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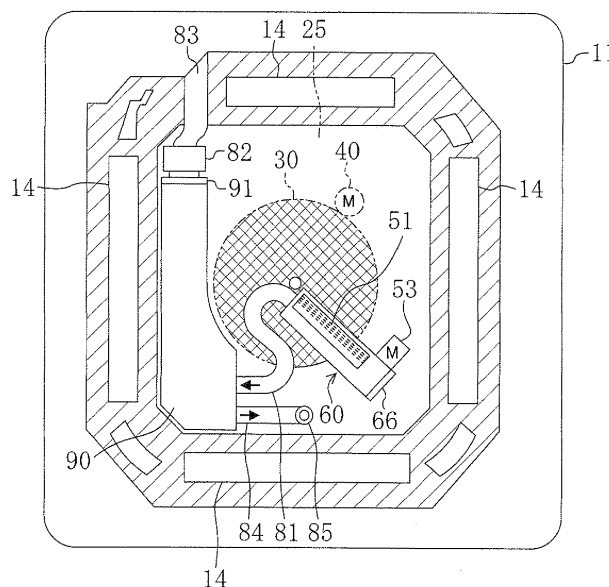
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(54) **INDOOR UNIT FOR AIR CONDITIONER**

(57) An indoor unit includes a dust removing section (50) configured to remove dust on an air filter (30), and a dust container (60) configured to contain the removed dust. The dust container (60) is connected to a dust collection box (90) having a larger volume than that of the

dust container (60) through a transfer duct (81). The dust collection box (90) is connected to a transfer fan (82) configured to transfer dust from the dust container (60) to the dust collection box (90) by suction operation. The dust collection box (90) communicates with a cleaner insertion port (85) (85) through a suction duct (84).

FIG. 2



Description

TECHNICAL FIELD

[0001] The present invention relates to an indoor unit of an air conditioner, particularly to processes on dust removed from an air filter.

BACKGROUND ART

[0002] Among indoor units of air conditioners each having an air filter at an air inlet, those provided with a dust removing section for removing dust trapped on the air filter have been known.

[0003] For example, an air conditioner shown in PATENT DOCUMENT 1 includes a cleaning section as a dust removing section. The cleaning section includes a cleaning brush, a dust collecting brush, and a dust box. The cleaning brush moves, being in contact with the surface of an air filter to remove dust. The dust collecting brush is used for scraping dust deposited on the cleaning brush. The dust box houses the cleaning brush and the dust collecting brush, and contains the dust scraped by the dust collecting brush. The dust contained in the dust box is collected by opening a front panel of a casing body and sucking the dust through an opening in a box body with a cleaner.

CITATION LIST

PATENT DOCUMENT

[0004]

PATENT DOCUMENT 1: Japanese Patent Publication No. 2007-107764

SUMMARY OF THE INVENTION

TECHNICAL PROBLEM

[0005] The dust box of PATENT DOCUMENT 1 is disposed near an air filter (30) (i.e., near the path of sucked air), and thus, the volume of the dust box needs to be reduced as much as possible so as not to disturb airflow. In addition, since the dust box houses the cleaning brush and other components, the dust box cannot have a large volume for containing dust, and thus, the dust box cannot contain a large amount of dust. Further, the location of the dust box is strictly restricted. For these reasons, dust in the dust box needs to be frequently collected, and this collection process is complicated because of the location of the dust box.

[0006] It is therefore an object of the present invention to provide an air conditioner including an indoor unit having the function of removing dust from an air filter in which removed dust is effectively processed without greatly bothering a user.

SOLUTION TO THE PROBLEM

[0007] A first aspect of the present invention is directed to an indoor unit of an air conditioner in which an indoor heat exchanger (22), an indoor fan (21) configured to suck air from inside of a room, an air filter (30) disposed on an inlet side of the indoor fan (21), and a dust removing section (50) configured to remove dust trapped on the air filter (30) are provided in a casing (10). The indoor unit includes: a dust container (60) provided in the casing (10), and configured to contain dust removed by the dust removing section (50); and a transfer fan (82) provided in the casing (10), and configured to transfer dust contained in the dust container (60) to a predetermined place, together with air.

[0008] In this aspect, while air sucked into the casing (10) by the indoor fan (21) passes through the air filter (30), dust contained in the air is trapped on the air filter (30). The dust trapped on the air filter (30) is removed by the dust removing section (50), and is contained in the dust container (60). The dust in the dust container (60) is transferred to a predetermined place (e.g., outside the casing (10) or relatively large space in the casing (10)) by the transfer fan (82) together with air. That is, in this aspect, the dust removed from the air filter (30) is temporarily contained in the dust container (60), and then is transferred to another place without bothering a user.

[0009] In a second aspect of the present invention, the indoor unit of the first aspect further includes a dust collection box (90) having a volume larger than that of the dust container (60) and connected to the dust container (60) through a transfer duct (81). The transfer fan (82) is connected to the dust collection box (90), and is configured to transfer dust contained in the dust container (60) to the dust collection box (90) by suction operation.

[0010] In this aspect, air in the dust collection box (90) is sucked by the transfer fan (82). Accordingly, dust in the dust container (60) is transferred to the dust collection box (90) through the transfer duct (81). Since the dust collection box (90) has a large volume, the dust collection box (90) can contain a large amount of dust.

[0011] In a third aspect of the present invention, the indoor unit of the first aspect further includes a dust collection box (90) having a volume larger than that of the dust container (60) and connected to the dust container (60) through a transfer duct (81). The transfer fan (82) is connected to the dust collection box (90), and is configured to transfer dust contained in the dust container (60) to the dust collection box (90) by air blowing operation.

[0012] In this aspect, the air blown by the transfer fan (82) is sent to the dust container (60). This blowing operation causes the dust in the dust container (60) to be transferred to the dust collection box (90) through the transfer duct (81), and contained in the dust collection box (90). Since the dust collection box (90) has a large volume, the dust collection box (90) can contain a large amount of dust.

[0013] In a fourth aspect of the present invention, the

indoor unit of the second or third aspect further includes a cleaner insertion port (85) communicating with the dust collection box (90) through a suction duct (84), and configured to suck dust transferred to the dust collection box (90) from outside with a cleaner.

[0014] In this aspect, the dust transferred to the dust collection box (90) can be sucked and collected into a cleaner through the suction duct (84) by user's insertion of a hose of the cleaner into the cleaner insertion port (85). Further, at a certain level of suction by the cleaner, dust contained in the dust container (60) is also collected to the cleaner after passing through the transfer duct (81), the dust collection box (90), and the suction duct (84) in this order.

[0015] In a fifth aspect of the present invention, in the indoor unit of one of the first through fourth aspects, the dust removing section (50) includes a brush member (51) provided in the dust container (60) and configured to be in contact with the air filter (30), and a drive section (40) configured to move the air filter (30) relative to the brush member (51).

[0016] In this aspect, the air filter (30) is moved by the drive section (40), while being in contact with the brush member (51). This movement causes dust on the air filter (30) to be scraped (i.e., removed) by the brush member (51). The dust removed by the brush member (51) is contained in the dust container (60) without any process.

[0017] In a sixth aspect of the present invention, in the indoor unit of the fifth aspect, the brush member (51) of the dust removing section (50) includes a bristle portion (51b) made of pile fabric and configured to be in contact with the air filter (30).

[0018] In this aspect, the air filter (30) moves, while being in contact with the bristle portion (51b) of the brush member (51). This movement causes dust on the air filter (30) to be scraped (i.e., removed) by the bristle portion (51b). The bristle portion (51b) is made of pile fabric, and thus has relatively short bristles. Accordingly, airflow by the transfer fan (82) is not greatly disturbed in the dust container (60) depending on the length of bristles of the bristle portion (51b). That is, the resistance of airflow in the dust container (60) can be reduced.

[0019] In a seventh aspect of the present invention, the indoor unit of the second or third aspect further includes a flow rate detection section (69) provided in one of the dust container (60), the transfer duct (81), and the dust collection box (90), and configured to detect a flow rate of air.

[0020] In this aspect, the flow rate detection section (69) detects the airflow rate (i.e., the wind speed) in the dust container (60), the transfer duct (81), or the dust collection box (90). Further, in this aspect, in suction or blowing operation by the transfer fan (82), when the wind speed detected by the flow rate detection section (69) decreases to a predetermined value or less, it is determined that the dust collection box (90) is filled with dust. Otherwise, it is determined that clogging with dust etc. occurs in the transfer duct (81). That is, when the amount

of dust in the dust collection box (90) is small or no clogging occurs in the transfer duct (81), the wind speed detected by the flow rate detection section (69) is high. When the amount of dust in the dust collection box (90) is large or clogging occurs in the transfer duct (81), the wind speed detected by the flow rate detection section (69) is low. In this manner, a change (i.e., an increase) in the resistance of airflow is detected depending on the airflow rate, thereby determining whether or not the dust collection box (90) is filled with dust or clogging or the like occurs in the transfer duct (81).

[0021] In an eighth aspect of the present invention, in the indoor unit of the seventh aspect, the flow rate detection section (69) is located upstream of a dust container portion of the dust container (60).

[0022] In this aspect, the flow rate detection section (69) detects the airflow rate upstream of a dust container portion. That is, unlike a case where the flow rate detection section (69) is located downstream of the dust container portion, the flow rate of air containing no dust is detected.

ADVANTAGES OF THE INVENTION

[0023] As described above, dust removed from the air filter (30) and contained in the dust container (60) is transferred to a predetermined place by the transfer fan (82). Accordingly, dust can be moved to a relatively large place (e.g., an attic) or a predetermined place where the dust can be easily disposed, in a simple manner, without bothering a user. Since the dust container (60) is located near the air filter (30), i.e., near the path of sucked air, the volume of the dust container (60) needs to be reduced as much as possible so as not to disturb airflow. In this case, although a large amount of dust cannot be contained in the dust container (60), a large amount of dust can be contained in another place except for the dust container (60) in this aspect. As a result, the user's labor in discharging dust can be reduced.

[0024] In the second or third aspect, dust is transferred from the dust container (60) to the dust collection box (90) having a larger volume than that of the dust container (60) to be contained in the dust container (60) by suction operation or air blowing operation of the transfer fan (82). The dust collection box (90) is disposed at a position at which the dust can be easily disposed. This configuration can ensure that a large amount of dust is contained, and increases the efficiency in disposing the dust. In addition, if the single dust collection box (90) is commonly provided to a plurality of indoor units, dust removed in these indoor units can be collectively accumulated. Accordingly, even in a case where a plurality of indoor units are provided, the efficiency in disposing dust can be enhanced.

[0025] In the fourth aspect, only insertion of a hose of a cleaner into the cleaner insertion port (85) can allow dust in the dust collection box (90) and the dust container (60) to be sucked. Accordingly, the dust can be easily disposed, thereby further reducing the labor of disposing

the dust.

[0026] In the fifth aspect, it is ensured that dust removed by the brush member (51) is temporarily contained in the dust container (60). Since the air filter (30) is moved relative to the brush member (51), dust can be removed from the entire surface of the air filter (30). In this configuration, the volume and location of the dust container (60) are more strictly restricted. However, dust can be easily moved to a larger place from the dust container (60) in this aspect, and thus, a large amount of dust can be effectively accumulated.

[0027] In the sixth aspect, the brush member (51) includes the bristle portion (51b) made of pile fabric. Thus, the bristle portion (51b) has short bristles. Accordingly, the resistance of airflow in the dust container (60) can be reduced. As a result, the efficiency in transferring the dust contained in the dust container (60) can be enhanced.

[0028] In the seventh aspect, the airflow rate detection section (69) is provided in one of the dust container (60), the transfer duct (81), and the dust collection box (90). With this configuration, a change in airflow in the dust container (60), the transfer duct (81), or the dust collection box (90) can be detected. Based on this change in airflow resistance, it is determined whether or not the dust collection box (90) is filled with dust (i.e., the density of dust in the dust collection box (90)) or whether or not clogging occurs in the transfer duct (81). Accordingly, the timing of collecting (discharging) dust from the dust collection box (90) to outside the indoor unit can be appropriately determined. In addition, occurrence of clogging with dust or the like in the transfer duct (81) can be detected in an early stage. As a result, the reliability of the indoor unit can be enhanced.

