

DESCRIPTION

AIRFLOW ENVIRONMENT SYSTEM

TECHNICAL FIELD

[0001] The present disclosure relates to an airflow environment system that forms an airflow in an environmental space.

BACKGROUND ART

[0002] As an example of a conventional airflow environment system, a chair with an air purifier and an air curtain has been known (see, for example, PTL 1). A chair with an air purifier and an air curtain includes a chair having a backrest that can be seated, blow-out ports provided on each of an upper part and a rear surface of the backrest of the chair, a suctioning port provided in a lower part of the chair, and a filter, a damper, and a blower that are provided inside the chair. The chair with the air purifier and the air curtain purifies the air suctioned through the suctioning port, and discharge the air to an open space through the blow-out ports provided to the upper part and the rear surface of the backrest. The air discharged from the blow-out ports in the upper part forms an air curtain passing through the space above the chair and in front of the chair and returning to the suctioning port provided to the lower part. Furthermore, by adjusting the amount of air discharged from the blow-out port provided to the rear side of the backrest of the chair to the outside, a negative pressure is formed in a local space surrounded by the chair and the air curtain, and the air (e.g., cigarette smoke) in the local space is suppressed from flowing outside.

Citation List

Patent Literature

[0003] PTL 1: Unexamined Japanese Patent Publication No. H2-045013

SUMMARY OF THE INVENTION

[0004] However, in such a conventional airflow environment system, there is a concern that, when the airflow forming the air curtain is affected by some external environmental factor (disturbance), the airflow may be disturbed and the air in the local space surrounded by the chair and the air curtain may flow outside.

[0005] An object of the present disclosure is to provide an airflow environment system

capable of improving the stability of an airflow in a local space, and of suppressing the air in the local space from flowing outside.

[0006] An airflow environment system according to the present disclosure is an airflow environment system that generates an airflow in a specific space including a pair of seats that are provided facing each other, the specific space having an open surface that opens to an external space, on a lateral side of the pair of seats. An airflow environment system includes: a plurality of suction ports provided to the pair of seats and configured to suction air in the specific space; a plurality of purifiers provided to the pair of seats and configured to purify air suctioned through the plurality of suction ports; a plurality of discharge ports provided to the pair of seats and configured to discharge a part of the air purified by the plurality of purifiers to the external space; a plurality of release ports provided in the pair of seats and configured to release remaining part of the air purified by the plurality of purifiers to the specific space, as a plurality of airflows, each flowing in a specific direction along a backrest side of corresponding one of the pair of seats; and a reflector disposed facing the plurality of release ports in the specific direction, and to which each of the plurality of airflows flowing in the specific direction hits. The reflector is configured to cause the each of the plurality of airflows released from the plurality of discharge ports and having hit the reflector to collide with each other, to traverse between the pair of seats, and to return to a floor side of the pair of seats.

[0007] According to the present disclosure, it is possible to provide an airflow environment system capable of improving the stability of an airflow in a local space, and of suppressing the air in the local space from flowing outside.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Fig. 1 is an external perspective view of an airflow environment system according to a first exemplary embodiment of the present disclosure.

Fig. 2 is an external perspective view illustrating airflows formed by the airflow environment system.

Fig. 3 is a front view illustrating the airflows formed by the airflow environment system.

Fig. 4 is a block diagram illustrating a configuration of a blower system in the airflow environment system.

Fig. 5 is a front view illustrating an airflow formed by the airflow environment

system according to a second exemplary embodiment of the present disclosure.

Fig. 6 is an external perspective view illustrating an airflow formed by the airflow environment system according to the second exemplary embodiment of the present disclosure.

Fig. 7 is an external perspective view illustrating airflows formed by an airflow environment system according to a third exemplary embodiment of the present disclosure.

DESCRIPTION OF EMBODIMENT

[0009] An airflow environment system according to the present disclosure is an airflow environment system that generates an airflow in a specific space including a pair of seats that are provided facing each other, the specific space having an open surface that opens to an external space, on a lateral side of the pair of seats. An airflow environment system includes: a plurality of suction ports provided to the pair of seats and configured to suction air in the specific space; a plurality of purifiers provided to the pair of seats and configured to purify air suctioned through the plurality of suction ports; a plurality of discharge ports provided to the pair of seats and configured to discharge a part of the air purified by the plurality of purifiers to the external space; a plurality of release ports provided in the pair of seats and configured to release remaining part of the air purified by the plurality of purifiers to the specific space, as a plurality of airflows, each flowing in a specific direction along a backrest side of corresponding one of the pair of seats; and a reflector disposed facing the plurality of release ports in the specific direction, and to which each of the plurality of airflows flowing in the specific direction hits. The reflector is configured to cause the each of the plurality of airflows released from the plurality of discharge ports and having hit the reflector to collide with each other, to traverse between the pair of seats, and to return to a floor side of the pair of seats.

