

SOLAR POWER SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The invention relates to a power system. More particularly, the invention relates to a solar power system that converting sunlight to power generation.

Description of Related Art

[0002] In recent years, petrochemical energy gradually dried up, and the petrochemical energy will cause the Earth environmental pollution increasingly serious, and therefore, the utilization of natural energy or renewable energy has become importantly.

[0003] Therefore, many experts have begun to study a variety of renewable energy applications, wherein solar energy is the most viable natural energy. Under the current power has increasingly widespread use of solar power converting device, the urgent needs in shortage of the exhaustible energy and environmental consciousness gradually, the use of solar power converting devices is increasingly important. But, poor photoelectric converting efficiency of solar power generation system, such as U.S. Patent 5,462,112. The U.S. Patent 5,462,112 could not provide the power effectively.

SUMMARY OF THE INVENTION

[0004] The invention is directed to a solar power system having a heat exchanger that increases the contacting area between the fins and heat exchanging fluid substantially,

and results in heat exchange operation efficiently, thereby greatly enhance the photoelectric converting efficiency of the solar power system.

[0005] In the invention, a solar power system is provided. The solar power system is suitable for converting sunlight to an electric power. The solar power system includes heat exchanger, a heat-focusing device, a power-generating device, a power-transforming device, and a power storage. The heat exchanger includes at least a first fin and at least a second fin. Each first fin has a first body, a first communicating-groove structure, a second communicating-groove structure, and a first connecting-groove structure. The first communicating-groove structure, the second communicating-groove structure, and the first connecting-groove structure are disposed in the first body. Each second fin has a second body, a third communicating-groove structure, a fourth communicating-groove structure, and a second connecting-groove structure. The third communicating-groove structure, the fourth communicating-groove structure, and the second connecting-groove structure are disposed in the second body. Each first fin and each second fin are contacted along an assembly axis. The first communicating-groove structure and the second communicating-groove structure are communicated with the second connecting-groove structure, and the third communicating-groove structure and the fourth communicating-groove structure are communicated with the first connecting-groove structure.

[0006] The first communicating-groove structure, the second connecting-groove structure, and the second communicating-groove structure constitute a first guiding channel. The third communicating-groove structure, the first connecting-groove structure, and the fourth communicating-groove structure constitute a second guiding channel. A first heat-exchange fluid flows in the first guiding channel, and a second

heat-exchange fluid flows in the second guiding channel. The heat-focusing device is suitable for receiving sunlight, and focusing to the first heat-exchange fluid flowed in the first guiding channel. One end of the power-generating device is communicated with the outlet of the second guiding channel. The second heat-exchange fluid is suitable for driving the power-generating device to produce a mechanical energy. The power-transforming device is connected to the power-generating device, and suitable for transforming the mechanical energy into the electric power. The power storage is connected to the power-transforming device, and the electric power is stored in the power storage.

[0007] In one embodiment of the present invention, the first fin and the second fin are rectangular sheets. The first communicating-groove structure and the second communicating-groove structure are located at the two sides of the first body respectively. The third communicating-groove structure and the fourth communicating-groove structure are located at the two sides of the second body. The projection area of the first communicating-groove structure and the second communicating-groove structure in the second body is not overlapped with the third communicating-groove structure and the fourth communicating-groove structure. The projection area of the first connecting-groove structure in the second body is not overlapped with the second connecting-groove structure.

[0008] In one embodiment of the present invention, the first guiding channel and the second guiding channel are not communicated with each other, and each first fin and each second fin are staggered along the assembly axis.

[0009] In one embodiment of the present invention, the projection area of the first communicating-groove structure in the second body and the projection area of the

second communicating-groove structure in the second body are overlapped with the second connecting-groove structure respectively, and the projection area of the third communicating-groove structure in the first body and the projection area of the fourth communicating-groove structure in the first body are overlapped with the first connecting-groove structure respectively.

[0010] In one embodiment of the present invention, the projection area of the first communicating-groove structure in the second body and the projection area of the second communicating-groove structure in the second body are overlapped with the two ends of the second connecting-groove structure respectively. The projection area of the third communicating-groove structure in the first body and the projection area of the fourth communicating-groove structure in the first body are overlapped with the two ends of the first connecting-groove structure respectively.

[0011] In one embodiment of the present invention, the projection area of the two ends of the first connecting-groove structure in the second body is greater or equal to the area of the third communicating-groove structure and the fourth communicating-groove structure respectively. The projection area of the two ends of the second connecting-groove structure in the first body is greater or equal to the area of the first communicating-groove structure and the second communicating-groove structure respectively.

[0012] In one embodiment of the present invention, the first connecting-groove structure and the second connecting-groove structure are disposed in the first body and the second body along a connecting axis respectively, wherein the connecting axis is vertical to the assembly axis.

[0013] In one embodiment of the present invention, the heat exchanger further

includes a third fin and a fourth fin, wherein the third fin and the fourth fin are disposed in the two sides of the assembly of the first fin and the second fin along the assembly axis respectively. The third fin has a first inlet structure and a first outlet structure, and the fourth fin has a second inlet structure and a second outlet structure. The first inlet structure and the first outlet structure are connected to the two ends of the first guiding channel, and the second inlet structure and the second outlet structure are connected to the two ends of the second guiding channel. The first inlet structure is communicated with the first communicating-groove structure, the first outlet structure is communicated with the second communicating-groove structure, the second inlet structure is communicated with the third communicating-groove structure, and the second outlet structure is communicated with the fourth communicating-groove structure.

[0014] In one embodiment of the present invention, the projection area of the first inlet structure and the first outlet structure in the fourth fin is not overlapped with the second inlet structure and the second the outlet structure.

[0015] In one embodiment of the present invention, the second fin is an inverted state of the first fin, and the fourth fin is an inverted state of the third fin.

[0016] In one embodiment of the present invention, the heat exchanger further includes at least a fifth fin, wherein each fifth fin is disposed between the first fin and the second fin along the assembly axis. Each fifth fin has a first through hole, a second through hole, a third through hole, and a fourth through hole. The first through hole and the second through hole are communicated with the first guiding channel, and the third through hole and the fourth through hole are communicated with the second guiding channel.

[0017] In one embodiment of the present invention, one side of the first through hole

and one side of the second through hole are communicated with the first communicating-groove structure and the second communicating-groove structure respectively, and the other side of the first through hole and the other side of the second through hole are communicated with the two ends of the second connecting-groove structure respectively. One side of the third through hole and one side of the fourth through hole are communicated with the third communicating-groove structure and the fourth communicating-groove structure respectively, and the other side of third through hole and the other side of the fourth through hole are communicated with the two ends of the first connecting-groove structure respectively.

[0018] In one embodiment of the present invention, the first connecting-groove structure and the second connecting-groove structure are wavy type structures or jagged type structures.

[0019] In one embodiment of the present invention, the other end of the power-generating device is communicated with an inlet of the second guiding channel.

[0020] In one embodiment of the present invention, the solar power system further includes a first heat-exchange fluid tank, wherein the first heat-exchange fluid tank has a first heat-exchange fluid tank-inlet and a first heat-exchange fluid tank-outlet. The first heat-exchange fluid tank-inlet is communicated with an outlet of the first guiding channel, and the first heat-exchange fluid tank-outlet is communicated with an inlet of the first guiding channel.

[0021] In one embodiment of the present invention, the solar power system further includes a control valve disposed between the outlet of the first guiding channel and the first heat-exchange fluid tank, and the power-generating device is suitable for controlling an open state and a close state of the control valve.

[0022] In one embodiment of the present invention, the solar power system further includes a second heat-exchange fluid tank and a control module, wherein the second heat-exchange fluid tank is used to store the second heat-exchange fluid, and disposed between the power-generating device and an inlet of the second guiding channel. The control module is suitable for detecting the flow of the second heat-exchange fluid. When the flow of the second heat-exchange fluid is lower than a default value, the control module controls the second heat-exchange fluid tank to be the open state to process a supplement.

[0023] In one embodiment of the present invention, the control module includes a control unit and a flow control valve, wherein the control unit controls an open state or a close state of the second heat-exchange fluid tank.

[0024] In one embodiment of the present invention, the heat-focusing device is a heat-focusing mirror, the power-generating device is a steam driving device, the first heat-exchange fluid is oil, and the second heat-exchange fluid is water.

[0025] In one embodiment of the present invention, the solar power system further includes a pump used to drive the first heat-exchange fluid and the second heat-exchange fluid.

[0026] In the invention, another solar power system is provided. The solar power system is suitable for converting sunlight to an electric power. The solar power system includes a heat exchanger, a heat-focusing device, a power-generating device, a power-transforming device, and a power storage. The heat exchanger includes at least a first fin and at least a second fin. Each first fin has a first body, a first communicating-groove structure, a second communicating-groove structure, and a first connecting-groove structure. The first communicating-groove structure, the second

communicating-groove structure, and the first connecting-groove structure are disposed in the first body. The first connecting-groove structure has multiple first connecting-groove assemblies arranged in the first body along a disposing axis. Each second fin has a second body, a third communicating-groove structure, a fourth communicating-groove structure, and a second connecting-groove structure. The third communicating-groove structure, the fourth communicating-groove structure, and the second connecting-groove structure are disposed in the second body. The second connecting-groove structure has multiple second connecting-groove assemblies arranged in the second body along the disposing axis. Each first fin and each second fin are connected along an assembly axis. The first communicating-groove structure and the second communicating-groove structure are communicated through the second connecting-groove assemblies. The third communicating-groove structure and the fourth communicating-groove structure are communicated through the first connecting-groove assemblies.

[0027] The first communicating-groove structure, the second connecting-groove structure, and the second communicating-groove structure constitute a first guiding channel, and the third communicating-groove structure, the first connecting-groove structure, and the fourth communicating-groove structure constitute a second guiding channel, wherein a first heat-exchange fluid flows in the first guiding channel, and a second heat-exchange fluid flows in the second guiding channel. The heat-focusing device is suitable for receiving sunlight, and focusing to the first heat-exchange fluid flowed in the first guiding channel. One end of the power-generating device is communicated with the outlet of the second guiding channel. The second heat-exchange fluid is suitable for driving the power-generating device to produce a mechanical energy.

The power-transforming device is connected to the power-generating device, and suitable for transforming the mechanical energy into the electric power. The power storage is connected to the power-transforming device, and the electric power is stored in the power storage.

[0028] In one embodiment of the present invention, one end of each second connecting-groove assembly of the second fin is overlapped with the first communicating-groove structure of the adjacent first fin in a connecting axis. The other end of each second connecting-groove assembly is overlapped with the second communicating-groove structure of the first fin. One end of each first connecting-groove assembly of the first fin is overlapped with the third communicating-groove structure of the adjacent second fin along the connecting axis. The other end of each first connecting-groove assembly is overlapped with the fourth communicating-groove structure of the second fin.

[0029] In one embodiment of the present invention, the assembly axis, the disposing axis, and the connecting axis are vertical to each other. Each first fin and each second fin are staggered along the assembly axis, the first guiding channel and the second guiding channel are not communicated with each other, wherein the second fin is an inverted state of the first fin.

[0030] In one embodiment of the present invention, the first communicating-groove structure has multiple first communicating-groove assemblies arranged in the first body along the disposing axis, and the third communicating-groove structure has multiple third communicating-groove assemblies arranged in the second body along the disposing axis. One end of each second connecting-groove assembly of the second fin is overlapped with the first communicating-groove assembly of the adjacent the first fin

along the connecting axis. The other end of each second connecting-groove assembly is overlapped with the second communicating-groove structure along the connecting axis. One end of each first connecting-groove assembly of the first fin is overlapped with the third communicating-groove assembly of the adjacent second fin along the connecting axis. The other end of each first connecting-groove assembly is overlapped with the fourth communicating-groove structure along the connecting axis.

[0031] In one embodiment of the present invention, the first communicating-groove assemblies and the first connecting-groove assemblies arranged in the first body are staggered along the disposing axis, and the third communicating-groove assemblies and the second connecting-groove assemblies arranged in the second body are staggered along the disposing axis.

[0032] In one embodiment of the present invention, each first communicating-groove assembly has at least a first communicating-groove unit arranged in the first body along the connecting axis, and each first connecting-groove assembly has at least a first connecting-groove unit arranged in the first body along the connecting axis. Each third communicating-groove assembly has at least a third communicating-groove unit arranged in the second body along the connecting axis, and each second connecting-groove assembly has at least a second connecting-groove unit arranged in the second body along the connecting axis. One end of the second connecting-groove unit of the second fin is overlapped with one end of the first communicating-groove unit of the adjacent first fin. The other end of the second connecting-groove unit is overlapped with one end of another first communicating-groove unit of the first fin or the second communicating-groove structure of the first fin. One end of the first connecting-groove unit of the first fin is overlapped with one end of the third

communicating-groove unit of the adjacent second fin. The other end of the first connecting-groove unit is overlapped with one end of another third communicating-groove unit of the second fin or the fourth communicating-groove structure of the second fin.

[0033] In one embodiment of the present invention, the two first communicating-groove units overlapped with the second connecting-groove unit are arranged in the first body along the connecting axis closely, and the two third communicating-groove units overlapped with the first connecting-groove unit are arranged in the second body along the connecting axis closely.

[0034] In one embodiment of the present invention, the projection area of the first communicating-groove structure of the first fin in the second body and the projection area of the second communicating-groove structure in the second body are not overlapped with the third communicating-groove structure and the fourth communicating-groove structure. The projection area of the first connecting-groove structure of the first fin in the second body is not overlapped with the second connecting-groove structure.

[0035] In one embodiment of the present invention, the heat exchanger further includes a third fin and a fourth fin, wherein the third fin and the fourth fin are disposed in the two sides of the assembly of the first fin and the second fin along the assembly axis respectively. The third fin has a first inlet structure and a first outlet structure, and the fourth fin has a second inlet structure and a second the outlet structure, wherein the first inlet structure and the first outlet structure are connected to the two ends of the first guiding channel, the second inlet structure and the second outlet structure are connected to the two ends of the second guiding channel. The first inlet structure is communicated

with the first communicating-groove structure, the first outlet structure is communicated with the second communicating-groove structure, the second inlet structure is communicated with the third communicating-groove structure, and the second outlet structure is communicated with the fourth communicating-groove structure.

