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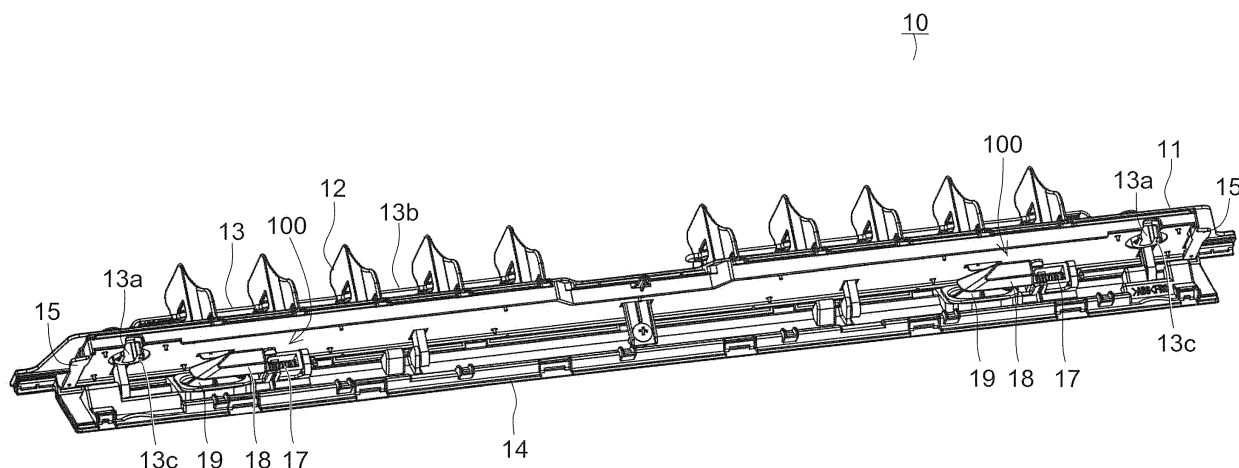
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(54) **AIR CONDITIONER**

(57) The purpose of the present invention is to provide an air conditioner that can improve convenience. An air conditioner 1 is provided with a housing 2 in which an inlet 4 and outlet 5 for air are opened, an air passage 6 that is provided in the housing 2 and that causes the inlet 4 and the outlet 5 to mutually communicate, an air blower 7 disposed inside the air passage 6, and a detachable

wind direction plate unit 10 having a wind direction plate 12 that changes the direction of air blown out from the outlet 5 in the left-right direction, wherein the wind direction plate unit 10 includes a base part 11 formed from a lower wall of a downstream-side end part of the air passage 6, and a bottom wall part 14 that forms the bottom wall of the housing 2.

FIG.3



Description

Technical Field

[0001] The present invention relates to an air conditioner including a wind direction plate which changes the direction of air discharged from an outlet in the left-right direction.

Background Art

[0002] A conventional air conditioner is disclosed in Patent Document 1 listed below. The conventional air conditioner includes a housing which has an inlet and an outlet for air, and which is attached to an upper part of a side wall of a room. Inside the housing, an air passage is formed to allow mutual communication between the inlet and the outlet. In the air passage, an air blower and a heat exchanger are disposed. On an upper wall of the air passage on a downstream side of the air blower, there is disposed a wind direction plate unit which is attachable and detachable.

[0003] The wind direction plate unit has a base part, a plurality of vertical wind direction plates, a connection part, and an operation member. The base part has an engagement part which engages with the upper wall of the air passage. The vertical wind direction plates stand on the base part to be aligned with each other in the left-right direction, and rotatable in the left-right direction. The connection part connects the plurality of wind direction plates with each other. The operation member is disposed at a center part of the connection part in the left-right direction, and the user can rotate the wind direction plates in the left-right direction by operating the operation member.

[0004] At the outlet, a plurality of lateral wind direction plates, which are attachable and detachable with respect to the housing, are arranged parallel to each other in the up-down direction. The lateral wind direction plates are rotatable in the up-down direction to change the direction of air discharged from the outlet in the up-down direction.

[0005] When the air blower is driven, air inside the room is drawn into the air passage through the inlet, and air that has exchanged heat with the heat exchanger is discharged from the outlet into the room. At this time, it is possible to change the direction of the air discharged from the outlet in the left-right direction by operating the operation member of the wind direction plate unit.

[0006] When the air blower is not operating, the user can detach the wind direction plate unit by removing the lateral wind direction plates, then releasing the engagement of the engagement part with the upper wall of the air passage, and then holding and pulling the wind direction plate unit downward. This allows the user easy cleaning of the wind direction plates, and further, easy cleaning of the air passage and the air blower via the outlet.

Citation List

Patent Documents

- 5 **[0007]** Patent Document 1: Japanese Patent No. 3306250 (Page 4, Page 5, FIG. 3)

Summary of Invention

10 Technical Problem

[0008] However, with the conventional air conditioner described above, the user has to put his or her hand into the air passage via the outlet to release the engagement of the wind direction plate unit with the upper wall of the air passage. This makes it troublesome to detach the wind direction plate unit from the housing, and disadvantageously degrades the user friendliness of the air conditioner.

20 **[0009]** The present invention aims to provide an air conditioner with improved user-friendliness.

Solution to Problem

25 **[0010]** To achieve the above object, according to an aspect of the present invention, a blower includes a housing which has an inlet and an outlet for air, an air passage which is disposed in the housing to allow mutual communication between the inlet and the outlet, an air blower which is disposed in the air passage, and a wind direction plate unit which is attachable and detachable, and has a wind direction plate which changes a direction of air discharged from the outlet in a left-right direction. Here, the wind direction plate unit includes a base part which is constituted by a downstream-side end part of a lower wall of the air passage, and a bottom wall part which constitutes a bottom wall of the housing.

[0011] According to an embodiment of the present invention, in the air conditioner having the above configuration, it is preferable for the wind direction plate unit to be attached and detached by being moved to slide along a direction in which air is discharged from the outlet.

[0012] According to an embodiment of the present invention, it is preferable that the air conditioner having the above configuration further include a wind direction plate motor which is disposed inside the housing, and a connection part which is rotatably fitted to the base part, and connects a shaft of the wind direction plate motor to the wind direction plate. Here, the connection part has a groove which is open at a rear end thereof such that the shaft is allowed to enter the groove through the rear end, and the connection part is supported by being loosely fitted in a through hole of the base part.

50 **[0013]** According to an embodiment of the present invention, in the air conditioner having the above configuration, it is preferable for both side walls of the groove to be inclined in directions such that the both side walls are more away from each other toward rear ends thereof.

[0014] According to an embodiment of the present invention, in the air conditioner having the above configuration, it is preferable for the through hole to be formed in an elliptical shape with a major axis thereof extending in the left-right direction.

[0015] According to an embodiment of the present invention, it is preferable for the air conditioner having the above configuration to further include an engagement part which is disposed in the housing, a movable member which is disposed between the bottom wall part and the base part of the wind direction plate unit, and which is biased by a biasing part into engagement with the engagement part, and a press member which is pressable via an opening formed in the bottom wall part. Here, when the press member is pressed, the movable member is caused to move to release the engagement of the movable member with the engagement part.

[0016] According to an embodiment of the present invention, in the air conditioner having the above configuration, it is preferable for the base part to include an uneven part disposed on an outer surface thereof such that a position of the press member coincides with a position of the uneven part in the left-right direction.

[0017] According to an embodiment of the present invention, it is preferable for the air conditioner having the above configuration to further include an attachment/detachment detecting sensor which detects attachment and detachment of the wind direction plate unit. Here, the air blower is prohibited from being driven when the wind direction plate unit has been detached.

[0018] According to an embodiment of the present invention, in the air conditioner having the above configuration, it is preferable that the attachment/detachment detecting sensor be a push button switch including a push button and an arm member disposed facing the push button, and that the wind direction plate unit be attached to the housing by being moved to slide on the arm member to cause the arm member to press the push button.

[0019] According to an embodiment of the present invention, it is preferable for the air conditioner having the above configuration to further include an occupancy sensor which detects a human body existing in a room. Here, air is discharged from the outlet avoiding the human body by means of the wind direction plate.

[0020] According to an embodiment of the present invention, it is preferable for the air conditioner having the above configuration to further include an operation lever which is coupled to the occupancy sensor to change the direction of the occupancy sensor in the left-right direction, and a lid which is openable and closable, and covers the operation lever.

[0021] According to an embodiment of the present invention, in the air conditioner having the above configuration, it is preferable that a recess be disposed in a leading end of the operation lever, that a projection be disposed on the lid to be fitted in the recess, and that a direction of the occupancy sensor is variable between three directions by selectively holding one of the following

three states: a first state where a right side surface of the operation lever inclined leftward is caught by the projection; a second state where the projection fits in the recess of the operation lever; and a third state where a left side surface of the operation lever inclined rightward is caught by the projection.

[0022] According to an aspect of the present invention, an air conditioner includes a housing which has an inlet and an outlet for air, an air passage which is disposed in the housing to allow mutual communication between the inlet and the outlet, an air blower which is disposed in the air passage, an occupancy sensor which detects a human body existing in a room, and a wind direction plate which changes a direction of air discharged from the outlet in a left-right direction based on a result of detection performed by the occupancy sensor. Here, the air conditioner further includes an operation lever which is coupled to the occupancy sensor and changes a direction of the occupancy sensor in the left-right direction, and a lid which is openable and closable, and covers the operation lever.

Advantageous Effects of Invention

[0023] According to the present invention, in an air conditioner, a wind direction plate unit, which is attachable and detachable and has a wind direction plate which changes a direction of air discharged from the outlet in a left-right direction, includes a base part constituted by a downstream-side end part of a lower wall of an air passage, and a bottom wall part which constitutes a bottom wall of the housing. With this configuration, a user can easily detach the wind direction plate unit from the air conditioner, without performing any detachment operation inside an air passage far away from the outlet. This contributes to the improvement of user-friendliness of the air conditioner.

Brief Description of the Drawings

[0024]

FIG. 1 is a perspective view illustrating an air conditioner of a first embodiment;

FIG. 2 is a side sectional view illustrating the air conditioner of the first embodiment;

FIG. 3 is a perspective view illustrating a wind direction plate unit incorporated in the air conditioner of the first embodiment;

FIG. 4 is a side sectional view illustrating the wind direction plate unit incorporated in the air conditioner of the first embodiment;

FIG. 5 is a top view illustrating the wind direction plate unit incorporated in the air conditioner of the first embodiment;

FIG. 6 is a rear sectional view illustrating the wind direction plate unit incorporated in the air conditioner of the first embodiment;

FIG. 7 is a rear sectional view illustrating a lock mechanism for the wind direction plate unit incorporated in the air conditioner of the first embodiment, showing a state where the wind direction plate unit is locked;

FIG. 8 is a rear sectional view illustrating the lock mechanism for the wind direction plate unit incorporated in the air conditioner of the first embodiment, showing a state where the wind direction plate unit is unlocked;

FIG. 9 is a top sectional view illustrating an engagement part for the wind direction plate unit incorporated in the air conditioner of the first embodiment;

FIG. 10 is a front sectional view illustrating a connection part of the wind direction plate unit incorporated in the air conditioner of the first embodiment;

FIG. 11 is a bottom sectional view illustrating the connection part of the wind direction plate unit incorporated in the air conditioner of the first embodiment;

FIG. 12 is a perspective sectional view illustrating an attachment/detachment detecting sensor incorporated in the air conditioner of the first embodiment;

FIG. 13 is a top view illustrating the attachment/detachment detecting sensor incorporated in the air conditioner of the first embodiment;

FIG. 14 is a side view illustrating the attachment/detachment detecting sensor incorporated in the air conditioner of the first embodiment;

FIG. 15 is a perspective view of an air conditioner of a second embodiment;

FIG. 16 is a perspective view of an occupancy sensor incorporated in the air conditioner of the second embodiment;

FIG. 17 is a side sectional view of the occupancy sensor incorporated in the air conditioner of the second embodiment;

FIG. 18 is a front view of an operation lever incorporated in the air conditioner of the second embodiment;

FIG. 19 is a top sectional view of the operation lever incorporated in the air conditioner of the second embodiment, with the occupancy sensor pointing leftward;

FIG. 20 is a top sectional view of the operation lever incorporated in the air conditioner of the second embodiment, with the occupancy sensor pointing frontward;

FIG. 21 is a top sectional view of the operation lever incorporated in the air conditioner of the second embodiment, with the occupancy sensor pointing rightward;

FIG. 22 is front view of the occupancy sensor incorporated in the air conditioner of the second embodiment, with the occupancy sensor pointing leftward;

FIG. 23 is a front view of the occupancy sensor incorporated in the air conditioner of the second embodiment, with the occupancy sensor pointing frontward;

FIG. 24 is a front view of the occupancy sensor incorporated in the air conditioner of the second embodiment, with the occupancy sensor pointing rightward; and

FIG. 25 is a top view of a wind direction plate unit incorporated in an air conditioner of a third embodiment.

Description of Embodiments

[0025] First Embodiment: Embodiments of the present invention will be described below with reference to the accompanying drawings. FIG. 1 shows a perspective view of an air conditioner of a first embodiment. An air conditioner 1, which is installed on a wall inside a room, is an indoor unit connected to an outdoor unit (not shown) installed outdoors. The air conditioner 1 receives instructions, including those for starting operation and stopping operation, from a remote controller (not shown) operated by a user.

