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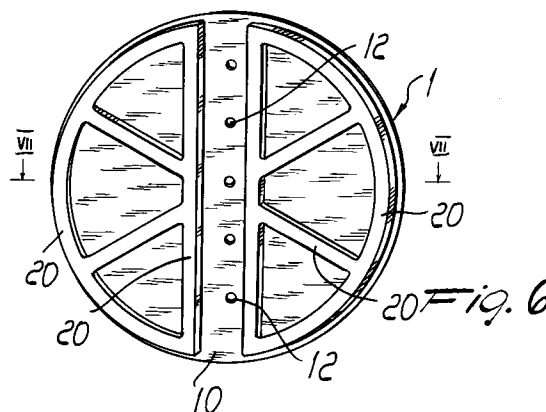
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I-20123 Milano (IT)(54) **One-way shutter with low pressure loss for ventilation devices in general.**

(57) A one-way shutter with low pressure loss for ventilation devices in general, comprising, on the outlet (2) that discharges the air stream generated by the ventilation device, a membrane (1) made of flexible material which is supported in a median portion (10) by a cross-member arranged substantially vertically, and rests perimetrically on an abutment edge (30) formed by the discharge outlet (2) when the ventilation device is inactive.

**EP 0 685 691 A2**

The present invention relates to a one-way shutter with low pressure loss for ventilation devices in general.

Conventional ventilation devices, and ambient-air exhausters in particular, normally use one-way shutters arranged on the air stream outlet in the discharge duct to prevent undesired reverse flow of air when the exhauster is not running.

These shutters are normally constituted by small plates that resume the closed position by gravity or are kept closed by elastic return elements.

There is a very wide range of valve elements, but in any case the presence of the shutter, which forms the one-way valve, produces a significant pressure loss on the air stream outlet, since the air stream must also keep the valve in open position while the exhauster is active.

A principal aim of the invention is indeed to eliminate the drawbacks described above by providing a one-way shutter with low pressure loss for ventilation devices in general structured so that the force required to open the shutter is extremely small, since the only contrasting force is the flexibility of the material being used.

Within the scope of this aim, a particular object of the invention is to provide a one-way shutter which is made of deformable plastics and accordingly has parts that can appropriately undergo deformation with respect to the flat inactive configuration if upstream pressure occurs, thus allowing better air flow.

Another object of the present invention is to provide a one-way shutter that, by virtue of its particular constructive characteristics, is capable of giving the greatest assurances of reliability and safety in use.

Another object of the present invention is to provide a one-way shutter that can be easily obtained starting from commonly commercially available elements and materials and is furthermore competitive from a merely economical point of view.

This aim, these objects, and others which will become apparent hereinafter are achieved by a one-way shutter with low pressure loss for ventilation devices in general, characterized in that it comprises, on the outlet that discharges the air stream generated by the ventilation device, a membrane made of flexible material that is supported in a median portion by a cross-member arranged substantially vertically, and rests perimetrically on an abutment edge formed by said discharge outlet when the ventilation device is inactive.

Further characteristics and advantages will become apparent from the following detailed description of a one-way shutter with low pressure loss for ventilation devices in general, illustrated only by

way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic side view of a ventilation device, according to the present invention, illustrating the outlet for discharging the air stream;

figure 2 is a rear view of the ventilation device, illustrating the outlet on which the one-way shutter according to the invention is applied;

figure 3 is a sectional view, taken along the plane III-III of figure 2;

figure 4 is a sectional view, taken along the plane III-III of figure 2, showing the ventilation device in operation and the shutter in open position;

figure 5 is an enlarged-scale detail view of the connection between the membrane and the cross-member;

figure 6 is an exploded perspective view of the outlet of the air stream and of the membrane;

figure 7 is a sectional view, taken along the plane VII-VII of figure 6.

