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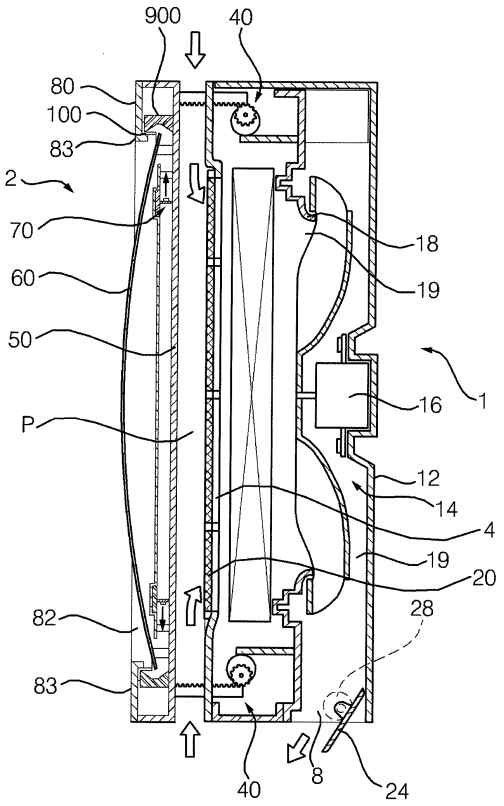
(54) Air conditioner with illumination

(57) An air conditioner of the present invention includes: a body (1) for taking indoor air inside through an air intake port, conditioning the air, and discharging the air to an air discharge port(6,8); and an illumination panel (2) on the body (1), wherein the illumination panel (2) includes: an illumination panel base (50); a first cover (60) on the illumination panel base (50); a light emitting unit (70) for emitting light outward between the illumination panel base (50) and the first cover (60), between the illumination panel base (50) and the first cover (60); a second cover (80) having a gap (78) between the first cover (60) and the second cover (80); and a reflector (90) for reflecting the light emitted from the light emitting unit (70) to the front of the first cover (60) through the gap, such that it has the advantage in that it can show a clear illumination pattern on the front of the first cover (60) while preventing the light emitting unit (70) from being seen from the outside.

FIG. 4



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Description

[0001] The present invention relates to an air conditioner, particularly an air conditioner with an illumination panel on the body.

[0002] In general, air conditioners are devices that heat/cool a room, using a refrigeration cycle of a refrigerant which is constructed by a compressor, a condenser, an expansion valve, and an evaporator, or that purifies air, using a filter, in order to create a more pleasant indoor environment for users.

[0003] The air conditioners have an air intake port through which indoor air is sucked and an air discharge port through which the air conditioned in the air conditioners is discharged to the outside. The air conditioners may include a heat exchanger therein which exchanges heat between a refrigerant and air.

[0004] The air conditioners usually keep placed in a room or a living room, occupying a space, usually only for cooling and heating, which is the main function, and the period of actual use is relatively shorter than those of other household appliances.

[0005] When a lamp is installed in the air conditioners, the decorative beauty of the air conditioners can be improved by the lamp and the light from the lamp can indirectly illuminate the room. In the air conditioners, a portion of the indoor unit may be a transparent part, and when a lamp is disposed behind the transparent part, the light from the lamp can be radiated to the front of the transparent part through it.

[0006] However, when a lamp is disposed behind the transparent part and radiates light forward to the transparent part in the air conditioners, there is a problem in that the lamp may be seen through the transparent part when the lamp is turned off and the light radiated forward from the lamp has a difficulty in making a clear illumination pattern having a specific shape because it spreads wide to the front of the transparent part.

[0007] An object of the present invention is to provide an air conditioner that can make a clear illumination pattern.

[0008] In order to achieve the object of the present invention, an air conditioner according to claim 1 includes: a body taking indoor air inside through an air intake port, conditioning the air, and discharging the air to an air discharge port; and an illumination panel on the body, in which the illumination panel includes: an illumination panel base; a first cover on the illumination panel base; a light emitting unit emitting light outward between the illumination panel base and the first cover, between the illumination panel base and the first cover; a second cover having a gap between the first cover and the second cover; and a reflector reflecting the light emitted from the light emitting unit to the front of the first cover through the gap.

[0009] The reflector may have a space therein where the light emitting unit is disposed.

[0010] The reflector may be disposed to surround the portion between the illumination panel base and the first cover.

[0011] The reflector may be disposed to surround the outer circumference of the first cover.

[0012] The inner diameter of the reflector may be larger than the outer diameter of the first cover.

[0013] Only a portion of the front of the first cover may face the reflector.

[0014] The front of the first cover may be rounded to be convex forward, and the reflector may have at least one reflective side reflecting light toward the front of the first cover.

[0015] The reflector may have a plurality of reflective sides sequentially reflecting the light emitted from the light emitting unit.

[0016] The reflective sides may include: a first reflective side reflecting forward the light emitted from the light emitting unit; and a second reflective side reflecting the light, which reflects from the first reflecting side, toward the front of the first cover.

[0017] The second cover may have an opening that exposes the first cover to the outside.

[0018] The opening may be smaller than the first cover.

[0019] The gap may be formed between the front of the first cover and the edge of the opening.

[0020] The illumination panel may further include a light transmission cover transmitting the light reflecting from the reflector and protecting the reflector.

[0021] A plurality of LEDs of the light emitting unit may be arranged to radially emit light.

[0022] The light emitting unit may have a plurality of emission modes in which at least one of the size and the position of an illumination pattern to be formed on the front of the first cover is different.

[0023] The light emitting unit may have a plurality of emission modes in which the number of LEDs turned on in a plurality of LEDs is different.

[0024] The light emitting unit may have a plurality of emission modes in which the position of LEDs turned on in a plurality of LEDs is different.

[0025] The light emitting unit may have a variable emission mode in which the shape of an illumination pattern changes, as time passes.

[0026] The air conditioner according to the present invention has the advantage in that it can show a clear illumination pattern on the front of the first cover while preventing the light emitting unit from being seen from the outside.

[0027] The air conditioner according to the present invention has the advantage in that it can prevent an illumination pattern shown on the front of the first cover from being expanding too wide and to show a clear illumination pattern that can be recognizable from a distance.

[0028] The air conditioner according to the present invention has the advantage in that it is possible to show the operation information or various items of information of the air conditioner to be easily seen from the outside, in accordance with the size and position of the illumina-

tion pattern shown on the front of the first cover.

[0029] The air conditioner according to the present invention has the advantage in that it is possible to display the operation information or various items of information of the air conditioner through the illumination pattern while simplifying the front design of the air conditioner.

[0030] The air conditioner according to the present invention has the advantage in that it is possible to show various illumination patterns of which at least one of the size and the position is different, with a simple structure.

[0031] The air conditioner according to the present invention has the advantage in that it is possible to produce an illumination pattern that can be easily recognized from a distance, with minimum parts, and to protect the light emitting unit.

FIG. 1 is a perspective view in operation of a first embodiment of an air conditioner according to the present invention.

FIG. 2 is a perspective view in stop of the first embodiment of an air conditioner according to the present invention.

FIG. 3 is a horizontal cross-sectional view in operation of the first embodiment of an air conditioner according to the present invention.

FIG. 4 is a vertical cross-sectional view in operation of the first embodiment of an air conditioner according to the present invention.

FIG. 5 is a front view showing the inside of an illumination panel of the first embodiment of an air conditioner according to the present invention.

FIG. 6 is a cross-sectional view enlarging a portion of the illumination panel of the first embodiment of an air conditioner according to the present invention.

FIG. 7 is a view showing an illumination pattern of the first embodiment of an air conditioner according to the present invention.

FIG. 10 is a cross-sectional view enlarging a portion of the illumination panel of a second embodiment of an air conditioner according to the present invention.

FIG. 11 is a cross-sectional view showing a third embodiment of an air conditioner according to the present invention.

FIG. 12 is a cross-sectional view showing a fourth embodiment of an air conditioner according to the present invention.

[0032] Hereinafter, embodiments of a heat pump according to the present invention are described with reference to the accompanying drawings.

[0033] FIG. 1 is a perspective view in operation of a first embodiment of an air conditioner according to the present invention and FIG. 2 is a perspective view in stop of the first embodiment of an air conditioner according to the present invention.

[0034] Referring to FIGS. 1 and 2, the air conditioner includes a body 1 that sucks indoor air through an air intake port, conditions it, and then discharges it through an air discharge port and an illumination panel 2 mounted on the body 1.

[0035] The body 1 has the air intake port through which indoor air is sucked into the body 1. The air discharge port through which the air conditioned in the body 1 is discharged to the outside of the body 1 is formed at the body 1. A plurality of air discharge ports may be formed at the body 1. The body 1 may include a rear case 12 and a front case 13 disposed ahead of the rear case 12. The rear case 12 and the front case 13 may define the external appearance of the body 1.

[0036] The illumination panel 2 may be disposed on the panel 1 to be movable forward/backward. The illumination panel 2 can move backward close to the body 1 and move forward away from the body 1. The illumination panel 2 may define an air intake channel P in cooperation with the body 1 when moving forward. The air intake channel P may be vertically open between the illumination panel 2 and the body 1. When the air intake channel P is vertically open, the air intake channel P may be open at the top and the bottom, and the illumination panel 2 may be open at the top, the bottom, and the rear and closed at the front, the left side, and the right side. When the illumination panel 2 moves forward, the indoor air can be sucked into the air intake channel P while rising into the air intake channel P from under the air intake channel P, and the indoor air can be sucked into the air intake channel P while moving down into the air intake channel P from above the air intake channel P.

[0037] FIG. 3 is a horizontal cross-sectional view in operation of the first embodiment of an air conditioner according to the present invention, FIG. 4 is a vertical cross-sectional view in operation of the first embodiment of an air conditioner according to the present invention, FIG. 5 is a front view showing the inside of an illumination panel of the first embodiment of an air conditioner according to the present invention, FIG. 6 is a cross-sectional view enlarging a portion of the illumination panel of the first embodiment of an air conditioner according to the present invention, and FIG. 7 is a view showing an illumination pattern of the first embodiment of an air conditioner according to the present invention.

[0038] An air intake port 4 may be formed at the front of the body 1. A plurality of air discharge ports 6 and 8 may be formed at other parts, except the front, of the body 1. The air discharge ports 6 and 8 may be formed to discharge air in different directions. The air discharge ports 6 and 8 may be distributed at a plurality of positions of the body 1. In the body 1, a side air discharge port 6 may be formed at at least any one of the left and right sides and a lower air discharge port 8 may be formed at the lower portion. The side air discharge port 6 may be formed at the left and right sides of the body 1. A left air discharge port 6A may be formed at the left side of the body 1 and a right air discharge port 6B may be formed at the right side. The air conditioned in the body 1 can be separately discharged in three directions through the left air discharge port 6A, the right air discharge port 6B,

and the lower air discharge port 8. Hereinafter, when the left air discharge port 6A and the right air discharge port 6B are separately described, they are referred to as the left air discharge port 6A and the right air discharge port 6B, but in other cases, the left air discharge port 6A and the right air discharge port 6B are referred to as the side air discharge port 6. A blower unit 14 and a heat exchanger 15 may be disposed in the body 1. The blower unit 14 and the heat exchanger 15 may be disposed between the rear case 12 and the front case 14.

