

# TEMPERATURE REGULATION SYSTEM WITH HYBRID REFRIGERANT SUPPLY AND REGULATION

## BACKGROUND OF THE INVENTION

### 5 (a) Field of the invention

The present invention provides a temperature regulation system with hybrid refrigerant supply and regulation wherein a pressure-reducing regulator (R100) from an evaporator (EVA100) being controlled by a switch valve (V100) is installed between a condenser (CON100) and the  
10 evaporator (EVA100), and a refrigerant injector (IJ100) is installed between the condenser (CON100) and the evaporator (EVA100), and an electric control unit (ECU100) is provided for controlling the switch valve (V100) and the pressure-reducing regulator (R100) or for controlling the refrigerant injector (IJ100), such that both or at least one thereof is served  
15 to transport the refrigerant (REF100) to the interior or exterior of the evaporator (EVA100).

In the aspect of structure, after the refrigerant of a conventional dry-expansion type evaporator absorbs the thermal energy of icy water in a copper pipe, the refrigerant would become over-heating gas and return  
20 to the compressor, the icy water enters an enclosure and covers the exterior of the copper pipe; a flooded type evaporator is the evaporator having the refrigerant filled at the interior and the exterior, the refrigerant at the enclosure side maintains at a certain liquid level, wherein the refrigerant absorbs the thermal energy of icy water for being evaporated to  
25 gaseous refrigerant and returned to the compressor; a spray type evaporator utilizes a means of injecting the liquid refrigerant on a compressor for forming a flowing film which can be used to absorb the thermal energy of icy water for being evaporated to gaseous refrigerant and returned to the compressor; a falling type evaporator allows the liquid  
30 refrigerant in a dripping, columnar or sheet-like state to downwardly flow,

so bubbles formed by evaporating the refrigerant are driven by the gravity of liquid refrigerant so as to downwardly move along with the liquid refrigerant.

The present invention discloses a temperature regulation system with hybrid refrigerant supply and regulation, in which the refrigerant is injected by a refrigerant injector (IJ100) for allowing the refrigerant to be in a small particle or fine mist state and injected to the interior or exterior of an evaporator (EVA100), such that the refrigerant in the small particle or fine mist state is enabled to be accelerated for being injected to the surface of the evaporator (EVA100) thereby being diffused to films and evaporated, and forcing the gaseous refrigerant, which has already been evaporated, to be away from the surface of the evaporator (EVA100).

#### (b) Description of the Prior Art

For a conventional temperature regulation system applied in an air conditioning or freezing device, e.g. an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator and freezers or in a regulation device for lowering/increasing temperature or dehumidifying, the method of transporting refrigerant into an evaporator is to flow through a regulation coil or regulation valve so as to be passively sucked into the evaporator, the diffusion level and uniformity thereof are mostly poor.

### SUMMARY OF THE INVENTION

The present invention provides a temperature regulation system with hybrid refrigerant supply and regulation capable of being applied in an air conditioning or freezing device, e.g. an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator and freezers or in a regulation device for lowering/increasing temperature or dehumidifying, in which a conventional pressure-reducing regulator (R100) being in series connected with a switch valve (V100) is parallel

connected with a refrigerant injector (IJ100) and are both installed between the fluid outlet of the condenser (CON100) and an evaporator (EVA100), so the temperature regulation system with hybrid refrigerant supply and regulation is structured; and through settings of an operation  
5 input device (OID100) and control and regulation of an electric control unit (ECU100) and an driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting  
10 the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously  
15 utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

### **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a schematic view showing the main system structure of the  
20 foundational theories according to the present invention.

FIG. 2 is a schematic view showing the system structure of FIG. 1 being further installed with a temperature detector (TD100).

FIG. 3 is a schematic view showing the system structure of FIG. 1 being further installed with a liquid refrigerant detector (HD100).

25 FIG. 4 is a schematic view showing the system structure of FIG. 1 being further installed with a temperature detector (TD100) and a liquid refrigerant detector (HD100).

FIG. 5 is a schematic view showing the system structure of FIG. 4 being further installed with a fan (F101) for blowing air flow to pass  
30 through the evaporator (EVA100).

