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(71) Applicant: **VKR Holding A/S**
2970 Hørsholm (DK)

(72) Inventor: **Jensen, Jimmy Skjold**
5591, Gelsted (DK)

(54) **Ventilation device and roof window system**

(57) A roof window ventilation device providing regulated ventilation by restriction means which may be a baffle configured to restrict and regulate the air flow. The

roof window ventilation device may also be adjustable and provide manually defined ventilation. The ventilation device is configured for fitting on a roof window / skylight. A roof window ventilation system is also provided.

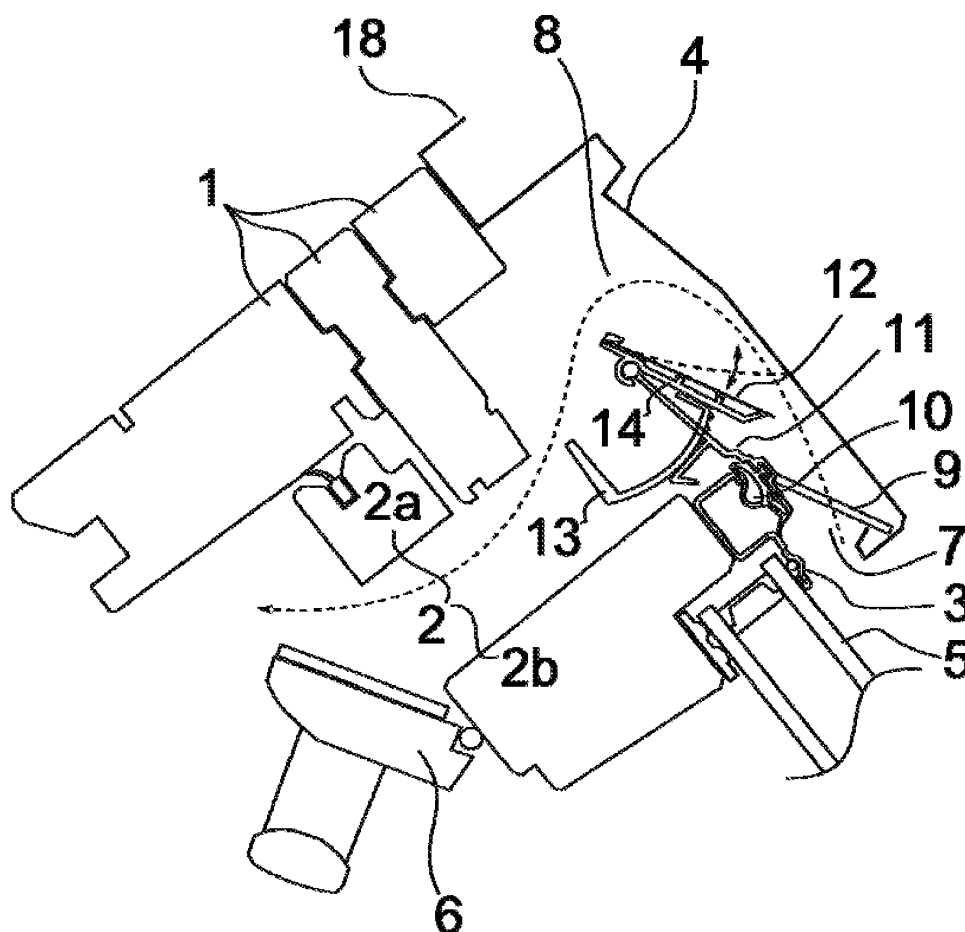


Fig. 2

Description

Field

[0001] The exemplary and non-limiting embodiments of this invention relate generally to roof window ventilation more particularly to air flow regulation.

Background

[0002] Roof windows often have a ventilation duct which may also be opened/closed by for example a flap or louver. Such ventilation ducts may also have a pressure operated valve/baffle to limit the air flow in order to reduce flow fluctuations caused by the wind and to improve the comfort etc. For example W008133539A1 shows a roof window ventilation duct with a flow limitation baffle.

Summary

[0003] It would be desirable to provide a ventilation solution which is easy to install on a roof window. Both with respect to retrofitting existing roof windows and manufacture of new roof windows it is an improvement to provide a ventilation solution, which does not require design changes to the roof window. Further roof windows are installed in roofs with inclination (for example 15-85 degrees) and consequently there are requirements for a storm and watertight ventilation device.

[0004] It would be advantageous to provide roof window ventilation that eliminate or reduce the drawbacks mentioned above and further provide a number of advantages, for example if the roof window is sold in places where a flow limitation is needed, then a flow limiting ventilation device may be provided with the window and then there is no need to design a new roof window. In accordance with a first aspect of the exemplary embodiments there is provided a roof window ventilation device comprising:

a top cover comprising an air intake;
 seal means configured to provide a duct;
 restriction means configured to restrict the air flow at least in the inlet direction through the duct;
 wherein the air intake and the seal means and the restriction means are provided via the top cover which is configured to be fitted to a roof window and provide regulated ventilation.