[0039] The rear case 12 may define a channel for air. The air sent by the blower unit 14 can be guided to the air discharge port by the rear case 12. The rear case 12 may define the rear external appearance of the body 1. The rear case 12 may define the external appearance of four, that is, the top, bottom, left, and right sides, and the rear of the body 1. The left air discharge port 6A may be formed at the left side of the rear case 12 and the right air discharge port 6B may be formed at the right side. The left air discharge port 6A may be open in the left-right direction at the left side of the rear case 12. The right air discharge port 6B may be open in the left-right direction at the right side of the rear case 12. The lower air discharge port 8 may be further formed at the lower portion of the rear case 12. The lower air discharge port 8 may be open in the up-down direction at the lower portion of the rear case 12.

[0040] The front case 13 may define the front external appearance of the body 1. The air intake port 4 may be formed at the front case 13. The air intake port 4 may be open in the front-rear direction at the front case 13. An intake grill 13a protecting the inside of the body 1 may be formed at the front case 13. The intake grill 13a may be positioned at the air intake port 4. The intake grill 13a may be arranged across the air intake port 4.

[0041] The blower unit 14 may suck air into the air intake port 4 and discharge it to the air discharge ports 6 and 8 through the heat exchanger 15. The blower unit 14 may be a centrifugal blower unit that sucks air ahead and circumferentially sends it. The blower unit 14 may include a motor 16 on the rear case 12 and a blower 17 on the rotary shaft of the motor 16. The blower unit 14 may further include an orifice 18 that guides air to the blower 17. The motor 16 may be arranged with the rotary shaft forward. The blower 17 may be a centrifugal fan such as a turbo fan which sucks air ahead and circumferentially sends it. The orifice 18 may define a channel for the air sent by the blower 17 in cooperation with the rear case 12. An air guide that guides the air sent by the blower 17 may be formed at the rear case 12. The rear case 12 may function as a fan housing covering the motor 16 and the blower 17. An air hole 19 through which air passes may be formed in the orifice 18. The air hole 19 may be positioned between the blower 17 and the heat exchanger 15.

[0042] The heat exchanger 15 may be disposed opposite the air intake port 4. The heat exchanger 15 may be positioned between the front case 13 and the orifice 18. The heat exchanger 15 may be perpendicular to at least one of the front case 13 and the orifice 18.

[0043] The air conditioner may include a filter 20 that purifies the air sucked into the air intake port 4. The filter 20 may be mounted on the front of the front case 13 to be slidable to the left and right. A sliding guide that guides the filter 20 sliding left and right may be formed on the front case 13.

[0044] The body 1 may include side discharge vanes 22 that guides the air discharged from the side discharge port 6 to a side of the illumination panel 2 and a lower discharge vane 24 that guides the air discharged to the lower discharge port 8.

[0045] The side discharge vane 22 may include a left discharge vane 22A that guides the air discharged to the left air discharge port 6A and a right discharge vane 22B that guides the air discharged to the right air discharge port 6B. The left discharge vane 22A may be disposed at the left side of the body 1 to be able to turn to the left and right about the vertical rotational center, and when it turns out from the left of the body 1, it can guide the air discharged to the left air discharge port 6A. The right discharge vane 22B may be disposed at the right side of the body 1 to be able to turn to the left and right about the vertical rotational center, and when it turns out from the right of the body 1, it can guide the air discharged to the right air discharge port 6B. The left discharge port 22A and the right discharge port 22B may turn in the opposite directions in operation of the air conditioner, other configuration and operation, except the turning direction, may be the same, and when the left discharge port 22A and the right discharge port 22B are separately described below, they are referred to as the left discharge port 22A and the right discharge port 22B, and in other common configuration, they are referred to as the side discharge vane 22.

[0046] The lower discharge vane 24 can control the vertical direction of the air discharged to the lower air discharge port 8 while turning up/down about a horizontal rotational center. The rotational center of the lower discharge vane 24 may be disposed in the body 1.

[0047] The air conditioner includes a side discharge vane driving mechanism 26 turning the side discharge vane 22 and a lower discharge vane driving mechanism 28 turning the lower discharge vane 24.

[0048] The side discharge vane driving mechanism 26 may be disposed at the body 1 and the side discharge vane 22 may be connected to the side discharge vane driving mechanism 26. The side discharge vane driving mechanism 26 may include a side discharge vane driving motor in the body 1. The side discharge vane driving mechanism 26 may include a left discharge vane driving mechanism 26A turning the left discharge vane 22A and a right discharge vane driving mechanism 26B turning the right discharge vane 22B. Hereinafter, when the left discharge vane driving mechanism 26A and the right discharge vane driving mechanism 26B are separately described, they are referred to as the left discharge vane

driving mechanism 26A and the right discharge vane driving mechanism 26B, and in other common configuration, they are referred to as the side discharge vane driving mechanism 26.

[0049] The lower discharge vane driving mechanism 28 may be disposed at the body 1 and the lower discharge vane 24 may be connected to the lower discharge vane driving mechanism 28. The lower discharge vane driving mechanism 28 may include a lower discharge vane driving motor in the body 1.

[0050] The illumination panel 2 may be larger in size than the air intake port 4. The illumination panel 2 may be disposed ahead of the air intake port 4 to cover it, such that the air intake port 4 is not seen from the outside. The illumination panel 2 may function as a decoration for improving the decorative beauty of the air conditioner or as a display showing information. The illumination panel 2 may produce an illumination pattern that can be seen from the outside. The illumination panel 2 can produce a ring-shaped illumination pattern, an illumination pattern of a ring shape with one side open, and a spot illumination pattern. The ring shape with one side open may have an open angle less than 90°, such as the C-shape, may be a semi-ring shape, may have an open angle above 180° and less than 270°, and may include a curve shape, not the ring shape and the spot shape.

[0051] The air conditioner may include an illumination panel driving mechanism 40 that moves the illumination panel 2 forward/backward. The illumination panel driving mechanism 40 may include a motor 42, a pinion 44, and a rack 46. A plurality of illumination panel driving mechanisms 40 may be provided and they can move the entire illumination panel 2 forward/backward. When the motor 42 is disposed in the body 1, the pinion 44 may be fitted on the rotary shaft of the motor and the rack 46 may be disposed on the illumination panel 2. When the motor 42 is disposed on the display panel 2, the pinion 44 may be fitted on the rotary shaft of the motor and the rack 46 may be disposed on the body 1. The illumination panel driving mechanism 40 can move the illumination panel 2 forward in operation of the air conditioner. The illumination panel driving mechanism 40 can move the illumination panel 2 backward in stop of the air conditioner.

[0052] The air conditioner may further include a control unit that controls the illumination panel 2, the blower unit 14, the illumination panel driving mechanism 40, the side discharge vane driving mechanism 26, and the lower discharge vane driving mechanism 28. The control unit, in operation of the air conditioner, can drive the blower unit 14, drive the illumination panel driving mechanism 40 in a forward mode, and drive the side discharge vane driving mechanism 26 and the lower discharge vane driving mechanism 28 in an opening mode. The control unit, in operation of the air conditioner, can control the illumination panel 2 in an operation display mode and the operation display mode may be a mode showing operation modes such as cooling operation, heating operation, and defrosting operation with specific illumination patterns. The control unit, in stop of the air conditioner, can stop the blower unit 14, drive the illumination panel driving mechanism 40 in a backward mode, and drive the side discharge vane driving mechanism 26 and the lower discharge vane driving mechanism 28 in a closing mode. The control unit, in stop of the air conditioner, can control the illumination panel 2 in an information display mode and the information display mode can show information unrelated to the operation modes of the air conditioner with illumination patterns different from the illumination pattern for the operation display modes.

[0053] The illumination panel 2 is described hereafter.

[0054] The illumination panel 2 includes: an illumination base 50; a first cover 60 on the illumination panel base 50; a light emitting unit 70 disposed between the illumination panel base 50 and the first cover 60 and emitting light outward from between the illumination panel base 50 and the first cover 60; a second cover 80 forming a gap 78 with the first cover 60 therebetween; and a reflector 90 reflecting the light from the light emitting unit 60 to the front of the first cover 60 through the gap 78. When light is radiated from the light emitting unit 70, the light can travel to the reflector 90 between the illumination panel base 50 and the first cover 60 and the light traveling to the reflector 90 can reflect from the reflector 90 to the gap 78. The light reflecting from the reflector 90 to the gap 78 can reach the front of the first cover 60 through the gap 78 and an illumination pattern can be formed on the front 64 of the first cover 60 by the light reflecting from the reflector 90. That is, the light generated by the light emitting unit 70 behind the first cover 60 can be radiated to the front 64 of the first cover 60 without passing through the first cover 60.

[0055] The illumination panel base 50 may be mounted on the body 1. The illumination panel base 50 may define the rear external appearance of the illumination panel 2. The illumination panel base 50 may be connected to the body 1, outside the body 1. The illumination panel base 50 may be connected with the illumination panel driving mechanism 40 and moved by the illumination panel driving mechanism 40. One of the motor 42 and the rack 46 may be disposed on the illumination panel base 50. The illumination panel 50 may define the air intake channel P in cooperation with the front of the body 1. The rear of the illumination panel base 50 may be an air intake guide surface. The illumination panel base 50 may define the air intake channel P in cooperation with the body 1 when moving forward and air can be sucked into the air intake port 4 through between the rear of the illumination panel base 50 and the front of the body 1. The light emitting unit 70 may be disposed on the illumination panel base 50. The first cover 60 may be disposed on the illumination panel base 50. The second cover 80 may be disposed on the illumination panel base 50.

