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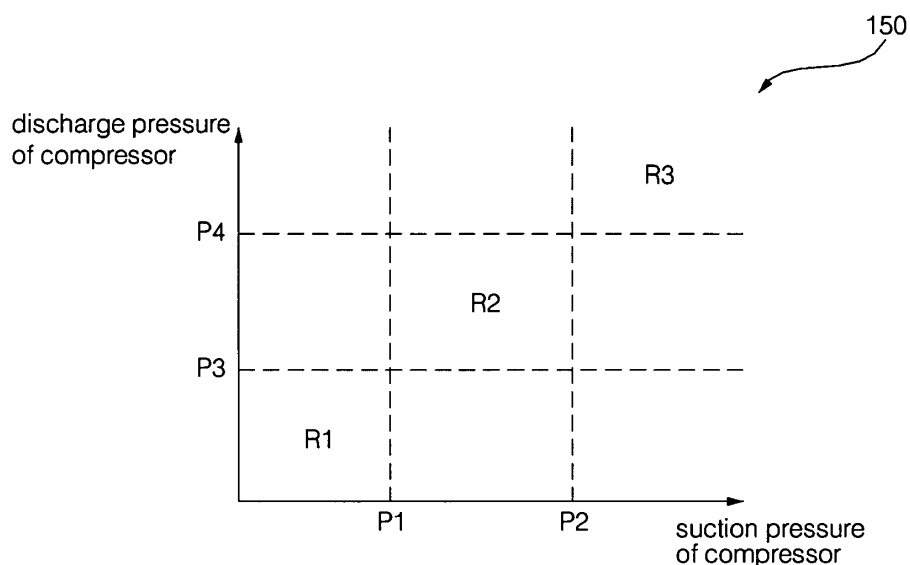
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(54) **Simultaneous cooling-heating multiple type air conditioner**

(57) A simultaneous cooling-heating multiple type air conditioner includes a plurality of cooling-heating combined-use indoor units controlled in an operation domain divided into a plurality of operation zones based on a refrigerant suction pressure and a refrigerant discharge pressure of a compressor. The operation domain includes three operation zones. In the first operation zone, a cooling-initiative simultaneous cooling and heating op-

eration mode is switched to a heating-initiative simultaneous cooling and heating operation mode. In the second operation zone, the cooling-initiative simultaneous cooling and heating operation mode or the heating-initiative simultaneous cooling and heating operation mode, does not switch to different modes. In the third operation zone, the heating-initiative simultaneous cooling and heating operation mode is switched to the cooling-initiative simultaneous cooling and heating operation mode.

FIG. 6



EP 1 921 400 A2

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a multiple type air conditioner, and more particularly to a simultaneous cooling-heating multiple type air conditioner configured to simultaneously cool and heat.

Discussion of Related Art

[0002] Generally, an air conditioner is an appliance for cooling and heating an indoor space, such as a residential interior space, a restaurant or an office. In order to effectively cool and heat an indoor space divided into a plurality of rooms, multiple type air conditioners, which can cool and heat respective rooms independently have been developed. In particular, a multiple type air conditioner is configured in such a manner that a plurality of indoor units are connected to a single outdoor unit, and the indoor units are installed in respective rooms. Each indoor unit operates in either a cooling mode or a heating mode, and conditions air of an indoor space.

[0003] However, conventional multiple type air conditioners are controlled to either cool or heat all the rooms in one indoor space at the same time, and as such they can not meet the demand of independently conditioning the respective rooms differently.

SUMMARY OF THE INVENTION

[0004] It would be desirable to provide a simultaneous cooling-heating multiple type air conditioner that is configured to be controlled steadily in a simultaneous cooling and heating operation period.

[0005] In order to achieve the above objects and advantageous effects, according to one aspect of the present invention, there is provided a simultaneous cooling-heating multiple type air conditioner controlled with an operation domain including a plurality of operation zones which are divided based on a refrigerant suction pressure and a refrigerant discharge pressure of a compressor, in which the operation domain includes a first operation zone in which a cooling-initiative simultaneous cooling and heating operation mode is switched to a heating-initiative simultaneous cooling and heating operation mode, a second operation zone in which a mode switching between the cooling-initiative simultaneous cooling and heating operation mode and the heating-initiative simultaneous cooling and heating operation mode does not occur, and a third operation zone in which the heating-initiative simultaneous cooling and heating operation mode is switched to the cooling-initiative simultaneous cooling and heating operation mode.

[0006] According to a further aspect of the present invention, there is provided a simultaneous cooling-heating

multiple type air conditioner including a plurality of cooling-heating combined-use indoor units, each having an indoor heat exchanger, a cooling-heating combined-use outdoor unit including a compressor, an outdoor heat exchanger, and a refrigerant switching part installed at a discharge side of the compressor for switching flow of refrigerant based on operation conditions such as cooling-only operation, heating-only operation, cooling-initiative simultaneous cooling and heating operation, and heating-initiative simultaneous cooling and heating operation, and a distributor installed between the cooling-heating combined-use indoor units and the cooling-heating combined-use outdoor unit for distributing the refrigerant into passages of the cooling-heating combined-use indoor units based on the operation conditions such as cooling-only operation, heating-only operation, cooling-initiative simultaneous cooling and heating operation, and heating-initiative simultaneous cooling and heating operation, wherein the air conditioner is controlled with an operation domain including a plurality of operation zones which are divided according to a refrigerant suction pressure and a refrigerant discharge pressure of the compressor, in which the operation zone domain comprises a first operation zone in which a cooling-initiative simultaneous cooling and heating operation mode is switched to a heating-initiative simultaneous cooling and heating operation mode, a second operation zone in which a mode switching between the cooling-initiative simultaneous cooling and heating operation mode and the heating-initiative simultaneous cooling and heating operation does not occur, and a third operation zone in which the heating-initiative simultaneous cooling and heating operation mode is switched to the cooling-initiative simultaneous cooling and heating operation mode.

