn evaporator. When the pressure of organic working fluid reaches the set pressure, the self-operated pressure regulator valve at the outlet of the evaporator opens triggered by operating pressure. The organic working fluid vapor flows into the turbine and pushes the turbine to rotate with a high speed, driving the generator to provide output power. The low-temperature low-pressure exhaust gas flows into the condenser and condenses into liquid working fluid. Through the first and second evaporator in turn providing working steam, the turbine can maintain continuous work and provide output power. Compared with the prior technology, the present invention has reliable performance, relying on the evaporation of the working fluid in a closed space to achieve increased pressure.



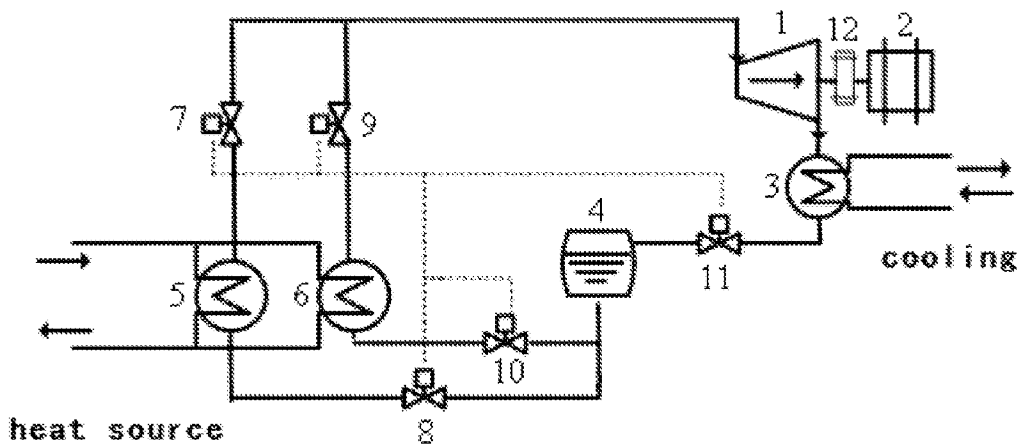


Fig.1

PASSIVE LOW TEMPERATURE HEAT SOURCES ORGANIC WORKING FLUID POWER GENERATION METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of International Patent Application No. PCT/CN2013/085944 with an international filing date of Oct. 25, 2013, designating the United States, now pending, and further claims priority benefits to Chinese Patent Application No. 201310496376.1 filed Oct. 21, 2013. The contents of all of the aforementioned applications, including any intervening amendments thereto, are incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention relates to a method of generating electricity, particularly to a passive type low-temperature heat sources organic working fluid power generation methods.

BACKGROUND TECHNIQUE

[0003] Low temperature heat source usually refers to heat sources below 200° C. There are a variety and the huge amount of low temperature heat sources, including solar energy, geothermal energy and industrial waste heat etc. According to statistics, the solar radiation of two-thirds of the whole land area in China is greater than 5000 MJ per square meter. The geothermal heat resources can be equal to about 3.3 billion tons of standard coal. The industrial energy consumption accounts for 70 percentage of the total energy consumption. Since the low-temperature heat sources featured with a wide distribution and low quality, it is difficult to be utilized by conventional energy conversion devices, resulting in that most of these energy vain discharged into the environment causing great waste and environmental pollution. Therefore, in order to explore technologies for rationally using the energy become such a hot topic in the field of energy technology. The ORC power generation system using organic working fluid is considered the most potential technology for low temperature heat sources. The organic working fluid can achieve a high pressure before entering into the turbine for expansion, which has a high energy efficiency compared with the water vapor, when the heat source temperature is below 270° C.

