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(54) Ventilation Discharge

Luftauslass für Belüftung

Sortie d'air de ventilation

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- **"EXTRACTEURS HELICOCENTRIFUGES"**
REVUE PRATIQUE DU FROID ET DU
CONDITIONNEMENT D'AIR,FR,PYC EDITION
S.A. PARIS, no. 724, 28 February 1991
(1991-02-28), page 58 XP000177631 ISSN:
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Description

[0001] The invention relates to a ventilation discharge system for a room in a house, comprising a discharge pipe extending from an inlet situated in the room to an outlet situated out on the roof, which discharge pipe is provided with draught promoting means in or near the outlet, as described in the preamble of claim 1. Such a ventilation discharge is known from EP-A-0.404.615; and from FR-A-2.569.319.

[0002] These days in most cases mechanical ventilation systems are placed in newly-built houses. These systems have inlets at the location of the rooms where a high moisture charge may arise, such as the toilet, the bathroom and the kitchen, and discharge pipes which lead to a central exhaust booth, which by means of a further discharge pipe with roof passage discharges the moist air to the outside air. Although such systems may function well they have the disadvantage that they have to be continuously active - all be it at a reduced power - because continuous ventilation of the house has to be taken care of by that means too. This does not only cost energy, the noise of the mechanical system can also be disturbing for the occupants.

[0003] Another - much less used system - is natural ventilation. To that end new or recent houses are provided with separate discharge pipes for each room to be ventilated, which are designed to have a flow resistance which is as minimal as possible. To that end the discharge pipes are as straight as possible and provided with a natural draughting roof passage. A roof passage which proved to have a very low resistance is the Multivent® from the supply program of Ubbink Nederland BV.

[0004] It appeared that the - in itself energy-saving-natural ventilation systems run short in capacity with large moisture charge and a therefore large need of ventilation. With a diameter of the discharge pipe of 125 mm the natural flow can be about 7 l/sec, but according to (Dutch) standards the flow for toilet, bathroom, and kitchen respectively has to be 7, 14 and 21 l/sec. For the bathroom and kitchen additional measures are therefore necessary, which as a rule consist of opening windows or using a ventilator fan in the outer wall or an extractor.

[0005] The object of the invention is to improve on this and to that end the invention provides a ventilation discharge system as described in claim 1.

[0006] As a result of its placement in the discharge pipe the ventilating fan will exert little inflow resistance on the air approaching through the portion of the discharge pipe which is situated upstream. The capacity of the ventilator fan and because of it the space it takes up and the sound produced as a result of it can therefore be kept limited.

[0007] The ventilating fan can with the appropriate housing be arranged in the passage of the discharge pipe. The ventilating fan is adapted here to let air through by natural draught when switched off, preferably with a flow of 7 l/sec. For instance this can be realised by a ventilating fan with a free-run position with very low resistance against rotation, in which case the naturally rising air will have the ventilating fan rotate during passage there along, and/or with blades which leave interspaces of such width that the air can flow passed it without much resistance being encountered.

[0008] From another aspect the invention provides a ventilation discharge of the kind mentioned in the preamble, in which a ventilating fan has been placed in the discharge pipe, downstream of a straight length of pipe thereof.

[0009] Preferably the ventilating fan is situated at ample distance from the inlet, such as over half a meter. An advantageous arrangement is one in which the ventilating fan is situated near the outlet, below the roof. The length of pipe on the approach side can then be as long as possible.

[0010] Preferably the ventilation discharge is provided with means for switching on the ventilating fan when needed, so that it is only active when necessary and for the rest only the natural draught is used. The capacity of the ventilating fan therefore is only additional, for the bathroom for instance 7 l/sec and for the kitchen 14 l/sec. As a result the consumption of energy can remain low, and the production of noise need not take place longer than necessary.

[0011] The switch means can be active in various ways. It is known to couple the switch means to a light switch for the room concerned. However, it can also be advantageous to couple the switch means to a moisture content sensor, a movement sensor or CO₂ content sensor.

[0012] The ventilating fan can - with the appropriate housing - be accommodated in a fixed manner in or at the discharge pipe. In that case it is preferable that means are present to take out or giving access to the ventilating fan for doing service work.

[0013] The ventilating fan can in an advantageous manner be accommodated in the discharge pipe like a cassette, to which end the discharge pipe has been provided with suitable access means and support means.

