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(54) **Indoor unit of an airconditioner comprising at least one cross-flow fan**

Inneneinheit einer Klimaanlage mit mindestens einem Querstromgebläse

Appareil de climatisation à l'intérieur avec au moins un ventilateur à courant transversal

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Description

Technical Field

[0001] The present invention relates to an air conditioning apparatus provided with a heat exchanger and a pair of upper and lower cross-flow fans in a housing having an inlet and an upper outlet and a lower outlet, wherein air flowing from the inlet into the housing is heat-exchanged by the heat exchanger, and is blown off from the upper and lower outlets by means of the pair of the upper and lower cross-flow fans.

Background Art

[0002] In a conventional air conditioning apparatus of this type, a pair of upper and lower cross-flow fans are provided in a housing, the air flowing from an inlet into a housing and heat-exchanged by a heat exchanger is blown off from both of an upper outlet and a lower outlet or is blown off from either of them, enabling a plurality of airflow controls (see Patent Document 1).

[Patent Document 1] Japanese Laid-open Patent Application Laid-open No. 61-59145

[0003] EP 1 734 313 A1 discloses an air conditioning apparatus comprising an upper outlet and a lower outlet according to the preamble of claim 1.

DISCLOSURE OF THE INVENTION

Problem(s) to Be Solved by the Invention

[0004] However, in the above-described conventional air conditioning apparatus, a motor support portion and a bearing support portion are required for a respective one of the pair of the upper and lower cross-flow fans, and thus, there is apprehension that: the number of structural parts is increased; and dewdrops adhering to the structural parts enter from a clearance of the structural parts into a ventilation trunk, and are discharged and fly from the outlets into room together with cool air.

[0005] Accordingly, it is an object of the present invention to prevent entry of dewdrops adhering to a motor support portion and a bearing support portion of a pair of the upper and lower cross-flow fans as structural parts into a ventilation trunk, preventing the dewdrops from being discharged and flying from an outlet into room together with cool air.

SUMMARY OF THE INVENTION

Means for Solving the Problem(s)

[0006] The present invention is directed to an air conditioning apparatus having the features of claim 1.

Advantageous Effect(s) of the Invention

[0007] According to the present invention, a bearing support portion and a motor support portion of a pair of upper and lower cross-flow fans are integrally formed, respectively, so that the dewdrops adhering to the bearing support portion and the motor support portion of the pair of the upper and lower cross-flow fans as structural parts can be precluded from entering a ventilation trunk from a clearance between these structural parts and can be prevented from being discharged and flying from an inlet into room together with cool air. In addition, the number of parts is reduced, assembling can be easily performed, and an inexpensive equipment configuration can be realized.

[0008] In addition, a bearing support portion and a motor support portion of a pair of upper and lower cross-flow fans are integrally formed, respectively, on shield plates provided at the left and right of a heat exchanger, and a drain pan is installed downwardly of the heat exchanger, so that the dewdrops adhering to the motor support portion or the bearing support portion are guided to the drain pan along the shield plates, and can be discharged to the outside without entry into a ventilation trunk.

BRIEF DESCRIPTION OF THE DRAWINGS**[0009]**

FIG. 1 is a front view of indoor equipment constituting an air conditioning apparatus.

FIG 2 is a perspective view of the indoor equipment constituting the air conditioning apparatus.

FIG 3 is a sectional view taken along the line A-A of FIG 1.

FIG. 4 is an exploded perspective view showing the indoor equipment when a front panel is removed.

FIG. 5 is a perspective view of the indoor equipment when it is seen from a rightward direction, similarly.

FIG 6 is a perspective view of the indoor equipment when it is seen from a leftward direction, similarly.

FIG. 7 is an enlarged sectional view of essential parts of a drain pan.

FIG 8 is an enlarged longitudinal sectional view of essential parts at the periphery of an upper outlet.

FIG. 9 is an exploded perspective view of an opening-forming body of the upper outlet and a mount frame body mounting a longitudinal blade.

FIG. 10 is an enlarged longitudinal sectional view of the periphery of the upper outlet in a state before the mount frame body is mounted, the body mounting the longitudinal blade on the opening-forming body of the outlet.

DESCRIPTION OF THE SPECIFIC EMBODIMENT(S)

[0010] Hereinafter, the specific embodiment of the

present invention will be described referring to FIGS. 1 to 10. Reference numeral 1 designates floor placement indoor equipment constituting an air conditioning apparatus together with outdoor equipment (not shown) as heat source equipment, and a heat exchanger 3 and a pair of upper and lower cross-flow fans 4, 5 are provided in a housing 2. The cross-flow fans 4, 5 are made of: fan main bodies 4A, 5A, each of which is formed in a substantially cylindrical shape; shaft bearings 4B, 5B, a bearing or the like for rotatably retaining a shaft at one side of the fan main bodies 4A, 5A; and a drive motors 4C, 5C, an output shaft of which is rotatably mounted on the other side of the fan main bodies 4A, 5A.

[0011] The housing 2 is made of a front panel 6 and a main body casing 7; a front inlet 8, a side inlet 9, an upper outlet 10, and a lower outlet 11 are provided on the front panel 6; and an upper-inlet flap 12 opening during operation is provided at the upper outlet 10.

[0012] In addition, a stepped portion 7A is formed so that, on a top face of the main body casing 7, a rear top face portion is lower than a front top face portion and, on both side portions, a rear side portion is more inward than a front side portion. The stepped portion 7A is formed in this manner, whereby when indoor equipment 1 is embedded and installed in a house wall, a clearance between the indoor equipment 1 and the wall becomes invisible and the indoor equipment 1 can be finely installed when it is seen from the front.

