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FILTER ASSEMBLY AND AIR PURIFIER INCLUDING SAME

Abstract

An air purifier include: a frame; a filter assembly detachably mounted in the frame for filtering air; a fan assembly providing a blowing force to move air from an outside of the frame to an inside of the frame; and a controller for controlling an operation of the fan assembly. The filter assembly includes: a plurality of filter members of different types; and a filter holder supporting the plurality of filter members and including a first filter region and a second filter region which are separate from each other.

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Background/Summary

TECHNICAL FIELD

[0001] The present disclosure relates filter assembly and an air purifier including the same.

BACKGROUND ART

[0002] In general, an air purifier is a device that sucks in polluted indoor air and purifies indoor air by filtering out dust, odor particles, and the like from the incoming air, to deliver clean air. Such air purifiers work by drawing in contaminated air, filtering it, and then discharging the cleaned air back into the environment, thereby purifying the indoor air.

[0003] Meanwhile, air purifiers may include a filter for removing dust, odor particles, and other impurities from the incoming air, and a frame that allows for replaceable filter mounting. Additionally, multiple types of filters with distinct functions, such as HI A filter deodorization filters, and functional filters, may be provided within the air purifier.

[0004] Korean Patent Publication No. 10-2016-0099145, “Air Purifier” (Patent Document 1), discloses a frame supporting a first air purification filter, second air purification filter, functional filter, and other filters for air filtration.

[0005] However, the air purifier of Patent Document 1 faces difficulties in replacing multiple filters as each filter must be individually detached and mounted onto the frame. For instance, to replace multiple filters, the operator must detach each filter from the frame and then remount each filter onto the frame individually. This process is time-consuming and cumbersome, requiring the operator to manage multiple filters separately, which can be inconvenient and inefficient.

[0006] Thus, there is a need for an air purifier that includes a filter assembly capable of easily attaching and detaching multiple types of filters simultaneously to and from the frame, allowing for convenient handling and transportation of the filters.

[0007] Meanwhile, Korean Patent Publication No. 10-2018-0138247, “Air Purifier with Dual Fans for Different Discharge Directions” (Patent Document 2), discloses an air purifier equipped with an upper dual-directional fan and a lower dual-directional fan to circulate air.

[0008] However, in Patent Document 2, both the upper and lower fans operate at the same rotation speed, which may result in varying differential pressures on the upper and lower filters when multiple types of filters are arranged vertically. For example, if an activated carbon filter is positioned at the lower part and a mesh-type filter is positioned at the upper part, the differential pressures across these filters will differ even if the upper and lower fans operate at the same rate. Consequently, the upper filter may reach its replacement cycle more quickly, which causes the air purifier's cleaning efficiency to decrease.

[0009] Additionally, in Patent Document 2, since the air flows toward both the upper and lower fans after passing through the filter, vortices may form between the filters and the fans. This results in prolonged air retention within the space between the filters and fans, which lengthens airflow time and reduces the purification efficiency of the air purifier.

[0010] Accordingly, there is a need for an air purifier that can control multiple fans to ensure that none of the filters reach their replacement cycle prematurely, even with multiple filters in place.
[0011] Furthermore, there is a need for a filter assembly and an air purifier including the same, capable of preventing vortex formation between the filter and the fan, thereby enhancing the purifier's cleaning efficiency.

DETAILED DESCRIPTION OF INVENTION

Technical Problems

[0012] One embodiment of the present disclosure, developed with consideration of the aforementioned background, aims to provide an air purifier capable of mounting or detaching various types of filter members into or from a frame at once.
[0013] Furthermore, one embodiment of the present disclosure seeks to provide an air purifier that prevents the filter assembly from being mounted into the frame in an incorrect orientation.
[0014] Additionally, one embodiment of the present disclosure aims to offer an air purifier that controls a first fan unit, facing a first filter region, to operate at a higher rotational speed than a second fan unit. This allows air to smoothly pass through the first filter region even if a higher differential pressure is applied to it compared to the second filter region.
[0015] Moreover, one embodiment of the present disclosure seeks to provide a filter assembly and an air purifier including the same, which prevents vortex formation between the filter assembly and the frame by having a plurality of wall portions supported on the protruding ribs of the frame.