[0026] The air conditioner 1 includes a housing 2 which is attached to a side wall W (see FIG. 2) inside a room, and a front panel 3, which constitutes a front face of the housing 2, is detachably attached with respect to the housing 2. The housing 2 engages a claw part (not shown) with, and thereby is supported on, an attachment plate (not shown), which is attached to the side wall W at a height close to a ceiling S (see FIG. 2).

[0027] In a top face of the housing 2, an inlet 4 is formed to extend in the left-right direction, and an outlet 5 is formed in a lower part of the housing 2. The outlet 5 has a substantially rectangular shape extending in the left-right direction of the housing 2, and faces downward. When the air conditioner 1 is not operating, the outlet 5 is shut with a wind guide panel 80, which is curved.

[0028] FIG. 2 shows a side sectional view of the air conditioner 1. Inside the housing 2, an air passage 6 is disposed which allows mutual communication between the inlet 4 and the outlet 5. Inside the air passage 6, an air blower 7 is disposed which blows out air. When the air blower 7 is driven, air in the room is drawn into the air passage 6 through the inlet 4, and is then blown out into the room through the outlet 5. As the air blower 7, a cross flow fan is preferably used, but other kinds of air blowers may be used instead.

[0029] Between the inlet 4 and the air blower 7 inside the air passage 6, a heat exchanger 8 is disposed. The heat exchanger 8 is connected to a compressor (not shown) disposed in the outdoor unit to operate a refrigeration cycle, and exchanges heat with air in the air passage 6. Thereby, during cooling operation and heating operation of the air conditioner 1, the wind guide panel 80 is opened, and cool air and warm air, respectively, are blown out into the room through the outlet 5. Under the heat exchanger 8, a drain pan 9 is disposed.

[0030] In the air passage 6, between the air blower 7 and the outlet 5, a blow-out passage 63 is formed. Upper and lower surfaces of the blow-out passage 63 are re-

spectively constituted by an upper wall 63a and a lower wall 63b, and left and right surfaces of the blow-out passage 63 are constituted by side walls (not shown) on which a shaft of the air blower 7 is supported. The upper wall 63a and the lower wall 63b are both inclined downward toward their front ends, and guide air in a front downward direction.

[0031] At a position near the outlet 5, in the blow-out passage 63, a wind direction plate unit 10 is disposed to be attachable and detachable with respect to the housing 2. The wind direction plate unit 10 includes a plurality of wind direction plates 12 which are rotatable in the left-right direction. Thereby, the direction of air discharged through the outlet 5 is changed in the left-right direction. Further, at a position near a terminal end of the air passage 6 in the housing 2, a guide member (not shown) is disposed which guides the wind direction plate unit 10 to its fitting position. For attachment and detachment of the wind direction plate unit 10, the guide member guides the wind direction plate unit 10 to slide along a blowing-out direction of the outlet 5. A detailed description of the wind direction plate unit 10 will be given later.

[0032] The wind guide panel 80 is supported, by an extendable arm member (not shown) disposed in the housing 2, to be rotatable in the up-down direction. As illustrated in FIG. 2, the wind guide panel 80 closes the outlet 5 when the air conditioner 1 is not operating. Thereby, an inside of the air passage 6 becomes invisible, and as a result, the appearance of the air conditioner 1 is improved.

[0033] During the cooling operation of the air conditioner 1, the wind guide panel 80 rotates into a position indicated by an alternate long and short dash line X, and guides conditioned air discharged through the outlet 5 in a horizontal or upper direction, as indicated by an arrow A. During the heating operation of the air conditioner 1, the wind guide panel 80 rotates into a position indicated by an alternate long and two short dashes line Y, and guides conditioned air discharged through the outlet 5 in a downward direction as indicated by an arrow B. Thus, the direction of conditioned air discharged through the outlet 5 is changed in the up-down direction by the wind guide panel 80.

[0034] Between the inlet 4 and the heat exchanger 8, a filter 70 is disposed which extends in the left-right direction and faces the inlet 4. The filter 70 is arranged from a front end part to a rear end part of the housing 2, and captures dust in the air drawn into the air passage 6 through the inlet 4. The filter 70 is formed by joining a polypropylene mesh (not shown), by welding, to a rectangular frame (not shown) which is formed of a synthetic resin such as ABS or the like and which has window parts arranged in a plurality of lines and columns. At left and right end parts of the frame of the filter 70, there are formed racks (not shown) which respectively mesh with pinions (not shown) disposed in the housing 2.

[0035] In the housing 2, a filter cleaner 50 is disposed which removes dust from the filter 70 and collects the

removed dust. The filter cleaner 50 includes a filter motor (not shown), a rotary brush 51, a dust box 52, and a guide frame 53.

[0036] The filter motor drives and rotates the pinions meshing with the racks of the filter 70. The guide frame 53 is disposed in an upper part of an inside of the housing 2, and guides the filter 70, which is caused to move when the filter motor is driven. When the filter motor is driven, the filter 70 moves to and fro between a capture position C at which the filter 70 faces the inlet 4 and an inversion position D at which the filter 70 is turned upside down.

[0037] The dust box 52 is disposed below the guide frame 53, and is attachable and detachable with respect to the housing 2. The rotary brush 51 is disposed over the dust box 52, and is driven to rotate by a brush motor (not shown). The rotary brush 51 removes dust from the filter 70 while the filter 70 is moving, and the removed dust is collected in the dust box 52.

[0038] FIG. 3 shows a perspective view of the wind direction plate unit 10, as seen from a rear face side. FIG. 4 shows a side sectional view of the wind direction plate unit 10, illustrating how the wind direction plate unit 10 is attached to the housing 2. FIG. 5 shows a top view of the wind direction plate unit 10. FIG. 6 shows a rear sectional view of the wind direction plate unit 10. The wind direction plate unit 10 includes a base part 11, a plurality of wind direction plates 12, a connection part 13, and a bottom wall part 14.

[0039] The base part 11 is constituted by a downstream-side end part of the lower wall 63b of the air passage 6. When the wind direction plate unit 10 is attached to the housing 2, an upper surface of the base part 11 is flush with an upper surface of such a part of the lower wall 63b as is on the upstream side of the base part 11. On each of two side end parts of the base part 11, a through hole 11a and a projection 15 projecting sideways are disposed. The through hole 11a is formed in a substantially elliptical shape which has a major axis thereof extending in the left-right direction, and cut parts 11g (see FIG. 11) are disposed one at each of left and right end parts of the through hole 11a. The plurality of wind direction plates 12 are stood on the base part 11 to be aligned with each other in the left-right direction, and are rotatable, in the left-right direction.

[0040] The connection part 13 has an insertion part 13c (see FIG. 10) which has a groove 13a and is inserted in the through hole 11a, and a connection bar 13b which is connected to the insertion part 13c and couples the plurality of wind direction plates 12 to each other. In the groove 13a, a later-described cap 22, which is disposed on a shaft 21 of a wind direction plate motor 20, is fitted to be attachable and detachable. The insertion part 13c is substantially circular shaped in horizontal section, and has two engagement parts 13d (see FIG. 11) projecting from a circumferential surface of the insertion part 13c, and a flange 13e (see FIG. 10) disposed over the engagement parts 13d to cover a peripheral part of the through hole 11a from above the base part 11. The en-

gagement parts 13d are respectively inserted in the cut parts 11g, and then the insertion part 13c is turned. Thereby, the peripheral part of the through hole 11a is disposed between the engagement parts 13d and the flange 13e, and the insertion part 13c is rotatably supported at the base part 11 by being loosely fitted in the through hole 11a.

[0041] The bottom wall part 14 is connected to a front end of the base part 11 (a terminal end of the lower wall 63b of the air passage 6), and constitutes a bottom wall of the housing 2. Further, in right and left parts of the wind direction plate unit 10, lock mechanisms 100 are disposed for locking the wind direction plate unit 10 onto the housing 2.

[0042] FIG. 7 and FIG. 8 show rear sectional views of one of the lock mechanisms 100 that is disposed in the left part of the wind direction plate unit 10. FIG. 7 illustrates a locked state, and FIG. 8 illustrates an unlocked state. The right-side one of the lock mechanisms 100 has the same configuration as the left-side one, and thus the following description of the lock mechanisms 100 will be given by taking the left-side lock mechanism 100 as a representative example of the lock mechanisms 100.

[0043] The lock mechanism 100 has an engagement part 16 (see FIG. 9), a biasing part 17, a movable member 18, and a press member 19. FIG. 9 shows a top sectional view of a left end part of a lower end part of the housing 2. The engagement part 16 is a recess formed in the left end part of the lower end part of the housing 2 to have an opening on a side face. Anterior to the engagement part 16, a slope 25 is disposed which is inclined such that a rearer part of the slope 25 is closer to a center part of the housing 2 in the left-right direction. The movable member 18 is disposed between the bottom wall part 14 and the base part 11 of the wind direction plate unit 10, and biased, by the biasing part 17 which is a coil spring or the like, in a direction toward engagement of a leading end part 18a of the movable member 18 with the engagement part 16. At a right end part of the movable member 18, there is disposed a slope 18b which is inclined upward from right to left.

[0044] The press member 19 is pressable via an opening 14a formed in the bottom wall part 14. When the user presses the press member 19 upward, a leading end part 19a of the press member 19 slides on the slope 18 of the movable member 18 to cause the movable member 18 to move rightward (leftward in the figure). Thereby, the leading end part 18a moves rightward such that the engagement between the leading end part 18a and the engagement part 16 is released, and the wind direction plate unit 10 is unlocked from the housing 2.

[0045] FIG. 10 and FIG. 11 show a front sectional view and a bottom sectional view, respectively, of the insertion part 13c of the connection part 13. Behind a front end part of the lower wall 63b inside the housing 2, the wind direction plate motor 20 is disposed. To a leading end part of the shaft 21 of the wind direction plate motor 20, the cap 22 is fitted which is rectangular shaped in section.

[0046] The groove 13a has a rear end thereof opened, such that the cap 22 is allowed to enter and exit the groove 13a via the open rear end. Thereby, it is easy to couple and uncouple the wind direction plate unit 10 to and from the shaft 21 of the wind direction plate motor 20. By the cap 22 being fitted in the groove 13a, the connection part 13 is coupled to the shaft 21 to allow the rotation of the shaft 21 to be transferred to the wind direction plates 12.

[0047] FIG. 12 and FIG. 13 are a perspective sectional view and a top sectional view, respectively, of a right end part of the wind direction plate unit 10. Note that FIG. 12 and FIG. 13 show the wind direction plate unit 10 in a state where it is attached in the housing 2. At each of left and right end parts of the lower end part of the housing 2, an attachment/detachment detecting sensor 30 is disposed.

[0048] The attachment/detachment detecting sensor 30 is a push-button switch, and includes a push button 31 and an arm member 32. The arm member 32 is made of a thin-rectangular shaped plate of a metal such as stainless steel or the like, and disposed, with a front end thereof as a fulcrum, so as to be biased in a direction away from the push button 31, and face the push button 31. A rear end of the arm member 32 is curved to be convex upward to form a curved part 32a.

[0049] FIG. 14 shows a side view of the arm member 32 of the attachment/detachment detecting sensor 30. In attaching the wind direction plate unit 10 to the housing 2 from the front of the housing 2 by moving the wind direction plate unit 10 as indicated by an arrow S, the projection 15 slides on the arm member 32 rearward from the front side. Then, when the projection 15 reaches a position indicated by an alternate long and short dash line 15', it moves onto the curved part 32a to push the arm member 32 down into a position indicated by an alternate long and short dash line 32'. Meanwhile, the push button 31 is pushed by the arm member 32 down into a position indicated by an alternate long and short dash line 31'. The air conditioner 1 thereby determines that the wind direction plate unit 10 has been attached to the housing 2.

[0050] When the wind direction plate unit 10 is detached from the housing 2, the pressing of the push button 31 by the projection 15 via the arm member 32 is released. The air conditioner 1 thereby determines that the wind direction plate unit 10 has been detached from the housing 2. At this time, driving of the air blower 7 is prohibited. This allows safe cleaning of the air blower 7 and the air passage 6 to be performed with the wind direction plate unit 10 detached.

[0051] The above-configured air conditioner 1 starts the cooling or heating operation when the user operates the remote controller. During the cooling operation, the wind guide panel 80 rotates into a position indicated by the alternate long and short dash line X (see FIG. 2), such that conditioned air is discharged through the outlet 5 in the horizontal or upper direction, as indicated by the

arrow A. Thereby, cooling of the room is performed. During the heating operation, the wind guide panel 80 rotates into a position indicated by the alternate long and two short dashes line Y (see FIG. 2), such that conditioned air is discharged downward through the outlet 5, as indicated by the arrow B. Thereby, heating of the room is performed.

[0052] When the user operates the remote controller to stop the cooling or heating operation, in a case where the air conditioner 1 has been operated a number of times exceeding a predetermined upper limit number of times, the filter motor of the filter cleaner 50 is driven to cause the pinions to turn. Thereby, the filter 70 is caused to move, along the guide frame 53, from the capture position C toward the inversion position D, and on reaching the inversion position D, the filter 70 moves toward the capture position C. Meanwhile, the rotary brush 51 is caused to rotate by the brush motor, and dust on the filter 70 is removed by the rotary brush 51. The dust removed from the filter 70 is accumulated in the dust box 52. The dust box 52 is detachable from the housing 2 to dump the dust accumulated therein.

