

DESCRIPTION

Title of Invention: BLOWER APPARATUS

5 TECHNICAL FIELD

[0001] The present disclosure relates to a blower apparatus having a display device, and more particularly to a blower apparatus that sends out an airflow toward the front of a display surface.

10 BACKGROUND ART

[0002] There is known an image display device that includes an air blower, and the image display device blows out airflows toward a center of a screen from blowing ports at locations separated from each other with the screen viewed by a viewer interposed therebetween and sends out the airflows forward from the screen by colliding the airflows with each other (for example, PTL 1).

Citation List

Patent Literature

[0003] PTL 1: Unexamined Japanese Patent Publication No. 2006-352424

20 SUMMARY OF THE INVENTION

[0004] For example, the above image display device can imitate wind blown from a window by an airflow sent forward from a screen displaying a landscape. That is, according to this image display device, it is possible to provide a realistic feeling (bodily sensation) of a situation in which the airflow is blown out to the viewer in front of the display surface to some extent, but it is required to further improve the realistic feeling (bodily sensation).

[0005] An object of the present disclosure is to provide a blower apparatus capable of improving sensibility of an airflow sent toward the front of a display surface.

[0006] A blower apparatus according to the present disclosure includes a first blow-out port, a second blow-out port, a first switch, a second switch, and a controller. The first blow-out port blows out a first airflow in substantially parallel with a display surface of a display device having a housing which has a substantially rectangular shape in front view in a first direction from one side of the housing of the display device to the other side of

the housing facing the one side. The second blow-out port blows out a second airflow in substantially parallel with the display surface in a second direction from the other side to the one side. The first switch is provided at a flow path to the first blow-out port, and switches between an airflow having a first temperature and an airflow having a second
5 temperature different from the first temperature, and circulates the airflow as the first airflow. The second switch is provided at a flow path to the second blow-out port, switches between the airflow having the first temperature and the airflow having the second temperature, and circulates the airflow as the second airflow. The controller causes the first
10 airflow from the first blow-out port and the second airflow from the second blow-out port of which blown air volumes and temperatures are respectively controlled to generate a third airflow forward from the display surface by controlling an air blower provided outside to send out, to the first switch and the second switch, the airflow having the first temperature and the airflow having the second temperature, the first switch, and the second switch.

15 **[0007]** According to the blower apparatus of the present disclosure, it is possible to improve the sensibility of the airflow sent toward the front of the display surface.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Fig. 1 is a schematic configuration diagram of an exercise support system using a
20 blower apparatus according to a first exemplary embodiment of the present disclosure.

Fig. 2 is a schematic block diagram of the exercise support system.

Fig. 3 is a schematic configuration diagram of the blower apparatus included in the exercise support system.

Fig. 4A is a schematic cross-sectional view of the blower apparatus taken along a
25 plane parallel to a display surface so as to include a first blow-out port and a second blow-out port formed in the blower apparatus.

Fig. 4B is a schematic cross-sectional view of the blower apparatus taken along a horizontal plane so as to include the first blow-out port and the second blow-out port.

Fig. 5 is a schematic block diagram of a device for air-conditioning of air to be
30 supplied to the blower apparatus.

Fig. 6 is a block diagram for controlling blown air volumes and temperatures of airflows blown out from the first blow-out port and the second blow-out port constituting the blower apparatus.

Fig. 7 is a schematic block diagram of an exercise support system using a blower apparatus according to a second exemplary embodiment of the present disclosure.

Fig. 8 is a schematic configuration diagram of the blower apparatus included in the exercise support system.

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DESCRIPTION OF EMBODIMENTS

[0009] Hereinafter, exemplary embodiments of the present disclosure will be described with reference to the accompanying drawings. The following exemplary embodiments illustrate preferred specific examples of the present disclosure. Thus, numerical values, shapes, materials, components, placement positions and connection forms of the components, etc., which are described in the following exemplary embodiments, are illustrative and are not to limit the scope of the present disclosure. Accordingly, among the components in the following exemplary embodiments, the components that are not recited in the independent claims representing the most superordinate concept of the present disclosure are described herein as optional components. In each drawing, substantially the same components are denoted by the same reference numerals, and redundant description will be omitted or simplified.

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(First exemplary embodiment)

[0010] First, a schematic configuration of exercise support system 1 using blower apparatus 10 according to a first exemplary embodiment of the present disclosure will be described with reference to Figs. 1 and 2. Fig. 1 is a schematic configuration diagram of exercise support system 1 using blower apparatus 10. Fig. 2 is a schematic block diagram of exercise support system 1. Note that, in Fig. 1 and the subsequent drawings, description will be given while defining the left and right in a state where display device 20 is viewed from the front.

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[0011] Exercise support system 1 includes exercise device 3, blower apparatus 10, air conditioning unit 40, and a pair of air blowers (air blower 43L and air blower 43R). Although details will be described later, blower apparatus 10 includes display device 20, first switch 44L, second switch 44R, first air blowing unit 60L, second air blowing unit 60R, and controller 70 (see Fig. 5). First air blowing unit 60L has first blow-out port 15L, and second air blowing unit 60R has second blow-out port 15R (see Fig. 3).

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[0012] Exercise support system 1 is constructed as box-shaped room unit 2, and is a system in which user U can use exercise device 3 while enjoying continuous exercise in an

environment with realistic feeling (bodily sensation) corresponding to a video (landscape, situation, or the like) projected on display device 20.

[0013] Specifically, as illustrated in Fig. 1, room unit 2 in exercise support system 1 includes exercise space S1 in which user U exercises, and air conditioning space S2 for
5 generating and storing air-conditioned air to be supplied from blower apparatus 10 to exercise space S1.

[0014] In exercise space S1, exercise device 3 (for example, a bicycle ergometer) is installed at a center, and blower apparatus 10 having display device 20 on a wall surface in front of exercise device 3 is provided. Door 4 serving as an entrance to exercise space S1 is
10 provided on a rear wall surface of exercise device 3 (see Fig. 2).

[0015] Blower apparatus 10 includes display device 20 having housing 20a having a substantially rectangular shape in front view (see Fig. 3). Blower apparatus 10 is an apparatus that sends out airflows toward the front of display surface 20b of display device 20 by causing airflows flowing from the pair of air blowing units (first air blowing unit
15 60L and second air blowing unit 60R) provided at both ends of display device 20 to collide with each other. Details of blower apparatus 10 will be described later.

