CLAIMS

1. A temperature regulation system with a hybrid refrigerant supply, comprising:

~~an operation input device (OID100) for inputting operation signals to control actuation or stopping of the system, select operation modes, regulate temperature settings, and set an air output level when a fan is installed;~~

a condenser (CON100);

an evaporator (EVA100) having at least one surface on an interior or exterior of the evaporator (EVA100) from which refrigerant in a small particle or fine mist state is evaporated to carry thermal energy away from the surface;

a fine particle or mist forming refrigerant injector (IJ100) for ~~increasing a pressure of~~accelerating a refrigerant (REF100) ~~from~~supplied by the condenser (CON100), which is in a liquid state, to transform the liquid state refrigerant (REF100) into the ~~and injecting the pressurized refrigerant (REF100) in a~~ small particle or fine mist state ~~to one of:~~that diffuses and forms a film on the interior or exterior surface of the evaporator (EVA100), evaporation of the refrigerant (REF100) from the interior or exterior surface of the evaporator (EVA100) carrying thermal energy away from the interior or exterior surface of the evaporator (EVA100) .

~~an interior of the evaporator (EVA100), and~~

~~an exterior surface of the evaporator (EVA100), said refrigerant injector (IJ100) accelerating the refrigerant (REF100) in the small particle or fine mist state before injection onto the exterior surface of the evaporator (EVA), wherein the refrigerant (REF100) is diffused and evaporated~~;

a compressing pump (PUMP100) for compressing the evaporated refrigerant (REF100) from the ~~condenser (CON100)~~evaporator (EVA100) and supplying the evaporated and compressed refrigerant (REF100) to the condenser (CON100) for transformation into a liquid;

a switch valve (V100) connected between the condenser (CON100) and the evaporator (EVA100) and arranged to open and close;

a pressure-reducing regulator (R100) connected in series with the switch valve (V100), said series-connected pressure-reducing regulator (R100) and switch valve (V100) being further connected in parallel with the refrigerant injector (IJ100), for reducing a pressure of the liquid refrigerant (REF100) supplied by the condenser (CON100) to the ~~refrigerant injector (IJ100)~~evaporator (EVA100);

pipelines (P100) for connecting and carrying the refrigerant (REF100) between the refrigerant injector (IJ100), pressure-reducing regulator (R100), switch valve (V100), evaporator (EVA100), compressing pump (PUMP100), and condenser (CON100) to enable the refrigerant (REF100) to circulate,

a driving circuit device (CD100) for (a) operating the switch valve (V100) to control a flow of liquid refrigerant (REF100) to the pressure-reducing regulator (R100), and the refrigerant injector (IJ100), ~~for~~(b) controlling operation of the pressure-reducing regulator (R100), and ~~for~~(c) controlling injection of the liquid refrigerant (REF100) ~~into~~ the interior or exterior of the evaporator (EVA100); and

an electric control unit (ECU100) ~~connected to receive the operation signals from the operation input device (OID100) and~~ for supplying control signals to the driving circuit device (CD100) to control operation schedules and operation modes of the switch valve (V100), the pressure-reducing regulator (R100), and the refrigerant injector (IJ100), said operation modes including the following:

(1) closing the switch valve (V100) and causing the refrigerant injector (IJ100) to actively inject the refrigerant (REF100) into the evaporator (EVA100);

(2) opening the switch valve (V100) to cause the refrigerant (REF100) to be supplied to the evaporator (EVA100) through the pressure-reducing regulator (R100);

(3) alternating between mode (1) and mode (2);

(4) synchronously utilizing mode (1) and mode (2) to supply the refrigerant (REF100) to the evaporator (EVA100) through both the refrigerant injector (IJ100) and the pressure-reducing regulator (R100).

2. A temperature regulation system with a hybrid refrigerant supply as claimed in claim 1, further comprising a temperature detector (TD100) for detecting a temperature generated by the evaporator, wherein said electronic control unit (ECU100) controls said operation schedules and modes of (a) the switch valve (V100), (b) the pressure-reducing regulator (R100), and (c) the refrigerant injector (IJ100), said control of operation schedules and modes being in response to temperature detection signals from the temperature detector (TD100).

3. A temperature regulation system with a hybrid refrigerant supply as claimed in claim 1, further comprising a liquid refrigerant detector (HD100) installed in the evaporator for detecting an evaporation state of the refrigerant (REF100) and, when the refrigerant (REF100) is not completely evaporated, sending a feedback signal to the electric control unit (ECU100) ~~to control~~, said electric control unit (ECU100) controlling the refrigerant injector (IJ100) in response to the feedback signal to reduce an amount of refrigerant (REF100) injected into the evaporator (EVA100).

4. A temperature regulation system with a hybrid refrigerant supply as claimed in claim 3, further comprising a temperature detector (TD100) for detecting a temperature generated by the evaporator, wherein said electronic control unit (ECU100) controls said operation schedules and modes of (a) the switch valve (V100), (b) the pressure-reducing regulator (R100), and (c) the refrigerant injector (IJ100), said control of operation schedules and modes being in response to temperature detection signals from the temperature detector (TD100).

5. A temperature regulation system with a hybrid refrigerant supply as claimed in claim 4, further comprising a fan (F101) for blowing air through the evaporator (EVA100), said fan (F101) being controlled by the electric control unit (ECU100) in response to feedback from at least one of the temperature detector (TD100) and the liquid refrigerant detector (HD100).

6. A temperature regulation system with a hybrid refrigerant supply as claimed in claim 5, further comprising a second fan (F102) ~~controlled by the electric~~ controlled by the electric control unit (ECU100) for blowing air through the condenser (CON100).

7. A temperature regulation system with a hybrid refrigerant supply as claimed in claim 1, wherein the evaporator (EVA100) is included in a heat exchanger (HE100) having a secondary side pipeline (P200), the heat exchanger (HE100) transferring heat between the refrigerant (REF100) in the evaporator (EVA100) and a fluid in the secondary side pipeline (P200).

8. A temperature regulation system with a hybrid refrigerant supply as claimed in claim 7, further comprising a liquid refrigerant detector (HD100) installed in the evaporator for detecting an evaporation state of the refrigerant (REF100) and, when the refrigerant (REF100) is not completely evaporated, sending a feedback signal to the electric control unit (ECU100) ~~to control~~, said electric control unit (ECU100) controlling the refrigerant injector (IJ100) in response to the feedback signal to reduce an amount of refrigerant (REF100) injected into the evaporator (EVA100).

9. A temperature regulation system with a hybrid refrigerant supply as claimed in claim 8, further comprising a temperature detector (TD100) for detecting a temperature generated by the evaporator, wherein said electronic control unit (ECU100) controls said operation schedules and modes of (a) the switch valve (V100), (b) the pressure-reducing regulator (R100), and (c) the refrigerant injector (IJ100), said control of operation schedules and modes being in response to temperature detection signals from the temperature detector (TD100).

10. A temperature regulation system with a hybrid refrigerant supply as claimed in claim 9, further comprising a fan (F102) controlled by the electric control unit (ECU100) for blowing air through the condenser (CON100).

11. A temperature regulation system with a hybrid refrigerant supply as claimed in any one of claims 1-10, wherein the system is included in one of an air conditioner, refrigerator, freezer, temperature regulation device, and dehumidifier.