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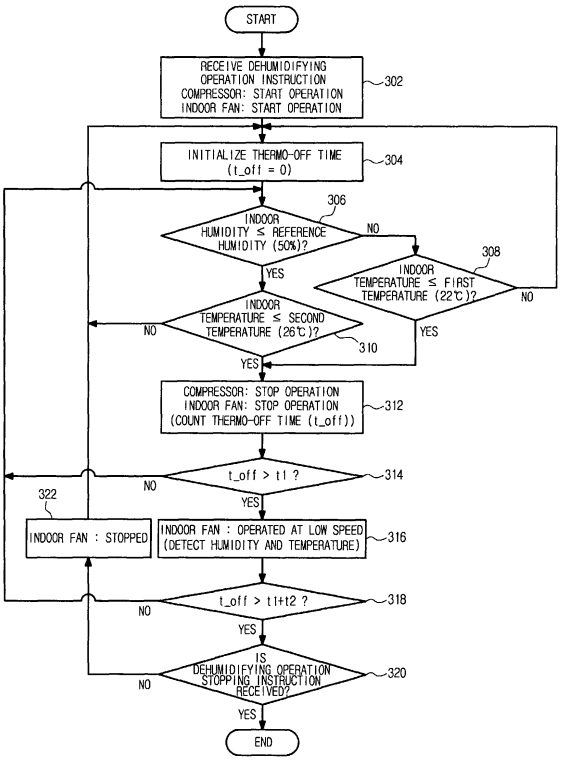
(54) Method of controlling air conditioner

(57) Disclosed is a method of controlling an air conditioner. A dehumidifying operation of the air conditioner is performed based on a relatively upper reference temperature when an indoor humidity satisfies a reference indoor humidity, and is performed based on a relative lower reference temperature when the indoor humidity does not satisfy the reference indoor humidity. The dehumidifying operation is performed in consideration of both temperature and humidity, and thus the temperature and the humidity of an air-conditioning space are maintained optimally.

FIG. 3



EP 2 148 147 A2

Description

CROSS-REFERENCE TO RELATED APPLICATION(S)

[0001] This application claims the benefit of Korean Patent Application No. 2008-0071133, filed on July 22, 2008, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND

1. Field

[0002] The present invention relates to a method of controlling an air conditioner, and more particularly to a method of controlling a dehumidifying operation of an air conditioner.

2. Description of the Related Art

[0003] In general, air conditioners basically perform a cooling operation in an air-conditioning space, and further perform a dehumidifying operation, in which the humidity in the air-conditioning space is lowered. The dehumidifying operation of the air conditioner is performed in a similar method as that of the cooling operation. That is, a refrigerant is circulated through a refrigerating cycle including a compressor, an outdoor heat exchanger (condenser), an expansion device, and an indoor heat exchanger (evaporator), and thus cools air in an air-conditioning space. When the air in the air-conditioning space is cooled, two loads, i.e., a sensible heat load and a latent heat load, are removed. When the sensible heat load is removed, the temperature of the air in the air-conditioning space is lowered, and when the latent heat load is removed, moisture in the air in the air-conditioning space is removed. That is, both the temperature and the humidity of the air-conditioning space are lowered by the dehumidifying operation.

SUMMARY

[0004] Therefore, one aspect of the invention is to provide a method of controlling a dehumidifying operation of an air conditioner.

[0005] In accordance with one aspect, the present invention provides a method of controlling an air conditioner, including detecting an indoor humidity; performing a dehumidifying operation based on a first temperature set in advance when the indoor humidity is higher than a reference indoor humidity; and performing the dehumidifying operation based on a second temperature set in advance when the indoor humidity is not higher than the reference indoor humidity.

[0006] The method may further include stopping the operations of a compressor and an indoor fan for a first predetermined time when any one condition, among a condition that the indoor humidity is higher than the reference indoor humidity and an indoor temperature is not higher than the first temperature and a condition that the indoor humidity is not higher than the reference indoor humidity and the indoor temperature is not higher than the second temperature, is satisfied.

[0007] The method may further include determining whether or not the dehumidifying operation is required by observing the indoor humidity and the indoor temperature for the first predetermined time; and re-operating the compressor and the indoor fan, when it is determined that the dehumidifying operation is required.

[0008] The method may further include operating the indoor fan for a second predetermined time, when the first predetermined time has elapsed, to circulate indoor air. The operation of the indoor fan may be carried out by rotating the indoor fan at a speed lower than the rotation speed of the indoor fan in the dehumidifying operation.

[0009] The method may further include determining whether or not the dehumidifying operation is required by detecting the temperature and humidity of the circulated indoor air for the second predetermined time; and re-operating the compressor, when it is determined that the dehumidifying operation is required.

[0010] The method may further include rotating the indoor fan at a speed required by the dehumidifying operation together with the re-operation of the compressor.

[0011] The first temperature may be set to the lower temperature limit of a temperature range, at which the mean skin temperature of a man is uniformly maintained at the reference indoor humidity; and the second temperature may be set to the upper temperature limit of the temperature range, at which the mean skin temperature of a man is uniformly maintained at the reference indoor humidity

[0012] In accordance with another aspect, the present invention provides a method of controlling an air conditioner, including inputting a user's desired reference indoor humidity from a user; determining an allowable temperature range corresponding to the reference indoor humidity; detecting an indoor humidity; performing a dehumidifying operation based on the lower temperature limit of the allowable temperature range when the indoor humidity is higher than the reference indoor humidity; and performing the dehumidifying operation based on the upper temperature limit of the allowable temperature range when the indoor humidity is not higher than the reference indoor humidity.

