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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention generally relates to a lamp and, more particularly, to a lamp that is inserted into a ceiling for indoor or outdoor illumination.

2. Description of the Related Art

[0002] Taiwan Patent Publication No. M359644 discloses a lamp cooling apparatus comprising a base plate, an annual cooling seat, a fan and a housing. The base plate has a first face and a second face. The first face is mounted with a plurality of light-radiating elements and the second face is coupled with the annual cooling seat, with a plurality of vents extending from the first face to the second face. The fan is disposed on the annual cooling seat. The housing is coupled to the second face of the base plate in order for the annual cooling seat and the fan to be covered in the housing, wherein the first face that is mounted with the light-radiating elements faces outward. The housing has a plurality of striped vents which allows external air to be drawn into the housing therethrough during rotation of the fan. The drawn-in air flows through the annual cooling seat for air exchange with the hot air generated by the light-radiating elements, and is then drawn out of the lamp via the vents of the base plate.

[0003] An embedded lamp refers to a lamp that is inserted into a "plate ceiling" (that is, the ceiling that is assembled by a plurality of square plates) by inserting its housing into the ceiling so that the first face of the base plate mounted with the light-radiating elements faces downward for light radiation. In this situation, since the housing has been inserted into the plate ceiling, vents of the housing are located above the plate ceiling. However, the area above the plate ceiling is an enclosed space with poor air circulation, therefore resulting in poor heat dissipation. Furthermore, objects such as pipelines, cable lines or heat shield articles may be disposed in the enclosed area. Therefore, air circulation is further impacted.

[0004] As stated above, the conventional lamp has poor heat dissipation due to the structure design thereof, leading to a difficulty in dispelling the heat remained on the annual cooling seat. As a result, the service life of the lamp is reduced as the light-radiating elements are long operated under a high temperature condition. Furthermore, the luminance of the light-radiating elements is also attenuated when the light-radiating elements are at a high temperature.

[0005] Furthermore, another conventional lamp is disclosed by the invention of a US Patent Application Publication No. US 200810165535 A1 and entitled as "Thermally- Managed LED- Based Recessed Down Lights."

An LED down light with a housing can and a ventilation cone is disclosed, wherein an LED array is arranged in the ventilation cone and a gap is formed between the housing can and the ventilation cone. Similar structures are also disclosed by the inventions of US Patent No. 6,095,671 A and European Patent Application No. EP 0730716 A1. However, none of the inventions in the patent application and the two patents discloses a member arranged between the housing can and the ventilation cone to ensure the gap between the housing can and the ventilation cone.

[0006] Therefore, it is desired to improve the conventional lamp.

15 SUMMARY OF THE INVENTION

[0007] It is therefore the primary objective of the invention to provide a lamp with better cooling effect.

[0008] It is another objective of the invention to provide a lamp with a longer service life.

[0009] It is still another objective of the invention to provide a lamp with a consistent level of luminance.

[0010] The invention discloses a lamp comprising a housing, an inner shell, a fan, a heat sink and a lighting module. The housing has a first compartment and a first opening on an end thereof. The inner shell is adapted to be received in the first compartment and has a second compartment and a second opening on an end thereof, wherein the second opening is aligned with the first opening. An air channel is formed between the housing and the inner shell in the first compartment. The inner shell further comprises a through-hole allowing the first compartment to communicate with the second compartment. The fan is located adjacent to the through-hole and has two air-flowing sides for drawing air in and out of the lamp such that the air is allowed to pass through the through-hole. The heat sink has a bottom plate with one face facing the fan. The lighting module is adapted to be coupled to another face of the bottom plate.

40 BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The present invention will become more fully understood from the detailed description given hereinafter and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

Fig. 1 shows an exploded diagram of a lamp according to a first embodiment of the invention.

Fig. 2 shows a side cross sectional view of the lamp according to the first embodiment of the invention.

Fig. 3 shows a side cross sectional view of a lamp according to a second embodiment of the invention.

Fig. 4 shows an exploded diagram of a lamp according to a third embodiment of the invention.

Fig. 5 shows a side cross sectional view of the lamp according to the third embodiment of the invention.

Fig. 6 shows a side cross sectional view of a lamp according to a fourth embodiment of the invention.

Fig. 7 shows an exploded diagram of a lamp according to a fifth embodiment of the invention.

Fig. 8 shows a side cross sectional view of the lamp according to the fifth embodiment of the invention.

[0012] In the various figures of the drawings, the same numerals designate the same or similar parts. Furthermore, when the term "first", "second", "third", "fourth", "inner", "outer", "top", "bottom" and similar terms are used hereinafter, it should be understood that these terms refer only to the structure shown in the drawings as it would appear to a person viewing the drawings and are utilized only to facilitate describing the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0013] Referring to Figs. 1 and 2, a lamp is disclosed according to a first embodiment of the invention. The lamp comprises a housing 1, an inner shell 2, a fan 3, a heat sink 4 and a lighting module 5. The inner shell 2 is received in the housing 1. An air channel A is formed between the housing 1 and the inner shell 2 when the inner shell 2 is received in the housing 1. The fan 3 is located adjacent to a through-hole 24 of the inner shell 2. The heat sink 4 and lighting module 5 are located inside the inner shell 2. During rotation of the fan 3, air can flow in and out of the inner shell 2 through the through-hole 24 in order to have an air exchange with the hot air generated by the lighting module 5. Thus, cooling of the lighting module 5 is achieved.

[0014] The housing 1 comprises a first compartment 11 and a first opening 12 on an end thereof. The housing 1 further comprises a first protrusion 13 which extends outward from a periphery of the first opening 12.

[0015] The inner shell 2 has a second compartment 21 and a second opening 22 on an end thereof. The inner shell 2 further comprises a second protrusion 23 which extends outward from a periphery of the second opening 22. A diameter D1 of the inner shell 2 is preferably smaller than a diameter D2 of the first compartment 11. The second opening 22 preferably has the same shape as the first opening 12. In addition, the second opening 22 preferably has a diameter smaller than that of the first opening 12 such that the second opening 22 is covered in the range of the first opening 12 when the inner shell 2 is received in the first compartment 11. The through-hole 24 extends from an outer surface of the inner shell 2 to an inner surface of the inner shell 2 so that the first compartment 11 is allowed to communicate with the second compartment 21.

[0016] A separation member 14 is disposed between the housing 1 and the inner shell 2, which may be in a stick-like, column-like, block-like or strip-like form, such as ribs, pillars or blocks and so on. The separation member 14 may be disposed on an inner surface of the housing 1 or an outer surface of the inner shell 2 so as to

space the housing 1 from the inner shell 2. In the embodiment, the separation member 14 is in the form of a plurality of ribs disposed on the outer surface of the inner shell 2.

[0017] The fan 3 may guide the air through the through-hole 24 and has two air-flowing sides, namely, an air inlet 31 and an air outlet 32.

[0018] The heat sink 4 is preferably made of a material with high heat conductivity. The heat sink 4 comprises a bottom plate 41 having one face mounted with a plurality of fins 42.

[0019] The lighting module 5 comprises a base plate 51 and a plurality of lighting elements 52. The lighting elements 52 may preferably be light-emitting diodes (LEDs) mounted on one face of the base plate 51.

[0020] Referring to Figs. 1 and 2 again, during assembly of the lamp, the second opening 22 is aligned with the first opening 12 and covered in the range of the first opening 12 when the inner shell 2 is received in the first compartment 11. The housing 1 is spaced from the inner shell 2 by the ribs so that the air channel A is formed between the housing 1 and the inner shell 2. In addition, a ventilation opening B may be formed between the first protrusion 13 and the second protrusion 23 via the separation members 14 separating the housing 1 from the inner shell 2, thereby allowing the external air to flow into the air channel A via the ventilation opening B.

[0021] The fan 3 may be disposed adjacent to or in the through-hole 24, with one air-flowing side thereof communicating with the air channel A and another air-flowing side thereof communicating with the second compartment 21 to allow air flow between the air channel A and the second compartment 21. In the embodiment, the fan 3 is disposed in a location adjacent to the through-hole 24 in the second compartment 21, with the air inlet 31 communicating with the air channel A and the air outlet 32 communicating with the second compartment 21. In this way, external air is drawn into the lamp via the ventilation opening B and flows into the second compartment 21 via the air channel A and the through-hole 24.

[0022] The heat sink 4 is disposed in the second compartment 21, with the face of the bottom plate 41 mounted with the fins 42 preferably facing the air outlet 32. The fins 42 may be evenly spaced on the bottom plate 41. Alternatively, as shown in the embodiment, the fins 42 may be disposed along a periphery of the bottom plate 41 so as to form a circular space for receiving the fan 3.

[0023] The base plate 51 of the lighting module 5 is coupled to another face of the bottom plate 41 not mounted with the fins 42, with the lighting elements 52 facing the second opening 22. A covering plate 25 may be further disposed on the second opening 22. The covering plate 25 is preferably a light-permeable plate that allows passage of light, such as a transparent or translucent plate. The covering plate 25 has a plurality of vents 251 preferably located along a periphery thereof.

