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(71) Applicant and
(72) Inventor: **KIM, Dong Kyu** [KR/KR]; 201 Mido Villa, 863-18 (23/3) Dang-dong, Gunpo-si, Gyeonggi-do 435-010 (KR).

(74) Agent: **SEONG, Nak Hoon**; 503 Seongji Heights 3-cha Bldg., 642-6 Yeoksam-dong, Gangnam-gu, Seoul 135-717 (KR).

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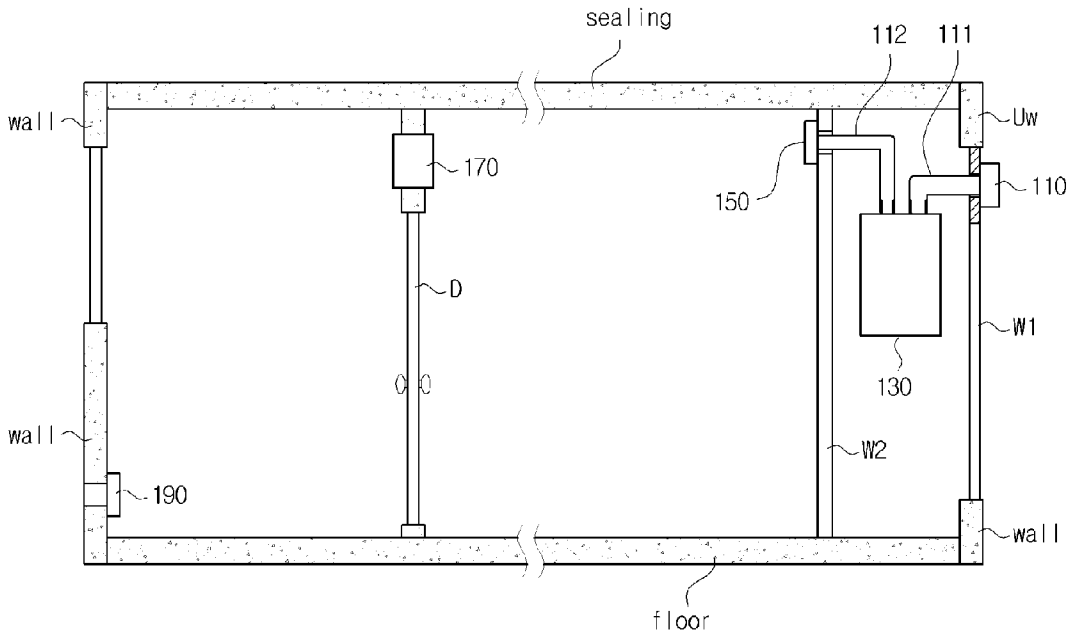
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: VENTILATING SYSTEM



(57) Abstract: Disclosed is a ventilation system (100) comprising an air introduction unit (110) for introducing outdoor air into an indoor space, an air purification unit (130) for purifying air introduced by the air introduction unit (110), an air jet unit (150) for diffusing and jetting air purified by the air purification unit (130) into a predetermined space, an air distribution unit (170) for distributing air in the predetermined space to a plurality of spaces, and an air evacuation unit (190) for evacuating air containing pollutants which reside in the plurality of spaces.

WO 2007/114590 A1

Description

VENTILATING SYSTEM

Technical Field

[1] The present invention relates to a ventilating system, and more particularly to a ventilation system which purifies and sends fresh outdoor air to a space inside a building and forcibly evacuates polluted indoor air outside the building in order to keep indoor air fresh.

Background Art

[2] A ventilation system is an apparatus which is generally installed in buildings and transportation systems to exchange polluted indoor air with fresh outdoor air. For example, the ventilation system has a structure in general buildings such that polluted air is pushed up by the pressure caused by the difference between indoor and outdoor temperatures and is then evacuated outside a building by the suction force of natural wind blowing in an upper portion of a space inside the building, and fresh air is pulled up from the lower portion of the indoor space of the building.

[3] Such a ventilation system has a problem of decreased heating efficiency, especially in the winter season, because heated air rises and is exhausted.

[4] In particular, carcinogens such as benzene, toluene, or xylene, having relatively high specific gravity in comparison with oxygen, remain in an indoor space rather than being discharged outside, since they cannot rise along with the heated air.

[5] Furthermore, in the case in which the ventilation system is equipped with a heat exchanger in order to recover heat from the discharged heated air, narrow gaps between heat-sinking plates of the heat exchanger cause heat exchange efficiency to decrease as time goes by because foreign matter is caught in the gaps between heat-sinking plates, and makes the work of cleaning the heat exchanger difficult. Further, since the structure of the ventilation system is complicated, price competitiveness suffers.

Disclosure of Invention

Technical Problem

[6] Accordingly, the present invention has been devised in consideration of the aforementioned problems and conditions, and it is a feature of the present invention to provide a ventilation system which does not evacuate hot air rising to and staying in an upper portion of a space inside a building, so that heat efficiency is thus increased.

[7] It is a further feature of the present invention to provide a ventilation system which can reliably evacuate carcinogens, such as benzene, toluene, and xylene, residing in the lower portion of a space inside a building.

[8] It is a still further feature of the present invention to provide a ventilation system which does not cause problems such as decreased heating efficiency, cleaning difficulty, and complication of a ventilation structure attributable to a heat exchanger.

Technical Solution

[9] In order to achieve the above described advantageous effects and features in accordance with the present invention, there is provided a ventilation system having an air introduction unit for introducing outdoor air into a space inside a building and an air evacuation unit for evacuating indoor air outside the building, in which the air introduction unit is installed in an upper portion of the building and the air evacuation unit is installed in a lower portion of the building.

[10] The ventilation system further includes an air purification system such as a filter in order to purify outdoor air before the outdoor air is introduced into of the space inside the building.

Advantageous Effects

[11] According to the present invention, it is possible to increase heating efficiency because indoor air is evacuated through the air evacuation unit installed in a lower portion of a building so heated air residing in an upper portion of a room of a building is not evacuated outside.

[12] Further, since the air evacuation unit is installed in a lower portion of a building, carcinogens such as benzene, toluene, and xylene, residing in a lower portion of a building, can be reliably evacuated outside the building.

[13] Still further, since the ventilation system does not include a heat exchanger, the ventilation system is free from problems of decreased heat exchange efficiency, difficulty in cleaning a heat exchanger, and complication of the ventilation structure.

Brief Description of the Drawings

[14] FIG. 1 is a schematic view illustrating a ventilation system according to one embodiment of the present invention;

[15] FIG. 2 is a schematic view illustrating an air introduction unit shown in FIG. 1;

[16] FIG. 3 is a schematic view illustrating a purification unit shown in FIG. 1;

[17] FIG. 4 is a cross-sectional view illustrating the purification unit, taken along line A-A shown in FIG. 1;

[18] FIG. 5 is a cross-sectional view illustrating a filter shown in FIG. 4;

[19] FIG. 6 is a cross-sectional view illustrating an air purification unit, taken along line B-B shown in FIG. 3;

[20] FIG. 7 is a cross-sectional view illustrating the air diffuser shown in FIG. 1;

[21] FIG. 8 is a perspective view illustrating the air distribution unit shown in FIG. 1;

[22] FIG. 9 is a cross-sectional view illustrating the socket and filter shown in FIG. 8;

[23] FIG. 10 is a perspective view illustrating the air evacuation unit shown in FIG. 1; and

[24] FIG. 11 is a cross-sectional view illustrating the socket and filter shown in FIG. 10.