[0007] In particular embodiments, the suction pressure of the compressor is less than a first suction pressure, a discharge pressure of the compressor is less than a first discharge pressure in the first operation zone; the suction pressure of the compressor ranges from the first suction pressure to a second suction pressure wherein the second suction pressure is greater than the first suction pressure and the discharge pressure of the compressor ranges from the first discharge pressure to a second discharge pressure wherein the second discharge pressure is greater than the first discharge pressure in the second operation zone; and the suction pressure of the compressor may be greater than the second suction pressure and the discharge pressure of the compressor may be greater than the second discharge pressure. In this instance, the air conditioner operating in the first operation zone and the third operation zone can be controlled to move to the second operation zone by varying discharge flow rate of refrigerant discharged from the compressor or the number of revolutions of the outdoor fan.

[0008] The distributor may include a liquid header, a low pressure gas header, and a high pressure gas header. The simultaneous cooling-heating multi-air conditioner according to the present invention may further include

a liquid refrigerant pipe for connecting the cooling-heating outdoor unit to the liquid header, a low pressure gas pipe for connecting the cooling-heating outdoor unit to the low pressure gas header, and a high pressure gas pipe for connecting the cooling-heating outdoor unit to the high pressure gas header.

[0009] Since the simultaneous cooling-heating multiple type air conditioner according to the present invention switches its operation modes in an operation domain divided into a plurality of operation zones based on the refrigerant suction pressure and the refrigerant discharge pressure of the compressor, it can be steadily operated and controlled during the simultaneous cooling and heating operation period.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

FIG 1 is a schematic view illustrating a simultaneous cooling-heating multiple type air conditioner according to one embodiment of the present invention;

FIG 2 is a view illustrating the operation status of the simultaneous cooling-heating multiple type air conditioner shown in FIG 1, which operates in a cooling-only operation mode;

FIG 3 is a view illustrating the operation status of the simultaneous cooling-heating multiple type air conditioner shown in FIG 1, which operates in a heating-only operation mode;

FIG 4 is a view illustrating the operation status of the simultaneous cooling-heating multiple type air conditioner shown in FIG 1, which operates in a cooling-initiative simultaneous cooling-heating operation mode;

FIG 5 is a view illustrating the operation status of the simultaneous cooling-heating multiple type air conditioner shown in FIG 1, which operates in a heating-initiative simultaneous cooling-heating operation mode; and

FIG 6 is a view illustrating an operation domain of the simultaneous cooling-heating multiple type air conditioner shown in FIG 1, which is controlled to perform a simultaneous cooling-heating operation.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

[0011] Hereinafter, a simultaneous cooling-heating multiple type air conditioner according to embodiments of the present invention will be described with reference to the accompanying drawings.

[0012] A multiple type air conditioner in which some indoor units operate to cool air and the other indoor units operate to heat air at the same time has been researched and developed. The conventional multiple type air conditioner for simultaneous cooling-heating operation is controlled based on a target discharge pressure and a

target suction pressure set for simultaneous cooling-heating operation of a compressor. In this instance, depending on cooling to heating operation ratio of the indoor units operating in cooling mode or in heating mode, the simultaneous cooling-heating multiple type air conditioner performs a cooling-initiative simultaneous cooling and heating operation or a heating-initiative simultaneous cooling and heating operation. Accordingly, since the multiple type air conditioner for simultaneous cooling and heating operations is controlled case by case based on the operation ratio of the indoor units, indoor temperature and outdoor temperature, there is a no-controlled zone in which operation of the air conditioner can not be controlled by the target discharge pressure and the target suction pressure.

[0013] Further, the conventional multiple type air conditioner performing simultaneous cooling and heating operations is disadvantageous in that it cannot respond to a variety of design specifications, a variety range of indoor temperatures and a variety range of outdoor temperatures. Accordingly, since the conventional multiple type air conditioner performing simultaneous cooling and heating operations does not have optimum operation efficiency, it cannot sufficiently cool and heat an indoor space. Still further, since the control scheme of the conventional multiple type air conditioner performing simultaneous cooling and heating operations is very complicated, an operation mode switching time between the cooling-initiative simultaneous cooling and heating operation and the heating-initiative simultaneous cooling and heating operation is increased by 5 through 15 minutes, and noise occurs during the operation mode switching time. Further, damage is caused to a compressor when trying to reduce the mode switching noise.

[0014] FIG 1 illustrates a simultaneous cooling-heating multiple type air conditioner 100 according to one embodiment of the present invention. In this example, the simultaneous cooling-heating multiple type air conditioner 100 includes a first, a second, a third and a fourth cooling-heating combined-use indoor units B1, B2, B3 and B4, a cooling-heating combined-use outdoor unit A, and a distributor C.

[0015] The cooling-heating combined-use outdoor unit A includes a first and a second compressor 53 and 54, an outdoor heat exchanger 51, an outdoor heat exchanger fan 61 and a switching part. The switching part includes a four-way valve 62. Suction parts of the first and second compressors 53 and 54 are connected to each other through a combined-use accumulator 52. The first compressor 53 is an inverter compressor that is configured to vary compression capacity of refrigerant, and the second compressor 54 is a constant-speed compressor having constant compression capacity of refrigerant.

[0016] A first discharge pipe 55 and a second discharge pipe 56 are connected to respective discharge sides of the first and second compressors 53 and 54, and bridged by a bridging part 57. The first and second discharge pipes 55 and 56 are further respectively connect-

ed to a first and a second oil separator 58 and 59 in order to recover oil from refrigerant discharged from the first and second compressors 53 and 54. The first and second oil separators 58 and 59 are respectively connected to a first and a second recovery pipe 30 and 31 in order to guide the separated oil to respective suction sides of the first and second compressors 53 and 54.

[0017] The bridging part 57 is connected to a high pressure gas pipe 63 in order to make refrigerant discharged from the first and second compressors 53 and 54 bypass the four-way valve 62. The bridging part 57 is connected to the four-way valve 62 via a third discharge pipe 68.

[0018] An outdoor heat exchanger 51 is connected to the four-way valve 62 via a first connection pipe 71. In the outdoor heat exchanger 51, refrigerant condenses or evaporates by exchanging heat with outdoor air. In order to facilitate heat exchanging, an outdoor fan 61 blows air into the outdoor heat exchanger 51. The outdoor heat exchanger 51 is configured to operate as a condenser during a cooling-only operation period or a cooling-initiative simultaneous cooling-heating operation period, and is configured to operate as an evaporator during a heating-only operation period or a heating-initiative simultaneous cooling-heating operation period.

