

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 collecting box.

[0005]

A filter of a sheet shape is wound on the supply roll. The winding roll rotates by driving of a winding roll motor, and winds up the filter drawn out from the supply roll. The brush body forms brush bristles radially on a shaft body, 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 collecting box 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.

[0006]

The projector of PTL 2 is provided with a sensor for detecting the temperature and pressure inside the casing of the projector. In the cleaning device having the above configuration, in a case where dust accumulates in the filter and the temperature inside the casing exceeds a predetermined temperature or in a case where the pressure in

the casing is lower than a predetermined value, the winding roll motor rotates and the filter is cleaned. In a case where an integration time of the operation time of the projector exceeds the predetermined time, a configuration in which the winding roll motor rotates to clean the filter is also described.

Citation List

Patent Literature

[0007]

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, page 9, Fig. 1, Fig. 4)

Summary of Invention

Technical Problem

[0008]

However, according to the cleaning device of PTL 2, the cleaning device is driven based on a detection result of the sensor and the integration time of the operation time of the projector. Therefore, if the cleaning device of PTL 2 is provided in an air purifier, there is a problem that air in a living room cannot be cleaned sufficiently when the cleaning device is driven in a case where the air in the living room is contaminated.

[0009]

An object of the present invention is to provide an air purifier capable of improving the cleaning effect.

Solution to Problem

[0010]

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 to face the suction port, a cleaning device cleaning the filter, and a contamination sensor detecting contamination degree in an air, in which an automatic cleaning mode in which the cleaning device is driven at a first cleaning time for each predetermined first cycle is provided, and driving of the cleaning device is prohibited when a stop condition that a contamination degree in the air is greater than a predetermined value within a predetermined period immediately before the first cleaning time is satisfied.

[0011]

According to the present invention, in the air purifier having the above configuration, it is preferable that the air purifier includes an illuminance sensor that detects an illuminance in a living room, and the stop condition includes a case where the illuminance in the living room is lower than a predetermined illuminance within a

predetermined period immediately before the first cleaning time.

[0012]

According to the present invention, in the air purifier having the above configuration, it is preferable that the stop condition includes a case where a predetermined operation is performed within a predetermined period immediately before the first cleaning time.

[0013]

According to the present invention, in the air purifier having the above configuration, it is preferable that the cleaning device is forcibly driven irrespective of the stop condition when a predetermined time longer than the first cycle is elapsed from previous driving of the cleaning device during continuation of the automatic cleaning mode.

[0014]

According to the present invention, in the air purifier having the above configuration, it is preferable that a forced cleaning mode that forcibly drives the cleaning device at a second cleaning time for each second cycle longer than the first cycle is provided so that the forced cleaning mode and the automatic cleaning mode is alternatively selected.

[0015]

According to the present invention, in the air purifier

having the above configuration, it is preferable that the cleaning device is stopped when an instruction of stopping is performed while the cleaning device is forcibly driven, and the cleaning device is driven after a lapse of a predetermined time shorter than the first cycle.

[0016]

According to the present invention, in the air purifier having the above configuration, it is preferable that the contamination sensor includes one or both of a dust sensor that detects a concentration of dust in the air and an odor sensor that detects a concentration of odorous components in the air.

[0017]

According to the present invention, in the air purifier having the above configuration, it is preferable to stop the blower when the cleaning device is driven.

Advantageous Effects of Invention

[0018]

According to the present embodiment, the automatic cleaning mode in which the cleaning device for cleaning the filter is driven at the first cleaning time for each predetermined first cycle is provided, and driving of the cleaning device is prohibited when the stop condition that the contamination degree in the air is greater than the predetermined value within a predetermined period

immediately before the first cleaning time is satisfied. As a result, in a case where the air in the living room is contaminated, it is possible to drive the blower and give priority to air cleaning over cleaning of the filter. Therefore, the cleaning effect of the air purifier can be improved.

Brief Description of Drawings

[0019]

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

[Fig. 5] Fig. 5 is a side cross-sectional view of a supply roll of the cleaning device of the air purifier according to the first embodiment of the present invention.

[Fig. 6] Fig. 6 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. 7] Fig. 7 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. 8] Fig. 8 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. 9] Fig. 9 is a plan view illustrating an operation unit of the air purifier according to the first embodiment of the present invention.

[Fig. 10] Fig. 10 is a flowchart illustrating a determination operation for determining a cleaning time of the cleaning device of the air purifier according to the first embodiment of the present invention.

[Fig. 11] Fig. 11 is a side view of a support member of a cover portion of an air purifier according to a second embodiment of the present invention before a supply roll is mounted.

[Fig. 12] Fig. 12 is a side view of the support member of the cover portion of the air purifier according to the second embodiment of the present invention after the supply roll is mounted.

[Fig. 13] Fig. 13 is a side view of a support member of

a cover portion of an air purifier according to a third embodiment of the present invention before a supply roll is mounted.

[Fig. 14] Fig. 14 is a side view of the support member of the cover portion of the air purifier according to the third embodiment of the present invention after the supply roll is mounted.

