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(54)

LIQUID-COOLING SYSTEM FOR RAPID HEAT DISSIPATION IN COMPUTER.

(57)

The present invention discloses a liquid-cooling system for rapid heat dissipation in a computer comprising a computer body provided with a processor, a graphics card, a mainboard and a power supply, wherein the computer body is further provided with a liquid circulation system comprising a coolant storage tank, a pump, a processor cooling module, a mainboard cooling module, a graphics card cooling module and a power supply cooling module that communicate sequentially along coolant circulation direction and are connected sequentially through a number of circulation pipelines to form a coolant circuit. Through the reasonable arrangement of the coolant circulation pipelines, heat produced by the elements of the computer can be quickly dissipated, such that each piece of hardware can always be in an excellent working state and the performance release rates of the processor and the graphics card can be improved.

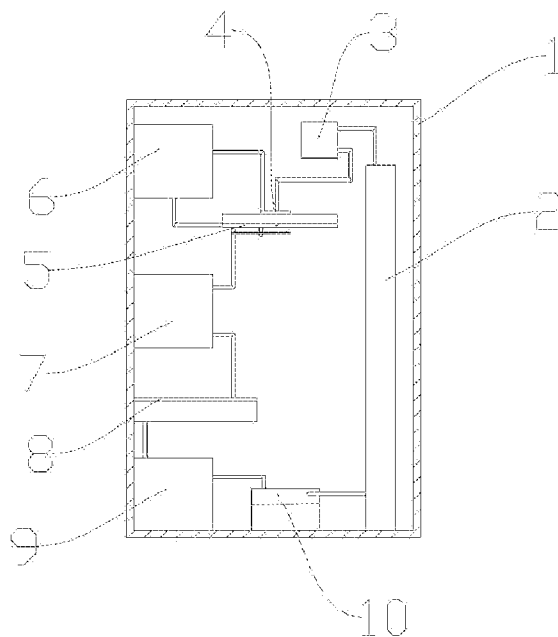


FIG. 2

DESCRIPTION**LIQUID-COOLING SYSTEM FOR RAPID HEAT DISSIPATION IN COMPUTER****TECHNICAL FIELD**

The present invention relates to a system for heat dissipation, in particular to a liquid-cooling system for rapid heat dissipation in a computer.

BACKGROUND

High-performance computers are generally equipped with high-performance processors and high-performance discrete graphics card, which will generate a large quantity of heat during high-load operation and thus lead to an elevated temperature. In order to ensure the hardware security, temperature monitoring devices are integrated in both the processor and graphics card. When the temperature reaches to a preset temperature in the BIOS of the computer, the computer will automatically operate at reduced frequency so as to reduce the heat produced and ensure the stable operation of the hardware. This situation is usually referred to as a "junction temperature" in the art. When the computer operates at a high load with an insufficient heat dissipation capacity of the case, heat produced by hardware such as the processor and the graphics card cannot be instantly dissipated, which causes frequent hit to the junction temperature during operation. At the moment, the computer will get stuck, show low working efficiency and even crash.

Therefore, the heat dissipation capacity of the computer is closely related to the performance and stable operation of the computer. Existing household computer equipment mostly adopts air-cooling heat dissipation means, while high-performance computers generally adopt liquid-cooling heat dissipation with high heat dissipation efficiency. The structural design of liquid-cooling heat dissipation can have a great impact on the heat dissipation effect. The liquid-cooling heat dissipation case with low heat dissipation efficiency often requires a large-capacity refrigerant container outside the case, which may compromise the portability and safety of the case.

SUMMARY

In order to solve the technical problems, the present invention provides a liquid-cooling system LU502132 for rapid heat dissipation in a computer which can effectively and rapidly cool the elements of the computer and dissipate heat.

The technical scheme of the present invention is as follows:

Provided is a liquid-cooling system for rapid heat dissipation in a computer comprising a computer body provided with a processor, a graphics card, a mainboard and a power supply, wherein the computer body is further provided with a liquid circulation system comprising a coolant storage tank, a pump, a processor cooling module, a mainboard cooling module, a graphics card cooling module and a power supply cooling module that communicate sequentially along coolant circulation direction and are connected sequentially through a number of circulation pipelines to form a coolant circuit;

the power supply cooling module comprises a power supply heat-absorption module for rapidly cooling the power supply and a power supply heat-dissipation module for dissipating heat in the coolant that absorbs heat from the power supply;

the mainboard cooling module comprises a mainboard heat-absorption module for rapidly cooling the mainboard and a mainboard heat-dissipation module for dissipating heat in the coolant that absorbs heat from the mainboard;

the processor cooling module comprises a processor heat-absorption module for rapidly cooling the processor and a processor heat-dissipation module for dissipating heat in the coolant that absorbs heat from the processor; and

the graphics card cooling module comprises a graphics card heat-absorption module for rapidly cooling the graphics card and a graphics card heat-dissipation module for dissipating heat in the coolant that absorbs heat from the graphics card.

