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(54) **Apparatus and method for exhausting smoke with air outlet connected to a central mechanical ventilation system**

(57) The invention relates to a device for exhausting air, comprising an exhaust device provided with an air inlet, an air outlet and connecting means for connecting the air outlet of the exhaust device to a central mechanical ventilation system (cmv) provided with a first fan of a building, with a second fan to enable a better exhaustion of air at the exhaust device than by means of the cmv,

wherein means are provided for diverting at least part of the air flow from the air outlet of the exhaust device away from the connection to the cmv. The invention also relates to a connecting device for connecting an air outlet of an exhaust device to a cmv and to a building provided with such a device. The invention further relates to a method for connecting an exhaust device to a cmv.

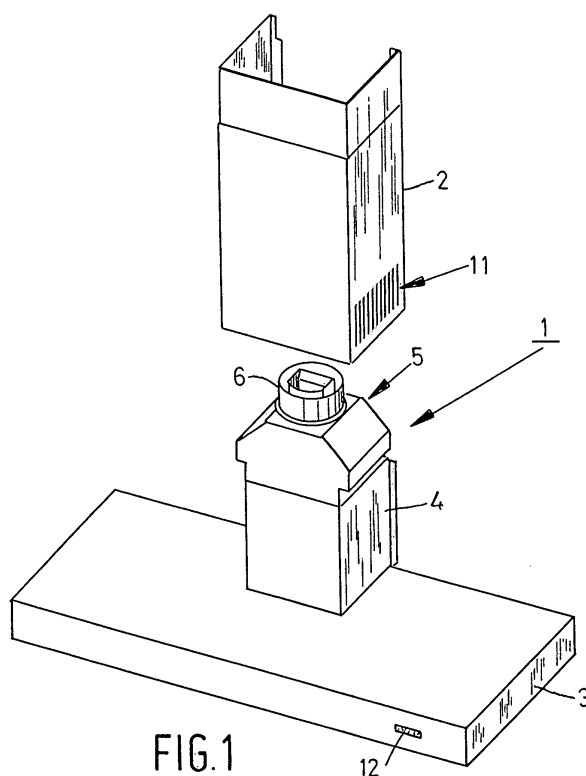


FIG.1

Description

[0001] The present invention relates to a device for exhausting air, comprising an exhaust device provided with an air inlet for exhausting air from a room, an air outlet and connecting means for connecting the air outlet of the exhaust device to a central mechanical ventilation system (cmv) provided with a first fan of a building.

[0002] Such a device is used as a range hood for use in a kitchen of a house which has a cmv. A cmv is a central ventilation system wherein a first fan generates an underpressure in the cmv in comparison with the atmospheric pressure in the house, and wherein a number of exhaust points are provided in rooms from which it may be desirable to exhaust undesirable air, such as sanitary rooms and the kitchen of the house. The known range hood is mounted above a cooking ring, so that undesirable cooking smells can be exhausted more directly than by means of an exhaust point mounted in a wall of the kitchen. Since the range hood is mounted above the place where a large part of the undesirable air rises when cooking, a large part of said undesirable air is caught by the range hood and subsequently carried into the cmv. The underpressure that is generated in the cmv by the first fan reinforces the exhaust action of the range hood.

[0003] A drawback of the known range hood, however, is the fact that the exhaust capacity of a cmv is limited, frequently to maximally 120 m³ per hour. This is insufficient for an adequate exhaustion of cooking smells from a kitchen, so that the undesirable cooking smells can to some extent spread in the kitchen and possibly also over the rest of the house. To obtain an adequate exhaustion, it would be necessary to use a range hood having a greater exhaust capacity (range hoods with a built-in fan for use in domestic kitchens have a capacity of as much as 1000 m³ per hour), but such a range hood may not be connected to the cmv, because it would interfere with the operation of the cmv or even lead to a breakdown of the cmv. The range hood having a built-in fan and thus a greater exhaust capacity must be connected to a separate air exhaust duct, therefore, but such an air exhaust duct is not always available in a house.

