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(54) **A roof window system comprising a roof window and a ventilation assembly, and method of operating the ventilation assembly in the roof window**

(57) The roof window (1) has a frame (2) defining a frame plane, and a sash (3). The roof window (1) forms part of a roof window system further comprising a ventilation assembly (100). The ventilation assembly (100) comprises a housing (150) having predefined dimensions and accommodating said ventilation unit or units (110, 120). Each ventilation unit includes a set of flow

channels (1511, 1521) and a set of transition channels (1611) having a first connecting end connected, in a mounted condition, to the set of flow channels (1511, 1521) and a second connecting end connected, in the mounted condition, to the ventilation device of the roof window (1).

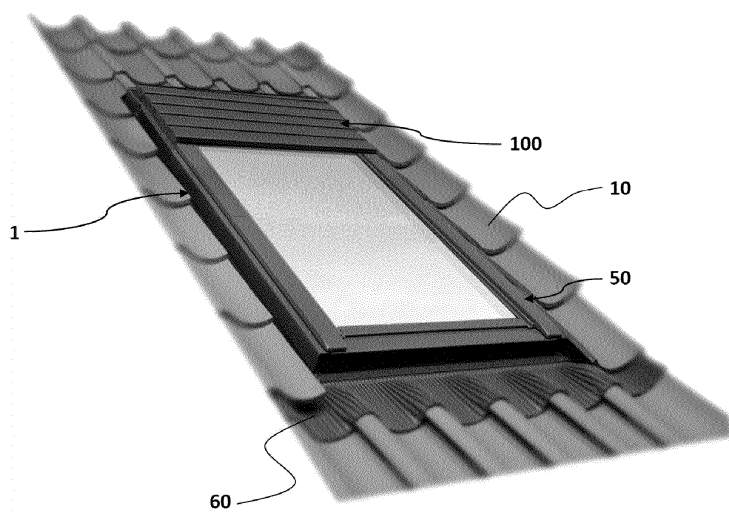


Fig. 1

Description

[0001] The present invention relates to a roof window system comprising a roof window having at least one frame defining a frame plane and including a pane, the roof window further comprising a ventilation device connected to a frame member and adapted for providing ventilation of a building in which the roof window is mounted, and a ventilation assembly for a roof window having a ventilation device, comprising at least one ventilation unit including a at least one ventilator, the at least one ventilation unit being adapted to be connected to the ventilation device of the roof window. The invention furthermore relates to a method of operating the ventilation assembly in the roof window.

[0002] One of the primary functions in a window, besides admitting light, is to allow stale, warm, or otherwise used or spent air inside the building to exit and allowing fresh air from the exterior to enter the building in which the window is installed. This presupposes that the window is openable. Over time, the provision of ventilation in windows, also in situations in which the window is not open, either because it is a fixed window, or simply is not open, has become more or less standard equipment. This is the result of, among other things, increased focus on improving indoor climatic conditions and the microclimate in buildings. One example of a roof window providing a ventilating aperture is the well-known VELUX® with a ventilation flap, which in pivot-hung windows also fulfils the double function of operating the window. In such a pivot-hung window, the ventilation flap thus has three positions, viz. a first and closed position, in which the window is closed and no ventilation is provided, a second position, in which the ventilation flap allows passage of air to and from the building, and a third position, in which the window may be operated. Other examples of ventilation devices are shown in for instance DK176947B1.

[0003] Natural ventilation provided by such a ventilation device has a number of advantages. Among others, it is free of charge and noise-less. However, in certain fields of applications, for instance mechanical ventilation may be desirable.

[0004] Examples of prior art roof window systems, including roof windows and ventilation assemblies, are shown in for instance Applicant's European patents EP0458725B1 and EP0372597B1, and in published Danish patent application DK200001472A.

[0005] Other examples are shown in documents DE102004037563A1, 20204020630U1, DE19811469A1 and DE2906729U1.

[0006] Although many of the above-mentioned prior art roof window systems, roof windows and ventilation assemblies provide well-functioning solutions, they also require that the roof window is built to receive such a ventilation assembly, typically by designing special parts and/or requiring further investment in the installation of auxiliary parts and installation equipment. Thus, severe limitations as to retro-fitting existing windows exist.

[0007] It is therefore an object of the present invention to provide a roof window system, which provides for increased flexibility and ease of installation and use.

[0008] It is a further object to provide a roof window system which makes it possible to reduce the overall energy consumption of the building.

[0009] It is a still further object to provide a roof window system, in which operation of the ventilation assembly is facilitated.

[0010] In a first aspect, these and further objects are achieved with a roof window system of the kind mentioned in the introduction, in which the ventilation assembly comprises a housing having predefined dimensions and accommodating said ventilation unit or units, and that each ventilation unit includes a set of flow channels and a set of transition channels having a first connecting end connected, in a mounted condition, to the set of flow channels and a second connecting end connected, in the mounted condition, to the ventilation device of the roof window..

[0011] Thereby a roof window system is provided, with which the flexibility and ease of installation aimed at are achieved.

[0012] In a second aspect, a method of operating the ventilation assembly is provided.

[0013] Further presently preferred embodiments and further advantages will be apparent from the following detailed description and the appended dependent claims.

[0014] The invention will be described in more detail below by means of a non-limiting example of an embodiment and with reference to the schematic drawing, in which

Fig. 1 shows a perspective view of a roof window system according to the invention mounted in a roof; Fig. 2 shows a partial plan view of an embodiment of a roof window system comprising a roof window and a ventilation assembly according to the invention, with some parts removed, seen from above or outside;

Fig. 3 shows a plan view of a detail of the ventilation assembly of the embodiment shown in Fig. 2;

Fig. 4 shows a partial plan view of details of the roof window and ventilation assembly of the embodiment shown in Fig. 2;

Fig. 5 shows a partial perspective view, on a larger scale, of the details shown in Fig. 4;

Fig. 6 shows a partial plan view, on a larger scale, of the details shown in Fig. 4;

Fig. 7 shows a partial perspective view, on a still larger scale, of the details shown in Figs 4, 5 and 6;

Figs 8 and 9 show perspective views of details of the ventilation assembly in the embodiment shown in Figs 2 to 7, seen from the side of the roof window;

Figs 10 and 11 show plan views, seen from below; Fig. 12 shows a perspective view of one of the details of Figs 8 to 11, seen from the side facing away from

the roof window;

Fig. 13 shows a perspective view of the detail of Fig. 12, seen from the side facing the roof window;

Fig. 14 shows a schematic cross-sectional view of the roof window system in an embodiment of the invention;

Figs 15 and 16 shows schematic perspective views of a detail of the ventilation assembly in an embodiment of the invention, in two different operational conditions; and

Figs 17 to 21 show perspective views of details of a ventilation assembly of the roof window system in an alternative embodiment.

[0015] Referring first to Figs 1, 14 and 15-16 showing the overall appearance and principles underlying a roof window system in an embodiment of the invention, the roof window system comprises a roof window 1 and a ventilation assembly generally designated 100.

[0016] The roof window 1 comprises at least one frame, in the embodiment shown and described two frames, of which one frame 2 is a stationary frame and an openable sash 3 encasing a pane 4. The frame 2 is, in a manner known *per se*, substantially rectangular and has a top member, and further a bottom member and two side members, not shown in detail, and the sash 3 has a top member, and further a bottom member and two side members, not shown in detail.

[0017] The frame 2 is adapted to be built into a roof structure of virtually any kind, typically comprising a number of rafters and battens, and further non-shown details such as vapour barrier collars etc., below a roofing material 10, here in the form of tiles.