Preferably, each of the power supply heat-absorption module, the mainboard heat-absorption module, the processor heat-absorption module and the graphics card heat-absorption module comprises a heat-absorption plate provided with a flexural coolant circulation channel, and the heat-absorption plate contacts with heating elements.

Preferably, the coolant circulation channel is horizontally flexural and fills the inside of the heat-absorption plate, and an inlet end and an outlet end of the coolant circulation channel are connected to the circulation pipelines.

Preferably, a silicone grease for rapidly transferring heat is provided between the heat-absorption plate and the element producing heat. U502132

Preferably, a heat-dissipation fan for dissipating heat from the heat-absorption plate is provided on the side of the heat-absorption plate away from the element producing heat.

Preferably, each of the power supply heat-dissipation module, the mainboard heat-dissipation module, the processor heat-dissipation module and the graphics card heat-dissipation module comprises a number of parallel copper fins stacked with gaps therebetween, the copper fin is provided with a plurality of circular holes arranged in a matrix array, a heat-dissipation copper pipeline passes through the circular hole, and an inlet and an outlet of the heat-dissipation copper pipeline communicate with the circulation pipelines.

Preferably, each of the power supply heat-dissipation module, the mainboard heat-dissipation module, the processor heat-dissipation module and the graphics card heat-dissipation module comprises a cooling fan.

The beneficial technical effects of the present invention are as follows:

- I. The coolant is driven by pump to flow in the cooling circuit and absorbs heat produced by the elements of the computer. Heat carried by the coolant is discharged by the heat-dissipation modules, and the circulating liquid coolant can quickly cool and dissipate heat of the mainboard, the processor, the graphics card and the power supply, such that the computer elements are damaged by overheating.
- II. Through the reasonable arrangement of the coolant circulation pipelines, heat produced by the elements of the computer can be quickly dissipated, such that each piece of hardware can always be in an excellent working state and the performance release rates of the processor and the graphics card can be improved. The liquid-cooling system does not need an external refrigerant container, which improves the portability and safety of the equipment.
- III. Through the connection of the heat-absorption plates provided in the heat-dissipation modules with the computer elements, and by the flexural coolant circulation channels in the heat-absorption plates and the heat-dissipation fans, the liquid-cooling heat dissipation effect can be improved and the heat dissipation efficiency is further promoted.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a structural schematic view of a liquid-cooling system for rapid heat dissipation in a computer according to the present invention;

FIG. 2 is a cross-sectional view of the liquid-cooling system for rapid heat dissipation in the computer according to the present invention; LU502132

FIG. 3 is a cross-sectional view of a heat-absorption plate of the liquid-cooling system for rapid heat dissipation in the computer according to the present invention;

FIG. 4 is a schematic view of the mechanism of the heat-absorption plate and a heat-dissipation fan of the liquid-cooling system for rapid heat dissipation in the computer according to the present invention;

FIG. 5 is a structural schematic view of a heat-dissipation copper pipeline and copper fins of the liquid-cooling system for rapid heat dissipation in the computer according to the present invention;

FIG. 6 is a front view of the heat-dissipation copper pipeline and the copper fins of the liquid-cooling system for rapid heat dissipation in the computer according to the present invention;

FIG. 7 is a structural schematic view of the heat-dissipation copper pipeline, the copper fins and a cooling fan of the liquid-cooling system for rapid heat dissipation in the computer according to the present invention.

In the drawings:

1-computer body, 2-coolant storage tank, 3-pump, 4-processor heat-absorption module, 5-mainboard heat-absorption module, 6-processor heat-dissipation module, 7-mainboard heat-dissipation module, 8-graphics card heat-absorption module, 9-graphics card heat-dissipation module, 10-power supply heat-absorption module, 11-heat-absorption plate, 12-coolant circulation channel, 13-heat-dissipation fan, 14-heat-dissipation copper pipelines, 15-copper fin, 16-cooling fan.

DETAILED DESCRIPTION

In order to allow the technical means of the present invention to be more clearly understood and to be implemented in accordance with the content of the specification, the specific mode of implementation of the present invention are further described in detail below with reference to the drawings and the embodiments. The following embodiments are used for illustrating the present invention but not for limiting the scope of the present invention.