[0004] Consequently it is an object of the present invention to provide an exhaust device as mentioned in the introduction which has a greater exhaust capacity than the cmv so as to obtain a better exhaustion of air than is possible with the known exhaust device. This object is achieved by the present invention in that the exhaust device is provided with a second fan so as to enable a more powerful exhaustion of air at the exhaust device than by means of the cmv, and in that means are provided for diverting at least part of the air flow from the air outlet of the exhaust device away from the connection to the cmv. As already said before, it is not possible according to the prior art to connect an exhaust device provided with an independent fan to a cmv, at least not if the capacity of said exhaust device leads to more air flowing

into the cmv through the exhaust point than the specifications of the cmv allow. The reason is that such a fan may cause an overpressure of the air just outside the connection point of the cmv, so that more air will flow into the cmv than is allowed. This may interfere with the operation of the cmv or even cause a breakdown thereof. However, if means are provided that regulate the air flow at the connection point of the cmv in a manner that prevents the occurrence of such an overpressure at said connection point, the exhaust device may nevertheless be provided with a fan of its own, which enables a more powerful exhaustion of air, whilst preventing the risk of derangement or even a breakdown of the cmv. The object of the present invention is thus achieved.

[0005] Furthermore, range hoods are known which return all the exhausted air to the room outside the range hood from which the range hood extracted air. A fan mounted in the range hood causes air to be sucked into the range hood through the air inlet. The sucked-in air is filtered in the range hood and subsequently returned, via the air outlet, to the room from which the air was extracted. With a view to improving the air quality it is however preferable not to return the exhausted air to the room. If a cmv is available, the capacity of the cmv may be utilised by means of the present invention for permanently extracting air exhausted by the range hood from the room.

[0006] From EP 1 180 648 there is known a motorised extracting hood having an air inlet provided with a grease filter, behind which a fan is disposed, which sucks in air from the room to be ventilated and blows it into two separate compartments, each compartment having a separate air outlet. One air outlet opens into the room to be ventilated and the other air outlet opens into a tube, which is in turn connected to a cmv. Said device does not comprise means for diverting at least part of the air flow from the other outlet away from the connection to the cmv. In said device the separation of the air flow through the air inlet takes place directly behind the grease filter at the air inlet.

[0007] Preferably, a dividing device is provided between the air outlet of the exhaust device and the connection to the cmv for dividing an air flow from the air outlet of the exhaust device into a first subflow to the cmv and a second subflow. If the air flow from the air outlet of the exhaust device is larger than the exhaust capacity of the cmv, an excess portion of said air flow can be diverted away from the cmv with the second subflow by dividing the air flow from the air outlet.

[0008] In a preferred embodiment of the invention, a constant volume regulator is provided between the air outlet of the exhaust device and the cmv. In an embodiment provided with a dividing device, the constant volume regulator is preferably provided between the dividing device and the cmv. Usually, means that regulate the air flow to the cmv are provided at the connection point to the cmv, but as a rule this only has a limited regulating effect. If there is a chance of a comparatively large overpressure prevailing outside the connection point for the

cmv, a constant volume regulator can prevent the flow of a (too) large volume of air into the cmv in spite of the presence of the limited provisions that are already present.

[0009] Preferably, the device is provided with a recirculation opening for recirculating at least part of the air to a room from which the exhaust device exhausted the air. This makes it possible to discharge air from the air outlet of the exhaust device which cannot or must not flow into the cmv and which has accumulated in a small space, generating an overpressure in said space. Moreover, by returning the excess air to the room from which it was exhausted by the exhaust device, the underpressure in said room generated by the exhaustion of air by the exhaust device is partially compensated.

[0010] Preferably, the second subflow is led to the recirculation opening. This enables a quick discharge of "excess" air from the device to the room where there may be an underpressure.

[0011] Preferably, the exhaust capacity of the exhaust device is adjustable. This makes it possible to turn the exhaust device on and off, if desired, and to adjust the exhaust capacity of the exhaust device according to the prevailing circumstances.

[0012] In a preferred embodiment of the invention, the maximum exhaust capacity of the exhaust device is at least 120 m³ per hour. The normal exhaust capacity of a cmv is about 120 m³ per hour. Only an exhaust device having a higher maximum exhaust capacity will provide a better exhaustion of air from a room, at least when set to a capacity of more than 120 m³ per hour.

[0013] In a preferred embodiment of the invention, the maximum exhaust capacity of the exhaust device is maximally 1040 m³ per hour. This is the maximum capacity of range hoods for domestic use, because a larger capacity would result in a (too) large underpressure being generated in a kitchen, which might lead to undesirable air flows in the house.