Technical Solution

[0016] In accordance with one aspect of the present disclosure, there is provided a filter assembly including: a plurality of filter members of different types for filtering contaminants from flowing air; and a filter holder supporting the plurality of filter members and including a first filter region and a second filter region that are separated without overlapping when viewed in a direction of air flow, wherein the filter holder includes: a first edge portion forming at least a portion of the first filter region; a second edge portion forming at least a portion of the second filter region; and a partitioning portion dividing the first filter region and the second filter region, wherein the first edge portion, the second edge portion, and the partitioning portion are integrally combined.
[0017] Further, one or more of the first filter region and the second filter region may include a sub region in which one of the different types of filter members is supported and a main region in which another of the different types of filter members is supported, to stack and support the different types of filter members.
[0018] Further, one or more of the first edge portion, the second edge portion, and the partitioning portion may include a stepped portion formed between the sub region and the main region, and the stepped portion may extend along at least a perimeter of one or more of the first filter region and the second filter region.
[0019] Further, a height of the partitioning portion may be greater than at least one of a thickness of the sub region in a front and rear direction and a thickness of the main region in the front and rear direction.
[0020] Further, the thickness of the sub region in the front and rear direction may be smaller than the thickness of the main region in the front and rear direction, and the height of the partitioning portion may be greater than the thickness of the sub region in the front and rear direction and smaller than the thickness of the main region in the front and rear direction.
[0021] Further, a plurality of wall portions may be spaced apart from each other on a rear surface of the partitioning portion to form a groove.
[0022] Further, at least some of the plurality of wall portions may be in contact with some of the plurality of filter members of different types, respectively.
[0023] Further, an air purifier may include: the filter assembly described above; a frame supporting the filter assembly; and a fan assembly providing a blowing force to move air from an outside of the frame to an inside of the frame.

[0024] Further, the fan assembly may include a first fan unit and a second fan unit, the first fan unit may guide the air to pass through the first filter region of the filter assembly, and the second fan unit may guide the air to pass through the second filter region of the filter assembly.
[0025] Further, a plurality of wall portions may be spaced apart on a rear surface of the partitioning portion to form a groove, and the frame may include a plurality of protruding ribs that extend toward the partitioning portion, and the plurality of protruding ribs project toward an inner side of the groove or toward the first filter region and the second filter region outside the groove.
[0026] Further, a plurality of wall portions may be spaced apart on a rear surface of the partitioning portion to form a groove, the frame may include a protruding rib extending toward the partitioning portion, and the protruding rib may include a plurality of protruding ribs that protrude to face the plurality of wall portions.
[0027] In accordance with another aspect of the present disclosure, there is provided an air purifier including: a frame; a filter assembly detachably mounted on the frame for filtering air; a fan assembly providing a blowing force to move air from an outside of the frame to an inside of the frame; and a controller for controlling an operation of the fan assembly, wherein the filter assembly includes: a plurality of filter members of different types; and a filter holder supporting the plurality of filter members and including a first filter region and a second filter region which are separate from each other, wherein a portion of the plurality of filter members is supported by the filter holder in the first filter region, and another portion of the plurality of filter members is supported by the filter holder in the second filter region, wherein the fan assembly includes: a first fan unit for guiding the air to pass through the first filter region; and a second fan unit for guiding the air to pass through the second filter region, wherein an air resistance value for the portion of the filter members supported in the first filter region differs from an air resistance value for the portion of the filter members supported in the second filter region, and wherein the controller controls the fan assembly such that the first fan unit operates at a higher rotation speed than the second fan unit.
[0028] Further, the first filter region may be mounted in the frame to be disposed below the second filter region.
[0029] Further, the plurality of filter members may include a first filter member including a HEPA filter and a second filter member including a deodorization filter, the first filter member may include a plurality of first filter members, and one of the plurality of first filter members may be supported in the first filter region along with the second filter member, and another of the plurality of first filter members may be supported in the second filter region.
[0030] Further, the plurality of filter members may further include a third filter member of a type different from the first filter member and the second filter member, and the third filter member may be supported by the filter holder in the second filter region along with the other first filter member.
[0031] Further, the filter holder may include: an edge portion surrounding and supporting edges of the plurality of filter members; and a rib portion that prevents at least some of the plurality of filter members supported by the edge portion from becoming detached from the edge portion, and the rib portion may extend from the edge portion toward one or more of the first filter region and the second filter region.
[0032] Further, the filter holder may include: an edge portion surrounding and supporting edges of the plurality of filter members; and a gripping portion provided on an outer circumferential surface of the edge portion, and the gripping portion may be made of a flexible material to be disposed between the filter holder and the frame when the filter assembly is mounted in the frame.
[0033] Further, the filter holder may include an edge portion surrounding and supporting edges of the plurality of filter members, and, when viewed in an up and down direction, the edge portion may have at least a portion of each of both ends in a left and right direction tapered in shape.
[0034] Further, the edge portion, when viewed in the left and right direction, may have at least a portion of one end of both ends tapered in shape in the up and down direction, while the other end has a slope different from that of the one end.

[0035] Further, the frame may have an inlet for allowing the air to flow into the inside of the frame and an outlet for discharging the air from the inside of the frame to the outside of the frame, and the outlet may be formed at an upper portion of the frame, and the inlet is formed at a side surface of the frame.

Effect of Invention

[0036] According to one embodiment of the present disclosure, it is possible to mount or detach various types of filters into or from the frame simultaneously.

[0037] Furthermore, according to one embodiment of the present disclosure, the filter assembly can be prevented from being mounted into the frame in an incorrect orientation.

