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(54) An air-conditioning fan with embedded swinging functions

(57) The present invention provides an air-conditioning fan with embedded swinging functions, comprising: a foundation, a holding portion, a guard net assembly portion and a support casing; the protruding end of the support casing is provided with a movable motor rack; a half-guard net, consisting of an assembly end and an open side, of which the open side is assembled at the guard net assembly portion of the foundation; an embedded rotary fan assembly, consisting of a drive motor, a rotary vane, a crank linkage and a rotary motor; of which the drive motor is assembled into the support casing; after penetrating a spherical abutting seat, the rotating shaft of the drive motor is universally pivoted and abutted onto the movable motor rack via the spherical abutting seat; the second linkage end of the crank linkage is designed in an axial tilt state, so an included angle is formed axially between the first and second linkage ends; with this design, the rotary vane of the air-conditioning fan can swing in an axial tilt state to change automatically wind outlet direction, so it is possible to increase the multi-directional wind outlet and achieve excellent structural robustness, lower vibration and noise with improved applicability.

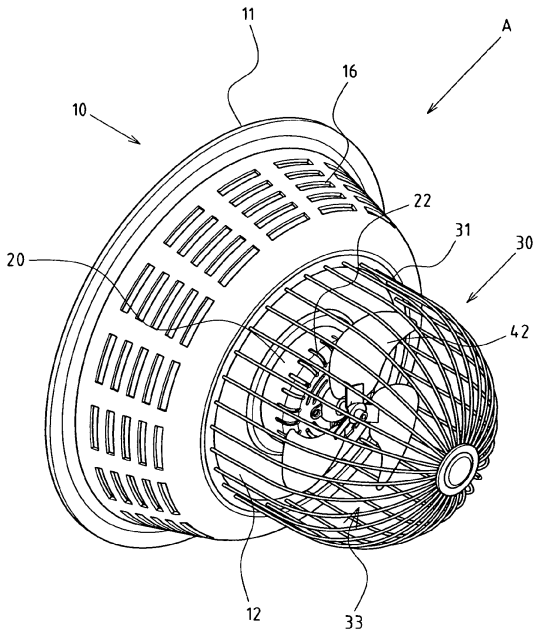

FIG.1

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Description

BACKGROUND OF INVENTION

1. Field of the Invention

[0001] The present invention relates generally to an air-conditioning fan with embedded swinging functions, and more particularly to an innovative one which is designed with a rotary vane fitted with an embedded swinging device.

2. Description of Related Art

[0002] The air-conditioning fan of the present invention refers to a fan that supplies air through the rotation of rotary vane.

[0003] The currently available rotary-vane fan comprises structurally oscillating and cover-rotating types in view of the wind direction; while the rotary vane of said oscillating fan is rotated, the headstock is driven to generate oscillating motion for changing automatically the wind direction; however, as the oscillating rotary-vane fan shifts reciprocally along a path of fixed height, the wind outlet cannot be expanded upwards and downwards, making it unsuitable for some operating environments; on the other hand, as the pivot of the oscillating rotary-vane fan is located at lower rear of the headstock, when the headstock swings, the outer casing of the rotary vane will swing greatly by focusing on the aforementioned pivot, leading to an increase of volume of the rotary-vane fan requiring for a larger space.

[0004] As for the cover-rotating rotary-vane fan, the fan casing is designed to be pivoted onto a diversion frame, such that the wind direction can be changed with the rotation of the diversion frame; yet, as the diversion frame of the cover-rotating rotary-vane fan could realize the wind diversion effect via several inclined plates, the inclined structure of the inclined plate impedes air current to some extent, resulting in remarkable reduction of air supply performance of the rotary-vane fan; and depressed aperture of these plates brings about inconvenient cleaning by the users.

[0005] As for the big-sized industrial rotary-vane fan, the rotary vane is generally made of metal sheets to generate strong wind, and the framework is positioned by a robust support; since certain industrial rotary-vane fans eliminate the swinging functions for the intended robustness, the wind outlet will be reduced to cut down its applicability, thus increasing the probability of removing manually the rotary-vane fan by the user; in this process, the hands are possibly hurt by the sharp rotary vane (especially in the operating conditions), causing the safety hazards.

[0006] Thus, to overcome the aforementioned problems of the prior art, it would be an advancement if the art to provide an improved structure that can significantly improve the efficacy.

[0007] Therefore, the inventor has provided the present invention of practicability after deliberate design and evaluation based on years of experience in the production, development and design of related products.

SUMMARY OF THE INVENTION

[0008]

1. As the drive motor and the rotary vane can swing in an axial tilt state to change automatically the wind outlet direction, and the wind outlet direction of the rotary vane varies uniquely along a circular path, it is possible to increase the multi-directional wind outlet with better efficiency and applicability.
2. When the drive motor and the rotating shaft swing circularly in an axial tilt state, the front end of the drive motor can be abutted onto the movable motor rack of the support casing with the help of spherical abutting seat, so as to realize a stable and universal support on the spherical surface, and achieve a reliable, low-noise and high-performance swinging.
3. Based on the structural design that said half-guard net is directly assembled onto the assembly surface of the foundation, and both the half-guard net and the embedded rotary fan assembly are positioned onto the foundation of stronger rigidity, it is possible to achieve excellent structural robustness, lower vibration and noise for more stable and smooth swinging of the rotary vane, thereby improving the quality and applicability of the air-conditioning fan with embedded swinging functions.
4. Based on the structural design that a lateral wind inlet is arranged onto periphery of the support casing, and the lateral wind inlet is elongated, the air inlet effect could be further improved.

[0009] Although the invention has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention as hereinafter claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

FIG. 1 shows an assembled perspective view of the preferred embodiment of the present invention.
FIG. 2 shows an exploded perspective view of the preferred embodiment of the present invention.
FIG. 3 shows a partially exploded perspective view of the preferred embodiment of the present invention.
FIG. 4 shows an assembled sectional view of the preferred embodiment of the present invention.
FIG. 5 shows an application view that the present invention is assembled under the ceiling.

FIG. 6 shows an application view of the present invention that the depth of the lateral wind inlet is increased.

FIG. 7 shows an outside view of the air-conditioning fan of the present invention.

FIG. 8 shows another outside view of the air-conditioning fan of the present invention.

FIG. 9 shows an assembled plain view showing the other preferred embodiment of the air-conditioning fan of the present invention.

FIG. 10 shows an assembled schematic view showing the other preferred embodiment of the air-conditioning fan of the present invention that the half-guard net is provided with a removable portion.

FIG. 11 shows a partially assembled sectional view showing the other preferred embodiment of the air-conditioning fan of the present invention.

FIG. 12 shows an enlarged view of position B in FIG. 11.