[0013] In addition, an air filter 14 with an air cleaning filter 13 is removably installed on a front face of the heat exchanger 3, and a drain pan 15 is provided downwardly of the heat exchanger 3. A drain hose connecting portion 15B (equipped with a connecting port) to which a drain hose is to be connected is provided obliquely downwardly at a lower part of this drain pan 15. In other words, an oblique face 15A is formed between a right side face and a bottom face of the drain pan 15, and a drain hose connecting portion 15B is provided at a lower part of this oblique face 15A so as to be oriented in an outwardly oblique downward direction, i.e., in a downward-going right-outward direction.

[0014] An oblique face is formed between a left side face and a bottom face of the drain pan 15, whereby a drain hose connecting portion may be provided at a lower part of this oblique face so as to be oriented in an outwardly oblique downward direction, i.e., in a downward-going left-outward direction. In addition, the drain hose connecting portion may be formed integrally with the drain pan 15 or may be formed by being connected to the drain pan 15.

[0015] The reason why the drain hose connecting portion 15B oriented obliquely downwardly has been formed so as to be oriented in the downward-going right-outward direction is that a stress on the drain hose can be reduced even in a case in which the drain hose is pulled out in any direction. In other words, this is because, if this connecting portion has been formed in a downward or lateral direction, a circumstance that a trap is obliged to be

formed with the drain hose being bent in a limited space occurs, and a bending activity or a stress on the drain hose due to the bending occurs.

[0016] A heat insulation material 16 is mounted on a rear part of the main body casing 7. Inside of this heat insulation material 16, there are arranged: a rear air trunk guide plate 17 formed in an elbowed shape in a cross-sectional view, positioned between a pair of cross-flow fans 4 and 5; an upper-side fan case 18 which is continuously upward of this rear air trunk guide plate 17 and covers the upper cross-flow fan 4 with predetermined intervals; and a lower-side fan case 19 which is continuously downward of the rear trunk air guide plate 17 and covers the lower cross-flow fan 5 with predetermined intervals.

[0017] In addition, an upper-side blow-off passageway 20 is formed between the cross-flow fan 4 and the upper outlet 10, and a lower-side blow-off passageway 21 is formed between the cross-flow fan 5 and the lower outlet 11.

[0018] Shield plates 22, 23 forming a ventilation trunk together with the rear air trunk guide plate 17 are provided at the left and right of the heat exchanger 3 in the housing 2. Bearing support portions 22A, 22B, for housing one end of the fan main bodies 4A, 5A, and for supporting the shaft bearings 4B, 5B, made of bearings or the like partially embedded in a main body casing 7, are integrally formed at the upper and lower parts of the shield plate 22. In addition, at the upper and lower parts of the shield plate 23, motor support portions 23A, 23B for supporting motors 4C, 5C are integrally formed together with the main body casing 7. Further, the motors 4C, 5C are fixed to the main body casing 7 by means of mount members 24, 25. The drain pan 15 is disposed downwardly of the heat exchanger 3 and the shield plates 22, 23 so as to receive water droplets such as drain water flowing down from this heat exchanger 3 or dewdrops adhering to exterior faces of the shield plates 22, 23.

[0019] In the thus constituted indoor equipment 1 of the air conditioning apparatus, the heat exchanger 3 acts as an evaporator (cooler) during cooling operation, and in general, a pair of upper and lower cross-flow fans 4, 5 operates. Indoor air flows from the front inlet 8 and the side inlet 9 into the housing 2, and is cleaned by means of an air filter 14. Afterwards, the cleaned air is cooled by means of the heat exchanger 3, and cool air is produced. The cool air is diverted upwardly and downwardly at the air trunk guide 17 and the diverted airflows are guided to the cross-flow fans 4, 5. The guided airflows are passed through the upper-side blow-off passageway 20 and the lower-side blow-off passageway 21, and are blown indoors from the upper outlet 10 and the lower outlet 11, respectively.

[0020] The bearing support portions 22A, 22B and the motor support portions 23A, 23B of a pair of the upper and lower cross-flow fans 4, 5 are integrally formed, respectively, on the shield plates 22, 23 provided at the left and right of the heat exchanger 3 in the housing 2, thus

reducing the number of structural parts. In addition, in a case where the shield plates 22, 23 were constituted after divided into up and down respectively, water droplets such as dewdrops adhering to the bearing support portions 22A, 22B or the motor support portions 23A, 23B entered the ventilation trunk through a clearance of the connecting portion, and flew into room; however, the entry can be prevented since these shield plates are integrally formed.

[0021] In addition, the drain pan 15 was installed downwardly of the heat exchanger 3 and the left and right shield plates 22, 23, so that the dewdrops adhering to the bearing support portions 22A, 22B or the motor support portions 23A, 23B are guided to the drain pan 15 along the exterior faces of the shield plates 22, 23, and are then discharged to the outside without entry into the ventilation trunk. In particular, the dewdrops can be prevented from being discharged and flying from the lower outlet 11 into room together with cool air. Further, the number of parts is reduced, assembling can be easily performed, and an inexpensive equipment configuration can be realized.

[0022] Moreover, if the drain hose connecting portion had been formed in a downward or lateral direction, a circumstance that a trap is obliged to be formed with the drain hose being bent in a limited space occurred, and the bending activity or the stress on a drain hose due to the bending occurred. However, according to the embodiment, the drain hose connecting portion 15B was provided so as to be oriented in an obliquely downward direction, i.e., in a downward-going right-outward direction, at the lower part of the oblique face 15A formed between the right side face and the bottom face of the drain pan 15, so that the drain water flowing into the drain pan 15 can be smoothly discharged to the outside without the occurrence of drain hose bending activity or the stress on the drain hose due to the bending.

[0023] Next, referring to FIGS. 8 to 10, a structure of preventing a user from inserting his or her finger(s) from the upper inlet 10 so as not to touch the upper cross-flow fan 4 will be described below. First, an upper-inlet flap 12 opening during operation is openably provided at the upper outlet 10. In other words, a support member 31, which is fixed to an opening-forming body 30 forming an opening of the outlet 10, and a support piece 32, which is provided at the back side of the upper outlet flap 12, are swingably supported via a support shaft 33.