[0014] In another possible embodiment the ventilation discharge system is provided with receiving means for keeping the ventilating fan outside of the passage of the discharge pipe, and with means for moving the ventilating fan from the receiving means to the passage and back again. The ventilating fan cannot in any case impede natural ventilation then.

[0015] The invention will now be elucidated on the basis of a number of exemplary embodiments shown in the attached drawings, in which:

Figure 1 shows a house with a number of moist rooms, which are ventilated with the system according to the invention;

Figure 2 shows a cut-away, schematic view of a first example of the arrangement of the ventilating fan in the system according to the invention;

Figure 2A-2C show details of the arrangement of figure 2;

Figure 3A and 3B show a cut-away view of a second example of the arrangement of the ventilating fan in the system according to the invention, switched off and on respectively.

[0016] In figure 1 a house 1 is shown in which a kitchen 2, a bathroom 3, and a toilet 4 are the rooms in which periodically extra moisture is generated which should be discharged. For the normal and this additional moisture discharge for the rooms 2, 3, and 4 separate ventilation discharges 5, 6 and 7 are provided, which extend from the room concerned through the roof 8, to the outside.

[0017] The ventilation discharges 5, 6 and 7 have a discharge pipe 9, 10 and 11 respectively with an inlet 12, 13 and 14 and an outlet 15, 16 and 17. The pipes 9, 10 and 11, including the inlets and outlets are formed with a low flow resistance, such as the Multivent® mentioned earlier, and are therefore suitable for natural ventilating the rooms for discharging the normal moisture charge. The pipe diameter here is 125 mm.

[0018] At a distance from inlet and the outlet in each pipe 9, 10 or 11, a ventilating fan 18, 19 and 20 respectively which discharges to the outside is arranged near the outlet but below the roof in the attic space. With the help of these ventilating fans the discharge capacity is increased at the moment that this is necessary: incase of additional moisture charge as a result of for instance showering or cooking.

[0019] Switching on the ventilating fan can be coupled to a light switch (toilet, bathroom) a temperature switch (over a stove), air humidity sensors or CO₂ sensors. Movement detectors can also be thought of, in particular for toilets. The ventilating fan can be controlled by means of electricity coming from PV-cells on the roof.

[0020] The ventilating fans 18, 19 and 20, just like the discharge pipes 5, 6 and 7 (except in pipe length) can be similar to each other in shape and dimensions, so that the system can be used universally. The capacity is then adapted to 7 l/sec without ventilating fan and 21 l/sec with ventilating fan.

[0021] A first possible embodiment of the ventilation discharge system according to the invention is shown in figures 2, 2A, 2B and 2C, in which in the discharge pipe 6 is present portion 21a which is enlarging in the direction D, a circle-cylindrical portion 21b and a tapering portion 21c. The cylindrical portion 21b is limited below and on top by circumferential edges 55a (figure 2A) and has an opening 54 in which/from which an axial ventilating fan 22 can be slid in/slid out of (directions X). The ventilating fan 22 in this example is type 4650 N of the brand Papst, of the company Vibo. The ventilating fan 22 is accommodated in cassette 50, and is surrounded by a mass 51 of sound insulating material. As can be seen in the figures 2B and 2C the ventilating fan has a circumferential cylinder wall 52. The ventilating fan 22 comprises an axle 22a with a motor and a number of blades 22b which leave spaces in between them both in axial and in circumferential direction, as well as number of placing arms 53, which are fixed to the casing 52 and keep the motor and the axle in their places. The cassette 50 is furthermore provided with a lid 56 for access to the ventilating fan 22.

[0022] The whole which is depicted in figure 2C, that is to say the cassette 50 with ventilating fan 22 and pipe portions 21a, b, c can be offered as a unit to be placed in discharge pipes.

[0023] The ventilating fan 22 has a switched on position and a switched off position running free in one direction. When there is no additional moisture charge in the room to be ventilated, the ventilating fan 22 is in the free-run position and the air can escape upwards by natural draught in the direction D, between the blades in the direction E. The ventilating fan 22 could possibly rotate freely here, driven by the upward flow of air. When additional ventilation capacity is required in connection with formation of moisture in the room to be ventilated the ventilation fan is switched on to enlarge the flow in the direction D.