[0036] In one embodiment of the present invention, the projection area of the first inlet structure and the first outlet structure of the third fin in the fourth fin is not overlapped with the second inlet structure and the second the outlet structure, and the fourth fin is an inverted state of the third fin.

[0037] In one embodiment of the present invention, the first inlet structure has multiple first inlet units arranged along the disposing axis, and the second inlet structure has multiple second inlet units arranged along the disposing axis. The first inlet units are communicated with the first communicating-groove structure, and the second inlet units are communicated with the third communicating-groove structure.

[0038] In one embodiment of the present invention, the projection area of the first inlet units in the first body is overlapped with the first communicating-groove structure, and the projection area of the second inlet units in the second body is overlapped with the third communicating-groove structure.

[0039] In one embodiment of the present invention, the heat exchanger further includes a fifth fin and a sixth fin, wherein the fifth fin and the sixth fin are disposed in the two sides of the assembly of the first fin, the second fin, the third fin, and the fourth fin along the assembly axis respectively. The fifth fin has a first through hole and a second through hole, and the sixth fin has a third through hole and a fourth through hole. One side of the first inlet structure is communicated with the first communicating-groove structure, and another side of the first inlet structure is

communicated with the first through hole. One side of the first outlet structure is communicated with the second communicating-groove structure, and another side of the first outlet structure is communicated with the second through hole. One side of the second inlet structure is communicated with the third communicating-groove structure, and another side of the second inlet structure is communicated with the third through hole. One side of the second outlet structure is communicated with the fourth communicating-groove structure, and another side of the second outlet structure is communicated with the fourth through hole. The sixth fin is the inverted state of the fifth fin.

[0040] In one embodiment of the present invention, the other end of the power-generating device is communicated with the inlet of the second guiding channel.

[0041] In one embodiment of the present invention, the solar power system further includes a first heat-exchange fluid tank, wherein first heat-exchange fluid tank has a first heat-exchange fluid tank-inlet and a first heat-exchange fluid tank-outlet. The first heat-exchange fluid tank-inlet is communicated with the outlet of the first guiding channel. The first heat-exchange fluid tank-outlet is communicated with the inlet of the first guiding channel.

[0042] In one embodiment of the present invention, the solar power system further includes a control valve disposed between the outlet of the first guiding channel and the first heat-exchange fluid tank, and the power-generating device is suitable for controlling an open state and a close state of the control valve.

[0043] In one embodiment of the present invention, the solar power system further includes a second heat-exchange fluid tank and a control module, wherein the second heat-exchange fluid tank is used to store the second heat-exchange fluid, and disposed

between the power-generating device and the inlet of the second guiding channel. The control module is suitable for detecting the flow of the second heat-exchange fluid. When the flow of the second heat-exchange fluid is lower than a default value, the control module controls the second heat-exchange fluid tank to be the open state to process a supplement.

[0044] In one embodiment of the present invention, the control module includes a control unit and a flow control valve, wherein the control unit controls an open state or a close state of the second heat-exchange fluid tank.

[0045] In one embodiment of the present invention, the heat-focusing device is a heat-focusing mirror, the power-generating device is a steam driving device, the first heat-exchange fluid is oil, and the second heat-exchange fluid is water.

[0046] In one embodiment of the present invention, the solar power system further includes a pump used to drive the first heat-exchange fluid and the second heat-exchange fluid.

[0047] In the invention, the other solar power system is provided. The solar power system is suitable for converting sunlight to an electric power. The solar power system includes a heat exchanger, a heat-focusing device, a power-generating device, a power-transforming device, and a power storage. The heat exchanger includes at least a first fin and at least a second fin. Each first fin has a first body, a first communicating-groove structure, a second communicating-groove structure, and a first connecting-groove structure, wherein the first communicating-groove structure, the second communicating-groove structure, and the first connecting-groove structure are disposed in the first body. The first communicating-groove structure has multiple first communicating-groove assemblies arranged in the first body along a disposing axis, and

the first connecting-groove structure has multiple first connecting-groove assemblies arranged in the first body along the disposing axis. Each first communicating-groove assembly has multiple first communicating-groove units arranged in the first body along a connecting axis, and each first connecting-groove assembly has multiple first connecting-groove units arranged in the first body along the connecting axis.

[0048] Each second fin has a second body, a third communicating-groove structure, a fourth communicating-groove structure, and a second connecting-groove structure, wherein the third communicating-groove structure, the fourth communicating-groove structure, and the second connecting-groove structure are disposed in the second body. The third communicating-groove structure has multiple third communicating-groove assemblies arranged in the second body along the disposing axis, and the second connecting-groove structure has multiple second connecting-groove assemblies arranged in the second body along the disposing axis. Each third communicating-groove assembly has multiple third communicating-groove units arranged in the second body along the connecting axis. Each second connecting-groove assembly has multiple second connecting-groove units arranged in the second body along the connecting axis. Each first fin and each second fin are connected along an assembly axis. The second connecting-groove assemblies are communicated with the first communicating-groove structure and the second communicating-groove structure, and the first connecting-groove assemblies are communicated with the third communicating-groove structure and the fourth communicating-groove structure. The first communicating-groove unit of each first communicating-groove assembly is staggered with the adjacent first communicating-groove unit. The first connecting-groove unit of each first connecting-groove assembly is staggered with the adjacent first

connecting-groove unit. The third communicating-groove unit of each third communicating-groove assembly is staggered with the adjacent third communicating-groove unit. The second connecting-groove unit of each second connecting-groove assembly is staggered with the adjacent second connecting-groove unit.

[0049] The first communicating-groove structure, the second connecting-groove structure, and the second communicating-groove structure constitute a first guiding channel, and the third communicating-groove structure, the first connecting-groove structure, and the fourth communicating-groove structure constitute a second guiding channel, wherein a first heat-exchange fluid flows in the first guiding channel, and a second heat-exchange fluid flows in the second guiding channel. The heat-focusing device is suitable for receiving sunlight, and focusing to the first heat-exchange fluid flowed in the first guiding channel. One end of the power-generating device is communicated with the outlet of the second guiding channel. The second heat-exchange fluid is suitable for driving the power-generating device to produce a mechanical energy. The power-transforming device is connected to the power-generating device, and suitable for transforming the mechanical energy into the electric power. The power storage is connected to the power-transforming device, and the electric power is stored in the power storage.

[0050] In one embodiment of the present invention, one end of each second connecting-groove assembly of the second fin is overlapped with the first communicating-groove structure of the adjacent first fin along the connecting axis. The other end of each second connecting-groove assembly is overlapped with the second communicating-groove structure of the first fin. One end of each first

connecting-groove assembly of the first fin is overlapped with the third communicating-groove structure of the adjacent second fin along the connecting axis. The other end of each first connecting-groove assembly is overlapped with the fourth communicating-groove structure of the second fin.

[0051] In one embodiment of the present invention, one end of the second connecting-groove unit of the second fin is overlapped with one end of the first communicating-groove unit of the adjacent first fin. The other end of the second connecting-groove unit is overlapped with one end of another first communicating-groove unit of the first fin or the second communicating-groove structure of the first fin. One end of the first connecting-groove unit of the first fin is overlapped with one end of the third communicating-groove unit of the adjacent second fin. The other end of the first connecting-groove unit is overlapped with one end of another third communicating-groove unit of the second fin or the fourth communicating-groove structure of the second fin.

[0052] In one embodiment of the present invention, and the two first communicating-groove units overlapped with the second connecting-groove unit are arranged in the first body along the connecting axis closely, and the two third communicating-groove units overlapped with the first connecting-groove unit are arranged in the second body along the connecting axis closely.

[0053] In one embodiment of the present invention, the second connecting-groove unit of the second fin is communicated with the two adjacent first communicating-groove units arranged along the disposing axis and the two adjacent first communicating-groove units arranged along the connecting axis in the first fin. The first connecting-groove unit of the first fin is communicated with the two adjacent third

communicating-groove units arranged along the disposing axis and the two adjacent third communicating-groove units arranged along the connecting axis in the second fin.

[0054] In one embodiment of the present invention, the first communicating-groove unit, the third communicating-groove unit, the first connecting-groove unit, and the second connecting-groove unit are diamond type structures.

[0055] In one embodiment of the present invention, the second communicating-groove structure has multiple second communicating-groove units arranged in the first body along the disposing axis. Each second communicating-groove unit is arranged in one side of the corresponding first communicating-groove assembly along the connecting axis. The fourth communicating-groove structure has multiple fourth communicating-groove units arranged in the second body along the disposing axis. Each fourth communicating-groove unit is arranged in one side of the corresponding third communicating-groove assembly along the connecting axis.

[0056] In one embodiment of the present invention, the second fin is an inverted state of the first fin.

[0057] In one embodiment of the present invention, the first communicating-groove structure further includes a first mainstream channel, and each first communicating-groove assembly constitutes the tributary channel connected with the first mainstream channel along the connecting axis. The first connecting-groove structure further includes a second mainstream channel, and each first connecting-groove assembly constitutes the tributary channel connected with the second mainstream channel along the connecting axis. The third communicating-groove structure further includes a third mainstream channel, and each third communicating-groove assembly constitutes the tributary channel connected with the

third mainstream channel along the connecting axis. The second connecting-groove structure further includes a fourth mainstream channel, and each second connecting-groove assembly is connected with the fourth mainstream channel along the connecting axis. The first mainstream channel and the fourth mainstream channel are communicated with each other, and the third mainstream channel and the second mainstream channel are communicated with each other.

[0058] In one embodiment of the present invention, the projection area of the second connecting-groove structure in the first body is overlapped with the first communicating-groove structure and the second communicating-groove structure, and the projection area of the first connecting-groove structure in the second body is overlapped with the third communicating-groove structure and the fourth communicating-groove structure.

[0059] In one embodiment of the present invention, the first communicating-groove structure, the first connecting-groove structure, the third communicating-groove structure, and the second connecting-groove structure are similar to the “claw” type structures or the “E” type structures.

[0060] In one embodiment of the present invention, the first communicating-groove structure and the first connecting-groove structure are embedded in the first body, and the third communicating-groove structure and the second connecting-groove structure are embedded in the first body. The second communicating-groove structure is disposed between the second mainstream channel and the first communicating-groove structure, and the fourth communicating-groove structure is disposed between the fourth mainstream channel and the third communicating-groove structure.

[0061] In one embodiment of the present invention, the heat exchanger further

includes a third fin and a fourth fin, wherein the third fin and the fourth fin are disposed in the two sides of the assembly of the first fin and the second fin along the assembly axis respectively. The third fin has a first inlet structure and a first outlet structure, and the fourth fin has a second inlet structure and a second the outlet structure. The first inlet structure and the first outlet structure are connected to the two ends of the first guiding channel, and the second inlet structure and the second outlet structure are connected to the two ends of the second guiding channel. The first inlet structure is communicated with the first communicating-groove structure, and the first outlet structure is communicated with the second communicating-groove structure. The second inlet structure is communicated with the third communicating-groove structure, and the second outlet structure is communicated with the fourth communicating-groove structure.

[0062] In one embodiment of the present invention, the projection area of the first inlet structure and the first outlet structure of the third fin in the fourth fin is not overlapped with the second inlet structure and the second the outlet structure.

[0063] In one embodiment of the present invention, the first outlet structure has multiple first the outlet units arranged along the disposing axis, the second outlet structure has multiple second the outlet units arranged along the disposing axis. The first the outlet units are communicated with the second communicating-groove structure, and the second outlet units are communicated with the fourth communicating-groove structure.

[0064] In one embodiment of the present invention, the projection area of the first the outlet units in the first body are overlapped with the second communicating-groove structure, and the projection area of the second outlet units in the second body are

overlapped with the fourth communicating-groove structure.

[0065] In one embodiment of the present invention, the solar power system further includes a fifth fin and a sixth fin, wherein the fifth fin and the sixth fin are disposed in the two sides of the assembly of the first fin, the second fin, the third fin, and the fourth fin along the assembly axis respectively. The fifth fin has a first through hole and a second through hole, and the sixth fin has a third through hole and a fourth through hole. One side of the first inlet structure is communicated with the first communicating-groove structure, and another side of the first inlet structure is communicated with the first through hole. One side of the first outlet structure is communicated with the second communicating-groove structure, and another side of the first outlet structure is communicated with the second through hole. One side of the second inlet structure is communicated with the third communicating-groove structure, and another side of the second inlet structure is communicated with the third through hole. One side of the second outlet structure is communicated with the fourth communicating-groove structure, and another side of the second outlet structure is communicated with the fourth through hole.

[0066] In one embodiment of the present invention, the fourth fin is an inverted state of the third fin, and the sixth fin is the inverted state of the fifth fin.

[0067] In one embodiment of the present invention, the other end of the power-generating device is communicated with the inlet of the second guiding channel.

[0068] In one embodiment of the present invention, the solar power system further includes a first heat-exchange fluid tank, wherein first heat-exchange fluid tank has a first heat-exchange fluid tank-inlet and a first heat-exchange fluid tank-outlet. The first heat-exchange fluid tank-inlet is communicated with the outlet of the first guiding

channel, and the first heat-exchange fluid tank-outlet is communicated with the inlet of the first guiding channel.

[0069] In one embodiment of the present invention, the solar power system further includes a control valve disposed between the outlet of the first guiding channel and the first heat-exchange fluid tank, and the power-generating device is suitable for controlling an open state and a close state of the control valve.

[0070] In one embodiment of the present invention, the solar power system further includes a second heat-exchange fluid tank and a control module, wherein the second heat-exchange fluid tank is used to store the second heat-exchange fluid, and disposed between the power-generating device and the inlet of the second guiding channel. The control module is suitable for detecting the flow of the second heat-exchange fluid. When the flow of the second heat-exchange fluid is lower than a default value, the control module controls the second heat-exchange fluid tank to be the open state to process a supplement.