[0019] An outdoor electronic expansion valve 65 and an overcooling device 66 are installed between or in the middle of the liquid pipe 72, connected between the outdoor heat exchanger 51 and the distributor C. The outdoor electronic expansion valve 65 expands refrigerant upon the heating-only operation and the heating-initiative simultaneous cooling-heating operation. The overcooling device 66 cools the refrigerant moving to the distributor upon the cooling-only operation and the cooling-initiative simultaneous cooling-heating operation. The outdoor electronic expansion valve 65 expands the refrigerant condensed in the first through fourth indoor heat exchangers 11, 21, 31 and 41 during the heating-only operation period or the heating-initiative simultaneous cooling-heating operation period before the refrigerant is introduced into the outdoor heat exchanger 51. The overcooling device 66 includes an overcooler 66a installed in such a manner that it surrounds a part of the liquid pipe 72, a bypass pipe 66b installed between the overcooler 66a and the distributor C in order to make a portion of the refrigerant moving to the distributor bypass the distributor so as to be introduced into the overcooler 66a, an electronic expansion valve 66c installed in a part of the bypass pipe 66b, and a recovery pipe 66d connected between the overcooler 66a and a third discharge pipe 64.

[0020] The distributor C is installed between the cooling-heating combined-use outdoor unit A and the first through fourth cooling-heating combined-use indoor units B1, B2, B3 and B4 and distributes the refrigerant to the first, second, third and fourth cooling-heating combined-use indoor units B1, B2, B3 and B4 based on the operation conditions such as cooling-only operation, heating-only operation, cooling-initiative simultaneous

cooling-heating operation and heating-initiative simultaneous cooling-heating operation. The distributor C includes a high pressure gas header 81, a low pressure gas header 82, a liquid header 83 and control valves (not shown).

[0021] The first, second, third and fourth cooling-heating combined-use indoor units B1, B2, B3 and B4 includes respective first, second, third and fourth electronic expansion valves 12, 22, 32 and 42, and respective first, second, third and fourth indoor fans 15, 25, 35 and 45. The first, second, third and fourth electronic expansion valves 12, 22, 32 and 43 are installed on respective first, second, third and fourth connection pipes 13, 23, 33 and 43 connected between the first, second, third and fourth indoor heat exchangers 11, 21, 31 and 41 and the high pressure gas header 81.

[0022] The high pressure gas header 81 is connected to the high pressure gas pipe 63 of the bridging part 57, and respective sides of the first, second, third and fourth indoor heat exchangers 11, 21, 31 and 41. The low pressure gas header 82 is connected to the lower pressure gas pipe 75, which the low pressure gas header 82 is connected to the suction pipe 64, and connected to respective other sides of the first, second, third and fourth heat exchangers 11, 21, 31, and 41. The high pressure gas header 81, the low pressure gas header 82 and the liquid header 83 can be respectively connected to a high pressure gas pipe 63', a low pressure gas pipe 75' and a liquid pipe 72' of a different outdoor unit (not shown).

[0023] Referring to FIG 2 through FIG 5, the operation statuses of the simultaneous cooling-heating multiple type air conditioner shown in FIG 1 and flow of refrigerant according to the operation methods will be described below.

[0024] FIG 2 illustrates the operation status of the simultaneous cooling-heating multiple type air conditioner and the flow of refrigerant upon a cooling-only operation. The refrigerant at a high pressure gas state discharged from the first and second compressors 53 and 54 pass through the first and second discharge pipes 55 and 56, and finally flow into the outdoor heat exchanger 51 through the third discharge valve 68 and the four-way valve 62. High pressure liquid refrigerant, obtained as the high pressure gas refrigerant is condensed by the outdoor heat exchanger 51, is introduced into the liquid header 83 via the overcooling device 66. The refrigerant discharged from the liquid header 83 through the first, second, third and fourth indoor connection pipes 13, 23, 33 and 43 is expanded by the first, second, third and fourth electronic expansion valves 12, 22, 32 and 42, then evaporated by the first, second, third and fourth indoor heat exchangers 11, 21, 31 and 41, and finally introduced into the low pressure gas header 82. Low pressure gas refrigerant discharged from the low pressure gas header 82 is introduced into the suction and discharge pipe 64 and then sucked into the first and second compressors 53 and 54 via the accumulator 52.

[0025] FIG 3 illustrates the operation status of the si-

multaneous cooling-heating multiple type air conditioner 100 and the flow of refrigerant in the air conditioner 100 upon the heating-only operation. The high pressure gas refrigerant discharged from the first and second compressors 53 and 54 pass through the first and second discharge pipes 55 and 56, then pass through the bridging part 57 and the high pressure gas pipe 63 and is finally introduced into the high pressure gas header 81 without passing by way of the four-way valve 62. The refrigerant discharged from the high pressure gas header 81 via fifth, sixth, seventh and eighth indoor connection pipes 14, 24, 34 and 44 is condensed in the first, second, third and fourth indoor heat exchangers 11, 21, 31 and 41. After that, the refrigerant is introduced into the liquid header 83, next discharged through the liquid pipe 72, then expanded by the outdoor electronic expansion valve 65, and finally evaporated in the outdoor heat exchanger 51. The low pressure gas refrigerant flows to the suction pipe 64 via the four-way valve 62, and then is introduced into the first and second compressors 53 and 54 via the accumulator 52.

[0026] FIG 4 illustrates the operation status of the simultaneous cooling-heating multiple type air conditioner 100 and the flow of refrigerant in the air conditioner 100 upon the cooling-initiative simultaneous cooling and heating operation. For example, Fig. 4 illustrates a case in which the first, second, and third indoor units B1, B2 and B3 operate in a cooling mode and the fourth indoor unit B4 operates in a heating mode. The flow of refrigerant in the first, second and third indoor units B1, B2 and B3 operating in the cooling mode are similar to or the same as that shown in the cooling-only operation mode shown in FIG 2. The operation shown in FIG 4 will thereby be described below, mainly by referencing some of the differences of FIG 4 with respect to FIG 2.

