

DESCRIPTION

Title of Invention: AIR PURIFIER

Technical Field

[0001]

The present invention relates to an air purifier including a cleaning device for cleaning a filter.

Background Art

[0002]

PTL 1 discloses an air purifier in the related art. The air purifier has a casing that opens a suction port and an air outlet. An air pathway connecting the suction port and the air outlet is provided in the casing, and a blower is disposed in the air pathway. A pre-filter (filter) is disposed facing the suction port.

[0003]

In the air purifier configured as described above, when an operation is started, the blower is driven and air in a living room is sucked from the suction port. The air sucked from the suction port is delivered from the air outlet after dust is collected by the pre-filter. As a result, the air in the living room can be cleaned.

[0004]

In recent years, there has been an increasing demand for an air purifier provided with a cleaning device for cleaning a pre-filter. PTL 2 discloses a cleaning device

that cleans a filter disposed facing an air inlet of a projector. The cleaning device is provided with a supply roll, a winding roll, a brush body, a supply roll motor, a winding roll motor, a brush body motor, and a dust container.

[0005]

A filter of a sheet shape is wound on the supply roll. In the winding roll, a cap member is fitted to both ends of a shaft, and one end of the shaft is rotatably supported by a support portion. The other end of the shaft is connected to a winding roll motor. As a result, the winding roll rotates by driving of the winding roll motor, and winds up the filter drawn out from the supply roll.

[0006]

The brush body forms brush bristles radially on a shaft, and rotates by driving of a brush body motor during rotation of the winding roll, so that the brush bristles rub the filter to remove the dust. The dust container collects the dust removed from the filter by the brush body. The supply roll is rotationally driven by a supply roll motor, and rewinds the filter wound on the winding roll. As a result, the dust on the filter is removed and the filter is cleaned.

[0007]

The cleaning device of PTL 2 has a detection switch. The detection switch is disposed in the vicinity of the winding roll and detects whether or not the filter wound on

the winding roll has reached a predetermined outer diameter. When it is detected by the detection switch that the filter wound on the winding roll has reached the predetermined outer diameter, the supply roll motor is driven. As a result, the filter wound on the winding roll is rewound to the supply roll.

Citation List

Patent Literature

[0008]

PTL 1: Japanese Unexamined Patent Application

Publication No. 2009-66466 (page 8, page 9, Fig. 1)

PTL 2: Japanese Patent No. 5627066 (page 6, page 7, Fig. 1, Fig. 4)

Summary of Invention

Technical Problem

[0009]

However, according to the cleaning device of PTL 2, since the filter is in the form of a sheet, the outer diameter varies in response to the winding amount of the filter wound on the winding roll. Therefore, there is a problem that the detection switch cannot accurately detect a timing of a winding end of the winding roll and a timing of a rewinding end to a supply roll, and the cleaning of the filter is insufficient.

[0010]

According to the cleaning device of PTL 2, there is a problem that a cap member may be mistakenly inserted and fitted to an end portion of a shaft, and assembly workability is deteriorated.

[0011]

An object of the present invention is to provide an air purifier capable of sufficiently cleaning a filter.

[0012]

Another object of the present invention is to provide the air purifier with improved assembly workability.

Solution to Problem

[0013]

The present invention provides an air purifier including a casing opening a suction port and an air outlet, an air pathway connecting the suction port and the air outlet to each other, a blower disposed in the air pathway, a filter disposed facing the suction port, and a cleaning device cleaning the filter, in which the cleaning device includes a supply roll on which the filter of a sheet shape is wound on a shaft, a winding roll that winds up the filter, a drive motor that rotationally drives the winding roll, an biasing portion that biases the supply roll in a direction opposite to a winding direction by the winding roll, and a rotation amount detection unit that detects a rotation amount of the supply roll, and drive control of the drive

motor is performed based on a detection result of the rotation amount detection unit.

[0014]

According to the present invention, in the air purifier having the above configuration, it is preferable that the air purifier includes a main body portion that opens the air outlet, and a cover portion that opens the suction port, is detachably disposed on the main body portion, and holds the supply roll, in which the rotation amount detection unit includes a light emitting portion and a light receiving portion disposed in the main body portion, and a light transmitting state and a light shielding state between the light emitting portion and the light receiving portion are switched with each other in accordance with a rotation of the supply roll.

[0015]

According to the present invention, in the air purifier having the above configuration, it is preferable that a cam surface formed on a circumferential surface of an end portion of the shaft in an axial direction, and a lever member sliding on the cam surface to displace in a radial direction of the shaft are disposed, the lever member is disposed between the light emitting portion and the light receiving portion to form the light shielding state, and the lever member is withdrawn from a space between the light

emitting portion and the light receiving portion to form the light transmitting state.

[0016]

According to the present invention, in the air purifier having the above configuration, it is preferable that the lever member is formed of a thin member supported so as to be tiltable inside the main body portion, and a slit into which the lever member is inserted is disposed in the main body portion.

[0017]

According to the present invention, in the air purifier having the above configuration, it is preferable that the light emitting portion and the light receiving portion face an end portion of the shaft in an axial direction with a window portion opening to the main body portion interposed in between, and a reflection portion reflecting light emitted from the light emitting portion is disposed on a circumferential surface of the shaft.

[0018]

According to the present invention, in the air purifier having the above configuration, it is preferable that the window portion is covered with a transparent member.

[0019]

According to the present invention, in the air purifier having the above configuration, it is preferable that in a

case where the supply roll does not reach a predetermined rotation amount within a predetermined time after the winding roll is rotationally driven, error notification is performed.

[0020]

The present invention provides an air purifier including a casing opening a suction port and an air outlet, an air pathway connecting the suction port and the air outlet to each other, a blower disposed in the air pathway, a filter disposed facing the suction port, and a cleaning device cleaning the filter, in which the cleaning device includes a supply roll on which the filter of a sheet shape is wound on a first shaft, a winding roll that winds up the filter on a second shaft, a first support member that is fitted to one end of the supply roll and rotatably supports the supply roll, a first rotation drive unit that is connected to another end of the supply roll and rotates the supply roll, a second support member that is fitted to one end of the winding roll and rotatably supports the winding roll, a second rotation drive unit that is connected to another end of the winding roll and rotates the winding roll, and a plurality of cap members that are fitted to both ends of the first shaft and both ends of the second shaft, the cap member includes a fitting portion that is fittable to the first support member and the second support member, and

a connecting portion that is connectable to the first rotation drive unit side and the second rotation drive unit side.

