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AIR CIRCULATION APPARATUS WITH LIGHT

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(71) Applicant(s)
Iconic Fan Company Pty Ltd

(72) Inventor(s)
Tsukasa, Inoshita

(74) Agent / Attorney
Chrysiliou IP, BIZTEK Suite 114, 20 Dale Street, Brookvale, NSW, 2100, AU

ABSTRACT

To provide a blowing apparatus with illumination functionality that is capable of further improving indoor air circulation.

Means for Solving the Problem

Characterized in that it is equipped with base parts 10, 11 installed on a ceiling surface, a blower 2 that is disposed on the bottom side of the base parts 10, 11, a blower supporting part 3 that supports the blower 2, an illuminating part 4 that is positioned in a ring-like manner around the outer periphery of the blower 2, an illumination linking part 5 that links the illuminating part 4 and the base parts 10, 11, and a tilting mechanism that tilts the blower 2 relative to the ceiling surface.

AIR CIRCULATION APPARATUS WITH LIGHT

SPECIFICATION

Problems to be Solved

[001] However, the rotary shaft for the fan blades in this blower is fastened in a single direction (vertical), so efficiency was poor in the aspect of air circulation.

[002] The present utility model takes the aforementioned circumstances into consideration. An objective of the present utility model is to provide a blowing apparatus with illumination functionality that is capable of further improving indoor air circulation.

Means for Solving the Problem

[003] To solve the aforementioned problem, the blowing apparatus with illumination functionality that relates to the present utility model comprises a base part installed on a ceiling surface;

a blower that is disposed on the bottom side of the base part;

a blower supporting part that supports the blower;

an illuminating part that is positioned in a ring-like manner around the outer periphery of the blower;

an illumination linking part that links the illuminating part and the base part;, and

a tilting mechanism that tilts the blower relative to the ceiling surface.

[004] In the constitution described above, the illuminating part is positioned in a ring-like manner around the outer periphery (circumference) of the blower. In other words, this constitution has both blowing functionality and illuminating part functionality. The blower has a tilting mechanism that tilts the blower relative to a ceiling surface. Therefore, the blowing direction of the blower can be changed by utilizing the tilting function. For that reason, it is possible appropriately to adjust the blowing direction while considering the indoor conditions, whereby it is possible further to improve indoor air circulation.

[005] It is preferable for the base parts that relate to the present utility model to be equipped with a first base part positioned on the ceiling surface side and a second base part that is integrated at the bottom side of the first base part, and for the second base part and the blower supporting part to be linked together via the tilting mechanism.

[006] By using this constitution, it is possible to change the blowing direction by linking the blower supporting part relative to the second base part that comprises the base parts.

[007] It is preferable for the present utility model to be equipped with a rotation mechanism that rotates the second base part relative to the first base part around a vertical shaft.

[008] By using this constitution, it is possible to rotate the blower itself in a state where the blowing direction of the blower is inclined. For that reason, it is possible to further perform uniform indoor ventilation.

[009] It is preferable for the tilting mechanism described for this present utility model to include a mechanism that rotatably supports the blower supporting part on the shaft that is set in the horizontal direction.

[010] With this constitution, it is possible to tilt the blower by rotating the blower supporting part around the horizontal shaft.

[011] It is preferable for the second base part described for this present utility model to have an integrated rotary motor that is composed of a tilting drive motor, which comprises the tilting mechanism, and the rotation mechanism.

[012] With this constitution, it is possible to attain a constitution that rotates the blower in a state where the blower is tilted.

[013] It is preferable for the blower described for this present utility model to be equipped with a cylindrical case that is disposed around the periphery of the blower blades, wherein a ring-shaped gap is formed between this cylindrical case and the illuminating part.

[014] With this constitution, it is possible to drive and tilt the blower without interfering with the illuminating part because a predetermined gap is formed between the blower and the illuminating part.

[015] It is preferable for the rotation mechanism described for this present utility model to be equipped with a large-diameter gear, which is fastened on the first base part, and a small-diameter gear, which is driven by the rotary motor and circles around the periphery of the large-diameter gear.

[016] With this constitution, it is possible to rotate the second base part relative to the first base part by rotating the small-diameter gear using the rotary motor. In other words, it is possible to rotate the blower itself.