[0024] Referring to Fig. 2, when in use, the housing 1 is inserted into a ceiling 9, with the first protrusion 13 of

the housing 1 abutting upward with the ceiling 9. When the fan 3 rotates, the air can flow between the air channel A and the second compartment 21 via the through-hole 24, enabling the air to flow through the heat sink 4 to dispel the hot air generated by the lighting module 5. The direction of air flow may be changed by switching the rotation directions of the fan 3. For example, when the fan 3 rotates in a clockwise direction, the external air is drawn into the second compartment 21 via the ventilation opening B, air channel A and through-hole 24, and then drawn out of the lamp via the vents 251. On the contrary, when the fan 3 rotates in a counterclockwise direction, the external air is drawn into the second compartment 21 via the vents 251, and then drawn out of the lamp via through-hole 24, air channel A and ventilation opening B. Thus, the heat generated by the lighting module 5 is dispelled.

[0025] Regardless of the rotation direction of the fan 3, the ventilation opening B and the vents 251 are allowed to communicate with the external air because the ventilation opening B and the vents 251 are both located beneath the ceiling 9 rather than above the ceiling 9. Thus, the air inside the lamp is allowed to smoothly circulate with the external air. Besides, since the ventilation opening B is separated from the vents 251 by the second protrusion 23, it is avoided that the exhausted hot air be immediately drawn into the lamp again. Thus, better ventilation and cooling effects of the lamp are achieved.

[0026] Referring to Fig. 3, a lamp is disclosed according to a second embodiment of the invention. The lamp comprises a housing 1, an inner shell 2, a fan 3, a heat sink 4 and a lighting module 5. A covering plate 25' is also disposed on the second opening 22 of the inner shell 2.

[0027] In contrast to the previous first embodiment, a separation portion 252' is disposed on one face of the covering plate 25' facing the lighting module 5. The separation portion 252' is preferably in form of an annular lateral wall, with a plurality of vents 251' being located out of an encompassed range of the separation portion 252'. In addition, when the covering plate 25' is assembled in the second opening 22 of the inner shell 2, a top side of the separation portion 252' is in contact with the bottom plate 41 of the heat sink 4, allowing the lighting module 5 to be located inside the encompassed range of the separation portion 252'.

[0028] Based on this, when the fan 3 rotates in one direction, external air is drawn into the lamp via the ventilation opening B and the air channel A before flowing through the through-hole 24 and the heat sink 4, and is finally drawn out of the lamp via the vents 251' of the covering plate 25'. On the contrary, when the fan 3 rotates in another direction, external air is drawn into the lamp via the vents 251' of the covering plate 25', then flows through the heat sink 4 and the through-hole 24 and is finally drawn out of the lamp via the ventilation opening B.

[0029] Despite the rotation directions of the fan 3, the lighting elements 52 or circuit chip of the lighting module

5 is separated from the external air by the separation portion 252', thus avoiding accumulation of dust inside the lamp.

[0030] Referring to Fig. 4, a lamp is disclosed according to a third embodiment of the invention. The lamp comprises a housing 1', an inner shell 6, a fan 3', a heat sink 4' and a lighting module 5'.

[0031] In contrast to the previous embodiment, the inner shell 6 has a second compartment 61 and a plurality of vents 64. The fan 3' is preferably located adjacent to and surrounded by the vents 64 such that the air can flow between the air channel A and the second compartment 61 via the vents 64. The inner shell 6 further comprises an air-guiding cap 65 in form of a plate. The air-guiding cap 65 has an assembly hole 651, an annular portion 652 and an extension portion 653. The assembly hole 651 is located on a center of the air-guiding cap 65 for receiving the fan 3'. The annular portion 652 extends outward and downward in a curved manner from an outer periphery thereof to form the extension portion 653, so as to facilitate the air flows of the lamp. An outer periphery of the extension portion 653 is coupled to the inner shell 6 during assembly. The vents 64 are covered under the air-guiding cap 65 when the air-guiding cap 65 is coupled to the inner shell 6.

[0032] A plurality of supporting columns 66 is disposed between the housing 1' and the inner shell 6. Specifically, the supporting columns 66 are disposed on a second protrusion 63 of the inner shell 6 and abut upward with a first protrusion 13' of the housing 1'. Thus, the housing 1' is spaced from the inner shell 6 by the supporting columns 66.

[0033] Referring to Figs. 4 and 5, during assembly of the lamp, the second opening 22 is aligned with a first opening 12' of the housing 1' and covered in the range of the first opening 12' when the inner shell 6 is received in a first compartment 11'. An air channel A is formed by the supporting columns 66 spacing the housing 1' from the inner shell 6. A ventilation opening B is formed between the second protrusion 63 and the first protrusion 13'.

[0034] Referring to Fig. 5, the fan 3' is disposed in the air-guiding cap 65 and the heat sink 4' is disposed on the inner shell 6. The heat sink 4' comprises a bottom plate 41' having one face mounted with a plurality of fins 42', with the face mounted with the fins 42' preferably facing the fan 3'. The base plate 51 of the lighting module 5 is coupled to another face of the bottom plate 41' not mounted with the fins 42', with the lighting elements 52 facing a second opening 62 of the inner shell 6.

[0035] Referring to Fig. 5, when in use, the housing 1' is inserted into the ceiling 9, with the first protrusion 13' of the housing 1' abutting upward with the ceiling 9. When the fan 3' rotates, the air can flow between the air channel A and the second compartment 61 via the vents 64, enabling the air to flow through the heat sink 4' to dispel the hot air generated by the lighting module 5. Therefore, the third embodiment facilitates not only the ventilation but

also the cooling of the lamp.

[0036] Referring to Fig. 6, a lamp is disclosed according to a fourth embodiment of the invention. The lamp comprises a housing 1", an inner shell 2', a fan 3', a heat sink 4' and a lighting module 5. In contrast to the previous three embodiments, the inner shell 2' has a second compartment 21' extending outward to form a second protrusion 22'. An outer periphery of the second protrusion 22' is coupled to a circumference of a first opening 11" of the housing 1" so as to close the first opening 11". An air channel A is also formed between the housing 1" and the inner shell 2'. The housing 1" has a plurality of vents 12" which is adjacent to the first opening 11" and located on an outer surface thereof.

[0037] When in use, the housing 1" is inserted into the ceiling 9 in a way that allows the vents 12" to communicate with the outside air beneath the ceiling 9. When the fan 3' rotates, the air can be drawn into the lamp via the vents 12" and the air channel A, enabling the air to flow through the heat sink 4' to dispel the hot air generated by the lighting module 5 and then to be drawn out of the lamp via vents 23'. In the embodiment, the lamp has a better visual effect because the first opening 11" is closed by the second protrusion 22'.

[0038] Referring to Figs. 7 and 8, a lamp is disclosed according to a fifth embodiment of the invention. The lamp comprises a housing 7, an inner shell 8, a fan 3, a heat sink 4 and a lighting module 5. In contrast to the first embodiment, the housing 7 comprises a first protrusion 73 abutting with a second protrusion 83 of the inner shell 8 such that a first opening 72 of the housing 7 is closed by the second protrusion 83.

[0039] The housing 7 has a separation member 74 in the form of a labyrinth protrusion which is located in a first compartment 71 thereof and abuts with an inner surface thereof. The inner shell 8 has a separation member 85 also in the form of a labyrinth protrusion abutting with an outer surface thereof. The housing 7 is spaced from the inner shell 8 via the separation members 74 and 85, thus forming an air channel A.

[0040] In the embodiment, the separation members 74 and 85 abut with each other so that the air channel A is separated into a first air channel A1 and a second air channel A2. The inner shell 8 has a through-hole 84 in communication with the first air channel A1. The first air channel A1 communicates with a second compartment 81 of the inner shell 8 via the through-hole 84. The inner shell 8 has a plurality of striped vents 86 in communication with the second air channel A2 such that the second air channel A2 is allowed to communicate with the second compartment 81 via the striped vents 86. The second protrusion 83 of the inner shell 8 has a plurality of first vents 87a and a plurality of second vents 87b, with the first vents 87a communicating with the first air channel A1 and the second vents 87b communicating with the second air channel A2.

[0041] When the fan 3 rotates in one direction, the external air can be drawn into the lamp via the first vents

87a before flowing through the first air channel A1, through-hole 84, second compartment 81, striped vents 86 and second air channel A2, and is finally drawn out of the lamp via second vents 87b. Alternatively, when the fan 3 rotates in another direction, the external air can be drawn into the lamp via the second vents 87b, then flows through the second air channel A2, striped vents 86, second compartment 81, through-hole 84 and first air channel A1, and is finally drawn out of the lamp via first vents 87a. Thus, heat generated by the lighting module 5 is dispelled.