FIG. 13 shows another application view of the rotary motor of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0011] FIGS. 1~3 depict preferred embodiments of an air-conditioning fan of the present invention with embedded swinging functions, which, however, are provided for only explanatory objective for patent claims; said air-conditioning fan A comprising:

a foundation 10, consisting of a support 11 and an assembly surface 12;

a holding portion 13, arranged depressedly at central section of the assembly surface 12 of the foundation 10;

a guard net assembly portion 14, arranged around the assembly surface 12 of the foundation 10;

a support casing 20, protruded into a hollow casing, assembled at the central section of the assembly surface 12 of the foundation 10 correspondingly to the holding portion 13; the protruding end of the support casing 20 is provided with a movable motor rack 21, which is designed into a spherical pattern;

a half-guard net 30, with a protruded and half-guard pattern; the half-guard net 30 consists of a assembly end 31 and an open side 32, of which the open side 32 is assembled at the guard net assembly portion 14 of the foundation 10; a spacing between the assembly end 31 and the support casing 20 is used to form a holding space of rotary vane 33;

an embedded rotary fan assembly 40, consisting of a drive motor 41, a rotary vane 42, a crank linkage 43 and a rotary motor 44; of which the drive motor 41 is assembled into the support casing 20; after penetrating a spherical abutting seat 411, the rotating shaft 412 of the drive motor 41 is universally pivoted and abutted onto the movable motor rack 21 via the spherical abutting seat 411; then the rotary vane 42 is mounted at the end of the rotating shaft 412, and located in its holding space 33; the rotary motor 44 is accommodated into the holding portion 13 on the assembly surface 12 of the foundation 10; the crank linkage 43 consists of the first linkage end 431 and the second linkage end 432, of which the first linkage end 431 is linked to the drive shaft of the rotary motor 44, and the second linkage end 432 linked to the rear end of the drive motor 41; referring also to FIGS. 3, 6, bulges 413 and grooves 210 are arranged at interval between the periphery of the spherical abutting seat 411 and the spherical movable motor rack 21; the bulges 413 are mated with the grooves 210; moreover, the width of said bulge 413 is smaller than that of said groove 210, so the spherical abutting seat 411 can swing universally in the spherical movable motor rack 21, and can also be limited properly with the mating of the bulge 413 and the groove 210 (note: as the vibration caused by the rotation of the axle center 412 may drive the displacement of the drive motor 41, so limitation is required from the mating of the bulge 413 and the groove 210);

of which, the second linkage end 432 of the crank linkage 43 is designed in an axial tilt state, so an included angle X is formed axially between the second linkage end 432 and the first linkage end 431 (marked in FIG. 4).

of which, a hollow holding space 15 is placed peripherally within the foundation 10, and a lighting 50 is assembled within the hollow holding space 15; a transparent frame 16 is arranged at periphery of the foundation 10, so that the ray from the energized lighting 50 can be transmitted from the transparent frame 16;

of which, said lighting 50 consists of an annular lamp and at least mood lamp 51, of which said mood lamp 51 is either a small lamp or an LED, which is used for illumination, decoration and projection for improving the indoor mood via the lighting 50;

of which, the support 11 of the foundation 10 is designed into a wall-abutted surface, so that the air-conditioning fan can be wall-mounted or hung vertically under the ceiling (i.e.: a ceiling fan), as shown in FIG.5.

[0012] Referring to FIGS. 7, 8, the support 11 B of the foundation 10 is designed into a rack, so that the air-conditioning fan A can be placed stably on the ground or table.

[0013] Of which, the guard net assembly portion 14 of the foundation 10 is designed into an annular grooved pattern, and the open side of the half-guard net 30 is provided with an annular embedded flange 34, allowing to be positioned onto the guard net assembly portion 14 of annular grooved pattern for stable positioning purpose.

[0014] Of which, a lateral wind inlet 22 is arranged at periphery of the support casing 20; said lateral wind inlet

22 is designed with varying length, as disclosed in FIG. 6, the lateral wind inlet 22 is elongated to increase the air inlet.

[0015] Based on above-specified structural design, the present invention is operated as follows:

Referring to FIGS. 4, 5, when the rotary motor 44 of the embedded rotary fan assembly 40 is activated to rotate the drive shaft, the crank linkage 43 will be driven for rotation, so the second linkage end 432 of the crank linkage 43 will rotate circumferentially, and then the drive motor 41 along with the rotating shaft 412 will swing circularly in an axial tilt state; hence, even when the foundation 10 of said air-conditioning fan A is not displaced, the rotary vane 42 can swing circularly in an axial tilt state to change automatically wind outlet direction; moreover, the wind outlet direction of the rotary vane 42 varies uniquely along a circular path, enabling to increase the multi-directional wind outlet with better efficiency; on the other hand, when the drive motor 41 along with the rotating shaft 412 swings circularly in an axial tilt state, the front end of the drive motor 41 can be abutted onto the movable motor rack 21 of the support casing 20 with the help of spherical abutting seat 411, so as to realize a stable and universal support on the spherical surface.

[0016] Referring also to FIGS. 9, 10, 11 another preferred embodiment of said air-conditioning fan A, the first difference lies in that, a removable portion 35 is arranged at central section of the half-guard net 30B, so that the half-guard net 30B is divided into a locating frame 36 and a removable shield 37; said removable portion 35 is located by a snapper, enabling the user to remove easily and quickly the removable shield 37 (shown in FIG. 10) for cleaning or maintenance of the rotary vane 42; the second difference lies in the assembly pattern of the half-guard net 30B, support casing 20 and the guard net assembly portion 14 of the foundation 10; as shown in FIGS. 11, 12, an inward flange 38 is formed onto the open side 32 of the half-guard net 30B, and the assembly end of the support casing 20 is fitted with an outward flange 23 to limit said inward flange 38; additionally, a limiting frame 60 is set to limit simultaneously the outward flange 23 and inward flange 38 onto the guard net assembly portion 14 of the foundation 10, and then bolted by a bolt 61; the outward flange 23 is locked into the screw hole 140 preset on the guard net assembly portion 14, so that the half-guard net 30B and support casing 20 are positioned simultaneously.

[0017] Referring also to FIG. 13, the holding portion 13 is also provided with a holder 131, so that the rotary motor 44 is arranged at rear end of the drive motor 41; the second linkage end 432 of the crank linkage 43 is linked to the drive shaft of the rotary motor 44, while the first linkage end 431 of the crank linkage 43 is pivoted onto the holder 131 of the holding portion 13.

Claims

1. An air-conditioning fan with embedded swinging functions, of which the air-conditioning fan comprising:

a foundation, consisting of a support and an assembly surface;
a holding portion, arranged depressedly at central section of the assembly surface of the foundation;
a guard net assembly portion, arranged around the assembly surface of the foundation;
a support casing, protruded into a hollow casing, assembled at the central section of the assembly surface of the foundation correspondingly to the holding portion; the protruding end of the support casing is provided with a movable motor rack, which is designed into a spherical pattern;
a half-guard net, with a protruded and half-guard pattern; the half-guard net consists of a assembly end and an open side, of which the open side is assembled at the guard net assembly portion of the foundation; a spacing between the assembly end and the support casing is used to form a holding space of rotary vane;
an embedded rotary fan assembly, consisting of a drive motor, a rotary vane,
a crank linkage and a rotary motor; of which the drive motor is assembled into the support casing; after penetrating a spherical abutting seat, the rotating shaft of the drive motor is universally pivoted and abutted onto the movable motor rack via the spherical abutting seat; then the rotary vane is mounted at the end of the rotating shaft, and located in its holding space; the rotary motor can be accommodated into the holding portion on the assembly surface of the foundation; the crank linkage consists of the first and second linkage ends, of which the first linkage end is linked to the drive shaft of the rotary motor, and the second linkage end linked to the rear end of the drive motor;
of which, the second linkage end of the crank linkage is designed in an axial tilt state, so an included angle X is formed axially between the first and
second linkage ends.

