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(54) **AIR CONDITIONING APPARATUS AND AIR
CONDITIONING METHOD AND
NEUTRALIZING VIRUS AND BACTERIA IN
A ROOM**

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See application file for complete search history.

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(57) **ABSTRACT**

An air conditioning apparatus includes an air vacuum pump that sucks in air from a prescribed space to place the space under negative pressure, a first hot and cool air tank that contains the sucked air, first valves that adjust the flow rate of air supplied to or discharged from the first hot and cool air tank, a second hot and cool air tank that contains the sucked air while an air flow from the air vacuum pump to the first hot and cool air tank is restricted, second valves that adjust the flow rate of air supplied to or discharged from the second hot and cool air tank, and a heating and cooling device that manages the temperature of at least one of the first and second hot and cool air tanks to which an air flow from the air vacuum pump is restricted.

3 Claims, 2 Drawing Sheets

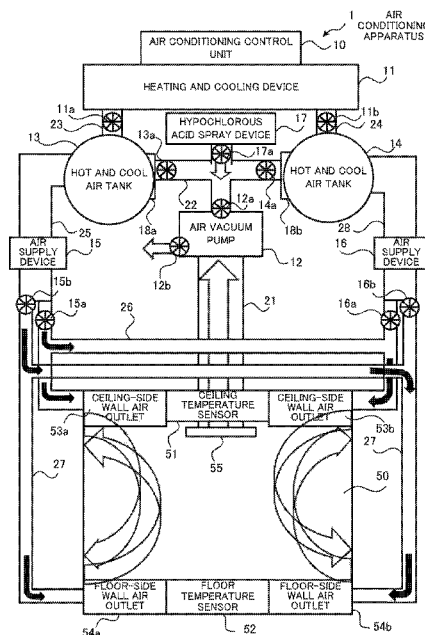
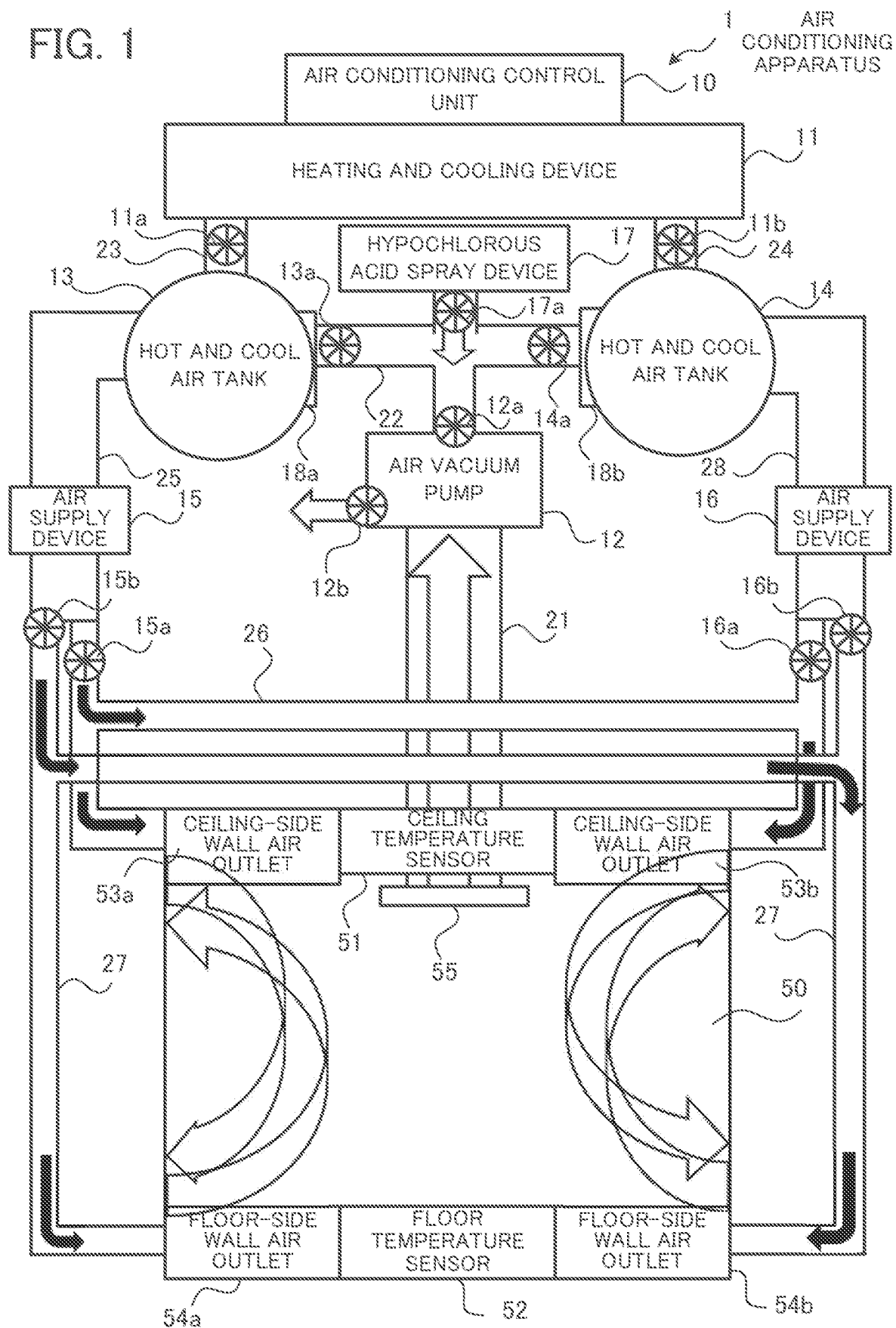