[0042] The first vents 87a and second vents 87b may be selectively located on an outer surface of the housing 7 adjacent to the first opening 72, with the first vents 87a communicating with the first air channel A1 and the second vents 87b communicating with the second air channel A2. In this way, the external air can flow in and out of the lamp through the same paths described above.

[0043] A separation plate 88 may be further disposed in the second compartment 81 of the inner shell 8 so as to separate the second compartment 81 into an upper compartment 81a and a lower compartment 81b, with the through-hole 84 and the striped vents 86 communicating with the upper compartment 81 a. The separation plate 88 has an assembly hole 881, with the lighting elements 52 of the lighting module 5 preferably disposed in the assembly hole 881 and facing the lower compartment 81b. A covering plate 89 may be disposed in the second opening 82 of the inner shell 8, with the covering plate 89 being preferably made of a light-permeable material such as a transparent or translucent plate. With the covering plate 89, the lighting elements 52 or circuit chip of the lighting module 5 is separated from external air, avoiding accumulation of dust inside the lamp.

[0044] As stated above, the air channel and the vents of the lamp are allowed to communicate with the outside air beneath the ceiling when the housing of the lamp is inserted into the ceiling, thus allowing the external air to enter the lamp for air circulation. In this way, heat dissipation of the lamp is increased.

[0045] The invention facilitates heat dissipation of a lighting module of a lamp by providing the lamp with better air circulation and cooling effect, thereby prolonging the service life of the lamp.

[0046] The invention facilitates heat dissipation of a lighting module of a lamp so that the luminance attenuation of the lighting module resulting from operation at a high temperature is avoided.

[0047] Although the invention has been described in detail with reference to its presently preferable embodiment, it will be understood by one of ordinary skill in the art that various modifications can be made without departing from the spirit and the scope of the invention, as set forth in the appended claims.

Claims

1. A lamp, comprising a housing (1, 1', 7), a fan (3, 3'), a heat sink (4, 4') and a lighting module (5), wherein the housing (1, 1', 7) has a first compartment (11, 11', 71) and a first opening (11", 12, 12', 72) on an end thereof, and an inner shell (2, 2', 6, 8) adapted to be received in the first compartment (11, 11', 71) and having a second compartment (21, 61, 81) and a second opening (21', 22, 62, 82) on an end thereof, wherein the second opening (21', 22, 62, 82) is aligned with the first opening (11', 12, 12', 72), an air channel (A) is formed between the housing (1, 1', 7) and the inner shell (2, 2', 6, 8) in the first compartment (11, 11', 71), the inner shell (2, 2', 6, 8) further comprises a through-hole (24, 84) allowing the first compartment (11, 11', 71) to communicate with the second compartment (21, 61, 81), wherein the fan (3, 3') is located adjacent to the through-hole (24, 84) and has two air-flowing sides (31, 32) for drawing air in and out of the lamp such that the air is allowed to pass through the through-hole (24, 84); and the lamp is **characterized in that** the lamp further comprises: a separation member (14) disposed between the housing (1) and the inner shell (2) so as to form the air channel (A), and the heat sink (4, 4') has a bottom plate (41, 41') with one face facing the fan (3, 3'), and the lighting module (5) is adapted to be coupled to another face of the bottom plate (41, 41').
2. The lamp as claimed in claim 1, **characterized in that** the second opening (21', 22, 62, 82) has a diameter smaller than that of the first opening (11', 12, 12', 72), and the second opening (21', 22, 62, 82) is covered in the range of the first opening (11', 12, 12', 72) when the second opening (21', 22, 62, 82) is aligned with the first opening (11', 12, 12', 72).
3. The lamp as claimed in claim 1, **characterized in that** one of the air-flowing sides (31, 32) communicates with the air channel (A) and the other one of the air-flowing sides (31, 32) communicates with the second compartment (21, 61, 81), the heat sink (4, 4') is disposed in the second compartment (21, 61, 81), and the face of the bottom plate (41, 41') facing the fan (3, 3') faces the other one of the air-flowing sides (31, 32).
4. The lamp as claimed in claim 1, **characterized in that** the inner shell (6) further comprises a plurality of vents (64) and an air-guiding cap (65) in the form of a plate, the air-guiding cap (65) has an assembly hole (651), an annual portion (652) and an extension portion (653), the assembly hole (651) is adapted to receive the fan (3, 3'), the annual portion (652) extends outward and downward in a curved manner from an outer periphery thereof to form the extension portion (653), and the vents (64) are covered under the air-guiding cap (65) when the air-guiding cap (65) is coupled to the inner shell (6).
5. The lamp as claimed in claim 1, **characterized in that** the lamp further comprises a first protrusion (13, 13') extending outward from a periphery of the first opening (12, 12') and a second protrusion (23, 63) extending outward from a periphery of the second opening (22, 62), wherein a ventilation opening (B) is formed between the first protrusion (13, 13') and the second protrusion (23, 63).
6. The lamp as claimed in claim 1, **characterized in that** the face of the bottom plate (41, 41') facing the other one of the air-flowing sides (31, 32) is mounted with a plurality of fins (42, 42').
7. The lamp as claimed in claim 1, **characterized in that** the lighting module (5) comprises a plurality of lighting elements (52) and a base plate (51), the base plate (51) has one face mounted with the lighting elements (52) and another face mounted with the bottom plate (41, 41').
8. The lamp as claimed in claim 1, **characterized in that** the lamp further comprises a covering plate (25, 25') disposed on the second opening (22, 62), wherein the covering plate has a plurality of vents (251, 251').
9. The lamp as claimed in claim 8, **characterized in that** the lamp further comprises a separation portion (252') in the form of an annual lateral wall disposed on one face of the covering plate (25') facing the lighting module (5), wherein the vents (251') are located out of an encompassed range of the separation portion (252'), the separation portion (252') is in contact with the bottom plate (41, 41') of the heat sink (4, 4'), and the lighting module (5) is located inside the encompassed range of the separation portion (252').
10. The lamp as claimed in claim 1, **characterized in that** the lamp further comprises a second protrusion (22') extending outward from a periphery of the second opening (21'), wherein the second protrusion (22') has an outer periphery coupled to a circumference of the first opening (11'), and the housing (1) has a

plurality of vents (12") which is adjacent to the first opening (11') and located on an outer surface thereof.

11. The lamp as claimed in claim 1, **characterized in that** the lamp further comprises a first protrusion (73) extending outward from a periphery of the first opening (72) and a second protrusion (83) extending outward from a periphery of the second opening (82), wherein the first protrusion (73) abuts with the second protrusion (83) such that the first opening (72) is closed by the second protrusion (83).
12. The lamp as claimed in claim 11, **characterized in that** the separation member (74, 85) separates the air channel (A) into a first air channel (A1) and a second air channel (A2), the through-hole (84) is adapted for the first air channel (A1) to communicate with the second compartment (81), and the inner shell (8) further comprises a plurality of striped vents (86) allowing the second air channel (A2) to communicate with the second compartment (81).
13. The lamp as claimed in claim 12, **characterized in that** the second protrusion (83) has a plurality of first vents (87a) and a plurality of second vents (87b), and the first vents (87a) communicate with the first air channel (A1) and the second vents (87b) communicate with the second air channel (A2).
14. The lamp as claimed in claim 13, **characterized in that** the lamp further comprises a separation plate (88) disposed in the second compartment (81) adapted to separate the second compartment (81) into an upper compartment (81a) and a lower compartment (81b), wherein the through-hole (84) and the striped vents (86) communicate with the upper compartment (81a), the separation plate (88) has an assembly hole (881), the lighting module (5) is disposed in the assembly hole (881) and faces the lower compartment (81b), and a covering plate (89) is disposed at the second opening (82).

Patentansprüche

1. Leuchte, die ein Gehäuse (1, 1', 7), einen Ventilator (3, 3'), eine Wärmesenke (4, 4') und ein Lichtmodul (5) umfasst, wobei das Gehäuse (1, 1', 7) eine erste Kammer (11, 11', 71) und eine erste Öffnung (11", 12, 12', 72) an einem Ende desselben sowie eine innere Schale (2, 2', 6, 8), die dafür ausgelegt ist, in der ersten Kammer (11, 11', 71) aufgenommen zu werden, und eine zweite Kammer (21, 61, 81) und

eine zweite Öffnung (21', 22, 62, 82) an einem Ende derselben aufweist, wobei die zweite Öffnung (21', 22, 62, 82) auf die erste Öffnung (11", 12, 12', 72) ausgerichtet ist, wobei ein Luftkanal (A) zwischen dem Gehäuse (1, 1', 7) und der inneren Schale (2, 2', 6, 8) in der ersten Kammer (11, 11', 71) ausgebildet ist und wobei die innere Schale (2, 2', 6, 8) ferner ein Durchgangsloch (24, 84) aufweist, das es der ersten Kammer (11, 11', 71) ermöglicht, mit der zweiten Kammer (21, 61, 81) zu kommunizieren, wobei der Ventilator (3, 3') benachbart zu dem Durchgangsloch (24, 84) angeordnet ist und zwei Luftströmungsseiten (31, 32) aufweist, um Luft in die Leuchte hinein- und aus der Leuchte herauszuziehen, derart, dass die Luft durch das Durchgangsloch (24, 84) strömen kann; und wobei die Leuchte **dadurch gekennzeichnet ist, dass** die Leuchte ferner umfasst:

ein Trennelement (14), das zwischen dem Gehäuse (1) und der inneren Schale (2) angeordnet ist, um so den Luftkanal (A) zu bilden, und wobei die Wärmesenke (4, 4') eine Bodenplatte (41, 41') mit einer Seitenfläche, die dem Ventilator (3, 3') zugewandt ist, aufweist und das Lichtmodul (5) dafür ausgelegt ist, mit einer anderen Seitenfläche der Bodenplatte (41, 41') gekoppelt zu werden.

2. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** die zweite Öffnung (21', 22, 62, 82) einen kleineren Durchmesser als die erste Öffnung (11", 12, 12', 72) aufweist und dass die zweite Öffnung (21', 22, 62, 82) in dem Bereich der ersten Öffnung (11", 12, 12', 72) abgedeckt ist, wenn die zweite Öffnung (21', 22, 62, 82) auf die erste Öffnung (11", 12, 12', 72) ausgerichtet ist.
3. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** eine der Luftdurchströmungsseiten (31, 32) mit dem Luftkanal (A) kommuniziert und die andere der Luftdurchströmungsseiten (31, 32) mit der zweiten Kammer (21, 61, 81) kommuniziert, wobei die Wärmesenke (4, 4') in der zweiten Kammer (21, 61, 81) angeordnet ist und wobei die Seitenfläche der Bodenplatte (41, 41'), die dem Ventilator (3, 3') zugewandt ist, der anderen der Luftdurchströmungsseiten (31, 32) zugewandt ist.
4. Leuchte nach Anspruch 1, **dadurch gekennzeichnet, dass** die innere Schale (6) ferner mehrere Luftdurchlässe (64) und einen luftführenden Aufsatz (65) in der Form einer Platte umfasst, wobei der luftführende Aufsatz (65) ein Verbindungsloch (651), einen ringförmigen Abschnitt (652) und einen Verlängerungsabschnitt

- (653) umfasst, wobei das Verbindungsloch (651) dafür ausgelegt ist, den Ventilator (3, 3') aufzunehmen, wobei sich der ringförmige Abschnitt (652) von einem äußeren Umfang desselben in einer gekrümmten Art nach außen und nach unten erstreckt, um den Verlängerungsabschnitt (653) auszubilden, und wobei die Luftdurchlässe (64) unter dem luftführenden Aufsatz (65) abgedeckt sind, wenn der luftführende Aufsatz (65) mit der inneren Schale (6) gekoppelt ist.
5. Leuchte nach Anspruch 1,
dadurch gekennzeichnet, dass
die Leuchte ferner einen ersten Vorsprung (13, 13'), der sich von einem Umfang der ersten Öffnung (12, 12') nach außen erstreckt, und einen zweiten Vorsprung (23, 63), der sich von einem Umfang der zweiten Öffnung (22, 62) nach außen erstreckt, umfasst, wobei zwischen dem ersten Vorsprung (13, 13') und dem zweiten Vorsprung (23, 63) eine Ventilationsöffnung (B) ausgebildet ist.
6. Leuchte nach Anspruch 1,
dadurch gekennzeichnet, dass
an der Seitenfläche der Bodenplatte (41, 41'), die der anderen der Luftdurchströmungsseiten (31, 32) zugewandt ist, mehrere Flügel (42, 42') befestigt sind.
7. Leuchte nach Anspruch 1,
dadurch gekennzeichnet, dass
das Lichtmodul (5) mehrere Lichtelemente (52) und eine Basisplatte (51) umfasst, wobei die Basisplatte (51) eine Seitenfläche, an der die Lichtelemente (52) befestigt sind, und eine andere Seitenfläche, an der die Bodenplatte (41, 41') befestigt ist, aufweist.
8. Leuchte nach Anspruch 1,
dadurch gekennzeichnet, dass
die Leuchte ferner eine Deckplatte (25, 25') umfasst, die auf der zweiten Öffnung (22, 62) angeordnet ist, wobei die Deckplatte mehrere Luftdurchlässe (251, 251') aufweist.
9. Leuchte nach Anspruch 8,
dadurch gekennzeichnet, dass
die Leuchte ferner einen Trennabschnitt (252') in der Form einer ringförmigen Seitenwand umfasst, die auf einer Seitenfläche der Deckplatte (25'), die dem Lichtmodul (5) zugewandt ist, angeordnet ist, wobei die Luftdurchlässe (251') außerhalb eines umgreifenden Bereichs des Trennabschnitts (252') angeordnet sind, wobei sich der Trennabschnitt (252') im Kontakt mit der Bodenplatte (41, 41') der Wärmesenke (4,4') befindet, und wobei das Lichtmodul (5) innerhalb des umgreifenden Bereichs des Trennabschnitts (252') angeordnet ist.
10. Leuchte nach Anspruch 1,
dadurch gekennzeichnet, dass
die Leuchte ferner einen zweiten Vorsprung (22'), der sich von einem Umfang der zweiten Öffnung (21') nach außen erstreckt, umfasst, wobei der zweite Vorsprung (22') einen äußeren Umfang aufweist, der an einen Umfang der ersten Öffnung (11') gekoppelt ist, und wobei das Gehäuse (1) mehrere Luftdurchlässe (12") aufweist, die zu der ersten Öffnung (11') benachbart sind und auf einer äußeren Oberfläche derselben angeordnet sind.
11. Leuchte nach Anspruch 1,
dadurch gekennzeichnet, dass
die Leuchte ferner einen ersten Vorsprung (73), der sich von einem Umfang der ersten Öffnung (72) nach außen erstreckt, und einen zweiten Vorsprung (83), der sich von einem Umfang der zweiten Öffnung (82) nach außen erstreckt, umfasst, wobei der erste Vorsprung (73) mit dem zweiten Vorsprung (83) so aneinanderstößt, dass die erste Öffnung (72) durch den zweiten Vorsprung (83) geschlossen wird.
12. Leuchte nach Anspruch 11,
dadurch gekennzeichnet, dass
das Trennelement (74, 85) den Luftkanal (A) in einen ersten Luftkanal (A1) und in einen zweiten Luftkanal (A2) trennt, wobei das Durchgangsloch (84) für den ersten Luftkanal (A1) ausgelegt ist, um mit der zweiten Kammer (81) zu kommunizieren, und wobei die innere Schale (8) ferner mehrere streifenförmige Luftdurchlässe (86) umfasst, die dem zweiten Luftkanal (A2) ermöglichen, mit der zweiten Kammer (81) zu kommunizieren.
13. Leuchte nach Anspruch 12,
dadurch gekennzeichnet, dass
der zweite Vorsprung (83) mehrere erste Luftdurchlässe (87a) und mehrere zweite Luftdurchlässe (87b) aufweist und dass die ersten Luftdurchlässe (87a) mit dem ersten Luftkanal (A1) kommunizieren und die zweiten Luftdurchlässe (87b) mit dem zweiten Luftkanal (A2) kommunizieren.
14. Leuchte nach Anspruch 13,
dadurch gekennzeichnet, dass
die Leuchte ferner eine Trennplatte (88) umfasst, die in der zweiten Kammer (81) angeordnet ist und dafür ausgelegt ist, die zweite Kammer (81) in eine obere Kammer (81a) und in eine untere Kammer (81b) zu trennen, wobei das Durchgangsloch (84) und die streifenförmigen Luftdurchlässe (86) mit der oberen Kammer (81a) kommunizieren, wobei die Trennplatte (88) eine Verbindungsöffnung (881) aufweist, das Lichtmodul (5) in der Verbindungsöffnung (881) angeordnet ist und der unteren Kammer (81b) zugewandt ist und eine Deckplatte (89) an der zweiten Öffnung (82) angeordnet ist.

