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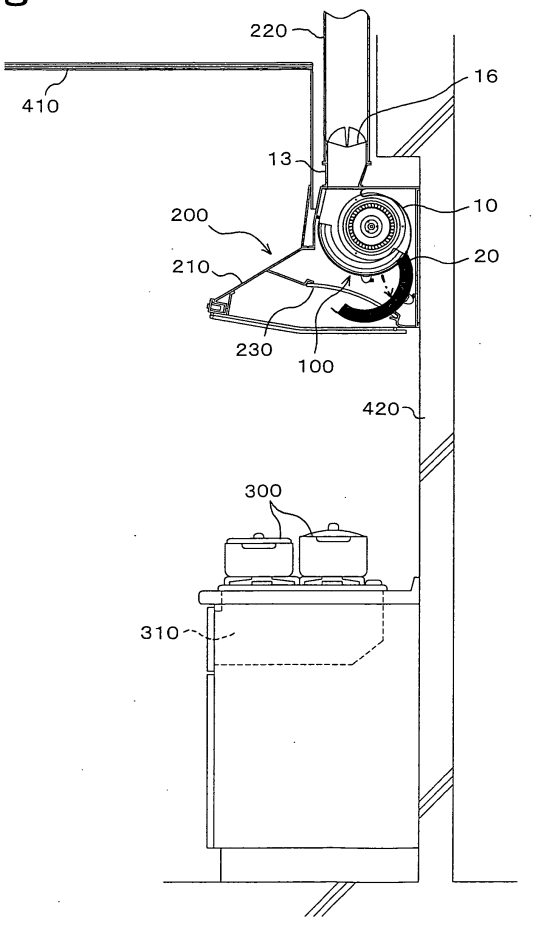
(54) **RANGE HOOD FAN HAVING FILTER**

(57) A range hood fan (100) is constituted of a case main body (10) connected partly to an exhaust gas duct (220) and forming an exhaust gas passage (14) inside the case main body, a fan motor (30) supported by a partition wall (12) in the case main body (10) and having a fan (32) on a rotation shaft (31), and an exhaust gas suction opening (15) formed in a portion open in a hood main body (210) of the case main body (10). A first filter (40) is provided at the lower part of the case main body (10). The first filter (40) is formed by net structure through which gas containing oily smoke can be passed and has first grooves (41) which are extended in a rotation direction of the fan (32) and end portions of which are open in the exhaust gas passage (14). A second filter (50) is provided inside the first filter (40). The second filter (50) is formed by net structure through which gas containing oily smoke can be passed and has second grooves (51) that are larger than the first grooves (41) and are open in the exhaust gas passage (14). The gas sucked by the fan (32) through the exhaust gas suction opening (15) is caused to flow along each of the second grooves (51) and of the first grooves (41), so that oily smoke is liquefied and collected.

Fig.1



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Description

Technical Field

[0001] The present invention relates to a fan used in a range hood for evacuating air or gas, which contains oily smoke generated during cooking with cookers such as pots or pans (the gas includes vapor, and exhaust gas in the case of a gas range), to the outside of a house.

Background Art

[0002] In a kitchen, gas such as exhaust gas from gas burning and vapor including oily smoke and odor is released during cooking with various cookers such as pots and pans. If such oily-smoke-containing gas is not evacuated to the outside of a house, the gas results in a deterioration of combustion efficiency and a hypoxia state which adversely affects human health, and also the oily smoke stains the room. Therefore, such oily-smoke-containing gas is usually evacuated to the outside by a ventilation fan, or by a blower from an exhaust duct through a range hood installed above the cookers.

[0003] In particular, comparing with the use of a ventilation fan, the method using a range hood can guide the oily-smoke-containing gas efficiently with the range hood, thus can be used in a so-called "system kitchen". Moreover, this is very advantageous as an exhaust method because it can secure to evacuate the oily-smoke-containing gas by getting a range hood closer to the source of the oily-smoke-containing gas.

[0004] However, in a conventional evacuation method using such a range hood, the following problems has yet to be solved; problem 1, noise in operation, problem 2, disposal of oily smoke which causes stains on outer walls near the opening of the exhaust gas duct, and stains inside the device.

[0005] First of all, in view of the noise problem, although a general range hood has an enough size to cover cookers, the evacuating duct for evacuating oily-smoke-containing gas sucked from the hood has a limited size of 15cm in diameter. Therefore, a blower must be a large size, which tends to generate noise, also it is understood that noise is generated when the oily-smoke-containing gas hits or contacts the various places of the gas passage.

[0006] In addition, when the oily-smoke-containing gas is sucked by a vacuum apparatus, if there are complex obstacles in the passage of the gas, these obstacles not only lower the suction efficiency by raising suction resistance, but also cause such noise as mentioned above. More specifically, because an exhaust gas duct must be lead through walls and the ceiling to be opened to the outdoor, a diameter of the exhaust gas duct must be small comparing with the opening space of the range hood as described above. Thus, some kinds of measures have to be taken to suck the oily-smoke-containing gas toward the duct having a small diameter without any obstacles, and evacuate the gas.

[0007] In particular, in a kitchen provided with an intake system as well as an exhaust system, a exhaust system having ability of about $400m^3/h$ is enough for evacuating only exhaust gas, but an exhaust system having ability of $500m^3/h$ is required for evacuating oily smoke as well as exhaust gas. However, because there are few kitchens provided with such a intake system separately, an exhaust system capable of evacuating oily smoke as well as exhaust gas requires ability of about $700m^3/h$ at the maximum. The above-mentioned noise cannot be avoided in the case of the evacuation through the exhaust gas duct by using such an exhauster having high ability.

[0008] Therefore, we may adopt a so-called Sirocco fan as a device having a large displacement volume but causing little noise. However, since the size of such a general Sirocco fan, including its casing, is considerably big, the design structure of a range hood and the overall system kitchen have to be changed when it is installed in the range hood having a small size or in other place. However, at the current situation it is almost impossible to change the design including the size of the range hood and other parts within the kitchens with a limited space, thus such a Sirocco fan cannot be utilized or adapted for the kitchen as it is.

[0009] Therefore, the inventor made an invention suggested in Japanese Patent publication No. 2609280 after various considerations as to exhaust systems capable to solve the above first problem, i.e., to reduce the noise significantly while fully keeping the advantages of the exhaust method using a range hood.

[0010] This invention already suggested is as follows; "An exhaust device to draw in fumed air produced from cocking on a cooking range in a kitchen and to expel said fumed air into an exhaust duct, comprising:

a vent box connected with said exhaust duct in fluid communication therewith, which is installed in one of a range hood and in a housing box connected with a range hood in fluid communication therewith; and

a drawer device housed in said vent box,

wherein said vent box includes a connection enclosure in an upper portion thereof in fluid communication with said exhaust duct which converges toward said exhaust duct,

wherein a pair of substantially vertical partitions are provided within said vent box on opposite sides from the longitudinal axis of said vent box, each having a titled plate extending toward a central crossline of an opening of said exhaust duct, provide a pair of vent routes together with side walls of said vent box, said vent routes converging toward said exhaust duct,

wherein said drawer device comprises: a drive motor; a pair of drive shafts protruding substantially horizontally in opposite directions from said drive motor correspondingly into said vent routes through said partitions; and a pair of Sirocco fans having blades correspondingly mounted on said drive shafts in said vent routes, each set of said blades converging toward said drive motor".

[0011] The exhaust system, which the inventor of the present invention already suggested in Japanese Patent No.2609208, is thus able to solve the above first problem. However, after the later examination, the possibility that it does not solve sufficiently the above second problem concerning oily smoke was found.

[0012] Now, in view of the above second problem concerning oily smoke, in a general range hood, a filter 230 is provided in a hood main body 210, and the filter liquefies oil or oily particles of oily smoke sucked directly and turn it into oil droplets to collect the same. However, it is impossible to catch all the oil or oily particles by the filter 230 provided in the hood main body 210, thus the remaining oil or oily particles are sucked up by a range hood fan installed behind the filter 230 and smears blades and other parts comprising of this range hood.

