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(71) Applicant: **Franke Futurum AB**
934 24 Byske (SE)

mode, the splitting device (5) is in a first fixed state with a first opening area (30) to the exhaust duct (3) so that the forced flow (11) is split in the exhaust flow (12) and the recirculation flow (13) through the cleaning device (4). Further, we describe a ventilation system for a house or a building and a method for operating a fume extractor hood (1).

Description

[0001] The invention relates to a fume extractor hood according to the preamble of claim 1 and a ventilation system according to claim 12. Further, the invention relates to a method for operating a fume extractor hood according to claim 16.

[0002] The energy efficiency of new buildings and in case of the refurbishment of existing buildings plays an important role in view of environmental and financial aspects today. On the other hand, a good indoor climate is also of importance for the building residents, making it necessary to replace used air by fresh air, which air has to be heated to room temperature on cold days and/or can transport a lot of humidity on warm days. When cooking, the air in the kitchen can be full of unpleasant odors, which are at least partially removed by a fume extractor hood.

[0003] Fume extractor hoods with exhaust air operation will guide the captured air to the outside. The unpleasant odors are removed efficiently, but warm air is wasted through the exhausting duct. In recirculation extractor hoods, the air captured by the extractor hood is cleaned by a cleaning device and led back directly to the kitchen. Heated air within the kitchen is not wasted, but the performance of recirculation extractor hoods strongly depends on the capability of the cleaning devices, which decrease over the time. Additionally, the moisture content of the air is not reduced.

[0004] From EP 1 055 883 B1 a fume extractor hood is known which comprises a switching device for switching between an exhaust air operation and a circulation air operation in dependence on the outside temperature. On cold days, the circulation air operation is preferred to avoid that warm air is removed from the room and replaced by cold air, which has to be heated to room temperature resulting in higher energy costs.

[0005] From DE 10 2015 116 863 A1 a further fume extractor hood is known which can be operated in exhaust and/or recirculation air operation. This fume extractor hood comprises a control unit and an air guiding system for switching between exhaust and recirculation air operation, wherein the flow rate is reduced in the recirculation air operation. Generally, the noise level in recirculation air operation is significantly higher compared to the exhaust air operation. A reduced flow rate minimizes the noise during recirculation air operation. However, the odor collecting capability depends on a high flow rate, so that with a reduced flow rate the odor nuisance increases.

[0006] Especially in Nordic countries, the fume extractor hoods in a block building or similar are in connection with a central ventilation unit and do not have a motor within the fume extractor hood. The necessary air flow is provided by a central ventilation unit in this case and the odor reduction during cooking is achieved by adjusting the damper to the central ventilation unit. Additionally, these fume extractor hoods can have external air guiding

elements, which are arranged at the circumference of the extractor hood and improve the odor reduction capability by guiding the captured air. However, these external air guiding elements can influence the headroom and can have also an aesthetically disturbing effect.

[0007] It is therefore an object of the present invention to provide a fume extractor hood, a ventilation system and a method for operating a fume extractor hood, which provide efficient odor reduction at a high air flow, especially without air guiding elements.

[0008] It is further an object of the present invention to provide a fume extractor hood, a ventilation system and a method for operating a fume extractor hood, which provide efficient odor reduction independent from the odor reduction capability of the cleaning device.

[0009] It is further an object of the present invention to provide a fume extractor hood, a ventilation system and a method for operating a fume extractor hood, which provide a basic ventilation of the kitchen.

[0010] These objects of the invention and further objects are achieved by a fume extractor hood according to claim 1, a ventilation system for a house or a building according to claim 12 and a method for operating a fume extractor hood according to claim 16. Further embodiments are specified in the dependent claims.

[0011] The fume extractor hood according to the present invention comprises, as known in the prior art, a flow generator for providing a forced flow in an active mode of the flow generator, an exhaust duct for guiding an exhaust flow, a cleaning device for cleaning a recirculation flow, and a splitting device for splitting the forced flow in the exhaust flow and the recirculation flow.

[0012] According to the present invention, in the active mode, the splitting device is in a first fixed state with (i.e., defining) a first opening area to the exhaust duct so that the forced flow is split in the exhaust flow and the recirculation flow through the cleaning device.

[0013] With the splitting device in said first fixed state in the active mode, a constant reduction of unpleasant odors of the captured air by means of the forced flow with a high flow rate is achieved due to the exhaust flow while the lifetime of the cleaning device is prolonged compared to pure recirculation hoods. A splitting of the forced flow is achieved without any additional air guiding elements within the extractor hood for the recirculation flow and the exhaust flow, apart from the splitting device itself, so that space requirement within the extractor hood is reduced. Further, the forced flow is always kept at a high flow rate, which is important for capturing unpleasant odors. Additionally, also external air guiding elements can be omitted without effecting the odor reduction capability.

[0014] According to a preferred embodiment of the fume extractor hood, the splitting device is in a second fixed state with a second opening area to the exhaust duct in a passive mode, in which the flow generator is inactive, for preventing the recirculation flow. The kitchen or room can thus be ventilated in the passive mode

through the fume extractor hood for a better indoor climate.

[0015] Preferably, the splitting device is a mechanical device and comprises at least one flap and/or one slider and/or one plate and/or one fin, which is movable for setting the first opening area and second opening area.

[0016] In another preferred embodiment of the extractor hood, a measuring device is arranged upstream and/or downstream the splitting device for measuring the pressure and/or the flow of the forced flow, exhaust flow and/or basic flow within the extractor hood or in the exhaust duct. Measuring the pressure and/or flow of the forced flow, exhaust flow and/or basic flow can be used for setting the first and second fixed state(s).

[0017] In another preferred embodiment, the measuring device comprises a test valve, which is preferably arranged in the splitting device and/or at an inner wall of the extractor hood or the exhaust duct, and a measurement unit, which is removable or permanently connected to the test valve. An integrated test valve allows exact measurement of the pressure at a same position without any additional influence when using a hand meter or the like. The test valve can be arranged in the splitting device, in the exhaust duct, in the air duct or at any other place within the extractor hood, which allows the measurement of the pressure and/or flow of at least one air flow.

[0018] Preferably, the first and/or the second fixed state of the splitting device is/are set up, preferably by mechanical or electronical means, during installation and/or the start-up of the extractor hood based on the pressure and/or the flow of the forced flow, exhaust flow and/or basic measured within the extractor hood and/or the exhaust duct. Predefined adjustments diagrams can be used for setting up the first fixed state and second fixed state correctly based on said pressure and/or flow measurement.