[0029] In the eighth aspect, the flow rate detection section (69) is located upstream of the dust container portion. Accordingly, the airflow rate in a portion where no dust exists can be detected. With this configuration, sensing by the flow rate detection section (69) is not affected by dust, and thus, the accuracy in detecting the wind speed is increased. Consequently, the timing of collecting (discharging) dust from the dust collection box (90) to outside the indoor unit is more appropriately determined. In addition, degradation of the flow rate detection section (69) by dust can be reduced. With the configuration described above, the reliability of the indoor unit can be further enhanced.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030]

[FIG. 1] FIG. 1 is a vertical cross-sectional view illustrating a structure of an indoor unit according to an embodiment.

[FIG. 2] FIG. 2 is a lateral cross-sectional view illustrating the structure of the indoor unit of the embodiment when viewed from above.

[FIG. 3] FIG. 3 is a perspective view illustrating struc-

tures of a partition plate, an air filter, and a dust container according to the embodiment.

[FIG. 4] FIG. 4 is a cross-sectional view illustrating an attachment of the air filter according to the embodiment.

[FIG. 5] FIG. 5 is a perspective view illustrating a structure of a filter drive section according to the embodiment.

[FIG. 6] FIG. 6 is a perspective view illustrating structures of a dust removing section and the dust container according to the embodiment when viewed from above.

[FIG. 7] FIG. 7 is a lateral cross-sectional view illustrating the structure of the dust container of the embodiment.

[FIG. 8] FIG. 8 is a lateral cross-sectional view illustrating a structure of a dust amount detection section according to the embodiment, showing a relationship with the dust container.

[FIG. 9] FIG. 9 shows views schematically illustrating relationships between the air filter and the dust removing section of the embodiment, FIGS. 9(A) and 9(B) show states in filter cleaning operation, and FIG. 9(C) shows a state in normal operation.

[FIG. 10] FIG. 10 is a lateral cross-sectional view illustrating a relationship between the air filter and the dust removing section in dust removal operation of the embodiment.

[FIG. 11] FIG. 11 shows lateral cross-sectional views illustrating operation of the dust removing section in brush cleaning operation of the embodiment.

[FIG. 12] FIG. 12 is a vertical cross-sectional view illustrating a structure of an indoor unit according to a first variation of the embodiment.

[FIG. 13] FIG. 13 is a lateral cross-sectional view illustrating the structure of the indoor unit of the first variation when viewed from above.

[FIG. 14] FIG. 14 is a vertical cross-sectional view illustrating a structure of an indoor unit according to a second variation of the embodiment.

[FIG. 15] FIG. 15 is a vertical cross-sectional view illustrating the structure of the indoor unit of the second variation.

DESCRIPTION OF REFERENCE CHARACTERS

[0031]

1	indoor unit
10	casing
21	indoor fan
22	indoor heat exchanger
30	air filter
40	filter drive section (drive section)
50	dust removing section
51	rotating brush (brush member)
51b	bristle portion
60	dust container

69 wind speed sensor (flow rate detection section)
 81 transfer duct
 82 transfer fan
 84 suction duct
 85 cleaner insertion port

DESCRIPTION OF EMBODIMENTS

[0032] An embodiment of the present invention will be described in detail hereinafter with reference to the drawings.

[0033] An indoor unit (1) of this embodiment constitutes part of an air conditioner, and is placed on a ceiling of a room. The air conditioner includes a refrigerant circuit connecting a compressor, an outdoor heat exchanger, and an expansion valve provided in an outdoor unit, to an indoor heat exchanger (22) provided in the indoor unit (1), using pipes. The refrigerant circuit performs a vapor compression refrigeration cycle by reversibly circulating a refrigerant. The air conditioner performs cooling operation in which the indoor heat exchanger (22) in the refrigerant circuit functions as an evaporator, and heating operation in which the indoor heat exchanger (22) in the refrigerant circuit functions as a condenser.

<Configuration of Indoor Unit >

[0034] As shown in FIGS. 1 and 2, the indoor unit (1) includes a casing (10) and a decorative panel (11). In the casing (10), the indoor heat exchanger (22), a drain pan (23), an indoor fan (21), an air filter (30), a filter drive section (40), a dust removing section (50), a dust container (60), a dust transfer section (80), and a dust collection box (90) are provided.

[0035] The casing (10) is in the shape of a substantially rectangular parallelepiped box which is open at the bottom. A heat insulator (17) is laminated on an inner surface of the casing (10). The casing (10) is disposed with the bottom thereof inserted in an opening of a ceiling plate.

[0036] The decorative panel (11) is in the shape of a rectangular plate. When viewed in plan, the decorative panel (11) is slightly larger than the casing (10). The decorative panel (11) is attached to the casing (10) to cover the lower portion of the casing (10) with a sealing member (16) sandwiched therebetween. The decorative panel (11), when attached to the casing (10), is exposed in the room.

[0037] The decorative panel (11) has one inlet (13) and four outlets (14). The inlet (13) is rectangular-shaped, and is formed in the center of the decorative panel (11). A suction grille (12) provided with slits is fitted in the inlet (13). Each of the outlets (14) is in the shape of a narrow rectangle. The outlets (14) are respectively formed along the sides of the decorative panel (11). An adjuster plate (15) for adjusting the direction of airflow is provided at each of the outlets (14). The adjuster plate (15) rotates to adjust the direction of airflow (i.e., the direction of blowing air).

[0038] The indoor fan (21) is a so-called turbo fan. The indoor fan (21) is disposed near the center of the casing (10) and above the inlet (13). The indoor fan (21) includes a fan motor (21a) and an impeller (21b). The fan motor (21a) is fixed to a top plate of the casing (10). The impeller (21b) is connected to a rotation axis of the fan motor (21a). A bell mouth (24) communicating with the inlet (13) is provided below the indoor fan (21). The bell mouth (24) divides space in the casing (10) located upstream of the indoor heat exchanger (22) into a room near the indoor fan (21) and a room near the suction grille (12). The indoor fan (21) is configured to blow air sucked from below through the bell mouth (24) in a radial direction.

[0039] The indoor heat exchanger (22) is configured as a cross-fin type fin-and-tube heat exchanger. When viewed in plan, the indoor heat exchanger (22) is in the shape of a rectangular frame, and is disposed to surround the indoor fan (21). In the indoor heat exchanger (22), a refrigerant and indoor air (blown air) sent by the indoor fan (21) exchange heat.

[0040] The drain pan (23) is disposed below the indoor heat exchanger (22). The drain pan (23) receives drainage generated as a result of condensation of moisture in the air in the indoor heat exchanger (22). The drain pan (23) is provided with a drain pump (not shown) for discharging the drainage. The drain pan (23) is inclined so that the drainage is collected to part of the drain pan at which the drain pump is provided.

[0041] A partition plate (25) is provided below the bell mouth (24). The partition plate (25) vertically divides space between the bell mouth (24) and the suction grille (12). Specifically, the partition plate (25) divides space upstream of the indoor heat exchanger (22) into a room near the indoor heat exchanger (22) including the bell mouth (24), and a room near the suction grille (12).

[0042] A vent (26) through which the air sucked through the inlet (13) flows into the bell mouth (24) is formed in the center of the partition plate (25). As shown in FIG. 3, the circular vent (26) is divided into four fan-shaped vents by four radially extending radial members (27). The radial members (27) are connected to each other at the center of the circular vent, and a cylindrical filter rotation axis (28) protrudes downward from the center. The filter rotation axis (28) is a rotation axis about which the air filter (30) rotates. Two filter holders (29) are formed on one of the radial members (27).

[0043] As shown in FIG. 3, the air filter (30) is disposed below the partition plate (25), and is in the shape of a disc which is large enough to cover an inlet of the bell mouth (24). Specifically, the air filter (30) includes an annular filter body (31) and a mesh member (37). A gear (32) is formed on an outer circumferential surface of the filter body (31). A cylindrical axis receiver (33) supported by six radial ribs (34) is formed in the center of the annular filter body (31). Specifically, each of the radial ribs (34) radially extends from the axis receiver (33). An inner annular rib (35) and an outer annular rib (36) coaxial with the filter body (31) are formed radially inside the filter

body (31). The outer annular rib (36) has a larger diameter than the inner annular rib (35). The mesh member (37) entirely covers the inside of the filter body (31). The air sucked through the inlet (13) passes through the mesh member (37) of the air filter (30), and flows into the bell mouth (24). The dust contained in the air is trapped on the mesh member (37).

[0044] The air filter (30) is biased downward by the filter holders (29) abutting the radial ribs (35, 36). Therefore, the air filter (30) is pressed onto a rotating brush (51) of a dust removing section (50) described later. This improves the efficiency of dust removal by the dust removing section (50).

[0045] As also shown in FIG. 4, the air filter (30) is attached, with the axis receiver (33) fitted on the filter rotation axis (28) of the partition plate (25). The air filter (30) is rotatable about the filter rotation axis (28). The dust container (60) is disposed below the air filter (30). With the axis receiver (33) of the air filter (30) fitted on the filter rotation axis (28), a filter attachment (68) of the dust container (60) is fixed to the axis receiver (33) of the partition plate (25) with a fixing screw (28a). Thus, the air filter (30) is held between the partition plate (25) and the dust container (60).

[0046] A filter drive section (40) for rotating the air filter (30) is provided near the air filter (30) (see, FIG. 2). The filter drive section (40) constitutes a drive section for relatively moving the air filter (30) and the rotating brush (51).

[0047] Specifically, the filter drive section (40) includes a filter drive motor (41) and a limit switch (44) as shown in FIG. 5. A drive gear (42) is attached to a drive shaft of the filter drive motor (41), and the drive gear (42) engages with the gear (32) of the filter body (31). A switch actuator (43) which is a tab is formed on one of the surfaces of the drive gear (42). The switch actuator (43) actuates a lever (44a) of the limit switch (44) in response to the rotation of the drive gear (42). The limit switch (44) detects the actuation of the lever (44a) by the switch actuator (43). That is, the switch actuator (43) and the limit switch (44) detect the rotational position of the drive gear (42).

[0048] The dust removing section (50), the dust container (60), and the dust transfer section (80) will be described with reference to FIGS. 6-8. The dust removing section (50) and other components are arranged below the partition plate (25) and the air filter (30) (see, FIGS. 1 and 2).

[0049] The dust removing section (50) is provided to remove dust trapped on the air filter (30). The dust removing section (50) includes a rotating brush (51), a cleaning brush (52), and a brush drive section (53). The rotating brush (51) constitutes a brush member according to the present invention.

[0050] As shown in FIG. 7, the rotating brush (51) and the cleaning brush (52) are provided in a brush receiving opening (63) of the dust container (60) described later.

[0051] The rotating brush (51) includes a narrow cylindrical shaft (51a) and a bristle portion (51b) attached

to an outer circumferential surface of the shaft (51a). The bristle portion (51b) is made of a plurality of bristles. The bristle portion (51b) covers part of the circumference of the shaft (51a), and extends in the longitudinal direction of the shaft (51a). The cleaning brush (52) is disposed rearward of the rotating brush (51).

[0052] The cleaning brush (52) includes a body (52a), a bristle portion (52b), and a spring (52c). The body (52a) is a plate-like member, and has the same length as the shaft (51a) of the rotating brush (51). The plate surface of the body (52a) faces the outer circumferential surface of the rotating brush (51). An upper portion of the body (52a) is curved to correspond to the outer circumferential surface of the shaft (51a) of the rotating brush (51). The bristle portion (52b) is provided on the curved portion of the body (52a) to extend in the longitudinal direction of the body (52a). The spring (52c) is attached to a lower end portion of the body (52a), and to an inner wall of the dust container (60). That is, the body (52a) is supported by the spring (52c).

[0053] The rotating brush (51) and the cleaning brush (52) have a length equal to or larger than the radius of the air filter (30). The rotating brush (51) and the cleaning brush (52) are arranged to extend radially outward from the center of the air filter (30).

[0054] The rotating brush (51) is configured in such a manner that dust is removed from the mesh member (37) when the bristle portion (51b) comes into contact with the mesh member (37) of the rotating air filter (30). The rotating brush (51) is driven by the brush drive section (53) to rotate in a reversible manner. As shown in FIG. 6, the brush drive section (53) includes a brush drive motor (54), and a drive gear (55) and a driven gear (56) engaging with each other. The drive gear (55) is attached to a drive shaft of the brush drive motor (54), and the driven gear (56) is attached to an end of the shaft (51a) of the rotating brush (51). This structure drives the rotating brush (51) to rotate.

[0055] The bristle portion (52b) of the cleaning brush (52) is configured to come into contact with the bristle portion (51b) of the rotating brush (51) as the rotating brush (51) is rotated by the brush drive section (53). The contact allows dust to be removed from the bristle portion (51b) of the rotating brush (51). Specifically, the cleaning brush (52) removes the dust from the rotating brush (51) to clean the rotating brush (51). The dust removal action of the rotating brush (51) and the cleaning brush (52) will be described later.

