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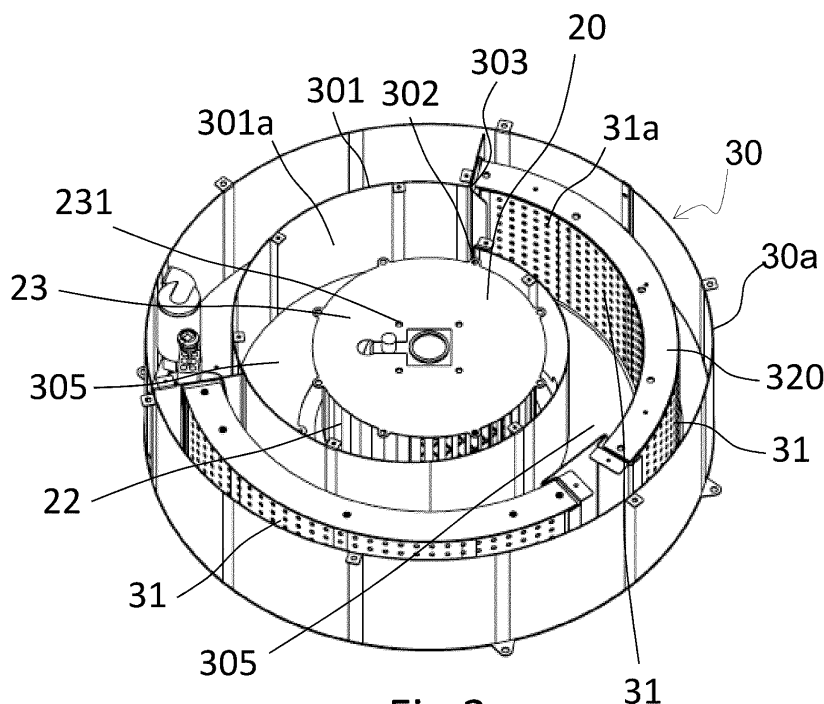
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(54) FILTERING HOOD WITH FILTERS FACING THE IMPELLER

(57) The present invention relates to a filtering hood (1) for kitchens and the like, comprising a box body (10) comprising a suction inlet (2), and a suction unit (20) for sucking a fluid from the suction inlet (2). The suction unit comprises a centrifugal fan adapted to suck the fluid from the suction inlet and to expel it through a lateral surface (220). The hood further comprises a filtering unit (30) for filtering the fluid expelled through the lateral surface (220) of the suction unit (20) and for retaining impurities of such expelled fluid. The filtering unit (30) is further arranged

along a curved portion provided with concavity facing the lateral surface (220) of the suction unit (20). The curved portion comprises a duct (305) for conveying the fluid expelled through the lateral surface (220) of said suction unit (20) towards an outlet opening formed on the box body (10), wherein said duct comprises a first portion that comprises a side wall (301) and a second portion that comprises at least a perforated panel (31) to allow fluid to run through.

**Fig.3****EP 3 163 175 A1**

Description

TECHNICAL FIELD

[0001] The present invention relates to the field of filtering hoods, particularly of the type used in kitchens for treating cooking smoke and odors.

[0002] The present invention particularly relates to filtering hoods equipped with filtering panels according to the preamble of claim 1.

PRIOR ART

[0003] Filtering hoods for kitchens are a type of air treatment hoods. These hoods are characterized by re-introducing sucked air, once sanitized and purified through suitable filters, inside the same environment from where it has been drawn out. Current filtering hoods provide the sucked air, before being reintroduced in the environment, to run through a path, specifically a manifold, channeling it into chambers provided with outlet surfaces where filtering elements are arranged. However the filtration efficiency of the hood is reduced since filtering elements are provided only on outlets that are provided downstream such channels, resulting in possible particulate deposits inside the hood and consequent malfunctions.

[0004] An example of such filtering hoods is known from the European patent EP2664857.

[0005] A further drawback is that the air flow runs through such channels for the whole length thereof before being expelled from the hood, air being accelerated up to turbulence speed conditions that generate undesired noise when in use. In order to overcome such drawback, the most recent filtering hoods provide the possibility of inserting therein suitable sound absorbing devices, but such solution does not guarantee a suitable acoustic insulation. Moreover the application of such devices is a bulky solution weighing down the hood both from a structural perspective and from an aesthetic perspective.

[0006] Flows of air under high speed conditions within the hood cause the efficacy of the filtering elements and therefore the hood efficiency to be reduced, since a higher speed of sucked air running through the filtering elements corresponds to the latter being less able to retain impurities and odors.

[0007] Then an extraction device is known from the European patent EP2159493 wherein a filtering wall completely surrounds an impeller for filtering air pushed by the impeller.

OBJECTS AND SUMMARY OF THE INVENTION

[0008] It is the object of the present invention to overcome prior art drawbacks.

[0009] Particularly it is the object of the present invention to provide a filtering hood with high filtration efficiency

characteristics.

[0010] It is also an object of the present invention to provide a little noisy filtering hood. These and other objects of the present invention are achieved by a hood embodying the characteristics of the annexed claims, which form an integral part of the present description.

[0011] The idea at the base of the present invention provides to make a filtering hood comprising a box body providing a suction inlet and a suction unit to suck a fluid from the suction inlet. The suction unit comprises a centrifugal fan that draws fluid from the suction inlet and expels it through the lateral surfaces with which it is provided. The hood further comprises a filtering unit to filter the fluid expelled from the suction unit and to retain impurities present in such fluid. More in details, the filtering unit is arranged along a curved portion provided with concavity facing the lateral surfaces of the suction unit.

[0012] Preferably the fluid expelled from the suction unit through its lateral surface is directed towards said curved portion provided with concavity facing the lateral surface thereof; more precisely the fluid expelled from the suction unit through its lateral surface is neither conveyed in a connecting duct for being transferred from the suction area to the filtering area of the hood, nor it is let free to flow, that is directly towards the filtering elements, but it travels along the curved portion and is directed towards the filtering elements, also arranged in a curved manner about the lateral surface of the suction unit.