[0019] According to another embodiment, the exhaust flow in the active mode is at least 1.2 cubic meters per minute or more. A minimum exhaust flow rate in the active mode guarantees a continuous and significant odor reduction in the kitchen or room independent of the current state of the cleaning device. This will also prolong the life of the cleaning device.

[0020] According to a further embodiment of the invention, an air duct for at least partially guiding the forced flow is arranged within the extractor hood, wherein the air duct is at least partially enclosed by the cleaning device so that the recirculation flow can leave the air duct into the cleaning device through at least one opening. The air duct has the function of guiding the air within the extractor hood, especially of guiding the forced flow. Additionally, the air duct has at least one opening, through which the recirculation flow enters the cleaning device. This allows a compact design of the extractor hood with a minimum on duct length for guiding the air flows within the extractor hood.

[0021] In another preferred embodiment the air duct is directly connected to the exhaust duct via the splitting

device, which is arranged downstream the air duct. This results in a compact design of the extractor hood.

[0022] In a further embodiment, the exhaust duct and the air duct are arranged beside each other and that the splitting device is arranged in the exhaust duct and/or the air duct. An easy access to the splitting device, the exhaust duct and the air duct is achieved.

[0023] Preferably, the cleaning device is a charcoal filter. A charcoal filter can absorb a high amount of unwanted odors so that the recirculation flow is less contaminated with odors.

[0024] The object of the present invention is also achieved by a ventilation system for a house or building, comprising at least one extractor hood as described above, and a central exhaust duct, which is connected to the exhaust duct of the extractor hood, wherein the central exhaust duct comprises a further flow generator for providing a basic flow and/or a forced exhaust air flow. With the connection of the extractor hood to the central exhaust duct, the kitchen and other rooms of the house or building can ventilated through the extractor hood. This has a positive effect on the indoor climate, especially when air with a high humidity is removed from the kitchen.

[0025] In a preferred embodiment of the ventilation system, the ventilation system comprises one or more air inlet devices, i.e. at least one air inlet device, for providing a fresh air flow to an interior of the house or the building, which inlet device is configured to be activated automatically, e. g. based on activation of the extractor hood, the indoor temperature or the indoor air quality, or manually by a control unit, preferably through mechanical or electronical means. Especially in newly built houses or buildings, which have a good thermal insulation with a good seal on the outer shell, the air inlet devices provide enough fresh air to avoid a low pressure in the house or building, in particular during functioning of the extractor hood.

[0026] In yet another embodiment of the ventilation system, the control unit is arranged at or on the extractor hood so that the user can switch on the system easily. Additionally, the control unit can also activate and deactivate a flow generator or fan within and/or outside the extractor hood or a damper for supplying additional air.

[0027] According to another embodiment of the ventilation system, the first opening area and the second opening area depend on a flow ratio between the basic flow, the exhaust flow and/or the forced flow. Depending on the opening area in the first fixed state and the second fixed state, the ratio between the recirculation flow and the exhaust flow can be set so that independent from the odor reduction capability of the cleaning device an odor reduction within in the kitchen can be achieved.

[0028] The object of the present invention is further achieved by method for operating a fume extractor hood with an exhaust duct for guiding an exhaust flow and a cleaning device, through which a recirculation flow circulates, wherein a forced flow is provided by a flow generator in an active mode of the flow generator and the forced

flow is split by a splitting device into the exhaust flow and the recirculation flow, wherein in the active mode, the splitting device is set in a first fixed state, in which the splitting device has a first opening area to the exhaust duct and the forced flow is split, by the splitting device, in the exhaust flow and the recirculation flow through the cleaning device.

[0029] In a preferred embodiment of the method, the splitting device is set in the second fixed state with a second opening area to the exhaust duct in a passive mode, when the flow generator is inactive, so that the recirculation flow is prevented.

[0030] In yet another preferred embodiment of the method, a pressure and/or the flow of the forced flow, exhaust flow and/or basic flow upstream and/or downstream the splitting device is measured in the active and/or passive mode. The pressure and/or flow can be easily measured preferably with an integrated measuring device.

[0031] Further features and advantages of the present invention will be described in connection with exemplary embodiments with relation to the drawings.

Figure 1a and 1b show a sectional view of a schematic fume extractor hood according to the invention in different states;
 Figure 2a and 2b show a sectional view of a schematic fume extractor hood according to another embodiment of the invention;
 Figure 3a and 3b show a first embodiment of the splitting device in the first and second state;
 Figure 4 shows another embodiment of the splitting device;
 Figure 5 shows the odor reduction capability over time; and
 Figure 6 is a schematic sectional view of a block building with a ventilation system according to the invention.

[0032] Figures 1a and 1b show a cross-sectional side view of a fume extractor hood 1 according to the present invention for different states. The fume extractor hood 1 comprises a flow generator 2 for providing a forced flow 11 within the extractor hood 1 in an active mode, when the flow generator 2 is running. The flow generator 2 is preferably a fan with a motor, which is activated by a control unit 9. The flow generator 2 could also be a suction device or any other device for providing a forced flow 11. A grease filter 8 is located upstream the flow generator 2. Before the thus captured air 16 enters the extractor hood 1, the grease filter 8 absorbs fat and other particles from the captured air 16 for avoiding unwanted deposits of these particles within the extractor hood 1. Otherwise, the efficiency of the extractor hood 1 would be reduced and an enhanced cleaning may be necessary. Within the extractor hood 1, the forced flow 11 is guided to an air

duct 10. The air duct 10 is at least partially surrounded by a cleaning device 4, which can be preferably devised as a charcoal filter or similar. An exhaust duct 3 is directly connected to the air duct 10, separated therefrom by a splitting device 5.

[0033] In the active mode, which is shown in Figure 1a, the forced flow 11, which is usually comprised of warm and humid air, which transports unpleasant odors, is split into exhaust flow 12 and recirculation flow 13 through cleaning device 4 by the splitting device 5. For achieving a splitting of the forced flow 11, the splitting device 5 is set in a first fixed state with a first opening area 30 to the exhaust duct 3. The exhaust flow 12 is guided through the exhaust duct 3 to the outside world and takes away unpleasant odors and humid air. The recirculation flow 13 is guided through the cleaning device 4 and reverted into the kitchen so that unpleasant odors are removed therefrom by the cleaning device 4 while keeping the warm air within the room. For recirculation, the air duct 10 has to be at least partially permeable for the recirculation flow 13, for example through openings 17 in the wall of the air duct 10. Alternatively, parts of the wall of the air duct 10 or even the complete air duct 10 could be part of the cleaning device 4, which removes unpleasant odors from the recirculation flow 13.