Best Mode for Carrying Out the Invention

[25] A ventilation system according to the present invention includes an air introduction unit for introducing outdoor air into a building, an air purification unit for purifying air introduced by the air introduction unit, an air jet unit for diffusing and jetting air purified by the air purification unit into a predetermined space in the building, an air distribution unit for distributing the air in the predetermined space to divided spaces, and an air evacuation unit for evacuating polluted air in the divided spaces outside.

[26] The ventilation system may further include an installation plate for receiving the air introduction unit therein. The installation plate is made of iron net or PVC net.

[27] The ventilation system may further include a filter for filtrating introduced air and a blower for blowing the purified air.

[28] The filter include a filter part, further includes a ring-shaped upper lid and a ring-shaped lower lid installed on an upper end and a lower end of the filter part, respectively, and is connected to the air introduction unit via a transportation pipe. The filter part has a wrinkled shape, like the letter "W."

[29] The blower is installed in the air introduction unit using an anti-vibration pad in order to absorb vibrations generated when the blower operates and is connected to the air distribution unit via two or more transportation pipes.

[30] The air jet unit may include an air diffuser which diffuses and jets air, and the air diffuser includes a diffusing part for diffusing air and a neck part connected to the air purification unit via a transportation pipe.

[31] The air distribution unit may include a socket installed to a fixed body and a filter detachably installed to the socket.

[32] The filter includes a filter part, for filtering dust from the air and preventing the generation of noise, and ring-shaped lids combined with respective ends of the filter part. The filter part includes an outer filter part and an inner filter part, which is inserted into the outer filter part, and the outer filter part and the inner filter part form a wrinkled shape in the form of the letter "W."

[33] The air evacuation unit includes a socket installed on a fixed body and a filter detachably attached to the socket.

[34] The socket is provided with a fan motor for evacuating indoor air to the outside.

[35] The filter includes a filter part for preventing the introduction of outdoor air and the generation of noise, and ring-shaped lids combined with respective ends of the filter part. The filter part has a wrinkled shape in the form of the letter "W."

Mode for the Invention

[36] Hereinafter, a ventilation system according to preferred embodiments of the present invention will be described with reference to the accompanying drawings.

[37] The ventilation system according to embodiments of the present invention is an example of a ventilation system installed in a building having a veranda, a living room and bedrooms.

[38] As shown in FIG. 1, the ventilation system 100 comprises an air introduction unit 100, an air purification unit 130, an air jet unit 150, an air distribution unit 170, and an air evacuation unit 190.

[39] The air introduction unit 110 functions to introduce outdoor air into a building, and is fixed to an outer window W1 of a veranda.

[40] The air purification unit 130 functions to purify outdoor air introduced by the air introduction unit 110 and is fixed to the inner surface of a wall of a veranda using a fixing means such as bolts.

[41] The air jet unit 150 functions to jet purified air toward a living room, and is fixed to the upper portion of an inner window W2 of a veranda, disposed between the veranda and the living room.

[42] The air introduction unit 110 and the air purification unit 130 are connected to each other via a first transportation pipe 111, and the air purification unit 130 and the air jet unit 150 are connected to each other via a second transportation pipe 112.

[43] The air distribution unit 170 functions to distribute air, jetted to the living room, to respective bedrooms and is fixed to the upper portion of a door D disposed between the living room and the bedroom.

[44] The air evacuation unit 190 functions to evacuate polluted indoor air outside a building and is installed to be fixed to the lower portion of the inner surface of a wall of each bedroom.

[45] As shown in FIG. 2, the upper portion of the window W1 is cut away, a partition plate 121 is provided on the cut upper end of the window W1, and an installation plate 122 is provided on the partition plate 121. The installation plate 122 can be made of iron net or PVC net, and is securely fixed between the wall (denoted by Uw in FIG. 1) and the partition plate 121 by a fixing means such as an adhesive, which is not shown, but is well-known.

[46] The installation plate 122 has a penetration hole 123, allowing air introduced by the air introduction unit 110 to pass therethrough, and a plurality of through holes 124 arranged around the penetration hole 123. The air introduction unit 110 is fixed to the installation plate 122 using a coupling means such as bolts 125 which are passed through respective through holes 124.

[47] As shown in FIG. 3, the air purification unit 130 includes a cube-shaped casing 131, and sockets 132 and 133 provided in a top panel of the casing 131. One socket 132 is disposed on a first side of the top panel of the casing 131 and the other two sockets 133 are disposed on a second side of the top panel of the casing 131, being spaced far apart from the socket 132.

[48] As shown in FIG. 4, which is a cross-sectional view taken along line A-A in FIG. 3, the sockets 132 and 133 provided on the top panel of the casing 131 protrude from the upper surface and the lower surface, respectively, and extend upward and downward from the upper and the lower surface, respectively, by a predetermined length.

[49] In the casing 131, a filter 134 for filtering air and a blower 135 for directing the filtrated air toward the outside of the casing are installed.

[50] The filter 134, as shown in FIG. 5, comprises a filter part 136 and an upper lid 137a and a lower lid 137b for securing the filter part 136. A ring-shaped lid fixation plate 138 is installed on the upper lid 137a, and the socket 139 is fixed on the lid fixation plate 138 through a welding method. The socket 132 and the socket 139 are connected to each other via a third transportation pipe 113.

[51] The filter part 136 is densely wrinkled to thus have the shape of the letter "W" and has a cylindrical shape overall when it is in the state of shrinking. When the filter part 136 is in the state of shrinking, the upper lid 137a and the lower lid 137b are inserted into an upper end portion and a lower end portion of the filter part 137, respectively.

[52] The blower 135 is selected from ones which are well known in the art. The blower 135 is securely installed on the support plate 141, which has the shape of the letter "L" and is installed on the floor. Further, an anti-vibration pad 142 is provided between the support plate 141 and the floor in order to absorb vibrations generated when the blower 135 operates.

[53] As shown in FIG. 6, there are a fan motor 143 and a distributor 144 for distributing air into two pipes. The distributor 144 is installed such that it is fixed to the blower 135 using a fixing belt 145.

[54] The distributor 144 is connected to the two sockets 133 installed in the top plate 151 via two fourth transportations 114.

[55] As shown in FIG. 7, the air jet unit 150 has a hollow cylindrical or parallelepiped casing 151, and is fixed to the window W2 of a veranda by a coupling means such as bolts 153, which pass through the through holes 152 formed in the casing 151. A diffuser 154 is disposed in the casing 151 in order to diffuse and jet air. The diffusing part 155 of the diffuser 154 is directed toward the living room, and a neck part 156 of the diffuser 154 is directed toward the veranda. The neck part 156 is connected to the second transportation pipe 112 connected to the air purification unit 130.

[56] As shown in FIG. 8 and FIG. 9, the air distribution unit 170 includes a socket 171

and a filter 175.