[0013] Such solution allows the filtration efficiency of a filtering hood to be improved during its operation, since it allows the sucked air flow to be filtered when exhausted from the suction unit and therefore it allows possible deposits of particulate or impurities in the hood to be reduced.

[0014] Such solution moreover allows, in proximity of the suction unit, a uniform air flow to be obtained processed by the hood, in terms of fluid dynamics characteristics, thus reducing turbulent speed conditions inside the hood and consequently its noise.

[0015] Still the reduction in air speed conditions inside the hood further results in improving the filtration efficiency, since it allows the time air takes to run through the filtering elements to be increased and consequently the filtration efficiency to be increased. Further advantageous characteristics of the present invention will be more clear from the following description and annexed claims, which are an integral part of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The invention will be described below with reference to some not limitative examples, provided by way of example and not as a limitation in the annexed drawings. These drawings show different aspects and embodiments of the present invention and, where appropriate, reference numerals showing like structures, components, materials and/ or elements in different figures are denoted by like reference numerals.

Figure 1 is an exploded view of the hood according to the invention.

Figure 2, 3 and 4 are details of the hood according to the invention.

Figure 5 is a view taken along a lateral section of the hood according to the invention.

Figure 6 and 7 and 8 are a variant embodiment of the hood according to the invention.

Figure 9 are the method steps for purifying an air flow according to the invention.

Figure 10 is a variant embodiment of the filtering unit of the hood according to the invention.

Figure 11 is the filtering unit of figure 10 without an upper plate.

DETAILED DESCRIPTION OF THE INVENTION

[0017] While the invention is susceptible of various modifications and alternative constructions, some non-limitative embodiments, provided by way of example, are described in details herein below.

[0018] It should be understood, however, that there is no intention to limit the invention to the specific disclosed embodiments but, on the contrary, the invention intends to cover all the modifications, alternative constructions and equivalents that fall within the scope of the invention as defined in the claims.

[0019] In the description below therefore the use of "for example", "etc.", "or" denotes non-exclusive alternatives without limitation, unless otherwise noted; the use of "also" means "among which, but not limited to" unless otherwise noted; the use of "includes/comprises" means "includes/comprises, but not limited to", unless otherwise noted.

[0020] Fig.1 shows an exploded view of a filtering hood 1 according to the invention. The hood 1 comprises a suction inlet 2 (visible in fig.5) and a box body 10, inside which a suction unit 20 is housed (visible more in details in Fig.4). The box body 10 acts for covering some components of the hood, and in some variants, it may have a shape different from that of fig. 1 or, it may be even omitted.

[0021] With reference to Figs.3, 4 and 5 the suction unit 20 is a centrifugal fan comprising an electric motor 21 on which an impeller 22 is fitted, whose rotation allows a fluid to be sucked from the suction inlet 2. The suction unit 20 further provides a circular shaped upper surface 23, on which holes 231 are formed. The upper surface 23 acts as a support where the electric motor 21 is fastened, for example by means of tightening screws inserted into the holes 231, screwed in respective seats present in the motor frame.

[0022] As visible in fig.5 the impeller 22 has the shape of a circular base right prism whose lateral surface 200 is provided with a plurality of blades 223, which are equally spaced along such surface and such to define, therebetween, a plurality of slits 224, developing parallel to the axis of rotation of the impeller and allow air to pass.

Moreover blades 223 of the impeller are arranged in proximity of the perimetral circumference of such prism, such to define an inner chamber 222 intended to house the electric motor 21. Thus the suction unit 20 is a block removable from the box body 10, such that, when needed, maintenance of the motor or replacement of the impeller can be performed. Moreover at the lower base 22a of the impeller 22 there is provided an opening 221 in fluid communication with the suction inlet 2 of the hood. Therefore with the hood in the operating condition, the air sucked by the inlet 2, due to the rotational motion of the impeller 22, flows firstly in the chamber 222 from where then is expelled, through the slits 224, with a trajectory that substantially lies on a plane orthogonal to the axis of rotation of the impeller.

[0023] Thus the sucked air is expelled from the inner chamber 222 of the impeller through the whole lateral surface 220 involved by the rotation of the impeller 22.

[0024] In the example described herein, with reference to figure 5, between the opening 221 and the suction inlet 2 of the hood a perforated panel 11 is interposed, having a flat shape and preferably with a circular geometry and made of a metal material, which acts as a filter for grease particles suspended in the sucked air.

[0025] The perforated panel 11 is supported by supporting bases of a support element 110 fastened to opposite lateral walls of the box body 10, and it is removable when needed such to clean or replace it.

[0026] The support element 110 on the contrary surrounds the perforated panel 11 and, between the box body 10 and the supporting element 110 panels 13a are interposed preferably made of a material transparent to light, such as for example glass. Thus a light beam emitted by LED strips 13 arranged in a recess of the supporting element 110, can pass through the panels 13a and illuminate a cooking top (not shown) installed underneath the hood 1.

[0027] With reference to figures 2, 3 and 4 the hood 1 further comprises a filtering unit 30 inserted in the box body 10.

[0028] In the embodiment shown herein, the filtering unit 30 comprises an enclosure comprising a circular perimetral wall 30a fastened at the bottom to a base 30b provided with a plurality of openings (30c,30d) and at the top by an upper plate 300.

[0029] In details the base 30b is circular and it comprises a concentric circular opening 30c intended to receive the suction unit 20 that, in the installed condition, rises from the surface containing the base 30b for the height of the lateral surface 220 of the impeller 22.

[0030] Moreover near the edge of the circular opening 30c, a wall 301 vertically rises from the base 30b, provided with an inner surface 301a facing the suction unit 20 and, developed by following a spiral path, with the center in the geometric center of the circular opening 30c, surrounding the suction unit 20.

[0031] Preferably such wall runs a spiral path for such a portion that its final end 303 is substantially radially

aligned with its initial end 302. However in other embodiments, such portion can have a lower or even longer length.

