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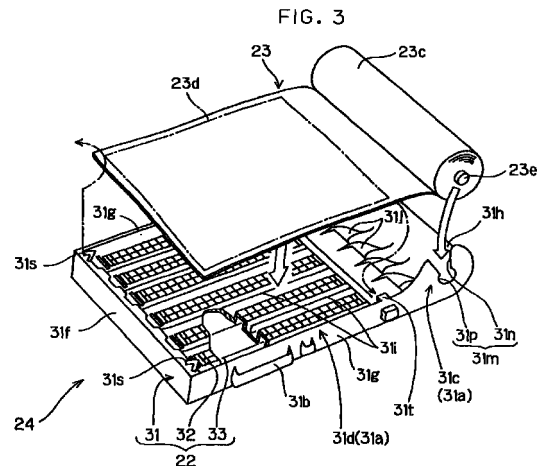
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(54) **DUST-COLLECTING ELEMENT FOR AIR-CLEANING APPARATUS**

(57) Disclosed is a dust collecting element (24) which is attachable to and detachable from an air cleaner main body (12) and comprises an ionization section (22) for charging dust in air and a filter (23d) serving as a dust collection section. A cassette section (31a) for supporting the filter (23d) is integrally formed with a casing (31) of the ionization section (22). Specifically, a plurality of ionization wires (33) and a plurality of pairs of opposite electrode plates (32a) arranged opposite to each other with the ionization wire (33) interposed therebetween are arranged on one surface of the casing (31) of the ionization section (22), and the cassette section (31a) for supporting the filter (23d) is provided on another surface of the casing (31).



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## Description

### Technical Field

**[0001]** The present invention relates generally to an air cleaner. Particularly, it relates to a dust collecting element of an air cleaner of an electric dust collection type comprising an ionization section and a dust collection section.

### Background Art

**[0002]** Conventionally known as an air cleaner of an electric dust collection type has been one comprising an ionization section including an ionization wire to which a high voltage is to be applied and an electrostatic filter serving as a dust collection section for capturing charged dust particles. An air duct through which air flows is formed inside the air cleaner. The sections are arranged such that a current in the air duct passes through the electrostatic filter from the ionization section.

**[0003]** The electrostatic filter serving as the dust collection section and the ionization section are made maintainable. That is, a casing of the ionization section and a casing for supporting the electrostatic filter are separately formed. Further, the ionization section and the electrostatic filter are separately mounted on an air cleaner main body so as to be attachable and detachable.

**[0004]** In such construction that the ionization section and the dust collection section are separately mounted on the air cleaner main body, however, it takes a lot of time and labor to attach and detach them in the case of maintenance, which is laborious.

**[0005]** In order that the ionization section and the dust collection section can be separately mounted on the air cleaner main body, the construction is complicated, and the number of components is large. Therefore, the component cost and the assembly cost are high, so that the air cleaner is high in cost. Moreover, the casings of the ionization section and the electrostatic filter are large in size, and are themselves high in cost.

### Disclosure of Invention

**[0006]** Therefore, an object of the present invention is to provide a dust collecting element of an air cleaner which is easy to maintain and is low in cost.

**[0007]** Another object of the present invention is to provide an air cleaner which is easy to maintain and can be realized at a low cost.

**[0008]** A dust collecting element of an air cleaner according to the present invention is a dust collecting element which is attachable to and detachable from an air cleaner main body, characterized by comprising an ionization section for charging dust in air, and a filter

serving as a dust collection section, a cassette section for supporting the filter being integrally formed with a casing of the ionization section.

**[0009]** This construction is convenient in that the ionization section and the dust collection section are integrally handled as the dust collecting element. For example, it does not take a lot of time and labor to attach and detach the ionization section and the filter to and from the air cleaner main body in the case of maintenance.

**[0010]** The filter is supported on the casing of the ionization section. Accordingly, a member for supporting the filter may not be provided separately from the casing. As a result, the number of components can be reduced, so that the air cleaner can be made low in cost.

**[0011]** Furthermore, the casing having high rigidity can support the filter. Accordingly, the filter can be made easy to handle even if it is difficult to handle because it is flexible. Therefore, the air cleaner is easy to maintain.

**[0012]** In a preferred embodiment of the present invention, a plurality of ionization wires and a plurality of pairs of opposite electrode plates arranged opposite to each other with the ionization wire interposed therebetween are arranged on one surface of the casing of the ionization section, and the cassette section for supporting the filter is provided on another surface of the casing.

**[0013]** This construction is more convenient in that the ionization section and the filter can be respectively maintained from the one surface and another surface of the casing without interfering with each other.

