(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 026 453 A2

# (12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
**09.08.2000 Bulletin 2000/32**

(51) Int. Cl.[7]: **F24F 13/18**, E06B 7/02

(21) Application number: **00200409.1**

(22) Date of filing: **07.02.2000**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE**
Designated Extension States:
**AL LT LV MK RO SI**

(30) Priority: **08.02.1999 NL 1011239**

(71) Applicant:
**Zwaan, Adrianus Jacobus**
**NL-2252 BD Voorschoten (NL)**

(72) Inventor:
**Zwaan, Adrianus Jacobus**
**NL-2252 BD Voorschoten (NL)**

(74) Representative:
**Ottevangers, Sietse Ulbe et al**
**Vereenigde,**
**Nieuwe Parklaan 97**
**2587 BN The Hague (NL)**

## (54) Ventilating device with a slotted duct closable by a pivotable valve element

(57) A ventilating device comprising a housing substantially elongated in the width direction and provided with a slotted ventilating duct which terminates at one end in an outer mouth breaking through a first housing wall part and at its other end in an inner mouth breaking through a second housing wall part, which ventilating duct is at least partly bounded by plate-shaped elements, including a pivotally arranged valve element which is arranged near the inner mouth and can be brought by an operating mechanism from an open position in which the passage of the ventilating duct is at its maximum, via a number of intermediate positions to a position closing the ventilating duct, which valve element is of such design that when the valve element is in an intermediate position the duct passage, viewed in a direction from the outer mouth to the inner mouth, is gradually, that is to say substantially steplessly, reduced by the valve element, as compared with the passage in the open position.

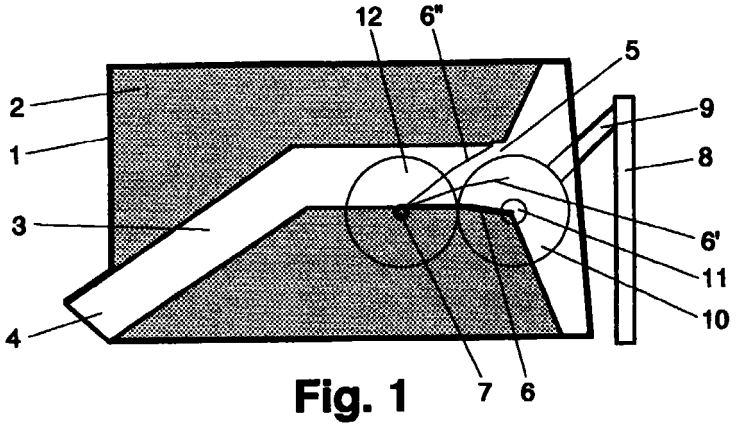


Fig. 1

EP 1 026 453 A2

## Description

**[0001]** The invention relates to a ventilating device comprising a housing substantially elongated in the width direction and provided with a slotted ventilating duct which terminates at one end in an outer mouth breaking through a first housing wall part and at its other end in an inner mouth breaking through a second housing wall part, which ventilating duct is at least partly bounded by plate-shaped elements, including a pivotally arranged valve element which is arranged near the inner mouth and can be brought by an operating mechanism from an open position in which the passage of the ventilating duct is at its maximum, via a number of intermediate positions to a position closing the ventilating duct.

**[0002]** Such a ventilating device is known from GB-A-2 309 776. Built in a window, a casing or a wall which separates a space in a building from the surroundings of the building, such a ventilating device provides the supply of fresh air to this space. With the valve element this supply can be controlled, which is done with the operating mechanism by a person present in the space to be ventilated. For this reason the operating mechanism is arranged on the side of the inner mouth, so that, from a structural viewpoint, the valve element is preferably placed at this inner mouth and the pivot pin of this valve element is also arranged on the inner mouth side thereof. Thus, a relatively simple operating mechanism for the valve element can be realized.