[0032] At the final end 303 of the wall 301, the filtering unit 30 comprises one or more consecutive panels 31, preferably with a geometry as a circumference arc, provided with a surface 31a made of a perforated sheet facing the suction unit 20 and arranged concentrically and outside the latter, such to form a first array.

[0033] In a preferred embodiment, there are provided several panels 31 and each one of them is spaced from an adjacent panel such that a second array of panels defines a plurality of chambers 32 between the first and the second arrays, each one intended to contain filtering material, such as for example washable polyurethane impregnated with activated carbon or zeolite.

[0034] The inner surface of the wall 301 and the surfaces 31a made of perforated sheet of the innermost array of the plurality of panels 31, on the contrary define the lateral walls of a duct 305 which is run by the air flow sucked by the suction unit 20. The sucked air flow namely firstly runs through the spiral portion and then it passes through the surfaces 31a made of perforated sheet such to be filtered.

[0035] In the shown example the chambers 32 are further closed at the top and at the bottom by respective panels 320, such that two adjacent arrays of panels 31 can be removably fastened to the base, at slots 30d formed thereon. Thus the chamber 32 defined by the panels 31 is a block removable such to replace, when needed, the filtering material contained therein or to clean the perforated surfaces 31a.

[0036] The filtering unit 30 further comprises an upper plate 300 comprising a first 310 and a second 311 portion, in the shown embodiment, both having the shape of circular ring sector but having different diameter. In particular the first portion 310 is intended to close at the top the duct 305, since its inner circumference 300a is flush with the circumference of the upper surface 23 of the suction unit 20, while its outer circumference 300b is flush with the outermost array of the plurality of panels 31. Moreover as visible in figures, the outermost array of panels 31 is spaced from the perimetral wall 30a of the enclosure. Thus the filtered air that has run through the outermost array of panels, is conveyed in an intermediate chamber 40 in fluid communication with the environment where the hood is installed, and therefore it can flow out in such environment.

[0037] In the example shown in fig.1, the intermediate chamber 40 is closed at the top by a panel 41 provided with a grid 42 and fastened to the hood body 10, such that air can flow outside the hood preventing particulate or dirt from depositing therein.

[0038] Thus once the filtering unit 30 is assembled it is a unique removable block that acts also as a chamber containing the suction unit 20. The filtering panels 31, when inserted in the hood 1, are arranged, at least for a portion, around the suction unit 20 and are interposed

between the perimetral wall 30a of the filtering unit 30 and the suction unit 20. Thus the holes present on the whole surface 31a of the panels allow air to pass through a sequence of areas facing along the duct 305 run through by the air sucked by the suction unit 20.

[0039] Another aspect of the present invention, shown in fig.9, relates to a method to purify an air flow by a filtering hood 1 as described herein before, comprising the following steps.

- a. sucking air from the surrounding environment, through a suction inlet 2, with a centrifugal fan of a suction unit 20 and expelling it through a lateral surface 220 of said suction unit 20 (step 101);
- b. directing the air expelled from the suction unit 20 through its lateral surface 220 towards a filtering unit 30 arranged along a curved portion provided with concavity facing the lateral surface 220 of the suction unit 20 (step 102); and c. passing the expelled air through the filtering elements of the filtering unit 30, thus purifying it from impurities and/or grease particles contained in the air (step 103).

[0040] Preferably step b. (step 102) of the above method comprises the operation of directing the air expelled from the suction unit 20 through its lateral surface 220 towards a duct 305 of the curved portion, said duct comprising a first portion that comprises a side wall 301 and a second portion that comprises at least a perforated panel 31 to allow fluid to pass through; in this case it has to be noted that the air expelled from the suction unit through its lateral surface is neither conveyed into a connection duct for being transferred from the suction zone to the filtering zone of the hood, nor it is let free to flow that is directly towards the filtering elements, but it runs through the curved portion and is conveyed towards the filtering elements, also arranged in a curved manner around the lateral surface of the suction unit.

[0041] The fact of running the air to be purified through the curved portion and of letting air to pass through the curved filtering elements facing the lateral surface of the suction unit advantageously allows a more efficacious and less noisy purification to be carried out.

[0042] From the above description it is clear how the hood described, and the relevant method for purifying external air, allows the above objects to be achieved.

[0043] It is therefore clear for a person skilled in the art that it is possible to make changes and variants to the solution described with reference to the above figures without for this reason departing from the scope of protection of the present patent as defined in the annexed claims.

[0044] In particular, even though in the example described above the filtering unit comprises a duct composed of a first portion defined by a perimetral wall and a second portion composed of a series of consecutive concentric panels between which filtering material is interposed, for the purposes of the present invention it is

sufficient for such filtering unit to be arranged along a curved portion provided with a concavity facing the lateral surface 220 of the suction unit 20. Therefore it is possible to provide in an alternative solution, only one array of panels equipped with a perforated surface whose holes act for retaining impurities and/or grease particles contained in the air. A further embodiment on the contrary can provide one or more arrays of panels, but arranged along all the perimetral wall of the duct run through by air, such to surround completely the suction unit.

[0045] Still it is possible to provide the filtering material to be housed in compartments surrounding in a discontinuous manner the suction unit and arranged along a perimetral edge of the filtering unit.

[0046] For example such as show in figs. 6,7 and 8 it is possible to provide the filtering unit to be composed of an upper surface 71 and a lower surface 72 where respective joining elements (71a,71b) are arranged along the perimeter, which allow the upper surface and the lower surface to be coupled and uncoupled.

[0047] The lower surface 72 further has an opening 73 allowing the suction unit 20 to be housed in the filtering unit.

[0048] The joining elements (71a,71b) are further spaced from each other, and in the coupled condition, define volumes 74 therebetween in fluid communication with the inner chamber 222. In each one of the volumes filtering material 75 is inserted, such as for example blocks of activated charcoal baffles, such to surround the suction unit 20. Similarly to the embodiment described above, the filtering material acts on air expelled from the inner chamber 222 along the lateral surface 220 involved by the rotation of the impeller 22.