[0013] The allowable temperature range may be a temperature range, at which the mean skin temperature of a man is uniformly maintained at the reference indoor humidity inputted by the user.

[0014] The method may further include stopping the operations of a compressor and an indoor fan for a first predetermined time when any one condition, among a condition that the indoor humidity is higher than the reference indoor humidity and an indoor temperature is not higher than the lower temperature limit of the allowable

temperature range and a condition that the indoor humidity is not higher than the reference indoor humidity and the indoor temperature is not higher than the upper temperature limit of the allowable temperature range, is satisfied.

[0015] The method may further include the indoor fan for a second predetermined time, when the first predetermined time has elapsed, to circulate indoor air.

[0016] In accordance with a further aspect, the present invention provides a method of controlling an air conditioner, including inputting a user's desired reference indoor humidity from a user; inputting a user's desired reference temperature range from the user; detecting an indoor humidity; performing a dehumidifying operation based on the lower temperature limit of the reference temperature range when the indoor humidity is higher than the reference indoor humidity; and performing the dehumidifying operation based on the upper temperature limit of the reference temperature range when the indoor humidity is not higher than the reference indoor humidity.

[0017] The method may further include stopping the operations of a compressor and an indoor fan for a first predetermined time when any one condition, among a condition that the indoor humidity is higher than the reference indoor humidity and an indoor temperature is not higher than the lower temperature limit of the reference temperature range and a condition that the indoor humidity is not higher than the reference indoor humidity and the indoor temperature is not higher than the upper temperature limit of the reference temperature range, is satisfied.

[0018] The method may further include operating the indoor fan for a second predetermined time, when the first predetermined time has elapsed, to circulate indoor air.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings in which:

FIG. 1 is a view illustrating a refrigerating cycle of an air conditioner in accordance with one embodiment of the present invention;

FIG. 2 is a block diagram illustrating a control system of the air conditioner of FIG. 1;

FIG. 3 is a flow chart illustrating a method of controlling an air conditioner in accordance with one embodiment of the present invention;

FIG. 4 is a flow chart illustrating a method of controlling an air conditioner in accordance with another embodiment of the present invention; and

FIG. 5 is a flow chart illustrating a method of controlling an air conditioner in accordance with a further embodiment of the present invention.

DETAILED DESCRIPTION

[0020] Reference will now be made in detail to the embodiments of the present invention, an example of which is illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiments are described below to explain the present invention by referring to the annexed drawings.

[0021] Humidity, which is controlled by the dehumidifying operation of an air conditioner, is relative humidity, and the relative humidity is defined as the proportion of the amount of current steam to the amount of saturated steam at the current temperature. It is known that the proper range of the relative humidity, which is proper for a man to live, is approximately 40% to approximately 60%. Therefore, under the same relative humidity, temperatures may be different.

[0022] For this reason, when the dehumidifying operation is performed based on humidity, temperature may be excessively lowered or raised. Further, when the dehumidifying operation is performed based on temperature, humidity may be excessively lowered or raised.

[0023] In a method of controlling an air conditioner in accordance with the present invention, a dehumidifying operation is performed in consideration of both temperature and humidity, and thus temperature and humidity are maintained optimally.

[0024] Now, exemplary embodiments of the present invention will be described with reference to FIGS. 1 to 5. First, FIG. 1 is a view illustrating a refrigerating cycle of an air conditioner in accordance with one embodiment of the present invention.

[0025] As shown in FIG. 1, an air conditioner 100 in accordance with one embodiment of the present invention includes an outdoor unit 102 and an indoor unit 104, which are connected by a liquid refrigerant pipe 106a and a gas refrigerant pipe 106b to form one refrigerating cycle. A compressor 108 provided in the outdoor unit 102 compresses a refrigerant into a high-temperature and high-pressure gas state. An outdoor heat exchanger 110 receives the high-temperature and high-pressure gas refrigerant discharged from the compressor 108, and exchanges heat between the gas refrigerant and outdoor air. An outdoor fan 112 forcibly blows the outdoor air such that the outdoor heat exchanger (condenser) 110 exchanges heat between the gas refrigerant and the outdoor air. The high-temperature and high-pressure refrigerant of the outdoor unit 102 is expanded (decompressed) by an expansion device 114, and is supplied to the indoor unit 104. An outdoor temperature sensor 115 is installed on the outdoor unit 102, and detects an outdoor temperature.

[0026] An indoor heat exchanger (evaporator) 116 is installed in the indoor unit 104. An indoor fan 118 forcibly blows indoor air to the indoor heat exchanger 116 such that the indoor heat exchanger 116 exchanges heat between the refrigerant of the indoor heat exchanger 116 and the indoor air.

[0027] An indoor temperature sensor 120 and an indoor humidity sensor 122 are installed at a portion of the indoor unit 104, through which indoor air is sucked to the indoor unit 104. The indoor temperature sensor 120 detects a temperature in an air-conditioning space, i.e., a temperature of air flowing from the air-conditioning space into the indoor unit 104. The indoor humidity sensor 122 detects a humidity in the air-conditioning space, i.e., a relative humidity in the air flowing from the air-conditioning space into the indoor unit 104.

[0028] FIG. 2 is a block diagram illustrating a control system of the air conditioner of FIG. 1. As shown in FIG. 2, a control unit 202 of the outdoor unit 102 uses the outdoor temperature, supplied from the outdoor temperature sensor 115 connected to an input side of the control unit 202, in a cooling operation. A storing unit 204 communicably connected to the control unit 202 stores a system software required to control the overall operation of the air conditioner 100 through the control unit 202. Particularly, a reference indoor humidity (for example, 50%) and reference temperatures, i.e., a first temperature (for example, 22°C) and a second temperature (for example, 26°C) required to perform a dehumidifying operation are stored in the storing unit 204. The outdoor fan 112 and the compressor 108 are connected to an output side of the control unit 202.