[57] The socket 171 is installed on a panel disposed above a door between each bedroom and the living room. The socket 171 comprises an insertion part 171 inserted into a hole which has a diameter from 125 to 250 millimeters and is formed in the wall above the door, an installation part 173 to which the filter 175 is installed, and a frame part 174 disposed between the insertion part 172 and the installation part 173 and having a relatively large area in comparison with the insertion part 172 and the installation part 173. Thanks to the frame part 174, the insertion part 172 is inserted alone into the hole of the wall in which the socket 141 is provided.

[58] The filter 175 comprises a filter part 176, which eliminates dust from the air and prevents noise, and a ring-shaped front lid 177 and a ring-shaped back lid 178 which are coupled to the front end and the back end of the filter part 176. The filter part 176 comprises an inner filter part 176a and an outer filter part 176b. The inner filter part 176a has a cylinder shape having a diameter of 270 millimeters, and has wrinkles, each being distanced by about 20 millimeters and formed by folding filter cloth into the shape of the letter "W" 280 times. The outer filter part 176b has a cylinder shape having a diameter of 320 millimeters, and has wrinkles, each being distanced by about 20 millimeters and formed by folding filter cloth into the shape of the letter "W" 350 times. The inner filter part 176a is inserted into the outer filter part 176b. A picture frame can be attached to the outer surface of the front lid 177 in order to improve the appearance of the filter.

[59] Since the filter 175 can be separated from the socket 171, it is possible to separate the filter 175 alone when dust collects on the filter 175, so that the filter 175 can be easily cleaned.

[60] As shown in FIG. 10 and FIG. 11, the air evacuation unit 190 comprises a socket 191 and a filter 195.

[61] The socket 191 is installed in a lower portion of an outer wall of each bedroom. The socket 191 comprises an insertion part 192 inserted into a hole formed in the outer wall of each bedroom and an installation part 193 to which the filter 195 is installed. A frame part 194, having a relatively large area in comparison with the insertion part 192 and the installation part 193, is provided between the insertion part 192 and the installation part 193. Thanks to the frame part 194, the insertion part 192 is inserted alone into the hole of the wall in which the socket 191 is formed. Further, a fan motor 196 is installed on the installation part 193 in order to evacuate air.

[62] The filter 195 comprises a filter part 197 which prevents outdoor air from being introduced and inhibits noise generated when the fan motor 196 operates, and a ring-shaped front lid 198a and a ring-shaped back lid 198b which are coupled to the front end and the back end of the filter part 197, respectively. The filter part 197 has

wrinkles formed by folding filter cloth in the shape of the letter "W" 280 times, in which the wrinkles are distanced from each other by about 20 millimeters, and has a diameter of 270 millimeters.

[63] A picture frame can be attached to the outer surface of the front lid 198a in order to improve the appearance of the filter 195.

[64] Since the filter 195 can be separated from the socket 191, the filter can be easily cleaned when dust is piled on the filter 195.

[65] The operation of the ventilation system according to the present invention is described below.

[66] Outdoor air introduced by the air introduction unit 110 flows to the air purification unit 130 via the first transportation pipe 111.

[67] The air then flows to the filter unit 134 via the third transportation pipe 113, which is connected to the first transportation pipe 111, so that it is filtered. The filtered air flows to the second transportation pipe 112 via the fourth transportation pipe 114 using the force of the blower 135.

[68] The air is then jetted into the living room by the air jet unit 150, which is connected to the second transportation pipe 112. At this time, pollutants residing near the floor of the living room are pushed outside the building through a gap formed between a windowsill and a window due to the movement of air.

[69] Then, the air in the living room flows toward each bedroom through the air distribution unit 170. At this time, indoor air containing pollutants near the floor of each bedroom is discharged outside the bedroom thanks to suction force generated when the fan motor 196 of the air evacuation unit 190 operates. Thus, thanks to the air distribution unit 170, the air fills empty spaces formed as the indoor air is discharged.

[70] Hereinabove, even though the ventilation system according to the present invention is described with reference to preferred embodiments, the present invention is not limited to the above-described embodiments, and those skilled in the art will appreciate that various modifications and changes are possible, without departing from the scope and spirit of the invention.

Industrial Applicability

[71] The ventilation system according to the present invention can be installed in buildings and vehicles, and can increase heating efficiency because hot air rising to the upper portion of an indoor space is not discharged out.

[72] The ventilation system according to the present invention can reliably discharge carcinogens such as benzene, toluene, and xylene residing in the lower portion of a space inside buildings and vehicles.

[73] Since the ventilation system according to the present invention does not include a

heat exchanger, it can be free from problems such as decreased heat exchange efficiency, difficulty in cleaning a heat exchanger, and complication of a ventilation structure.

Claims

[1] A ventilation system, comprising:
an air introduction unit for introducing outdoor air into an indoor space;
an air purification unit for purifying air introduced by the air introduction unit;
an air jet unit for diffusing and jetting air purified by the air purification unit into a predetermined indoor space;
an air distribution unit for distributing air remaining in the predetermined indoor space to other partitioned indoor spaces; and
an air evacuation unit for evacuating air containing pollutants which remain in the partitioned indoor spaces outside.

[2] The ventilation system according to claim 1, further comprising an installation plate in which the air introduction unit is installed.

[3] The ventilation system according to claim 2, wherein the installation plate is made of iron net or PVC net.

[4] The ventilation system according to claim 1, wherein the air purification unit includes a filter for filtering the introduced air and a blower for blowing the purified air out.

[5] The ventilation system according to claim 4, wherein the filter comprises a filter part, and a ring-shaped upper lid and a ring-shaped lower lid installed to an upper end and a lower end of the filter part, respectively, and wherein the filter is connected to the air introduction unit via a transportation pipe.

[6] The ventilation system according to claim 5, wherein the filter part has a wrinkled shape in the form of a letter "W."

[7] The ventilation system according to claim 4, wherein the blower is installed to the air purification unit using an anti-vibration pad disposed therebetween.

[8] The ventilation system according to claim 4, wherein the blower is connected to the air jet unit via two or more transportation pipes.

[9] The ventilation system according to claim 1, wherein the air jet unit includes an air diffuser which diffuses and jets air, and the air diffuser comprises a diffusing part for diffusing air and a neck part connected to the air purification unit via a transportation pipe.

[10] The ventilation system according to claim 1, wherein the air distribution unit comprises a socket installed to a fixed body and a filter detachably installed to the socket.

[11] The ventilation system according to claim 10, wherein the filter comprises a filter part for eliminating dust from air and inhibiting noise, and ring-shaped lids provided to respective ends of the filter part.

[12] The ventilation system according to claim 11, wherein the filter part comprises an outer filter part and an inner filter part, inserted into the outer filter part, and the inner filter part and the outer filter part form a wrinkled shape in a form of a letter "W."

[13] The ventilation system according to claim 1, wherein the air evacuation unit comprises a socket installed to a fixed body and a filter detachably installed to the socket.