[0018] In the embodiment shown, the window is centre-hung in that the sash 3 is connected to the frame 2 by a pivot hinge (not shown) provided between side members of the frame 2 and sash 3, respectively, to be openable by tilting the sash 3 of the window 1 about a pivot hinge axis defined by the pivot hinge. The pivot hinge comprises two parts, namely a sash part and a frame part. The hinges used are preferably of the type described in the applicant's earlier patent applications WO9928581 and GB1028251, where a curved member and a tap on one hinge part travels in a curved guide track in the other during opening and closing of the window. The radius of curvature entails that when using such hinges, the hinge axis lies at a small distance above the actual hinge parts and as the sash frame is turned first the curved member and then the tap comes out of the track. In combination this provides a pattern of movement which allows easy operation of a centre-hung window and allows the sash frame to be turned substantially entirely around.

[0019] As used in this description, a closed position of the roof window 1 means a position in which the frame plane and the sash plane coincide, that is form an angle of 0 degrees with each other. Similarly an open position of the roof window 1 as used herein generally means a position in which the sash 3 is tilted about the pivot hinge

axis such that the frame plane and the sash plane no longer coincide. Notwithstanding the centre-hung roof window described, the window according to the invention may in other embodiments be top-hung, with or without an intermediate frame structure, have the hinge axis somewhere between the top and the centre, be side-hung or for that matter even be bottom-hung, or fixed, i.e. not openable.

[0020] The sash 3 and frame 2 of the window according to the invention may be made of wooden members or members made of cast or extruded polyurethane (PUR).

[0021] In the installed position, the frame 2 and sash 3 are protected, in a manner known *per se*, by cover elements, of which a cladding is generally designated 50, a bottom flashing member 60 and a top flashing member 70 (cf. Fig. 14). Towards the interior, a suitable finishing may be provided, for instance comprising a lining 80.

[0022] The roof window 1 has a ventilation device, which in the embodiment shown comprises a ventilation flap 40, which is connected to the top member of the sash 3 via a hinge connection 41 and which furthermore comprises a handle 42. The ventilation flap 40 is an elongate element, which is connected to the top sash member by means of the hinge connection 41 and furthermore to a lock not shown by means of another hinge connection adapted to enable the ventilation flap 40 to be placed in at least two, and preferably at least three, different positions including a closed and at least one open position. To this end the lock may for instance be a spring biased locking mechanism. Two locks may be provided, or only one lock or for that matter more than two locks may also be provided. As described in Applicant's international application No. PCT/DK2012/050371 (not yet published), a top sash module may be provided in the sash top member.

[0023] Operating the handle 42 rotates the ventilation flap 40 from an open position to a closed position and vice versa. One or more intermediate positions, in which the ventilation flap 40 may be temporarily locked, may be defined between the open and closed position. In the embodiment shown and described, the sash 3 is pivotally connected to the frame 2, and the ventilation flap 40 is adapted to assume three position, viz. a first or closed position, in which the roof window 1 is closed and no ventilation is provided, a second and ventilating position, in which the roof window 1 is still closed but a ventilation aperture is provided to allow air passage, and a third and entirely open position, in which the sash 3 is able to pivot relative to the frame 2 to open the window. Activation of the ventilation assembly 100 thus takes place simply by operating the handle 42 of the ventilation flap 40, which in the embodiment shown forms part of a ventilation device of the window 1. In other windows, for instance a top-hung roof window, the ventilation flap 40 may be able to assume only two position, viz. a closed position and an open, ventilating position, whereas operation of the sash takes place in other ways, for instance by a handle

or other operating means located at the bottom member of the sash.

[0024] The roof window 1 of the invention forms part of a roof window system, which in addition to the roof window 1 comprises a ventilation assembly generally designated 100. In the embodiment shown, the ventilation assembly 100 is positioned substantially in the plane of the frame 2 and the sash 3 of the roof window 1, above the top member of the window frame 2 as seen in the inclination of the roof.

[0025] Details of an embodiment of the ventilation assembly 100 will now be described in further detail with particular reference to Figs 2 to 13.

[0026] The ventilation assembly 100 comprises a housing 150 having predefined dimensions and accommodating two ventilation units 110, 120. Each ventilation unit includes a set of flow channels 1511, 1512, 1521, 1522 and a set of transition channels 1611 (only shown in respect of one element) having a first connecting end for connection to the set of flow channels and a second connecting end adapted to be connected to the ventilation device of the roof window.

[0027] The ventilation assembly 100 comprises a housing 150 having predefined dimensions, namely a predefined width, a predefined length and predefined height. The housing 150 is divided in the height direction into a bottom part 1501 and a top part 1502. In the length direction, the housing 150 is divided into a left-hand part and a right-hand part, which in the embodiment shown are integral with each other. Each of the left-hand and right-hand parts accommodates a respective ventilation unit 110 and 120. As indicated in Fig. 5, each ventilation unit 110 and 120 has a respective ventilator 130, 140, which in turn is provided with a power supply and activation means (not shown).

[0028] In the preferred embodiment, the predefined dimensions of the housing 150 including the predefined width, length and height, are chosen such that the width does not exceed or at most corresponds to the width of the window, and the height does not exceed or at most corresponds to the height of the window. Furthermore, the housing 150 of the ventilation assembly 100 is located substantially in the plane of the frame and sash. This makes it possible to provide a ventilation assembly which is inconspicuous and easy to install, as the same aperture in the roof may be utilised, for instance simply by removing one or more rows of tile above the window. No penetration of the underlying vapour barrier collar is necessary, just as the provision of cover members is made easy. Consequently, flashing members fitting the roof window 1 may be provided, just with an extra length as compared to the flashing fitting the window itself to accommodate the ventilation assembly 100 as well. In a corresponding manner, the top flashing member 70 may simply be transferred and reused from the top of the roof window 1 to the top of the ventilation assembly 100. The top casing of the roof window 1 is simply removed and replaced by the lower-most portion of a cover part of the

ventilation assembly 100, or be provided with extension pieces to be coupled to the cover members of the frame. The provision of such cover parts is evident to a person skilled in the art.

[0029] The set of flow channels 1511, 1512, 1521, 1522 is formed by channel parts in the respective bottom and top parts 1501, 1502. A recess 1510 (cf. Fig. 3, showing the recess 1510 in the top part 1502) is formed in the housing 150 to accommodate the ventilation units 110, 120.

[0030] The lower-most (seen in the direction of the inclination of the roof when the roof window system is installed) flow channels 1511, 1521 of the set of flow channels are adapted to be connected to a set of transition channels 1611, respectively, having a first connecting end for connection to the set of flow channels and a second connecting end adapted to be connected to the ventilation device of the roof window.

[0031] The sets of transition channels 1611 are formed in a respective transition element 161, 162, which in the embodiment shown is provided as a separate element from the remaining parts of the ventilation assembly 100, which provides for a particularly easy installation. The transition elements 161, 162 may for instance be made from a plastic material or other insulating material to avoid the formation of cold bridges.

[0032] The set of transition channels 1611 in one transition element 161 comprises three apertures at the first connecting end for connection to the set of flow channels 1511, and two apertures at the second connecting end adapted to be connected to the ventilation device 40 of the roof window 1. As shown most clearly in Fig. 13, the apertures at the second connecting end are provided with inclined or arched plates 1612. The presence of three apertures at the first connecting end in the embodiment shown allows for accommodation of parts of the window, such as the lock case (typically in the case of wide windows having two lock cases) or positioning means in the form of barrel bolts.

[0033] In the embodiment shown in Figs 1 to 13, the ventilation takes place via openings in the frame 2 of the roof window 1. However, it is also possible to provide the ventilation to flow channels above the frame 2, and/or via the sash 3.

[0034] Referring again to Figs 14, 15 and 16, a preferred embodiment of the invention will be described in more detail. In this embodiment, the ventilation assembly 100 comprises two ventilation units 110, 120, and each ventilation unit comprises a heat exchange device in the form of a regenerator. Reference in that regard is made to documents WO 2012/025122 A1 and WO 2012/155913 A1, the contents of which are incorporated.

