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(54) **Unitary air conditioning system**

Einheitliche Klimaanlage

Dispositif de conditionnement d'air unitaire

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- **PATENT ABSTRACTS OF JAPAN vol. 2000, no. 14, 5 March 2001 (2001-03-05) -& JP 2000 304301 A (HITACHI PLANT ENG & CONSTR CO LTD), 2 November 2000 (2000-11-02)**

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Description

[0001] The present invention relates to an air conditioning system, and particularly, to a unitary air conditioning system provided with an outdoor unit and a plurality of blower units connected to the outdoor unit, for cooling or heating each zone inside a building.

[0002] In general, a unitary air conditioning system is a kind of central heating and cooling system in which cool air or warm air is made by using a heating and cooling device provided in a factory, an office, a hotel, a house or the like, and supplied to each zone through a pipe or a duct provided in a building.

[0003] In the unitary air conditioning system, to independently supply the cool or warm air to individual zones by distinguishing a zone requiring cooling or heating and a zone which does not so, a zone controller for distributing the cool or warm air is installed on a duct, or a plurality of heating and cooling devices are individually installed correspondingly to a plurality of zones.

[0004] US 5,317,907 discloses an air-conditioning apparatus having ambient air-conditioning unit and a plurality of personal air-conditioning units connected to outdoor unit.

[0005] As shown in FIGS. 1 and 2, a conventional unitary air conditioning system includes an outdoor unit 1 fixedly installed outside a building (a two-story building in the drawing); a supply duct 3 installed inside each zone (Z1) and (Z2) in the building, for distributing the cool or warm air to the zones (Z1) and (Z2); a return duct 4 for returning the cool or warm air in each zone (Z1) and (Z2); a central blower unit 2 connected with the outdoor unit 1 by refrigerant pipes, for sending cool or warm air to the supply duct 3; and a zone controller 5 installed between the central blower unit 2 and the supply duct 3 and between the central blower unit 2 and the return duct 4, for controlling a supply and a return of the air to and from the zones (Z1) and (Z2).

[0006] The outdoor unit 1 includes a compressor 1a for compressing refrigerant; a first heat exchanger 1b connected to the compressor 1 a by refrigerant pipes, for heat exchange between refrigerant and ambient air; an expander 1 c for expanding volume of refrigerant and reducing pressure of refrigerant; a four way valve 1d disposed adjacent to the compressor 1a, for circulating a compressed refrigerant discharged from the compressor 1a according to a heating cycle or a cooling cycle; and an accumulator 1e disposed in the vicinity of a refrigerant inlet of the compressor 1a, for filtering a liquefied refrigerant.

[0007] The central blower unit 2 includes a second heat exchanger 2a connected to the compressor 1 a and the expander 1 c by refrigerant pipes, respectively; and a supply fan (not shown) disposed adjacent to the second heat exchanger 2a, for supplying the cool or warm air to the supply duct 3.

[0008] A plurality of discharge openings 3a are formed at the supply duct 3 to supply the cool or warm air to a zone requiring cooling or heating, and a plurality of suction openings 4a through which the air of each zone is sucked are formed at the return duct 4.

[0009] The zone controller 5 is composed of valve 5a, 5b, 5c and 5d for selectively supplying the cool or warm air to each zone (Z1) and (Z2), wherein the valves are installed at the supply duct 3 and the return duct 4 arranged in the corresponding zone (Z1) and (Z2). By the zone controller 5, the cool or warm air is distributed thus to be supplied to each zone (Z1) and (Z2), or be selectively supplied to only one of the zones (Z1) and (Z2).

[0010] The conventional air conditioning system having such a structure is operated as follows.

[0011] First, in case that a load detected in each zone (Z1) and (Z2) is greater than a preset value, the cool or warm air is simultaneously supplied through the supply duct 3 of each zone (Z1) and (Z2). On the other side, in case that just one load of one of the zones (Z1) and (Z2) is greater than a preset value, the cool or warm air is supplied through the supply duct 3 of the corresponding zone, which requires cooling or heating, by operation of the zone controller 5.

[0012] For example, during the cooling operation, a refrigerant compressed by the compressor 1a of the outdoor unit 1 is condensed in the first heat exchanger 1b of the outdoor unit 1, and the condensed refrigerant passes through the expander 1c and then passes through the second heat exchanger 2a of the central blower unit 2, thereby exchanging its heat with the air introduced through the return duct 4. The air cooled in such a manner moves to the supply duct 3 by a supply fan (not shown).

[0013] At this time, the zone controller 5 is operated according to a load of each corresponding zone (Z1) and (Z2), thereby cooling the zone that requires cooling.

[0014] Meanwhile, during the heating operation, a flow of the refrigerant is converted by operation of the four way valve 1d, and a heating cycle is carried out as a reverse cycle of the cooling cycle.

[0015] However, the conventional air conditioning system constructed and operated as described above has following problems.

[0016] First, a zone controller for controlling a return and supply of air should be additionally installed when the cool or warm air is to be more intensively supplied to a zone having high loads, such as a kitchen, a sun room, an exercise room or the like in the building. However, operations for an additional installation of the duct and the zone controller are complicated.