FIG. 1



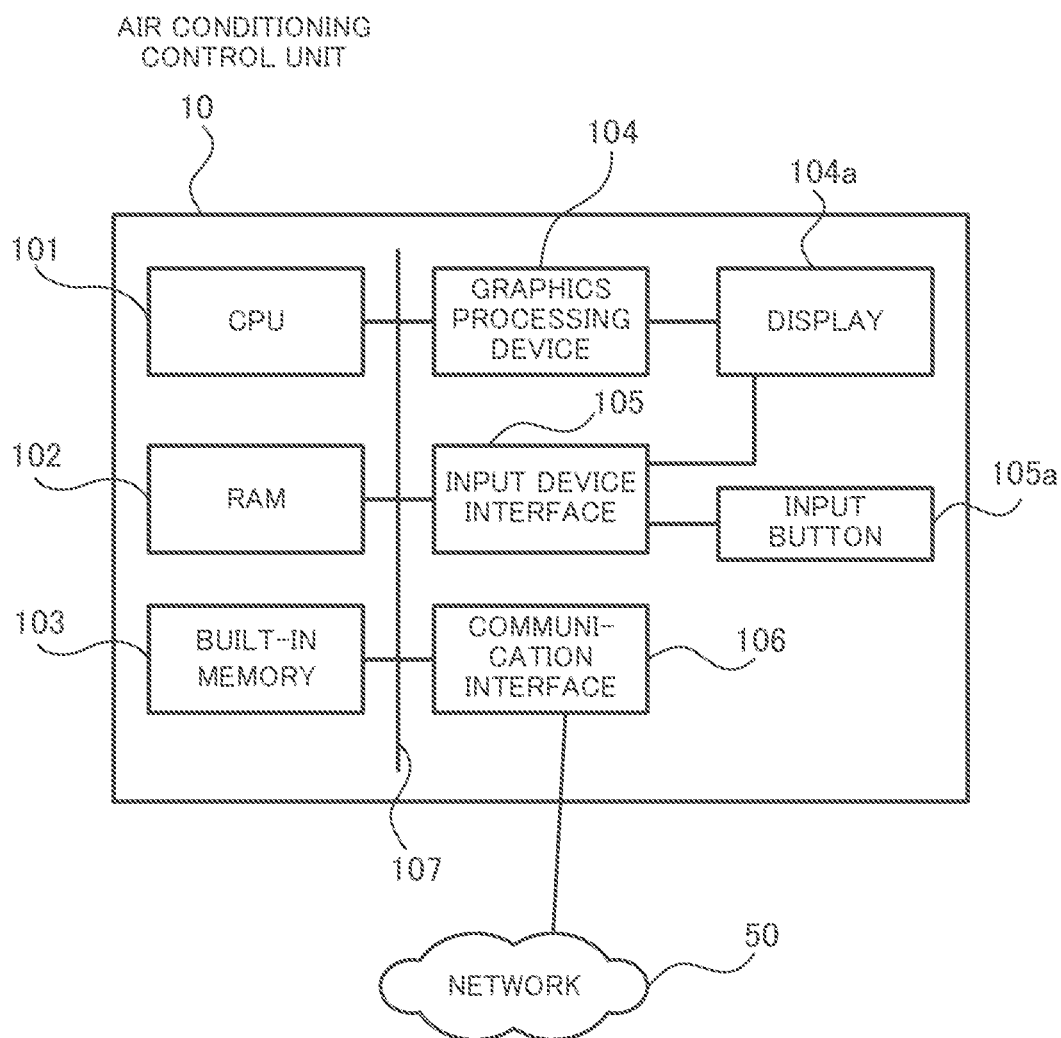


FIG. 2

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AIR CONDITIONING APPARATUS AND AIR CONDITIONING METHOD AND NEUTRALIZING VIRUS AND BACTERIA IN A ROOM