**[0014]** The plurality of pairs of opposite electrode plates may be integrated, to form an opposite electrode plate section, and the cassette section may hold the filter and the opposite electrode plate section such that they are brought into contact with each other.

**[0015]** If the opposite electrode plate section is grounded, therefore, the filter can be easily grounded through the opposite electrode plate section. Accordingly, charge can be prevented from being stored in the filter, thereby making it possible to prevent the dust collection capability from being decreased.

**[0016]** Furthermore, the cassette section may support the filter in a state where a surface, on the side opposite to the ionization section, of the filter is exposed, and may have supporting claws for engaging at least four corners of the filter integrally formed therein.

**[0017]** According to this construction, the one surface of the filter is exposed and is engaged by the supporting claws. Accordingly, a structure for supporting the filter can be simplified, so that the air cleaner can be made much lower in cost. Moreover, the supporting claws and the casing are integrally formed, so that the air cleaner can be made much lower in cost.

**[0018]** In order to support the filter, the filter is merely engaged by the supporting claws, which saves

time and labor at the time of maintenance.

**[0019]** The supporting claws may comprise a sting claw for penetrating and engaging the filter in the vicinity of its upper corner and a holding claw for regulating the separation of the filter from the cassette section in the vicinity of its lower corner.

**[0020]** Furthermore, the filter may be a roll filter having such a shape that a used area is taken out of a roll of a wound unused area and is used as the filter. In this case, it is preferable that the cassette section has a used area holding section for holding the used area serving as the filter and a roll containing section for holding the roll. In this case, it is preferable that the holding claw also functions as a guide claw for guiding the roll filter to the used area holding section.

**[0021]** A member for supporting the roll filter tends to be large in size and high in cost. Accordingly, such construction that the roll filter can be held on the casing of the ionization section is highly preferable.

**[0022]** The roll containing section may have a core holding section for holding a core of the roll so as to be attachable and detachable. In this case, it is preferable that the core holding section has a groove receiving the core, and an inlet to the groove is so formed as to be blocked by a member on the side of the air cleaner main body in a state where the dust collecting element is attached to the air cleaner main body.

**[0023]** An air cleaner according to the present invention has the dust collecting element having the above-mentioned features and an air cleaner main body to and from which the dust collecting element is attachable and detachable. This construction makes it possible to realize an air cleaner which is easy to maintain and is low in cost.

**[0024]** The foregoing and other objects, features and effects of the present invention will become more apparent from the following description of the present invention when taken in conjunction with the accompanying drawings.

#### Brief Description of Drawings

#### **[0025]**

Fig. 1 is an exploded perspective view of an air cleaner according to an embodiment of the present invention;

Fig. 2 is a sectional plan view of the schematic construction of a dust collecting element, a photocatalyst element, and a light source of the air cleaner shown in Fig. 1; and

Fig. 3 is a perspective view of the dust collecting element of the air cleaner shown in Fig. 1, which illustrates a state where a roll filter is detached as viewed from the rear.

#### Modes for Carrying out the Invention

**[0026]** An embodiment of the present invention will be described while referring to accompanying drawings.

**[0027]** Although description is now made of an air cleaner having the function of cleaning contaminants by a photocatalyst and the function of removing dust by ionization, the present invention may be applied to an air cleaner having only the function of removing dust by ionization.

**[0028]** Fig. 1 is an exploded perspective view of an air cleaner according to an embodiment of the present invention.

**[0029]** The air cleaner 1 comprises a box-shaped housing 10 for defining an air duct in its inner part. In the housing 10, the following sections are arranged in the order listed along the air duct from the front. That is, a pre-filter 21 for removing relatively large refuse or dust, a dust collecting element 24 for ionizing dust particles in a flow (an air current) along the air duct by an ionization section 22 and adsorbing the dust particles using a roll filter 23 serving as a dust collection section, a photocatalyst element 25 for holding a photocatalyst, a light source 26 for exciting the photocatalyst upon irradiation of the photocatalyst element 25 with ultraviolet rays to clean the contaminants, and an air fan 27 such as a sci-rocco fan for producing the air current in a predetermined direction are provided inside the housing 10.

**[0030]** The housing 10 has a front case 11 having an air inlet 11a on its front surface for defining an upstream part of the air duct and a rear case 12 provided behind the front case 11. The rear case 12 defines a downstream part of the air duct. A containing recess 12a is formed on a front surface of the rear case 12. The dust collecting element 24, the photocatalyst element 25, and the light source 26 are mounted inside the containing recess 12a in this order from the front so as to be attachable and detachable. The air fan 27 is mounted on an innermost part of the containing recess 12a. An air outlet 28 is provided on the top of the rear case 12.