[0056] The bristle portions (51b, 52b) of the rotating brush (51) and the cleaning brush (52) are made of so-called pile fabric. The pile fabric is hairy fabric obtained by weaving an extra fiber (pile yarn) into base fabric, and has relatively short bristles projecting from the base fabric. The pile fabric is inclined pile fabric in which the bristles are inclined in a certain direction.

[0057] Specifically, the bristles of the bristle portion (51b) of the rotating brush (51) are inclined to the left from the shaft (51a) in FIG. 7. In other words, the bristles

of the bristle portion (51b) are inclined in a direction opposite the direction of rotation of the air filter (30). When the air filter (30) rotates in the direction opposite the direction of inclination of the bristles of the bristle portion (51b), the dust on the mesh member (37) is efficiently scraped. On the other hand, when the air filter (30) rotates in the same direction as the direction of inclination of the bristles of the bristle portion (51b), the dust on the mesh member (37) is not scraped, but the dust trapped on the bristle portion (51b) is removed. The bristles of the bristle portion (52b) of the cleaning brush (52) are inclined downward from the body (52a) in FIG. 7. Specifically, the bristles of the bristle portion (52b) are inclined in the direction opposite the direction of clockwise rotation of the rotating brush (51) in FIG. 7.

[0058] The dust container (60) contains the dust removed from the rotating brush (51) by the cleaning brush (52). As shown in FIG. 7, the dust container (60) is a columnar container bent substantially in the shape of rotated V when viewed from the side (from the right in FIG. 6). An upper portion of the dust container (60) is a removal portion (61) for removing the dust on the air filter (30), and a lower portion of the dust container (60) is a container portion (62) for containing the dust removed from the air filter (30).

[0059] A brush receiving opening (63) is formed in a top plate of the removal portion (61) to extend in the longitudinal direction of the top plate, and the rotating brush (51) and the cleaning brush (52) are arranged in the brush receiving opening (63) as described above. The above-described filter attachment (68) is formed at a side surface of the removal portion (61). An edge (61a) of the top plate rearward of the brush receiving opening (63) (i.e., an edge opposite the cleaning brush (52)) is tapered toward the rotating brush (51), with an end face thereof being curved to correspond to the bristle portion (51b) of the rotating brush (51). This minimizes a gap between an edge (61a) and the rotating brush (51) as much as possible. Therefore, even if the dust on the air filter (30) is not removed by the rotating brush (51), and passes over the rotating brush (51), the dust is immediately guided in the direction of movement of the air filter (30) along the edge (61a). Specifically, the dust that passed over the rotating brush (51) is not disturbed by the top plate of the removal portion (61), but moves smoothly while being adhered to the air filter (30). This modification to the edge (61a) can prevent the dust from remaining in the gap between the rotating brush (51) and the top plate of the removal portion (61). If the dust remains in the gap, the dust gradually grows into a cluster of a certain size, and is finally flipped out of the gap to fall in the room, etc. However, this problem can be prevented in this embodiment. Further, since the gap between the edge (61a) and the rotating brush (51) is reduced, the dust container (60) is more closed (i.e., sealed).

[0060] A lower (bottom) part of the container portion (62) is convex curved. The dust removed from the rotating brush (51) by the cleaning brush (52) falls and accumu-

lates in the curved part of the container portion (62). An end (i.e., an end at which the brush drive section (68) is provided) of the container portion (62) is a mesh portion (66) having a plurality of minute holes. The other end (i.e., an end at which the filter attachment (68) is provided) of the container portion (62) is a transfer opening (67) connected to a transfer duct (81) of a dust transfer section (80) described later.

[0061] As shown in FIG. 8, the dust container (60) includes a dust amount detection section (70) for detecting the amount of dust in the container portion (62). The dust amount detection section (70) includes a sensor box (71). The sensor box (71) is disposed close to the second end (67) of the container portion (62) of the dust container (60) (see, FIG. 6). The sensor box (71) extends laterally across the container portion (62) to cover the bottom of the container portion (62). The sensor box (71) contains an LED (72) and a phototransistor (73). The LED (72) and the phototransistor (73) are arranged to face each other so as to laterally sandwich the container portion (62). On the other hand, a first transparent window (64) and a second transparent window (65) are formed in a wall of the container portion (62) at positions corresponding to the LED (72) and the phototransistor (73), respectively.

[0062] In the dust amount detection section (70), the intensity of light sequentially transmitted from the LED (72) through the first transparent window (64) and the second transparent window (65) is detected by the phototransistor (73). Depending on the detected light intensity, the amount of dust (i.e., the density of the dust) contained in the container portion (62) is detected. Specifically, when the amount of the contained dust is small, transmittance of light from the first transparent window (64) to the second transparent window (65) in the container portion (62) is high, and thus, the detected light intensity is high. On the other hand, if the amount of the contained dust is large, the transmittance of light from the first transparent window (64) to the second transparent window (65) in the container portion (62) is low, and thus, the detected light intensity is low. In this manner, the dust amount detection section (70) can determine whether or not dust is contained in the container portion (62).

[0063] The dust transfer section (80) includes the transfer duct (81), a transfer fan (82), an exhaust port (83), a suction duct (84), and a cleaner insertion port (85), as shown in FIGS. 1 and 2.

[0064] An end, as an inlet end, of the transfer duct (81) is connected to the transfer opening (67) of the container portion (62) of the dust container (60), and the other end, as an outlet end, is connected to the dust collection box (90) described later. The transfer duct (81) is made of a flexible tube.

[0065] The suction side of the transfer fan (82) is connected to a portion of the dust collection box (90) opposite a portion of the dust collection box (90) at which the transfer duct (81) is connected. The air-supply side (i.e., the

blowing side) of the transfer fan (82) is connected to the exhaust port (83) penetrating the casing (10). The transfer fan (82) transfers, by suction operation, dust contained in the dust container (60) to the dust collection box (90) together with air. During the transfer, air (indoor air) is introduced into the dust container (60) from outside through the mesh portion (66). In this manner, in this embodiment, an airflow generated by the transfer fan (82) transfers dust in the dust container (60) to a predetermined place.

[0066] An end, as an inlet end, of the suction duct (84) is connected to an end of the dust collection box (90) to which the transfer duct (81) is connected. The other end, as an outlet end, of the suction duct (84) is connected to the cleaner insertion port (85) formed in the decorative panel (11). The cleaner insertion port (85) is an opening for receiving, for example, a hose of a cleaner for suction. The suction duct (84) is made of a flexible tube. With this configuration, dust transferred to the dust collection box (90) is collected into a cleaner. In this collection, air (indoor air) is introduced into the dust container (60) from outside through the mesh portion (66).

[0067] In this manner, air supply through the mesh portion (66) of the dust container (60) keeps a good pressure balance in the dust container (60) and the dust collection box (90), thereby appropriately transferring and discharging (i.e., collecting to the cleaner) the dust to and from the dust container (60) and the dust collection box (90).

[0068] As described above, the dust collection box (90) contains the dust transferred from the dust container (60) as shown in FIGS. 1 and 2. The dust collection box (90) is in the shape of a rather narrow, rectangular parallelepiped, and is disposed below the partition plate (25) as the dust container (60) is. The dust collection box (90) is disposed along one of the sides of the partition plate (25) so as not to overlap with the air filter (30) when viewed in plan. In this configuration, the flow of air sucked through the suction grille (12) is not disturbed.

[0069] The dust collection box (90) has a volume larger than that of the dust container (60). The portion of the dust collection box (90) connected to the transfer fan (82) is smaller in area than the other portion when viewed in plan. A side plate of the dust collection box (90) close to the air filter (30) is curved to correspond to the outer circumference of the air filter (30). A filter (91) is provided in the portion of the dust collection box (90) connected to the transfer fan (82). Accordingly, dust transferred to the dust collection box (90) does not flow out of an exhaust port (91).

-Working Mechanism-

[0070] A working mechanism of the indoor unit (1) will be described with reference to FIGS. 9-11. The indoor unit (1) is capable of switchably performing normal operation of cooling/heating the room, and filter cleaning operation of cleaning the air filter (30).

<Normal Operation>

[0071] In the normal operation, as shown in FIG. 9(C), the rotating brush (51) is rotated such that the bristle portion (51b) is located close to the cleaning brush (52). Specifically, the rotating brush (51) is rotated to a position at which the bristle portion (51b) of the rotating brush (51) is not in contact with the air filter (30), thereby causing a surface of the rotating brush (51) without bristles (i.e., a circumferential surface of the shaft (51a) on which the bristle portion (51b) is not formed) to face the air filter (30). At this time, the air filter (30) and the transfer fan (82) are stopped.

[0072] In this state, the indoor fan (21) is driven. Then, indoor air sucked into the indoor unit (1) through the inlet (13) passes through the air filter (30), and enters the bell mouth (24). When the air passes through the air filter (30), dust contained in the air is trapped on the mesh member (37) of the air filter (30). The air entered the bell mouth (24) blows from the indoor fan (21). The blown air is cooled or heated as a result of heat exchange with a refrigerant in the indoor heat exchanger (22), and is supplied to the inside of the room through the outlets (14). Thus, the room is cooled or heated.

[0073] As described above, in the normal operation, the bristle portion (51b) of the rotating brush (51) and the air filter (30) are not in contact with each other. This configuration can prevent degradation of the bristle portion (51b) due to constant contact with the air filter (30), thereby improving durability of the rotating brush (51).

<Filter Cleaning Operation>

[0074] In the filter cleaning operation, the compressor is stopped, and the refrigerant does not circulate in the refrigerant circuit. In this filter cleaning operation, "dust removal operation," "brush cleaning operation," "dust transfer operation," and "dust discharge operation" are switchably performed.

[0075] The "dust removal operation" is performed to remove the dust trapped on the air filter (30). The "brush cleaning operation" is performed to remove the dust attached to the rotating brush (51). The "dust transfer operation" is performed to transfer the dust from the dust container (60) to the dust collection box (90). The "dust discharge operation" is performed to discharge the dust in the dust collection box (90) to outside the casing (10), i.e., to cause the dust in the dust collection box (90) to be collected into a cleaner.

[0076] In this embodiment, the "dust removal operation" and the "brush cleaning operation" are alternately performed. First, in the "dust removal operation," the indoor fan (21) is stopped. Then, as shown in FIG. 9(A), the rotating brush (51) is rotated to bring the bristle portion (51b) into contact with the air filter (30). In this state, the air filter (30) rotates in the direction of an arrow indicated in FIG. 9(A) (i.e., the counterclockwise direction). Specifically, as indicated by an arrow (a white arrow) in FIG.

10, the air filter (30) moves in a direction opposite the inclination of the bristles of the bristle portion (51b) of the rotating brush (51). The rotating brush (51) is kept stopped.

[0077] As a result, the dust on the air filter (30) is trapped on the bristle portion (51b) of the rotating brush (51) (see, FIG. 11(A)). Then, when the lever (44a) of the limit switch (44) of the filter drive means (40) is actuated, the filter drive motor (41) stops, thereby stopping the air filter (30). That is, the air filter (30) is stopped after rotating by a predetermined angle. In this way, the dust remaining on part of the air filter (30) that has passed over the bristle portion (51b) of the rotating brush (51) is removed. Since the bristles of the bristle portion (51b) are inclined in the direction opposite the direction of rotation (movement) of the air filter (30), the dust on the air filter (30) is easily scraped by the bristle portion (51b). Accordingly, the efficiency in removing dust by the rotating brush (51) is increased. When the air filter (30) stops, the "dust removal operation" is switched to the "brush cleaning operation."

[0078] In the "brush cleaning operation," the indoor fan (21) and the rotating brush (51) remain stopped, and the air filter (30) rotates in the direction of an arrow indicated in FIG. 9(B) (i.e., the clockwise direction). Specifically, the air filter (30) rotates in the reverse direction of the direction of rotation in the "dust removal operation," i.e., in the same direction as the inclination of the bristles of the bristle portion (51b) of the rotating brush (51). In this embodiment, the air filter (30) rotates to move to a distance corresponding to the width of the bristle portion (51b) of the rotating brush (51). As a result, the dust remaining between the air filter (30) and the bristle portion (51b), i.e., the dust almost separated from the air filter (30), uniformly adheres to the bristle portion (51b). Thus, the dust on the air filter (30) is reliably trapped on the bristle portion (51b). This process can improve the efficiency of dust removal by the rotating brush (51).