[Fig. 15] Fig. 15 is a plan view of a pre-filter of an air purifier according to a fourth embodiment of the present invention.

[Fig. 16] Fig. 16 is a perspective view of a pressing member of an air purifier according to a fifth embodiment of the present invention.

Description of Embodiments

[0020]

<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. 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 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.

[0021]

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.

[0022]

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.

[0023]

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.

[0024]

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).

[0025]

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.

[0026]

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.

[0027]

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.

[0028]

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.

[0029]

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

[0030]

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.

[0031]

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.

[0032]

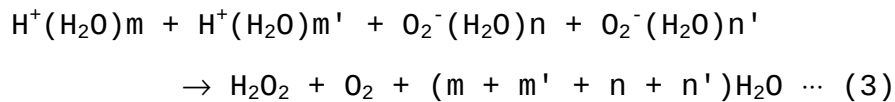
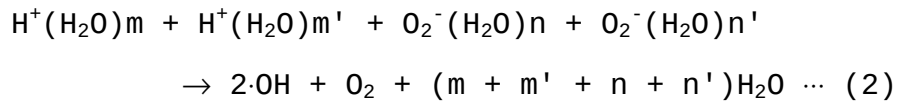
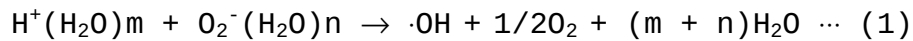
The ion generator 11 has an ion generation surface 11a for generating ions by application of a high voltage and the ion generation surface 11a faces into the air pathway 8. A voltage formed of an AC waveform or an impulse waveform is applied to the ion generation surface 11a. In a case where positive 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.

[0033]

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.

[0034]



[0035]

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).

[0036]

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.

[0037]

The supply roll 40 has a shaft 41 extending in the left-right direction, and caps 48 are fitted to both end portions of the shaft 41. The caps 48 are rotatably supported by support members 49 disposed at the upper end portion of the inner surface of the cover portion 21. As a result, the supply roll 40 is disposed so as to be rotatable with a rotation shaft extending in the left-right direction. One end (right end) of the supply roll 40 is connected to the biasing portion 70 via the cap 48.

[0038]

The winding roll 50 has a shaft 51 extending in the left-right direction, and caps 58 are fitted to both end portions of the shaft 51. The left and right caps 58 are rotatably supported by support members 59 and gear units 60 disposed at the lower end portion of the inner surface of the cover portion 21, respectively. As a result, the winding roll 50 is disposed so as to be rotatable with a rotation shaft extending in the left-right direction.

[0039]

Fig. 4 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.

[0040]

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.

[0041]

Fig. 5 is a side cross-sectional view of the supply roll 40. Since the configuration of the winding roll 50 is the same as that of the supply roll 40, the supply roll 40 will be described as a representative. The shaft 41 forming a shaft portion of the supply roll 40 has a core member 41a and a sleeve 41d.

[0042]

The core member 41a is formed of an extruded metal such as aluminum having a C-shaped cross section and has a groove portion 41b extending in the axial direction on the circumferential surface. An inner wall surface 41c facing the groove portion 41b is inclined and the circumferential width of the groove portion 41b is wider on the outer circumferential side than that on the inner circumferential side. The inner wall surface 41c of the groove portion 41b supports the circumferential surface of the bar member 6a of the pre-filter 6.

[0043]

The sleeve 41d is formed of a resin molded product having a C-shaped cross section and having an opening portion 41e extending in the axial direction, and is fitted over the core member 41a. The pre-filter 6 supporting the bar member 6a on the groove 41b is inserted into the opening portion 41e. The width of the opening portion 41e of the sleeve 41d is smaller than the diameter of the bar member 6a, and the bar member 6a supported by the core member 41a is locked. At this time, both end portions of the sleeve 41d in the circumferential direction press the bar member 6a by elasticity, and the bar member 6a is elastically held by the groove portion 41b of the core member 41a and the sleeve 41d.

[0044]

When a force is applied in a direction to widen the

opening portion 41e of the sleeve 41d (left-right direction in Fig. 5), the sleeve 41d is elastically deformed. The bar member 6a of the pre-filter 6 can be attached to or detached from the shaft 41 via the widened opening portion 41e. Similarly, the bar member 6a at the lower end portion of the pre-filter 6 can be attached to or detached from the shaft 51. As a result, it is possible to easily remove the pre-filter 6 from the cleaning device 30 to replace the pre-filter 6 or the like.

[0045]

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.

[0046]

The dust collecting portion 90 has a lid portion 91, a container 92, and a comb portion 93, and is detachably disposed to the cover portion 21. The 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 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 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.

[0047]

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 container 92. At this time, since the container 92 is formed of the transparent resin, the user can easily grasp the amount of dust in the container 92.

[0048]

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 of the main body portion 20.

