the room. This configuration disadvantageously increases the size of the humidity control apparatus.

[0005]

Embodiments of the present disclosure downsize a humidity control unit.

SOLUTION TO THE PROBLEM

[0006]

According to a first aspect, , there is provided a humidity control unit including: an air passage through which a first space which is a target space and a second space communicate with each other; a moisture absorber arranged in the air passage and configured to absorb moisture from air and desorb the moisture to the air; a heat source arranged in the air passage and configured to at least cool or heat the moisture absorber; an air transport mechanism configured to allow the air in the air passage to flow in reverse directions; and a controller configured to control the heat source and the air transport mechanism.

[0007]

In an embodiment, the air transport mechanism is able to switch the direction of air flow between two directions. Thus, the air in the second space can be transported to the first space after passing through the moisture absorber and the heat source. The air in the first space can also be transported to the second space after passing through the moisture absorber and the heat source. Both of these two actions use the same air passage. This can downsize the humidity control unit.

[0008]

In an embodiment of the first aspect, the controller performs a first action of allowing

the heat source to cool the moisture absorber and allowing the air transport mechanism to transport the air in the second space to the first space.

[0009]

In the above embodiment, heat source may directly cool the moisture absorber, or may indirectly cool the moisture absorber with the air cooled by the heat source.

[0010]

In the above embodiment, the air in the second space is dehumidified by the moisture absorber and transported to the first space in the first action.

[0011]

In an embodiment of the first aspect, the controller alternately performs the first action and a second action of allowing the heat source to heat the moisture absorber and allowing the air transport mechanism to transport the air in the first space to the second space.

[0012]

In the above embodiment, heat source may directly heat the moisture absorber, or may indirectly heat the moisture absorber with the air heated by the heat source.

[0013]

In the above embodiment, the air in the second space is dehumidified by the moisture absorber and transported to the first space in the first action. The air in the first space receives moisture from the moisture absorber, and is then transported to the second space in the second action.

[0014]

In an embodiment of the first aspect, the controller stops the air transport mechanism for a predetermined period after the end of the first action and before the start of the second

action.

[0015]

In the above embodiment, the air transport mechanism stops after the end of the first action. During this period, low humidity air transported to the first space can be dispersed.

[0016]

In an embodiment of the first aspect, the controller stops the air transport mechanism for a predetermined period after the end of the second action and before the start of the first action.

[0017]

In the above embodiment, the air transport mechanism stops after the end of the second action. During this period, high humidity air transported to the second space (S2) can be dispersed.

[0018]

In an embodiment of the first aspect, the controller performs a third action of allowing the heat source to heat the moisture absorber and allowing the air transport mechanism to transport the air in the second space to the first space.

[0019]

In the above embodiment, the air in the second space is humidified by the moisture absorber and transported to the first space in the third action.

[0020]

In an embodiment of the first aspect, the controller alternately performs the third action and a fourth action of allowing the heat source to cool the moisture absorber and allowing the air transport mechanism to transport the air in the first space to the second space.

[0021]

In the above embodiment, the air in the second space is humidified by the moisture absorber, and is then transported to the first space in the third action. The air in the first space gives moisture to the moisture absorber, and is then transported to the second space in the fourth action.

[0022]

In an embodiment of the first aspect, the controller stops the air transport mechanism for a predetermined period after the end of the third action and before the start of the fourth action.

[0023]

In the above embodiment, the air transport mechanism stops after the end of the third action. During this period, high humidity air transported to the first space can be dispersed.

[0024]

In an embodiment of the first aspect, the controller stops the air transport mechanism for a predetermined period after the end of the fourth action and before the start of the third action.

[0025]

In the above embodiment, the air transport mechanism stops after the end of the fourth action. During this period, low humidity air transported to the second space can be dispersed.

[0026]

In an embodiment of the first aspect, the first space is an indoor space, and the second space is an outdoor space.

[0027]

In the above embodiment, the air passage allows the indoor space to communicate with the outdoor space. The air transport mechanism is able to switch the action of supplying the air in the outdoor space to the indoor space and the action of discharging the air in the indoor space to the outdoor space.

[0028]

In an embodiment of the first aspect, the heat source includes a heat exchange unit in which a heating medium flows.

[0029]

In the above embodiment, the air and the heating medium exchange heat in the heat exchange unit.