[0079] Then, in the "brush cleaning operation," the rotating brush (51) rotates to the left in FIG. 11 (i.e., in the counterclockwise direction), with the indoor fan (21) kept stopped. In this case, the rotating brush (51) rotates with the dust kept trapped on the bristle portion (51b). In addition, the rotating brush (51) rotates with the bristle portions (51b, 52b) of the rotating brush (51) and the cleaning brush (52) kept in contact with each other (see, FIG. 11(B)). The rotating brush (51) stops after it rotates by a predetermined rotation angle.

[0080] Then, the rotating brush (51) rotates in the reverse direction (i.e., to the right in FIG. 11 (i.e., clockwise direction)). As a result, the dust trapped on the bristle portion (51b) of the rotating brush (51) is removed by the bristle portion (52b) of the cleaning brush (52) (see, FIG. 11(C)). Since the bristles of the bristle portion (52b) of the cleaning brush (52) are inclined downward, i.e., in a direction opposite the direction of rotation of the rotating brush (51), the dust is scraped from the bristle portion (51b) of the rotating brush (51). The bristle portions (51b,

52b) in contact with each other push the body (52a) of the cleaning brush (52) rearward, but the spring (52c) biases the body (52a) toward the rotating brush (51). Therefore, the bristle portions (51b, 52b) do not separate from each other, thereby appropriately pressing the cleaning brush (52) to the rotating brush (51). This process ensures removal of the dust from the bristle portion (51b) of the rotating brush (51). In this way, the dust is trapped on the bristle portion (52b) of the cleaning brush (52). The rotating brush (51) rotates to return to the original state (i.e., the state of FIG. 11(A)), and then stops.

[0081] Then, the rotating brush (51) rotates to the left (i.e., counterclockwise) again by a predetermined rotation angle. As a result, the dust trapped on the bristle portion (52b) of the cleaning brush (52) is scraped by the bristle portion (51b) of the rotating brush (51), and falls in the container portion (62) of the dust container (60) (see, FIG. 11(D)). Since the bristles of the bristle portion (51b) of the rotating brush (51) are inclined toward the rotation direction, the dust is reliably scraped from the bristle portion (52b) of the cleaning brush (52). In this case, as described above, the spring (52c) suitably presses the cleaning brush (52) onto the rotating brush (51), thereby further ensuring removal of the dust from the cleaning brush (52). In this way, the dust trapped on the rotating brush (51) is removed, and is contained in the container portion (62) of the dust container (60). Then, the rotating brush (51) rotates to the right (i.e., clockwise) again to return to the original state (i.e., the state of FIG. 11(A)), and the "brush cleaning operation" is finished.

[0082] Once the "brush cleaning operation" is finished, the "dust removal operation" is performed again. Specifically, the air filter (30) is rotated again, and is stopped when the lever (44a) of the limit switch (44) is actuated again. As a result, the dust on part of the air filter (30) that has passed over the bristle portion (51b) of the rotating brush (51) is trapped on the bristle portion (51b) of the rotating brush (51) (i.e., the state shown in FIG. 11(A)). In this way, the "dust removal operation" and the "brush cleaning operation" are alternately performed. As a result, the dust is removed sequentially from predetermined parts of the air filter (30). When the dust is removed from every part of the air filter (30), the "dust removal operation" and the "brush cleaning operation" are completely finished. For example, when the lever (44a) of the limit switch (44) is actuated a predetermined number of times, the system determines that the air filter (30) has made a single turn. Then, the operations are finished.

[0083] The "dust transfer operation" is performed after the "brush cleaning operation" is performed once or a plurality of times.

[0084] In the "dust transfer operation," the rotating brush (51) stops in the state shown in FIG. 11(A), and the air filter (30) stops. In this state, the transfer fan (82) is driven. Then, air in the dust collection box (90) is discharged from the exhaust port (83). Accordingly, dust in the dust container (60) is transferred (sucked), together with the air, to the dust collection box (90) through the

transfer duct (81). Thereafter, the "dust removal operation" and the "brush cleaning operation" are performed again, and the "dust transfer operation" is performed. These operations are repeated, thereby causing the dust to be gradually accumulated in the dust collection box (90). When the dust collection box (90) becomes filled with dust, no dust is transferred from the dust container (60) to the dust collection box (90) even when the "dust transfer operation" is performed, and thereby, dust is gradually accumulated in the dust container (60). On the other hand, in the dust container (60), the amount of contained dust is detected by the dust amount detection section (70). When a predetermined amount of dust is contained in the container portion (62) of the dust container (60) in spite of the "dust transfer operation," the light intensity detected by the phototransistor (73) of the dust amount detection section (70) decreases to a set value or less. Then, it is determined that the dust collection box (90) is filled with dust.

[0085] In the filter cleaning operation of this embodiment, when it is detected that the dust collection box (90) is filled with dust as described above, the "dust discharge operation" is performed. In the "dust discharge operation," as in the "dust transfer operation" described above, the rotating brush (51) stops in the state shown in FIG. 11(A), and the air filter (30) stops. The transfer fan (82) also stops. In this state, a user inserts a hose of a cleaner into the cleaner insertion port (85). This suction operation causes the dust in the dust collection box (90) to be sucked into the cleaner through the suction duct (84). At this time, the dust in the dust container (60) is also sucked into the cleaner, after passing through the transfer duct (81), the dust collection box (90), and the suction duct (84) in this order. As a result, the dust in the dust collection box (90) and the dust in the dust container (60) are collected to the cleaner. That is, the dust in, for example, the dust collection box (90) is discharged to outside the casing (10).

-Advantages of Embodiment-

[0086] In this embodiment, the dust container (60) is located below the air filter (30), and thus, serves as a resistance (i.e., disturbs) airflow. For this reason, the dust container (60) needs to be formed as small as possible. In this embodiment, the dust collection box (90) having a larger volume than the dust container (60) is provided at a position at which the dust collection box (90) does not disturb airflow, and the transfer fan (82) is used to transfer the dust in the dust container (60) to the dust collection box (90). In this manner, a large amount of dust removed from the air filter (30) can be eventually accumulated in the dust collection box (90) without bothering a user. As a result, the user's labor in discharging the dust can be reduced.

[0087] In addition, since the dust in the air filter (30) is eventually accumulated in the dust collection box (90), the size of the dust container (60) can be reduced. As a

result, the flow resistance of sucked air in the indoor unit (1) can be reduced, thereby increasing operating efficiency.

[0088] Further, in this embodiment, the suction duct (84) and the cleaner insertion port (85) enables dust in the dust collection box (90) to be easily discharged to outside the casing (10). This configuration can further reduce the labor in discharging the dust.

[0089] In this embodiment, the rotating brush (51) is provided in the dust container (60). This configuration ensures that the dust removed by the rotating brush (51) is temporarily accumulated in the dust container (60). In addition, since the air filter (30) is moved relative to the rotating brush (51), dust can be removed from the entire surface of the air filter (30). In this configuration, the volume and location of the dust container (60) are more strictly restricted. However, in this embodiment, since the dust can be easily moved from the dust container (60) to the dust collection box (90), a large amount of dust can be effectively accumulated.

[0090] Moreover, in this embodiment, the bristle portion (51b) of the rotating brush (51) is made of pile fabric. Accordingly, the bristle portion (51b) has short bristles, and thus, the area occupied by the rotating brush (51) can be reduced. Since the bristle portion (51b) has short bristles and the bristle portion (51b) is located only in part of the rotating brush (51) in the circumferential direction, the resistance to airflow can be reduced in the dust container (60). As a result, the transfer efficiency in the dust transfer operation and the discharge efficiency in the dust discharge operation can be increased.

[0091] In this embodiment, in the normal operation in which the air filter (30) is not cleaned, the bristle portion (51b) of the rotating brush (51) and the air filter (30) are not in contact with each other. This configuration can prevent degradation of the bristle portion (51b) due to constant contact with the air filter (30) for a long period, thereby improving durability of the rotating brush (51) and maintaining the dust removal function for a long period.

[0092] In particular, in this embodiment, the bristle portion (51b) is formed in part of the rotating brush (51) in the circumferential direction. Thus, only rotation of the rotating brush (51) easily prevents the rotating brush (51) and the air filter (30) from being in contact with each other. In addition, since the bristle portion (51b) is provided only in part of the rotating brush (51) in the circumferential direction, the cost of materials for the bristle portion (51b) can be reduced, thereby reducing cost of the dust removing section (50).

[0093] In this embodiment, the dust removing section (50) includes the cleaning brush (52). This configuration ensures removal of the dust trapped on the rotating brush (51), and causes the dust to be contained in the dust container (60). Accordingly, for the rotating brush (51), degradation of the dust removal function due to an increase in the amount of trapped dust can be reduced. Thus, the dust removal efficiency of the air filter (30) can be increased.

[0094] Further, in this embodiment, the air filter (30) is rotated by a predetermined angle at each time such that the dust removal operation and the brush cleaning operation are alternately performed. Thus, a high dust removal efficiency can be maintained in the entire air filter (30). This configuration ensures removal of dust from the entire air filter (30).

-Variations of Embodiment-

[0095] Variations of the embodiment will be described hereinafter.

<First Variation>

[0096] In a first variation, the configuration of the dust transfer section (80) of the embodiment is changed, as shown in FIGS. 12 and 13.

[0097] Specifically, in this variation, the transfer fan (82) is connected to an end of the dust container (60). More specifically, an end of the transfer fan (82) toward an air-supply side (i.e., the blowing side) is connected to an end of the dust container (60) opposite to the end of the dust container (60) to which the transfer duct (81) is connected. An end of the dust collection box (90) opposite to the end thereof connected to the transfer duct (81) and the suction duct (84) is connected to the exhaust port (83). The portion of the dust collection box (90) connected to the exhaust port (83) is provided with the filter (91).

[0098] In this variation, air is blown from the transfer fan (82) to the dust container (60) in the "dust transfer operation." Accordingly, dust in the dust container (60) is transferred, together with the air, to the dust collection box (90) through the transfer duct (81). At this time, the air in the dust collection box (90) is discharged to the exhaust port (83) through the filter (91). This operation keeps a good pressure balance in the dust container (60) and the dust collection box (90). In addition, since the dust collection box (90) includes the filter (91), the transferred dust does not flow into the exhaust port (83). In this manner, in this variation, the dust contained in the dust container (60) is transferred to the dust collection box (90) by an air blow from the transfer fan (82). Other configuration, operation, and advantages are the same as in the embodiment.

<Second Variation>

[0099] In a second variation, a wind speed sensor (69) is provided instead of the dust amount detection section (70) in the dust container (60) of the embodiment and the first variation.

[0100] Specifically, in the dust container (60) of the embodiment, as shown in FIG. 14, the wind speed sensor (69) is provided near the inner surface of the mesh portion (66). In the dust container (60) of the first variation, as shown in FIG. 15, the wind speed sensor (69) is provided

near the outlet of the transfer fan (82). That is, in each of the dust collection boxes (60), the wind speed sensor (69) is disposed upstream, in airflow, of the container portion (62) in which dust is contained. The wind speed sensor (69) is a flow rate detection section for detecting an airflow rate (i.e., a wind speed) by suction operation or air blow operation of the transfer fan (82).

[0101] In the this variation, based on a value detected by the wind speed sensor (69), it is determined whether or not the dust collection box (90) is filled with dust and whether or not clogging occurs in the transfer duct (81), for example. Specifically, in the "dust transfer operation," the wind speed in the dust container (60) is detected by the wind speed sensor (69). In this case, if the amount of dust in the dust collection box (90) is not large, the detection value of the wind speed sensor (69) is small. That is, since almost no dust exists in an air path from the dust container (60) to the dust collection box (90), the airflow resistance is low, and thus, the wind speed is high. Thereafter, as the dust in the dust container (60) is transferred, together with the air, to the dust collection box (90), the amount of dust contained in the dust collection box (90) increases. Accordingly, the airflow resistance increases, and the wind speed decreases. When the dust collection box (90) is filled with dust (i.e., the amount of dust in the dust collection box (90) reaches a predetermined value), the value (i.e., the wind speed) detected by the wind speed sensor (69) decreases to a predetermined value or less. In this manner, it is detected that the dust collection box (90) is filled with dust. When it is detected that the dust collection box (90) is filled with dust, the transfer fan (82) is stopped, and the "dust discharge operation" is performed in the same manner as in the embodiment. In this manner, the timing of starting the "dust discharge operation" is appropriately determined.