[0049]

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 pressing member 22 has a rectangular frame 22a formed of a synthetic resin such as ABS. In the frame 22a, a rib 22b extending in the vertical direction and a plurality (three in this embodiment) of ribs 22c extending in the left-right direction and disposed in parallel in the vertical direction are provided. As a result, the pressing member 22 has windows of a plurality of stages and a plurality of rows. 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.

[0050]

The magnet 23 is provided at the central portion of the right end portion of the frame 22a of the pressing member 22. A Hall element (not illustrated) is provided at a position facing the magnet 23 of the main body portion 20. The air purifier 1 can determine whether or not the cover portion 21 is mounted on the main body portion 20 by a Hall element. The air purifier 1 prohibits the operation of the blower 10 in a case where it is determined that the cover portion 21 is not mounted on the main body portion 20. As a result, the air blowing operation of the air purifier 1 in a state where the cover portion 21 is not mounted on the main body

portion 20 is avoided.

[0051]

The gear unit 60 and the biasing portion 70 are disposed at one end portion (right end portion) of the cover portion 21. Therefore, a space SP is formed on the inner surface of the cover portion 21 between the gear unit 60 and the biasing portion 70. In the space SP, a tape-shaped member 300 describing information on the instruction of handling the air purifier 1 is affixed. The information includes information on a method of removing the pre-filter 6 from the cleaning device 30 and information on a method of operating a handle 73 of the biasing portion 70 described later.

[0052]

As a result, when the user removes the cover portion 21 from the main body portion 20, the user visually recognizes the above information, and can easily recognize the method of removing the pre-filter 6 from the cleaning device 30 and the method of operating the handle 73 of the biasing portion 70. Therefore, the convenience of the air purifier 1 can be improved.

[0053]

Fig. 6 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. 7 is an

enlarged perspective view of the inside of the gear unit 60. The gear unit 60 has a bevel gear 61 (first cross shaft gear), a bevel gear 62 (second cross shaft gear), a spur gear 63 (first parallel shaft gear), a spur gear 64 (second parallel shaft gear), 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).

[0054]

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.

[0055]

A shaft portion 63a of the spur gear 63 has a fitting hole (not illustrated) into which a protrusion portion 58a (refer to Fig. 3) of the cap 58 is fitted. As a result, the spur gear 63 and the bevel gear 62 are connected to the winding roll 50.

[0056]

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.

[0057]

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.

[0058]

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 (shaft portion 63a) 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.

[0059]

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

[0060]

Fig. 8 is an exploded perspective view of the biasing portion 70 of the cleaning device 30. The biasing portion 70 has a rotating body 71 (first rotating body) and a rotating body 72 (second rotating body) housed in housings 78 and 79 screwed with each other. A clamping portion 71a protrudes from one end surface in the axial direction of the rotating body 71 and a groove portion 71b is provided on the other end surface. A locking portion 48a provided on the cap 48 is fitted into the groove portion 71b. As a result, the rotating body 71 locks the shaft portion of the supply roll 40, and the supply roll 40 is connected to the biasing portion 70.

[0061]

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.

[0062]

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.

[0063]

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 via the opening portion 78a. As a result, the handle 73 is rotatably mounted on the housing 78. [0064]

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.

[0065]

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.

[0066]

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.

[0067]

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.

[0068]

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.

[0069]

An operation unit 19 is provided on the front upper surface of the main body portion 20. Fig. 9 is a plan view of the operation unit 19. The operation unit 19 has a plurality of buttons 19a to 19d, and performs operation setting of the air purifier 1 by a user operation. By the operation of the button 19a, the start of driving and the stop of driving of the cleaning device 30 are instructed. By the operation of the button 19b, change of the air volume of the air sent out from the air outlets 4 and 5 is instructed. By the operation of the button 19c, a blowing direction of the air sent out from the air outlets 4 and 5 is changed. By the operation of the button 19d, the start of operation and the stop of operation of the air purifier 1 are instructed.

[0070]

When the user operates the buttons 19a to 19d in a predetermined order while the operation of the air purifier 1 is stopped, the air purifier 1 can alternatively select an automatic cleaning mode and a forced cleaning mode. In the automatic cleaning mode, the cleaning device 30 is driven at a first cleaning time for each predetermined first cycle (48 hours in the present embodiment). In the forced cleaning mode, the cleaning device 30 is forcibly driven at a second

cleaning time for each second cycle (720 hours in the present embodiment) longer than the first cycle.

[0071]

A dust sensor (not illustrated) and an odor sensor (not illustrated) are provided in the main body portion 20. The dust sensor is disposed on a rear upper surface of the main body portion 20 and detects the concentration of dust in the air. The odor sensor detects the concentration of odorous components in the air. An illuminance sensor 18 (refer to Fig. 9) for detecting the illuminance inside the living room is provided on the upper surface of the main body portion 20.

[0072]

Table 1 indicates the overall rank based on the dust rank and the odor rank (contamination degree D in the air). The dust rank is ranked into 4 ranks from 0 to 3 depending on the concentration of dust in the air detected by the dust sensor. The odor rank is ranked into 4 ranks from 0 to 3 depending on the concentration of odorous components in the air detected by the odor sensor. The total rank is derived from the sum of the dust rank and the odor rank and is ranked in 7 ranks from 0 to 6. The higher the dust rank, the odor rank and the overall rank, the more the air in the living room is contaminated.