[0004] As early as 1924, the scientists began to study the organic rankine cycle using the low-boiling organic working fluid such as ether. With awareness of worldwide energy crisis increasing, governments and energy scientists focus on organic rankine cycle technology. The United States, Japan, Israel, Italy, Germany, France and other countries have devoted a lot of manpower, resources to competing on research and development of organic rankine cycle power generation technology. At present, the organic working fluid of the rankine power system is mainly applied in geothermal power plants, solar energy, industrial waste heat and biomass thermal power generation. The companies which master organic rankine cycle power generation technology mainly include Electra Therm, Turboden, Eneftech, Ormat, Freepower, Green Energy Australasia and Infinity turbine etc all over the world. The development of organic rankine cycle power generation technology and system in China began in the early 1970s. Although organic rankine cycle power generation technology has been developed over years, China is technically not been able to achieve substantial breakthroughs.

[0005] The conventional organic working fluid generation method has to work with external power. The working fluid need to be pressured by the pump to maintain normal power state, while the working fluid pump itself needs to consume a lot of power, resulting in reduced overall system efficiency. In addition, the control process also requires externally supplied power. So the conventional organic rankine cycle power generation system largely depends on external power and needs equipment maintenance costs.

DISCLOSURE

[0006] The purpose of the present invention is to overcome the above drawbacks of the prior art and to provide a reliable power generation method, especially a method of passive type organic working fluid low-temperature thermal energy generation, which relies on evaporation of the working fluid in a closed space to achieve increased working pressure.

[0007] The purpose of the present invention can be achieved by the following technical solutions:

[0008] 1. A method of the passive type low-temperature heat sources organic working fluid generation method comprises the steps of:

(1) when the organic working fluid within the first evaporator absorbs heat and evaporates, the temperature and the pressure of first evaporator increases until the organic working fluid pressure reaches the set pressure. The first self-operated pressure regulator valve at the outlet of the first evaporator opens triggered by working pressure, the organic working fluid vapor flows into the turbine and pushes the turbine to rotate with a high speed, driving the generator to provide output power. The low-temperature low-pressure exhaust gas flows into the condenser and condenses into liquid working fluid;

(2) The condensed organic working fluid flows into the reservoir. As the organic working fluid of the first evaporator consuming, the evaporator pressure drops to the set value of self-operated pressure regulator valve, and the first self-operated pressure regulator valve and a fifth self-operated pressure regulator valve automatically shuts down. The second self-operated pressure regulator valve opens automatically by gravity, and the organic working fluid of reservoir flows into the first evaporator. After a period of time, the second self-operated pressure regulator valve is dosed again and the fifth self-operated pressure regulator valve is open. The organic working fluid within the first evaporator is heated for the next cycle;

(3) when the first evaporator is refilled with liquid medium, the second evaporator working fluid is heated to the set pressure and the third self-operated pressure regulator valve automatically opens, replacing the first evaporator to provide continuous working steam to drive turbine and generator for output power. The refrigerant refilling method of the second evaporator is the same as the first evaporator. When the third self-operated pressure regulator valve and the fifth self-operated pressure regulator valve doses automatically, the fourth self-operated pressure regulator valve automatically opens. The organic working fluid from the reservoir flows into the second evaporator by gravity. After refilling process, the fourth self-operated pressure regulator valve doses automatically and the fifth self-operated pressure regulator valve automatically open;

(4) A second evaporator is refilled with organic working fluid and heated to the working point. During this period, according to the system design, the pressure of the working fluid of first organic evaporator has reached to the set value. The first organic evaporator can replace of the second evaporator for the output working steam. The first evaporator and the second evaporator in turn provide continuous working steam to drive turbine and generator for continuous output power.
wherein said organic working fluid is pure or mixture of R245fa, R600, R600a, R141b or R142b.
wherein said organic working fluid in the first evaporator is heated and evaporated. The temperature can reached 60° C.-180° C. The pressure reaches the set pressure of 0.5 MPa-5 MPa.
wherein said organic working fluid in the second evaporator is heated and evaporated.
The temperature can reached 60° C.-180° C. The pressure reaches the set pressure of 0.5 MPa-5 MPa.
wherein said temperature of the steam at the inlet of turbine is 60° C.-180° C., with a pressure of 0.5 MPa-5 MPa.
wherein said outlet pressure of turbine is 0.2 MPa-1.0 MPa and the outlet temperature of turbine is 30° C.-120° C.
wherein said position of reservoir is 200-2000 mm higher than that of the first evaporator and the second evaporator, in order to use the gravitational potential for the transmission of liquid refrigerant.
wherein said heat source for evaporator includes the geothermal energy, solar energy or industrial waste heat. The heat temperature ranges from 85 to 200° C.
wherein said cold source for condenser is groundwater, river water, sea water or air.
The cold source temperature is 0~40° C.
wherein said turbine expansion ratio ranges from 1.5 to 15.