RELATED APPLICATIONS

This application claims priority under 35 U.S.C. § 119 to co-pending JP Application 2020-098317, filed Jun. 5, 2020, which is incorporated by reference herein in its entirety.

FIELD

The embodiment discussed herein relates to an air conditioning apparatus and an air conditioning method.

BACKGROUND

An apparatus for controlling the air condition in living space has been known. For example, there has been known a structure of air conditioning equipment that includes a comfort detection and determination means capable of detecting the comfort of a room and a people counter means capable of detecting the number of people in the room, and that is provided with an air conditioning mechanism of freely circulating air conditioned according to the comfort detected by the comfort detection and determination means and is also provided with an air outlet that is open on the floor of the room. The air conditioning mechanism is provided to circulate the conditioned air or stops the air circulation according to the number of people in the room, detected by the people counter means, and the air outlet is provided to blow the conditioned air that is circulated within the room by the air conditioning mechanism.

Please see, for example, Japanese Laid-open Patent Publication No. 6-221612.

To prevent the infection of coronavirus that has been spreading worldwide, most countries in the world recommend avoiding three Cs (closed spaces, crowded conditions, and close-contact settings).

As long as people do their work in indoor facility (hereinafter, referred to as “room”), it is difficult for them to avoid the three Cs, irrespective of whether the work is administrative work, service work, or production work.

Especially, in existing air conditioning systems, an air outlet for hot air is located on or close to a ceiling, and when hot or cool air starts to blow in a room, the room is pressurized and so is under higher pressure than its surroundings. Therefore, droplets of virus and bacteria (hereinafter, referred to as pathogens) expelled from people's breathing in the room disperse into the hot or cool air flow and spread into every corner of the room.

In order to avoid the three Cs, it would be a quick way to open windows and doors to create air flow so as to remove pathogens from a room. This way, however, has a problem in that it is difficult to keep comfortable temperature in the room during mid-summer and mid-winter.

SUMMARY

According to one aspect, there is provided an air conditioning apparatus including: an air vacuum unit that sucks in air from a prescribed space to place the prescribed space under negative pressure; a first reservoir that contains the air sucked in by the air vacuum unit; a first adjustment unit that adjusts a flow rate of air supplied to and discharged from the first reservoir; a second reservoir that contains the air sucked

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in by the air vacuum unit while a flow of the air from the air vacuum unit to the first reservoir is restricted; a second adjustment unit that adjusts a flow rate of air supplied to and discharged from the second reservoir; and a heating and cooling device that manages a temperature of at least one of the first reservoir and the second reservoir upon determining that a flow of the air from the air vacuum unit to the at least one of the first reservoir and the second reservoir is restricted.

The object and advantages of the invention will be realized and attained by means of the elements and combinations particularly pointed out in the claims.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are not restrictive of the invention.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 illustrates an air conditioning apparatus according to one embodiment; and

FIG. 2 illustrates the hardware configuration of an air conditioning control unit according to the embodiment.

DETAILED DESCRIPTION

Hereinafter, an air conditioning apparatus according to one embodiment will be described in detail with reference to the accompanying drawings.

For easy understanding of the embodiment, the position, size, shape, range, and others of each component illustrated in the drawings may not represent the actual position, size, shape, range, and others. Therefore, the embodiment is not limited to the illustrated positions, sizes, shapes, ranges, and others.

Elements that are each expressed in a singular form in the embodiment may be plural in use, except otherwise particularly specified in writing.

Embodiment

FIG. 1 illustrates an air conditioning apparatus according to one embodiment.

The air conditioning apparatus 1 of this embodiment controls the air condition in a room (prescribed space) 50. The room 50 is provided with a ceiling temperature sensor 51, a floor temperature sensor 52, ceiling-side wall air outlets 53a and 53b, and floor-side wall air outlets 54a and 54b.

The ceiling temperature sensor 51 detects the temperature around the ceiling of the room 50. The floor temperature sensor 52 detects the temperature around the floor of the room 50.