[0071] In one embodiment of the present invention, the control module includes a control unit and a flow control valve, wherein the control unit controls an open state or a close state of the second heat-exchange fluid tank.

[0072] In one embodiment of the present invention, the heat-focusing device is a heat-focusing mirror, the power-generating device is a steam driving device, the first heat-exchange fluid is oil, and the second heat-exchange fluid is water.

[0073] In one embodiment of the present invention, the solar power system further includes a pump used to drive the first heat-exchange fluid and the second heat-exchange fluid.

[0074] As described in the embodiments of the invention, in the invention of the solar

power system, at least two fins are set with multiple communicating-groove structures and connecting-groove structure in the heat exchanger respectively. In each fin, a communicating-groove structure is not communicated with a connecting-groove structure, and one communicating-groove structure is not communicated with another communicating-groove structure. When the fins are assembled, a communicating-groove structure of one fin is communicated with the adjacent communicating-groove structure through a connecting-groove structure of another fin. The communicating-groove structures of each fin constitute a guiding channel by the connecting-groove structure of another fin when the fins are assembled. Thus, the heat exchanger of the invention has two guiding channels to perform a heat-exchange process for the fluids with different temperatures.

[0075] In addition, since the heat exchanger of the invention is assembled by at least two types of fins staggered with each other and each fin has multiple communicating-groove structures and a connecting-groove structure, the heat-exchange fluid is forced to be confluent or separated constantly when The heat-exchange fluid flows into the heat exchanger. This increases the contact area between the heat-exchange fluid and heat exchanger substantially, and increases the rate of the heat-exchange process of heat-exchange fluids to achieve good heat-exchange performance. Therefore, the second heat-exchange fluid is, for example, water. The first heat-exchange fluid is, for example, oil. The second heat-exchange fluid can be vaporized into steam rapidly and efficiently when the first heat-exchange fluid is heated via sunlight by the heat exchanger of the invention. The steam is applied to drive the power-generating device to produce a mechanical energy. The mechanical energy is transformed to an electric power, and the photo-electric conversion efficiency of the

solar power system is upgraded substantially.

[0076] Other features and advantages of the invention will be further understood from the further technological features disclosed by the embodiments of the invention wherein there are shown and described embodiments of this invention, simply by way of illustration of best modes to carry out the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0077] The accompanying drawings are included to provide a further understanding of the disclosure, and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the disclosure and, together with the description, serve to explain the principles of the disclosure.

[0078] FIG. 1 is a schematic view illustrating the solar power system according to one embodiment of the present invention.

[0079] FIG. 2A is an exploded view illustrating the heat exchanger according to one embodiment of the present invention.

[0080] FIG. 2B is a schematic view illustrating the heat exchanger removing of partial of fins depicted in FIG. 2A.

[0081] FIG. 3A is a schematic view illustrating the heat exchanger according to another embodiment of the present invention.

[0082] FIG. 3B is an exploded view illustrating the heat exchanger depicted in FIG. 3A.

[0083] FIG. 3C is an enlarged schematic view illustrating a region of R depicted in FIG. 3B.

[0084] FIG. 3D is a plane schematic view illustrating the heat exchanger depicted in

FIG. 3B.

[0085] FIG. 3E is an enlarged schematic view illustrating the first fin depicted in FIG. 3D.

[0086] FIG. 3F is an enlarged schematic view illustrating the second fin depicted in FIG. 3D.

[0087] FIG. 4A is a schematic view illustrating another heat exchanger according to one embodiment of the present invention.

[0088] FIG. 4B is an exploded view illustrating the heat exchanger depicted in FIG. 4A.

[0089] FIG. 4C is an enlarged schematic view illustrating a region of R depicted in FIG. 4B.

[0090] FIG. 4D is a plane schematic view illustrating the heat exchanger depicted in FIG. 4B.

[0091] FIG. 4E is an enlarged schematic view illustrating the first fin depicted in FIG. 4D.

[0092] FIG. 4F is an enlarged schematic view illustrating the second fin depicted in FIG. 4D.

[0093] FIG. 4G is a schematic view illustrating a stack of the first fin depicted in FIG. 4E and the second fin depicted in FIG. 4F.

DESCRIPTION OF EMBODIMENTS

[0094] Other features and advantages of the invention will be further understood from the further technological features disclosed by the embodiments of the invention wherein there are shown and described embodiments of this invention, simply by way

of illustration of best modes to carry out the invention.

[0095] FIG. 1 is a schematic view illustrating the solar power system according to one embodiment of the present invention. Referring to FIG. 1, the solar power system 1 of the present embodiment is suitable for converting sunlight to an electric power. The solar power system includes a heat exchanger 10, a heat-focusing device 20, a power-generating device 30, a power-transforming device 40, and a power storage 50. The heat exchanger 10 is set with a first guiding channel C1 and a second guiding channel C2 mainly. The first guiding channel C1 and other channel communicated therewith are capable of flowing for a first heat-exchange fluid F1 with higher temperature, for example. The second guiding channel C2 and other channel communicated therewith are capable of flowing for a second heat-exchange fluid F2 with lower temperature, for example. The first heat-exchange fluid F1 is, for example, oil or other appropriate fluids with higher boiling point. The second heat-exchange fluid F2 is, for example, water or other appropriate fluids with lower boiling point. The heat-focusing device 20 is, for example, a heat-focusing mirror. The power-generating device 30 is, for example, a steam driving device. The power-generating device 30 and the power-transforming device 40 constitute a power generation module.

[0096] In the present embodiment, heat-focusing device 20 is suitable for receiving sunlight. Sunlight is focused to the first heat-exchange fluid F1 in the first guiding channel C1. Since the first heat-exchange fluid F1 is, for example, appropriate fluid with higher boiling point, like oil, the temperature of the first heat-exchange fluid F1 rises substantially (approximately 800 degrees Celsius) when the first heat-exchange fluid F1 be heated by sunlight. Besides, since the second heat-exchange fluid F2 is, for example, appropriate fluid with lower boiling point, like water, the temperature of the

second heat-exchange fluid F2 in the second guiding channel C2 is normal (approximately 20 degrees Celsius). Therefore, the heat exchanger of the invention 10 has a good heat-exchange efficiency when the first heat-exchange fluid F1 and the second heat-exchange fluid F2 flows into the heat exchanger 10. In other words, the second heat-exchange fluid F2 is, for example, liquid. The second heat-exchange fluid F2 be heated and vaporized to a steam. The design of the heat exchanger 10 of the present embodiment will be hereinafter described in detail.

[0097] From the above, one end of the power-generating device 30 is communicated with the outlet O2 of the second guiding channel C2 (the other end of the power-generating device 30 is communicated with the inlet I2 of the second guiding channel C2). The vaporization of the second heat-exchange fluid F2 is suitable for driving the power-generating device 30 to produces a mechanical energy. The power-transforming device 40 is connected to the power-generating device 30, and transforms the mechanical energy to be an electric power. The power storage 50 is connected to the power-transforming device 40, and used to store the electric power. In addition, in the present embodiment, the other end of the power-generating device 30 is communicated with the inlet I2 of the second guiding channel C2. The vaporization of the second heat-exchange fluid F2 will be condensed into liquid again after driving the power-generating device 30. The liquid state of the second heat-exchange fluid F2 is driven to flow toward the inlet I2 of the second guiding channel C2, and performs the heat-exchange process again cyclically.

[0098] In addition, the solar power system 1 of the present embodiment further includes a first heat-exchange fluid tank 60, wherein the first heat-exchange fluid tank 60 has a first heat-exchange fluid tank-inlet 62 and a first heat-exchange fluid

tank-outlet 64. The first heat-exchange fluid tank-inlet 62 is communicated with the outlet O1 of the first guiding channel C1. The first heat-exchange fluid tank-outlet 64 is communicated with the inlet I1 of the first guiding channel C1. The first heat-exchange fluid F1 completed the heat-exchange process of the heat exchanger 10 is stored to the first heat-exchange fluid tank 60 through the first heat-exchange fluid tank-inlet 62. The temperature of the first heat-exchange fluid F1 completed the heat-exchange process is, for example, about 500 degrees Celsius. The solar power system 1 further includes a control valve 70 disposed between the outlet O1 of the first guiding channel C1 and the first heat-exchange fluid tank 60. This provides an appropriate method to control an open state and a close state of the control valve 70 by the power-generating device 30, and further controls the flow of the first heat-exchange fluid F1.

[0099] Worth mentioning is that the solar power system 1 of the present embodiment not only perform the power generation process under sunlight, but also can perform the power generation process without sunlight. In detail, the temperature of the first heat-exchange fluid F1 is, for example, about 500 degrees Celsius when the heat-exchange process is completed. The temperature of the first heat-exchange fluid F1 still keeps in a high temperature state (higher than 200 degrees Celsius) when the first heat-exchange fluid F1 is stored in the first heat-exchange fluid tank 60 for sometime. Without sunlight, the present embodiment can apply the first heat-exchange fluid F1 to keep in the high temperature state to perform the heat-exchange process. The high temperature state of the first heat-exchange fluid F1 makes the second heat-exchange fluid F2 steam to produce the above mechanical energy. That is, the solar power system 1 of the invention can operate in any weather, and has not influence in a cloudy day or at night.

[00100] In addition, the solar power system 1 of the present embodiment also includes a second heat-exchange fluid tank 80 and a control module 90 adapted to detect the flow of the second heat-exchange fluid F2. The second heat-exchange fluid tank 80 is used to store the second heat-exchange fluid F2, and disposed between the power-generating device 30 and the inlet I2 of the second guiding channel C2. Since the second heat-exchange fluid F2 is prone to consume in the process of vaporization or in the process of driving the power-generating device 30 to produce the mechanical energy, the present embodiment applies the control module 90 to monitor the flow of the second heat-exchange fluid F2 and performs a follow-up supplement. In detail, the control module 90 controls the second heat-exchange fluid tank 80 to be the open state to process a supplement when the flow of the second heat-exchange fluid F2 is lower than a default value. The control module 90 is constituted of a control unit 92 and a flow control valve 94, for example. The control unit 92 is used to control the second heat-exchange fluid tank 80 to be an open state or a close state. In addition, about the flow of the first heat-exchange fluid F1 and the second heat-exchange fluid F2, the present embodiment can apply a pump to drive the first heat-exchange fluid F1 and the second heat-exchange fluid F2 to flow, and make the first heat-exchange fluid F1 and the second heat-exchange fluid F2 circulate in the solar power system 1 constantly.

[00101] Above description is for the connection between the various components of the solar power system 1 of the invention. Next, the design of the heat exchanger in the solar power system 1 of the invention will be illustrated, and the description of how to own a good heat-exchange efficiency to make the solar power system 1 of the invention has a good photo-electric conversion efficiency is also illustrated.

[00102] FIG. 2A is an exploded view illustrating the heat exchanger according to one

embodiment of the present invention, and FIG. 2B is a schematic view illustrating the heat exchanger removing of partial of fins depicted in FIG. 2A. Referring to FIG. 2A and FIG. 2B, the heat exchanger 10 in FIG. 2A includes a first fin 100, a second fin 200, a third fin 300, a fourth fin 400, and a fifth fin 500. The first fin 100, the second fin 200, the third fin 300, the fourth fin 400, and the fifth fin 500 are, for example, rectangular sheets, and are contacted along an assembly axis L1. The third fin 300 and the fourth fin 400 are, for example, disposed in the two sides of the assembly of the first fin 100 and the second fin 200 along the assembly axis L1 respectively. Each fifth fin 500 is, for example, disposed between the first fin 100 and the second fin 200 along the assembly axis L1. In the present embodiment, the second fin 200 is, for example, an inverted state of the first fin 100. The inverted state is, for example, the state of the rotating 180 degrees of the first fin 100 along the assembly axis L1. The second fin 200 also be other inverted state of the first fin 100, including but not limited to this type. In addition, the fourth fin 400 also is, for example, the inverted state of the third fin 300.

[00103] The heat exchanger 10 of the present embodiment is constituted of at least a first fin 100 and at least a second fin 200 mainly, and the first fin 100 and the second fin 200 will be illustrated in detail as follow. The first fin 100 has a first body 110, a first communicating-groove structure 120, a second communicating-groove structure 130, and a first connecting-groove structure 140. The first communicating-groove structure 120, the second communicating-groove structure 130, and the first connecting-groove structure 140 are disposed in first body 110, and the first communicating-groove structure 120 and the second communicating-groove structure 130 are disposed in the two sides of first body 110 respectively. The first connecting-groove structure 140 is disposed in the first body 110 along a connecting axis L2. The connecting axis L2 is, for

example, vertical to the assembly axis L1.

[00104] In addition, the second fin 200 has a second body 210, a third communicating-groove structure 220, a fourth communicating-groove structure 230, and a second connecting-groove structure 240, and the third communicating-groove structure 220, the fourth communicating-groove structure 230, and the second connecting-groove structure 240 are disposed in the second body 210. The third communicating-groove structure 220 and the fourth communicating-groove structure 230 are disposed in the two sides of the second body 210 respectively, and the second connecting-groove structure 240 is disposed in the second body 210 along the connecting axis L2. The first connecting-groove structure 140 and the second connecting-groove structure 240 of the present embodiment are, for example, wavy type structures. The heat-exchange fluid flowed into the heat exchanger 1 will be collided to have a turbulence constantly by the wavy type structures of the first connecting-groove structure 140 and the second connecting-groove structure 240. This upgrades the heat-exchange efficiency of the fins. The first connecting-groove structure and the second connecting-groove structure in other embodiments are, for example, jagged type structures or appropriate structures capable of increasing the turbulence of the heat-exchange fluid, and the present invention does not have any limitation.