[0009] Compared with the prior art, the present invention use gravity for liquid medium transmission without working fluid pump and relies on evaporation of the working fluid in a dosed space to achieve increased pressure. the whole process is controlled by self-operated pressure regulator valve. The entire power system structure is simple with a reliable performance and low cost. It's feasible for small and practical implement.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. **1** is the schematic of an apparatus used in this method.

[0011] Fig: a turbine **1**, a generator **2**, a condenser **3**, a reservoir tank **4**, the first evaporator **5**, the second evaporator **6**, the first self-operated pressure regulator valve **7**, the second self-operated pressure regulator valve **8**, the third self-operated pressure regulator valve **9**, the fourth self-operated pressure regulator valve **10**, the fifth self-operated pressure regulator valve **11**, the coupling **12**.

DETAILED DESCRIPTION

[0012] Combining with the drawings and specific embodiments, the present invention will be described in detail. The passive type organic working fluid power generation device as shown in FIG. **1**, comprising: a turbine **1**, a generator **2**, a condenser **3**, a reservoir tank **4**, the first evaporator **5**, the second evaporator **6**, the first self-operated pressure regulator valve **7**, the second self-operated pressure regulator valve **8**, the third self-operated pressure regulator valve **9**, the fourth self-operated pressure regulator valve **10**, the fifth self-operated pressure regulator valve **11**, the coupling **12**. The low temperature heat sources fluid is connected to inlet and outlet of the first evaporator **5** and the second evaporator **6** on the heat source side through the pipeline. The heat source fluid provides heat for the organic working fluid in the evaporator. The outlet of a first evaporator **5** on the working fluidside is connected to inlet of turbine **1** through the first self-operated pressure regulator valve **7**. The inlet of first evaporator **5** on the working fluidside is connected to the outlet of reservoir bottom **4** through second self-operated pressure regulator valve **8**. The outlet of the second evaporator **6** on the working fluidside is connected to the inlet of turbine **1** through a third self-operated pressure regulator valve **9**.

[0013] The inlet of the second evaporator **6** on the working fluid side is connected to the outlet of bottom of the reservoir **4** through the fourth self-operated pressure regulator valve **10**.

[0014] The shaft of turbine **1** is connected to the shaft of the generator **2** by coupling **12**. The outlet the turbine **1** is connected to the inlet of the condenser **3** on the working fluid side.

[0015] The outlet of the condenser **3** on the working fluid side is connected to inlet of top of the reservoir **4** through fifth self-operated pressure regulator valve **11**. The inlet and outlet of a condenser **3** on cold source side are connected with an external cooling source fluid through a pipe.

[0016] The organic working fluid of the present invention is pure fluid or mixture of R245fa, R600, R600a, R141b, R142b, etc.

[0017] The position of reservoir of the present invention is relative 200-2000 mm higher than that of the evaporator, in order to use gravitational potential energy for the transmission liquid working fluid.