The ceiling-side wall air outlets 53a and 53b are air outlets that are provided in the vicinity of the ceiling of the room 50 and blow cool air discharged from the air conditioning apparatus 1.

The floor-side wall air outlets 54a and 54b are air outlets that are provided in the vicinity of the floor of the room 50 and blow hot air discharged from the air conditioning apparatus 1. In this connection, the number of ceiling-side wall air outlets 53a and 53b and the number of floor-side wall air outlets 54a and 54b are not limited to the illustrated example.

The room 50 is also provided with a grille (a lattice metal plate used at an air inlet) 55.

The air conditioning apparatus **1** includes an air conditioning control unit **10**, a heating and cooling device **11**, an air vacuum pump (air vacuum unit) **12**, a hot and cool air tank (first reservoir) **13**, a hot and cool air tank (second reservoir) **14**, air supply devices **15** and **16**, and a hypochlorous acid spray device **17**. The air conditioning control unit **10** is an artificial intelligence (AI) air conditioning controller, for example. The air conditioning control unit **10** controls the entire air conditioning apparatus **1** (heating and cooling device **11**, air vacuum pump **12**, air supply devices **15** and **16**, various sensors, and others).

FIG. **2** illustrates the hardware configuration of an air conditioning control unit according to the embodiment.

The air conditioning control unit **10** is entirely controlled by a central processing unit (CPU) **101**.

A random access memory (RAM) **102** and a plurality of peripheral devices are connected to the CPU **101** via a bus **107**.

The RAM **102** is used as a main storage device of the air conditioning control unit **10**. The RAM **102** temporarily stores therein at least part of operating system (OS) programs and application programs that are executed by the CPU **101**. In addition, the RAM **102** stores therein various kinds of data to be used by the CPU **101** in processing.

Connected to the bus **107** are a built-in memory **103**, a graphics processing device **104**, an input device interface **105**, a communication interface **106**.

The built-in memory **103** performs data write and read. The built-in memory **103** is used as an auxiliary storage device of the air conditioning control unit **10**. The built-in memory **103** stores therein OS programs, application programs, and various kinds of data. Examples of the built-in memory include semiconductor storage devices such as flash memories.

A display **104a** is connected to the graphics processing device **104**. The graphics processing device **104** displays images on the screen of the display **104a** in accordance with instructions from the CPU **101**. Examples of the display **104a** include liquid crystal displays and others. In addition, the display **104a** has a touch panel function.

The display **104a** and an input button **105a** are connected to the input device interface **105**. The input device interface **105** gives signals received from the input button **105a** and the touch panel of the display **104a** to the CPU **101**.

The communication interface **106** is connected to a network **50**. The communication interface **106** communicates data with other computers and communication devices over the network **50**. In addition, the communication interface **106** is able to obtain information from various sensors provided in the air conditioning apparatus **1** with one or both of wireless communication and wired communication.

With the above hardware configuration, the processing functions of the present embodiment are implemented. Refer now back to FIG. **1** again.

The air vacuum pump **12** sucks in air from the room **50** through the grille **55** provided in the room **50** and an air vacuum duct **21**, to thereby place the room **50** under negative pressure. The air vacuum pump **12** has a meter that measures the volume of the sucked air. In addition, the air vacuum pump **12** is provided with valves **12a** and **12b**. Examples of the valves **12a** and **12b** include air chuck valves. The same applies to the other valves in this description.

The air vacuum pump **12** pressurizes the sucked air and discharges it to the hot and cool air tanks **13** and **14** through a duct **22**. A valve **13a** is provided in the duct **22** between the air vacuum pump **12** and the hot and cool air tank **13**. A

valve **14a** is provided in the duct **22** between the air vacuum pump **12** and the hot and cool air tank **14**.

The hot and cool air tanks **13** and **14** contain compressed air discharged by the air vacuum pump **12**.

The relationship between the size and the pressure resistant of the hot and cool air tanks **13** and **14** is as follows.

Assuming that the room **50** has a floor space of 33 m² and a ceiling height of 2.5 m, the volume of the room **50** is calculated as 82.5 m³. One atmospheric pressure is approximately 0.1 Mpa. Assuming that the hot and cool air tank **13** has a radius of 0.5 m, the volume of the hot and cool air tank **13** is calculated as approximately 0.532 m³. 82.5 m³/0.532 m³@15.5 Mpa is obtained. For example, in the case where a 70 MPa tank, which is used for a hydrogen car, has a diameter of 1 m, it is possible to heat and cool a room of approximately 150 m³.

