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Humidifier and air conditioner using the humidifier

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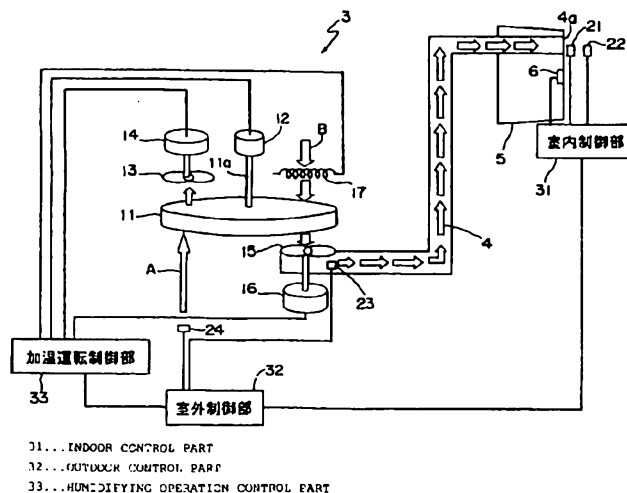
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(54) Title: HUMIDIFIER AND AIR CONDITIONER USING THE HUMIDIFIER

(54) 発明の名称: 加湿装置およびそれを用いた空気調和機



(57) Abstract: A humidifier capable of performing an optimum humidifying operation and increasing a comfortableness by eliminating the shortage of the amount of humidification and an air conditioner using the humidifier; the humidifier, comprising a humidifying rotor (11), a moisture sucking fan (13) installed in a moisture sucking path passing through the humidifying rotor (11), a humidifying fan (15) installed in a humidifying path passing through the humidifying rotor (11), a motor for humidifying rotor (12) for driving the humidifying rotor (11), and a heater (17) installed on the upstream side of the humidifying rotor (11) in the humidifying path, wherein at least one of the moisture sucking fan (13), humidifying fan (15), motor for humidifying rotor (12), and heater (17) is controlled according to the atmospheric humidity.

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ABSTRACT

There are provided a humidifier, as well as an air conditioner using the same, capable of performing optimum humidification operation and improving comfort by resolving insufficient humidification. The humidifier includes a humidifying rotor (11), a moisture absorbing fan (13) provided on a moisture absorbing passage running through the humidifying rotor (11), a humidifying fan (15) provided on a humidifying passage running through the humidifying rotor (11), a motor (12) for the humidifying rotor for driving the humidifying rotor (11), and a heater (17) provided on the humidifying passage upstream from the humidifying rotor (11). At least one of the moisture absorbing fan (13), the humidifying fan (15), the motor (12) for the humidifying rotor and the heater (17) is controlled according to the outside air humidity.



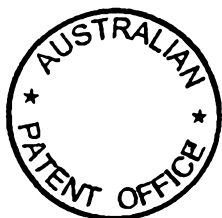
HUMIDIFIER AND AIR CONDITIONER USING THE SAME

TECHNICAL FIELD

The present invention relates to a humidifier
5 which supplies humidified air indoors and an air
conditioner using the same.

BACKGROUND ART

Conventionally, a humidifier includes a
10 humidifying rotor, a fan provided on a moisture absorbing
passage running through the humidifying rotor, i.e., a
moisture absorbing fan, a fan provided on a humidifying
passage running through the humidifying rotor, i.e., a
humidifying fan, a motor for the humidifying rotor for
15 driving the humidifying rotor, and a heater provided on the
humidifying passage upstream from the humidifying rotor.
The humidifier supplies humidified air, which is humidified
by absorbing moisture from the outside air outside a room
onto the humidifying rotor, and then desorbing the moisture
20 from the humidifying rotor, into the room through a
humidifying hose. Thus, indoor humidity which tends to
become dry in winter is adjusted to improve comfort.
However, the humidifier has a problem that optimum
humidification operation cannot be performed because the



capability of absorption/desorption of the humidifying rotor changes with variations in outside air humidity.