**[0031]** The air duct is a duct leading from the air inlet 11a to the air outlet 28 via the air fan 27 for causing air to flow backward from the front in the front case 11 and the rear case 12.

**[0032]** Fig. 2 is a sectional plan view of the schematic construction of the dust collecting element, the photocatalyst element, and the light source in the air cleaner shown in Fig. 1.

**[0033]** The dust collecting element 24 comprises an ionization section 22 and a roll filter 23. The ionization section 22 comprises a plurality of ionization wires 33 serving as discharge wires extending in a direction perpendicular to the direction of the air current and parallel to one another, an opposite electrode plate section 32 including pairs of opposite electrode plates 32a arranged opposite to each other with the ionization wire 33 interposed therebetween, and a casing 31 for posi-

tioning and fixing the opposite electrode plate section 32 and the ionization wires 33. The ionization section 22 charges the dust particles in the air current by an ion shower produced by corona discharges. The opposite electrode plate section 32 is grounded.

**[0034]** The roll filter 23 has an electrostatic filter 23a for electrically adsorbing the dust particles charged by the ionization section 22.

**[0035]** The photocatalyst element 25 carries a photocatalyst for decomposing an odorous component or the like upon being irradiated with ultraviolet rays on a surface or an inner part of a photocatalyst carrying member 51 composed of a honeycomb structure having a plurality of vent holes 51a. The photocatalyst is a material which absorbs light and applies its energy to a reactant to cause a chemical reaction. Specific examples include titanium oxide ( $Ti_2O$ ), zinc oxide ( $ZnO$ ), and tungsten oxide ( $WO_3$ ) having an anatase-type crystal structure.

**[0036]** The light source 26 is a straight pipe-type cold cathode fluorescent lamp, for example. A plurality of light sources are provided. The light source 26 can emit light having a wavelength of 320 to 420 nm, and hardly adversely affects the human body. Moreover, it can activate the photocatalyst such as  $TiO_2$  or  $ZnO$  to efficiently clean contaminants.

**[0037]** According to the air cleaner 1, when the air fan 27 is driven, the air is sucked in from the air inlet 11a. Relatively large dust in the air is captured by the pre-filter 21 while flowing through the air duct, while fine dust is charged by the ionization section 22 and is captured by the electrostatic filter 23a. Contaminants such as an odorous component are cleaned by the photocatalyst element 25. Air thus cleaned is blown off from the air outlet 28.

**[0038]** The dust collecting element 24 will be described in detail below.

**[0039]** The external shape of the dust collecting element 24 is formed of the casing 31 in the ionization section 22, as shown in Fig. 1. The casing 31 is mounted so as to be attachable and detachable inside the containing recess 12a in the rear case 12 serving as the air cleaner main body. The containing recess 12a has a first portion 12b formed in its lower part and being semi-circular in cross section and a second portion 12c formed above the first portion 12b and having the photocatalyst element 25 mounted thereon. The dust collecting element 24 is attached by fitting a lower part of the dust collecting element 24 in the first portion 12b of the containing recess 12a such that a front surface of the photocatalyst element 25 mounted on the second portion 12c and a rear surface of the dust collecting element 24 are parallel to each other.

**[0040]** Fig. 3 is a perspective view of the dust collecting element of the air cleaner shown in Fig. 1, which illustrates a state where the roll filter is removed as viewed from the rear. Figs. 3 and 2 will be referred to.

**[0041]** A front surface of the dust collecting element

24 has the above-mentioned sections constituting the ionization section 22. The rear surface of the dust collecting element 24 has a cassette section 31a. The roll filter 23 is mounted on the cassette section 31a. A handle 31b for attachment and detachment is provided on a side surface of the dust collecting element 24.

**[0042]** The roll filter 23 comprises the above-mentioned electrostatic filter 23a composed of a charged non woven fabric and a sheet-shaped filter 23b carrying the photocatalyst, and is constructed by overlapping and joining both the filters. It is possible to use, as the electrostatic filter 23, a polyolefin series charged non woven fabric having a Metsuke of  $50 \text{ g/m}^2$ . The roll filter 23 comprises a roll 23c which is a portion where a sheet-shaped member is wound around a tube-shaped core 23e and a roll filter portion 23d, which is a used area, delivered from the roll 23c. The roll 23c is contained in a roll containing section 31c of the cassette section 31a, and the roll filter portion 23d, which is a used area, delivered from the roll 23c is arranged so as to be perpendicular to the air current. In the roll filter portion 23d which is a used area, the electrostatic filter 23 is arranged so as to face toward the ionization section 22.