[0005] Hereby is achieved, that when associated with a roof window frame a duct is provided. Hereby a regulated ventilation solution is provided which can fit existing roof windows and which does not require special roof window productions. Furthermore water leak is reduced due to the location of the restriction means, which are associated with the air intake. The seal means configured to provide a duct may provide the duct when associated

with a roof window or when in use. In accordance with a second aspect of the exemplary embodiments there is provided a ventilation system comprising a roof window and a top cover wherein:

the roof window comprises a frame and a sash and a ventilation passage between the interior and exterior;
 the top cover covers the top of the window frame and the top of the window sash and wherein the top cover comprises;
 an air intake and
 sealing means providing a duct between the top cover and the roof window frame and
 restriction means configured to restrict the air flow at least in the inlet direction through the duct;
 In accordance with both the first and/or second aspects of the exemplary embodiments, the restriction means is at least a baffle projecting into the air duct for adjusting under the control of the incoming airflow the cross sectional area available in said duct.

[0006] Hereby air flow may automatically be adjusted/reduced by the pressure difference or the air flow in the duct.

[0007] In accordance with both the first and/or second aspects of the exemplary embodiments, the restriction means may be adjustable with at least two manually controlled configurations, one first manual configuration providing a first substantially free air flow and a second manual configuration providing a second more restricted and/or blocked air flow.

[0008] Hereby the user may manually shut or adjust the desired ventilation level in dependence on season etc. Further during a storm the restriction means may prevent rain from entering the ventilation duct and/or passage. Such reduction of water may be based on restriction by pressure difference or by manually adjusting the restriction means.

[0009] In accordance with both the first and/or second aspects of the exemplary embodiments, the restriction means comprise adjustment means and operating means providing manually defined settings.

[0010] Hereby the operating means may be used to define the setting of the ventilation.

[0011] In accordance with both the first and/or second aspects of the exemplary embodiments, the seal means are configured for engagement with a roof window frame or sash to provide a seal.

[0012] Hereby the air flow path is defined and the restriction means may function. Further the seal means prevent/limit water leak from storms. Also the regular dimensions of the top cover are substantially unchanged. Further such seal means are compatible with existing windows.

[0013] In accordance with both the first and/or second aspects of the exemplary embodiments, the seal means provided may comprise:

a flexible portion configured to absorb a gap or a rigid portion configured to engage a flexible portion on a roof window frame (1) or sash (2).

[0014] Hereby is achieved that the seal means may include a flexible portion, which can be provided on either the top cover or the window.

[0015] In accordance with both the first and/or second aspects of the exemplary embodiments, the restriction means are arranged in association with the air intake located at the lower part of the top cover.

[0016] Hereby the restriction means are provided in vicinity of the air intake located at the lower part of the top cover and a compact top cover is provided with an appearance which match existing windows. Further water leaks are reduced, because the restriction means can close during the wind fluctuations. Further the noise is reduced, because the restriction means are far away from the interior passage.

[0017] In accordance with both the first and/or second aspects of the exemplary embodiments, the air intake is between the seal means and top cover. Hereby the seal means and top cover are on opposite sides of the air intake respectively. The air intake provides air flow to the duct and the restriction means. By arranging the seal means and the air intake in the bottom of the top cover good fit is provided with respect to a roof window and also provided is a water resistant ventilation.

[0018] In accordance with both the first and/or second aspects of the exemplary embodiments, the seal means are configured for engagement with a roof window pane profile of a roof window sash.

[0019] Hereby a particularly good fit is provided, as the seal means are very suitable for engaging a profile to provide a tight seal.

[0020] In accordance with both the first and/or second aspects of the exemplary embodiments, the adjustment means and a baffle are mutually arranged. Hereby a compact design is provided, which may be retrofitted and applied to existing windows.

[0021] In accordance with both the first and/or second aspects of the exemplary embodiments, an adjustable support holds the baffle and thereby provide automatic and manual controlled air restriction.

[0022] In accordance with both the first and/or second aspects of the exemplary embodiments, the seal means comprise a first flexible component and a second engaging component, the at least first flexible component or second engaging component being provided on the top cover.

[0023] Hereby the seals are provided as two components configured for engagement. The flexible component may be located on the roof window and still it will be possible to retrofit the top cover.

[0024] In accordance with both the first and/or second aspects of the exemplary embodiments a support is secured to the top cover by means of a hinge and the support has operating means which can be set in different

positions. Hereby the baffle may be supported, adjusted and operated by a compact design which may fit a top cover and which is compatible with existing windows.

[0025] In accordance with both the first and/or second aspects of the exemplary embodiments, the baffle and a support are substantially the same length and substantially parallel.

[0026] In accordance with both the first and/or second aspects of the exemplary embodiments, the top cover cross section comprises a V, U or L shaped bend configured to attach the top cover to a roof window flashing.

[0027] Hereby the cover may be retrofitted to roof windows.

[0028] In accordance with both the first and/or second aspects of the exemplary embodiments, the restriction means are configured to restrict the air flow at least in the inlet direction through the duct by restricting the air flow based on a manual setting and in dependence on the air pressure.

[0029] Hereby the user may manually limit or adjust the desired ventilation level in dependence on season etc. Further during a storm the ventilation may be shut to reduce water leak.

[0030] In accordance with both the first and/or second aspects of the exemplary embodiments, the restriction means or support may cover a ventilation passage in a roof window. Hereby the security is improved, as it becomes more difficult to insert a tool through the ventilation passage to activate the windows operator and open the roof window.

[0031] In accordance with both the first and/or second aspects of the exemplary embodiments, the adjustment means are linked to a window operator (for example a ventilation flap grip) and configured to continuously restrict the air flow when the window operator is closed.