[0056] The first cover 60 may be disposed on the illumination panel base 50. The first cover 60 can be seen from the outside of the illumination panel 2 and define a portion of the external appearance of the front of the il-

lumination panel 2. The illumination panel 2 may have a space that can receive the light emitting unit 70 between the first cover 60 and the illumination panel base 50. The outer circumference 61 of the first cover 60 may be spaced from the inner circumference of the reflector 90. The first cover 60 may be convex forward. The front 64 of the first cover 60 may be convex forward. Only a portion of the front 64 of the first cover 60 may face the reflector 90. A portion of the front 64 of the first cover 60 may face the reflector 90 while the other portion of the front 64 may not face the reflector 90. The front 64 of the first cover 60 may have a first area facing the inner circumference of the reflector 90 in the left-right direction and a second area not facing the inner circumference of the reflector 90 in the left-right direction. The front 64 of the first cover 60 may have an illumination pattern area where an illumination pattern is formed and a non-illumination pattern area where an illumination pattern is not formed. The light reflecting from the reflector 90 reaches a partial area (first area) facing the reflector 90, on the front 64 of the first cover 60, and an illumination pattern may be formed only in the area (first area) facing the reflector 90, on the front 64 of the first cover 60. An illumination pattern may not be formed in the other area (second area) not facing the reflector 90, on the front 64 of the first cover 60, the illumination pattern formed on the front 64 of the first cover 60 may be clearly shown in some area (first area) facing the reflector 90, on the front 64 of the first cover 60, without spreading throughout the front 64 of the first cover 60. The rear 63 of the first cover 60 may face the illumination panel base 50. The rear 63 of the first cover 60 may be concave. The front 64 of the first cover 60 may face the front of the air conditioner. The front 64 of the first cover 60 may be rounded to be convex forward and the light reflecting from the reflector 90 may reach the front 64 of the first cover 60. The first cover 60 may be an illumination pattern side where an illumination pattern is formed, when the light emitting unit 7 is turned on. The first cover 60 may be larger than the entire size of the light emitting unit 7 and may function as a shield covering the light emitting unit 70 from the outside. The first cover 60 may function as a lighting plate where an illumination pattern L to be displayed by the illumination panel 2 is shown. The first cover 60 may be opaque, the light reflecting from the reflector 90 may travel to the front 64 of the first cover 60 through the gap 78, and the light traveling to the front 64 of the first cover 60 may be shown on the front of the first cover 60. A first cover fastening portion 66 for fastening the first cover 60 to the illumination panel base 50 with fasteners such as screws may be formed at the first cover 60. The first cover fastening portion 66 may protrude toward the illumination panel base 50 from the rear 63 of the first cover 60. The first cover fastening portion 66 may be implemented by at least one boss portion formed at the first cover 60. The front 64 of the first cover 60 may be white and the color of the illumination pattern to be formed on the front 64 of the first cover 60 may depend on the color of the light reflecting from the reflector 60.

[0057] The light emitting unit 70 may be disposed in the space S inside the reflector 90. The light emitting unit 70 may have a plurality of modes in which at least one of the size and the position of the illumination pattern to be formed on the front of the first cover 60 is different.

[0058] The light emitting unit 70, as shown in FIG. 7, may have at least two emission modes with illumination patterns having different sizes on the front of the first cover 60. The light emitting unit 70 may have a first emission mode for producing an illumination pattern having a first size and a second emission mode for producing an illumination pattern having a second size smaller than the first size. The light emitting unit 70 may have three emission modes L1, L2, and L3 or more, depending on the size of illumination patterns, without being limited to two emission modes, and may have various emission modes in accordance with the size of illumination patterns. The light emitting unit 70 can keep specific patterns for a predetermined time, in a plurality of illumination patterns having different sizes.

[0059] The light emitting unit 70, as shown in FIG. 8, may have at least two emission modes with illumination patterns at different positions on the front of the first cover 60. The light emitting unit 70 may have various emission modes in accordance with the area (position) of illumination patterns. The light emitting unit 70 may have a first emission mode for producing an illumination pattern in the first area of the front 64 of the first cover 60 and a second emission mode for producing an illumination pattern in the second area at different position from the first area. The light emitting unit 70 may have, for example, a first emission mode for producing an illumination pattern L4 in the left area from the vertical center line of the illumination panel 2 and a second emission mode for producing an illumination pattern L5 in the right area from the vertical center line of the illumination panel 2. The light emitting unit 70 may have first, second, third, and fourth emission modes for producing illumination patterns L4, L5, L6, and L7 in four areas of a left area, a right area, an upper area, and a lower area, respectively, with respect to the center of the illumination panel 2.

[0060] The light emitting unit 70 may have various emission modes with different sizes and areas of illumination patterns and may have more various emission modes by combinations of the sizes and the areas of illumination patterns.

[0061] In the light emitting unit 70, at least one LED can selectively produce a plurality of illumination patterns. One LED may emit various kinds of light with different colors and illuminations and may emit various kinds of light in which at least one of the color and the illumination is difference in accordance with combinations of the colors and the illuminations of the light emitted from one LED. The light emitting unit 70 may include a plurality of LEDs 71 and 72 and the LEDs 71 and 72 may be simultaneously or selectively controlled, depending on the emission modes. The light emitting unit 70 may

include a PCB 74 mounted with LEDs. The light emitting unit 70 may include a plurality of PCBs and the LEDs 71 and 72 may be distributed on the PCBs. The PCBs 74 may be spaced from each other. In the light emitting unit 70, at least two LEDs may be disposed on one PCB 74. The LEDs 71 and 72 may be sequentially positioned along a circular virtual line O, such that the light emitting unit 70 can radially emit light. The light emitting unit 70 may produce different illumination patterns on the front 64 of the first cover 60 for each of the emission modes. The light emitting unit 70 may include a main PCB 75 on which the PCBs 74 are disposed. The PCBs 74 may be spaced from each other on the main PCB 75. The PCBs 74 may be arranged in different directions on the main PCB 75. The PCBs 74 may be arranged with one side facing the inner circumference of the reflector 90. The LEDs 71 and 72 may be disposed on the side facing the reflector 90, in both sides of the PCB 74, such that they can emit light toward the inner circumference of the reflector 90. The light emitting unit 70 may be arranged such that the LEDs 71 and 72 radially emit light. The LEDs 71 and 72 can be simultaneously turned on, or some of them can be turned on with the others off. The light emitting unit 70 may have a plurality of emission modes in which the number of LEDs turned on, in the LEDs 71 and 72, is different. The light emitting unit 70 may include a first emission mode for turning on all of the LEDs 71 and 72 and a second emission mode for tuning on some of the LEDS 71 and 72 with the others off. The first emission mode and the second emission mode may be different in the size of illumination patterns to be formed on the front 64 of the first cover 60. One of the first emission mode and the second emission mode may be the operation mode display mode and the other one may be the information display mode. The operation mode display mode may be a mode showing the operation mode of the air conditioner such as cooling operation, heating operation, defrosting operation, and purifying operation. The information display mode may be a mode showing specific periods of time such as morning or evening with specific illumination patterns or showing information such as temperature, humidity, the degree of purity, and weather with specific illumination patterns.

[0062] The light emitting unit 70 may have a plurality of emission modes in which the LEDs turned on, in the LEDs 71 and 72, are different in position. The light emitting unit 70 may include a first emission mode (see (d) of FIG. 8) in which the LED at the left side of the LEDs 71 and 72 is turned on and a second emission mode (see (e) of FIG. 8) in which the LED at the right side of the LEDs 71 and 72 is turned on. The light emitting unit 70 may include a third emission mode (see (f) of FIG. 8) in which the LED at the upper portion of the LEDs 71 and 72 is turned on and a fourth emission mode (see (g) of FIG. 8) in which the LED at the lower portion of the LEDs 71 and 72 is turned on. The emission modes (see (d), (e), (f), and (g) of FIG. 8) in which the positions of the turned on LEDs are different may show different items of information.

[0063] In the light emitting unit 70, the PCB 74 and the PCBs 71 and 72 on the PCB 74 may constitute one light emitting module and the light emitting unit 70 may include a plurality of light emitting modules A, B, C, D, E, F, G, and H. The light emitting modules A, B, C, D, E, F, G, and H can be simultaneously or separately controlled. The light emitting modules A, B, C, D, E, F, G, and H may produce the ring-shaped illumination pattern L1 (first illumination pattern) shown in (a) of FIG. 7, when all of them are simultaneously turned on. The light emitting modules A, B, C, D, E, F, G, and H may produce the ring-shaped illumination pattern L2 with one side open (second illumination pattern) shown in (b) of FIG. 7, when two or three of them are turned on with the other off. The light emitting modules A, B, C, D, E, F, G, and H may produce the spot illumination pattern L3 (third illumination pattern) shown in (c) of FIG. 7, when one of them is simultaneously turned on with the other off. The light emitting modules A, B, C, D, E, F, G, and H may produce variable illumination patterns that are obtained by changing the ring-shaped illumination pattern L1, the ring-shaped illumination pattern L2 with one side open, and the spot illumination pattern L3, as time passes. The light emitting unit 70 may show one of the ring-shaped illumination pattern L1 and the ring-shaped illumination pattern L2 with one side open and then show the other one, as time passes. The light emitting unit 70 may alternately show the ring-shaped illumination pattern L2 and the ring-shaped illumination pattern L2 with one side open. The light emitting unit 70 may sequentially show the ring-shaped illumination pattern L1, the ring-shaped illumination pattern L2 with one side open, and the spot illumination pattern 3, as time passes. The light emitting unit 70 may combine the ring-shaped illumination pattern L1, the ring-shaped illumination pattern L2 with one side open, and the spot illumination pattern 3 in various ways, as time passes, and the present invention is not limited to the order described above. The light emitting modules A, B, C, D, E, F, G, and H all may emit the same color of light. A emission group of the light emitting modules A, B, C, D, E, F, G, and H may emit light with a color different from that of the light emitted by another emission group. The light emitting modules A, B, C, D, E, F, G, and H all may emit light with the same illumination. A emission group of the light emitting modules A, B, C, D, E, F, G, and H may emit light with illumination different from that of the light emitted by another emission group. The light emitting modules A, B, C, D, E, F, G, and H may all be sequentially controlled with time differences. The light emitting modules A, B, C, D, E, F, G, and H may all be sequentially turned on, as time passes. The light emitting modules A, B, C, D, E, F, G, and H may all be sequentially turned off, as time passes.

[0064] The light emitting unit 70 may have variable emission modes h, I, and j in which illumination patterns changes, as time passes, as shown in FIG. 9. The light emitting unit 70 may produce an illumination pattern that

changes in size, as time passes. The light emitting unit 70 may produce an illumination pattern L8 having a first size, as shown in (h) of FIG. 9, and then produce an illumination pattern L9 having a second size smaller than that of the illumination pattern L8 having the first size, as shown in (i) of FIG. 9. Thereafter, the light emitting unit 70 may produce an illumination pattern L10 having a third size smaller than that of the illumination pattern L9 having the second size, as shown in (j) of FIG. 9, after producing the illumination pattern L9 having the second size, as shown in (i) of FIG. 9. The light emitting unit 70 may produce an illumination pattern that gradually decreases in size, as time passes, and ma produce an illumination pattern that gradually increases in size, as time passes. The light emitting unit 70 may have a plurality of variable emission modes and the variable emission modes may be selectively performed. The positions of illumination patterns where the sizes decrease may be different in the variable emission modes. The positions of illumination patterns where the sizes increase may be different in the variable emission modes.