[0016] In air conditioning space S2, air conditioning unit 40, the pair of air blowers (air blower 43L and air blower 43R), and controller 70 are installed as illustrated in Fig. 2. Air conditioning unit 40 includes air conditioner 41 and humidity control device 42 in order to
20 generate and store the air-conditioned air to be supplied from blower apparatus 10 to exercise space S1.

[0017] Air conditioning unit 40 adjusts a temperature and humidity of air inside air conditioning space S2 to predetermined conditions by air conditioner 41 and humidity control device 42. As a result, the air under the predetermined conditions (temperature and
25 humidity) is stored inside air conditioning space S2. Here, air conditioner 41 is a device that takes in the air in air conditioning space S2, controls a temperature of the taken air, and sends out the air to the inside of air conditioning space S2. Humidity control device 42 is a device that takes in air in air conditioning space S2, controls humidity of the taken air, and sends out the air to the inside of air conditioning space S2.

[0018] As shown in Fig. 2, the pair of air blowers (air blower 43L and air blower 43R) send out the air-conditioned air adjusted by air conditioning unit 40 to first air blowing unit 60L and second air blowing unit 60R. Specifically, air blower 43L circulates the air-conditioned air adjusted by air conditioning unit 40 through a duct (not illustrated), and
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sends out the air to first air blowing unit 60L. On the other hand, air blower 43R circulates the air-conditioned air adjusted by air conditioning unit 40 through a duct (not illustrated), and sends out the air to second air blowing unit 60R.

5 **[0019]** Controller 70 controls operations of air conditioning unit 40 and the pair of air blowers (air blower 43L and air blower 43R). Controller 70 includes, for example, a computer system including a processor and a memory. The processor executes a program stored in the memory, and thus, the computer system functions as controller 70. Here, the program executed by the processor is assumed to be recorded in advance in the memory of the computer system. The program may be provided by being recorded in a non-temporary recording medium such as a memory card, or may be provided through a
10 telecommunication line such as the Internet. Controller 70 will be described in detail later.

[0020] Although details will be described later, in the present exemplary embodiment, air conditioning space S2 is divided into a plurality of air conditioning spaces (first air conditioning space S2a and second air conditioning space S2b in Fig. 5 to be described
15 later). Air conditioning unit 40 and the pair of air blowers (air blower 43L and air blower 43R) are provided in each air conditioning space (first air conditioning space S2a or second air conditioning space S2b) (see Fig. 5).

[0021] Next, a schematic configuration of blower apparatus 10 constituting exercise support system 1 will be described with reference to Figs. 3 to 4B. Fig. 3 is a schematic configuration diagram of blower apparatus 10. Fig. 4A is a schematic cross-sectional view of blower apparatus 10 taken along a plane parallel to display surface 20b so as to include
20 first blow-out port 15L and second blow-out port 15R formed in blower apparatus 10. Fig. 4B is a schematic cross-sectional view of blower apparatus 10 taken along a horizontal plane so as to include first blow-out port 15L and second blow-out port 15R.

25 **[0022]** As illustrated in Fig. 3, blower apparatus 10 includes display device 20 having housing 20a having a substantially rectangular shape in front view. That is, housing 20a of display device 20 has a substantially rectangular surface having display surface 20b. Blower apparatus 10 is an apparatus that sends out airflows toward the front of display surface 20b of display device 20 by causing airflows flowing from the pair of air blowing
30 units (first air blowing unit 60L and second air blowing unit 60R) provided at both ends of display device 20 to collide with each other. Display device 20 is, for example, a device having a large display screen such as a digital signage which is an information medium displaying various videos or characters. In the present exemplary embodiment, display

device 20 displays a video corresponding to a set exercise support program (for example, a video program for cycling in nature).

[0023] The pair of air blowing units (first air blowing unit 60L and second air blowing unit 60R) constituting blower apparatus 10 are provided at both ends of display device 20, and blow out airflows (first airflow 30L and second airflow 30R), respectively, in directions substantially parallel to display surface 20b from positions facing each other with display surface 20b interposed therebetween.

[0024] Specifically, as illustrated in Figs. 3 to 4B, blower apparatus 10 includes first blow-out part 10L installed on a left side which is one side of housing 20a of display device 20, and second blow-out part 10R installed on a right side which is the other side of housing 20a facing the left side.

[0025] First blow-out part 10L is constructed as a housing of first air blowing unit 60L. First blow-out port 15L that blows out first airflow 30L in substantially parallel with display surface 20b of display device 20 in a first direction from the left side to the right side of housing 20a is formed in first blow-out part 10L. That is, blower apparatus 10 includes first blow-out port 15L that blows out first airflow 30L in substantially parallel with display surface 20b of display device 20 in a first direction from the left side which is one side of housing 20a toward the right side which is the other side of housing 20a facing the left side.

[0026] Second blow-out part 10R is constructed as a housing of second air blowing unit 60R. In second blow-out part 10R, second blow-out port 15R that blows out second airflow 30R in substantially parallel with display surface 20b of display device 20 is formed in a second direction from the right side to the left side of housing 20a. That is, blower apparatus 10 includes second blow-out port 15R that blows out second airflow 30R in substantially parallel with display surface 20b of display device 20 in the second direction from the right side that is the other side of housing 20a toward the left side that is one side of housing 20a.

[0027] As shown in Fig. 4A, a plurality of first louvers 14L for adjusting, in a horizontal direction, first airflow 30L blown out from first blow-out port 15L are provided in first blow-out port 15L. As illustrated in Fig. 4B, first air introduction path 13L is formed inside first blow-out part 10L, and first air introduction path 13L communicates with first blow-out port 15L.

[0028] As shown in Fig. 2, air blower 43L is provided in a flow path behind first blow-

out part 10L (first air blowing unit 60L). Air is blown from air blower 43L to first air introduction path 13L, and thus, the blown air is blown out, as first airflow 30L, from first blow-out port 15L via first air introduction path 13L.

[0029] On the other hand, as shown in Fig. 4A, a plurality of second louvers 14R for adjusting, in a horizontal direction, second airflow 30R blown out from second blow-out port 15R are provided in second blow-out port 15R. As illustrated in Fig. 4B, second air introduction path 13R is formed inside second blow-out part 10R, and second air introduction path 13R communicates with second blow-out port 15R.