[0024] The opening-forming body 30, as shown in FIG. 9, is roughly made up of: a bottom plate 30A; double-sided plates 30B; and a narrow top plate 30C, and fixing pieces 30D are formed on the double-sided plates 30B.

[0025] In addition, in front of the upper cross-flow fan 4 and the lower cross-flow fan 5, front trunk air guide plates 38A, 38B are provided with predetermined intervals (see FIG 3). Reference numeral 35 designates a mount frame body. On a top face 35A of this mount frame body 35, a plurality of longitudinal blades 36 are turnably mounted with predetermined intervals. These longitudi-

nal blades 36 are constituted to be geared with each other via a gear shaft 37 and swung to the left and right so as to enable adjustment of the blow-off directions to the left and right.

[0026] Further, a drooping piece 35B formed by bending a rear part of the mount frame body 35 (constituting a front air trunk guide together with the front air trunk guide plate 38A) is coupled to the front air trunk guide plate 38A from above, and a wire netting 40 for preventing finger insertion is interposed on a bottom plate 30A of the opening-forming body 30. The top face 35A of the mount frame body 35 is coupled from the rear so as to sandwich a lower part of the wire netting. Afterwards, a fixing piece 30D of the opening-forming body 30 and the mount frame body 35 are fixed to each other by means of a screw 34 (see FIGS. 8 and 10).

[0027] In this way, the wire netting 40 has been mounted by interposing it on the bottom plate 30A of the opening-forming body 30 of the upper inlet 10, and coupling the upper face 35A of the mount frame body 35 from the rear so as to sandwich a lower part of the wire netting. This makes it possible to prevent a user from inserting his or her finger(s) through the upper outlet 10 and touching the upper cross-flow fan 4. Therefore, the wire netting 40 for preventing finger insertion, provided in the upper outlet 10, can be easily and rigidly mounted, and a mount frame body 35 equipped with the drooping piece 35B (constituting a part of the front air trunk guide) is rigidly mounted, thereby minimizing an influence on an airflow quantity and noise and disabling the wire netting 40 from being easily removed.

[0028] While the embodiment of the present invention has been described hereinabove, various alternations are possible without departing from the scope of the invention as defined in claim 1.

Description of Reference Numerals

[0029]

1	Indoor equipment
2	Housing
3	Heat exchanger
4	Upper cross-flow fan
5	Lower cross-flow fan
8	Front inlet
9	Side inlet
10	Upper outlet
11	Lower outlet
15	Drain pan
15A	Drain hose connecting portion
22, 23	Shield plate
22A, 22B	Bearing support portion
23A, 23B	Motor support portion
30	Opening-forming body
30A	Bottom plate of opening-forming body
35	Mount frame body
35A	Top face of mount frame body

- 35B Drooping piece
 36 Longitudinal blade
 38A Front air trunk guide plate
 40 Wire netting

nen Ventilationskasten bilden;
 und
 die Ablaufwanne (15) unterhalb der Schirmplatten (22, 23) installiert ist.

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Claims

1. An air conditioning apparatus in a housing (2) having an inlet (8) and an upper outlet (10) and a lower outlet (11), comprising:

a heat exchanger (3); and
 a pair of upper and lower cross-flow fans (4, 5),
 air flowing from the inlet (8) into the housing (2) being heat exchanged by the heat exchanger (3) and blown off from the upper outlet (10) and the lower outlet (11) by means of the pair of the upper and lower cross-flow fans (4, 5),

wherein: bearing support portions (22A, 22B) and motor support portions (23A, 23B) of the pair of the upper and lower cross-flow fans (4, 5) are integrally formed, respectively, on shield plates (22, 23) provided at a left and a right of the heat exchanger (3) and a drain pan (15) is installed downwardly of the heat exchanger, **characterized in that** said shield plates (22, 23) are forming a ventilation trunk together with a rear air trunk guide plate (17); and said drain pan (15) is installed downwardly of the shield plates (22, 23).

Patentansprüche

1. Klimaanlagevorrichtung in einem Gehäuse (2), das einen Einlass (8) und einen oberen Auslass (10) und einen unteren Auslass (11) aufweist, die Folgendes umfasst:

einen Wärmetauscher (3); und
 ein Paar obere und untere Kreuzstromgebläse (4, 5), wobei Luft, die von dem Einlass (8) in das Gehäuse (2) strömt, durch den Wärmetauscher (3) wärmegetauscht und aus dem oberen Auslass (10) und dem unteren Auslass (11) mittels des Paares von oberen und unteren Kreuzstromgebläsen (4, 5) ausgeblasen wird,
 wobei: Lagerträgerteile (22A, 22B) und Motorträgerteile (23A, 23B) des Paares der oberen und unteren Kreuzstromgebläse (4, 5) jeweils integral auf Schirmplatten (22, 23) gebildet sind, die zur Linken und zur Rechten des Wärmetauschers (3) bereitgestellt sind, und eine Ablaufwanne (15) unterhalb des Wärmetauschers installiert ist, **dadurch gekennzeichnet, dass** die Schirmplatten (22, 23) gemeinsam mit einer rückwärtigen Luftkastenführungsplatte (17) ei-

Revendications

1. Appareil de conditionnement d'air dans un boîtier (2) ayant une entrée (8) et une sortie supérieure (10) et une sortie inférieure (11), comprenant :

un échangeur de chaleur (3) ; et
 une paire de ventilateurs supérieur et inférieur à courants croisés (4, 5), l'air s'écoulant depuis l'entrée (8) en entrant dans le boîtier (2) subissant un échange de chaleur avec l'échangeur de chaleur (3) et étant soufflé hors de la sortie supérieure (10) et de la sortie inférieure (11) au moyen de la paire de ventilateurs supérieur et inférieur à courants croisés (4, 5),
 dans lequel : des portions de support de palier (22A, 22B) et des portions de support de moteur (23A, 23B) de la paire de ventilateurs supérieur et inférieur à courants croisés (4, 5) sont formées intégralement, respectivement, sur des plaques écran (22, 23) prévues à gauche et à droite de l'échangeur de chaleur (3) et un plateau de drainage (15) est installé en bas de l'échangeur de chaleur,
caractérisé en ce que lesdites plaques écran (22, 23) forment ensemble un coffre de ventilation avec une plaque de guidage d'air arrière (17) dans le coffre ; et
 ledit plateau de drainage (15) est installé en bas des plaques écran (22, 23).