[0038] Additionally, according to one embodiment of the present disclosure, by controlling the first fan unit, which faces a first filter region, to operate at a higher rotational speed than a second fan unit, even if a higher differential pressure is applied to the first filter region than to the second filter region, air can smoothly pass through the first filter region.

[0039] Moreover, according to one embodiment of the present disclosure, a plurality of wall portions are supported by the protruding ribs of a frame, thereby preventing vortex formation between the filter assembly and the frame.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0040] FIG. **1** is a perspective view of an air purifier according to a first embodiment of the present disclosure.

[0041] FIG. **2** is an exploded perspective view of the air purifier shown in FIG. **1**.

[0042] FIG. **3** is a front view of the frame shown in FIG. **2**.

[0043] FIG. **4** is an exploded perspective view of the filter assembly shown in FIG. **2**.

[0044] FIG. **5** is a rear perspective view of a filter holder shown in FIG. **4**.

[0045] FIG. **6** is a cross sectional view taken along line VI-VI of FIG. **4**.

[0046] FIG. **7** is a plan view and partial enlarged view of the filter holder shown in FIG. **4**.

[0047] FIG. **8** is a left side view of the filter holder shown in FIG. **4**.

[0048] FIG. **9** is a cross sectional view taken along line IX-IX of FIG. **1**.

[0049] FIG. **10** is an exploded perspective view of a filter assembly according to a second embodiment of the present disclosure.

BEST MODE FOR CARRYING OUT THE INVENTION

[0050] Hereinafter, specific embodiments for implementing a spirit of the present disclosure will be described in detail with reference to the drawings.

[0051] In describing the present disclosure, detailed descriptions of known configurations or functions may be omitted to clarify the present disclosure.

[0052] When an element is referred to as being ‘connected’ to, ‘supported’ by, or ‘coupled’ to, another element, it should be understood that the element may be directly connected to, supported by, or coupled to another element, but that other elements may exist in the middle.

[0053] The terms used in the present disclosure are only used for describing specific embodiments, and are not intended to limit the present disclosure. Singular expressions include plural expressions unless the context clearly indicates otherwise.

[0054] Terms including ordinal numbers, such as first and second, may be used for describing various elements, but the corresponding elements are not limited by these terms. These terms are only used for the purpose of distinguishing one element from another element.

[0055] In the present specification, it is to be understood that the terms such as “including” are intended to indicate the existence of the certain features, areas, integers, steps, actions, elements, combinations, and/or groups thereof disclosed in the specification, and are not intended to preclude

the possibility that one or more other certain features, areas, integers, steps, actions, elements, combinations, and/or groups thereof may exist or may be added.

[0056] Further, in the present disclosure, it is to be noted that expressions, such as the upper side and the lower side, are described based on the illustration of drawings, but may be modified if directions of corresponding objects are changed. For the same reasons, some components are exaggerated, omitted, or schematically illustrated in the accompanying drawings, and the size of each component does not fully reflect the actual size.

[0057] Hereinafter, an air purifier **1** according to one embodiment of the present disclosure will be described with reference to the drawings.

[0058] Referring to FIGS. **1** and **2**, an air purifier **1** according to a first embodiment of the present disclosure is capable of purifying polluted air into clean air by filtering dust, odor particles, and the like from air introduced into an interior of the air purifier **1**. The air purifier **1** may draw in external air into an interior thereof and discharge a clean air that has been purified to an outside. Such an air purifier **1** may include a frame **100**, a filter assembly **200**, a fan assembly **300**, a controller **400**, and a pre filter **500**.

[0059] The frame **100** may support the filter assembly **200** and the fan assembly **300**. Additionally, the frame **100** may support the filter assembly **200** such that the filter assembly **200** is replaceably mounted. The frame **100** may include a body frame **110**, a cover frame **120**, and a support frame **130**.

[0060] The body frame **110** may support the filter assembly **200** and the fan assembly **300**. For example, the body frame **110** may have a predetermined space formed therein and may support the filter assembly **200** and the fan assembly **300** arranged inside thereof. An outlet **111** for discharging air introduced into the frame **100** to the outside may be formed in the body frame **110**. The outlet **111** may be disposed on an upper surface of the body frame **110**.

[0061] The cover frame **120** may be detachably coupled to the body frame **110**. The cover frame **120** may cover both front and rear sides of the body frame **110**. Further, an inlet **121** through which external air is introduced into the frame **100** may be formed in the cover frame **120**.

[0062] Meanwhile, a plurality of cover frames **120** may be provided, and the plurality of cover frames **120** may be coupled to both sides of the body frame **110**. For example, the plurality of cover frames **120** may be coupled to the front and rear surfaces of the frame **100**, allowing external air to be introduced from both front and back sides of the frame **100**.