[0053] While neither the cooling operation nor the heating operation of the air conditioner 1 is being performed, when a predetermined button on the remote controller is pressed, the wind direction plates 12 are arranged to be perpendicular to a width direction (the left-right direction) of the housing 2 (a state illustrated in FIG. 5). In this state, a long side of the cap 22 of the wind direction plate motor 20 is perpendicular to the width direction of the housing 2. Further, the wind guide panel 80 is disposed in the position indicated by the alternate long and two short dashes line Y (see FIG. 2).

[0054] Then, when the user pushes the press member 19 upward while holding the wind direction plate unit 10 in the up-down direction at the position of the press member 19 with his/her fingers, the engagement of the leading end part 18a of the movable member 18 with the engagement part 16 is released to unlock the wind direction plate unit 10. Then, the user slides the wind direction plate unit 10 along the blowing-out direction of the outlet 5 to detach the wind direction plate unit 10.

[0055] Here, the wind direction plate unit 10 includes the base part 11 which is constituted by the downstream-side end part of the lower wall 63b of the air passage 6, and the bottom wall part 14 constituting the bottom wall of the housing 2. Thereby, the user is allowed to easily detach the wind direction plate unit 10, without performing any detachment operation inside the air passage 6 far away from the outlet 5. This contributes to the improvement of user-friendliness of the air conditioner 1.

[0056] Further, since the lock mechanism 100 is disposed outside the air passage 6, the lock mechanism 100 does not interfere with the air flowing in the air passage 6. Accordingly, it is possible to prevent air flow disturbance which would otherwise be caused by the lock mechanism 100, and thus to prevent degradation of the blowing performance of the air conditioner 1.

[0057] With the wind direction plate unit 10 detached, the user can easily reach the inside of the air passage 6 and the air blower 7 via the outlet 5 for cleaning. It is also easy for the user to clean the wind direction plates 12. This contributes to the improvement of the cleanability of the air conditioner 1. Here, since the air blower 7 is prohibited from being driven at this time, safe cleaning of the air blower 7 and the air passage 6 is ensured.

[0058] When the wind direction plate unit 10 is not attached to the housing 2, if the user operates the remote controller for the cooling operation or the heating operation, a voice notification, such as "Please attach the wind direction plate unit," will be given to the user. This provides an easy way of prompting the user to attach the wind direction plate unit 10. Here, the notification for prompting the user to attach the wind direction plate unit 10 may be given by lighting an indicator (not shown) disposed on the front face of the housing 2.

[0059] After cleaning the air passage 6 and the air blower 7, the user attaches the wind direction plate unit 10 to the housing 2. At this time, the leading end part 18a of the movable member 18 is pressed against the slope 25 (see FIG. 9) of the housing 2, and thus moves against the biasing force of the biasing part 17 to reach the engagement part 16, and then the leading end part 18a engages with the engagement part 16. Thus, just by moving the wind direction plate unit 10 to slide along the blowing-out direction of the outlet 5 without pressing the press member 19, the leading end part 18a is brought into engagement with the engagement part 16, and the wind direction plate unit 10 is locked to the housing 2.

[0060] According to the present embodiment, the wind direction plate unit 10, which is attachable and detachable, and has the wind direction plates 12, includes the base part 11, which is constituted by the downstream-side end part of the lower wall of the air passage 6, and the bottom wall part 14, which constitutes the bottom wall of the housing 2. This configuration allows the user to easily detach the wind direction plate unit 10 without performing any detachment operation inside the air passage 6 away from the outlet 5. This contributes to the improvement of user-friendliness of the air conditioner 1.

[0061] To detach or attach the wind direction plate unit 10, it is moved to slide along the blowing-out direction of the outlet 5. With this configuration, it is possible to detach the wind direction plate unit 10 with more ease while preventing interference between the wind direction plates 12 and the upper wall of the air passage 6.

[0062] Further, the connection part 13 of the wind direction plate unit 10 has the groove 13a, which is open at a rear end thereof such that the shaft 21 of the wind direction plate motor 20 is allowed to enter the groove 13a through the rear end, and the connection part 13 is loosely fitted in the through hole 11a disposed in the base part 11. With this configuration, it is possible to couple and uncouple the connection part 13 and the wind direction plate motor 20 to and from each other with ease in attaching and detaching the wind direction plate unit 10.

[0063] Here, if the user touches the wind direction plates 12 with a finger in detaching the wind direction plate unit 10, there may occur a case where long sides of the cap 22 is caused to incline with respect to the width direction of the housing 2. Even in such a case, since the connection part 13 is supported by being loosely fitted in the through hole 11a, it is possible to allow the shaft 21 to make an exit from the groove 13a with ease, and also to allow the shaft 21 to make an entry into the groove 13a with ease.

[0064] Further, the both side walls of the groove 13a are inclined in directions such that the both side walls are more away from each other toward rear ends thereof. With this configuration, the cap 22 of the wind direction plate motor 20 makes an easy entry into the groove 13a when the wind direction plate unit 10 is attached to the housing 2. Thus, it is possible to couple the wind direction plate motor 20 to the wind direction plates 12 with ease.

[0065] Further, since the through hole 11a of the base part 11 is formed in an elliptical shape with the major axis thereof extending in the left-right direction, it is possible to easily achieve movement of the insertion part 13c of the connection part 13 in the left-right direction. Thus, it is possible, in attaching and detaching the wind direction plate unit 10, to easily achieve the coupling and the uncoupling of the connection part 13 and the wind direction plate motor 20 to and from each other.

[0066] Further included are the engagement part 16 which is disposed inside the housing 2, the movable member 18 which is disposed between the bottom wall part 14 and the base part 11 of the wind direction plate unit 10 and biased by the biasing part 17 into engagement with the engagement part, and the press member 19 which is pressable via the opening 14a formed in the bottom wall part 14. When the press member 19 is pressed, the movable member 18 is caused to move to release the engagement thereof with the engagement part 16. This allows the user to easily unlock the wind direction plate unit 10 while holding the wind direction plate unit 10 in the up-down direction.

[0067] Further included is the attachment/detachment detecting sensor 30 which detects the attachment and the detachment of the wind direction plate unit 10, and when the wind direction plate unit 10 is detached, driving of the air blower 7 is prohibited. This allows safe cleaning of the air blower 7 and the air passage 6, with the wind direction plate unit 10 detached.

[0068] Further, the attachment/detachment detecting sensor 30 is a push button switch, and the arm member 32 is disposed which faces the push button 31 of the attachment/detachment detecting sensor 30, such that, when the wind direction plate unit 10 is attached, the projection 15 slides on the arm member 32 to press the push button 31. With this configuration, it is possible to have the push button 31 securely pressed on attaching the wind direction plate unit 10 to the housing 2, even in a case where the stroke (moving distance) of the push button 31 is short. Thus, it is possible to prevent misde-

tection by the attachment/detachment detecting sensor 30.

[0069] **Second Embodiment:** Next, a second embodiment of the present invention will be described. FIG. 15 shows a perspective view of an air conditioner of the second embodiment. For convenience of description, such parts as find their counter parts in the first embodiment illustrated in FIGS. 1 to 14 referred to above are denoted by the common reference signs. The second embodiment is different from the first embodiment in that the second embodiment includes an occupancy sensor 40. In the other respects, the second embodiment is similar to the first embodiment.

[0070] At a position above the outlet 5, in a lower part of the housing 2, there is disposed an occupancy sensor 40, which detects a human body existing in a room, to point in a lower frontward direction with respect to the housing 2. The occupancy sensor 40 is an infrared sensor, and detects a human body existing in the room. The occupancy sensor 40 has a predetermined view angle (for example, 60°) in the left-right direction.

[0071] FIG. 16 and FIG. 17 show a perspective view and a side sectional view, respectively, of the occupancy sensor 40. The occupancy sensor 40 is disposed inside an opening 40a of the housing 2. Over the opening 40a, there is disposed an accommodation chamber 40c which has an opening 40b in a front face thereof, and an operation lever 41 is disposed in the accommodation chamber 40c.

[0072] The operation lever 41 is coupled to the occupancy sensor 40 via a rotation shaft 41a disposed at a rear end of the operation lever 41. The operation lever 41 and the occupancy sensor 40 are both rotatable about the rotation shaft 41a in the left-right direction. At a front end of the operation lever 41, a recess 41a is formed, and in a front part of the operation lever 41, a convex part 41b is disposed behind the recess 41a to project upward in a hemispherical shape. As illustrated in FIG. 18, in a front part of an upper wall of the accommodation chamber 40c, a plurality (three, in the present embodiment) of concave parts 40d are aligned in the left-right direction, in each of which the convex part 41b is fittable.

[0073] Further, anterior to the operation lever 41, there is disposed a lid 42 which is made of resin, openable and closable, and covers the operation lever 41. A lower end of the lid 42 is pivotally supported on the housing 2 via a horizontal shaft, and on a back of an upper end part of the lid 42, a projection 42a is disposed to project rearward to fit in the recess 41a of the operation lever 41.

[0074] The lid 42 has an engagement claw 42b disposed at each side end part of the lid 42 to engage in one of engagement holes 42c of the housing 2, and, at an upper end of the lid 42, a handle 42d is disposed. In the housing 2, at a position opposing the handle 42d, a step part 40g is disposed, with a predetermined gap between the handle 42d and the step part 40g when the lid 42 is in a closed state. With this configuration, it is possible to easily hold the handle 42d of the lid 42 in the

close state. The lid 42 has an opening 42f formed at a position opposing the occupancy sensor 40.

[0075] A person who installs the air conditioner 1 holds the handle 42d and opens the lid 42. At this time, the engagement claw 42b is elastically deformed such that the engagement thereof with the engagement hole 42c is released. In a case of installing the air conditioner 1 in a right end part of the side wall W, the operation lever 41 is rotated about the rotation shaft 41a in the left-right direction to fit the convex part 41b in a left one of the concave parts 40d. As a result, as illustrated in FIG. 19, the operation lever 41 is inclined leftward such that a left side surface of the operation lever 41 contacts a left side surface of the accommodation chamber 40c. And, when the lid 42 is closed, a right side surface of the operation lever 41 is caught by the projection 42a, such that the occupancy sensor 40 is held pointing in a leftward direction as illustrated in FIG. 22.

[0076] In a case of installing the air conditioner 1 in a middle part of the side wall W in the left-right direction, the operation lever 41 is rotated to fit the convex part 41b in a middle one of the concave parts 40d. And, when the lid 42 is closed, as illustrated in FIG. 20, the projection 42a of the lid 42 fits in the recess 41a of the operation lever 41, such that the occupancy sensor 40 is held pointing in a frontward direction as illustrated in FIG. 23.

[0077] In a case of installing the air conditioner 1 in a left end part of the side wall W, the operation lever 41 is rotated to fit the convex part 41b in a right one of the concave parts 40d. As a result, as illustrated in FIG. 21, the operation lever 41 is inclined rightward such that the right side surface of the operation lever 41 contacts a right side surface of the accommodation chamber 40c. And, when the lid 42 is closed, the left side surface of the operation lever 41 is caught by the projection 42a, such that the occupancy sensor 40 is held pointing in a rightward direction as illustrated in FIG. 24.

[0078] As has been described above, the pointing operation of the occupancy sensor 40 is changeable in the left-right direction by operating the operation lever 41. This makes it possible to optimize the detection range of the occupancy sensor 40 in accordance with the installation position of the air conditioner 1 to allow secure detection of a human body existing in the room.

[0079] At this time, the person who installs the air conditioner 1 does not need to touch the occupancy sensor 40 to change its direction. This helps protect the occupancy sensor 40 from being touched with a finger to be soiled.

[0080] In the air conditioner 1 configured as described above, during the cooling or heating operation, when a human body existing in the room is detected by the occupancy sensor 40, the wind direction plates 12 of the wind direction plate unit 10 rotates in the left-right direction such that air is discharged through the outlet 5 avoiding the detected human body. Thereby, it is possible to prevent the user from continuously receiving wind directly from the air conditioner 1, and this helps reduce damage

to the user's health.

[0081] According to the present embodiment, it is possible to achieve the same advantages as the first embodiment.

[0082] The air conditioner 1 further includes the occupancy sensor 40 which detects a human body existing in the room, and discharges air through the outlet 5, avoiding the human body by means of the wind direction plates 12 of the wind direction plate unit 10. Thereby, it is possible to prevent wind from continuously blowing directly to the user, and thus to reduce damage to his or her health.

[0083] The air conditioner 1 further includes the operation lever 41, which is coupled to the occupancy sensor 40, and makes it possible to change the direction of the occupancy sensor 40 in the left-right direction. This allows a person who installs the air conditioner 1 to change the direction of the occupancy sensor 40 without touching the occupancy sensor 40. Thus, it is possible to reduce soiling of the occupancy sensor 40 caused by being touched with a finger. Further, since the operation lever 41 is covered by the lid 42, the direction of the occupancy sensor 40 is prevented from being unintendedly changed by, for example, the person who installs the air conditioner 1, the user, or the like.

[0084] Further, the direction of the occupancy sensor 40 is variable between three directions by selectively holding one of the following three states: a state where the operation lever 41 is inclined leftward, with the right side surface thereof caught by the projection 42a (first state); a state where the projection 42a fits in the recess 41a of the operation lever 41 (second state); and a state where the operation lever 41 is inclined rightward, with the left side surface thereof caught by the projection 42a (third state).