Revendications

1. Lampe comprenant un boîtier (1, 1', 7), un ventilateur (3, 3'), un dissipateur de chaleur (4, 4') et un module d'éclairage (5), dans laquelle le boîtier (1, 1', 7) a un premier compartiment (11, 11', 71) et une première ouverture (11", 12, 12', 72) sur son extrémité et une coque interne (2, 2', 6, 8) adaptée pour être reçue dans le premier compartiment (11, 11', 71) et ayant un second compartiment (21, 61, 81) et une seconde ouverture (21', 22, 62, 82) sur son extrémité, dans laquelle la seconde ouverture (21', 22, 62, 82) est alignée avec la première ouverture (11', 12, 12', 72), un canal d'air (A) est formé entre le boîtier (1, 1', 7) et la coque interne (2, 2', 6, 8) dans le premier compartiment (11, 11', 71), la coque interne (2, 2', 6, 8) comprend en outre un trou de passage (24, 84) permettant au premier compartiment (11, 11', 71) de communiquer avec le second compartiment (21, 61, 81), dans laquelle le ventilateur (3, 3') est positionné de manière adjacente au trou de passage (24, 84) et a deux côtés d'écoulement d'air (31, 32) pour aspirer dans et hors de la lampe de sorte que l'air est autorisé à passer à travers le trou de passage (24, 84); et la lampe est **caractérisée en ce que** la lampe comprend en outre:
- un élément de séparation (14) disposé entre le boîtier (1) et la coque interne (2) afin de former le canal d'air (A), et le dissipateur de chaleur (4, 4') a une plaque inférieure (41, 41') avec une face faisant face au ventilateur (3, 3'), et le module d'éclairage (5) est adapté pour être couplé à une autre face de la plaque inférieure (41, 41').
2. Lampe selon la revendication 1, **caractérisée en ce que:**
- la seconde ouverture (21', 22, 62, 82) a un plus petit diamètre que celui de la première ouverture (11', 12, 12', 72) et la seconde ouverture (21', 22, 62, 82) est couverte dans la plage de la première ouverture (11', 12, 12', 72) lorsque la seconde ouverture (21', 22, 62, 82) est alignée avec la première ouverture (11', 12, 12', 72).
3. Lampe selon la revendication 1, **caractérisée en ce que:**
- l'un des côtés d'écoulement d'air (31, 32) communique avec le canal d'air (A) et l'autre côté des côtés d'écoulement d'air (31, 32) communique avec le second compartiment (21, 61, 81), le dissipateur de chaleur (4, 4') est disposé dans le second compartiment (21, 61, 81) et la face de la plaque inférieure (41, 41') faisant face au ventilateur (3, 3') fait face à l'autre côté des côtés d'écoulement d'air (31, 32).
4. Lampe selon la revendication 1, **caractérisée en ce que:**
- la coque interne (6) comprend en outre une pluralité d'évents (64) et un capuchon de guidage d'air (65) se présentant sous la forme d'une plaque, le capuchon de guidage d'air (65) a un trou d'assemblage (651), une partie annulaire (652) et une partie d'extension (653), le trou d'assemblage (651) est adapté pour recevoir le ventilateur (3, 3'), la partie annulaire (652) s'étend vers l'extérieur et vers le bas d'une manière incurvée à partir de sa périphérie externe afin de former la partie d'extension (653), et les évents (64) sont couverts sous le capuchon de guidage d'air (65) lorsque le capuchon de guidage d'air (65) est couplé à la coque interne (6).
5. Lampe selon la revendication 1, **caractérisée en ce que:**
- la lampe comprend en outre une première saillie (13, 13') s'étendant vers l'extérieur à partir d'une périphérie de la première ouverture (12, 12') et une seconde saillie (23, 63) s'étendant vers l'extérieur à partir d'une périphérie de la seconde ouverture (22, 62), dans laquelle une ouverture de ventilation (B) est formée entre la première saillie (13, 13') et la seconde saillie (23, 63).
6. Lampe selon la revendication 1, **caractérisée en ce que:**
- la face de la plaque inférieure (41, 41') faisant face à l'autre côté des côtés d'écoulement d'air (31, 32) est montée avec une pluralité d'aillettes (42, 42').
7. Lampe selon la revendication 1, **caractérisée en ce que:**
- le module d'éclairage (5) comprend une pluralité d'éléments d'éclairage (52) et une plaque de base (51), la plaque de base (51) a une face montée avec les éléments d'éclairage (52) et une autre face montée avec la plaque inférieure (41, 41').
8. Lampe selon la revendication 1, **caractérisée en ce que:**
- la lampe comprend en outre une plaque de recouvrement (25, 25') disposée sur la seconde ouverture (22, 62), dans laquelle la plaque de recouvrement a une pluralité d'évents (251,

251').

9. Lampe selon la revendication 8, caractérisée en ce que:

la lampe comprend en outre une partie de séparation (252') se présentant sous la forme d'une paroi latérale annulaire disposée sur une face de la plaque de recouvrement (25') faisant face au module d'éclairage (5), dans laquelle les événements (251') sont positionnés hors d'une plage comprise de la partie de séparation (252'), la partie de séparation (252') est en contact avec la plaque inférieure (41, 41') du dissipateur de chaleur (4, 4'), et le module d'éclairage (5) est positionné dans la plage comprise de la partie de séparation (252').

10. Lampe selon la revendication 1, caractérisée en ce que:

la lampe comprend en outre une seconde saillie (22') s'étendant vers l'extérieur à partir d'une périphérie de la seconde ouverture (21'), dans laquelle la seconde saillie (22') a une périphérie externe couplée à une circonférence de la première ouverture (11'), et le boîtier (1) a une pluralité d'événements (12") qui est adjacente à la première ouverture (11') et positionnée sur sa surface externe.

11. Lampe selon la revendication 1, caractérisée en ce que:

la lampe comprend en outre une première saillie (73) s'étendant vers l'extérieur à partir d'une périphérie de la première ouverture (72) et une seconde saillie (83) s'étendant vers l'extérieur à partir d'une seconde ouverture (82), dans laquelle la première saillie (73) vient en butée contre la seconde saillie (83) de sorte que la première ouverture (72) est fermée par la seconde saillie (83).

12. Lampe selon la revendication 11, caractérisée en ce que:

l'élément de séparation (74, 85) sépare le canal d'air (A) en un premier canal d'air (A1) et en un second canal d'air (A2), le trou de passage (84) est adapté pour que le premier canal d'air (A1) communique avec le second compartiment (81), et la coque interne (8) comprend en outre une pluralité d'événements rayés (86) permettant au second canal d'air (A2) de communiquer avec le second compartiment (81).

13. Lampe selon la revendication 12, caractérisée en

ce que:

la seconde saillie (83) a une pluralité de premiers événements (87a) et une pluralité de seconds événements (87b), et les premiers événements (87a) communiquent avec le premier canal d'air (A1) et les seconds événements (87b) communiquent avec le second canal d'air (A2).

14. Lampe selon la revendication 13, caractérisée en ce que:

la lampe comprend en outre une plaque de séparation (88) disposée dans le second compartiment (81) adaptée pour séparer le second compartiment (81) en un compartiment supérieur (81a) et en un compartiment inférieur (81b), dans laquelle le trou de passage (84) et les événements rayés (86) communiquent avec le compartiment supérieur (81 a), la plaque de séparation (88) a un trou d'assemblage (881), le module d'éclairage (5) est disposé dans le trou d'assemblage (881) et fait face au compartiment inférieur (81 b) et une plaque de recouvrement (89) est disposée au niveau de la seconde ouverture (82).

