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(54) **AIR COOLING DEVICE CONTROL METHOD AND AIR COOLING DEVICE**

VERFAHREN ZUR STEUERUNG EINER LUFTKÜHLVORRICHTUNG UND
LUFTKÜHLVORRICHTUNG

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(73) Proprietors:
• **QINGDAO HAIER SPECIAL ELECTRIC FREEZER**
CO., LTD
Qingdao, Shandong 266101 (CN)

• **HAIER SMART HOME CO., LTD.**
Qingdao, Shandong 266101 (CN)

(72) Inventor: **WANG, Desen**
Qingdao, Shandong 266101 (CN)

(74) Representative: **Winter, Brandl - Partnerschaft**
mbB
Alois-Steinecker-Straße 22
85354 Freising (DE)

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Description

TECHNICAL FIELD

[0001] The present invention relates to the technical field of air-cooling devices, and specifically to a method of controlling an air-cooling device and an air-cooling device.

BACKGROUND

[0002] In an air-cooling device such as a wine cabinet, thermostatic control is usually achieved for products in dual temperature zones in a manner of using a single evaporator + dual evaporation blowers. When a certain chamber needs to be refrigerated, the compressor operates, and the corresponding evaporation blowers operate to achieve the refrigeration of the chamber; this manner is structurally simple, but cannot achieve the thermostatic control under a lower ambient temperature as cold air blends each other seriously.

[0003] The thermostatic control can ensure optimal tastes and the storage of stored articles such as wines thereof. In the prior art, dual evaporators + dual evaporator blowers + dual heating wires + a solenoid valve are usually employed to control to switch to achieve the thermostatic control. When a first chamber needs to be refrigerated, the solenoid valve switches to the first chamber so that the evaporator in the first chamber refrigerates, and the evaporation blower in the first chamber operates; when a second chamber needs to be refrigerated, the solenoid valve switches to the second chamber so that the evaporator in the second chamber refrigerates, and the evaporation blower in the second chamber operates; switch of the solenoid valve is performing between the two chambers; when each chamber needs to be heated, the heating wire in the chamber is activated, and the evaporation blower in the chamber operates; this manner can achieve the thermostatic control, but it has problems such as a complicated structural design and a cumbersome production process.

[0004] CN 109990567 A discloses an air-cooled wine cabinet with double temperature zones. The wine cabinet comprises an air volume distribution module, an upper air curtain module, a lower air curtain module, an upper fan and a lower fan, wherein the lower air curtain module divides the internal part of the wine cabinet into an upper temperature zone and a lower temperature zone. The air volume distribution module sends the wind generated by the upper fan into the upper temperature zone through the upper air curtain module, and sends the wind generated by the lower fan into the lower temperature zone through the lower air curtain module. The operation of the upper fan is affected by the temperature in the upper temperature zone, the operation of the lower fan is affected by the temperature in the lower temperature zone, and the two temperature zones are independent of each other, thereby realizing the independent control of the two

temperature zones. In addition, the upper air curtain module is provided with a plurality of upper air outlets and the lower air curtain module is provided with a plurality of lower air outlets, so that the wind blown into the upper temperature zone and the lower temperature zone is more uniform.

SUMMARY

[0005] An object of the present invention is to provide a method of controlling an air-cooling device and an air-cooling device, which achieves the thermostatic control of the dual temperature zones of a single air-cooling system with a simplified structural design and process by employing a structural design with a single evaporator + a single evaporation blower + two dampers + three heating wires, in conjunction with the control of operational relationship of the compressor, the evaporation blower, the heating wires and the dampers.

[0006] To achieve the above object, the present invention provides a method of controlling an air-cooling device, and an air-cooling device according to the appended set of claims.

[0007] As compared with the prior art, the present invention has the following advantages and active effects: in the method of controlling an air-cooling device and the air-cooling device of the present invention, the thermostatic control is achieved by employing a single cycle refrigeration system, structurally with the circulation air passage, the compressor, the single evaporator, the single evaporation blower, and the first damper and second damper which are respectively disposed at the first chamber and second chamber and both connected to the circulation air passage; if both chambers need to be refrigerated, the compressor and evaporation blower are activated, and the two dampers are opened; if both chambers need to be heated, the compressor is controlled to stop and the evaporation blower is controlled to operate, the two dampers are closed, and the heating wires in the chambers are activated; if one chamber needs to be refrigerated and the other chamber needs to be heated, the damper of the chamber to be refrigerated is opened and the damper of the chamber to be heated is closed, and the heating wire in the chamber to be heated is activated; when the temperature of the chamber to be refrigerated reaches the preset refrigeration temperature, the compressor is controlled to stop and the damper of the chamber to be refrigerated is closed after a delay when the defrost temperature reaches the first preset temperature; when the temperature of the chamber being heated meets the heating temperature, the heating wire therein is turned off, and the damper of the chamber being heated is opened when the defrost temperature reaches the second preset temperature after a delay after the damper of the chamber being refrigerated is closed. In conjunction with the control in the above three manners, the thermostatic control may be implemented individually for the two chambers

respectively with the structure of the single air-cooling system. As compared with the dual evaporators + dual evaporation blowers + dual heating wires + an solenoid valve manner that can achieve the thermostatic control in the prior art, the single air-cooling system exhibits a more simplified structural design and process, and achieves the thermostatic control of the air-cooling device with the single air-cooling system and dual temperature zones with the simplified structural and process design.

[0008] Other features and advantages of the present invention will be made more apparent by reading through detailed depictions of embodiments of the present invention with reference to figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

FIG. 1 illustrates a structural schematic view of an air-cooling device according to an embodiment of the present invention;

FIG. 2 illustrates a flow chart of a method of controlling an air-cooling device according to an embodiment of the present invention;

FIG. 3 illustrates a functional architecture view of an air-cooling device according to an embodiment of the present invention.