FIG. 1

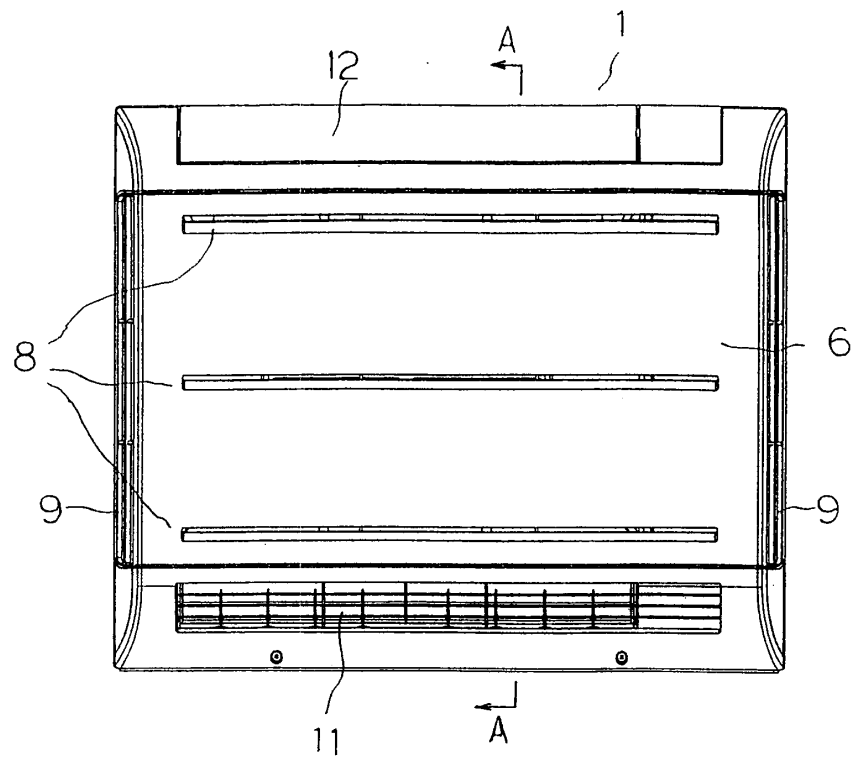
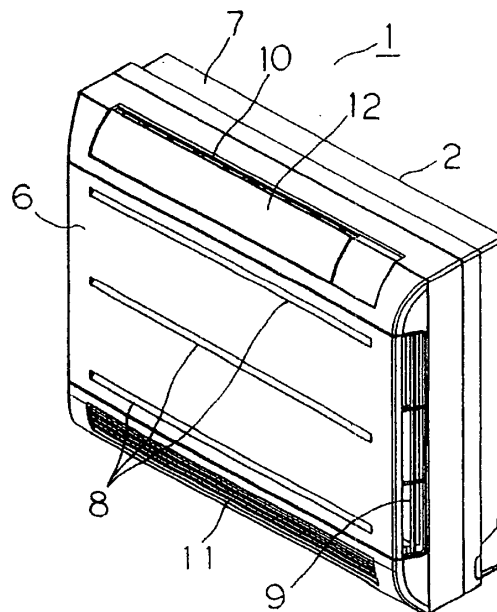