[0065] The variable emission modes may include a variable emission mode in which an illumination pattern gradually decreases in size, as time passes, and the area of the illumination pattern with the size decreased is an area under the center of the illumination panel 2. That is, the in the variable emission mode, the light emitting unit 70 may produce a large illumination pattern in the early stage of the emission mode and produce a small illumination pattern in the area under the center of the illumination panel 2 in the latter stage of the variable emission mode. The variable emission modes may include a variable emission mode in which an illumination pattern gradually decreases in size, as time passes, and the area of the illumination pattern with the size decreased is an area over the center of the illumination panel 2. That is, the in the variable emission mode, the light emitting unit 70 may produce a large illumination pattern in the early stage of the emission mode and produce a small illumination pattern in the area over the center of the illumination panel 2 in the latter stage of the variable emission mode. The variable emission modes may include a variable emission mode in which an illumination pattern gradually increases in size, as time passes, and the area of the illumination pattern with the size increased is an area under the center of the illumination panel 2. That is, the in the variable emission mode, the light emitting unit 70 may produce a small illumination pattern under the center of the illumination panel 2 in the early stage of the emission mode and produce a large illumination pattern in the latter stage of the variable emission mode. The variable emission modes may include a variable emission mode in which an illumination pattern gradually increases in size, as time passes, and the area of the illumination pattern with the size increased is an area over the center of the illumination panel 2. That is, the in the variable emission mode, the light emitting unit 70 may produce a small illumination pattern over the center of the illumination panel 2 in the early stage of the emission mode and produce a large illumination pattern in the latter stage of the variable emission mode.

[0066] The light emitting unit 70 may further include a main PCB holder 76 on which the main PCB 75 is disposed. The light emitting unit 70 may have a light emitting unit fastening portion 77 fastened to the illumination panel base 50 by fasteners such as screws. The light emitting unit fastening portion 77 may be formed at the main PCB holder 76. The light emitting unit fastening portion 77 may be at least one boss portion formed at the main PCB holder 76.

[0067] The second cover 80 may define the front external appearance of the illumination panel 2 in cooperation with the first cover 60. The second cover 80 may function as a reflector shield covering the reflector 90. The second cover 80 may function as a reflector protector protecting the reflector 90. The second cover 80 may be disposed on the illumination panel base 50. The second cover 80 has an opening 82 exposing the first cover 60 to the outside. The opening 82 may be smaller than the first cover 60. The outer circumference 61 of the first cover 60 may be covered by the second cover 80. The edge 83 of the opening 82 may cover the outer circumference 61 of the first cover 60. The gap 78 between the second cover 80 and the first cover 60 may be formed between the front 64 of the first cover 80 and the edge 83 of the opening 82. Describing the gap 78 in detail, the gap 78 may be formed between the portion facing the reflector 90, of the front 64 of the first cover 80, and the edge 83 of the opening 82 of the second cover 80. The second cover 80 may have a front body 84 with the opening 82 and at least one side cover 86. The front body 84 may be positioned ahead of the illumination panel base 50, covering the reflector 90. The side body 86 may close a portion of the gap between the illumination panel base 50 and the body 1. The front body 84 may be positioned ahead of the body 1. The side body 86 may include a left body 86A and a right body 86B when the air intake channel P vertically opens. When the side body 86 includes the left body 86A and the right body 86B, the air intake channel P may be formed between the left body 86A and the right body 86B, when the illumination panel 2 moves forward. The left body 86A may close a left gap T1 between the illumination panel base 50 and the body 1. The right body 86B may close a right gap T2 between the illumination panel base 50 and the body 1. The left body 86A and the right body 86B may be formed at the sides of the front body 84. The left body 86A and the right body 86B may be perpendicular to the front body 84. Hereinafter, when left body 86A and the right body 86B are separately described, they are referred to as the left body 86A and the right body 86B, but in other cases, the left body 86A and the right body 86B are referred to as the side body 86.

[0068] The reflector 90 may be disposed around the outer circumference of the first cover 60. The reflector 90 may disposed around between the illumination panel

base 50 and the first cover 60. The reflector 90 may be a ring. The reflector 90 may produce a ring-shaped illumination band (illumination pattern) ahead of the first cover 60. The inner diameter D1 of the reflector 90 may be larger than the outer diameter D2 of the first cover 60. The reflector 90 may have a reflective side 92 reflecting light toward the front 64 of the first cover 60. It may have a plurality of reflective sides 91 and 92 sequentially reflecting the light emitted from the light emitting unit 70. The reflective sides 91 and 92 may include a first reflective side 91 reflecting forward the light emitted from the light emitting unit 70 and a second reflective side 92 reflecting light, which reflects from the first reflective side 91, toward the front 64 of the first cover 60. The first reflective side 91 and the second reflective side 92 may be inclined in opposite directions. The first reflective side 91 and the second reflective side 92 may be formed on the inner circumference of the reflector 90. The reflector 90 may have a recession on the inner circumference and the recession may define a ring-shaped space 93. The reflector 90 may be implemented by sequentially arranging a plurality of rounded reflective plates 93, 94, 95, and 96 in a ring shape. The reflector 90 may be assembled in one ring-shaped reflector 90 by combining the reflective plates 93, 94, 95, and 96 in consideration of forming of the first reflective side 91 and the second reflective side 92. The reflector 90 may produce different shapes of illumination patterns, depending on the number of the light emitting modules A, B, C, D, E, F, G, and H turned on.

[0069] A light transmission cover 100 may be formed in a ring shape. The light transmission cover 100 may include a ring-shaped plate 102. The light transmission cover 110 may include a hollow cylinder 104 formed in a hollow cylindrical shape. The ring-shaped plate 102 may protrude at the end of the hollow cylinder 104. The hollow cylinder 104 may be perpendicular to the ring-shaped plate 102. The ring-shaped plate 102 and the hollow cylinder 104 may be integrally formed. The ring-shaped plate 102 may be positioned between the reflector 90 and the second cover 80 and at least a portion of the hollow cylinder 104 may be positioned between the reflector 90 and the first cover 60. The ring-shaped plate 102 may be fixed between the reflector 90 and the second cover 80. The hollow cylinder 104 can prevent foreign substances from flowing into between the first cover 60 and the second cover 80. The light reflecting from the reflector 90 may travel to the front 64 of the first cover 60 through the hollow cylinder 104. The light transmission cover 100 may function as a diffusion plate that diffuses the light reflecting from the reflector 90. The light transmission cover 100 may be coated with a light diffusion layer that diffuses light.

[0070] The operation of the present invention having the configuration is described hereafter.

[0071] In the light emitting unit 70, first, all of the LEDs 71 and 72 may be turned on and the light emitting modules A, B, C, D, E, F, G, and H may radiate light. The light from the light emitting unit 70 may be radially emitted, and the light from the light emitting modules A, B, C, D, E, F, G, and H may be emitted outward between the illumination panel base 50 and the first cover 60 through between the illumination panel base 50 and the first cover 60 and may be radially emitted between the illumination panel base 50 and the first cover 60. The radially emitted light may travel to the first reflective side 91 of the reflector 90 in the space S inside the reflector 90 and the direction of the light may be changed forward by the first reflective side 91 toward the second reflective side 92. The second reflective side 92 may reflect the light back to the space S inside the reflector 90 and the light reflecting from the second reflective side 92 may travel to the front 64 of the first cover 60 through the gap 78 between the first cover 60 and the second cover 80. A ring-shaped illumination pattern may be formed on the front 64 of the first cover 60, as shown in (a) of FIG. 7. The light shown in a ring shape on the front 64 of the first cover 60 may be smaller than the reflector 90, and since it travels to the front 64 of the first cover 60 through the gap 78 between the first cover 60 and the second cover 80, it can be shown clearly in a ring shape.

[0072] On the other hand, in the light emitting unit 70, some of the LEDs 71 and 72 may be turned on with the other off. In the light emitting unit 70, when the LEDs 71 and 72 are turned on, the LEDs in adjacent two or more light emitting modules can be turned on. In the light emitting unit 70, when some of the LEDs 71 and 72 are turned on, all of the LEDs in one light emitting module may be turned on or only one of the LEDs in one light emitting module may be turned on. Light can be emitted from the light emitting module with the LEDs turned on and light cannot be radiated from the light emitting module with only the LEDs turned off. The light emitted from the light emitting module with the LEDs turned on may travels outward between the illumination panel base 50 and the first cover 60 through between the illumination panel base 50 and the first cover 60. The light traveling outward between the illumination panel base 50 and the first cover 60 may be sequentially reflected, as the LEDs 71 and 72 are all turned on, in which the reflector 90 can reflect the light only from the area facing the light emitting modules with the LEDs turned on can reflect the light, without reflecting the light throughout the entire circumference. On the other hand, the light reflecting from the reflector 90 can travel to the front of the first cover 60 through the gap 78 between the first cover 60 and the second cover 80, in which on the front 64 of the first cover, an illumination pattern having a ring shape with one side open may be shown, as shown in (b) of FIG. 7, or a spot illumination pattern may be shown, as shown in (c) of FIG. 7. In the light emitting unit 70, when only some of the LEDs 71 and 72 are turned on, the number of the LEDs to be turned may be changed, and when the turned-on LEDs are three or more, an illumination pattern having a ring shape with one side open may be shown turning-on of three or more adjacent LEDs, or a spot illumination pattern may be shown when the turned-on LEDs are one

to two. The illumination pattern having a ring shape with one side open or the spot illumination pattern shown on the front 64 of the first cover 60 may be smaller than a ring-shaped illumination pattern. Since the illumination pattern having a ring shape with one side open or the spot illumination pattern on the front 64 of the first cover 60 passes through the gap 78 between the first cover 60 and the second cover 80, it can be shown clear.

[0073] The air conditioner can show ring-shaped clear light in any one of the operation display mode and the information display mode and can show clear light in a ring-shaped with one side open or a spot shape in the other one of the operation display mode and the information display mode.

[0074] User etc. can easily check the current display mode from a distance from the shape and the position of the illumination on the front of the first cover 60, such that they can easily recognize the operation information or various items of information of the air conditioner.

[0075] FIG. 10 is a cross-sectional view enlarging a portion of the illumination panel of a second embodiment of an air conditioner according to the present invention.

[0076] In the air conditioner of the embodiment, a reflector 90' may include a body portion 98 and a light diffusion portion 99 on the body part 98 and other configuration and operation except that the reflector 90' includes the body portion 98 and the light diffusion portion 99 are the same as or similar to those of the first embodiment of the present invention, such that the detailed description is not provided.