2. The structure defined in Claim 1, wherein a hollow holding space is placed peripherally within the foundation, and a lighting is assembled within the hollow holding space; a transparent frame is arranged at periphery of the foundation, so that the ray from the energized lighting can be transmitted from the transparent frame.

3. The structure defined in Claim 2, wherein said light-

ing consists of an annular lamp.

4. The structure defined in Claim 2, wherein said lighting consists of at least mood lamp, of which said mood lamp is either a small lamp or an LED.

5. The structure defined in Claim 1, wherein the support of the foundation is designed into a wall-abutted surface, so that the air-conditioning fan can be wall-mounted or hung vertically.

6. The structure defined in Claim 1, wherein the support of the foundation is designed into a rack, so that the air-conditioning fan can be placed stably.

7. The structure defined in Claim 1, wherein the guard net assembly portion of the foundation is designed into an annular grooved pattern, and the open side of the half-guard net is provided with an annular embedded flange, allowing to be positioned onto the guard net assembly portion of annular grooved pattern.

8. The structure defined in Claim 1, wherein a lateral wind inlet is arranged at periphery of the support casing.

9. The structure defined in Claim 1, wherein a removable portion is arranged at central section of the half-guard net, so that the half-guard net is divided into a locating frame and a removable shield; said removable portion can be removed easily and quickly by means of snapping.

10. The structure defined in Claim 1, wherein an inward flange is formed onto the open side of the half-guard net, and the assembly end of the support casing is fitted with an outward flange to limit said inward flange; a limiting frame is set to limit simultaneously the outward flange and inward flange onto the guard net assembly portion of the foundation, and then bolted by a bolt; the outward flange is locked into the screw hole preset on the guard net assembly portion, so that the half-guard net and support casing are positioned simultaneously.

11. The structure defined in Claim 1, wherein bulges and grooves are arranged at interval between the periphery of the spherical abutting seat and the spherical movable motor rack.

12. The structure defined in Claim 1, wherein the holding portion is provided with a holder, so that the rotary motor is arranged at rear end of the drive motor; the second linkage end of the crank linkage is linked to the drive shaft of the rotary motor, while the first linkage end of the crank linkage is pivoted onto the holder of the holding portion.