[0030] As illustrated in Fig. 2, air blower 43R is provided in a flow path behind second blow-out part 10R (second air blowing unit 60R). Air is blown from air blower 43R to second air introduction path 13R, and thus, the blown air is blown out, as second airflow 30R, from second blow-out port 15R via second air introduction path 13R.

[0031] Here, an operation principle of blower apparatus 10 will be described with reference to Figs. 4A and 4B. First, the operation principle in which an airflow (third airflow 30F including first airflow 30L and second airflow 30R) is sent out toward the front of display surface 20b by first blow-out port 15L and second blow-out port 15R will be described.

[0032] When air is blown out in substantially parallel with display surface 20b from first blow-out port 15L in the first direction from the left side to the right side of housing 20a, the blown air forms first airflow 30L along display surface 20b by an induction phenomenon due to a Coanda effect. Here, the induction phenomenon by the Coanda effect refers to a phenomenon in which a negative pressure region is formed between the blown air and display surface 20b, and the blown air is induced to the negative pressure region side. When air is blown out from second blow-out port 15R in substantially parallel with display surface 20b in the second direction from the right side to the left side of housing 20a, the blown air forms second airflow 30R along display surface 20b due to the induction phenomenon by the Coanda effect.

[0033] Here, first blow-out port 15L and second blow-out port 15R face each other, and first airflow 30L formed by first blow-out port 15L and second airflow 30R formed by second blow-out port 15R collide with each other in front region 30C of display surface 20b. First airflow 30L and second airflow 30R that have collided with each other are pushed forward from display surface 20b with display surface 20b serving as a wall, and are sent out as third airflow 30F.

[0034] As described above, in blower apparatus 10 having display device 20 according to the present exemplary embodiment, third airflow 30F is sent out forward from display surface 20b by first blow-out port 15L and second blow-out port 15R. Thus, blower apparatus 10 according to the present exemplary embodiment can blow the airflows
5 forward from display surface 20b. The airflows are blown out from first blow-out port 15L and second blow-out port 15R so as to be substantially parallel to display surface 20b. Herein, the term "substantially parallel" may be an extent that the induction phenomenon by the Coanda effect can act. That is, even though the airflows blown out from first blow-out port 15L and second blow-out port 15R are in a direction slightly away from or
10 approaching the direction parallel to display surface 20b, the airflows are included in a range substantially parallel to the display surface according to the present disclosure.

[0035] Next, a detailed configuration of air conditioning unit 40 and the pair of air blowers (air blower 43L and air blower 43R) in the present exemplary embodiment will be described with reference to Fig. 5. Fig. 5 is a schematic block diagram of a device that air-
15 conditions air to be supplied to blower apparatus 10 (first air blowing unit 60L and second air blowing unit 60R).

[0036] As illustrated in Fig. 5, air conditioning space S2 is divided into a plurality of air conditioning spaces (first air conditioning space S2a and second air conditioning space S2b), and air conditioning unit 40 and the pair of air blowers (air blower 43L and air
20 blower 43R) are provided in each of the air conditioning spaces (first air conditioning space S2a and second air conditioning space S2b).

[0037] Specifically, first air conditioning unit 40a as air conditioning unit 40, first air blower 43L1 as air blower 43L, and third air blower 43R1 as air blower 43R are installed in first air conditioning space S2a.

[0038] First air conditioning unit 40a includes first air conditioner 41a as air conditioner 41 and first humidity control device 42a as humidity control device 42. First air conditioning unit 40a adjusts the air inside first air conditioning space S2a to satisfy a first condition (first temperature and first humidity) by first air conditioner 41a and first humidity control device 42a. As a result, the air-conditioned air under the first condition is
25 stored in first air conditioning space S2a.

[0039] First air blower 43L1 sends out, as air-conditioned air 30L1, the air-conditioned air (air that has satisfied the first condition) stored in first air conditioning space S2a. When first damper 44L1 is in an opened state, air-conditioned air 30L1 is sent out to first air
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blowing unit 60L and is blown out, as first airflow 30L, from first blow-out port 15L.

[0040] Third air blower 43R1 sends out, as air-conditioned air 30R1, the air-conditioned air stored in first air conditioning space S2a. When third damper 44R1 is in an opened state, air-conditioned air 30R1 is sent out to second air blowing unit 60R and is blown out,

5 as second airflow 30R, from second blow-out port 15R.

[0041] On the other hand, in second air conditioning space S2b, second air conditioning unit 40b as air conditioning unit 40, second air blower 43L2 as air blower 43L, and fourth air blower 43R2 as air blower 43R are installed. Second air conditioning unit 40b includes second air conditioner 41b as air conditioner 41 and second humidity control device 42b as

10 humidity control device 42. Second air conditioning unit 40b adjusts the air in second air conditioning space S2b to satisfy a second condition (second temperature and second humidity) by second air conditioner 41b and second humidity control device 42b. Here, for example, the second condition is set to have a lower temperature and higher humidity than the first condition.

15 **[0042]** Second air blower 43L2 sends out, as air-conditioned air 30L2, the air-conditioned air (air under the second condition) stored in second air conditioning space S2b. When second damper 44L2 is in an opened state, air-conditioned air 30L2 is sent out to first air blowing unit 60L and is blown out, as first airflow 30L, from first blow-out port 15L.

[0043] Fourth air blower 43R2 sends out, as air-conditioned air 30R2, the air-conditioned air stored in second air conditioning space S2b. When fourth damper 44R2 is in an opened state, air-conditioned air 30R2 is sent out to second air blowing unit 60R and is blown out,

20 as second airflow 30R, from second blow-out port 15R.

[0044] As illustrated in Fig. 5, first switch 44L and second switch 44R are provided in second air conditioning space S2b. Here, first switch 44L is disposed in the vicinity of first air blowing unit 60L, and second switch 44R is disposed in the vicinity of second air blowing unit 60R.

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[0045] First switch 44L includes first damper 44L1 and second damper 44L2, and switches the air-conditioned air sent out to first air blowing unit 60L between air-conditioned air 43L1 from first air blower 30L1 and air-conditioned air 43L2 from second air blower 30L2. Specifically, first switch 44L sends out air-conditioned air 30L1 from

30 first air blower 43L1 to first air blowing unit 60L by setting first damper 44L1 in an opened state and second damper 44L2 in a closed state. That is, air-conditioned air 30L1 from first air blower 43L1 is blown out, as first airflow 30L, from first blow-out port 15L.