[0024] In tests with such an arrangement it appeared that the energy free performance coefficient, that is the number indicating the ventilating performance in relation to the used (and discharged) energy, was better than for the usual mechanical ventilating systems. An important reason for this is that in the system according to the invention only momentary use is made of an additional driven ventilation means, as a result of which the loss of warmth and use of energy are kept limited.

[0025] In figure 2 the ventilating fan 22 fills the entire passage in the discharge pipe 6 at the location of the cylinder portion 21b, whereas figure 3 an embodiment is shown in which the enlarged portion 21 is enlarged extra with respect to the embodiment of figure 2, and in which at radial inward distance of the cylindrical wall 21b a further cylindrical wall 24 is placed, which with the cylindrical wall 21b determines a vertical annular passage 25. The wall 25 surrounds the ventilating fan 22 and is attached to the wall 21b with low flow resistance connection parts. When there is no formation of additional moisture in the room to be ventilated the ventilating fan 22 stands still or rotates along freely with the rising air flow, but an optimal free passage is always offered to the rising air D via the annular space 25. When switching on the ventilating fan an additional air flow in the direction F occurs.

[0026] Finally in the figures 3A and 3B an embodiment with an axial ventilating fan 422 is shown, which can be

accommodated in the switched-off position in chamber 450 integrally formed with the pipe 406, in order to permit free flow in the direction D, but when additional discharge capacity is wanted can be tilted in the passage in the pipe 406 to urge air up in the direction F.

[0027] It will be understood that the capacity of the ventilating fan depends on the fact whether there is question of a permanent free passage next to the ventilating fan or not.

Claims

1. Ventilation discharge system (5, 6, 7) comprising a room in a house, comprising a substantially straight length of discharge pipe (9, 10, 11) extending substantially vertically from an inlet (12, 13, 14) situated in the room to an outlet (15, 16, 17) situated out on the roof, which discharge pipe is provided with draught promoting means in or near the outlet, said ventilation discharge system forming a natural draught ventilation discharge, **characterised in that** said ventilation discharge system further comprises a ventilating fan (18, 19, 20) which is placed or can be placed in the discharge pipe, at a distance from the inlet, the ventilating fan filling the passage of the discharge pipe and being adapted to let air through by natural draught when switched off and adapted to provide an air flow of 21 l/sec when switched on.
2. Ventilation discharge system according to claim 1, furthermore provided with means for switching on the ventilating fan when needed.
3. Ventilation discharge system according to claim 2, the switch means being coupled to a light switch for the room concerned.
4. Ventilation discharge system according to claim 2, the switch means being coupled to a moisture content sensor, a movement sensor or CO₂ content sensor.
5. Ventilation discharge system according to any one of the preceding claims, the ventilating fan (22) being accommodated in a cassette (55), which is accommodated in a removable manner in the discharge pipe.
6. Ventilation discharge system according to any one of the preceding claims, the ventilating fan being adapted to let air through with a flow of about 7 l/sec when switched off, preferably an air flow equivalent to 7 l/sec in a discharge pipe with a cross section of 125 mm.
7. Ventilation discharge system according to any one of the preceding claims, the ventilating fan being situated more than approximately half a meter from the inlet of the discharge pipe.
8. Ventilation discharge system according to claim 16, the ventilating fan being situated near the outlet side, below the roof.
9. Ventilation discharge system according to any one of the claims 1-4, furthermore provided with receiving means for keeping the ventilating fan outside of the passage of the discharge pipe, and with means for moving the ventilating fan from the receiving means to the passage and back again.
10. Ventilation discharge system according to any one of the preceding claims, wherein said ventilating fan being adapted for providing an air flow equivalent to 21 l/sec in a discharge pipe with a cross section of 125 mm.

Patentansprüche

1. System für Belüftungsabfluß (5,6,7) umfassend einen Raum in einem Haus, umfassend ein hauptsächlich geradliniges Abflußrohr (9,10,11), welches sich hauptsächlich vertikal von einem in dem Raum gelegenen Einlaß (12,13,14) zu einem außen auf dem Dach gelegenen Auslaß (15,16, 17) erstreckt, welches Abflußrohr mit luftzugfördernden Mitteln in oder nahe dem Auslaß versehen ist, wobei das System für Belüftungsabfluß einen natürlichen Luftzug-belüftungsabfluß bildet, **dadurch gekennzeichnet, daß** das System für Belüftungsabfluß weiter ein auf Abstand des Einlasses in dem Abflußrohr angeordnetes, oder anzuordnendes Ventilatorrad (18, 19,20) umfaßt, wobei das Ventilatorrad den Durchgang des Abflußrohrs füllt und angepasst ist um, wenn ausgeschaltet, Luft durch natürlichen Luftzug durchzulassen und angepasst ist um, wenn eingeschaltet, einen Luftfluß von 21 L/Sek zu verschaffen.