[0010] With such a configuration, in the specific space (local space) having an open surface that opens to the external space, on a lateral side of the pair of seats, air curtain is formed by airflows released from the respective release ports along the backrest sides of the respective seats, reflected by the reflector, and return to the floor side of the seats, in a manner traversing between the pair of seats. Therefore, it is possible to confine the airflows in the spaces on the respective side of the seats, while suppressing the airflows forming the air curtain from being affected by the external environment (disturbance). At this time, since the airflows collide each other to form the air curtain, the stability of the airflow is

improved. In other words, it is possible to provide an airflow environment system capable of improving the stability of the airflow in the specific space and suppressing the air in the specific space from flowing out to the external space.

[0011] Furthermore, in the airflow environment system according to the present disclosure, the reflector may be a plate-like reflector curved in an arc shape, in a manner protruding toward the ceiling side of the pair of seats. As a result, the airflows hitting the reflector flow along the plate-shaped reflector plate that is curved in an arc shape. Therefore, the stability of the airflows can be improved.

[0012] Furthermore, in the airflow environment system according to the present disclosure, the reflector may include a plurality of reflectors provided as a pair correspondingly to the plurality of airflows released from the plurality of release ports. As a result, the airflows flow along the respective reflector plates, each curved in an arc shape, and collide with each other. Therefore, a loss of energy due to the collision of airflows is suppressed, and airflows are allowed to flow toward the floor side more smoothly. As a result, the stability of the airflows can be further improved.

[0013] In the airflow environment system according to the present disclosure, the ceiling side of the open surface may be provided with a separation wall that separates the specific space from the external space in a manner closing an open-surface side of the plurality of reflectors. As a result, in the region where the airflows reflected by the reflector collide with each other, it is possible to suppress airflows attempting to flow out of the reflector to the external space, on the side of open surface. Therefore, the effect of suppressing the air in the specific space from flowing outside can be further enhanced.

[0014] The airflow environment system according to the present disclosure may further include a plurality of blow-out ports, each provided at an end of corresponding one of the plurality of release ports, the end being located on a side of the open surface, and blowing out an airflow inclined in a direction toward an opposite side of the open surface, along the backrest side of the corresponding one of the pair of seats, so as to merge with corresponding one of the airflows flowing in the specific direction. As a result, the airflows blown out from the blow-out ports do not collide with each other on the side of open surface of the reflector, and collisions of the airflows on the side of the open surface of the reflector are suppressed. Therefore, the effect of suppressing the air in the specific space from flowing out to the external space can be further enhanced.

[0015] In the airflow environment system according to the present disclosure, each of the

pair of seats may have an area not provided with corresponding one of the plurality of release ports on one side of the corresponding one of the pair of seats, the one side being on a side of the open surface. As a result, collisions of the airflows on the open-surface side of the reflector are eliminated. Therefore, the effect of suppressing the air in the specific space from flowing out to the external space can be further enhanced.

[0016] Exemplary embodiments of the present disclosure will now be explained with reference to the accompanying drawings. Note that the following exemplary embodiments are merely examples of embodiments of the present disclosure, and are not intended to limit the technical scope of the present disclosure in any way. The drawings explained in the embodiments are schematic representations, and the ratios of the sizes and the thicknesses of the elements in each of the drawings do not necessarily reflect the actual dimensional ratios.

[0017] (First exemplary embodiment)

To begin with, an outline of airflow environment system 1 according to a first exemplary embodiment of the present disclosure will be explained with reference to Figs. 1 to 3. Fig. 1 is an external perspective view of airflow environment system 1 according to the first exemplary embodiment of the present disclosure. Fig. 2 is an external perspective view illustrating airflows formed by airflow environment system 1. Fig. 3 is a front view illustrating the airflows formed by airflow environment system 1.

[0018] In the following description, horizontal directions (the left side, the right side), vertical directions (the floor surface on the lower side, the ceiling surface on the upper side), and depth directions (a near side or a front surface of the near side, a far side or a rear surface of the far side) are defined as those in a front view of airflow environment system 1. A frontal side of seat 3, a lateral side (or a near-side lateral side) of seat 3, and the backrest side of seat 3 will be sometime explained with respect to a front view of seat 3.

[0019] Airflow environment system 1 is installed as private room unit 10 also serving as a meeting space, a resting space, and the like provided in an open space, for example. As illustrated in Fig. 1, airflow environment system 1 includes a pair of seats 3 (seat 3 each including blower system 2) provided facing each other in private room unit 10, and allowing users to sit facing each other. Airflow environment system 1 is a system that generates an airflow in a local space (local space SP1, local space SP2) having open surface X that opens to external space SP3, on one side of a pair of seats 3 (on the near-

side lateral side of seats 3 in Fig. 1). In airflow environment system 1, a blower operation of blower system 2 prevents the air in local space SP1 (or local space SP2) delineated by private room unit 10 and air curtain 8 from leaking (flowing out) to local space SP2 (or local space SP1) facing thereto and to external space SP3, and suppresses odor or contaminated air from spreading. Note that one or both of local space SP1 and local space SP2 corresponds to the "specific space" as used in the claims. Local space SP1 and local space SP2 may also be referred to as environmental spaces.