First switch 44L sends out air-conditioned air 44L2 from second air blower 43L2 to first air blowing unit 60L by setting first damper 44L1 in a closed state and second damper 30L2 in a closed state. That is, air-conditioned air 30L2 from second air blower 43L2 is blown out, as first airflow 30L, from first blow-out port 15L. As described above, in first switch 44L, a temperature and humidity condition of first airflow 30L blown out from first blow-out port 15L of first air blowing unit 60L can be easily switched between the first condition (first temperature and first humidity) and the second condition (second temperature and second humidity). That is, blower apparatus 10 includes first switch 44L for switching between the airflow having the first temperature (air-conditioned air 30L1 from first air blower 43L1) and the airflow having the second temperature different from the first temperature (air-conditioned air 30L2 from second air blower 43L2) and circulating the airflow as first airflow 30L. First switch 44L is provided on a flow path to first blow-out port 15L.

[0046] On the other hand, second switch 44R includes third damper 44R1 and fourth damper 44R2, and switches the air-conditioned air sent out to second air blowing unit 60R between air-conditioned air 30R1 from third air blower 43R1 and air-conditioned air 30R2 from fourth air blower 43R2. Specifically, second switch 44R sends out air-conditioned air 30R1 from third air blower 43R1 to second air blowing unit 60R by setting third damper 44R1 in an opened state and fourth damper 44R2 in a closed state. That is, air-conditioned air 30R1 from third air blower 43R1 is blown out, as second airflow 30R, from second blow-out port 15R. Second switch 44R sends out air-conditioned air 30R2 from fourth air blower 43R2 to second air blowing unit 60R by setting third damper 44R1 in a closed state and fourth damper 44R2 in an opened state. That is, air-conditioned air 30R2 from fourth air blower 43R2 is blown out, as second airflow 30R, from second blow-out port 15R. As described above, in second switch 44R, a temperature and humidity condition of second airflow 30R blown out from second blow-out port 15R of second air blowing unit 60R can be easily switched between the first condition (first temperature and first humidity) and the second condition (second temperature and second humidity) as with first airflow 30L. That is, blower apparatus 10 includes second switch 44R for switching between air-conditioned air 30R1 from third air blower 43R1 which is the airflow having the first temperature and air-conditioned air 30R2 from fourth air blower 43R2 which is the airflow having the second temperature and circulating the airflow as second airflow 30R. Second switch 44R is provided on a flow path to second blow-out port 15R. The plurality of air blowers (first

air blower 43L1 to fourth air blower 43R2) are configured to send out the airflows having the first temperature (air-conditioned air 30L1 and air-conditioned air 30R1) and the airflows having the second temperature (air-conditioned air 30L2 and air-conditioned air 30R2) to first switch 44L and second switch 44R.

5 **[0047]** In blower apparatus 10, first switch 44L and second switch 44R switch the temperature and humidity of the air-conditioned air between the first condition (first temperature and first humidity) and the second condition (second temperature and second humidity). As described above, a distance by which the air-conditioned air reaches first blow-out port 15L and second blow-out port 15R is shortened by disposing first switch
10 44L in the vicinity of first air blowing unit 60L and disposing second switch 44R in the vicinity of second air blowing unit 60R. Accordingly, blower apparatus 10 according to the present exemplary embodiment can suppress occurrence of a time lag until the air-conditioned air is switched to air-conditioned air having a different condition.

[0048] Next, a method for controlling blown air volumes and temperatures of the airflows
15 (first airflow 30L and second airflow 30R) blown out from first blow-out port 15L of first air blowing unit 60L and second blow-out port 15R of second air blowing unit 60R will be described with reference to Figs. 3 to 6. Fig. 6 is a block diagram for controlling the blown air volumes and temperatures of the airflows blown out from first blow-out port 15L of first air blowing unit 60L and second blow-out port 15R of second air blowing unit 60R
20 constituting blower apparatus 10.

[0049] First, the control of the blown air volumes of the airflows out from first blow-out port 15L of first air blowing unit 60L and second blow-out port 15R of second air blowing unit 60R will be described.

[0050] Controller 70 is provided in first air conditioning space S2a (see Fig. 5).
25 Controller 70 is an arithmetic device that controls the blown air volumes of first airflow 30L blown out from first blow-out port 15L of first air blowing unit 60L and second airflow 30R blown out from second blow-out port 15R of second air blowing unit 60R. Controller 70 controls the blown air volumes of first airflow 30L and second airflow 30R, and generates third airflow 30F forward from display surface 20b by causing first airflow
30 30L and second airflow 30R to collide with each other as shown in Figs. 3 to 4B.

[0051] Here, the blown air volume of first airflow 30L blown out from first blow-out port 15L is determined by the blown air volume of air blower 43L (first air blower 43L1 or second air blower 43L2) that supplies the air to first air blowing unit 60L. The blown air

volume of second airflow 30R blown out from second blow-out port 15R is determined by the blown air volume of air blower 43R (third air blower 43R1 or fourth air blower 43R2) that supplies the air to second air blowing unit 60R.

[0052] Thus, controller 70 controls the blown air volume of each of air blower 43L (first air blower 43L1 or second air blower 43L2) and air blower 43R (third air blower 43R1 or fourth air blower 43R2). As a result, controller 70 controls the blown air volumes (first airflow 30L and second airflow 30R) blown out from first blow-out port 15L of first air blowing unit 60L and second blow-out port 15R of second air blowing unit 60R.

[0053] As illustrated in Fig. 6, storage 90 is connected to controller 70. Storage 90 is a nonvolatile memory, is provided inside blower apparatus 10, and stores send-out positions and air volumes of the airflows on display surface 20b suitable for an image together with image information displayed on display device 20.