**[0003]** However, when the valve element is placed in an intermediate position, this construction results in vortices disturbing the air flow, because the free end edge of the valve element placed in the intermediate position comes to lie in the ventilating duct. This not only results in a reduction of the passage of the ventilating duct, as intended, but also in an obstruction which forms either a vortex space or a stepped stop surface. The disturbance of the air flow thereby caused means a substantial and, moreover, variable and hardly predictable increase in the resistance, so that the control of the supply is considerably impeded and the accuracy of the control as regards the throughput passed is adversely affected.

**[0004]** The formation of the stepped transition when placing the valve element in an intermediate position also occurs with another type of ventilating device, namely the type with a rotating valve, as known from DE-A-31 20 694.

**[0005]** It is an object of the invention to reduce the air resistance of such a ventilating device and thus facilitate the throughput control.

**[0006]** This is achieved according to the invention in a device of the type described in the opening paragraph if the valve element is of such design that when the valve element is in an intermediate position the duct passage, viewed in a direction from the outer mouth to the inner mouth, is gradually, that is to say substantially steplessly, reduced by the valve element, as compared with the passage in the open position. By taking these measures which, in fact, mean that a vortex space or a stepped transition is covered or replaced by a part which substantially continuously reduces the passage of the ventilating duct in the direction of the air flow to the intended height, it is realized that when placing the valve element in an intermediate position the air flow remains undisturbed such that no vortices disturbing the air flow are caused. By thus designing the valve element according to the invention, not only the air flow is affected as less adversely as possible, but also the accuracy with which the throughput passed can be controlled is substantially increased.

**[0007]** The above effect can be obtained, for instance, by extending the valve element in the above-discussed known construction by a more or less flexible flap or by a plate-shaped part which, on the one hand, is hingedly connected with the above-mentioned free edge of the valve element, and which, on the other hand, can freely slide along the lower wall of the ventilating duct. In the open position of the ventilating device the plate-shaped part lies flat on the lower wall, while when the valve element is placed in an intermediate position the plate-shaped part is taken along by the valve element and thus comes to lie in a position slanting upwards, viewed in the direction of flow. Preferred is, however, a structurally simpler solution in which the valve element is a substantially plate-shaped member which is hinged on a pin located at the end edge of the valve element directed towards the outer mouth, and in which the operating mechanism is provided with a lever extending at the inner mouth to outside the housing, with which lever the pin can be rotated and thus the valve element can be pivoted. The pin then comes to lie at some distance within the housing of the ventilating device. In order that the angle through which the lever must be pivoted to bring the valve element from the open to the closed position is kept within reasonable limits in relation to the height of the housing of the ventilating device, it may be preferred that the lever carries a gear wheel which gears with a gear wheel mounted on the pin.

**[0008]** The free end of the valve element is located at the inner mouth in the form of a movable end edge. If it is considered desirable to have a widening configuration at the inner mouth also in an intermediate position, this can be realized if a second plate-shaped member connects to the plate-shaped member, which second plate-shaped member makes such an angle with the first plate-shaped member that at the inner mouth the relevant widening configuration is obtained. The free end edge is kept out of sight as much as possible when looking into the ventilating device at the inner mouth, when the second plate-shaped member is hingedly connected with the first plate-shaped member, so that when the first plate-shaped member pivots upwards the second plate-shaped member can pivot downwards.

Another possibility is to extend the valve element by a flexible flap.

**[0009]** In order that the air resistance is kept as low as possible, in particular in the open position, it is preferred that at least a part of the first plate-shaped member not connecting to the pin extends in the direction of the inner mouth divergently with respect to the opposite wall partly determining the ventilating duct. In order that the air resistance is kept as low as possible also in all the intermediate positions, it may further be preferred that an elastic flexible sheet-like part lies over the valve element.

**[0010]** The inward displacement of the pivot pin may be a reason, as mentioned above, to arrange a gear wheel transmission between the pivot pin and an operating lever. Such a gear wheel construction may be omitted if the operating mechanism engages the first or the second plate-shaped member at a distance from the pin.