[0085] Thereby, it is possible to securely hold the occupancy sensor 40 in a state where its direction is adjusted in accordance with the installation position of the air conditioner 1. Thus, it is possible to maintain an optimal detection range of the occupancy sensor 40 with ease.

[0086] Third Embodiment: Next, a description will be given of a third embodiment of the present invention. FIG. 25 shows a top view of a wind direction plate unit 10 of an air conditioner 1 of the third embodiment. For convenience of description, such parts as find their counter parts in the first embodiment illustrated in FIGS. 1 to 14 referred to above are denoted by the common reference signs. The present embodiment is different from the first embodiment in that a base part 11 of the wind direction plate unit 10 has a configuration different from its counterpart in the first embodiment. In the other respects, the third embodiment is similar to the first embodiment.

[0087] On a top surface (outer surface) of the base part 11, a plurality of projections 11b, each having a linear shape extending in the left-right direction in top view, are arranged parallel to each other at predetermined intervals in a front-rear direction. The position of the press

member 19 coincides with the position of the projections 11b in the left-right direction. The projections 11b project upward from a flat surface 11c of the base part 11 such that a height (an amount of projection from the flat surface 11c) of each projection 11b is approximately 0.5 mm. The projections 11b and the flat surface 11c between adjacent ones of the projections 11b together form an uneven 11d.

[0088] With this configuration, in detaching the wind direction plate unit 10, the uneven part 11d functions as an anti-slip surface when the user holds the wind direction plate unit 10 with his or her fingers at the position of the press member 19 in the up-down direction, and allows the user to securely hold the wind direction plate unit 10 while pressing the press member 19 upward. This further improves the user-friendliness of the air conditioner 1.

[0089] Note that as long as the height of the projections 11b is approximately 1 mm or lower, the projections 11b do not become a large resistance to air flowing in the air passage 6, and thus does not very much hinder the blowing performance of the air conditioner 1.

[0090] According to the present embodiment, it is possible to achieve the same advantages as the first embodiment. Further, the uneven part 11d is disposed on the outer surface of the base part 11 such that the position of the press member 19 and that of the uneven part 11d coincide with each other in the left-right direction. Thereby, it is possible for the user to securely hold the wind direction plate unit 10 in detaching the wind direction plate unit 10.

[0091] Note that, in the present embodiment, an uneven part may be formed by arranging dotted projections, instead of the linear projections 11b, in a matrix pattern on the outer surface of the base part 11.

[0092] Further, an uneven part similar to the uneven part 11d of the present embodiment may be disposed in the air conditioner 1 of the second embodiment.

[0093] It should be understood that the scope of the present invention is not limited to the above discussed embodiments, and that the present invention is implementable with various modifications and changes without departing from the gist of the invention. It should also be understood that the present invention may be implemented by combining some or all of the embodiments.

Industrial Applicability

[0094] The present invention is applicable to air conditioners having a wind direction plate which changes the direction of air discharged through an outlet in the left-right direction.

List of Reference Signs

[0095]

- 1 air conditioner
- 2 housing

- 3 front panel
- 4 inlet
- 5 outlet
- 6 air passage
- 5 7 air blower
- 8 heat exchanger
- 9 drain pan
- 10 wind direction plate unit
- 11 base part
- 10 11a through hole
- 11d uneven part
- 12 wind direction plate
- 13 connection part
- 13a groove
- 15 14 bottom wall
- 15 projection
- 16 engagement part
- 17 biasing part
- 18 movable member
- 20 19 press member
- 20 wind direction plate motor
- 21 shaft
- 22 cap
- 30 attachment/detachment detecting sensor
- 25 31 push button
- 32 arm member
- 40 occupancy sensor
- 41 operation lever
- 41a recess
- 30 42 lid
- 42a projection
- 50 filter cleaner
- 51 rotary brush
- 52 dust box
- 35 53 guide frame
- 70 filter
- 80 wind guide panel
- 100 lock mechanism

Claims

1. An air conditioner, comprising:

- 45 a housing which has an inlet and an outlet for air; an air passage which allows mutual communication between the inlet and the outlet; an air blower which is disposed in the air passage; and
- 50 a wind direction plate unit which is attachable and detachable, and has a wind direction plate which changes a direction of air discharged from the outlet in a left-right direction, wherein
- 55 the wind direction plate unit includes a base part which is constituted by a downstream-side end part of a lower wall of the air passage, and a bottom wall part which constitutes a bottom wall

- of the housing.
2. The air conditioner according to claim 1, wherein the wind direction plate unit is attached and detached by being moved to slide along a direction in which air is discharged from the outlet.
 3. The air conditioner according to claim 1 or 2, further comprising:
 - a wind direction plate motor which is disposed inside the housing; and
 - a connection part which is rotatably fitted to the base part, and connects a shaft of the wind direction plate motor to the wind direction plate, wherein the connection part has a groove which is open at a rear end thereof such that the shaft is allowed to enter the groove through the rear end, and the connection part is supported by being loosely fitted in a through hole of the base part.
 4. The air conditioner according to claim 3, wherein both side walls of the groove are inclined in directions such that the both side walls are more away from each other toward rear ends thereof.
 5. The air conditioner according to claim 4, wherein the through hole is formed in an elliptical shape with a major axis thereof extending in the left-right direction.
 6. The air conditioner according to any one of claims 1 to 5, further comprising:
 - an engagement part which is disposed in the housing;
 - a movable member which is disposed between the bottom wall part and the base part of the wind direction plate unit, and which is biased by a biasing part into engagement with the engagement part; and
 - a press member which is pressable via an opening formed in the bottom wall part, wherein, when the press member is pressed, the movable member is caused to move to release the engagement thereof with the engagement part.
 7. The air conditioner according to claim 6, wherein the base part includes an uneven part disposed on an outer surface thereof such that a position of the press member coincides with a position of the uneven part in the left-right direction.
 8. The air conditioner according to any one of claims 1 to 7, further comprising an attachment/detachment detecting sensor which detects attachment and detachment of the wind direction plate unit, wherein the air blower is prohibited from being driven when the wind direction plate unit has been detached.
 9. The air conditioner according to claim 8, wherein the attachment/detachment detecting sensor is a push button switch including a push button and an arm member disposed facing the push button, and the wind direction plate unit is attached to the housing by being moved to slide on the arm member to cause the arm member to press the push button.
 10. The air conditioner according to any one of claims 1 to 9, further comprising an occupancy sensor which detects a human body existing in a room, wherein air is discharged from the outlet avoiding the human body by means of the wind direction plate.
 11. The air conditioner according to claim 10, further comprising:
 - an operation lever which is coupled to the occupancy sensor, and changes a direction of the occupancy sensor in the left-right direction; and
 - a lid which is openable and closable, and covers the operation lever.
 12. The air conditioner according to claim 11, wherein
 - a recess is disposed in a leading end of the operation lever,
 - a projection is disposed on the lid to be fitted in the recess, and
 - a direction of the occupancy sensor is variable between three directions by selectively holding one of the following three states:
 - a first state where a right side surface of the operation lever inclined leftward is caught by the projection;
 - a second state where the projection fits in the recess of the operation lever; and
 - a third state where a left side surface of the operation lever inclined rightward is caught by the projection.