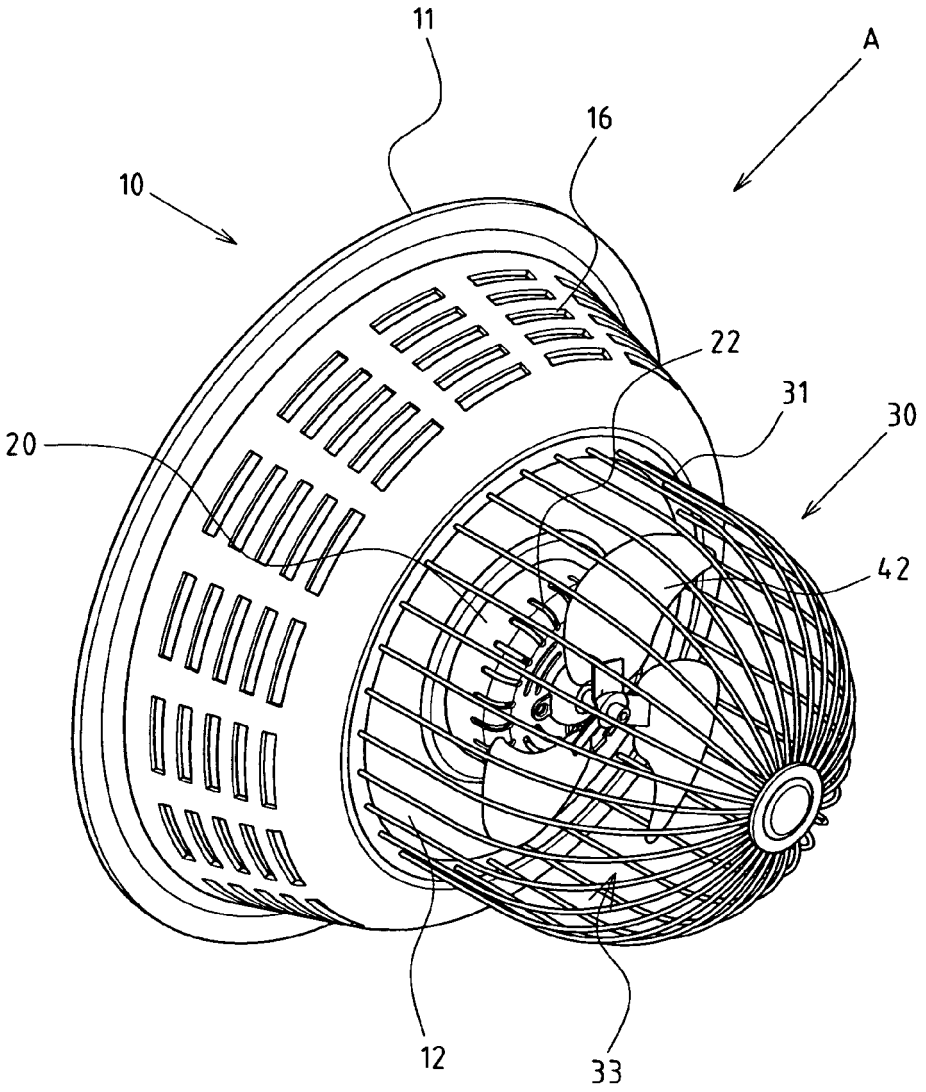

FIG.1

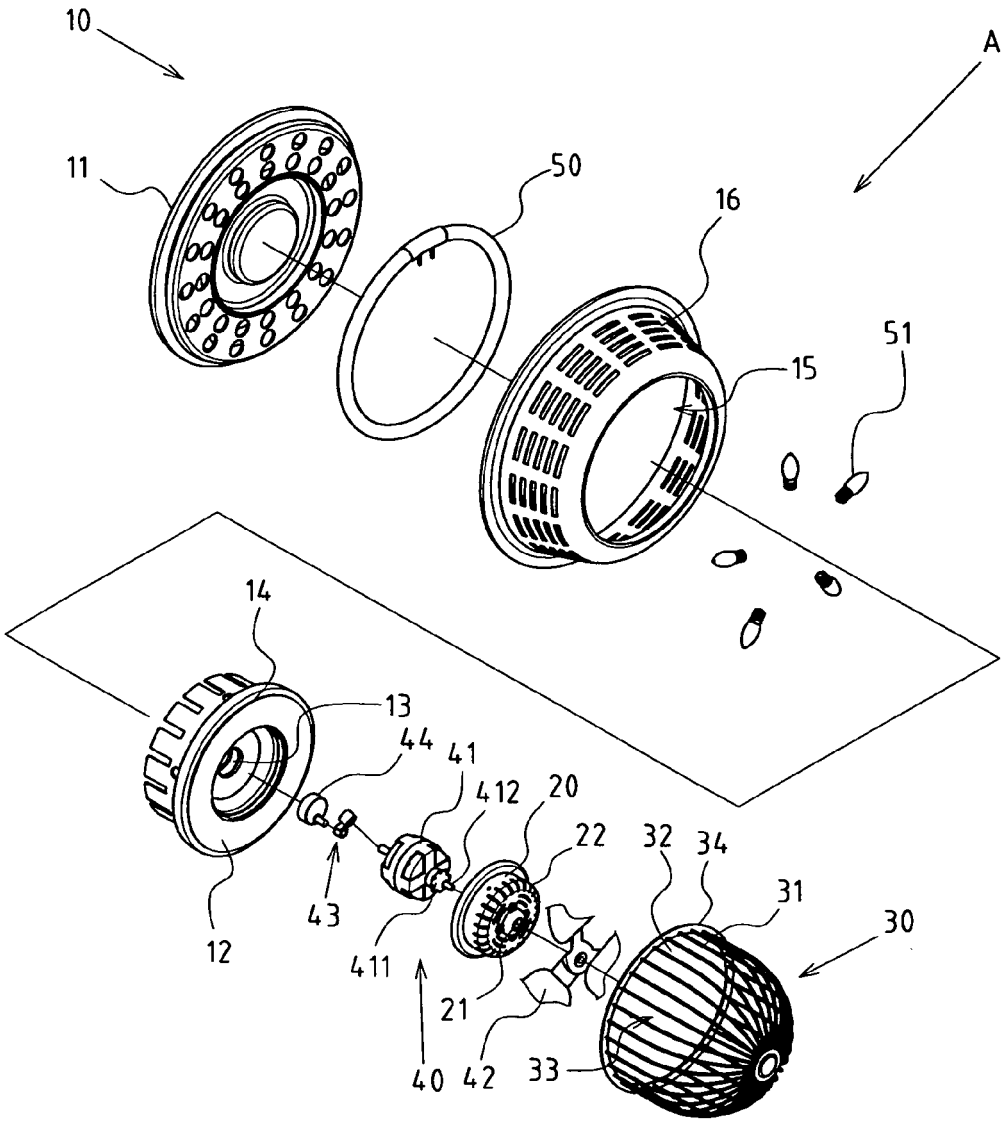
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FIG.2

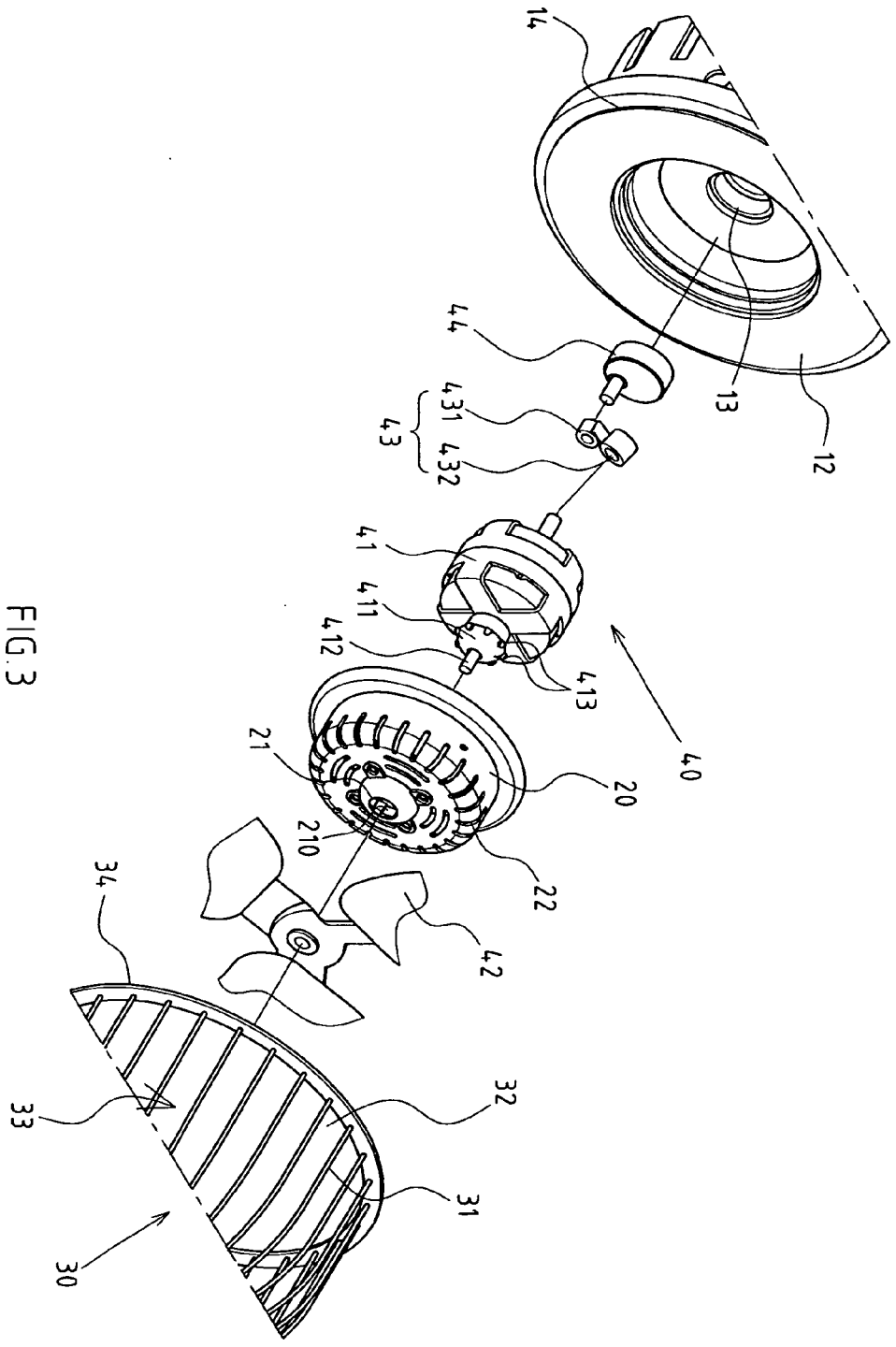
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FIG.3