[0017] Also, to independently correspond to a load of each zone, a plurality of outdoor units and a plurality of central blower units may be installed corresponding to the number of zones. However, it may cause an increase in cost, which is very inefficient.

[0018] Therefore, an aim of the present invention is to provide a unitary air conditioning system capable of effectively performing cooling or heating operation corresponding to a load of each zone by being provided with a cooling/heating control unit for selectively distributing

a refrigerant from an outdoor unit to each blower unit for performing cooling or heating operation on each zone.

[0019] Another aim of the present invention is to provide a unitary air conditioning system capable of individually cooling or heating a specific zone having high loads or having no duct by employing an individual cooling and heating system within a central cooling and heating system performing heating and cooling operation on each zone in a building.

[0020] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, there is provided a unitary air conditioning system according to claim 1. Preferred features are defined in the dependent claims.

[0021] The foregoing and other aims, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

[0022] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a unit of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

[0023] In the drawings:

FIG. 1 is a schematic view showing one example of a conventional air conditioning system;
FIG. 2 is a block diagram showing the air conditioning system of FIG. 1;
FIG. 3 is a schematic view showing an air conditioning system in accordance with an embodiment of the present invention;
FIG. 4 is a block diagram showing the air conditioning system of FIG. 3; and
FIG. 5 is a control block diagram of the air conditioning system of FIG. 3.

[0024] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[0025] As shown in FIGS. 3 to 5, a unitary air conditioning system in accordance with an embodiment of the present invention includes an outdoor unit 110 installed outside a building; a plurality of ducts 121 and 122 installed at each zone (Z1) and (Z) in the building, for distributing cool or warm air inside the building; a central blower unit 120 connected to the outdoor unit 110 and installed inside or outside the building, for supplying the cool or warm air inside the building through the ducts 121 and 121; an individual blower unit 140 connected to the outdoor unit 110 and installed at a specific zone (Z3) in the building, such as a kitchen or the like, for individually supplying the cool or warm air to the specific zone; and a cooling/heating control unit 300 for selectively distributing a refrigerant from the outdoor unit 110 toward the central blower unit 120 and the individual blower unit 140 and controlling the cooling and heating operation for each zone (Z1), (Z2) and (Z3).

[0026] The outdoor unit 110 includes a compressor 111 for compressing refrigerant; an outdoor heat exchanger 113 for heat exchange between refrigerant and ambient air; a four way valve 117 for circulating the refrigerant discharged from the compressor 111 according to a cooing cycle or a heating cycle; an accumulator 118 disposed in the vicinity of a refrigerant inlet of the compressor 111, for filtering a liquefied refrigerant; an expander 114 connected to the outdoor heat exchanger 113, for expanding volume of refrigerant and reducing pressure of refrigerant; and a fan 119 disposed adjacent to the outdoor heat exchanger 113.

[0027] The plurality of ducts 121 and 122 are divided to be arranged in a plurality of zones (Z1) and (Z2) in the building, respectively, and are composed of a supply duct 121 having a plurality of discharge openings 121a; and a returned duct 122 having a plurality of suction openings 122a.

[0028] Preferably, the number of central blower units 120 corresponds to the number of zones (Z1) and (Z2), and the central blower units 120 are installed in parallel, so that the cool or warm air can be independently supplied to the zones (Z1) and (Z2) in the building. In the present embodiment, a two-story building is divided into a first zone (Z1) on the first story and a second zone (Z2) on the second story, and an air conditioning system in which two central blower units corresponding to the first and second zones (Z1) and (Z2) are installed in parallel will be now be described.

[0029] The central blower unit 120 includes a first heat exchanger 123 connected to the outdoor unit 110 through a first refrigerant pipe 150; and a blower 125 for supplying the air heat-exchanged by the first heat exchanger 123 to the supply duct 121.

[0030] The individual blower unit 140 includes a second heat exchanger 141 connected to the outdoor unit 110 by the second refrigerant pipe 160; and a blower fan 142 for sending the air heat-exchanged by the second heat exchanger 141.

[0031] The individual blower unit 140 is disposed in a zone where there are relatively high loads or a duct is not installed, such as a kitchen or a sun room inside the building, and subsidiarily cools or heats the zone (Z3).

[0032] Various types, such as a panel type, cabinet type, a slim type, a ceiling type, or the like can be employed for the individual blower unit 140, and the number of individual blower units 140 may be installed correspondingly to the number of zones requiring subsidiary cooling or heating.

[0033] The cooling/heating control unit 300 includes a plurality of first temperature controllers 124 installed inside each zone (Z1) and (Z2) in the building, for detecting a temperature of each zone (Z1) and (Z2) and receiving a set temperature value of a user; a second temperature controller 144 installed at the individual blower unit 140,

for receiving a set temperature value of the user and detecting a temperature of a room where the individual blower unit 140 is installed; control valves 151, 152, 161 and 162 respectively installed at the first and second refrigerant pipes 150 and 160; and a control unit 301 connected with the first temperature controller 124 and the second temperature controller 144, for comparing room temperatures inputted from the first and second temperature controller 124 and 144 with a set temperature, and controlling operation of the control valves 151, 152, 161 and 162 and the compressor 111.