[0049] In the example of figure 10 and 11 another variant of the filtering unit 30 is shown. In details, figure 11 shows the filtering unit of figure 10 without the upper plate 300 such to show the inside in details.

[0050] Also in such variant, as in figures 1-4, the filtering unit 30 is arranged along a substantially curved portion provided with concavity facing the lateral surface 220 of the suction unit 20.

[0051] The curved portion comprises a duct 305 to convey the fluid expelled through the lateral surface 220 of the suction unit 20 towards an outlet opening formed on the box body. In such embodiment the duct 305 is substantially circular and is delimited, in a position distal from the impeller 22, by perforated panels 31 and solid panels 33. The air pushed by the impeller 22 passes through the perforated panels 31 where it is filtered and then it passes through the upper openings 312 (delimited on one side by the upper plate 300 and on the other side by the perimetral walls 30a) and the perimetral openings 313 (obtained from the perimetral walls 30a) such to enter the chamber 40 and to flow out from an outlet (not shown in the figures) of the box body 10 of the hood.

Claims

1. Filtering hood (1) for kitchens and the like, comprising

- a box body (10) comprising a suction inlet (2),
- a suction unit (20) for sucking a fluid from said suction inlet (2), the suction unit comprising a centrifugal fan adapted to suck said fluid from said suction inlet (2) and to expel it through a lateral surface (220);
- a filtering unit (30) for filtering the fluid expelled through the lateral surface (220) of the suction unit (20) and for retaining impurities of the said expelled fluid, the filtering unit (30) being arranged along a curved portion provided with concavity facing the lateral surface (220) of said suction unit (20),

characterized in that said curved portion comprises a duct (305) for conveying the fluid expelled through the lateral surface (220) of said suction unit (20) towards an outlet opening formed on the box body (10), wherein said duct comprises a first portion that comprises a side wall (301) and a second portion that comprises at least a perforated panel (31) to allow fluid to run through.

2. Filtering hood (1) according to claim 1, wherein said side wall (301) develops following a spiral path, and wherein said second portion develops following a circumferential path with center in the axis of rotation of said centrifugal fan.
3. Filtering hood (1) according to claim 1 or 2, wherein said filtering unit (30) comprises a plurality of concentric and consecutive perforated panels (31), spaced from one another in such a way to define a plurality of chambers (32).
4. Filtering hood (1) according to claim 3, wherein at least one panel of said plurality of panels (31) comprises a perforated surface adapted to retain impurities of the fluid expelled through the lateral surface (220) of said suction unit (20).
5. Filtering hood (1) according to claim 3 or 4, wherein said plurality of chambers (32) is closed at the top and at the bottom by an upper panel and a lower panel, and wherein the upper panel and the lower panel are fastened to each other such that the filtering unit (30) is a single block removable from the hood (1).
6. Filtering hood (1) according to claim 5, further comprising a filtering material disposed inside one or more of said chambers (32) and wherein the filtering material contained in said plurality of chambers (32)

is washable polyurethane impregnated with activated carbon and/or activated carbon and/or zeolite.

7. Filtering hood (1) according to one or more of the preceding claims, wherein at the suction inlet a panel (11) is arranged adapted to retain grease particles of the sucked air. 5

8. Filtering hood (1) according to claim 1, wherein the filtering unit (30) is composed of an upper surface (71) and a lower surface (72) which are provided along their perimeter with respective joining elements (71a, 72a) that allow the upper surface and the lower surface to be removably fastened, and wherein said joining elements (71a, 72a) are arranged in such a way to define a plurality of volumes (74) which surround and are in fluid communication with the slits (224) of the impeller (22). 10
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9. Filtering hood (1) according to claim 8, wherein inside the plurality of volumes (74) filtering material is inserted. 20

10. Method for purifying a flow of air through a filtering hood (1) according to any one of the preceding claims, comprising the following steps: 25
 - a. sucking air from the surrounding environment, through a suction inlet (2), with a centrifugal fan of a suction unit (20) and expel it through a lateral surface (220) of said suction unit (20) (step 101); 30
 - b. directing the air expelled from the suction unit (20) through its lateral surface (220) towards a filtering unit (30) arranged along a curved portion provided with concavity facing the lateral surface (220) of the suction unit (20) (step 102); and 35
 - c. passing the expelled air through the filtering elements of the filtering unit (30), thus purifying it from impurities and/or grease particles contained in the air (step 103) **characterized in that** 40

step b. provides to direct the air expelled from the suction unit (20) through its lateral surface (220) towards a duct (305) of the curved portion, said duct comprising a first portion that comprises a side wall (301) and a second portion that comprises at least a perforated panel (31) to allow the fluid to run through. 45