DETAILED DESCRIPTION

[0010] Specific embodiments of the present invention will be described in more detail below with reference to figures.

[0011] As shown in FIG. 1, an air-cooling device according to the present invention comprises a cabinet 1 and a liner 2, the liner 2 is mounted in the cabinet 1, the internal cavity of the liner 2 is partitioned into a first chamber 3 and a second chamber 4, a first heating wire 5 is mounted in the first chamber 3, and a second heating wire 6 is mounted in the second chamber 4; the air-cooling device employs a single cycle refrigeration system to achieve refrigeration; the single cycle refrigeration system comprises a circulation air passage 7, a compressor 8 and an evaporator 9, and is disposed on a rear side outside the liner 2; the rear side outside the liner 2 is further provided with an evaporation blower 10 on which is mounted a defrost sensor for detecting defrost temperature; a first damper 11 is provided on the first chamber 3 and connected to the circulation air passage 7; a second damper 12 is provided on the second chamber 4 and connected to the circulation air passage 7.

[0012] On the architecture of the air-cooling device shown in FIG. 1, the present invention provides a method of controlling the air-cooling device to achieve dual-temperature thermostatic control with the single cycle refrigeration system. Specifically, as shown in FIG. 2, the method comprises the following steps:

Step S21: activating the compressor and the evaporation

blower and opening the first damper and the second damper.

[0013] An example is taken in which the air-cooling device activates refrigeration. After the air-cooling device is powered on, the single cycle refrigeration system is activated at first, and the first damper 11 and second damper 12 are opened to implement refrigeration for the first chamber 3 and second chamber 4, respectively.

[0014] Step S22: judging whether refrigeration temperature in the two chambers both meet refrigeration requirements.

[0015] During respective refrigeration in the two chambers, judgment is respectively made as to whether the refrigeration temperatures in the two chambers meet respective refrigeration requirements; after refrigeration in a period of time, there are two cases of the refrigeration in the two chambers: 1) the refrigeration temperatures in the two chambers both meet the refrigeration requirements and both chambers need to enter thermostatic regulation; 2) one chamber already meets its refrigeration requirement and needs to enter thermostatic regulation, and the other chamber does not meet its refrigeration requirement and needs to be further refrigerated.

[0016] Based on the above two cases, different steps are respectively performed according to the controlling method proposed by the present invention. When case 1 occurs first, step S23 is performed as follows: controlling the compressor to power off, opening the first damper and the second damper and controlling the evaporation blower to continue to operate, and activating the first heating wire and second heating wire.

[0017] After both chambers meet their respective refrigeration requirements, the first heating wire 5 of the first chamber 3, and the second heating wire 6 of the second chamber 4 are respectively activated to perform thermostatic control of the two chambers; in the embodiment of the present invention, a compensatory heating wire 13 is disposed on a rear side of the evaporator 9; upon thermostatic control, the defrost process of the evaporator 9 is accelerated through the operation of the compensatory heating wire 13 to quickly increase the surface temperature of the evaporator 9, and compensatory heating is performed for the thermostatic control in the chambers through the operation of the evaporation blower 10. Specifically, when the compressor 8 stops to enter the thermostatic control, the evaporation blower 10 is kept in operation, the first damper 11 and second damper 12 are kept in the open state, and the compensatory heating wire 13 is activated. When both chambers perform thermostatic regulation through their respective heating wires, the heat of the compensatory heating wire 13, due to the action of the evaporation blower 10, enters the first chamber 13 through the first damper 11 and enters the second chamber 4 through the second damper 12 to perform compensation for the temperature in the two chambers, respectively.

[0018] When it occurs that one chamber needs to be heated, and the other chamber needs to be refrigerated

when case 2 happens, or during the thermostatic regulation of step S23, an example is taken in which the first chamber 3 needs to be refrigerated and the second chamber 4 needs to be heated to, to perform:

Step S24: controlling the compressor and the evaporation blower to operate, opening the first damper and closing the second damper, and activating the second heating wire.

[0019] The compressor 8 is activated, the evaporation blower 10 continues to operate, the first damper 11 is opened and the second damper 12 is closed, the second heating wire 6 is activated to operate, and cold air running in the single cycle refrigeration system enters the first chamber 3 through the first damper 11 to refrigerate the first chamber 3; since the second damper 12 is closed, cold air does not enter the second chamber 2 and the second chamber 2 continues to be heated by the operation of the second heating wire 6. During this period, when the first chamber 3 reaches its preset refrigeration temperature, the following step is performed:

Step S25: controlling the compressor to stop, and closing the first damper after a delay until the defrost temperature reaches a first preset temperature.

[0020] After the first chamber 3 meets its refrigeration requirement again, the compressor 8 is controlled to stop, the defrost temperature detected by a defrost sensor is obtained, and the first damper 11 is closed when the defrost temperature reaches the first preset temperature T1.

[0021] After the compressor 8 stops, the compensatory heating wire 13 is activated immediately to assist the evaporator 8 in defrosting to increase the surface temperature of the evaporator 9 as quickly as possible to prepare for subsequent thermostatic regulation of the chambers.

[0022] Step S26: opening the second damper when the defrost temperature reaches a second preset temperature after the first damper is closed.

[0023] After the first damper 11 is closed, the second chamber 4 continued to be heated. The defrost sensor detects the defrost temperature. When the defrost temperature reaches the second preset temperature T2, the second damper 12 is opened. In the period of time after the compressor 8 stops until the second damper 12 is opened, the compensatory heating wire 13 already starts to operate, and the defrost temperature on the surface of the evaporator 9 is high; after the second damper 12 is opened, the heating of the second chamber 4 can be compensated to quicken the thermostatic regulation of the second chamber 4.