[0021]

According to the present invention, in the air purifier having the above configuration, it is preferable that each of the first support member and the second support member includes a fitting hole having an identical diameter, the fitting portion is formed by an outer circumferential surface of the cap member, the connecting portion is formed by an engaging hole opening on an end surface of the cap member in an axial direction, and a shaft portion extending from a side of the first rotation drive unit and a side of the second rotation drive unit is engaged with the engaging hole.

Advantageous Effects of Invention

[0022]

According to the air purifier of the present invention, the drive motor is driven and controlled based on the detection result of the rotation amount detection unit that detects the rotation amount of the supply roll, and the drive motor is reversed or stopped. As a result, it is possible to accurately detect the timing of the winding end of the winding roll and the timing of the rewinding end to the supply roll.

[0023]

According to the air purifier of the present invention, the cleaning device includes a first rotation drive unit for rotating the supply roll and a second rotation drive unit for rotating the winding roll. The fitting portion of the cap member is formed so as to be fittable to the first support member and the second support member. The connecting portion of the cap member is formed so as to be connectable to the first rotation drive unit side and the second rotation drive unit side. As a result, the cap members disposed at both end portions of the supply roll and the winding roll can be used in common. Therefore, it is possible to reduce the parts cost of the air purifier and to improve assembly workability.

Brief Description of Drawings

[0024]

[Fig. 1] Fig. 1 is a front view illustrating an air purifier according to a first embodiment of the present invention.

[Fig. 2] Fig. 2 is a side cross-sectional view illustrating the air purifier according to the first embodiment of the present invention.

[Fig. 3] Fig. 3 is an exploded perspective view illustrating a cleaning device of the air purifier according to the first embodiment of the present invention.

[Fig. 4] Fig. 4 is a perspective view illustrating a cap member of the air purifier according to the first embodiment of the present invention.

[Fig. 5] Fig. 5 is a side cross-sectional view illustrating the cap member of the air purifier according to the first embodiment of the present invention.

[Fig. 6] Fig. 6 is a side cross-sectional view illustrating the cap member of the air purifier according to the first embodiment of the present invention.

[Fig. 7] Fig. 7 is a plan view illustrating a pre-filter of the air purifier according to the first embodiment of the present invention.

[Fig. 8] Fig. 8 is a perspective view illustrating a winding roll, a dust collecting portion, and an inside of a gear unit of the cleaning device of the air purifier according to the first embodiment of the present invention.

[Fig. 9] Fig. 9 is an enlarged perspective view of the inside of the gear unit of the cleaning device of the air purifier according to the first embodiment of the present invention.

[Fig. 10] Fig. 10 is a side view illustrating a rotation detection unit of the air purifier according to the first embodiment of the present invention.

[Fig. 11] Fig. 11 is a top view illustrating the rotation detection unit of the air purifier according to the

first embodiment of the present invention.

[Fig. 12] Fig. 12 is an exploded perspective view of a biasing portion of the cleaning device of the air purifier according to the first embodiment of the present invention.

[Fig. 13] Fig. 13 is a side view illustrating a rotation detection unit of the air purifier according to a second embodiment of the present invention.

[Fig. 14] Fig. 14 is a top view illustrating the rotation detection unit of the air purifier according to the second embodiment of the present invention.

[Fig. 15] Fig. 15 is a perspective view illustrating a cap member of the air purifier according to a third embodiment of the present invention.

Description of Embodiments

[0025]

<First Embodiment>

Embodiments of the present invention will be described below with reference to the drawings. Figs. 1 and 2 illustrate a front view and a side cross-sectional view of an air purifier according to a first embodiment. A front side of the air purifier 1 is defined as an Y1 direction, and a rear side is defined as an Y2 direction. Arrow S indicates the flow of air. An air purifier 1 has a casing 2 which opens a suction port 3 and air outlets 4 and 5, and is installed on a floor or the like in a living room. The

casing 2 has a main body portion 20 and a cover portion 21. The cover portion 21 is detachably disposed to a rear surface 20a of the main body portion 20, and opens the suction port 3. The main body portion 20 opens the air outlets 4 and 5 to a front upper portion and an upper surface, respectively.

[0026]

Airflow direction plates 14 and 15 for varying the airflow direction are provided at the air outlets 4 and 5, respectively. The airflow direction plate 14 is formed of a flat plate and is supported so as to be rotatable in the vertical direction by a rotation shaft portion (not illustrated) provided on the airflow direction plate 14. On the lower surface of the airflow direction plate 14, a plurality of vertical louvers 14a are vertically disposed side by side in the left-right direction. The vertical louvers 14a at both side end portions are inclined outward in the left-right direction as going forward.

[0027]

The airflow direction plate 15 is formed of a flat plate and is supported so as to be rotatable in the vertical direction by a rotation shaft portion 15b provided at the front portion of the airflow direction plate 15. On the lower surface of the airflow direction plate 15, a plurality of vertical louvers 15a are vertically disposed side by side

in the left-right direction. The vertical louvers 15a at both side end portions are inclined outward in the left-right direction as going rearward.

[0028]

The airflow direction plates 14 and 15 close the air outlets 4 and 5, respectively, when the operation of the air purifier 1 is stopped, and open the air outlets 4 and 5 during operation.

[0029]

In the casing 2, an air pathway 8 connecting the suction port 3 and the air outlets 4 and 5 is provided. In the air pathway 8, a pre-filter 6 (filter), a deodorizing filter 7, a dust collecting filter 9, a humidifying portion 200, a blower 10, an ion generator 11, and a damper 12 are provided in order from the suction port 3 toward the air outlets 4 and 5 (from the upstream to the downstream of the airflow).

[0030]

The air pathway 8 has a first branch pathway 8a and a second branch pathway 8b which branch at the downstream of the ion generator 11. The first branch pathway 8a and the second branch pathway 8b communicate with the air outlets 4 and 5, respectively. A cross-sectional area of the air flow path of the first branch pathway 8a is smaller than a cross-sectional area of the air flow path of the second branch

pathway 8b.

[0031]

The damper 12 is formed of a thin plate shape and is supported so as to be rotatable in the vertical direction by the rotation shaft portion 12a. The damper 12 can rotate in a direction to open (counterclockwise direction in Fig. 2) from the closed position (refer to Fig. 2) of the first branch pathway 8a. The damper 12 varies the air volume balance of the first branch pathway 8a and the second branch pathway 8b.

[0032]

The blower 10 is formed by a centrifugal fan such as a sirocco fan driven by the motor 10a, and sucks in the axial direction and exhausts in the circumferential direction.

[0033]

The pre-filter 6 is formed of a mesh of a sheet shape of polypropylene or the like, and is disposed on the cover portion 21 so as to face the suction port 3. Large dust in the intake air can be collected by the pre-filter 6.