The heating and cooling device **11** sends hot or cool air to the hot and cool air tanks **13** and **14** through ducts **23** and **24** in accordance with instructions from the air conditioning control unit **10**. A valve **11a** is provided between the heating and cooling device **11** and the hot and cool air tank **13**. A valve **11b** is provided between the heating and cooling device **11** and the hot and cool air tank **14**.

The air supply device **15** blows cool air coming from the hot and cool air tank **13** through a duct **25**, from the ceiling-side wall air outlets **53a** and **53b** through a cool air duct **26**. A valve **15a** is provided between the air supply device **15** and the cool air duct **26**. In addition, the air supply device **15** blows hot air coming from the hot and cool air tank **13** through the duct **25**, from the floor-side wall air outlets **54a** and **54b** through a hot air duct **27**. A valve **15b** is provided between the air supply device **15** and the hot air duct **27**.

The air supply device **16** blows cool air coming from the hot and cool air tank **14** through a duct **28**, from the ceiling-side wall outlets **53a** and **53b** through the cool air duct **26**. A valve **16a** is provided between the air supply device **16** and the cool air duct **26**. In addition, the air supply device **16** blows hot air coming from the hot and cool air tank **14** through the duct **28**, from the floor-side wall air outlets **54a** and **54b** through the hot air duct **27**. A valve **16b** is provided between the air supply device **16** and the hot air duct **27**.

The hypochlorous acid spray device **17** sprays hypochlorous acid to the duct **22**. In this connection, the hypochlorous acid spray device **17** is an example of a device for disinfecting and sterilizing virus in the air. Disinfectant for the spray is not limited to hypochlorous acid. A valve **17a** is provided between the hypochlorous acid spray device **17** and the duct **22**. In addition, a filter **18a** is disposed at the input stage of the hot and cool air tank **13**. In addition, a filter **18b** is disposed at the input stage of the hot and cool air tank **14**. The filters **18a** and **18b** block both hypochlorous acid molecules remaining in the duct **22** and chlorine odor generated at the time of decomposition.

In this connection, the valves **13a**, **15a**, and **15b** are examples of a first adjustment unit for adjusting the flow rate of air supplied to or discharged from the hot and cool air tank **13**. The valves **14a**, **16a**, and **16b** are examples of a second adjustment unit for adjusting the flow rate of air supplied to or discharged from the hot and cool air tank **14**.

The following describes how the air conditioning apparatus operates (processes). First, the operating state of the left half of FIG. **1** will be described step by step. In the following description, step numbers are given for convenience of explanation.

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(Step S0) The valves 12a, 13a, and 17a are open when the air conditioning apparatus 1 starts up. The other valves (valves 11a, 11b, 12b, 14a, 15a, 16a and 16b) are all closed.

(Step S1) The air conditioning control unit 10 operates the air vacuum pump 12. The air vacuum pump 12 sucks in air from the room 50 via the grille 55 provided in the vicinity of the ceiling and the air vacuum duct 21.

At this time, the air conditioning control unit 10 determines based on the temperatures detected by the ceiling temperature sensor 51 and floor temperature sensor 52 whether to operate the heating and cooling device 11. For example, in the case where the temperatures detected by the ceiling temperature sensor 51 and floor temperature sensor 52 fall in a preset range of temperature (for example, a range of 20° C. to 24° C. (humidity of 40% to 60%) during the winter season, and a range of 25° C. to 27° C. (humidity of 50% to 60%) during the summer season), the air conditioning control unit 10 determines not to operate the heating and cooling device 11. When determining not to operate the heating and cooling device 11, the air conditioning control unit 10 opens the valve 12b to exhaust the air of the room 50 to maintain the room in a reduced pressure state. When determining to operate the heating and cooling device 11, the process proceeds to the following step S2.

(Step S2) Since the air vacuum pump 12 is a booster pump as described earlier, the pressurized air passes through the spray duct 22. Pathogens in the air are deactivated by the hypochlorous acid water sprayed by the hypochlorous acid spray device 17, and then the air is sent to the hot and cool air tank 13 via the valve 13a that is open.

(Step S3) The air conditioning control unit 10 determines whether a prescribed amount of compressed air is contained in the hot and cool air tank 13 and duct 25 (hereinafter, referred to as “CHTD1”), with reference to the value indicated by the meter provided in the air vacuum pump 12. If the CHTD1 contains the prescribed amount of compressed air, the air conditioning control unit 10 closes the valves 12a, 13a, and 17a and opens the valve 11a. Then, the heating and cooling device 11 operates to start the cooling or heating of the CHTD1.