[0077] The body portion 98 may be formed in the same shape as that of the reflector 90 of the first embodiment of the present invention and may be made of plastic or metal. The reflector 90' may have a plurality of reflective sides 91 and 92, as in the first embodiment of the present invention, and the reflective sides 91 and 92 may be formed at the light diffusion portion 99. The light diffusion portion 99 may have a white coated layer on the body portion 98.

[0078] FIG. 11 is a cross-sectional view showing a third embodiment of an air conditioner according to the present invention.

[0079] The air conditioner of the embodiment may further include a light guide panel 130 that guides light emitted from the light emitting unit 70, as shown in FIG 11. The other configuration and operation except for the light guide panel 130 are the same as or similar to those of the first embodiment or the second embodiment of the present invention, such that the same reference numerals are used and the detailed description is not provided.

[0080] The light guide panel 130 may be positioned between the light emitting unit 70 and the reflector 90 in the light radiation direction. The light guide panel 130 can transmit light to the reflector 90 with minimum dispersion or reduction of light. The light guide panel 130 may be formed in a disk with the center bored or a ring shape. The light guide panel 130, which guides light emitted from the light emitting unit 70 to the reflector 90, may have the inner circumference facing the light emitting unit 70 and the outer circumference facing the reflector 90. The light guide panel 130 may include a hollow portion 132. The hollow portion 132 may be larger than the light emitting unit 70 and may surround the outer circumference of the light emitting unit 70. The outer diameter D3 of the light guide panel 130 may be smaller than the inner diameter D1 of the reflector 90. The inner diameter D4 of the light guide panel 130 may be larger than the outer diameter D5 of the light emitting unit 70.

[0081] When light is emitted from the light emitting unit 70, the light may travel to the light guide panel 130 through the inner circumference of the light guide panel 130 and travel through the outer circumference of the light guide panel 130 after passing through the light guide panel 130. The light passing through the outer circumference of the light guide panel 130 may reflect from the inner circumference of the reflector 90 and reach to the front of the first cover 60 through the gap 78 between the first cover 60 and the second cover 80.

[0082] FIG. 12 is a cross-sectional view showing a fourth embodiment of an air conditioner according to the present invention.

[0083] In the air conditioner of the present invention, as shown in FIG. 12, the firs cover 60 may have an inner body portion 68 and an outer body portion 69 inclined or rounded around the inner body portion 68. The other configuration and operation except for the first cover 60 may be the same as or similar to those of one of the first to third embodiments and the detailed description is not provided.

[0084] The inner body portion 68 and the outer body portion 69 may be bent. The inner body portion 68 may be bent from the outer circumference of the inner body portion 68. The inner body portion 68 may be positioned at the opening 82 of the second cover 80 and the outer body portion 69 may be rounded or inclined toward the inner circumference of the reflector 90 from the outer circumference of the inner body portion 68. The outer body portion 69 may be formed such that the outer diameter gradually increases as it goes back from the inner body portion 68. The inner body portion 68 may be a disk and the outer body portion 69 may be a cylinder that is formed around the disk and of which the outer diameter gradually increases as it goes back. In the first cover 60, a portion of the front of the outer body portion 69 may face the reflector 90, the front of the inner body portion 68 of the first cover 60 may not face the reflector 90, and the light reflecting from the reflector 90 may form an illumination pattern on the front of the outer body portion 69. The light reflecting from the reflector 90 can be restricted on the front of the outer body portion 69 of the first cover 60 without diffusing and expanding to the front of the inner body portion 68. The inner body portion 68 may have a non-illumination pattern portion where an illumination pattern is not formed, the outer body portion 69 may have an illumination pattern portion where an illumination pattern is formed, and the illumination pattern

formed in a portion of the front of the first cover 60 may be shown with clear color and shape ahead of the outer body portion 69.

Claims

1. An air conditioner comprising:

   a body (1) taking indoor air inside through an air intake port (4), conditioning the air, and discharging the air to an air discharge port (6, 8); and
   an illumination panel (2) on the body (1),
   wherein the illumination panel (2) includes:

   an illumination panel base (50);
   a first cover (60) on the illumination panel base (50);
   a light emitting unit (70) emitting light outward between the illumination panel base (50) and the first cover (60), the light emitting unit (70) being provided between the illumination panel base (50) and the first cover (60);
   a second cover (80) having a gap (78) between the first cover (60) and the second cover (80); and
   a reflector (90) reflecting the light emitted from the light emitting unit (70) to the front of the first cover (60) through the gap (78).

2. The air conditioner of claim 1, wherein the reflector (90) has a space therein where the light emitting unit (70) is disposed.

3. The air conditioner of claim 1 or 2, wherein the reflector (90) is disposed to surround the portion between the illumination panel base (50) and the first cover (60).

4. The air conditioner of claim 1, wherein the reflector (90) is disposed to surround the outer circumference (61) of the first cover (60).

5. The air conditioner of claim 4, wherein the inner diameter of the reflector (90) is larger than the outer diameter of the first cover (60).

6. The air conditioner of any one of claims 1 to 5, wherein only a portion of the front (64) of the first cover (60) faces the reflector (90).

7. The air conditioner of any one of claims 1 to 6, wherein the front (64) of the first cover (60) is rounded to be convex forward, and
   the reflector (90) has at least one reflective side reflecting light toward the front of the first cover (60).

8. The air conditioner of any one of claims 1 to 7, wherein the reflector (90) has a plurality of reflective sides (91, 92) sequentially reflecting the light emitted from the light emitting unit (70).

9. The air conditioner of claim 8, wherein the reflective sides include:

   a first reflective side (91) reflecting forward the light emitted from the light emitting unit (70); and
   a second reflective side (92) reflecting the light, which reflects from the first reflecting side (91), toward the front (64) of the first cover (60).

10. The air conditioner of any one of claims 1 to 9, wherein the second cover (80) has an opening (82) that exposes the first cover (60) to the outside.

11. The air conditioner of claim 10, wherein the opening (82) is smaller than the first cover (60).

12. The air conditioner of any one of claims 1 to 11, wherein the illumination panel (2) further includes a light transmission cover (100) transmitting the light reflecting from the reflector (90) and configured to protect the reflector (90).

13. The air conditioner of any one of claims 1 to 12, wherein a plurality of LEDs of the light emitting unit (70) are arranged to radially emit light.

14. The air conditioner of any one of claims 1 to 13, wherein the light emitting unit (70) has a plurality of emission modes in which at least one of the size and the position of an illumination pattern to be formed on the front of the first cover (60) is different.

15. The air conditioner of any one of claims 1 to 14, wherein the light emitting unit (70) has a variable emission mode in which the shape of an illumination pattern changes, as time passes.