[0034] The first and second refrigerant pipes 150 and 160 are opened and closed by the operation of the control valves 151, 152, 161, and 162. According to this, the operation of the central blower unit 120 and the individual blower unit 140 is controlled, and the cooling or heating for each zone (Z1), (Z2) and (Z3) in the building is selectively controlled.

[0035] Meanwhile, preferably, the control unit 301 is directly connected with the second temperature controller 144 through a communication line.

[0036] Operation of the air conditioning system having such a structure in accordance with an embodiment of the present invention will now be described. Here, a case that the air conditioning system performs the cooling operation will be explained as an example.

[0037] First, if a temperature value of each zone (Z1), (Z2) and (Z3), which is detected from the first and second temperature controllers 124 and 144 of the cooling/heating control unit 300, and a temperature value set by a user are inputted to the control unit 301, the control unit 301 compares a room temperature of each zone (Z1), (Z2) and (Z3) with the set value of the user.

[0038] At this time, if the room temperatures of the zones (Z1), (Z2) and (Z3) exceed the set value, the control unit 301 outputs a signal for driving the compressor 111 and simultaneously, outputs a signal for opening the control valves 151, 152, 161 and 162.

[0039] Here, if all the temperature values of the zones (Z1), (Z2) and (Z3) exceed the set value, the control unit 301 opens all of the control valves 151, 152, 161 and 162. And if just one temperature value of one of the zones (Z1), (Z2) and (Z3) exceeds the set value, the control unit 301 opens only one set of control valves that are connected to the blower unit related to the corresponding zone, of the control valves 151, 152, 161 and 162.

[0040] For example, if a load of the first or second zone (Z1) and (Z2) exceeds a preset value and a load of the third zone (Z3) is smaller than the preset value, that is, if the cooling is required only for the first or second zone (Z1) and (Z2), the compressor 111 is driven by a signal of the control unit 301, the control valves 151 and 152 connected to the central blower unit 120 related to cooling operation for the first or second zone (Z1) and (Z2) are opened, and the control valves 161 and 162 connected to the individual blower unit 140 related to cooling operation for the third zone (Z3) maintains a closed state.

[0041] And a refrigerant compressed by the compressor 111 is introduced to the outdoor heat exchanger 113 through the four way valve 117 to be condensed, and the condensed refrigerant passes through the expander 114, thereby being expanded, reducing the pressure. And the refrigerant expanded in the expander 114 moves to the first heat exchanger 123 and is evaporated to thereby exchange its heat with ambient air of the first heat exchanger 123. And then, the air moves toward the outdoor unit 110.

[0042] And the air heat-exchanged by the first heat exchanger 123 is discharged to supply duct 121 by the blower 125 and to the first and second zones (Z1) and (Z2) through the discharge openings 121a. And the air having completed its cooling operation in the first or second zone (Z1) and (Z2) is introduced to the return duct 122 through the suction openings 122a, is reintroduced to the central blower unit 120 and passes through the first heat exchanger 123, thereby being cooled again. Such processes are repeated, so that the central cooling operation is performed on the first or second zone (Z1) and (Z2).

[0043] Meanwhile, if the sum of loads of the third zone (Z3) having specially high loads, such as a kitchen, a sun room or the like is greater than a preset value, the second refrigerant pipe 160 connecting the individual blower unit 140 with the outdoor unit 110 is opened by operation of the control valves 161 and 162. According to this, the refrigerant having passed through the outdoor heat exchanger 113 and the expander 114 is introduced to the second heat exchanger 141 of the individual blower unit 140 and exchanges it heat with ambient air of the second heat exchanger 141. And the air heat-exchanged by the second heat exchanger 141 is sent to the third zone (Z3) by the fan 141, thereby individually cooling the third zone (Z3).

[0044] Meanwhile, the control unit 301 compares a room temperature of each zone (Z1), (Z2) and (Z3) with a set value. If all the room temperatures of the zones (Z1), (Z2) and (Z3) are lower than the set value, the control unit 301 outputs a signal for stopping the compressor 111 and simultaneously outputs a signal for closing the control valves 151, 152, 161 and 162. According to this, the compressor 111 is stopped, the first and second refrigerant pipes 150 and 160 that respectively connects the central blower unit 120 and the individual blower unit 140 with the outdoor unit 110 are closed, thereby stopping the cooing operation for each zone.

[0045] In case that the air conditioning system in accordance with the present invention performs heating operation, a flow of a refrigerant is changed by the operation of the four way valve 116, and the refrigerant moves in reverse order of the above-described cooling cycle.

[0046] In the unitary air conditioning system in accordance with the present invention, a central blower unit performing central cooling or heating operation through a duct and an individual blower unit for individually cooling or heating a specific zone where there are relatively high loads or a duct is not installed are installed to be connected in parallel to one outdoor unit. Accordingly, cool-

ing or heating operation can be performed zone by zone using a duct and simultaneously, individual cooling or heating operation can be additionally performed on a specific zone, so that a cost is lowered and the cooling and heating operation for the building can be efficiently carried out.