FIG. 6 is a schematic view showing the system structure of FIG. 4 being further installed with a fan (F101) for blowing air flow to pass through the evaporator (EVA100) and a fan (F102) for blowing air flow to pass through the condenser (CON100).

5        FIG. 7 is a system block diagram showing the evaporator (EVA100) of FIG. 4 being further combined with a heat exchanger (HE100).

FIG. 8 is a system block diagram showing FIG. 7 being further installed with a fan (F102).

## 10            **DESCRIPTION OF MAIN COMPONENT SYMBOLS**

CD100 : Driving circuit device

CON100 : Condenser

ECU100 : Electric control unit

EVA100 : Evaporator

15        F101 、 F102 : Fan

HD100 : Liquid refrigerant detector

HE100 : Heat exchanger

IJ100 : Refrigerant injector

OID100 : Operation input device

20        P100 : Pipeline

P200 : Secondary side pipeline

PUMP100 : Compressing pump

R100 : Pressure-reducing regulator

REF100 : Refrigerant

25        TD100 : Temperature detector

V100 : Switch valve

## **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

For a conventional temperature regulation system applied in an air  
30    conditioning or freezing device, e.g. an integral or separation type

cold/warm air conditioner, icy water type air conditioner, refrigerator and freezers or in a regulation device for lowering/increasing temperature or dehumidifying, the method of transporting refrigerant into an evaporator is to flow through a regulation coil or regulation valve so as to be  
5 passively sucked into the evaporator, the diffusion level and uniformity thereof are mostly poor;

The present invention provides a temperature regulation system with hybrid refrigerant supply and regulation wherein a pressure-reducing regulator (R100) from the evaporator (EVA100) being controlled by a  
10 switch valve (V100) is installed between a condenser (CON100) and a evaporator (EVA100), and a refrigerant injector (IJ100) is installed between the condenser (CON100) and the evaporator (EVA100), and an electric control unit (ECU100) is provided for controlling the switch valve (V100) and the pressure-reducing regulator (R100) or for controlling the  
15 refrigerant injector (IJ100), such that both or at least one thereof is served to transport the refrigerant (REF100) to the interior or exterior of the evaporator (EVA100);

In the aspect of structure, after the refrigerant of a conventional dry-expansion type evaporator absorbs the thermal energy of icy water in  
20 a copper pipe, the refrigerant would become over-heating gas and return to the compressor, the icy water enters an enclosure and covers the exterior of the copper pipe; a flooded type evaporator is the evaporator having the refrigerant filled at the interior and the exterior, the refrigerant at the enclosure side maintains at a certain liquid level, wherein the  
25 refrigerant absorbs the thermal energy of icy water for being evaporated to gaseous refrigerant and returned to the compressor; a spray type evaporator utilizes a means of injecting the liquid refrigerant on a compressor for forming a flowing film which can be used to absorb the thermal energy of icy water for being evaporated to gaseous refrigerant  
30 and returned to the compressor; a falling type evaporator allows the liquid

refrigerant in a dripping, columnar or sheet-like state to downwardly flow, so bubbles formed by evaporating the refrigerant are driven by the gravity of liquid refrigerant so as to downwardly move along with the liquid refrigerant.

5       The present invention discloses a temperature regulation system with hybrid refrigerant supply and regulation, in which the refrigerant is injected by a refrigerant injector (IJ100) for allowing the refrigerant to be in a small particle or fine mist state and injected to the interior or exterior of an evaporator (EVA100), such that the refrigerant in the small particle  
10 or fine mist state is enabled to be accelerated for being injected to the surface of the evaporator (EVA100) thereby being diffused to films and evaporated, and forcing the gaseous refrigerant, which has already been evaporated, to be away from the surface of the evaporator (EVA100).