The present applicant has proposed a humidifier which repeats alternately a humidification operation of blowing off humidified air indoors through the humidifying hose and a drying operation of blowing dry air into the humidifying hose. The humidifier can prevent condensation water from residing inside the humidifying hose at low cost (it is noted that this humidifier is here described for an easier understanding of the present invention, and is not a publicly known technique nor a prior art). However, the humidifier that performs the humidification operation and the drying operation alternately has a problem that the humidification operation time is shortened to lead to insufficient humidification and impairment of comfort because the drying operation is controlled irrespective of the level of the outside air humidity, and performed even if the humidity of the outside air is low and condensation does not occur in the humidifying hose.

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DISCLOSURE OF THE INVENTION

Therefore, an object of the present invention is to provide a humidifier that can perform optimum humidification operation and improve comfort by resolving



insufficient humidification, and an air conditioner using the same.

In order to achieve the above object, the present invention provides a humidifier comprising a humidifying rotor, a moisture absorbing fan provided on a moisture absorbing passage running through the humidifying rotor, a humidifying fan provided on a humidifying passage running through the humidifying rotor, a motor for the humidifying rotor for driving the humidifying rotor, and a heater provided on the humidifying passage upstream from the humidifying rotor, the humidifier thereby obtaining humidified air from the humidifying passage, further comprising

control means for controlling at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor, and the heater according to outside air humidity so that the humidified air has a desired amount of humidification.

The following functions and effects can be obtained with the humidifier having the above constitution through control operations by the control means as shown below:

(1) By increasing the number of revolutions of the moisture absorbing fan as the outside air humidity decreases, the amount of outside air passing through the



humidifying rotor via the moisture absorbing passage is increased so that the amount of water absorbed onto the humidifying rotor can be maintained; on the other hand, by reducing the number of revolutions of the moisture
5 absorbing fan as the outside air humidity increases, a sufficient amount of water absorbed onto the humidifying rotor can be maintained although the amount of outside air passing through the humidifying rotor via the moisture absorbing passage is decreased.

10 (2) By increasing the number of revolutions of the humidifying fan as the outside air humidity decreases, the amount of air passing through the humidifying rotor via the humidifying passage is increased so that the amount of humidification can be maintained; on the other hand, by
15 reducing the number of revolutions of the humidifying fan as the outside air humidity increases, a sufficiently humidified air can be obtained although the amount of air passing through the humidifying passage is decreased to decrease the amount of air passing through the humidifying
20 rotor.

(3) Exhaust heat can be reduced by decreasing the speed of revolution of the motor for the humidifying rotor as the outside air humidity increases.



(4) Since the amount of water absorbed onto the humidifying rotor increases as the outside air humidity increases, heater input can be lowered.

Thus, by performing at least one of (1) through
5 (4) described above, an optimum humidification operation can be performed according to the outside air humidity. In addition, any of the cases (1) through (4) can ensure energy saving.

One embodiment comprises an outside air
10 temperature sensor for detecting outside air temperature,

wherein the control means controls at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater based on the outside air temperature detected by the outside air
15 temperature sensor.

In this embodiment, as the outside air temperature detected by the outside air temperature sensor increases, the amount of adsorption onto the humidifying rotor tends to increase as in the case of high outside air
20 humidity. Therefore, an optimum humidification operation according to the outside air humidity can be achieved based on the outside air temperature without any humidity sensor for detecting the outside air humidity. This humidification operation is, essentially, to estimate an outside air humidity based on an outside air temperature



and then perform control based on this estimated outside air humidity.

One embodiment comprises a blowoff air temperature sensor for detecting blowoff air temperature of the humidifying passage downstream from the humidifying rotor,

wherein the control means controls at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater based on the blowoff air temperature detected by the blowoff air temperature sensor.