[0014] In a preferred embodiment of the invention, the exhaust device comprises a filter device, preferably comprising a odour filter and/or a grease filter. Thus, not only the air that is carried into the cmv is pre-filtered, so that the filter device in the cmv will become clogged less easily. Also the air that is not carried into the cmv is filtered by the filter device before it is carried away from the cmv, for example back to the room from which the air was originally extracted. This is important especially if the capacity of the exhaust device is considerably larger than that of the cmv, because otherwise only a small part of the air exhausted by the exhaust device will be filtered before being recirculated into the same room. The odour filter is preferably a carbon filter. Carbon filters are excellently suited for filtering smells which are caught in a range hood, for example when cooking.

[0015] The present invention further relates to a connecting device for connecting an air outlet of an exhaust device for exhausting air to a central mechanical ventilation system (cmv) provided with a first fan of a building.

[0016] Such a connecting device is known, it consists of a length of pipe for connecting the air outlet of the exhaust device to the cmv. A drawback of such a connecting device, however, is that its use is limited to connecting an exhaust device that does not have a fan of its own. After all, all the air exhausted by the fan is carried to the cmv. A fan mounted in the exhaust device would cause an overpressure at the connection to the cmv, with the attendant risks already mentioned in the foregoing.

[0017] Consequently it is an object of the present invention to provide a connecting device according to the preceding paragraph by means of which an exhaust device provided with a fan of its own can be connected to a cmv without the aforesaid risks. This object is achieved by the present invention in that the connecting device comprises means for diverting at least part of the air flow from the air outlet of the exhaust device away from the connection to the cmv. The advantages of this have already been discussed in the foregoing in relation to the device according to the invention.

[0018] The connecting device preferably comprises a dividing device for dividing an air flow from the air outlet of the exhaust device into a first subflow to the cmv and a second subflow. This makes it possible to divert part of said air flow away from the cmv, possibly in dependence on the intensity of the air flow from the air outlet, so as to prevent said part of the air flow from interfering with the operation of the cmv.

[0019] In a preferred embodiment of the invention, the connecting device comprises a constant volume regulator for regulating the volume that can flow into the cmv. Said constant volume regulator may enhance the operation of means for regulating the air flow from outside to inside the cmv, which means are provided at the connection to the cmv already. In addition, this enhances the effect realised by the dividing device. It is conceivable to use a constant volume regulator without using a dividing device, in particular in the case of range hoods provided with a less powerful fan of their own.

[0020] The present invention further relates to a building comprising a central mechanical ventilation system (cmv) provided with a first fan, which cmv comprises at least one connection for connecting an exhaust device.

[0021] Such a device is known to be used in houses provided with a cmv. In the kitchen a connection is present to which a resident can connect a motorless range hood mounted over a cooking ring, which is suitable for catching cooking air. As already discussed in the foregoing, only motorless range hoods may be connected to such a connection.

[0022] Consequently it is an object of the present invention to provide a building according to the preceding paragraph in which it is possible to connect a range hood provided with a fan of its own to the cmv. This object is achieved by the present invention in that means are provided for diverting at least part of the air flow from the air outlet of the exhaust device away from the connection to the cmv. This makes it possible to connect a range hood

having a comparatively large exhaust capacity to the cmv. The advantages correspond to the advantages already discussed in relation to the connecting device according to the present invention, the difference being that the building provided with the cmv is already prepared for connecting a range hood provided with a fan of its own or, in other words, that the connecting means are already integrated in the building.

[0023] In a preferred embodiment of the present invention, the connection comprises a dividing device for dividing an air flow from the air outlet of the exhaust device provided with a fan of its own into a first subflow to the cmv and a second subflow. The advantages of such an embodiment have already been discussed in the foregoing in relation to the exhaust device and the connecting device according to the present invention.

[0024] The present invention also relates to a method for connecting an exhaust device to a central mechanical ventilation system (cmv) provided with a first fan of a building. Such a method is known, it comprises the provision of a connecting duct between an air outlet of the exhaust device and the connection to the cmv. A drawback of the known method, however, is that only exhaust devices not having any exhaust capacity or a limited exhaust capacity can be connected to the cmv therewith, because derangement or even a breakdown of the cmv caused by a (too) large inflow of air via the exhaust device must be prevented.