[0018] The organic working fluid within a first evaporator **5**, a second the evaporator **6** is heated during evaporation, the temperature in the evaporator increases. Through rational design, when the working fluid pressure of the first evaporator **5** reaches a design working pressure for turbine at first, the first self-operated pressure regulator valve **7** at the outlet of the first evaporator **5** is opened triggered by the working pressure. The working steam flows into the turbine **1** and pushes turbine to rotate with a high speed, driving a generator **2** to provide output power. The low-temperature low-pressure exhaust gas flows into the condenser **3** and condensates to liquid. The condensed liquid refrigerant flows into the reservoir **4**. With the consumption of working steam in the first evaporator **5**, pressure in the evaporator gradually drops to the set value of regulator valve, the first self-operated pressure regulator valve **7** and the fifth self-operated pressure regulator valve **11** closes, the second self-operated pressure regulator valve **8** opens automatically, the liquid working fluid in the reservoir **4** flows back into the first evaporator **5** under gravity. The second self-operated pressure regulator valve **8** is dosed again, and the fifth self-operated pressure regulator valve **11** opens. The working fluid is closed in the first evaporator **5** and absorbs heat for the next cycle. During the refilling of the first evaporator **5**, the first self-operated pressure regulator valve **7** and self-operated pressure regulator valve **11** is closed, while the third self-operated pressure regulator valve **9** opens. When the working fluid pressure of the second evaporator **8** reaches to the design value, the third self-operated pressure regulator valve **9** opens, taking over the first evaporator **5** to provide continuous working steam driving the turbine and generator for output power. The refrigerant filling method of the second evaporator **6** is the same as the first evaporator. The third self-operated pressure regulator valve **9** and the fifth self-operated pressure regulator valve **11** automatically close, while the fourth self-operated pressure regulator valve **10** is automatically opened. The liquid working from reservoir **4** flows into the second evaporator **6** under gravity. After the refilling process is completed, the fourth self-operated pressure regulator valve **10** is automatically closed, the fifth self-operated pressure regulator valve **11** automatically opens. The working fluid is closed in the second evaporator **6** and heated to the working point.

[0019] According to the design process, the pressure of the working fluid in the first evaporator **5** has been heated to the design value, replacing the second evaporator **6** to provide working steam. The first evaporator **5**, the second evaporator **6** in turn provide working steam, which can drive the turbine for continuous output power.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0020] This embodiment can use solar energy, geothermal energy, waste heat and other low-temperature heat resources range 60° C.~200° C. The operating pressure of evaporator is the corresponding saturation pressure of liquid refrigerant when the heat source temperature ranges at 60·200° C. Groundwater, river water, sea water or air can be used as cold source. The cold source temperature ranges from 0 to 40° C. The working pressure of the condenser is the corresponding saturation pressure of liquid refrigerant when the cooling water or cooling air temperature ranges from 0° C. to 40° C. The device can rely on groundwater, river (sea) water or air as cold source to provide the output power from a few kilowatts to hundreds of kilowatts. The following is specific operations.

Example 1

[0021] The working fluid is R600a. The heat temperature is 120° C. The cooling water temperature is 20° C. The evaporation temperature of the evaporator is 100° C. The evaporation pressure is 1.98 MPa. The mass flow rate of steam generation is 1.8 kg/s. The condensation temperature is 30° C. The condensation pressure is 0.403 MPa. The efficiency of the heat exchanger is 0.9. The turbine expansion ratio is 5.0. The turbine efficiency is 0.8. In addition, the first and second evaporator internal volume is 0.2 m3. The reservoir internal volume is 0.4 m3. The initial liquid volume in reservoir internal is 120 kg.

[0022] The present invention is to work through the following steps:

(1) When the second self-operated pressure regulator valve automatically opens, the liquid working fluid of reservoir about 30° C. flows into the first evaporator under gravity until fluid balance. The second self-operated pressure regulator valve is closed and the 60 kg liquid refrigerant is dosed in the first evaporator;

(2) The liquid refrigerant in the first evaporator absorbs heat and evaporates. The temperature and pressure of working fluid is increasing to 100° C., 1.98 MPa, which is inlet steam parameters of the turbine;

(3) The first self-operated pressure regulator valve at the outlet of the first evaporator opens automatically under pressure, and the working steam with mass flow rate of 1.8 kg/s flows into the turbine for further expansion, driving the generator to provide output power. The turbine outlet pressure and temperature is 0.403 MPa and 47.4° C.;

(4) The working fluid is discharged into the condenser and condenses to saturated liquid of 30° C., then flows into the reservoir.