[0063] Referring to FIGS. **2** and **3**, the support frame **130** may support the filter assembly **200** and may be configured so that the filter assembly **200** is removably mounted. In addition, the support frame **130** may be disposed on the inside of the body frame **110** and may be arranged on both front and rear sides of the fan assembly **300**. The support frame **130** may include a first support **131**, a second support **132**, a protruding rib **133**, and a frame step **134**.

[0064] The first support **131** may support an outer peripheral surface of the filter holder **210** when the filter assembly **200** is mounted on the frame **100**. For example, the first support **131** may support an upper, lower, left, and right surfaces of each of edge portions **211** and **212** described later when the filter assembly **200** is mounted on the frame **100**.

[0065] The second support **132** may support at least a portion of the filter holder **210** when the filter assembly **200** is mounted in the frame **100**. For example, the second support **132** may support the edge of the first edge portion **211** to be described later when the filter assembly **200** is mounted on the frame **100**. The second support **132** may extend outward from the fan housing **320** toward the outside of the frame **100**.

[0066] The protruding rib **133** may support the partitioning portion **213** of the filter holder **210**, as described later. For example, a plurality of protruding ribs **133** may be provided, and the plurality of protruding ribs **133** may support a plurality of wall portions **213***a* when the filter assembly **200** is mounted in the frame **100**. In this case, the plurality of protruding ribs **133** may come into close contact with the plurality of wall portions **213***a* and form an airflow path with the plurality of wall

portions **213***a*. Further, the plurality of protruding ribs **133** may protrude to face the plurality of wall portions **213***a* when the filter assembly **200** is mounted in the frame **100**. However, this is merely exemplary, and the protruding ribs **133** may protrude toward grooves between the wall portions **213***a* or toward a first filter region **210***a* and a second filter region **210***b*.

[0067] The frame step **134** may prevent the filter assembly **200** from being excessively inserted into the inside of the frame **100** when the filter assembly **200** is mounted in the frame **100**. For example, when the filter assembly **200** is mounted in the frame **100**, the filter assembly **200** may be caught by the frame step **134**. In this case, the filter assembly **200** does not come into close contact with the fan housing **320** and may be spaced apart from the fan housing **320**. The frame step **134** may be formed in at least one of the first support **131** and the second support **132**.

[0068] Referring to FIGS. **4** and **5**, the filter assembly **200** may filter external air into clean air. The filter assembly **200** may be detachably mounted in the frame **100**. For example, after a certain period of use, the filter assembly **200** may be replaced with a new one. Additionally, a plurality of filter assemblies **200** may be provided, and these may be arranged on both sides of the frame **100**. For example, the plurality of filter assemblies **200** may be disposed in the front and rear sides of the frame **100**, allowing filtration of air introduced from both the front and rear sides of the frame **100**. The filter assembly **200** may include a filter holder **210** and a filter unit **220**.

[0069] The filter holder **210** may support the filter unit **220** and may be mounted on the frame **100**. Additionally, the filter holder **210** may be provided to enclose the filter unit **220**. The filter holder **210** may include a first filter region **210***a* and a second filter region **210***b*.

[0070] In the first filter region **210***a*, a first filter member **221** and a second filter member **222** may be placed together. In this case, in the first filter region **210***a*, the first filter member **221** and the second filter member **222** may be arranged in a thickness direction of the filter holder **210**. The first filter region **210***a* may include a first main region **211***a* and a first sub region **212***a*, where different types of filter members **221**, **222**, and **223** are arranged.

[0071] The first main region **211***a* may accommodate the first filter member **221**, and the first sub region **212***a* may accommodate the second filter member **222**. Additionally, the first main region **211***a* and the first sub region **212***a* may be arranged in the thickness direction of the filter holder **210**. For instance, when the filter assembly **200** is mounted on the frame **100**, the first main region **211***a* may be positioned closer to the inside of the frame **100** than the first sub region **212***a*. Further, referring to FIG. **6**, a thickness T**1** of the first main region **211***a* in a front and rear direction may be greater than a thickness T**2** of the first sub region **212***a* in the front and rear direction.

[0072] Referring again to FIGS. **4** and **5**, in the second filter region **210***b*, the first filter member **221** and the third filter member **223** may be placed together. In this case, the second filter region **210***b* may have the first filter member **221** and the third filter member **223** arranged in the thickness direction of the filter holder **210**. Additionally, a differential pressure between air before passing through the second filter region **210***b* and air after passing through the second filter region **210***b* may differ from a differential pressure between air before passing through the first filter region **210***a* and air after passing through the first filter region **210***a*. For example, the differential pressure by the second filter region **210***b* may be lower than the differential pressure the first filter region **210***a*.

[0073] Furthermore, when the filter assembly **200** is mounted in the frame **100**, the second filter region **210***b* may be positioned above the first filter region **210***a*. The second filter region **210***b* may also include a second main region **211***b* and a second sub region **212***b*, where different types of filter members **221**, **222**, and **223** are arranged.