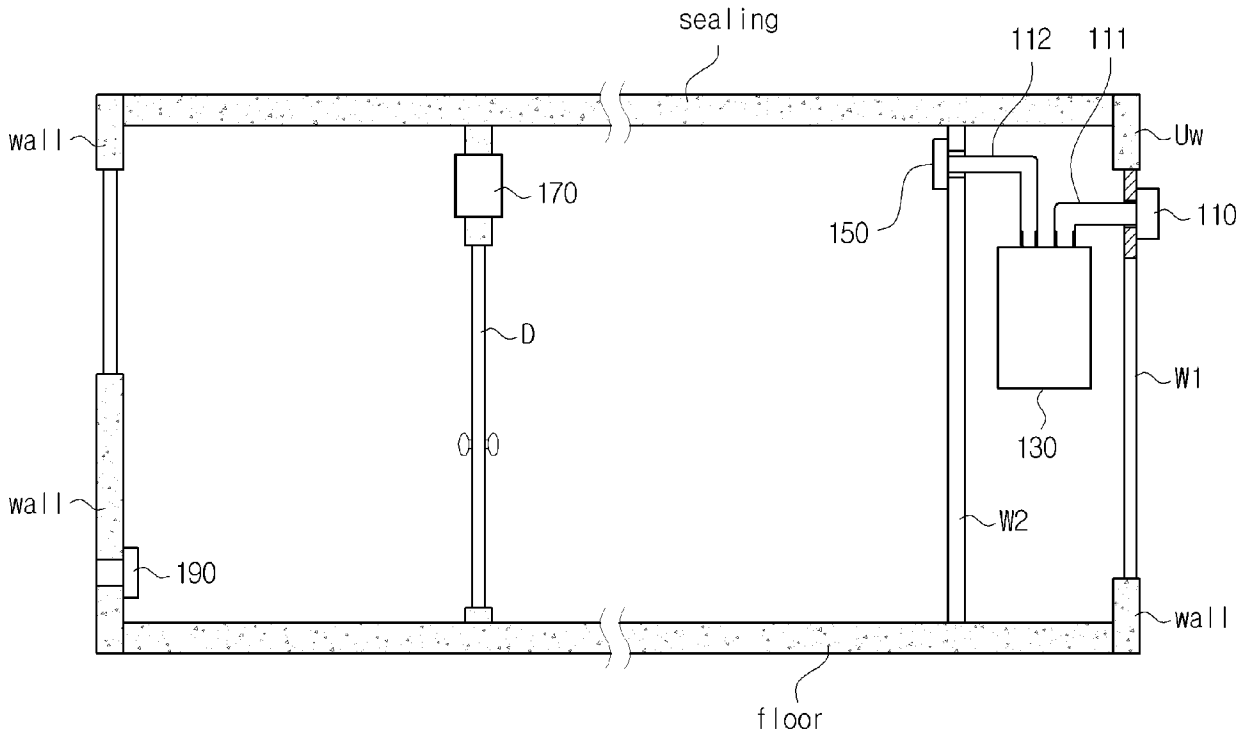
[14] The ventilation system according to claim 13, wherein the socket has a fan motor which evacuates indoor air out.

[15] The ventilation system according to claim 13, wherein the filter comprises a filter part which prevents introduction of outdoor air and generation of noise and ring-shaped lids provided to respective ends of the filter part.

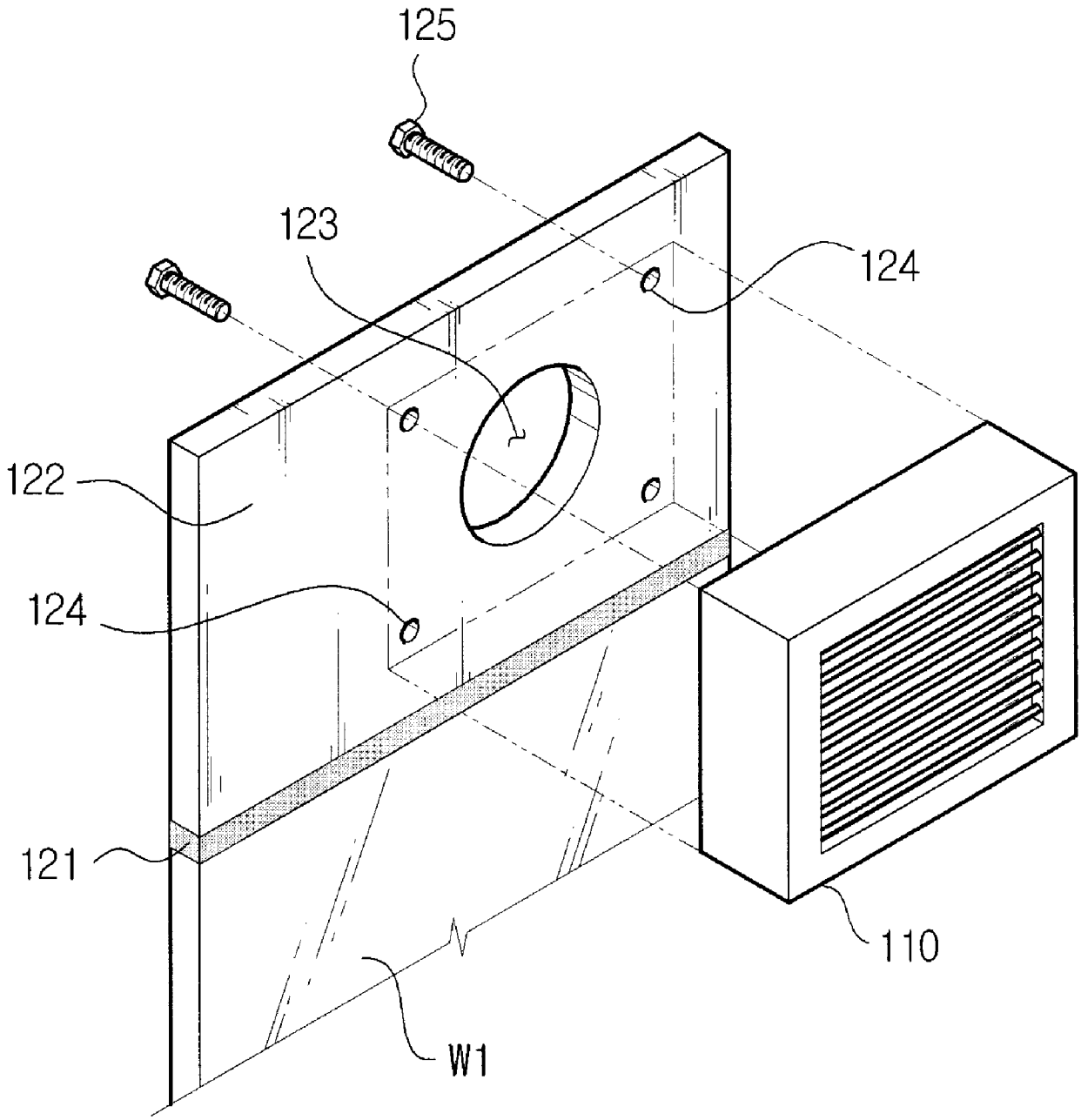
[16] The ventilation system according to claim 15, wherein the filter part has a wrinkled shape in a form of a letter "W."