**[0011]** Disturbing the air flow in the ventilating duct as less as possible according to the invention when placing the valve element in an intermediate position has special additional advantages if the valve element is adjustable by a motor and is provided with a control unit for adjustment to a specific throughput, in which connection a sensor is arranged in the ventilating duct, which sensor applies signals to the control unit for keeping the throughput constant, and which sensor is placed in the ventilating duct part before the pivotable valve element. By building in a motor, a control unit and a sensor an automatically controlled ventilating device is obtained, that is to say a ventilating device which can be adjusted to a specific throughput, and which independently keeps this throughput constant by readjusting the position of the valve element. The readjustment is controlled depending on control signals from the sensor. By placing the sensor in the part of the ventilating duct where the measures according to the invention ensure that a uniform air flow is disturbed as less as possible, the realization of an accurate and optimum control is substantially promoted.

**[0012]** With reference to exemplary embodiments schematically shown in the drawings, the ventilating device according to the invention will be further explained, only by way of example. In the drawings:

Fig. 1 is a cross-section of a first embodiment;
Fig. 2 is a cross-section of a second embodiment;
Fig. 3 is a cross-section of a third embodiment; and
Fig. 4 is a cross-section of a fourth embodiment of the ventilating device according to the invention;

**[0013]** The ventilating device very schematically shown in Fig. 1 comprises a housing 1 largely filled with sound-damping material 2, in which a ventilating duct 3 is provided. The ventilating duct 3, which has an outer mouth 4 and an inner mouth 5, may be bounded by sound-damping material 2 or by plate-shaped elements, one of which is a valve element 6, which is hinged on a pin 7, and which is shown in the open position, that is to say the position in which the ventilating duct 3 has its maximum passage. Pivotation of the valve element 6 to the position closing the ventilating duct 3 takes place by pulling the operating rod 8, which is hingedly connected with a lever 9, which, in turn, is fixed to a disk 10. The disk 10 is rotatable on a pin 11 and is provided on its outer circumference with teeth, not shown, which gear with teeth, likewise not shown, of a disk 12 mounted on the pin 7 and rotatable together with this pin. Thus, by pulling the operating rod 8 the valve element 6 is pivoted upwards, for instance to an intermediate position 6' or an end or closing position 6'', in which the passage of the ventilating duct 3 is entirely closed. As appears from the intermediate position 6', the pivotation of the valve element 6 results not in an abrupt, but in a gradual reduction of the passage of the ventilating duct 3. In the ventilating devices hitherto known, the valve element rotates on the pin 11, which valve element then comes to form a vortex chamber in the ventilating duct.

**[0014]** Another possibility is to pivot the valve element on the pin 11, which valve element is then extended in the direction of the outer mouth 4 with a plate-shaped part, which, in the place where in Fig. 1 the pin 7 is indicated, is hingedly connected with the valve element, and which is further loosely supported on the lower wall of the ventilating duct. When pivoting the valve element to reduce the passage of the ventilating duct, the hinge edge is pulled upwards along with the plate-shaped part, while the opposite free edge thereof slides over the lower wall of the ventilating duct in the direction of the inner mouth 5. Consequently, viewed from the outer mouth 4, the plate-shaped part comes to form an upwardly slanting surface, to which the valve element connects as a downwardly slanting surface, which results in a continuous, gradual and stepless narrowing and then widening of the ventilating duct with as less disturbance of the air flow as possible. Instead of a hinged plate-shaped part, a more or less flexible flap may also be used.

**[0015]** In Fig. 2 a similar ventilating device is shown as in Fig. 1. However, the valve element 6 is provided therein with a bent connecting part 13, which results in a directedly widening configuration also in the intermediate position, indicated by 13'. Further arranged in the ventilating duct 3 is a sensor 14 which measures the velocity of the air flow through the ventilating duct 3. The measuring value of the sensor 14 is passed to a control unit, not shown, which can control a motor, likewise not shown, which motor can rotate the pin 7 of the valve element 6. Thus, an automatically controlled ventilating device is obtained, that is to say a ventilating device which can be adjusted to a specific throughput, and which keeps the throughput constant, even when the pressure difference between the outer mouth 4 and the inner mouth 5 changes. It will be clear that this control is soon disturbed when all kinds of air vortices occur in the

vicinity of the sensor 14.