(Step S4) Almost at the same time as step S3, the right half of FIG. 1 starts to operate. More specifically, the air conditioning apparatus 1 opens the valves 12a, 14a, and 17a. The following steps S5 to S7 are almost the same as steps S1 to S3.

(Step S5) The air conditioning control unit 10 operates the air vacuum pump 12. The air vacuum pump 12 sucks in air from the room 50, from the grille 55 provided in the vicinity of the ceiling via the air vacuum duct 21.

At this time, the air conditioning control unit 10 determines based on the temperatures detected by the ceiling temperature sensor 51 and floor temperature sensor 52 whether to operate the heating and cooling device 11. When determining not to operate the heating and cooling device 11, the air conditioning control unit 10 opens the valve 12b to exhaust the air of the room 50 to maintain the room in a reduced pressure state. When determining to operate the heating and cooling device 11, the process proceeds to the following step S6.

(Step S6) Since the air vacuum pump 12 is a booster pump as described earlier, the pressurized air passes through the spray duct 22. Pathogens in the air are deactivated by the hypochlorous acid water sprayed by the hypochlorous acid spray device 17, and then the air is sent to the hot and cool air tank 14 via the valve 14a that is open.

(Step S7) The air conditioning control unit 10 determines whether a prescribed amount of compressed air is contained

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in the hot and cool air tank 14 and duct 28 (hereinafter, referred to as “CHTD2”), with reference to the value indicated by the meter provided in the air vacuum pump 12. If the CHTD2 contains the prescribed amount of compressed air, the air conditioning control unit 10 closes the valves 12a, 14a, and 17a and opens the valve 11b. Then, the heating and cooling device 11 operates to start the cooling or heating of the CHTD2.

By the way, when the CHTD1 reaches a prescribed temperature, the air conditioning control unit 10 executes step S8 and subsequence steps.

(Step S8) When the CHTD1 reaches the prescribed temperature, the air conditioning control unit 10 closes the valve 11a. If the air discharged from the heating and cooling device 11 to the hot and cool air tank 13 is cool air, the air conditioning control unit 10 opens the valve 15a. If the air discharged from the heating and cooling device 11 to the hot and cool air tank 13 is hot air, the air conditioning control unit 10 opens the valve 15b.

The air supply device 15 sends the hot or cool air to the room 50. At the same time, the air supply device 15 measures the amount of the hot or cool air. The air conditioning control unit 10 continues to manage the discharged amounts of the air vacuum pump 12 and air supply device 15 so that the room has one atmospheric pressure or lower.

By the way, before the CHTD1 runs out of the compressed air, the air conditioning control unit 10 controls the heating and cooling device 11 so that the compressed air in the CHTD2 reaches the prescribed temperature. When the CHTD1 is about to run out of the compressed air, the air conditioning control unit 10 executes step S9 and subsequence steps.

(Step S9) The air conditioning control unit 10 closes the valve 11b. If the air discharged from the heating and cooling device 11 to the hot and cool air tank 14 is cool air, the air conditioning control unit 10 opens the valve 16a. If the air discharged from the heating and cooling device 11 to the hot and cool air tank 14 is hot air, the air conditioning control unit 10 opens the valve 16b. In addition, the air conditioning control unit 10 opens the valves 12a, 13a, and 17a. Thereby, the air sucked in from the room 50 passes through the spray duct 22. Pathogens in the air are deactivated by the hypochlorous acid water sprayed by the hypochlorous acid spray device 17, and then the air is sent to the hot and cool air tank 13 via the valve 13a that is open.

(Step S10) Before the CHTD2 runs out of the compressed air, the air conditioning control unit 10 controls the heating and cooling device 11 so that the compressed air in the CHTD1 reaches the prescribed temperature. Until the temperature of the room 50 reaches the preset temperature, the air conditioning control unit 10 repeats steps S1 to S9, which include containing compressed air in the hot and cool air tanks 13 and 14 alternately, carrying out temperature management, and operating the air supply devices 15 and 16 to discharge air from the cool air duct 26 or hot air duct 27. After that, until the room temperature goes above or below the set temperature, the air conditioning control unit 10 operates the air vacuum pump 12 and opens the valve 12b. By doing so, the air sucked in from the room 50 is exhausted to the outside.

In the way described above, the air conditioning control unit 10 is able to heat and cool the room 50 by managing the air vacuum pump 12, air supply devices 15 and 16, and all valves while maintaining the room 50 at a prescribed atmospheric pressure less than or equal to one atmospheric pressure.