[00105] From the above, when the first fin 100, the second fin 200, the third fin 300, the fourth fin 400, and the fifth fin 500 are contacted with each other along the assembly axis L1, the second connecting-groove structure 240 is communicated with the first communicating-groove structure 120 and the second communicating-groove structure 130, and the first connecting-groove structure 140 is communicated with the third communicating-groove structure 220 and the fourth communicating-groove structure

230. In detail, in the present embodiment, the projection area of the first communicating-groove structure 120 and the second communicating-groove structure 130 of the first fin 100 in the second body 210 is overlapped with the second connecting-groove structure 240 respectively. The projection area of the third communicating-groove structure 220 and the fourth communicating-groove structure 230 of the second fin 200 in the first body 110 is overlapped with the first connecting-groove structure 140 respectively. Thus, the first communicating-groove structure 120, the second connecting-groove structure 240, and the second communicating-groove structure 130 constitute the first guiding channel C1, and the third communicating-groove structure 220, the first connecting-groove structure 140, and the fourth communicating-groove structure 230 constitute the second guiding channel C2.

[00106] Further, the projection area of the first communicating-groove structure 120 and the second communicating-groove structure 130 of the first fin 100 in the second body 210 is overlapped with the two ends of the second connecting-groove structure 240 respectively. The projection area of the third communicating-groove structure 220 and the fourth communicating-groove structure 230 of the second fin 200 in the first body 110 is overlapped with the two ends of the first connecting-groove structure 140 respectively. The projection area of the two ends of the first connecting-groove structure 140 in the second body 210 is greater or equal to the area of the third communicating-groove structure 220 and the fourth communicating-groove structure 230 respectively. The projection area of the two ends of the second connecting-groove structure 240 in first body 110 is greater or equal to the area of the first communicating-groove structure 120 and the second communicating-groove structure

130 respectively. Therefore, the second heat-exchange fluid F2 can flow to the first connecting-groove structure 140 from the third communicating-groove structure 220 smoothly, and then flow to the fourth communicating-groove structure 230 from the first connecting-groove structure 140. The first heat-exchange fluid F1 can flow to the second connecting-groove structure 240 from the first communicating-groove structure 120 smoothly, and then flow to the second communicating-groove structure 130 from the second connecting-groove structure 240.

[00107] In addition, in the present embodiment, the projection area of the first communicating-groove structure 120 and the second communicating-groove structure 130 of the first fin 100 in the second body 210 is not overlapped with the third communicating-groove structure 220 and the fourth communicating-groove structure 230. The projection area of the first connecting-groove structure 140 of the first fin 100 in the second body 210 is not overlapped with the second connecting-groove structure 240. That is, the first guiding channel C1 and the second guiding channel C2 are not communicated with each other when the first fin 100 and the second fin 200 are contacted along the assembly axis L1.

[00108] In the present embodiment, the first guiding channel C1 is, for example, a 「」 type guiding channel. The second guiding channel C2 is, for example, a 「」 type guiding channel. The across area of the first guiding channel C1 is, for example, across the cross-section of the heat exchanger 10. Similarly, the across area of the second guiding channel C2 also is, for example, across the cross-section of the heat exchanger 10. That is, the across area of the first guiding channel C1 and the across area of the second guiding channel C2 are similar substantially. Therefore, the first heat-exchange fluid F1 and the second heat-exchange fluid F2 can perform the

heat-exchange process effectively by flowing across the heat exchanger 10 completely. The guiding direction of the fluid in the first guiding channel C1 and the guiding direction of the fluid in the second guiding channel C2 are, for example, clockwise or counterclockwise simultaneously.

[00109] Next, other fins of the present embodiment will be illustrated as follow. The third fin 300 of the present embodiment has a first inlet structure 310 and a first outlet structure 320, and the fourth fin 400 has a second inlet structure 410 and a second the outlet structure 420. The third fin 300 and the fourth fin 400 are, for example, disposed in the two sides of the assembly of the first fin 100 and the second fin 200 along the assembly axis L1 respectively. The fifth fin 500 has a first through hole 510, a second through hole 520, a third through hole 530, and a fourth through hole 540. The fifth fin 500 is, for example, disposed between the first fin 100 and the second fin 200 along the assembly axis L1. One side of the first through hole 510 and one side of the second through hole 520 are, for example, communicated with the first communicating-groove structure 120 and the second communicating-groove structure 130 respectively. Another side of the first through hole 510 and another side of the second through hole 520 are, for example, communicated with the two ends of the second connecting-groove structure 240 respectively. One side of the third through hole 530 and one side of the fourth through hole 540 are communicated with the third communicating-groove structure 220 and the fourth communicating-groove structure 230 respectively. Another side of the third through hole 530 and another side of the fourth through hole 540 are, for example, of communicated with the two ends of the first connecting-groove structure 140 respectively.

[00110] From the above, the first inlet structure 310 and the first outlet structure 320

of the third fin 300 are, for example, connected to the two ends of the first guiding channel C1. The second inlet structure 410 and the second the outlet structure 420 of the fourth fin 400 are, for example, connected to the two ends of the second guiding channel C2. The first inlet structure 310 of the third fin 300 is communicated with the first communicating-groove structure 120 of the first fin 100. The first outlet structure 320 of the third fin 300 is communicated with the second communicating-groove structure 130 of the first fin 100. The second inlet structure 410 of the fourth fin 400 is communicated with the third communicating-groove structure 220 of the second fin 200. The second the outlet structure 420 of the fourth fin 400 is communicated with the fourth communicating-groove structure 230 of the second fin 200. Since the first guiding channel C1 and the second guiding channel C2 are not communicated with each other, the projection area of the first inlet structure 310 and the first outlet structure 320 of the third fin 300 in the fourth fin 400 is not overlapped with the second inlet structure 410 and the second the outlet structure 420.

[00111] Besides, the first through hole 510 and the second through hole 520 of the fifth fin 500 are communicated with the first guiding channel C1, and the third through hole 530 and the fourth through hole 540 of the fifth fin 500 are communicated with the second guiding channel C2. The fifth fin 500 disposed between the first fin 100 and the second fin 200 is provided for the first heat-exchange fluid F1 with higher temperature and the second heat-exchange fluid F2 with lower temperature to flow simultaneously, and increases the heat-exchange process between the first heat-exchange fluid F1 and the second heat-exchange fluid F2.

[00112] In addition to the capability of providing the first heat-exchange fluid F1 with higher temperature and the second heat-exchange fluid F2 with lower temperature to

flow in the fifth fin 500 simultaneously, since the first guiding channel C1 for the first heat-exchange fluid F1 with higher temperature includes the first communicating-groove structure 120 of the first fin 100, the second communicating-groove structure 130 of the first fin 100, and the second connecting-groove structure 240 of the second fin 200, and the second guiding channel C2 for the second heat-exchange fluid F2 with lower temperature includes the first connecting-groove structure 140 of the first fin 100, the third communicating-groove structure 220 of the second fin 200, and the fourth communicating-groove structure 230 of the second fin 200, the first fin 100 and the second fin 200 are also capable of flowing of the first heat-exchange fluid F1 with higher temperature and the second heat-exchange fluid F2 with lower temperature. Therefore, the design of the first fin 100 and the second fin 200 can increase the heat-exchange process between the first heat-exchange fluid F1 and the second heat-exchange fluid F2. The first connecting-groove structure 140 like the wavy type structure in the first fin 100 and the second connecting-groove structure 240 like the wavy type structure in the second fin 200 like the wavy type structure further have the capability of making a constant turbulence of the first heat-exchange fluid F1 and the second heat-exchange fluid F2 to upgrade the heat-exchange efficiency. Thus, the heat exchanger 10 of the present embodiment has better heat-exchange performance.

[00113] The present embodiment takes the stagger of a first fin 100 and a second fin 200 along the assembly axis L1 mainly for example. In other embodiments, multiple first fins 100 can be assembled in advance, and multiple second fins 200 can be assembled in advance. And then, the assembly of the first fins 100 and the assembly of the second fins 200 can be staggered to constitute another heat exchanger, and the

present invention does not have any limitation. About the staggered method of the assembly of the first fins 100 and the second fins 200, the present invention does not have any limitation. In addition, the present embodiment is constituted of at least a first fin 100 and at least a second fin 200 mainly, the assembled type of the third fin 300, the fourth fin 400, and the fifth fin 500 opposite to the location of the first fin 100 and the second fin 200 as described in above is one of various embodiments. It is within the scope and spirit of the present invention as long as the appropriate disposing type for the first guiding channel C1 and the second guiding channel C2 flowing smoothly, and the present invention does not have any limitation.

[00114] FIG. 3A is a schematic view illustrating the heat exchanger according to another embodiment of the present invention. FIG. 3B is an exploded view illustrating the heat exchanger depicted in FIG. 3A. FIG. 3C is an enlarged schematic view illustrating a region of R depicted in FIG. 3B. FIG. 3D is a plane schematic view illustrating the heat exchanger depicted in FIG. 3B. FIG. 3E is an enlarged schematic view illustrating the first fin depicted in FIG. 3D. FIG. 3F is an enlarged schematic view illustrating the second fin depicted in FIG. 3D. Referring to FIG. 3A, FIG. 3B, FIG. 3C, FIG. 3D, FIG. 3E, and FIG. 3F, the heat exchanger 10' of the present embodiment includes a first fin 100', a second fin 200', a third fin 300', a fourth fin 400', a fifth fin 500', and a sixth fin 600'. The first fin 100', the second fin 200', the third fin 300', the fourth fin 400', the fifth fin 500', and sixth fin 600' are, for example, rectangular sheets, and are contacted along an assembly axis L1.

[00115] The third fin 300' and the fourth fin 400' are disposed in the two sides of the assembly of the first fin 100' and the second fin 200' along the assembly axis L1 respectively. The fifth fin 500' and sixth fin 600' are disposed in the two sides of the

assembly of the first fin 100', the second fin 200', the third fin 300', and the fourth fin 400' along the assembly axis L1 respectively. In the present embodiment, the second fin 200' is, for example, an inverted state of the first fin 100'. The inverted state is, for example, the state of the rotating 180 degrees of the first fin 100' along the assembly axis L1. The second fin 200' also be other inverted states of the first fin 100', including but not limited to this type. In addition, the fourth fin 400' is, for example, an inverted state of the third fin 300', and the sixth fin 600' is, for example, an inverted state of the fifth fin 500'.

[00116] The heat exchanger 10' of the present embodiment is constituted of at least a first fin 100' and at least a second fin 200' mainly, and the first fin 100' and the second fin 200' will be illustrated in detail as follow. The first fin 100' has a first body 110', a first communicating-groove structure 120', a second communicating-groove structure 130', and a first connecting-groove structure 140', wherein the first communicating-groove structure 120', the second communicating-groove structure 130', and the first connecting-groove structure 140' are disposed in first body 110'. In addition, the second fin 200' has a second body 210', a third communicating-groove structure 220', a fourth communicating-groove structure 230', and a second connecting-groove structure 240', wherein the third communicating-groove structure 220', the fourth communicating-groove structure 230', and the second connecting-groove structure 240' are disposed in the second body 210'.

[00117] When the first fin 100', the second fin 200', the third fin 300', the fourth fin 400', the fifth fin 500', and sixth fin 600' are contacted along the assembly axis L1, the second connecting-groove structure 240' is communicated with the first communicating-groove structure 120' and the second communicating-groove structure

130'. The first connecting-groove structure 140' is communicated with the third communicating-groove structure 220' and the fourth communicating-groove structure 230'. In detail, the first connecting-groove structure 140' is constituted of multiple first connecting-groove assemblies 142' arranged in the first body 110' along a disposing axis L3 in the present embodiment. The second connecting-groove structure 240' is constituted of multiple second connecting-groove assemblies 242' arranged in the second body 210' along the disposing axis L3. The disposing axis L3 is, for example, vertical to the assembly axis L1. One end of each second connecting-groove assembly 242' of the second fin 200' is overlapped with the first communicating-groove structure 120' of the adjacent first fin 100' along a connecting axis L2. The other end of the second connecting-groove assembly 242' is overlapped with the second communicating-groove structure 130' of the first fin 100'. One end of each first connecting-groove assembly 142' of the first fin 100' is overlapped with the third communicating-groove structure 220' of the adjacent second fin 200' along the connecting axis L2. The other end of the first connecting-groove assembly 142' is overlapped with the fourth communicating-groove structure 230' of the second fin 200'. Therefore, the first communicating-groove structure 120', the second connecting-groove structure 240', and the second communicating-groove structure 130' constitute the first guiding channel C1', and the third communicating-groove structure 220', the first connecting-groove structure 140', and the fourth communicating-groove structure 230' constitute the second guiding channel C2'. The assembly axis L1, the disposing axis L3, and the connecting axis L2 are, for example, vertical to each other.

[00118] Further, in the present embodiment, the projection area of the first communicating-groove structure 120' and the second communicating-groove structure

130' of the first fin 100' in the second body 210' is not overlapped with the third communicating-groove structure 220' and the fourth communicating-groove structure 230'. The projection area of the first connecting-groove structure 140' of the first fin 100' in the second body 210' is not overlapped with the second connecting-groove structure 240'. That is, when the first fin 100' and the second fin 200' are contacted along the assembly axis L1, the first guiding channel C1' and the second guiding channel C2' are not communicated with each other. Therefore, the second heat-exchange fluid F2 can flow to the first connecting-groove structure 140' from the third communicating-groove structure 220' smoothly, and flow to the fourth communicating-groove structure 230' from the first connecting-groove structure 140' smoothly. The first heat-exchange fluid F1 can flow to the second connecting-groove structure 240' from the first communicating-groove structure 120' smoothly, and flow to the second communicating-groove structure 130' from the second connecting-groove structure 240' smoothly.

[00119] Worth mentioning is that, the first connecting-groove structure 140' and the second connecting-groove structure 240' are constituted of multiple first connecting-groove assemblies 142' and multiple second connecting-groove assemblies 242' respectively, the first heat-exchange fluid F1 flowed into the first guiding channel C1' and the second heat-exchange fluid F2 flow into the second guiding channel C2' can be separated by the first connecting-groove assemblies 142' and the second connecting-groove assembly 242' respectively. Therefore, the heat-exchange efficiency between the heat-exchange fluid and fins is upgraded by the separations of the first heat-exchange fluid F1 flowed into the first guiding channel C1' and the second heat-exchange fluid F2 flowed into the second guiding channel C2'. The above

separation further makes a heat-exchange efficiency between the first heat-exchange fluid F1 in the first guiding channel C1' and the second heat-exchange fluid F2 in the second guiding channel C2'.