[0029] In addition to the indoor temperature sensor 120 and the indoor humidity sensor 122, as shown in FIG. 1, a display unit 206 and an input unit 208 are provided in the indoor unit 104. The display unit 206 displays operating state data of the air conditioner 100, a user's input demand message, or etc. The input unit 208 allows a user living in the air-conditioning space to generate an operation instruction or to set (input) a predetermined value. The instruction or the predetermined value inputted through the input unit 208 of the indoor unit 104 is transmitted to the control unit 202 of the outdoor unit 102.

[0030] FIG. 3 is a flow chart illustrating a method of controlling an air conditioner in accordance with one embodiment of the present invention. As shown in FIG. 3, when the control unit 202 receives a dehumidifying operation instruction through the input unit 208 of the indoor unit 104, the control unit 202 operates the compressor 108 and the indoor fan 118 to perform the dehumidifying operation (operation 302). Here, the indoor fan 112 is operated also to perform the operation of the outdoor unit 102. Then, the control unit 202 starts the dehumidifying operation, and initializes a thermo-off time (t_off) (operation 304). The thermo-off time (t_off) is a time, for which the operation of the compressor 108 is stopped when any one of the humidity and the temperature reaches a desired level due to the dehumidifying operation. When the dehumidifying operation is started, the control unit 202 operates the compressor 108 and the indoor fan 118 so as to lower the humidity of the air-conditioning space to the reference indoor humidity (for example, 50%) or less, and thus cools the air-conditioning space (operation 306).

[0031] In case that the humidity of the air-conditioning space does not satisfy the reference indoor humidity, i.e., is higher than the reference indoor humidity (for example, 50%) (no at operation 306), when the indoor temperature of the air-conditioning space does not satisfy one reference temperature, i.e., is higher than the first reference temperature (for example, 22°C) (no at operation 308), the compressor 108 and the indoor fan 118 are continuously operated to further perform the dehumidifying operation, and thus further lowers the humidity and the temperature of the air-conditioning space. In case that the humidity of the air-conditioning space is still higher than the reference indoor humidity (for example, 50%) (no at operation 306), when the temperature of the air-conditioning space is not higher than the first temperature (22°C), which is the lower temperature limit of the reference temperature range (yes at operation 308), the compressor 108 and the indoor fan 118 are stopped to prevent the indoor temperature of the air-conditioning space from being lowered under the first temperature (22°C) although the indoor humidity of the air-conditioning space does not satisfy the target reference indoor humidity (thermo-off, operation 312). When the compressor 108 and the indoor fan 118 are stopped, the thermo-off time (t_off) is counted from this moment.

[0032] On the other hand, in case that the humidity of the air-conditioning space satisfies the reference indoor humidity, i.e., is not higher than the reference indoor humidity (for example, 50%) (yes at operation 306), when the temperature of the air-conditioning space is higher than another reference temperature, i.e., the second temperature (26°C) (no at operation 310), the compressor 108 and the indoor fan 118 are further operated although the indoor humidity of the air-conditioning space satisfies the reference indoor humidity, and thus further lowers the temperature of the air-conditioning space. Since a user still feels comfortable although the humidity of the air-conditioning space is lower than the reference indoor humidity of 50% to some extent, the dehumidifying operation is continued such that the indoor temperature is not higher than the second temperature (26°C), which is the upper temperature limit of the reference temperature range, although the humidity is slightly lower than 50%. In case that the humidity of the air-conditioning space is not higher than the reference indoor humidity (for example, 50%) (yes at operation 306), when the temperature of the air-conditioning space is not higher than the second temperature (26°C) (yes at operation 310), the control unit 202 determines that the air-conditioning space is in an optimal state and stops the compressor 108 and the indoor fan 118 (thermo-off, operation 312). When the compressor 108 and the indoor fan 118 are stopped, the thermo-off time (t_off) is counted from this moment.

[0033] That is, when the indoor humidity does not satisfy the reference indoor humidity, the target indoor temperature is maximally lowered to the lower temperature limit (for example 22°C) of the allowable temperature range, but is not lowered under the lower temperature

limit. Further, although the indoor humidity satisfies the reference indoor humidity, the indoor temperature is not raised above the upper temperature limit (for example 26°C) of the allowable temperature range,

[0034] After the thermo-off, the thermo-off time (t_off) is counted, and it is monitored whether or not the indoor humidity and the indoor temperature are deviated from the target indoor humidity and the target indoor temperature under the condition that the compressor 108 and the indoor fan 118 are stopped for a first predetermined time (t1) to the maximum (operation 314). Under the condition that the thermo-off time (t_off) does not elapse the first predetermined time (t1) (no at operation 314), when the indoor humidity satisfies the reference indoor humidity and the indoor temperature exceeds the second temperature, i.e., the upper temperature limit of the allowable temperature range, (no at operation 310) or the indoor humidity does not satisfy the reference indoor humidity and the indoor temperature exceeds the first temperature, i.e., the lower temperature limit of the allowable temperature range, (no at operation 308), the dehumidifying operation in operations 302 and 304 is repeated. The stoppage of the compressor 108 and the indoor fan 118 for the first predetermined time (t1) after the thermo-off serves to prevent the rise of the humidity caused by the supply of moisture formed around the indoor heat exchanger 116 to the air-conditioning space due to the operation of the indoor fan 118.