**[0043]** The casing 31 is rectangular as viewed from the front in a state where it is contained in the containing recess 12a, and is formed in the shape of an approximate box which is thin in the longitudinal direction. The casing 31 has an upper edge 31f, a pair of side edges 31g respectively hanging downward from both right and left ends of the upper edge 31f, a lower plate portion 31h for connecting lower parts of both the side edges 31g to each other, and a plurality of lattice portions 31i each having an approximately T shape in cross section for connecting the lower plate portion 31h and the upper edge 31f to each other. The portions are integrally formed of a resin material.

**[0044]** The ionization wires 33 and the opposite electrode plate section 32 are positioned and mounted on a front surface of the casing 31, thereby constituting the ionization section 22. The opposite electrode plate section 32 is formed in the shape of an approximate wave plate which is rectangular in cross section, and has a plurality of recesses 32b forming the opposite electrode plates 32a provided in a standing condition on its plate surface and a lot of through holes 32c at the bottoms of the recesses 32b (positioned at the right in Fig. 2), as shown in Fig. 2. The recess 32b is arranged between the adjacent lattice portions 31i. The ionization wire 33 is stretched so as to vertically extend in the recess 32b. The through hole 32c forms a part of the above-mentioned air duct. The air current can pass around the ionization wires 33.

**[0045]** The cassette section 31a has a used area holding section 31d for supporting the roll filter portion 23d which is a used area and the roll containing section 31c for holding the roll 23c. The sections constitute a part of the casing 31.

**[0046]** In the roll containing section 31c, the lower plate portion 31h of the casing 31 is semicircular in cross section, to define a recess to contain the roll 23c. The recess opens backward, and the roll 23c can be mounted inside the recess from the rear.

**[0047]** A plurality of guide ribs 31j for guiding a part, near the roll 23c, of the roll filter 23 are formed in the roll containing section 31c.

**[0048]** Furthermore, the roll containing section 31c has a core holding section 31m for holding the core 23e of the roll 23c so as to be attachable and detachable.

**[0049]** The core holding section 31m has a groove 31n formed opening backward in both the side edges 31g and opened backward and a containing portion 31p formed in an innermost part of the groove 31n to hold the core 23e.

**[0050]** An inlet to the groove 31n is made wider than the inner part of the groove 31n. Accordingly, the core 23e can be easily contained in the groove 31n.

**[0051]** The containing portion 31p is formed in a size corresponding to the diameter of the core 23e. Further, the width of a connecting portion between the containing portion 31p and the groove 31n, that is, an inlet to the containing portion 31p is made smaller by a predetermined amount than the diameter of the core 23e. Consequently, the core 23e can be engaged, thereby making it possible to prevent the core 23e from carelessly slipping off the containing portion 31p. Consequently, the roll filter 23 can be prevented from carelessly slipping off the dust collecting element 24, so that the dust collecting element 24 is easy to handle in the case of maintenance. The core 23e can be contained in the containing portion 31p while elastically deforming the side edges 31g to widen the inlet to the containing portion 31p. When the core 23e is contained in the groove 31n through the inlet to the groove 31n, the groove 31n guides the core 23e to the containing portion 31p. The core 23e can be thus arranged and held in the containing portion 31p. In a state where the dust collecting element 24 is mounted inside the containing recess 12a, the inlet to the groove 31n is blocked by the first portion 12b of the recess 12a. Accordingly, the core 23e in the core holding section 31m is prevented from slipping off outward.

**[0052]** The guide ribs 31j are formed on a rear surface of the lower plate portion 31h. When the roll filter 23 is delivered from the roll 23c, a new filter portion can be smoothly guided to the used area holding section 31d for supporting the roll filter portion 23d which is a used area.

**[0053]** The used area holding section 31d is arranged in a rear surface of the casing 31, that is, in a part, through which the air current passes, of the casing 31. The used area holding section 31d includes a rear surface of the upper edge 31f in the casing 31, an upper end of the lower plate portion 31h, rear surfaces of the lattice portions 31i, and a rear surface of the opposite electrode plate section 32. A front surface of the roll fil-

ter portion 23d which is a used area (on the side of the electrostatic filter 23a) can be made parallel to each of the rear surfaces. A plurality of supporting claws are provided on the rear surface of the casing 31, to engage four corners of the roll filter portion 23d which is a used area. In this state, the casing 31 supports the roll filter portion 23d which is a used area in a state where its surface opposite to the ionization section 22 is exposed.