[0013] It is difficult to clean a general range hood fan which is installed inside of the filter 230, and besides it is almost impossible to clean the blades which are inside of the range hood fan. On this account, as the oil droplets attached on each blade accumulate gradually, it may be a cause for losing the function of the range hood fan itself.

[0014] Therefore, in Japanese Patent Laid-Open Publication No. 2000-104969, "a fan casing for multiblade fan in a simple structure to improve performance for collecting oil" was proposed. This fan casing as shown in FIG. 12 has an air flow touch area enlarged to the both front and back sides of air guide 4 placed in casing 1 as well as inside of the casing 1" and it is conceivable that "it can provide the fan casing, which improves the efficiency of capturing oil and fat content and does not get clogged, at a low price with a simple structure without adding any modifications for the main body and right and left side plate" (description of paragraph 0021 of the above publication).

[0015] However, as the above description, when the air flow (the oily-smoke-containing gas) comes in contact with not only the inner surface of the casing 1, but also the air guide 4 formed inside of the casing 1, it can be considered as a cause of noise, thus it may not be able to solve the above first problem of noise.

[0016] In paragraph 0011 in the above-cited publication it is described that "the edge of entrance of an air guide 4 is made as a slanting edge, jaggy edge and the like to change the timing of air collision in the case of the inflow, thus prevent from generating noise by air colliding to the full length of the entrance edge 4a' simultaneously". However, even though it can achieve some prevention of noise at the entrance of the air guide, the noise prevention effect cannot be expected in total because the prevention of the noise can be done only a part of the long air guide 4. In addition, it should be understood that merely flowing oily-smoke-containing gas on the surface of the flat air guide 4 is not enough to collect and catch the oil or oily particles of the oily smoke. As such it is hard to believe that its technology solves the second problem concerning oily smoke.

[0017] In addition, in Japanese patent No. 3,009,649, "a range hood" is suggested as shown in FIG. 13 for the purpose of "providing a range hood which can improve the capture efficiency of oil and fat content without raising pressure loss, and also prevent the oil and fat content from flowing out to the duct side".

[0018] The conventional range hood shown in FIG. 13 has "a fan casing having a corrugated inner surface of a fan casing installing a fan of a blower equipped in the hood" (claim 1), in particular, as disclosed in claim 4, "the said corrugated surface of the body is formed alternatively and continuously so as to cross the flowing direction of the air (oily-smoke-containing gas) generated by the rotation of the fan".

[0019] Then oily-smoke-containing gas sucked in the fan casing collides with the corrugated surface, thus it is considered that noise occurs by the air collision to the corrugated surface like the conventional embodiment shown in FIG. 12, although the oily smoke can be caught.

[0020] Thus, the inventor completed the present invention after repeated examinations in various ways to perform the collection of oil from oil-containing smoke effectively and greatly reduce noise while the advantages of an exhaust method using a range hood is kept.

[0021] That is, the purpose of the present invention is to provide a range hood fan 100 capable to catch oil or oily particles of oily smoke, which is not caught by a general filter in the upstream, and also noise is not generated at the time of this procedure of catching the oil or oily particles, i.e. even though oily-smoke-containing gas flows.

Disclosure of The Invention

[0022] In order to solve the above-described problems, the present invention has been developed, and the invention described in claim 1 employs the following means as described below being attached with reference numerals, which are used in the description of best mode for carrying out the invention described later; that is, "a range hood fan (100), which is used in a range hood (200) collecting oily-smoke-containing gas generated from cookers such as pots and pans during cooking, and evacuating the oily-smoke-containing gas to the outdoor through an exhaust gas duct (220), and is installed in a hood main body (210). The range hood comprises a case main body (10) connected partly to an exhaust gas duct (220) and forming an exhaust gas passage (14) inside the case main body, a fan motor (30) having a fan (32) on a rotation shaft (31) and being supported by a partition wall (12) in the case main body (10), and an exhaust gas suction opening (15) formed in a portion opening in the hood main body (210) in the case main body (10). The range hood further comprises a first filter (40) being provided at a lower inside part of the case main body (10) by net structure through which the oily-smoke-containing gas can be passed and having first grooves (41) extended in a rotation direction of the fan (32) and end portions of which are open in a exhaust gas passage (14), and a

second filter (50) provided inside the first filter (40), the second filter (50) being formed by net structure through which the oily-smoke-containing gas can be passed and having second grooves (51) that are larger than the first grooves (41) and end portions of which are open in the exhaust gas passage (14). The first filter (40) and the second filter (50) liquefies and collects oil or oily contaminants from the oily smoke of the gas by flowing the gas, which sucked from exhaust gas suction opening by a fan (32), along each of the second grooves (51) and of the first grooves (41)."

[0023] That is, this range hood fan 100 comprises the first filter 40 and second filter 50 formed by net structure on the inner surface of the lower inside part of the case main body 10 as shown in FIG. 8- FIG. 10, the first filter 40 having the first grooves 41 and the second filter 50 having the second grooves 51. Particularly, in the range hood fan 100 of this invention, as shown in FIG.10, each of the second grooves 51 is deeper than each of the first grooves 41, and the first filter 40 and the second filter partly contact with each other.

[0024] In the range hood fan 100 constructed as above, when the fan motor 30 rotates, a fan 32 attached to the rotation shaft starts rotating, and gas caught by a hood main body of the range hood 200 starts being sucked from a exhaust gas suction opening 15 formed in the case main body 10 of the range hood fan 100. Because part of oil and oily particles of oily-smoke-containing gas is caught primarily by the filter 230 installed in the food main body 210, the oily smoke is reduced by the time it reaches a exhaust gas suction openings 15. However the oily smoke is not eliminated completely.

[0025] The oily-smoke-containing gas sucked from each of the exhaust gas suction openings 15 by the rotation of fan 32 as mentioned above flows in a exhaust gas passage 14 in the case main body as shown with outline arrows in FIG. 9. At this stage, as shown with outline arrows in the left side of FIG. 9, most of the oily-smoke-containing gas gets into the first filter 40 and second filter 50 from the left end of FIG. 9 as shown, and the remaining oily-smoke-containing gas flows along the surface of the second filter 50 (the surface facing the fan 32). Of course, because each of the first filter 40 and second filter 50 is made of, for example, a metal net structure, the flowing oily-smoke-containing gas sufficiently passes through each net structure from the inside of the first filter 40 and second filter 50 to the outside, or the other way around.

[0026] Because the oily-smoke-containing gas flowing along the surface of the first filter 40 and second filter 50 and passing these filters as mentioned above naturally contacts and passes each net structure of the first filter 40 and second filter 50, the oil and oily particles of oily smoke liquefied and gets caught by the first filter 40 or the second filter 50. In the range hood fan 100 as shown in the best mode described below, the oil and oily particles caught is collected in a oil pit 21 placed at the bottom part of the case main body 10.

[0027] Importantly, the range hood fan 100 does not become a source of noise because it does not generate a big noise when the oily-smoke-containing gas contacts the surface of the first filter 40 and second filter 50 and passes these net structures. The first reason for the above is that the first grooves 41 formed in the first filter 40 and the second grooves 51 formed in the second filter 50 make a smooth flow of the oily-smoke-containing gas. The second reason for the above is that the first filter 40 and second filter 50 are actually "filters" with net structures.

[0028] For the detail of the first reason, as shown in FIG. 9, because the first grooves 41 of the first filter 40 and the second grooves 51 of the second filter 50 are dented in the flowing direction of the oily-smoke-containing gas shown with outline arrows in the drawing, the filters do not provide resistance for the flow of the oily-smoke-containing gas as shown in FIG. 10, thus the oily-smoke-containing gas passes smoothly through the filters. In addition, the second grooves 51 of the second filter 50 is formed deeper than the first grooves 41 of the first filter 40, and the second filter 50 is in close contact with the first filter 40 as shown in FIG. 10. Therefore, even if the force of the oily-smoke-containing gas is added on the second filter 50 and first filter 40, these filters do not vibrate each other, thus do not generate noises.