FIG.1

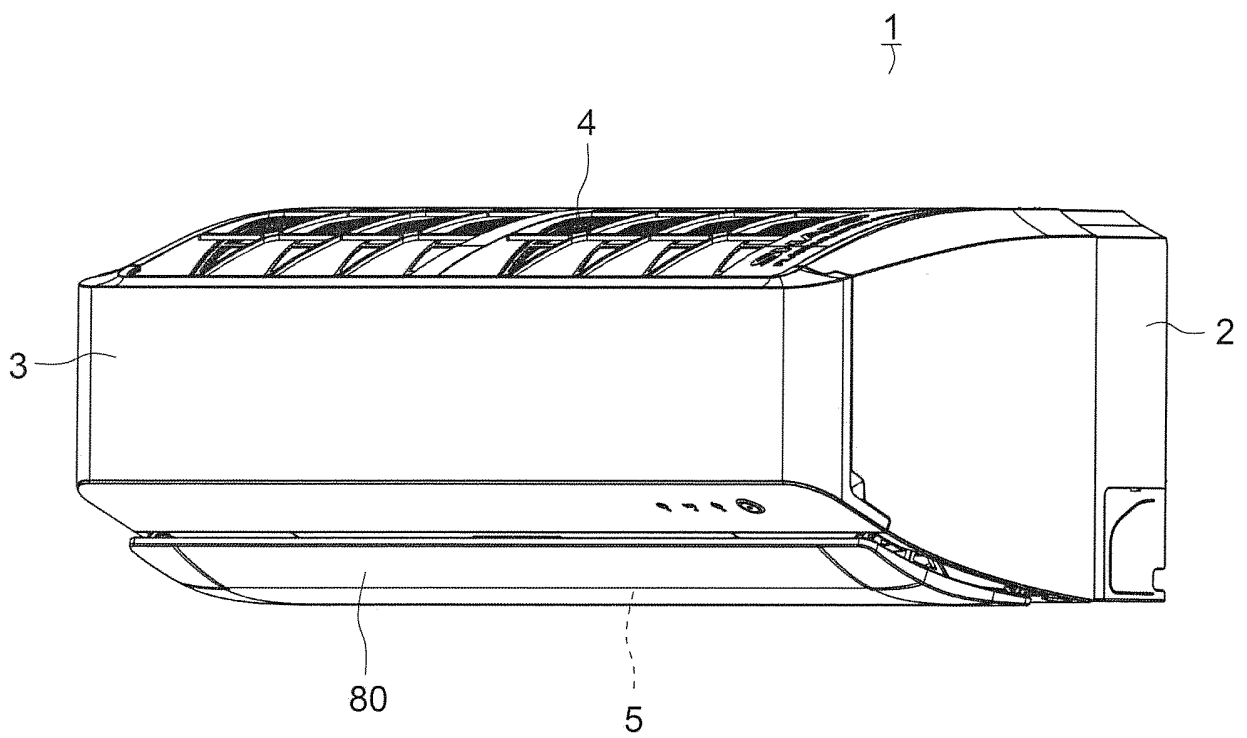


FIG.2

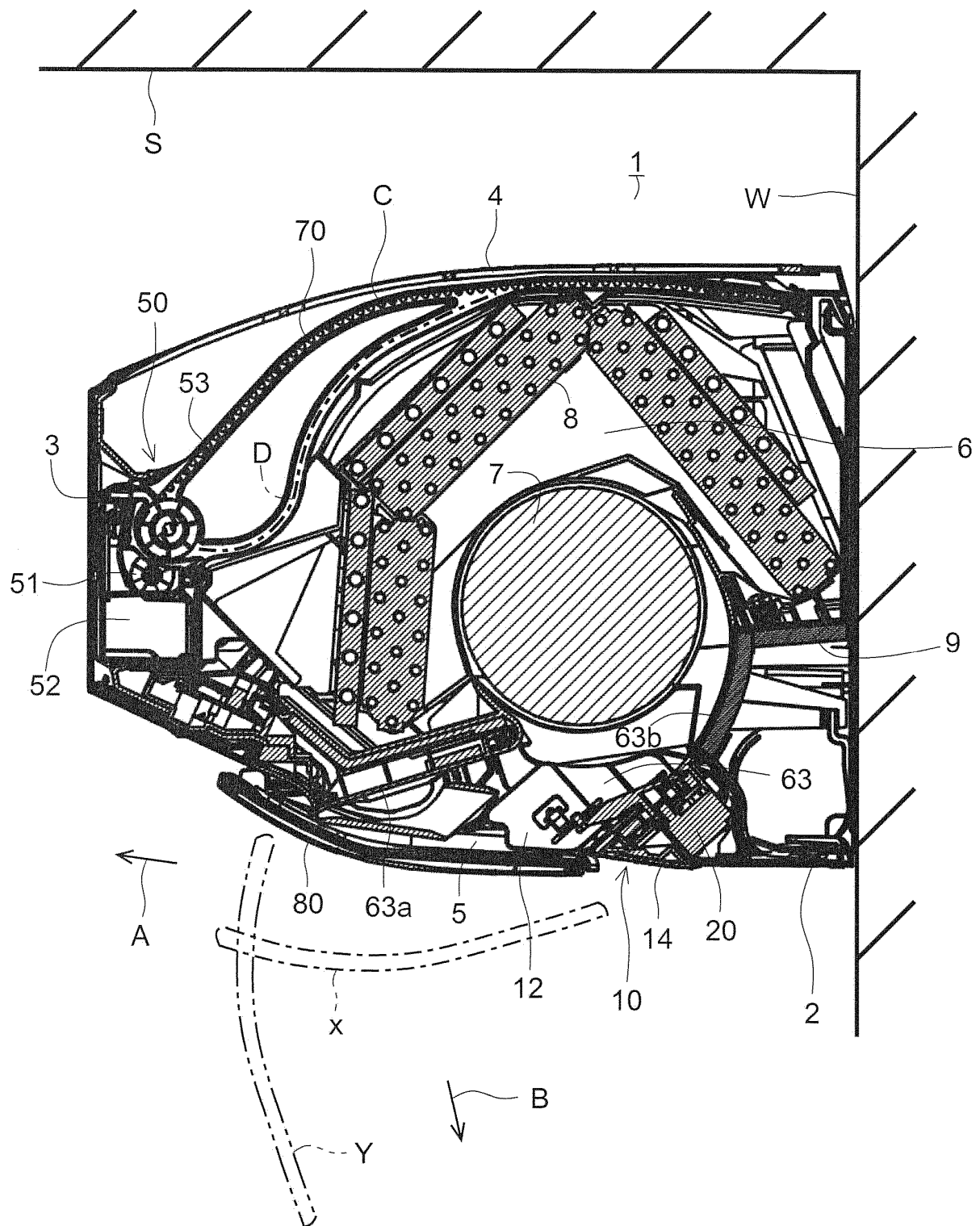


FIG.3

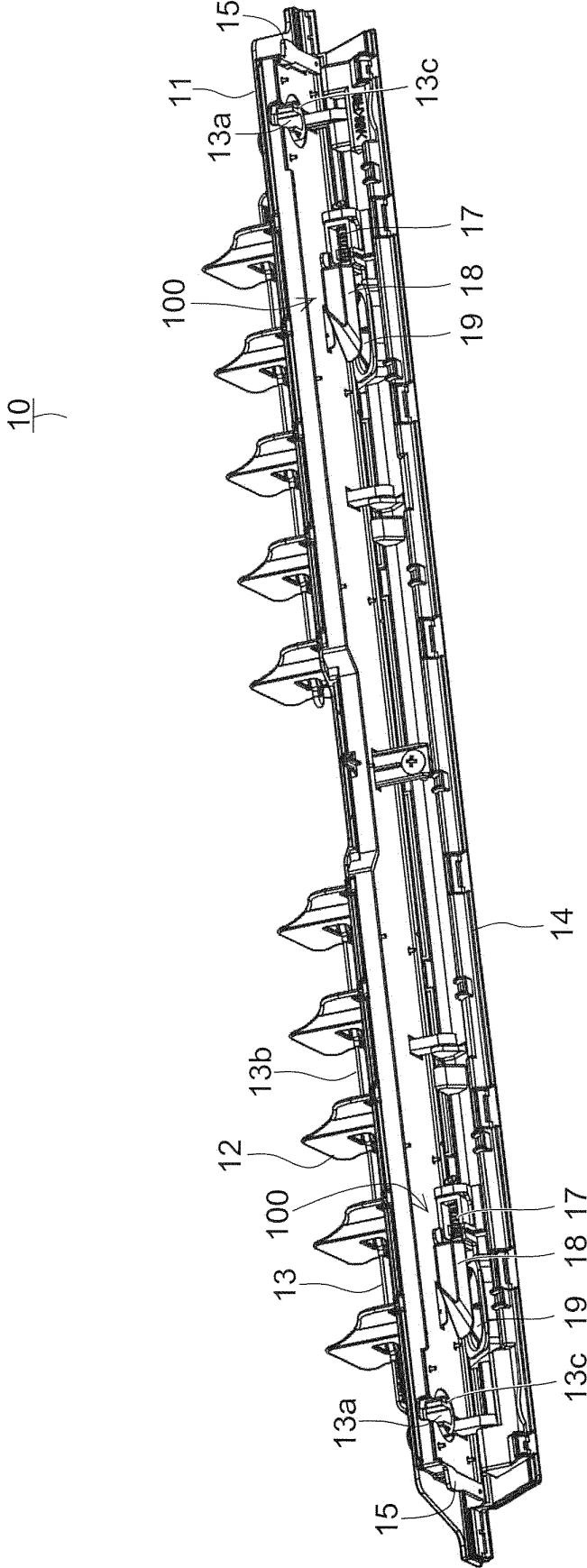
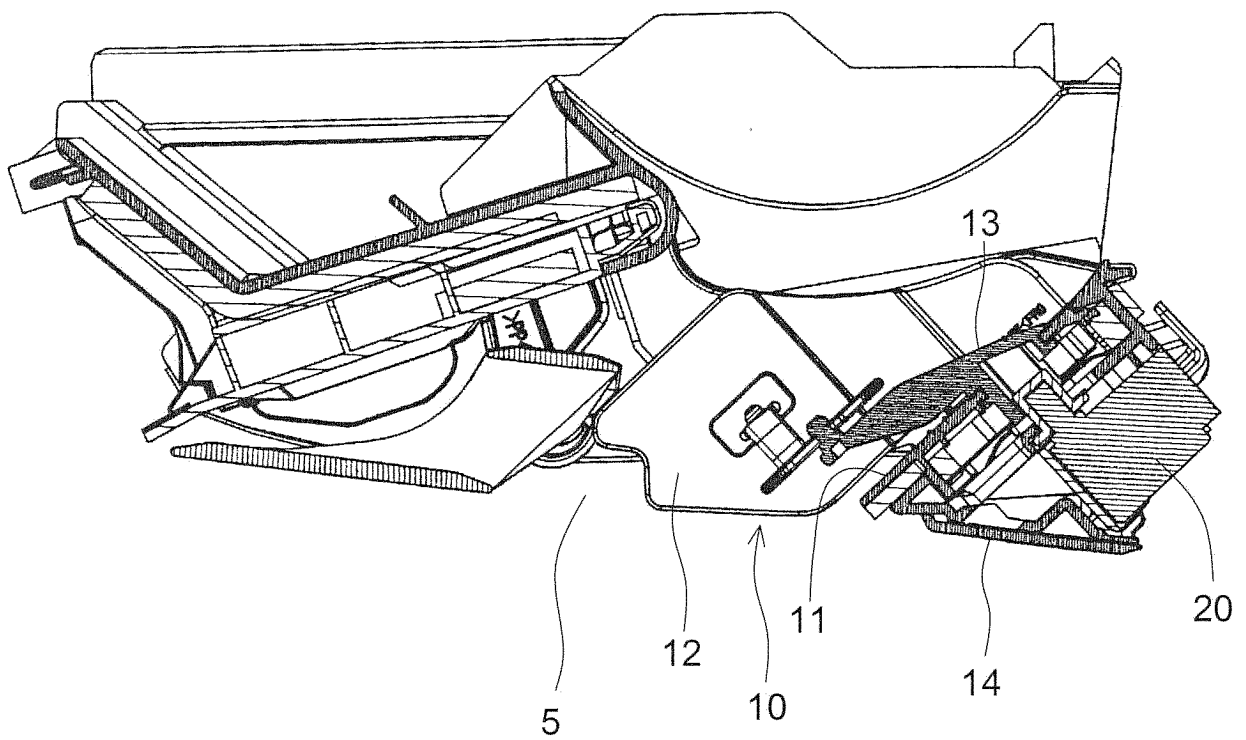