[00120] In the present embodiment, the first guiding channel C1' is, for example, capable of flowing for the first heat-exchange fluid F1 with higher temperature, and the second guiding channel C2' is, for example, capable of flowing for the second heat-exchange fluid F2 with lower temperature. The first guiding channel C1' is, for example, a 「」 type guiding channel. The second guiding channel C2' is, for example, a 「」 type guiding channel. The across area of the first guiding channel C1' is, for example, across the cross-section of the heat exchanger 10'. Similarly, the across area of the second guiding channel C2' also is, for example, across the cross-section of the heat exchanger 10'. That is, the across area of the first guiding channel C1' and the across area of the second guiding channel C2' are similar substantially. Therefore, the first heat-exchange fluid F1 and the second heat-exchange fluid F2 can perform the heat-exchange process effectively by flowing across the heat exchanger 10' completely. The guiding direction of the fluid in the first guiding channel C1' and the guiding direction of the fluid in the second guiding channel C2' are, for example, clockwise or counterclockwise simultaneously.

[00121] From the above, in order to have a better heat-exchange efficiency by frequent separations, the first communicating-groove structure 120' is also constituted of multiple first communicating-groove assemblies 122' arranged in the first body 110' along the disposing axis L3, and the third communicating-groove structure 220' is constituted of multiple third communicating-groove assemblies 222' arranged in the second body 210' along the disposing axis L3 in the present embodiment. One end of

each second connecting-groove assembly 242' of the second fin 200' is overlapped with the first communicating-groove assembly 122' of the adjacent first fin 100' along the connecting axis L2, and the other end of the second connecting-groove assembly 242' is overlapped with the second communicating-groove structure 130' in the connecting axis L2 when the first fin 100' and the second fin 200' are contacted. Similarly, one end of each first connecting-groove assembly 142' of the first fin 100' is overlapped with the third communicating-groove assembly 222' of the adjacent second fin 200' along the connecting axis L2, and the other end of the first connecting-groove assembly 142' is overlapped with the fourth communicating-groove structure 230' along the connecting axis L2.

[00122] Especially, in order to increase the heat-exchange area between the heat-exchange fluid and the fin, each first communicating-groove assembly 122' of the present embodiment has at least a first communicating-groove unit 122a' arranged in the first body 110' along the connecting axis L2, each first connecting-groove assembly 142' has at least a first connecting-groove unit 142a' arranged in the first body 110' along the connecting axis L2, each third communicating-groove assembly 222' has at least a third communicating-groove unit 222a' arranged in the second body 210' along the connecting axis L2, and each second connecting-groove assembly 242' has at least a second connecting-groove unit 242a' arranged in the second body 210' along the connecting axis L2. The connecting-groove unit or the communicating-groove unit is, for example, a strip type structure or other appropriate structure.

[00123] One end of the second connecting-groove unit 242a' of the second fin 200' is overlapped with one end of the first communicating-groove unit 122a' of the adjacent first fin 100', and the other end of the second connecting-groove unit 242a' is

overlapped with one end of another first communicating-groove unit 122a' of the first fin 100' or the second communicating-groove structure 130' of the first fin 100'. One end of the first connecting-groove unit 142a' of the first fin 100' is overlapped with one end of the third communicating-groove unit 222a' of the adjacent e second fin 200', and the other end of the first connecting-groove unit 142a' is overlapped with one end of another third communicating-groove unit 222a' of the second fin 200' or the fourth communicating-groove structure 230' of the second fin 200'. The two first communicating-groove units 122a' overlapped with the second connecting-groove unit 242a' are arranged in the first body 110' along the connecting axis L2 adjacently, and the two third communicating-groove units 222a' overlapped with the first connecting-groove unit 142a' are arranged in the second body 210' along the connecting axis L2 adjacently. It increases the heat-exchange area between the heat-exchange fluid and the fin substantially by the design of each groove assembly having at least a groove unit, and further upgrades the heat-exchange efficiency of the heat exchanger 10'. In the present embodiment, the first communicating-groove assembly 122' is, for example, constituted of two first communicating-groove units 122a'. The first connecting-groove assembly 142' is, for example, constituted of two first connecting-groove units 142a'. The third communicating-groove assembly 222' is, for example, constituted of two third communicating-groove units 222a'. The second connecting-groove assembly 242' is, for example, constituted of two second connecting-groove units 242a'. About the groove assembly is, for example, constituted of two groove units, the present invention does not have any limitation.

[00124] On the other hand, because of partial overlap between the end of the second connecting-groove unit 242a' and the end of the first communicating-groove unit 122a',

partial overlap between the end of second connecting-groove unit 242a' and the end of the second communicating-groove structure 130', partial overlap between the end of the first connecting-groove unit 142a' and the end of the third communicating-groove unit 222a', and partial overlap between the end of the first connecting-groove unit 142a' and the end of the fourth communicating-groove structure 230', the heat-exchange fluid flowed to any connecting-groove unit or any communicating-groove unit be separated into two communicating-groove units with partial overlap or two connecting-groove units with partial overlap. The above heat-exchange fluid separated into two communicating-groove units or two connecting-groove units will be confluent to the connecting-groove unit overlapped with the two communicating-groove units simultaneously or the communicating-groove unit overlapped with the two communicating-groove units simultaneously. That is, the heat-exchange fluid will be separated and confluent in the process of flowing through each groove unit constantly. Therefore, there being have a maximum contact area between each fin and the heat-exchange fluid in the process of the heat-exchange fluid flowing through the heat exchanger 10'. The heat-exchange process will be performed between the heat-exchange fluids flowing through each connecting-groove unit or communicating-groove unit and the heat exchanger 10', further make the heat exchanger 10' have a good heat-exchange efficiency.

[00125] Furthermore, in order to have a shorter and direct heat-exchange path between the first heat-exchange fluid F1 with higher temperature in the first guiding channel C1' and the second heat-exchange fluid F2 with lower temperature in the second guiding channel C2' in the present embodiment, the first communicating-groove assemblies 122' and the first connecting-groove assemblies 142' arranged in the first body 110' are

staggered along the disposing axis L3, and the third communicating-groove assemblies 222' and the second connecting-groove assemblies 242' arranged in the second body 210' are staggered along the disposing axis L3 similarly. As a result, the first guiding channel C1' and the second guiding channel C2' are the relationship of the adjacent upper and lower. Therefore, there will be a shorter and direct heat-exchange path between the first heat-exchange fluid F1 with higher temperature in the first guiding channel C1' and the second heat-exchange fluid F2 with lower temperature in the second guiding channel C2', thereby allowing the heat-exchange process of the heat exchanger 10' efficiently.

[00126] Next, other types of fins in the present embodiment will be illustrated. The third fin 300' of the present embodiment has a first inlet structure 310' and a first outlet structure 320', and the fourth fin 400' has a second inlet structure 410' and a second the outlet structure 420'. The first inlet structure 310' and the first outlet structure 320' are connected to the two ends of the first guiding channel C1', and the second inlet structure 410' and the second the outlet structure 420' are connected to the two ends of the second guiding channel C2'. The first inlet structure 310' are the first communicating-groove structure 120' are communicated with each other, the first outlet structure 320' and the second communicating-groove structure 130' are communicated with each other, the second inlet structure 410' and the third communicating-groove structure 220' are communicated with each other, and the second the outlet structure 420' and the fourth communicating-groove structure 230' are communicated with each other. The projection area of the first inlet structure 310' and the first outlet structure 320' of the third fin 300' in the fourth fin 400' is not overlapped with the second inlet structure 410' and the second the outlet structure 420'. Similarly, in order to increase the

heat-exchange area between the heat-exchange fluid and the fin, the first inlet structure 310' are also constituted of multiple first inlet units 312' arranged along the disposing axis L3, and the second inlet structure 410' are constituted of multiple second inlet units 412' arranged along the disposing axis L3. The projection area of the first inlet units 312' in first body 110' is overlapped with the first communicating-groove structure 120', and the projection area of the second inlet units 412' in the second body 210' is overlapped with the third communicating-groove structure 220'. That is, the first inlet units 312' and the first communicating-groove structure 120' are communicated with each other, and the second inlet units 412' and the third communicating-groove structure 220' are communicated with each other.

[00127] In addition, the fifth fin 500' has a first through hole 510' and a second through hole 520', and the sixth fin 600' has a third through hole 610' and a fourth through hole 620'. One side of the first inlet structure 310' is communicated with the first communicating-groove structure 120', and another side of the first inlet structure 310' is communicated with the first through hole 510'. One side of the first outlet structure 320' is communicated with the second communicating-groove structure 130', and another side of the first outlet structure 320' is communicated with the second through hole 520'. One side of the second inlet structure 410' is communicated with the third communicating-groove structure 220', and another side of the second inlet structure 410' is communicated with the third through hole 610'. One side of the second the outlet structure 420' is communicated with the fourth communicating-groove structure 230', and another side of the second the outlet structure 420' is communicated with the fourth through hole 620'.

[00128] Therefore, the first heat-exchange fluid F1 with higher temperature can flow

into the first guiding channel C1' through the first through hole 510' and the first inlet structure 310', and flows out of the heat exchanger 10' through the first outlet structure 320' and the second through hole 520' after flowing out of the first guiding channel C1'. On the other hand, the second heat-exchange fluid F2 with lower temperature can flow into the second guiding channel C2' through the third through hole 610' and the second inlet structure 410', and flows out of the heat exchanger 10' through the second the outlet structure 420' and fourth through hole 620' after flowing out of the second guiding channel C2'. By the above connection, the heat-exchange process can be performed between the first heat-exchange fluid F1 with higher temperature and the second heat-exchange fluid F2 with lower temperature of the heat exchanger 10'. In the present embodiment, the heat exchanger 10' further includes a seventh fin 700' and an eighth fin 800'. The seventh fin 700' and the eighth fin 800' are disposed in the two sides of the assembly of the first fin 100', the second fin 200', the third fin 300', the fourth fin 400', the fifth fin 500', and sixth fin 600' along the assembly axis L1, and the heat-exchange fluids can flow into or out of the heat exchanger 10' through a opening disposed in the seventh fin 700' or the eighth fin 800'.

[00129] The present embodiment takes the stagger of a first fin 100' and a second fin 200' along the assembly axis L1 mainly for example. In other embodiments, multiple first fins 100' can be assembled in advance, and multiple second fins 200' can be assembled in advance. And then, the assembly of the first fins 100' and the assembly of the second fins 200' can be staggered to constitute another heat exchanger. About the staggered method of the assembly of the first fins 100' and the second fins 200', the present invention does not have any limitation. In addition, the present embodiment is constituted of at least a first fin 100' and at least a second fin 200' mainly, the assembled

type of the third fin 300', the fourth fin 400', the fifth fin 500', the fifth fin 500', the sixth fin 600', the seventh fin 700', and the eighth fin 800' opposite to the location of the first fin 100' and the second fin 200' as described in above is one of various embodiments. It is within the scope and spirit of the present invention as long as the appropriate disposing type for the first guiding channel C1' and the second guiding channel C2' flowing smoothly, and the present invention does not have any limitation.

[00130] FIG. 4A is a schematic view illustrating another heat exchanger according to one embodiment of the present invention. FIG. 4B is an exploded view illustrating the heat exchanger depicted in FIG. 4A. FIG. 4C is an enlarged schematic view illustrating a region of R depicted in FIG. 4B. FIG. 4D is a plane schematic view illustrating the heat exchanger depicted in FIG. 4B. FIG. 4E is an enlarged schematic view illustrating the first fin depicted in FIG. 4D. FIG. 4F is an enlarged schematic view illustrating the second fin depicted in FIG. 4D. FIG. 4G is a schematic view illustrating a stack of the first fin depicted in FIG. 4E and the second fin depicted in FIG. 4F. Referring to FIG. 4A, FIG. 4B, FIG. 4C, FIG. 4D, FIG. 4E, FIG. 4F, and FIG. 4G, the heat exchanger 10'' of the present embodiment includes a first fin 100'', a second fin 200'', a third fin 300'', a fourth fin 400'', a fifth fin 500'', and a sixth fin 600''. The first fin 100'', the second fin 200'', the third fin 300'', the fourth fin 400'', the fifth fin 500'', and sixth fin 600'' are, for example, rectangular sheets, and contacted along the assembly axis L1.

[00131] The third fin 300'' and the fourth fin 400'' are disposed in the two sides of the assembly of the first fin 100'' and the second fin 200'' along the assembly axis L1 respectively, and the fifth fin 500'' and the sixth fin 600'' are disposed in the two sides of the assembly of the first fin 100'', the second fin 200'', the third fin 300'', and the fourth fin 400'' along the assembly axis L1 respectively. In the present embodiment, the

second fin 200'' is, for example, an inverted state of the first fin 100''. The inverted state is, for example, the state of the rotating 180 degrees of the first fin 100'' along the assembly axis L1. The second fin 200'' also be other inverted state of the first fin 100'', including but not limited to this type. In addition, the fourth fin 400'' is, for example, an inverted state of the third fin 300'', and the sixth fin 600'' is, for example, an inverted state of the fifth fin 500''.

[00132] The heat exchanger 10'' of the present embodiment is constituted of at least a first fin 100'' and at least a second fin 200'' mainly, and the first fin 100'' and the second fin 200'' will be illustrated in detail as follow. The first fin 100'' has a first body 110'', a first communicating-groove structure 120'', a second communicating-groove structure 130'', and a first connecting-groove structure 140'', wherein the first communicating-groove structure 120'', the second communicating-groove structure 130'', and the first connecting-groove structure 140'' are disposed in first body 110'', The first communicating-groove structure 120'' has multiple first communicating-groove assemblies 122'' arranged in the first body 110'' along the disposing axis L3, and the first connecting-groove structure 140'' has multiple first connecting-groove assemblies 142'' arranged in the first body 110'' along the disposing axis L3. Each first communicating-groove assembly 122'' has multiple first communicating-groove units 122a'' arranged in the first body 110'' along a connecting axis L2, and each first connecting-groove assembly 142'' has multiple first connecting-groove units 142a'' arranged in the first body 110'' along the connecting axis L2. In addition, the second communicating-groove structure 130'' is, for example, constituted of multiple second communicating-groove units 132a'' arranged in the first body 110'' along the disposing axis L3. Each second communicating-groove unit 132a''

is, for example, arranged in one side of the corresponding first communicating-groove assembly 122'' along the connecting axis L2.