[0020] More specifically, as illustrated in Fig. 1, airflow environment system 1 includes box-type private room unit 10, a pair of seats 3 each of which including blower system 2, and reflector 4.

[0021] Private room unit 10 is a structure configuring a local space used by a user for a meeting or a break. Specifically, private room unit 10 is surrounded by wall surface 10a on the left side, wall surface 10b on the right side, wall surface 10c on the ceiling side, wall surface 10d on the far side, separation wall 10e covering a part of near front side of private room unit 10 on the ceiling side, and floor surface 10f, and has an open surface X that opens to external space SP3, on the near-side lateral side of seats 3. "Open surface X" is a virtual surface with no substance, and is a virtual surface surrounded by wall surface 10a, wall surface 10b, and an end of separation wall 10e on the front side. Inside private room unit 10, the pair of seats 3 are installed on floor surface 10f, and reflector 4 is installed on wall surface 10c of ceiling side.

[0022] Separation wall 10e is a member that separates the local spaces (local space SP1, local space SP2) from and external space SP3 in a manner closing open surface X of reflector 4, on the ceiling side of open surface X.

[0023] Floor surface 10f is a member forming private room unit 10. Floor surface 10f may be a floor of an open space where private room unit 10 is installed.

[0024] The pair of seats 3 are seats on which users can sit facing each other, and are disposed facing each other. Specifically, a pair of seats 3 is disposed so that one of the pair of seats 3 is installed on the side of left wall surface 10a in private room unit 10, and the other is installed on the side of right wall surface 10b in private room unit 10. A table is disposed between the pair of seats 3. A description will be now be given focusing on one of the pair of seats 3. Remaining the other of the pair of seats 3 has the same structure and functions as the one of the pair of seats 3.

[0025] As illustrated in Fig. 1, seat 3 includes a base on which a user can sit, and a

backrest. Blower system 2 is incorporated in seat 3. Seat 3 also serves as a member forming an outer frame of blower system 2. In order to enable blower system 2 to operate and to generate airflows (air curtain 8), seat 3 also includes release port 5, suction port 6, and discharge port 7.

[0026] Release port 5 is an opening for releasing airflows A1 (see Fig. 2) flowing along the backrest side of seat 3 in a first direction (upward in the vertical direction) into the local space (local space SP1 or local space SP2). Specifically, release port 5 is disposed on the top surface of the backrest of seat 3, and configured by a slit-shaped opening (or a plurality of holes). Release port 5 is provided in a manner extending along the top surface of the backrest, from the near-side lateral side of seat 3 toward far-side wall surface 10d. Release port 5 is connected communicably with blower system 2, and releases the air blown out of blower system 2 into the local space, as airflows A1 flowing along the first direction.

[0027] Airflows A1 released from release port 5 flow along the wall surface (wall surface 10a or wall surface 10b), due to an induction phenomenon caused by the Coanda effect (a phenomenon by which a region of a negative pressure is formed between the blown air and the wall surface on the backrest side of seat 3, and the blown airflow is pulled toward the region of the negative pressure). The first direction corresponds to a "specific direction" as used in the claims.

[0028] Suction port 6 is an opening through which the air in the local space (local space SP1 or local space SP2) is suctioned. Suction port 6 is disposed on the base of seat 3, on floor surface 10f side, and configured by, for example, a plurality of slit-shaped holes elongated in the vertical direction. Suction port 6 is provided in a manner extending along the frontal side of the base of seat 3, from the near-side lateral side of seat 3 toward far-side wall surface 10d. As blower system 2 performs a blowing operation, the air in the local space is suctioned into suction port 6. Suction port 6 is connected communicably with blower system 2 via an internal space (not illustrated) of seat 3, and sends the suctioned air into purifier 2b (see Fig. 4) configuring blower system 2.

[0029] Discharge port 7 is an opening through which a part of the air in the local space (local space SP1 or local space SP2) is discharged to external space SP3. Specifically, discharge port 7 is disposed on the near-side lateral side of the base of seat 3. Discharge port 7 is connected communicably with blower system 2, and discharges a part of the air purified by purifier 2b to external space SP3, as blower system 2 performs a blowing

operation.

[0030] As described above, blower system 2 is configured to be housed or held inside seat 3. Blower system 2 is connected communicably with each of release port 5, suction port 6, and discharge port 7 in the internal space of seat 3. The blowing operation of blower system 2 then causes the air in the local space (local space SP1 or local space SP2) to be suctioned through suction port 6 into blower system 2. A part of the suctioned air is discharged from discharge port 7 to external space SP3, and the remaining part of the suctioned air is released to the local space through release port 5. Blower system 2 will be described later in detail.