[0032] Hereby a better noise damping and insulation is achieved.

[0033] In accordance with both the first and/or second aspects of the exemplary embodiments, the position of a baffle in relation to the duct is adjustable. One non-limiting advantage that is gained by the use of the exemplary embodiments is providing a ventilation component which fits existing roof windows and which does not require special roof windows to provide regulated ventilation. Further the top cover looks similar and does not affect the look of the window.

[0034] Another non-limiting advantage that is gained is during a storm where there is a higher risk of water leak; here the higher air pressure difference causes the baffle to restrict the air flow and reduces the risk of water leak.

[0035] Other features and advantages of the disclosed embodiments will appear from the following detailed disclosure, from the attached dependent claims as well as from the drawings. Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, com-

ponent, means, step, etc]" are to be interpreted openly as referring to at least one instance of the element, device, component, means, etc., unless explicitly stated otherwise. Any characteristic is to be interpreted as a substantially characteristic unless explicitly stated otherwise.

Brief description of the drawings

[0036] The foregoing and other aspects of the teachings of this invention are made more evident in the following description, when read in conjunction with the attached figures, wherein:

Fig. 1 shows an example of a roof window.

Fig. 2 shows an example of a cross section of a roof window.

Fig. 3 shows an example of a cross section of an open roof window and possible characteristics.

Fig. 4-5 show examples of a cross section of a roof window with a passage in the frame.

Fig. 6 shows an example of one end of a top cover.

Fig. 7 shows an example of a chart explaining the ventilation regulation.

Detailed description

[0037] The disclosed embodiments will now be described more fully hereinafter with reference to the accompanying drawings, in which certain examples are shown. These disclosed examples may, however, be embodied in many different forms and should not be construed as limited; rather, these examples are provided by way of example so that this disclosure will be thorough and complete, and will fully convey the scope of the disclosed embodiments to those skilled in the art. Like numbers refer to like elements throughout.

Fig. 1 illustrates a roof window with a window frame (1) and a swinging sash (2). The roof window has a movable sash typically including a window pane and a pane profile (3). A roof window typically also has covers, flashing and a top cover (4). It is an advantage to provide a ventilation solution without affecting the roof window frame and window sash. Thereby the roof window may be a standard roof window with lower handling, transport and manufacturing costs. Also existing roof windows can be upgraded by installing a new ventilation solution.

Fig. 2 illustrates the roof window with a window frame (1) and swinging sash (2). The window comprises a window pane (5) and pane profile (3). The roof window top is covered by top cover (4). The top cover is used to make the top of roof windows weather tight. The top cover (4) may be manufactured from one piece metal sheet or by assembly of plural parts. The top cover (4) covers the top of the window frame and window sash whereby a water tight sloping roof

window installation is provided. The top cover (4) comprises a face (4) which is substantially parallel to the roof window frame/pane when in use and a U or L shaped bend (18) configured to attach the top cover (4) to a roof window flashing. The top cover (4) comprises a portion with a groove which is configured for abutment of the window frame and providing drainage.

[0038] The groove and bend (18) may be combined.

[0039] The window sash (2) has ventilation means for example a ventilation flap (6) and a passage defined between sash parts 2a and 2b. An air intake (7) is provided and a filter (9) may be used to prevent insects, dirt and some water from entering the ventilation duct (8).

[0040] Seal means (10) provide a seal between the air intake (7) and the air duct (8). The seal means (10) provide a seal between the air intake (7) and baffle (12). The seal means (10) engage the top cover (8) with the window frame (1) or window sash (2). The seal means (10) may be a flexible seal. The seal means (10) work with the pane profile (3). The seal means (10) may be an extruded seal profile. The seal means (10) may be a protrusion fitting into a corresponding slot. The seal means (10) may be a surface or protrusion fitting into or engaging a seal or gasket located on the window frame (1) or window sash (2). The seal means (10) may be a profile or seal configured to cooperate with a complementing part on the window sash and/or frame. The seal means (10) may be provided on a top cover profile (11). The top cover profile (11) is a base for the baffle (12) and the seal means (10) and optionally the adjustment means (14). A seal means may be provided on the movable end of the baffle (12) and enable the baffle (12) to directly engage the pane profile (3). The seal means (10) may extend substantially along the top cover (4) length or the length of the ventilation passage. The seal means (10) may also be a spring loaded sheet or profile. The seal means (10) provided on the top cover (4) face towards the window.

[0041] The seal means (10) comprise a first flexible component and a second engaging component, the at least first flexible or second engaging component being provided on the top cover (4). When the first flexible component and second engaging component get together a seal is provided.

[0042] A baffle (12) is supported by a support (14). The baffle (12) has a first/passive position where the air flow is unrestricted. The baffle (12) has a second/active position where the air flow is restricted. The support (14) supports the baffle (12) such that in the passive position the baffle is substantially straight and the support (14) permits the baffle to flex in one direction towards the active position. The baffle (12) is supported by one of its edges to project into the air duct (8) for adjusting under the control of the incoming airflow the cross-sectional area available in said duct (8) by elastic deformation of said baffle (12). The baffle (12) may for example be manufactured from PVC or from thin flexible sheet material.

The baffle (12) may be installed such that gravity helps to return the baffle (12) to the passive position. The support (14) may comprise spacers (17) which prevent the baffle (12) from sticking to the support. The spacers (17) may for example be extruded integrally with the baffle support (14). Spacers may extend in parallel with the long edge of the baffle (12). Spacers may extend orthogonally with respect to the direction of the air flow.