WO 2007/114590 PCT/KR2007/001549

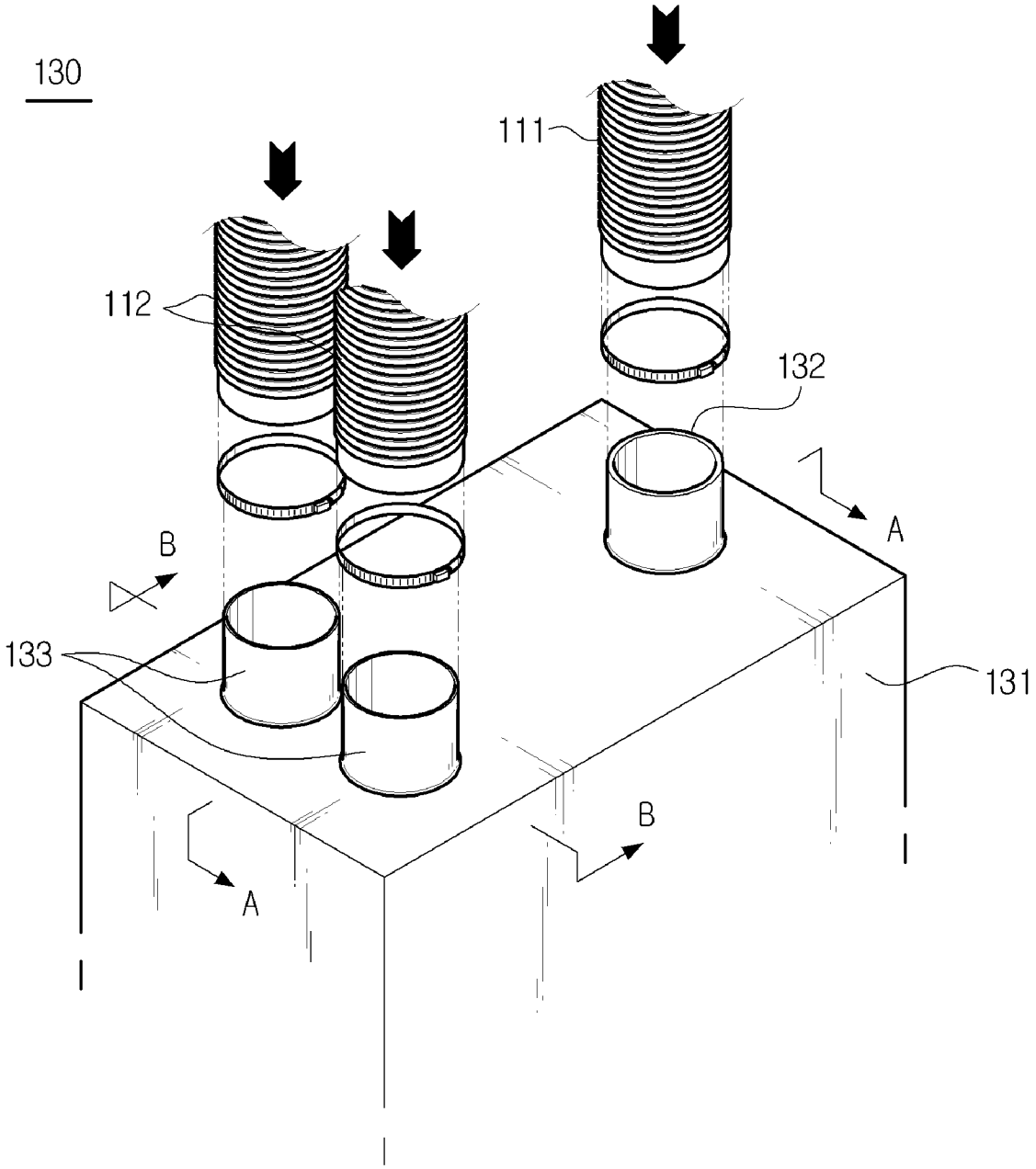
[Fig. 1]



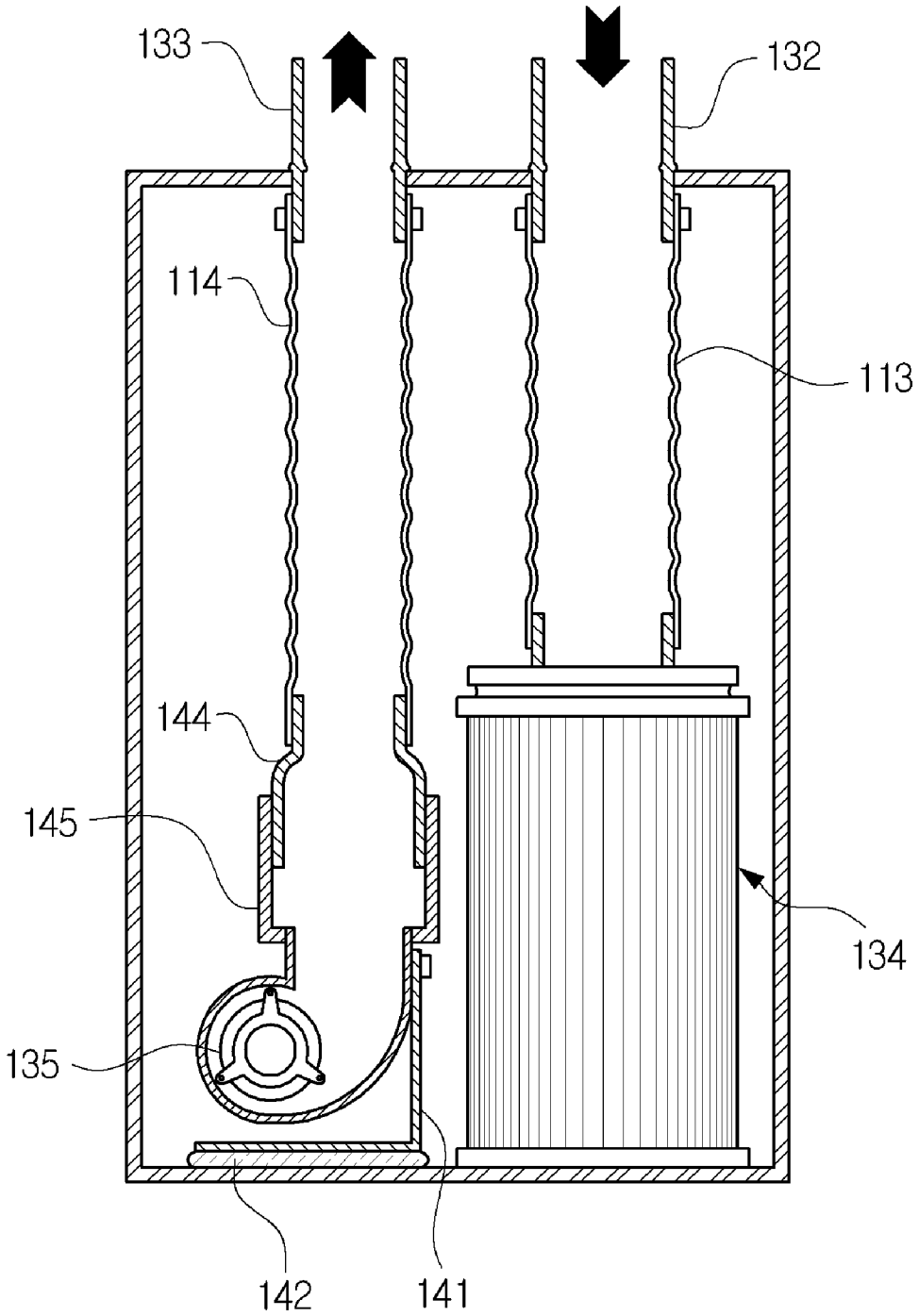
[Fig. 2]