[0031] Reflector 4 will be now explained.

[0032] Reflector 4 is installed on wall surface 10c of the ceiling side in private room unit 10, at a position facing blower system 2 in the first direction, and is a member hit by airflows A1 flowing along the first direction. Reflector 4 causes airflows A1 released from release port 5 and having hit reflector 4 to collide each other, so as to pass (traverse) between the pair of seats 3 and to return to floor surface 10f side.

[0033] Specifically, as illustrated in Fig. 3, reflector 4 is installed on wall surface 10c of the ceiling-side in private room unit 10. Reflector 4 is disposed in a manner facing release port 5 in the first direction (vertically upward direction), and the bottom surface of reflector 4 (a surface facing release port 5) is curved surface 4a having a substantially semi-cylindrical shape (hog-backed shape), with a concave in the central portion thereof. Specifically, an axial direction of curved surface 4a having a substantially semi-cylindrical shape is substantially in parallel with wall surface 10a and wall surface 10b, and is curved in an arc shape in a manner protruding toward the ceiling side, in a view in the axial direction. It can also be said that reflector 4 is formed by a plate-shaped reflector plate that is curved, in an arc shape, in a manner protruding toward the ceiling side.

[0034] In reflector 4, while airflow environment system 1 (blower system 2) is in operation, airflows A1 (airflows A1 flowing along the first direction) released from the release ports 5 hit curved surface 4a of reflector 4. Each airflow A1 having hit curved surface 4a turns into airflow A2 flowing along curved surface 4a in a second direction (in the direction from the backrest side to the frontal side of seat 3). Furthermore, one airflow A2 flowing along curved surface 4a in the second direction collides with the other airflow A2 coming from the opposite side, in the central portion of reflector 4 (curved surface 4a), and airflows A2 are released from the central portion of reflector 4 (curved surface 4a)

toward floor surface 10f, as air curtain 8 flowing in a third direction (direction from the ceiling surface toward floor surface 10f).

[0035] Blower system 2 will now be described with reference to Fig. 4. Fig. 4 is a block diagram illustrating a configuration of blower system 2 in airflow environment system 1. Although blower system 2 is incorporated in each of the pair of seats 3, the description will be given focusing on one of the pair of seats 3, in the same manner as the description of seat 3.

[0036] Blower system 2 is a unit installed on wall surface 10c of the floor surface side in the local space (local space SP1 or local space SP2) and releases airflow A1 (see Fig. 2) flowing in the first direction on the backrest side of seat 3 to the local space.

[0037] Specifically, as illustrated in Fig. 4, blower system 2 is configured by including blower 2a and purifier 2b.

[0038] Blower 2a is a device that suctions the air in the local space (local space SP1 or local space SP2) through suction port 6, under the control of a control unit (not illustrated), generates airflows A1 flowing in the first direction (vertically upward direction), and sends the airflows to release port 5. Blower 2a is, for example, a sirocco fan that generates an airflow containing more rectilinear components than swirl components.

[0039] Purifier 2b is a device that purifies the air in the local space (local space SP1 or local space SP2) suctioned through suction port 6. Purifier 2b can also be said to be a device that purifies the air of airflows A1 to be released into the local space (local space SP1 or local space SP2) via release port 5 and the airflows to be released into external space SP3 via discharge port 7. Specifically, purifier 2b is an air filter installed in an air passage through which air suctioned via suction port 6 circulates, for example, and removes viruses, pollens, dust, dirt, and the like from the air suctioned via suction port 6, and outputs cleaned air.

[0040] As purifier 2b, for example, a high efficiency particulate air (HEPA) filter is used. The air purified by purifier 2b is released upwards through release port 5, as an airflow, by blower 2a. A space sterilizing deodorizer configured to generate hypochlorous acid water by electrolysis or the like, and to mix the hypochlorous acid into the airflow generated by blower 2a may be used as purifier 2b.

[0041] Airflow in airflow environment system 1 will now be explained with reference to Fig. 3.

[0042] In airflow environment system 1, as illustrated in Fig. 3, blower system 2

performs the blowing operation to release airflows A1 through respective blow-out ports 5 in the first direction. Airflows A1 released from release ports 5 flow along the wall surface (wall surface 10a, wall surface 10b), due to the induction phenomenon caused by the Coanda effect. Airflows A1 released from release ports 5 hit curved surface 4a, at the end of curved surface 4a of reflector 4. Each airflow A1 having hit curved surface 4a turns into airflow A2 flowing along curved surface 4a in a second direction (in the direction from the backrest side to the frontal side of seat 3). One airflow A2 flowing along curved surface 4a in the second direction then collides with the other airflow A2 coming from the opposite side, at the central portion of reflector 4 (curved surface 4a), and airflows A2 turns into airflow A3 flowing toward floor surface 10f in the third direction.