[0035] The flow direction is switched at intervals, either in response to a preset pattern or to predefined values measured for instance by sensors. In order to make the switch, each ventilator 130, 140 is pivotally journaled in the ventilation unit 110, 120 to switch the flow direction in the respective set of flow channels 1511, 1512 and

1521, 1522. In addition to securing that the temperature in the individual ventilation units is utilized to a maximum, the switch entails that the pressure inside the room is kept substantially constant, without creating either an overpressure or an underpressure. The switch in the flow direction of the respective ventilators may be controlled in such a way that the ventilators blow in opposite directions, but it is also conceivable to let the ventilators blow in the same direction to increase the flow. A cycle of 30 seconds in each direction is typical, but other intervals may apply. The control may also be performed manually.

[0036] Once the roof window system including the roof window 1 and the ventilation assembly 100 is mounted, the ventilation assembly 100 may be operated to perform the desired ventilation. This is carried out substantially by the following steps:

- providing the ventilation assembly with activation means,
- connecting the ventilation unit or units to the ventilation device of the roof window, and
- activating the ventilation assembly by operating the ventilation device.

[0037] In the preferred embodiment, the step of activating the ventilation assembly is carried out by bringing the ventilation flap 40 from a first to a second position, and de-activated by bringing the ventilation flap 40 from the second to the first position. Preferably from the second to the first or to a third position, in case the roof window 1 is a centre-hung or pivot window, of which the ventilation flap 40 also fulfils the function of an operator.

[0038] In the cases, in which the ventilation assembly comprises two ventilation units, and wherein each ventilation unit comprises a heat exchange device, preferably a regenerator, and the ventilator is pivotally journaled in the ventilation unit, the flow direction in the set of flow channels is switched by pivoting the ventilator. A set-up with a two-part ventilator is also conceivable. The journaling of the ventilator or ventilators has the supplemental advantage that the not-shown cylinder of the ventilator(s) acts as a damper, thus allowing to close-off the ventilation aperture.

[0039] The power supply may be provided as 230 V household supply or in other ways. The ventilators 130, 140 are advantageously chosen to provide a flow rate in the range of 10 to 30 m³/h to provide air for a room with a volume of 20 to 60 m³. Test results on commercially available ventilators having such a capacity typically have a sound pressure level (L_{pa}) of 32 to 42 dB.

[0040] The heat exchange in the regenerators shown in Figs 15 and 16 indicate one situation in Fig. 15: The flow of outgoing warm air in one ventilation unit 110, which heats the regenerator of that ventilation unit such that cooled air exits the ventilation unit 110. In the other ventilation unit 120, cool air from the outside passes through the regenerator of ventilation unit 120 and is heated and enters the interior as warm air. This provides

for a heat recovery rate of up to 90%. In Fig. 16, the flow direction has been switched, and cool air entering the now heated regenerator of ventilation unit 110 is heated and enters the interior as warm air, whereas warm air from the interior passes through the regenerator of ventilation unit 120 and is cooled down during the passage and exits to the exterior as cool air.

[0041] The ventilation assembly 100 may furthermore comprise a Hall element for registering the position of the ventilation flap. This provides for the possibility of obtaining operation without physical contact of the parts involved. In an embodiment, which presupposes that the ventilation flap 40 is provided with a lock case with a striking plate in a manner known per se, a Hall element is connected to the striking plate. This provides for easy mounting of the ventilation assembly. Thus, the necessary wiring to power and control the ventilation assembly is guided through well-established parts of the window. No penetration of the underroof is necessary. Other elements may be present for indicating a light or other marking in the transition channels, for instance blue for cold air and red for warm air, or the like.

[0042] In the alternative embodiment shown in Figs 17 to 21, elements having the same or analogous function as in the previous embodiments carry the same reference numerals to which 100 and 1000, respectively, has been added. Only differences from the previous embodiment will be described in detail.

[0043] The ventilation assembly 200 thus has a housing generally designated 250. Elements shown in Fig. 17 include an adapting element 260 and two transition elements 261, 262. Visible in Fig. 18 are cover parts 251, 252 and 253.

[0044] As in the previous embodiment, the housing 250 may have predefined dimensions including a predefined width, a predefined length and a predefined height.

[0045] Referring now to Figs 18 to 21, it is shown that the housing 250 is divided in the height direction into a top part 2501 seen at the top of these Figures, and a bottom part 2504. The top part 2501 has a slightly curved configuration. In the embodiment shown, the housing 250 is additionally also divided in the height direction into an intermediate part 2503, and a lid part 2502. The lid part 2502 may for instance be made from an insulating material. The set of flow channels 2511, 2521 is formed in the bottom part 2504, which also provides a portion serving as transition channel 2611. A set of regenerators 270 and 280 is mounted to the intermediate part 2503.

[0046] The ventilation assembly is, as in the previous embodiment, symmetric about a longitudinal line, but other configurations are conceivable. The ventilators 230a, 230b, 240a, 240b are included in a ventilator module, which may for instance be formed as a commercially available module such as from InVentilate. Two ventilators 230a, 230b and 240a, 240b, respectively, are thus present in each flow channel 2511 and 2521, respectively.

[0047] The air intake may be provided either at the top

of the housing of the ventilation assembly 200, or at the sides thereof.

[0048] In a not-shown embodiment, the ventilation device comprises a pushbutton ventilation device as disclosed in DK176947B1. The activation and deactivation of the ventilation assembly could also be built-into the ventilation device also in this embodiment.

[0049] Alternatively, the ventilation flap may be electrically or pneumatically operated, possibly controlled by remote control means.

[0050] In addition to blowing warm (or cold) air into the room, heating (or cooling) of other locations is also conceivable.

[0051] It should be noted that the above description of preferred embodiments serves only as an example, and that a person skilled in the art will know that numerous variations are possible without deviating from the scope of the claims.

Claims

1. A roof window system comprising:

a roof window (1) having at least one frame (2, 3) defining a frame plane and including a pane (4), the roof window (1) further comprising a ventilation device (40) connected to a frame member and adapted for providing ventilation of a building in which the roof window is mounted, and

a ventilation assembly (100; 200) comprising at least one ventilation unit (110, 120) including at least one ventilator (130, 140; 230a, 230b, 240a, 240b), the at least one ventilation unit being adapted to be connected to the ventilation device of the roof window, **characterized in that** the ventilation assembly (100; 200) comprises a housing (150; 250) having predefined dimensions and accommodating said ventilation unit or units (110, 120; 230a, 230b, 240a, 240b), and that each ventilation unit includes a set of flow channels (1511, 1521; 2511, 2521) and a set of transition channels (1611) having a first connecting end connected, in a mounted condition, to the set of flow channels (1511, 1521) and a second connecting end connected, in the mounted condition, to the ventilation device of the roof window (1).

2. A roof window system according to claim 1, wherein the predefined dimensions of said housing (150) include a predefined width, a predefined length and a predefined height, and wherein the housing (150) is divided in the height direction into a bottom part (1501) and a top part (1502), and wherein said set of flow channels (1511, 1512, 1521, 1522) is formed by channel parts in the respective bottom and top

parts (1501, 1502), and wherein the housing (150) is preferably divided in the width direction into a left-hand part and a right-hand part, each left-hand and right-hand part comprising a respective one of two ventilation units (110, 120), said left-hand and right-hand parts being preferably integral with each other.

3. A roof window system according to claim 1, wherein the predefined dimensions of said housing (250) include a predefined width, a predefined length and a predefined height, and wherein the housing (250) is divided in the height direction into a top part (2501) and a bottom part (2504), wherein said set of flow channels (2511, 2521) is formed in the bottom part (2504), and wherein the housing (250) is preferably additionally divided in the height direction into an intermediate part (2503), and more preferred also into a lid part (2502).

4. A roof window system according to any one of the preceding claims, wherein said set of transition channels (1611) is formed in a transition element (161, 162), preferably separately from the remaining parts of the ventilation assembly (100), the set of transition channels (161) preferably comprising three apertures at the first connecting end for connection to the set of flow channels (1511, 1512, 1521, 1522), and two apertures at the second connecting end adapted to be connected to the ventilation device (40) of the roof window (1), the apertures at the second connecting end being more preferably provided with inclined or arched plates.