FIG. 2



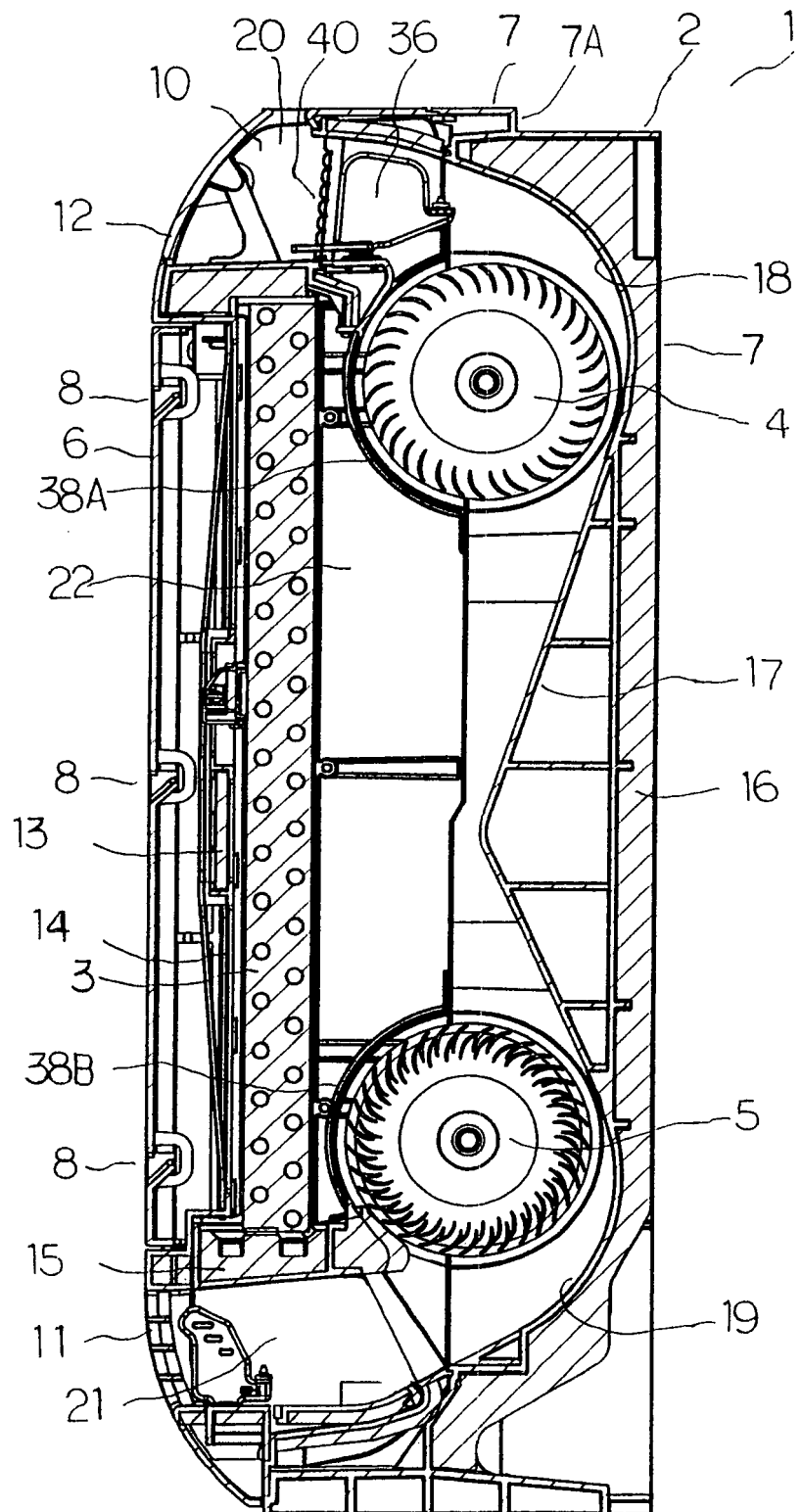


FIG. 3

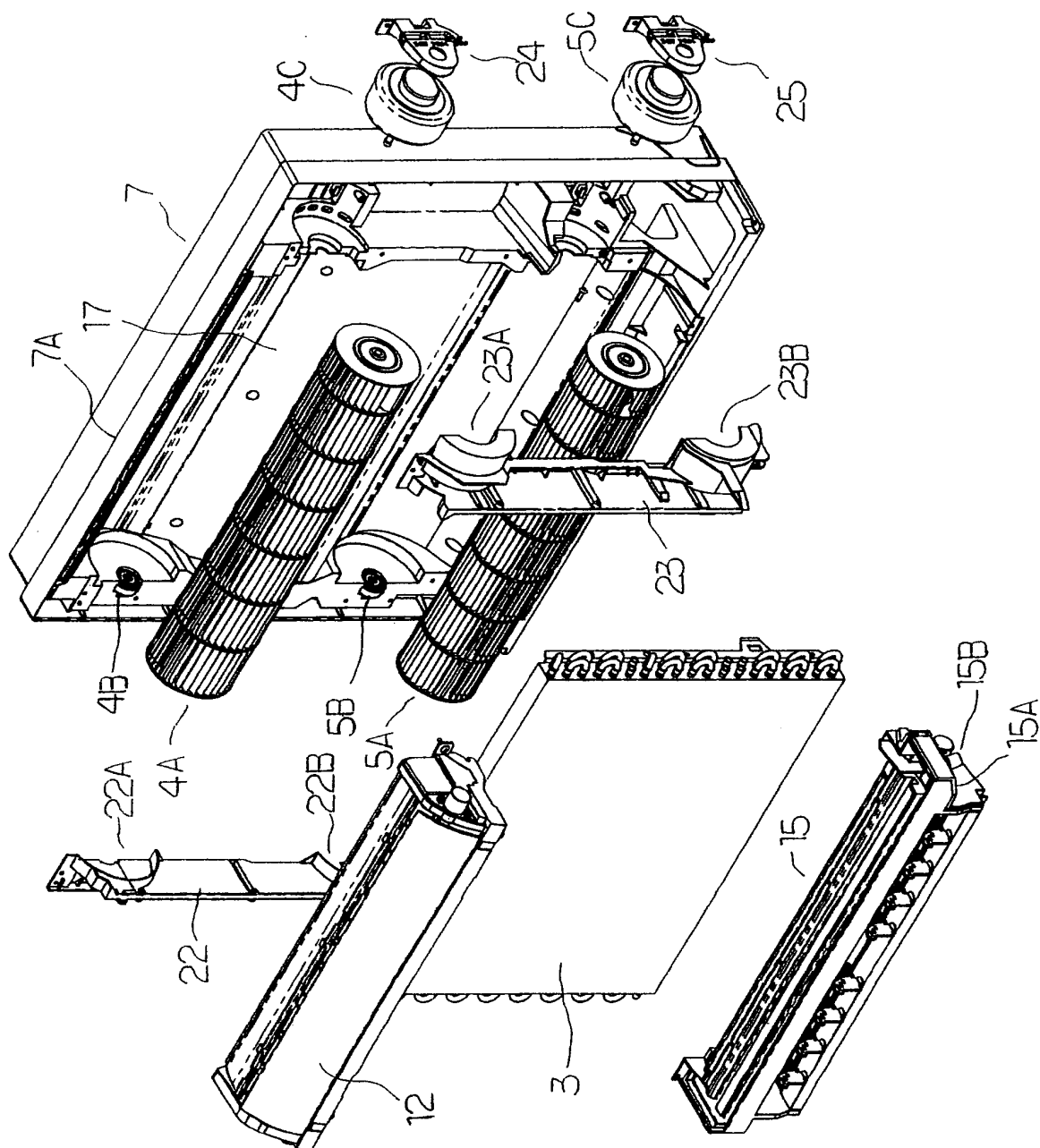