[0029] Then, for the detail of the second reason, because each of the first filter 40 and second filter 50 is a filter having net structure, the flow of oily-smoke-containing gas enters and leaves the first filters 40 and the second filter 50 freely. Thus, in the flow of the oily-smoke-containing gas, a big resistance, which can be a source of noise, is not generated by the first filter 40 and second filter 50. In addition, even if a turbulence in the flow of oily-smoke-containing gas occurred, the turbulence is rectified and put out by the first filter 40 and second filter 50, thus the noise is not generated by the turbulence. From the above reasons, each of the first filter 40 and second filter 50 does not generate noise by the oily-smoke-containing gas flow.

[0030] When the gas contacts the surface of such first filter 40 and second filter 50 and passes the net structure thereof, the oil or oily particles in the oily-smoke-containing gas is liquefied as is the case with the filter 230 installed in the hood main body 210. The liquefied oil flows to the oil pit 21 along the first filter 40 and second filter 50 and is corrected in the oil pit 21.

[0031] Thus, the range hood fan 100 disclosed in claim 1 removes most of the oil or oily particles of the oily-smoke-contained gas entered into the case main body 10 through the filter 230 placed in the hood main body 210, while it reduces noise. As a result, the exhaust gas from the exhaust gas duct 220 contains no oily smoke, thus the outer wall surfaces of a building does not get stained.

[0032] Now, the invention disclosed in claim 2 is explained below. This invention of claim 2 is characterized by "a bottom of the case main body (10) having a opening

and closing lid (20) opening a exhaust gas passage (14), and the first filter (40) and the second filter (50) being detachably attached on an inner surface of the opening and closing lid (20)" as to the range hood fan 100.

[0033] That is, in the range hood fan 100 according to claim 2, the above first filter 40 and second filter 50 are attached detachably on the inner surface of the opening and closing lid 20 as shown in FIG. 9 and FIG. 10, the opening and closing lid 20 being openable and closable to the case main body 10 as shown FIG. 1 and FIG. 11.

[0034] As a result of the above, in the range hood fan 100 according to claim 2, the first filter 40 and second filter 50 attached on the inner surface of the opening and closing lid 20 can be detached from the hood main body 210 by opening the lid 20 as shown in FIG. 11. That is, when the maintenance such as the exchange and cleaning of the filter 230 in the hood main body 210 is conducted, the maintenance of the first filter 40 and second filter 50 of the range hood fan 100 can be also conducted at the same time.

[0035] Thus, the range hood fan 100 according to claim 2 produce the identical function as in the case of the range hood fan 100 of claim 1, and also the maintenance of the first filter 40 and second filter 50 of the range hood fan 100 can be easily performed according to the invention of claim 2.

Brief description of drawings

[0036]

FIG. 1 is a fragmentary vertical cross-sectional view, which illustrates a kitchen provided with a range hood 200 having a range hood fan 100 according to the present invention.

FIG. 2 is an enlarged right side elevation view of the range hood fan 100 in the range hood 200.

FIG. 3 is a left side elevation view of the range hood fan 100.

FIG. 4 is a front elevation view of the range hood fan 100.

FIG. 5 is a rear elevation view of the range hood fan 100.

FIG. 6 is a plane view of the range hood fan 100.

FIG. 7 is the bottom plan view of the range hood fan 100.

FIG. 8 is an enlarged transverse cross-sectional view taken along 1-1 line of FIG. 2.

FIG. 9 is an enlarged vertical longitudinal sectional view taken along 2-2 line of FIG. 6.

FIG. 10 is an enlarged partial transverse cross-sectional view taken along 3-3 line region of FIG. 8.

FIG. 11 is a partial cutaway left side elevation view to show the state of opening of an opening and closing lid 20 provided under a case main body 10.

FIG. 12 is a longitudinal sectional view illustrating a prior art

FIG. 13 is a longitudinal sectional view illustrating another prior art.

(Explanations of the letters of numerals)

[0037]

100	range hood fan
10	case main body
11	evacuating opening
12	partition wall
13	duct joint
14	exhaust gas passage
15	exhaust gas suction opening
16	damper
20	opening and closing lid
21	oil pits
22	hinge
23	stopper screw
30	fan motor
31	rotation shaft
32	fan
32a	blades
40	first filter
41	first grooves
41a	end portion
42	first filter passage
50	second filter
51	second grooves
51a	end portion
52	second filter passage
200	range hood
210	hood main body
220	exhaust gas duct
230	filter
300	cooker
310	gas range or electromagnetic range
410	ceiling
420	wall

The best mode for carrying out the invention

[0038] Now, the range hood fan 100 according to the best mode shown in the drawings will be described below, then it should be understood that this range hood fan 100 of the best mode substantially includes all the above-mentioned invention.

[0039] FIG. 1 shows a kitchen which has a range hood

200 installed near the ceiling 410, the range hood 200 includes the range hood fan 100 of this invention. In this kitchen, cookers such as pots and pans are heated by a gas range or an electromagnetic cooker 310 placed attaching to the wall 420. Capture of oily-smoke-containing gas generated from each cooker is facilitated by sucking the gas by the range hood fan 100 installed in the range hood 200, and also by evacuating the gas from a exhaust gas duct 220.

[0040] When this range hood 200 is sucking the oily-smoke-containing gas, some of the oily smoke (oil or oily particles) is removed by a filter 230 provided in hood main body 210. However the oily smoke cannot be removed 100%, thus the rest of the oily smoke is sucked into the range hood fan 100 of the present invention.

[0041] As shown in FIG. 2-11, the range hood fan 100 is constituted of a case main body 10 connected partly to an exhausting duct 220 and forming an exhaust gas passage 14 inside the case main body, a fan motor 30 supported by a partition wall 12 in the case main body and having a fan 32 on a rotation shaft 31, an exhaust gas suction opening 15 formed in a portion opening in the hood main body 210 of the case main body 10. A first filter 40 is provided at the lower part of the case main body 10 by net structure through which oily-smoke-containing gas can be passed and has first grooves 41 extended in a rotation direction of the fan 32 and end portions of which are open in a exhaust passage 14. A second filter 50 is provided inside the first filter 40. The second filter is formed by a net structure through which oily-smoke-containing gas can be passed and having second grooves 51 that are larger than the first grooves 41 and end portion of which are open in the exhaust passage 14.

[0042] The case main body 10 of the range hood fan 100 hermetically includes the fan motor 30 and the fan 32 within thereof. The upper end of the case main body is a duct joint 13 for connecting with the exhaust duct 220 opened to the out door. The inside of the duct joint 13 is an evacuating opening 11. Further, at both right and left side of the case main body 10, as shown in FIG. 2 and FIG. 3, exhaust gas suction openings 15 are opened to suck oily-smoke-containing gas caught by food 210. In addition, a damper 16 intercepting fresh air coming through the exhaust duct 220 is provided in the evacuating opening 11 of the case main body 10.

[0043] Further, at the lower part of the case main body 10, the opening and closing lid 20 is provided in the form that it can be opened and closed as shown in FIG. 1 and FIG. 11, and is attached to the case main body 10 with a hinge 22 as shown in FIGs. 9 and 11. In addition, this opening and closing lid 20 is fixed to the case main body 10 with a stopper screw 23 provided at the other side of the hinge 22.

[0044] The partition wall 12 is provided at the center of the case main body 10 as shown in FIG. 8. The both sides of this partition wall 12 are the exhausting gas passages 14 connected to the evacuating opening. In addition, this partition wall 12 supports a fan motor 30 as shown in FIG. 8, and is set in the position that the fan 32 fixed to the rotating shaft 31 of the fan motor is stable within either side of the partition wall 12.