In the description of the present invention, it should be noted that directions or positional relationships indicated by terms "center", "upper", "lower", "left", "right", "vertical",

"horizontal", "front", "back" and the like are those shown based on the drawings, and are merely intended to facilitate and simplify description rather than indicate or imply that the indicated device or element must have a specific direction and must be configured and operated according to the specific direction. Therefore, these directions or positional relationships should not be construed as limiting the present invention.

In the description of the present invention, it should be noted that, unless otherwise explicitly specified and defined, the terms "mount", "install", "connect", "arrange" and "provide" are to be construed broadly and, for example, may indicate a fixed connection or arrangement, or a detachable connection or arrangement, or an integral connection or arrangement. For those of ordinary skill in the art, the specific meanings of the aforementioned terms in the present invention can be understood according to specific conditions.

A specific embodiment discloses a liquid-cooling system for rapid heat dissipation in a computer comprising a computer body 1 provided with a processor, a graphics card, a mainboard and a power supply, wherein the computer body is further provided with a liquid circulation system comprising a coolant storage tank 2, a pump 3, a processor cooling module, a mainboard cooling module, a graphics card cooling module and a power supply cooling module that communicate sequentially along coolant circulation direction and are connected sequentially through a number of circulation pipelines to form a coolant circuit.

In this structure, the coolant can be driven by pump to flow in the cooling circuit and absorbs heat produced by the elements of the computer. Heat carried by the coolant is discharged by the heat-dissipation modules, and the circulating liquid coolant can quickly cool and dissipate heat of the mainboard, the processor, the graphics card and the power supply, such that the computer elements are damaged by overheating.

Furthermore, the power supply cooling module comprises a power supply heat-absorption module 10 for rapidly cooling the power supply and a power supply heat-dissipation module for dissipating heat in the coolant that absorbs heat from the power supply.

Furthermore, the mainboard cooling module comprises a mainboard heat-absorption module 5 for rapidly cooling the mainboard and a mainboard heat-dissipation module 7 for dissipating heat in the coolant that absorbs heat from the mainboard.

Furthermore, the processor cooling module comprises a processor heat-absorption module 4 for rapidly cooling the processor and a processor heat-dissipation module 6 for dissipating heat in the coolant that absorbs heat from the processor.

Furthermore, the graphics card cooling module comprises a graphics card heat-absorption module 8 for rapidly cooling the graphics card and a graphics card heat-dissipation module 9 for dissipating heat in the coolant that absorbs heat from the graphics card.

Furthermore, each of the power supply heat-absorption module, the mainboard heat-absorption module, the processor heat-absorption module and the graphics card heat-absorption module comprises a heat-absorption plate 11 provided with a flexural coolant circulation channel 12, and the heat-absorption plate contacts with heating elements.

Furthermore, the coolant circulation channel is horizontally flexural and fills the inside of the heat-absorption plate, and an inlet end and an outlet end of the coolant circulation channel are connected to the circulation pipelines.

Furthermore, a silicone grease for rapidly transferring heat is provided between the heat-absorption plate 11 and the element producing heat.

Furthermore, a heat-dissipation fan 13 for dissipating heat from the heat-absorption plate 11 is provided on the side of the heat-absorption plate away from the element producing heat.

Furthermore, each of the power supply heat-dissipation module, the mainboard heat-dissipation module, the processor heat-dissipation module and the graphics card heat-dissipation module comprises a number of parallel copper fins 15 stacked with gaps therebetween, the copper fin is provided with a plurality of circular holes arranged in a matrix array, a heat-dissipation copper pipeline 14 passes through the circular hole, and an inlet and an outlet of the heat-dissipation copper pipeline communicate with the circulation pipelines.

Furthermore, each of the power supply heat-dissipation module, the mainboard heat-dissipation module, the processor heat-dissipation module and the graphics card heat-dissipation module comprises a cooling fan 16.

The coolant is driven by pump to flow in the cooling circuit and absorbs heat produced by the elements of the computer. Heat carried by the coolant is discharged by the heat-dissipation modules, and the circulating liquid coolant can quickly cool and dissipate heat of the mainboard, the processor, the graphics card and the power supply, such that the computer elements are damaged by overheating. Through the reasonable arrangement of the coolant circulation

pipelines, heat produced by the elements of the computer can be quickly dissipated, such that LU502132 each piece of hardware can always be in an excellent working state and the performance release rates of the processor and the graphics card can be improved. The liquid-cooling system does not need an external refrigerant container, which improves the portability and safety of the equipment. Through the connection of the heat-absorption plates provided in the heat-dissipation modules with the computer elements, and by the flexural coolant circulation channels in the heat-absorption plates and the heat-dissipation fans, the liquid-cooling heat dissipation effect can be improved and the heat dissipation efficiency is further promoted.