      The present invention provides a temperature regulation system with  
15 hybrid refrigerant supply and regulation capable of being applied in an air conditioning or freezing device, e.g. an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator and freezers or in a regulation device for lowering/increasing temperature or dehumidifying, in which a conventional pressure-reducing regulator  
20 (R100) being in series connected with a switch valve (V100) is parallel connected with a refrigerant injector (IJ100) and are both installed between the fluid outlet of the condenser (CON100) and an evaporator (EVA100), so the temperature regulation system with hybrid refrigerant supply and regulation is structured; and through settings of an operation  
25 input device (OID100) and control and regulation of an electric control unit (ECU100) and an driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting  
30 the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the

switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously  
5 utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

According to this invention, embodiments of the temperature regulation system with hybrid refrigerant supply and regulation are as followings:

10 FIG. 1 is a schematic view showing the main system structure of the foundational theories according to the present invention;

As shown in FIG. 1, it main consists of:

--Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or  
15 digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;

--Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and  
20 related softwares, and provided for receiving commands sent by the operation input device (OID100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

25 --Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control  
30 and drive the refrigerant injector (IJ100) to inject the liquid refrigerant

(REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or  
5 to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in a  
10 integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to  
15 the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant  
20 injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100),  
25 and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Compressing pump (PUMP100): constituted by a fluid compressing  
30 pump rotationally or reciprocally driven by mechanical forces, motor

powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

5     --Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

      --Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series  
10   connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

      --Switch valve (V100): constituted by a fluid switch valve controlled by  
15   manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or  
20   closed;

      --Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to  
25   circulate therein;

      In the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes  
30   for supplying and regulating the refrigerant (REF100) to the evaporator

(EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

10        FIG. 2 is a schematic view showing the system structure of FIG. 1 being further installed with a temperature detector (TD100);

As shown in FIG. 2, it main consists of:

--Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;

--Temperature detector (TD100): provided for detecting the temperature generated by the evaporator and transferring to the electric control unit (ECU100);

--Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to

control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or to terminate the injection of the refrigerant injector (IJ100);

10     --Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in an integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity;

20     --Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging

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the liquid refrigerant (REF100) which has not completely been evaporated;

--Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

--Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

--Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

In the mentioned temperature regulation system with hybrid

refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

FIG. 3 is a schematic view showing the system structure of FIG. 1 being further installed with a liquid refrigerant detector (HD100).

As shown in FIG. 3, it mainly consists of:

--Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;

--Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100) and the detected signals sent by the liquid refrigerant detector (HD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the

electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control  
5 and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or  
10 to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in a  
15 integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to  
20 the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant  
25 injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100),  
30 and is further installed with an outlet for discharging the refrigerant

(REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Liquid refrigerant detector (HD100): installed in the evaporator (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the refrigerant (REF100) is not completely evaporated and the residual liquid refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100) controlling the driving circuit device (CD100) to regulate the refrigerant injector (IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

--Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

--Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator

(R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

5       --Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

10       In the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator  
15 (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3)  
20 alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

FIG. 4 is a schematic view showing the system structure of FIG. 1  
25 being further installed with a temperature detector (TD100) and a liquid refrigerant detector (HD100)

As shown in FIG. 4, it mainly consists of:

--Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or  
30 digital operation signals, and provided for controlling the system to be

actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;

--Temperature detector (TD100): provided for detecting the temperature generated by the evaporator and transferring to the electric control unit  
5 (ECU100);

--Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100), the detected signals sent by the liquid  
10 refrigerant detector (HD100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control  
20 and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or  
25 to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in a  
30 integrated structure with the evaporator (EVA100), for receiving the

operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Liquid refrigerant detector (HD100): installed in the evaporator (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the refrigerant (REF100) is not completely evaporated and the residual liquid refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100) controlling the driving circuit device (CD100) to regulate the refrigerant injector (IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

--Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided

for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

--Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

--Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

In the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve

(V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

FIG. 5 is a schematic view showing the system structure of FIG. 4 being further installed with a fan (F101) for blowing air flow to pass through the evaporator (EVA100).

As shown in FIG. 5, it mainly consists of:

--Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;

--Temperature detector (TD100): provided for detecting the temperature generated by the evaporator and transferring to the electric control unit (ECU100);

--Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100), the detected signals sent by the liquid refrigerant detector (HD100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the

electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control  
5 and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or  
10 to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in a  
15 integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to  
20 the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant  
25 injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100),  
30 and is further installed with an outlet for discharging the refrigerant

(REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Liquid refrigerant detector (HD100): installed in the evaporator (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the refrigerant (REF100) is not completely evaporated and the residual liquid refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100) controlling the driving circuit device (CD100) to regulate the refrigerant injector (IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

--Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

--Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator

(R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

5     --Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

10     --Fan (F101): constituted by a fan driven by an electric motor or the mechanical revolving force, and provided for blowing air flow to pass through the evaporator (EVA100), such that the air and the evaporator (EVA100) exchange heat then be discharged;

      In the mentioned temperature regulation system with hybrid  
15   refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve  
20   (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the  
25   refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

      FIG. 6 is a schematic view showing the system structure of FIG. 4 being further installed with a fan (F101) for blowing air flow to pass  
30   through the evaporator (EVA100) and a fan (F102) for blowing air flow to

pass through the condenser (CON100).