(5) In the power generation process, the liquid refrigerant in the first evaporator constantly is heated and evaporates until completely evaporating after about 26 s. The working fluid pressure drops rapidly to the condensing pressure, while the second self-operated pressure regulator valve automatically opens. The first self-operated pressure regulator valve and the five self-operated pressure regulator valve automatic shutdown, the saturated liquid refrigerant of reservoir flows into the evaporator by gravity. After the refilling process of the first evaporator, the second self-operated pressure regulator valve closes automatically, and the fifth self-operated pressure regulator valve automatically opens. The working fluid in the first evaporator absorbs heat, reaching to the designed work point to replace the second evaporator to provide continuous working steam.

(6) During the refilling process with the working fluid of the first evaporator, according to the design, the working fluid within the second evaporator work has reached the working point, the third self-operated pressure regulator valve automatically opens. The second evaporator begins to work triggered by pressure, to replace first evaporator to provide continuous working steam to drive a turbine and generator. When the working fluid evaporates completely within the second evaporator, the method of refilling with working medium of the second evaporator is the same as the first evaporator. The third self-operated pressure regulator valve and the fifth self-operated pressure regulator valve closes automatically. The four self-operated pressure regulator valve is open, the working fluid of reservoir flows into the second evaporator by gravity. At the same time, according to the design, the working fluid of first evaporator has reached the work point, the first self-operated pressure regulator valve opens, replacing the second evaporator to provide continuous working steam to drive the turbine and generator for output power.

(7) The present invention uses two evaporators—the first evaporator and the second evaporator alternately to provide high temperature high pressure steam to drive turbine and the generator, thereby ensuring continuous output power. In this instance, the system thermal efficiency is 13.7%, generating 56.8 kW output power.

Example 2

[0023] The working fluid is R245fa. The heat temperature is 120° C. The cooling water temperature is 20° C. The evaporation temperature of the evaporator is 100° C. The evaporation pressure is 1.26 MPa. The mass flow rate of steam generation is 4 kg/s. The condensation temperature is 30° C. The condensation pressure is 0.403 MPa. The efficiency of the heat exchanger is 0.9. The turbine expansion ratio is 7.1. The turbine efficiency is 0.8. In addition, the first and second evaporator internal volume is 2 m^3. The reservoir internal volume is 3 m^3. The initial liquid volume in reservoir internal is 2400 kg.

[0024] The present invention is to work through the following step.

(1) When the second self-operated pressure regulator valve automatically opens, the liquid working fluid of reservoir about 30° C. flows into the first evaporator under gravity until fluid balance. The second self-operated pressure regulator valve is closed and the 60 kg liquid refrigerant is dosed in the first evaporator;

(2) The liquid refrigerant in the first evaporator absorbs heat and evaporates. The temperature and pressure of working fluid is increasing to 100° C., 1.26 MPa, which is inlet steam parameters of the turbine;

(3) The first self-operated pressure regulator valve at the outlet of the first evaporator opens automatically under pressure, and the working steam with mass flow rate of 4 kg/s flows into the turbine for further expansion, driving the generator to provide output power. The turbine outlet pressure and temperature is 0.177 MPa and 49.5° C.;

(4) The working fluid is discharged into the condenser and condenses to saturated liquid of 30° C., then flows into the reservoir.

(5) In the power generation process, the liquid refrigerant in the first evaporator constantly is heated and evaporates until completely evaporating after about 260 s. The working fluid pressure drops rapidly to the condensing pressure, while the second self-operated pressure regulator valve automatically opens. The first self-operated pressure regulator valve and the five self-operated pressure regulator valve automatic shutdown, the saturated liquid refrigerant of reservoir flows into the evaporator by gravity. After the refilling process of the first evaporator, the second self-operated pressure regulator valve doses automatically, and the fifth self-operated pressure regulator valve automatically opens. The working fluid in the first evaporator absorbs heat, reaching to the designed work point to replace the second evaporator to provide continuous working steam.

(6) During the refilling process with the working fluid of the first evaporator, according to the design, the working fluid within the second evaporator work has reached the working point, the third self-operated pressure regulator valve automatically opens. The second evaporator begins to work triggered by pressure, to replace first evaporator to provide continuous working steam to drive a turbine and generator. When the working fluid evaporates completely within the second evaporator, the method of refilling with working medium of the second evaporator is the same as the first evaporator. The third self-operated pressure regulator valve and the fifth self-operated pressure regulator valve closes automatically. The four self-operated pressure regulator valve is open, the working fluid of reservoir flows into the second evaporator by gravity. At the same time, according to the design, the working fluid of first evaporator has reached the work point, the first self-operated pressure regulator valve opens, replacing the second evaporator to provide continuous working steam to drive the turbine and generator for output power.