[0054] Controller 70 determines the blown air volume of each of air blower 43L (first air blower 43L1 or second air blower 43L2) and air blower 43R (third air blower 43R1 or fourth air blower 43R2) based on the send-out position and the air volume of the airflow on display surface 20b stored in storage 90 according to the displayed image. For example, it is assumed that data indicating that third airflow 30F is sent out forward from a predetermined position on display surface 20b with a predetermined air volume is stored in storage 90 in association with the displayed image. In this case, controller 70 calculates the blown air volume of first airflow 30L blown out from first blow-out port 15L and the blown air volume of second airflow 30R blown out from second blow-out port 15R such that third airflow 30F is blown out forward from a predetermined position on display surface 20b with a predetermined air volume. A relationship between the predetermined position where third airflow 30F is sent out and the blown air volumes of first airflow 30L and second airflow 30R will be briefly described. When the predetermined position where third airflow 30F is sent out is at a center of display surface 20b, the blown air volume of first airflow 30L and the blown air volume of second airflow 30R are substantially the same. As a result, front region 30C where first airflow 30L blown out from first blow-out port 15L and second airflow 30R blown out from second blow-out port 15R collide becomes substantially the center of display surface 20b, and third airflow 30F is sent out from substantially the center of display surface 20b. On the other hand, when the predetermined position is on a left side of the center of display surface 20b, the blown air volume of second airflow 30R is set to be larger than the blown air volume of first airflow

30L, and when the predetermined position is on a right side of the center of display surface 20b, the blown air volume of first airflow 30L is set to be larger than the blown air volume of second airflow 30R. That is, controller 70 can send out third airflow 30F from a desired position of display surface 20b in a left-right direction by adjusting a ratio between the
5 blown air volume of first airflow 30L and the blown air volume of second airflow 30R. As described above, controller 70 controls the blown air volumes of the plurality of air blowers (first air blower 43L1 to fourth air blower 43R2) based on a content of the image displayed on display surface 20b. As a result, controller 70 controls the blown air volume of first airflow 30L blown out from first blow-out port 15L and the blown air volume of
10 second airflow 30R blown out from second blow-out port 15R. As a result, controller 70 controls the position of display surface 20b at which third airflow 30F is generated.

[0055] Controller 70 controls the blown air volumes of air blower 43L and air blower 43R such that the blown air volume of first airflow 30L blown out from first blow-out port 15L and the blown air volume of second airflow 30R blown out from second blow-out port
15 15R become the calculated blown air volumes.

[0056] As described above, controller 70 controls the blown air volumes of the airflows blown out from first blow-out port 15L of first air blowing unit 60L and second blow-out port 15R of second air blowing unit 60R based on the content of the image displayed on display surface 20b of display device 20. As a result, blower apparatus 10 can generate
20 third airflow 30F having a desired blown air volume from a desired position on display surface 20b forward from display surface 20b by causing first airflow 30L and second airflow 30R having the blown air volumes calculated by controller 70 to collide with each other.

[0057] Next, the control of the temperatures of the airflows blown out from first blow-out port 15L of first air blowing unit 60L and second blow-out port 15R of second air blowing unit 60R will be described.
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[0058] Controller 70 controls the temperature of first airflow 30L blown out from first blow-out port 15L and the temperature of second airflow 30R blown out from second blow-out port 15R. Storage 90 stores the temperature of the airflow on display surface 20b
30 suitable for the image together with the image information to be displayed on display device 20 according to an exercise support program (for example, a video program for cycling in nature). Controller 70 determines switching between circulation states of the air-conditioned air in first switch 44L and second switch 44R based on the temperature of the

airflow stored in storage 90 according to the displayed image. That is, when the temperature and humidity condition of the airflow based on the content of the image displayed on display device 20 changes from the first condition (first temperature and first humidity) to the second condition (second temperature and second humidity), controller 70

5 controls first switch 44L as follows. That is, controller 70 controls first switch 44L such that first damper 44L1 is changed from the opened state to the closed state and second damper 44L2 is changed from the closed state to the opened state. As a result, the air-conditioned air sent out to first air blowing unit 60L is switched from air-conditioned air 30L1 from first air blower 43L1 to air-conditioned air 30L2 from second air blower 43L2.

10 **[0059]** On the other hand, controller 70 controls second switch 44R such that third damper 44R1 is changed from the opened state to the closed state and fourth damper 44R2 is changed from the closed state to the opened state. As a result, the air-conditioned air sent out to second air blowing unit 60R is switched from air-conditioned air 30R1 from third air blower 43R1 to air-conditioned air 30R2 from fourth air blower 43R2.

15 **[0060]** As described above, controller 70 controls first switch 44L and second switch 44R to switch between the airflows having the first temperature (air-conditioned air 30L1 and air-conditioned air 30R1) and the airflows at the second temperature (air-conditioned air 30L2 and air-conditioned air 30R2) based on the content of the image displayed on display surface 20b. As a result, controller 70 controls the temperatures of the airflows blown out

20 from first blow-out port 15L of first air blowing unit 60L and second blow-out port 15R of second air blowing unit 60R. As a result, blower apparatus 10 can generate third airflow 30F under the second condition forward from display surface 20b by causing first airflow 30L and second airflow 30R under the second condition to collide with each other.

[0061] That is, blower apparatus 10 includes controller 70 that controls the plurality of air

25 blowers (first air blower 43L1 to fourth air blower 43R2), first switch 44L, and second switch 44R. As a result, controller 70 generates third airflow 30F forward from display surface 20b by causing first airflow 30L from first blow-out port 15L and second airflow 30R from second blow-out port 15R, of which the blown air volumes and the temperatures are controlled, to collide with each other.

30 **[0062]** As described above, blower apparatus 10 according to the present first exemplary embodiment can obtain the following effects.

[0063] (1) When third airflow 30F is sent out forward from display surface 20b of display device 20 from first blow-out port 15L and second blow-out port 15R, blower apparatus 10

controls the blown air volumes and the temperatures and humidities of first airflow 30L and second airflow 30R. Accordingly, third airflow 30F in which the blowing position and the temperature and humidity of the airflow on display surface 20b are controlled is sent out from blower apparatus 10. Thus, blower apparatus 10 can improve the bodily sensation of user U who receives third airflow 30F.

5 [0064] (2) Blower apparatus 10 sends out third airflow 30F in which the blowing position and the temperature and humidity of the airflow on display surface 20b are controlled based on the content of the image displayed on display surface 20b of display device 20. Accordingly, blower apparatus 10 can improve the bodily sensation (realistic feeling) of user U who receives third airflow 30F.

10 [0065] (3) Blower apparatus 10 changes the temperature and humidity of third airflow 30F based on the content of the image displayed on display surface 20b of display device 20. At this time, blower apparatus 10 switches between the air-conditioned air under the first condition (first temperature and first humidity) and the air-conditioned air under the second condition (second temperature and second humidity) by first switch 44L and second switch 44R. Accordingly, blower apparatus 10 can more quickly cause user U to feel the temperature and humidity corresponding to the content of the image displayed on display surface 20b of display device 20. That is, blower apparatus 10 can improve followability to the image content of the bodily sensation of user U.