Brief Description of the Drawings

[017] [Figure 1] An external, perspective view from of a blower apparatus pursuant to an embodiment, seen from a front side;

[018] [Figure 2] An external, perspective view of the blower apparatus depicted in Fig. 1 from a rear side;

[019] [Figure 3] A side view of the blower apparatus depicted in Fig. 1;

[020] [Figure 4] A front view of the blower apparatus depicted in Fig. 1;

[021] [Figure 5] A front view of a state with a cover removed;

[022] [Figure 6] A sectional view of A-A in Fig. 5

[023] [Figure 7] A sectional view of B-B Fig. 5

[024] [Figure 8] A sectional view showing the blower in a tilted state;

[025] [Figure 9] A side view showing the blower in a tilted state (state where the illuminating part removed); and

[026] [Figure 10] A sectional view of C-C in Fig. 3.

Mode for Carrying Out the Device

[027] A preferred embodiment of the blowing apparatus (ceiling circulator) with illumination functionality that relates to the present utility model will now be described with reference to the drawings. Fig. 1 is an external, perspective of the blower apparatus according to this embodiment as seen from the front. Fig. 2 is an external, perspective view of the blower apparatus depicted in Fig. 1 from a rear side. Fig. 3 is a side view. Fig.4 is a front view. To facilitate

a description , the ceiling surface side is defined as the rear side (top), and the base surface side is defined as the front side (bottom).

[028] The blower apparatus according to the present utility model has both illumination functionality and blowing functionality. The blowing apparatus is mounted to on an indoor ceiling surface for use. The blowing apparatus is equipped with a base part 1 that is mounted to a ceiling surface, a blower 2 (fan) that is disposed on the bottom side of the base part 1, a blower supporting part 3 that supports the blower 2, an illuminating part 4 that is positioned in a ring-like manner around the outer periphery of the blower 2, and illumination linking parts 5 that link the illuminating part 4 and the base part 1. The materials that constitute the base part 1 may be appropriately selected from metal, or resin, or the like.

[029] As illustrated in Fig.3, the base part 1 is equipped with a first base part 10 positioned on the ceiling surface side, and a second base part 11 that is integrated at the bottom side of the first base part 10. The first base part 10 is fastened on the ceiling surface using known means. The first base part 10 has a cylindrical case, and a material such as a power supply circuit, and a control circuit and the like are disposed on an inside.

[030] The first base part 10 has a large-diameter part 10a and a small-diameter part 10b; both are formed into a cylindrical shape. A recess 10c is formed in the front side of the small-diameter part 10b, and the second base part 11 is disposed in this recess 10c. The second base part 11 has a cylindrical case with a smaller diameter than the small-diameter part 10b of the first base part 10. The details are described below. The second base part 11 is rotatably installed on the small-diameter part 10b of the first base part 10. The rotary shaft is set in a manner so that it is oriented vertically, and it is configured in a manner so that the blower 2 and the blower supporting part 3 can integrally rotate when the second base part 11 rotates.

[031] As illustrated in Fig.4, the blower 2 is composed of 7 fan blades 20. There are no particular restrictions with respect to the shape or number of the fan blades 20. It is preferable for the rotation direction of the fan blades 20 to be able to be set to rotate in both the clockwise and

counter-clockwise directions. However, it is also acceptable to limit the rotation direction to only one of these directions.

[032] A cylindrical case 21 is disposed around the periphery of the fan blades 20; it is linked to an impeller guard 22 positioned at a center of the fan blades 20, via three spokes 23. The cylindrical case 21 is formed in a ring-like shape when viewed from the front, and has an inner diameter that is slightly larger than an outermost diameter of the fan blades 20.

[033] The illuminating part 4 is covered by a translucent cover 40. The cover 40 is formed in a ring-like shape when viewed from the front. Fig. 5 is a front side view showing a state in which the cover 40 has been removed. Fig. 6 is a sectional view of A-A in Fig. 5. Fig.7 is a sectional view of B-B in Fig. 5. The cover 40 is disposed above an illumination substrate 45 (floor surface side) so that it can be freely attached and detached. A known locking member 41 for locking the cover 40 on top of the illumination substrate 45 is disposed at three locations along the circumferential direction. Preferably, the illumination substrate 45 is metal and it is equipped with a heat radiation functionality.

[034] The top of the illumination substrate 45 is equipped with LED substrate 42 equipped with many integrated LEDs 43. The tops of the LED substrates 42 are equipped with a diffusion cover 44 that covers the LEDs 43. The diffusion covers 44 are translucent and attain uniform illumination by diffusing light that is illuminated from the LEDs 43. The diffusion covers 44 have functionality that protects the LED substrates 42 from being touched by a user's hands or the like.