**[0016]** In Fig. 3, again, a similar ventilating device is shown as in Fig. 1. However, the bent connecting part 13 shown in Fig. 2 is replaced therein by a part 15 attached to the valve element 6 via a hinge 16. Furthermore, this embodiment comprises an operating mechanism in the form of a sliding button 17 with a slotted hole guide 18, into which a pin stud 19 extends, which is attached to the end of the part 15. By pushing the sliding button 17 upwards, the valve element 6 can be brought from the open to the closed position, indicated by 6', 15'.

**[0017]** In Fig. 4 a ventilating device is shown which comprises a housing 21 which, together with a valve element 26, defines a ventilating duct 23 with an outer mouth 24 and an inner mouth 25. The valve element 26 is pivotable on a pin 27 and can thus be brought from an open position via intermediate positions, one of which is indicated by 26', to a closed position, indicated by 26''. The pivotation can take place with a manually operated mechanism, but will be effected in this embodiment, in accordance with the embodiment shown in Fig. 2, with a motor not shown, and readjustment in an adjusted throughput position so as to keep the passed amount of air constant is effected by a sensor 28 in a controlled manner.

**[0018]** It is self-evident that within the scope of the invention as laid down in the appended claims many modifications and variants are possible. Thus, the type or the design of the valve element may be varied in many ways or adapted to specific conditions. Moreover, the operating mechanisms shown may be mutually exchanged or replaced by another suitable construction. One example may be the motor-driven displacement of the hinge 16 in the embodiment shown in Fig. 3. Furthermore, the housing of the ventilating device may be varied in any desired way and further conventional provisions, such as insect grilles and the like, may be arranged therein. Finally, it is observed that the very schematic representation of the ventilating devices in the drawings has led to the omission of constructional details usually present, such as, inter alia, fastening elements for mounting in a window, a casing or a wall, insulating means for preventing cold bridges and assembling of the house from several parts or sections.

## Claims

1. A ventilating device comprising a housing substantially elongated in the width direction and provided with a slotted ventilating duct which terminates at one end in an outer mouth breaking through a first housing wall part and at its other end in an inner mouth breaking through a second housing wall part, which ventilating duct is at least partly bounded by plate-shaped elements, including a pivotally arranged valve element which is arranged near the inner mouth and can be brought by an operating mechanism from an open position in which the passage of the ventilating duct is at its maximum, via a number of intermediate positions to a position closing the ventilating duct, characterized in that the valve element is of such design that when the valve element is in an intermediate position the duct passage, viewed in a direction from the outer mouth to the inner mouth, is gradually, that is to say substantially steplessly, reduced by the valve element, as compared with the passage in the open position.

2. A ventilating device according to claim 1, characterized in that the valve element is a substantially plate-shaped member which is hinged on a pin located at the end edge of the valve element directed towards the outer mouth.

3. A ventilating device according to claim 2, characterized in that the operating mechanism is provided with a lever extending at the inner mouth to outside the housing, with which lever the pin can be rotated and thus the valve element can be pivoted.

4. A ventilating device according to claim 3, characterized in that the lever carries a gear wheel which gears with a gear wheel mounted on the pin.

5. A ventilating device according to any of the preceding claims, characterized in that a second plate-shaped member connects to the plate-shaped member, which second plate-shaped member makes such an angle with the first plate-shaped member that at the inner mouth a widening configuration is obtained.

6. A ventilating device according to claim 5, characterized in that the second plate-shaped member is hingedly connected with the first plate-shaped member.

7. A ventilating device according to any of the preceding claims, characterized in that at least a part of the first plate-shaped member not connecting to the pin extends in the direction of the inner mouth divergently with respect to the opposite wall partly determining the ventilating duct.

8. A ventilating device according to any of the preceding claims, characterized in that an elastic flexible sheet-like part lies over the valve element.