[0047] In addition, by providing a cooling/heating control unit which can circulate a refrigerant by distributing the refrigerant between one outdoor unit and a plurality of blower units, the plurality of blower units are systematically operated according to a load of each zone in a building. Accordingly, the cooling or heating operation for each zone can be effectively carried out.

[0048] As the present invention may be embodied in several forms without departing from the essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalence of such metes and bounds are therefore intended to be embraced by the appended claims.

Claims

1. A unitary air conditioning system comprising:

an outdoor unit (110) including a compressor (111) for compressing refrigerant, an outdoor heat exchanger (113) for heat exchange of refrigerant, and an expander (114) connected to the outdoor heat exchanger (113), for expanding refrigerant;

a central blower unit (120), having a first heat exchanger (123) connected to the outdoor unit (110) by a first refrigerant pipe and a blower (125) for supplying the air heat-exchanged by the first heat exchanger (123); and

a cooling/heating control unit (300) for selectively distributing a refrigerant from the outdoor unit (110) toward the first heat exchanger (123) of the central blower unit (120) and controlling cooling or heating operation for each of a first zone and a second zone (Z1, Z2) of the building; and

an individual blower unit (140) including a second heat exchanger (141) connected to the outdoor unit (110) by a second refrigerant pipe (160) and a fan (142) for sending the air heat-exchanged by the second heat exchanger (141), and disposed in a third zone (Z3) inside the building, for individually cooling or heating the third zone (Z3), the individual blower unit operating independently of the central blower unit (120);

the unitary air conditioning system being **characterised by**:

each of a plurality of supply ducts (121) having a plurality of discharge openings (121a), wherein the plurality of return ducts (122) are installed in each zone (Z1, Z2);

each of a plurality of return ducts (122) having a plurality of suction openings (122a), wherein the plurality of return ducts (122) are installed in each zone (Z1, Z2); and

the blower (125) of the central blower unit (120) being for supplying the air heat-exchanged by the first heat exchanger (123) to the supply ducts (121);

the plurality of the supply ducts (121) being adapted to supply the heat-exchanged air from the central blower unit (120) to the first zone (Z1) and the second zone (Z2) of the building;

the plurality of the return ducts (122) being adapted to reintroduce air from the first zone (Z1) and the second zone (Z2) to the central blower unit (120);

wherein the central blower unit (120) performs a central cooling or heating operation on each zone (Z3), and the individual blower unit (140) performs an individual cooling or heating operation on a specific zone (Z3);

wherein the cooling/heating control unit (300) comprises a plurality of first temperature controllers (124) installed inside each of the first and second zones (Z1,Z2) in the building, for detecting a temperature of each of the first and second zones (Z1, Z2) and receiving a set temperature value of a user; and a second temperature controller (144) installed at the individual blower unit (140), for receiving a set temperature value of the user and detecting a temperature of the third zone (Z3);

wherein the cooling/heating control unit (300) compares a room temperature of each of the first, second and third zones (Z1, Z2 and Z3) with a set value, and then controls operation of the central blower unit (120) and the individual blower unit (140).

2. The system of claim 1 wherein the cooling/heating control unit (300) comprises:

a plurality of control valves (151,152,161,162) respectively installed at a first refrigerant pipe (150) that respectively connect the outdoor unit (110) with the central blower unit (120) and a second refrigerant pipe (160) that connects the outdoor unit (110) with the individual blower unit (140); and

a control unit (301) connected with the first temperature controllers (124) and the second temperature controller (144), for comparing the

room temperatures inputted from the first and second temperature controllers with the set temperature value, and controlling the control valves.

3. The system of claim 2, wherein the second temperature controller (144) and the control unit (301) are directly connected to each other through a communication line.

Patentansprüche

1. Einheitliche Klimaanlage, umfassend:

Eine Außeneinheit (110) einschließlich eines Kompressors (111) zum Komprimieren von Kältemittel, einen Außenluftwärmetauscher (113) zum Wärmetausch von Kältemittel und einen mit dem Außenluftwärmetauscher (113) verbundenem Expander (114) zum Expandieren des Kältemittels;
eine zentrale Gebläseeinheit (120) mit einem ersten Wärmetauscher (123), der durch eine erste Kältemittelleitung mit der Außeneinheit (110) verbunden ist, und einem Gebläse (125) zur Lieferung der durch den ersten Wärmetauscher (123) wärmegetauschten Luft; und
eine Kühl-/Heizsteuereinheit (300) zum selektiven Verteilen eines Kühlmittels von der Außeneinheit (110) in Richtung des ersten Wärmetauschers (123) der zentralen Gebläseeinheit (120) und Steuern des Kühl- oder Heizbetriebs für jede einer ersten Zone und einer zweiten Zone (Z1, Z2) des Gebäudes; und
eine individuelle Gebläseeinheit (140) einschließlich eines zweiten Wärmetauschers (141), der durch eine zweite Kältemittelleitung (160) mit der Außeneinheit (110) verbunden ist, und einem Ventilator (142) zum Senden der durch den zweiten Wärmetauscher (141) wärmegetauschten Luft, und in einer dritten Zone (Z3) innerhalb des Gebäudes angeordnet, zum individuellen Kühlen oder Wärmen der dritten Zone (Z3), wobei die individuelle Gebläseeinheit unabhängig von der zentralen Gebläseeinheit (120) arbeitet;
die einheitliche Klimaanlage, die **dadurch gekennzeichnet ist, dass**:

jeder einer Vielzahl von Zuführungskanälen (121) eine Vielzahl von Ausströmöffnungen (121a) aufweist, wobei die Vielzahl von Rückführungskanälen (122) in jeder Zone (Z1, Z2) eingebaut ist;
jeder einer Vielzahl von Rückführungskanälen (122) eine Vielzahl von Saugöffnungen (122a) aufweist, wobei die Vielzahl von Rückführungskanälen (122) in jeder Zone (Z1, Z2) eingebaut ist; und
das Gebläse (125) der zentralen Gebläseeinheit (120) der Zuführung der, durch den ersten Wärmetauscher (123) wärmegetauschten, Luft zu den Zuführungskanälen (121) dient;
die Vielzahl der Zuführungskanäle (121) angepasst ist, die wärmegetauschte Luft von der zentralen Gebläseeinheit (120) der ersten Zone (Z1) und der zweiten Zone (Z2) des Gebäudes zuzuführen;
die Vielzahl der Rückführungskanäle (122) angepasst ist, Luft von der ersten Zone (Z1) und der zweiten Zone (Z2) wieder der zentralen Gebläseeinheit (120) zuzuführen;
wobei die zentrale Gebläseeinheit (120) einen zentrale Kühl- oder Heizvorgang an jeder Zone (Z3) ausführt, und die individuelle Gebläseeinheit (140) einen individuellen Kühl- oder Heizvorgang an einer speziellen Zone (Z3) ausführt;

wobei die Kühl-/Heizsteuereinheit (300) eine Vielzahl erster Temperaturregler (124) umfasst, die in jeder der ersten und zweiten Zonen (Z1, Z2) im Gebäude eingebaut sind, um eine Temperatur jeder der ersten und zweiten Zonen (Z1, Z2) zu detektieren und einen eingestellten Temperaturwert eines Benutzers zu empfangen; und ein zweiter Temperaturregler (144), der an der individuellen Gebläseeinheit (140) eingebaut ist, zum Empfangen eines eingestellten Temperaturwertes des Benutzers und Detektieren einer Temperatur der dritten Zone (Z3);
wobei die Kühl-/Heizsteuereinheit (300) eine Raumtemperatur jeder der ersten, zweiten und dritten Zonen (Z1, Z2 und Z3) mit einem eingestellten Wert vergleicht, und danach den Betrieb der zentralen Gebläseeinheit (120) und der individuellen Gebläseeinheit (140) steuert.

2. System nach Anspruch 1, wobei die Kühl-/Heizsteuereinheit (300) umfasst:

eine Vielzahl von Steuerventilen (151, 152, 161, 162), die jeweils an einer ersten Kühlmittelleitung (150) eingebaut sind, die jeweils die Außenlufteinheit (110) mit der zentralen Gebläseeinheit (120) verbindet und eine zweite Kühlmittelleitung (160), welche die Außenlufteinheit (110) mit der individuellen Gebläseeinheit (140) verbindet; und
eine Steuereinheit (301), die mit den ersten Temperaturreglern (124) und dem zweiten Temperaturregler (144) verbunden ist, um die von den ersten und zweiten Temperaturreglern eingegebenen Raumtemperaturen mit dem einge-

stellten Temperaturwert zu vergleichen und die Steuerventile zu steuern.

3. System nach Anspruch 2, wobei der zweite Temperaturregler (144) und die Steuereinheit (301) durch eine Verbindungsleitung direkt miteinander verbunden sind.

Revendications

1. Dispositif de conditionnement d'air unitaire comportant:

une unité à l'extérieur (110) qui comprend un compresseur (111) servant à comprimer le réfrigérant, un échangeur de chaleur à l'extérieur (113) servant à l'échange thermique du réfrigérant,, et un dispositif d'expansion (114) connecté à l'échangeur de chaleur à l'extérieur (113) et servant à dilater le réfrigérant;
une unité soufflante centrale (120) comportant un premier échangeur de chaleur (123) connecté à l'unité à l'extérieur (110) par un premier tuyau pour réfrigérant et une soufflante (125) servant à alimenter l'air qui a subi un échange thermique par le premier échangeur de chaleur (123); et
une unité de commande de refroidissement/chauffage (300) servant à distribuer de manière sélective un réfrigérant à partir de l'unité à l'extérieur (110) vers le premier échangeur de chaleur (123) de l'unité soufflante centrale (120) et à contrôler le refroidissement ou le chauffage de chaque zone faisant partie d'une première zone et d'une deuxième zone (Z1, Z2) du bâtiment; et
une unité soufflante individuelle (140) comportant un deuxième échangeur de chaleur (141) connecté à l'unité à l'extérieur (110) par un deuxième tuyau pour réfrigérant (160) et un ventilateur (142) et servant à transmettre l'air qui a subi un échange thermique par le deuxième échangeur de chaleur (141), et disposé dans une troisième zone (Z3) à l'intérieur du bâtiment, servant à refroidir ou chauffer individuellement la troisième zone (Z3), l'unité soufflante individuelle fonctionnant indépendamment de l'unité soufflante centrale (120);
le système de conditionnement d'air unitaire étant **caractérisé en ce que**:

chacune parmi la pluralité de conduites d'arrivée (121) possède une pluralité d'ouvertures de décharge (121a), **caractérisées en ce que** la pluralité de conduites de retour (122) est installée dans chaque zone (Z1, Z2);
chacune parmi la pluralité de conduites de retour (122) possède une pluralité d'ouvertures d'aspiration (122a), **caractérisées en ce que** la pluralité de conduites de retour (122) est installée dans chaque zone (Z1, Z2); et
la soufflante (125) de l'unité soufflante centrale (120) servant à alimenter l'air qui a subi un échange thermique par le premier échangeur de chaleur (123) vers les conduites d'arrivée (121);
la pluralité de conduites d'arrivée (121) est adaptée de maniière à alimenter l'air qui a subi un échange thermique à partir de l'unité soufflante centrale (120) vers la première zone (Z1) et la deuxième zone (Z2) du bâtiment;
la pluralité de conduites de retour (122) est adaptée de maniière à réintroduire l'air venant de la première zone (Z1) et de la deuxième zone (Z2) dans l'unité soufflante centrale (120);
caractérisé en ce que l'unité soufflante centrale (120) assure le refroidissement ou le chauffage central de chaque zone (Z3), et **en ce que** l'unité soufflante individuelle (140) assure le refroidissement ou le chauffage individuel dans une zone particulière (Z3);
caractérisé en ce que l'unité de commande de refroidissement/chauffage (300) comprend une pluralité de premiers régulateurs de température (124) installés à l'intérieur de chacune des première et deuxième zones (Z1, Z2) du bâtiment, et servant à détecter une température dans chacune des première et deuxième zones (Z1, Z2) et à recevoir la température déterminée par un utilisateur; et un deuxième régulateur de température (144) installé au niveau de l'unité soufflante individuelle (140) et servant à recevoir une température déterminée par l'utilisateur; et aussi à détecter une température dans la troisième zone (Z3);
caractérisé en ce que l'unité de commande de refroidissement/chauffage (300) compare la température d'une pièce dans chacune des première, deuxième et troisième zones (Z1, Z2, Z3) à une valeur de repère, puis commande le fonctionnement de l'unité soufflante centrale (120) et de l'unité soufflante individuelle (140).

2. Système selon la revendication 1, **caractérisé en ce que** l'unité de commande de refroidissement/chauffage (300) comprend:

une pluralité de vannes de commande (151,

152, 161, 162) installées respectivement au niveau d'un premier tuyau pour réfrigérant (150) qui raccorde respectivement l'unité à l'extérieur (110) à l'unité soufflante centrale (120), et au niveau d'un deuxième tuyau pour réfrigérant (160) qui raccorde l'unité à l'extérieur (110) à l'unité soufflante individuelle (140); et
une unité de commande (301) connectée aux premiers régulateurs de température (124) et au deuxième régulateur de température (144), et servant à comparer les températures de la pièce fournies à partir des premiers et deuxième régulateurs de température à la température déterminée, et aussi à contrôler les vannes de commande.

3. Système selon la revendication 2, **caractérisé en ce que** le deuxième régulateur de température (144) et l'unité de commande (301) sont directement connectés l'un à l'autre au moyen d'une ligne de communication.