FIG. 1

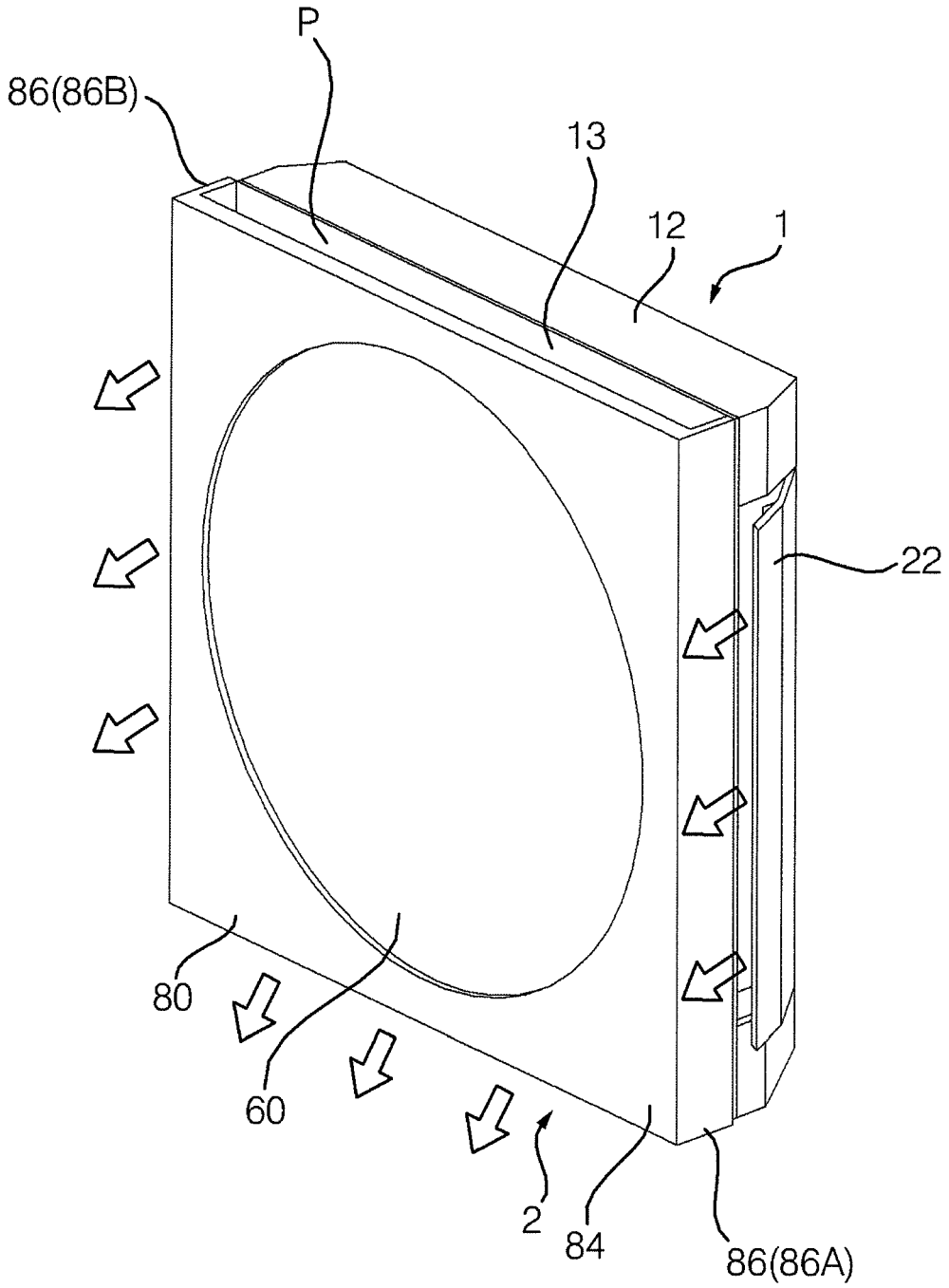

FIG. 2

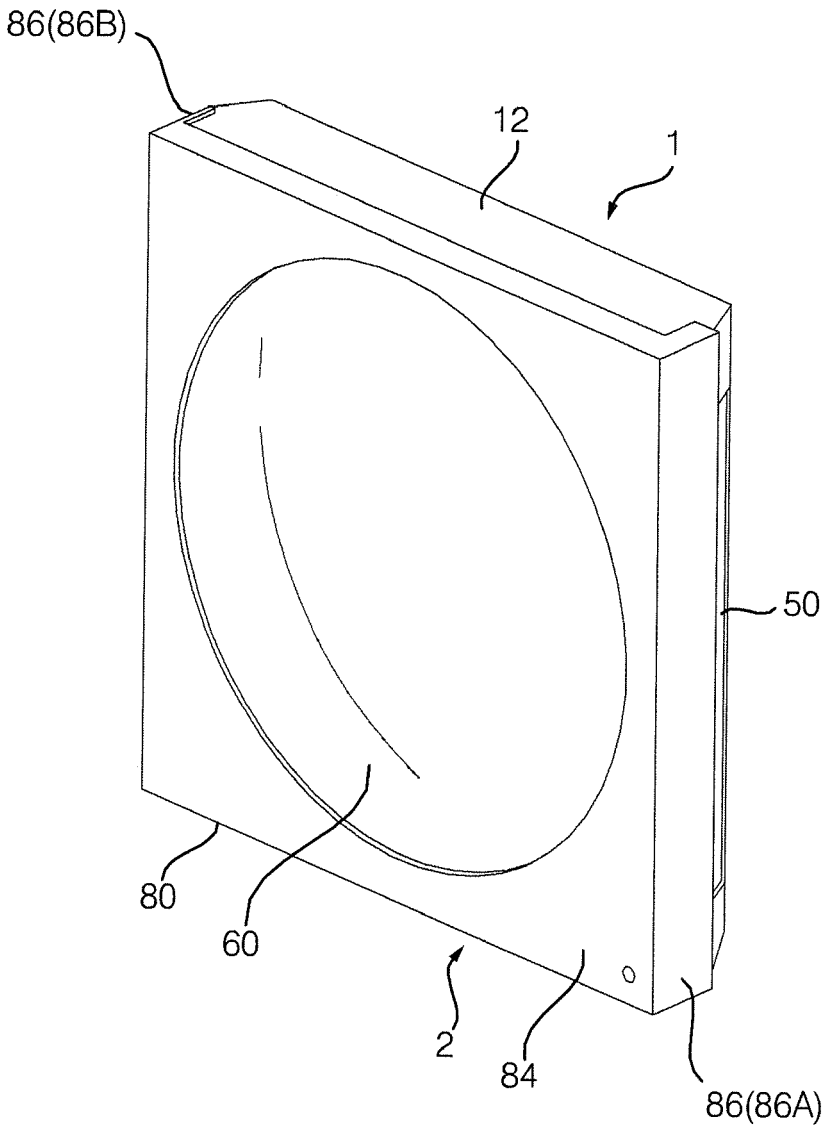

FIG. 3

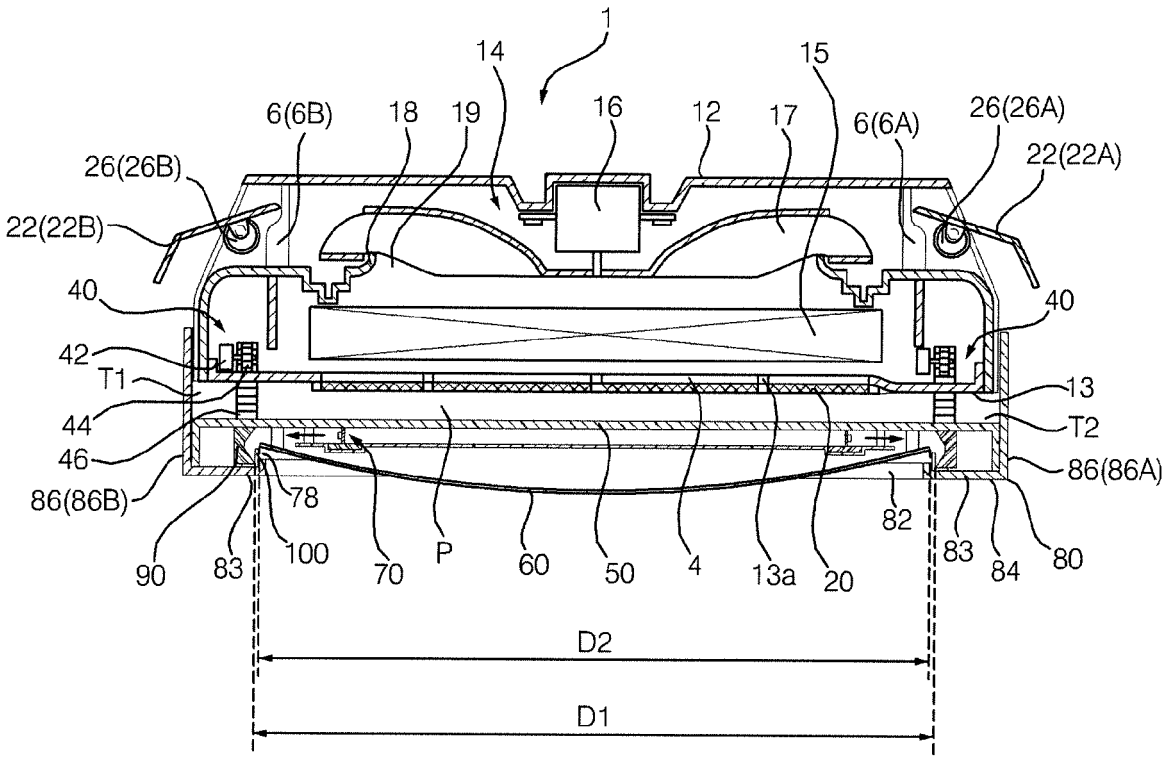
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FIG. 4