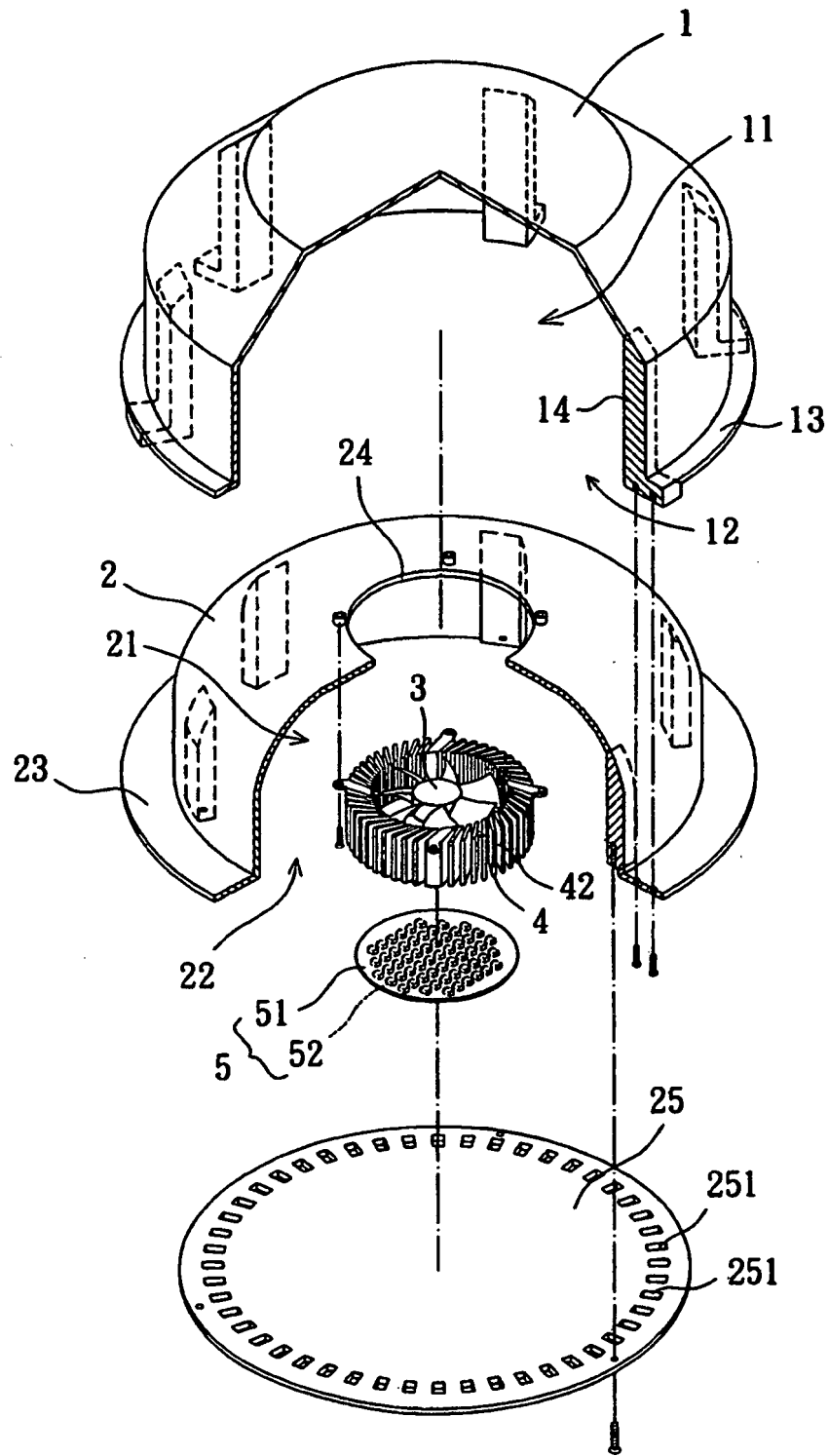


FIG. 1

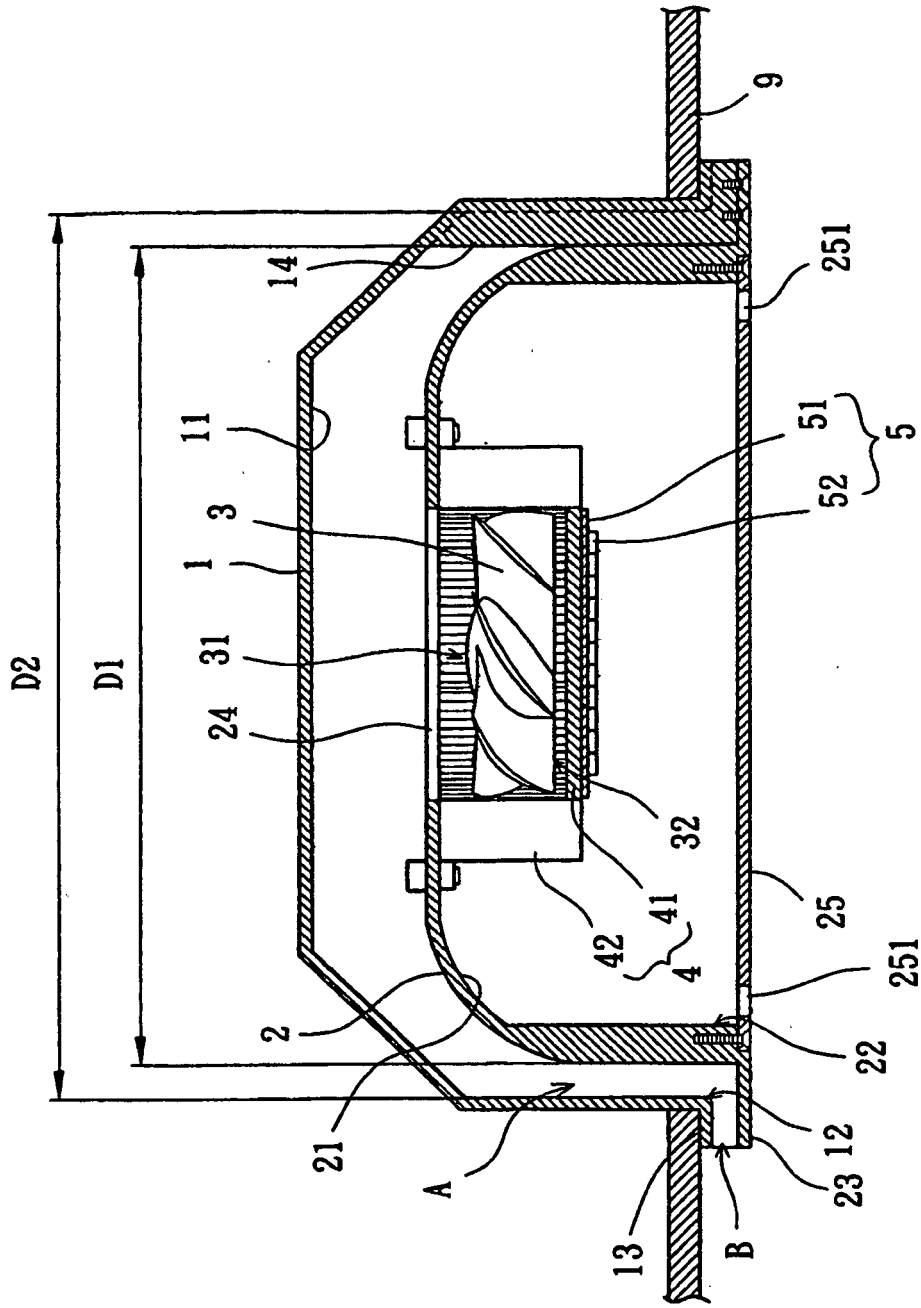


FIG. 2

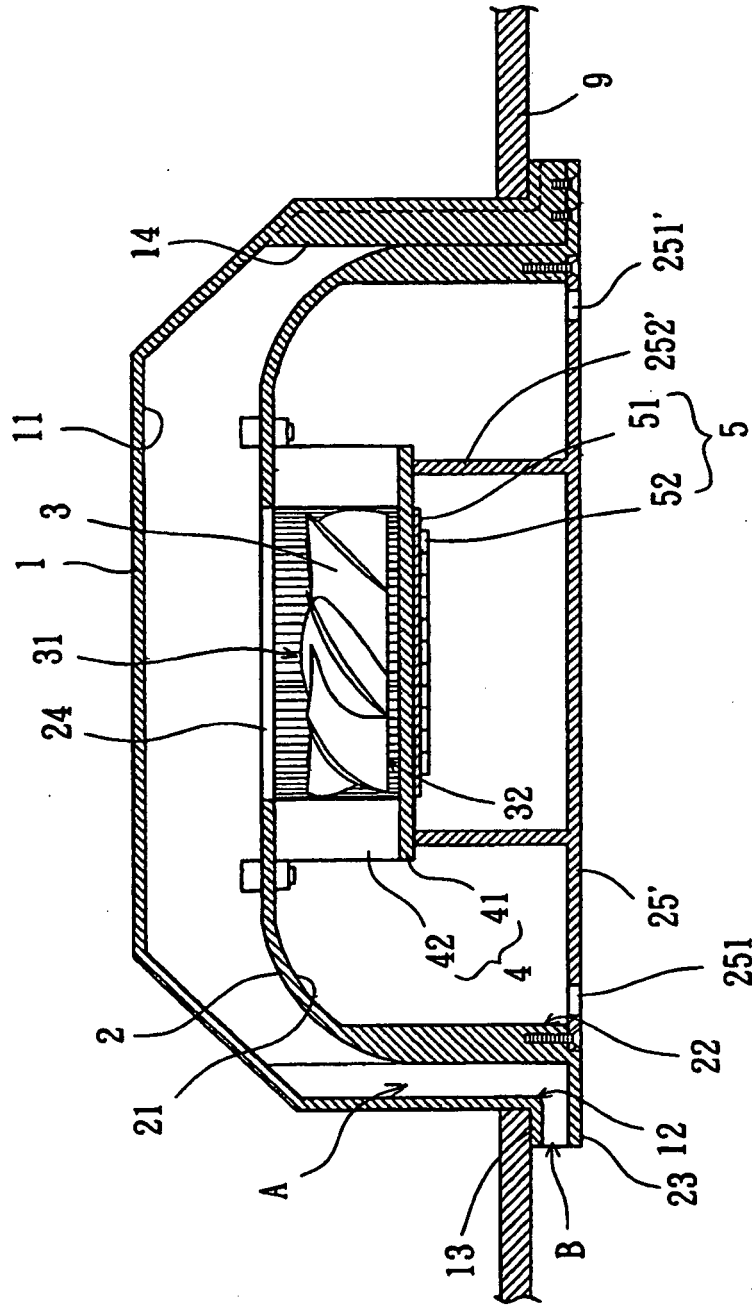


FIG. 3