**[0054]** The supporting claws engage the four corners of the roll filter portion 23d which is a used area. The supporting claws include hook-shaped sting claws 31s for respectively engaging the two upper corners of the roll filter portion 23d which is a used area and guide claws 31t for engaging the two lower corners of the roll filter portion 23d which is a used area. The supporting claws may engage more portions of the roll filter 23, provided that they can engage at least four corners.

**[0055]** The guide claw 31t is in the vicinity of the core holding section 31m, and is integrally formed so as to have an L shape in cross section at a rear end of the side edge 31g of the casing 31. The guide claw 31t has a portion integrated with the side edge 31g of the casing 31 along a side edge of the roll filter portion 23d which is a used area and a portion extending from an end of that portion toward the inside of the roll filter 23 along the roll filter 23. A pair of guide claws 31t is provided such that they are opposite to each other. The pair of guide claws 31t can hold both sides, near the core 23e, of the roll filter portion 23d which is a used area so that they do not separate from the cassette section 31a, and can guide the roll filter 23 pulled out of the roll 23c.

**[0056]** The sting claws 31s are formed in the shape of a hook folded upward. A pair of sting claws 31s are integrally formed in the upper edge 31f of the casing 31. The pair of sting claws 31s can penetrate and engage the roll filter 23.

**[0057]** In the air cleaner 1, the dust collecting element 24 can be maintained in the following manner. That is, when the front case 11 is removed, the containing recess 12a is opened forward, as shown in Fig. 1. In this case, the dust collecting element 24 can be detached by pulling up the casing 31 upward toward the front. Further, it can be attached in an inverse operation. The ionization section 22 and the roll filter 23 can be thus integrally handled as the dust collecting element 24 and simultaneously attached and detached, which saves time and labor.

**[0058]** With respect to the detached dust collecting element 24, the ionization section 22 can be repaired from its front surface, and the roll filter 23 can be repaired from its rear surface.

**[0059]** As the maintenance of the roll filter 23, the roll filter portion 23d which is a used area, which is considered to have already been used because it becomes dirty, is detached from the casing 31 and is cut away. The roll filter 23 which has not been used yet is then delivered from the roll 23c, and it is mounted, as the roll filter portion 23d which is a used area, on the casing 31

upon engaging its four corners with the sting claws 31s and the guide claws 31t (see Fig. 3). The roll filter 23 can be thus replaced in significantly simple work.

**[0060]** When the roll filter 23 has been used up, the roll filter 23 is replaced. That is, the core 23e which has already been used is taken out of the core holding section 31m, a core 23e of a roll filter 23 which has not been used yet is contained in the groove 31n and is held in the containing portion 31p, to mount a roll 23c on the roll containing section 31c. The roll filter portion 23d which is a used area is then mounted in the above-mentioned manner.

**[0061]** In the maintenance of the roll filter 23, the sections constituting the ionization section 22 need not be detached. Accordingly, the ionization section 22 and the roll filter 23 can be maintained without interfering with each other.

**[0062]** The present embodiment produces the following effects. That is, the ionization section 22 and the roll filter 23 can be integrally handled as the dust collecting element 24. Accordingly, it does not take a lot of time and labor to attach and detach them in the case of maintenance.

**[0063]** The roll filter 23 can be generally supported by the casing 31 having high rigidity. Therefore, the air cleaner can be easily handled and is easy to maintain.

**[0064]** Furthermore, the roll filter 23 can be supported by being engaged using the supporting claws, which saves time and labor. Particularly, it can be simply engaged using the sting claws 31s and the guide claws 31t.

**[0065]** The ionization section 22 is formed on the front surface of the casing 31, and the cassette section 31a for supporting the roll filter 23 is provided on the rear surface of the casing 31, thereby making it possible to conveniently maintain the ionization section 22 and the roll filter 23 without interfering with each other. In this case, the dust collecting element 24 is not limited to the foregoing, provided that the plurality of ionization wires 33 and the plurality of pairs of opposite electrode plates 32a arranged opposite to each other with the ionization wire 33 interposed therebetween may be arranged on one surface of the casing 31, and the cassette section 31a for supporting the roll filter portion 23d which is a used area may be provided on the other surface of the casing 31.

**[0066]** Since the roll filter 23 is supported on the casing 31 in the ionization section 22, a member for supporting the roll filter 23 may not be provided separately from the casing 31. As a result, the number of components can be reduced. Accordingly, the air cleaner can be made low in cost. Particularly, the member for supporting the roll filter 23 tends to be large in size and high in cost. Therefore, the air cleaner according to the present embodiment comprising no separate member for supporting roll filter 23 is highly preferable.