FIG.4



5. G. F.

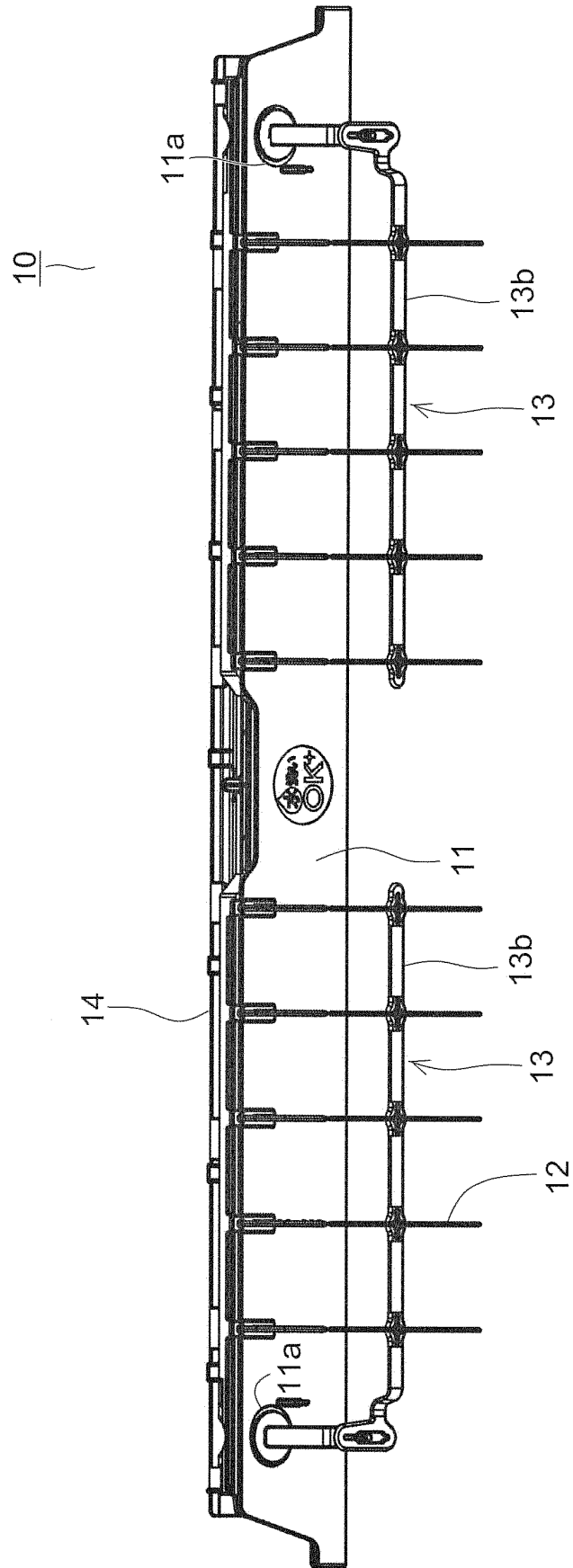


FIG.6

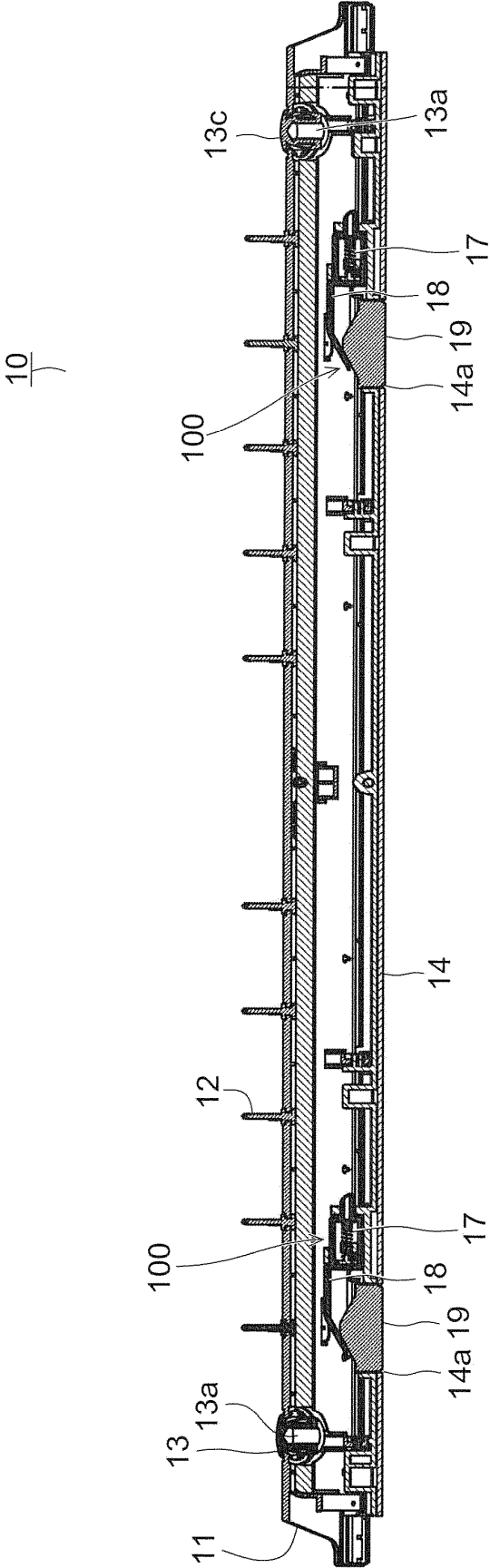


FIG.7

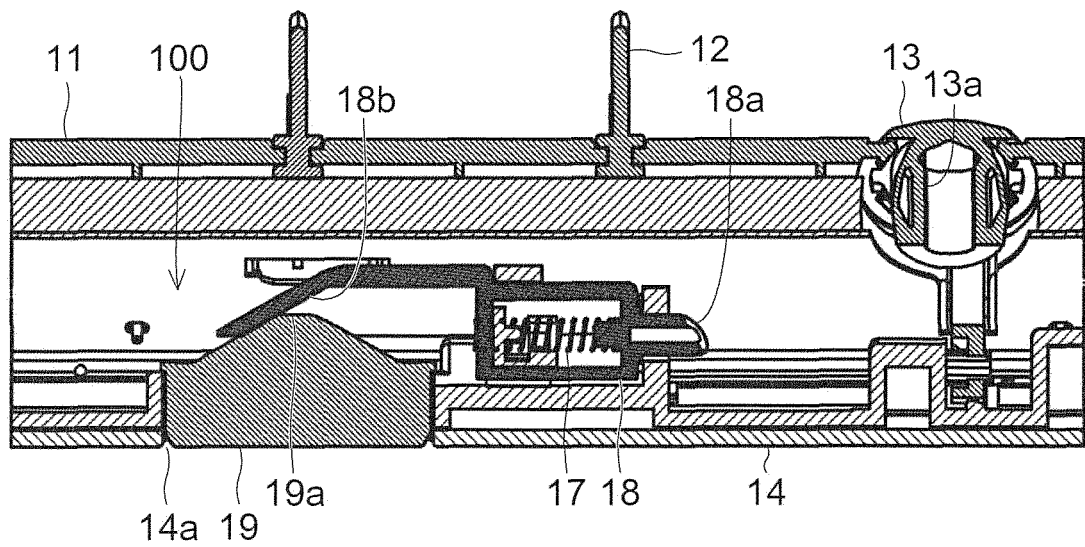


FIG.8

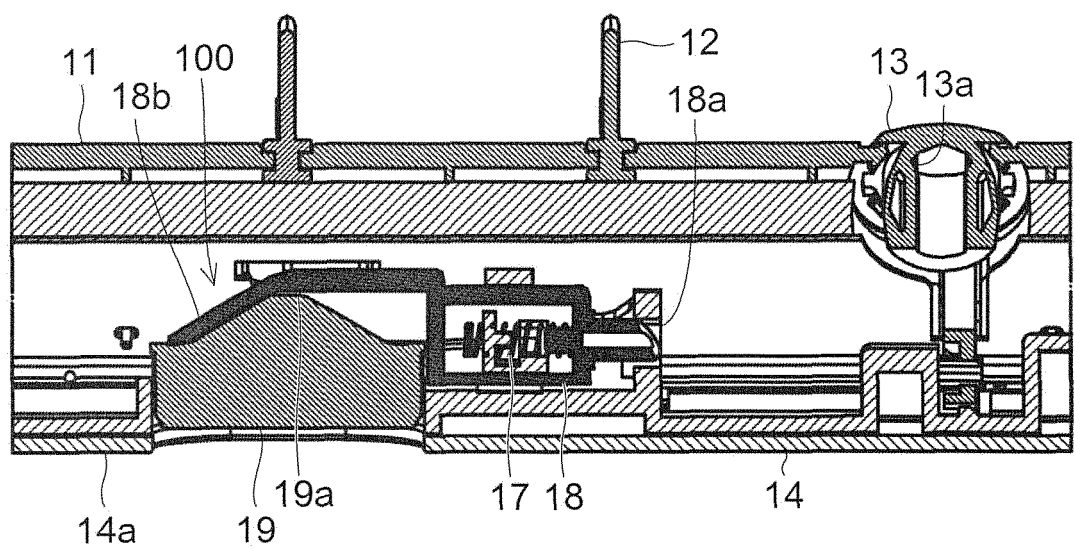


FIG.9

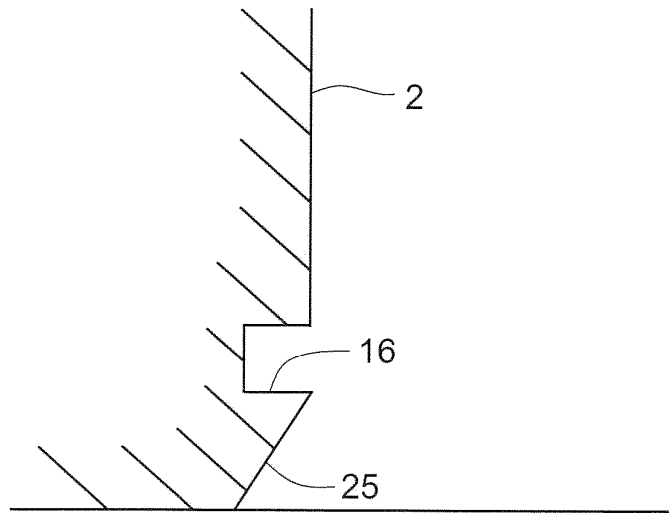


FIG.10

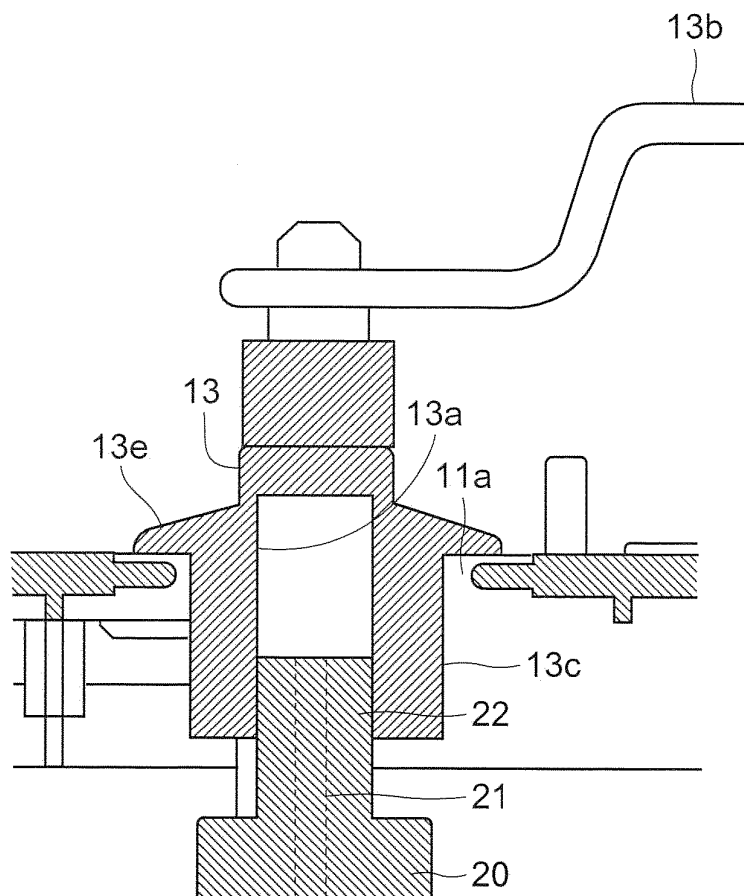


FIG.11

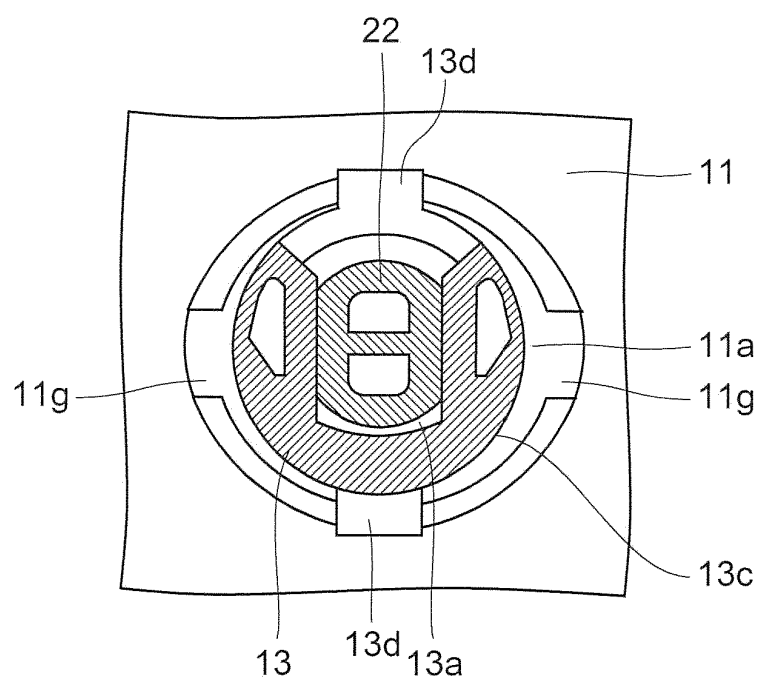


FIG.12

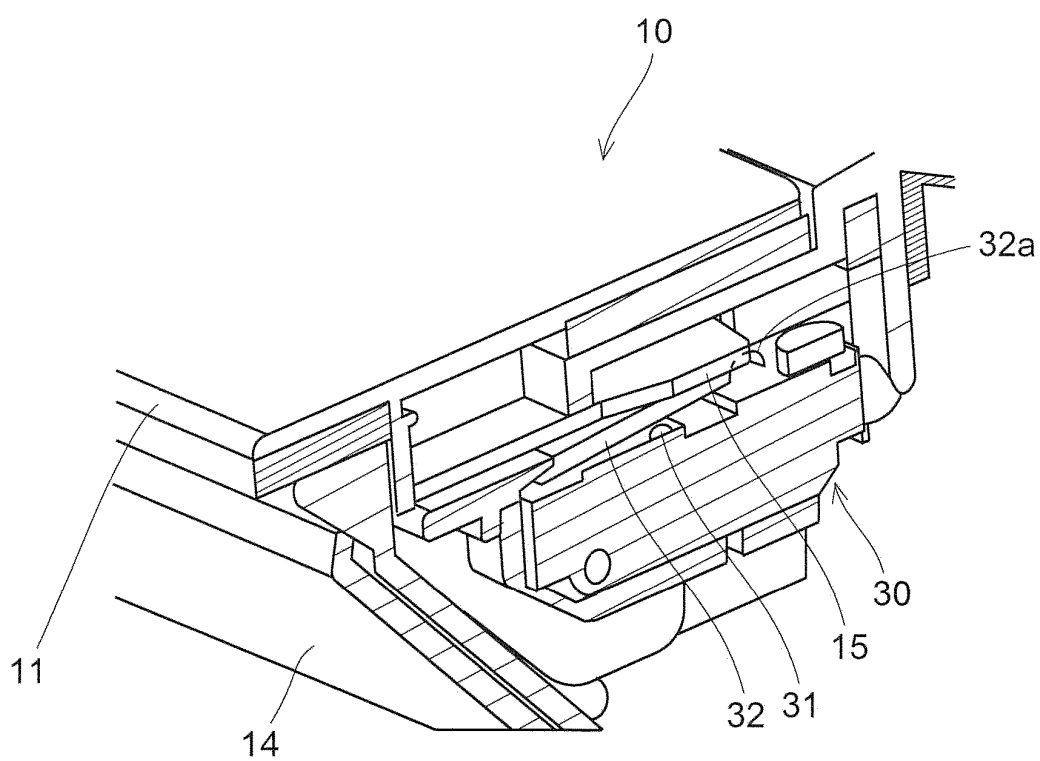


FIG.13

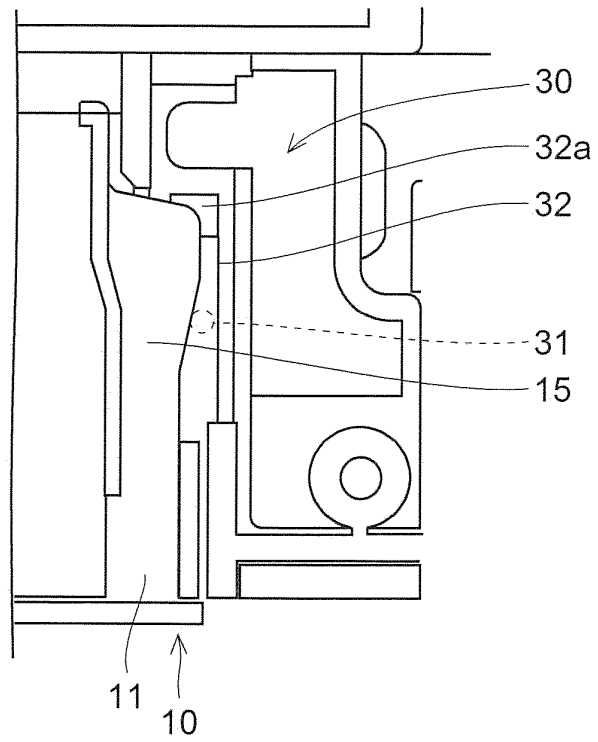


FIG.14

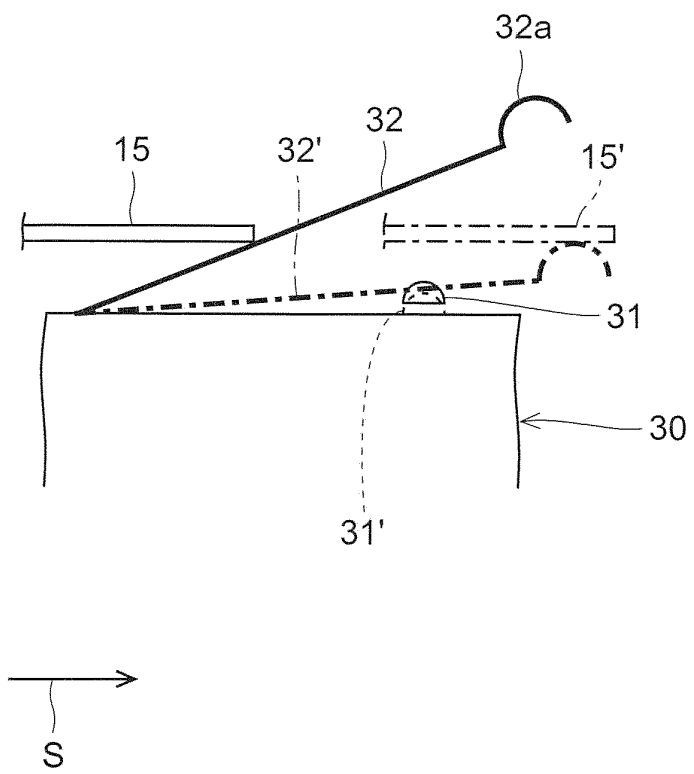


FIG.15

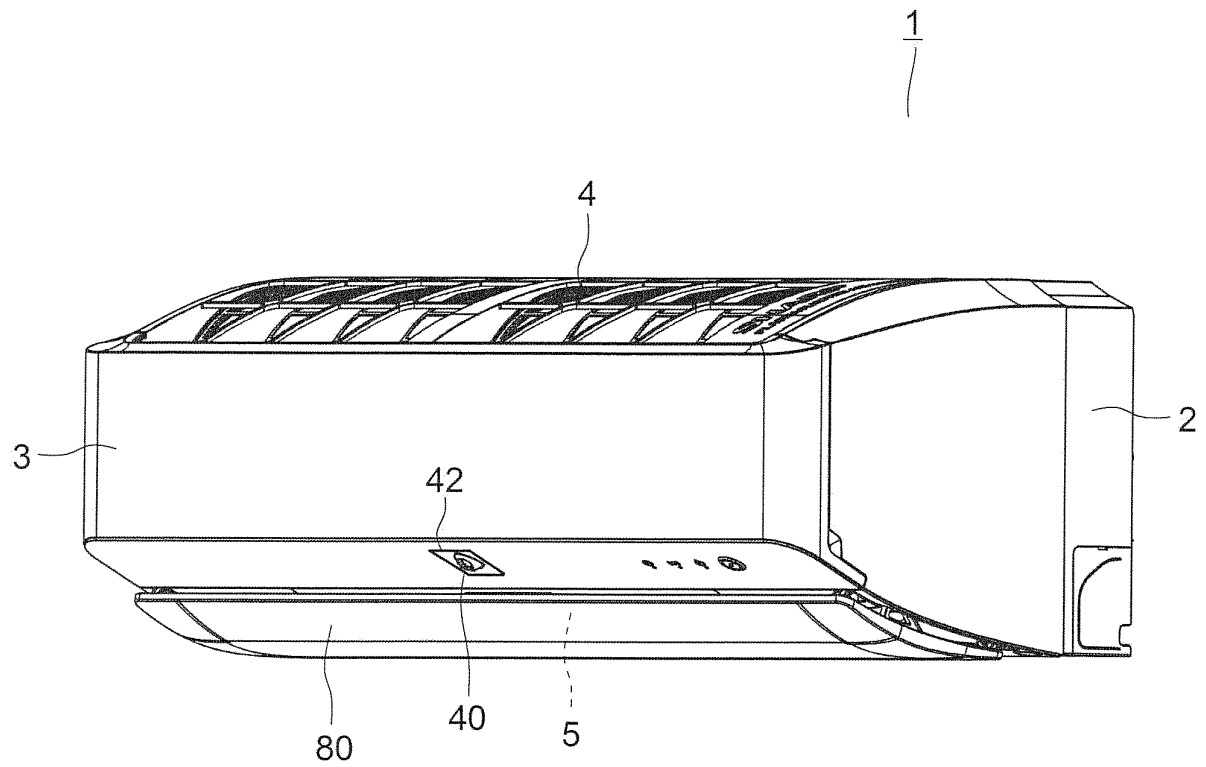


FIG.16

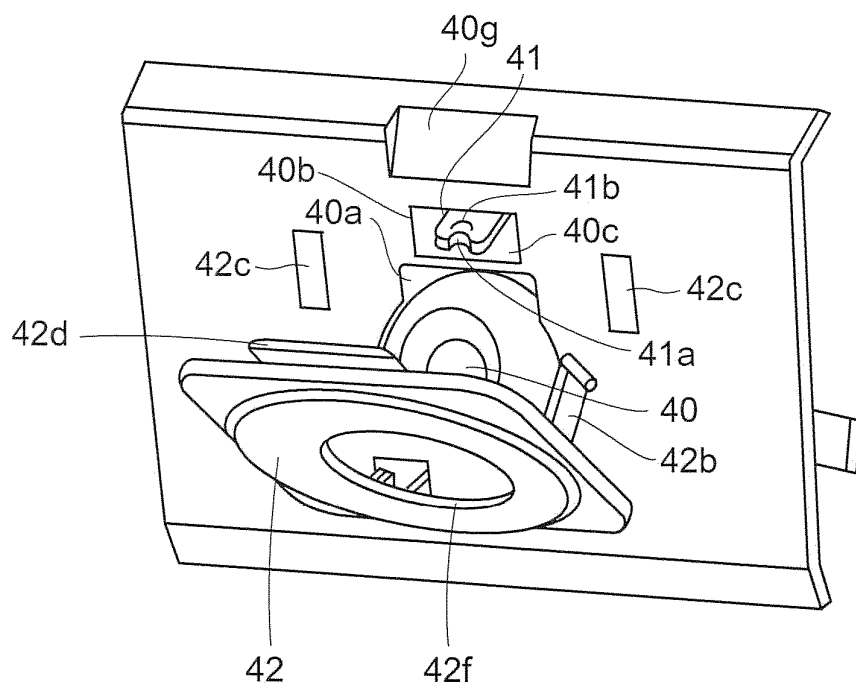


FIG.17

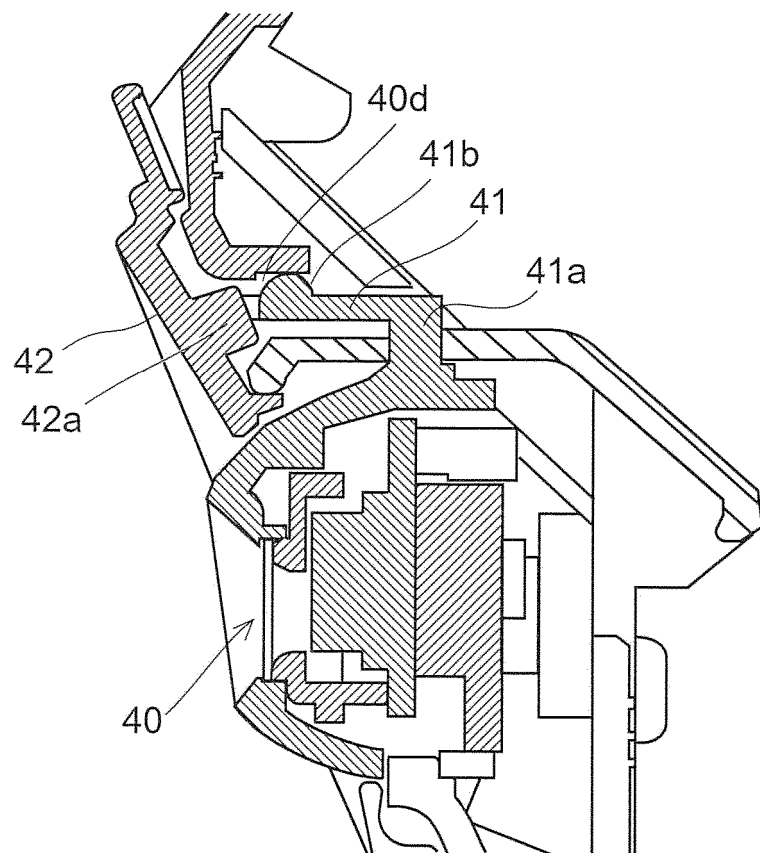


FIG.18

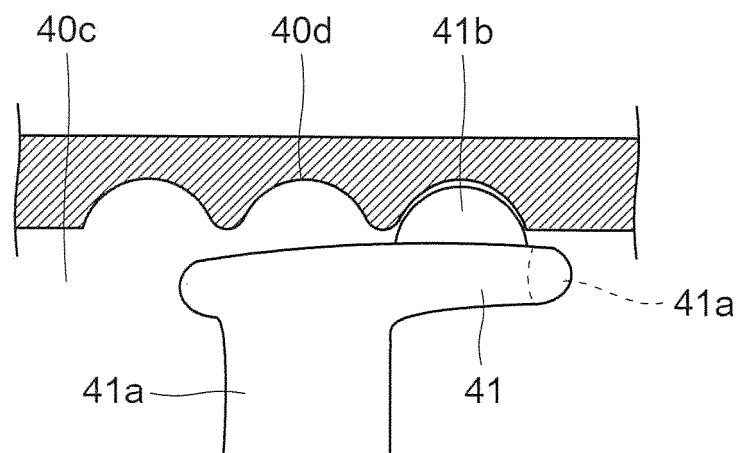


FIG.19

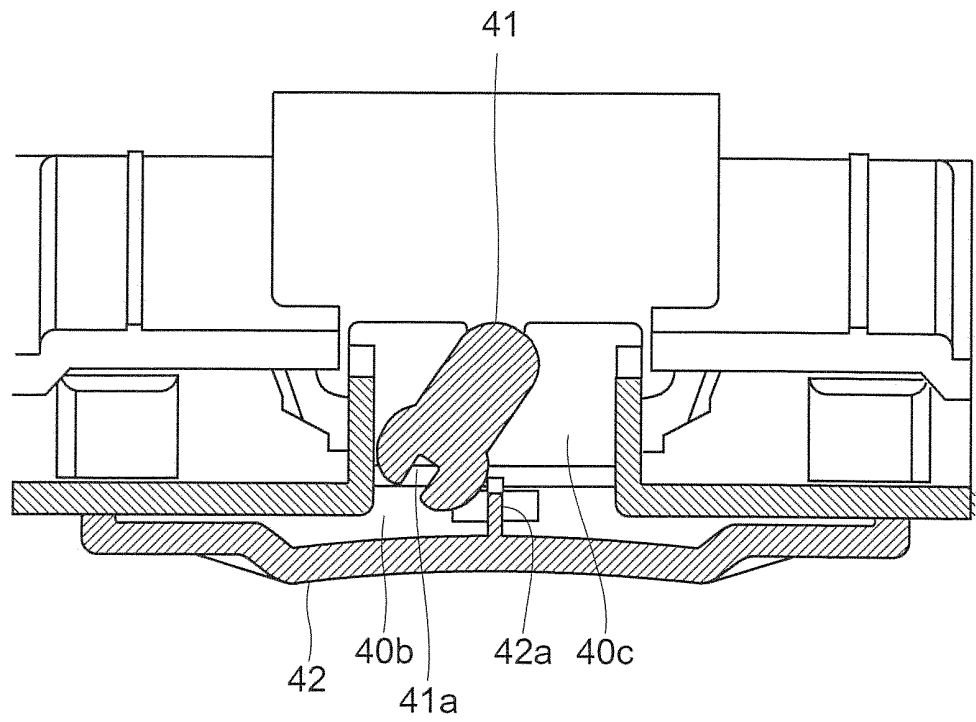


FIG.20

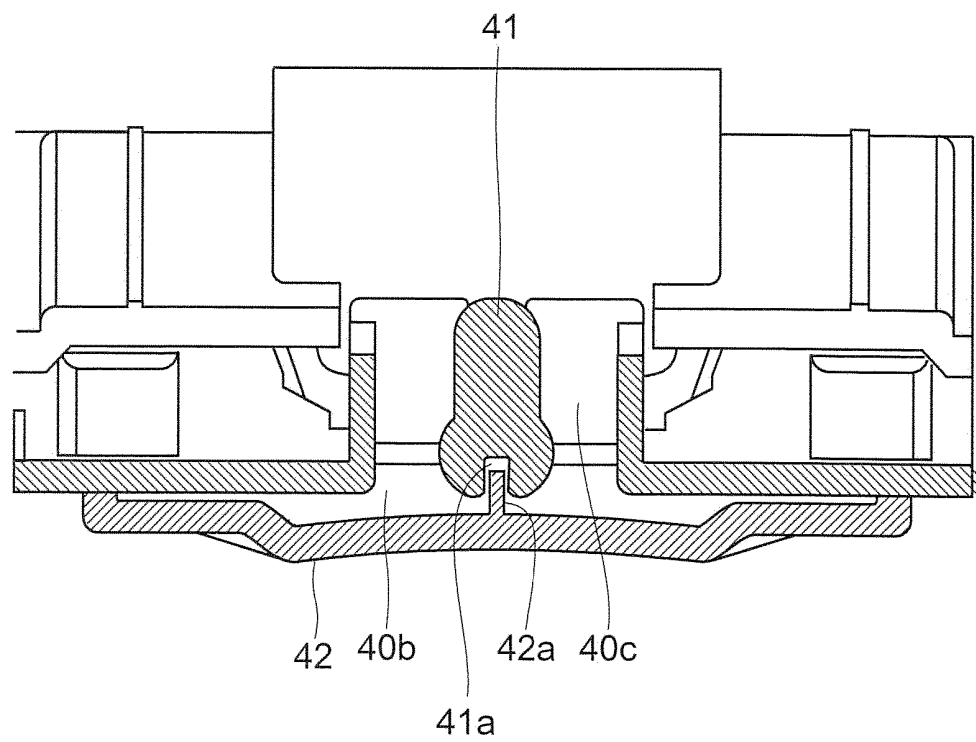


FIG.21

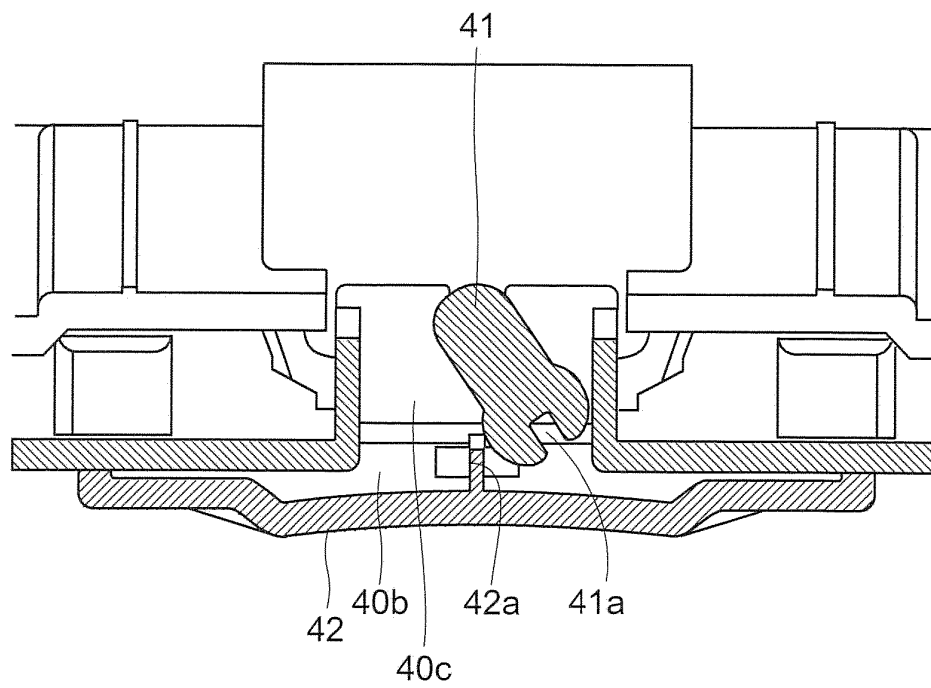


FIG.22

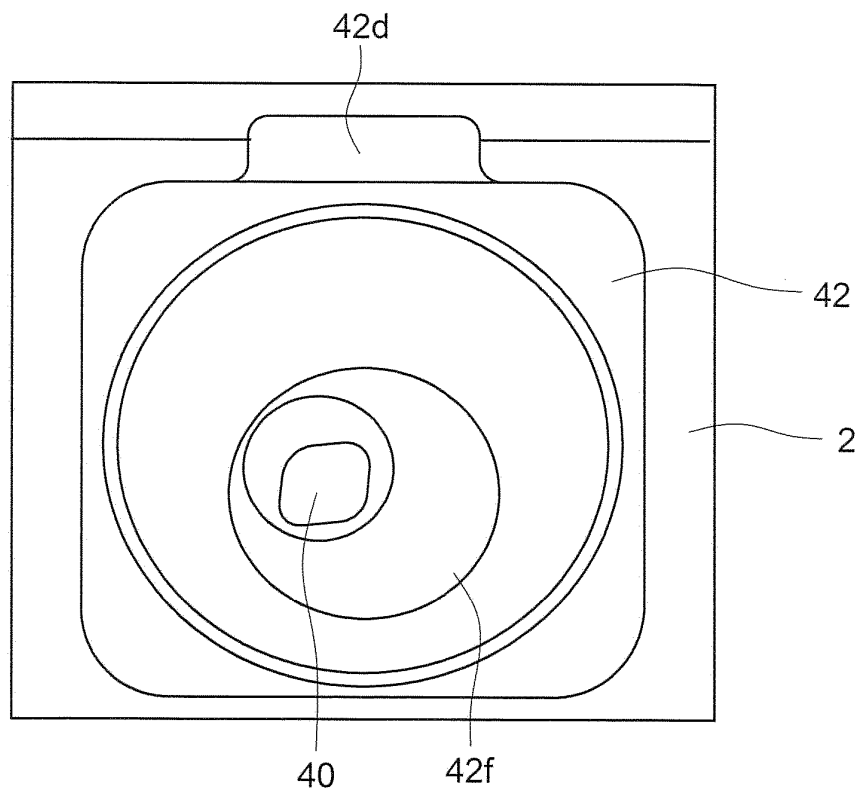


FIG.23