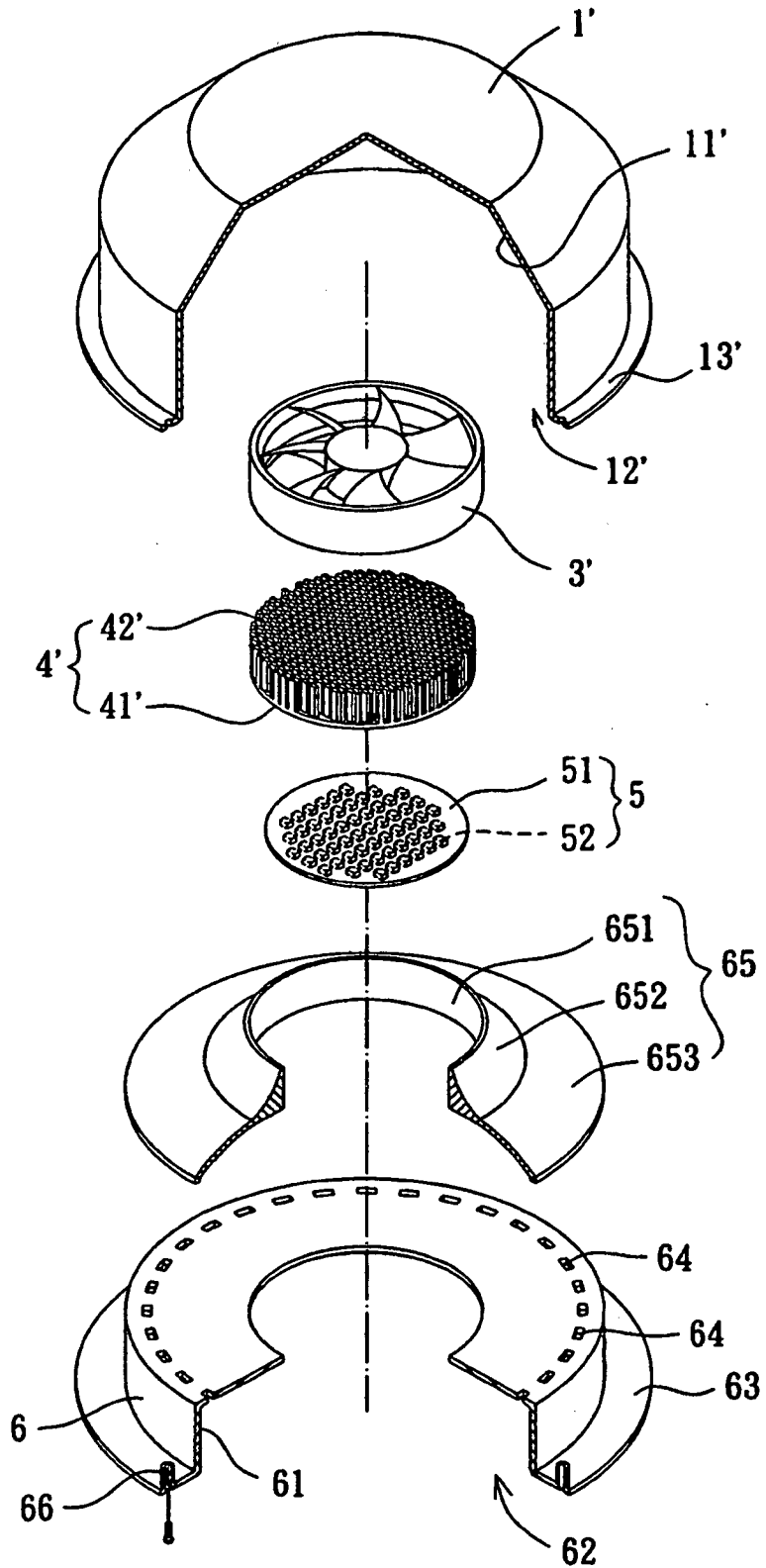


FIG. 4

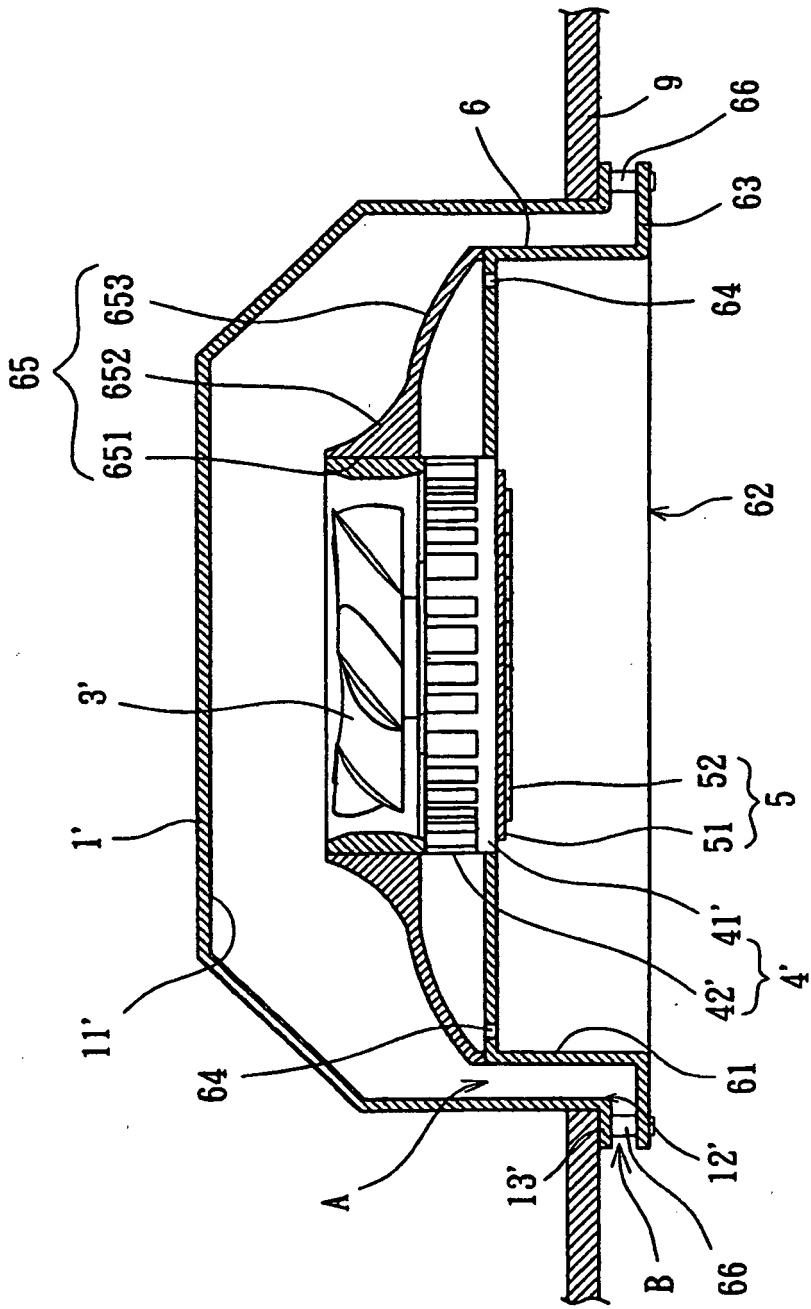


FIG. 5

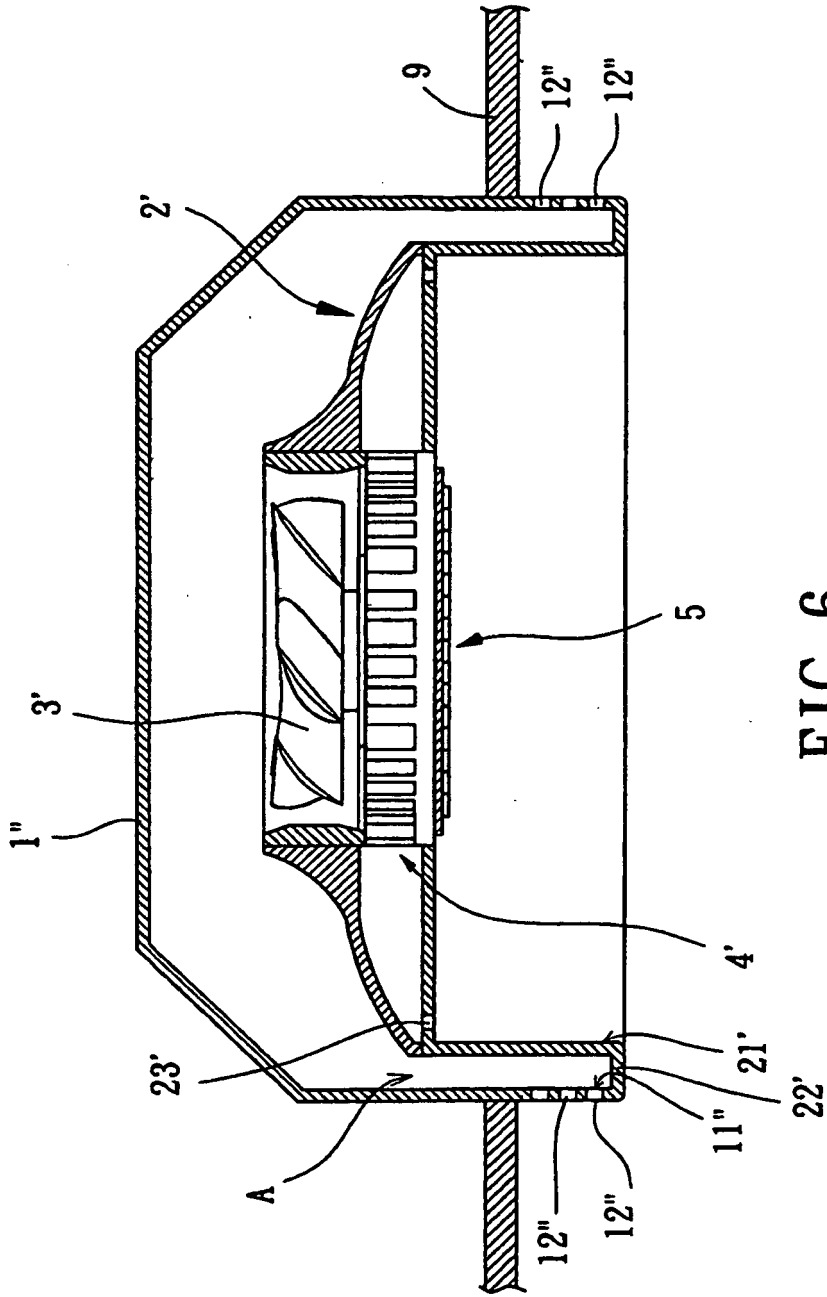


FIG. 6

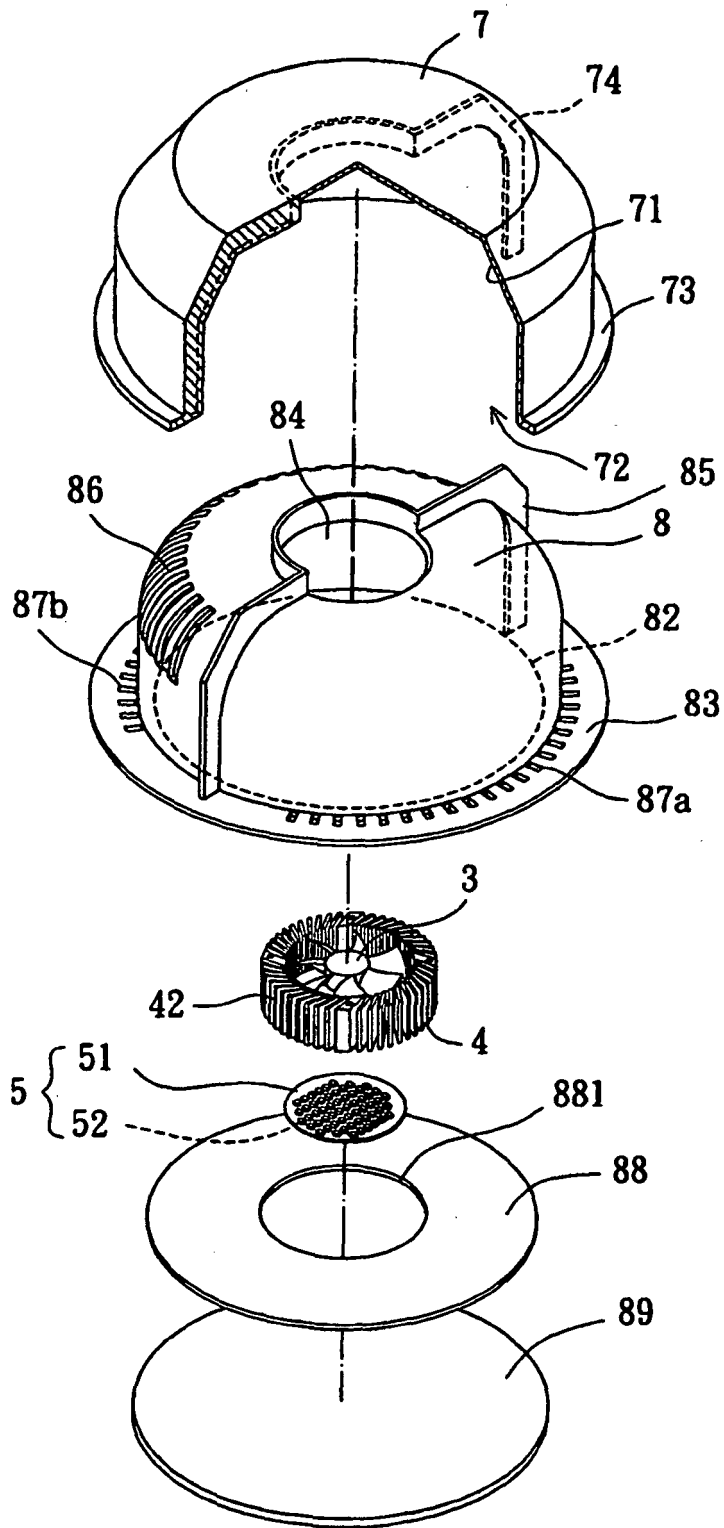