[0027] A portion of the high pressure gas refrigerant discharged from the first and second compressors 53 and 54 passes through the high pressure gas pipe 63 via the bridging part 57, and is then introduced into the high pressure gas header 81. The refrigerant flowing out of the high pressure gas header 81 passes through the indoor connection pipe 44, is then condensed in the fourth indoor heat exchanger 41, and is finally introduced into the liquid header 83. The refrigerant flowing out of the fourth indoor unit B4 and the refrigerant flowing out of the outdoor heat exchanger 51, are introduced into respective first, second and third indoor units B1, B2 and B3, via the liquid header 83.

[0028] FIG 5 illustrates the operation status of the simultaneous cooling-heating multiple type air conditioner 100 and the flow of refrigerant in the air conditioner 100 upon the heating-initiative simultaneous cooling and heating operation. For example, FIG 5 illustrates a case in which the first, second, and third indoor units B1, B2 and B3 operate in a heating mode and the fourth indoor unit B4 operates in a cooling mode. The flow of refrigerant in the first, second and third indoor units B1, B2 and B3 operating in the heating mode are similar to or the same

as that shown in the heating-only operation shown in FIG 3. The refrigerant in the fourth indoor unit B4 flows differently. High pressure liquid refrigerant is introduced into the fourth indoor unit B4, after passing through the fourth connection pipe 43 from the liquid header 83. Prior to arriving at the liquid header 83, the flow of refrigerant is similar to the flow of refrigerant in FIG. 2. The refrigerant is then expanded in the fourth indoor electronic expansion valve 42, and evaporated in the fourth indoor heat exchanger 41, and introduced into the low pressure gas header 82. After that, the refrigerant passes through the low pressure gas pipe 75, and flows into the third discharge pipe 64 so that it is mixed with the refrigerant evaporated by the outdoor heat exchanger 51.

[0029] FIG 6 illustrates the operation domain 150 of the simultaneous cooling-heating operation of the first, second, third and fourth cooling-heating combined-use indoor units B1, B2, B3 and B4. The operation domain 150 is characterized by or divided into a plurality of operation zones. The multi-type air conditioner operates in a particular zone depending on refrigerant suction pressures and refrigerant discharge pressures of the first and second compressors 53 and 54. The refrigerant discharge pressure may be set by a value measured by pressure sensors installed to the discharge pipes of the first and second compressors 53 and 54, or set by a value measured by a pressure sensor installed to the third discharge pipe.

[0030] The operation domain may be characterized and divided in a matrix form and includes a first operation zone R1, a second operation zone R2 and a third operation zone R3. In the first operation zone R1, the suction pressure of the first and second compressors 53 and 54 is less than a first suction pressure P1, and the discharge pressure of the first and second compressors 53 and 54 is less than a first discharge pressure P3. In the second operation zone R2, the suction pressure of the first and second compressors 53 and 54 is equal to or greater than the first suction pressure P1 and less than a second suction pressure P2. The second suction pressure P2 is greater than the first suction pressure P1 ($P2 > P1$). In the second operation zone R2, the discharge pressure of the first and second compressors 53 and 54 is equal to or greater than the first discharge pressure P3 and is equal to or less than a second discharge pressure P4. The second discharge pressure P4 is greater than the first discharge pressure P3 ($P4 > P3$). In the third operation zone R3, the suction pressure of the first and second compressors 53 and 54 is greater than the second suction pressure P2 and the discharge pressure of the first and second compressors 53 and 54 is greater than the second discharge pressure P4. To further illustrate this example, the first suction pressure P1 may be 725kPa (gauge pressure), the second suction pressure P2 may be 987 kPa (gauge pressure), the first discharge pressure P3 may be 2565 kPa (gauge pressure) and the second discharge pressure P4 may be 2985 kPa (gauge pressure).

[0031] The simultaneous cooling-heating multiple type

air conditioner 100 performs switching of the cooling-initiative simultaneous cooling and heating operation mode when operating in the first operation zone R1. That is, the simultaneous cooling-heating multiple type air conditioner 100 performing the cooling-initiative simultaneous cooling and heating operation switches its operation mode so as to perform the heating-initiative simultaneous cooling and heating operation when the suction pressure or the discharge pressure of the first and second compressors 53 and 54 decreases and it comes into the range of the first operation zone R1.

[0032] In the third operation zone R3, the simultaneous cooling-heating multiple type air conditioner 100 switches its operation mode from the heating-initiative simultaneous cooling and heating operation to the cooling-initiative simultaneous cooling and heating operation. That is, the simultaneous cooling-heating multiple type air conditioner 100 performing the heating-initiative simultaneous cooling and heating operation switches to the cooling-initiative simultaneous cooling and heating operation when at least one of the suction pressure and the discharge pressure of the first and second compressors 53 and 54 increases and it comes into the third operation zone R3.

[0033] The second operation zone R2 is a normal operation zone in which operation mode switching does not occur in this operation zone. As an example, the simultaneous cooling-heating multiple type air conditioner 100 performing the heating-initiative simultaneous cooling and heating operation in the first operation zone R1, keeps or maintains the heating-initiative simultaneous cooling and heating operation even if the suction pressure or the discharge pressure of the first and second compressors 53 and 54 increases provided it comes into the second operation region R2. As an alternative example, the simultaneous cooling-heating multiple type air conditioner 100 performing the cooling-initiative simultaneous cooling and heating operation in the third operation zone R3, keeps or maintains the cooling-initiative simultaneous cooling and heating operation even if the suction pressure or the discharge pressure of the first and second compressors 53 and 54 decreases provided it comes into the second operation zone R2.

[0034] The simultaneous cooling-heating multiple type air conditioner 100 operating in the first operation zone R1 and the third operation zone R3 is controlled to move to the second operation zone R2. There can be a variety of control methods. For example, the refrigerant discharge flow of the first and second compressors 53 and 54 can be controlled. The frequency of the first compressor 53 may be varied or the refrigerant discharge flow can be varied by on/off control of the second compressor 54. Further, the number of rotations of the outdoor fan 61 can be varied. For example, when the simultaneous cooling-heating multiple type air conditioner 100 performs the cooling-initiative simultaneous cooling and heating operation in the third operation zone R3, if the refrigerant discharge flow of the first and second com-

pressors 53 and 54 is increased or the number of rotation of the outdoor fan 61 is increased, operation of the simultaneous cooling-heating multiple type air conditioner 100 moves to the second operation zone R2. The time it takes for the first operation zone R1 or the third operation zone R3 to move to second operation zone R2 can be greatly reduced, for example, to approximately 3 minutes or less. In contrast, conventional operation zone switching time is about 5 to 15 minutes. Accordingly, since the time when the simultaneous cooling-heating multiple type air conditioner 100 steadily operates in the second operation zone R2 is increased, optimum air conditioning cycle efficiency can be realized and the control scheme can be simplified.