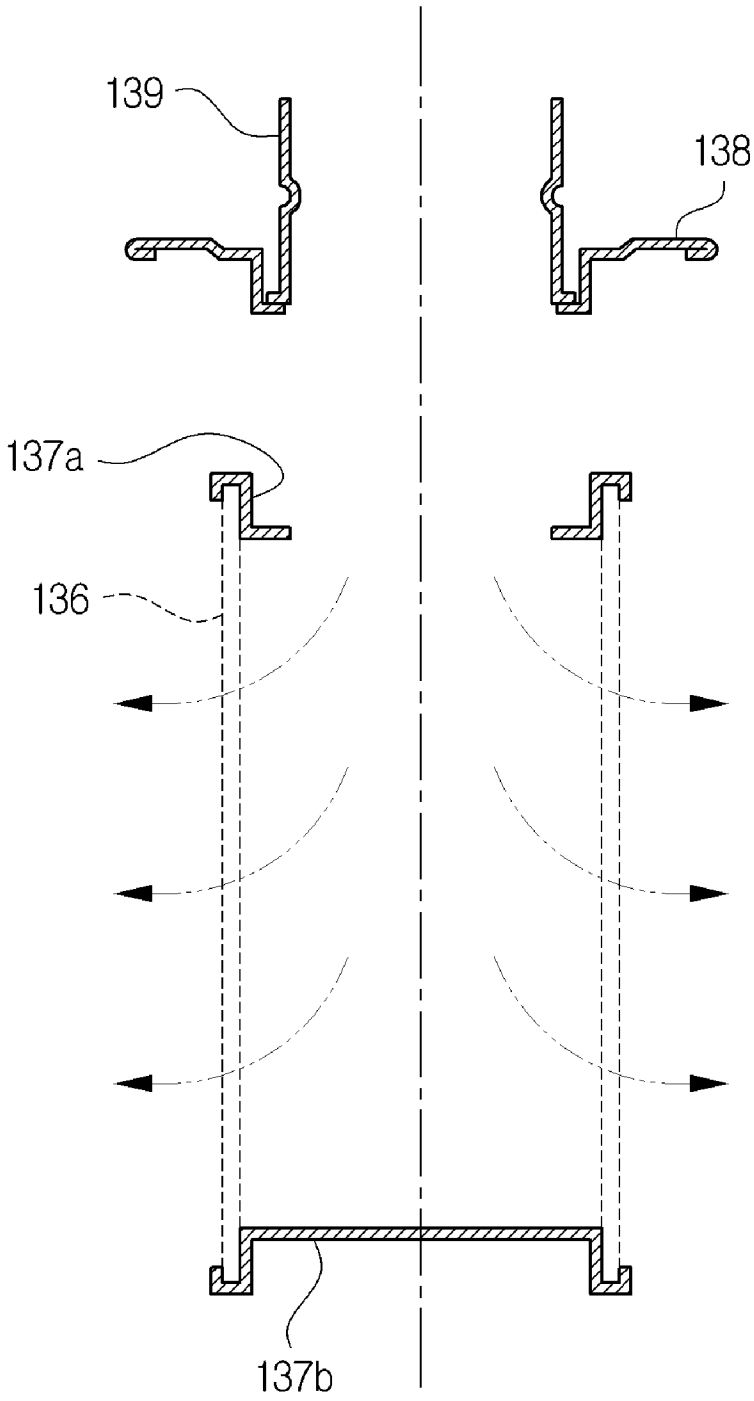
[Fig. 3]



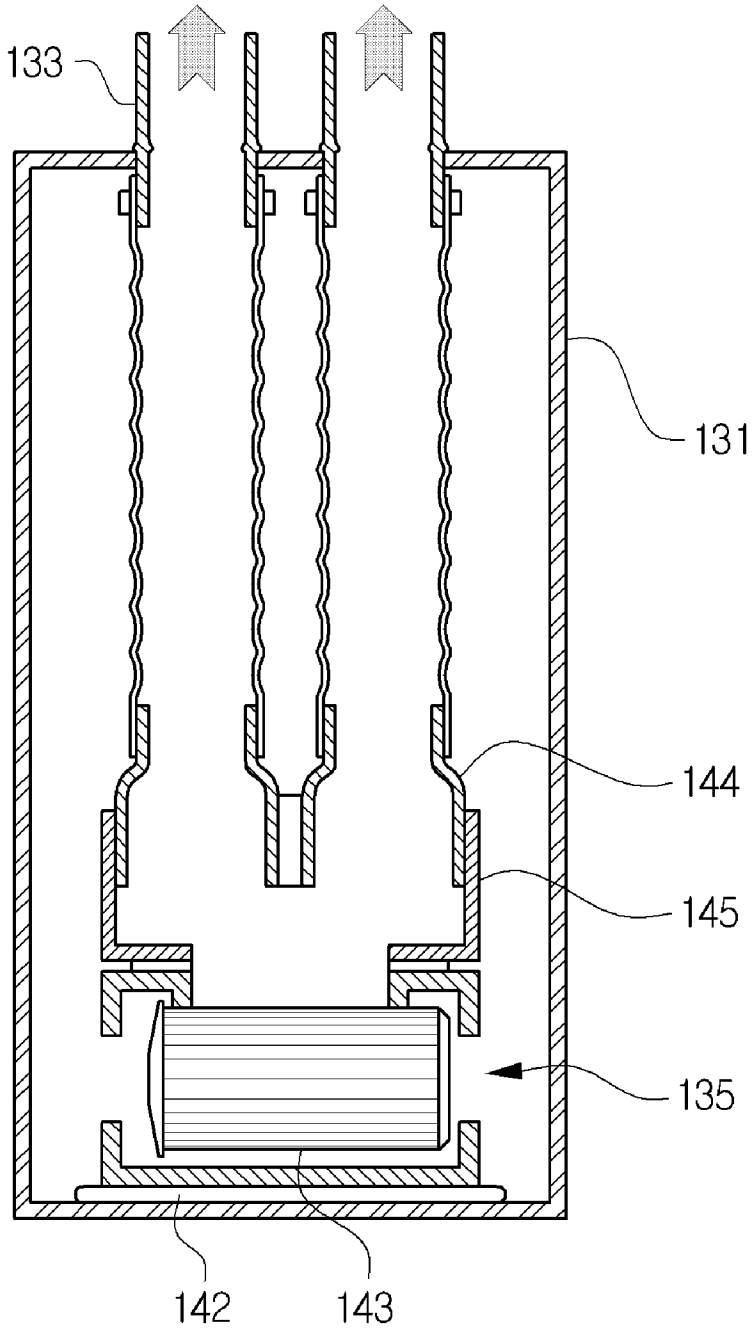
[Fig. 4]