[0035] On the other hand, when the indoor humidity satisfies the reference indoor humidity and the indoor temperature is not higher than the second temperature, i.e., the upper temperature limit of the allowable temperature range, (yes at operation 310) or the indoor humidity does not satisfy the reference indoor humidity and the indoor temperature is not higher than the first temperature, i.e., the lower temperature limit of the allowable temperature range, (yes at operation 308) until the thermo-off time (t_off) elapses the first predetermined time (t1), only the indoor fan 116 is operated at a speed lower than the rotation speed in the dehumidifying operation for a second predetermined time (t2) to the maximum under the condition that the compressor 108 is still stopped (operation 316). Under the condition that the thermo-off time (t_off) does not elapse the sum of the first predetermined time (t1) and second predetermined time (t2) (no at operation 318), when the indoor humidity satisfies the reference indoor humidity and the indoor temperature exceeds the second temperature, i.e., the upper temperature limit of the allowable temperature range, (no at operation 310) or the indoor humidity does not satisfy the reference indoor humidity and the indoor temperature exceeds the first temperature, i.e., the lower temperature limit of the allowable temperature range, (no at operation 308), the dehumidifying operation in operations 302 and 304 is repeated again. The operation of the indoor fan 118 at a low speed for the second predetermined time (t2) serves to cause the indoor air to be circulated through the indoor unit 104 such that the indoor humidity and the indoor temperature can be more exactly detected.

[0036] When the control units 202 does not receive a dehumidifying operation stopping instruction until the thermo-off time (t_off) elapses the sum of the first predetermined time (t1) and second predetermined time (t2) (no at operation 320), the indoor fan 118 is stopped (operation 322), and the dehumidifying operation in operations 306, 308, and 310 is repeated, if necessary. When the control unit 202 receives the dehumidifying operation stopping instruction (yes at operation 320), the dehumidifying operation is finished.

[0037] FIG. 4 is a flow chart illustrating a method of controlling an air conditioner in accordance with another embodiment of the present invention. As shown in FIG. 4, when the control unit 202 receives a dehumidifying operation instruction through the input unit 208 of the indoor unit 104 (operation 402), the control unit 202 receives a reference indoor humidity, i.e., a user's desired indoor humidity, from a user (operation 404). The receipt of the reference indoor humidity is carried out by inquiring a desired indoor humidity through the display unit 206 of the indoor unit 104 and inducing the user to input the desired indoor humidity through the input unit 208.

[0038] The control unit 202 determines an allowable temperature range corresponding to the reference indoor humidity, i.e., the upper temperature limit and the lower temperature limit (operation 406). The control unit 202 determines that a mean skin temperature (MST) range where a user feels comfortable at the reference indoor humidity becomes the allowable temperature range. That is, the storing unit 404 of the outdoor unit 102 stores in advance data regarding the MST range where the user feels comfortable according to the reference indoor humidity, and the control unit 202 determines the allowable temperature range in the dehumidifying operation with reference to the data stored in the storing unit 204. For example, when the reference indoor humidity inputted by the user is 65% and the allowable temperature range corresponding to the reference indoor humidity is 22.1~29.4°C, the first temperature is the lower temperature limit of 22.1°C and the second temperature is the upper temperature limit of 29.4°C.

[0039] When the allowable temperature range is determined, the control unit 202 sets the lower temperature limit of the MST range to be the first temperature and the upper temperature limit of the MST range to be the second temperature (operation 408). Here, the first temperature and the second temperature respectively correspond to the first temperature and the second temperature, which are used in operation 308 and operation 310 of FIG 3. That is, the control unit 202 applies the reference indoor temperature received from the user and the target temperature range (the first and second temperatures) determined corresponding to the reference indoor temperature to the method of FIG. 3, and thus the method of controlling the dehumidifying operation of the air conditioner in accordance with this embodiment is performed (operation 410). Since the reference indoor humidity is

received directly from the user and the dehumidifying operation of the air conditioner is performed to follow the reference indoor humidity, a humidity condition required by the user is completely embodied and supplied to the user.

[0040] FIG. 5 is a flow chart illustrating a method of controlling an air conditioner in accordance with a further embodiment of the present invention. As shown in FIG. 5, when the control unit 202 receives a dehumidifying operation instruction through the input unit 208 of the indoor unit 104 (operation 502), the control unit 202 receives a reference indoor humidity, i.e., a user's desired indoor humidity, from a user (operation 504). Further, the control unit 202 receives an allowable temperature range, i.e., a user's desired reference temperature range, from the user (operation 506). The receipt of the reference indoor humidity and the reference temperature range is carried out by inquiring a desired indoor humidity and a desired indoor temperature range through the display unit 206 of the indoor unit 104 and inducing the user to input the desired indoor humidity and the desired indoor temperature range through the input unit 208.

[0041] When the reference temperature range is determined, the control unit 202 sets the lower temperature limit of the reference temperature range to be the first temperature and the upper temperature limit of the reference temperature range to be the second temperature (operation 508). Here, the first temperature and the second temperature respectively correspond to the first temperature and the second temperature, which are used in operation 308 and operation 310 of FIG. 3. That is, the control unit 202 applies the reference indoor humidity received from the user and the reference temperature range (the first and second temperatures) determined corresponding to the reference indoor humidity to the method of FIG. 3, and thus the method of controlling the dehumidifying operation of the air conditioner in accordance with this embodiment is performed (operation 510). Since the reference indoor humidity and the reference temperature range are received directly from the user and the dehumidifying operation of the air conditioner is performed to follow the reference indoor humidity and the reference indoor temperature, humidity and temperature conditions required by the user are completely embodied and supplied to the user.

[0042] Although embodiments of the invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.