[0073]

[Table 1]

		Odor rank			
		0	1	2	3
Dust rank	0	0	1	2	3
	1	1	2	3	4
	2	2	3	4	5
	3	3	4	5	6

[0074]

The air purifier 1 is provided with two timers for measuring the operation time. As described later, the cleaning device 30 is driven based on an integration time T1 by one timer and an integration time T2 by another timer.

[0075]

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 the air 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.

[0076]

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.

[0077]

Fig. 10 is a flowchart illustrating a determination operation for determining a cleaning time of the cleaning device 30 of the air purifier 1. The determination operation is performed in parallel with the blowing operation of the air purifier 1. In Step #11, it is determined whether or not the automatic cleaning mode is set by a predetermined operation of the operation unit 19. In a case where the automatic cleaning mode is set, the process proceeds to Step #12. In a case where the automatic cleaning mode is not set (a case of forced cleaning mode), the process proceeds to Step #21.

[0078]

In Step #12, it is determined whether or not the integration time T2 of the operation time of the air purifier 1 in the automatic cleaning mode is reached 720 hours or more. In the present embodiment, the operation time of the air purifier 1 indicates the drive time of the blower 10. The time for turning on the power of the air

purifier 1 may be used as the operation time of the air purifier 1. In a case where the integration time T_2 is 720 hours or longer, the process proceeds to Step #22. In a case where the integration time T_2 is not 720 hours or longer, the process proceeds to Step #13. In Step #13, the process stands by until the integration time T_1 is 48 hours (first cycle) or longer.

[0079]

In Step #14, the process stands by until the total rank (contamination degree D in the air) is lower than a predetermined value D_t (for example, rank "2") within a predetermined period (determination period, for example, 10 minutes) immediately before the first cleaning time for each 48 hours. In Step #15, it is determined whether or not the illuminance L in the living room is higher than a predetermined upper limit illuminance L_t within a predetermined period (determination period, for example, 10 minutes) immediately before the first cleaning time. The upper limit illuminance L_t can be set to the illuminance in the living room in a case where the interior illumination device (not illustrated) is turned off at night, for example. In a case where the illuminance L in the living room is higher than the upper limit illuminance L_t , the process proceeds to Step #16. In a case where the illuminance L is not higher than the upper limit illuminance L_t , the process

returns to Step #14, and Steps #14 and #15 are repeated.

[0080]

In Step #16, it is determined whether or not a predetermined operation (for example, operation of buttons 19b and 19c) of the operation unit 19 is performed within a predetermined period (determination period, for example, 5 minutes) immediately before the first cleaning time. In a case where the predetermined operation of the operation unit 19 is not performed, the process proceeds to Step #17. In a case where the predetermined operation is performed, the process returns to Step #14, and Steps #14 to #16 are repeated.

[0081]

That is, in Steps #14 to #16, the driving of the cleaning device 30 is prohibited when the stop condition is satisfied. The stop condition is that the contamination degree D in the air is greater than the predetermined value D_t within a predetermined period immediately before the first cleaning time for each 48 hour. The stop condition includes a case where the illuminance L in the living room is lower than the upper limit illuminance L_t and a case where a predetermined operation of the operation unit 19 is performed within a predetermined period immediately before the first cleaning time. The length of each determination period may be the same as or different from each other.

[0082]

In Step #17, the cleaning device 30 is driven to perform the cleaning operation. In Step #18, the integration time T1 is reset, the process returns to Step #11, and Steps #11 to #18 are repeated.

[0083]

In Step #21, the operation stands by until the integration time T2 of the operation time of the air purifier 1 in the forced cleaning mode reaches 720 hours or more. In Step #22, the cleaning device 30 is forcibly driven irrespective of the stop condition, and the cleaning operation is performed. In Step #23, it is determined whether or not cleaning of the pre-filter 6 by the cleaning device 30 is normally ended. In a case where the cleaning of the pre-filter 6 by the cleaning device 30 is normally ended, the process proceeds to Step #25. In a case where the cleaning is not normally ended (for example, in a case where cleaning operation is canceled halfway due to operation of operation unit 19), the process proceeds to Step #24.

[0084]

In Step #24, the process stands by until a predetermined time (for example, 4 hours) shorter than the first cycle (48 hours) is elapsed. After the lapse of a predetermined time, the process proceeds to Step #22, and

the cleaning device 30 is driven.

[0085]

In Step #25, the integration times T1 and T2 are reset. After Step #25, the process returns to Step #11, and Steps #11 to #18 and Steps #21 to #25 are repeated.

[0086]

Next, the operation of the cleaning device 30 will be described. In Steps #17 and #22 of Fig. 10, the cleaning device 30 is driven and the cleaning operation by the cleaning device 30 is started. 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]

At this time, the movement speed of the pre-filter 6 is preferably approximately 4 mm/sec. As a result, the torque of the drive motor 100 can be suppressed, and the dust on the pre-filter 6 can be reliably removed by the brush body

80.