[0045] In addition, fan 32 are so-called "Sirocco fan" provided with blades 32a extended in the direction of the rotation axis 31 of the fan motor 30, each of the blades 32a being slanted outward as it goes to each exhaust gas opening 15. By constructing the fan 32 in this manner, the suction force by the fan 32 is raised, and the generation of noise by forwarding oily-smoke-containing gas is prevented.

[0046] The range hood fan 100 of this invention is provided with the first filter 40 and the second filter 50 exposed to the exhaust path 14 comprised of the case main body 10 as shown in FIG. 8, 9. According to the best mode, these first filter 40 and second filter 50 are removably attached to the inner surface of the opening and closing lid 20, thus can be removed from this opening and closing lid 20 when maintenance is necessary. These first filter 40 and second filter 50 made of metal net or perforated metal, each mesh of the net structure of the second filter 50 is larger than that of the first filter 40 so as to make it easier for the oily-smoke-containing gas to reach the first filter 40 through the second filter 50.

[0047] The first filter 40 near the opening and closing lid 20 is formed with a number of the first grooves 41 as shown in FIG. 10, and the space between these first grooves and the opening and closing lid 20 forms first filter passages 42. Each of the first grooves 41 having a long shape is extended to the rotation direction of the fan 32 as shown in FIG. 9, thus the grooves 41 are hard to become resistance against the flow of the oily-smoke —containing gas, and also have a large contact surface to the oily-smoke-containing gas. In addition, both ends 41a of each of the first grooves 41 open to the exhaust gas passage 14 formed in the case main body 10 as shown in FIG. 9, so that the induction of gas to the first filter passages 42 and derivation of gas from the first filter passages 42 can be performed without resistance.

[0048] The second filter 50 directly facing the exhaust gas passage 14 is formed with a number of the second grooves 51 along the current of the gas, the second grooves 51 is deeper than the first grooves 41 and, in the best mode, the size is about the size that two first grooves 40 of the first filter 40 can get into a second grooves 51. Of course, the second filter passages 52 are formed between the second grooves 51 as shown in FIG. 10, and the both ends 51a of the second filter 50 open to the exhaust gas passage14 as shown in FIG.9. As a result, as is the case of the first filter 40, the second filter 50 makes the resistance against oily-smoke-containing gas lower by the second grooves 51 formed along the flowing direction of oily-smoke-containing gas, and induce and evacuate the oily-smoke-containing gas by the both ends 51a.

[0049] Because the first filter 40 and second filter 50 each have a net structure, it goes without saying that

oily-smoke-containing gas can move freely between these filters. Thus, even if a turbulence of the oily-smoke-containing gas is generated within the case main body 10, the turbulence cannot be constant because this turbulence moves freely through each mesh of the net structure. Thus, the oily-smoke-containing gas passes the net structure or contact to the surface of the first filter 40 and second filter 50, and the oil or oily particles with in the smoke is caught by the first filter 40 or the second filter 50 and liquefied. The liquefied oil or oily particles goes to the inner surface of the opening and closing lid 20 along the first filter 40 and second filter 50, and the liquefied oily smoke is collected in a oil pit 21 provided at the lid.

[0050] In the range hood fan 100 in accordance with the best mode, as shown in FIG. 9, a part of the exhaust gas passage 14, where the oily-smoke-containing gas first contacts or passes the first filter 40 and second filter 50 is formed to be narrower than a part of exhaust gas passage 14, which is located at the back end of the first filter and the second filter. Therefore, at the part near the evacuating opening 11 of the case main body, the pressure of the oily-smoke-containing gas becomes low, and the oily smoke in the gas is easy to be liquefied, thus it is secured that the first filter 40 and second filter 50 can catch and liquefy the oily smoke. In contrast, most of oily-smoke-containing gas forwarded by the fan 32 goes into the first filter passages 42 of the first filter 40 and the second filter passages 52 of the second filter 50 due to the narrowed shape of the both end of 41a and 51a in the left side of FIG. 9.

Industrial applicability

[0051] Because a range hood fan 100 constructed as above according to claim 1 comprises a first filter 40 and second filter 50 inside of the bottom of a case main body 10, and is formed with a number of first grooves 41 and second grooves 51 along the flowing direction of the first grooves 41 in the first filter 40 and second filter 50, oil and oily particles that are not removed by the second grooves 51 can be caught, thus the range hood fan 100 can greatly reduce oil of the exhaust gas evacuated to the outdoor from a exhaust gas duct 220 connected with the range hood fan 100. As a result, by installing the range hood fan 100 of the present invention, the outside wall, at which the exhaust gas duct 220 opens, does not get stained and the building can be kept clean.

[0052] In addition, the range hood fan 100 according to claim 2 can give the same effect as the above-mentioned range hood fan 100 according to claim 1, and also installs the first filter 40 and second filter 50 releasably on the inner surface of an opening and closing lid 20 placed at the lower part of the case main body 40 so that the maintenance such as cleaning or exchange of the first filter 40 and second filter 50 can be easily performed and the durability of the range hood fan 100 can be improved greatly.

Claims

1. A range hood fan (100), which is used in a range hood (200) collecting oily-smoke-containing gas generated from cookers such as pots and pans during cooking, and evacuating the oily-smoke-containing gas to the outdoor through an exhaust gas duct (220), and is installed in a hood main body (210),
the range hood comprising a case main body (10) connected partly to an exhaust gas duct (220) and forming an exhaust gas passage (14) inside the case main body, a fan motor (30) having a fan (32) on a rotation shaft (31) and being supported by a partition wall (12) in the case main body (10), and an exhaust gas suction opening (15) formed in a portion opening in the hood main body (210) in the case main body (10),
the range hood further comprising a first filter (40) being provided at a lower part of the case main body (10) by net structure through which the oily-smoke-containing gas can be passed and having first grooves (41) extended in a rotation direction of the fan (32) and end portions of which are open in a exhaust gas passage (14), and a second filter (50) provided inside the first filter (40), the second filter (50) being formed by net structure through which the oily-smoke-containing gas can be passed and having second grooves (51) that are larger than the first grooves (41) and end portions of which are open in the exhaust gas passage (14),
the first filter (40) and the second filter (50) liquefying and collecting the oily smoke of the gas by flowing the gas, which sucked from exhaust gas suction opening by a fan (32), along each of the second grooves (51) and of the first grooves (41).

2. The range hood according to claim 1, wherein a bottom of the case main body (10) having a opening and closing lid (20) opening a exhaust gas passage (14), and the first filter (40) and the second filter (50) being detachably attached on an inner surface of the opening and closing lid (20).