FIG. 1

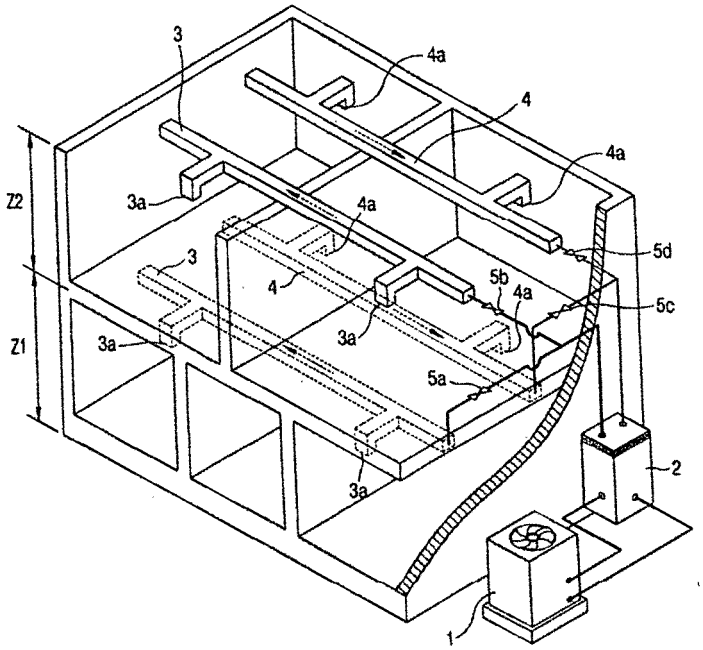


FIG. 2

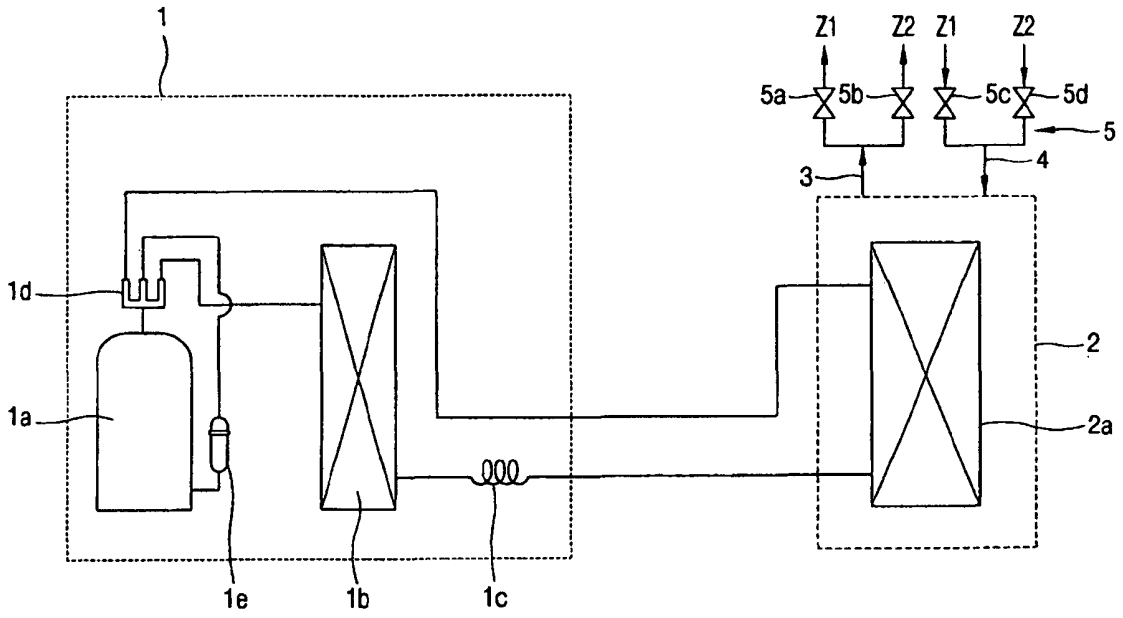


FIG. 3

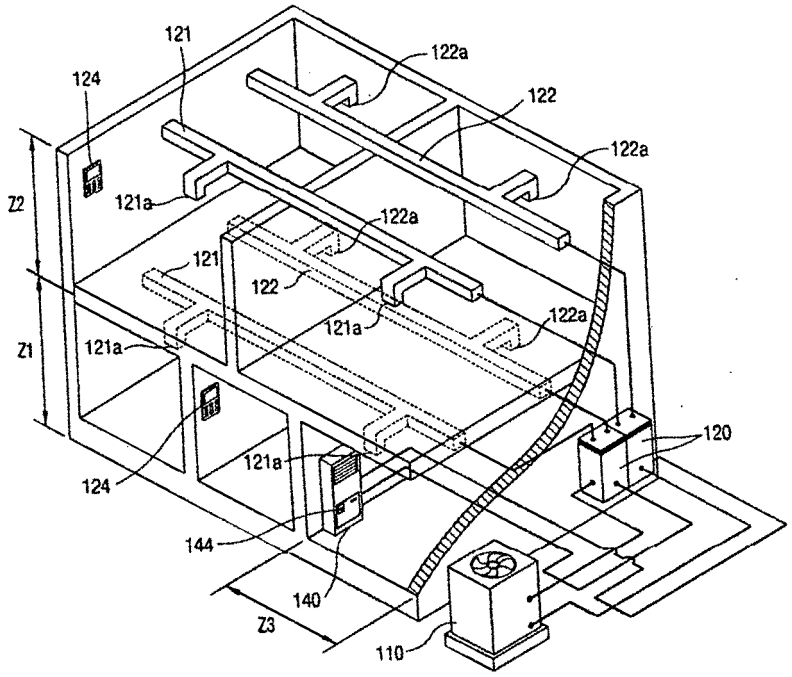

121
122a
124
122
122a
121a
122a
121
122
121a
122a
Z2
Z1
121a
120
121a
124
144
140
Z3
110