[0043] At a position where facing airflows A2 collide with each other, airflow A3 flows not only in the third direction toward floor surface 10f, but also in the direction toward open surface X but reflected by separation wall 10e and flows in the third direction. In other words, separation wall 10e plays a role for suppressing airflow A3 attempting to flow out to external space SP3 from a side of the open surface X of reflector 4.

[0044] Airflow A3 is then released from the central portion of reflector 4 (curved surface 4a) toward floor surface 10f to form air curtain 8. In other words, airflow A3 flows toward floor surface 10f, in a manner traversing between the pair of seats 3, to form air curtain 8. In other words, air curtain 8 provides a shield between the pair of seats 3.

[0045] Air curtain 8 then collides with the top plate of the table, and is diverted toward the pair of respective seats 3, and diverted air curtains 8 go around into the space under the table. Airflows A4 having entered the spaces under the table are suctioned into blower systems 2 via respective suction ports 6.

[0046] After airflow A4 suctioned into each blower system 2 is purified by purifier 2b, a part of airflow A4 is discharged from discharge port 7 (see Fig. 1) to external space SP3, and most of remaining airflow A4 is released upwards again through release port 5, as airflow A1.

[0047] In this manner, airflow environment system 1 creates a series of airflows (airflows A1 to A4) in the local space (local space SP1, local space SP2). In other words, airflow environment system 1 creates air curtain 8 released from release ports 5 on the backrest sides of respective seats 3, reflected by reflector 4, and returning as airflow A3 toward floor surface 10f in a manner traversing between the pair of seats 3, in the local space (local space SP1, local space SP2) having open surface X that opens to external space SP3

on the near-side lateral side of the pair of seats 3. As a result, in airflow environment system 1, local space SP1 corresponding to one seat 3 and local space SP1 corresponding to the other seat 3 are formed separately in the local space of private room unit 10.

[0048] As described above, with airflow environment system 1 according to the first embodiment, the following advantageous effects can be achieved.

[0049] (1) Airflow environment system 1 includes a pair of seats 3 provided facing each other, and is a system that generates an airflow in a local space (local space SP1, local space SP2) having open surface X that opens to external space SP3, on the near-side lateral side of the pair of seats 3. Airflow environment system 1 includes: suction port 6 provided in each of the pair of seats 3 and configured to suction air from the local space; purifier 2b provided in each of the pair of seats 3 and configured to purify the air suctioned through suction port 6; discharge port 7 provided in each of the pair of seats 3 and configured to discharge a part of the air purified by purifier 2b to external space SP3; release port 5 provided in each of the pair of seats 3 and configured to release remaining part of the air purified by purifier 2b to the local space as airflow A1 flowing in the first direction, along a backrest side of each one of the pair of seats 3; and reflector 4 disposed in a manner facing release port 5 in the first direction and hit by respective airflows A1 flowing along the first direction. Reflector 4 is configured to cause airflows A2 having been released from release ports 5 and having hit reflector 4 to collide with each other, traverse between the pair of seats 3, and return to the side of floor surface 10f of the pair of seats 3.

[0050] As a result, in the local space (local space SP1, local space SP2) having open surface X that opens to external space SP3 on the near-side lateral side of the pair of seats 3, air curtain 8 is formed so that an airflow released from release port 5 on the backrest side of each seat 3, reflected as airflows A3 by reflector 4, and returned toward floor surface 10f, in a manner traversing between the pair of seats 3. Therefore, it is possible to confine the airflows within each of the local spaces (local space SP1 or local space SP2) on the respective sides of seats 3, while allowing the airflows forming air curtain 8 (airflows A1 to A3) to be less affected by the external environment (disturbance). At this time, because airflows A2 collide with each other to form air curtain 8, the stability of the airflow is improved. In other words, it is possible to provide airflow environment system 1 capable of improving the stability of the airflow in the local space (local space SP1 or local space SP2), and of suppressing the air inside of the local space (local space SP1 or local space SP2) from flowing out to external space SP3.

[0051] (2) In airflow environment system 1, air curtain 8 traversing between the pair of seats 3 is formed by causing two airflows A2 to collide with each other. As a result, the stability of the airflows can be improved, compared with the air curtain in the conventional airflow environment system.

[0052] (3) In airflow environment system 1, reflector 4 is provided as a plate-like reflector curved in an arc shape, in a manner protruding toward the ceiling side with respect to the pair of seats 3. As a result, airflows A1 hitting reflector 4 flow along the plate-like reflecting plate that is curved in an arc shape. Therefore, the stability of the airflows can be improved.

[0053] (4) In airflow environment system 1, separation wall 10e separating the local space (local space SP1 and local space SP2) from external space SP3 is provided on the ceiling side of the open surface X, in a manner closing reflector 4 on the side of open surface X. As a result, in the region where airflows A2 reflected by reflector 4 collide with each other, it is possible to suppress airflows A3 attempting to flow out of reflector 4 to external space SP3, on the side of open surface X. Therefore, the effect of suppressing the air inside the local space from flowing outside can be further enhanced.