[0034] In the active mode, the splitting device 5 is in a first fixed state with a first opening area 30 to the exhaust duct 3, which allows the forced flow 11 to be split into the exhaust flow 12 and the recirculation flow 13. In case the flow generator 2 is inactive, which is defined as the passive mode and which is shown in Figure 1b, the splitting device 5 is set in a second fixed state with a second opening area 31 to the exhaust duct 3. Also in the passive mode, the captured air 16 passes the grease filter 8 and is guided in the air duct 10 as a basic flow 14, which is generated for example by pressure differences between the interior rooms and the outside world or by a basic flow generator within the exhaust duct 3 (not shown). With the splitting device 5 in the second fixed state, venting of the room or kitchen is enabled by means of exhaust flow 12 through the exhaust duct 3 while recirculation flow 13 is prevented in the passive mode.

[0035] A further embodiment of the fume extractor hood 1 is shown in Figures 2a and 2b. The fume extractor hood 1 comprises an exhaust duct 3 for the exhaust flow 12 and an air duct 10, through which the forced flow 11 enters the cleaning device 4 for the recirculation flow 13. In contrast to Figures 1a and 1b, the exhaust duct 3 and the air duct 10 are separated and arranged beside each other. The exhaust duct 3 and the air duct 10 have their own opening within the extractor hood. The splitting device 5 is arranged in this embodiment in the opening of the exhaust duct 3 and provides in the first fixed state a first opening area 30 to the exhaust duct 3 for the exhaust flow 12.

[0036] In the active mode, shown in Fig. 2a, the forced flow 11 provided by the flow generator 2 enters the air duct 10 as well as the exhaust duct 3 through the opening

area 30. In the air duct 10, the forced flow 11 passes the openings 17 in the wall of the air duct 10, enters the cleaning device 4 and is reverted into the kitchen as recirculation flow 13. The exhaust flow 12 is guided within the exhaust duct 3 to the outside world. In the passive mode, shown in Fig. 2b, when the flow generator 2 is inactive and the splitting device 5 is set in the second fixed state, the basic flow 14 enters only the exhaust duct 3 through the opening area 31, which is preferably larger than the opening area 30 in the active mode (shown in Fig. 2a). The recirculation flow 13 is prevented by a low pressure within the extractor hood 1 and a low flow rate of the basic flow 14 respectively.

[0037] For setting the first and second fixed state of the splitting device 5, one or more measuring devices 7 can be installed within the extractor hood 1 for measuring the pressure and/or the flow of the forced flow 11, the exhaust flow 12 and/or the basic flow 14. The measuring device 7 can comprise a test valve, which is preferably arranged at the inner wall of the exhaust duct 3, the air duct 10 or the extractor hood 1. The test valve is connected to a measuring unit for measuring the pressure and/or flow through the test valve. Once the positions of the first and second fixed state of the splitting device 5 are set-up during installation and/or start-up, further measurements of the pressure and/or the flow are not necessary, if there is no change in the basic parameters. Therefore, the measuring unit can have a removable connection to the test valve, so that this unit can be used for the installation of several fume extractor hoods 1.

[0038] In Figures 3a and 3b, the splitting device 5 is shown in more detail. The splitting device 5 can be a mechanical device comprising one flap 6, which is slidable by an actuator 18 and can move between a position A and a position B. In the active mode, the splitting device 5 is in the first fixed state, in which the sliding flap 6 is moved by the actuator 18 in position B (as denoted in Fig. 3a) so that a first opening area 30 to the exhaust duct 3 is defined as shown in Figure 3a. In the passive mode, when the flow generator 2 is inactive, the splitting device 5 is set in the second fixed state, in which the sliding flap 6 is moved also by the actuator 18 to position A providing a second opening area 31 to the exhaust duct 3. The movement of the sliding flap 6 can be achieved by an actuator 18 or other electronical and/or mechanical means and is triggered by the control unit 9. The adjustment of the position of the flap 6 in the first and second fixed state is preferably carried out by the actuator 18 so that the flap 6 can only move between these two fixed positions. Alternatively, mechanical stops can be set at the position A and B, which prevent a movement of the flap 6 over these fixed positions. The geometry of the first and second opening areas 30, 31 depends on the general geometry of the air duct 10, which is connected upstream the splitting device 5, and the exhaust duct 3, which is directly attached downstream the splitting device 5. For example, the opening area 30, 31 could have a rectangular, round or oval shape.

[0039] The opening areas 30, 31 provided in the first and second fixed states and therefore the position of the sliding flap 6 in these states depends on the pressure and/or flow of the forced flow 11 in the active mode and the pressure and/or flow of the basic flow 14 and/or the exhaust flow 12 through the extractor hood 1 in the passive mode. Due to the large difference between the pressure of the forced flow 11 in the active mode and the basic flow 14 and/or exhaust flow 14 in the passive mode, the first opening area 30 of the first fixed state is preferably larger than the second opening area 31 in the second fixed state so that the noise level increases only slightly in the active mode or that an increase of the noise level is prevented completely.

[0040] Especially the first opening area 30 has to be set carefully so that the forced flow 11 is split into the exhaust flow 12 and the recirculation flow 13. The setting of the first opening area 30 in the first fixed state and the second opening area 31 in the second fixed state is preferably done during the installation or the start-up of the extractor hood 1. An adjustment diagram, provided by the manufacturer of the extractor hood 1, can provide the installation technician with the necessary settings for the opening areas 30, 31 for different forced flows 11 and basic flows 14. Depending on the pressure of the forced flow 11 and the basic flow 14, the two different opening areas 30, 31 can be set according to the adjustment diagram. A scale 19 can be present at the edge of the opening areas 30, 31 of the splitting device 5 to allow an easy setting of the sliding flap 6, as shown in Figures 3a and 3b. For measuring the pressure and/or flow of forced flow 11 and/or basic flow 14 and/or the exhaust flow 12, a measuring device 7 can be installed downstream and/or upstream the splitting device 5.