15 [0066] (4) Blower apparatus 10 stores the air-conditioned air under the first condition (first temperature and first humidity) in advance in first air conditioning space S2a and sends out the air-conditioned air by air blower 43L, and stores the air-conditioned air under the second condition (second temperature and second humidity) in advance in second air conditioning space S2b and sends out the air-conditioned air by air blower 43R.

20 Accordingly, even though the blown air volume by blower apparatus 10 (first air blowing unit 60L and second air blowing unit 60R) is temporarily larger than a volume that can be air-conditioned by air conditioning unit 40, blower apparatus 10 can continue blowing air while maintaining the blowing condition (the first condition or the second condition). (Second exemplary embodiment)

25 [0067] Blower apparatus 10a according to a second exemplary embodiment of the present disclosure includes first air blowing unit 60L1 and second air blowing unit 60R1 in place of first air blowing unit 60L and second air blowing unit 60R of blower apparatus 10 according to the first exemplary embodiment. Blower apparatus 10a blows out first airflow

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30L3 from first blow-out port 15L1 of first air blowing unit 60L1 and blows out second airflow 30R3 from second blow-out port 15R1 of second air blowing unit 60R1. Blower apparatus 10a is different from blower apparatus 10 according to the first exemplary embodiment in that first airflow 30L3 and second airflow 30R3 are configured to be blown
5 out forward from a side of display surface 20b so as to intersect at a position of exercise device 3 (user U who uses exercise device 3). A configuration and a blowing control operation of blower apparatus 10a other than such a difference are similar to those of blower apparatus 10 according to the first exemplary embodiment. Hereinafter, the description of the contents already described in the first exemplary embodiment will be
10 omitted as appropriate, and differences from the first exemplary embodiment will be mainly described.

[0068] Blower apparatus 10a according to the second exemplary embodiment of the present disclosure will be described with reference to Figs. 7 and 8. Fig. 7 is a schematic block diagram of exercise support system 1a using blower apparatus 10a according to the
15 second exemplary embodiment of the present disclosure. Fig. 8 is a schematic configuration diagram of blower apparatus 10a constituting exercise support system 1a.

[0069] Similarly to exercise support system 1 according to the first exemplary embodiment, exercise support system 1a enables user U to use exercise device 3 while enjoying continuous exercise in an environment with realistic feeling (bodily sensation)
20 corresponding to a video (landscape, situation, or the like) projected on display device 20. When user U uses exercise device 3, exercise support system 1a blows an airflow from blower apparatus 10a toward user U. Exercise support system 1a provides higher quality of exercise support (training) than in the related art to user U by controlling the airflow (in particular, a wind speed (blown air volume) or the temperature and humidity of the
25 airflow) blown toward user U.

[0070] In air conditioning space S2, air conditioning unit 40, a pair of air blowers (air blower 43L and air blower 43R), and controller 70 are installed as shown in Fig. 7. Air conditioning unit 40 includes air conditioner 41 and humidity control device 42 in order to generate and store air-conditioned air to be supplied from a pair of air blowing units (first
30 air blowing unit 60L1 and second air blowing unit 60R1) to exercise space S1.

[0071] Blower apparatus 10a sends out an airflow from each of the pair of air blowing units (first air blowing unit 60L1 and second air blowing unit 60R1) extending along both left and right ends of display device 20 toward exercise device 3 (user U who uses exercise

device 3). Although details will be described later, first airflow 30L3 from first blow-out port 15L1 of first air blowing unit 60L1 and second airflow 30R3 from second blow-out port 15R1 of second air blowing unit 60R1 are blown out obliquely forward toward the center of display surface 20b of display device 20. As a result, first airflow 30L3 and second airflow 30R3 intersect with each other at a position of exercise device 3 (user U who uses exercise device 3). This can also be said that first airflow 30L3 and second airflow 30R3 collide at the position of exercise device 3 (user U).

[0072] Air conditioning unit 40 adjusts a temperature and humidity of air inside air conditioning space S2 to predetermined conditions by air conditioner 41 and humidity control device 42. As a result, air (air-conditioned air) satisfying predetermined conditions (temperature and humidity) is stored inside air conditioning space S2.

[0073] As illustrated in Fig. 7, the pair of air blowers (air blower 43L and air blower 43R) send out the air-conditioned air adjusted by air conditioning unit 40 to the corresponding pair of air units (first air blowing unit 60L1 and second air blowing unit 60R1). Specifically, air blower 43L circulates the air-conditioned air adjusted by air conditioning unit 40 through a duct (not illustrated) at a predetermined wind speed (blown air volume), and sends out the air to first air blowing unit 60L1. On the other hand, air blower 43R circulates the air-conditioned air adjusted by air conditioning unit 40 through a duct (not illustrated) at a predetermined wind speed (blown air volume), and sends out the air to second air blowing unit 60R1.

[0074] Each air-conditioned air (first airflow 30L3 or second airflow 30R3) sent out from the pair of air blowing units (first air blowing unit 60L1 and second air blowing unit 60R1) is sent out toward user U who uses exercise device 3. That is, first airflow 30L3 and second airflow 30R3 are blown out from the pair of air blowing units (first air blowing unit 60L1 and second air blowing unit 60R1) forward (toward exercise device 3) from a side of display surface 20b so as to intersect at the position of exercise device 3 (the position of user U who uses exercise device 3).

[0075] Next, a schematic configuration of blower apparatus 10a will be described with reference to Fig. 8. Fig. 8 is a schematic configuration diagram of blower apparatus 10a constituting exercise support system 1a.

[0076] As illustrated in Fig. 8, blower apparatus 10a includes display device 20 having housing 20a having a substantially rectangular shape in front view. That is, housing 20a of display device 20 has a substantially rectangular surface having display surface 20b.

Blower apparatus 10a sends out the airflow toward user U from the pair of air blowing units (first air blowing unit 60L1 and second air blowing unit 60R1) provided at both left and right ends of display device 20.

[0077] Specifically, blower apparatus 10a includes first blow-out part 10L1 installed
5 along a left side which is one side of housing 20a of display device 20, and second blow-out part 10R1 installed along a right side which is the other side of housing 20a facing the left side.