(7) The present invention uses two evaporators—the first evaporator and the second evaporator alternately to provide high temperature high pressure steam to drive turbine and the generator, thereby ensuring continuous output power. In this instance, the system thermal efficiency is 15.5%, generating 92.6 kW output power.

Example 3

[0025] The working fluid is R141b. The heat temperature is 120° C. The cooling water temperature is 20° C. The evaporation temperature of the evaporator is 100° C. The evaporation pressure is 0.675 MPa. The mass flow rate of steam generation is 20 kg/s. The condensation temperature is 30° C. The condensation pressure is 0.094 MPa. The efficiency of the heat exchanger is 0.9. The turbine expansion ratio is 7.2. The turbine efficiency is 0.8. In addition, the first and second evaporator internal volume is 2 m^3. The reservoir internal volume is 3 m3. The initial liquid volume in reservoir internal is 2400 kg.

[0026] The present invention is to work through the following steps:

(1) When the second self-operated pressure regulator valve automatically opens, the liquid working fluid of reservoir about 30° C. flows into the first evaporator under gravity until fluid balance. The second self-operated pressure regulator valve is closed and the 1200 kg liquid refrigerant is dosed in the first evaporator;

(2) The liquid refrigerant in the first evaporator absorbs heat and evaporates. The temperature and pressure of working fluid is increasing to 100° C., 0.675 MPa, which is inlet steam parameters of the turbine;

(3) The first self-operated pressure regulator valve at the outlet of the first evaporator opens automatically under pressure, and the working steam with mass flow rate of 1.8 kg/s flows into the turbine for further expansion, driving the generator to provide output power. The turbine outlet pressure and temperature is 0.094 MPa and 44.5° C.;

(4) The working fluid is discharged into the condenser and condenses to saturated liquid of 30° C., then flows into the reservoir.

(5) In the power generation process, the liquid refrigerant in the first evaporator constantly is heated and evaporates until completely evaporating after about 55.9 s. The working fluid pressure drops rapidly to the condensing pressure, while the second self-operated pressure regulator valve automatically opens. The first self-operated pressure regulator valve and the five self-operated pressure regulator valve automatic shutdown, the saturated liquid refrigerant of reservoir flows into the evaporator by gravity. After the refilling process of the first evaporator, the second self-operated pressure regulator valve closes automatically, and the fifth self-operated pressure regulator valve automatically opens. The working fluid in the first evaporator absorbs heat, reaching to the designed work point to replace the second evaporator to provide continuous working steam.

(6) During the refilling process with the working fluid of the first evaporator, according to the design, the working fluid within the second evaporator work has reached the working point, the third self-operated pressure regulator valve automatically opens. The second evaporator begins to work triggered by pressure, to replace first evaporator to provide continuous working steam to drive a turbine and generator. When the working fluid evaporates completely within the second evaporator, the method of refilling with working medium of the second evaporator is the same as the first evaporator. The third self-operated pressure regulator valve and the fifth self-operated pressure regulator valve closes automatically. The four self-operated pressure regulator valve is open, the working fluid of reservoir flows into the second evaporator by gravity. At the same time, according to the design, the working fluid of first evaporator has reached the work point, the first self-operated pressure regulator valve opens, replacing the second evaporator to provide continuous working steam to drive the turbine and generator for output power.

(7) The present invention uses two evaporators—the first evaporator and the second evaporator alternately to provide high temperature high pressure steam to drive turbine and the generator, thereby ensuring continuous output power. In this instance, the system thermal efficiency is 13.7%, generating 560 kW output power.