In this embodiment, as the blowoff air temperature of the humidifying passage downstream from the humidifying rotor detected by the blowoff air temperature sensor decreases, the amount of water adsorption onto the humidifying rotor tends to increase as in the case of high outside air humidity. Therefore, an optimum humidification operation according to the outside air humidity can be achieved based on the blowoff air temperature without any humidity sensor for detecting the outside air humidity. This humidification operation is, essentially, to estimate an outside air humidity based on a blowoff air temperature and then perform control based on this estimated outside air humidity.



One embodiment comprises an outside air temperature sensor for detecting outside air temperature; and

a blowoff air temperature sensor for detecting
5 blowoff air temperature of the humidifying passage downstream from the humidifying rotor,

wherein the control means controls at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater based on the
10 outside air temperature detected by the outside air temperature sensor and the blowoff air temperature detected by the blowoff air temperature sensor.

In this embodiment, as the outside air temperature detected by the outside air temperature sensor
15 increases and as the blowoff air temperature detected by the blowoff air temperature sensor decreases, the amount of water adsorption onto the humidifying rotor tends to increase as in the case of high outside air humidity. Therefore, an optimum humidification operation according to
20 the outside air humidity can be achieved based on the outside air temperature and blowoff air temperature without any humidity sensor for detecting the outside air humidity. This humidification operation is, essentially, to estimate an outside air humidity based on an outside air temperature



and a blowoff air temperature and execute control based on this estimated outside air humidity.

One embodiment comprises an outside air humidity sensor for detecting outside air humidity,

5 wherein the control means controls at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater based on the outside air humidity detected by the outside air humidity sensor.

10 In this embodiment, as the outside air humidity increases, the amount of water adsorbed onto the humidifying rotor tends to increase. Therefore, an optimum humidification operation according to the outside air humidity can be achieved by directly detecting the outside
15 air humidity with the outside air humidity sensor.

One embodiment comprises a humidifying hose for conveying the humidified air indoors from the humidifying passage,

 wherein the control means controls a length of
20 drying operation time for blowing dry air heated by the heater into the humidifying hose to dry interior of the humidifying hose according to a level of the outside air humidity.

 In this embodiment, indeed appropriately longer
25 drying time is needed with the outside air humidity high,



but the drying operation time can be reduced with the outside air humidity low because less condensation occurs in the humidifying hose. As a result, insufficient humidification can be resolved and the comfort can be improved.

One embodiment comprises a display section placed near a humidified-air blowoff opening and serving for displaying outside air humidity.

In this embodiment, an inhabitant can be informed of an exact state of the outside air by referring to the outside air humidity displayed on the display section placed near the humidified-air blowoff opening.

Further, an air conditioner of the present invention is characterized by comprising any one of the humidifiers described above.

With this air conditioner, a more comfortable heating can be provided by effectively humidifying the interior of a room with the humidifier during heating operation in which the interior of the room is more likely to become dry.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic block diagram of an air conditioner using a humidifier according to an embodiment of the present invention;



Fig. 2 is a block diagram of main part of the air conditioner using the humidifier, and

Fig. 3 is a view showing the relationship between outside air humidity and blowoff air temperature.

5

BEST MODE FOR CARRYING OUT THE INVENTION

A humidifier and an air conditioner using the same of the present invention will be described in detail below according to an embodiment thereof shown in the
10 accompanying drawings.

Fig. 1 is a schematic block diagram of an air conditioner using a humidifier according to an embodiment of the present invention, where reference numeral 1 denotes an indoor unit, 2 denotes an outdoor unit, 3 denotes a
15 humidifier disposed on top of the outdoor unit 2, and 4 denotes a humidifying hose 4 which connects the indoor unit 1 and the humidifier 3 to each other. The air conditioner using the humidifier 3 supplies humidified air to the indoor unit 1 through the humidifying hose 4 from the
20 humidifier 3 to humidify the interior of a room.

Fig. 2 shows a block diagram of main part of Fig. 1, and the humidifier 3 includes a disc-shaped humidifying rotor 11 in a casing (not shown). The humidifying rotor 11 is formed into, for example, a honeycomb shape or a porous and multiparticle shape from an adsorbent such as silica



gel, zeolite and alumina, and is rotated about a shaft 11a by a motor 12 for the humidifying rotor. The casing is internally partitioned by partition plates (not shown) to form a moisture absorbing passage A and a humidifying
5 passage B running through individual portions of the humidifying rotor 11.