[0074] The second main region **211***b* may accommodate the first filter member **221**, and the second sub region **212***b* may accommodate the third filter member **223**. In addition, the second main region **211***b* and the second sub region **212***b* may be arranged in the thickness direction of the filter holder **210**. For example, when the filter assembly **200** is mounted in the frame **100**, the second main region **211***b* may be positioned closer to the inside of the frame **100** than the first sub region

212*a*. Referring to FIG. **6**, a thickness T**1** of the second main region **211***b* in the front and rear direction may be greater than a thickness T**2** of the second sub region **212***b* in the front and rear direction.

[0075] While the present specification describes the first filter region **210***a* and the second filter region **210***b* as having the main regions **211***a* and **211***b* and the sub regions **212***a* and **212***b*, respectively, this is merely exemplary and does not limit the present disclosure. Therefore, one or more of the first filter region **210***a* and the second filter region **210***b* may include the main regions **211***a* and **211***b* and the sub regions **212***a* and **212***b*. For example, only the first filter region **210***a* may include the main region **211***a* and the sub region **212***a*.

[0076] Meanwhile, the filter holder **210** may include a first edge portion **211**, a second edge portion **212**, a partitioning portion **213**, and a step **214**.

[0077] The first edge portion **211** surrounds and supports the first filter member **221**. The first edge portion **211** may form at least part of the first filter region **210***a* and at least part of the second filter region **210***b*. For example, the first edge portion **211** may form the first main region **211***a* of the first filter region **210***a* and the second main region **211***b* of the second filter region **210***b*. Additionally, when the filter assembly **200** is mounted in the frame **100**, the first edge portion **211** may be supported by the first support **131** and the second support **132**.

[0078] Referring to FIG. **7**, the first edge portion **211** may have a tapered shape in at least a portion of each of both ends thereof in a left and right direction when viewed in an up and down direction. For instance, when the filter assembly **200** is mounted in the frame **100** and viewed in the up and down direction, both ends of the first edge portion **211** in the left and right direction may spread outward toward the outside of the frame **100**. In this case, the filter assembly **200** can be prevented from being mounted on the frame **100** with the second edge portion **212** positioned more inward than the first edge portion **211** in the frame **100**. In other words, when the filter assembly **200** is mounted on the frame **100** with the second edge portion **212** positioned more inward than the first edge portion **211**, both ends of the first edge portion **211** in the left and right direction interfere with the support frame **130**.

[0079] Referring to FIG. **8**, among both ends of the first edge portion **211** in the up and down direction, when viewed in the left and right direction, one end has a tapered shape and the other end has a different slope from the one end. For example, the first edge portion **211**, when viewed from the left and right direction, may have upper and lower ends that are tapered with different inclines. In this case, the filter assembly **200** may be prevented from being mounted to the frame **100** with the first filter region **210***a* disposed upward of the second filter region **210***b*. In other words, when the filter assembly **200** is mounted in the frame **100** with the first filter region **210***a* disposed upward of the second filter region **210***b*, both upper and lower ends of the first edge portion **211** interfere with the support frame **130**.

[0080] The second edge portion **212** surrounds and supports the second filter member **222** and the third filter member **223**. The second edge portion **212** may form at least part of the first filter region **210***a* and at least part of the second filter region **210***b*. For example, the second edge portion **212** may form the first sub region **212***a* of the first filter region **210***a* and the second sub region **212***b* of the second filter region **210***b*. Additionally, when the filter assembly **200** is mounted in the frame **100**, the second edge portion **212** may be positioned outward of the frame **100** than the first edge portion **211**.

[0081] Referring again to FIG. **5**, the partitioning portion **213** may partition the first filter region **210***a* and the second filter region **210***b*. The partitioning portion **213** may be formed to extend across the first edge portion **211** and the second edge portion **212** with a predetermined width. Further, the partitioning portion **213** may be integrally coupled with the first edge portion **211** and the second edge portion **212**. The partitioning portion **213** may have a predetermined height H in the up and down direction, which may be greater than at least one of the thickness T**1** in the front and rear direction of the first main region **211***a* and the thickness T**2** in the front and rear direction

of the first sub region **212***a*. For example, the height H of the partitioning portion **213** may be smaller than the thickness T**1** in the front and rear direction of the first main region **211***a* and greater than the thickness T**2** in the front and rear direction of the first sub region **212***a*. The partitioning portion **213** may be positioned at the center of the filter holder **210** and may support the filter unit **220**. Additionally, the partitioning portion **213** may include a wall portion **213***a*.