[0041] For a good odor reduction in the active mode, the flow rate of the exhaust flow 12 through the opening area 30 should be at least 1.2 cubic meters per minute. The odor reduction capability of the cleaning device 4 decreases over the time of use of the extractor hood 1 as shown in Figure 5. Having a new cleaning device 4, the odor reduction capability of the cleaning device 4 can be 95% or even higher. Over the time, this capability decreases, usually linear with the time. For pure recirculation extractor hoods, the odor reduction capability decreases further (as shown by the dotted line after the time t_1), if the cleaning device 4 is not replaced by a new one or refreshed, e.g. by heating the cleaning device 4 to high temperatures. Independent from the actual lifetime of the cleaning device 4, a minimum exhaust flow 12 should provide at least an odor reduction capability of 50%. Providing an exhaust flow 12, preferably an exhaust flow 12 of at least 1.2 cubic meters per minute, the flow rate of the recirculation flow 13 through the cleaning device 4 can be reduced compared to a pure recirculation extractor hood thus resulting in an increased lifetime of the cleaning device 4 while having the same or even better odor reduction within the kitchen (as shown by the dashed line in Figure 5).

[0042] Alternatively, the splitting device 5 can comprise two flaps 6a and 6b, as shown in Figure 4. The two flaps 6a, 6b can have different mechanical properties with one slidable or swivel-mounted flap 6a and one swiveling flap 6b. In the preferred example of a splitting device 5 shown in Figure 4, flap 6b lies on flap 6a in the passive mode, so that only a small opening area is opened to the exhaust duct 3. In the active mode, the flap 6b is swiveled and moved away (lifted) from the flap 6a so that a larger opening area 30 to the exhaust duct 3 is now opened. Alternatively, flap 6a can also be lifted away from flap 6b for the providing the set-up fixed opening area 30 in the active mode. For setting the opening area 30 on the different flow rates or different pressure of the forced flow 11, the exhaust flow 12 and/or the basic flow 14, the flaps 6a, 6b are movable, preferably swivel-mounted along the scale 19.

[0043] Alternatively to the exemplary splitting devices 5 shown in Figures 1 to 4, the opening area 30 in the active mode could be smaller than the opening area 31 in the passive mode. Especially than the basic air flow 14 in the passive mode already provides a high flow rate and/or the exhaust flow 12 should be limited to a minimum in the active mode, but not completely prevented, while enhancing the recirculation flow 13. In this case, a smaller opening 30 in the active compared to opening area 31 in the passive mode may set the right ratio between the exhaust flow 12 and the recirculation flow 13 without limiting or adjusting the forced flow 11 and/or the basic flow 14.

[0044] The present invention is not limited to the use of one or more flaps 6, 6a, 6b in the splitting device 5. Other mechanical devices, which are suitable for setting a first and a second fixed state (i.e., corresponding opening areas) in the active and passive mode, could be used in the splitting device 5. Further embodiments of the splitting device 5 may include one or more round plates, which can be rotated in a certain plane around a point that does not correspond to the center of the plate. By rotating the plate between a first and a second fixed position, the opening areas 30 and 31 are adjusted to the actual active or passive mode.

[0045] Alternatively, the splitting device 5 can comprises one or more fins, which can be tiltable between a first and a second fixed state and thus providing a first opening area 30 and a second opening area 31 in the active and passive mode. Each fin can be tiltable separately or together with adjacent fins or all fins of the splitting device 5.

[0046] Further alternatively, a (bladed) aperture device or any other suitable device could be used for defining the first and second fixed states.

[0047] The fume extractor hood 1 can be part of a ventilation system for a house or building as shown in Fig. 6. The ventilation system additionally comprises a central exhaust duct 23, in which guiding means for the exhaust flow or a direct connection to the exhaust duct 3 of one or, in the case of an apartment house as shown in Fig.

6, several fume extractor hoods 1 are provided. For providing a basic air flow 14 within the central exhaust duct 23 for removing used air from the kitchen or other rooms of the apartment house, a central flow generator 22 is arranged in the central exhaust duct 23, typically towards the end of the central exhaust duct 23 on the roof. In the passive mode, the house or building is vented through the extractor hood 1 and other exhaust openings 24, which are also connected with the central exhaust duct 23, by the basic air flow 14, which has a relatively low flow rate, e.g. 1.2 cubic meters per minute, which reduces the space requirement for the central exhaust duct 23 to a minimum. The additional exhaust opening 24 are placed preferably in rooms with high humidity like bathrooms or other rooms. A central exhaust flow 20 transports the used air through the central exhaust duct 23 to the outside world.

[0048] In the active mode, the splitting device 5 - as described in detail above - is set in the first fixed state and a forced flow 11 is provided by the flow generator 2. For constant pressure within the central exhaust duct 23, the speed of the central flow generator 22 is also increased when the flow generator 2 is in the active mode to avoid a congestion of the exhaust air. Alternatively, the central flow generator 22 can also provide a forced central flow.

[0049] For avoiding a low pressure in the house or building, especially during said active mode, one or more air inlet devices 21, preferably comprising a further flow generator 25, for providing a fresh air flow 15 are placed in different rooms of the house or building so that the exhaust air is replaced by fresh air for a good indoor climate. The air inlet devices 21 can be connected to and controlled by the control unit 9 at or on the extractor hood 1 so that at least in the active mode the exhaust air is replaced by fresh air to avoid a low pressure. It is also conceivable that the central flow generator 22 and the air inlet devices 21 are controlled by a central house control device (not shown).

Reference numerals

[0050]

1	Extractor hood
2	Flow generator
3	Exhaust duct
4	Cleaning device
5	Splitting device
6, 6a, 6b	Flap
7	Measuring device
8	Filter
9	Control unit
10	Air duct
11	Forced flow
12	Exhaust flow
13	Recirculation flow
14	Basic flow

15 Fresh air flow
 16 Captured air
 17 Openings
 18 Actuator
 19 Scale
 20 Central exhaust flow
 21 Air inlet device
 22 Central flow generator
 23 Central exhaust duct
 24 Exhaust opening
 25 Flow generator

30 First opening area
 31 Second opening area

A, B Position

Claims

1. Fume extractor hood (1), comprising
 a flow generator (2) for providing a forced flow (11)
 in an active mode of the flow generator (2),
 an exhaust duct (3) for guiding an exhaust flow (12),
 a cleaning device (4) for cleaning a recirculation flow
 (13),
 a splitting device (5) for splitting the forced flow (11)
 in the exhaust flow (12) and the recirculation flow
 (13),
characterized in that in the active mode, the split-
 ting device (5) is in a first fixed state with a first open-
 ing area (30) to the exhaust duct (3) so that the forced
 flow (11) is split in the exhaust flow (12) and the re-
 circulation flow (13) through the cleaning device (4).
2. Extractor hood (1) according to claim 1, **character-
 ized in that** in a passive mode, in which the flow
 generator (2) is inactive, the splitting device (5) is in
 a second fixed state with a second opening area (31)
 to the exhaust duct (3) for preventing the recircula-
 tion flow (13).
3. Extractor hood (1) according to claim 1 or 2, **char-
 acterized in that** the splitting device (5) is a mechan-
 ical device and comprises at least one flap (6, 6a,
 6b) and/or one slider and/or one plate and/or one fin,
 which is movable for setting the first opening area
 (30) and second opening area (31).
4. Extractor hood (1) according to one of the previous
 claims, **characterized in that** a measuring device
 (7) is arranged upstream and/or downstream the
 splitting device (5) for measuring the pressure and/or
 the flow of the forced flow (11), exhaust flow (12)
 and/or basic flow (14) within the extractor hood (1)
 or in the exhaust duct (3).
5. Extractor hood (1) according to claim 4, **character-**

ized in that the measuring device (7) comprises a
 test valve, which is preferably arranged in the split-
 ting device (5) and/or at an inner wall of the extractor
 hood (1) or the exhaust duct (3), and a measurement
 unit, which is removable or permanently connected
 to the test valve.