[0034]

The deodorizing filter 7 is formed in a honeycomb shape, and can absorb odorous components in the air to deodorize air.

[0035]

The dust collecting filter 9 is formed of a HEPA filter,

and a frame material (not illustrated) is welded by hot melting so as to cover a filter material (not illustrated). Fine dust in the air and fine particles such as PM 2.5 with a particle diameter smaller than a predetermined particle diameter (for example, 3 μm) can be collected by the dust collecting filter 9.

[0036]

The humidifying portion 200 immerses the lower portion of a humidifying filter 202 in the water in a tray 201, and humidifies the air passing through the humidifying filter 202. As a result, humidified air is delivered from the air outlets 4 and 5.

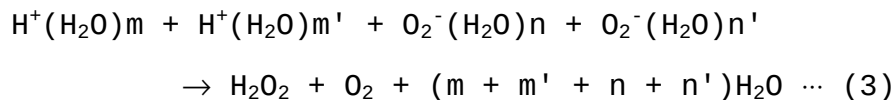
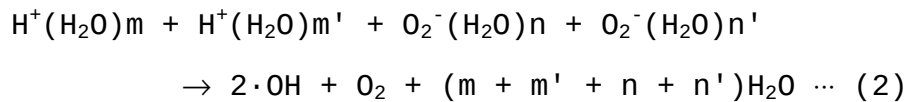
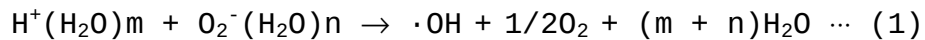
[0037]

The ion generator 11 has an ion generation surface 11a for generating ions by application of a high voltage and the ion generation surface 11a faces into the air pathway 8. A voltage formed of an AC waveform or an impulse waveform is applied to the ion generation surface 11a. In a case where positive voltage is applied to the ion generation surface 11a, positive ions mainly formed of $\text{H}^+(\text{H}_2\text{O})_m$ are generated. In a case of negative voltage, negative ions mainly formed of $\text{O}_2^-(\text{H}_2\text{O})_n$ are generated. Here, m and n are integers. $\text{H}^+(\text{H}_2\text{O})_m$ and $\text{O}_2^-(\text{H}_2\text{O})_n$ aggregate on the surface of airborne bacteria and odorous components in the air and surround these.

[0038]

As illustrated in the formulas (1) to (3), [$\cdot\text{OH}$] (hydroxyl radical) or H_2O_2 (hydrogen peroxide) which is active species is agglutinated on the surface of microorganisms and the like by collision, to destroy floating bacteria and the like. Here, m' and n' are integers. Therefore, positive ions and negative ions are generated and delivered from the air outlets 4 and 5, so that sterilization and odor removal in the living room can be performed.

[0039]



[0040]

An operation unit 19 is provided on the front upper surface of the main body portion 20. The operation unit 19 has a plurality of buttons (not illustrated), and performs operation setting of the air purifier 1 by a user operation. By operating each button, it is possible to change the air volume of the air sent out from the air outlets 4 and 5, change the air blowing direction, or the like.

[0041]

A display unit 17 is provided on the front upper portion of the main body portion 20. The display unit 17 is disposed on the right side of the air outlet 4, and is configured to include, for example, a liquid crystal panel.

[0042]

A cleaning device 30 for cleaning the pre-filter 6 is provided on the cover portion 21. Fig. 3 is an exploded perspective view illustrating the cleaning device 30. The cleaning device 30 includes a supply roll 40, a winding roll 50, a gear unit 60, a biasing portion 70, a brush body 80, a dust collecting portion 90, and a drive motor 100 (refer to Fig. 2).

[0043]

The supply roll 40 and the winding roll 50 are disposed on the upper and lower portions of the cover portion 21, respectively, and hold both ends of the pre-filter 6. The pre-filter 6 is wound around the supply roll 40 when the cleaning device 30 is stopped, and is sent out from the supply roll 40 and wound up by the winding roll 50 when the cleaning device 30 is driven.

[0044]

The supply roll 40 has a shaft 41 (first shaft) extending in the left-right direction, and a cap member 58 is fitted to both end portions of the shaft 41. One end of the supply roll 40 is supported by a support member 49

attached to the upper end portion of the inner surface of the cover portion 21. The other end of the supply roll 40 is connected to the biasing portion 70 (first rotation drive unit) with a cam 112 to be described later interposed therebetween.

[0045]

An attachment or detachment sensor (not illustrated) for detecting attachment or detachment of the support member 49 of the supply roll 40 is provided. The attachment or detachment sensor is configured to include, for example, a Hall element (not illustrated) and a magnet (not illustrated). The magnet is mounted on the supply roll 40. The Hall element is disposed at a position facing the magnet of the supply roll 40 on the rear surface 20a of the main body portion 20.

[0046]

The winding roll 50 has a shaft 51 (second shaft) extending in the left-right direction, and the cap member 58 is fitted to both end portions of the shaft 51. One end of the winding roll 50 is supported by a support member 59 attached to the lower end portion of the inner surface of the cover portion 21. The other end of the supply roll 40 is connected to the drive motor 100 (second rotation drive unit, refer to Fig. 2) with the gear unit 60 interposed therebetween.

[0047]

The cap members 58 disposed at both end portions of the supply roll 40 and both end portions of the winding roll 50 are formed in the same shape as each other. Fig. 4 is a perspective view of a cap member 58, and Figs. 5 and 6 are side cross-sectional views of the cap member 58. The cap member 58 includes a cylindrical body portion 58a (fitting portion), a protrusion portion 58b protruding in the axial direction from the body portion 58a, and an engaging hole 58c (connecting portion) opening to the end surface of the protrusion portion 58b in the axial direction.

[0048]

The shaft 41 of the supply roll 40 and the shaft 51 of the winding roll 50 are formed to have the same diameter as each other. A fitting hole 49a opening to the support member (first support member) 49 and a fitting hole 59a opening to the support member (second support member) 59 are formed to have the same diameter as each other. One end of the body portion 58a is open and is fitted to one end portions of the shaft 41 and the shaft 51. The body portion 58a is fitted into the fitting hole 49a of the support member 49 and the fitting hole 59a of the support member 59 and is rotatably supported.