A moisture absorbing fan 13 is provided on the moisture absorbing passage A downstream from the humidifying rotor 11, and a motor 14 for the moisture
10 absorbing fan for driving the moisture absorbing fan 13 is provided. The humidifying rotor 11 takes up moisture (adsorbs water) from the air flowing through the moisture absorbing passage A in the direction of the arrow.

On the other hand, a humidifying fan 15 is
15 provided on the humidifying passage B downstream from the humidifying rotor 11, and a motor 16 for the humidifying fan for driving the humidifying fan 15 is provided to suck and drive air into flow as indicated by the arrows. A heater 17 is provided above the humidifying rotor 11 on the
20 humidifying passage B so that the air heated by the heater 17, when passing through the humidifying rotor 11, is humidified by the humidifying rotor 11 (water is desorbed from the humidifying rotor 11). The water adsorbed by the humidifying rotor 11 is desorbed by air of the humidifying passage B heated by the heater 17, the air is humidified,
25



and the humidified air is fed to a humidifying hose 4 by the humidifying fan 15.

In Fig. 2, reference numeral 21 denotes a humidity sensor disposed near a blowoff opening 4a of the humidifying hose 4 of an indoor unit body 5 and serving for detecting blowoff air humidity, 22 denotes an outlet-side blowoff air temperature sensor disposed near the blowoff opening 4a and serving for detecting the blowoff air temperature on the outlet side of the humidifying hose 4, 23 denotes an inlet-side blowoff air temperature sensor disposed near the downstream side of the humidifying fan 15 and serving for detecting the blowoff air temperature on the inlet side of the humidifying hose 4, and 24 denotes an outside air temperature sensor for detecting outside air temperature. Numeral 31 denotes an indoor control section for controlling an indoor fan (not shown) or the like upon receiving signals from the humidity sensor 21 and the outlet-side blowoff air temperature sensor 22, reference numeral 32 denotes an outdoor control section for controlling a compressor (not shown) or the like upon receiving signals from the inlet-side blowoff air temperature sensor 23 and the outside air temperature sensor 24, and reference numeral 33 denotes a humidification operation control section 33 serving as control means for controlling the humidification operation

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upon receiving signals from the outdoor control section 32. The humidification operation control section 33 controls the motor 12 for the humidifying rotor, the motor 14 for the moisture absorbing fan, the motor 16 for the humidifying fan, and the heater 17.

Further, a display section 6 for displaying the outside air humidity is provided at a portion of the indoor unit body 5 near the blowoff opening 4a of the humidifying hose 4. The display section 6 displays an outside air humidity estimated by the humidification operation control section 33.

Fig. 3 shows the relationship between outside air humidity (relative humidity) and blowoff air temperature of the humidifying fan 15 under the conditions that the outside air temperatures are 0°C and 7°C, where the blowoff air temperature decreases as the outside air humidity increases and as the outside air temperature decreases. Therefore, a table with which the outside air humidity is determined according to such a relationship between outside air temperature and blowoff air temperature is prepared in advance, as shown in Table 1 (values of the outside air humidity are omitted in Table 1).



Table 1:

		Blowoff Air Temperature (°C)							
		20	20.5	21	21.5	22	...	64.5	65
Outside Air Temperature (°C)	-10								
	-8								
	-6								
	-4								
	-2								
	0								
	.								
	.								
	.								
	20								
	22								
	24								

It is noted that a relational equation that determines the outside air humidity from the relationship between outside air temperature and blowoff air temperature or other means may be used instead of such tables as Table 1. Moreover, relational equations may be coupled together to determine actuator operation parameters directly from an outside air temperature and a blowoff air temperature.