[0024] Step S27: turning off the second heating wire when the temperature of the second chamber satisfies a heating temperature.

[0025] Regarding to the control of the evaporation blower 10, when the defrost temperature reaches the first preset temperature T1, i.e., when the first damper 11 is closed in step S25, the evaporation blower 10 is controlled to stop. At this time, the compensatory heating

wire 13 already starts to perform auxiliary defrost for the evaporator 9 to increase the defrost temperature as soon as possible; when the defrost temperature reaches the second preset temperature T2, i.e., after the second air damper is opened in step S26, the evaporation blower 10 is again activated to operate, the heating of the second chamber 4 is compensated more quickly due to the action of the evaporation blower 10, the thermostatic regulation of the second chamber 4 is further quickened, and the second heating wire is turned off only when the second chamber satisfies the heating temperature.

[0026] Then, if the two chambers need to be refrigerated or heated again and again during the thermostatic control, the two chambers both may individually implement the thermostatic regulation in a manner that they are refrigerated simultaneously, or heated simultaneously, or one is refrigerated and the other is heated. As compared with the dual evaporators + dual evaporation blowers + dual heating wires +an solenoid valve manner that can achieve the thermostatic control in the prior art, the solution of the present invention is implemented based on the single cycle refrigeration system, exhibits a more simplified structural design and process, achieves the thermostatic control of the air-cooling device with a single air-cooling system and dual temperature zones, and is more adapted to be applied to the industry.

[0027] After the above step S26, when the compressor 8 is activated again, the second damper 2 needs to be closed immediately. That is to say, as long as the compressor 8 operates, the damper of the chamber which is currently being heated needs to be closed immediately to avoid the impact exerted by cold air on the heating.

[0028] After the first heating wire 5 and second heating wire 6 are activated, they both operate with a current conduction rate as required by a heating level, and the compensatory heating wire 13, after being activated, operates with a 100% current conduction rate.

[0029] Based on the abovementioned method of controlling the air-cooling method, as shown in FIG. 3, the air-cooling device according to the present invention further comprises a full air-cooling control module 31, a full heating control module 32 and a single chamber air-cooling/heating control module 33; the full air-cooling control module 31 is configured to control the compressor 8 and the evaporation blower 10 to operate and open the first damper 11 and second damper 12; the full heating control module 32 is configured to control the compressor 8 to stop, open the first damper 11 and second damper 12, and control the evaporation blower 10 to operate; and activate the first heating wire 5, the second heating wire 6 and the compensatory heating wire 13 to operate; the single chamber air-cooling/heating control module 33 is configured to: control the compressor 8 and the evaporation blower 10 to operate, open the first damper 11 and close the second damper 12, and activate the second heating wire 6; when the temperature of the first chamber 3 reaches the preset refrigeration temperature, control

the compressor 8 to stop, and close the first damper 11 after a delay when the defrost temperature reaches the first preset temperature T1; close the second heating wire 12 when the temperature of the second chamber 4 meets the heating temperature; and open the second damper 12 after the first damper 1 is closed until when the defrost temperature reaches the second preset temperature T2.

[0030] The single chamber air-cooling/heating control module 33 comprises an evaporation blower control unit 331 configured to control the evaporation blower 10 to stop when the defrost temperature reaches the first preset temperature T1; and control the evaporation blower 10 to operate until the temperature of the second chamber 4 meets the heating temperature, when the defrost temperature reaches the second preset temperature T2.

[0031] The air-cooling device according to the present invention further comprises a compensatory heating control module 34 configured to activate the compensatory heating wire 13 after the compressor 8 stops, specifically, activate the compensatory heating wire according to a 100% current conduction rate.

[0032] A specific control method for the air-cooling device to achieve the thermostatic control has already been described above in detail, and will not be detailed any more here.

[0033] It should be appreciated that the above depictions are not intended to limit the present invention, the present invention is not only limited to the above examples, and variations, modifications, additions or substitutes made by those having ordinary skill in the art should also fall within the protection scope of the present invention as defined by the appended claims.

Claims

1. A method of controlling an air-cooling device, the air-cooling device comprising:

a cabinet (1);
 a liner (2) which is mounted in the cabinet and whose internal cavity is partitioned into a first chamber (3) and a second chamber (4);
 a first heating wire (5) mounted in the first chamber;
 a second heating wire (6) mounted in the second chamber;
 a single cycle refrigeration system comprising a circulation air passage (7), a compressor (8) and an evaporator (9);
 a defrost sensor detecting defrost temperature is mounted on the evaporator;
 an evaporation blower (10) mounted outside the liner;
 a first damper (11) provided on the first chamber and connected to the circulation air passage;
 a second damper (12) provided on the second

chamber and connected to the circulation air passage;

wherein the air-cooling device further comprises a compensatory heating wire (13) disposed on a rear side of the evaporator;

the controlling method comprises:

when the first chamber does not meet its refrigeration requirement and the second chamber meets its refrigeration requirement, controlling the compressor and the evaporation blower to operate, opening the first damper and closing the second damper, and activating the second heating wire; controlling the compressor to stop and activating the compensatory heating wire when the first chamber reaches a preset refrigeration temperature, and closing the first damper and controlling the evaporation blower to stop after a delay after stopping the compressor until the defrost temperature reaches a first preset temperature; turning off the second heating wire when the second chamber meets a heating temperature; and opening the second damper and controlling the evaporation blower to operate when the defrost temperature reaches the second preset temperature after a delay after the first damper is closed, and controlling the evaporation blower to stop when the second chamber meets a heating temperature;
 the second preset temperature is higher than the first preset temperature.