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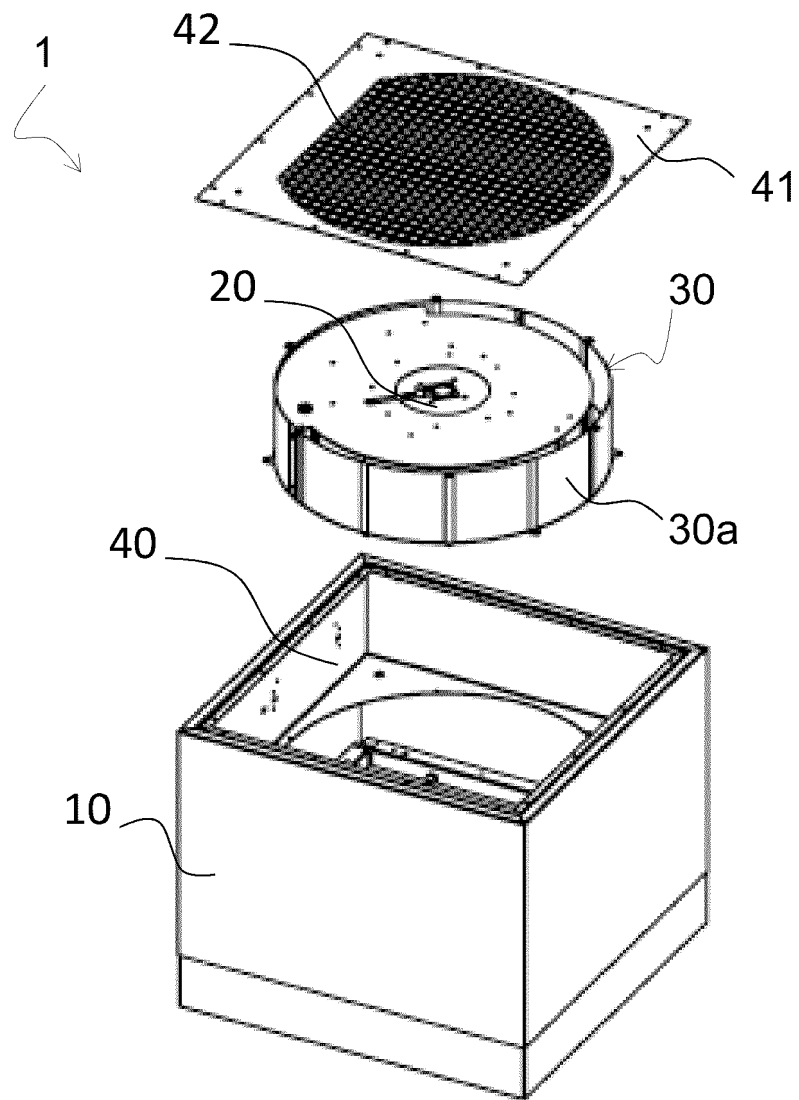