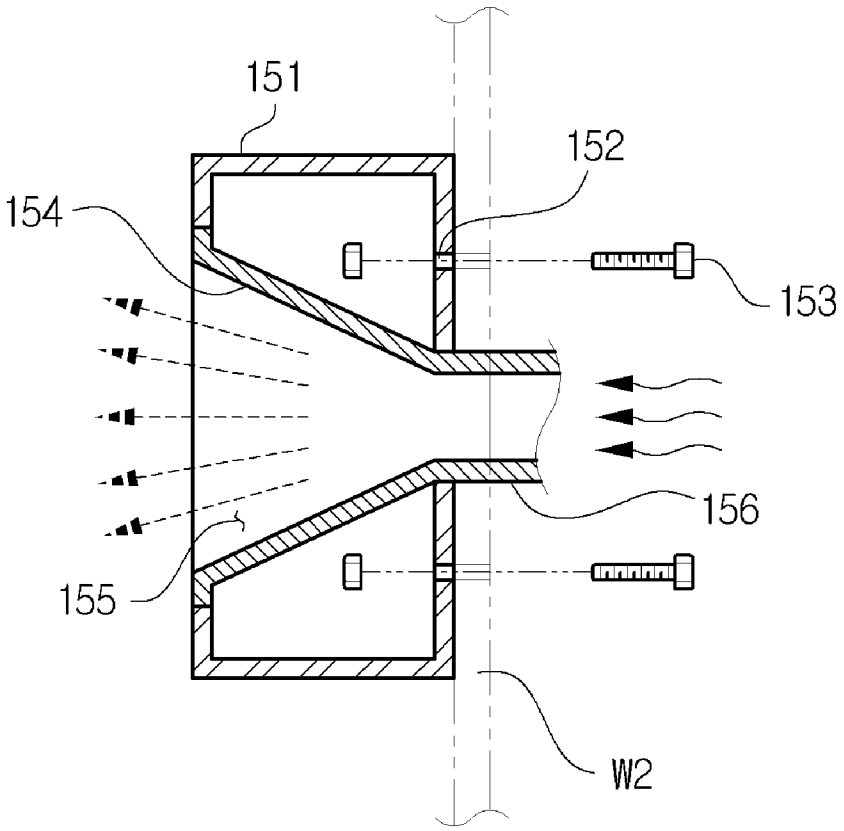
[Fig. 5]



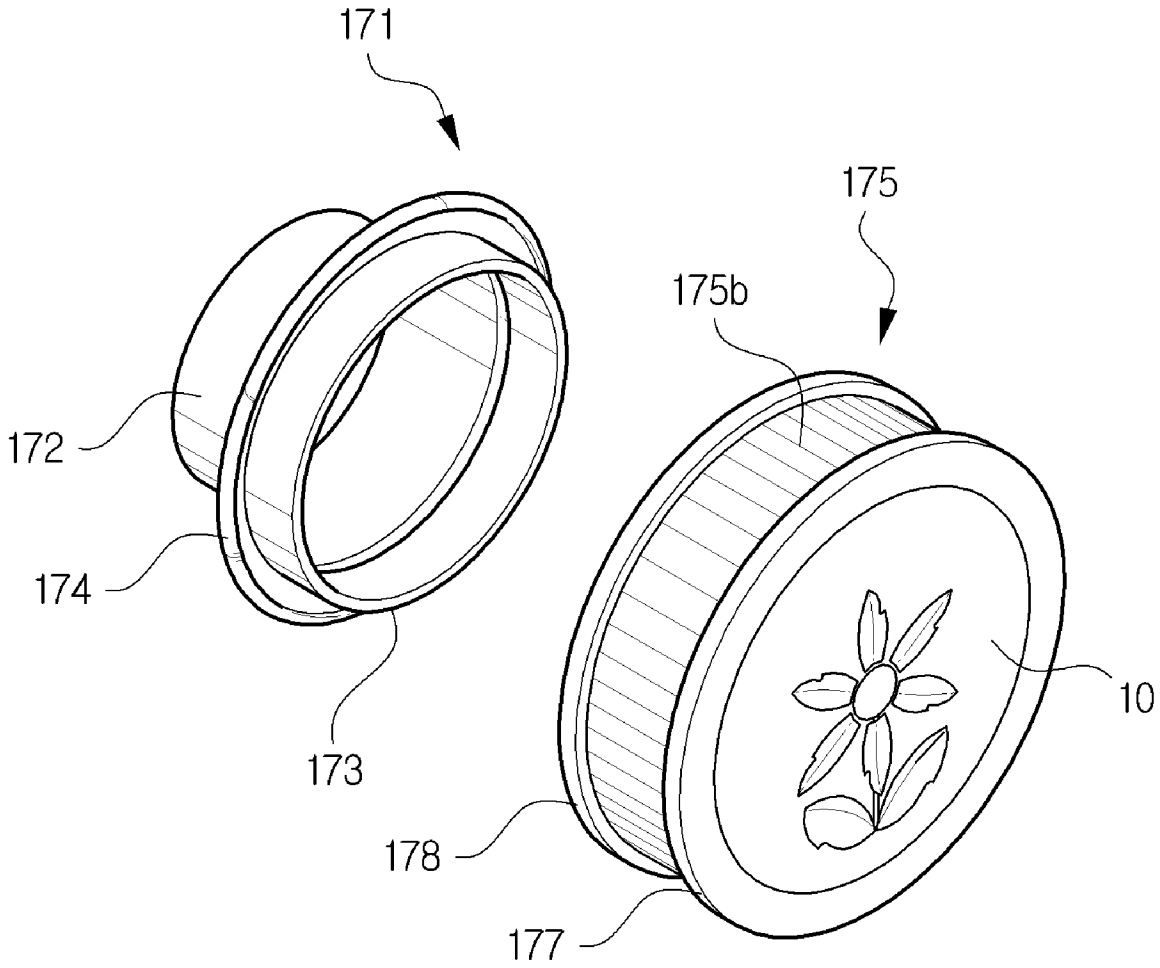
[Fig. 6]



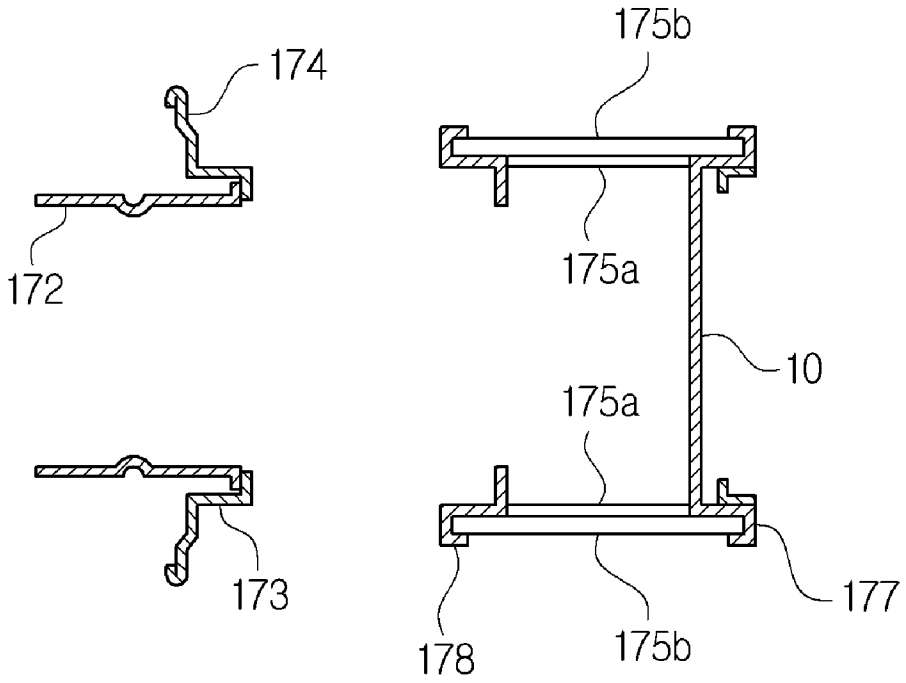
[Fig. 7]