[0054] In addition, since airflows A3 having hit separation wall 10e forms a flow heading toward floor surface 10f, air curtain 8 can be stabilized.

[0055] (5) In airflow environment system 1, as box-type private room unit 10, a local space (local space SP1, local space SP2) having open surface X that opens to external space SP3, on the near-side lateral side of the pair of seats 3 is formed. As a result, the airflows (airflows A1 to A4, air curtain 8) generated in the local space can be less affected by the external environment (disturbance).

[0056] (6) In airflow environment system 1, discharge port 7 is provided to discharge a part of the air purified by purifier 2b to external space SP3. As a result, a negative pressure is formed in the local space (local space SP1 or local space SP2) surrounded by seat 3 and air curtain 8, so that the air in the local space can be further suppressed from flowing out to external space SP3.

[0057] (Second exemplary embodiment)

Airflow environment system 1a according to a second exemplary embodiment of the present disclosure will now be described with reference to Fig. 5. Fig. 5 is a front view illustrating air flows formed by airflow environment system 1a according to the second exemplary embodiment of the present disclosure.

[0058] Airflow environment system 1a according to the second exemplary embodiment of the present disclosure is different from that according to the first exemplary embodiment in that reflector 14 has two curved surfaces each having a substantially semi-cylindrical shape (hog-backed shape). Other elements of airflow environment system 1a are the same as those of airflow environment system 1 according to the first embodiment. In the following, descriptions of the matters having been already described in the first exemplary embodiment will be omitted as appropriate, and differences with respect to the first exemplary embodiment will be mainly explained.

[0059] As illustrated in Fig. 5, reflector 14 is installed on wall surface 10c of the ceiling side in private room unit 10. Reflector 14 is disposed in a manner facing release port 5 in the first direction (vertically upward direction). A bottom surface (the surface facing the release port 5) of reflector 14 has curved surface 14a and curved surface 14b each of which is recessed at a central portion and having a substantially semi-cylindrical shape (hog-backed shape). Specifically, an axial direction of each of curved surface 14a and curved surface 14b having a substantially semi-cylindrical shape is substantially in parallel with wall surface 10a and wall surface 10b, and has the central portion curved in an arc shape in a manner protruding toward the ceiling side in a view in the axial direction. It can also be said that reflector 14 is formed by connecting two plate-shaped reflector plates each of which curved in an arc shape, in a manner protruding toward the ceiling side.

[0060] In reflector 14, during operation of airflow environment system 1a (blower system 2), airflow A1 (airflow A1 flowing along the first direction) released from one release port 5 hits curved surface 14a of reflector 14, and airflow A1 (airflow A1 flowing along the first direction) released from the other release port 5 hits curved surface 14b of reflector 14. Airflow A1 having hit curved surface 14a turns into airflow B1 flowing along curved surface 14a in the second direction (direction from the backrest side to the frontal side of one of seats 3). Airflow A1 having hit curved surface 14b turns into airflow B1 flowing along curved surface 14b in the second direction (direction from the backrest side to the frontal surface side of the other of seats 3). Upon reaching a connected portion between curved surface 14a and curved surface 14b (the central portion of reflector 14), airflows B1 change their directions to diagonal direction heading toward floor surface 10f.

[0061] One of airflows B1 flowing along curved surface 14a in the second direction collide with the other of airflows B1 coming from the opposite side, at the connected portion between curved surface 14a and curved surface 14b of reflector 4 (the central

portion of reflector 14), and airflows B1 are released from the central portion of reflector 14 toward floor surface 10f as air curtain 8 flowing in the third direction (the direction from the ceiling side toward floor surface 10f side).

[0062] In airflow environment system 1a, airflows B1 having collided in the manner described above forms air curtain 8 traversing between the pair of seats 3. In other words, air curtain 8 provides a shield between the pair of seats 3. In airflow environment system 1a, airflows return in the same manner as in airflow environment system 1.

[0063] As described above, with airflow environment system 1a according the second embodiment, the following advantageous effects can be achieved.

[0064] (7) In airflow environment system 1a, as reflector 14, a pair of plate-like reflectors each of which curved in an arc shape, in a manner protruding toward the ceiling side, is provided as a plurality of reflectors that are provided as a pair each corresponding to corresponding one of airflows A1 released from respective release ports 5. In other words, in airflow environment system 1a, reflector 14 includes curved surface 14 and curved surface 14b, and the axial directions of curved surface 14 and curved surface 14b are substantially in parallel with wall surface 10a and wall surface 10c, respectively, and curved surface 14a and curved surface 14b each of which curved in an arc shape, in a manner protruding toward the ceiling side, are provided continuously in a direction perpendicular to the axis. As a result, airflows B1 flow along respective reflector plates each of which is curved in an arc shape, and collide with each other. Therefore, a loss of energy due to the collision of airflows B1 is suppressed, and airflows B1 are allowed to flow toward floor surface 10f more smoothly. As a result, the stability of the airflows can be further improved.