[0102] In a case where clogging occurs in the transfer duct (81) or the dust container (60), the airflow resistance increases, and the wind speed decreases. Accordingly, it can be estimated that clogging occurs in the transfer duct (81) or other places by detecting that the value (i.e., the wind speed) detected by the wind speed sensor (69) reaches a predetermined value or less. After inspection, clogging is removed, and then, the "dust transfer operation" is started again.

[0103] As described above, the wind speed sensor (69) is provided in the dust container (60), thereby detecting a change in the airflow resistance in the dust container (60) and the transfer duct (81) during the "dust transfer operation." Based on the detected change in airflow resistance, it is determined whether or not the dust collection box (90) is filled with dust. As a result, the timing of starting the "dust discharge operation" can be appropriately determined.

[0104] In addition, based on the value detected by the wind speed sensor (69), it can also be estimated that clogging with dust in the transfer duct (81) or other places occurs. Thus, problems in airflow can be detected in an

early stage. Accordingly, a reliable indoor unit (1) can be provided.

[0105] Further, since the wind speed sensor (69) is provided upstream of the container portion (62) of the dust container (60), an airflow rate in a portion where no dust exists can be detected. With this configuration, sensing by the wind speed sensor (69) is not affected by dust, thereby increasing the accuracy in detecting the wind speed. As a result, the timing of starting the "dust discharge operation," for example, can be more accurately determined. Furthermore, degradation of the wind speed sensor (69) by dust can be reduced. The foregoing configuration can further enhance reliability of the indoor unit (1).

[0106] In this variation, the wind speed sensor (69) may be disposed at a position except for the upstream position in the dust container (60), and may be provided in the transfer duct (81) or the dust collection box (90). In these cases, whether or not the dust collection box (90) is filled with dust can be determined, and clogging with dust can be detected in an early stage in the same manner.

<<Other Embodiments>>

[0107] The foregoing embodiment may be changed in the following manner.

[0108] For example, in the foregoing embodiment, the dust collection box (90) is provided in the casing (10). Alternatively, the dust collection box (90) may be provided in any place outside the casing (10) where dust can be easily disposed. The dust collection box (90) may be omitted, and the transfer duct (81) may be directly provided to reach an attic so that dust is accumulated in the attic.

[0109] In the foregoing embodiment, the air filter (30) is rotated relative to the rotating brush (51) in the dust removal operation of the filter cleaning operation. Alternatively, the dust container (60) (including the rotating brush (51) and the cleaning brush (52)) may be moved relative to the air filter (30). In this case, the dust container (60) revolves about the axis receiver (33) of the air filter (30). In other words, according to the present invention, the air filter (30) and the rotating brush (51) move relative to each other in the dust removal operation.

[0110] In the foregoing embodiment, the air filter (30) is circular. However, the present invention is not limited to this shape, and the air filter (30) may be rectangular. In this case, for example, the air filter (30) moves linearly with respect to the rotating brush (51).

[0111] In the foregoing embodiment, the indoor unit (1) is provided on the ceiling of the room. However, the present invention is not limited to this configuration, and is also applicable to an indoor unit provided on a wall of the room, i.e., an indoor unit of a wall hanging type.

[0112] In the foregoing embodiment, in the indoor unit (1), the indoor heat exchanger (22) is provided at an air blowing side of the indoor fan (21). The present invention

is also applicable to an indoor unit (1) in which an indoor heat exchanger (22) is disposed between an air filter (30) and an indoor fan (21).

[0113] The above-described embodiments are provided as preferred examples in nature, and are not intended to limit the scope, applications, and use of the invention.

INDUSTRIAL APPLICABILITY

[0114] As described above, the present invention is useful for an indoor unit of an air conditioner having a dust removal function for an air filter.

Claims

1. An indoor unit of an air conditioner in which an indoor heat exchanger (22), an indoor fan (21) configured to suck air from inside of a room, an air filter (30) disposed on an inlet side of the indoor fan (21), and a dust removing section (50) configured to remove dust trapped on the air filter (30) are provided in a casing (10), the indoor unit comprising:

a dust container (60) provided in the casing (10), and configured to contain dust removed by the dust removing section (50); and
a transfer fan (82) provided in the casing (10), and configured to transfer dust contained in the dust container (60) to a predetermined place, together with air.

2. The indoor unit of claim 1, further comprising a dust collection box (90) having a volume larger than that of the dust container (60) and connected to the dust container (60) through a transfer duct (81), wherein the transfer fan (82) is connected to the dust collection box (90), and is configured to transfer dust contained in the dust container (60) to the dust collection box (90) by suction operation.

3. The indoor unit of claim 1, further comprising a dust collection box (90) having a volume larger than that of the dust container (60) and connected to the dust container (60) through a transfer duct (81), wherein the transfer fan (82) is connected to the dust collection box (90), and is configured to transfer dust contained in the dust container (60) to the dust collection box (90) by air blowing operation.

4. The indoor unit of claim 2 or 3, further comprising a cleaner insertion port (85) communicating with the dust collection box (90) through a suction duct (84), and configured to suck dust transferred to the dust collection box (90) from outside with a cleaner.

5. The indoor unit of claim 2 or 3, wherein the dust removing section (50) includes a brush member (51)

provided in the dust container (60) and configured to be in contact with the air filter (30), and a drive section (40) configured to move the air filter (30) relative to the brush member (51).

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6. The indoor unit of claim 5, wherein the brush member (51) of the dust removing section (50) includes a bristle portion (51b) made of pile fabric and configured to be in contact with the air filter (30).

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7. The indoor unit of claim 2 or 3, further comprising a flow rate detection section (69) provided in one of the dust container (60), the transfer duct (81), and the dust collection box (90), and configured to detect a flow rate of air.

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8. The indoor unit of claim 7, wherein the flow rate detection section (69) is located upstream of a dust container portion of the dust container (60).