[0030]

In an embodiment of the first aspect, the heat exchange unit includes: a first heat exchanger arranged closer to the first space than the moisture absorber and configured to cool and heat the air; and a second heat exchanger arranged closer to the second space than the moisture absorber and configured to cool and heat the air.

[0031]

In the above embodiment, the air cooled or heated in the first heat exchanger can pass through the moisture absorber. The air cooled or heated in the second heat exchange part can also pass through the moisture absorber.

[0032]

In an embodiment of the first aspect, the heat exchange unit is an adsorption heat exchanger having an adsorbent for adsorbing and desorbing water and serving as the moisture

absorber.

[0033]

In the above embodiment, the heating medium flowing through the adsorption heat exchanger cools or heats the adsorbent.

[0034]

In an embodiment of the first aspect, the humidity control unit further includes a refrigerant circuit (R) for circulating a refrigerant as the heating medium to perform a refrigeration cycle.

[0035]

In an embodiment of the first aspect, the humidity control unit further includes an outdoor unit having a compressor and an outdoor heat exchanger that are connected to the refrigerant circuit.

[0036]

In an embodiment of the first aspect, the air transport mechanism is a fan capable of rotating in a forward direction and a reverse direction.

[0037]

In the above embodiment, the direction of rotation of the fan is switched between the forward direction and the reverse direction, allowing the air in the air passage to flow in two directions.

[0038]

In an embodiment of the first aspect, the air transport mechanism includes a first fan for sending the air to the first space and a second fan for sending the air to the second space.

[0039]

In the above embodiment, operating the first fan can transport the air in the second space to the first space. Operating the second fan can transport the air in the first space to the second space.

[0040]

In an embodiment of the first aspect, the air transport mechanism includes: at least one fan; and a flow path switching mechanism configured to switch a flow path of the air in the air passage between a first state and a second state. The fan allows the air to flow from the second space to the first space in the air passage in the first state, and allows the air to flow from the first space to the second space in the air passage in the second state.

[0041]

In the above embodiment, the fan transports the air. When the flow path switching mechanism switches the flow path of the air between the first state and the second state, the air can flow in reverse directions in the air passage.

[0042]

In an embodiment of the first aspect, a center of an opening to the first space in the air passage and a center of an opening to the second space in the air passage substantially coincide with each other in a direction of the air flowing in the air passage.

[0043]

In the above embodiment, the flow path resistance of the air passage can be reduced.

[0044]

In an embodiment of the first aspect, the air passage is provided to penetrate a wall that is a partition between the first space and the second space.

[0045]

In an embodiment of the first aspect, the air passage is arranged in a window or a window frame between an indoor space as the first space and an outdoor space as the second space.

[0046]

In an embodiment of the first aspect, the humidity control unit further includes a filter arranged in the air passage to be closer to the outdoor space as the second space than the moisture absorber and the heat source. The filter is configured such that dust adhering to the filter is removed by the air flowing from the indoor space as the first space to the outdoor space.

[0047]

In the above embodiment, the filter can collect the dust in the outdoor air. The air can release the dust adhering to the filter to the outdoor space.

[0048]

According to a second aspect, there is provided a humidity control system including a plurality of humidity control units configured to control humidity of a target space. Each of the plurality of humidity control units is the humidity control unit of any one of the first to twenty-second aspects.

[0049]

In an embodiment of the second aspect, the plurality of humidity control units can dehumidify and humidify the indoor space.

[0050]

In an embodiment of the second aspect, the humidity control system further includes an interlock control unit configured to control the plurality of humidity control units in a

coordinated manner.

[0051]

In the above embodiment, the plurality of humidity control units operate in a coordinated manner.

[0052]

In an embodiment of the second aspect, the plurality of humidity control units include at least one first humidity control unit and at least one second humidity control unit. The first humidity control unit and the second humidity control unit alternately perform: a first action of allowing the heat source to cool the moisture absorber and allowing the air transport mechanism to transport the air in the second space to the first space; and a second action of allowing the heat source to heat the moisture absorber and allowing the air transport mechanism to transport the air in the first space to the second space. The interlock control unit controls the first humidity control unit and the second humidity control unit so that the second humidity control unit performs the second action when the first humidity control unit performs the first action, and the second humidity control unit performs the first action when the first humidity control unit performs the second action.

[0053]

In the above embodiment, the first space can be continuously dehumidified and ventilated.