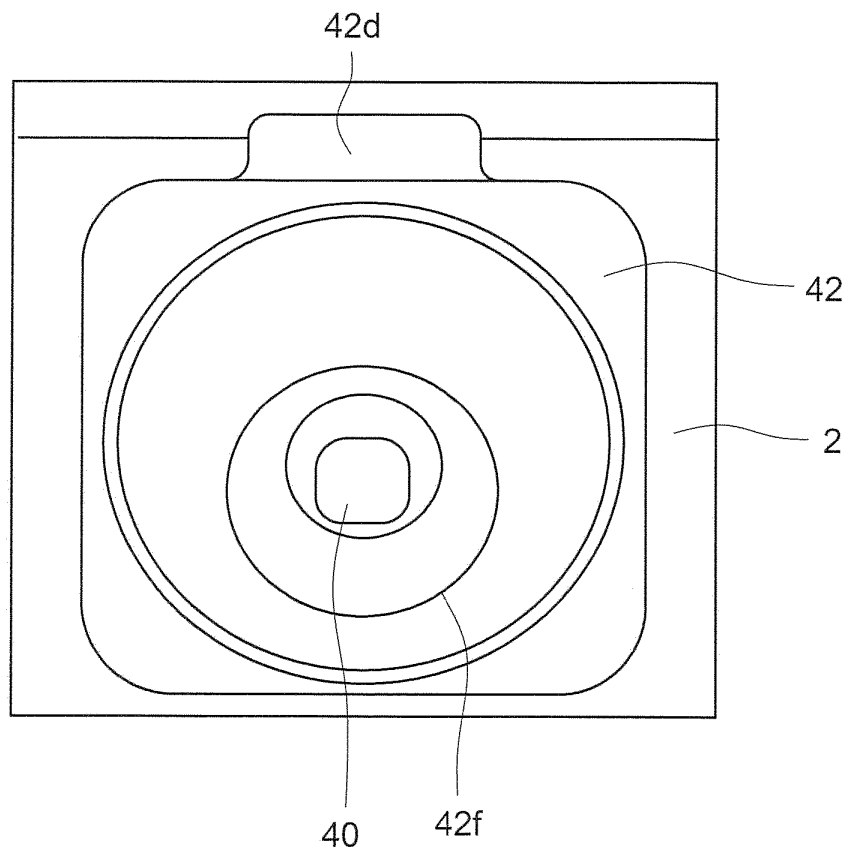


FIG.24

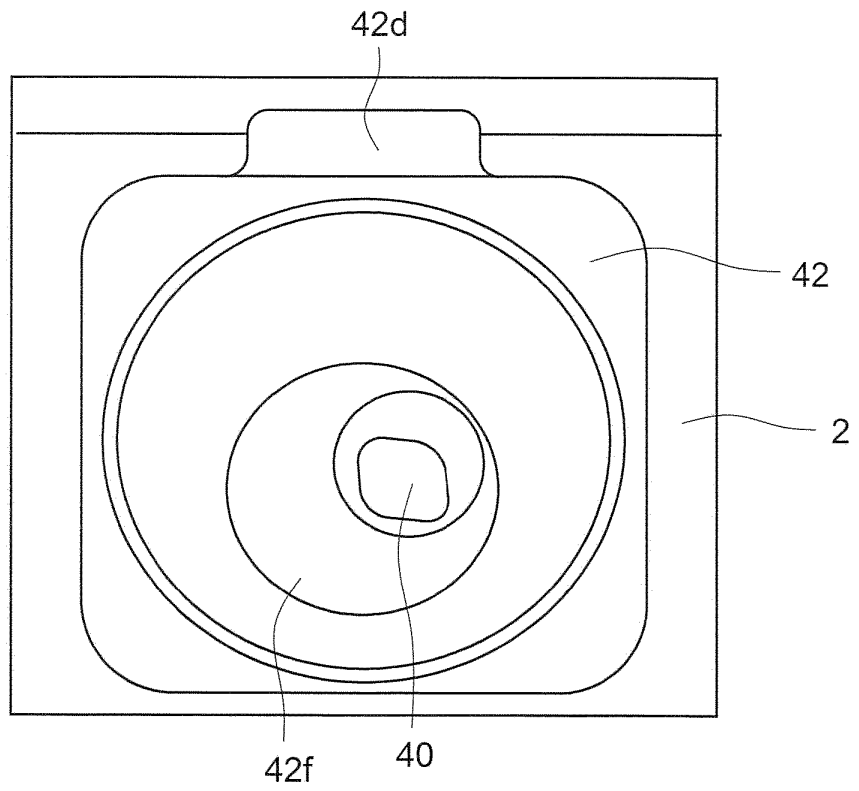
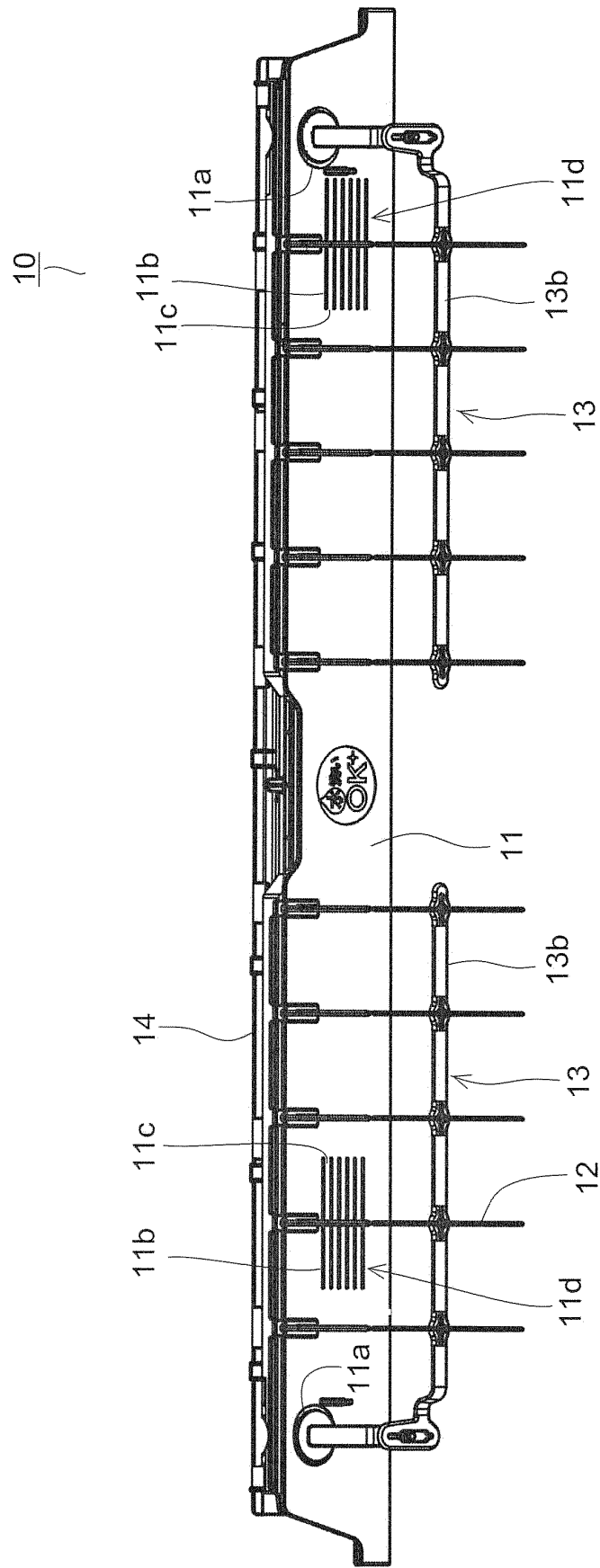


FIG.25



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2016/075200

A. CLASSIFICATION OF SUBJECT MATTER

F24F13/20(2006.01)i, F24F11/02(2006.01)i, F24F13/15(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24F13/20, F24F11/02, F24F13/15

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2016

Kokai Jitsuyo Shinan Koho 1971-2016 Toroku Jitsuyo Shinan Koho 1994-2016

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2011-64343 A (Sharp Corp.), 31 March 2011 (31.03.2011), paragraphs [0018] to [0039]; fig. 1 to 6 & US 2012/0171948 A1 & WO 2011/033843 A1 & CN 102472520 A & KR 10-2012-0041222 A	1,10 2-9,11-12
Y A	JP 2004-212044 A (Mitsubishi Electric Corp.), 29 July 2004 (29.07.2004), paragraph [0026]; fig. 7 (Family: none)	1,10 2-9,11-12
Y A	JP 2004-219049 A (Sanyo Electric Co., Ltd.), 05 August 2004 (05.08.2004), paragraphs [0019] to [0024]; fig. 4 to 5 & CN 1510342 A & KR 10-2004-0057983 A	1,10 2-9,11-12

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

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Date of the actual completion of the international search
19 October 2016 (19.10.16)Date of mailing of the international search report
01 November 2016 (01.11.16)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2016/075200

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2008-292034 A (Panasonic Corp.), 04 December 2008 (04.12.2008), paragraphs [0006], [0098], [0102] (Family: none)	10
A	US 2009/0199583 A1 (Samsung Electronics Co., Ltd.), 13 August 2009 (13.08.2009), paragraphs [0052] to [0057]; fig. 1 to 5 & KR 10-2009-0087253 A	1

Form PCT/ISA/210 (continuation of second sheet) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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