FIG. 4

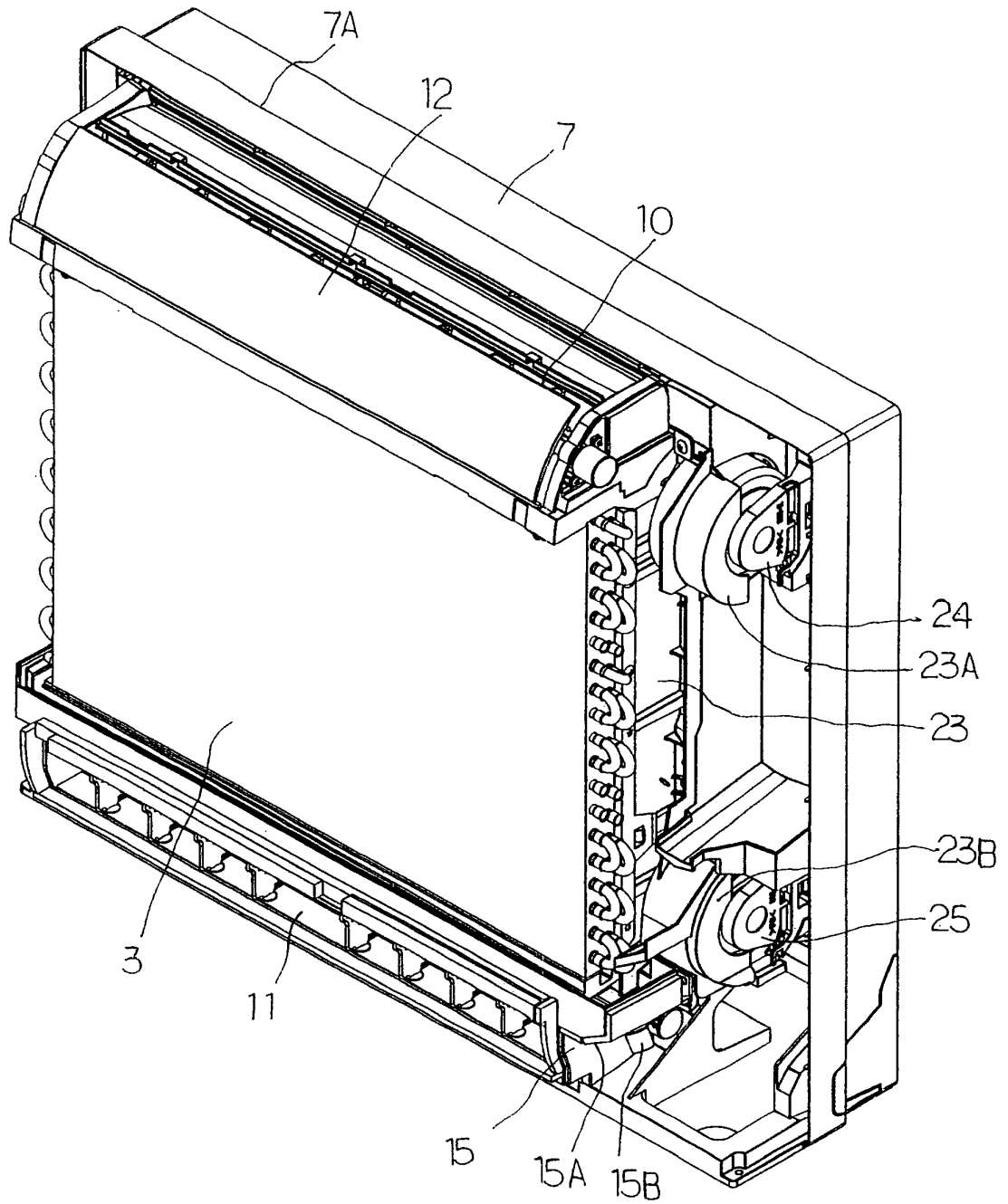
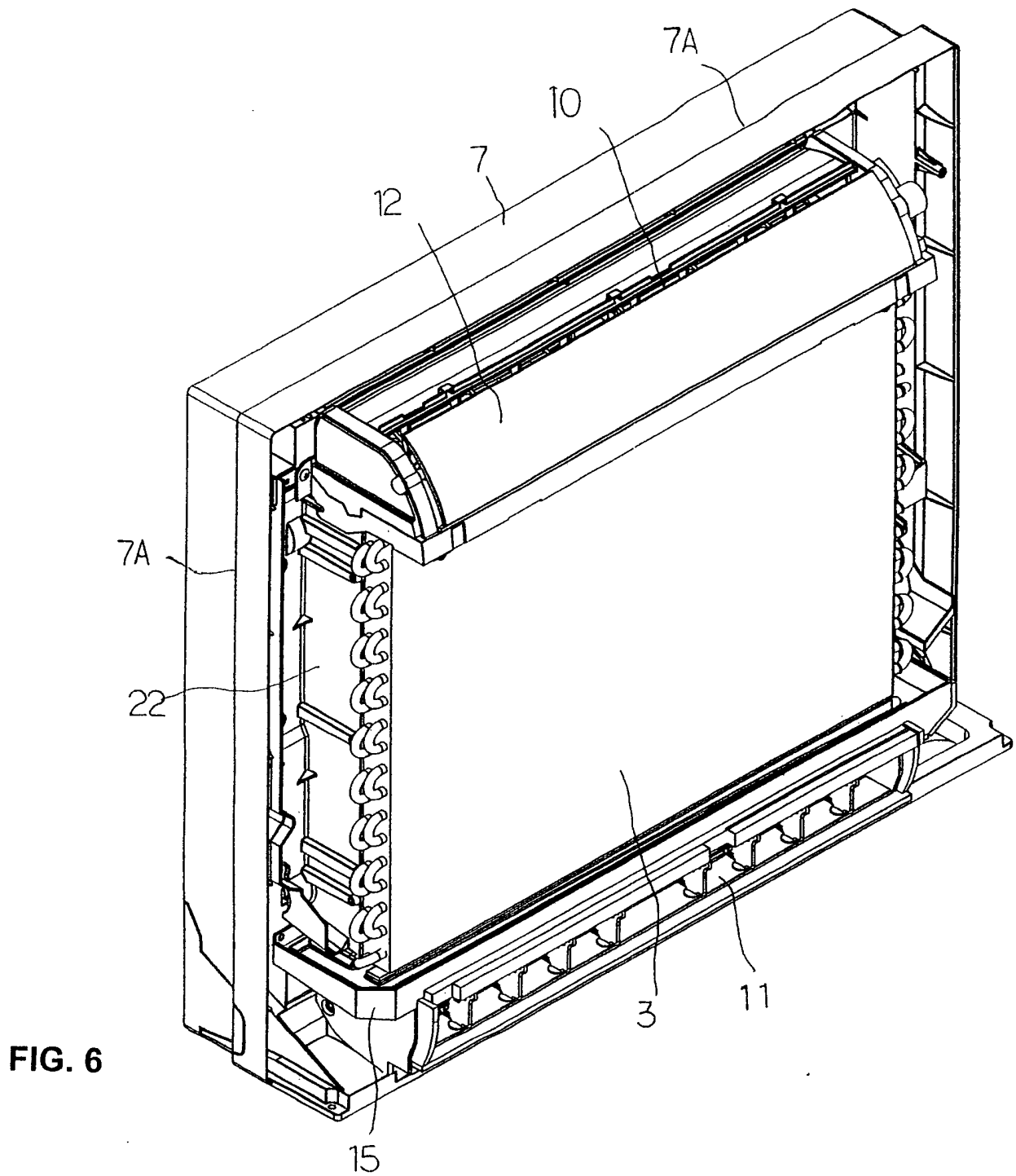