We claim:

1. A method of the passive type low-temperature heat sources organic working fluid generation method comprises the steps of:

(1) when the organic working fluid within the first evaporator absorbs heat and evaporates, the temperature and the pressure of first evaporator increases until the organic working fluid pressure reaches the set pressure. The first self-operated pressure regulator valve at the outlet of the first evaporator opens triggered by working pressure, the organic working fluid vapor flows into the turbine and pushes the turbine to rotate with a high speed, driving the generator to provide output power. The low-temperature low-pressure exhaust gas flows into the condenser and condenses into liquid working fluid;

(2) The condensed organic working fluid flows into the reservoir. As the organic working fluid of the first evaporator consuming, the evaporator pressure drops to the set value of self-operated pressure regulator valve, and the first self-operated pressure regulator valve and the fifth self-operated pressure regulator valve automatically shuts down. The second self-operated pressure regulator valve opens automatically by gravity, and the organic working fluid in reservoir flows into the first evaporator. After a period of time, the second self-operated pressure regulator valve is closed again and the fifth self-operated pressure regulator valve is open. The organic working fluid within the first evaporator is heated for the next cycle;

(3) when the first evaporator is refilled with liquid working fluid, the second evaporator's working fluid is heated to the set pressure and the third self-operated pressure regulator valve automatically opens, replacing the first evaporator to provide continuous working steam to drive turbine and generator for output power. The refrigerant refilling method of the second evaporator is the same as the first evaporator. When the third self-operated pressure regulator valve and the fifth self-operated pressure regulator valve closes automatically, the fourth self-operated pressure regulator valve automatically opens. The organic working fluid from the reservoir flows into the second evaporator by gravity. After refilling process, the fourth self-operated pressure regulator valve closes automatically and the fifth self-operated pressure regulator valve automatically open;

(4) The second evaporator is refilled with organic working fluid and heated to the working point. During this period, according to the system design, the pressure of the working fluid of first evaporator has reached to the set value. The first evaporator can replace of the second evaporator for the output working steam. The first evaporator and the second evaporator in turn provide continuous working steam to drive turbine and generator for continuous output power.

2. The passive type low-temperature heat sources organic working fluid power generation method as set forth in claim 1, is characterized in that: wherein said organic working fluid is pure or mixture of R245fa, R600, R600a, R141b or R142b.

3. The passive type low-temperature heat sources organic working fluid power generation method as set forth in claim 1, is characterized in that: wherein said organic working fluid in the first evaporator is heated and evaporated. The temperature can reached 60° C.-180° C. The pressure reaches the set pressure of 0.5 MPa-5 MPa.

4. The passive type low-temperature heat sources organic working fluid power generation method as set forth in claim 1, is characterized in that: wherein said organic working fluid in the second evaporator is heated and evaporated. The temperature can reached 60° C.-180° C. The pressure reaches the set pressure of 0.5 MPa-5 MPa.

5. The passive type low-temperature heat sources organic working fluid power generation method as set forth in claim 1, characterized in that: wherein said temperature of the steam at the inlet of turbine is 60° C.-180° C., with the pressure of 0.5 MPa-5 MPa.

6. The passive type low-temperature heat sources organic working fluid power generation method as set forth in claim 1, is characterized in that: wherein said outlet pressure of turbine is 0.2 MPa-1.0 MPa and the outlet temperature of turbine is 30° C.-120° C.

7. The passive type low-temperature heat sources organic working fluid power generation method as set forth in claim 1, is characterized in that: wherein said position of reservoir is 200-2000 mm higher than that of the first evaporator and the second evaporator, in order to use the gravitational potential for the transmission of liquid working fluid.

8. The passive type low-temperature heat sources organic working fluid power generation method as set forth in claim 1, is characterized in that: wherein said heat source for evaporator can be geothermal energy, solar energy or industrial waste heat. The heat source temperature ranges from 85 to 200° C.

9. The passive type low-temperature heat sources organic working fluid power generation method as set forth in claim 1, is characterized in that: wherein said cold source for condenser is groundwater, river water, sea water or air. The cold source temperature is 0-40° C.

10. The passive type low-temperature heat sources organic working fluid power generation method as set forth in claim 1, is characterized in that, wherein said the turbine expansion ratio range from 1.5 to 15.

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