FIG. 4

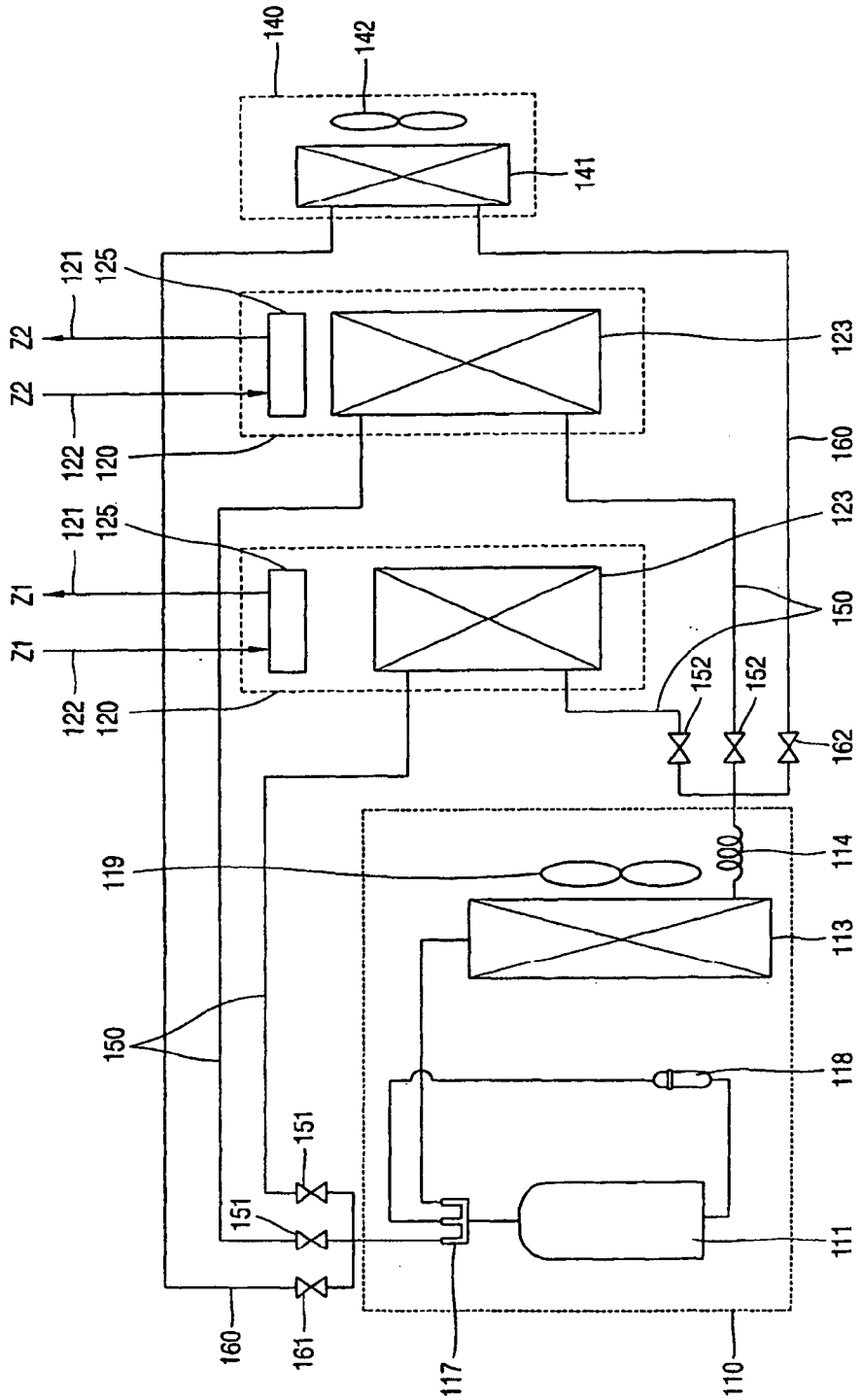
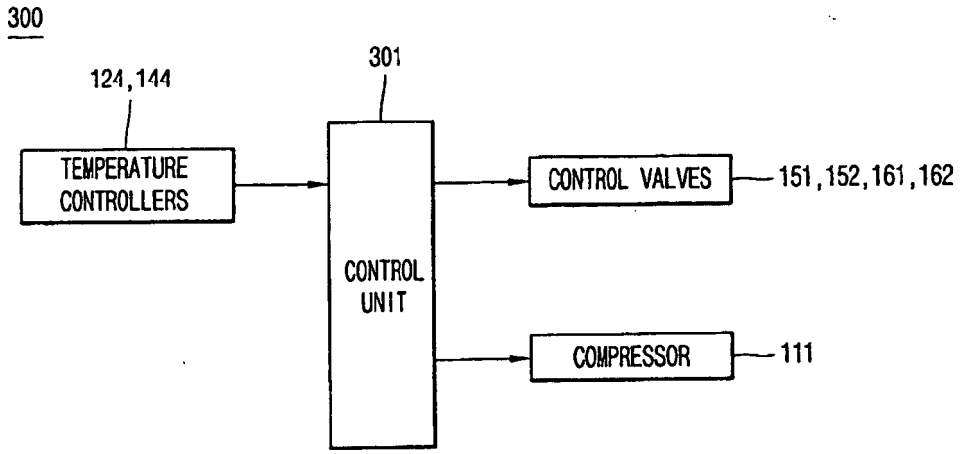

140
142
141
121
125
Z2
Z2
122
120
123
160
121
125
Z1
Z1
122
120
123
150
152
152
162
119
114
113
150
118
151
151
111
160
161
117
110

FIG. 5


300
124,144
301
TEMPERATURE CONTROLLERS
CONTROL UNIT
CONTROL VALVES
151,152,161,162
COMPRESSOR
111

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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