[0049]

An inner circumferential surface of the engaging hole

58c is formed in a female spline shape. A male spline shaft portion 112d protrudes in the axial direction in the cam 112 connected to the biasing portion 70 (refer to Fig. 3). A male spline shaft portion 63a (refer to Fig. 9) having the same shape as the shaft portion 112d of the cam 112 protrudes in the axial direction in a spur gear 63 (refer to Fig. 9) of the gear unit 60. The shaft portion 112d is engaged with the engaging hole 58c, and the shaft 41 and the biasing portion 70 (refer to Fig. 3) are connected to each other. The shaft portion 63a is engaged with the engaging hole 58c, and the shaft 51 and the drive motor 100 (refer to Fig. 2) are connected to each other.

[0050]

As a result, the cap members 58 disposed at both end portions of the supply roll 40 and the winding roll 50 can be used in common. Therefore, it is possible to reduce the parts cost of the air purifier 1 and to improve the assembly workability.

[0051]

Fig. 7 is a plan view illustrating the pre-filter 6. The pre-filter 6 has bar members 6a extending in the left-right direction at both end portions in the winding direction W and held by the supply roll 40 and the winding roll 50. The pre-filter 6 has a ventilation portion 6b disposed so as to face the suction port 3 when the cleaning

device 30 is stopped, and a storage portion 6c delivered from the supply roll 40 when the cleaning device 30 is driven.

[0052]

On the storage portion 6c, a design 6g which is visible from the suction port 3 is provided distinguished from the ventilation portion 6b. In the present embodiment, a red character is used as the design 6g "under cleaning". The design 6g is not particularly limited, and for example, a stripe pattern or the like having a color different from that of the ventilation portion 6b may be used.

[0053]

In Fig. 3, the brush body 80 is disposed in the dust collecting portion 90 detachably attached to the cover portion 21. The brush body 80 has a shaft 81 which is supported at both end portions in the axial direction in the dust collecting portion 90 and rotates when the cleaning device 30 is driven as described later to remove the dust on the pre-filter 6. A spur gear 68 is provided at one end (right end) of the shaft 81, and a brush bristle bundle 82 is spirally implanted at a predetermined interval on the circumferential surface of the shaft 81.

[0054]

The dust collecting portion 90 has a lid portion 91, a dust container 92, and a comb portion 93, and is detachably

disposed to the cover portion 21. The dust container 92 is formed of a transparent resin, and the upper surface is opened to support the brush body 80 at both side portions. The lid portion 91 opens an opening portion 91a which opens to the left and right ends, and covers the upper surface of the dust container 92. The brush bristle bundle 82 of the brush body 80 is exposed to the outside through the opening portion 91a. The comb portion 93 is formed to extend in the left-right direction, and is disposed in the dust container 92 with the tooth tip directed upward. The brush bristle bundle 82 of the rotating brush body 80 abuts on the tooth tip of the comb portion 93. Dust adhering to the brush bristle bundle 82 by the comb portion 93 is removed from the brush bristle bundle 82.

[0055]

The dust removed from the pre-filter 6 by the brush body 80 and the dust removed from the brush body 80 by the comb portion 93 are stored in the dust container 92. At this time, since the dust container 92 is formed of the transparent resin, the user can easily grasp the amount of dust in the dust container 92.

[0056]

The drive motor 100 (refer to Fig. 2) is disposed in the main body portion 20 of the casing 2, and the rotation shaft (not illustrated) of the drive motor 100 protrudes

rearward from the rear surface 20a of the main body portion 20. A stepping motor is used as the drive motor 100.

[0057]

A pressing member 22 is disposed in front of the pre-filter 6 with a predetermined clearance. The pressing member 22 is detachably attached to the cover portion 21. The pre-filter 6 can be stably disposed along the suction port 3 by the pressing member 22 and slack of the pre-filter 6 due to the suction airflow can be prevented.

[0058]

Fig. 8 is a perspective view illustrating the winding roll 50, the dust collecting portion 90, and the inside of the gear unit 60 of the cleaning device 30. Fig. 9 is an enlarged perspective view of the inside of the gear unit 60. The gear unit 60 has a bevel gear 61, a bevel gear 62, a spur gear 63, a spur gear 64, an internal gear 65, a spur gear 66, and a spur gear 67 in a housing 60a (refer to Fig. 3). The housing 60a is screwed to the cover portion 21 (refer to Fig. 3).

[0059]

The bevel gear 61 is disposed in a front-rear direction in the axial direction, and has a fitting hole 61a fitted in the rotation shaft (not illustrated) of the drive motor 100 (refer to Fig. 2) on the shaft. The bevel gear 62 is disposed in the left-right direction in the axial direction

and meshes with the bevel gear 61. The spur gear 63 is integrally formed concentrically with the bevel gear 62.

[0060]

A shaft portion 63a of the spur gear 63 is engaged with the cap member 58, and the spur gear 63 and the bevel gear 62 are connected to the winding roll 50.

[0061]

The spur gear 64 is disposed below the spur gear 63 and meshes with the spur gear 63. The internal gear 65 is provided integrally with the spur gear 64. The spur gear 66 meshes with the internal gear 65. The spur gear 67 is integrally formed concentrically with the spur gear 66. The spur gear 68 provided at one end of the brush body 80 meshes with the spur gear 67.

[0062]

When the drive motor 100 is driven, the winding roll 50 rotates via the bevel gear 61 and the bevel gear 62. The brush body 80 rotates via the spur gear 64, the internal gear 65, the spur gear 66, the spur gear 67, and the spur gear 68 by the rotation of the spur gear 63 integrated with the bevel gear 62. The spur gear 63 integrated with the bevel gear 62 and the spur gear 64 connected to the brush body 80 mesh with each other, so that the brush body 80 disposed in parallel with the winding roll 50 can be easily rotated.

[0063]

At this time, since the internal gear 65 integrated with the spur gear 64 is provided, the spur gear 68 on the rotation shaft of the brush body 80 can be disposed between the rotation shaft of the spur gear 63 and the rotation shaft of the spur gear 64. As a result, the brush body 80 sliding on the pre-filter 6 on the winding roll 50 can easily be disposed close to the winding roll 50.

[0064]

The bevel gears 61 and 62 may be crossed shaft gears. Each spur gear may be a parallel shaft gear, and a helical gear or the like may be used.

[0065]

The air purifier 1 is provided with a rotation amount detection unit 110 detecting the rotation amount of the supply roll 40. Fig. 10 is a side view of the rotation amount detection unit 110 and Fig. 11 is a top view of the rotation amount detection unit 110. The rotation amount detection unit 110 includes a photo interrupter 111, the cam 112, and a lever member 113.

[0066]

The photo interrupter 111 is disposed in the main body portion 20, and a light emitting portion 111a and a light receiving portion 111b of the photo interrupter 111 are disposed adjacent to each other in the axial direction of

the supply roll 40.