[00133] Each second fin 200'' has a second body 210'', a third communicating-groove structure 220'', a fourth communicating-groove structure 230'', and a second connecting-groove structure 240'', wherein the third communicating-groove structure 220'', the fourth communicating-groove structure 230'', and the second connecting-groove structure 240'' are disposed in the second body 210''. The third communicating-groove structure 220'' has multiple third communicating-groove assemblies 222'' arranged in the second body 210'' along the disposing axis L3, and the second connecting-groove structure 240'' has multiple second connecting-groove assemblies 242'' arranged in the second body 210'' along the disposing axis L3. Each third communicating-groove assembly 222'' has multiple third communicating-groove unit 222a'' arranged in the second body 210'' along the connecting axis L2, and each second connecting-groove assembly 242'' has multiple second connecting-groove units 242a'' arranged in the second body 210'' along the connecting axis L2. Besides, the fourth communicating-groove structure 230'' is, for example, constituted of multiple fourth communicating-groove units 232a'' arranged in the second body 210'' along the disposing axis L3. Each fourth communicating-groove unit 232a'' is, for example, arranged in one side of the corresponding third communicating-groove assembly 222'' along the connecting axis L2.

[00134] In the heat exchanger 10' of the above embodiment, the connecting-groove unit or the communicating-groove unit is, for example, a strip type structure. But in the heat exchanger 10'' of the present embodiment, the connecting-groove unit or the communicating-groove unit is, for example, diamond type structure. That is, the first

communicating-groove unit 122a'', the third communicating-groove unit 222a'', the first connecting-groove unit 142a'', and the second connecting-groove unit 242a'' are, for example, diamond type structures. The connecting-groove unit or the communicating-groove unit of the present embodiment can be a circular type structure or a triangular type structure, the present invention does not have any limitation.

[00135] From the above, in the first fin 100'', the first communicating-groove structure 120'' also includes a first mainstream channel 124'', and the first communicating-groove assembly 122'' is, for example, a tributary channel. The tributary channels constituted of the first communicating-groove assemblies 122'' are connected with the first mainstream channel 124'' along the connecting axis L2. The first connecting-groove structure 140'' further includes a second mainstream channel 144'', and each first connecting-groove assembly 142'' is, for example, a tributary channel, the tributary channels constituted of the first connecting-groove assemblies 142'' are connected with the second mainstream channel 144'' along the connecting axis L2. The second communicating-groove structure 130'' is disposed between the second mainstream channel 144'' and the first communicating-groove structure 120''. In detail, each second communicating-groove unit 132a'' is disposed between the second mainstream channel 144'' and the corresponding first communicating-groove assembly 122''.

[00136] Similarly, in the second fin 200'', the third communicating-groove structure 220'' further includes a third mainstream channel 224'', and each third communicating-groove assembly 222'' is, for example, a tributary channel. The tributary channels constituted of the third communicating-groove assemblies 222'' are connected with the third mainstream channel 224'' along the connecting axis L2. The

second connecting-groove structure 240'' further includes a fourth mainstream channel 244'', and each second connecting-groove assembly 242'' is, for example, a tributary channel. The tributary channels constituted of the second connecting-groove assemblies 242'' are connected with the fourth mainstream channel 244'' along the connecting axis L2. The fourth communicating-groove structure 230'' is disposed between the fourth mainstream channel 244'' and the third communicating-groove structure 220''. In detail, each fourth communicating-groove unit 232a'' is disposed between the fourth mainstream channel 244'' and the corresponding third communicating-groove assembly 222''.

[00137] The first communicating-groove structure 120'', the first connecting-groove structure 140'', the third communicating-groove structure 220'', the second connecting-groove structure 240'' are, for example, similar to the "claw" type structure or the "E" type structure. The first communicating-groove structure 120'' and the first connecting-groove structure 140'' are embedded with each other in first body 110'', and the third communicating-groove structure 220'' and the second connecting-groove structure 240'' are embedded with each other in the second body 210''. That is, in the first body 110'', one first communicating-groove structure 120'' is disposed between two first connecting-groove structures 140'', and one first connecting-groove structure 140'' is disposed between two first communicating-groove structures 120''. Similarly, in the second body 210'', one third communicating-groove structures 220'' is disposed between two second connecting-groove structure 240'', and one second connecting-groove structure 240'' is disposed between two third communicating-groove structures 220''.

[00138] When the first fin 100'', the second fin 200'', the third fin 300'', the fourth fin

400'', the fifth fin 500'', and the sixth fin 600'' are contacted along the assembly axis L1, the projection area of the second connecting-groove structure 240'' in first body 110'' is overlapped with the first communicating-groove structure 120'' and the second communicating-groove structure 130'', and the projection area of the first connecting-groove structure 140'' in the second body 210'' is overlapped with the third communicating-groove structure 220'' and the fourth communicating-groove structure 230''. Further, one end of each second connecting-groove assembly 242'' of the second fin 200'' is overlapped with the first communicating-groove structure 120'' of the adjacent the first fin 100'' along the connecting axis L2. The other end of the second connecting-groove assembly 242'' is overlapped with the second communicating-groove structure 130'' of the first fin 100'', and the first mainstream channel 124'' and the fourth mainstream channel 244'' are communicated with each other. In addition, one end of each first connecting-groove assembly 142'' of the first fin 100'' is overlapped with the third communicating-groove structure 220'' of the adjacent second fin 200'' along the connecting axis L2. The other end of the first connecting-groove assembly 142'' is overlapped with the fourth communicating-groove structure 230'' of the second fin 200'', and the third mainstream channel 224'' and the second mainstream channel 144'' are communicated with each other. That is, the second connecting-groove assemblies 242'' are adapt to communicate with the first communicating-groove structure 120'', and the second communicating-groove structure 130'' and the first connecting-groove assemblies 142'' are adapt to communicate with the third communicating-groove structure 220'' and the fourth communicating-groove structure 230''.

[00139] Besides, because of the first communicating-groove structure 120'' having

multiple first communicating-groove assemblies 122'' arranged in the first body 110'' along the disposing axis L3 and each first communicating-groove assembly 122'' having multiple first communicating-groove units 122a'' arranged in the first body 110'' along the connecting axis L2, one end of the second connecting-groove unit 242a'' of the second fin 200'' is overlapped with one end of the first communicating-groove unit 122a'' of the adjacent first fin 100''. The other end of the second connecting-groove unit 242a'' is overlapped with one end of another first communicating-groove unit 122a'' of the first fin 100'' or the second communicating-groove structure 130'' of the first fin 100''.

[00140] Similarly, because of the third communicating-groove structure 220'' having multiple third communicating-groove assemblies 222'' arranged in the second body 210'' along the disposing axis L3 and each third communicating-groove assembly 222'' having multiple third communicating-groove units 222a'' arranged in the second body 210'' along the connecting axis L2, one end of the first connecting-groove unit 142a'' of the first fin 100'' is overlapped with one end of the third communicating-groove unit 222a'' of the adjacent second fin 200''. The other end of the first connecting-groove unit 142a'' is overlapped with one end of another third communicating-groove unit 222a'' of the second fin 200'' or the fourth communicating-groove structure 230'' of the second fin 200''. The two first communicating-groove units 122a'' overlapped with the second connecting-groove unit 242a'' are arranged in the first body 110'' along the connecting axis L2 adjacently. The two third communicating-groove units 222a'' overlapped with the first connecting-groove unit 142a'' are arranged in the second body 210'' along the connecting axis L2 adjacently.

[00141] As a result, the first guiding channel C1'' is constituted of the first

communicating-groove structure 120'', the second connecting-groove structure 240'', and the second communicating-groove structure 130'', and the second guiding channel C2'' is constituted of the third communicating-groove structure 220'', the first connecting-groove structure 140'', and the fourth communicating-groove structure 230''. The assembly axis L1, the disposing axis L3, and the connecting axis L2 are, for example, vertical to each other.

[00142] In addition, in the present embodiment, the first guiding channel C1'' is, for example, capable of flowing for the first heat-exchange fluid F1 with higher temperature, and the second guiding channel C2'' is, for example, capable of flowing for the second heat-exchange fluid F2 with lower temperature. The first guiding channel C1'' is, for example, a 「」 type guiding channel. The second guiding channel C2'' is, for example, a 「」 type guiding channel. The across area of the first guiding channel C1'' is, for example, across the cross-section of the heat exchanger 10''. Similarly, the across area of the second guiding channel C2'' also is, for example, across the cross-section of the heat exchanger 10''. That is, the across area of the first guiding channel C1'' and the across area of the second guiding channel C2'' are similar substantially. Therefore, the first heat-exchange fluid F1 and the second heat-exchange fluid F2 can perform the heat-exchange process effectively by flowing across the heat exchanger 10'' completely.

[00143] Different from the heat exchanger 10' of the above embodiment, in the present embodiment, multiple groove units arranged along the connecting axis L2 can be defined to a groove unit arrangement, and each groove assembly is constituted of multiple groove unit arrangements A. One groove assembly is constituted of the adjacent groove unit arrangements A staggered with each other. That is, the first

communicating-groove unit 122a'' of each first communicating-groove assembly 122'' is staggered with the adjacent first communicating-groove unit 122a'', the first connecting-groove unit 142a'' of each first connecting-groove assembly 142'' is staggered with the adjacent first connecting-groove unit 142a'', the third communicating-groove unit 222a'' of each third communicating-groove assembly 222'' is staggered with the adjacent third communicating-groove unit 222a'', and the second connecting-groove unit 242a'' of each second connecting-groove assembly 242'' is staggered with the adjacent second connecting-groove unit 242a'' .

[00144] Therefore, when the first fin 100'' and the second fin 200'' are contacted along the assembly axis L1, the second connecting-groove unit 242a'' of the second fin 200'' is communicated with the two adjacent first communicating-groove units 122a'' arranged along the disposing axis L3 and the two adjacent first communicating-groove units 122a'' arranged along the connecting axis L2 in the first fin 100'', the first connecting-groove unit 142a'' of the first fin 100'' is communicated with the two adjacent third communicating-groove units 222a'' arranged along the disposing axis L3 and the two adjacent third communicating-groove units 222a'' arranged along the connecting axis L2 in the second fin 200''. That is, one second connecting-groove unit 242a'' is communicated with four adjacent first communicating-groove units 122a'' of the first fin 100'', and one first connecting-groove unit 142a'' is communicated with four adjacent third communicating-groove units 222a'' of the second fin 200''. Although the above illustration take one connecting-groove unit communicated with adjacent four communicating-groove units for example, but the design of one connecting-groove unit communicated with adjacent four communicating-groove units are all within the spirit and scope of this invention, including but not limited to this type.

[00145] From the above, the present embodiment also has better heat-exchange efficiency by the design of one connecting-groove unit communicated with multiple adjacent communicating-groove units and frequent flow separation. The design of each groove assembly constituted of multiple groove units further increases the heat-exchange area between the heat-exchange fluid and the fin substantially, and upgrades the heat-exchange efficiency of the heat exchanger 10''. In addition, because of one end of the two connected groove units overlapped with each other partially in the present embodiment, the heat-exchange fluid flowed to the connecting-groove unit or the communicating-groove unit will be separated or confluent continuously by the groove wall as described in above embodiment. Therefore, in the process of the heat-exchange fluid flowing through the heat exchanger 10'', there will be a largest contact area between each fin and the heat-exchange fluid, and the heat exchanger 10'' can perform the heat-exchange process in each connecting-groove unit or communicating-groove unit with the heat-exchange fluid, and make the heat exchanger 10'' have a good heat-exchange efficiency.

[00146] Worth mentioning is that the groove units of the present embodiment are, for example, a diamond type structure. The inner wall of the groove unit has at least a slope structure, so that the heat-exchange fluid will separated toward multiple directions after the heat-exchange fluid colliding with the end of the groove unit. There will be produced a serious turbulence to make the heat-exchange fluid in one section perform the heat-exchange stably.

[00147] Afterwards, other fins of the present embodiment will be illustrated as follow. The third fin 300'' of the present embodiment has a first inlet structure 310'' and a first outlet structure 320'', and the fourth fin 400'' has a second inlet structure 410'' and a

second the outlet structure 420''. The first inlet structure 310'' and the first outlet structure 320'' are connected to the two ends of the first guiding channel C1'', and the second inlet structure 410'' and the second the outlet structure 420'' are connected to the two ends of the second guiding channel C2''. The first outlet structure 320'' of the third fin 300'' is, for example, constituted of multiple first the outlet units 322'' arranged along the disposing axis L3. The second the outlet structure 420'' is, for example, constituted of multiple second the outlet unit 422'' arranged along the disposing axis L3. The projection area of the first the outlet units 322'' in first body 110'' is overlapped with the second communicating-groove structure 130'', and the projection area of the second the outlet unit 412'' in the second body 210'' is overlapped with the fourth communicating-groove structure 230''. the projection area of the first inlet structure 310'' and the first outlet structure 320'' of the third fin 300'' in the fourth fin 400'' is not overlapped with the second inlet structure 410'' and the second the outlet structure 420''.

[00148] Therefore, when the third fin 300'' and the fourth fin 400'' are disposed in the two sides of the assembly of the first fin 100'' and the second fin 200'' along the assembly axis L1 respectively, the first the outlet units 322'' and the second communicating-groove structure 130'' are communicated with each other, and the second the outlet units 422'' and the fourth communicating-groove structure 220'' are communicated with each other. That is, the first outlet structure 320'' is communicated with the second communicating-groove structure 130'', and the second the outlet structure 420'' is communicated with the fourth communicating-groove structure 230''. In addition, in the present embodiment, the first inlet structure 310'' is communicated with the first communicating-groove structure 120'', and the second inlet structure 410''

is communicated with the third communicating-groove structure 220''. The first outlet structure 320'' of the third fin 300'' is, for example, constituted of multiple first the outlet units 322'' arranged along the disposing axis L3. The second outlet structure 410'' is, for example, constituted of multiple second outlet units 422'' arranged along the disposing axis L3. The design can increase the heat-exchange area between the heat-exchange fluid and the fin.