With reference to the above figures, the one-way shutter with low pressure loss for ventilation devices in general, according to the invention, comprises a membrane 1 placed on the outlet 2 for discharging the air stream generated by a ventilation device 3.

The outlet 2, which preferably but not necessarily has a circular cross-section, forms a spider 5 that acts as a support for the membrane and prevents the elastic lips of the membrane 1 from flexing inwards and from possibly jamming when the ventilation device is off and in the case of counterpressure from the outside of the device towards the inside. The spider 5 furthermore facilitates better peripheral tightness of the membrane 1 against the reverse flow of air by adequately supporting said membrane.

More specifically, the membrane 1 comprises a layer of flexible material, such as silicone rubber, having a substantially circular shape and forming a diametrical central portion 10 in which a membrane supporting cross-member 11 engages. At the diametrical portion 10, the membrane has through holes 12 in which pins 13 are inserted; said pins protrude from the spider arms and are adapted to act as a snap-together coupling element for the cross-member 11.

The cross-member 11 must be arranged substantially vertically, and for this purpose, if the ventilation device 3 is mountable with different orientations, the outlet is rotatable so as to arrange the cross-member vertically.

The cross-member in practice divides the membrane into two substantially semicircular flaps having ridges 20 on the downstream face, relative to the direction of the flow; said ridges cause a limited stiffening of the membrane face, so as to

provide flaps that predominantly maintain a flat configuration.

Optionally, in order to achieve stiffening, the ridges 20 can be replaced with metal laminae molded in place in the elastic material.

The membrane is arranged perimetrically in abutment against an abutment edge 30 formed by the outlet 2, on which the peripheral region of the membrane rests when the ventilation device is not running.

If reverse flow occurs, tightness is further increased because the membrane is pressed against the abutment edge.

When the ventilation device is activated, as shown in figure 4, the delivery air stream causes the flaps to rotate about the axis formed in practice by the cross-member, folding the flaps towards the diametrical position and forming an angle therebetween that narrows as the pressure/flow-rate of the generated air stream increases, thus allowing better air flow.

From the above description it is thus evident that the invention achieves the intended aim and objects; in particular, the fact is stressed that a one-way shutter is provided which, by using a simple membrane made of flexible material, allows to drastically reduce losses and to simplify all structural elements, since it is not necessary to use elastic return means.

In practice, the materials employed, so long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. One-way shutter with low pressure loss for ventilation devices in general, characterized in that it comprises, on the outlet (2) that discharges the air stream generated by the ventilation device (3), a membrane (1) that is made of flexible material that is supported in a median portion (10) by a cross-member (11) arranged substantially vertically, and rests perimetrically on an abutment edge (30) formed by said discharge outlet (2) when the ventilation device is inactive.
2. One-way shutter according to claim 1, characterized in that said discharge outlet (2) has a

spider (5) that forms a diametric arm engageable with said median portion of said membrane.

3. One-way shutter according to the preceding claims, characterized in that it comprises, on said diametric arm of said spider (5), pins (13) that can engage through holes (12) of said membrane (1) and are adapted to act as a coupling element for said cross-member (11).
4. One-way shutter according to one or more of the preceding claims, characterized in that said membrane (1) has, laterally to the region affected by said through holes (12), stiffening elements (20) for providing a pair of flaps elastically rotatable with respect to said median portion (10).
5. One-way shutter according to one or more of the preceding claims, characterized in that said stiffening elements comprise ridges (20) formed monolithically with the elastic material that constitutes the membrane (1).
6. One-way shutter according to one or more of the preceding claims, characterized in that said stiffening elements comprise laminae made of metallic material molded in place together with said elastic material.
7. One-way shutter according to one or more of the preceding claims, characterized in that said membrane (1) has a substantially circular shape.
8. One-way shutter according to one or more of the preceding claims, characterized in that said membrane (1) is made of silicone rubber.
9. One-way shutter with low pressure loss for ventilation devices in general, characterized in that it comprises one or more of the described and/or illustrated features.