[0067]

The cam 112 is connected to the axial end portion of the shaft 41 with the cap member 58 interposed therebetween and rotates coaxially with the shaft 41. On a circumferential surface of the cam 112, there is formed a cam surface 112a in which a plurality of convex portions 112b recessed in the radial direction are disposed at a predetermined cycle in the circumferential direction.

[0068]

The lever member 113 has a thin plate shape and is supported so as to be tiltable inside the main body portion 20 by a shaft portion 113a at the front end in the front-rear direction (Y1-Y2 direction). The lever member 113 can pivot back and forth in the vertical direction with a pivot shaft 113a as a fulcrum.

[0069]

The lever member 113 extends toward the supply roll 40 via a slit 20b formed in the rear surface 20a of the main body portion 20 and a protrusion piece 113b protruding downward is disposed at the rear end of the lever member 113. The protrusion piece 113b is disposed above the cam surface 112a and abuts on the cam surface 112a by the own weight. The other end of a spring (elastic member) whose one end is fixed to the main body portion 20 may be fixed to the upper

portion of the lever member 113 and the protrusion piece 113b may abut on the cam surface 112a by using the elastic force of the spring.

[0070]

Since the lever member 113 is disposed inside the main body portion 20, the supply roll 40 and the main body portion 20 can be disposed close to each other, and the size of the air purifier 1 can be reduced. Since the lever member 113 is formed of a thin member and the slit 20b through which the lever member 113 is inserted is disposed in the main body portion 20, the width of the slit 20b can be narrowed. As a result, since the fingers of the user are not inserted from the slit 20b, it is possible to prevent contact between the electronic component in the main body portion 20 and the fingers, and to enhance the safety of the air purifier 1. It is possible to prevent dust from entering into the main body portion 20 through the slit 20b and causing the electronic component to fail.

[0071]

When the supply roll 40 rotates, the protrusion piece 113b slides on the uneven cam surface 112a, and the lever member 113 is displaced in the radial direction of the shaft 41 at a predetermined cycle. As a result, in accordance with the rotation of the supply roll 40, a light transmitting state and a light shielding state between the

light emitting portion 111a and the light receiving portion 111b are switched with each other.

[0072]

That is, when the lever member 13 is disposed between the light emitting portion 111a and the light receiving portion 111b, the space between the light emitting portion 111a and the light receiving portion 111b is in the light shielding state. As illustrated by a dashed line in Fig. 10, when the lever member 13 is withdrawn from the space between the light emitting portion 111a and the light receiving portion 111b, the space between the light emitting portion 111a and the light receiving portion 111b is in the light transmitting state.

[0073]

The photo interrupter 111 detects ON or OFF of light received by the light receiving portion 111b. As a result, the rotation amount detection unit 110 can detect the rotation amount of the supply roll 40 based on the number of pulses output from the light receiving portion 111b.

[0074]

The light transmitting state and the light shielding state between the light emitting portion 111a and the light receiving portion 111b are switched with each other by displacement of the lever member 113 sliding on the cam 112 integrated with the supply roll 40. Therefore, the rotating

cam 112 can be formed to have a small diameter so that the lever member 113 can be disposed only in one direction (upward in the present embodiment) in the radial direction with respect to the cam 112. Therefore, the size of the air purifier 1 can be reduced.

[0075]

Fig. 12 is an exploded perspective view of the biasing portion 70 of the cleaning device 30. The biasing portion 70 has a rotating body 71 and a rotating body 72 accommodated in the housings 78 and 79 which are screwed to each other. A clamping portion 71a is protruded from one end surface of the rotating body 71 in the axial direction and a groove portion 71b is disposed on the other end surface. A locking portion 48a disposed on one end surface of a locking member 48 connected to the cam 112 is fitted in the groove portion 71b. As a result, the supply roll 40 is connected to the rotating body 71 with the cap member 58, the cam 112, and the locking member 48 interposed therebetween, and is connected to the biasing portion 70.

[0076]

The rotating body 72 houses a spiral spring 75 inside the rotating body 71 side. One end (inner end) of the spiral spring 75 is clamped by the clamping portion 71a of the rotating body 71, and the other end (outer end) is mounted on the inner circumferential surface of the rotating

body 72. When the rotating body 71 rotates in the clockwise direction with respect to the rotating body 72 as viewed from the right side (viewed from direction of arrow A), biasing force of the spiral spring 75 increases. That is, when the rotating body 72 rotates in the clockwise direction with respect to the rotating body 71 as viewed from the direction of the arrow A, the biasing force of the spiral spring 75 decreases.

[0077]

A plurality of claws 72a are provided at predetermined intervals on the outer circumferential surface on the outer side (right side) of the rotating body 72 in the axial direction. A stopper 77 is pivotally supported in the housing 78, and the stopper 77 is biased by a torsion coil spring 77a in a direction to press the rotating body 72. As a result, the rotating body 72 is restricted from rotating in the clockwise direction, which reduces the biasing force of the spiral spring 75 as viewed from the direction of the arrow A by the engagement between the stopper 77 and the claw 72a.

[0078]

An opening portion 78a is opened in the right side surface of the housing 78, and a cylindrical handle 73 is disposed so as to cover the opening portion 78a. A flange portion 73a having a larger diameter than that of the

opening portion 78a is disposed in the housing 78. The handle 73 and the flange portion 73a are screwed to the outer wall of the housing 78 with a predetermined clearance in the axial direction with the opening portion 78a therebetween. As a result, the handle 73 is rotatably mounted on the housing 78.

[0079]

In the housing 78, a connecting member 74 is disposed on the inner side (left side) in the axial direction of the flange portion 73a. A compression spring 76 is disposed between the rotating body 72 and the connecting member 74, and the connecting member 74 is biased outward in the axial direction (right side). A plurality of cutout portions 74c are formed at predetermined intervals on the circumferential surface of the connecting member 74. A plurality of radially extending ribs 72c to be engaged with the cutout portion 74c are formed at the axially outer end portion of the rotating body 72. As a result, the connecting member 74 rotates integrally with the rotating body 72.

[0080]

The connecting member 74 is formed to have a larger diameter than these of the flange portion 73a and the opening portion 78a. A plurality of inclined portions 74a and a plurality of ribs 74b are provided at predetermined intervals on the axially outer (right side) surface of the

connecting member 74. The inclined portion 74a is gradually formed to be high in a counterclockwise direction when viewed from the direction of the arrow A. The rib 74b radially extends adjacent to a top portion of the inclined portion 74a and is formed higher than the top portion.

[0081]

A plurality of radially extending ribs 73b which engage with the rib 74b are provided on the axially inner surface (left side surface) of the flange portion 73a. On an inner wall surface of the housing 78, a protrusion (not illustrated) to be engaged with the rib 74b is provided.