[00149] In addition, the fifth fin 500'' has a first through hole 510'' and a second through hole 520'', the sixth fin 600'' has a third through hole 610'' and a fourth through hole 620'', one side of the first inlet structure 310'' is communicated with the first communicating-groove structure 120'', another side of the first inlet structure 310'' is communicated with the first through hole 510'', one side of the first outlet structure 320'' is communicated with the second communicating-groove structure 130'', another side of the first outlet structure 320'' is communicated with the second through hole 520'', one side of the second inlet structure 410'' is communicated with the third communicating-groove structure 220'', another side of the second inlet structure 410'' is communicated with the third through hole 610'', one side of the second the outlet structure 420'' is communicated with the fourth communicating-groove structure 230'', another side of the second the outlet structure 420'' is communicated with the fourth through hole 620''.

[00150] As a result, the first heat-exchange fluid F1 with higher temperature can flow into the first guiding channel C1' through the first through hole 510'' and the first inlet structure 310'', and flow out of the heat exchanger 10'' through the first outlet structure 320'' and the second through hole 520'' after flowing out of the first guiding channel C1''. On the other hand, the second heat-exchange fluid F2 with lower temperature can

flow into the second guiding channel C2'' through the third through hole 610'' and the second inlet structure 410'', and flow out of the heat exchanger 10'' through the second the outlet structure 420'' and fourth through hole 620'' after flowing out of the second guiding channel C2''. By the above connection, the heat-exchange process can be performed between the first heat-exchange fluid F1 with higher temperature and the second heat-exchange fluid F2 with lower temperature of the heat exchanger 10'. Similar to the heat exchanger 10' of the above embodiment, the heat exchanger 10'' of the present embodiment further includes a seventh fin 700'' and a eighth fin 800''. The seventh fin 700'' and the eighth fin 800'' are disposed in the two sides of the assembly of the first fin 100'', the second fin 200'', the third fin 300'', the fourth fin 400'', the fifth fin 500'', and sixth fin 600'' along the assembly axis L1, and the heat-exchange fluids can flow into or out of the heat exchanger 10'' through a opening disposed in the seventh fin 700'' or the eighth fin 800''.

[00151] The present embodiment takes the stagger of a first fin 100'' and a second fin 200'' along the assembly axis L1 mainly. In other embodiments, multiple first fins 100'' can be assembled in advance, and multiple second fins 200'' can be assembled in advance. And then, the assembly of the first fins 100'' and the assembly of the second fins 200'' can be staggered to constitute another heat exchanger. About the staggered method of the assembly of the first fins 100'' and the second fins 200'', the present invention does not have any limitation. In addition, the present embodiment is constituted of at least a first fin 100'' and at least a second fin 200'' mainly, the assembled type of the third fin 300'', the fourth fin 400'', the fifth fin 500'', the sixth fin 600'', the seventh fin 700'', and the eighth fin 800'' opposite to the location of the first fin 100'' and the second fin 200'' as described in above is one of various embodiments.

It is within the scope and spirit of the present invention as long as the appropriate disposing type for the first guiding channel C1'' and the second guiding channel C2'' flowing smoothly, and the present invention does not have any limitation.

[00152] Whether the heat exchanger 10, the heat exchanger 10', or the heat exchanger 10'' also has a good heat-exchange efficiency, and make the solar power system 1 of the invention upgrade the photo-electric conversion efficiency of the solar power system 1 efficiently and substantially.

[00153] To sum up, in the solar power system of the invention, at least two fins are set with multiple communicating-groove structures and connecting-groove structure in the heat exchanger respectively. In each fin, a communicating-groove structure is not communicated with a connecting-groove structure, and one communicating-groove structure is not communicated with another communicating-groove structure. When the fins are assembled, a communicating-groove structure of one fin is communicated with the adjacent communicating-groove structure through a connecting-groove structure of another fin. The communicating-groove structures are disposed in heat exchanger densely by various arrangements, further have a guiding channel with a good heat-exchange efficiency. Thus, the heat exchanger of the invention has two guiding channels to perform the heat-exchange process for the fluids with different temperatures.

[00154] In addition, since the heat exchanger of the invention is assembled by at least two types of fins staggered with each other and each fin has multiple communicating-groove structures and a connecting-groove structure, the heat-exchange fluid is forced to be confluent or separated constantly when The heat-exchange fluid flows into the heat exchanger. This increases the contact area between the

heat-exchange fluid and heat exchanger substantially, and increases the rate of the heat-exchange process of heat-exchange fluids to achieve good heat-exchange performance. Therefore, the second heat-exchange fluid is, for example, water. The first heat-exchange fluid is, for example, oil. The second heat-exchange fluid can be vaporized into steam rapidly and efficiently when the first heat-exchange fluid is heated via sunlight by the heat exchanger of the invention. The steam is applied to drive the power-generating device to produce a mechanical energy. The mechanical energy is transformed to an electric power, and the photo-electric conversion efficiency of the solar power system is upgraded substantially.

[00155] Furthermore, the solar power system of the invention not only performs the power generation process under sunlight, but also can perform the power generation process without sunlight. Without sunlight, the invention can apply the first heat-exchange fluid to keep in the high temperature state to perform the heat-exchange process. The high temperature state of the first heat-exchange fluid makes the second heat-exchange fluid steam to produce the above mechanical energy.

[00156] Although the invention has been described with reference to the above embodiments, it will be apparent to one of the ordinary skill in the art that modifications to the described embodiments may be made without departing from the spirit of the invention. Accordingly, the scope of the invention will be defined by the attached claims rather than by the above detailed descriptions.

WHAT IS CLAIMED IS:

1. A solar power system, suitable for converting sunlight to an electric power, comprising:

a heat exchanger, including at least a first fin and at least a second fin, each first fin has a first body, a first communicating-groove structure, a second communicating-groove structure, and a first connecting-groove structure, the first communicating-groove structure, the second communicating-groove structure, and the first connecting-groove structure are disposed in the first body, each second fin has a second body, a third communicating-groove structure, a fourth communicating-groove structure, and a second connecting-groove structure, the third communicating-groove structure, the fourth communicating-groove structure, and the second connecting-groove structure are disposed in the second body, each first fin and each second fin are contacted along a assembly axis, the first communicating-groove structure and the second communicating-groove structure are communicated with the second connecting-groove structure, the third communicating-groove structure and the fourth communicating-groove structure are communicated with the first connecting-groove structure, the first communicating-groove structure, the second connecting-groove structure, and the second communicating-groove structure constitute a first guiding channel, the third communicating-groove structure, the first connecting-groove structure, and the fourth communicating-groove structure constitute a second guiding channel, wherein a first heat-exchange fluid flows in the first guiding channel, a second heat-exchange fluid flows in the second guiding channel;

a heat-focusing device, suitable for receiving sunlight and focusing to the first heat-exchange fluid in the first guiding channel;

a power-generating device, one end of the power-generating device is communicated with a outlet of the second guiding channel, and the second heat-exchange fluid is suitable for driving the power-generating device to produce a mechanical energy;

a power-transforming device, connected to the power-generating device, and suitable for transforming the mechanical energy into a electric power; and

a power storage, connected to the power-transforming device, and the electric power is stored in the power storage.

2. The solar power system as recited in claim 1, wherein the first communicating-groove structure and the second communicating-groove structure are disposed in the two sides of the first body respectively, the third communicating-groove structure and the fourth communicating-groove structure are disposed in the two sides of the second body respectively, the projection area of the first communicating-groove structure of the first fin in the second body and the projection area of the second communicating-groove structure in the second body are not overlapped with the third communicating-groove structure and the fourth communicating-groove structure, the projection area of the first connecting-groove structure of the first fin in the second body is not overlapped with the second connecting-groove structure, the first guiding channel and the second guiding channel are not communicated with each other, and each first fin and each second fin are staggered along the assembly axis, the second fin is an inverted state of the first fin.

3. The solar power system as recited in claim 1, wherein the projection area of the first communicating-groove structure in the second body and the projection area of the second communicating-groove structure in the second body are overlapped with the

second connecting-groove structure respectively, the projection area of the third communicating-groove structure and the fourth communicating-groove structure of the second fin in the first body is overlapped with the first connecting-groove structure respectively.

4. The solar power system as recited in claim 1, wherein the heat exchanger further includes a third fin and a fourth fin, the fourth fin is an inverted state of the third fin, the third fin and the fourth fin are disposed in the two sides of the assembly of the first fin and the second fin along the assembly axis respectively, the third fin has a first inlet structure and a first outlet structure, the fourth fin has a second inlet structure and a second the outlet structure, the first inlet structure and the first outlet structure are connected to the two ends of the first guiding channel, the second inlet structure and the second outlet structure are connected to the two ends of the second guiding channel, the first inlet structure is communicated with the first communicating-groove structure, the first outlet structure is communicated with the second communicating-groove structure, the second inlet structure is communicated with the third communicating-groove structure, the second outlet structure is communicated with the fourth communicating-groove structure.

5. The solar power system as recited in claim 1, wherein the heat exchanger further includes at least a fifth fin, each fifth fin is disposed between the first fin and the second fin along the assembly axis, each fifth fin has a first through hole, a second through hole, a third through hole, and a fourth through hole, the first through hole and the second through hole are communicated with the first guiding channel, the third through hole and the fourth through hole are communicated with the second guiding channel, one side of the first through hole and the second through hole is communicated with the first

communicating-groove structure and the second communicating-groove structure respectively, another side of the first through hole and the second through hole is communicated with the two ends of the second connecting-groove structure respectively, one side of the third through hole and the fourth through hole is communicated with the third communicating-groove structure and the fourth communicating-groove structure respectively, another side of the third through hole and the fourth through hole is communicated with the two ends of the first connecting-groove structure respectively.

6. The solar power system as recited in claim 1, wherein the other end of the power-generating device is communicated with the inlet of the second guiding channel.

7. The solar power system as recited in claim 1, further includes a first heat-exchange fluid tank, a control valve, a second heat-exchange fluid tank, a control module, and a pump, wherein the first heat-exchange fluid is oil, the second heat-exchange fluid is water, the first heat-exchange fluid tank has a first heat-exchange fluid tank-inlet and a first heat-exchange fluid tank-outlet, the first heat-exchange fluid tank-inlet is communicated with the outlet of the first guiding channel, the first heat-exchange fluid tank-outlet is communicated with the inlet of the first guiding channel, the control valve is disposed between the outlet of the first guiding channel and the first heat-exchange fluid tank, the power-generating device is suitable for controlling a open state and a close state of the control valve, the second heat-exchange fluid tank is used to store the second heat-exchange fluid, and disposed between the power-generating device and the inlet of the second guiding channel, the control module is suitable for detecting the flow of the second heat-exchange fluid, and when the flow of the second heat-exchange fluid is lower than a default value, the control module controls the second heat-exchange fluid tank to be the open state to process a

supplement, the pump is used to drive the first heat-exchange fluid and the second heat-exchange fluid.

8. A solar power system, suitable for converting sunlight to an electric power, comprising:

a heat exchanger, including at least first fin and at least a second fin, each first fin has a first body, a first communicating-groove structure, a second communicating-groove structure, and a first connecting-groove structure, the first communicating-groove structure, the second communicating-groove structure, and the first connecting-groove structure are disposed in the first body, the first connecting-groove structure has multiple first connecting-groove assemblies arranged in the first body along a disposing axis, each second fin has a second body, a third communicating-groove structure, a fourth communicating-groove structure, and a second connecting-groove structure, the third communicating-groove structure, the fourth communicating-groove structure, and the second connecting-groove structure are disposed in the second body, the second connecting-groove structure has multiple second connecting-groove assemblies arranged in the second body along the disposing axis, each first fin and each second fin are connected along a assembly axis, the second connecting-groove assemblies are communicated with the first communicating-groove structure and the second communicating-groove structure, the first connecting-groove assemblies are communicated with the third communicating-groove structure and the fourth communicating-groove structure, the first communicating-groove structure, the second connecting-groove structure, and the second communicating-groove structure constitute a first guiding channel, the third communicating-groove structure, the first connecting-groove structure, and the fourth communicating-groove structure constitute

a second guiding channel, wherein a first heat-exchange fluid flows in the first guiding channel, a second heat-exchange fluid flows in the second guiding channel ;

a heat-focusing device, suitable for receiving sunlight and focusing to the first heat-exchange fluid in the first guiding channel;

a power-generating device, one end of the power-generating device is communicated with a outlet of the second guiding channel, and the second heat-exchange fluid is suitable for driving the power-generating device to produce a mechanical energy;

a power-transforming device, connected to the power-generating device, and suitable for transforming the mechanical energy into a electric power; and

a power storage, connected to the power-transforming device, and the electric power is stored in the power storage.

9. The solar power system as recited in claim 8, wherein one end of each second connecting-groove assembly of the second fin is overlapped with the first communicating-groove structure of the adjacent first fin in a connecting axis, the other end of each second connecting-groove assembly is overlapped with the second communicating-groove structure of the first fin, one end of each first connecting-groove assembly of the first fin is overlapped with the third communicating-groove structure of the adjacent second fin along the connecting axis, the other end of each first connecting-groove assembly is overlapped with the fourth communicating-groove structure of the second fin.

10. The solar power system as recited in claim 9, wherein the assembly axis, the disposing axis, and the connecting axis are vertical to each other, each first fin and each second fin are staggered along the assembly axis, the first guiding channel and the

second guiding channel are not communicated with each other, and the second fin is an inverted state of the first fin.