[035] Fig. 5 illustrates a state in which the diffusion covers 44 are removed. The LED substrates 42 have a 'V' shape, and four are arranged along a circumferential direction. Four diffusion covers 44 are also arranged in the same manner. It is acceptable for the LED substrates 42 to be arch-shaped, but there are no particular restrictions with respect to the shape. It is also possible appropriately to set the number arranged for the diffusion covers 44 and the shape of the LED substrates 42. When disposing a plurality of LED substrates 42, the adjacent metal sheets are electrically-connected via wiring.

[036] A ring-like gap is formed between the inner circumference of the cover 40 of the illuminating part 4 and the outer circumference of the cylindrical case 21 for the blower 2 (see Fig. 5). As described below, the blower 2 has tilting functionality, but a necessary gap must be ensure to allow for the tilting functionality to be easily driven.

[037] As can be understood from Fig. 3, the tips of the fan blades 20 will still slightly project more to the front side than the cover 40 for the illuminating part 4 even if the blower 2 is not tilted. The rear parts of the fan blades 20 will not project from the illuminating part 4 while the blower 2 is not tilted.

[038] The illumination linking parts 5 link the illumination substrate 45 of the illuminating part 4, the first base part 10, and the large-diameter part 10a together. The three illumination linking parts 5 have an empty space inside of them, and one of these illumination linking parts 5 is used to feed wire. For that reason, it is possible to supply power to the illuminating part 4.

[039] As can be understood from Fig. 6, the blower 2 is supported by a blower supporting part 3 that is positioned behind the blower 2. The blower supporting part 3 has a case 32, which houses a blade motor 30 and a motor shaft 31 therein. The fan blades 20 are installed on the motor shaft 31 so that the fan blades 20 can be rotationally-driven. The fan blades 20 are screwed into the motor shaft 31 via a cap 33 that has a screw.

[040] The cylindrical case 21 is constituted by a first case part 21a on a front side and a second case part 21b on the rear side being joined. The first case part 21a is joined to the second case part 21b so that they can be freely attached and detached, whereby making it possible to remove the first case part 21a. For that reason, it is possible to remove the fan blades 20 for cleaning, or the like. The first case part 21a is integrated with the spokes 23, whereby the first case part 21a can be integrally removed with the spokes 23.

[041] The second case part 21b is linked with the blower supporting part 3 via three spokes 24 (see Fig. 6). The material for the member for constituting the cylindrical case 21 may be appropriately selected such as from metal, or resin, or the like.

[042] The rear side surface 32a of the case 32 is formed into a spherical surface (or spherical shape). This allows for an empty space to be ensured to prevent interference with the second base part 11 when the blower 2 and the blower supporting part 3 are integrally tilted and driven.

[043] Next, the tilting mechanism that t tilts the blower 2 relative to the ceiling surface will be described. This tilting mechanism can appropriately adjust the blowing direction of the blower 2 in consideration of the indoor conditions, whereby it is possible further to improve the indoor air circulation.

[044] Fig. 8 is a sectional view that illustrates a state in which the blower 2 is tilted. Fig. 9 is a side view of a state in which the illuminating part 4 has been removed. For that reason, it is possible to change the blowing direction of the blower 2. The blowing direction can be operated using a remote control (not illustrated). The tilting angle in the examples depicted in Fig. 8 and Fig. 9 is 12^{o} relative to a level surface. It is also acceptable to allow the tilting angle to be changed in steps or not in steps.

[045] As illustrated in Fig.7 and Fig.9, the blower supporting part 3 can be rotated around the horizontal axis X relative to the second base part 11. For that reason, it is possible to tilt and drive the blower supporting part 3 relative to the second base part 11. A pair of bearings 34 have been disposed to provide support so that rotation can be performed (see Fig.7). A gear 35 is disposed to one of these bearings 34, which is driven by a gear and a tilting drive motor (not illustrated) disposed at the second base part 11. A rotary shaft for the gear 35 is oriented in the horizontal direction. The range in which the gear 35 can be rotated is, for example, set to 18^{o} or less, whereby the tilting angle will be restricted. For example, by disposing an appropriate mechanical stopper and/or a sensor that detects the rotation angle, it is possible to control the tilting range and the tilting angle.

[046] Next, the rotation mechanism that rotates the second base part 11 around the vertical shaft relative to the first base part 10 will be described. As previously described, a tilting

mechanism is disposed, but it rotate the blower 2 in a tilted state. This makes it possible evenly to blow indoors.