[0043] The baffle (12) is secured to the baffle support (14). The baffle support is secured to the top cover profile (11). The top cover profile (11) is attached to the top cover (4) and hereby provides a single roof window ventilation component.

[0044] Fig. 3 shows the roof window in an open position. When the roof window is open the seal means (10) disengage the moving window sash (2).

[0045] The ventilation may be adjusted by adjustment means (14). One example of providing adjustment means is to provide an adjustable support (14). The support (14) may have at least a first manual position and a second manual position, where the first manual position is an open position and the second manual position which restricts the air flow. The second manual position of the support (14) may also be entirely closed and block the airflow. Fig. 2 shows the support (14) in a first manual position providing air flow while fig. 3 shows the support (14) in a second manual position providing restricted air flow.

[0046] The adjustment means may be an operating means (13) with projections (16). The projections (16) allow the operating means to be stepwise adjusted. The operating means (13) may be connected or integral with the support (14). The adjustment means may be a support (14) with hinge means (15) which enables the support (14) to be adjusted. The operating means (13) may also be resiliently biased so friction holds the operating means (13) in the adjusted position. The adjustment means (14) in this example may be operated when the roof window is open. The operating means (13) may also be linked to a ventilation flap or grip and enable operation from the inside without opening the roof window. The adjustment means may not be a hinge but rather provide displacement for example by a groove or a guide. The adjustment means may for example provide adjustment by offset or sliding a flap. Or by sliding two plates with apertures relative to each other and provide an opening when the apertures overlap. The adjustment means may be provided as a flexible material enabling the support (14) to flex. Or a flexible base for the support (14).

[0047] Restriction means (12, 14) are means for manually or depending on the air flow to restrict the incoming air. The baffle (12) and/or the adjustable support (14) provide restriction means. The restriction means may be at least a baffle (12) projecting into the air duct (8) for adjusting under the control of the incoming airflow the cross-sectional area available in said duct (8) by elastic deformation of said baffle (12). The restriction means (12, 14) may be adjustable. The support (14) may function

as a closure plate and block or limit the air flow.

[0048] Fig. 4 illustrates a cross section of the roof window with ventilation through the window frame. The roof window has a ventilation passage defined in the window frame e.g. between the frame parts (1a) and (1b). The top cover (4) provides an air intake (7) by holes in the bottom. An air filter (9) may also be provided. The top cover (4) defines a duct (8) between the top cover (4) and window frame (1) or sash (2). The seal means (10) engage the top cover (4) with the window frame (1) or window sash (2). The baffle may be secured to the top cover (4) directly (fig. 4). The baffle (12) may be secured to a support (14) (fig. 5). The top cover (4) engages the seal means (10) and hereby provides an air inlet (7) and duct (8).

[0049] Fig. 5 also illustrates a cross section of a roof window with ventilation through the window frame. The support (14) is attached to the top cover (4) and engages the seal means (10). The engagement of the top cover (10) or the restriction means (12, 14) with the seal means (10) provides an air inlet (7) and duct (8).

[0050] Fig. 6 illustrates one end of the top cover (4). The cross section of top cover profile (11) shown on fig. 2 may extend in the entire width of the roof window.

[0051] The top cover profile (11) may for example be attached to the top cover (4) by plastic fittings (21) located at the two respective ends or by fittings attached to a groove or protrusion in the top cover profile (11). A plurality of baffles may be provided side by side or in separated ducts. A flexible sponge/foam seal (20) may be used to provide a good fit between the roof window and the top cover. Fig. 7 shows a chart indicative of the air flow dependent on the air pressure difference. The curve A indicates regular air flow, while the B curve shows the restricted/regulated airflow provided by the baffle (12). To change the characteristic of the baffle (12) by-pass holes or ducts which are not blocked by the baffle may also be provided. A plurality of baffles (12) with different properties may also be combined.

[0052] It will be understood that the embodiments described herein are merely exemplary and that variations and modifications of the teachings will still fall within the scope of this invention. For example, the top cover (4) may comprise several parts joined together. For example the air path may have a meandering shape to increase the water leak resistance. For example several baffles (12) may be arranged in parallel. For example the baffle (12) may not be flexible but rather stiff and supported by a flexible means etc. For example the baffle (12) may have a flexible portion and a rigid portion. For example an air passage may be provided in the sash (fig. 2), the frame (fig 4) or in a space defined between the sash and frame or combinations thereof. For example noise damping and/or insulation material may be provided or included in association with the top cover (4).

[0053] Furthermore, some of the features of the examples of this invention may be used to advantage without the corresponding use of other features. As such, the

foregoing description should be considered as merely illustrative of the principles, teachings, examples and exemplary embodiments of this invention, and not in limitation thereof.

Claims

1. A roof window ventilation device comprising:

a top cover (4) comprising an air intake (7);
seal means (10) configured to provide a duct (8);
restriction means (12,14) configured to restrict the air flow at least in the inlet direction through the duct (8);
wherein the air intake (7) and the seal means (10) and the restriction means (12,14) are provided via the top cover (4) which is configured to be fitted to a roof window and provide regulated ventilation.

2. The roof window ventilation device according to any previous claims, wherein the restriction means is at least a baffle (12) projecting into the air duct (8) for adjusting under the control of the incoming airflow the cross sectional area available in said duct (8).