In the air conditioner using the humidifier having the above constitution, the humidification operation control section 33 estimates an outside air humidity with Table 1, based on signals from the inlet-side blowoff air temperature sensor 23 and the outside air temperature sensor 24 received by the outdoor control section 32. The humidification operation control section 33 controls the motor 12 for the humidifying rotor according to the



estimated outside air humidity during the humidification operation. More specifically, by controlling the motor 14 for the moisture absorbing fan so that the number of revolutions of the moisture absorbing fan 13 increases as
5 the estimated outside air humidity decreases, the amount of outside air passing through the humidifying rotor 11 via the moisture absorbing passage A is increased to maintain the amount of water absorbed. On the other hand, by controlling the motor 14 for the moisture absorbing fan so
10 that the number of revolutions of the moisture absorbing fan 13 decreases as the outside air humidity increases, a sufficient amount of absorption can be maintained although the amount of outside air passing through the humidifying rotor 11 via the moisture absorbing passage A is decreased.

15 In another way of control, the humidification operation control section 33 controls the motor 16 for the humidifying fan according to the estimated outside air humidity during the humidification operation. More specifically, by controlling the motor 16 for the
20 humidifying fan so that the number of revolutions of the humidifying fan 15 increases as the estimated outside air humidity decreases, the amount of air passing through the humidifying rotor 11 via the humidifying passage B is increased to maintain the amount of humidification. On the
25 other hand, by controlling the motor 16 for the humidifying



fan so that the number of revolutions of the humidifying fan 15 decreases as the outside air humidity increases, sufficiently humidified air can be obtained although the amount of air passing through the humidifying passage is decreased to decrease the amount of air passing through the humidifying rotor 11.

Furthermore, in another way of control, the humidification operation control section 33 controls the motor 12 for the humidifying rotor according to an estimated outside air humidity during the humidification operation. More specifically, by controlling the motor 12 for the humidifying rotor so that the rotating speed of the humidifying rotor 11 is lowered as the estimated outside air humidity increases, exhaust heat is reduced.

Furthermore, in another way of control, the humidification operation control section 33 controls the input of the heater 17 according to an estimated outside air humidity during humidification operation. More specifically, the amount of adsorption of moisture onto the humidifying rotor 11 increases as the estimated outside air humidity increases, and therefore the input of the heater 17 is lowered accordingly.

Any one of the above-described ways of control according to the outside air humidity can ensure energy



saving, and two or more of those ways of control may be performed at the same time.

Thus, an optimum humidification operation can be performed according to the outside air humidity.

5 The humidifier 3 alternately repeats the humidification operation of blowing off humidified air indoors through the humidifying hose 4 and the drying operation of blowing dry air heated by the heater 7 into the humidifying hose 4 to dry the humidifying hose 4, so as
10 to prevent condensation water from residing within the humidifying hose 4. In this case, the humidification operation control section 33 controls the length of drying operation time according to the level of the outside air humidity so that under the condition of low humidity
15 (outside air humidity), where less condensation occurs in the humidifying hose 4, the drying operation time is shortened as the outside air humidity decreases. As a result, insufficient humidification can be resolving so that the comfort can be improved.

20 Moreover, an inhabitant can be informed of an exact state of outside air, while being in a room, by referring to the outside air humidity displayed on the display section 6 placed near the blowoff opening 4a of the humidifying hose 4.



In the embodiment described above, outside air humidity is estimated based on an outside air temperature and a blowoff air temperature, and at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater is controlled according to the estimated outside air humidity. Otherwise, at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater may also be controlled according to the outside air humidity based on either outside air temperature or blowoff air temperature. This means, in the final analysis, generally performing the control by estimating the outside air humidity based on either one of outside air temperature or blowoff air temperature.

Also, the inlet-side blowoff air temperature sensor 23 has been used above as a blowoff air temperature sensor for detecting the blowoff air temperature of the humidifying passage B downstream from the humidifying rotor 11. However, the blowoff air temperature sensor is not limited to the inlet-side blowoff air temperature sensor 23, and the outlet-side blowoff air temperature sensor 22 or a temperature sensor disposed anywhere within the humidifying hose may be used therefor.