[0082] The wall portion **213***a* may partition the first filter region **210***a* and the second filter region **210***b*. The wall portion **213***a* may include a plurality of wall portions **213***a* and the plurality of wall portions **213***a* may be spaced apart in the up and down direction in a rear surface of the partitioning portion **213** so that grooves are formed. Further, at least some of the plurality of wall portions **213***a* may each be in contact with some of the different types of filter members **221**, **222**, and **223**. For example, among the plurality of wall portions **213***a*, the wall portion **213***a* positioned in the lower side may contact the first filter member **221** and the second filter member **222**, and the wall portion **213***a* positioned in the upper side may contact the first filter member **221** and the third filter member **223**. The partitioning portion **213** may be supported by the protruding rib **133** when the filter assembly **200** is mounted in the frame **100**.

[0083] Referring again to FIG. **4**, the step **214** may engage with the second filter member **222** and the third filter member **223**. The step **214** may be formed on one or more of the edge portions **211** and **212** and the partitioning portion **213**. For example, the step **214** may be formed between the first edge portion **211** and the second edge portion **212**, and may be formed in an upper portion of the partitioning portion **213**. Further, the step **214** may be formed in the first filter region **210***a* and the second filter region **210***b*. The step **214** formed in the first filter region **210***a* may be formed along a periphery of the first filter region **210***a*, and the step **214** formed in the second filter region **210***b* may extend along a periphery of the second filter region **210***b*.

[0084] However, this is merely an example, and the step **214** may be formed on at least one of the first filter region **210***a* and the second filter region **210***b*. For example, the step **214** may be formed only in the first filter region **210***a*. In this case, the step **214** may extend along the periphery of the first filter region **210***a*.

[0085] The filter unit **220** may filter out contaminants from flowing air and filter external air into clean air. For example, the filter unit **220** may include known filters, such as a HEPA filter or a deodorization filter, to filter out dust, odor particles, etc., from the air. The filter unit **220** may include the plurality of filter members **221**, **222**, and **223**.

[0086] The plurality of filter members **221**, **222**, **223** may include the first filter member **221**, the second filter member **222**, and the third filter member **223**.

[0087] The first filter member **221** may be provided to filter out dust from air. For example, the first filter member **221** may include a HEPA filter. Also, the first filter member **221** may include a plurality of first filter members **221**. Some of the plurality of first filter members **221** may be placed in the first filter region **210***a* and others of the plurality of first filter members **221** may be placed in the second filter region **210***b*. Additionally, the first filter member **221** may be arranged to face the fan assembly **300** when the filter assembly **200** is mounted in the frame **100**.

[0088] The second filter member **222** may be provided to filter odor particles from air. For example, the second filter member **222** may include a carbon filter. The second filter member **222** may be placed in the first filter region **210***a*. Additionally, the second filter member **222** may be arranged to face the cover frame **120** when the filter assembly **200** is mounted in the frame **100**.

[0089] The third filter member **223** may be a different type of filter from the first and second filter members **221** and **222** and may be a functional filter that provides various functions. For example, the third filter member **223** may be an antibacterial filter capable of sterilizing microorganisms in air. However, although the third filter member **223** is described as an antibacterial filter in the present specification, it is merely an example, and the third filter member **223** may be a known filter that provides various functions. The third filter member **223** may be placed in the second filter region **210***b*. Additionally, the third filter member **223** may be arranged to face the cover

frame **120** when the filter assembly **200** is mounted in the frame **100**.
[0090] Meanwhile, an air resistance value for certain filter members **221** and **222** supported in the first filter region **210***a* may differ from an air resistance value for other filter members **221** and **223** supported in the second filter region **210***b*. For example, the air resistance value for the first filter member **221** and the second filter member **222** supported in the first filter region **210***a* may be greater than the air resistance value for the first filter member **221** and the third filter member **223** supported in the second filter region **210***b*.
[0091] Referring to FIG. **9**, the fan assembly **300** may provide blowing power to flow external air into the frame **100**. The fan assembly **300** may include a plurality of fan units **310**. The plurality of fan units **310** may include a first fan unit **311** and a second fan unit **312**, arranged in the up and down direction.
[0092] The first fan unit **311** may flow air toward the first filter region **210***a*. The first fan unit **311** may be disposed below the second fan unit **312**. Additionally, the first fan unit **311** may face the first filter region **210***a* when the filter assembly **200** is mounted in the frame **100**.
[0093] The second fan unit **312** may flow air toward the second filter region **210***b*. The second fan unit **312** may face the second filter region **210***b* when the filter assembly **200** is mounted in the frame **100**.
[0094] The first fan unit **311** and the second fan unit **312** may each include a fan housing **320**, a fan **330**, and a fan motor **340**.
[0095] The fan housing **320** may accommodate the fan **330** and the fan motor **340**. The fan housing **320** may be supported by the body frame **110**. The fan housing **320** may have an intake port **321** through which air is drawn into the fan housing **320** and an outlet **322** through which the air drawn into the fan housing **320** is discharged.
[0096] The fan **330** may rotate about a rotation axis extending in the front and rear direction. The fan **330** may be driven by the fan motor **340**.
[0097] The fan motor **340** may rotate the fan **330**, and the operation of the fan motor **340** may be controlled by the controller **400**.
[0098] The controller **400** may control the operation of the fan assembly **300**. The controller **400** may control the first fan unit **311** and the second fan unit **312** to operate differently. For example, the controller **400** may control the first fan unit **311** and the second fan unit **312** such that the first fan unit **311** operates at a higher rotational speed (rpm) than the second fan unit **312**. The controller **400** may be implemented with an electrical circuit board including a processor, a memory, and the like. The controller **400** may be implemented by a computing device including a microprocessor, a measurement device such as a sensor, and memory, the implementation method of which will be apparent to those skilled in the art and will not be described in further detail.
[0099] The pre filter **500** may primary filter contaminants in air before the air is filtered in the filter assembly **200**. The pre filter **500** may be disposed between the cover frame **120** and the filter assembly **200**, and external air may be passed through the pre filter **500** before passing through the fan assembly **300**. For example, the external air may pass sequentially through the inlet **121**, the pre filter **500**, the filter assembly **200**, and the fan assembly **300**.
[0100] In addition to the aforementioned configuration, according to-second embodiment of the present disclosure, the filter holder **210** may further include a rib portion **215** and a gripping portion **216**. Hereinafter, the second embodiment of the present disclosure will be described with reference to FIG. **10**. In describing the second embodiment, emphasis is placed on differences from the previously described embodiment, with the same descriptions and reference numbers being used as in the preceding embodiment.
[0101] The rib portion **215** may prevent the second filter member **222** and the third filter member **223**, supported by the second edge portion **212**, from detaching from the second edge portion **212**. This rib portion **215** may extend from the second edge portion **212** toward an inner side of the second edge portion **212**.