6. Extractor hood (1) according to one of the previous
 claims, **characterized in that** the first and/or the sec-
 ond fixed state of the splitting device (5) is/are set
 up, preferably by mechanical or electronical means,
 during installation and/or the start-up of the extractor
 hood (1) based on the pressure and/or the flow of
 the forced flow (11), exhaust flow (12) and/or basic
 flow (14) measured within the extractor hood (1)
 and/or the exhaust duct (3).
7. Extractor hood (1) according to one of the previous
 claims, **characterized in that** the exhaust flow (12)
 in the active mode is at least 1.2 cubic meter per
 minute or more.
8. Extractor hood (1) according to one of the previous
 claims, **characterized in that** an air duct (10) for
 guiding the forced flow (11) at least in part is arranged
 within the extractor hood (1), wherein the air duct
 (10) is at least partially enclosed by the cleaning de-
 vice (4) so that the recirculation flow (13) can leave
 the air duct (10) into the cleaning device (4) through
 at least one opening (17).
9. Extractor hood (1) according to claim 8, **character-
 ized in that** the air duct (10) is directly connected to
 the exhaust duct (3) via the splitting device (5), which
 is arranged downstream the air duct (10).
10. Extractor hood (1) according to claim 8, **character-
 ized in that** the exhaust duct (3) and the air duct (10)
 are arranged beside each other and that the splitting
 device (5) is arranged in the exhaust duct (3) and/or
 the air duct (10).
11. Extractor hood (1) according to one of the previous
 claims, **characterized in that** the cleaning device
 (4) is a charcoal filter.
12. Ventilation system for a house or building, compris-
 ing
 at least one extractor hood (1) according to one of
 the previous claims,
 and a central exhaust duct (23), which is connected
 to the exhaust duct (3) of the extractor hood (1),
 wherein the central exhaust duct (23) preferably
 comprises a further flow generator (22) for providing
 a basic flow (14) and/or a forced exhaust air flow.
13. Ventilation system according to claim 12, further
 comprising at least one air inlet device (21) for pro-

viding a fresh air flow (15) to an interior of the house or the building, which inlet device (21) is configured to be activated, automatically or manually by a control unit (9), preferably through mechanical or electronic means.

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14. Ventilation system according to claim 13, **characterized in that** the control unit (9) is arranged at or on the extractor hood (1).

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15. Ventilation system according to one of the claims 12 to 14, **characterized in that** the first opening area (30) and the second opening area (31) depend on a flow ratio between the basic flow (14), the exhaust flow (12) and/or the forced flow (11).

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16. Method for operating a fume extractor hood (1) with an exhaust duct (3) for guiding an exhaust flow (12) and a cleaning device (4), through which a recirculation flow (13) circulates, wherein a forced flow (11) is provided by a flow generator (2) in an active mode of the flow generator (2) and the forced flow (11) is split by a splitting device (5) into the exhaust flow (12) and the recirculation flow (13), **characterized in that** in the active mode, the splitting device (5) is set in a first fixed state, in which the splitting device (5) has a first opening area (30) to the exhaust duct (3) and the forced flow (11) is split, by the splitting device (5), in the exhaust flow (12) and the recirculation flow (13) through the cleaning device (4).

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17. Method according to claim 16, **characterized in that** in a passive mode, in which the flow generator (2) is inactive, the splitting device (5) is set in the second fixed state with a second opening area (31) to the exhaust duct (3) so that the recirculation flow (13) is prevented.

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18. Method according to one of the claims 16 or 17, **characterized in that** the first and the second fixed state of the splitting device (5) is set up during installation and/or the start-up of the extractor hood (1) based on the pressure and/or the flow of the forced flow (11), exhaust flow (12) and/or basic flow (14) measured within the extractor hood (1) and/or the exhaust duct (3) and/or the central exhaust duct (23).

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19. Method according to claim 18, **characterized in that** the pressure and/or the flow of the forced flow (11), exhaust flow (12) and/or basic flow (14) upstream and/or downstream the splitting device (5) is measured in the active and/or passive mode.