[0065] (Third exemplary embodiment)

Airflow environment system 1b according to a third exemplary embodiment of the present disclosure will now be described with reference to Fig. 6. Fig. 6 is an external perspective view illustrating air flows formed by airflow environment system 1b according to the third exemplary embodiment of the present disclosure.

[0066] Airflow environment system 1b according to the third exemplary embodiment of the present disclosure is different from that according to the first exemplary embodiment in that blow-out port 5a is provided as a part of release port 5 (release port 5 at an end on the side of open surface X), and the air blown out of blow-out port 5a is inclined toward a direction on the opposite side of external space SP3. Other elements of airflow

environment system 1b are the same as those of airflow environment system 1 according to the first embodiment. In the following, descriptions of the matters having been already described in the first exemplary embodiment will be omitted as appropriate, and differences with respect to the first exemplary embodiment will be mainly explained.

[0067] In airflow environment system 1b, release port 5 includes a plurality of holes. Among blow-out ports 5 arranged at predetermined intervals from the near-side lateral side of seat 3 toward far-side wall surface 10d on the top surface of the backrest of seat 3, release port 5 located at an end on the side of open surface X is established as blow-out port 5a that blows out airflow C1 in a fourth direction (a direction indicated by an arrow as airflow C1 in Fig. 4) different from the first direction from other release port 5. In other words, airflow environment system 1b includes blow-out port 5a provided at an end of release port 5, on the side of open surface X, and blowing out airflow C1 along the backrest side of seat 3, in a manner inclined in a direction toward the opposite side of open surface X, so as to be merged, on the side of the ceiling surface, with airflow A1 flowing in the first direction.

[0068] Airflow C1 plays a role for suppressing airflow A1 from flowing out to external space SP3 by diffusion, as airflow A1 flows in the first direction, along the wall surface (wall surface 10a or wall surface 10b) on the backrest side of seat 3.

[0069] As described above, with airflow environment system 1b according to the third embodiment, the following effects can be achieved.

[0070] (8) Airflow environment system 1b includes blow-out port 5a provided at an end of release port 5, on the side of open surface X, and blowing out airflow C1 along the backrest side of seat 3, in a manner inclined in a direction toward the opposite side of open surface X, so as to be merged with airflow A1 flowing in the first direction. As a result, the airflows C1 blown out of blow-out port 5a do not collide on reflector 4 on the side of open surface X, and the collision of airflows A2 on reflector 4 on the side of open surface X is suppressed. Therefore, it is possible to suppress the air in the local space (local space SP1 and local space SP2) from flowing out to external space SP3.

[0071] (9) Airflow environment system 1b is configured, in relation to airflow C1 released from some of the holes (blow-out ports 5a) on the side of open surface X, among a plurality of holes included in release port 5 disposed on the upper part of the backrest of seat 3, to release airflow C in a direction inclined in a direction toward the opposite side of external space SP3, as a blow-out direction from the end on the side of open surface X. As

a result, airflow C1 released in an inclined direction can suppress the diffusion of airflow A1 in a direction flowing out to external space SP3 through open surface X.

[0072] (Fourth exemplary embodiment)

Airflow environment system 1c according to a fourth exemplary embodiment of the present disclosure will now be described with reference to Fig. 7. Fig. 7 is an external perspective view illustrating airflows formed by airflow environment system 1c according to the fourth exemplary embodiment of the present disclosure.

[0073] Airflow environment system 1c according to the fourth exemplary embodiment of the present disclosure is different from that of the first exemplary embodiment in that a blow-out range of the release port is reduced inwardly toward the local space SP1 and local space SP2, with respect to open surface X. Other elements of airflow environment system 1c are the same as those of airflow environment system 1 according to the first embodiment. In the following, descriptions of the matters having been already described in the first exemplary embodiment will be omitted as appropriate, and differences with respect to the first exemplary embodiment will be mainly explained.

[0074] In airflow environment system 1c, as illustrated in Fig. 7, release port 5 is a slit-shaped opening (or a plurality of holes) disposed on the top surface of the backrest of seat 3, in such a manner that the blow-out range with respect to reflector 4 on the ceiling side is reduced inwardly toward local space SP1 and local space SP2, with respect to open surface X. In other words, each of the pair of seats 3 has area 5b where release port 5 is not provided on the top surface of the backrest, on the side of open surface X.

[0075] As described in the foregoing, with airflow environment system 1c according to the fourth exemplary embodiment, the following advantageous effects can be achieved.