2. The method of controlling an air-cooling device according to claim 1, wherein the specific operation of activating the compensatory heating wire is to activate the compensatory heating wire with a 100% current conduction rate.

3. The method of controlling an air-cooling device according to claim 1, wherein the controlling method further comprises:

opening the first damper and the second damper, and controlling the evaporation blower to operate;
 activating the first heating wire, the second heating wire and the compensatory heating wire.

4. An air-cooling device, comprising:

a cabinet (1);
 a liner (2)
 which is mounted in the cabinet and whose internal cavity is partitioned into a first chamber (3) and a second chamber (4);

a first heating wire (4) mounted in the first chamber;
 a second heating wire (6) mounted in the second chamber;
 a single cycle refrigeration system comprising a circulation air passage (7), a compressor (8) and an evaporator (9);
 a defrost sensor detecting defrost temperature is mounted on the evaporator;
 an evaporation blower (10) mounted outside the liner;
 wherein the air-cooling device further comprises:

a compensatory heating wire (13) disposed on a rear side of the evaporator;
 a first damper (11) provided on the first chamber and connected to the circulation air passage;
 a second damper (12) provided on the second chamber and connected to the circulation air passage;
 a single chamber air-cooling/heating control module (33) configured to: when the first chamber does not meet its refrigeration requirement and the second chamber meets its refrigeration requirement, control the compressor and the evaporation blower to operate, open the first damper and close the second damper, and activate the second heating wire; when the first chamber reaches a preset refrigeration temperature, control the compressor to stop and activate the compensatory heating wire, and close the first damper and control the evaporation blower to stop after a delay after stopping the compressor when the defrost temperature reaches a first preset temperature; close the second heating wire when the second chamber meets a heating temperature; and open the second damper and control the evaporation blower to operate after the first damper is closed until when the defrost temperature reaches a second preset temperature, and control the evaporation blower to stop when the second chamber meets a heating temperature; the second preset temperature is higher than the first preset temperature.

5. The air-cooling device according to claim 4, wherein the single chamber air-cooling/heating control module comprises:
 an evaporation blower control unit (331) configured to: control the evaporation blower to stop when the defrost temperature reaches the first preset temperature; and control the evaporation blower to operate until the second chamber meets the heating

temperature, when the defrost temperature reaches the second preset temperature.

6. The air-cooling device according to claim 4, wherein the air-cooling device further comprises:
 a compensatory heating control module (34) configured to activate the compensatory heating wire after the compressor stops.
7. The air-cooling device according to claim 6, wherein the compensatory heating control module is specifically configured to:
 activate the compensatory heating wire with a 100% current conduction rate.
8. The air-cooling device according to claim 4, wherein the air-cooling device further comprises:
 a full air-cooling control module (31) configured to: open the first damper and second damper, and control the evaporation blower to operate; and activate the first heating wire, the second heating wire and the compensatory heating wire.

Patentansprüche

1. Verfahren zum Steuern einer Luftkühlungsvorrichtung, wobei die Luftkühlungsvorrichtung Folgendes aufweist:
- einen Schrank (1);
 eine Auskleidung (2), welche in dem Schrank angebracht ist und dessen Innenraum in eine erste Kammer (3) und eine zweite Kammer (4) unterteilt ist;
 einen ersten Heizdraht (5), welcher in der ersten Kammer angebracht ist;
 einen zweiten Heizdraht (6), welcher in der zweiten Kammer angebracht ist;
 ein Einzyklus-Kühlsystem, welches einen Zirkulationsluftdurchgang (7), einen Kompressor (8) und einen Verdampfer (9) aufweist; wobei ein Abtausensor, welcher eine Abtautemperatur erfasst, am Verdampfer angebracht ist;
 ein Verdampfungsgebläse (10), welches außerhalb der Auskleidung angebracht ist;
 eine erste Klappe (11), welche an der ersten Kammer vorgesehen ist und mit dem Zirkulationsluftdurchgang verbunden ist;
 eine zweite Klappe (12), welche an der zweiten Kammer vorgesehen ist und mit dem Zirkulationsluftdurchgang verbunden ist;
 wobei die Luftkühlungsvorrichtung ferner einen Kompensations-Heizdraht (13) aufweist, welcher an einer Rückseite des Verdampfers angeordnet ist;
 wobei das Steuerverfahren die folgenden Schritte aufweist:

- wenn die erste Kammer ihren Kühlbedarf nicht erfüllt und die zweite Kammer ihren Kühlbedarf erfüllt, Steuern des Kompressors und des Verdampfungsgebläses, um zu arbeiten, Öffnen der ersten Klappe und Schließen der zweiten Klappe, und Aktivieren des zweiten Heizdrahtes; 5
Steuern des Kompressors, um zu stoppen, und Aktivieren des Kompensations-Heizdrahtes, wenn die erste Kammer eine voreingestellte Kühltemperatur erreicht, und Schließen der ersten Klappe und Steuern des Verdampfungsgebläses, um nach einer Verzögerung nach dem Stoppen des Kompressors zu stoppen, bis die Abtautemperatur eine erste voreingestellte Temperatur erreicht; 10
Abschalten des zweiten Heizdrahtes, wenn die zweite Kammer eine Heiztemperatur erreicht; und Öffnen der zweiten Klappe und Steuern des Verdampfungsgebläses, um zu arbeiten, wenn die Abtautemperatur die zweite voreingestellte Temperatur nach einer Verzögerung erreicht, nachdem die erste Klappe geschlossen ist; und Steuern des Verdampfungsgebläses, um zu stoppen, wenn die zweite Kammer eine Heiztemperatur erreicht; 15
wobei die zweite voreingestellte Temperatur höher als die erste voreingestellte Temperatur ist. 20
2. Verfahren zum Steuern einer Luftkühlungsvorrichtung nach Anspruch 1, wobei der spezifische Vorgang des Aktivierens des Kompensations-Heizdrahtes darin besteht, den Kompensations-Heizdraht mit einer 100%igen Stromleitungsrate zu aktivieren. 25
3. Verfahren zum Steuern einer Luftkühlungsvorrichtung nach Anspruch 1, wobei das Steuerverfahren ferner die folgenden Schritte aufweist: 30
Öffnen der ersten Klappe und der zweiten Klappe, und Steuern des Verdampfungsgebläses, um zu arbeiten; 35
Aktivieren des ersten Heizdrahtes, des zweiten Heizdrahtes und des Kompensations-Heizdrahtes. 40
4. Luftkühlungsvorrichtung, aufweisend: 45
einen Schrank (1);
eine Auskleidung (2), welche in dem Schrank angebracht ist und dessen Innenraum in eine erste Kammer (3) und eine zweite Kammer (4) unterteilt ist; 50
einen ersten Heizdraht (4), welcher in der ersten Kammer angebracht ist; 55