FIG. 5



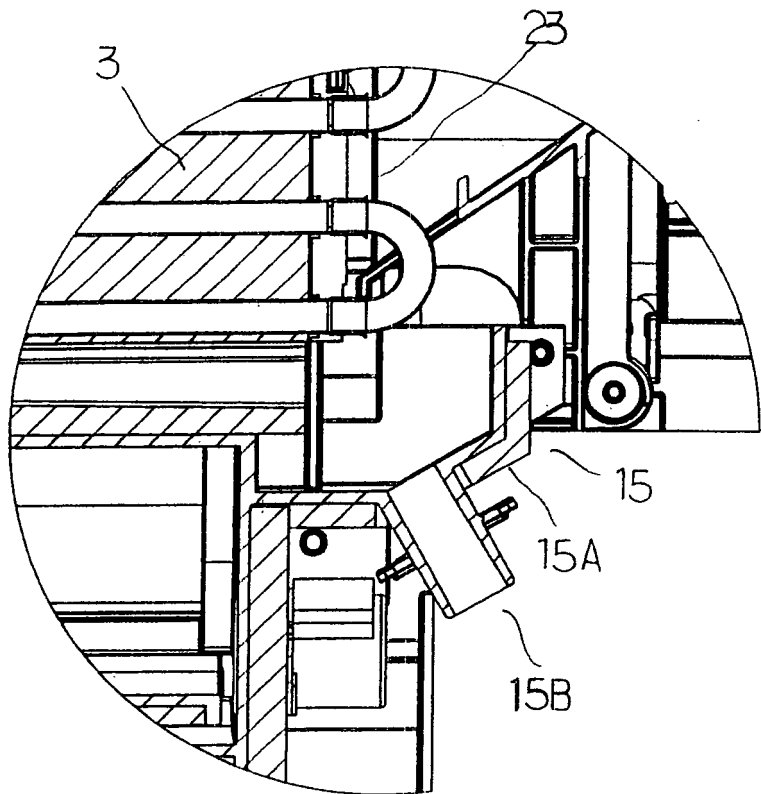
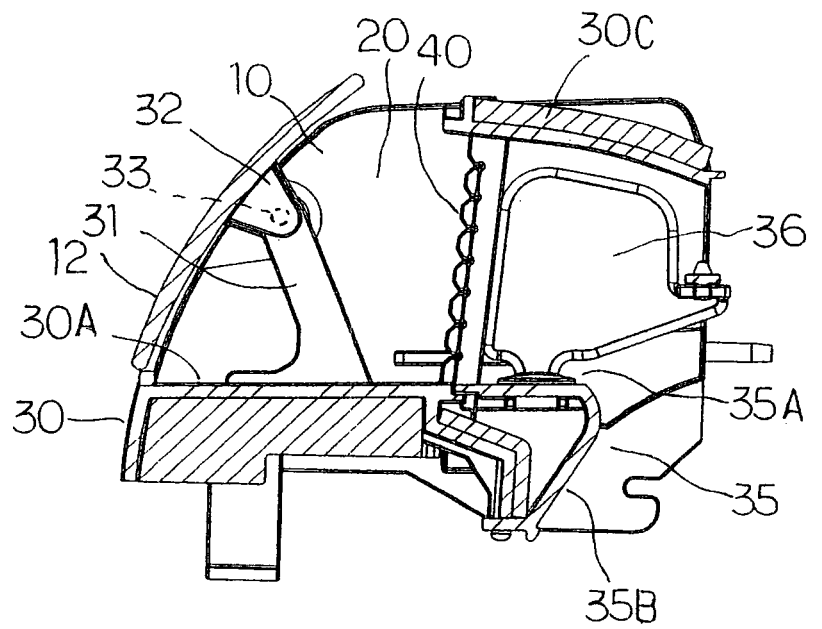