As shown in FIG. 6, it mainly consists of:

- 5    --Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;
- 10    --Temperature detector (TD100): provided for detecting the temperature generated by the evaporator and transferring to the electric control unit (ECU100);
- 15    --Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100), the detected signals sent by the liquid refrigerant detector (HD100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);
- 20    --Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control
- 25    and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or
- 30    to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in a  
5 integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to  
10 the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant  
15 injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100),  
20 and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Liquid refrigerant detector (HD100): installed in the evaporator  
25 (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the refrigerant (REF100) is not completely evaporated and the residual liquid refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100) controlling  
30 the driving circuit device (CD100) to regulate the refrigerant injector

(IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

--Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

--Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

--Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

--Fan (F101): constituted by a fan driven by an electric motor or the

mechanical revolving force, and provided for blowing air flow to pass through the evaporator (EVA100), such that the air and the evaporator (EVA100) exchange heat then be discharged;

--Fan (F102): constituted by a fan driven by an electric motor or the mechanical revolving force, and provided for blowing air flow to pass through the condenser (CON100), such that the air and the condenser (CON100) exchange heat;

In the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

FIG. 7 is a system block diagram showing the evaporator (EVA100) of FIG. 4 being further combined with a heat exchanger (HE100).

As shown in FIG. 7, it mainly consists of:

--Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;

--Temperature detector (TD100): provided for detecting the temperature

generated by the evaporator and transferring to the electric control unit (ECU100);

--Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100), the detected signals sent by the liquid refrigerant detector (HD100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in an integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist

state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Liquid refrigerant detector (HD100): installed in the evaporator (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the refrigerant (REF100) is not completely evaporated and the residual liquid refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100) controlling the driving circuit device (CD100) to regulate the refrigerant injector (IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

--Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

5 --Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

10 --Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being  
15 controlled by the driving circuit device (CD100) so as to be opened or closed;

--Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100)  
20 and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

--Heat exchanger (HE100): constituted by a primary side evaporator (EVA100) and a secondary side pipeline (P200) to be in a structure of being combined with each other for transferring thermal energy;

25 --Secondary side pipeline (P200): served as a secondary side pipeline for the heat exchanger (HE100) and allowing gas or liquid fluid to pass through;

In the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input  
30 device (OID100) and the control and regulation of the electric control unit

(ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

FIG. 8 is a system block diagram showing FIG. 7 being further installed with a fan (F102).

As shown in FIG. 8, it mainly consists of:

--Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;

--Temperature detector (TD100): provided for detecting the temperature generated by the evaporator and transferring to the electric control unit (ECU100);

--Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100), the detected signals sent by the liquid refrigerant detector (HD100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and

the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in an integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the

condenser (CON100) is able to be injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been  
5 evaporated;

--Liquid refrigerant detector (HD100): installed in the evaporator (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the refrigerant (REF100) is not completely evaporated and the residual liquid  
10 refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100) controlling the driving circuit device (CD100) to regulate the refrigerant injector (IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

15 --Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid  
20 state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve  
25 or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

30 --Switch valve (V100): constituted by a fluid switch valve controlled by

manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being  
5 controlled by the driving circuit device (CD100) so as to be opened or closed;

--Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100)  
10 and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

--Heat exchanger (HE100): constituted by a primary side evaporator (EVA100) and a secondary side pipeline (P200) to be in a structure of being combined with each other for transferring thermal energy;

15 --Secondary side pipeline (P200): served as a secondary side pipeline for the heat exchanger (HE100) and allowing gas or liquid fluid to pass through;

--Fan (F102): constituted by a fan driven by an electric motor or the mechanical revolving force, and provided for blowing air flow to pass  
20 through the condenser (CON100), such that the air and the condenser (CON100) exchange heat;

In the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit  
25 (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the  
30 switch valve (V100) to open for supplying the refrigerant (REF100) to the

evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

According to the temperature regulation system with hybrid refrigerant supply and regulation of this invention, mode selections include a mode with single supply and regulation set by the operation input device (OID100) for supplying the refrigerant to the evaporator (EVA100), or several modes being mixed and operated.