[0025] Consequently it is an object of the present invention to provide a method according to the preceding paragraph wherein an exhaust device having a comparatively large exhaust capacity can be connected to a cmv without the risk of derangement or a breakdown of the cmv due to a (too) large inflow of air. According to the present invention, this object is achieved in that means for diverting at least part of the air flow from the air outlet of the exhaust device away from the connection to the cmv are provided between an air outlet of the exhaust device and the cmv. The advantages of this have already been discussed in the foregoing. Also preferred embodiments of the means in question, such as a dividing device and a constant volume regulator, have already been discussed in the foregoing.

[0026] The invention will be explained in more detail hereinafter with reference to the appended figures. The figures and the description are only meant by way of illustration and by no means have a limitative effect on the scope of the present invention. In the drawing:

Figure 1 is a perspective view of a range hood according to the invention;

Figure 2 is an exploded view of a part of the range hood of figure 1; and

Figure 3 is a schematic sectional view of a range hood according to the present invention, showing air flows through the range hood from the fan.

[0027] Referring to figure 1, a range hood 1 is shown,

a duct 2 of which is shown separately. The duct is provided with ventilation openings 11. At the bottom of the range hood 1 is the exhaust box 3, on which a casing 4 surrounding a fan (not shown) of the range hood 1 is mounted. The fan can be set by means of a switch 12. Mounted on the casing 4 is a connecting device 5 for connecting the range hood 1 to a central mechanical ventilation system (cmv), which is not shown in figures 1 and 2. A constant volume damper 6 having an outer circumference that corresponds to the circumference of a connecting point for a cmv is disposed at the top of the connecting device 5.

[0028] Figure 2 is an exploded view of the connecting device 5 according to the invention, which is shown in assembled condition in figure 1. The connecting device comprises a housing formed by a box 7 with front plates 8, between which a V-shaped air divider with laterally projecting ends on both legs is provided as a dividing element. Disposed on the casing is the constant volume damper 6.

[0029] Figure 3 schematically shows the contours of the exhaust box 3 with the casing 4 for a fan 10. The casing blends into the connecting device 5, with the figure showing the contours of the box 7 within which the air divider 9 is present. Disposed on the box 7 is the constant volume damper 6. The casing 4 and the connecting device are surrounded by the duct 2, in which ventilation openings 11 are provided. Arrows A, B, C, C1, C2 schematically indicate directions of possible air flows within the range hood 1, in which directions air can flow in dependence on the position of the fan.

[0030] The operation of the range hood 1 will now be explained with reference to figures 1, 2 and 3. When the range hood 1 has been turned on by means of the switch 12, air is sucked into the range hood 1 via the exhaust box 3 in that the fan 10 generates an underpressure in the casing 4. The air flows from the exhaust box 3 into the casing 4 via a filter device 13 provided with a carbon filter for filtering odours from the air and a labyrinth filter for filtering grease particles from the air.

[0031] In the situation in which the fan 10 has been turned off by means of the switch 12, practically no air will flow via the exhaust box 3 into the casing 4 in the direction of the cmv, and the cmv will be fed mainly with air that is sucked into the duct 2 via the ventilation openings 11 by the cmv.

[0032] If the fan 10 has been switched to a low setting, in which the passage of air through the casing 4 is lower than the capacity of the cmv to which the range hood is connected, said air will flow in the direction of the constant volume damper 6 substantially on both sides of the air divider 9, as is indicated by means of arrows B. If the air flow from the casing 4 is insufficient for feeding the cmv, the cmv will carry air to the constant volume damper 6 and to the cmv via ventilation openings 11 in the duct 2.

[0033] In the situation in which the fan 10 has been set - by means of the switch 12 - to a position that corresponds to an air displacement through the casing 4 great-

er than the capacity of the constant volume damper 6 and the cmv, part of the air flow C will flow from the casing 4, past the air divider 9, in the direction of the constant volume damper 6 and the cmv (arrows C1), whilst a second air flow will flow back from the casing 4 in the direction of the ventilation openings 11 and into the room outside the exhaust device 1 from which the air was originally extracted, as is indicated by the arrows C2. Since said air has been filtered by the filter device 13, the air flow C2 mainly consists of "clean" air. The division of the air flow C into subflows C1 and C2 takes place as a result of the air divider 9 laterally deflecting the air flow C from the casing 4, as a result of which the air flow C is decelerated and a kind of lee is created in the wings of the box 7. Because of said lee, the cmv can draw a correct amount of air from the box 7 into the cmv via the constant volume damper 6. The constant volume damper 6 compensates the relatively low overpressure that may prevail in the box 7 as a result of the constant inflow of air that is blown from the casing 4 into the box 7 by the fan 10.