5. A roof window system according to any one of the preceding claims, wherein the ventilation assembly comprises at least two ventilation units, and wherein each ventilation unit comprises at least one ventilator (130, 140; 230a, 230b, 240a, 240b) and a heat exchange device, preferably a regenerator.

6. A roof window system according to claim 5, wherein the ventilator or ventilators (130, 140; 230a, 230b, 240a, 240b) is/are pivotally journalled in the ventilation unit to switch the flow direction in the set of flow channels (1511, 1512, 1521, 1522).

7. A roof window system according to any one of the preceding claims, wherein the predefined dimensions of the housing (150; 250) include a predefined width, a predefined length and predefined height, and are chosen such that the width does not exceed or at most corresponds to the width of the window, and the height does not exceed or at most corresponds to the height of the window.

8. A roof window system according to claim 7, wherein the frame (2) comprises a top member, a bottom member and two side members defining a frame

plane, and the sash (3) comprises a top member, a bottom member and two side members defining a sash plane, the sash (3) having an opening for the pane (4), the housing (150; 250) of the ventilation assembly being located substantially in the plane of the frame and sash. 5

9. A roof window system according to any one of the preceding claims, wherein the ventilation device includes a ventilation flap (40) having at least two operating positions, preferably three operating positions. 10
10. A roof window system according to claim 9, wherein the ventilation assembly includes activation means adapted to be activated by operating the ventilation device such that ventilation assembly is activated by bringing the ventilation flap (40) from a first to a second position, and de-activated by bringing the ventilation flap (40) from the second to the first position, preferably from the second to the first or to a third position. 15 20
11. A roof window system according to claim 9 or 10, wherein the ventilation flap (40) is provided with a lock case with a striking plate, and wherein a Hall element is connected to the striking plate. 25
12. A method of operating a ventilation assembly for a roof window having a ventilation device, comprising at least one ventilation unit including at least one ventilator, comprising the steps of: 30
 - providing the ventilation assembly with activation means, 35
 - connecting the ventilation unit or units to the ventilation device of the roof window, and
 - activating the ventilation assembly by operating the ventilation device. 40
13. The method of claim 12, wherein the ventilation device of the roof window includes a ventilation flap, and wherein the step of activating the ventilation assembly is carried out by bringing the ventilation flap from a first to a second position, and de-activated by bringing the ventilation flap from the second to the first position, preferably from the second to the first or to a third position. 45
14. The method of claim 12 or 13, wherein the ventilation assembly comprises at least two ventilation units, and wherein each ventilation unit comprises a heat exchange device, preferably a regenerator. 50
15. The method of claim 14, wherein each ventilator is pivotally jour-nalled in the ventilation unit, and wherein the flow direction in the set of flow channels is switched by pivoting the ventilator or ventilators. 55