According to the temperature regulation system with hybrid refrigerant supply and regulation of this invention, modes of supplying the refrigerant to the evaporator (EVA100) comprise one or more than one of the followings which include:

1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); or

2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); or

3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or

4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

In practical applications, the structures of the temperature regulation system with hybrid refrigerant supply and regulation provided by the present invention are as followings:

According to the temperature regulation system with hybrid refrigerant supply and regulation of this invention, the quantity of the refrigerant injector (IJ100) installed on the evaporator (EVA100) is one or

more than one.

According to the temperature regulation system with hybrid refrigerant supply and regulation of this invention, the evaporator (EVA100) and the refrigerant injector (IJ100) are individually structured  
5 or integrally structured.

According to the temperature regulation system with hybrid refrigerant supply and regulation of this invention, the series-connected switch valve (V100) and the pressure-reducing regulator (R100) installed between the evaporator (EVA100) and the fluid outlet of the condenser  
10 (CON100) includes one or more than one series-connected combinations.

According to the temperature regulation system with hybrid refrigerant supply and regulation of this invention, the switch valve (V100) and the pressure-reducing regulator (R100) are individually structured or integrally structured.

15 According to the temperature regulation system with hybrid refrigerant supply and regulation of this invention, the evaporator (EVA100), the refrigerant injector (IJ100), the switch valve (V100) and the pressure-reducing regulator (R100) are individually structured or two or more than two thereof are integrally structured.

20 According to the temperature regulation system with hybrid refrigerant supply and regulation of this invention, the driving circuit device (CD100) can further control the refrigerant injected by the refrigerant injector (IJ100) to be in a column-shaped liquid state or small particle state or fine mist state.

25 According to the temperature regulation system with hybrid refrigerant supply and regulation of this invention, the driving circuit device (CD100) can further control the injection direction of the refrigerant injector (IJ100) which includes continuous or intermittence or periodical scan in variable injection directions.

30 The temperature regulation system with hybrid refrigerant supply

and regulation includes being applied in an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator, freezers or in a regulation device for lowering/increasing temperature or dehumidifying.

5

## CLAIMS

1. A temperature regulation system with hybrid refrigerant supply and regulation in which a pressure-reducing regulator (R100) from an evaporator (EVA100) controlled by a switch valve (V100) being  
5 installed between a condenser (CON100) and the evaporator (EVA100), and a refrigerant injector (IJ100) being installed between the condenser (CON100) and the evaporator (EVA100), and an electric control unit (ECU100) being provided for controlling the switch valve (V100) and the pressure-reducing regulator (R100) or  
10 for controlling the refrigerant injector (IJ100) such that both or at least one thereof being served to transport the refrigerant (REF100) to the interior or exterior of the evaporator (EVA100);

In said temperature regulation system with hybrid refrigerant supply and regulation, the refrigerant is injected by a refrigerant  
15 injector (IJ100) for allowing the refrigerant to be in a small particle or fine mist state and injected to the interior or exterior of an evaporator (EVA100), such that the refrigerant in the small particle or fine mist state is enabled to be accelerated for being injected to the surface of the evaporator (EVA100) thereby being diffused to films  
20 and evaporated, and forcing the gaseous refrigerant, which has already been evaporated, to be away from the surface of the evaporator (EVA100); wherein it mainly consists of:

- Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices  
25 for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;
- Electric control unit (ECU100): constituted by electromechanical  
30 operation devices, solid electric circuit devices and micro processors

and related softwares, and provided for receiving commands sent by the operation input device (OID100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in a integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat

conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

--Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the

refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

--Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

wherein in the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

2. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 1 is further installed with a temperature detector (TD100), wherein it mainly consists of:

--Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the

operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;

--Temperature detector (TD100): provided for detecting the temperature generated by the evaporator and transferring to the electric control unit (ECU100);

--Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being

in a integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being

in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

5 --Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the  
10 evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

--Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing  
15 pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

wherein in the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of  
20 the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the  
25 evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing  
30 the mode 1) and the mode 2) to supply the refrigerant (REF100) to

the evaporator (EVA100).

3. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 1 is further installed with a liquid refrigerant detector (HD100), wherein it mainly consists of:

5       --Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the  
10       wind output level while a fan being installed;

      --Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100) and the detected signals sent by  
15       the liquid refrigerant detector (HD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

20       --Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the  
25       transportation, and to control and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the  
30       set amount of pressurized injection and the set intensity, or to

terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in a integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Liquid refrigerant detector (HD100): installed in the evaporator (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the refrigerant (REF100) is not completely evaporated and the residual liquid refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100)

controlling the driving circuit device (CD100) to regulate the refrigerant injector (IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

--Compressing pump (PUMP100): constituted by a fluid  
5 compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

10 --Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being  
15 in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

--Switch valve (V100): constituted by a fluid switch valve controlled  
20 by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

--Pipelines (P100): providing for connecting the mentioned  
25 refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the  
30 refrigerant (REF100) to circulate therein;

wherein in the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

4. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 1 is further installed with a temperature detector (TD100) and a liquid refrigerant detector (HD100), wherein it mainly consists of:

- Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;
- Temperature detector (TD100): provided for detecting the temperature generated by the evaporator and transferring to the electric control unit (ECU100);
- Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors

and related softwares, and provided for receiving commands sent by the operation input device (OID100), the detected signals sent by the liquid refrigerant detector (HD100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in a integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set

amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Liquid refrigerant detector (HD100): installed in the evaporator (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the refrigerant (REF100) is not completely evaporated and the residual liquid refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100) controlling the driving circuit device (CD100) to regulate the refrigerant injector (IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

--Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing

the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

--Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

--Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

wherein in the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively

utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

- 5     5. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 4 is further being installed with a fan (F101) for blowing air flow to pass through the evaporator (EVA100), wherein it mainly consists of:
- 10     --Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;
- 15     --Temperature detector (TD100): provided for detecting the temperature generated by the evaporator and transferring to the electric control unit (ECU100);
- 20     --Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100), the detected signals sent by the liquid refrigerant detector (HD100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and
- 25     operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);
- 30     --Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the

refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in a integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been

evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Liquid refrigerant detector (HD100): installed in the evaporator (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the refrigerant (REF100) is not completely evaporated and the residual liquid refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100) controlling the driving circuit device (CD100) to regulate the refrigerant injector (IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

--Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

--Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the

refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

--Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

--Fan (F101): constituted by a fan driven by an electric motor or the mechanical revolving force, and provided for blowing air flow to pass through the evaporator (EVA100), such that the air and the evaporator (EVA100) exchange heat then be discharged;

wherein in the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

6. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 4 is further installed with a fan (F101) for blowing air flow to pass through the evaporator (EVA100)

and a fan (F102) for blowing air flow to pass through the condenser (CON100), wherein it mainly consists of:

--Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;

--Temperature detector (TD100): provided for detecting the temperature generated by the evaporator and transferring to the electric control unit (ECU100);

--Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100), the detected signals sent by the liquid refrigerant detector (HD100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of

fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or to terminate the injection of the refrigerant injector (IJ100);

5 --Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being  
10 in a integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity;

15 --Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a  
20 pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been  
25 evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Liquid refrigerant detector (HD100): installed in the evaporator (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the  
30 refrigerant (REF100) is not completely evaporated and the residual

liquid refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100) controlling the driving circuit device (CD100) to regulate the refrigerant injector (IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

--Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

--Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

--Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

--Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing

pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

--Fan (F101): constituted by a fan driven by an electric motor or the mechanical revolving force, and provided for blowing air flow to pass through the evaporator (EVA100), such that the air and the evaporator (EVA100) exchange heat then be discharged;

--Fan (F102): constituted by a fan driven by an electric motor or the mechanical revolving force, and provided for blowing air flow to pass through the condenser (CON100), such that the air and the condenser (CON100) exchange heat;

wherein in the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

7. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 4, the evaporator (EVA100) thereof is further combined with a heat exchanger (HE100), wherein it mainly consists of:

--Operation input device (OID100): constituted by

manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;

--Temperature detector (TD100): provided for detecting the temperature generated by the evaporator and transferring to the electric control unit (ECU100);

--Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100), the detected signals sent by the liquid refrigerant detector (HD100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being  
5 in a integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or  
10 periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity;

--Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a  
15 refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be  
20 injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

--Liquid refrigerant detector (HD100): installed in the evaporator  
25 (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the refrigerant (REF100) is not completely evaporated and the residual liquid refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100)  
30 controlling the driving circuit device (CD100) to regulate the

refrigerant injector (IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

5       --Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100) from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

10       --Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

15       --Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

20       --Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

25       --Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

30       --Heat exchanger (HE100): constituted by a primary side evaporator

(EVA100) and a secondary side pipeline (P200) to be in a structure of being combined with each other for transferring thermal energy;

--Secondary side pipeline (P200): served as a secondary side pipeline for the heat exchanger (HE100) and allowing gas or liquid fluid to pass through;

wherein in the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

8. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 7 is further installed with a fan (F102), wherein it mainly consists of:

--Operation input device (OID100): constituted by manually-operated electromechanical interfaces or by circuit devices for inputting analog or digital operation signals, and provided for controlling the system to be actuated or stopped, selecting the operation modes, regulating temperature settings, and setting the wind output level while a fan being installed;

--Temperature detector (TD100): provided for detecting the

temperature generated by the evaporator and transferring to the electric control unit (ECU100);

--Electric control unit (ECU100): constituted by electromechanical operation devices, solid electric circuit devices and micro processors and related softwares, and provided for receiving commands sent by the operation input device (OID100), the detected signals sent by the liquid refrigerant detector (HD100) and the detected signals sent by the temperature detector (TD100) to operate the driving circuit device (CD100) so as to control the operation schedules and operation modes of the switch valve (V100) and the pressure-reducing regulator (R100) and the refrigerant injector (IJ100);

--Driving circuit device (CD100): receiving control signals from the electric control unit (ECU100) to control the switch valve (V100), so as to control the pressure-reducing regulator (R100) to transport the refrigerant (REF100), which is in a liquid state, from the condenser (CON100) into the evaporator (EVA100) or to terminate the transportation, and to control and drive the refrigerant injector (IJ100) to inject the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity, or to terminate the injection of the refrigerant injector (IJ100);

--Refrigerant injector (IJ100): constituted by a device having active pressurizing injection function driven by mechanical forces, electromagnetic forces, magnetostriction or piezoelectric effects, and provided for being combined with the evaporator (EVA100) or being in a integrated structure with the evaporator (EVA100), for receiving the operation driving of the driving circuit device (CD100) to inject

the liquid refrigerant (REF100) from the condenser (CON100) to the interior or exterior of the evaporator (EVA100) in a small particle state or fine mist state according to the direction of fixed or periodical scan with respect to the operation driving and the set amount of pressurized injection and the set intensity;

5 --Evaporator (EVA100): constituted by a material with good heat conductivity, in which a space structure is formed for allowing a fluid to pass through; the evaporator (EVA100) is installed with a refrigerant injector (IJ100) for communicating with the condenser (CON100), and is installed with a switch valve (V100) and a pressure-reducing regulator (R100) in series connection for allowing to be communicated with the condenser (CON100), such that the refrigerant (REF100) from the condenser (CON100) is able to be injected into the evaporator (EVA100), and is further installed with an outlet for discharging the refrigerant (REF100) which has been evaporated to the gas state or for discharging the liquid refrigerant (REF100) which has not completely been evaporated;

10 --Liquid refrigerant detector (HD100): installed in the evaporator (EVA100), and provided for detecting the evaporating state of the refrigerant (REF100) inside the evaporator (EVA100), when the refrigerant (REF100) is not completely evaporated and the residual liquid refrigerant (REF100) is remained, a signal is feedback to the electric control unit (ECU100) for the electric control unit (ECU100) controlling the driving circuit device (CD100) to regulate the refrigerant injector (IJ100) for reducing the amount of refrigerant (REF100) injected into the evaporator (EVA100);