The above description is only a preferred embodiment of the present invention and is not intended to limit the present invention. It should be noted that those of ordinary skills in the art can make various improvements and variations without departing from the technical principle of the present invention, and such improvements and variations shall also fall within the protection scope of the present invention.

CLAIMS

1. A liquid-cooling system for rapid heat dissipation in a computer comprising a computer body provided with a processor, a graphics card, a mainboard and a power supply, wherein the computer body is further provided with a liquid circulation system comprising a coolant storage tank, a pump, a processor cooling module, a mainboard cooling module, a graphics card cooling module and a power supply cooling module that communicate sequentially along coolant circulation direction and are connected sequentially through a number of circulation pipelines to form a coolant circuit;

the power supply cooling module comprises a power supply heat-absorption module for rapidly cooling the power supply and a power supply heat-dissipation module for dissipating heat in the coolant that absorbs heat from the power supply;

the mainboard cooling module comprises a mainboard heat-absorption module for rapidly cooling the mainboard and a mainboard heat-dissipation module for dissipating heat in the coolant that absorbs heat from the mainboard;

the processor cooling module comprises a processor heat-absorption module for rapidly cooling the processor and a processor heat-dissipation module for dissipating heat in the coolant that absorbs heat from the processor; and

the graphics card cooling module comprises a graphics card heat-absorption module for rapidly cooling the graphics card and a graphics card heat-dissipation module for dissipating heat in the coolant that absorbs heat from the graphics card.

2. The liquid-cooling system for rapid heat dissipation in the computer according to claim 1, wherein each of the power supply heat-absorption module, the mainboard heat-absorption module, the processor heat-absorption module and the graphics card heat-absorption module comprises a heat-absorption plate provided with a flexural coolant circulation channel, and the heat-absorption plate contacts with heating elements.

3. The liquid-cooling system for rapid heat dissipation in the computer according to claim 2, wherein the coolant circulation channel is horizontally flexural and fills the inside of the heat-absorption plate, and an inlet end and an outlet end of the coolant circulation channel are connected to the circulation pipelines.

4. The liquid-cooling system for rapid heat dissipation in the computer according to claim 2, wherein a silicone grease for rapidly transferring heat is provided between the heat-absorption plate and the element producing heat.

5. The liquid-cooling system for rapid heat dissipation in the computer according to claim 2, wherein a heat-dissipation fan for dissipating heat from the heat-absorption plate is provided on the side of the heat-absorption plate away from the element producing heat.
6. The liquid-cooling system for rapid heat dissipation in the computer according to claim 1, wherein each of the power supply heat-dissipation module, the mainboard heat-dissipation module, the processor heat-dissipation module and the graphics card heat-dissipation module comprises a number of parallel copper fins stacked with gaps therebetween, the copper fin is provided with a plurality of circular holes arranged in a matrix array, a heat-dissipation copper pipeline passes through the circular hole, and an inlet and an outlet of the heat-dissipation copper pipeline communicate with the circulation pipelines.
7. The liquid-cooling system for rapid heat dissipation in the computer according to claim 1, wherein each of the power supply heat-dissipation module, the mainboard heat-dissipation module, the processor heat-dissipation module and the graphics card heat-dissipation module comprises a cooling fan.

PATENTANSPRÜCHE

1. Wassergekühltes System zur schnellen Wärmeableitung für Computer, umfassend einen Computerkörper, in dem ein Prozessor, eine Grafikkarte, eine Hauptplatine und eine Stromversorgung vorgesehen sind, dadurch gekennzeichnet, dass in dem Computerkörper ferner ein Wasserzirkulationssystem vorgesehen ist, wobei das Wasserzirkulationssystem einen Kühlmittelspeicherkasten, eine Wasserpumpe, ein Prozessorkühlmodul, ein Hauptplatinenkühlmodul, ein Grafikkartenkühlmodul und ein Stromversorgungskühlmodul umfasst, die nacheinander entlang der Kühlmittelströmungsrichtung verbunden sind, wobei der Kühlmittelspeicherkasten, die Wasserpumpe, das Prozessorkühlmodul, das Hauptplatinenkühlmodul, das Grafikkartenkühlmodul und das Stromversorgungskühlmodul nacheinander durch eine Anzahl von Zirkulationsrohren verbunden sind, um einen Kühlmittelzirkulationskreislauf zu bilden;

wobei das Stromversorgungskühlmodul ein Stromversorgungswärmeabsorptionsmodul zum schnellen Abkühlen der Stromversorgung und ein Stromversorgungswärmeableitungsmodul zur Wärmeableitung des Kühlmittels, das die Wärme der Stromversorgung absorbiert hat, umfasst;