[0035] Various embodiments of the present invention are explained above, but the present invention is not limited to the above-stated embodiments. Those skilled in the art will appreciate that many variations and modifications can be made to the preferred embodiments without substantially departing from the principles of the present invention. Therefore, it is readily understood that those variations and modifications to the preferred embodiment will be within the scope of the claims.

Claims

1. A simultaneous cooling-heating multiple type air conditioner (100) including a plurality of cooling-heating combined-use indoor units (B1, B2, B3, B4) and operating in an operation domain (150) having a plurality of operation zones divided by a refrigerant suction pressure and a refrigerant discharge pressure of a compressor (53, 54), wherein the operation domain comprises:

a first operation zone (R1) in which a cooling-initiative simultaneous cooling and heating operation mode is switched to a heating-initiative simultaneous cooling and heating operation mode;

a second operation zone (R2) in which the cooling-initiative simultaneous cooling and heating operation mode or the heating-initiative simultaneous cooling and heating operation mode is not switched to different modes; and

a third operation zone (R3) in which the heating-initiative simultaneous cooling and heating operation mode is switched to the cooling-initiative simultaneous cooling and heating operation mode.

2. The simultaneous cooling-heating multiple type air conditioner according to claim 1, wherein when operating in the first operation zone, a suction pressure of the compressor is less than a first suction pressure (P1) and a discharge pressure (P3) of the compressor is less than a first discharge pressure,

when operating in the second operation zone, the suction pressure of the compressor is in a range from the first suction pressure to a second suction pressure (P2), wherein the second suction pressure is greater than a first suction pressure, and the discharge pressure of the compressor is in a range from the first discharge pressure to a second discharge pressure (P4), wherein the second discharge pressure is greater than the first discharge pressure, and when operating in the third operation zone, the suction pressure of the compressor is greater than the second suction pressure and the discharge pressure of the compressor is greater than the second discharge pressure.

3. The simultaneous cooling-heating multiple type air conditioner according to claim 2, wherein the air conditioner operating in the first operation zone is configured to be controlled to move to the second operation zone.
4. The simultaneous cooling-heating multiple type air conditioner according to claim 2, wherein the air conditioner operating in the third operation zone is configured to be controlled to move to the second operation zone.
5. The simultaneous cooling-heating multiple type air conditioner according to claim 2, wherein discharge flow of refrigerant from the compressor is controlled in such a manner that the air conditioner operating in the first operation zone is controlled to move to the second operation zone.
6. The simultaneous cooling-heating multiple type air conditioner according to claim 2, wherein discharge flow of refrigerant from the compressor is controlled in such a manner that the air conditioner operating in the third operation zone is controlled to move to the second operation zone.
7. The simultaneous cooling-heating multiple type air conditioner according to claim 2, further comprising an outdoor heat exchanger (51) for exchanging heat of the refrigerant with outdoor air and an outdoor fan (61) for blowing the outdoor air to the outdoor heat exchanger, wherein the number of revolutions of the outdoor fan is controlled in such a manner that the air conditioner operating in the first operation zone is controlled to move to the second operation zone.
8. The simultaneous cooling-heating multiple type air conditioner according to claim 2, further comprising an outdoor heat exchanger (51) for exchanging heat of the refrigerant with outdoor air and an outdoor fan (61) for blowing the outdoor air to the outdoor heat exchanger,

wherein the number of revolutions of the outdoor fan is controlled in such a manner that the air conditioner operating in the third operation zone is controlled to move to the second operation zone.

9. A simultaneous cooling-heating multiple type air conditioner according to claim 2, further comprising:

a cooling-heating combined-use outdoor unit (A) including the compressor, an outdoor heat exchanger (51), and a switching part (62) installed at a discharge side of the compressor, for switching flow of refrigerant based on operation conditions such as a cooling-only operation mode, a heating-only operation mode, the cooling-initiative simultaneous cooling and heating operation mode, and the heating-initiative simultaneous cooling and heating operation mode; and

a distributor (C) installed between the cooling-heating combined-use outdoor unit and the cooling-heating combined-use indoor units, the distributor being configured to distribute the refrigerant to the cooling-heating combined-use indoor units based on the operation conditions such as the cooling-only operation mode, the heating-only operation mode, the cooling-initiative simultaneous cooling and heating operation mode, and the heating-initiative simultaneous cooling and heating operation mode.

10. The simultaneous cooling-heating multiple type air conditioner according to claim 9, wherein the distributor further includes a liquid header (83), a low pressure gas header (82) and a high pressure gas header (81).

11. The simultaneous cooling-heating multiple type air conditioner according to claim 9 or claim 10, further comprising:

a liquid refrigerant pipe (72) connected between the cooling-heating combined-use outdoor unit and the liquid header;
a low pressure gas pipe (75) connected between the cooling-heating combined-use outdoor unit and the low pressure gas header; and
a high pressure gas pipe (63) connected between the cooling-heating combined-use outdoor unit and the high pressure gas header.