Although the humidifier of this embodiment does not have any outside air humidity sensor for detecting the



outside air humidity directly, at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater may be controlled by directly detecting an outside air humidity with an unshown
5 outside air humidity sensor so that a desired humidification amount of humidified air can be obtained based on the outside air humidity.

Furthermore, an air conditioner using a humidifier has been described in this embodiment. However,
10 the humidifier of the present invention may be used for other heating apparatus, or the present invention may be applied to a humidifier or the like used as a single unit.

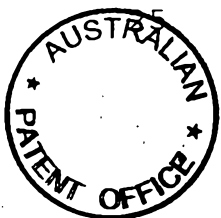
As apparent from the above, the present invention provides a humidifier including a humidifying rotor, a
15 moisture absorbing fan provided on a moisture absorbing passage running through the humidifying rotor, a humidifying fan provided on a humidifying passage running through the humidifying rotor, a motor for the humidifying rotor for driving the humidifying rotor, and a heater
20 provided on the humidifying passage upstream from the humidifying rotor, in which at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater is controlled by control means according to outside air humidity.



Therefore, with the humidifier of the present invention, an optimum humidification operation according to the outside air humidity can be performed and energy saving can be ensured.

5 In the humidifier of an embodiment, which includes an outside air temperature sensor for detecting the outside air temperature, the control means controls at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater
10 based on the outside air temperature detected by the outside air temperature sensor so that the optimum humidification operation according to the outside air humidity can be performed based on the outside air temperature without the need for providing an additional
15 humidity sensor for detecting the outside air humidity. This is because the amount of water adsorption onto the humidifying rotor tends to increase as the outside air temperature detected by the outside air temperature sensor increases.

20 In the humidifier of another embodiment, which includes a blowoff air temperature sensor for detecting the blowoff air temperature of the humidifying passage downstream from the humidifying rotor, the control means controls at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and



the heater based on the blowoff air temperature detected by the blowoff air temperature sensor so that an optimum humidification operation according to the outside air humidity can be performed based on the blowoff air temperature without the need for providing an additional humidify sensor for detecting the outside air humidity. This is because the amount of water adsorption onto the humidifying rotor tends to increase as the blowoff air temperature, which is detected by the blowoff air temperature sensor, of the humidifying passage downstream from the humidifying rotor decreases.

In the humidifier of another embodiment, which includes an outside air sensor for detecting the outside air temperature and a blowoff air temperature sensor for detecting the blowoff air temperature of the humidifying passage downstream from the humidifying rotor, the control means controls at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater based on the outside air temperature detected by the outside air temperature sensor and the blowoff air temperature detected by the blowoff air temperature sensor so that an optimum humidification operation according to the outside air humidity can be performed based on the outside air temperature and the blowoff air temperature without the need for providing an



additional humidify sensor for detecting the outside air humidity. This is because the amount of water adsorption onto the humidifying rotor tends to increase as the outside air temperature detected by the outside air temperature
5 sensor increases and as the blowoff air temperature detected by the blowoff air temperature sensor decreases.

In the humidifier of another embodiment, which includes a humidifying hose for conveying the humidified air indoors, the control means controls the length of the
10 drying operation time for blowing dry air heated by the heater into the humidifying hose to dry the interior of the humidifying hose, in response to the level of the outside air humidity. As a result, the drying operation time can be reduced under a condition of low outside air humidity,
15 where less condensation occurs in the humidifying hose, so that insufficient humidification can be resolved and the comfort can be improved.

Furthermore, in the humidifier of another embodiment, which includes a display section for displaying
20 the outside air humidity near the humidified-air blowoff opening, an inhabitant can be informed of an exact state of the outside air by referring to the outside air humidity displayed on the display section placed near the humidified-air blowoff opening.



Since the air conditioner of the present invention has any one of the humidifiers described above, a more comfortable heating can be provided by effectively humidifying the interior of a room with the humidifier
5 during heating operation in which the interior of the room is more likely to become dry.