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Fig. 1a

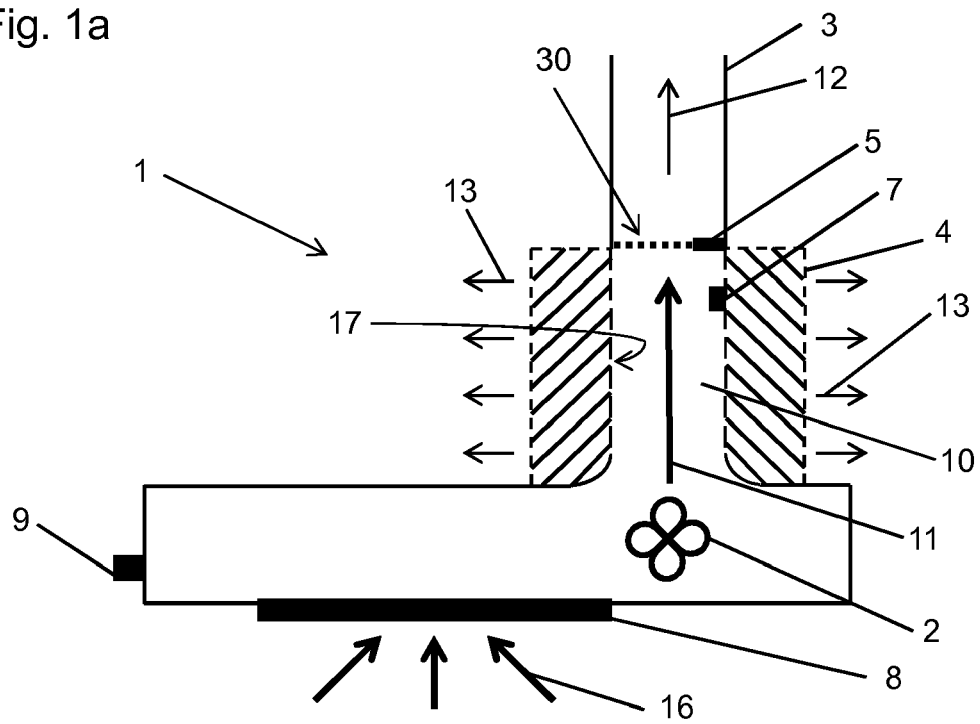


Fig. 1b

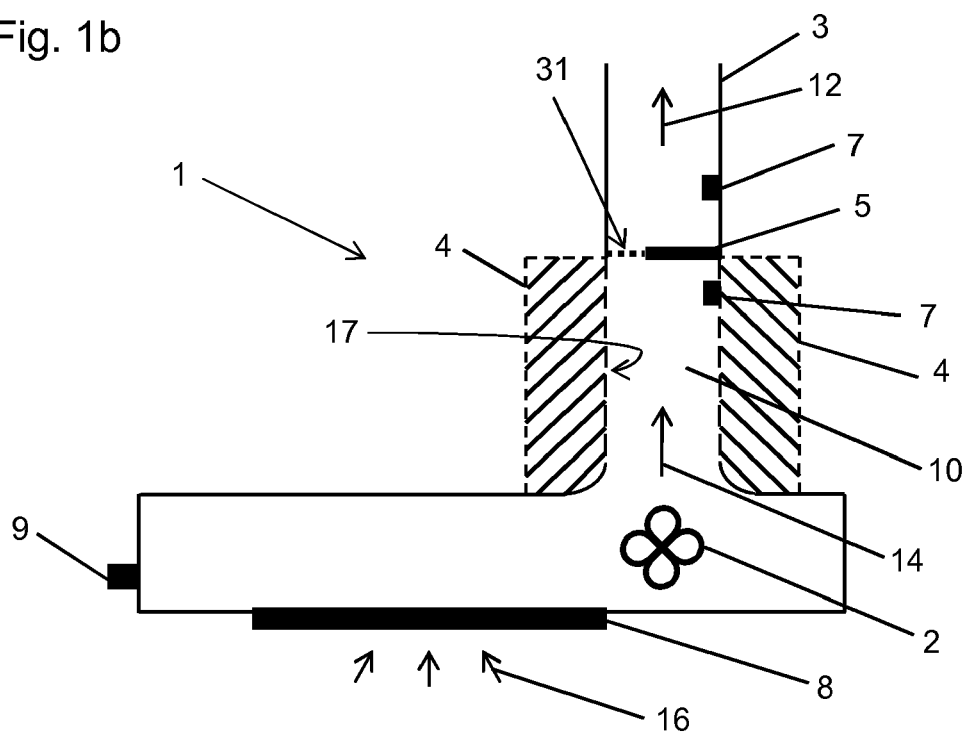


Fig. 2a

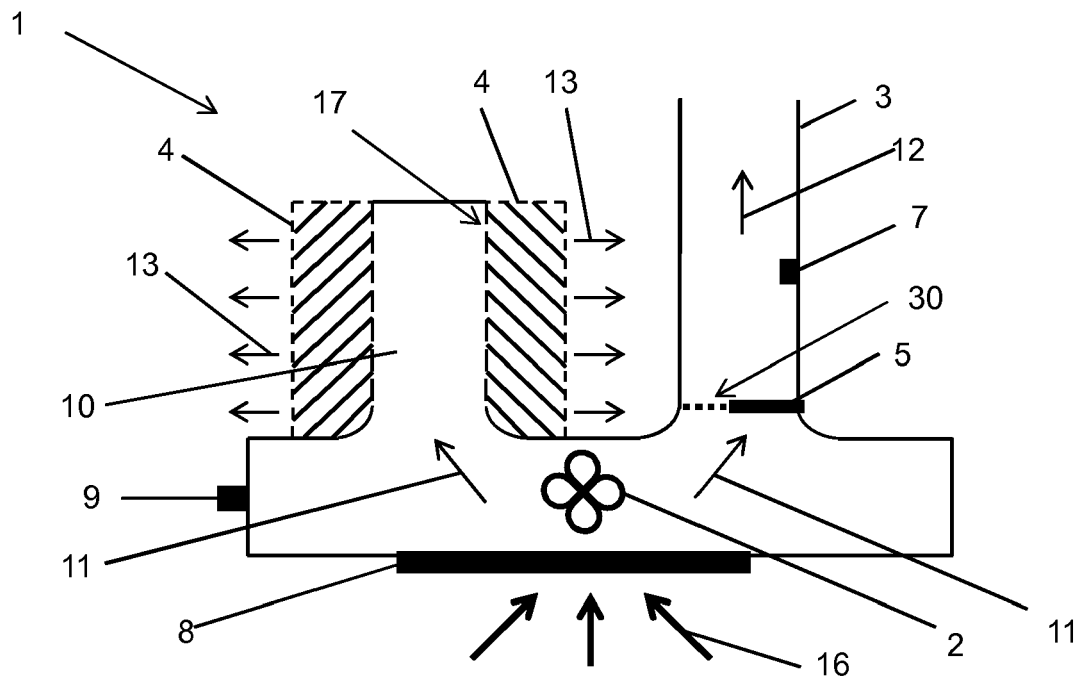


Fig. 2b

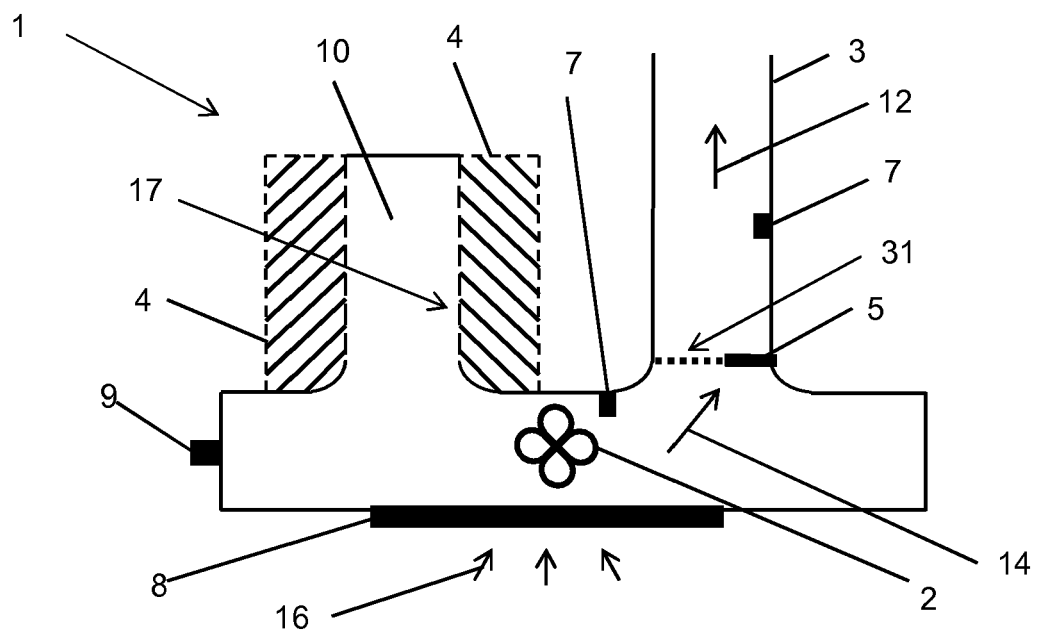


Fig. 3a

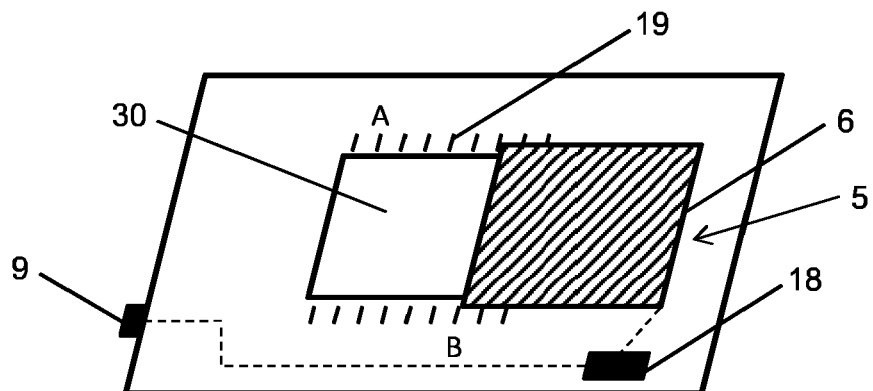


Fig. 3b

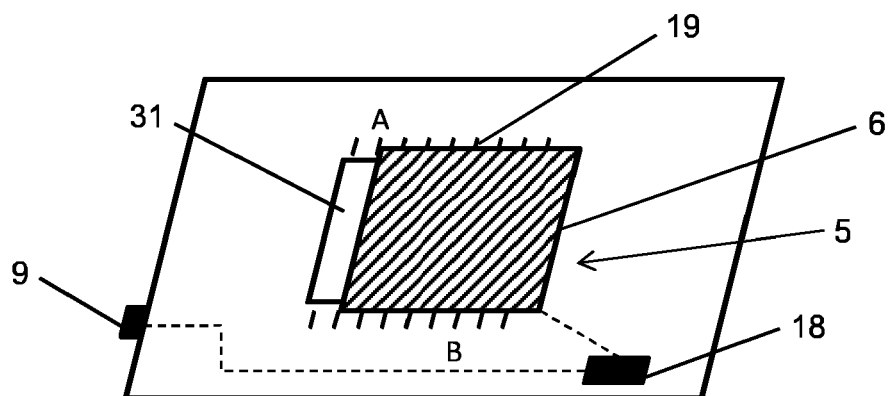


Fig. 4

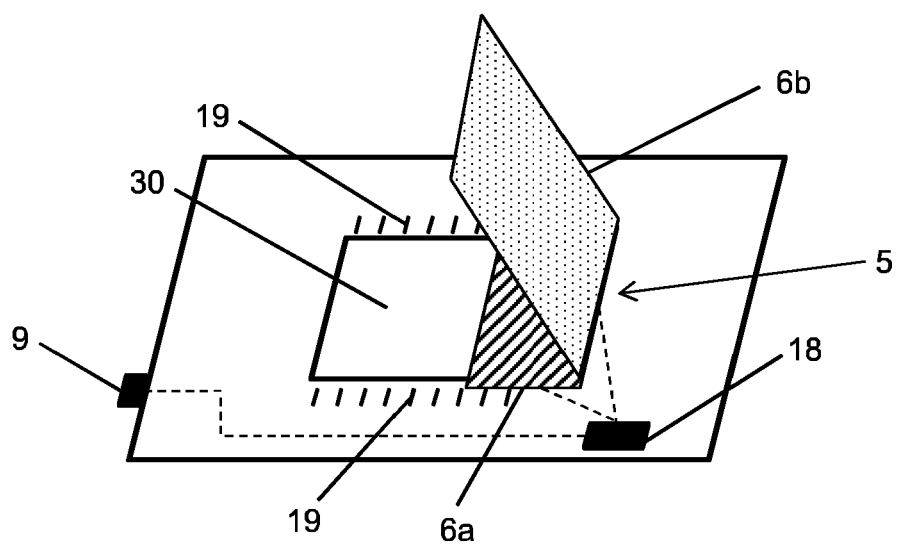


Fig. 5

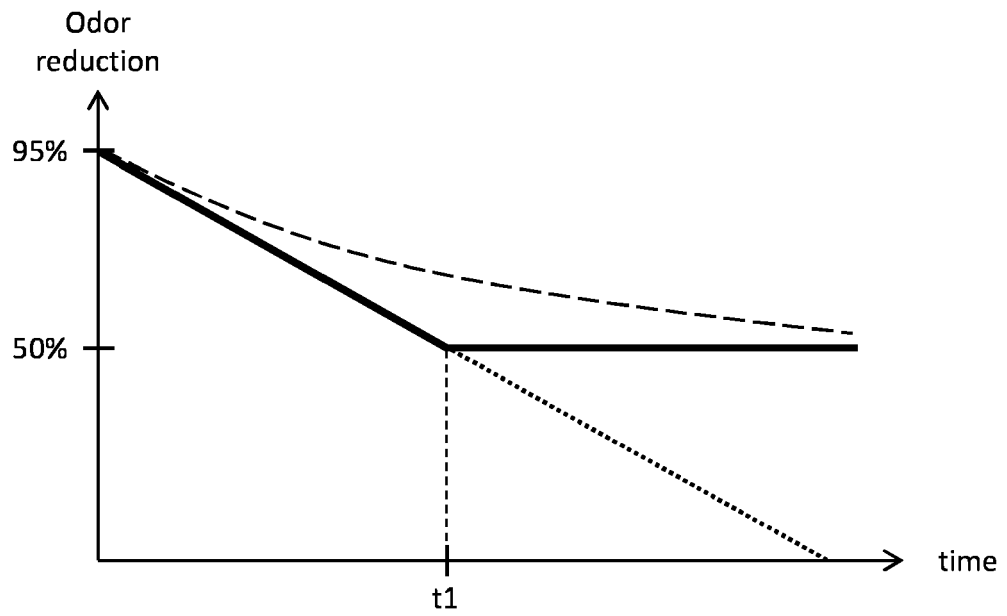
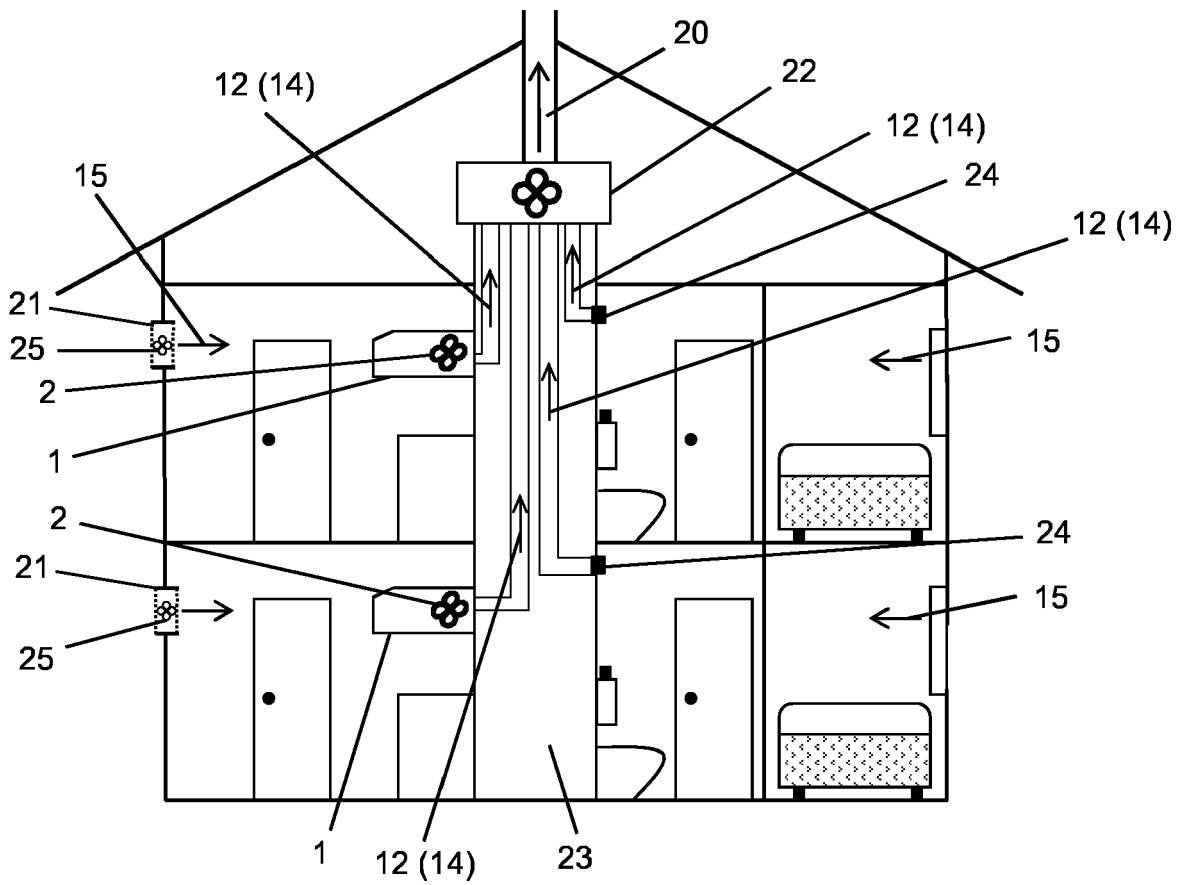


Fig. 6





EUROPEAN SEARCH REPORT

Application Number
EP 18 21 1697

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D Y	DE 10 2015 116863 A1 (MIELE & CIE [DE]) 6 April 2017 (2017-04-06) * paragraphs [0022], [0016] *	1,3,7, 11,15 4,13,14, 18,19	INV. F24C15/20 B08B15/02 F24F7/00