Fig.1

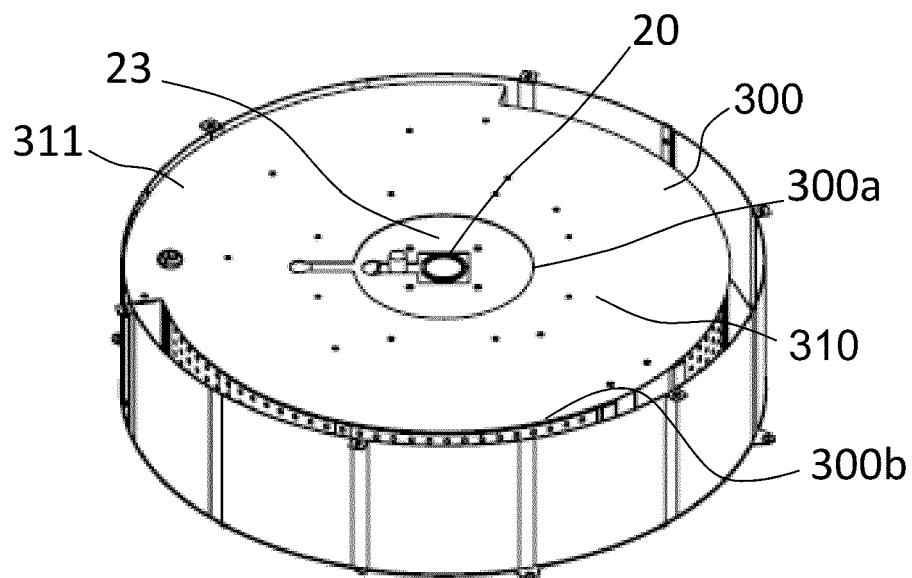


Fig.2

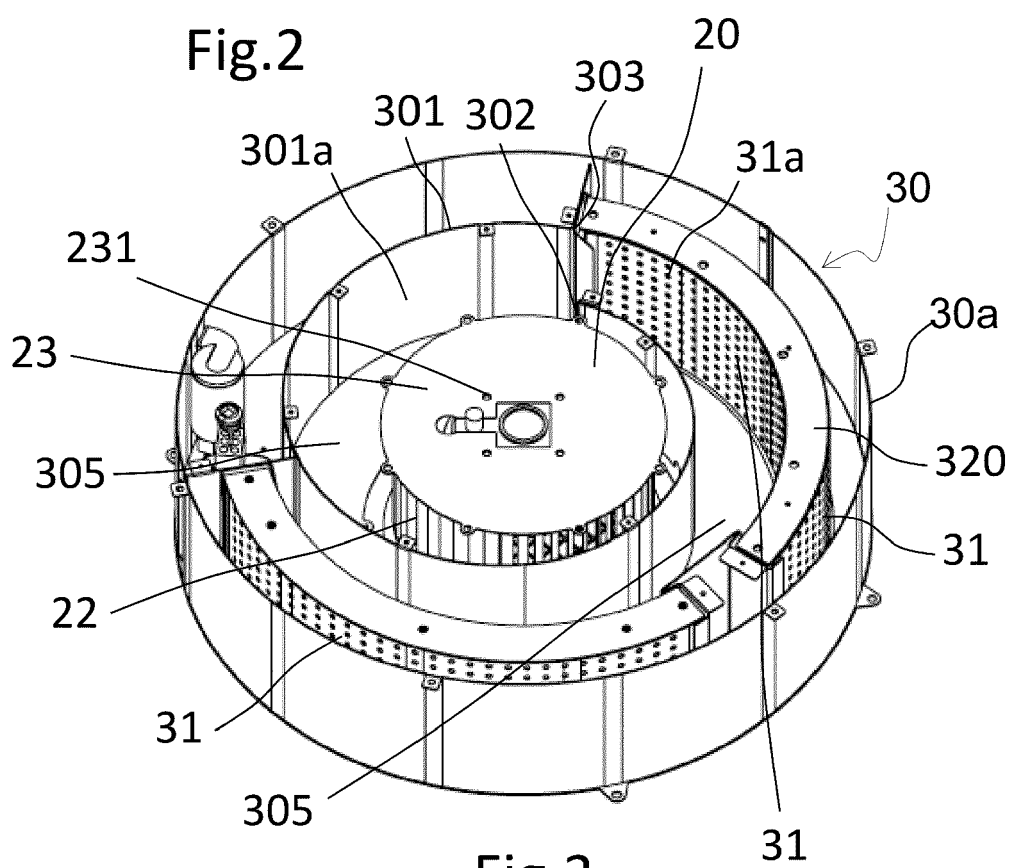


Fig.3

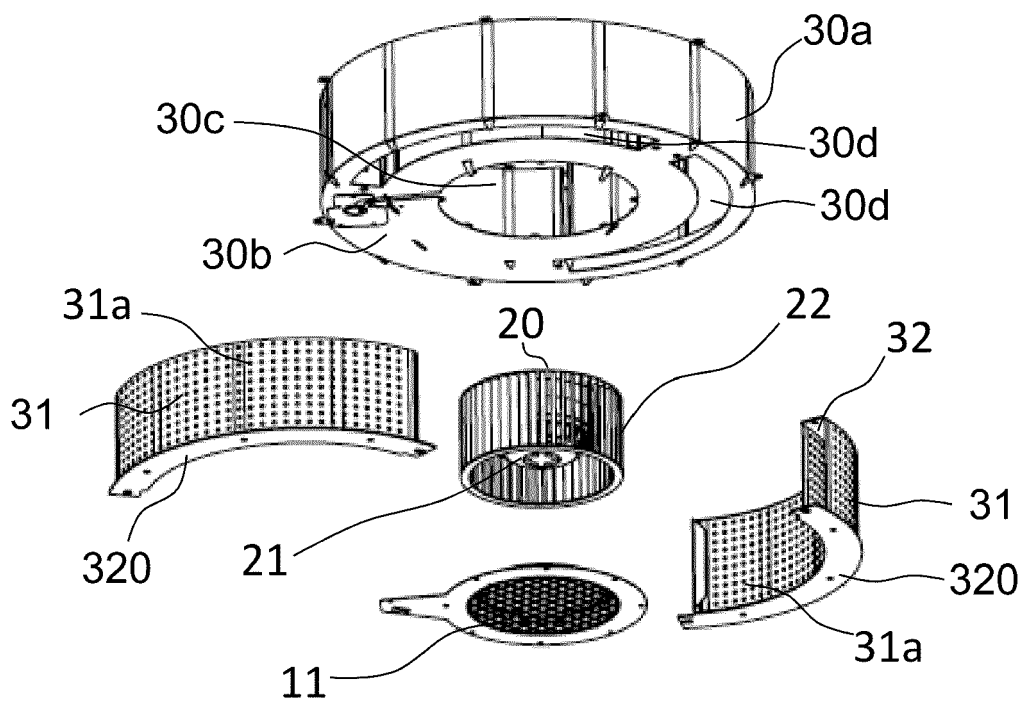


Fig.4