[0095]

When the rotation amount of the drive motor 100 reaches a predetermined value, 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.

[0096]

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 wound around the supply roll 40.

[0097]

When the rotation amount of the drive motor 100 reaches a predetermined value, the drive motor 100 is stopped. As described above, the cleaning operation by the cleaning device 30 is ended.

[0098]

A sensor for detecting the outer diameter of the

winding roll 50 may be disposed. As a result, the drive motor 100 can be reversed by detecting that the outer diameter of the winding roll 50 with the pre-filter 6 wound up is greater than the predetermined outer diameter. The drive motor 100 can be stopped by detecting that the outer diameter of the winding roll 50 is smaller than the predetermined outer diameter.

[0099]

After 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 collected in the container 92.

[0100]

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

[0101]

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.

[0102]

According to the present embodiment, the automatic cleaning mode in which the cleaning device 30 is driven at the first cleaning time for each predetermined first cycle is provided, and driving of the cleaning device 30 is prohibited when the stop condition that the total rank (contamination degree D in the air) is greater than the predetermined value Dt within a predetermined period immediately before the first cleaning time is satisfied. As a result, in a case where the air in the living room is contaminated, it is possible to drive the blower 10 and give priority to air cleaning over cleaning of the pre-filter 6. Therefore, the cleaning effect of the air purifier 1 can be improved.

[0103]

Only the dust sensor may be disposed in the air purifier 1 and the dirt rank may be set as the contamination degree D in the air. Only the odor sensor may be provided in the air purifier 1 and the odor rank may be set as the contamination degree D in the air.

[0104]

The stop condition includes a case where the illuminance L in the living room is lower than the predetermined upper limit illuminance L_t within a predetermined period immediately before the first cleaning time. As a result, in the automatic cleaning mode, in a case where the user is sleeping at night, driving of the cleaning device 30 is prohibited. Therefore, the comfort of the air purifier 1 can be improved without disturbing the user's sleep.

[0105]

The stop condition includes a case where a predetermined operation is performed within a predetermined period immediately before the first cleaning time. As a result, in the automatic cleaning mode, driving of the cleaning device 30 is prohibited during operation of the operating unit 19. Therefore, the instruction to the air purifier 1 by the user is not disturbed, and the usability of the air purifier 1 can be improved.

[0106]

The cleaning device 30 is forcibly driven irrespective of the stop condition when a predetermined time longer than the first cycle is elapsed from the previous driving of the cleaning device 30 during continuation of the automatic cleaning mode. As a result, in the automatic cleaning mode,

even in a case where the stop condition is satisfied and the pre-filter 6 is not cleaned, accumulation of excessive dust in the pre-filter 6 can be reliably prevented.

[0107]

The forced cleaning mode for forcibly driving the cleaning device 30 in the second cleaning time for each second cycle longer than the first cycle is provided so as to be selectable alternatively to the automatic cleaning mode. As a result, even in a case where the automatic cleaning mode is not set, the cleaning device 30 is driven in the forced cleaning mode. Therefore, accumulation of excessive dust in the pre-filter 6 can be reliably prevented.

[0108]

The cleaning device 30 is stopped when an instruction of stopping is performed while the cleaning device 30 is forcibly driven, and the cleaning device 30 is driven after a lapse of a predetermined time shorter than the first cycle. As a result, even in a case where the cleaning operation of the cleaning device 30 is canceled when the cleaning device 30 is forcibly driven, cleaning of the pre-filter 6 by the cleaning device 30 is performed after the lapse of a predetermined time. Therefore, accumulation of excessive dust in the pre-filter 6 can be reliably prevented.

[0109]

The brush body 80 is connected to the drive motor 100

for rotationally driving the winding roll 50, rotates when the winding roll 50 rotates, and slides on the pre-filter 6 (filter) on the winding roll 50. As a result, it is unnecessary to separately provide a brush body motor in the related art for rotating the brush body 80 in addition to the drive motor 100. Therefore, the manufacturing cost of the air purifier 1 can be reduced.

[0110]

The direction of rotation of the winding roll 50 and the direction of rotation of the brush body 80 are the same direction as each other. As a result, the brush body 80 slides on the pre-filter 6 from the direction opposite to the traveling direction of the pre-filter 6. Therefore, the brush body 80 can reliably remove the dust on the pre-filter 6.

[0111]

The circumferential speed of the brush body 80 is preferably greater than the 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. Therefore, the dust on the pre-filter 6 can be more reliably removed.

[0112]

The drive motor 100 is disposed in the main body portion 20 of the casing 2 and the supply roll 40 and the winding roll 50 are disposed in the cover portion 21. As a result, the cover portion 21 can be removed from the main body portion 20, and the pre-filter 6 can be replaced easily. Although the air purifier 1 is provided with the cleaning device 30, clogging of the pre-filter 6 may occur depending on the installation location of the air purifier 1 (for example, place where there are many oil stain such as kitchen). Even in this case, the pre-filter 6 can be easily detached and carefully cleaned.