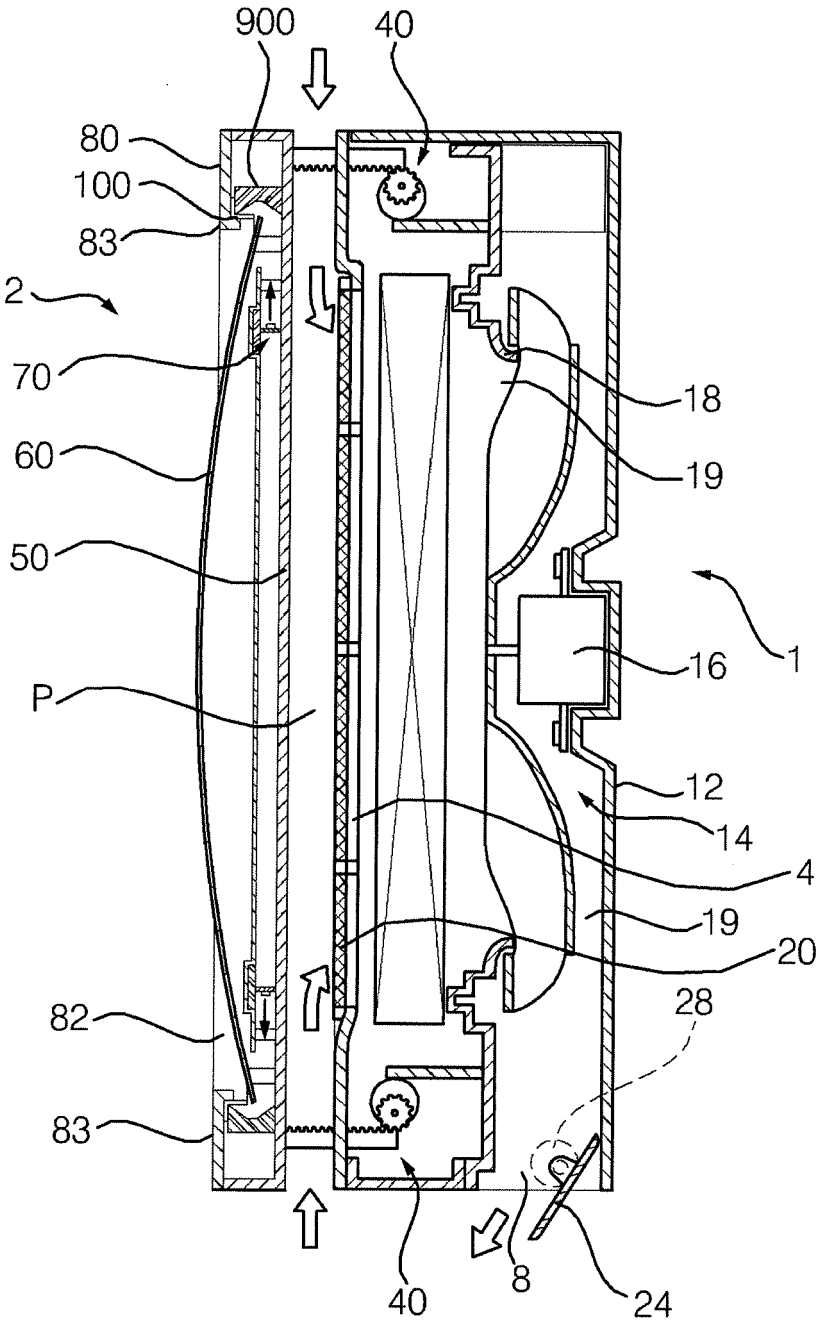

FIG. 5

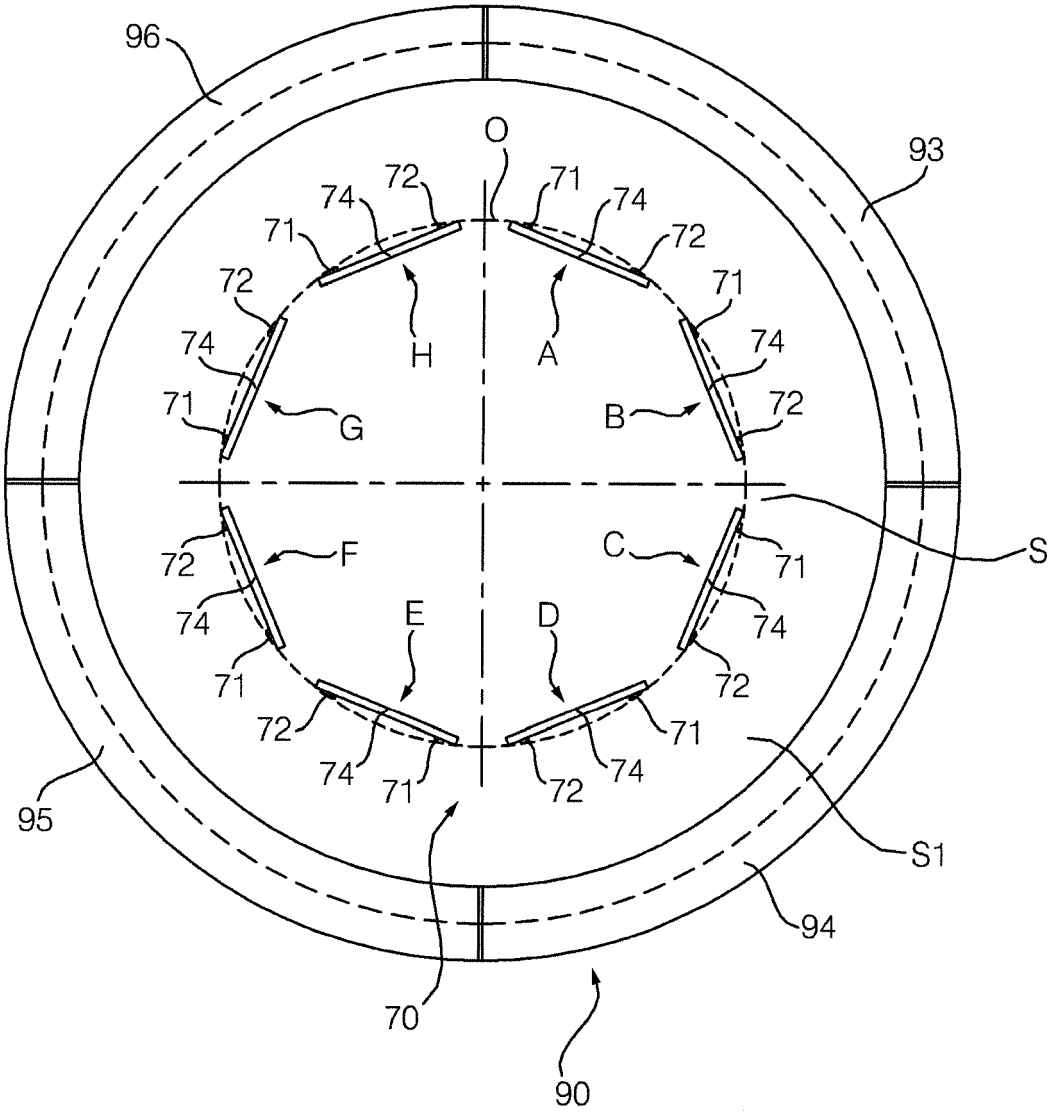

FIG. 6

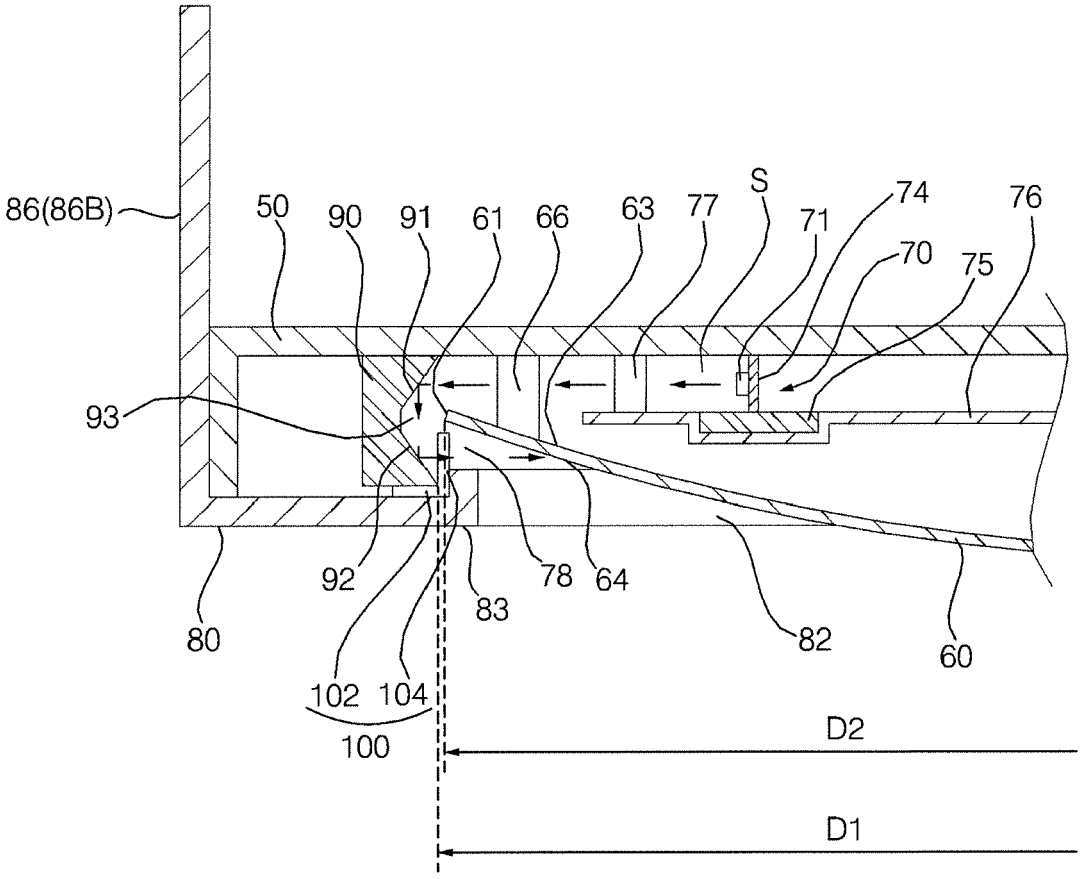
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FIG. 7