wobei das Hauptplatinenkühlmodul ein Hauptplatinenwärmeabsorptionsmodul zum schnellen Abkühlen der Hauptplatine und ein Hauptplatinenwärmeableitungsmodul zur Wärmeableitung des Kühlmittels, das die Wärme der Hauptplatine absorbiert hat, umfasst;

wobei das Prozessorkühlmodul ein Prozessorwärmeabsorptionsmodul zum schnellen Abkühlen des Prozessors und ein Prozessorwärmeableitungsmodul zur Wärmeableitung des Kühlmittels, das die Wärme des Prozessors absorbiert hat, umfasst;

wobei das Grafikkartenkühlmodul ein Grafikkartenwärmeabsorptionsmodul zum schnellen Abkühlen der Grafikkarte und ein Grafikkartenwärmeableitungsmodul zur Wärmeableitung des Kühlmittels, das die Wärme der Grafikkarte absorbiert hat, umfasst.

2. Wassergekühltes System zur schnellen Wärmeableitung für Computer nach Anspruch 1, dadurch gekennzeichnet, dass das Stromversorgungswärmeabsorptionsmodul, das Hauptplatinenwärmeabsorptionsmodul, das Prozessorwärmeabsorptionsmodul und das Grafikkartenwärmeabsorptionsmodul jeweils eine Wärmeabsorptionsplatte umfassen, wobei in

der Wärmeabsorptionsplatte ein mäanderförmiger Kühlmittelzirkulationskanal eingebracht ist und die Wärmeabsorptionsplatte in Kontakt mit einem Heizelement steht. LU502132

3. Wassergekühltes System zur schnellen Wärmeableitung für Computer nach Anspruch 2, dadurch gekennzeichnet, dass der Kühlmittelzirkulationskanal horizontal und mäanderförmig innerhalb der Wärmeabsorptionsplatte verlegt ist, und sowohl das Wassereinlassende als auch das Wasserauslassende des Kühlmittelzirkulationskanals mit den Zirkulationsrohren in Verbindung stehen.

4. Wassergekühltes System zur schnellen Wärmeableitung für Computer nach Anspruch 2, dadurch gekennzeichnet, dass zwischen der Wärmeabsorptionsplatte und dem Heizelement ein Silikonfett zur schnellen Wärmeübertragung vorgesehen ist.

5. Wassergekühltes System zur schnellen Wärmeableitung für Computer nach Anspruch 2, dadurch gekennzeichnet, dass die Wärmeabsorptionsplatte auf der vom Heizelement entfernten Seite mit einem Wärmeableitungslüfter zur schnellen Wärmeableitung der Wärmeabsorptionsplatte versehen ist.

6. Wassergekühltes System zur schnellen Wärmeableitung für Computer nach Anspruch 1, dadurch gekennzeichnet, dass das Stromversorgungswärmeableitungsmodul, das Hauptplatinenwärmeableitungsmodul, das Prozessorwärmeableitungsmodul und das Grafikkartenwärmeableitungsmodul jeweils eine Anzahl von gestapelten Kupferblechen umfassen, die parallel beabstandet angeordnet sind, wobei das Kupferblech mit einer Anzahl von kreisförmigen Löchern versehen ist, die im Matrixarray angeordnet sind, wobei durch das kreisförmige Loch ein Wärmeableitungskupferrohr verläuft, wobei sowohl der Einlass als auch der Auslass des Wärmeableitungskupferrohrs mit den Zirkulationsrohren in Verbindung stehen.

7. Wassergekühltes System zur schnellen Wärmeableitung für Computer nach Anspruch 1, dadurch gekennzeichnet, dass das Stromversorgungswärmeableitungsmodul, das Hauptplatinenwärmeableitungsmodul, das Prozessorwärmeableitungsmodul und das Grafikkartenwärmeableitungsmodul jeweils einen Kühllüfter umfassen.