FIG. 1

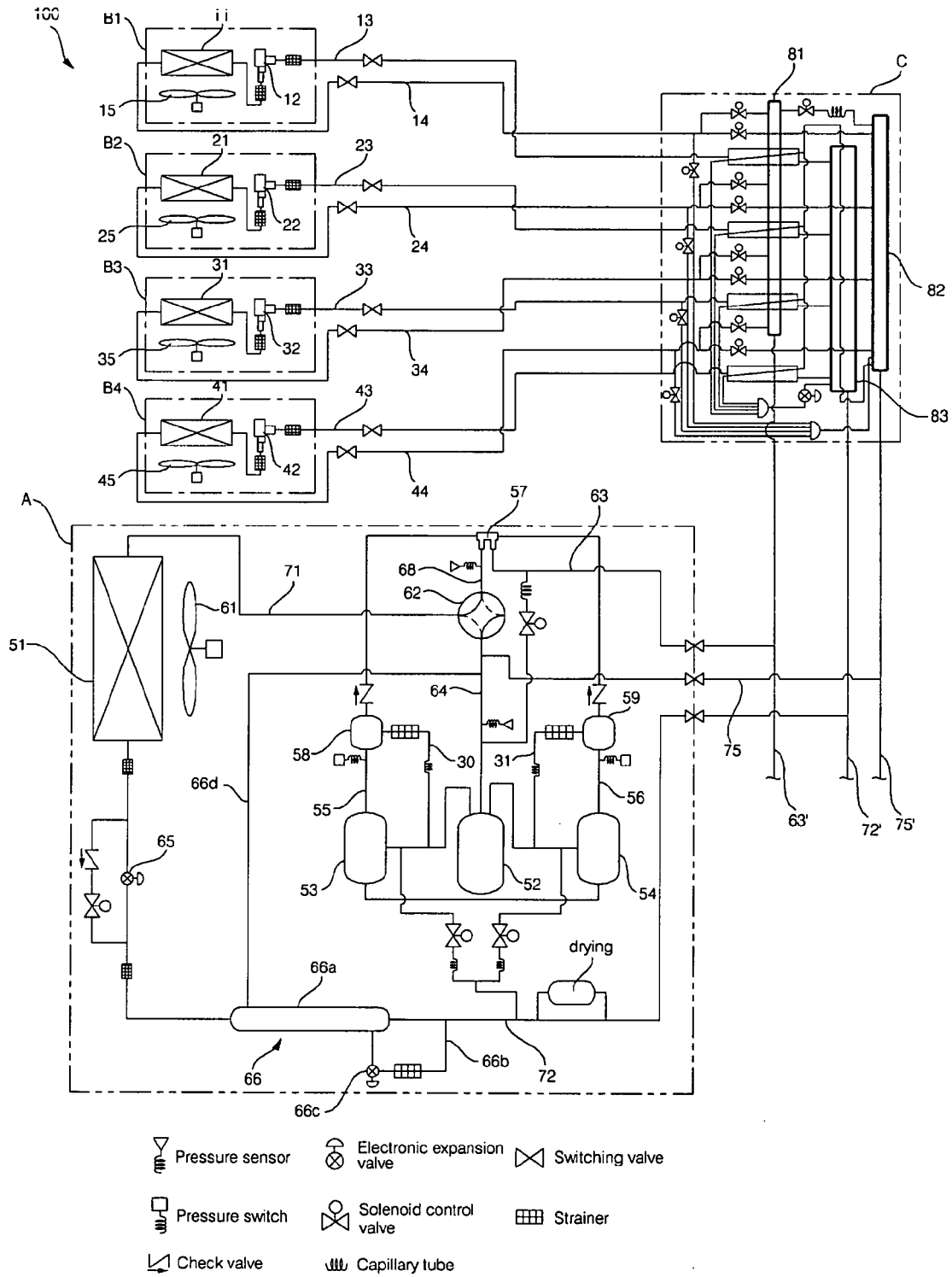


FIG. 2

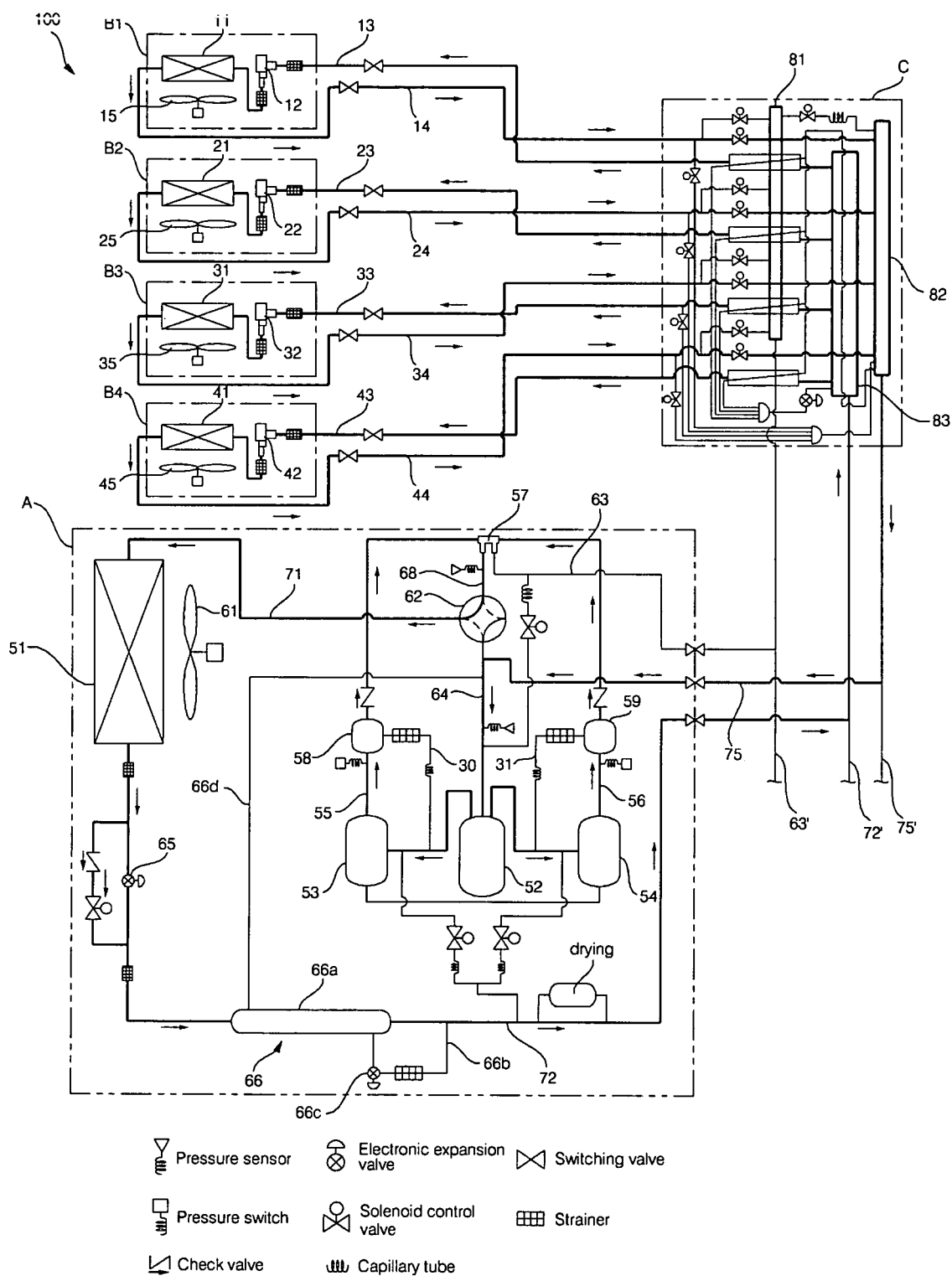