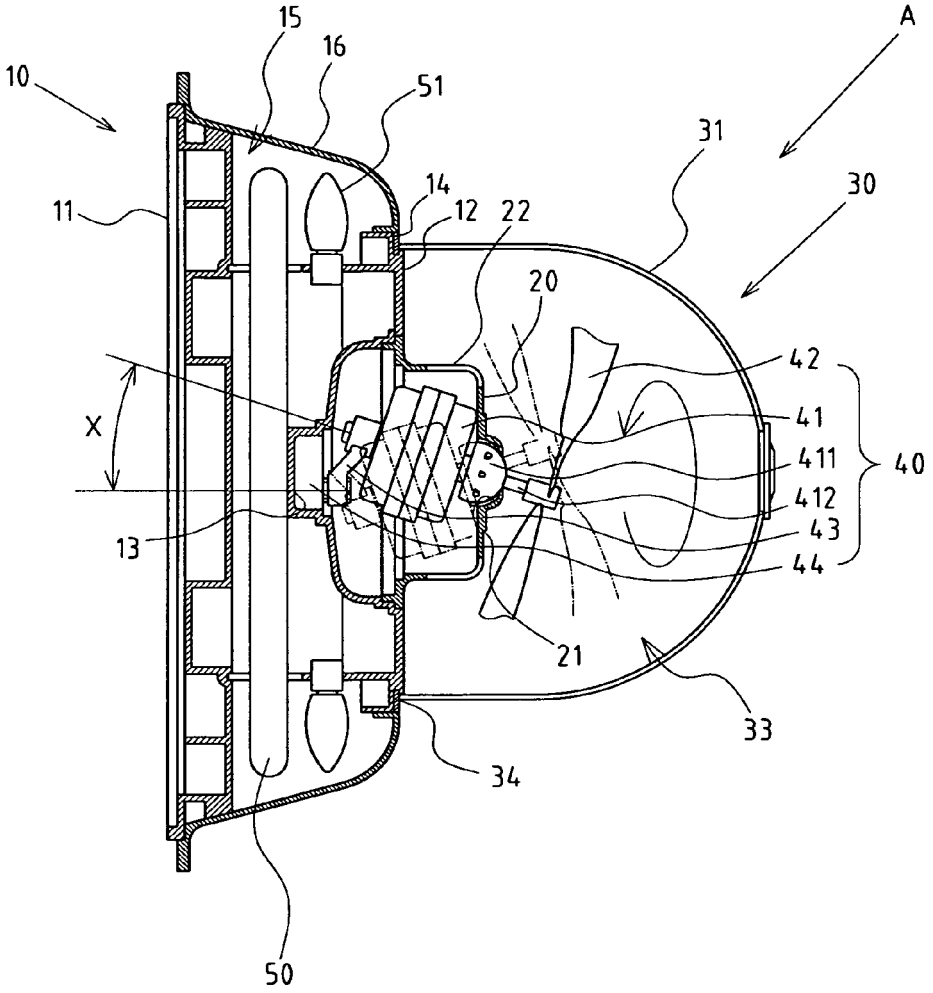
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FIG.4

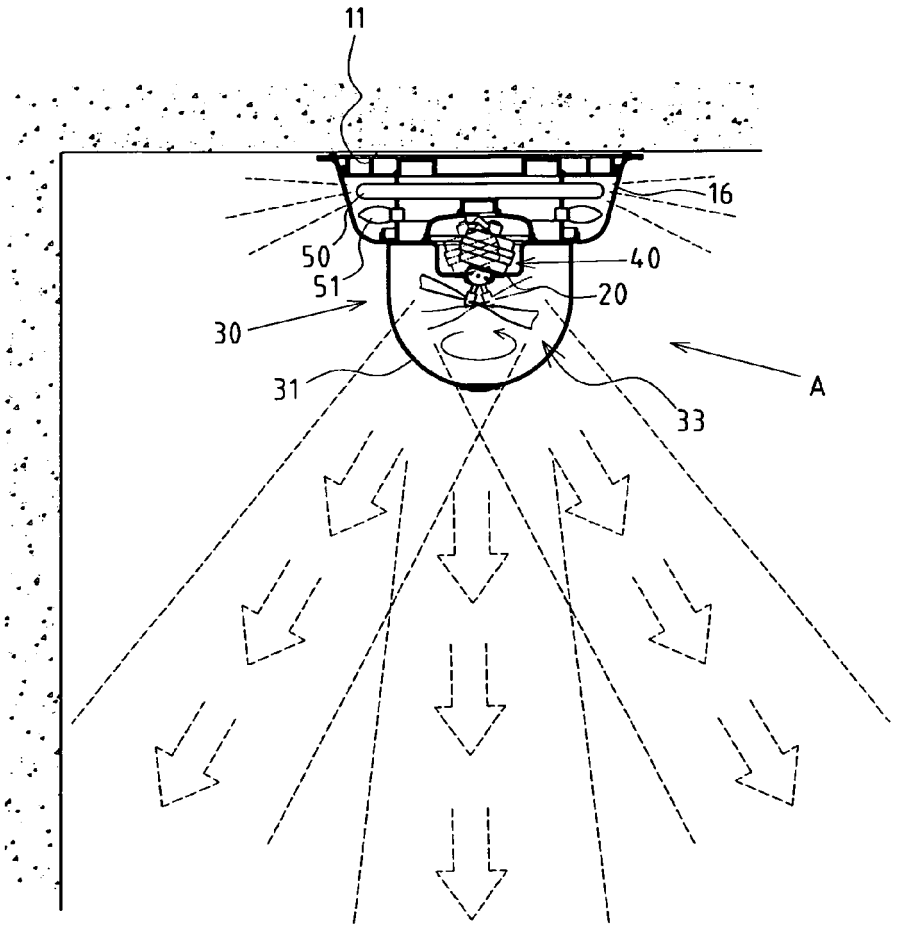

FIG.5

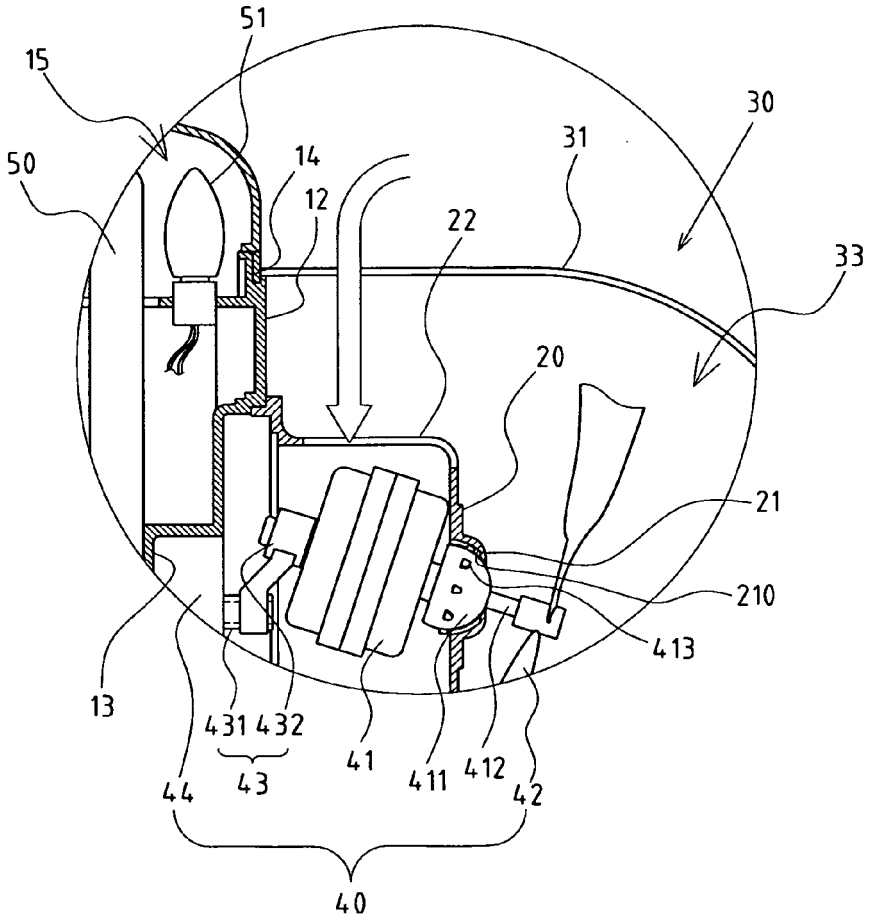
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FIG.6