[Fig. 8]



[Fig. 9]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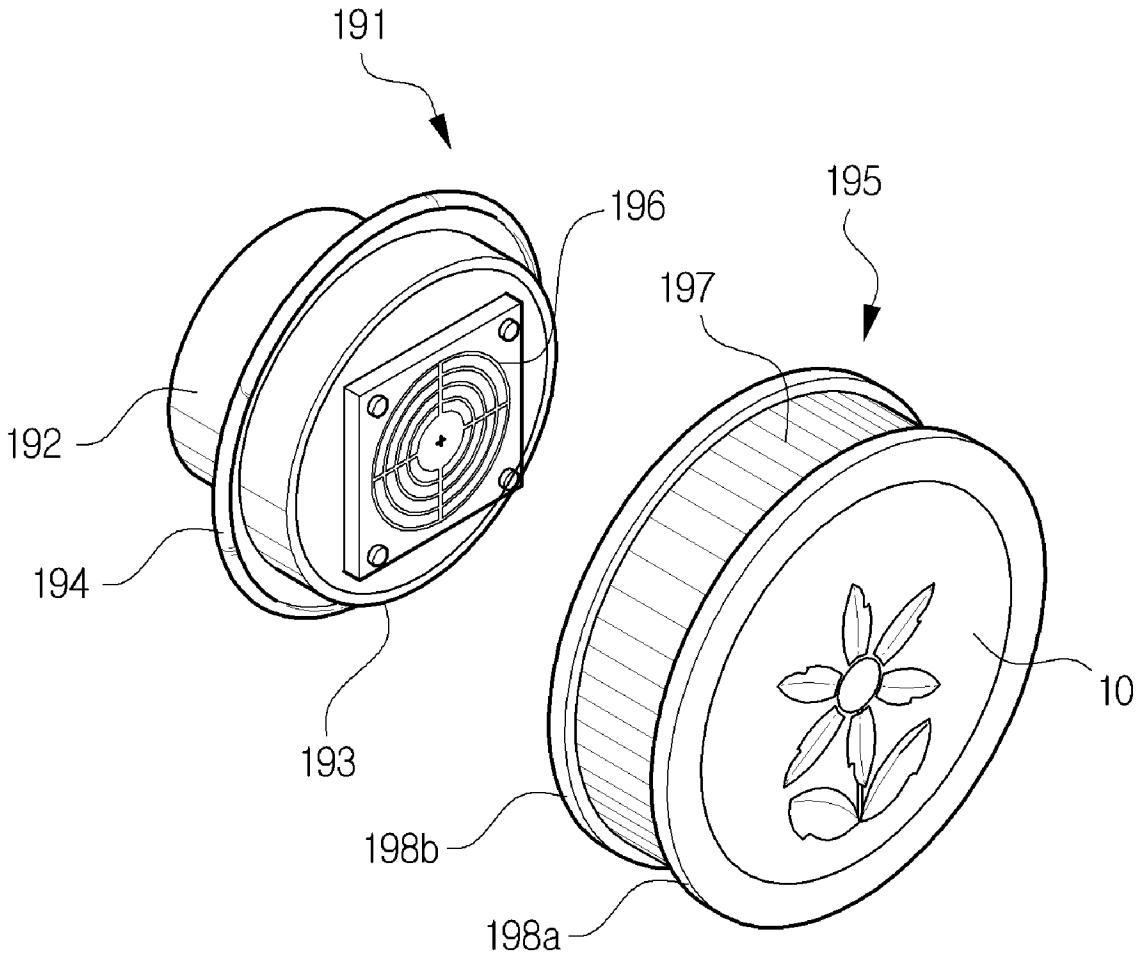
175b

[Fig. 10]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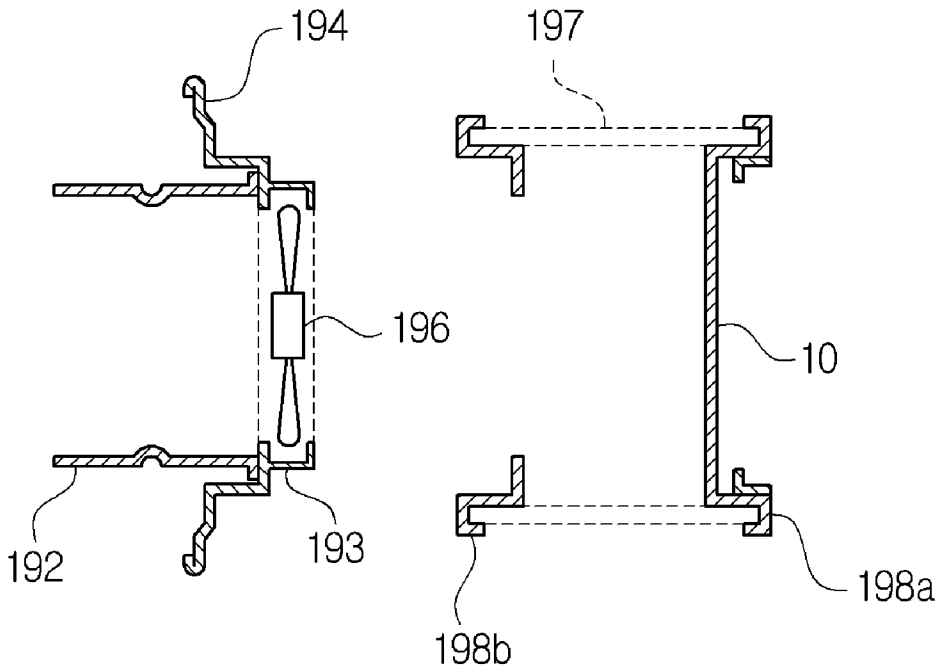
[Fig. 11]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2007/001549

A. CLASSIFICATION OF SUBJECT MATTER

F24F 7/06(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC8 F24F 7/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKIPOPSS(KIPO Internal) Keywords ; ventilation, filter, fan, house, room, natural, etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 20-0375010 Y (KANGNAM FILTER INC.; LG CONSTRUCTION INC.) 26 JAN. 2005 See page 2, line 64 - page 3, line 75 and Figs. 2a-4b	1, 4
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A	JP 09-178244 A (SHIRASAKASETSUBIKOGYO KK) 11 JULY 1997	1-16
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A	US 6,132,310 A (HYDRO-QUEBEC) 17 OCTOBER 2000	1-16
A	US 4,955,285 A (GEILINGER AG) 11 SEPTEMBER 1990	1-16

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

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Name and mailing address of the ISA/KR
Korean Intellectual Property Office
920 Dunsan-dong, Seo-gu, Daejeon 302-701,
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Authorized officer
TAK, Hyeong Yeop
Telephone No. 82-42-481-5507

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Information on patent family members

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