[0113]

The bevel gear 61 (first cross shaft gear) having a fitting hole 61a fitted to the rotation shaft of the drive motor 100, the bevel gear 62 (second cross shaft gear) meshing with the bevel gear 61, the spur gear 63 (first parallel shaft gear) rotating integrally with the bevel gear 62 and connected to the winding roll 50, and the spur gear 64 (second parallel shaft gear) meshing with the spur gear 63 and connected to the brush body 80 are provided. As a result, it is possible to easily realize the rotation of the winding roll 50 and the brush body 80 by one drive motor 100.

[0114]

Since the spur gear 63 connected to the winding roll 50

is disposed closer to the drive motor 100 than the spur gear 64 connected to the brush body 80, attenuation of the driving force transmitted to the winding roll 50 can be suppressed. As a result, the winding roll 50 biased by the biasing portion 70 via the pre-filter 6 can reliably be rotationally driven by the drive motor 100 against the biasing force.

[0115]

The internal gear 65 provided integrally with the spur gear 64 and the spur gear 66 (third parallel shaft gear) meshed with the internal gear 65 are provided between the brush body 80 and the spur gear 64, and the rotation shaft of the brush body 80 is 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.

[0116]

The pre-filter 6 has the ventilation portion 6b disposed so as to face the suction port 3 when the cleaning device 30 is stopped and the storage portion 6c delivered from the supply roll 40 when the cleaning device 30 is driven. On the storage portion 6c, the design 6g which is visible from the suction port 3 is provided distinguished from the ventilation portion 6b. As a result, the movement

of the pre-filter 6 is easily visually recognized, and the user can easily recognize the cleaning of the pre-filter 6 by the cleaning device 30.

[0117]

When the cleaning device 30 is driven, the blower 10 is stopped. As a result, it is possible to prevent the dust immediately after being removed from the pre-filter 6 from being sucked into the downstream side of the pre-filter 6. It is possible to prevent the user from erroneously recognizing that the blower 10 is stopped due to a failure due to the design 6g.

[0118]

The biasing portion 70 of the cleaning device 30 has the spiral spring 75 that biases the rotation shaft of the supply roll 40 in the direction opposite to the winding direction when winding the pre-filter 6 of the winding roll 50. As a result, when the drive motor 100 is reversed after winding of the winding roll 50 is ended, the pre-filter 6 is wound around the supply roll 40 by the restoring force of the spiral spring 75. Therefore, it is unnecessary to separately provide a motor for rotating the supply roll 40 in the direction opposite to the winding direction W of the winding roll 50 from the drive motor 100. As a result, the manufacturing cost of the air purifier 1 can be further reduced. Since the spiral spring 75 is used, it is possible

to wind the pre-filter 6 around the winding roll 50 at a long distance while biasing the pre-filter 6. As a result, the degree of freedom in designing the size of the pre-filter 6 can be enhanced.

[0119]

The biasing portion 70 has the rotating body 71 (first rotating body) to which the shaft portion of the supply roll 40 is locked and on which one end of the spiral spring 75 is mounted, the rotating body 72 (second rotating body) on which the other end of the spiral spring 75 is mounted and whose rotation in a direction to reduce the biasing force of the spiral spring 75 is restricted, and the handle 73 rotating the rotating body 72. As a result, when the supply roll 40 is mounted on the cover portion 21 and the handle 73 is operated, the pre-filter 6 is wound in a direction opposite to the winding direction W. Therefore, the slack of the pre-filter 6 can be reduced, and air containing dust can reliably pass through the pre-filter 6.

[0120]

The biasing portion 70 is provided with the connecting member 74 which is disposed between the handle 73 and the rotating body 72 and restricts the rotation of the handle 73 in the direction to reduce the biasing force of the spiral spring 75, and the connecting member 74 rotates integrally with the rotating body 72. As a result, it is possible to

reliably prevent the rotation of the rotating body 72 in the direction to reduce the biasing force of the spiral spring 75.

[0121]

The shaft 41 of the supply roll 40 has the core member 41a having the groove portion 41b and the sleeve 41d formed of an elastic body having the C-shaped cross section fitted over the core member 41a, and elastically clamps the bar member 6a of the pre-filter 6 by the sleeve 41d and the groove portion 41b. As a result, when the opening portion 41e of the sleeve 41d is expanded, the bar member 6a can be easily removed from the shaft 41. It is possible to prevent the bar member 6a from falling off the shaft 41 by the sleeve 41d. This is similar to the winding roll 50.

[0122]

The core member 41a of the supply roll 40 is formed of a metal, and the sleeve 41d is formed of a resin molded product. This is similar to the winding roll 50. As a result, it is possible to easily attach or detach the bar member 6a to and from the shafts 41 and 51 while sufficiently securing the strength of the shafts 41 and 51.