2. System für Belüftungsabfluß nach Anspruch 1, weiter mit Mitteln versehen zum Anschalten des Ventilatorrads falls nötig.
- 5 3. System für Belüftungsabfluß nach Anspruch 2, wobei die Schaltmittel mit einem Beleuchtungsschalter für den betreffenden Raum verbunden sind.
4. System für Belüftungsabfluß nach Anspruch 2, wobei die Schaltmittel mit einem Feuchtigkeitsgehaltsensor, einem Bewegungssensor oder CO₂-Gehaltsensor gekuppelt sind.
- 10 5. System für Belüftungsabfluß nach einem der vorhergehenden Ansprüche, wobei das Ventilatorrad (22) in einer Kassette (55) aufgenommen ist, welche auf eine entfernbare Weise im Abflußrohr aufgenommen ist.
6. System für Belüftungsabfluß nach einem der vorhergehenden Ansprüche, wobei das Ventilatorrad angepasst ist, um, wenn ausgeschaltet, Luft mit einem Fluß von ungefähr 7 L/Sek durchzulassen, vorzugsweise einen Luftfluß
15 gleich an 7L/Sek in einem Abflußrohr mit einem Querschnitt von 125mm.
7. System für Belüftungsabfluß nach einem der vorhergehenden Ansprüche, wobei das Ventilatorrad mehr als ungefähr ein halbes Meter vom Einlaß des Abflußrohrs gelegen ist.
- 20 8. System für Belüftungsabfluß nach Anspruch 16, wobei das Ventilatorrad nahe der Auslaßseite, unter dem Dach, gelegen ist.
9. System für Belüftungsabfluß nach einem der Ansprüche 1-4, weiter mit Aufnahmemitteln zum außer dem Durchgang des Abflußrohrs Halten des Ventilatorrads, und mit Mitteln zum Bewegen des Ventilatorrads von den Aufnahme-
25 mitteln zum Durchgang und zurück, versehen.
10. System für Belüftungsabfluß nach irgendeinem der vorhergehenden Ansprüche, wobei das Ventilatorrad angepasst ist zum Verschaffen eines Luftflusses gleich an 21 L/Sek in einem Abflußrohr mit einem Querschnitt von 125mm.

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Revendications

- 35 1. Système de sortie d'air de ventilation (5, 6, 7) comprenant une pièce dans une maison, comprenant une longueur sensiblement droite de conduit de sortie d'air (9, 10, 11) s'étendant sensiblement verticalement depuis une entrée (12, 13, 14) située dans la pièce vers une sortie (15, 16, 17) située à l'extérieur sur le toit, lequel conduit de sortie d'air est muni de moyens favorisant les courants d'air dans ou à proximité de la sortie, ledit système de sortie d'air de ventilation formant une sortie d'air de ventilation à courant d'air naturel, **caractérisé en ce que** ledit système de sortie d'air de ventilation comprend en outre un ventilateur (18, 19, 20) qui est placé ou peut être placé dans le conduit de sortie d'air, à une distance depuis l'entrée, le ventilateur remplissant le passage du conduit de sortie
40 d'air et étant adapté pour laisser passer l'air par un courant d'air naturel lorsqu'il est hors tension et adapté pour fournir un débit d'air de 21 l/sec lorsqu'il est sous tension.
2. Système de sortie d'air de ventilation selon la revendication 1, muni en outre de moyens pour commuter le ventilateur sous tension lorsque nécessaire.
- 45 3. Système de sortie d'air de ventilation selon la revendication 2, les moyens de commutation étant couplés à un commutateur d'éclairage pour la pièce concernée.
4. Système de sortie d'air de ventilation selon la revendication 2, les moyens de commutation étant couplés à un
50 capteur de teneur en humidité, un capteur de mouvement ou un capteur de teneur en CO₂.
5. Système de sortie d'air de ventilation selon l'une quelconque des revendications précédentes, le ventilateur (22) étant logé dans une cassette (55), laquelle est logée de manière amovible dans le conduit de sortie d'air.
- 55 6. Système de sortie d'air de ventilation selon l'une quelconque des revendications précédentes, le ventilateur étant adapté pour laisser passer l'air à un débit d'environ 71/sec lorsqu'il est hors tension, de préférence à un débit d'air équivalent à 7 l/sec dans un conduit de sortie d'air avec une section transversale de 125 mm.