FIGURES

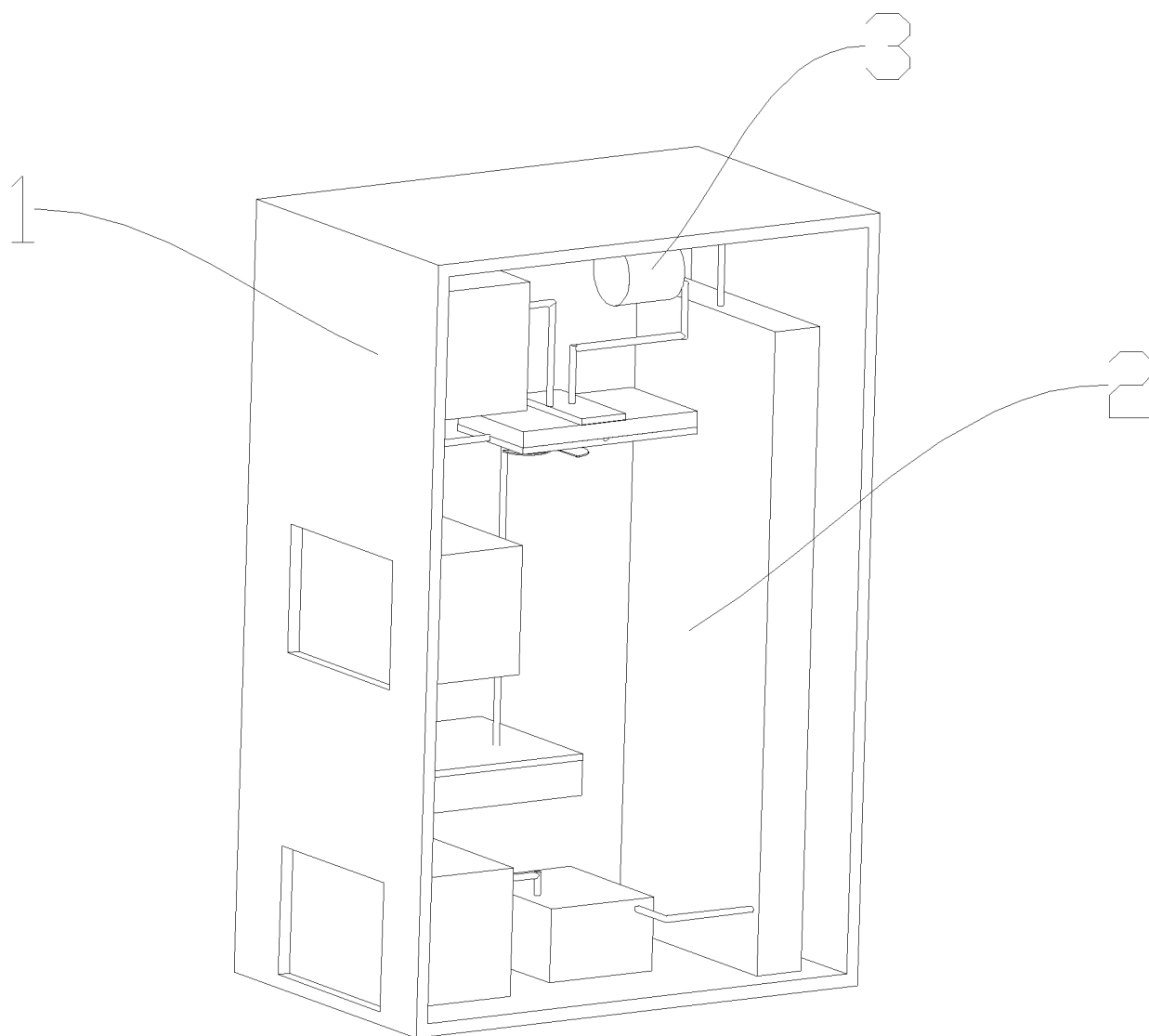


FIG. 1

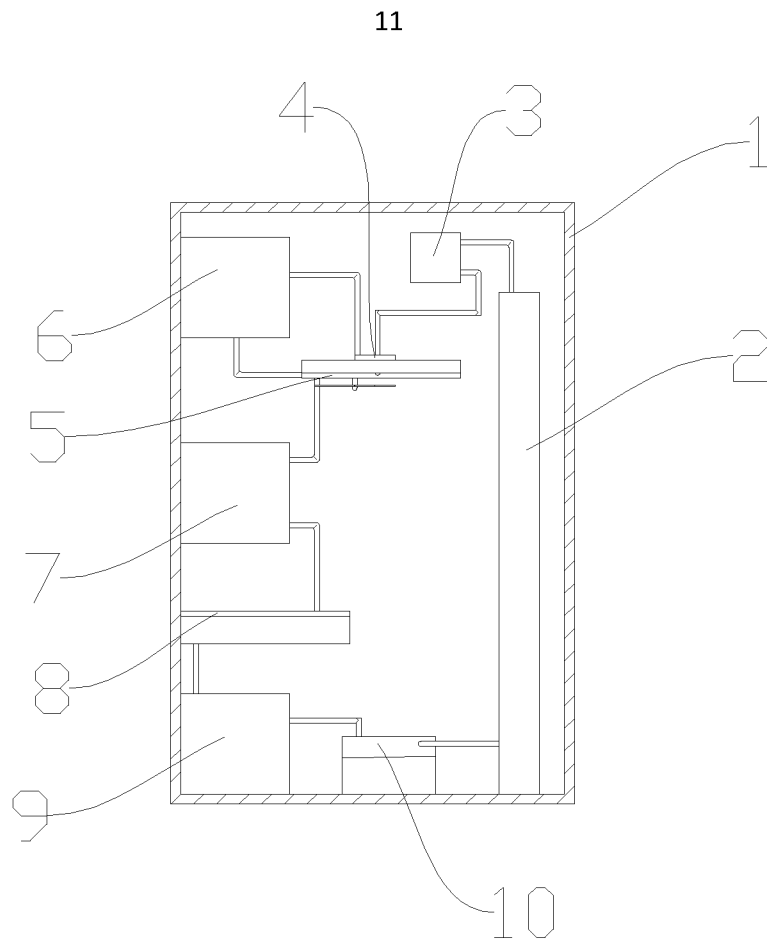


FIG. 2