Claims

1. A method of controlling an air conditioner, comprising:

   detecting an indoor humidity;
   performing a dehumidifying operation based on a first temperature set in advance when the indoor humidity is higher than a reference indoor humidity; and
   performing the dehumidifying operation based on a second temperature set in advance when the indoor humidity is not higher than the reference indoor humidity.

2. The method according to claim 1, further comprising stopping the operations of a compressor and an indoor fan for a first predetermined time when any one condition, among a condition that the indoor humidity is higher than the reference indoor humidity and an indoor temperature is not higher than the first temperature and a condition that the indoor humidity is not higher than the reference indoor humidity and the indoor temperature is not higher than the second temperature, is satisfied.

3. The method according to claim 2, further comprising:

   determining whether or not the dehumidifying operation is required by observing the indoor humidity and the indoor temperature for the first predetermined time; and
   re-operating the compressor and the indoor fan, when it is determined that the dehumidifying operation is required.

4. The method according to claim 2, further comprising operating the indoor fan for a second predetermined time, when the first predetermined time has elapsed, to circulate indoor air.

5. The method according to claim 4, wherein the operation of the indoor fan is carried out by rotating the indoor fan at a speed lower than the rotation speed of the indoor fan in the dehumidifying operation.

6. The method according to claim 4, further comprising:

   determining whether or not the dehumidifying operation is required by detecting the temperature and humidity of the circulated indoor air for the second predetermined time; and
   re-operating the compressor, when it is determined that the dehumidifying operation is required.

7. The method according to claim 6, further comprising rotating the indoor fan at a speed required by the dehumidifying operation together with the re-operation of the compressor.

8. The method according to claim 1, wherein:

the first temperature is set to the lower temperature limit of a temperature range, at which the mean skin temperature of a man is uniformly maintained at the reference indoor humidity; and the second temperature is set to the upper temperature limit of the temperature range, at which the mean skin temperature of a man is uniformly maintained at the reference indoor humidity

9. A method of controlling an air conditioner, comprising:

inputting a user's desired reference indoor humidity from a user;
determining an allowable temperature range corresponding to the reference indoor humidity;
detecting an indoor humidity;
performing a dehumidifying operation based on the lower temperature limit of the allowable temperature range when the indoor humidity is higher than the reference indoor humidity; and
performing the dehumidifying operation based on the upper temperature limit of the allowable temperature range when the indoor humidity is not higher than the reference indoor humidity.

10. The method according to claim 9, wherein the allowable temperature range is a temperature range, at which the mean skin temperature of a man is uniformly maintained at the reference indoor humidity inputted by the user.

11. The method according to claim 9, further comprising stopping the operations of a compressor and an indoor fan for a first predetermined time when any one condition, among a condition that the indoor humidity is higher than the reference indoor humidity and an indoor temperature is not higher than the lower temperature limit of the allowable temperature range and a condition that the indoor humidity is not higher than the reference indoor humidity and the indoor temperature is not higher than the upper temperature limit of the allowable temperature range, is satisfied.

12. The method according to claim 11, further comprising operating the indoor fan for a second predetermined time, when the first predetermined time has elapsed, to circulate indoor air.

13. A method of controlling an air conditioner, comprising:

inputting a user's desired reference indoor humidity from a user;
inputting a user's desired reference temperature range from the user;
detecting an indoor humidity;
performing a dehumidifying operation based on the lower temperature limit of the reference temperature range when the indoor humidity is higher than the reference indoor humidity; and
performing the dehumidifying operation based on the upper temperature limit of the reference temperature range when the indoor humidity is not higher than the reference indoor humidity.

14. The method according to claim 13, further comprising stopping the operations of a compressor and an indoor fan for a first predetermined time when any one condition, among a condition that the indoor humidity is higher than the reference indoor humidity and an indoor temperature is not higher than the lower temperature limit of the reference temperature range and a condition that the indoor humidity is not higher than the reference indoor humidity and the indoor temperature is not higher than the upper temperature limit of the reference temperature range, is satisfied.

15. The method according to claim 14, further comprising operating the indoor fan for a second predetermined time, when the first predetermined time has elapsed, to circulate indoor air.