[0123]

<Second Embodiment>

Next, a second embodiment of the present invention will be described. Fig. 11 is a side view of a support member of

a cover portion of an air purifier according to the present 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 10. In the present embodiment, the configuration of a support member 49 of a cover portion 21 is different from that of the first embodiment. The other parts are the same as those in the first embodiment.

[0124]

On the front end portion of the support member 49 (refer to Fig. 3) on the right side of the supply roll 40 of the cover portion 21, a rotating plate 400 formed of resin rotating in the vertical direction is disposed. A shaft portion 401 of the rotating plate 400 is disposed to be biased rearward from the center in the front-rear direction of the rotating plate 400. As a result, as illustrated in Fig. 11, in a case where the supply roll 40 is not mounted on the support member 49, a front end portion of the rotating plate 400 protrudes forward from the support member 49. Therefore, when attaching the cover portion 21 to the main body portion 20 in a state where the supply roll 40 is not mounted on the cover portion 21, the front end portion of the rotating plate 400 interferes with the main body portion 20. Therefore, it is possible to easily prevent forgetting to attach the supply roll 40 to the cover portion

21.

[0125]

On the other hand, as illustrated in Fig. 12, when the supply roll 40 is mounted on the support member 49, the supply roll 40 collides with the rear end portion of the rotating plate 400, and the rotating plate 400 rotates upward. As a result, the front end portion of the rotating plate 400 is retracted rearward, and interference between the rotating plate 400 and the main body portion 20 is prevented when the cover portion 21 is mounted on the main body portion 20.

[0126]

Also in this embodiment, the same effect as in the first embodiment can be obtained.

[0127]

<Third Embodiment>

Next, a third embodiment of the present invention will be described. Fig. 13 is a side view of a support member of a cover portion of an air purifier according to the present 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 10. In the present embodiment, the configuration of a support member 49 of a cover portion 21 is different from that of the first embodiment. The other parts are the same as those

in the first embodiment.

[0128]

The support member 49 has a fixed portion 49a and a moving portion 49b. A spring 49c is provided at a rear end portion of the moving portion 49b, and one end of the spring 49c is mounted on a front surface of the cover portion 21. At this time, in a state where the spring 49c is extended, the front end portion of the moving portion 49b is configured to protrude forward from the fixed portion 49a. As a result, as illustrated in Fig. 13, in a case where the supply roll 40 is not mounted on the support member 49, the front end portion of the moving portion 49b protrudes forward from the fixed portion 49a. Therefore, when attaching the cover portion 21 to the main body portion 20 in a state where the supply roll 40 is not mounted on the cover portion 21, the front end portion of the moving portion 49b interferes with the main body portion 20. Therefore, it is possible to easily prevent forgetting to attach the supply roll 40 to the cover portion 21.

[0129]

On the other hand, as illustrated in Fig. 14, when the supply roll 40 is mounted on the support member 49, the supply roll 40 abutting on the fixed portion 49a moves the moving portion 49b rearward. As a result, the front end portion of the moving portion 49b is retracted rearward, and

interference between the moving portion 49b and the main body portion 20 is prevented when the cover portion 21 is mounted on the main body portion 20.

[0130]

Also in this embodiment, the same effect as in the first embodiment can be obtained.

[0131]

In the second embodiment and the third embodiment, a photo interrupter (not illustrated) may be provided instead of the magnet 23 and the Hall element of the first embodiment. The photo interrupter has a light emitting portion and a light receiving portion facing each other. In a case where it is detected by the light receiving portion that the light traveling from the light emitting portion to the light receiving portion is shielded by the rotating plate 400 of the second embodiment protruding forward from the support member 49 or the moving portion 49b of the third embodiment, and driving of the blower 10 is prohibited. As a result, it is possible to prevent the air blowing operation of the air purifier 1 in a state where the cover portion 21 is not mounted on the main body portion 20.

[0132]

<Fourth Embodiment>

Next, a fourth embodiment of the present invention will be described. Fig. 15 is a plan view of a pre-filter of an

air purifier according to the present 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 10. In the present embodiment, the configuration of a pre-filter 6 is different from that of the first embodiment. The other parts are the same as those in the first embodiment.

[0133]

The pre-filter 6 of a sheet shape is formed with a first region A1 to a fourth region A4 arranged side by side in the winding direction W. The first region A1 is a region where the density of the mesh is low, the second region A2 is a region where the density of the mesh is high, the third region A3 is a region where activated carbon is attached to the mesh, and the fourth region A4 is a region where an aromatic is attached to the mesh.

[0134]

In the air purifier 1 having the above configuration, for example, in a case where it is determined that the dust concentration in the air is low according to the detection result of the dust sensor, the drive motor 100 is driven to rotate the winding roll 50, and the first region A1 is disposed facing the suction port 3. As a result, the air blowing efficiency of the air purifier 1 can be improved. For example, in a case where it is determined that the dust

concentration in the air is high according to the detection result of the dust sensor, the drive motor 100 is driven to rotate the winding roll 50, and the second region A2 is disposed facing the suction port 3. It is possible to determine the region facing the suction port 3 based on the length of the first region A1 to the fourth region A4 in the winding direction W and the rotation amount of the drive motor 100.