[0078] First blow-out part 10L1 is constructed as a housing of first air blowing unit 60L1. First blow-out port 15L1 that blows out first airflow 30L3 is formed in first blow-out part
10 10L1 in a direction from the left side of housing 20a toward exercise device 3. In other words, first blow-out port 15L1 extends along one side (left side) of housing 20a of display device 20 having housing 20a that is installed in front of exercise device 3 and has a substantially rectangular shape in front view, and blows out first airflow 30L3. An extension length of first blow-out port 15L1 is preferably equal to or slightly shorter than a
15 length of the left side of housing 20a.

[0079] Second blow-out part 10R1 is constructed as a housing of second air blowing unit 60R1. Second blow-out port 15R1 that blows out second airflow 30R3 is formed in second blow-out part 10R1 in a direction from the right side of housing 20a toward exercise
20 device 3. In other words, second blow-out port 15R1 extends along one side (right side) of housing 20a of display device 20 having housing 20a that is installed in front of exercise device 3 and has a substantially rectangular shape in front view, and blows out second airflow 30R3. An extension length of second blow-out port 15R1 is preferably equal to or slightly shorter than a length of the right side of housing 20a.

[0080] Similarly to first blow-out part 10L according to the first exemplary embodiment,
25 first air introduction path 13L (see Fig. 4B) is formed inside first blow-out part 10L1, and first air introduction path 13L communicates with first blow-out port 15L1. As shown in Fig. 7, air blower 43L is provided in a flow path behind first blow-out part 10L1 (first air blowing unit 60L1). When air is blown from air blower 43L to first air introduction path 13L, the blown air is blown out as first airflow 30L3 from first blow-out port 15L1 via first
30 air introduction path 13L.

[0081] Similarly to second blow-out part 10R according to the first exemplary embodiment, second air introduction path 13R (see Fig. 4B) is formed inside second blow-out part 10R1, and second air introduction path 13R communicates with second blow-out

port 15R1. As shown in Fig. 7, air blower 43R is provided in a flow path behind second blow-out part 10R1 (second air blowing unit 60R1). When air is blown from air blower 43R to second air introduction path 13R, the blown air is blown out as second airflow 30R3 from second blow-out port 15R1 via second air introduction path 13R.

5 **[0082]** As described above, first blow-out port 15L1 and second blow-out port 15R1 constituting blower apparatus 10a extend along both left and right ends of housing 20a of display device 20, respectively. First blow-out port 15L1 and second blow-out port 15R1 blow out the airflows (first airflow 30L3 and second airflow 30R3) toward user U from both the left and right ends of housing 20a, that is, from positions facing each other with
10 display surface 20b interposed therebetween. That is, first airflow 30L3 from first blow-out port 15L1 of first air blowing unit 60L1 and second airflow 30R3 from second blow-out port 15R1 of second air blowing unit 60R1 are blown out obliquely forward toward the center of display surface 20b of display device 20. First airflow 30L3 and second airflow 30R3 intersect at the position of user U who uses exercise device 3.

15 **[0083]** A method for controlling the wind speeds (blown air volumes) and the temperature of the airflows (first airflow 30L3 and second airflow 30R3) blown out from first blow-out port 15L1 and second blow-out port 15R1 is the same as the method for controlling the airflows in blower apparatus 10 according to the first exemplary embodiment, and thus, the description thereof will be omitted. Blower apparatus 10a
20 includes controller 70 that controls the plurality of air blowers (air blower 43L and air blower 43R) and first switch 44L and second switch 44R. As a result, controller 70 causes first airflow 30L3 and second airflow 30R3 of which the blown air volumes and the temperatures are respectively controlled to be blown out forward from a side of display surface 20b so as to intersect at the position of user U who uses exercise device 3.

25 **[0084]** According to blower apparatus 10a of the present second exemplary embodiment described above, the following effects can be obtained.

[0085] (1) Blower apparatus 10a blows out first airflow 30L3 and second airflow 30R3 from first blow-out port 15L1 and second blow-out port 15R1 forward from the side of display surface 20b so as to intersect at the position of user U who uses exercise device 3.
30 At this time, since blower apparatus 10a controls the blown air volumes and the temperatures and humidities of first airflow 30L3 and second airflow 30R3, it is possible to improve the bodily sensation of user U who receives such airflows.

[0086] (2) In blower apparatus 10a, the blow-out ports (first blow-out port 15L1 and

second blow-out port 15R1) are provided to extend along both the left and right sides of housing 20a constituting display device 20. Accordingly, blower apparatus 10a can generate the airflows having substantially the same vertical width as that of display surface 20b of display device 20 and can send out the airflows so as to intersect at the position of user U who uses exercise device 3. As a result, blower apparatus 10a can improve the bodily sensation of user U who receives the airflows.

[0087] (3) Since blower apparatus 10a sends out the airflows (first airflow 30L3 and second airflow 30R3) of which the temperatures and humidities are controlled based on the content of the image displayed on display surface 20b of display device 20, it is possible to improve the bodily sensation (realistic feeling) of user U who receives such airflows.

[0088] (4) Blower apparatus 10a changes the temperature and humidities of the airflows (first airflow 30L3 and second airflow 30R3) based on the content of the image displayed on display surface 20b of display device 20. At this time, blower apparatus 10a switches between the air-conditioned air under the first condition (first temperature and first humidity) and the air-conditioned air under the second condition (second temperature and second humidity) by first switch 44L and second switch 44R. Accordingly, blower apparatus 10a can more quickly cause user U to feel the temperature and humidity corresponding to the content of the image displayed on display surface 20b of display device 20. That is, blower apparatus 10a can improve the followability to the image content of the bodily sensation of user U.

[0089] (5) Blower apparatus 10a stores the air-conditioned air under the first condition (first temperature and first humidity) in advance in first air conditioning space S2a and sends out the air-conditioned air by air blower 43L, and stores the air-conditioned air under the second condition (second temperature and second humidity) in advance in second air conditioning space S2b and sends out the air-conditioned air by air blower 43R.

Accordingly, even though the blown air volume by blower apparatus 10a (first air blowing unit 60L1 and second air blowing unit 60R1) is temporarily larger than a volume that can be air-conditioned by air conditioning unit 40, blower apparatus 10a can continue blowing air while maintaining the blowing condition (the first condition or the second condition).