FIG. 1

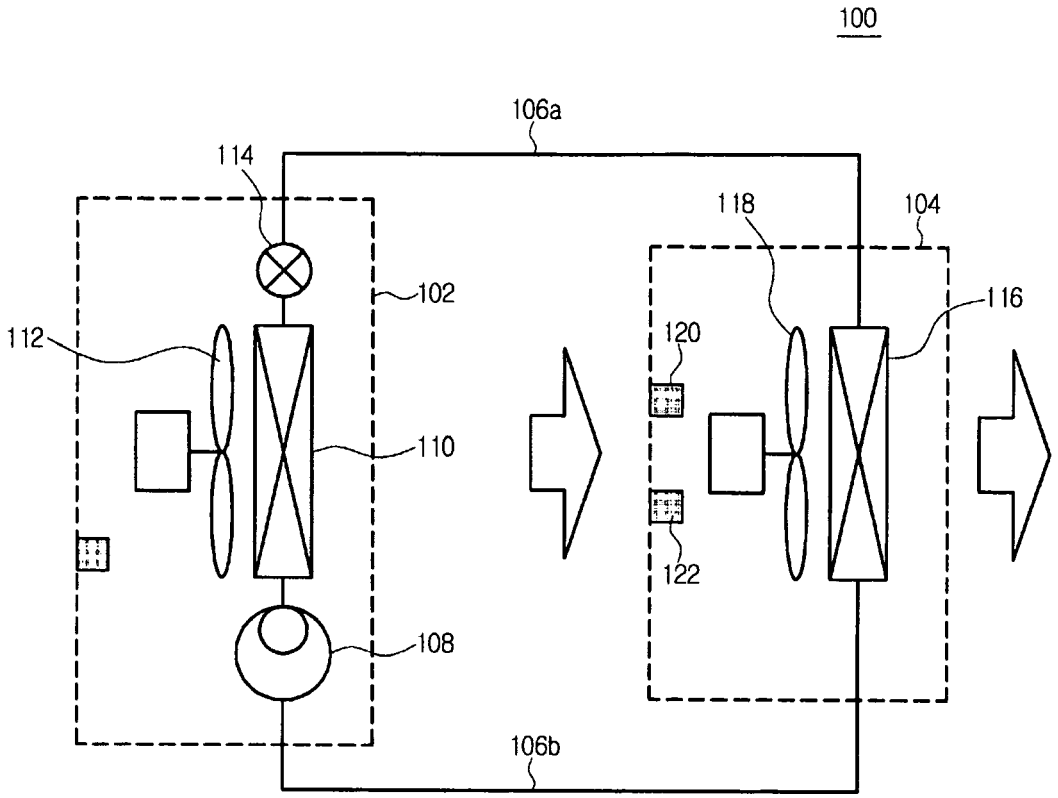


FIG. 2

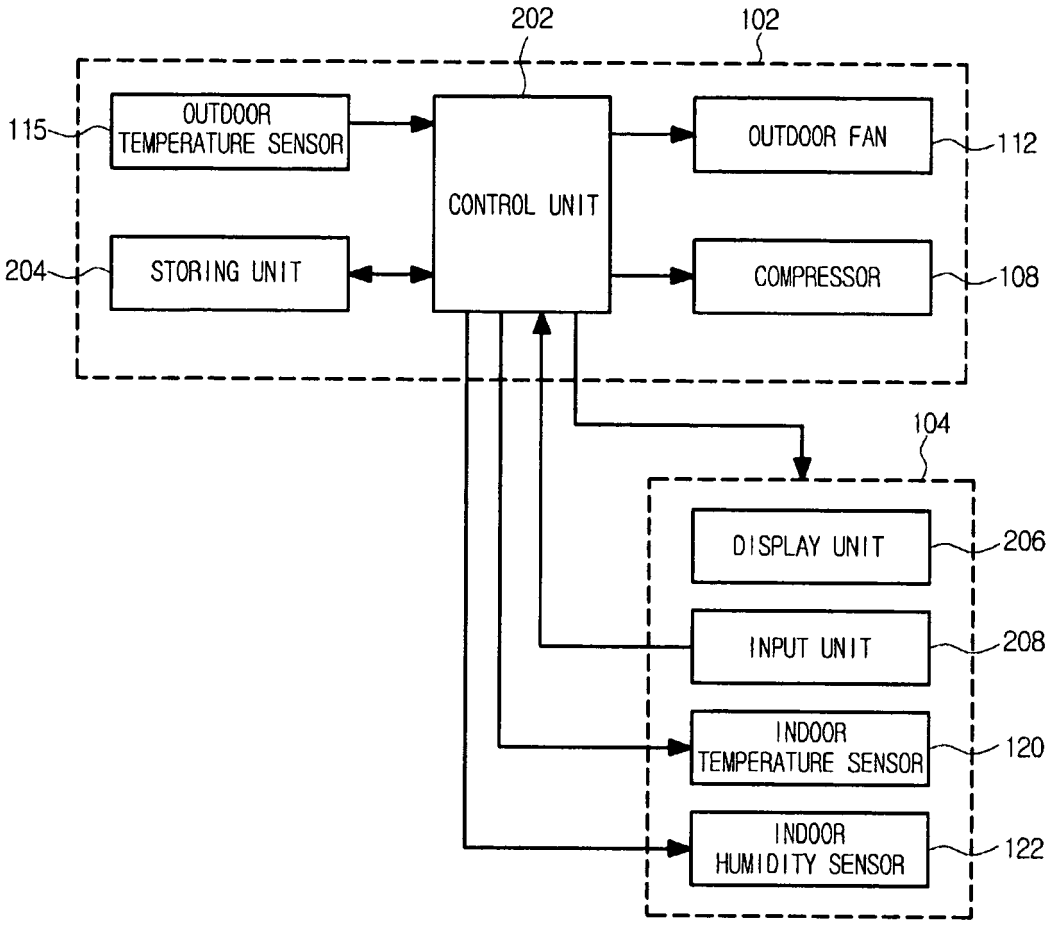

202
102
115
OUTDOOR TEMPERATURE SENSOR
CONTROL UNIT
OUTDOOR FAN
112
204
STORING UNIT
COMPRESSOR
108
104
DISPLAY UNIT
206
INPUT UNIT
208
INDOOR TEMPERATURE SENSOR
120
INDOOR HUMIDITY SENSOR
122