[047] Fig. 10 is a sectional view of C-C in Fig. 3. The rotation mechanism is composed of a large-diameter gear 60 that is fastened to the first base part 10 side and a small-diameter gear 61 that is disposed on the second base part 11 side. The small-diameter gear 61 is rotated and driven by a rotary motor (not illustrated). This rotary motor is mounted on the second base part 11. When the small-diameter gear 61 is driven, the small-diameter gear 61 moves to revolve around the large-diameter gear 60 because the large-diameter gear 60 is fastened. For that reason, the second base part 11 is rotated and driven relative to the first base part 10, and the blower 2 and the blower supporting part 3 that are disposed at the second base part 11 are rotated and driven together.

[048] A central shaft 62 for rotational driving is disposed in the vertical direction. Power is supplied from the power source part, which is disposed on the first base part 10 to the second base part 11 via the central shaft 62. A known slip ring mechanism (not illustrated) is also disposed smoothly to supply power via the rotating part(s). The power that is supplied to the second base part 11 is supplied to the blower 2 and the illuminating part 4, and supplied to the tilting drive motor and the rotary motor.

Alternative Embodiment

[049] Although the first base part 10 in this embodiment is composed of two cylindrical parts, namely a large-diameter part 10a and a small-diameter part 10b, there are no limitations to the shape of the first base part 10. For example, it is also acceptable to constitute the first base part 10 using a backward-facing frustum shape. The shape of the second base part 11 is also not limited only to a cylindrical shape. It is also acceptable to constitute the second base part 11 using other shapes such as a frustum shape, or the like.

Explanation of the Reference Numerals

1 Base part

10 First base part

10a Large-diameter part

10b Small-diameter part

10c Recess

11 Second base part

2 Blower

20 Fan blade

21 Cylindrical case

21a First case

21b Second case

3 Blower supporting part

30 Blade motor

31 Motor shaft

32 Case

34 Bearing

4 Illuminating part

40 Cover

42 LED substrate

43 LED

44 Diffusion cover

5 Illumination linking part

60 Large-diameter gear

61 Small-diameter gear

62 Central shaft

2026201622 03 Mar 2026

CLAIMS

1. A blowing apparatus with illumination functionality, comprising:

a base part installed on a ceiling surface;

a blower disposed on the bottom side of the base part;

a blower supporting part that supports the blower;

an illuminating part that is positioned in a ring-like manner around the outer periphery of the blower;

an illumination linking part that links the illuminating part and the base part; and

a tilting mechanism that tilts the blower relative to the ceiling surface.

2. The blowing apparatus with illumination functionality according to claim 1, wherein the base part is equipped with a first base part positioned on the ceiling surface side and a second base part that is integrated at the bottom side of the first base part, and the second base part and the blower supporting part are linked together via the tilting mechanism.

3. The blowing apparatus with illumination functionality according to claim 2, wherein a rotation mechanism is disposed that rotates the second base part relative to the first base part around a vertical shaft.

4. The blowing apparatus with illumination functionality according to claim 2, wherein the tilting mechanism includes a mechanism that rotatably supports the blower supporting part on the shaft that is set in a horizontal direction.

5. The blowing apparatus with illumination functionality described in Claim 3, characterized in that the second base part has an integrated rotary motor that is comprised of a tilting drive motor, which comprises the tilting mechanism, and the rotation mechanism.

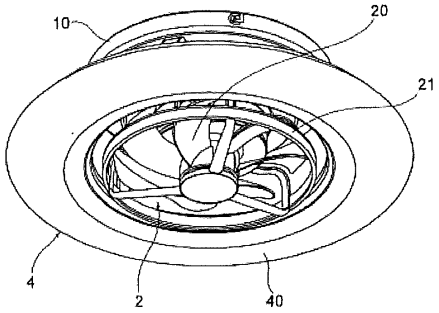
6. The blowing apparatus with illumination functionality according to any of claims 1 to 5, wherein the blower is equipped with a cylindrical case that is disposed around the periphery of the blower blades, and a ring-shaped gap is formed between this cylindrical case and the illuminating part.

7. The blowing apparatus with illumination functionality according to claim 5, wherein the rotation mechanism is equipped with a large-diameter gear, which is fastened to the first base part, and a small-diameter gear, which is driven by the rotary motor and revolves around a periphery of the large-diameter gear.