[0102] The gripping portion **216** may be provided on either the first edge portion **211** or the second edge portion **212** to allow a user to easily grip the filter assembly **200**. The gripping portion **216** may be made of a flexible material so that it can be positioned between the second edge portion **212** and the support frame **130** when the filter assembly **200** is mounted in the frame **100**.
[0103] As described above, according to the embodiments of the present disclosure, the filter assembly **200** allows various types of filter members **221**, **222**, and **223** to be supported by the single filter holder **210**, enabling the plurality of filter members **221**, **222**, and **223** to be attached to or detached from the frame **100** at once. In this case, transporting the plurality of filter members **221**, **222**, and **223** is convenient, and they can be easily replaced from the frame **100**.
[0104] Furthermore, the filter assembly **200** can be directionally mounted on the frame **100** due to the tapered shape of the edge portions **211** and **212** of the filter holder **210**. In this case, it is possible to prevent the filter assembly **200** from being mounted on the frame **100** such that the first filter member **221** is disposed on an outer side of the frame **100** than the second filter member **222**. Further, it is possible to prevent the filter assembly **200** from being mounted in the frame **100** such that the second filter member **222** is positioned above the third filter member **223**.
[0105] Meanwhile, according to the embodiments of the present disclosure, the air purifier **1** can prevent vortex formation between the filter assembly **200** and the frame **100** by supporting the plurality of wall portions **213***a* with the protruding rib **133** of the frame **100**. In this case, air that has passed through the filter assembly **200** can flow smoothly toward the fan assembly **300** without remaining between the filter assembly **200** and the frame **100**.
[0106] Further, the air purifier **1** controls the first fan unit **311**, which faces the first filter region **210***a*, to operate at a higher rotational speed than the second fan unit **312**. Accordingly, even if a higher differential pressure is applied to the first filter region **210***a* than to the second filter region **210***b*, air can flow smoothly through the first filter region **210***a*. **5**
[0107] The examples of the present disclosure have been described above as specific embodiments, but these are only examples, and the present disclosure is not limited thereto, and should be construed as having the widest scope according to the technical spirit disclosed in the present specification. A person skilled in the art may combine/substitute the disclosed **10** embodiments to implement a pattern of a shape that is not disclosed, but it also does not depart from the scope of the present disclosure. In addition, those skilled in the art can easily change or modify the disclosed embodiments based on the present specification, and it is clear that such changes or modifications also belong to the scope of the present disclosure.

Claims

1. A filter assembly comprising: a plurality of filter members of different types for filtering contaminants from flowing air; and a filter holder supporting the plurality of filter members and including a first filter region and a second filter region that are separated without overlapping when viewed in a direction of air flow, wherein the filter holder includes: a first edge portion forming at least a portion of the first filter region; a second edge portion forming at least a portion of the second filter region; and a partitioning portion dividing the first filter region and the second filter region, and wherein the first edge portion, the second edge portion, and the partitioning portion are integrally combined.
2. The filter assembly of claim 1, wherein one or more of the first filter region and the second filter region include a sub region in which one of the different types of filter members is supported and a main region in which another of the different types of filter members is supported, to stack and support the different types of filter members.
3. The filter assembly of claim 2, wherein one or more of the first edge portion, the second edge portion, and the partitioning portion includes a stepped portion formed between the sub region and the main region, and wherein the stepped portion extends along at least a perimeter of one or more