FIG. 3

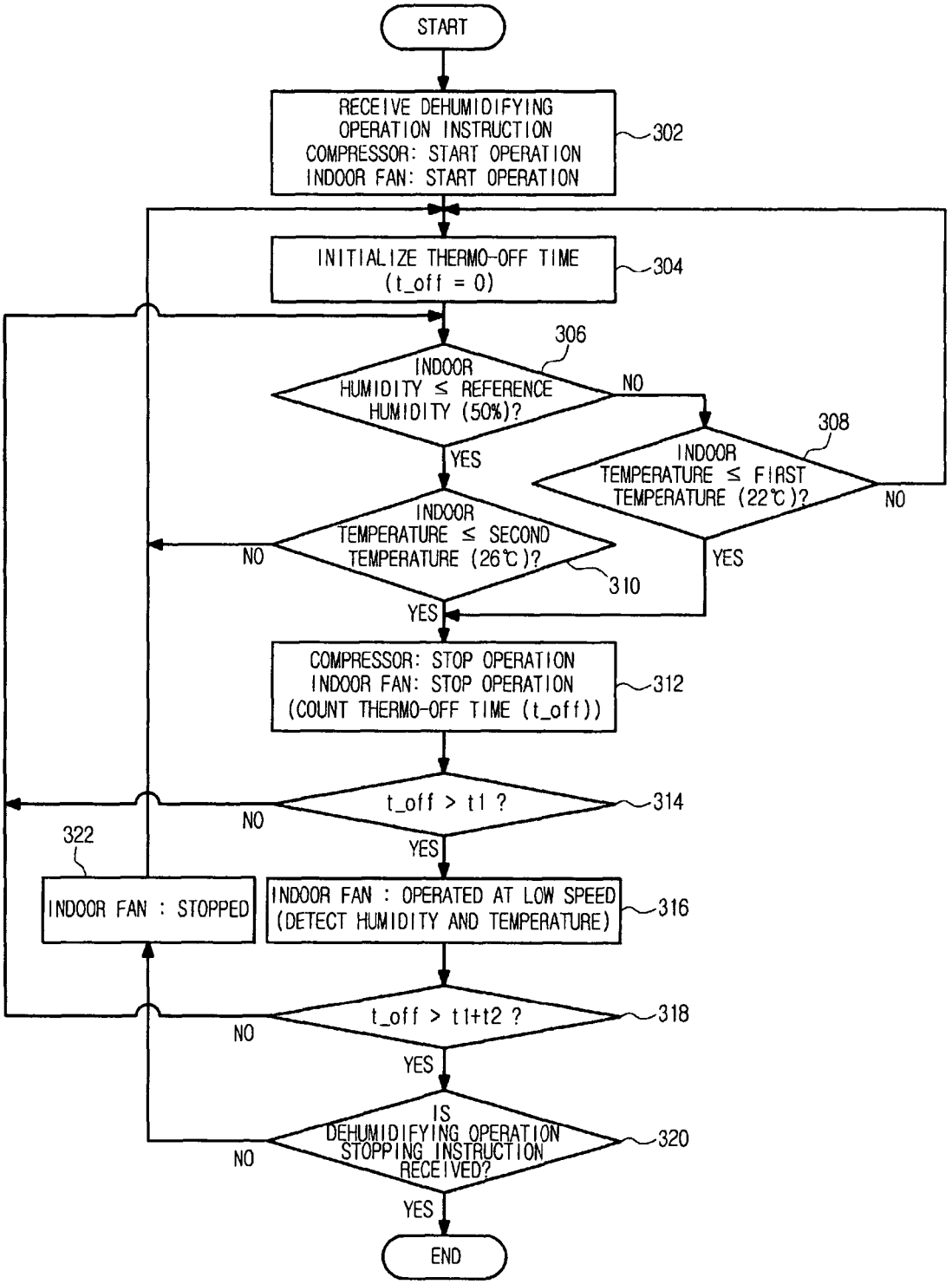

START
RECEIVE DEHUMIDIFYING OPERATION INSTRUCTION
COMPRESSOR: START OPERATION
INDOOR FAN: START OPERATION
302
INITIALIZE THERMO-OFF TIME (t_off = 0)
304
306
INDOOR HUMIDITY ≤ REFERENCE HUMIDITY (50%)?
NO
YES
308
INDOOR TEMPERATURE ≤ FIRST TEMPERATURE (22℃)?
NO
YES
INDOOR TEMPERATURE ≤ SECOND TEMPERATURE (26℃)?
NO
310
YES
COMPRESSOR: STOP OPERATION
INDOOR FAN: STOP OPERATION
(COUNT THERMO-OFF TIME (t_off))
312
t_off > t1 ?
NO
314
YES
322
INDOOR FAN : STOPPED
INDOOR FAN : OPERATED AT LOW SPEED
(DETECT HUMIDITY AND TEMPERATURE)
316
t_off > t1+t2 ?
NO
318
YES
IS DEHUMIDIFYING OPERATION STOPPING INSTRUCTION RECEIVED?
NO
320
YES
END