[0082]

When the handle 73 is rotated in the clockwise direction when viewed from the direction of the arrow A, the rib 74b engages with the rib 73b and engages with the protrusion of the housing 78. As a result, the rotation of the handle 73 is restricted.

[0083]

On the other hand, when the handle 73 is rotated in the counterclockwise direction when viewed from the direction of the arrow A, the rib 73b slides on the inclined portion 74a. Therefore, the connecting member 74 moves inward in the axial direction against the biasing force of the compression spring 76, and the rib 74b separates from the protrusion portion of the housing 78 in the axial direction. As a

result, the handle 73 can be rotated, and the rib 74b is engaged with the rib 73b, so that the rotating body 72 rotates in the direction of increasing the biasing force of the spiral spring 75. That is, the rotating body 72 is rotated by the handle 73.

[0084]

In the air purifier 1 having the above configuration, when the operation is started by operating the operation unit 19, it is determined whether or not the cover portion 21 is mounted on the main body portion 20. When it is determined that the cover portion 21 is mounted on the main body portion 20, the blower 10 and the ion generator 11 are driven. As a result, the air in the living room is sucked from the suction port 3 and flows through an air-blowing pathway 8. At this time, large dust is collected in the air by the pre-filter 6. Air is deodorized by the deodorizing filter 7, and fine dust in the air and fine particles such as PM 2.5 are collected by the dust collecting filter 9.

[0085]

Ions generated by the ion generator 11 are contained in the air. Air containing ions is blown into the living room from one or both of the air outlets 4 and 5. As a result, the air blowing operation of the air purifier 1 is performed, and the air in the living room is cleaned.

[0086]

Next, an operation of the cleaning device 30 will be described. At a predetermined time, the cleaning device 30 is driven and the cleaning operation by the cleaning device 30 is started. The cleaning operation is started, for example, in a case where the cumulative operation time within a predetermined period of time of the air purifier 1 exceeds a predetermined time. When the cleaning device 30 is driven, the blower 10 is stopped.

[0087]

When the cleaning device 30 is driven, the drive motor 100 rotates, and the bevel gear 61 (refer to Figs. 6 and 7) rotates in the counterclockwise direction when viewed from the front. The bevel gear 62 and the spur gear 63 rotate in the clockwise direction as viewed from the right side surface (viewed from direction of arrow A). As a result, the winding roll 50 rotates in the clockwise direction when viewed from the right side surface, and the pre-filter 6 is drawn out from the supply roll 40 and wound up.

[0088]

The spur gear 64, the internal gear 65, the spur gear 66, and the spur gear 67 rotate in the counterclockwise direction as viewed from the right side surface, and the spur gear 68 rotates in the clockwise direction as viewed from the right side surface. As a result, the brush body 80 rotates in the clockwise direction as viewed from the right

side surface. At this time, the brush bristle bundle 82 of the brush body 80 slides on the pre-filter 6 on the winding roll 50. As a result, the dust on the pre-filter 6 is removed, and the dust is collected in the container 92.

[0089]

At this time, the rotation direction of the winding roll 50 and the rotation direction of the brush body 80 are the same direction as each other. Therefore, the brush bristle bundle 82 of the brush body 80 slides on the pre-filter 6 from the direction opposite to a traveling direction of the pre-filter 6. Therefore, the brush body 80 can reliably remove the dust on the pre-filter 6.

[0090]

A circumferential speed of the brush body 80 is preferably greater than a circumferential speed of the winding roll 50. As a result, the contact length in the circumferential direction of the brush bristle bundle 82 on the pre-filter 6 is made longer than the contacting period of the brush bristle bundle 82 and the brush bristle bundle 82 can be brought into contact with the pre-filter 6 without a clearance.

[0091]

The brush bristle bundle 82 on the rotation shaft 81 is combed by the comb portion 93, and the dust attached to the brush bristle bundle 82 falls into the container 92.

[0092]

When the pre-filter 6 is wound on the winding roll 50, the rotating body 71 (refer to Fig. 8) of the biasing portion 70 connected to the supply roll 40 rotates in the clockwise direction (viewed from direction of arrow A) as viewed from the right side. As a result, the spiral spring 75 is wound, and the biasing force of the spiral spring 75 is increased.

[0093]

At this time, the design 6g (refer to Fig. 4) on the storage portion 6c of the pre-filter 6 moves downward and is viewed through the suction port 3. As a result, the user can easily recognize that the cleaning device 30 is being driven. Therefore, it is possible to prevent the user from erroneously recognizing that the blower 10 is stopped due to a failure. The blower 10 may be operated at a low speed when the cleaning device 30 is driven.

[0094]

When the rotation amount of the supply roll 40 reaches a predetermined value by the detection of the rotation amount detection unit 110, the drive motor 100 is reversed. As a result, the bevel gear 61 rotates in a direction opposite to that at the time of winding (clockwise direction in the present embodiment). At this time, the winding roll 50 and the brush body 80 rotate in the counterclockwise

direction when viewed from the right side surface.

[0095]

When the winding of the pre-filter 6 by the winding roll 50 is ended, the biasing force of the spiral spring 75 is larger than that before winding. Therefore, when the drive motor 100 is reversed, the rotating body 71 rotates in the counterclockwise direction as viewed from the right side surface by the restoring force of the spiral spring 75. As a result, the pre-filter 6 is rewound onto the supply roll 40.

[0096]

When the rotation amount of the supply roll 40 reaches a predetermined value due to the detection of the rotation amount detection unit 110, the drive motor 100 is stopped. As described above, the cleaning operation by the cleaning device 30 is ended.

[0097]

The drive motor 100 is driven and controlled based on the detection result of the rotation amount detection unit 110 which detects the rotation amount of the supply roll 40 and the drive motor 100 is reversed or stopped. As a result, it is possible to accurately detect a timing of a winding end of the winding roll 50 and a timing of a rewinding end to the supply roll 40.

[0098]

In a case where the supply roll 40 does not reach the predetermined rotation amount within a predetermined time even if the drive motor 100 is driven, an error notification is displayed by displaying characters or the like indicating an error on the display unit 17.

[0099]

If the supply roll 40 is dropped or the bar member 6a of the pre-filter 6 is released from the shaft 41 and the shaft 51, the supply roll 40 does not rotate even if the winding roll 50 rotates. If a rotation load of the supply roll 40 is increased by the dust accumulated in the pre-filter 6, the pre-filter 6 is not normally rewound to the supply roll 40.