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FIG. 1

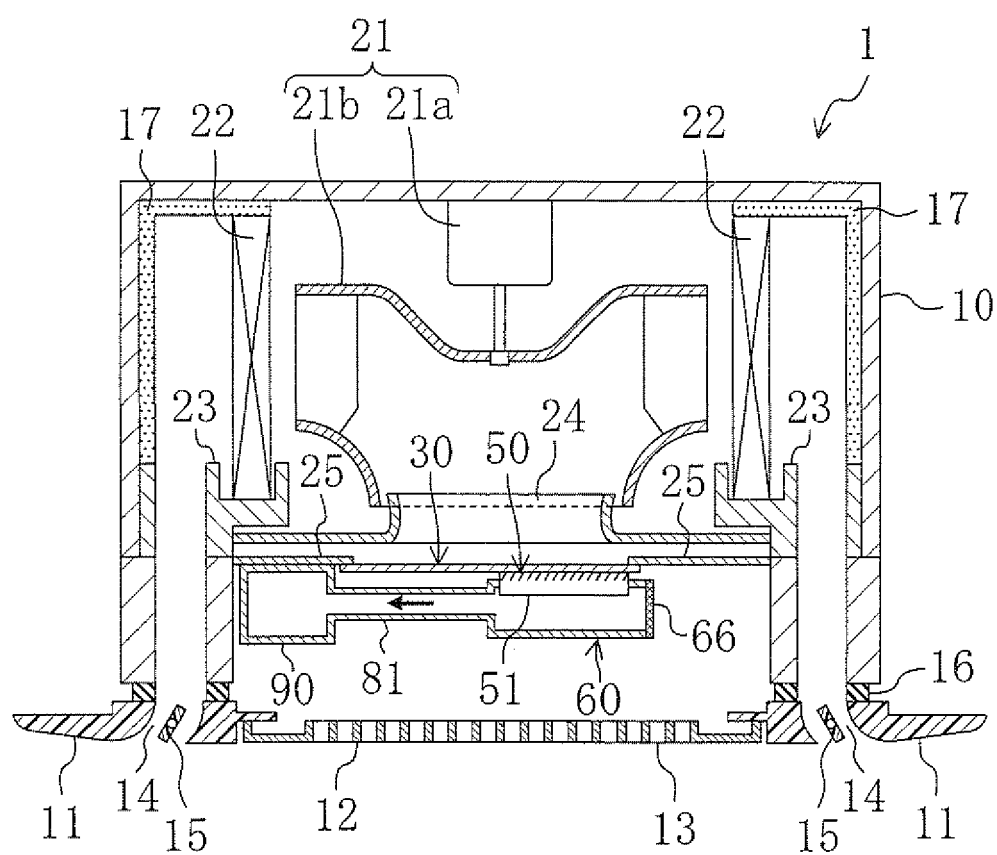


FIG. 2

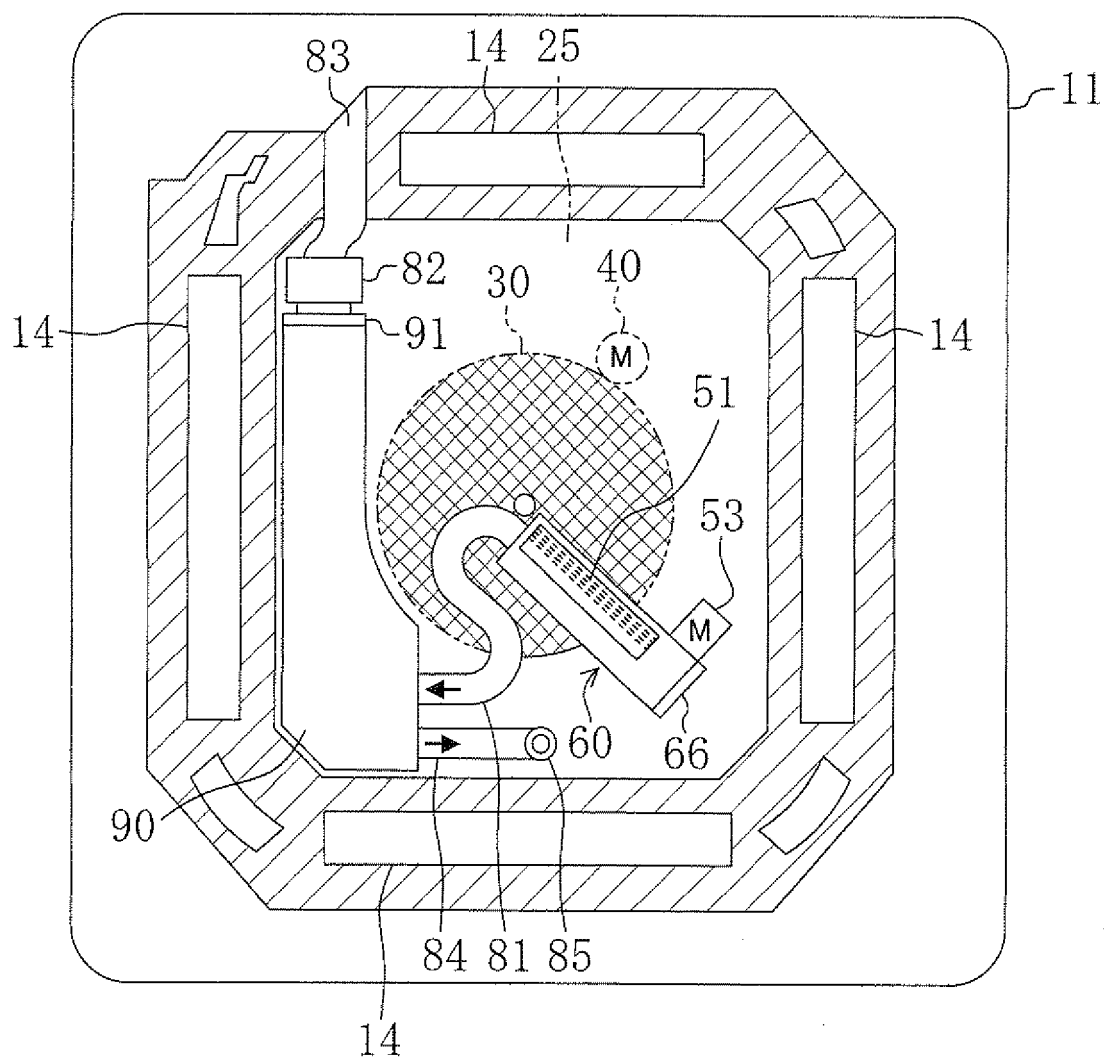


FIG. 3

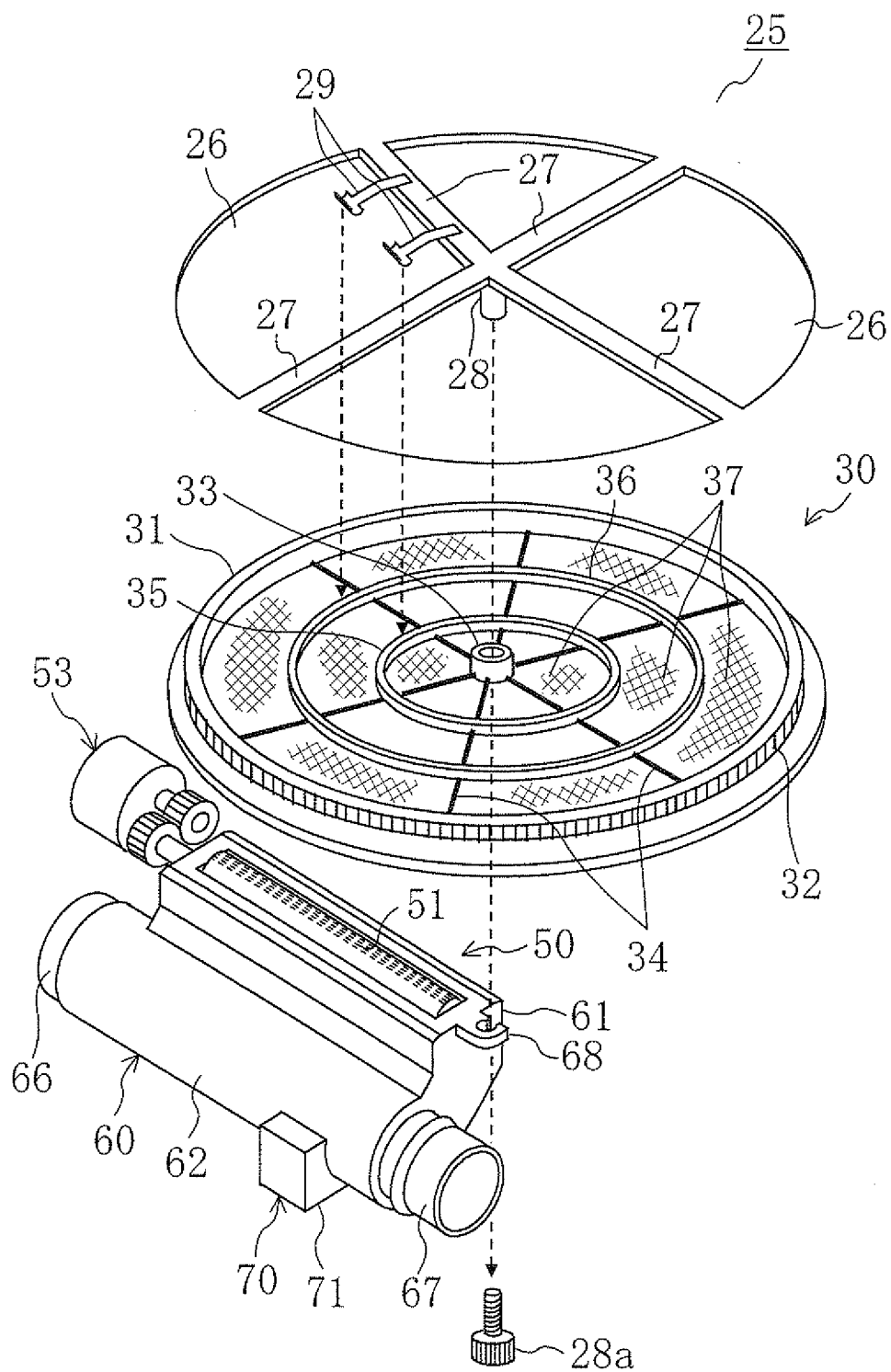


FIG. 4

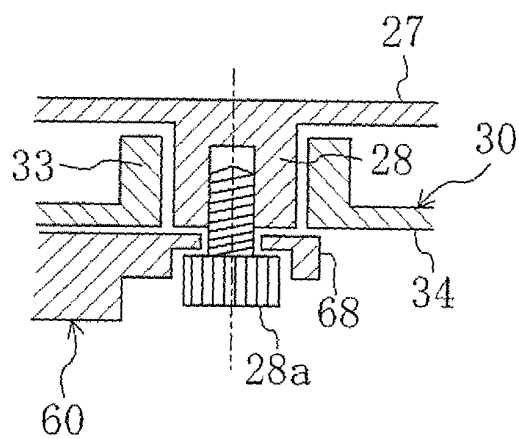


FIG. 5

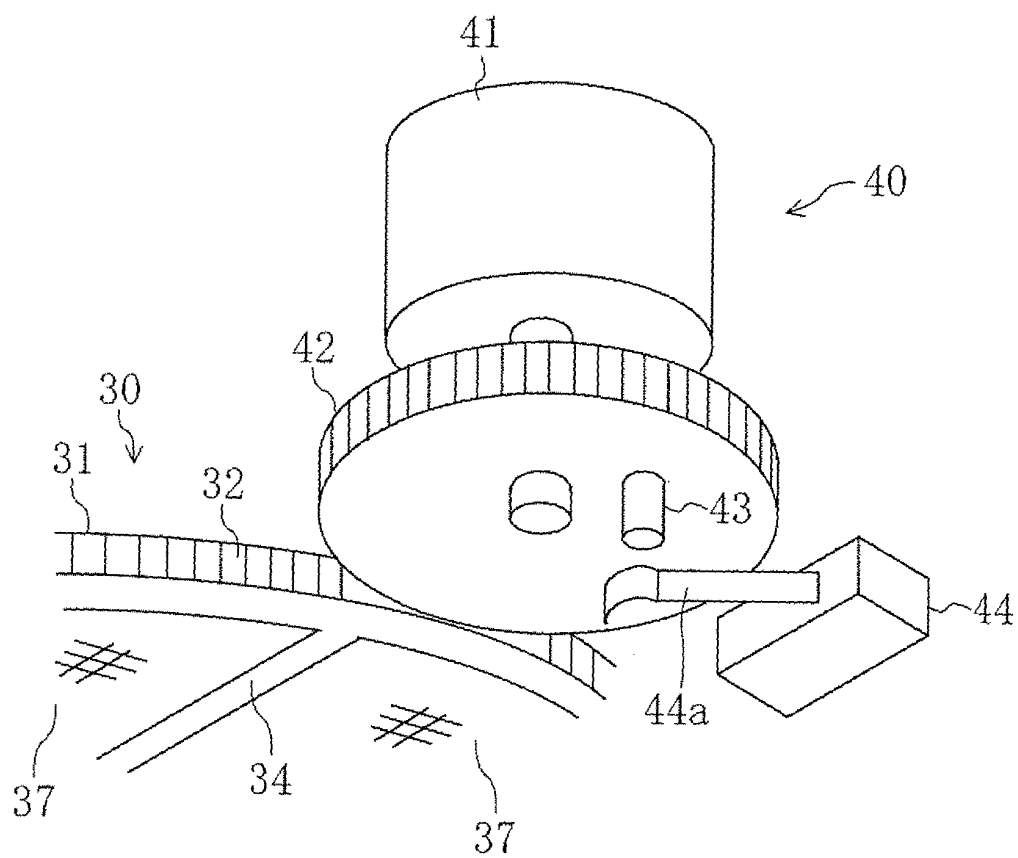


FIG. 6

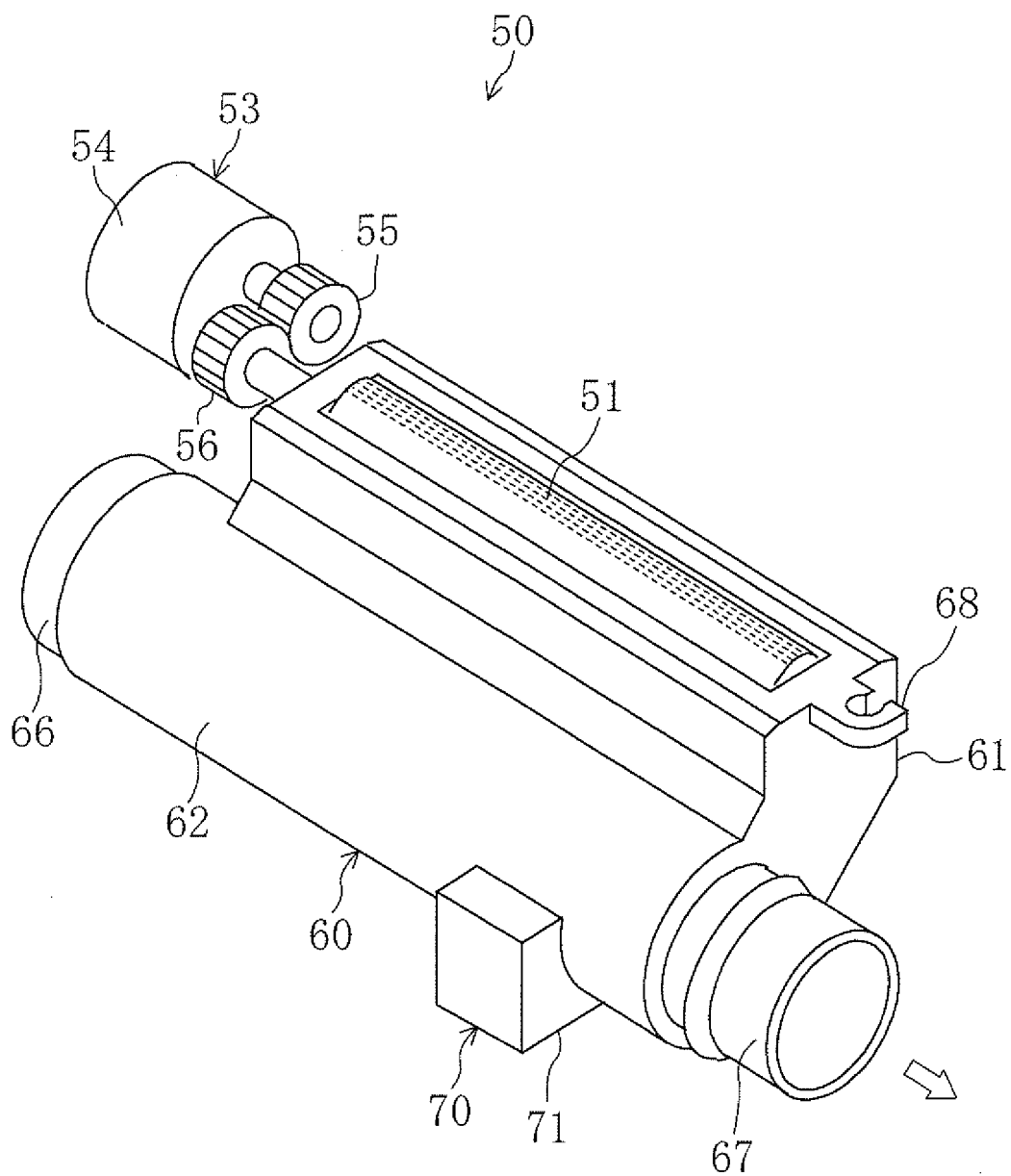


FIG. 7

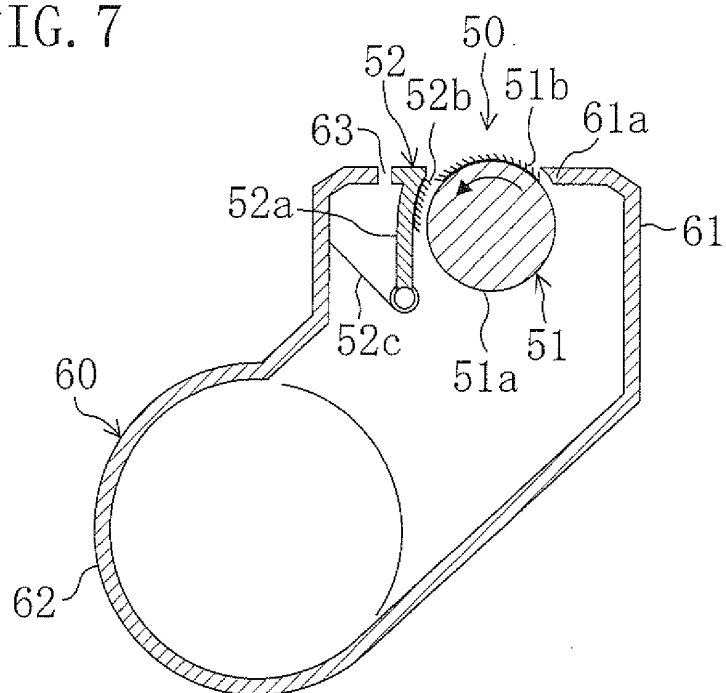


FIG. 8

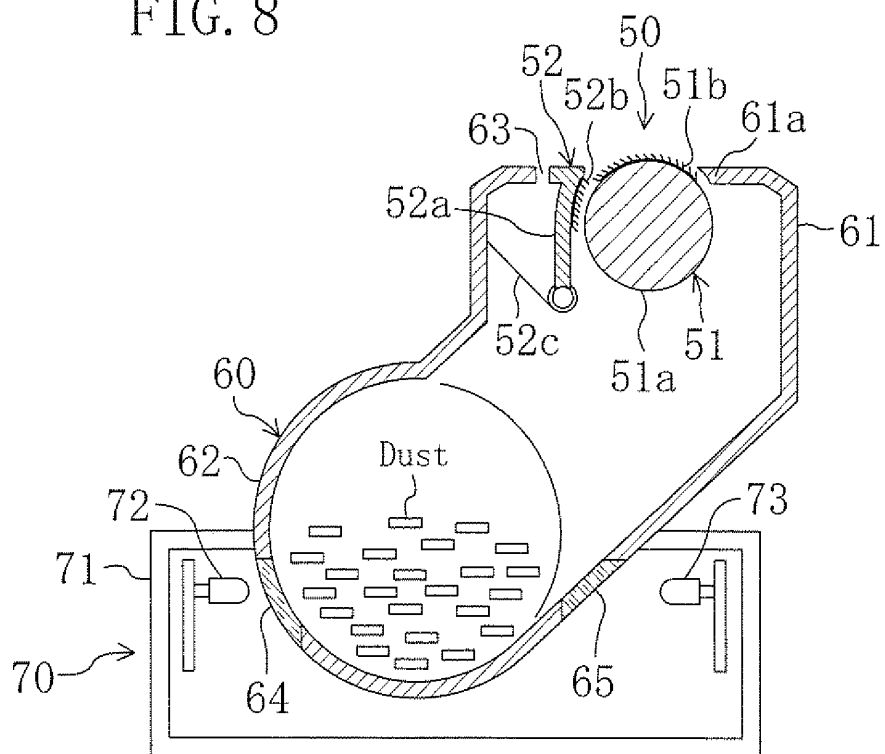


FIG. 9

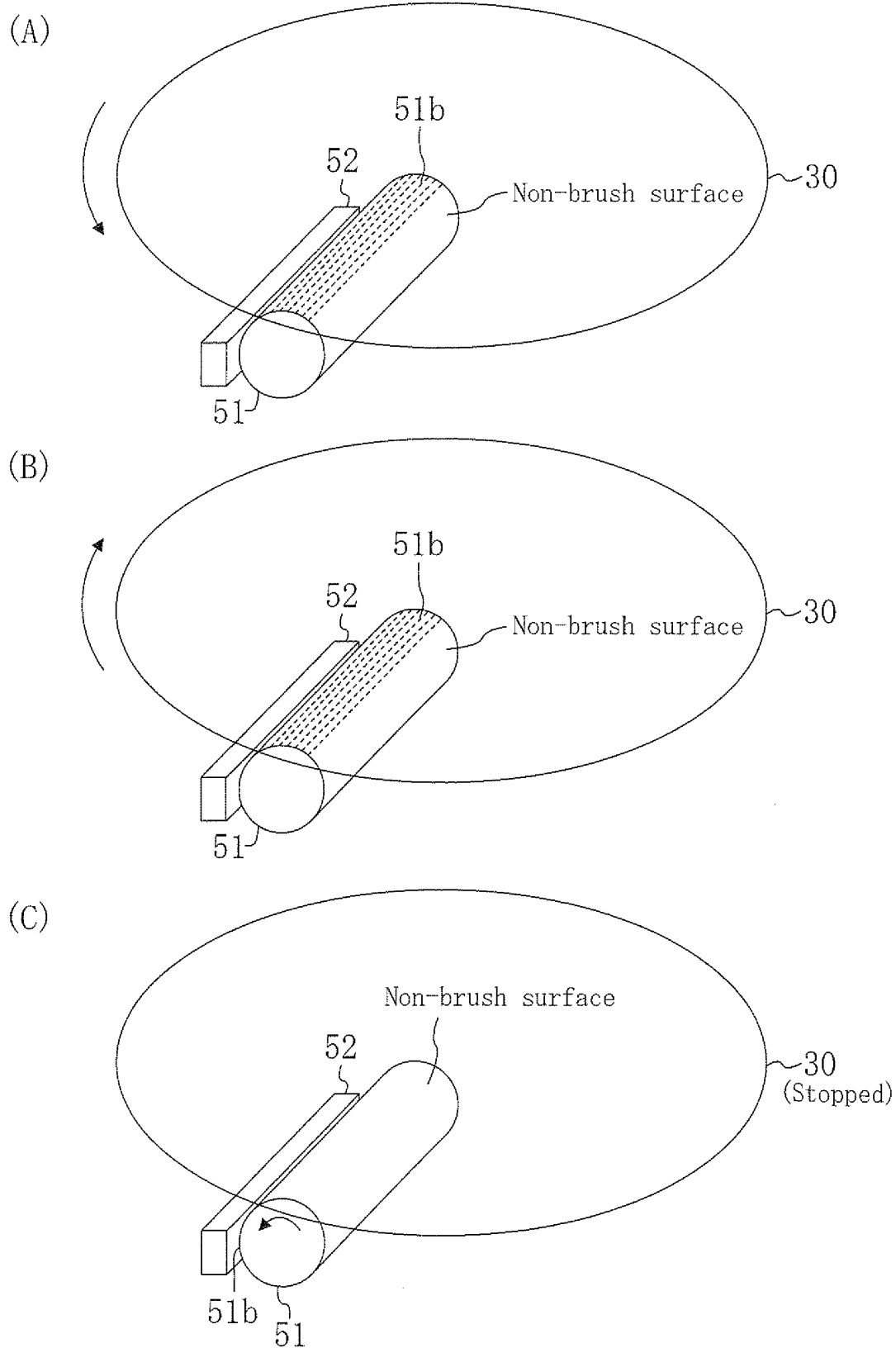


FIG. 10

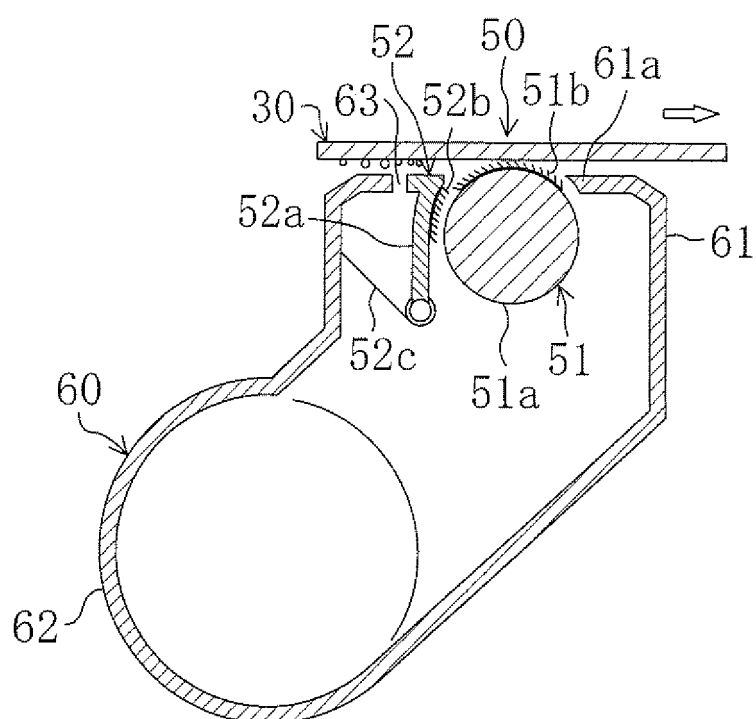


FIG. 11

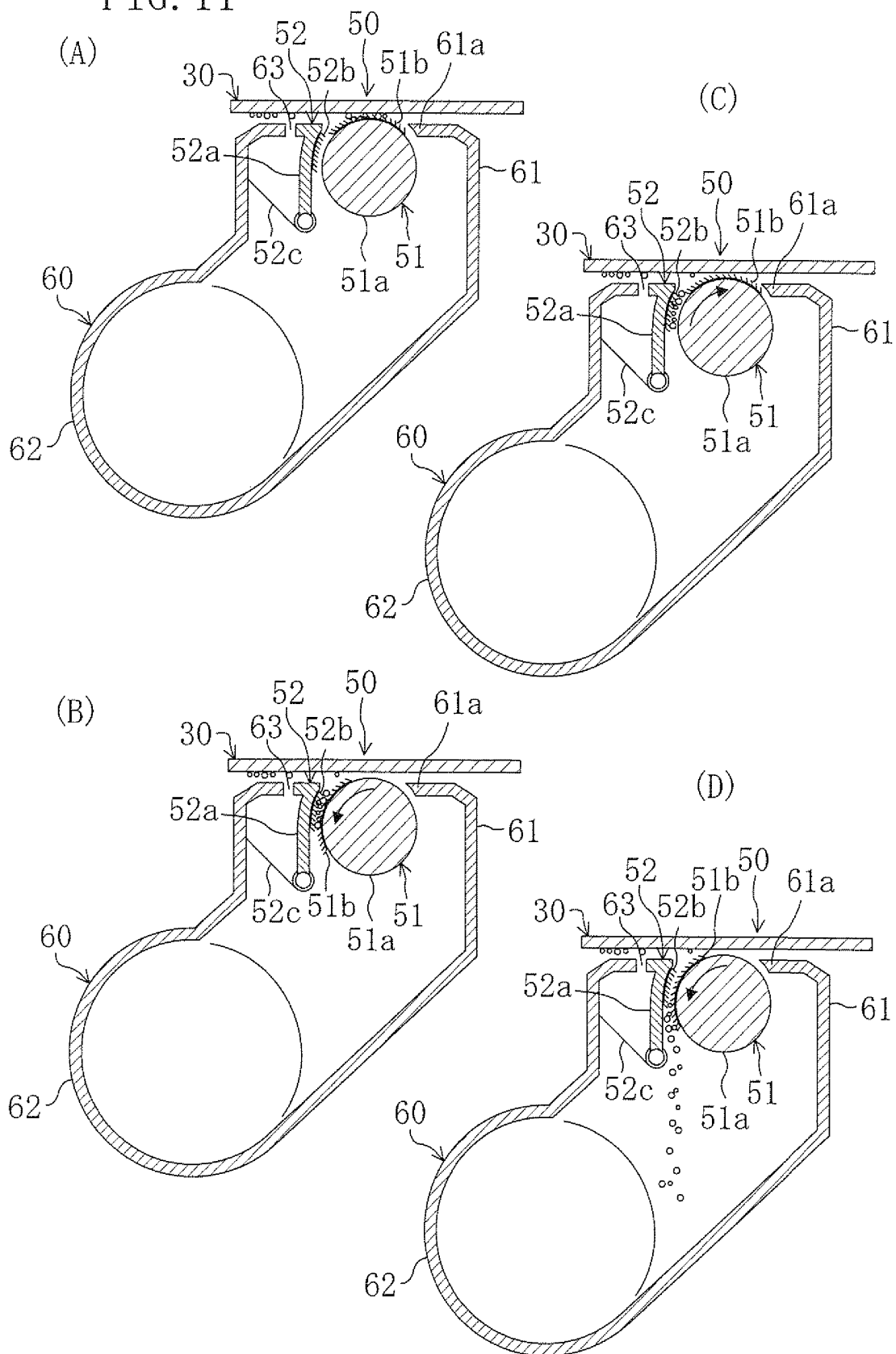


FIG. 12

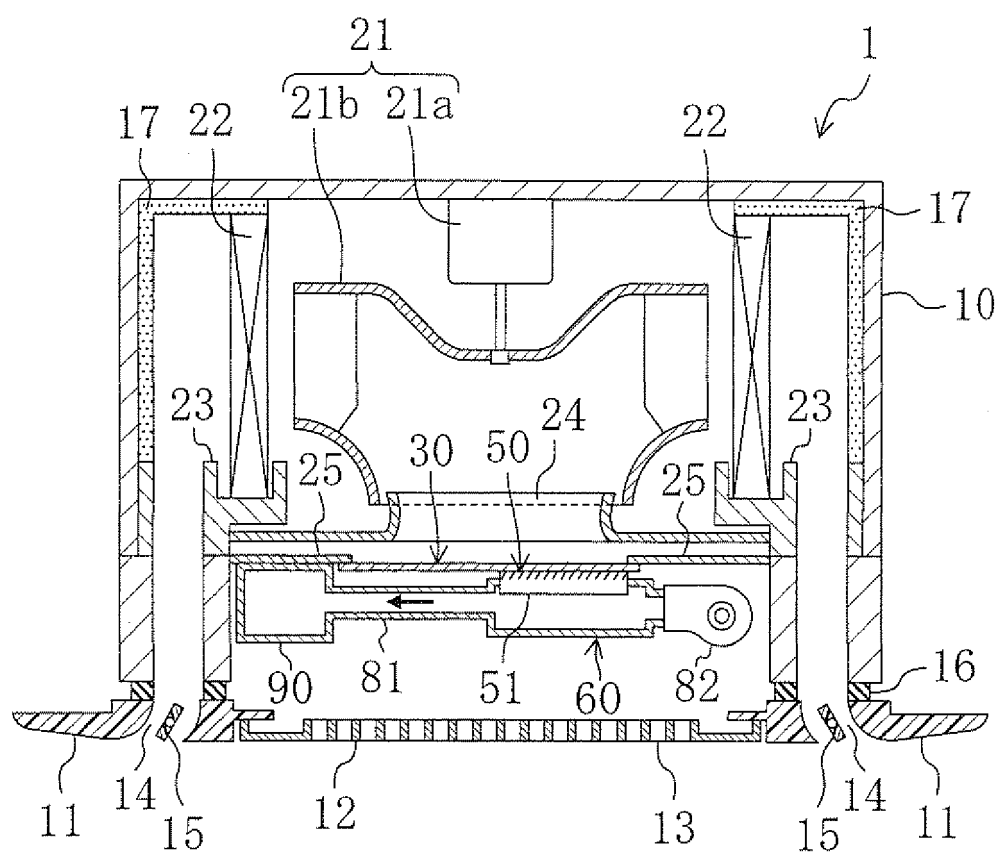


FIG. 13