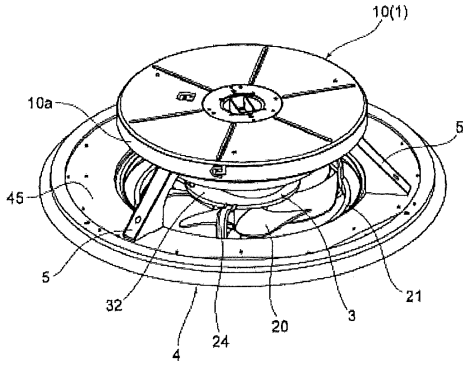
2026201622 03 Mar 2026

FIGURES

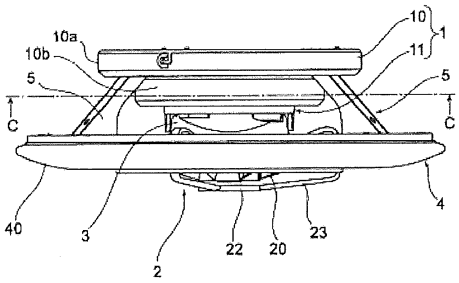
[Fig. 1]



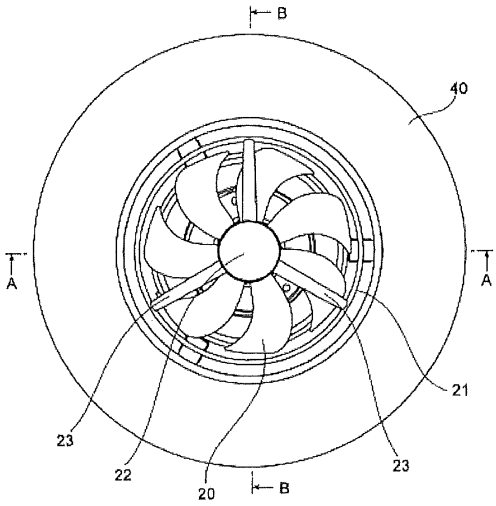
[Fig. 2]



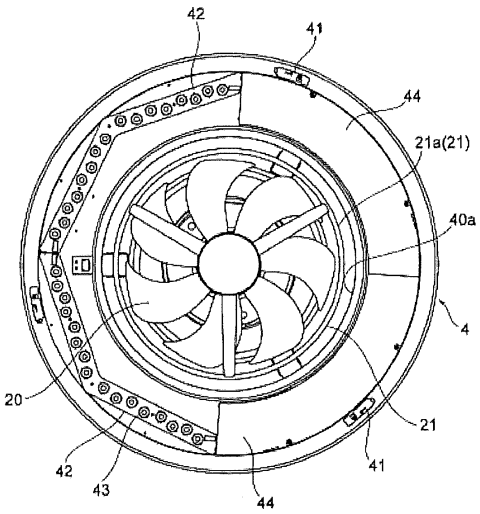
[Fig. 3]



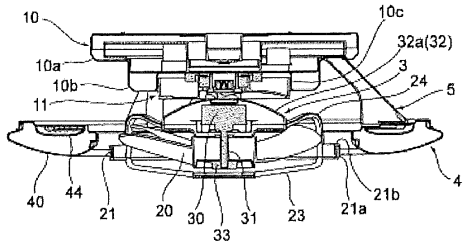
[Fig. 4]



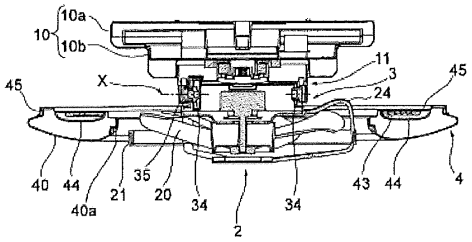
[Fig. 5]



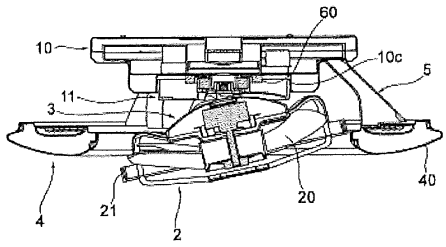
[Fig. 6]



[Fig. 7]

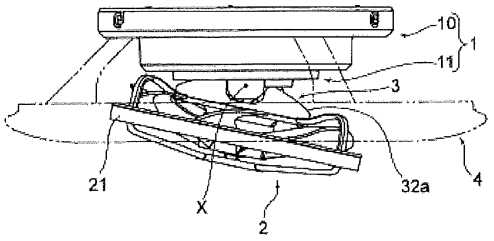


[Fig. 8]



2026201622 03 Mar 2026

[Fig. 9]



[Fig. 10]