Note that, without two hot and cool air tanks, namely the hot and cool air tanks **13** and **14**, it is very difficult to keep the room **50** in a reduced pressure state.

When the air in the hot and cool air tank **13** has been sterilized using the hypochlorous acid water and is sufficiently cooled or heated, the air is sent from the air supply device **15** to the room **50** through the cool air duct **26** or hot air duct **27**.

On the other hand, the air from the room **50** is discharged to and sufficiently contained in the hot and cool air tank **14**.

In this state, if the following inequality is not satisfied, “pressure in the hot and cool air tank **13** < the pressure in the hot and cool air tank **14**,” that is, if the pressure in the hot and cool air tank **14** is not higher than the pressure in the hot and cool air tank **13**, it is not possible to keep the room **50** under negative pressure.

In addition, after hot or cool air in the hot and cool air tank **13** is sent to the room **50** and thus no air remains in the hot and cool air tank **13**, the air sucked from the room **50** is contained in the hot and cool air tank **13**. When the air sucked from the room **50** is sufficiently contained in the hot and cool air tank **13**, the air is then sterilized using the hypochlorous acid water and is heated or cooled by the heating and cooling device **11**.

In this state, the following inequality needs to be satisfied: “pressure in the hot and cool air tank **13** > the pressure in the hot and cool air tank **14**.” The same processing is repeated thereafter.

To maintain the two states: “pressure in the hot and cool air tank **13** < pressure in the hot and cool air tank **14**” and “pressure in the hot and cool air tank **13** > pressure in the hot and cool air tank **14**,” the air conditioning control unit **10** controls the valves as described above to adjust pressure reduction. It is possible because their storage chambers are at high pressure.

That is, at least two hot and cool air tanks, namely the hot and cool air tanks **13** and **14**, are provided to prepare two storage chambers for containing air, and the air supply devices **15** and **16** are provided respectively corresponding to the hot and cool air tanks **13** and **14**, and the valves **15a** and **15b** and the valves **16a** and **16b** are respectively provided for the hot and cool air tanks **13** and **14**.

As described above, the air conditioning apparatus **1** includes the air vacuum pump **12** for sucking in air from a prescribed space **50** to place the space **50** under negative pressure, the hot and cool air tank **13** for containing the air sucked in by the air vacuum pump **12**, the valves **11a**, **13a**, **15a** and **15b** for adjusting the flow rate of air supplied to or discharged from the hot and cool air tank **13**, the hot and cool air tank **14** for containing the air sucked in by the air vacuum pump **12** when a flow of air from the air vacuum pump **12** to the hot and cool air tank **13** is restricted, the valves **11b**, **14a**, **16a**, and **16b** for adjusting the flow rate of air supplied to or discharged from the hot and cool air tank **14**, and the heating and cooling device **11** that manages the temperatures of the hot and cool air tank **13** and hot and cool air tank **14** when the flow of air from the air vacuum pump **12** thereto is restricted.

Therefore, by changing conventional pressure air conditioning to decompression air conditioning, it is possible to avoid the closed spaces and crowded conditions in the three Cs.

In addition, before heating and cooling, a little amount of hypochlorous acid water is sprayed to air sucked from a room. By doing so, it is possible to deactivate pathogens.

This air conditioning apparatus **1** is applicable to all kinds of rooms. It is applicable to not only houses and buildings

but also closed spaces such as moving objects including cars, buses, and trains so as to reduce pathogen infection of living things including humans in the closed spaces.

In addition, conventional air conditioners cause uneven temperature in a room. With the heating and cooling circulation type, however, it is possible to provide even temperature. Therefore, so-called “keeping head cool and feet warm” is possible, which makes it possible to reduce burdens on human bodies.

The processes that are performed by the air conditioning control unit **10** may be performed by a plurality of apparatuses in a distributed manner.

Heretofore, the air conditioning apparatus has been described with respect to the embodiment illustrated. The embodiment is not limited thereto, and the components of each unit may be replaced with other components having equivalent functions. In addition, other desired configurations and steps may be added to the embodiment.

The above-described processing functions may be implemented by using a computer. In this case, a program is prepared, which describes processes for the functions of the air conditioning control unit **10**. A computer implements the above-described processing functions by executing the program. The program describing the intended processes may be stored on a computer-readable storage medium. Computer-readable storage media include magnetic storage devices, optical discs, magneto-optical storage media, semiconductor memories, and others. The magnetic storage devices include hard disk drives, flexible disks (FDs), magnetic tapes, and others. The optical discs include DVDs, DVD-RAMs, CD-ROMs, CD-RWs, and others. The magneto-optical storage media include magneto-optical disks (MOs) and others.