**[0067]** The cassette section 31a exposes the rear surface of the roll filter 23, to engage the roll filter 23 by

the supporting claws. Accordingly, a structure for supporting the roll filter 23 can be simplified, so that the air cleaner can be made much lower in cost. Moreover, the supporting claws and the casing 31 are integrally formed, so that the air cleaner can be made much lower in cost.

**[0068]** Since both the ionization section 22 and the roll filter 23 are integrated with each other, they can be made close to each other. Accordingly, the electrostatic filter 23a in the roll filter portion 23d which is a used area and the rear surface of the opposite electrode plate section 32 can be reliably abutted against each other. As a result, the electrostatic filter 23a can be reliably grounded through the opposite electrode plate section 32. Consequently, the dust collection efficiency of the electrostatic filter 23a can be kept high. When the electrostatic filter 23a cannot be reliably grounded, charge is stored in the electrostatic filter. Therefore, the dust collection efficiency may be decreased.

**[0069]** Particularly, the roll filter portion 23d which is a used area can be easily mounted in a predetermined position of the casing 31 without allowing slack by being made parallel to the casing 31 or the like, thereby making it possible to more reliably ground the electrostatic filter 23a. Further, the roll filter portion 23d which is a used area can be made parallel to the opposite electrode plate section 32 through which the electrostatic filter 23a is to be ground, thereby making it possible to much more reliably ground the electrostatic filter 23a. In addition, the electrostatic filter 23a can be more reliably grounded by a front end 52a of a member 52 which is abutted against a part of the roll filter portion 23d which is a used area from the rear, as shown in Fig. 2.

**[0070]** The construction of the cassette section 31a is not limited to the foregoing, provided that it can support the roll filter portion 23d which is a used area. For example, the dust collecting element 24 may have a supporting claw formed separately from the casing 31 and support the roll filter 23 indirectly through the supporting claw.

**[0071]** Although in the above-mentioned embodiment, description has been made of the air cleaner having the function of cleaning contaminants by a photocatalyst and the function of removing dust by ionization, the light source 26, the photocatalyst element 25, the sheet-shaped filter 23b in the roll filter 23, and so forth can be omitted when the air cleaner is constructed as an air cleaner having only the function of removing dust by ionization.

**[0072]** In addition thereto, various design changes can be made within the scope of the terms in the claims.

#### Industrial Applicability

**[0073]** As described in the foregoing, a dust collecting element of an air cleaner according to the present invention is used for collecting dust in the air cleaner.

**Claims**

1. A dust collecting element (24) of an air cleaner, which is attachable to and detachable from an air cleaner main body (12), characterized by comprising:
- an ionization section (22) for charging dust in air; and  
a filter (23d) serving as a dust collection section,  
a cassette section (31a) for supporting the filter (23d) being integrally formed with a casing (31) of the ionization section (22).
2. The dust collecting element (24) of the air cleaner according to claim 1, characterized in that
- a plurality of ionization wires (33) and a plurality of pairs of opposite electrode plates (32a) arranged opposite to each other with the ionization wire (33) interposed therebetween are arranged on one surface of the casing (31) of the ionization section (22), and the cassette section (31a) for supporting the filter (23d) is provided on another surface of the casing (31).
3. The dust collecting element (24) of the air cleaner according to claim 2, characterized in that
- the plurality of pairs of opposite electrode plates (32a) are integrated, to form an opposite electrode plate section (32), and the cassette section (31a) holds the filter (23d) and the opposite electrode plate section (32) such that they are brought into contact with each other.
4. The dust collecting element (24) of the air cleaner according to any one of claims 1 to 3, characterized in that
- the cassette section (31a) supports the filter (23d) in a state where a surface, on a side opposite to the ionization section (22), of the filter (23d) is exposed, and has supporting claws (31s, 31t) for engaging at least four corners of the filter (23d) integrally formed therein.
5. The dust collecting element (24) of the air cleaner according to claim 4, characterized in that
- the supporting claws (31s, 31t) comprise a sting claw (31s) for penetrating and engaging the filter (23d) in the vicinity of its upper corner and a holding claw (31t) for regulating the separation of the filter (23d) from the cassette section (31a) in the vicinity of its lower corner.
6. The dust collecting element (24) of the air cleaner according to any one of claims 1 to 5, characterized in that
- the filter (23d) is a roll filter (23) having such a shape that a used area is taken out of a roll (23c) of a wound unused area and is used as the filter (23d), and the cassette section (31a) has a used area holding section (31d) for holding the used area serving as the filter (23d) and a roll containing section (31c) for holding the roll (23c).
7. The dust collecting element of the air cleaner according to claim 6, characterized in that
- the roll containing section (31c) has a core holding section (31m) for holding a core (23e) of the roll (23c) so as to be attachable and detachable.
8. The dust collecting element (24) of the air cleaner according to claim 7, characterized in that
- the core holding section (31m) has a groove (31n) receiving the core (23e), and an inlet to the groove (31n) is so formed as to be blocked by a member (12b) on the the of the air cleaner main body (12) in a state where said dust collecting element (24) is attached to the air cleaner main body (12).
9. An air cleaner, characterized by comprising:
- an air cleaner main body (12); and  
the dust collecting element (24) according to any one of claims 1 to 8, which is attachable to and detachable from the air cleaner main body (12).