FIG. 3

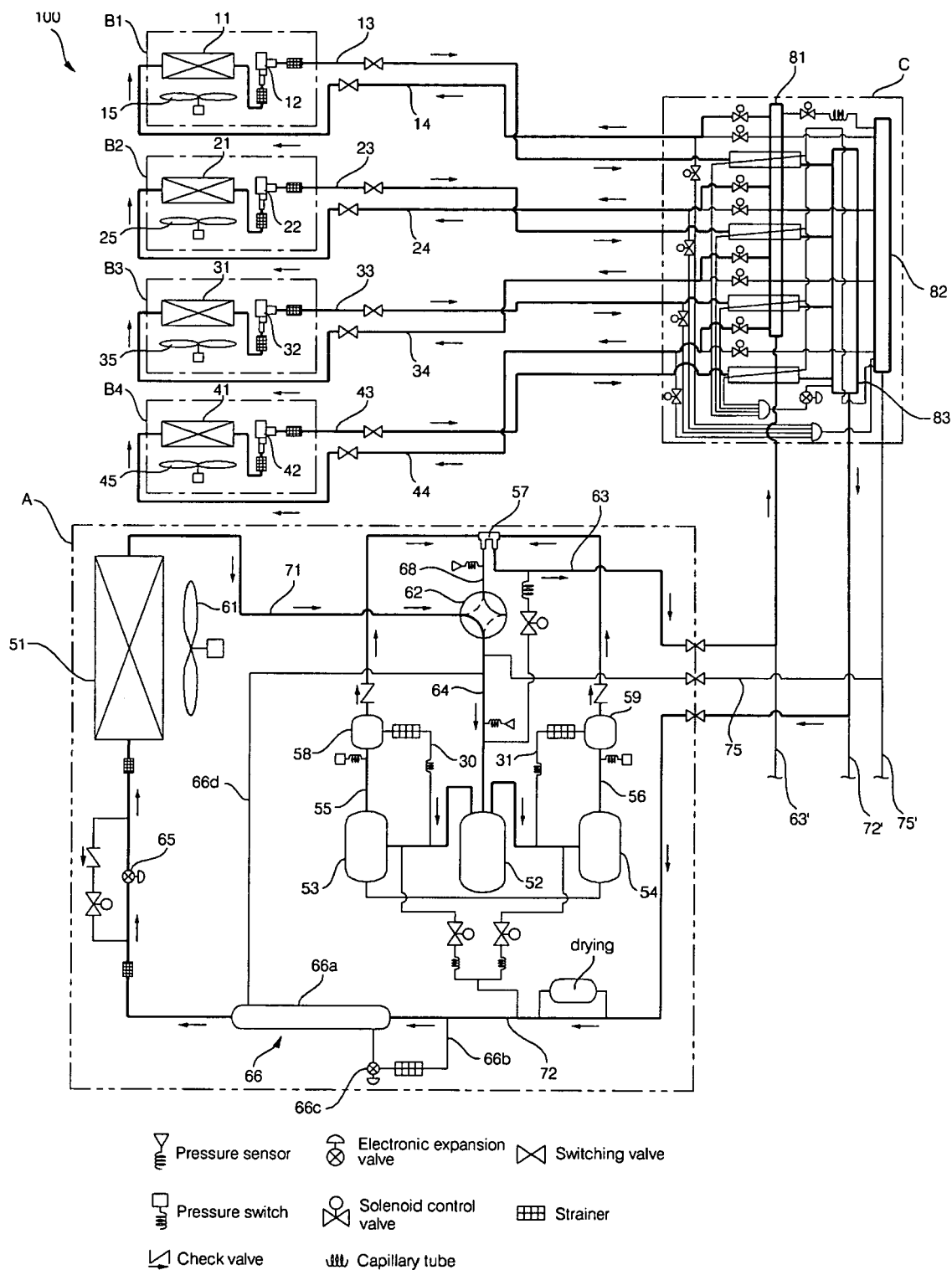


FIG. 4