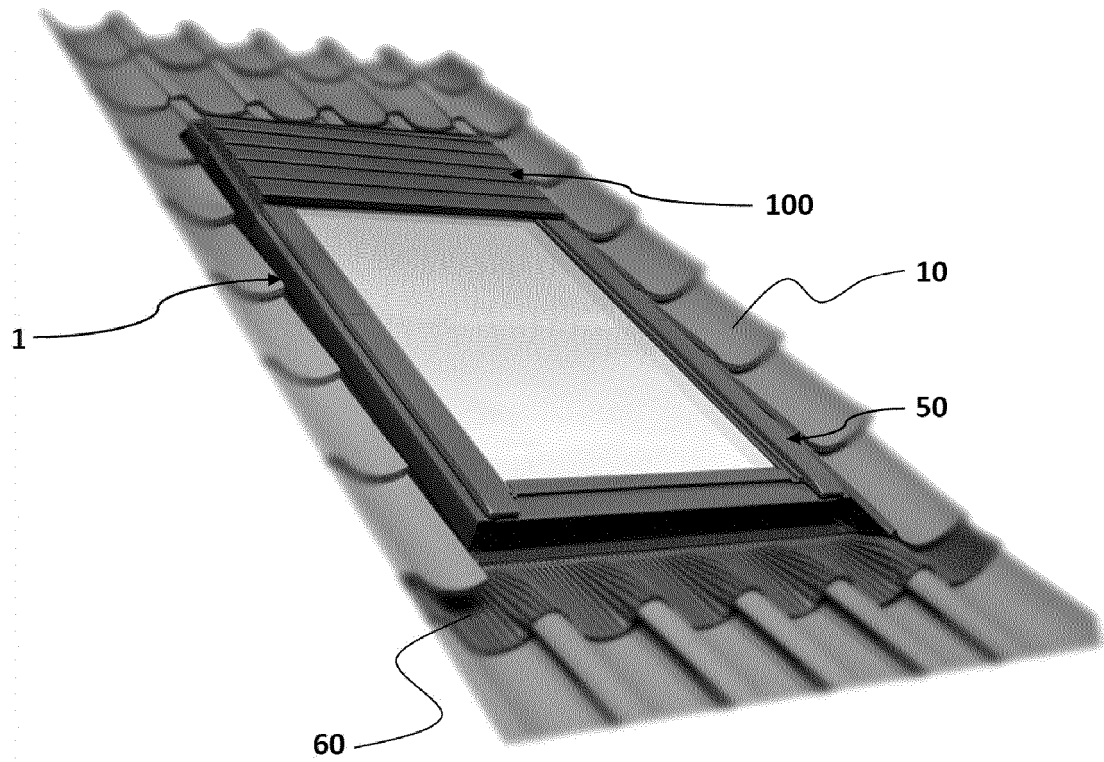


Fig. 1

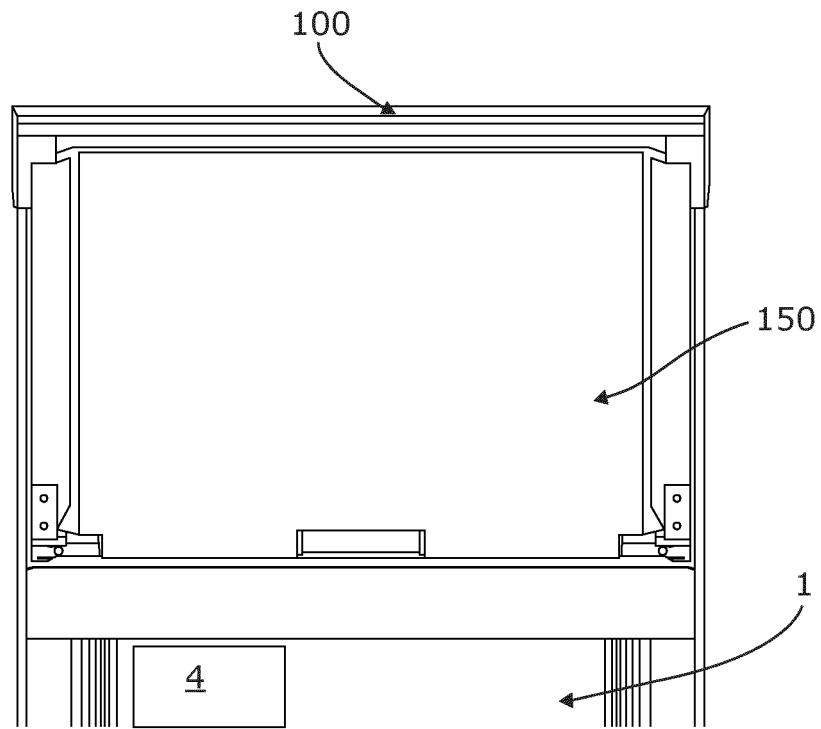


Fig. 2

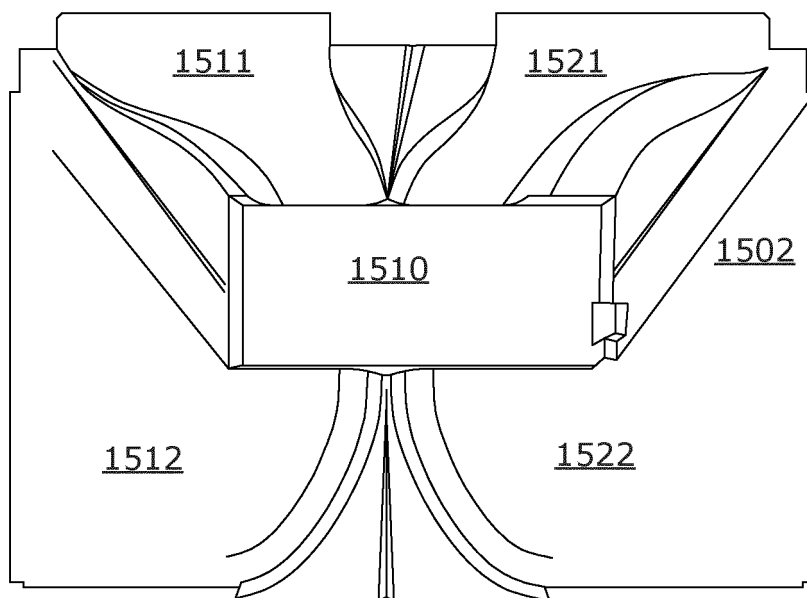


Fig. 3

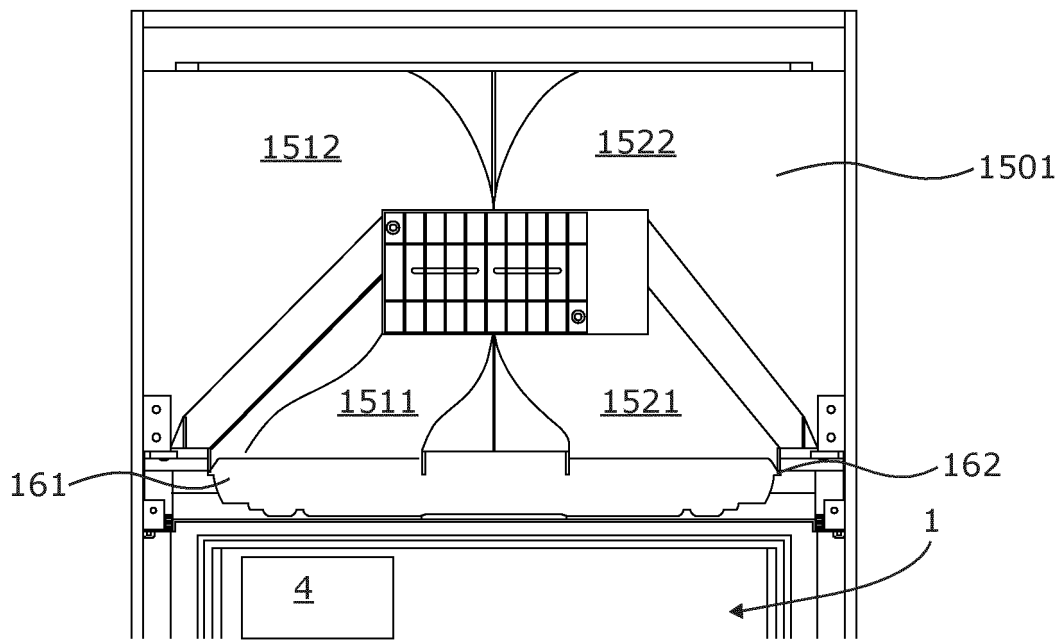


Fig. 4

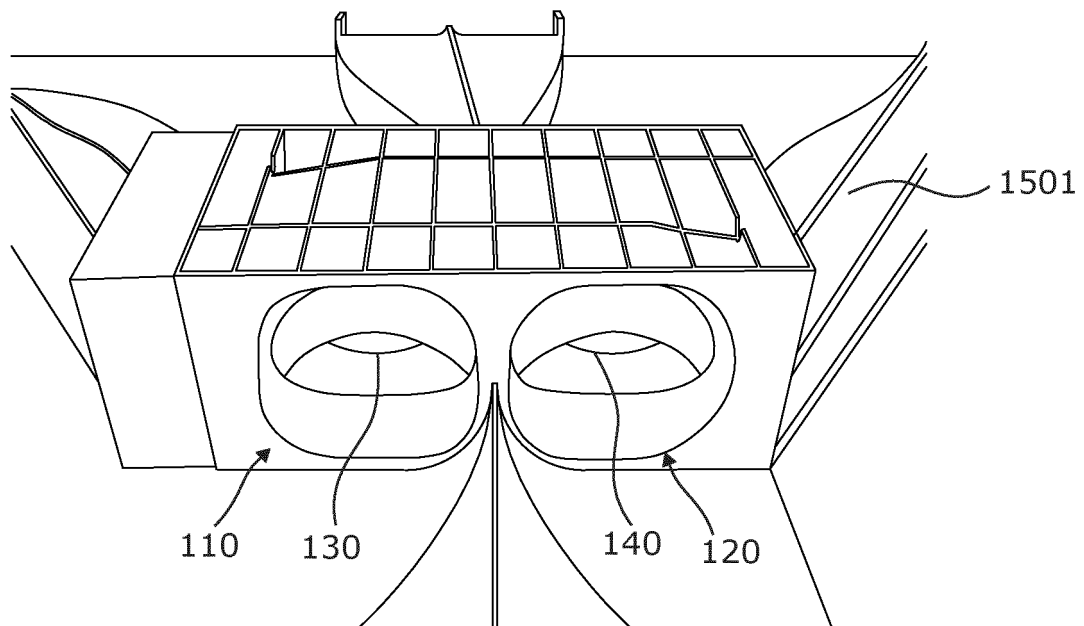


Fig. 5