Fig.1

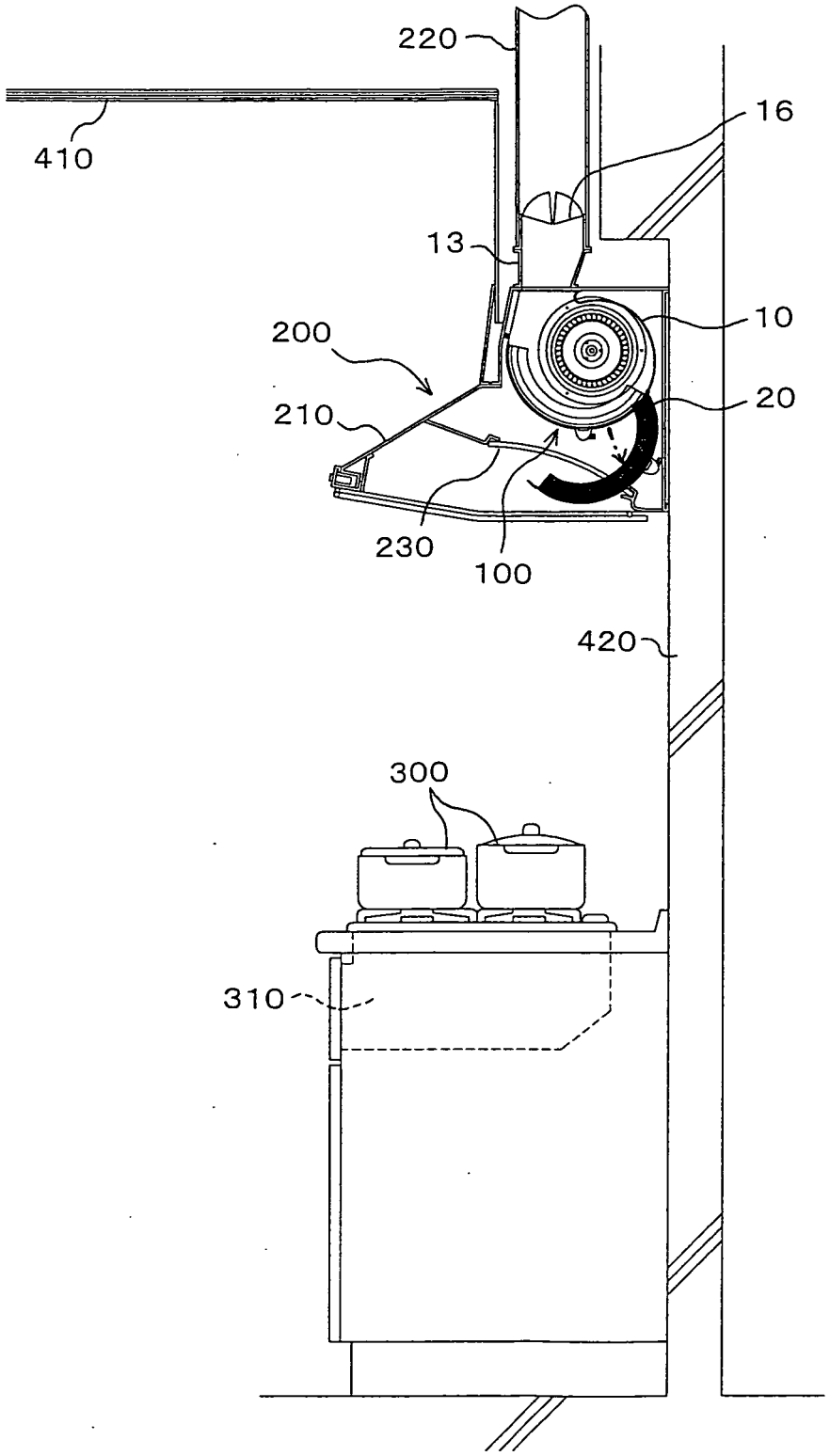


Fig.2

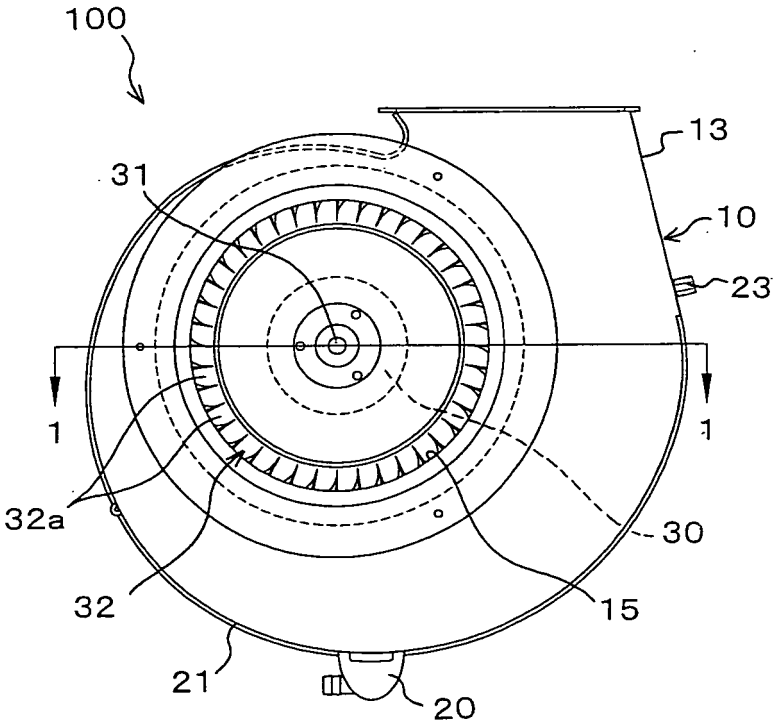


Fig.3

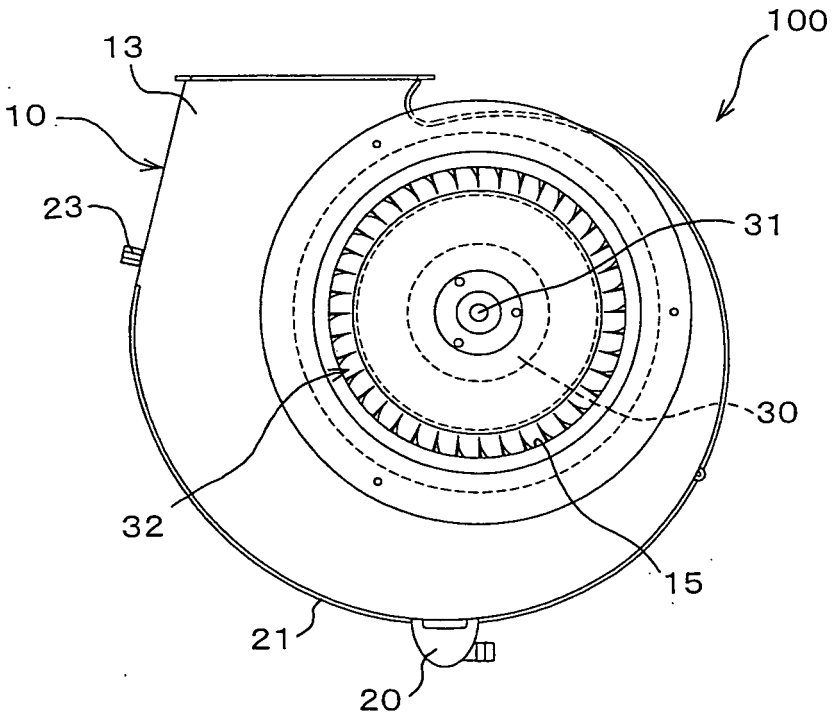


Fig.4

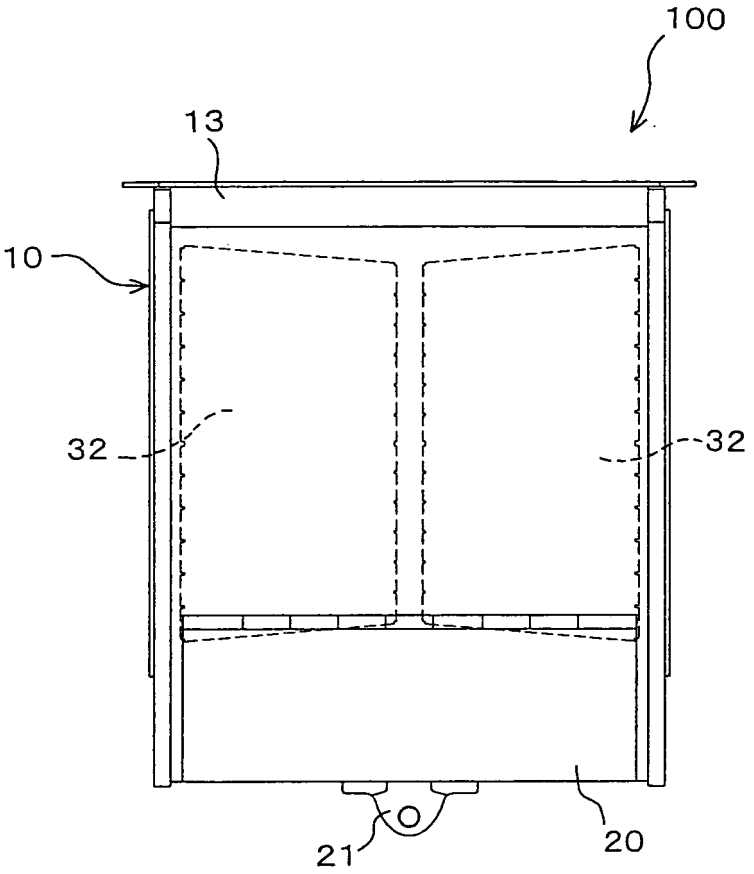


Fig.5

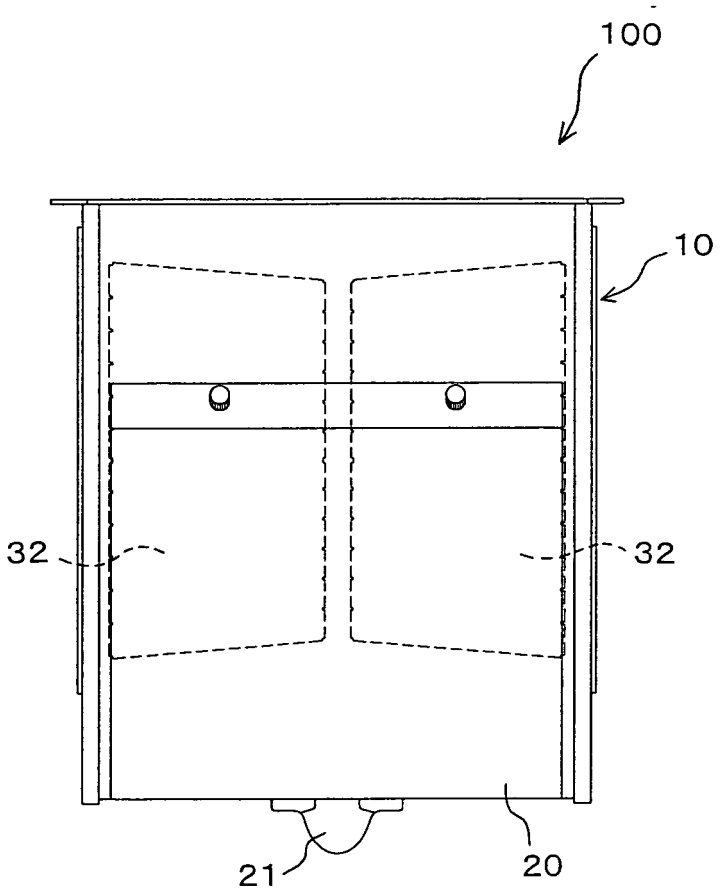


Fig.6

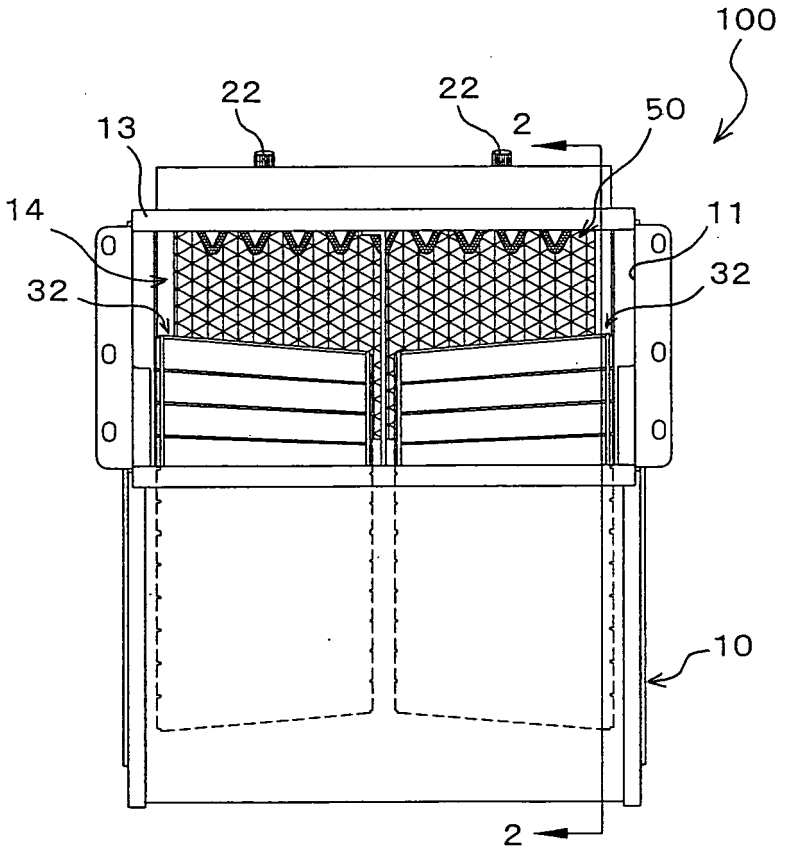


Fig.7

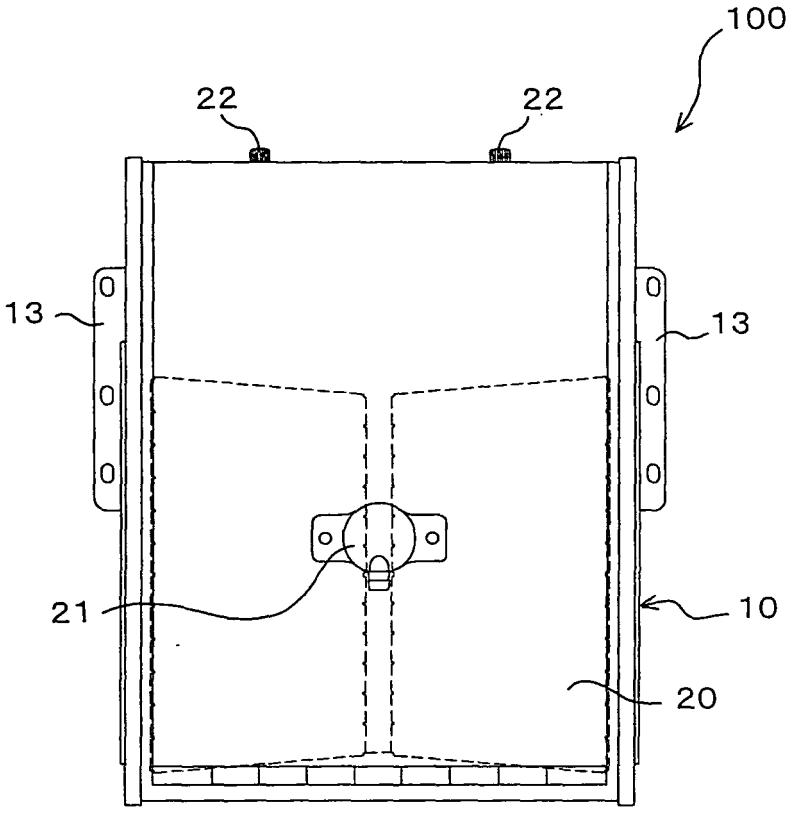


Fig.8

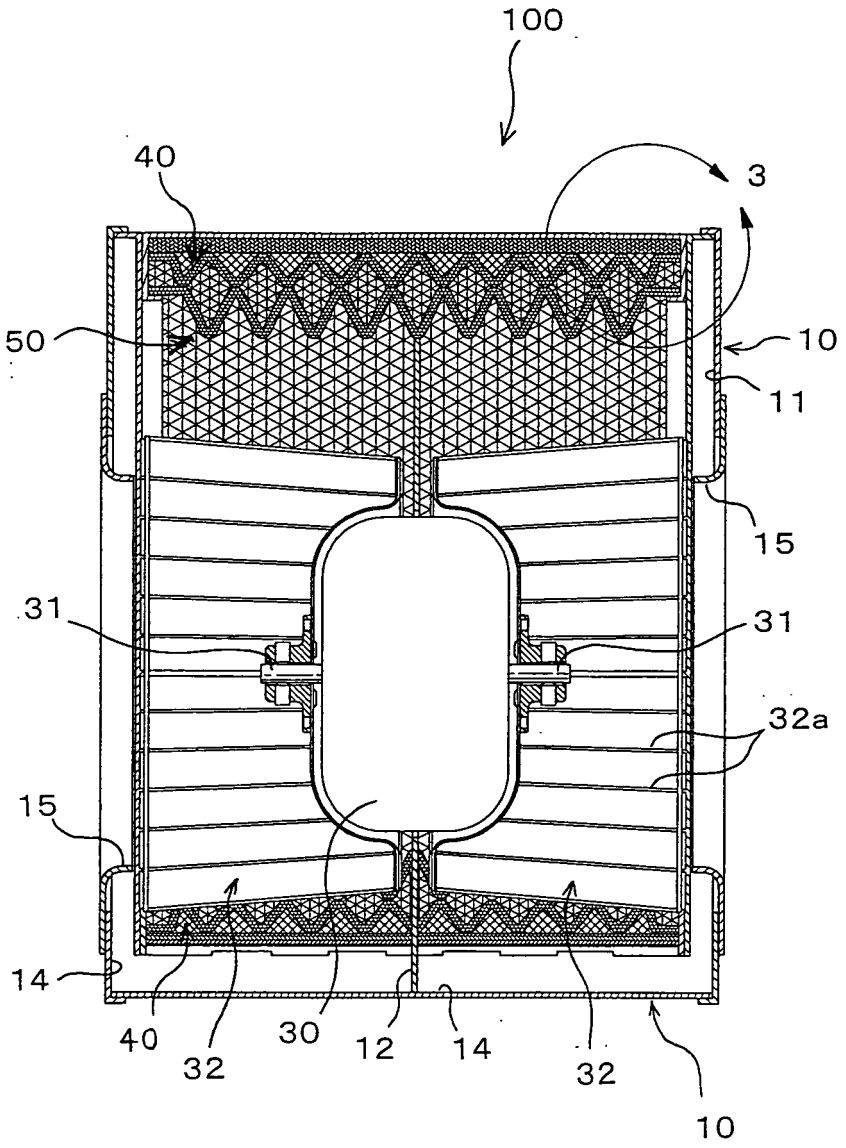


Fig.9