of the first filter region and the second filter region.
4. The filter assembly of claim 2, wherein a height of the partitioning portion is greater than at least one of a thickness of the sub region in a front and rear direction and a thickness of the main region in the front and rear direction.
5. The filter assembly of claim 4, wherein the thickness of the sub region in the front and rear direction is smaller than the thickness of the main region in the front and rear direction, and the height of the partitioning portion is greater than the thickness of the sub region in the front and rear direction and smaller than the thickness of the main region in the front and rear direction.
6. The filter assembly of claim 1, wherein a plurality of wall portions are spaced apart from each other on a rear surface of the partitioning portion to form a groove.
7. The filter assembly of claim 6, wherein at least some of the plurality of wall portions are in contact with some of the plurality of filter members of different types, respectively.
8. An air purifier comprising: the filter assembly of claim 1; a frame supporting the filter assembly; and a fan assembly providing a blowing force to move air from an outside of the frame to an inside of the frame.
9. The air purifier of claim 8, wherein the fan assembly includes a first fan unit and a second fan unit, wherein the first fan unit guides the air to pass through the first filter region of the filter assembly, and wherein the second fan unit guides the air to pass through the second filter region of the filter assembly.
10. The air purifier of claim 8, wherein a plurality of wall portions are spaced apart on a rear surface of the partitioning portion to form a groove, and wherein the frame includes a plurality of protruding ribs that extend toward the partitioning portion, and the plurality of protruding ribs project toward an inner side of the groove or toward the first filter region and the second filter region outside the groove.
11. The air purifier of claim 8, wherein a plurality of wall portions are spaced apart on a rear surface of the partitioning portion to form a groove, wherein the frame includes a protruding rib extending toward the partitioning portion, and wherein the protruding rib includes a plurality of protruding ribs that protrude to face the plurality of wall portions.
12. An air purifier comprising: a frame; a filter assembly detachably mounted in the frame for filtering air; a fan assembly providing a blowing force to move air from an outside of the frame to an inside of the frame; and a controller for controlling an operation of the fan assembly, wherein the filter assembly includes: a plurality of filter members of different types; and a filter holder supporting the plurality of filter members and including a first filter region and a second filter region which are separate from each other, wherein a portion of the plurality of filter members is supported by the filter holder in the first filter region, and another portion of the plurality of filter members is supported by the filter holder in the second filter region, wherein the fan assembly includes: a first fan unit for guiding the air to pass through the first filter region; and a second fan unit for guiding the air to pass through the second filter region, wherein an air resistance value for the portion of the filter members supported in the first filter region differs from an air resistance value for the portion of the filter members supported in the second filter region, and wherein the controller controls the fan assembly such that the first fan unit operates at a higher rotation speed than the second fan unit.
13. The air purifier of claim 12, wherein the first filter region is mounted in the frame to be disposed below the second filter region.
14. The air purifier of claim 12, wherein the plurality of filter members include a first filter member including a HEPA filter and a second filter member including a deodorization filter, wherein the first filter member includes a plurality of first filter members, and wherein one of the plurality of first filter members is supported in the first filter region along with the second filter member, and another of the plurality of first filter members is supported in the second filter region.
15. The air purifier of claim 14, wherein the plurality of filter members further include a third filter

member of a type different from the first filter member and the second filter member, and wherein the third filter member is supported by the filter holder in the second filter region along with the other first filter member.

16. The air purifier of claim 12, wherein the filter holder includes: an edge portion surrounding and supporting edges of the plurality of filter members; and a rib portion that prevents at least some of the plurality of filter members supported by the edge portion from becoming detached from the edge portion, wherein the rib portion extends from the edge portion toward one or more of the first filter region and the second filter region.

17. The air purifier of claim 12, wherein the filter holder includes: an edge portion surrounding and supporting edges of the plurality of filter members; and a gripping portion provided on an outer circumferential surface of the edge portion, and wherein the gripping portion is made of a flexible material to be disposed between the filter holder and the frame when the filter assembly is mounted in the frame.

18. The air purifier of claim 12, wherein the filter holder includes an edge portion surrounding and supporting edges of the plurality of filter members, and wherein, when viewed in an up and down direction, the edge portion has at least a portion of each of both ends in a left and right direction tapered in shape.

19. The air purifier of claim 18, wherein the edge portion, when viewed in the left and right direction, includes at least a portion of one end of both ends tapered in shape in the up and down direction, and the other end that has a slope different from a slope of the one end.

20. The air purifier of claim 12, wherein the frame has an inlet for allowing the air to flow into the inside of the frame and an outlet for discharging the air from the inside of the frame to the outside of the frame, and wherein the outlet is formed at an upper portion of the frame, and the inlet is formed at a side surface of the frame.