The claims defining the invention are as follows:

1. A humidifier comprising a humidifying rotor, a moisture absorbing fan provided on a moisture absorbing passage running through the humidifying rotor, a humidifying fan provided on a humidifying passage running through the humidifying rotor, a motor for the humidifying rotor for driving the humidifying rotor, and a heater provided on the humidifying passage upstream from the humidifying rotor, the humidifier thereby obtaining humidified air from the humidifying passage, further comprising
control for controlling at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor, and the heater according to outside air humidity
so that the humidifier air has a desired amount of humidification.

2. The humidifier according to Claim 1, further comprising:
an outside air temperature sensor for detecting outside air temperature,
wherein the control means controls at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater based on the outside air temperature detected by the outside air temperature sensor.

3. The humidifier according to claim 1, further comprising:
a blowoff air temperature sensor for detecting blowoff air temperature of the humidifying passage downstream for the humidifying rotor,
wherein the control means controls at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater based on the blowoff air temperature detected by the blowoff air temperature sensor.

4. The humidifier according to claim 1, further comprising:
an outside air temperature sensor for detecting outside air temperature; and
a blowoff air temperature sensor for detecting blowoff air temperature of the humidifying passage downstream from the humidifying rotor,
wherein the control means controls at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater based on the outside air temperature detected by the outside air temperature sensor and the blowoff air temperature detected by the blowoff air temperature sensor.

5. The humidifier according to claim 1, further comprising:
an outside air humidity sensor for detecting outside air humidity,



wherein the control means controls at least one of the moisture absorbing fan, the humidifying fan, the motor for the humidifying rotor and the heater based on the outside air humidity detected by the outside air humidity sensor.

5 6. The humidifier according to claim 1, further comprising
a humidifying hose for conveying the humidified air indoors from the humidifying passage,

 wherein the control means controls a length of drying operation time for blowing dry air heated by the heater into the humidifying hose to dry interior of the humidifying
10 hose according to a level of the outside air humidity.

 7. The humidifier according to claim 1, further comprising
a display section placed near a humidified air blowoff opening and serving for displaying outside air humidity.

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 8. A humidifier substantially as hereinbefore described with reference to Figs. 1 and 2 of the accompanying drawings.

 9. An air conditioner including the humidifier as claimed in any one of
20 claims 1 to 8.

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Daikin Industries, Ltd.

Patent Attorneys for the Applicant/Nominated Person

SPRUSON & FERGUSON

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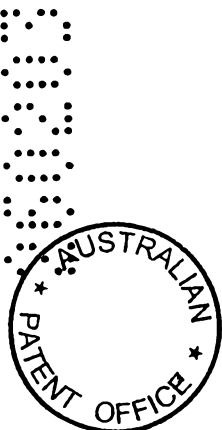