[0100]

In these cases, the control unit (not illustrated) determines that the supply roll 40 is not linked to the winding roll 50 and is not rotating normally, and notifies the error. As a result, the user can easily recognize that the cleaning of the pre-filter 6 by the cleaning device 30 does not ended. At this time, since the rotation amount detection unit 110 detects the rotation amount of the supply roll 40, it is possible to easily detect these errors.

[0101]

After the end of the cleaning operation by the cleaning device 30, the user can remove the dust collecting portion

90 from the cover portion 21 and discard the dust accumulated in the container 92.

[0102]

At the time of replacement of the pre-filter 6, the supply roll 40 attached to one end of the pre-filter 6 is attached to the cover portion 21. The lower end of the pre-filter 6 is attached to the winding roll 50.

[0103]

At this time, slack may occur in the pre-filter 6 between the supply roll 40 and the winding roll 50. In this case, when the user rotates the handle 73 of the biasing portion 70 in the counterclockwise direction as viewed from the right side surface (viewed from direction of arrow A), the rotating bodies 71 and 72 rotate in the counterclockwise direction as viewed from the right side surface. As a result, the pre-filter 6 is wound around the supply roll 40, and the slack of the pre-filter 6 can be eliminated. Therefore, when the blower 10 is driven, the air sucked from the suction port 3 can reliably pass through the pre-filter 6.

[0104]

According to the present embodiment, the drive motor 100 is driven and controlled based on the detection result of the rotation amount detection unit 110 that detects the rotation amount of the supply roll 40, and the drive motor

100 is reversed or stopped. As a result, it is possible to accurately detect the timing of the winding end of the winding roll 50 and the timing of the rewinding end to the supply roll 40.

[0105]

In a case where the supply roll 40 is not linked to the winding roll 50 and is not rotating normally, it is possible to easily detect the error by the rotation amount detection unit 110 that detects the rotation amount of the supply roll 40.

[0106]

The rotation amount detection unit 110 has the light emitting portion 111a and the light receiving portion 111b disposed in the main body portion 20, the light transmitting state and the light shielding state between the light emitting portion 111a and the light receiving portion 111b can be switched with each other in accordance with the rotation of the supply roll 40. As a result, the rotation amount detection unit 110 can be easily realized.

[0107]

The light shielding state and the light transmitting state are formed by the lever member 113 due to the displacement of the lever member 113 sliding on the cam surface 112a formed on the circumferential surface of the cam 112 integrated with the shaft 41. As a result, the

rotating cam 112 is formed to have a small diameter, and the lever member 113 can be disposed only in one direction in the radial direction with respect to the cam 112. Therefore, the size of the air purifier 1 can be reduced.

[0108]

The slit 20b which is formed of a thin member supported so as to be tiltable inside the main body portion 20 and into which the lever member 113 is inserted is disposed in the main body portion 20. As a result, the supply roll 40 and the main body 20 can be disposed close to each other, and the size of the air purifier 1 can be reduced. It is possible to prevent contact between the electronic component in the main body portion 20 and the fingers, and to enhance the safety of the air purifier 1.

[0109]

If the supply roll 40 does not reach the predetermined rotation amount within the predetermined time after the winding roll 50 is rotationally driven, the error notification is performed. As a result, the user can easily recognize that the cleaning of the pre-filter 6 by the cleaning device 30 does not ended.

[0110]

The cleaning device 30 is provided with the biasing portion 70 (first rotation drive unit) for rotating the supply roll 40 and the drive motor 100 (second rotation

drive unit) for rotating the winding roll 50. The body portion 58a (fitting portion) of the cap member 58 is formed so as to be fittable to the support member (first support member) 49 and the support member (second support member) 59. The engaging hole 58c (connecting portion) of the cap member 58 is formed so as to be connectable to the cam 112 on the biasing portion 70 side and the spur gear 63 on the drive motor 100 side. As a result, the cap member 58 disposed at both end portions of the supply roll 40 and the winding roll 50 can be used in common. Therefore, it is possible to reduce the parts cost of the air purifier 1 and to improve the assembly workability.

[0111]

<Second Embodiment>

Next, a second embodiment of the present invention will be described. Figs. 13 and 14 are a side view and a top view of the rotation amount detection unit 110 according to a second embodiment. For convenience of description, the same reference numerals are assigned to the same parts as those of the first embodiment illustrated in Figs. 1 to 12. In the present embodiment, the configuration of a rotation amount detection unit 110 is different from that of the first embodiment. The other parts are the same as those in the first embodiment.

[0112]

The rotation amount detection unit 110 includes the photo interrupter 111 and a reflection portion 114b. On the rear surface 20a of the main body portion 20, a window portion 20c opening to face the supply roll 40 is disposed. The window portion 20c is covered with a transparent member 20d such as acrylic.

[0113]

The reflection portion 114b is formed by a metal foil or the like and is disposed on a circumferential surface 114a of the rotating body 114 provided at the end portion of the shaft 41 in the axial direction. A plurality of reflection portions 114b are provided in the circumferential direction at a predetermined cycle. As a result, the reflection portion 114b and a non-reflection portion 114c other than the reflection portion 114b are alternately disposed in the circumferential direction on the circumferential surface 114a.

[0114]

The photo interrupter 111 is disposed on the main body portion 20, and the light emitting portion 111a and the light receiving portion 111b face the rotating body 114 with the window portion 20c interposed therebetween.

[0115]

When the supply roll 40 rotates and the light emitted from the light emitting portion 111a is irradiated on the

reflection portion 114b, the light is reflected and is incident on the light receiving portion 111b. When the light emitted from the light emitting portion 111a is irradiated on the non-reflection portion 114c, the light is not reflected and is not incident on the light receiving portion 111b.

[0116]

As a result, the rotation amount detection unit 110 can detect the rotation amount of the supply roll 40 based on the number of pulses output from the light receiving portion 111b.

[0117]

According to the present embodiment, the same effect as in the first embodiment can be obtained. The light emitting portion 111a and the light receiving portion 111b face the reflection portion 114b disposed on the circumferential surface of the shaft 41 with the window portion 20c opening to the main body portion 20 interposed therebetween. As a result, the rotation amount detection unit 110 can be easily realized.

[0118]

Since the lever member 113 (refer to Fig. 10) cannot be disposed, the main body portion 20 and the supply roll 40 can be disposed closer to each other. Therefore, the size of the air purifier 1 can be further reduced.

[0119]

Since the window portion 20c is covered by the transparent member 20d, it is possible to prevent contact between the electronic component in the main body portion 20 and the fingers and to enhance the safety of the air purifier 1.