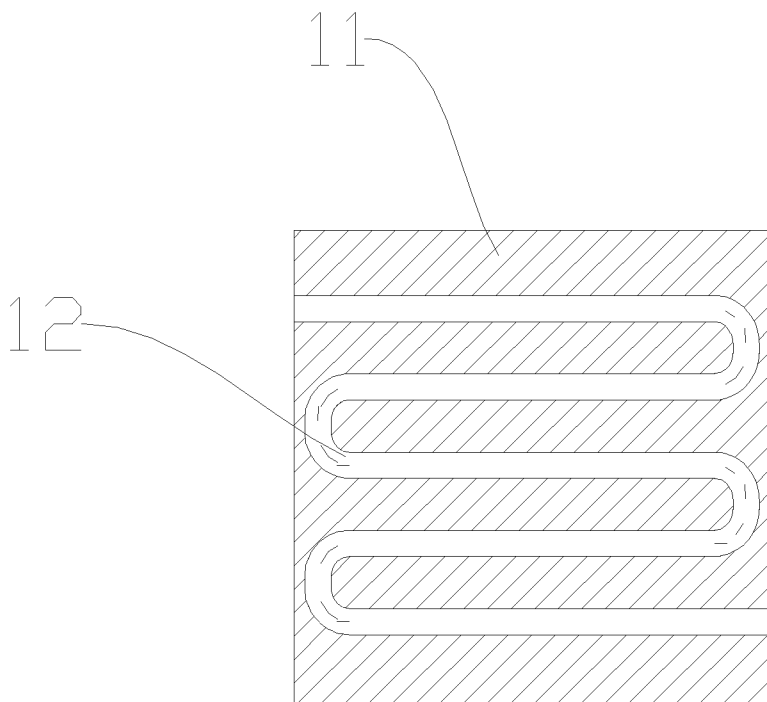


FIG. 3

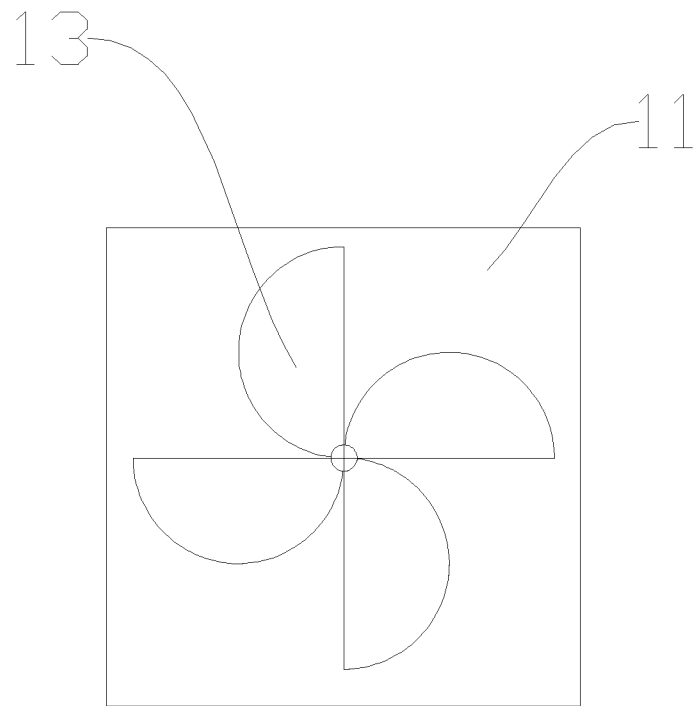


FIG. 4

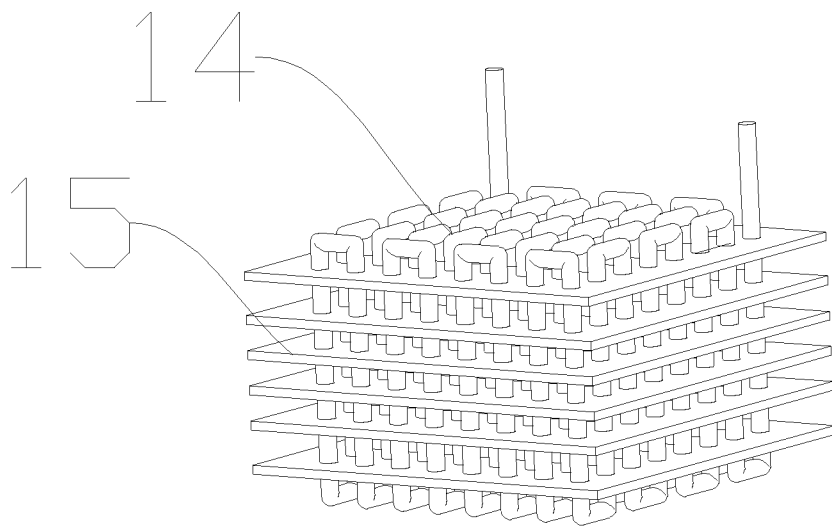