FIG. 1

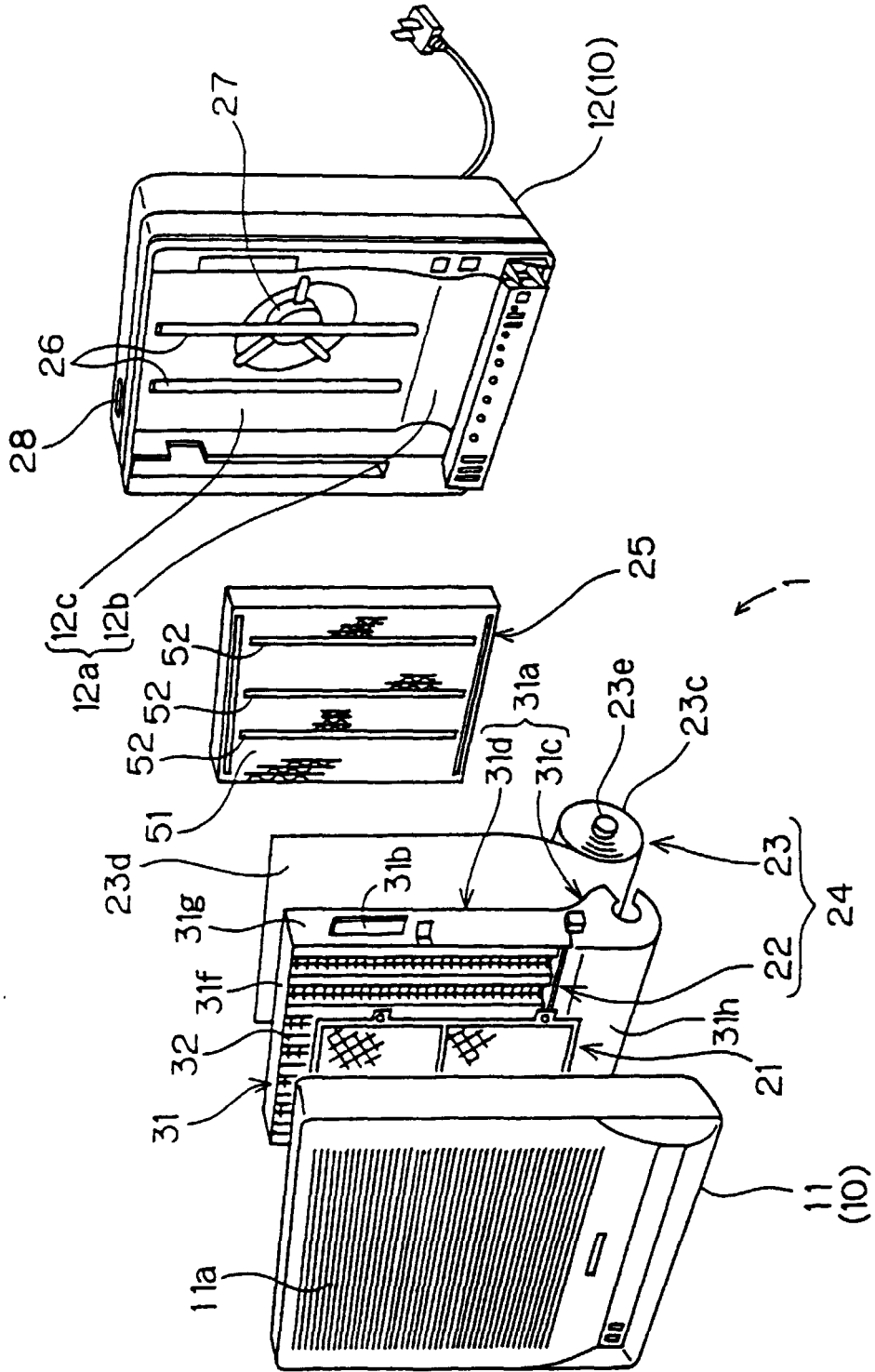
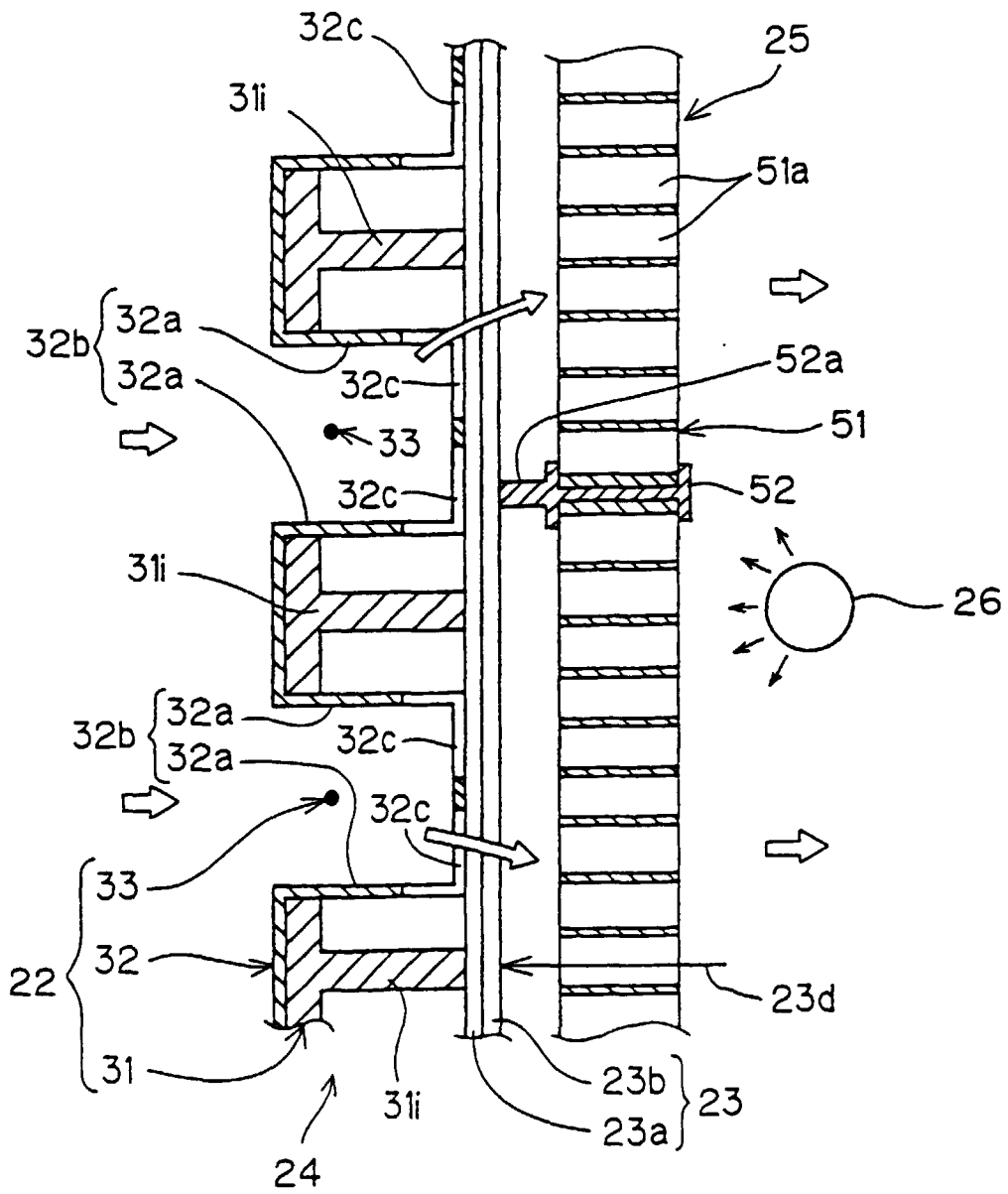


FIG. 2





## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP98/04596

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl. <sup>6</sup> B03C3/14		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) Int.Cl. <sup>6</sup> B03C3/00-3/88		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1926-1996 Toroku Jitsuyo Shinan Koho 1994-1998 Kokai Jitsuyo Shinan Koho 1971-1998 Jitsuyo Shinan Keisai Koho 1996-1998		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 164711/1982 (Laid-open No. 70746/1984) (Sanyo Electric Co., Ltd.), 14 May, 1984 (14. 05. 84) (Family: none)	1-9
Y	JP, 8-10648, A (TEAC Corp.), 16 January, 1996 (16. 01. 96) (Family: none)	3, 6-9
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
Date of the actual completion of the international search 30 November, 1998 (30. 11. 98)		Date of mailing of the international search report 1 December, 1998 (01. 12. 98)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

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