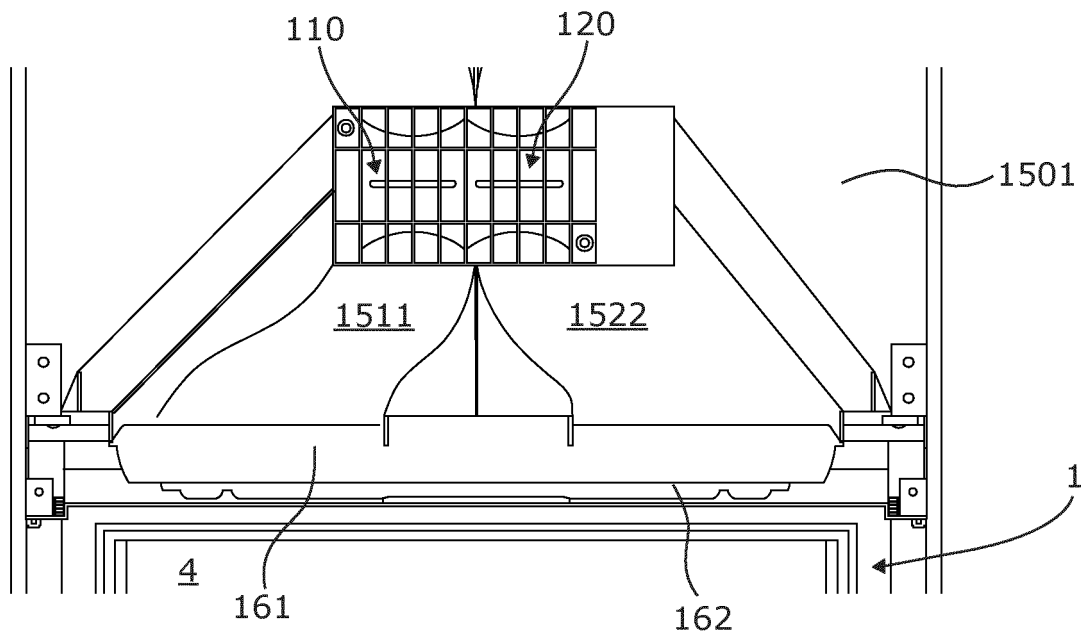


Fig. 6

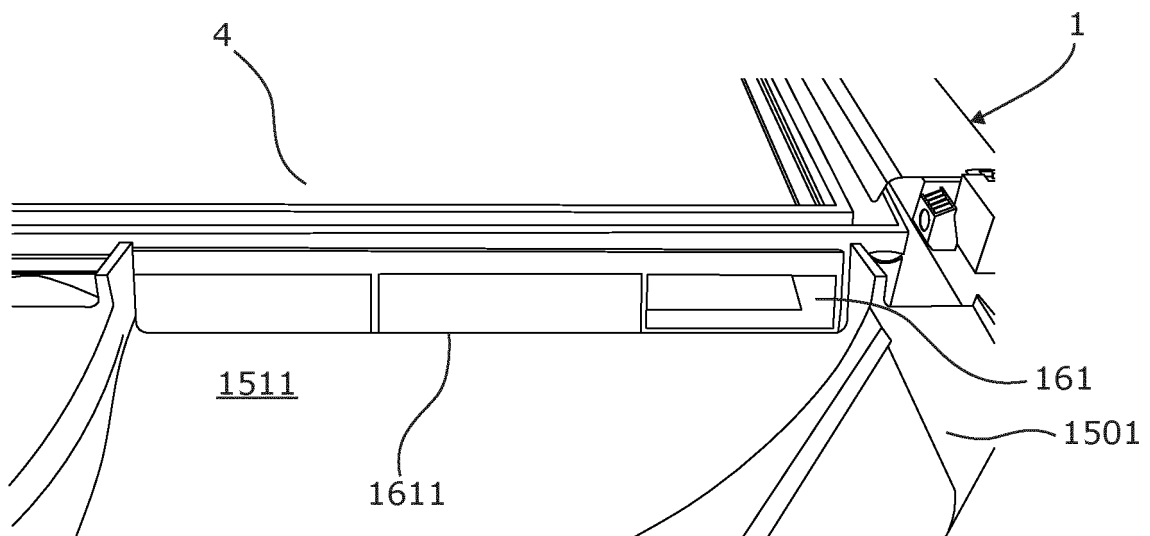


Fig. 7

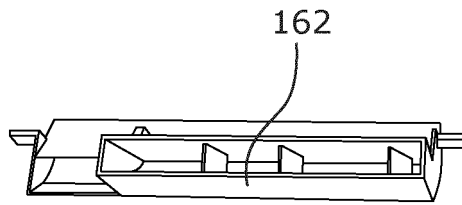


Fig. 8

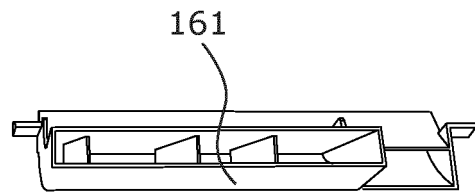


Fig. 9

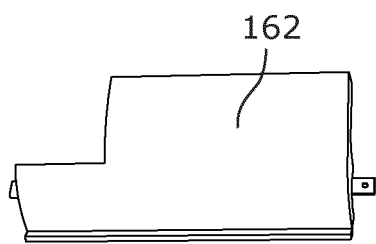


Fig. 10