11. The solar power system as recited in claim 9, wherein the first communicating-groove structure has multiple first communicating-groove assemblies arranged in the first body along the disposing axis, the third communicating-groove structure has multiple third communicating-groove assemblies arranged in the second body along the disposing axis, one end of each second connecting-groove assembly of the second fin is overlapped with the first communicating-groove assembly of the adjacent first fin along the connecting axis, the other end of each second connecting-groove assembly is overlapped with the second communicating-groove structure along the connecting axis, one end of each first connecting-groove assembly of the first fin is overlapped with the third communicating-groove assembly of the adjacent second fin along the connecting axis, the other end of each first connecting-groove assembly is overlapped with the fourth communicating-groove structure along the connecting axis, the first communicating-groove assemblies and the first connecting-groove assemblies arranged in the first body are staggered along the disposing axis, the third communicating-groove assemblies and the second connecting-groove assemblies arranged in the second body are staggered along the disposing axis.

12. The solar power system as recited in claim 11, wherein each first communicating-groove assembly has at least a first communicating-groove unit arranged in the first body along the connecting axis, each first connecting-groove assembly has at least a first connecting-groove unit arranged in the first body along the connecting axis, each third communicating-groove assembly has at least a third

communicating-groove unit arranged in the second body along the connecting axis, each second connecting-groove assembly has at least a second connecting-groove unit arranged in the second body along the connecting axis, one end of the second connecting-groove unit of the second fin is overlapped with one end of the first communicating-groove unit of the adjacent first fin, the other end of the second connecting-groove unit is overlapped with one end of another first communicating-groove unit of the first fin or the second communicating-groove structure of the first fin, one end of the first connecting-groove unit of the first fin is overlapped with one end of the third communicating-groove unit of the adjacent second fin, the other end of the first connecting-groove unit is overlapped with one end of another third communicating-groove unit of the second fin or the fourth communicating-groove structure of the second fin.

13. The solar power system as recited in claim 12, wherein the two first communicating-groove units overlapped with the second connecting-groove unit are arranged in the first body along the connecting axis closely, and the two third communicating-groove units overlapped with the first connecting-groove unit are arranged in the second body along the connecting axis closely.

14. The solar power system as recited in claim 8, wherein the heat exchanger further includes a third fin and a fourth fin, the fourth fin is an inverted state of the third fin, the third fin and the fourth fin are disposed in the two sides of the assembly of the first fin and the second fin along the assembly axis respectively, the third fin has a first inlet structure and a first outlet structure, the fourth fin has a second inlet structure and a second the outlet structure, the first inlet structure and the first outlet structure are connected to the two ends of the first guiding channel, the second inlet structure and the

second outlet structure are connected to the two ends of the second guiding channel, the first inlet structure is communicated with the first communicating-groove structure, the first outlet structure is communicated with the second communicating-groove structure, the second inlet structure is communicated with the third communicating-groove structure, the second outlet structure is communicated with the fourth communicating-groove structure.

15. The solar power system as recited in claim 14, wherein the heat exchanger further includes a fifth fin and a sixth fin, the fifth fin and the sixth fin are disposed in the two sides of the assembly of each first fin, each second fin, each third fin, and each fourth fin along the assembly axis respectively, the fifth fin has a first through hole and a second through hole, the sixth fin has a third through hole and a fourth through hole, one side of the first inlet structure is communicated with the first communicating-groove structure, another side of the first inlet structure is communicated with the first through hole, one side of the first outlet structure is communicated with the second communicating-groove structure, another side of the first outlet structure is communicated with the second through hole, one side of the second inlet structure is communicated with the third communicating-groove structure, another side of the second inlet structure is communicated with the third through hole, one side of the second outlet structure is communicated with the fourth communicating-groove structure, another side of the second outlet structure is communicated with the fourth through hole, the sixth fin is the inverted state of the fifth fin.

16. The solar power system as recited in claim 8, wherein the other end of the power-generating device is communicated with the inlet of the second guiding channel.

17. The solar power system as recited in claim 8, further includes a first heat-exchange fluid tank, a control valve, a second heat-exchange fluid tank, a control module, and a pump, wherein the first heat-exchange fluid is oil, the second heat-exchange fluid is water, the first heat-exchange fluid tank has a first heat-exchange fluid tank-inlet and a first heat-exchange fluid tank-outlet, the first heat-exchange fluid tank-inlet is communicated with the outlet of the first guiding channel, the first heat-exchange fluid tank-outlet is communicated with the inlet of the first guiding channel, the control valve is disposed between the outlet of the first guiding channel and the first heat-exchange fluid tank, the power-generating device is suitable for controlling a open state and a close state of the control valve, the second heat-exchange fluid tank is used to store the second heat-exchange fluid, and disposed between the power-generating device and the inlet of the second guiding channel, the control module is suitable for detecting the flow of the second heat-exchange fluid, when the flow of the second heat-exchange fluid is lower than a default value, the control module controls the second heat-exchange fluid tank to be the open state to process a supplement, the pump is used to drive the first heat-exchange fluid and the second heat-exchange fluid.

18. A solar power system, suitable for converting sunlight to an electric power, comprising:

a heat exchanger, including at least a first fin and at least a second fin, each first fin has a first body, a first communicating-groove structure, a second communicating-groove structure, and a first connecting-groove structure, the first communicating-groove structure, the second communicating-groove structure, and the first connecting-groove structure are disposed in the first body, the first communicating-groove structure has multiple first communicating-groove assemblies

arranged in the first body along a disposing axis, the first connecting-groove structure has multiple first connecting-groove assemblies arranged in the first body along the disposing axis, each first communicating-groove assembly has multiple first communicating-groove units arranged in the first body along a connecting axis, each first connecting-groove assembly has multiple first connecting-groove units arranged in the first body along the connecting axis, each second fin has a second body, a third communicating-groove structure, a fourth communicating-groove structure, and a second connecting-groove structure, the third communicating-groove structure, the fourth communicating-groove structure, and the second connecting-groove structure are disposed in the second body, wherein the third communicating-groove structure has multiple third communicating-groove assemblies arranged in the second body along the disposing axis, the second connecting-groove structure has multiple second connecting-groove assemblies arranged in the second body along the disposing axis, each third communicating-groove assembly has multiple third communicating-groove units arranged in the second body along the connecting axis, each second connecting-groove assembly has multiple second connecting-groove units arranged in the second body along the connecting axis, each first fin and each second fin are connected along a assembly axis, the second connecting-groove assemblies are communicated with the first communicating-groove structure and the second communicating-groove structure, the first connecting-groove assemblies are communicated with the third communicating-groove structure and the fourth communicating-groove structure, the first communicating-groove unit of each first communicating-groove assembly is staggered with the adjacent first communicating-groove unit, the first connecting-groove unit of each first

connecting-groove assembly is staggered with the adjacent connecting-groove unit, the third communicating-groove unit of each third communicating-groove assembly is staggered with the adjacent third communicating-groove unit, the second connecting-groove unit of each second connecting-groove assembly is staggered with the adjacent second connecting-groove unit, the first communicating-groove structure, the second connecting-groove structure, and the second communicating-groove structure constitute a first guiding channel, the third communicating-groove structure, the first connecting-groove structure, and the fourth communicating-groove structure constitute a second guiding channel, wherein a first heat-exchange fluid flows in the first guiding channel, a second heat-exchange fluid flows in the second guiding channel;

a heat-focusing device, suitable for receiving sunlight and focusing to the first heat-exchange fluid in the first guiding channel;

a power-generating device, one end of the power-generating device is communicated with a outlet of the second guiding channel, and the second heat-exchange fluid is suitable for driving the power-generating device to produce a mechanical energy;

a power-transforming device, connected to the power-generating device, and suitable for transforming the mechanical energy into a electric power; and

a power storage, connected to the power-transforming device, and the electric power is stored in the power storage.

19. The solar power system as recited in claim 18, wherein one end of each second connecting-groove assembly of the second fin is overlapped with the first communicating-groove structure of the adjacent first fin along the connecting axis, the other end of each second connecting-groove assembly is overlapped with the second

communicating-groove structure of the first fin, one end of each first connecting-groove assembly of the first fin is overlapped with the third communicating-groove structure of the adjacent second fin along the connecting axis, the other end of each first connecting-groove assembly is overlapped with the fourth communicating-groove structure of the second fin.

20. The solar power system as recited in claim 19, wherein one end of the second connecting-groove unit of the second fin is overlapped with one end of the first communicating-groove unit of the adjacent first fin, the other end of the second connecting-groove unit is overlapped with one end of another first communicating-groove unit of the first fin or the second communicating-groove structure of the first fin, one end of the first connecting-groove unit of the first fin is overlapped with one end of the third communicating-groove unit of the adjacent second fin, the other end of the first connecting-groove unit is overlapped with one end of another third communicating-groove unit of the second fin or the fourth communicating-groove structure of the second fin.

21. The solar power system as recited in claim 20, wherein the two first communicating-groove units overlapped with the second connecting-groove unit are arranged in the first body along the connecting axis closely, and the two third communicating-groove units overlapped with the first connecting-groove unit are arranged in the second body along the connecting axis closely.

22. The solar power system as recited in claim 18, wherein the second connecting-groove unit of the second fin is communicated with the two adjacent first communicating-groove units of the first fin arranged along the disposing axis and the two adjacent first communicating-groove units arranged along the connecting axis, the

first connecting-groove unit of the first fin is communicated with the two adjacent third communicating-groove units of the second fin arranged along the disposing axis and the two adjacent third communicating-groove units arranged along the connecting axis.

23. The solar power system as recited in claim 18, wherein the second communicating-groove structure has multiple second communicating-groove units arranged in the first body along the disposing axis, each second communicating-groove unit is arranged in one side of the corresponding first communicating-groove assembly along the connecting axis, the fourth communicating-groove structure has multiple fourth communicating-groove units arranged in the second body along the disposing axis, each fourth communicating-groove unit is arranged in one side of the corresponding third communicating-groove assembly along the connecting axis.

24. The solar power system as recited in claim 18, wherein the first communicating-groove structure further includes a first mainstream channel, each first communicating-groove assembly constitutes to a tributary channel connected with the first mainstream channel along the connecting axis, the first connecting-groove structure further includes a second mainstream channel, each first connecting-groove assembly constitutes to another tributary channel connected with the second mainstream channel along the connecting axis, the third communicating-groove structure further includes a third mainstream channel, each third communicating-groove assembly constitutes to another tributary channel connected with the third mainstream channel along the connecting axis, the second connecting-groove structure further includes a fourth mainstream channel, each second connecting-groove assembly is connected with the fourth mainstream channel along the connecting axis, the first mainstream channel and the fourth mainstream channel are communicated with each other, the third mainstream

channel and the second mainstream channel are communicated with each other.

25. The solar power system as recited in claim 24, wherein the projection area of the second connecting-groove structure in the first body is overlapped with the first communicating-groove structure and the second communicating-groove structure, the projection area of the first connecting-groove structure in the second body is overlapped with the third communicating-groove structure and the fourth communicating-groove structure, the first communicating-groove structure, the first connecting-groove structure, the third communicating-groove structure, and the second connecting-groove structure are similar to the “claw” type structure or the “E” type structure.

26. The solar power system as recited in claim 25, wherein the first communicating-groove structure and the first connecting-groove structure are embedded in the first body, the third communicating-groove structure and the second connecting-groove structure are embedded in the first body, the second communicating-groove structure is disposed between the second mainstream channel and the first communicating-groove structure, the fourth communicating-groove structure is disposed between the fourth mainstream channel and the third communicating-groove structure.

27. The solar power system as recited in claim 18, wherein the heat exchanger further includes a third fin and a fourth fin, the third fin and the fourth fin are disposed in the two sides of the assembly of the first fin and the second fin along the assembly axis respectively, the third fin has a first inlet structure and a first outlet structure, the fourth fin has a second inlet structure and a second the outlet structure, the first inlet structure and the first outlet structure are connected to the two ends of the first guiding channel, the second inlet structure and the second outlet structure are connected to the

two ends of the second guiding channel, the first inlet structure is communicated with the first communicating-groove structure, the first outlet structure is communicated with the second communicating-groove structure, the second inlet structure is communicated with the third communicating-groove structure, the second outlet structure is communicated with the fourth communicating-groove structure.

28. The solar power system as recited in claim 27, further includes a fifth fin and a sixth fin, the fifth fin and the sixth fin are disposed in the two sides of the assembly of each first fin, each second fin, each third fin, and each fourth fin along the assembly axis respectively, the fifth fin has a first through hole and a second through hole, the sixth fin has a third through hole and a fourth through hole, one side of the first inlet structure is communicated with the first communicating-groove structure, another side of the first inlet structure is communicated with the first through hole, one side of the first outlet structure is communicated with the second communicating-groove structure, and another side of the first outlet structure is communicated with the second through hole, one side of the second inlet structure is communicated with the third communicating-groove structure, and another side of the second inlet structure is communicated with the third through hole, one side of the second outlet structure is communicated with the fourth communicating-groove structure, and another side of the second outlet structure is communicated with the fourth through hole.

29. The solar power system as recited in claim 18, wherein the other end of the power-generating device is communicated with the inlet of the second guiding channel.

30. The solar power system as recited in claim 18, further includes a first heat-exchange fluid tank, a control valve, a second heat-exchange fluid tank, a control module, and a pump, wherein the first heat-exchange fluid is oil, the second

heat-exchange fluid is water, the first heat-exchange fluid tank has a first heat-exchange fluid tank-inlet and a first heat-exchange fluid tank-outlet, the first heat-exchange fluid tank-inlet is communicated with the outlet of the first guiding channel, the first heat-exchange fluid tank-outlet is communicated with the inlet of the first guiding channel, the control valve is disposed between the outlet of the first guiding channel and the first heat-exchange fluid tank, the power-generating device is suitable for controlling a open state and a close state of the control valve, the second heat-exchange fluid tank is used to store the second heat-exchange fluid, and disposed between the power-generating device and the inlet of the second guiding channel, the control module is suitable for detecting the flow of the second heat-exchange fluid, when the flow of the second heat-exchange fluid is lower than a default value, the control module controls the second heat-exchange fluid tank to be the open state to process a supplement, the pump is used to drive the first heat-exchange fluid and the second heat-exchange fluid.