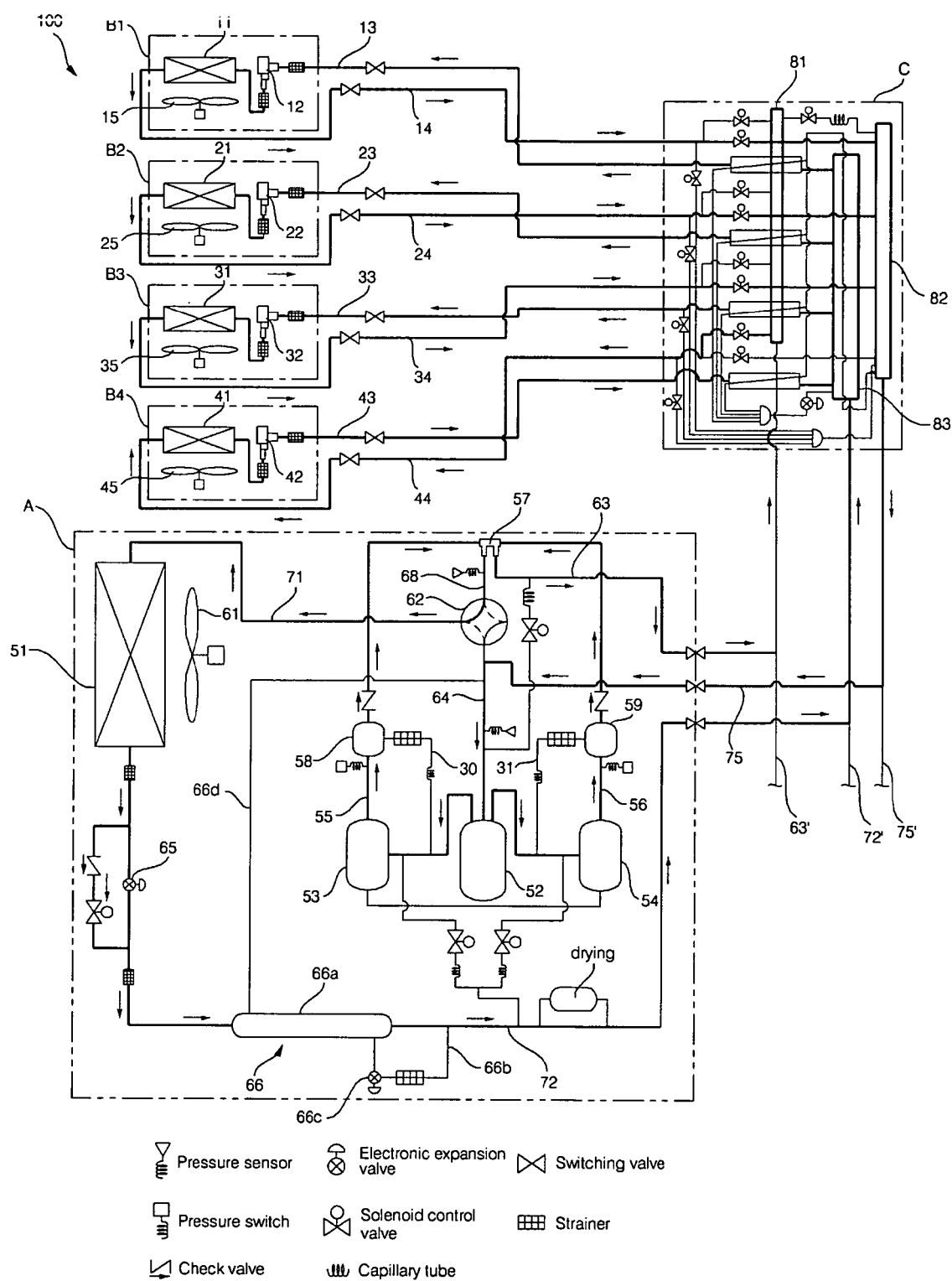


FIG. 5

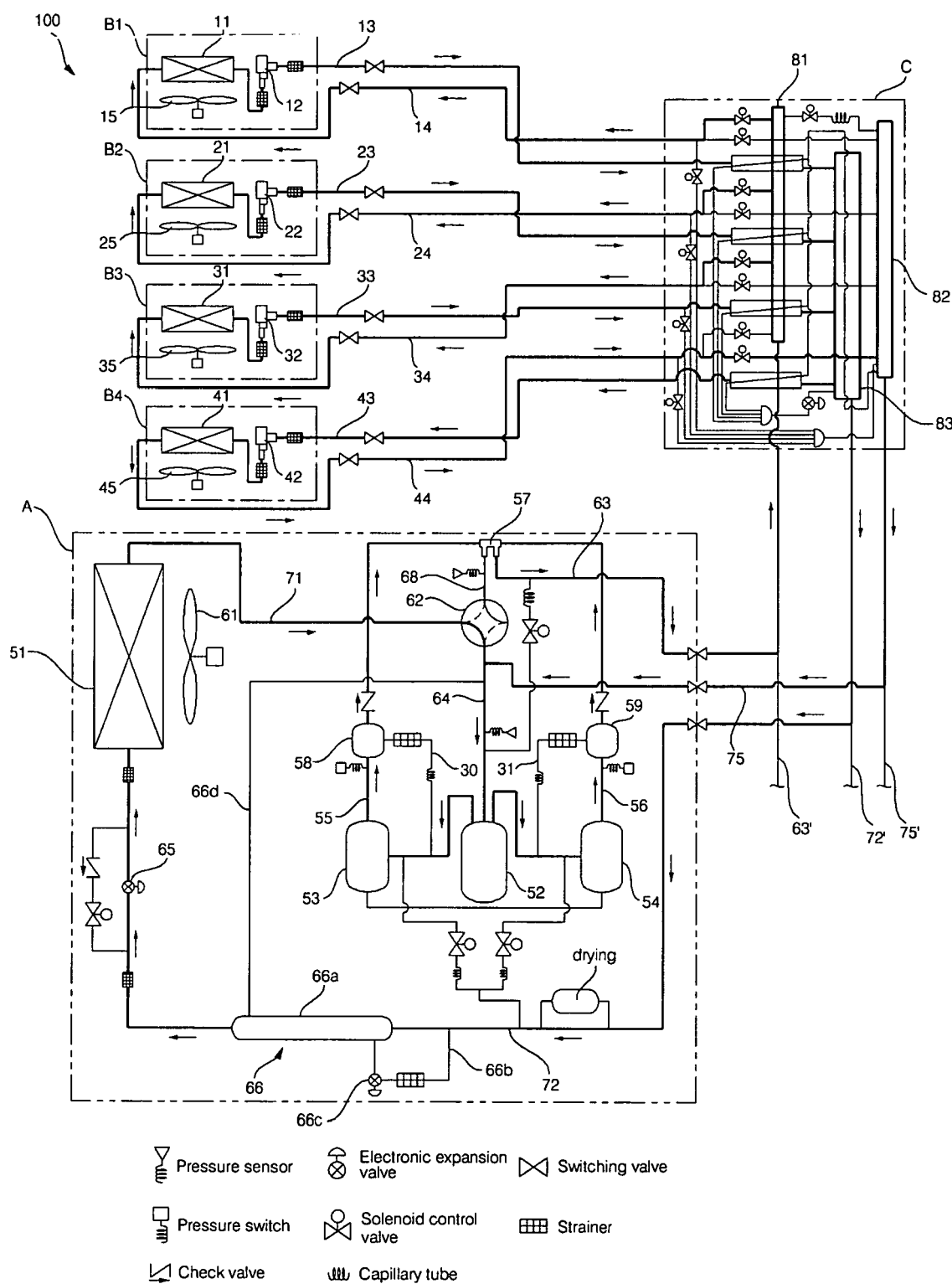


FIG. 6