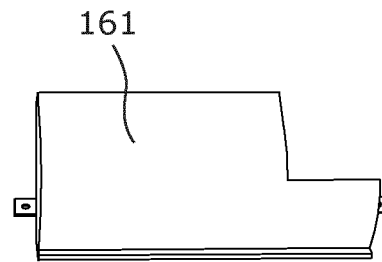


Fig. 11

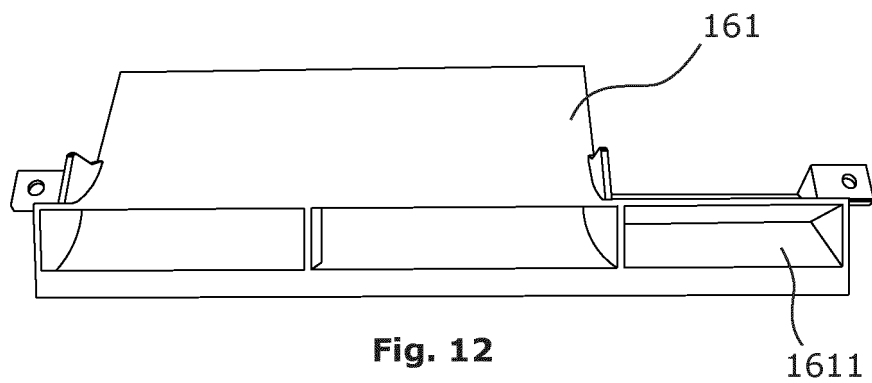


Fig. 12

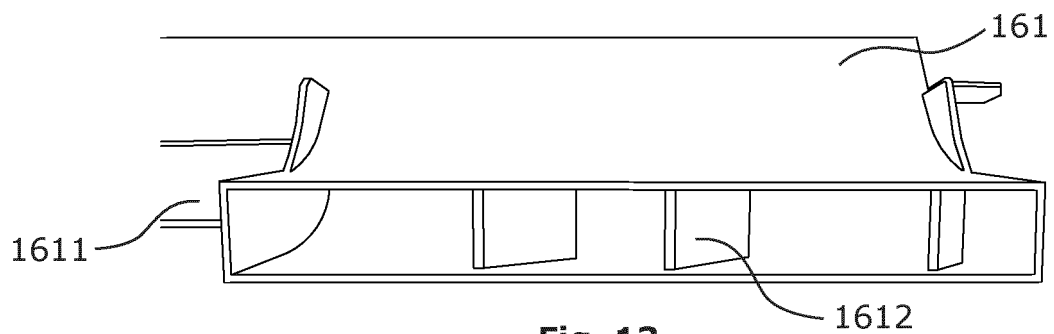


Fig. 13

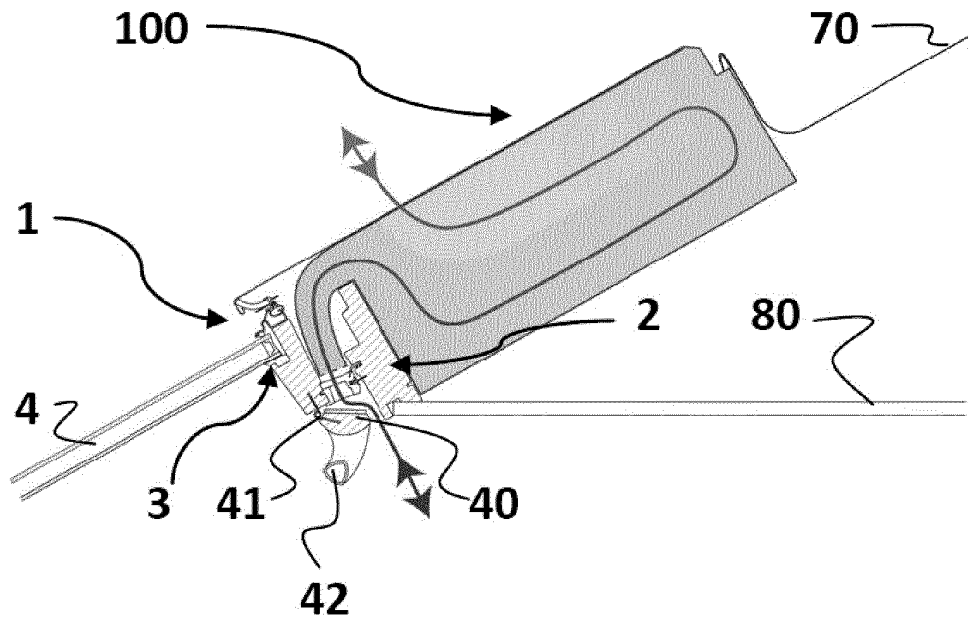


Fig. 14

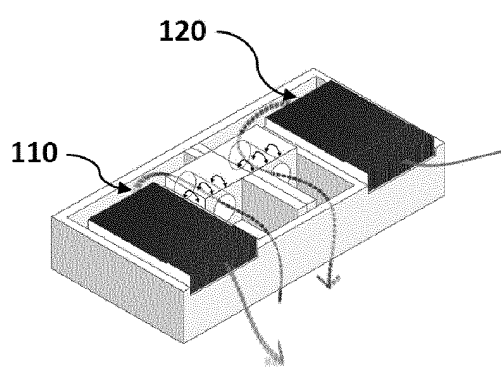


Fig. 15