[0034] The embodiment of an exhaust device according to the invention as described above and illustrated in the figures merely functions by way of explanation and by no means limits the scope of the present invention. Many alternatives are obvious to those skilled in the art, which alternatives all fall within the scope of the present invention. Thus, it is alternatively possible to connect a connecting device according to the invention to a duct which may or may not be provided with a fan of its own, through which duct air is carried outside the building, instead of connecting the constant volume damper to a cmv. An optimum can be realised in that case, on the one hand complying with the wish to discharge as much air as possible from the range hood 1 outside the building whilst on the other hand preventing hot air being discharged from the building via the range hood, in which case a greater heating capacity would be required in order to maintain a pleasant temperature in the building, at least during periods in which the building needs to be heated. It is even possible that statutory regulations prohibit the discharge of the entire air flow from a powerful range hood outside the building. Furthermore, the invention has been described herein on the basis of an embodiment of a range hood in a house, but it will be understood that also other uses of such a device are possible. Furthermore, preferred embodiments as described in combination with the range hood may also be used for the connecting device and the building and in the method according to the present invention.

Claims

1. A device for exhausting air, comprising an exhaust device provided with an air inlet for exhausting air from a room, an air outlet and connecting means for connecting the air outlet of the exhaust device to a central mechanical ventilation system (cmv) provided

ed with a first fan of a building, **characterised in that** the exhaust device is provided with a second fan to enable a better exhaustion of air at the exhaust device than by means of the cmv, and **in that** means are provided for diverting at least part of the air flow from the air outlet of the exhaust device away from the connection to the cmv.

2. A device according to claim 1, **characterised in that** a dividing device is provided between the air outlet of the exhaust device and the connection to the cmv for dividing an air flow from the air outlet of the exhaust device into a first subflow to the cmv and a second subflow.

3. A device according to claim 1 or 2, **characterised in that** a constant volume regulator is provided between the air outlet of the exhaust device and the cmv.

4. A device according to any one or more of the preceding claims, **characterised in that** the device is provided with a recirculation opening for recirculating at least part of the air to a room from which the exhaust device exhausted the air.

5. A device according to claim 4, **characterised in that** the second subflow is led to the recirculation opening.

6. A device according to any one or more of the preceding claims, **characterised in that** the exhaust capacity of the exhaust device is adjustable.

7. A device according to any one or more of the preceding claims, **characterised in that** the maximum exhaust capacity of the exhaust device is at least 120 m³/hour.

8. A device according to any one or more of the preceding claims, **characterised in that** the maximum exhaust capacity of the exhaust device is maximally 1040 m³/hour.

9. A device according to any one or more of the preceding claims, **characterised in that** the exhaust device comprises a filter device.

10. A device according to claim 9, **characterised in that** said filter device comprises an odour filter and/or a grease filter.

11. A device according to claim 10, **characterised in that** said odour filter is a carbon filter.

12. A connecting device for connecting an air outlet of an exhaust device for exhausting air to a central mechanical ventilation system (cmv) provided with a

first fan of a building, **characterised in that** the connecting device comprises means for diverting at least part of the air flow from the air outlet of the exhaust device away from the connection to the cmv.

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13. A connecting device according to claim 12, **characterised in that** the connecting device comprises a dividing device for dividing an air flow from the air outlet of the exhaust device into a first subflow to the cmv and a second subflow.

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14. A connecting device according to claim 12 or 13, **characterised in that** the connecting device comprises a constant volume regulator for regulating the volume that can flow into the cmv.

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15. A building comprising a central mechanical ventilation system (cmv) provided with a first fan, which cmv comprises at least one connection for connecting an exhaust device, **characterised in that** means are provided for diverting at least part of the air flow from the air outlet of the exhaust device away from the connection to the cmv.

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16. A building according to claim 15, **characterised in that** the connection comprises a dividing device for dividing an air flow from the air outlet of the exhaust device provided with a fan of its own into a first subflow to the cmv and a second subflow.