9. A ventilating device according to any of the preceding claims, characterized in that the operating mechanism engages the first or the second plate-shaped member at a distance from the pin.

10. A ventilating device according to any of the preced-

ing claims, characterized in that the valve element is adjustable by a motor and is provided with a control unit for adjustment to a specific throughput, in which connection a sensor is arranged in the ventilating duct, which sensor applies signals to the control unit for keeping the throughput constant, and which sensor is placed in the ventilating duct part before the pivotable valve element.

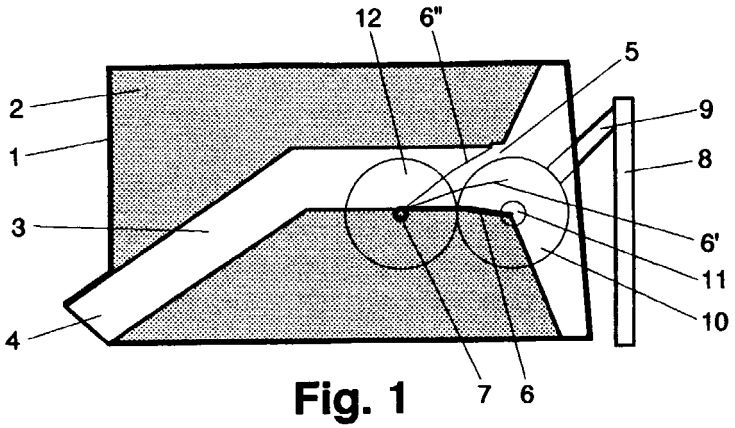


Fig. 1

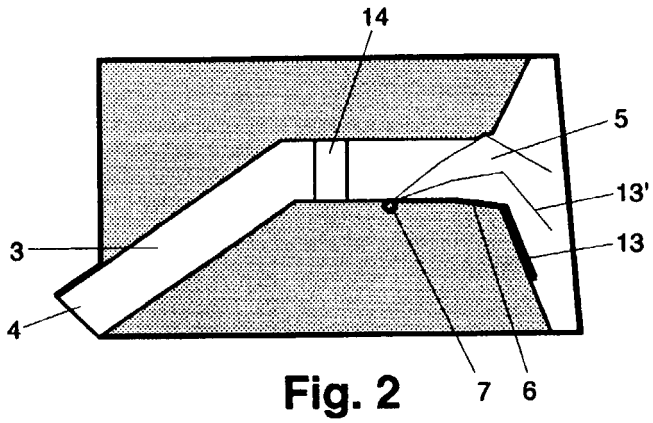


Fig. 2

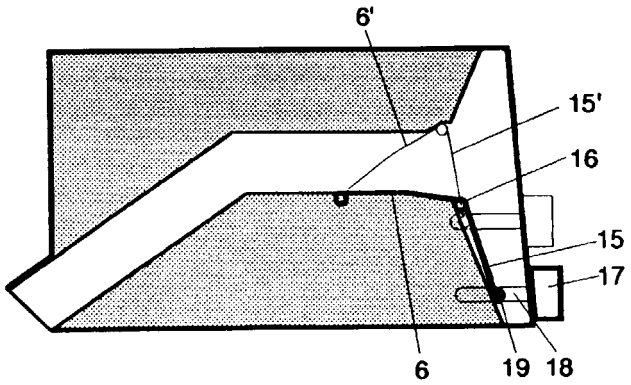


Fig. 3

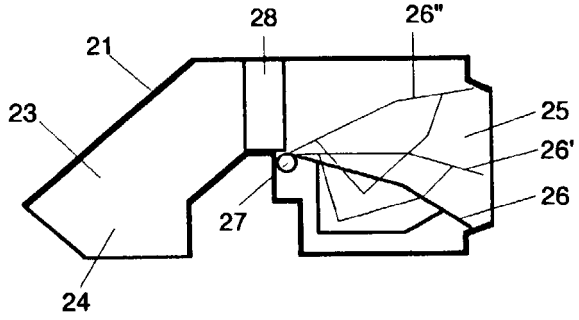


Fig. 4