[0135]

In a case where it is determined that the concentration of the odorous component in the air is high according the detection result of the odor sensor, the drive motor 100 is driven to rotate the winding roll 50, and the third region A3 or the fourth region A4 is disposed facing the suction port 3.

[0136]

As described above, since the region of the pre-filter 6 suitable for the state of the air in the living room is disposed facing the suction port 3, usability of the air purifier 1 can be improved.

[0137]

Also in this embodiment, the same effect as in the first embodiment can be obtained. The pre-filter 6 is formed with the first region A1 to the fourth region A4 arranged side by side in the winding direction W. As a

result, since the region of the pre-filter 6 suitable for the state of the air in the living room is disposed facing the suction port 3, the usability of the air purifier 1 can be improved.

[0138]

The user may operate the operation unit 19 to select the first region A1 to the fourth region A4.

[0139]

<Fifth Embodiment>

Next, a fifth embodiment of the present invention will be described. Fig. 16 is a perspective view of a pressing member of a pre-filter of an air purifier according to the present 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 10. In the present embodiment, the configuration of a pressing member 22 is different from that of the first embodiment. The other parts are the same as those in the first embodiment.

[0140]

The pressing member 22 of the embodiment has only the rib 22b extending in the winding direction W of the pre-filter 6 (vertical direction in the embodiment) and has no rib extending in a direction orthogonal to the winding direction W (left-right direction in the embodiment). As a

result, it is possible to prevent the dust from falling due to the rib extending in the direction orthogonal to the winding direction W sliding on the pre-filter 6.

[0141]

Also in this embodiment, the same effect as in the first embodiment can be obtained.

[0142]

In the first to fifth embodiments, the supply roll 40 and the winding roll 50 are disposed in the cover portion 21, and instead of this configuration, these may be disposed in the main body portion 20.

[0143]

In the cleaning operation of the air purifier 1 of the first to the fifth embodiments, the winding speed of the winding roll 50 and the rewinding speed to the supply roll 40 may be the same as or different from each other. For example, when the winding speed of the winding roll 50 is made smaller than the rewinding speed to the supply roll 40, it is possible to shorten the cleaning operation time by increasing the rewinding speed while removing the dust on the pre-filter 6.

Industrial Applicability

[0144]

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

filter.

Reference Signs List

[0145]

- 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
- 20 main body portion
- 21 cover portion
- 22 pressing member
- 23 magnet

30 cleaning device
40 supply roll
41 shaft
41a core member
41d sleeve
50 winding roll
60 gear unit
61 bevel gear (first cross shaft gear)
62 bevel gear (second cross shaft gear)
63 spur gear (first parallel shaft gear)
64 spur gear (second parallel shaft gear)
65 internal gear
66 spur gear (third parallel shaft gear)
70 biasing portion
71 rotating body (first rotating body)
71a clamping portion
72 rotating body (second 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
200 humidifying portion
201 tray
202 humidifying filter
300 tape-shaped member
400 rotating plate
401 shaft portion
SP space

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 to face the suction port;
a cleaning device cleaning the filter; and
a contamination sensor detecting contamination degree in an air,

wherein an automatic cleaning mode in which the cleaning device is driven at a first cleaning time for each predetermined first cycle is provided, and

driving of the cleaning device is prohibited when a stop condition that a contamination degree in the air is greater than a predetermined value within a predetermined period immediately before the first cleaning time is satisfied.

[Claim 2]

The air purifier according to Claim 1, further comprising:

an illuminance sensor that detects an illuminance in a living room,

wherein the stop condition includes a case where the

illuminance in the living room is lower than a predetermined illuminance within a predetermined period immediately before the first cleaning time.

[Claim 3]

The air purifier according to Claim 1 or 2,
wherein the stop condition includes a case where a predetermined operation is performed within a predetermined period immediately before the first cleaning time.

[Claim 4]

The air purifier according to any one of Claims 1 to 3,
wherein the cleaning device is forcibly driven irrespective of the stop condition when a predetermined time longer than the first cycle is elapsed from previous driving of the cleaning device during continuation of the automatic cleaning mode.

[Claim 5]

The air purifier according to any one of Claims 1 to 4,
wherein a forced cleaning mode that forcibly drives the cleaning device at a second cleaning time for each second cycle longer than the first cycle is provided so that the forced cleaning mode and the automatic cleaning mode is alternatively selected.

[Claim 6]

The air purifier according to Claim 4 or 5,
wherein the cleaning device is stopped when an

instruction of stopping is performed while the cleaning device is forcibly driven, and the cleaning device is driven after a lapse of a predetermined time shorter than the first cycle.

[Claim 7]

The air purifier according to any one of Claims 1 to 6, wherein the contamination sensor includes one or both of a dust sensor that detects a concentration of dust in the air and an odor sensor that detects a concentration of odorous components in the air.