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17. A method for connecting an exhaust device to a central mechanical ventilation system (cmv) provided with a first fan of a building, **characterised in that** means for diverting at least part of the air flow from the air outlet of the exhaust device away from the connection to the cmv are provided between an air outlet of the exhaust device and the cmv.

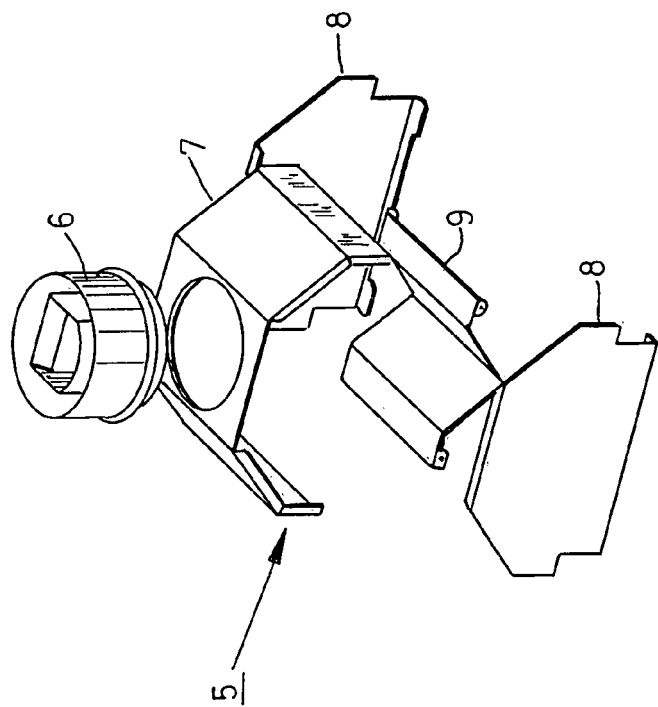
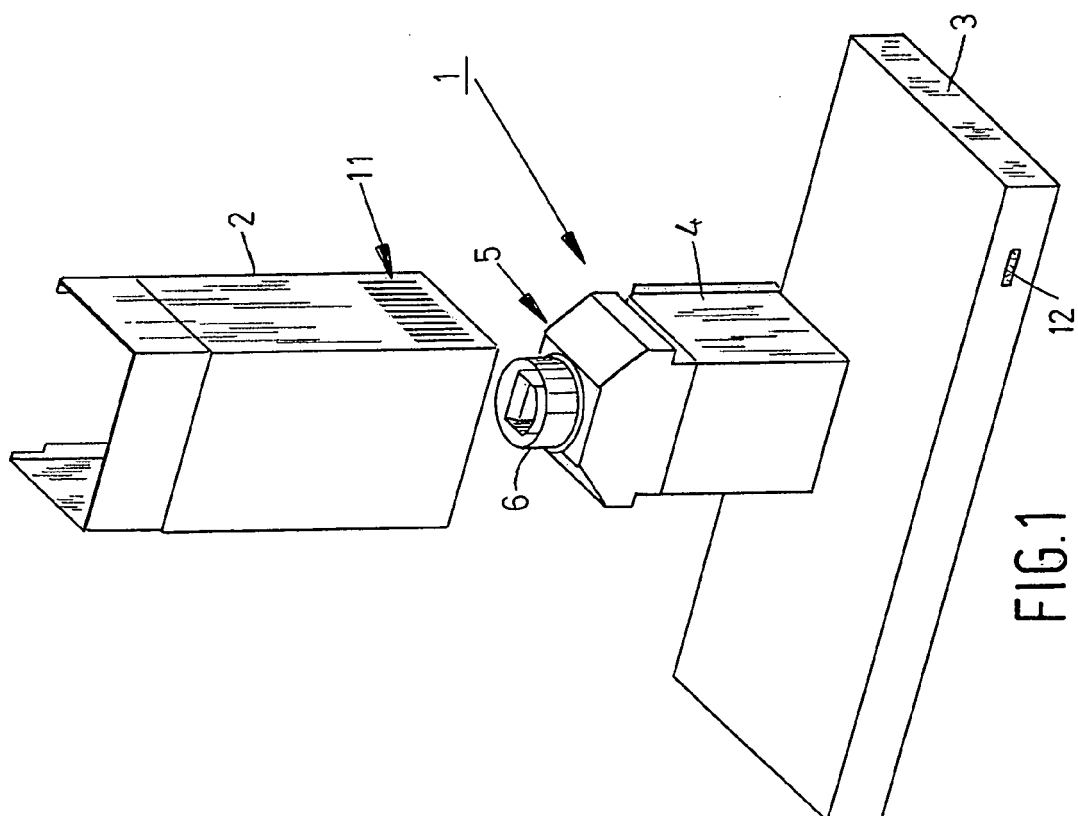
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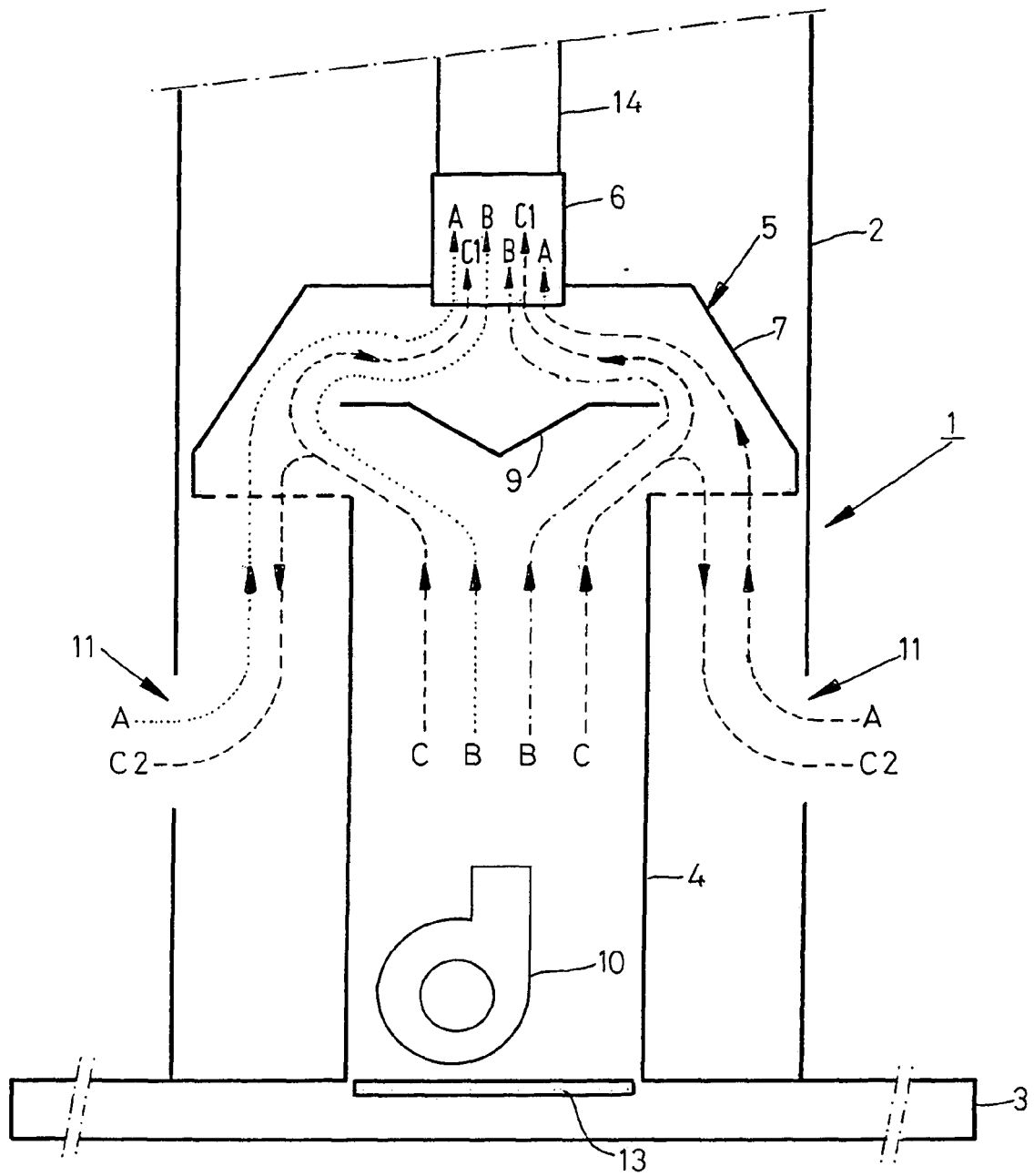


FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1180648 A [0006]