[0054]

In an embodiment of the second aspect, at least one of the first humidity control unit or the second humidity control unit is configured to stop the air transport mechanism for a predetermined period between the first action and the second action. The interlock control unit

controls the first humidity control unit and the second humidity control unit so that one of the first humidity control unit or the second humidity control unit performs the first or second action while the other of the first humidity control unit or the second humidity control unit is stopped.

[0055]

In the above embodiment, stopping the air transport mechanism for a period between the first and second actions can disperse the air transported to the first space or the second space. While one of the humidity control units is stopped, the other humidity control unit performs the first or second action. Thus, the first space can be ventilated while the air transport mechanism of one of the humidity control unit is stopped.

[0056]

In an embodiment of the second aspect, the first humidity control unit and the second humidity control unit alternately perform: a third action of allowing the heat source to heat the moisture absorber and allowing the air transport mechanism to transport the air in the second space to the first space; and a fourth action of allowing the heat source to cool the moisture absorber and allowing the air transport mechanism to transport the air in the first space to the second space. The interlock control unit controls the first humidity control unit and the second humidity control unit so that the second humidity control unit performs the fourth action when the first humidity control unit performs the third action, and the second humidity control unit performs the third action when the first humidity control unit performs the fourth action.

[0057]

In the above embodiment, the first space can be continuously humidified and ventilated.

[0058]

In an embodiment of the second aspect, at least one of the first humidity control unit or the second humidity control unit is configured to stop the air transport mechanism for a predetermined period between the third action and the fourth action. The interlock control unit controls the first humidity control unit and the second humidity control unit so that one of the first humidity control unit or the second humidity control unit performs the third or fourth action while the other of the first humidity control unit or the second humidity control unit is stopped.

[0059]

In the above embodiment, stopping the air transport mechanism for a period between the third and fourth actions can disperse the air transported to the first space or the second space. While one of the humidity control units is stopped, the other humidity control unit performs the third or fourth action. Thus, the first space can be ventilated while the air transport mechanism of one of the humidity control unit is stopped.

[0060]

In an embodiment of the second aspect, the humidity control unit further includes a first determination unit configured to determine a degree of pollution of the air in the second space. When at least a condition that the first determination unit determines that the degree of pollution of the air exceeds a predetermined value is met, the interlock control unit controls the plurality of humidity control units so that the total amount of the air supplied by the humidity control units exceeds the total amount of air discharged by the humidity control units.

[0061]

In the above embodiment, the total amount of the air supplied by the humidity control units exceeds the total amount of the air discharged by the humidity control unit when the air

in the second space has a high degree of pollution. This can keep the air with the high degree of pollution from entering the first space.

[0062]

In an embodiment of the second aspect, the humidity control system further includes an entry detector configured to detect the entry of the air from the second space to the first space. When at least a condition that the first determination unit determines that the degree of pollution of the air exceeds a predetermined value and a condition that the entry detector detects the entry of the air are met, the interlock control unit controls the plurality of humidity control units so that the total amount of the air supplied by the humidity control units exceeds the total amount of air discharged by the humidity control units (10).

[0063]

In the above embodiment, when the air in the second space has a high degree of pollution and the air enters the first space from the second space, the total amount of the air supplied by the humidity control units exceeds the total amount of the air discharged by the humidity control units. This can keep the air with the high degree of pollution from entering the first space (S1).

[0064]

In an embodiment of the second aspect, the humidity control system further includes a second determination unit configured to determine a degree of pollution of the air in the first space. When at least a condition that the second determination unit determines that the degree of pollution of the air exceeds a predetermined value is met, the interlock control unit controls the plurality of humidity control units so that the total amount of the air discharged by the humidity control units exceeds the total amount of the air supplied by the humidity control units.

[0065]

In the above embodiment, the total amount of air discharged by the humidity control units exceeds the total amount of air supplied by the humidity control unit when the air in the first space has a high degree of pollution. This can discharge the air with the high degree of pollution to the second space.

[0066]

In an embodiment of the second aspect, the humidity control system further includes an air volume detector configured to detect the amount of air supplied or discharged by a ventilator installed in the first space. The interlock control unit controls the plurality of humidity control units based on the amount of the air supplied or discharged detected by the air volume detector so that the total amount of the air supplied to the first space and the total amount of the air discharged from the first space become substantially identical to each other.

[0067]

In the above embodiment, the amount of the air supplied and the amount of the air discharged can be kept in balance in both of the first space and the second space, even when the ventilator in the first space supplies or discharges the air.