FIG. 4

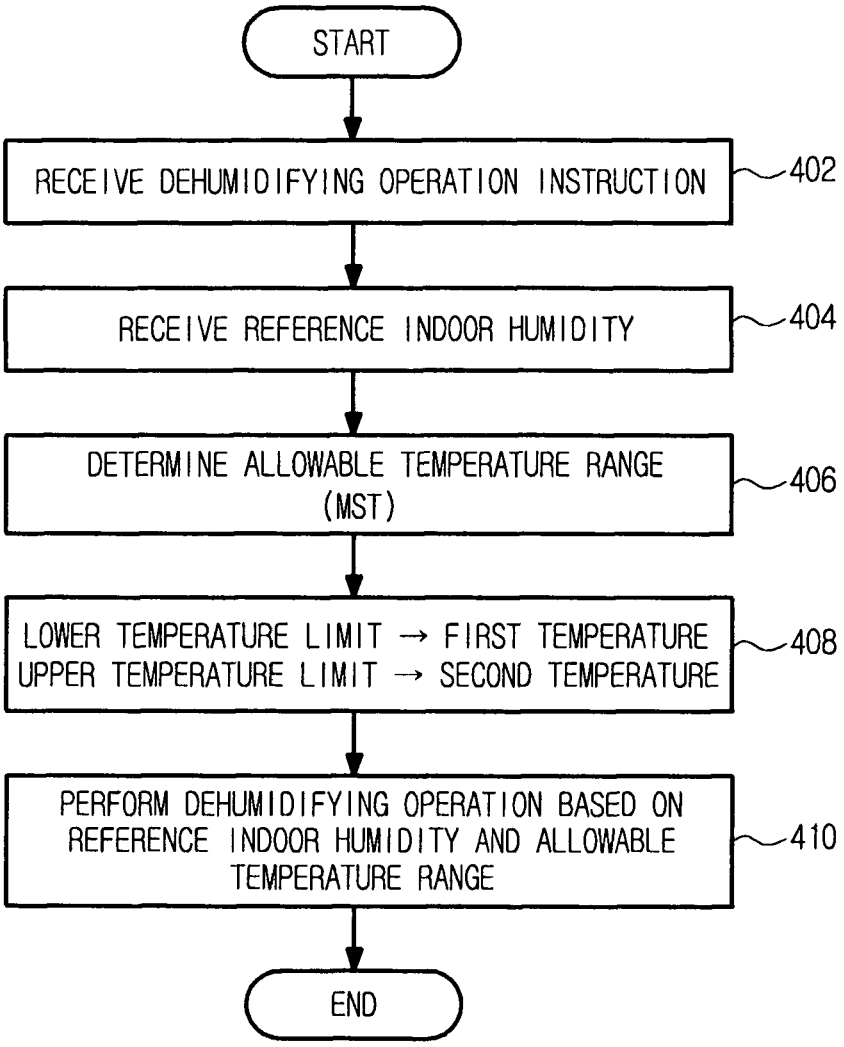
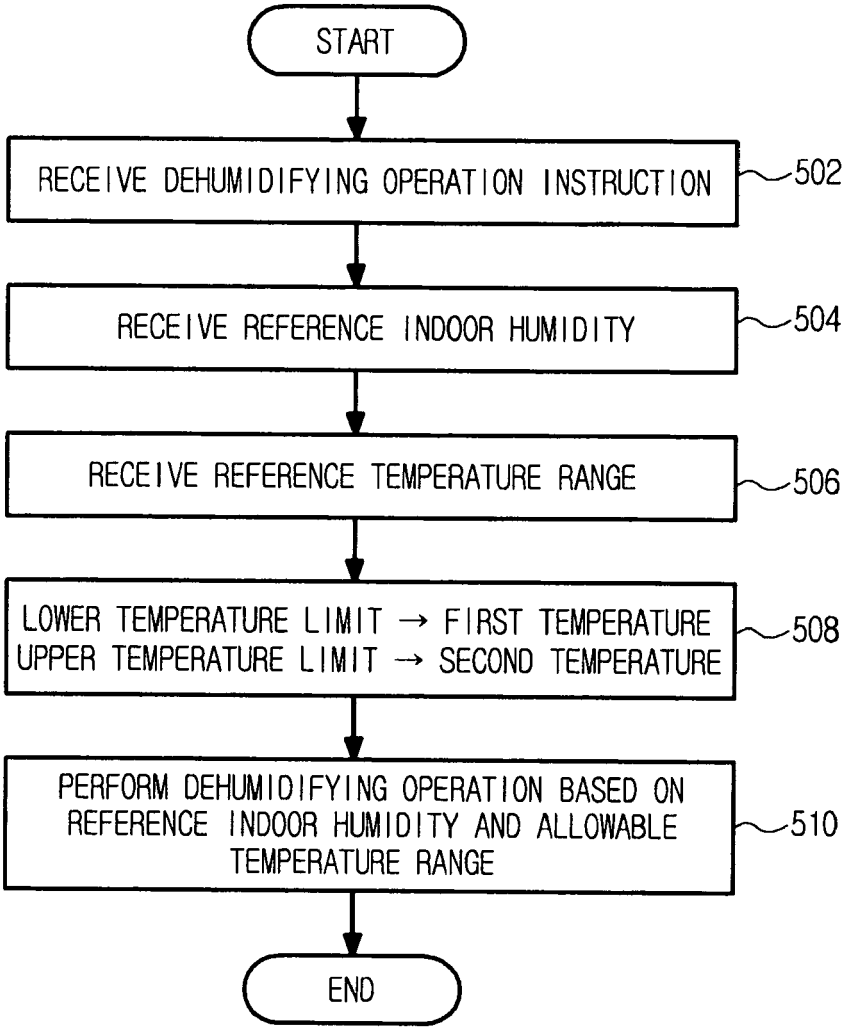

START
RECEIVE DEHUMIDIFYING OPERATION INSTRUCTION
402
RECEIVE REFERENCE INDOOR HUMIDITY
404
DETERMINE ALLOWABLE TEMPERATURE RANGE (MST)
406
LOWER TEMPERATURE LIMIT → FIRST TEMPERATURE
UPPER TEMPERATURE LIMIT → SECOND TEMPERATURE
408
PERFORM DEHUMIDIFYING OPERATION BASED ON REFERENCE INDOOR HUMIDITY AND ALLOWABLE TEMPERATURE RANGE
410
END

FIG. 5


START
RECEIVE DEHUMIDIFYING OPERATION INSTRUCTION
502
RECEIVE REFERENCE INDOOR HUMIDITY
504
RECEIVE REFERENCE TEMPERATURE RANGE
506
LOWER TEMPERATURE LIMIT → FIRST TEMPERATURE
UPPER TEMPERATURE LIMIT → SECOND TEMPERATURE
508
PERFORM DEHUMIDIFYING OPERATION BASED ON REFERENCE INDOOR HUMIDITY AND ALLOWABLE TEMPERATURE RANGE
510
END

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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