einen zweiten Heizdraht (6), welcher in der zweiten Kammer angebracht ist;
ein Einzyklus-Kühlsystem, welches einen Zirkulationsluftdurchgang (7), einen Kompressor (8) und einen Verdampfer (9) aufweist; wobei ein Abtausensor, welcher eine Abtautemperatur erfasst, am Verdampfer angebracht ist;
ein Verdampfungsgebläse (10), welches außerhalb der Auskleidung angebracht ist;
wobei die Luftkühlungsvorrichtung ferner Folgende aufweist:

- einen Kompensations-Heizdraht (13), welcher an einer Rückseite des Verdampfers angeordnet ist;
eine erste Klappe (11), welche an der ersten Kammer vorgesehen ist und mit dem Zirkulationsluftdurchgang verbunden ist;
eine zweite Klappe (12), welche an der zweiten Kammer vorgesehen ist und mit dem Zirkulationsluftdurchgang verbunden ist;
ein Einkammer-Luftkühlungs/-heizungs-Steuermodul (33), welches wie folgt konfiguriert ist: wenn die erste Kammer ihren Kühlbedarf nicht erfüllt und die zweite Kammer ihren Kühlbedarf erfüllt, Steuern des Kompressors und des Verdampfungsgebläses, um zu arbeiten, Öffnen der ersten Klappe und Schließen der zweiten Klappe, und Aktivieren des zweiten Heizdrahtes; wenn die erste Kammer eine voreingestellte Kühltemperatur erreicht, Steuern des Kompressors, um zu stoppen und Aktivieren des Kompensations-Heizdrahtes, und Schließen der ersten Klappe und Steuern des Verdampfungsgebläses, um nach einer Verzögerung nach dem Stoppen des Kompressors zu stoppen, wenn die Abtautemperatur eine erste voreingestellte Temperatur erreicht; Schließen des zweiten Heizdrahtes, wenn die zweite Kammer eine Heiztemperatur erfüllt; und Öffnen der zweiten Klappe und Steuern des Verdampfungsgebläses, um zu arbeiten, nachdem die erste Klappe geschlossen ist, bis die Abtautemperatur eine zweite voreingestellte Temperatur erreicht, und Steuern des Verdampfungsgebläses, um zu stoppen, wenn die zweite Kammer eine Heiztemperatur erreicht; 5
wobei die zweite voreingestellte Temperatur höher als die erste voreingestellte Temperatur ist. 10
5. Luftkühlungsvorrichtung nach Anspruch 4, wobei das Einkammer-Luftkühlungs/-heizungs-Steuermodul aufweist: 15

eine Verdampfungsgebläse-Steuereinheit (331), welche konfiguriert ist: das Verdampfungsgebläse zu steuern, um zu stoppen, wenn die Abtautemperatur die erste voreingestellte Temperatur erreicht; und das Verdampfungsgebläse zu steuern, um zu arbeiten, bis die zweite Kammer die Heiztemperatur erreicht, wenn die Abtautemperatur die zweite voreingestellte Temperatur erreicht.

6. Luftkühlungsvorrichtung nach Anspruch 4, wobei die Luftkühlungsvorrichtung ferner aufweist: ein Kompensationsheizungs-Steuermodul (34), welches konfiguriert ist, den Kompensations-Heizdraht zu aktivieren, nachdem der Kompressor gestoppt hat.
7. Luftkühlungsvorrichtung nach Anspruch 6, wobei das Kompensationsheizungs-Steuermodul speziell konfiguriert ist: den Kompensations-Heizdraht mit einer 100%igen Stromleitungsrate zu aktivieren.
8. Luftkühlungsvorrichtung nach Anspruch 4, wobei die Luftkühlungsvorrichtung ferner aufweist: ein Vollluftkühlungs-Steuermodul (31), welches konfiguriert ist: die erste Klappe und die zweite Klappe zu öffnen, und das Verdampfungsgebläse zu steuern, um zu arbeiten; und den ersten Heizdraht, den zweiten Heizdraht und den Kompensationsheizdraht zu aktivieren.