To distribute the program, portable storage media, such as DVDs and CD-ROMs, on which the program is stored, may be put on sale. Alternatively, the program may be stored in the storage device of a server computer and may be transferred from the server computer to other computers over a network.

A computer which is to execute the above program stores in its local storage device the program recorded on a portable storage medium or transferred from the server computer, for example. Then, the computer reads the program from the local storage device, and runs the program. The computer may run the program directly from the portable storage medium. Also, while receiving the program being transferred from the server computer over a network, the computer may sequentially run this program.

In addition, the above-described processing functions may also be implemented wholly or partly by using a digital signal processor (DSP), an application-specific integrated circuit (ASIC), a programmable logic device (PLD), or other electronic circuits.

According to one aspect, it is possible to control the air condition in a room while removing pathogens from the room.

All examples and conditional language provided herein are intended for the pedagogical purposes of aiding the reader in understanding the invention and the concepts contributed by the inventor to further the art, and are not to be construed as limitations to such specifically recited examples and conditions, nor does the organization of such examples in the specification relate to a showing of the superiority and inferiority of the invention. Although one or more embodiments of the present invention have been described in detail, it should be understood that various

changes, substitutions, and alterations could be made hereto without departing from the spirit and scope of the invention.

What is claimed is:

1. An air conditioning apparatus, comprising:

an air vacuum unit that sucks in air from a prescribed space to place the prescribed space under negative pressure;

a first reservoir that contains compressed air obtained by pressurizing the air from the air vacuum unit;

a first adjustment unit that adjusts a flow rate of the compressed air supplied to and discharged from the first reservoir;

a second reservoir that contains the compressed air from the air vacuum unit while a flow of the compressed air from the air vacuum unit to the first reservoir is restricted;

a second adjustment unit that adjusts a flow rate of the compressed air supplied to and discharged from the second reservoir; and

a heating and cooling device that manages a temperature of at least one of the first reservoir and the second reservoir upon determining that a flow of the compressed air from the air vacuum unit to the at least one of the first reservoir and the second reservoir is restricted, wherein,

the first adjustment unit determines whether the compressed air is contained in a first prescribed amount in the first reservoir, and upon determining that the compressed air is contained in the first prescribed amount in the first reservoir, restricts the flow of the compressed air from the air vacuum unit to the first reservoir,

the second adjustment unit determines whether the compressed air is contained in a second prescribed amount in the second reservoir, and upon determining that the compressed air is contained in the second prescribed amount in the second reservoir, restricts a flow of the compressed air from the air vacuum unit to the second reservoir, and

the first reservoir contains the compressed air discharged by the air vacuum unit while the flow of the compressed air from the air vacuum unit to the second reservoir is restricted.

2. The air conditioning apparatus according to claim 1, further comprising a spray device that sprays hypochlorous acid to the air sucked in by the air vacuum unit.

3. An air conditioning management method, comprising: causing, by a computer, an air vacuum unit to suck air from a prescribed space to place the prescribed space under negative pressure;

containing, by the computer, compressed air obtained by pressurizing the air from the air vacuum unit, in a first reservoir;

adjusting, by the computer, a flow rate of the compressed air supplied to and discharged from the first reservoir, and containing the compressed air sucked from the prescribed space in a second reservoir while a flow of the compressed air from the air vacuum unit to the first reservoir is restricted;

adjusting, by the computer, a flow rate of the compressed air supplied to and discharged from the second reservoir, and containing the compressed air sucked from the prescribed space in the first reservoir while a flow of the compressed air from the air vacuum unit to the second reservoir is restricted;

managing, by the computer, a temperature of at least one of the first reservoir and the second reservoir upon determining that a flow of the compressed air from the air vacuum unit to the at least one of the first reservoir and the second reservoir is restricted;

determining, by the computer, whether the compressed air is contained in a first prescribed amount in the first reservoir, and upon determining that the compressed air is contained in the first prescribed amount in the first reservoir, restricting the flow of the compressed air from the air vacuum unit to the first reservoir; and

determining, by the computer, whether the compressed air is contained in a second prescribed amount in the second reservoir, and upon determining that the compressed air is contained in the second prescribed amount in the second reservoir, restricting the flow of the compressed air from the air vacuum unit to the second reservoir.

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