3. The roof window ventilation device according to any previous claims, wherein the restriction means (12,14) are adjustable with at least two manually controlled configurations, one first manual configuration providing a first substantially free air flow and a second manual configuration providing a second more restricted and/or blocked air flow.

4. The roof window ventilation device according to any previous claims, wherein the restriction means (12,14) comprise adjustment means (14) and operating means (13) providing manually defined settings.

5. The roof window ventilation device according to any previous claims, wherein the seal means (10) are configured for engagement with a roof window frame (1) or sash (2) to provide a seal.

6. The roof window ventilation device according to any previous claims wherein the seal means (10) provided by the ventilation device comprise:

a flexible portion configured to absorb a gap or a rigid portion configured to engage a flexible portion on a roof window frame (1) or sash (2).

7. The roof window ventilation device according to any previous claims, wherein the restriction means (12,14) are arranged in association with the air intake (7) located at the lower part of the top cover (4).

8. The roof window ventilation device according to any previous claims, wherein the air intake (7) is between the seal means (10) and the top cover (4).

9. The roof window ventilation device according to any previous claims, comprising a roof window comprising a frame (1) and a sash (2) and a ventilation passage between the interior and exterior, the sash (2) being pivotable in relation to the frame (1) and, the top cover (4) covers the top of the window frame (1) and the top of the sash (2).

10. The roof window ventilation device according to any previous claims, wherein the seal means (10) are configured for engagement with a roof window pane profile (3) of a roof window sash (2).

11. A ventilation system comprising a roof window and a top cover (4) wherein:

the roof window comprises a frame (1) and a sash (2) and a ventilation passage between the interior and exterior;
the top cover (4) covers the top of the window frame (1) and the top of the window sash (2) and wherein the top cover (4) comprises;
an air intake (7) and
sealing means (10) providing a duct (8) between the top cover (8) and the roof window frame and restriction means (12,14) configured to restrict the air flow at least in the inlet direction through the duct (8);

12. A system according to any previous claims wherein:

the restriction means (12,14) comprise adjustment means (14) with at least two manually controlled configurations, one first manual configuration providing a first substantially free air flow and a second manual configuration providing a second more restricted and/or blocked air flow;

13. A system according to any previous claims wherein:

the restriction means is at least a baffle (12) projecting into the air duct (8) for adjusting under the control of the incoming airflow the cross sectional area available in said duct (8).

14. A system according to any previous claims wherein:

the seal means (10) are configured for engagement with a roof window frame (1) or sash (2) to provide a seal.

15. A system according to any previous claims wherein:

wherein the air intake (7) is between the seal means (10) and the top cover (4).

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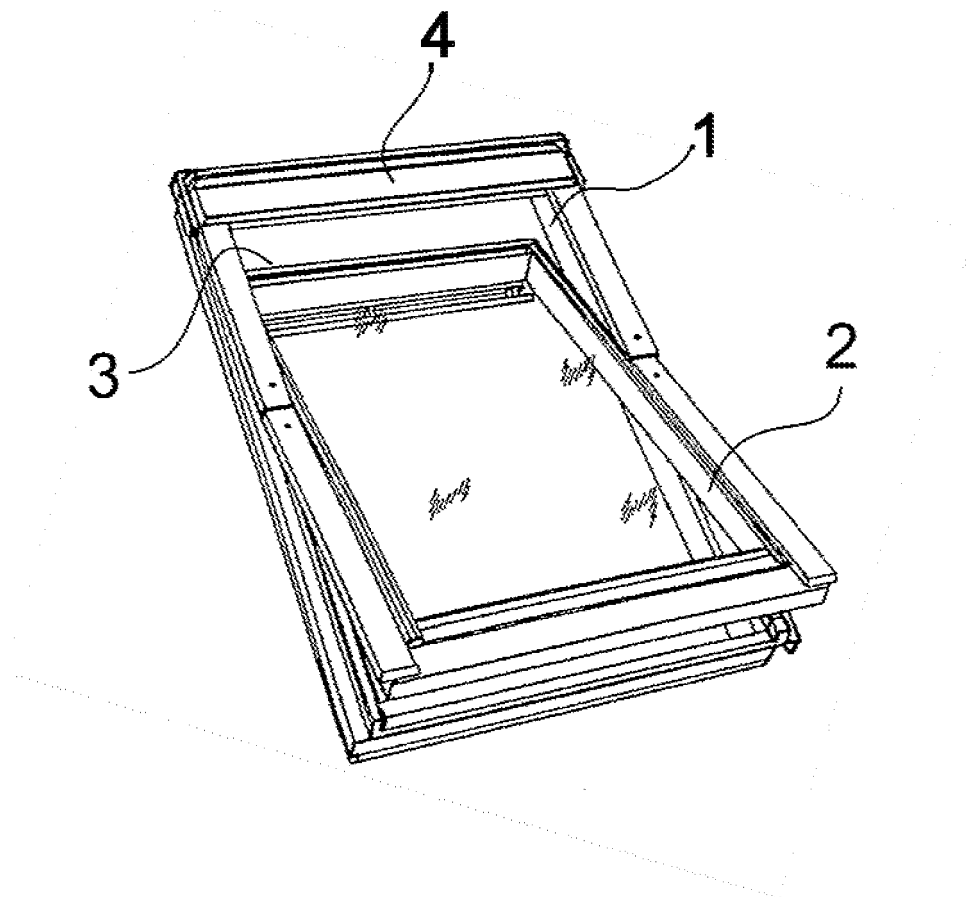