Revendications

1. Procédé de commande d'un dispositif de refroidissement d'air, le dispositif de refroidissement d'air comprenant :
 une armoire (1) ;
 une chemise (2) qui est montée dans l'armoire et dont la cavité interne est divisée en une première chambre (3) et une seconde chambre (4) ;
 un premier fil chauffant (5) monté dans la première chambre ;
 un second fil chauffant (6) monté dans la seconde chambre ;
 un système de réfrigération à cycle unique comprenant un passage d'air de circulation (7), un compresseur (8) ;
 et un évaporateur (9) ;
 un capteur de dégivrage détectant une température de dégivrage est monté sur l'évaporateur ;
 un ventilateur d'évaporation (10) monté à l'extérieur de la chemise ;
 un premier registre (11) prévu sur la première chambre et relié au passage d'air de circulation ;
 un second registre (12) prévu sur la seconde chambre et relié au passage d'air de circulation ;

dans lequel le dispositif de refroidissement d'air comprend en outre un fil chauffant compensatoire (13) disposé sur un côté arrière de l'évaporateur ;

le procédé de commande comprend :

lorsque la première chambre ne satisfait pas à son exigence de réfrigération et que la seconde chambre satisfait à son exigence de réfrigération, la commande du fonctionnement du compresseur et du ventilateur d'évaporation, l'ouverture du premier registre et la fermeture du second registre et l'activation du second fil chauffant ; la commande de l'arrêt du compresseur et l'activation du fil chauffant compensatoire lorsque la première chambre atteint une température de réfrigération prédéfinie, et la fermeture du premier registre et la commande de l'arrêt du ventilateur d'évaporation après un délai après l'arrêt du compresseur jusqu'à ce que la température de dégivrage atteigne une première température prédéfinie ; la mise hors tension du seconde fil chauffant lorsque la seconde chambre atteint une température de chauffage ; et l'ouverture du second registre et la commande du fonctionnement du ventilateur d'évaporation lorsque la température de dégivrage atteint la seconde température prédéfinie après un délai après la fermeture du premier registre, et la commande de l'arrêt du ventilateur d'évaporation lorsque la seconde chambre satisfait une température de chauffage ; la seconde température prédéfinie est plus élevée que la première température prédéfinie.

2. Procédé de commande d'un dispositif de refroidissement d'air selon la revendication 1, dans lequel l'opération spécifique d'activation du fil chauffant compensatoire consiste à activer le fil chauffant compensatoire avec un taux de conduction de courant de 100 %.
3. Procédé de commande d'un dispositif de refroidissement d'air selon la revendication 1, dans lequel le procédé de commande comprend en outre :
 l'ouverture du premier registre et du second registre et la commande du fonctionnement du ventilateur d'évaporation ;
 l'activation du premier fil chauffant, du second fil chauffant et du fil chauffant compensatoire.
4. Dispositif de refroidissement d'air, comprenant :

une armoire (1) ;
 une chemise (2) qui est montée dans l'armoire et dont la cavité interne est divisée en une première chambre (3) et une seconde chambre (4) ;
 un premier fil chauffant (4) monté dans la première chambre ;
 un second fil chauffant (6) monté dans la seconde chambre ;
 un système de réfrigération à cycle unique comprenant un passage d'air de circulation (7),
 un compresseur (8) et un évaporateur (9) ;
 un capteur de dégivrage détectant une température de dégivrage est monté sur l'évaporateur ;
 un ventilateur d'évaporation (10) monté à l'extérieur de la chemise ;
 dans lequel le dispositif de refroidissement d'air comprend en outre :

un fil chauffant compensatoire (13) disposé sur un côté arrière de l'évaporateur ;
 un premier registre (11) prévu sur la première chambre et relié au passage d'air de circulation ;
 un second registre (12) prévu sur la seconde chambre et relié au passage d'air de circulation ;
 un module de commande de refroidissement/chauffage d'air de chambre unique (33) configuré pour : lorsque la première chambre ne satisfait pas à son exigence de réfrigération et la seconde chambre satisfait à son exigence de réfrigération, commander le fonctionnement du compresseur et du ventilateur d'évaporation, ouvrir le premier registre et fermer le second registre et activer le second fil chauffant ; lorsque la première chambre atteint une température de réfrigération prédéfinie, commander l'arrêt du compresseur et activer le fil chauffant compensatoire et fermer le premier registre et commander l'arrêt du ventilateur d'évaporation après un délai après l'arrêt du compresseur lorsque la température de dégivrage atteint une première température prédéfinie ; fermer le second fil chauffant lorsque la seconde chambre atteint une température de chauffage ; et ouvrir le second registre et commander le fonctionnement du ventilateur d'évaporation après la fermeture du premier registre jusqu'à ce que la température de dégivrage atteigne une seconde température prédéfinie, et commander l'arrêt du ventilateur d'évaporation lorsque la seconde chambre atteint une température de chauffage ;
 la seconde température prédéfinie est plus élevée que la première température prédé-

finie.

5. Dispositif de refroidissement d'air selon la revendication 4, dans lequel le module de commande de refroidissement/chauffage d'air de chambre unique comprend :
 une unité de commande de ventilateur d'évaporation (331) configurée pour : commander l'arrêt du ventilateur d'évaporation lorsque la température de dégivrage atteint la première température prédéfinie ; et commander le fonctionnement du ventilateur d'évaporation jusqu'à ce que la seconde chambre atteigne la température de chauffage, lorsque la température de dégivrage atteint la seconde température prédéfinie.
6. Dispositif de refroidissement d'air selon la revendication 4, dans lequel le dispositif de refroidissement d'air comprend en outre :
 un module de commande de chauffage compensatoire (34) configuré pour activer le fil chauffant compensatoire après l'arrêt du compresseur.
7. Dispositif de refroidissement d'air selon la revendication 6, dans lequel le module de commande de chauffage compensatoire est spécifiquement configuré pour :
 activer le fil chauffant compensatoire avec un taux de conduction de courant de 100 %.
8. Dispositif de refroidissement d'air selon la revendication 4, dans lequel le dispositif de refroidissement d'air comprend en outre :
 un module de commande de refroidissement d'air complet (31) configuré pour : ouvrir le premier registre et le second registre et commander le fonctionnement du ventilateur d'évaporation ; et activer le premier fil chauffant, le second fil chauffant et le fil chauffant compensatoire.