Fig.1

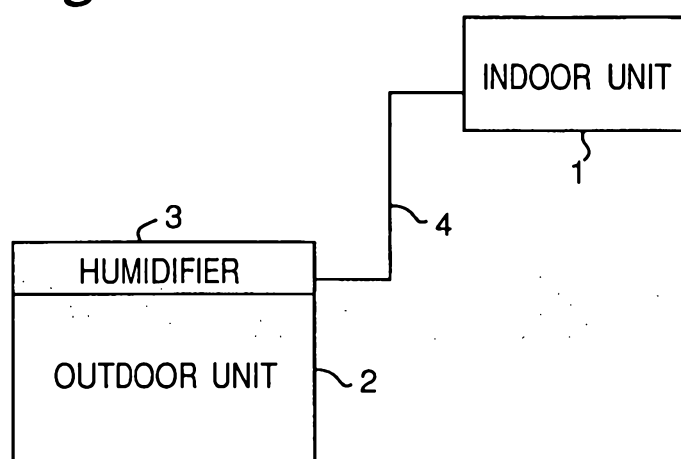


Fig.2

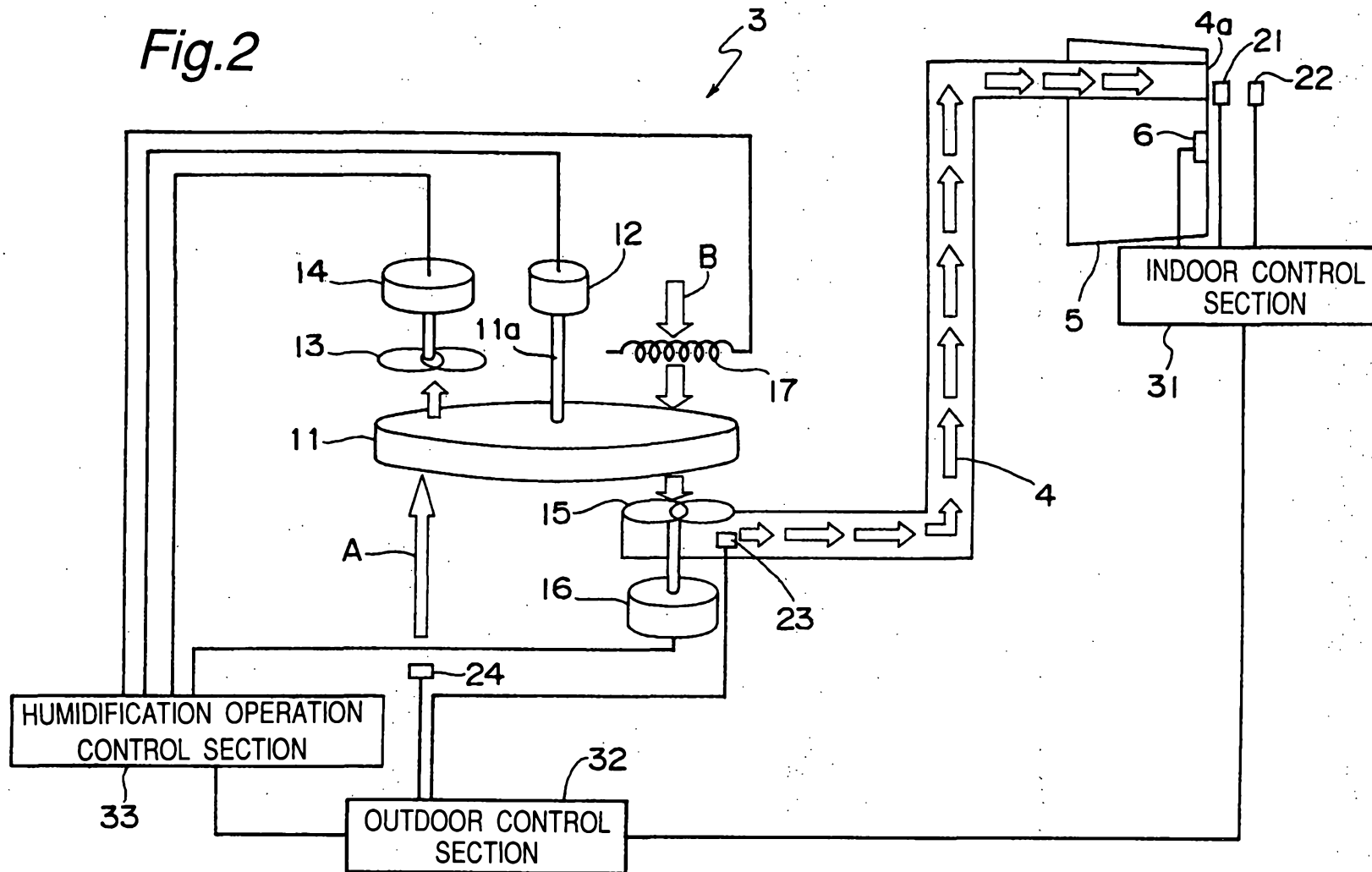


Fig.3