[0076] (10) In airflow environment system 1c, each of the pair of seats 3 has area 5b where release port 5 is not provided on of seat 3 on the side of the open surface X. As a result, in airflow environment system 1c, with area 5b provided, when airflow A1 flows along the wall surface on the backrest side of seat 3 (wall surface 10a or wall surface 10b), airflow A1 is less likely to deviate from the first direction toward open surface X by the diffusion of the air. Therefore, airflow A1 is less likely to flow out to external space SP3 through open surface X, without hitting reflector 4. Furthermore, in airflow environment system 1c, no collision of airflows A2 occurs on reflector 4 on the side of open surface X. Therefore, it is possible to suppress the air in the local space (local space SP1 and local space SP2) from flowing out to external space SP3.

[0077] Although the present disclosure has been described above based on the exemplary embodiments, the present disclosure is not limited to the above exemplary embodiments in any way, and it can be easily inferred that various modifications and variations may be made without departing from the scope of the present disclosure.

[0078] In airflow environment systems 1, 1a to 1c according to the first to the fourth exemplary embodiments, release port 5 is provided on the top surface of the backrest of seat 3, but the present disclosure is not limited thereto. For example, a gap may be formed between seat 3 and a wall surface (wall surface 10a or wall surface 10b) on the backrest side of seat 3, and release port 5 may be disposed inside the gap. This configuration improves the degree of freedom in the design of airflow environment systems 1, 1a to 1c.

[0079] In airflow environment systems 1, 1a to 1c according to the first to the fourth exemplary embodiments, private room unit 10 is configured to have open surface X on the near-side lateral side of seats 3, but the present disclosure is not limited thereto. For example, it is also possible to configure a far-side lateral side of seats 3 as the same open surface as open surface X. Even with such a configuration, the above-described advantageous effects can be achieved.

INDUSTRIAL APPLICABILITY

[0080] The airflow environment system according to the present disclosure is useful because it is possible to suppress the air contaminated in the environmental space from leaking to the external space.

REFERENCE MARKS IN THE DRAWINGS

- [0081]** 1: airflow environment system
1a: airflow environment system
1b: airflow environment system
1c: airflow environment system
2: blower system
2a: blower
2b: purifier
3: seat
4: reflector
4a: curved surface

5: release port
5a: blow-out port
5b: area
6: suction port
7: discharge port
8: air curtain
10: private room unit
10a: wall surface
10b: wall surface
10c: wall surface
10d: wall surface
10e: separation wall
10f: floor surface
14: reflector
14a: curved surface
14b: curved surface
SP1: local space
SP2: local space
SP3: external space
X: open surface
A1: airflow
A2: airflow
A3: airflow
A4: airflow
B1: airflow
C1: airflow

CLAIMS

1. An airflow environment system that generates an airflow in a specific space including a pair of seats that are provided facing each other, the specific space having an open surface that opens to an external space, on a lateral side of the pair of seats, the airflow environment system comprising:

a plurality of suction ports provided to the pair of seats and configured to suction air in the specific space;

a plurality of purifiers provided to the pair of seats and configured to purify air suctioned through the plurality of suction ports;

a plurality of discharge ports provided to the pair of seats and configured to discharge a part of the air purified by the plurality of purifiers to the external space;

a plurality of release ports provided in the pair of seats and configured to release a remaining part of the air purified by the plurality of purifiers to the specific space, as a plurality of airflows, each flowing in a specific direction along a backrest side of corresponding one of the pair of seats; and

a reflector disposed facing the plurality of release ports in the specific direction, and to which each of the plurality of airflows flowing in the specific direction hits,

wherein the reflector is configured to cause the each of the plurality of airflows released from the plurality of discharge ports and having hit the reflector to collide with each other, to traverse between the pair of seats, and to return to a floor side of the pair of seats.

2. The airflow environment system according to Claim 1, wherein the reflector is configured as a plate-like reflector curved in an arc shape, in a manner protruding toward a ceiling side of the pair of seats.

3. The airflow environment system according to Claim 2, wherein the reflector includes a plurality of reflectors provided as a pair correspondingly to the plurality of airflows released from the plurality of release ports.

4. The airflow environment system according to any one of Claims 1 to 3, wherein a ceiling side of the open surface is provided with a separation wall that separates

the specific space from the external space in a manner closing an open-surface side of the plurality of reflectors.

5. The airflow environment system according to any one of Claims 1 to 4, further comprising a plurality of blow-out ports, each provided at an end of corresponding one of the plurality of release ports, the end being located on a side of the open surface, and blowing out an airflow inclined in a direction toward an opposite side of the open surface, along the backrest side of the corresponding one of the pair of seats, to merge with corresponding one of the plurality of airflows flowing in the specific direction.

6. The airflow environment system according to any one of Claims 1 to 4, wherein each of the pair of seats has an area not provided with corresponding one of the plurality of release ports on one side of the corresponding one of the pair of seats, the one side being on a side of the open surface.