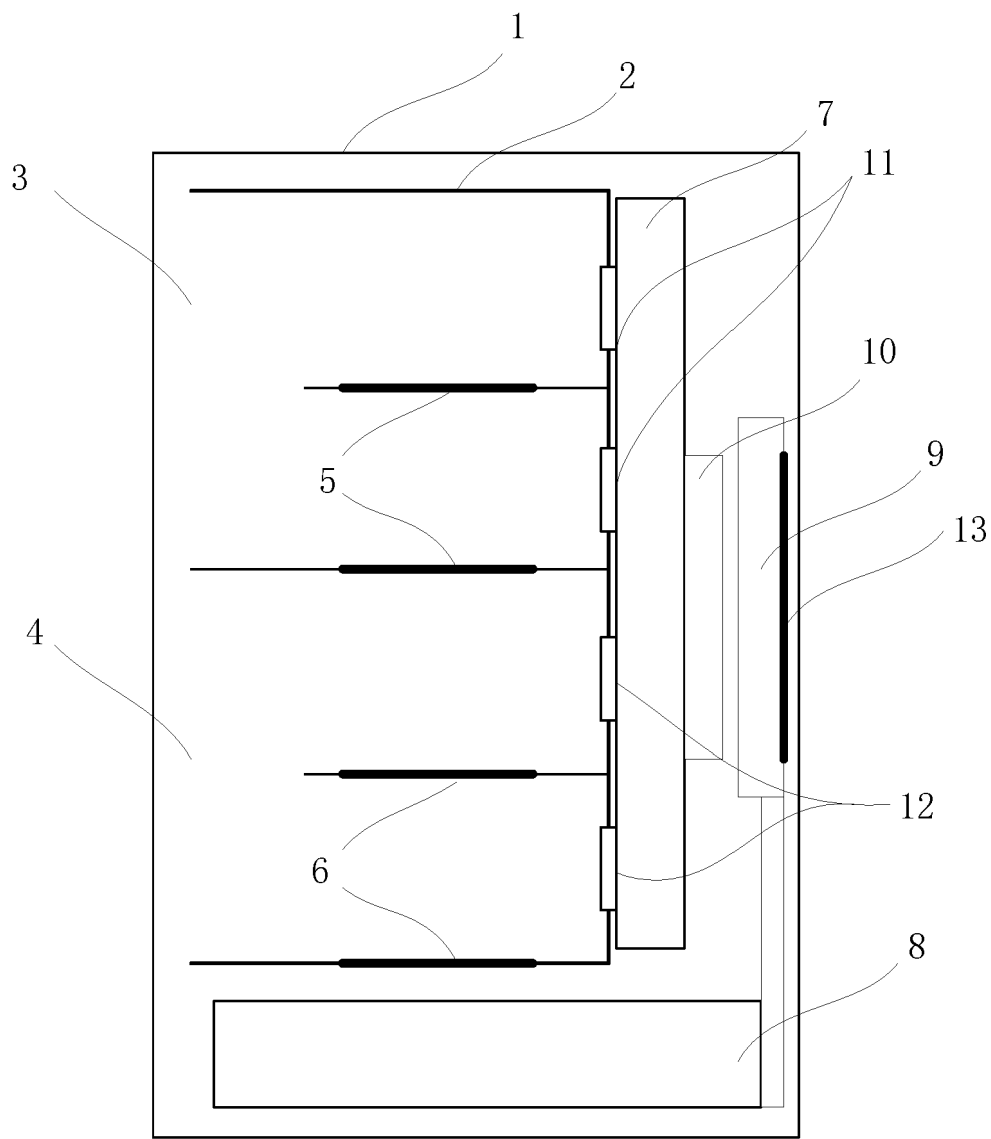


FIG. 1

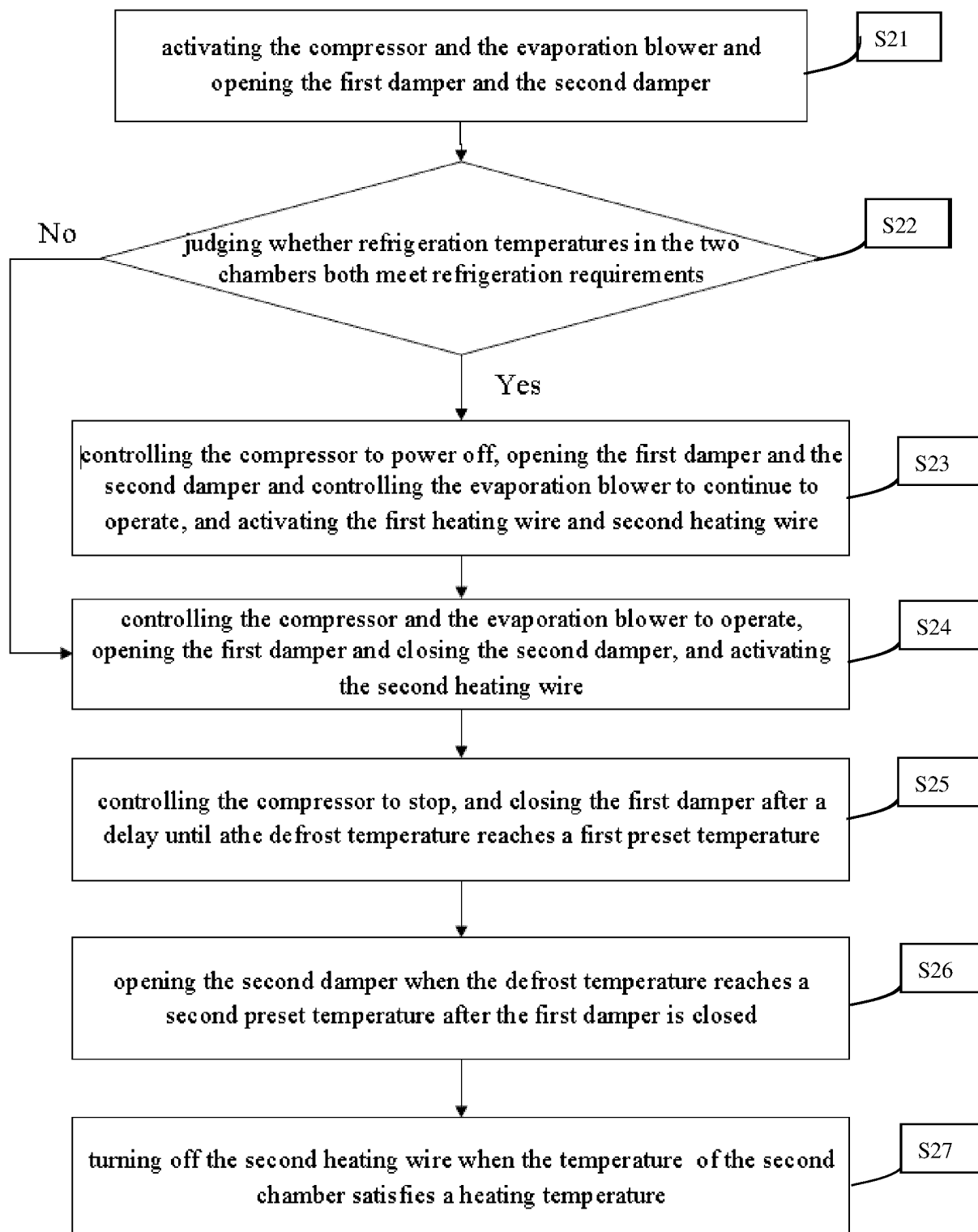


FIG. 2

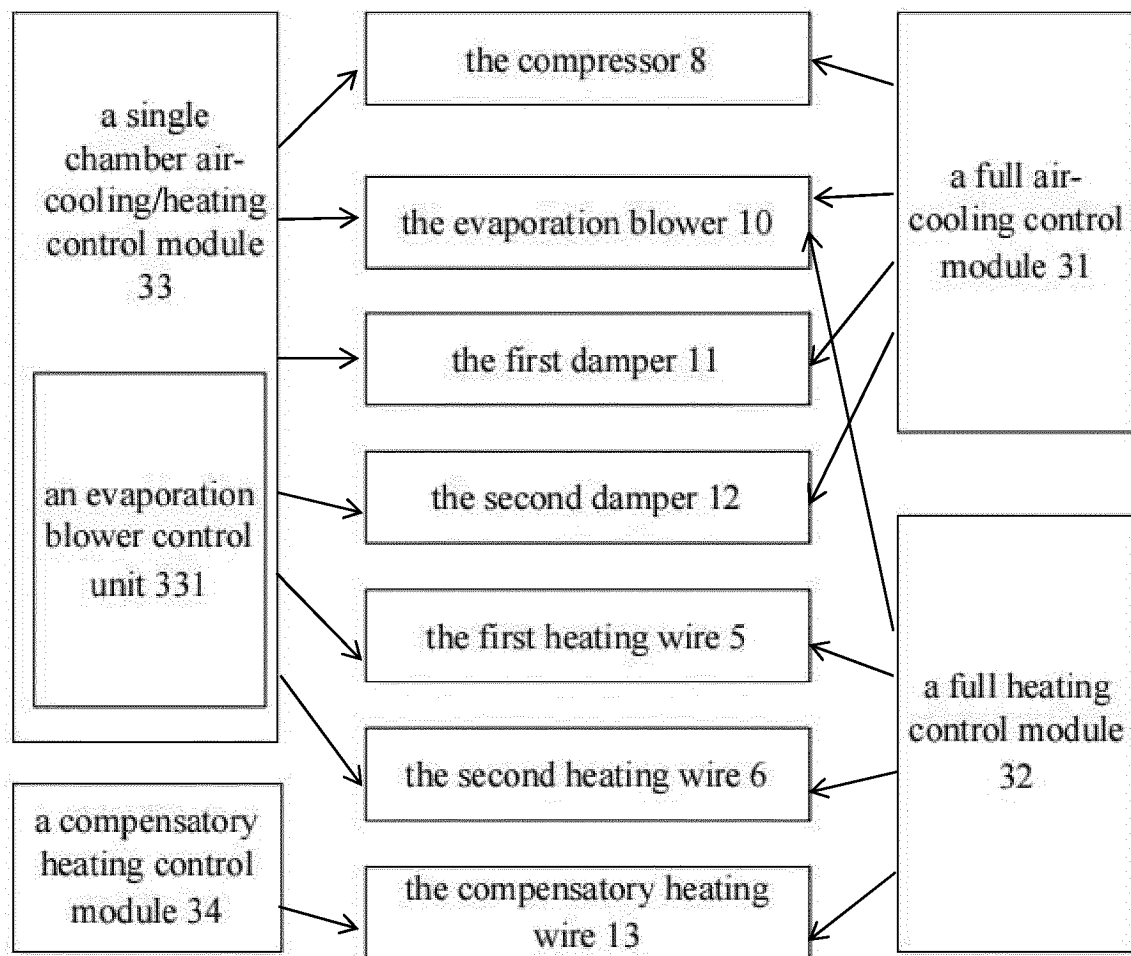


FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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