X,D	EP 1 055 883 B1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 20 December 2006 (2006-12-20) * paragraph [0014]; figure 1 *	1,8-10, 12	
X	EP 1 180 648 A1 (ALDES AERAILIQUE [FR]) 20 February 2002 (2002-02-20) * paragraph [0024] *	1,2,16, 17	
X	EP 2 570 735 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 20 March 2013 (2013-03-20) * paragraph [0015] *	1	
Y	DE 30 40 051 A1 (ROEHL GEORG [DE]) 3 June 1982 (1982-06-03) * claims 3,10 *	4,18,19	TECHNICAL FIELDS SEARCHED (IPC)
Y	EP 0 033 547 A1 (GEORG ROHL LICHTTECHNISCHE SPE [DE]) 12 August 1981 (1981-08-12) * claim 1 *	13,14	F24C F24F B08B
A	DE 34 04 004 A1 (BUERCHER FRIEDRICH) 25 October 1984 (1984-10-25) * figure 1 *	1-19	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 29 May 2019	Examiner Rodriguez, Alexander
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 21 1697

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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29-05-2019

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102015116863 A1	06-04-2017	NONE	
EP 1055883 B1	20-12-2006	AT 348984 T DE 19923993 A1 EP 1055883 A2 ES 2276649 T3	15-01-2007 30-11-2000 29-11-2000 01-07-2007
EP 1180648 A1	20-02-2002	AT 258294 T DE 60101825 T2 EP 1180648 A1 ES 2211750 T3 FR 2812933 A1	15-02-2004 04-11-2004 20-02-2002 16-07-2004 15-02-2002
EP 2570735 A1	20-03-2013	DE 102011082928 A1 EP 2570735 A1	21-03-2013 20-03-2013
DE 3040051 A1	03-06-1982	NONE	
EP 0033547 A1	12-08-1981	DE 3003930 A1 EP 0033547 A1	13-08-1981 12-08-1981
DE 3404004 A1	25-10-1984	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1055883 B1 [0004]
- DE 102015116863 A1 [0005]