FIG. 7

FIG. 8



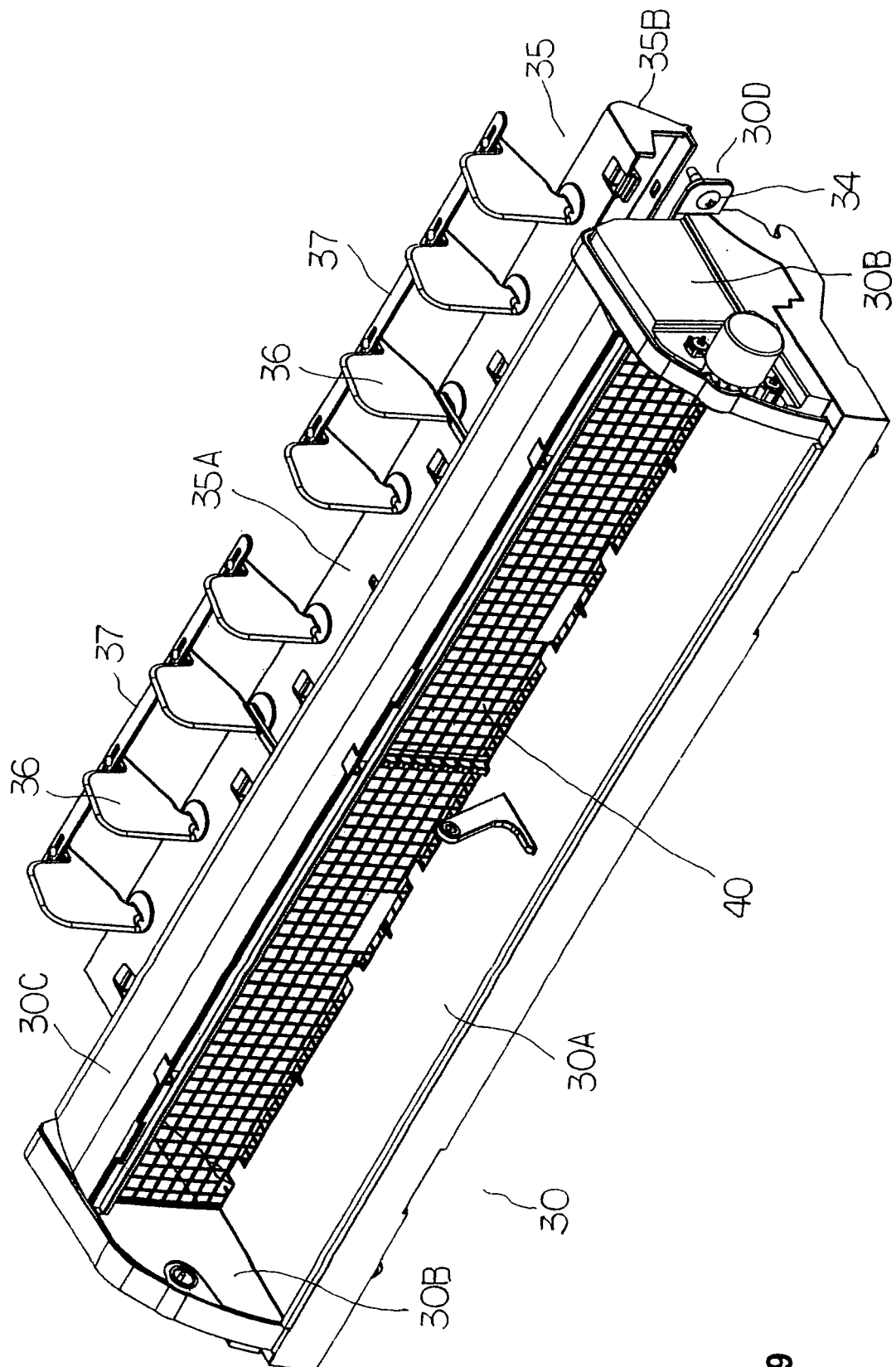
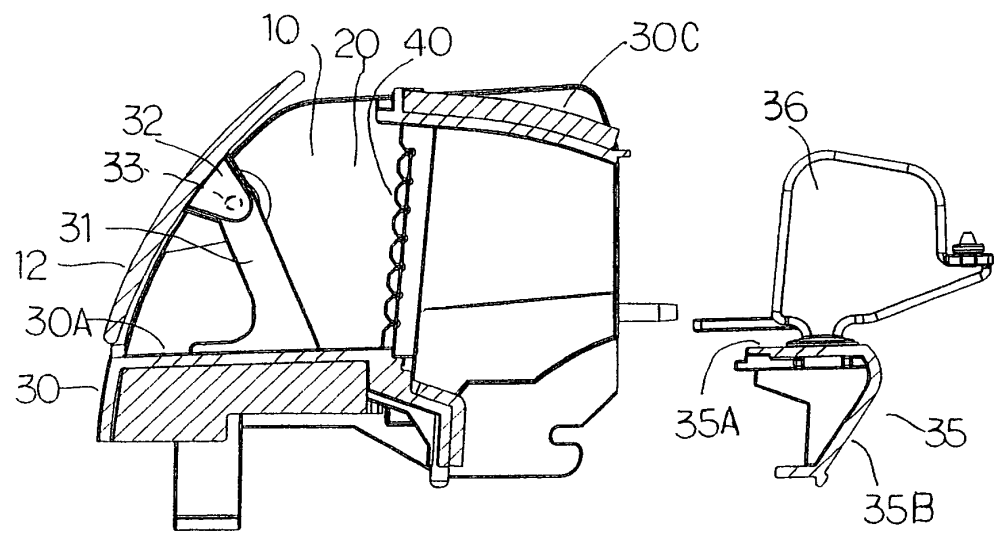


FIG. 9

FIG. 10



REFERENCES CITED IN THE DESCRIPTION

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