[0120]

<Third Embodiment>

Next, a third embodiment of the present invention will be described. Fig. 15 is a perspective view of a cap member 58 according to a third embodiment. For convenience of description, the same reference numerals are assigned to the same parts as those of the first embodiment illustrated in Figs. 1 to 12. In the present embodiment, the shape of the cap member 58 is different from that of the first embodiment. The other parts are the same as those in the first embodiment.

[0121]

The cap member 58 has a male spline engaging portion (connecting portion) 58d protruding in the axial direction from the body portion 58a. A female spline engaging hole (not illustrated) formed in cam 112 and a female spline engaging hole (not illustrated) formed in spur gear 63 are engaged. As a result, the same effect as in the first embodiment can be obtained.

Industrial Applicability

[0122]

The present invention can be applied to the air purifier provided with the cleaning device for cleaning a filter.

Reference Signs List

[0123]

- 1 air purifier
- 2 casing
- 3 suction port
- 4, 5 air outlet
- 6 pre-filter (filter)
- 6a bar member
- 6b ventilation portion
- 6c storage portion
- 6g design
- 7 deodorizing filter
- 8 air pathway
- 8a first branch pathway
- 8b second branch pathway
- 9 dust collecting filter
- 10 blower
- 11 ion generator
- 12 damper
- 14, 15 airflow direction plate

17 display unit
20 main body portion
20a rear surface
20b slit
20c window portion
20d transparent member
21 cover portion
22 pressing member
23 magnet
30 cleaning device
40 supply roll
41 shaft (first shaft)
49 support member (first support portion)
49a fitting hole
50 winding roll
51 shaft (second shaft)
58 cap member
58a body portion
58b protrusion portion
58c engaging hole (connecting portion)
58d engaging portion (connecting portion)
59 support member (second support portion)
59a fitting hole
60 gear unit
61 bevel gear

- 62 bevel gear
- 63 spur gear (second rotation drive unit)
- 64 spur gear
- 65 internal gear
- 66 spur gear
- 70 biasing portion
- 71 rotating body
- 71a clamping portion
- 72 rotating body
- 72a claw
- 73 handle
- 74 connecting member
- 75 spring
- 76 compression spring
- 77 stopper
- 77a torsion coil spring
- 78, 79 housing
- 80 brush body
- 81 shaft
- 82 brush bristle bundle
- 90 dust collecting portion
- 91 lid portion
- 91a opening portion
- 92 container
- 93 comb portion

- 100 drive motor
- 110 rotation amount detection unit
- 111 photo interrupter
 - 111a light emitting portion
 - 111b light receiving portion
- 112 cam (first rotation drive unit)
 - 112a cam surface
 - 112b convex portion
- 113 lever member
 - 113a pivot shaft
 - 113b protrusion piece
- 114 rotating body
 - 114a circumferential surface
 - 114b reflection portion
 - 114c non-reflection portion
- 200 humidifying portion
- 201 tray
- 202 humidifying filter
- 300 tape shaped member
- 400 rotating plate
- 401 shaft portion

CLAIMS

[Claim 1]

An air purifier comprising:

- a casing opening a suction port and an air outlet;
- an air pathway connecting the suction port and the air outlet to each other;
- a blower disposed in the air pathway;
- a filter disposed facing the suction port; and
- a cleaning device cleaning the filter,

wherein the cleaning device includes

- a supply roll on which the filter of a sheet shape is wound on a shaft,
- a winding roll that winds up the filter, a drive motor that rotationally drives the winding roll,
- an biasing portion that biases the supply roll in a direction opposite to a winding direction by the winding roll; and
- a rotation amount detection unit that detects a rotation amount of the supply roll,

and drive control of the drive motor is performed based on a detection result of the rotation amount detection unit.

[Claim 2]

The air purifier according to Claim 1, comprising:

- a main body portion that opens the air outlet; and
- a cover portion that opens the suction port, is

detachably disposed on the main body portion, and holds the supply roll,

wherein the rotation amount detection unit includes a light emitting portion and a light receiving portion disposed in the main body portion, and a light transmitting state and a light shielding state between the light emitting portion and the light receiving portion are switched with each other in accordance with a rotation of the supply roll.

[Claim 3]

The air purifier according to Claim 2,

wherein a cam surface formed on a circumferential surface of an end portion of the shaft in an axial direction, and a lever member sliding on the cam surface to displace in a radial direction of the shaft are disposed, the lever member is disposed between the light emitting portion and the light receiving portion to form the light shielding state, and the lever member is withdrawn from a space between the light emitting portion and the light receiving portion to form the light transmitting state.

[Claim 4]

The air purifier according to Claim 2 or 3,

wherein the lever member is formed of a thin member supported so as to be tiltable inside the main body portion, and a slit into which the lever member is inserted is disposed in the main body portion.

[Claim 5]

The air purifier according to Claim 2,
wherein the light emitting portion and the light receiving portion face an end portion of the shaft in an axial direction with a window portion opening to the main body portion interposed in between, and a reflection portion reflecting light emitted from the light emitting portion is disposed on a circumferential surface of the shaft.

[Claim 6]

The air purifier according to any one of Claims 1 to 5,
wherein in a case where the supply roll does not reach a predetermined rotation amount within a predetermined time after the winding roll is rotationally driven, error notification is performed.

[Claim 7]

An air purifier comprising:
a casing opening a suction port and an air outlet;
an air pathway connecting the suction port and the air outlet to each other;
a blower disposed in the air pathway;
a filter disposed facing the suction port; and
a cleaning device cleaning the filter,
wherein the cleaning device includes
a supply roll on which the filter of a sheet shape is wound on a first shaft,

a winding roll that winds up the filter on a second shaft,

a first support member that is fitted to one end of the supply roll and rotatably supports the supply roll,

a first rotation drive unit that is connected to another end of the supply roll and rotates the supply roll,

a second support member that is fitted to one end of the winding roll and rotatably supports the winding roll,

a second rotation drive unit that is connected to another end of the winding roll and rotates the winding roll, and

a plurality of cap members that are fitted to both ends of the first shaft and both ends of the second shaft, and

the cap member includes

a fitting portion that is fittable to the first support member and the second support member, and

a connecting portion that is connectable to the first rotation drive unit side and the second rotation drive unit side.

[Claim 8]

The air purifier according to Claim 7,

wherein each of the first support member and the second support member includes a fitting hole having an identical diameter, the fitting portion is formed by an outer

circumferential surface of the cap member, the connecting portion is formed by an engaging hole opening on an end surface of the cap member in an axial direction, and a shaft portion extending from a side of the first rotation drive unit and a side of the second rotation drive unit is engaged with the engaging hole.