7. Système de sortie d'air de ventilation selon l'une quelconque des revendications précédentes, le ventilateur étant situé à plus d'environ une demi-mètre de l'entrée du conduit de sortie d'air.
8. Système de sortie d'air de ventilation selon la revendication 7, le ventilateur étant situé à proximité du côté de la sortie, en dessous du toit.
9. Système de sortie d'air de ventilation selon l'une quelconque des revendications 1 à 4, muni en outre de moyens de réception pour maintenir le ventilateur en dehors du passage du conduit de sortie d'air, et de moyens pour déplacer le ventilateur depuis les moyens de réception vers le passage et inversement.
10. Système de sortie d'air de ventilation selon l'une quelconque des revendications précédentes, dans lequel ledit ventilateur est adapté pour fournir un débit d'air équivalent à 21 l/sec dans un conduit de sortie d'air avec une section transversale de 125 mm.

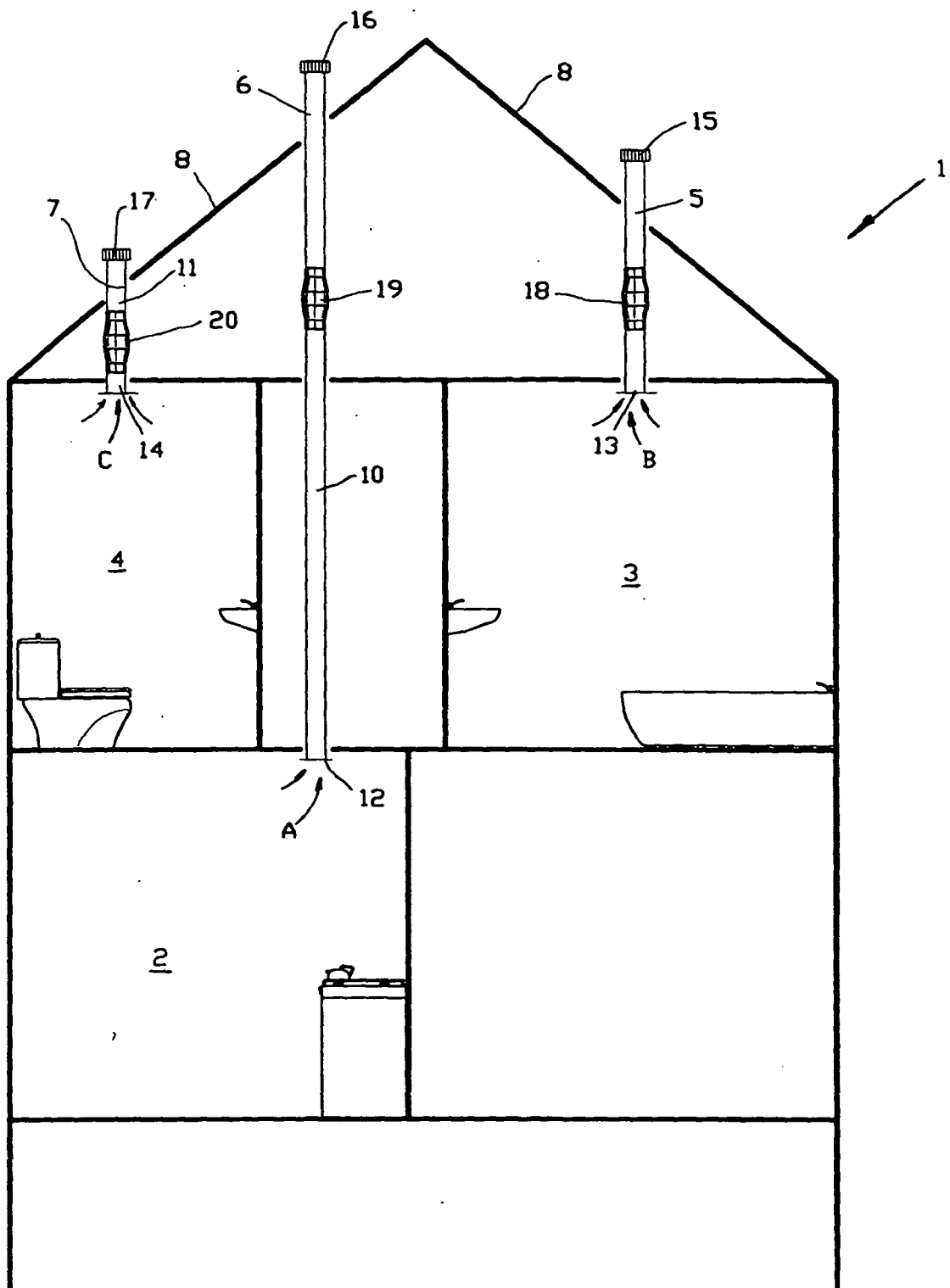


FIG. 1

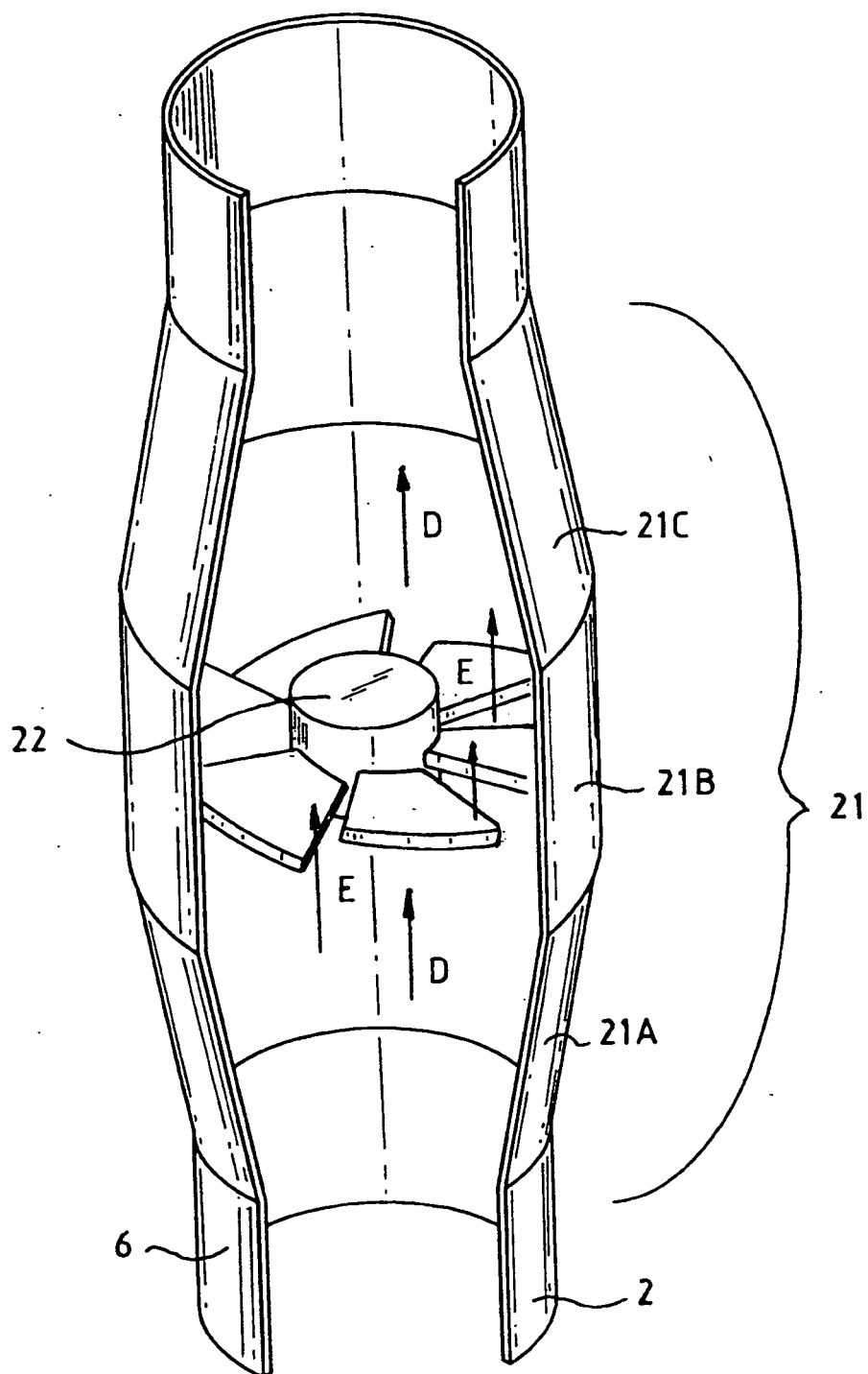


FIG. 2

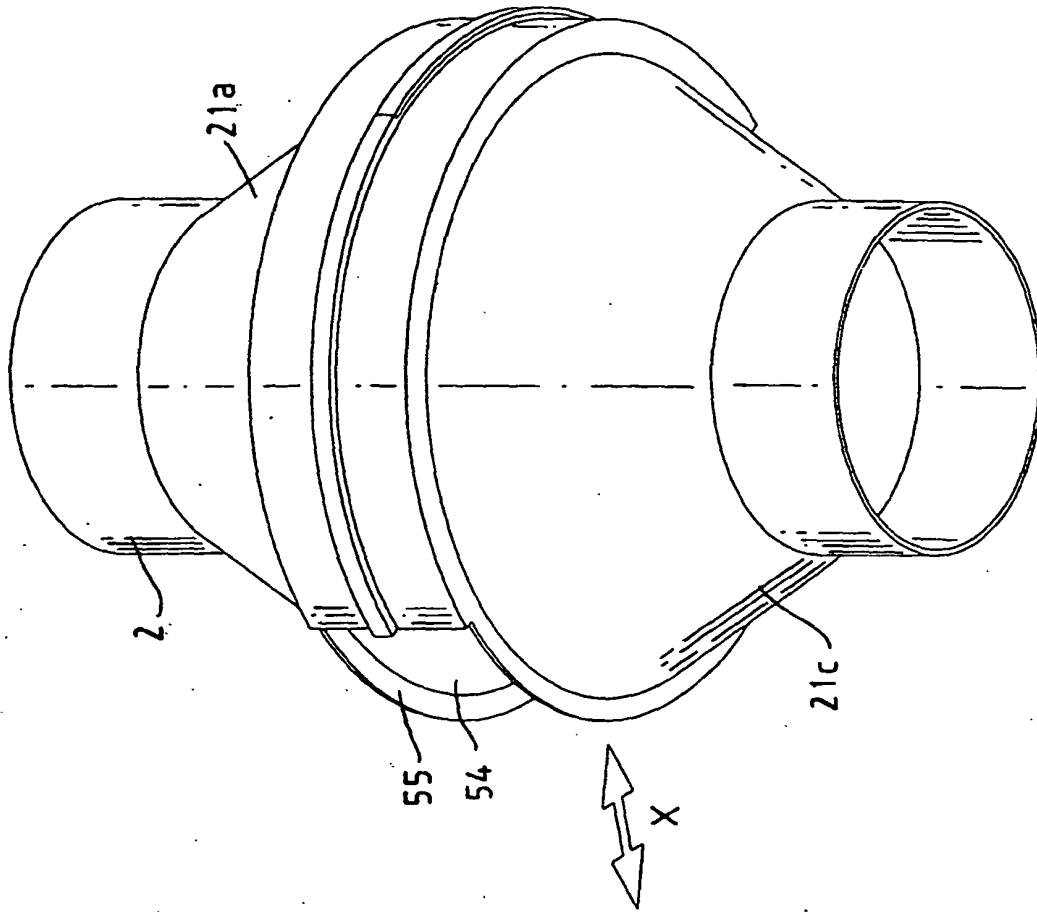


FIG. 2A

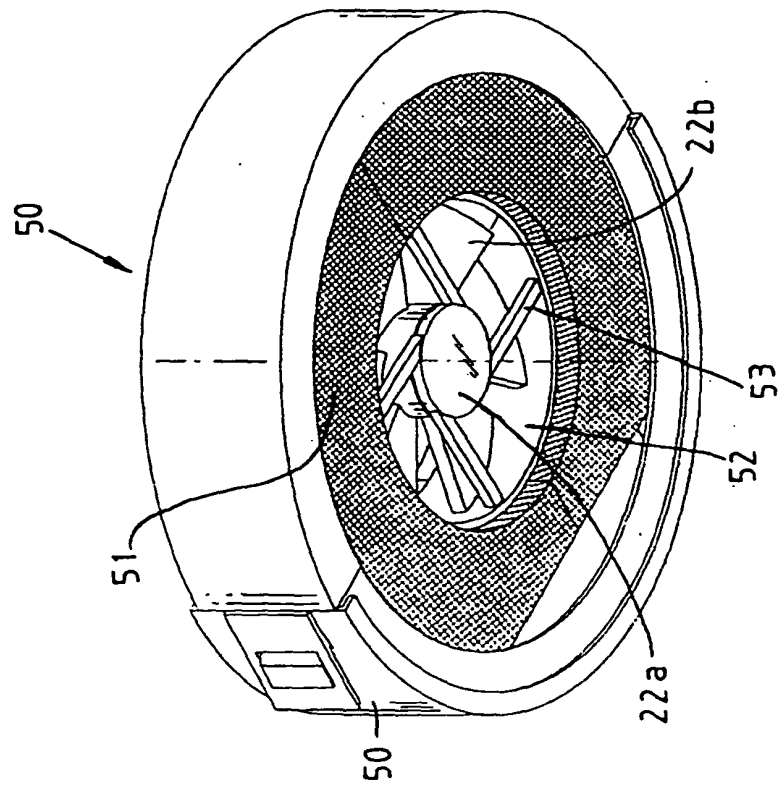


FIG. 2B

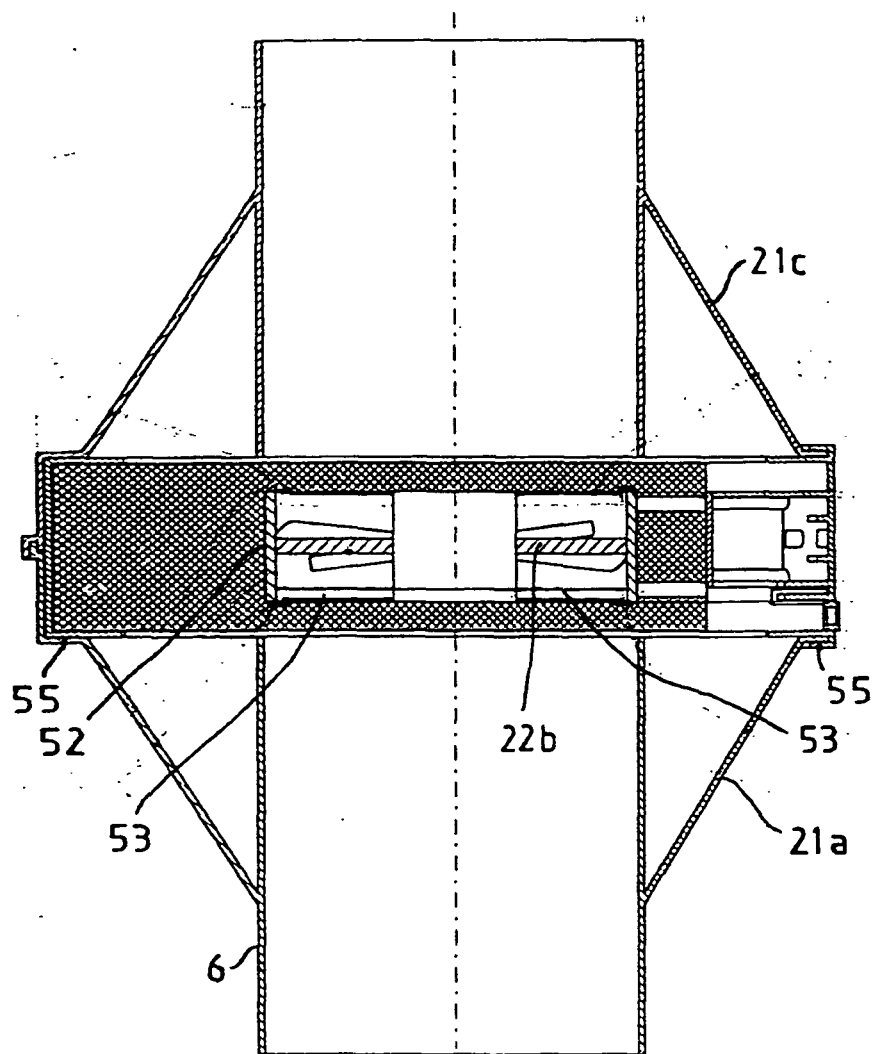


FIG. 2C