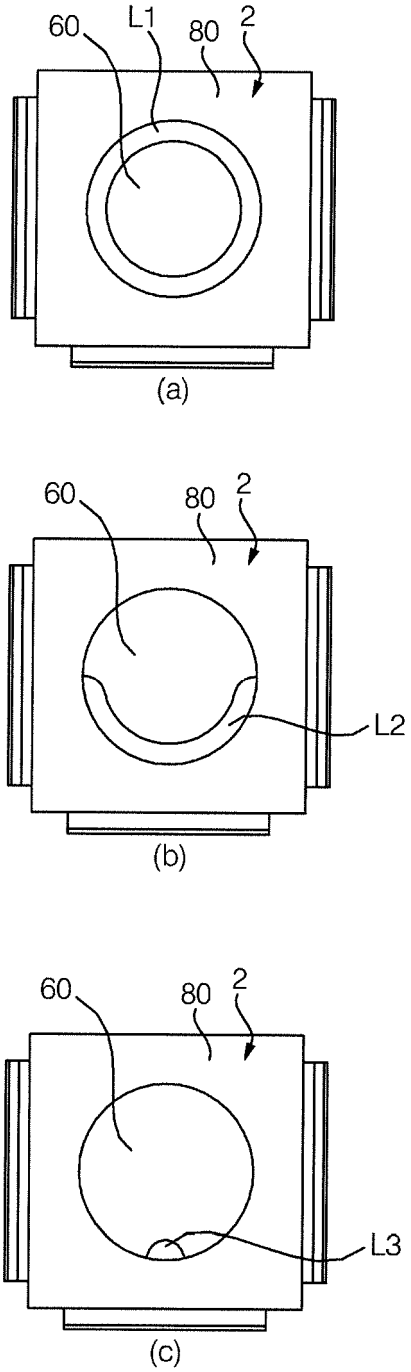

FIG. 8

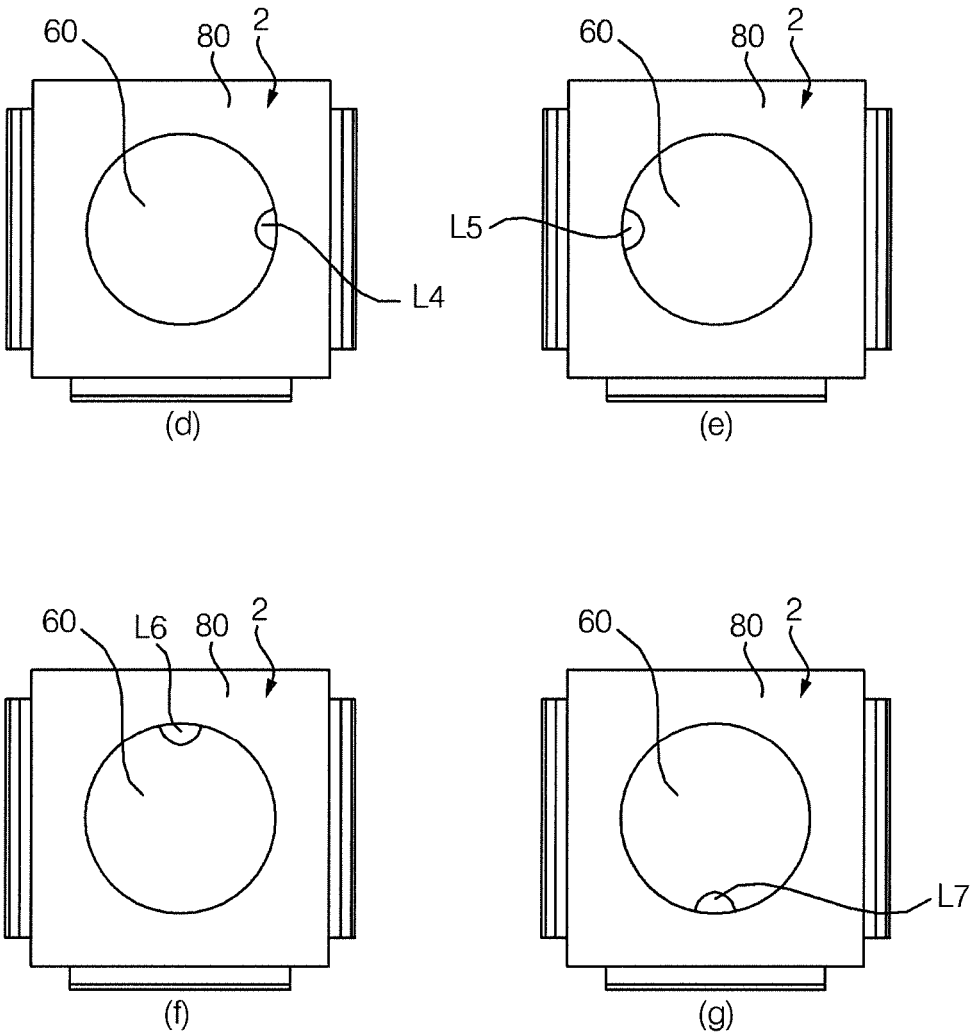

FIG. 9

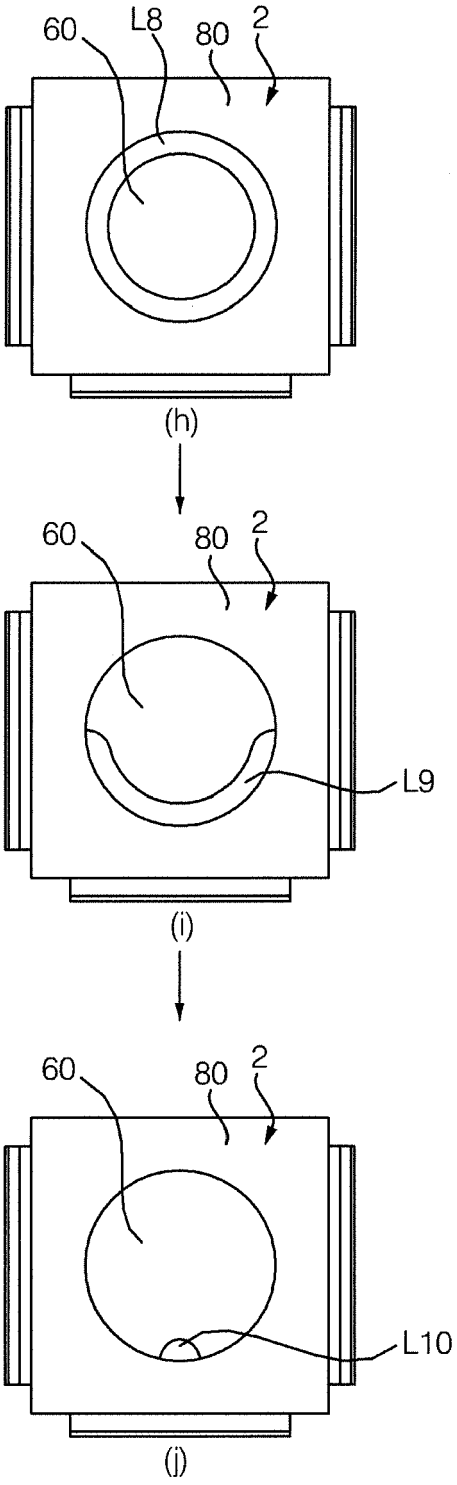

FIG. 10

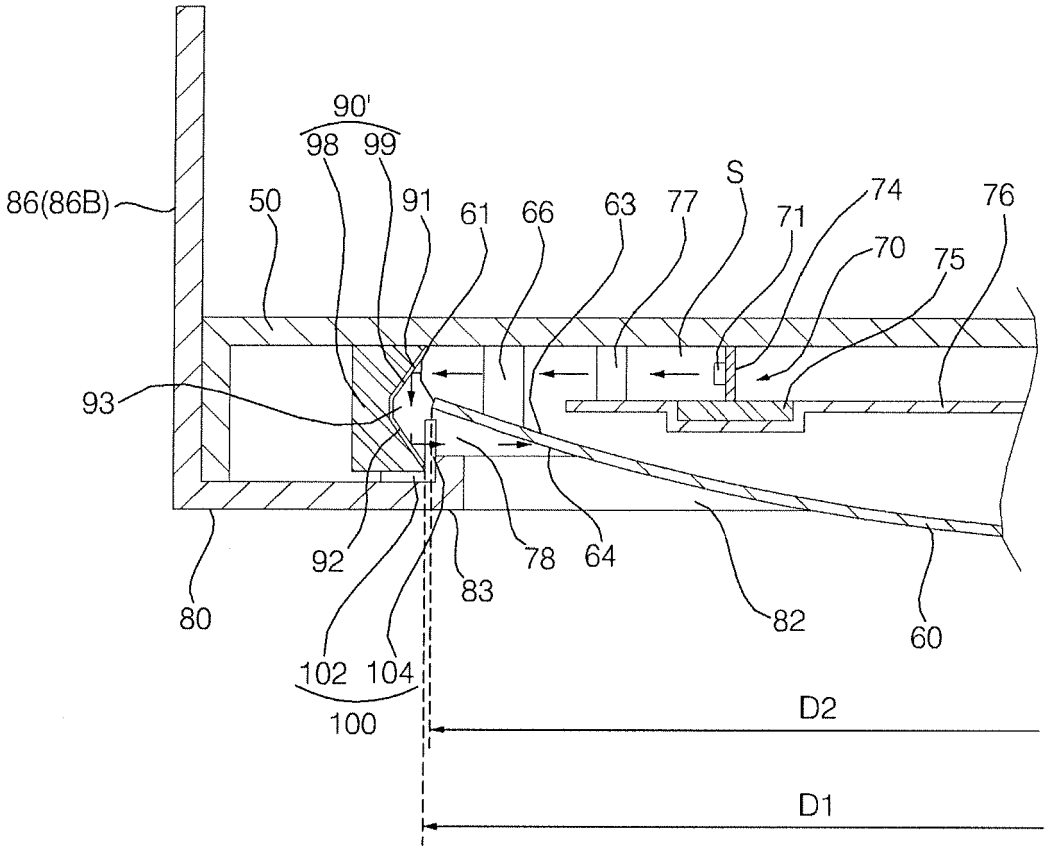
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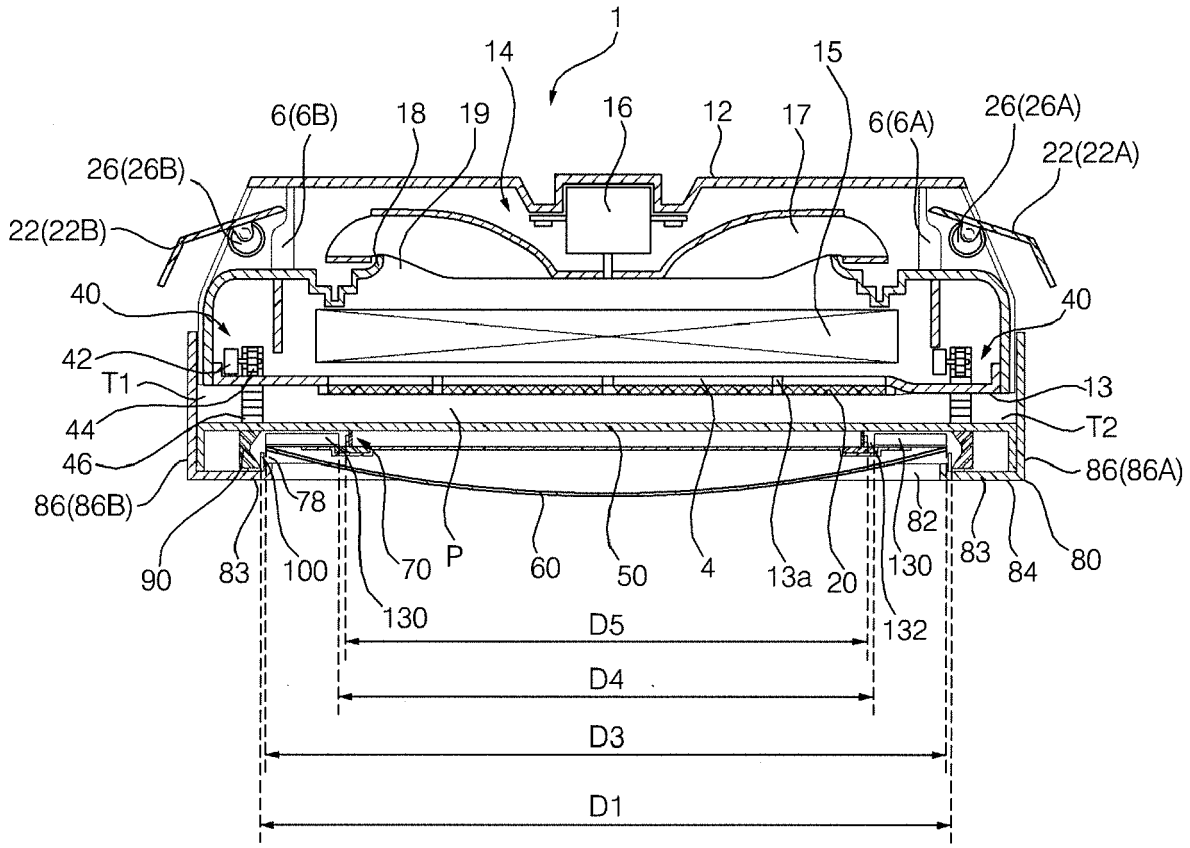
FIG. 11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6(6B)
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6(6A)
26(26A)
22(22A)
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42
T1
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86(86B)
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T2
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P
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13a
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130
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84
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D5
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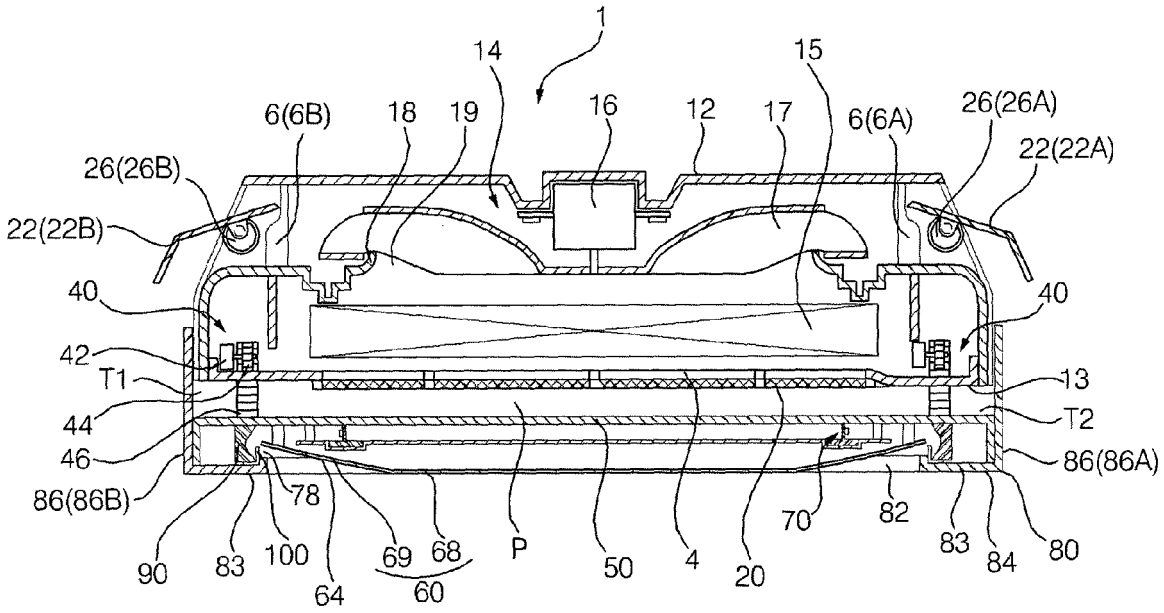
FIG. 12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EUROPEAN SEARCH REPORT

Application Number
EP 14 15 2133

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Place of search	Date of completion of the search	Examiner
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