Fig.1

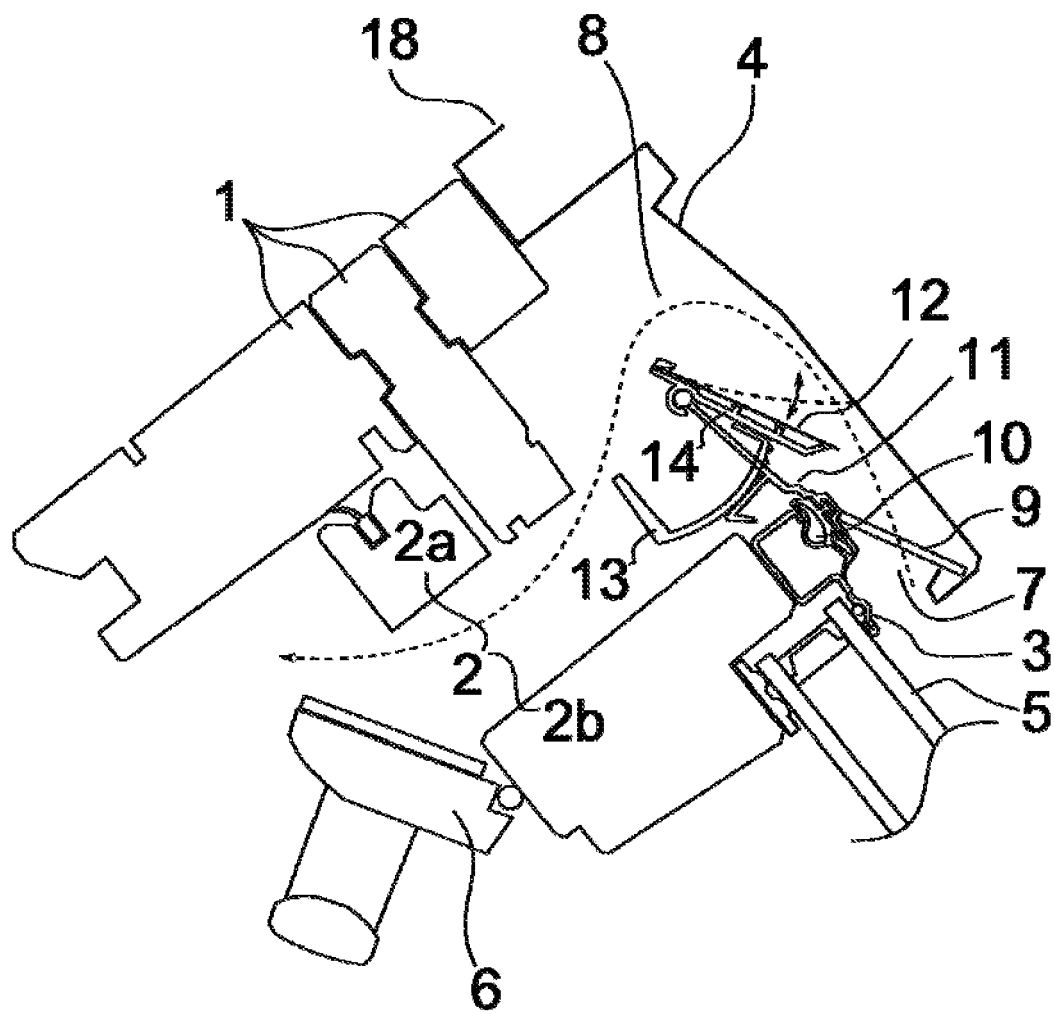


Fig. 2

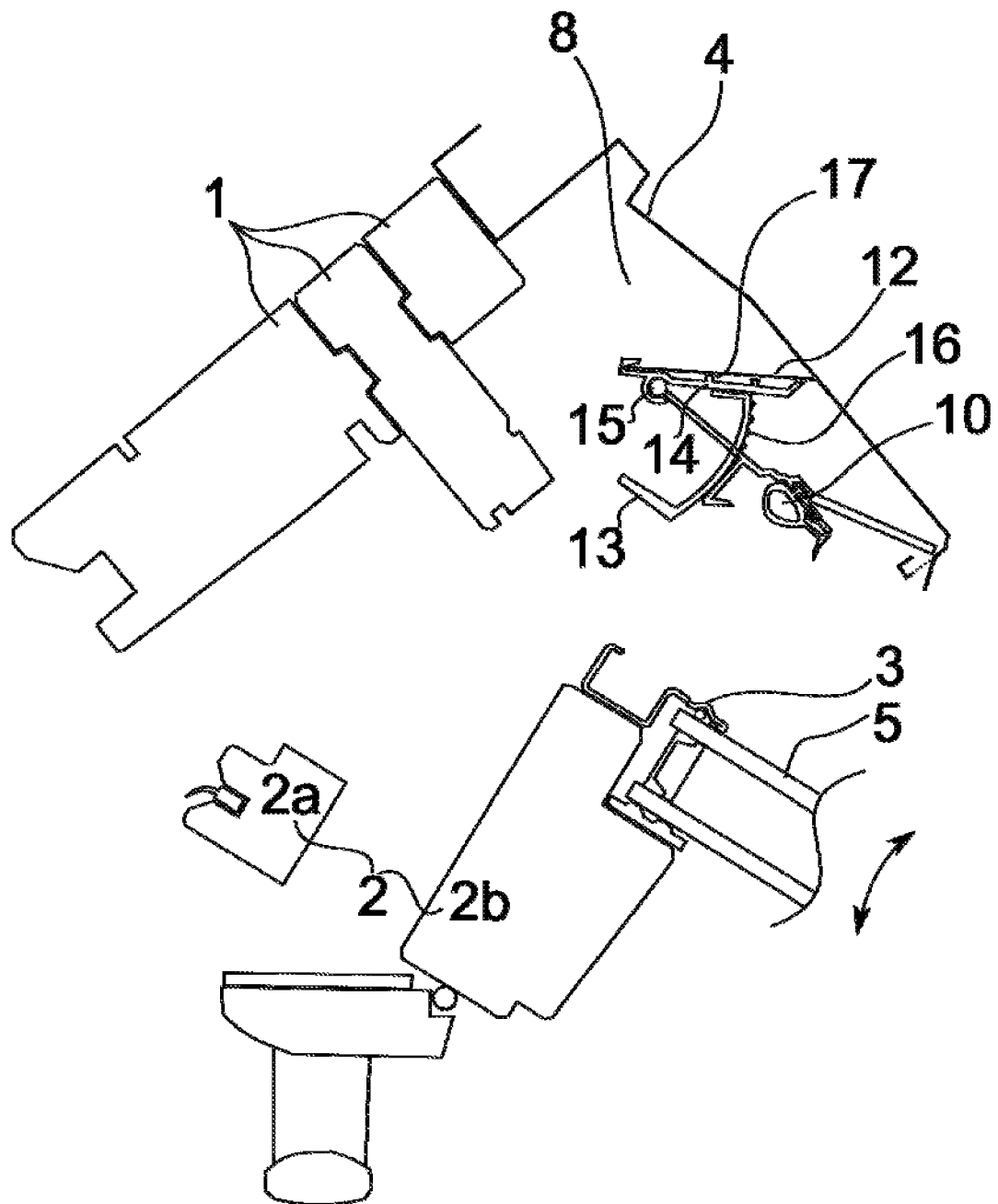


Fig. 3

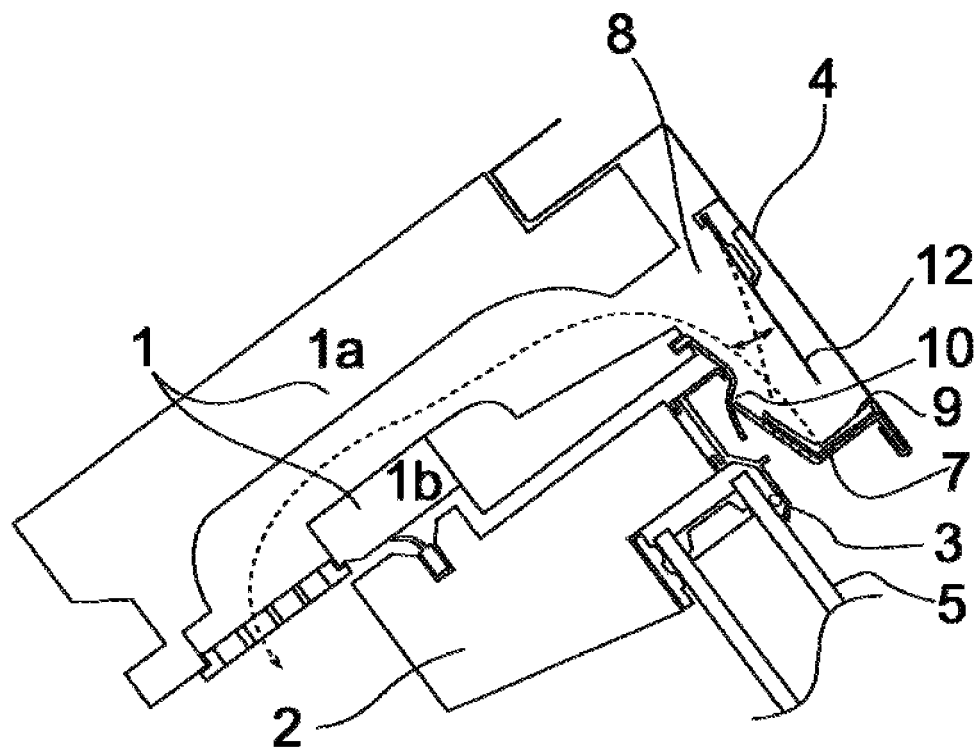


Fig. 4

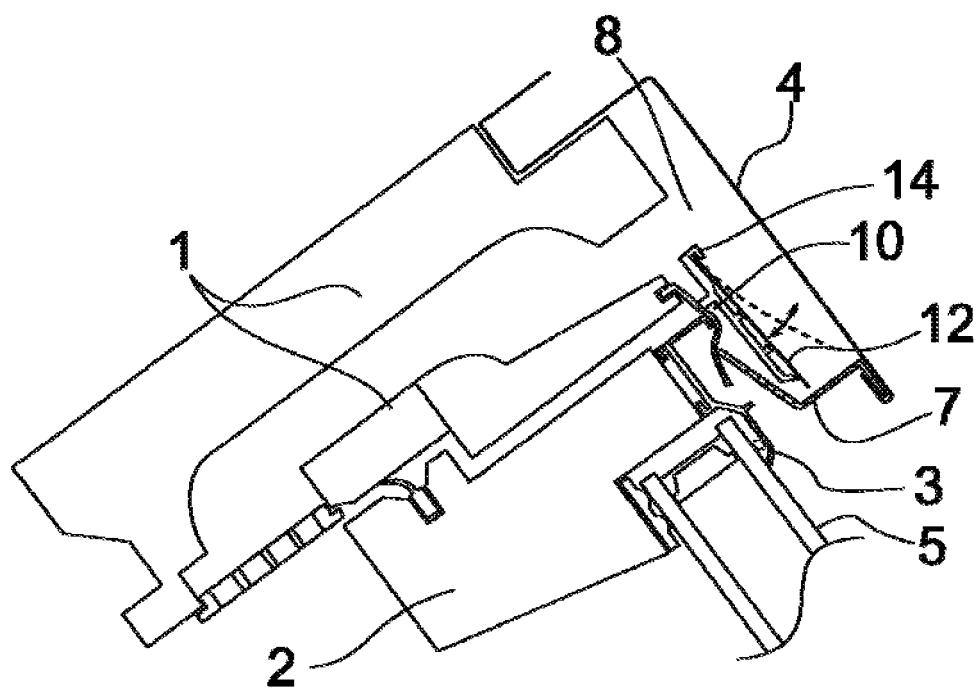


Fig. 5

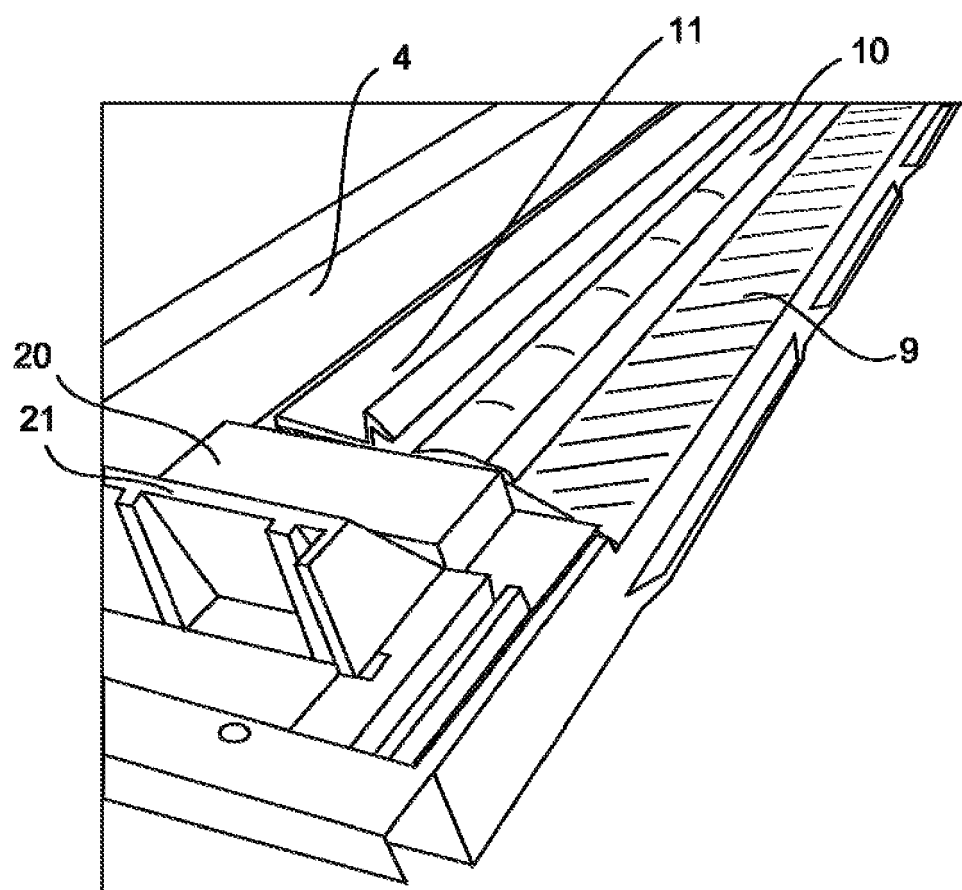


Fig. 6

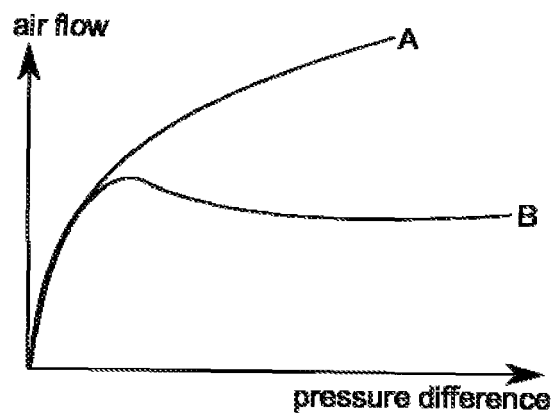


Fig 7



EUROPEAN SEARCH REPORT

Application Number
EP 09 17 4821

DOCUMENTS CONSIDERED TO BE RELEVANT			
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 March 2010	Examiner Bauer, Josef
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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 09 17 4821

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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