FIG. 7

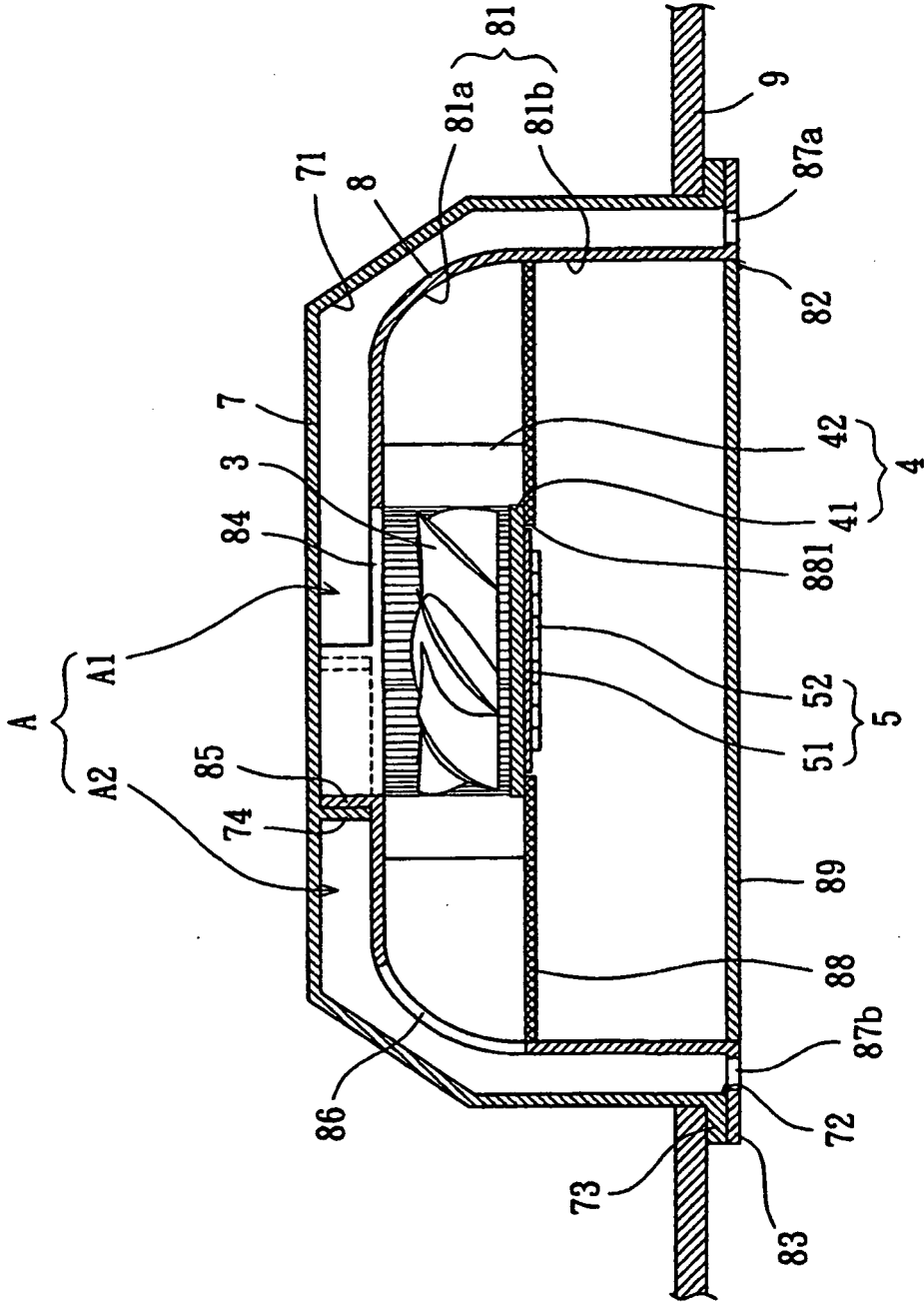


FIG. 8

REFERENCES CITED IN THE DESCRIPTION

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