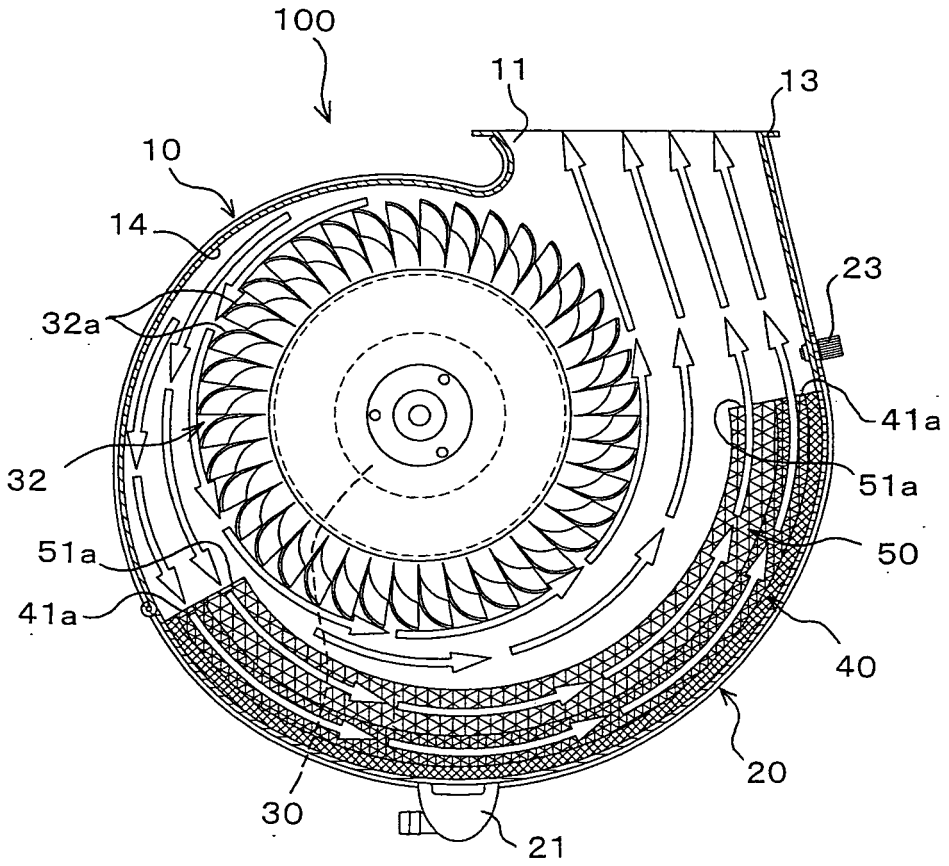


Fig.10

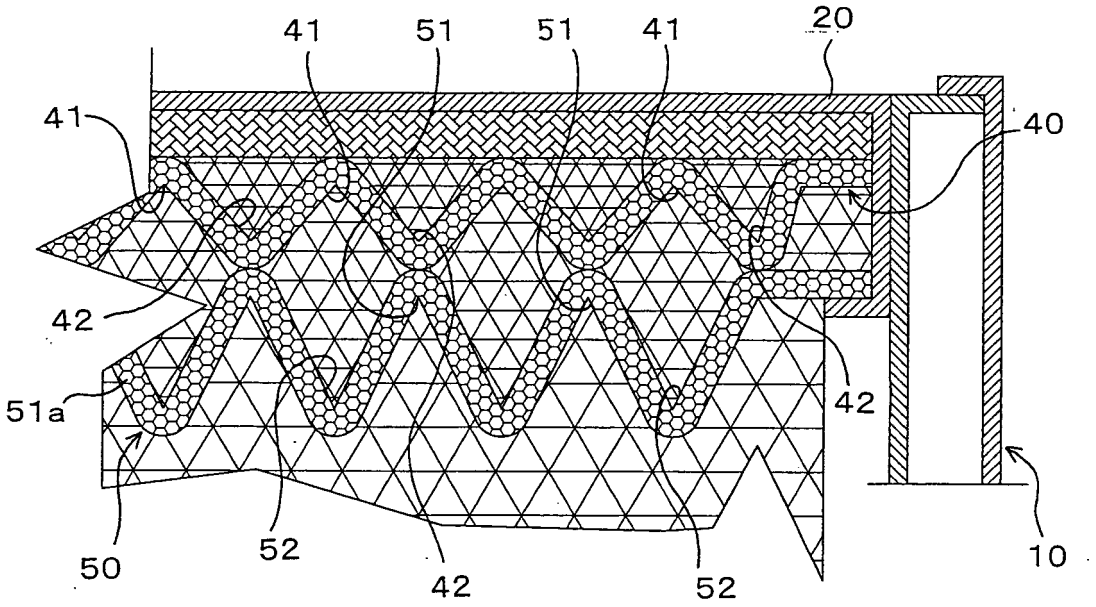


Fig.11

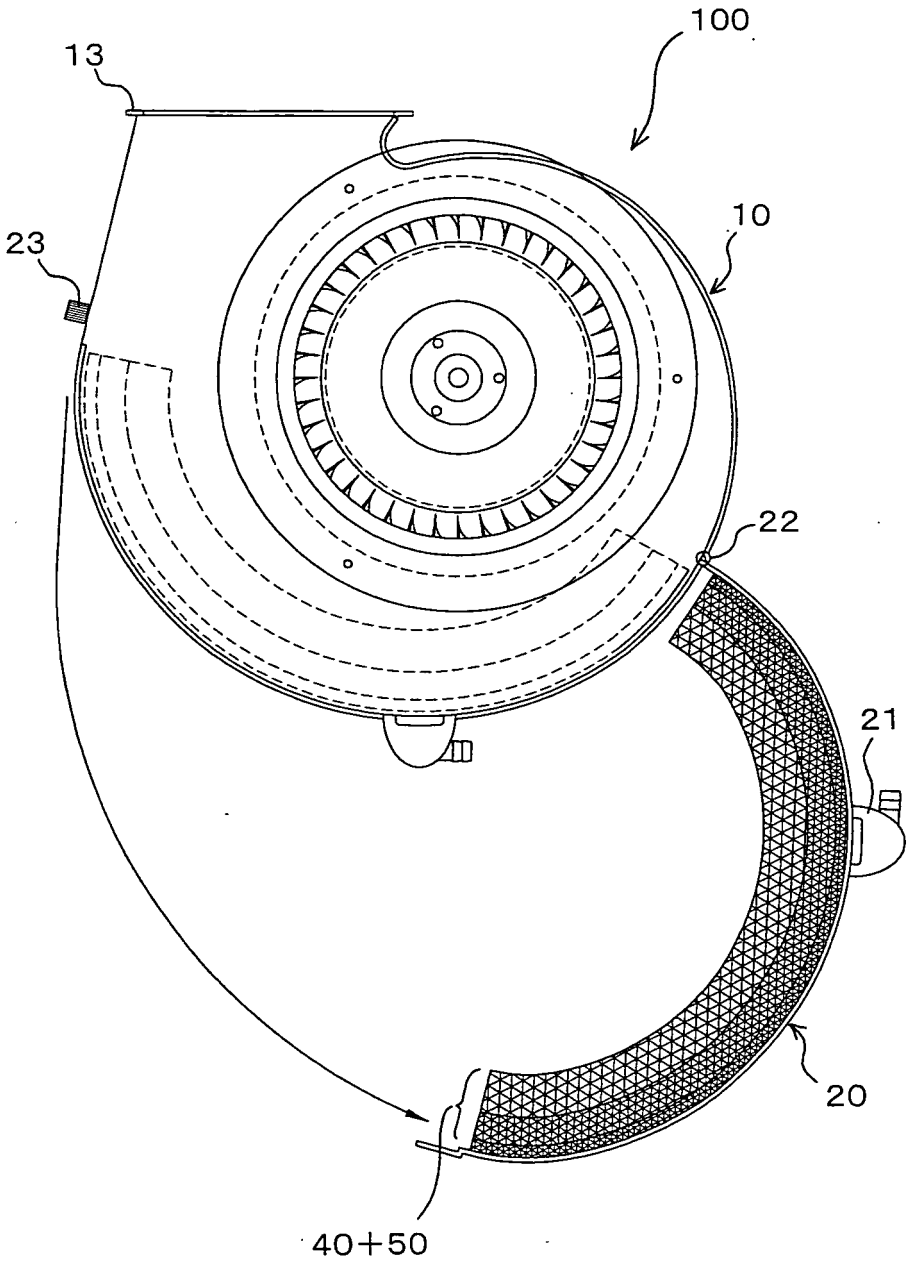


Fig.12

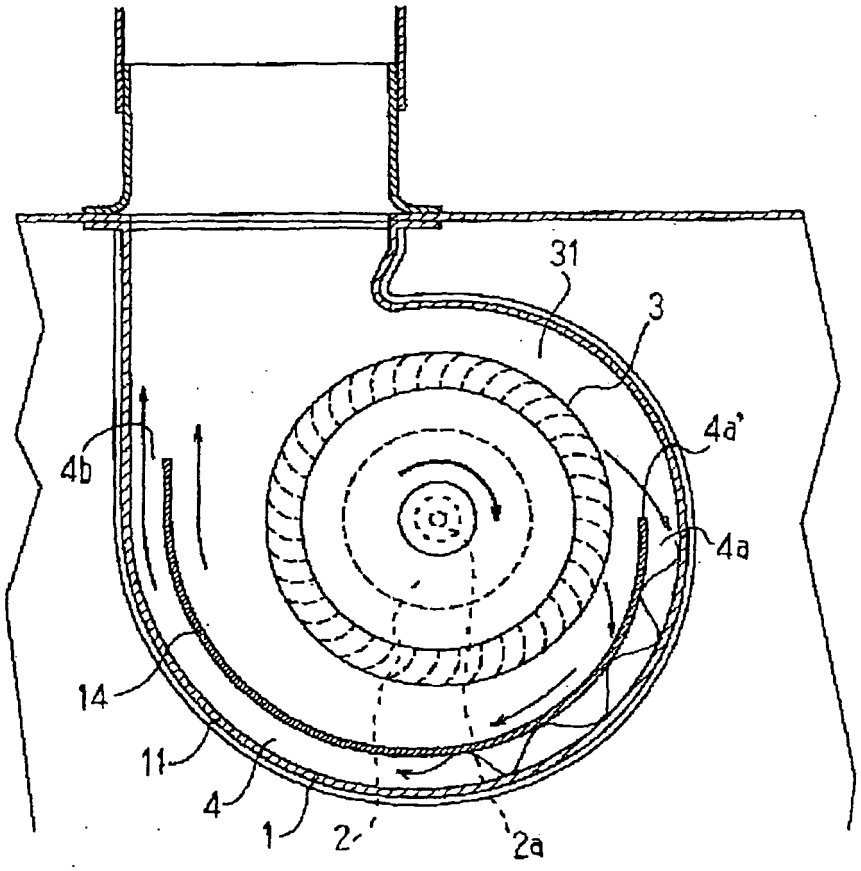
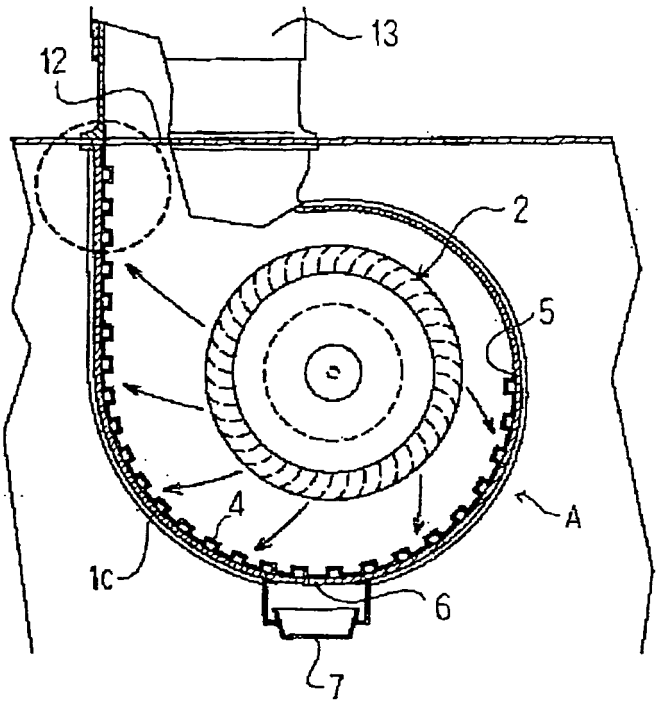


Fig.13



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP03/08307

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] F24F7/06

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[7] F24F7/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1926-1996 Jitsuyo Shinan Toroku Koho 1996-2003
Kokai Jitsuyo Shinan Koho 1971-2003 Toroku Jitsuyo Shinan Koho 1994-2003

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.
A	JP 2000-104969 A (Fuji Kogyo Co., Ltd.), 11 April, 2000 (11.04.00), (Family: none)	1-2
A	JP 2000-97466 A (Fuji Kogyo Co., Ltd.), 04 April, 2000 (04.04.00), (Family: none)	1-2
A	JP 11-351630 A (Fuji Kogyo Co., Ltd.), 24 December, 1999 (24.12.99), (Family: none)	1-2
A	JP 11-311431 A (Fuji Kogyo Co., Ltd.), 09 November, 1999 (09.11.99), (Family: none)	1-2

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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 July, 2003 (25.07.03)	12 August, 2003 (12.08.03)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1998)