FIG. 5

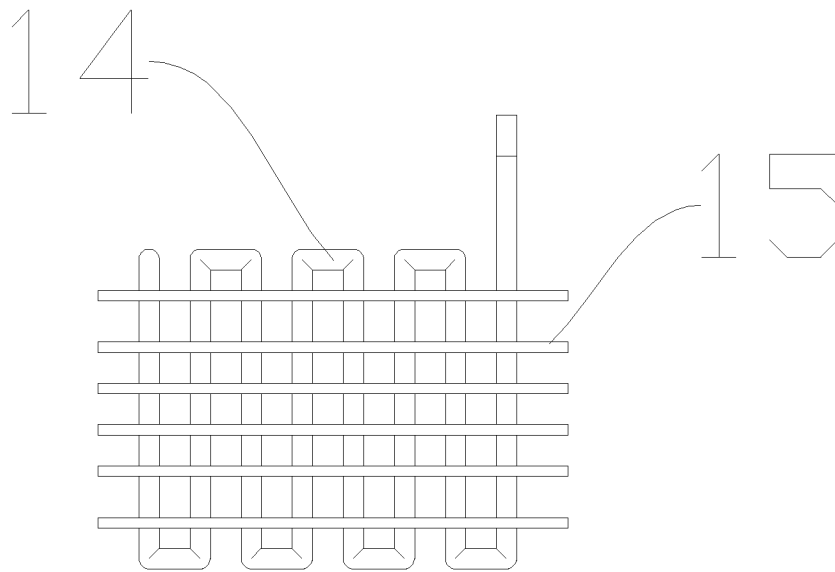


FIG. 6

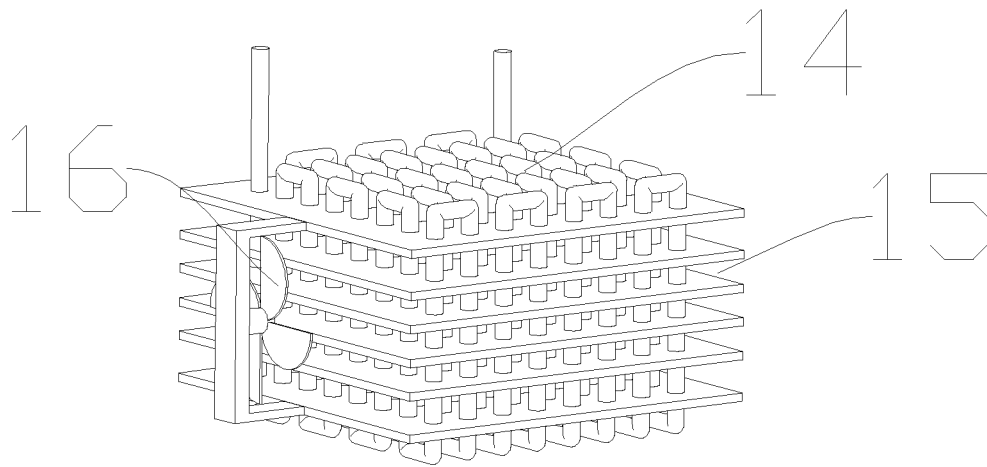


FIG. 7