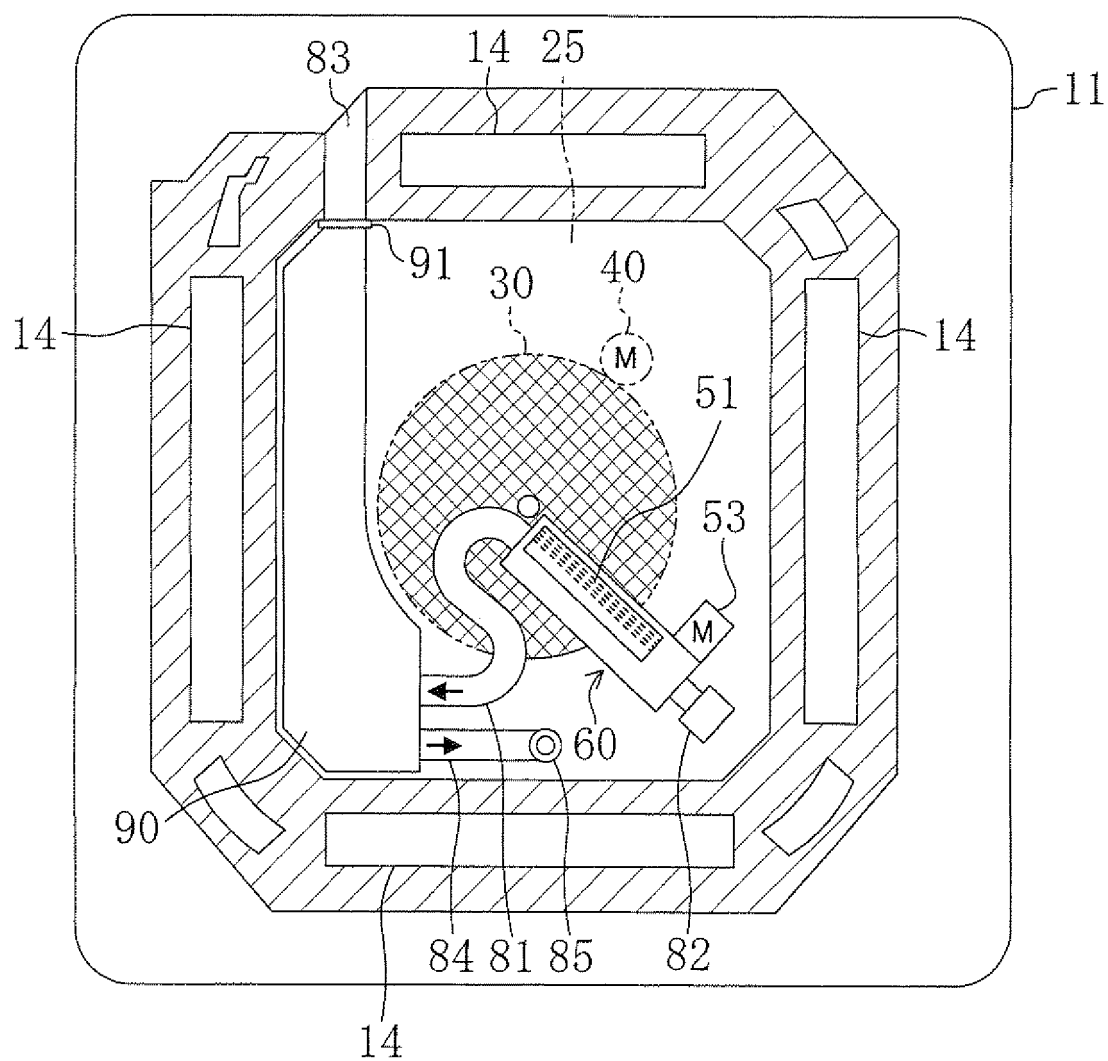


FIG. 14

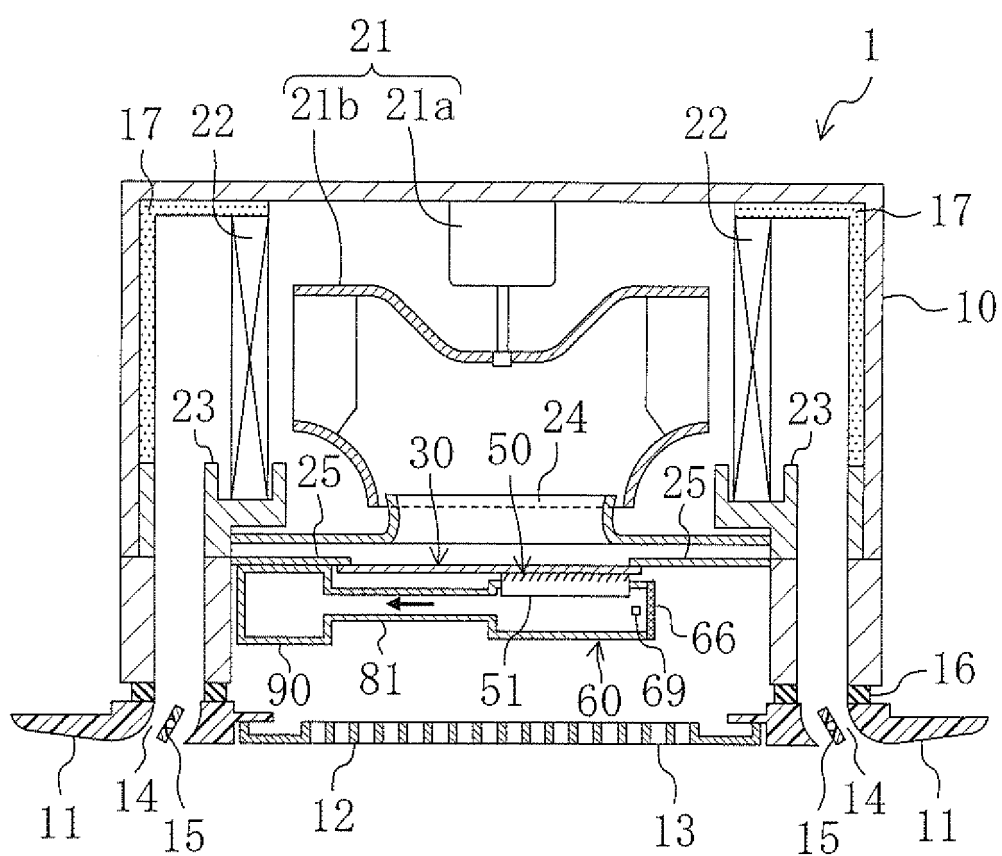
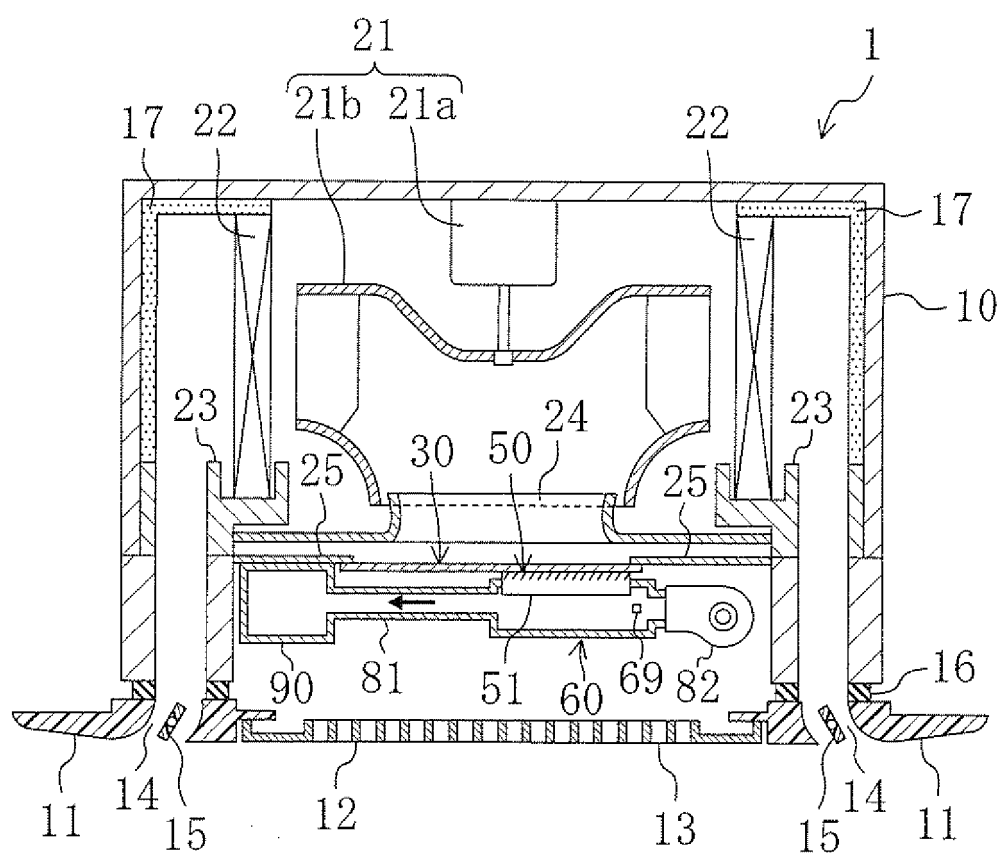


FIG. 15



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2009/000083

A. CLASSIFICATION OF SUBJECT MATTER

F24F13/28 (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)

F24F13/28

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	1996-2009
Kokai Jitsuyo Shinan Koho	1971-2009	Toroku Jitsuyo Shinan Koho	1994-2009

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.
X	JP 2006-214663 A (Matsushita Electric Industrial Co., Ltd.),	1-3
Y	17 August, 2006 (17.08.06), Full text; all drawings (Family: none)	4-8
Y	JP 2002-357398 A (Yugen Kaisha Kato Denko), 13 December, 2002 (13.12.02), Par. No. [0030]; Figs. 3, 4 (Family: none)	4-6
Y	JP 3-186244 A (Matsushita Electric Industrial Co., Ltd.), 14 August, 1991 (14.08.91), Page 2, upper left column, line 12 to upper right column, line 3 (Family: none)	7, 8

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

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"&" document member of the same patent family

Date of the actual completion of the international search
17 March, 2009 (17.03.09)Date of mailing of the international search report
31 March, 2009 (31.03.09)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2007107764 A [0004]