[0090] Although the present disclosure has been described above based on the exemplary embodiments, the present disclosure is not limited to the above exemplary embodiments at all, and it can be easily inferred that various modifications and variations can be made without departing from the gist of the present disclosure. For example, each exemplary

embodiment may be modified by adding a part or a plurality of parts of the configuration of another exemplary embodiment to this exemplary embodiment or replacing the part or the plurality of parts of the configuration of this exemplary embodiment. The numerical values mentioned in the above exemplary embodiments are merely examples, and other numerical values can be naturally used.

[0091] In the present exemplary embodiment, lighting equipment, acoustic equipment, air purification equipment, aroma generation equipment, space sterilization and deodorization equipment, and the like in room unit 2 are not shown, but these various equipment may be installed. These various facilities are operated according to the content of the image displayed on display device 20, and thus, it is possible to provide exercise support systems 1 and 1a using blower apparatuses 10 and 10a capable of further improving the airflow sensibility when the airflow is sent out forward from display surface 20b.

[0092] In the present exemplary embodiment, the pair of air blowers (air blower 43L and air blower 43R) is used to blow out the airflow from each of first blow-out port 15L (or first blow-out port 15L1) and second blow-out port 15R (or second blow-out port 15R1), but the present disclosure is not limited thereto. For example, the airflow may be blown out from each blow-out port by one air blower. As a result, the apparatus configuration can be downsized.

20 INDUSTRIAL APPLICABILITY

[0093] The blower apparatus according to the present disclosure is useful as a blower apparatus that sends out an airflow forward from a display device side, and can be used, for example, in an exercise support system using such a blower apparatus.

25 REFERENCE MARKS IN THE DRAWINGS

[0094]

1	exercise support system
1a	exercise support system
2	room unit
3	exercise device
4	door
10	blower apparatus
10a	blower apparatus
10L	first blow-out part

5	10L1	first blow-out part
	10R	second blow-out part
	10R1	second blow-out part
	13L	first air introduction path
	13R	second air introduction path
10	14L	first louver
	14R	second louver
	15L	first blow-out port
	15L1	first blow-out port
	15R	second blow-out port
15	15R1	second blow-out port
	20	display device
	20a	housing
	20b	display surface
	30C	front region
20	30F	third airflow
	30L	first airflow
	30L1	air-conditioned air
	30L2	air-conditioned air
	30L3	first airflow
25	30R	second airflow
	30R1	air-conditioned air
	30R2	air-conditioned air
	30R3	second airflow
	40	air conditioning unit
30	40a	first air conditioning unit
	40b	second air conditioning unit
	41	air conditioner
	41a	first air conditioner
	41b	second air conditioner
	42	humidity control device
	42a	first humidity control device
	42b	second humidity control device

	43L	air blower
	43L1	first air blower
	43L2	second air blower
	43R	air blower
5	43R1	third air blower
	43R2	fourth air blower
	44L	first switch
	44L1	first damper
	44L2	second damper
10	44R	second switch
	44R1	third damper
	44R2	fourth damper
	60L	first air blowing unit
	60L1	first air blowing unit
15	60R	second air blowing unit
	60R1	second air blowing unit
	70	controller
	90	storage
	S1	exercise space
20	S2	air conditioning space
	S2a	first air conditioning space
	S2b	second air conditioning space
	U	user

CLAIMS

1. A blower apparatus comprising:

- a first blow-out port from which a first airflow is blown out to flow in
5 substantially parallel with a display surface of a display device having a housing that has a substantially rectangular shape in front view, the first airflow flowing in a first direction from one side of the housing of the display device to another side of the housing facing the one side;
- a second blow-out port from which a second airflow is blown out to flow in
10 substantially parallel with the display surface and in a second direction from the other side to the one side;
- a first switch that is provided on a flow path of the first airflow to the first blow-out port, and switches between an airflow having a first temperature and an airflow having a second temperature different from the first temperature to be blown out from the first
15 blow-out port as the first airflow;
- a second switch that is provided on a flow path of the second airflow to the second blow-out port, switches between the airflow having the first temperature and the airflow having the second temperature to be blown out from the second blow-out port as the second airflow; and
- 20 a controller that controls an air blower, the first switch, and the second switch to cause the first airflow from the first blow-out port and the second airflow from the second blow-out port to collide with each other, thereby generating a third airflow flowing from the display surface, the air blower being provided outside and send out the airflow having the first temperature and the airflow having the second temperature to the first switch and
25 the second switch, respectively, the first airflow and the second airflow each having a blown air volume and a temperature which are controlled by the controller.

2. The blower apparatus according to Claim 1, wherein the controller controls a position of the display surface where the third airflow is generated by controlling a blown
30 air volume of the air blower based on a content of an image displayed on the display surface and controlling the blown air volume of the first airflow blown out from the first blow-out port and the blown air volume of the second airflow blown out from the second blow-out port.

3. The blower apparatus according to Claim 1 or 2, wherein the controller controls the first switch and the second switch to switch between the airflow having the first temperature and the airflow having the second temperature based on the content of the image displayed on the display surface.

4. A blower apparatus that blows out an airflow toward a user who exercises by using an exercise device, the blower apparatus comprising:

a first blow-out port that extends along one side of a housing of a display device that is installed on a front surface of the exercise device and has a housing having a substantially rectangular shape in front view, and from which a first airflow is blown out;

a second blow-out port that extends along another side of the housing facing the one side, and from which a second airflow is blown out;

a first switch that is provided on a flow path of the first airflow to the first blow-out port, switches between an airflow having a first temperature and an airflow having a second temperature different from the first temperature to be blown out from the first blow-out port as the first airflow;

a second switch that is provided on a flow path of the second airflow to the second blow-out port, switches between the airflow having the first temperature and the airflow having the second temperature to be blown out from the second blow-out port as the second airflow; and

a controller that controls an air blower, the first switch, and the second switch to cause the first airflow and the second airflow to forward from a display surface to intersect at a position of the user who uses the exercise device, the air blower being provided outside and send out the airflow having the first temperature and the airflow having the second temperature to the first switch and the second switch, respectively, the first airflow and the second airflow each having a blown air volume and a temperature which are controlled by the controller.

5. The blower apparatus according to Claim 4, wherein the controller controls the first switch and the second switch to switch between the airflow having the first temperature and the airflow having the second temperature based on a content of an image displayed on the display surface.