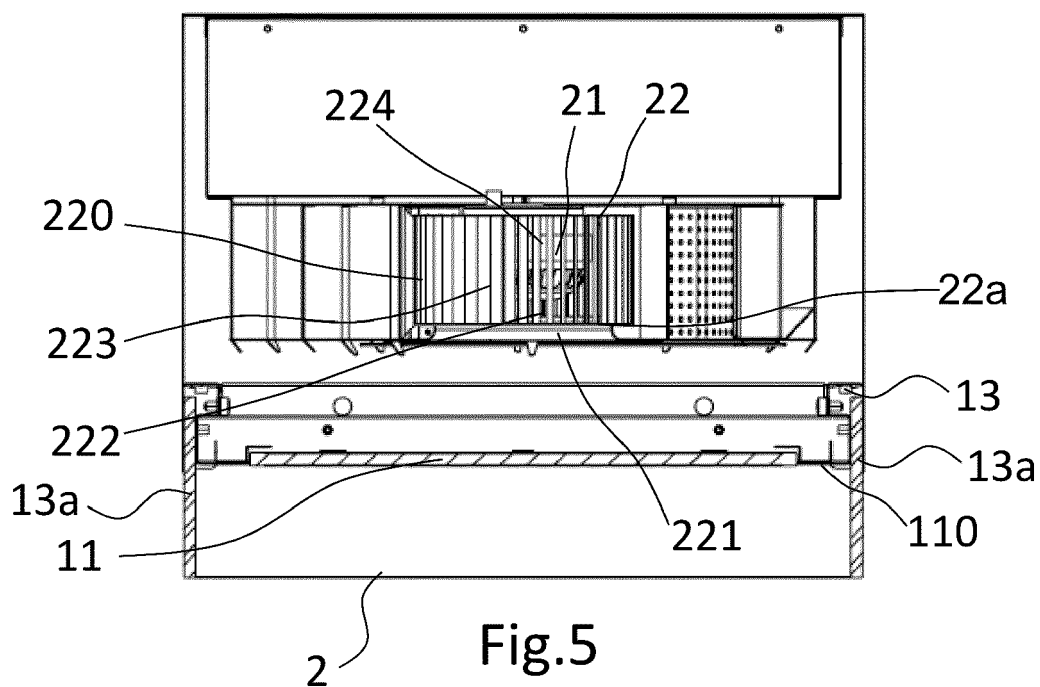
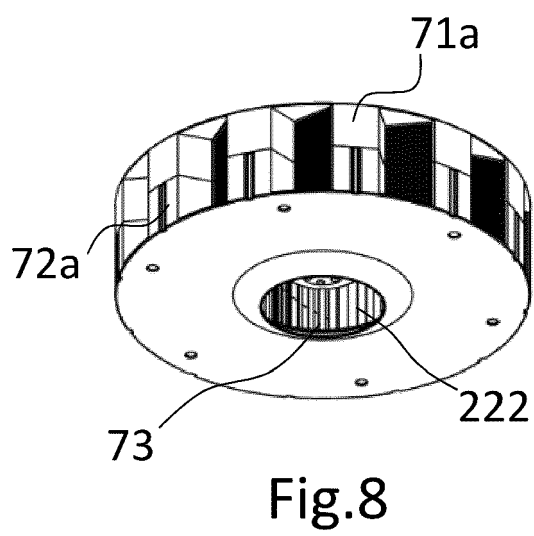
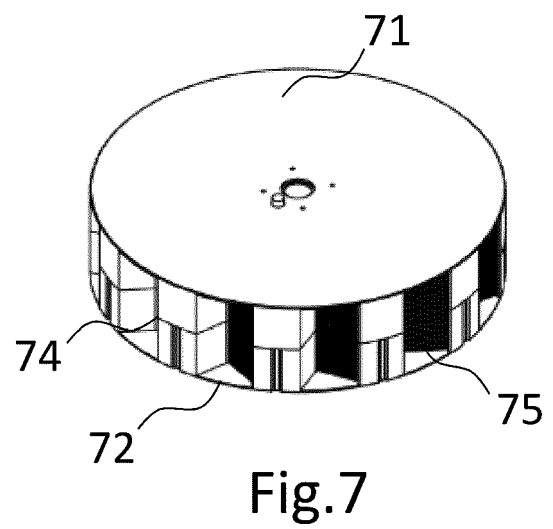
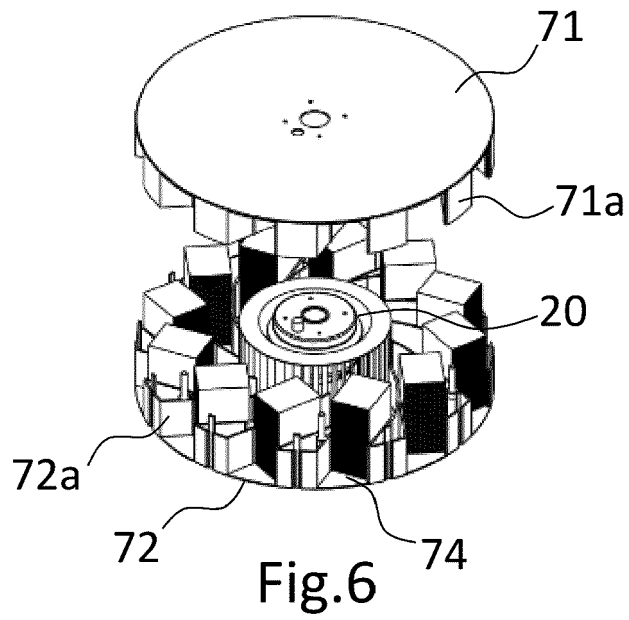