15 --Compressing pump (PUMP100): constituted by a fluid compressing pump rotationally or reciprocally driven by mechanical forces, motor powers, or fluid motors, or engines or electromagnetic coils, and provided for compressing the gas refrigerant (REF100)

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from the evaporator (EVA100) to the condenser (CON100) for being transformed to the liquid state;

--Condenser (CON100): constituted by a material with good heat conductivity, in which a pipeline structure is provided for allowing the refrigerant (REF100) to pass through;

5 --Pressure-reducing regulator (R100): constituted by an expansion valve or capillary device or liquid level controlling device, and being in series connected with the switch valve (V100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for reducing pressure and regulating the refrigerant from the condenser (CON100);

10 --Switch valve (V100): constituted by a fluid switch valve controlled by manual forces or mechanical forces or fluid forces or electromagnetic forces, and being in series connected with the pressure-reducing regulator (R100) then in parallel connected to the refrigerant injector (IJ100) between the condenser (CON100) and the evaporator (EVA100), for being controlled by the driving circuit device (CD100) so as to be opened or closed;

15 --Pipelines (P100): providing for connecting the mentioned refrigerant injector (IJ100), the pressure-reducing regulator (R100), the switch valve (V100), the evaporator (EVA100), the compressing pump (PUMP100) and the condenser (CON100) for allowing the refrigerant (REF100) to circulate therein;

20 --Heat exchanger (HE100): constituted by a primary side evaporator (EVA100) and a secondary side pipeline (P200) to be in a structure of being combined with each other for transferring thermal energy;

25 --Secondary side pipeline (P200): served as a secondary side pipeline for the heat exchanger (HE100) and allowing gas or liquid fluid to pass through;

30 --Fan (F102): constituted by a fan driven by an electric motor or the

mechanical revolving force, and provided for blowing air flow to pass through the condenser (CON100), such that the air and the condenser (CON100) exchange heat;

5 wherein in the mentioned temperature regulation system with hybrid refrigerant supply and regulation, through settings of the operation input device (OID100) and the control and regulation of the electric control unit (ECU100) and the driving circuit device (CD100), the following modes for supplying and regulating the refrigerant (REF100) to the evaporator (EVA100) can be achieved  
10 which include: 1) closing the switch valve (V100) and the refrigerant injector (IJ101) actively injecting the refrigerant (REF100) into the evaporator (EVA100); 2) controlling the switch valve (V100) to open for supplying the refrigerant (REF100) to the evaporator (EVA100) through the pressure-reducing regulator (R100); 3) alternatively  
15 utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100); or 4) synchronously utilizing the mode 1) and the mode 2) to supply the refrigerant (REF100) to the evaporator (EVA100).

9. The temperature regulation system with hybrid refrigerant supply  
20 and regulation according to claim 1, wherein it includes being applied in an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator, freezers or in a regulation device for lowering or increasing temperature or dehumidifying.

10. The temperature regulation system with hybrid refrigerant supply  
25 and regulation according to claim 2, wherein it includes being applied in an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator, freezers or in a regulation device for lowering or increasing temperature or dehumidifying.

11. The temperature regulation system with hybrid refrigerant supply  
30 and regulation according to claim 3, wherein it includes being

applied in an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator, freezers or in a regulation device for lowering or increasing temperature or dehumidifying.

- 5 12. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 4, wherein it includes being applied in an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator, freezers or in a regulation device for lowering or increasing temperature or dehumidifying.
- 10 13. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 5, wherein it includes being applied in an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator, freezers or in a regulation device for lowering or increasing temperature or dehumidifying.
- 15 14. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 6, wherein it includes being applied in an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator, freezers or in a regulation device for lowering or increasing temperature or dehumidifying.
- 20 15. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 7, wherein it includes being applied in an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator, freezers or in a regulation device for lowering or increasing temperature or dehumidifying.
- 25 16. The temperature regulation system with hybrid refrigerant supply and regulation according to claim 8, wherein it includes being applied in an integral or separation type cold/warm air conditioner, icy water type air conditioner, refrigerator, freezers or in a regulation device for lowering or increasing temperature or dehumidifying.