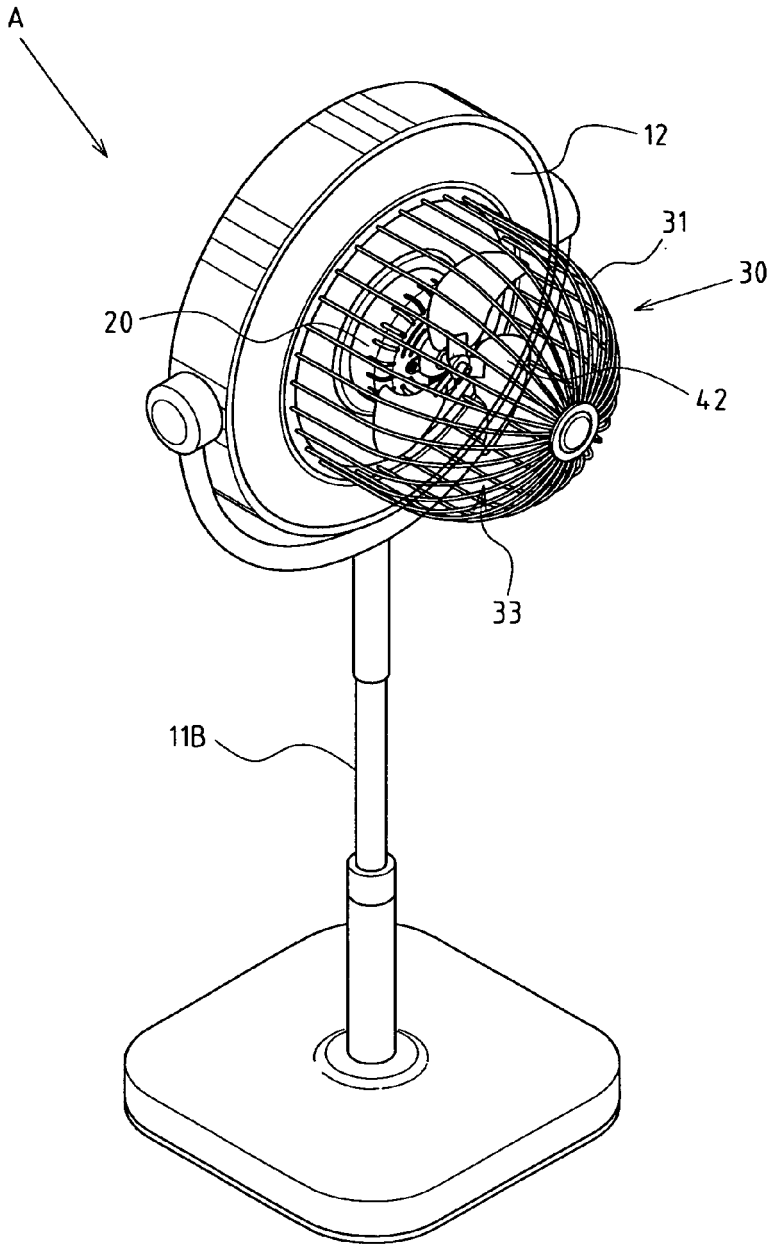

FIG.7

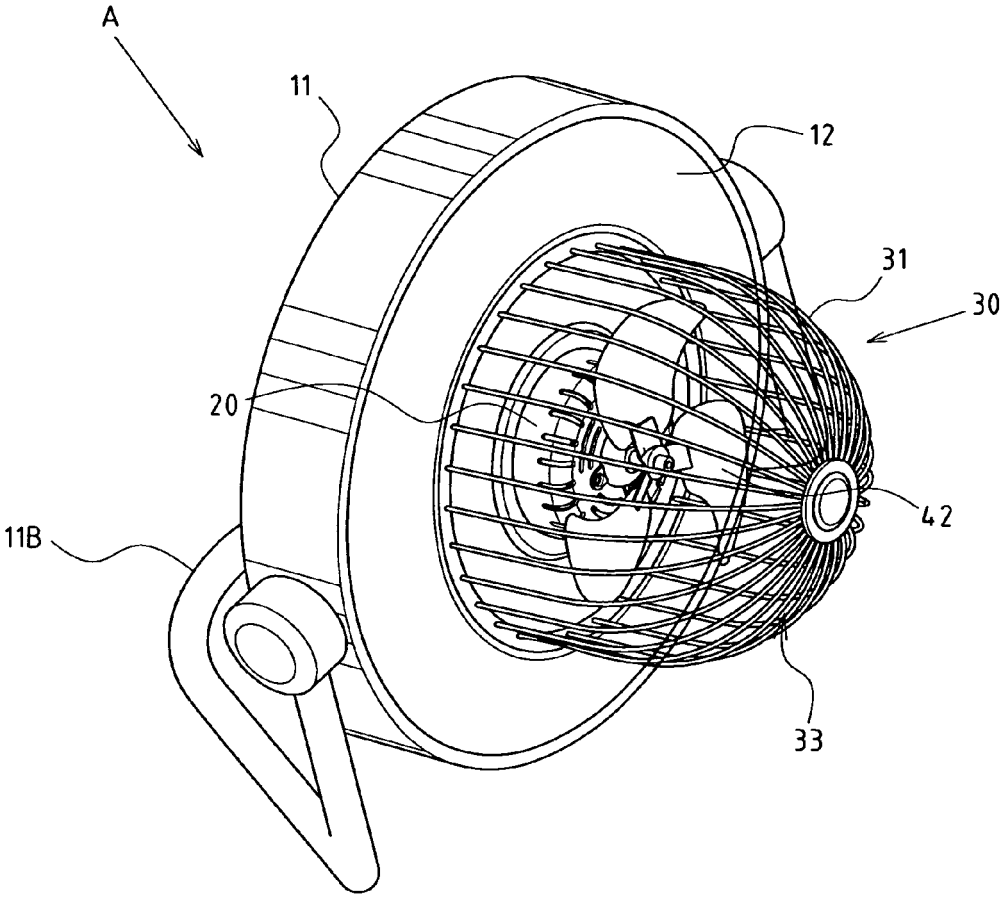

FIG.8

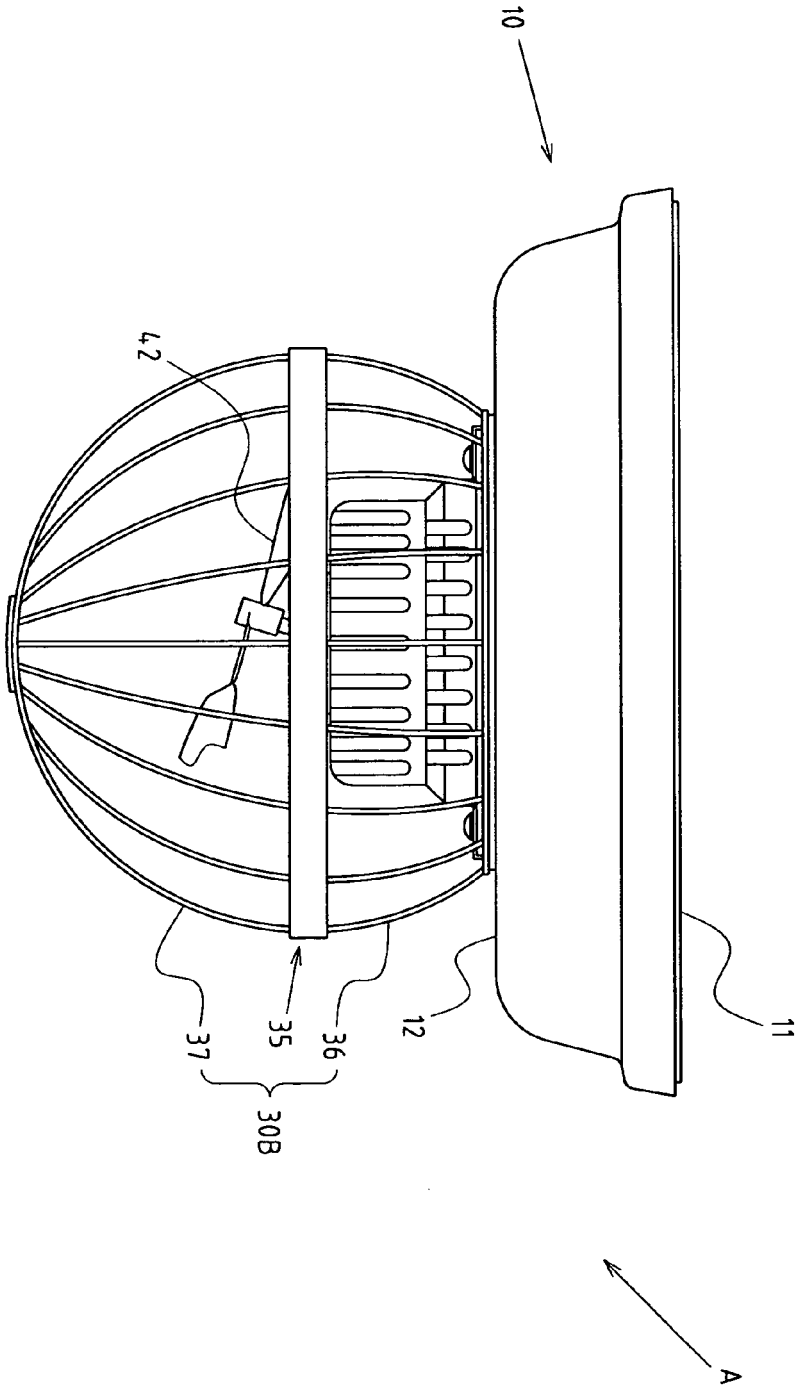

FIG.9

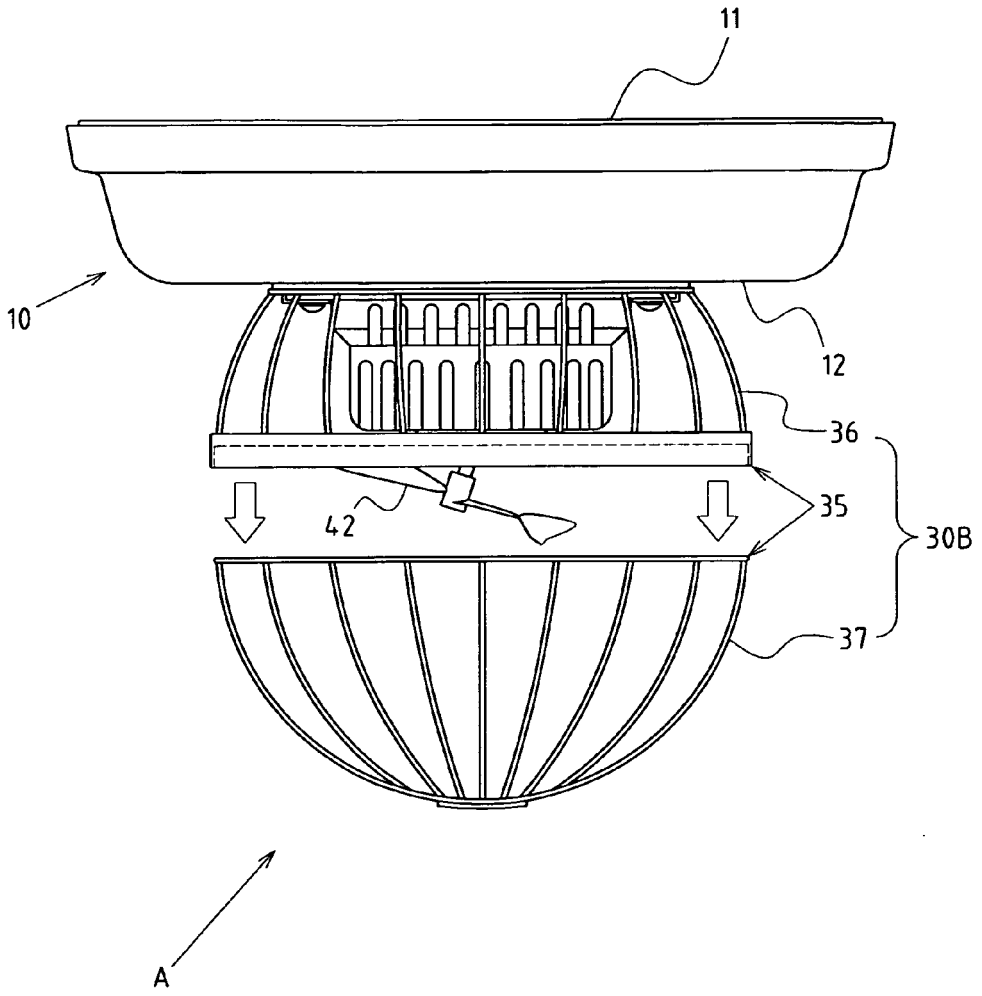

FIG.10

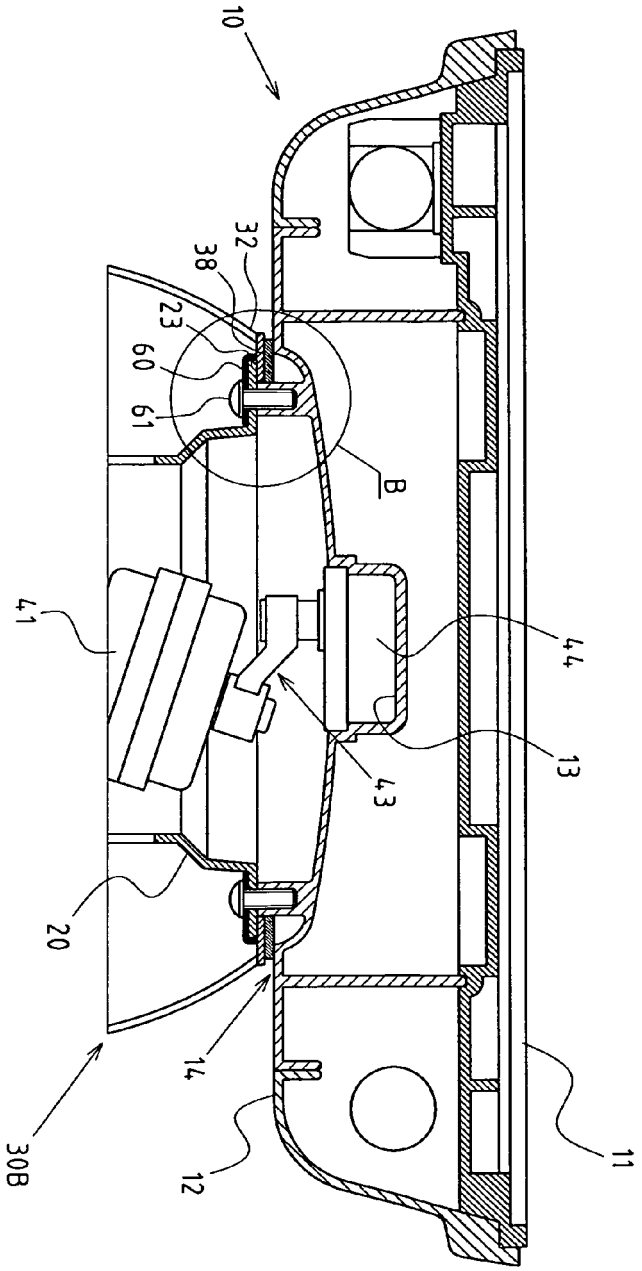

FIG.11

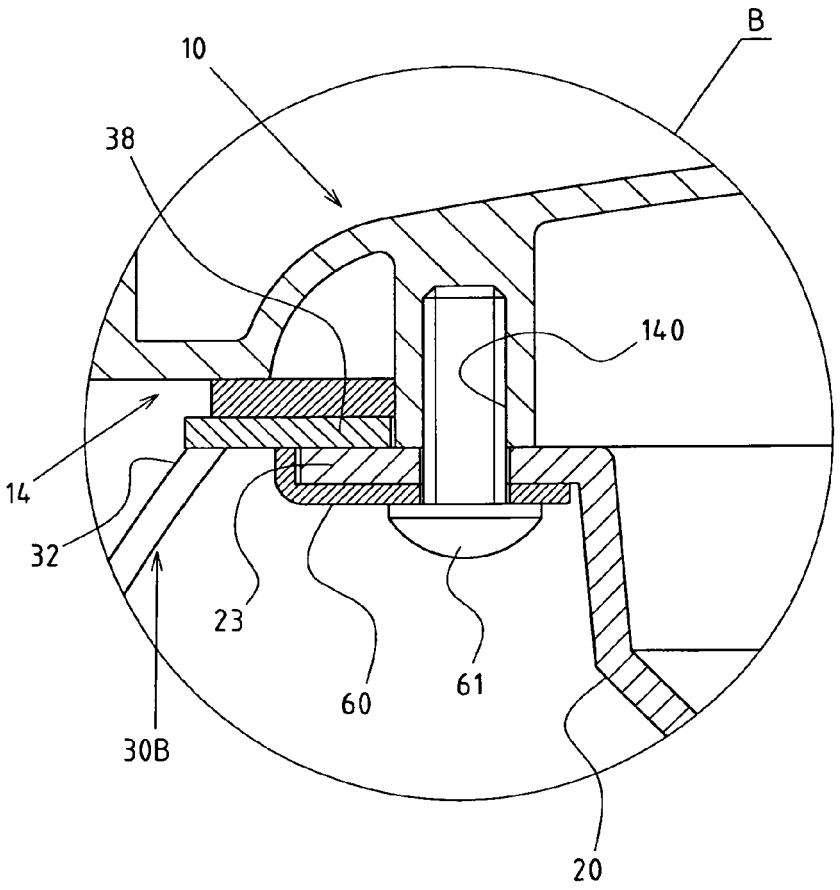

FIG.12

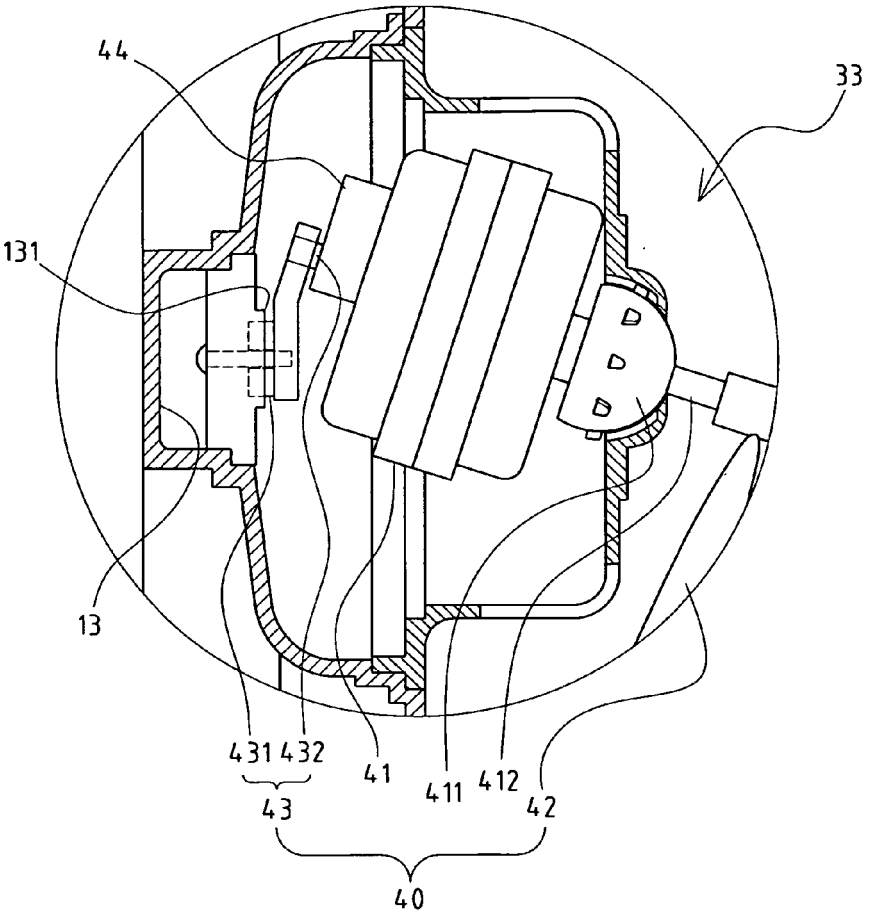

FIG.13

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EUROPEAN SEARCH REPORT

Application Number
EP 10 00 7928

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2008/304969 A1 (FU CHIAO [TW]) 11 December 2008 (2008-12-11) * the whole document * * figure 4 *	1-12	INV. F04D25/10 F04D25/12
A	US 5 743 709 A (JANE RODNEY B [US] ET AL) 28 April 1998 (1998-04-28) * the whole document *	1-12	
A	US 3 160 020 A (HENDRIK BRASKAMP WILLEM) 8 December 1964 (1964-12-08) * figure 1 *	1-12	
A	US 6 171 057 B1 (CHEN YEN-CHING [TW]) 9 January 2001 (2001-01-09) * figure 2 *	1-12	

TECHNICAL FIELDS SEARCHED (IPC)

F04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 December 2010	Ingelbrecht, Peter

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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1 EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 00 7928

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20-12-2010

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82