Fig.5



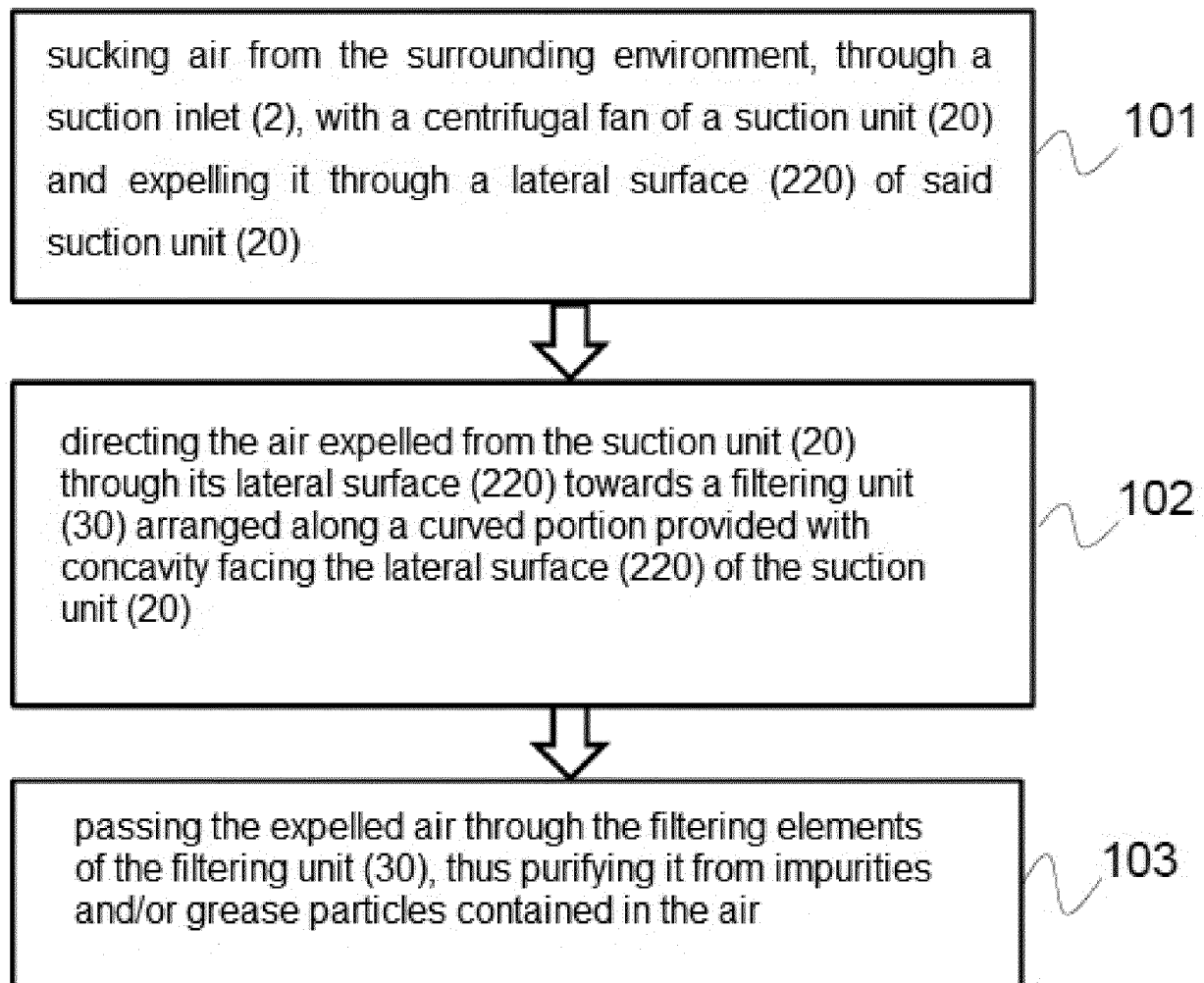
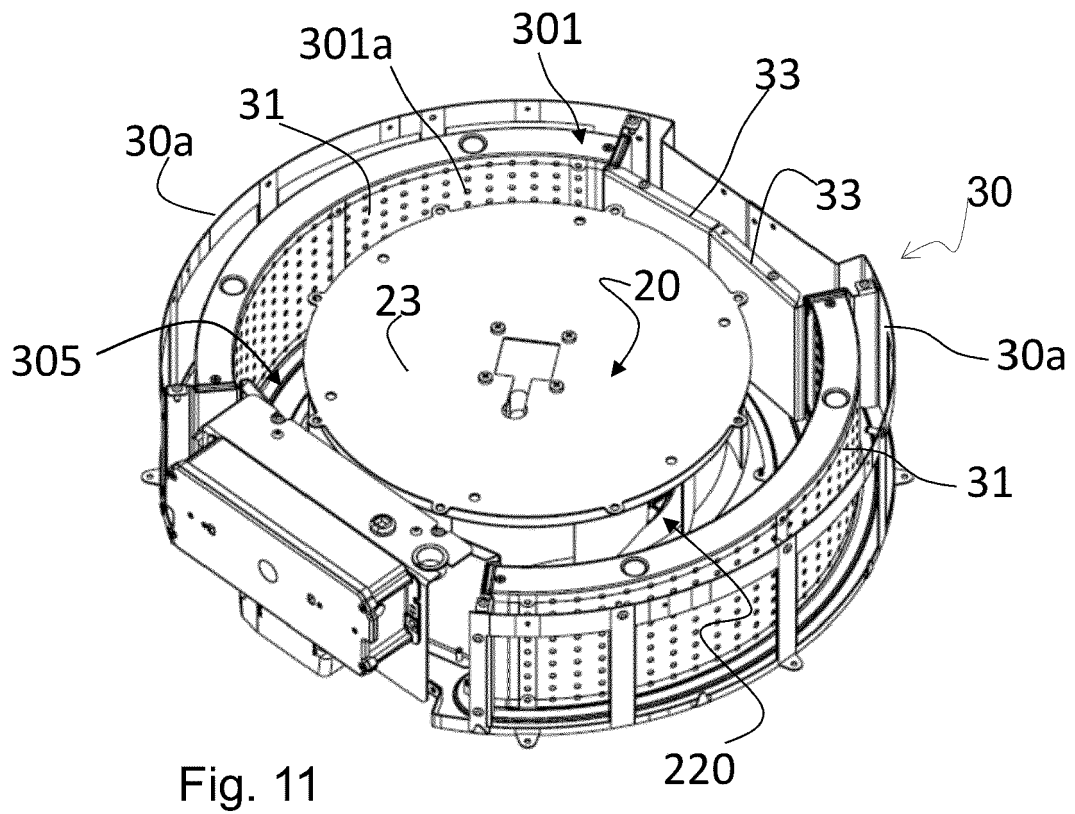
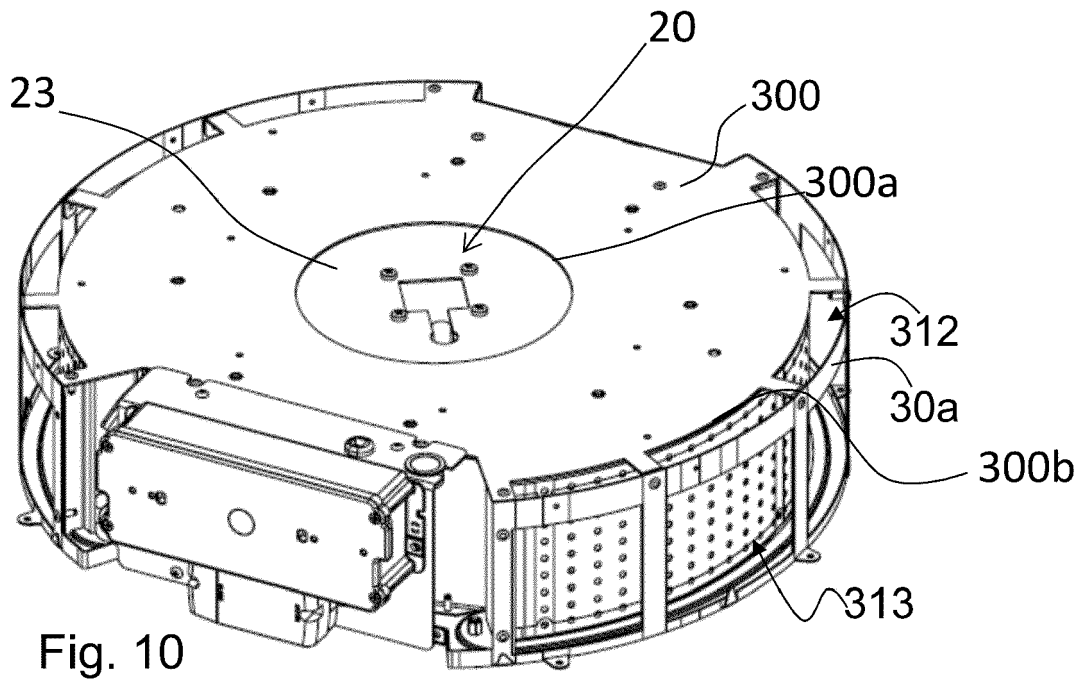


Fig. 9





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