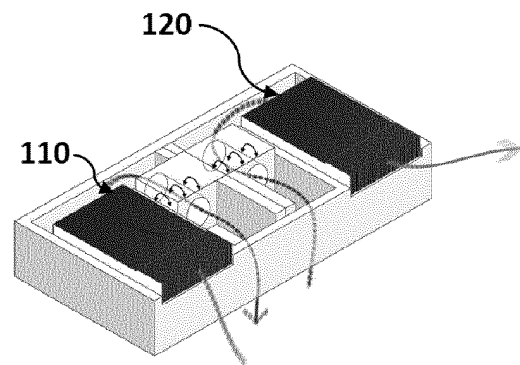


Fig. 16

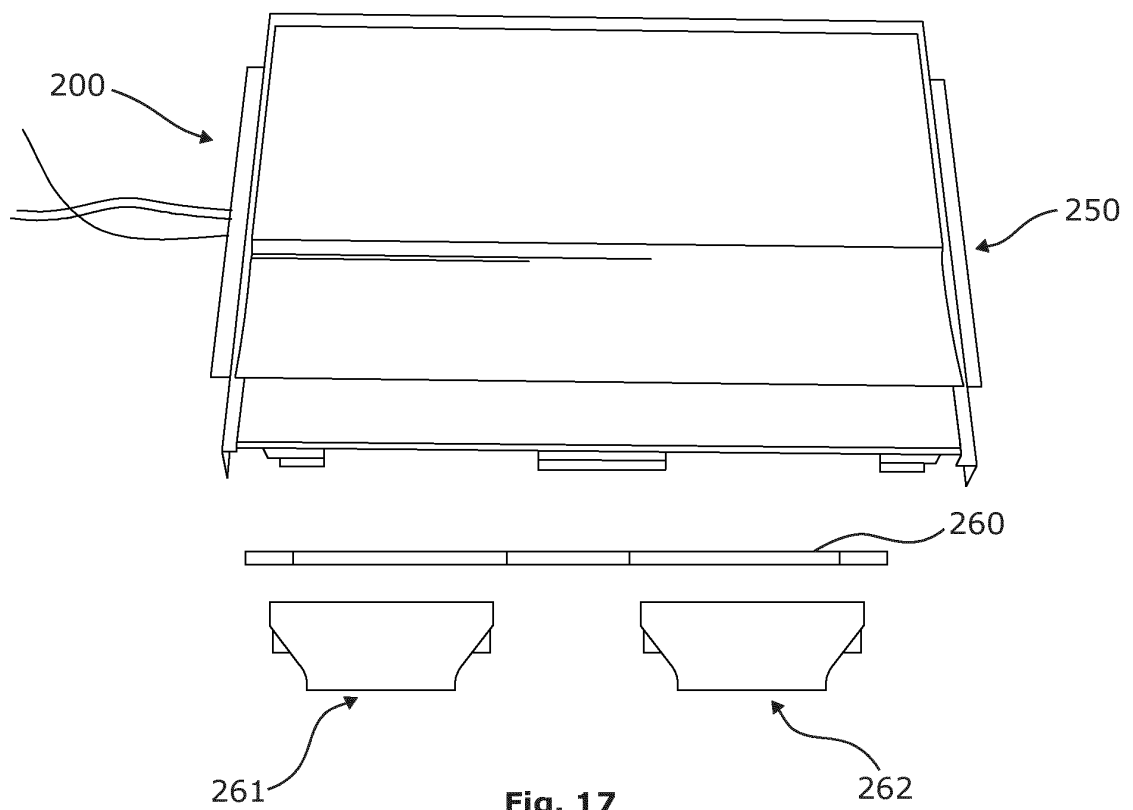


Fig. 17

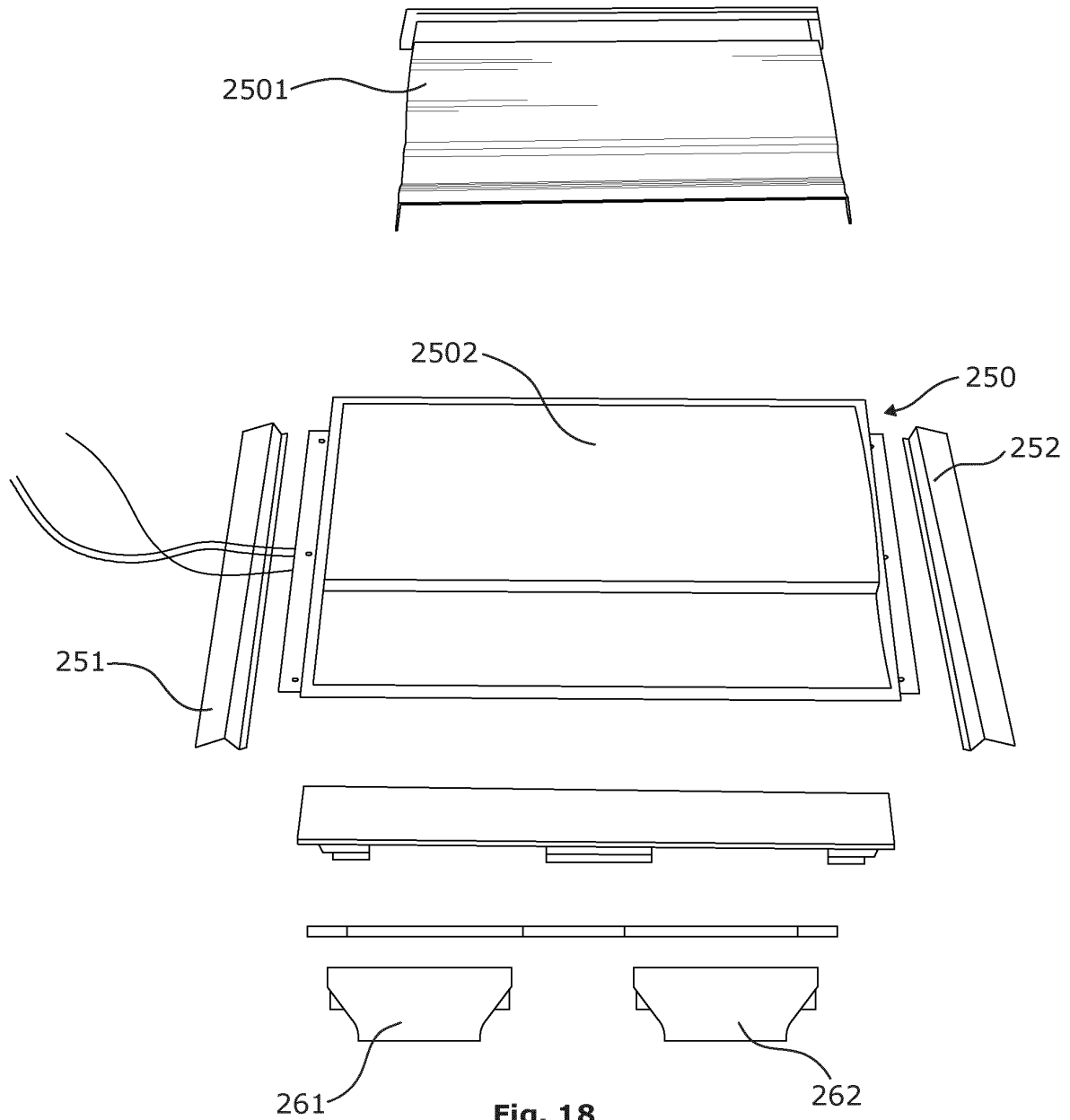


Fig. 18

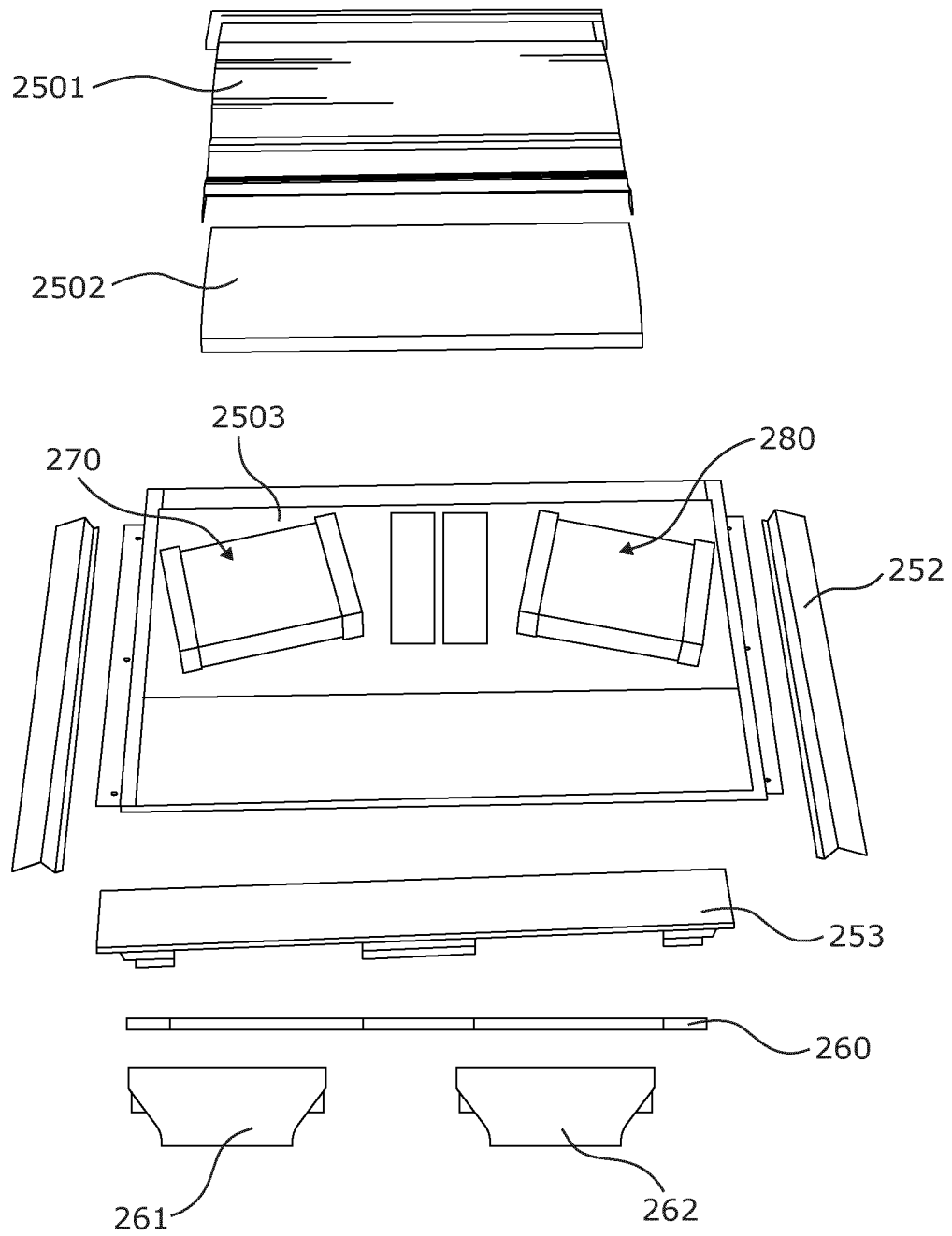


Fig. 19

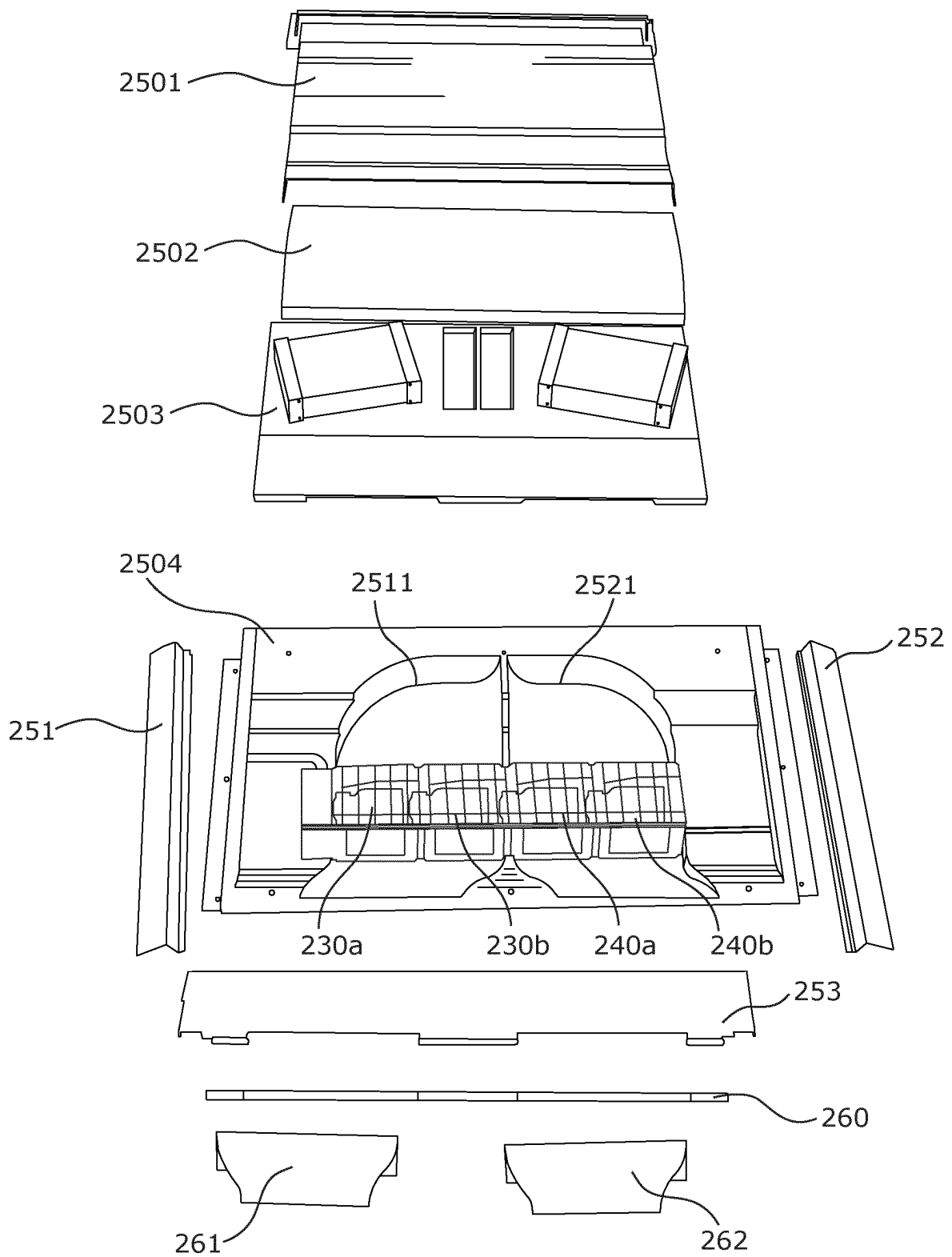


Fig. 20

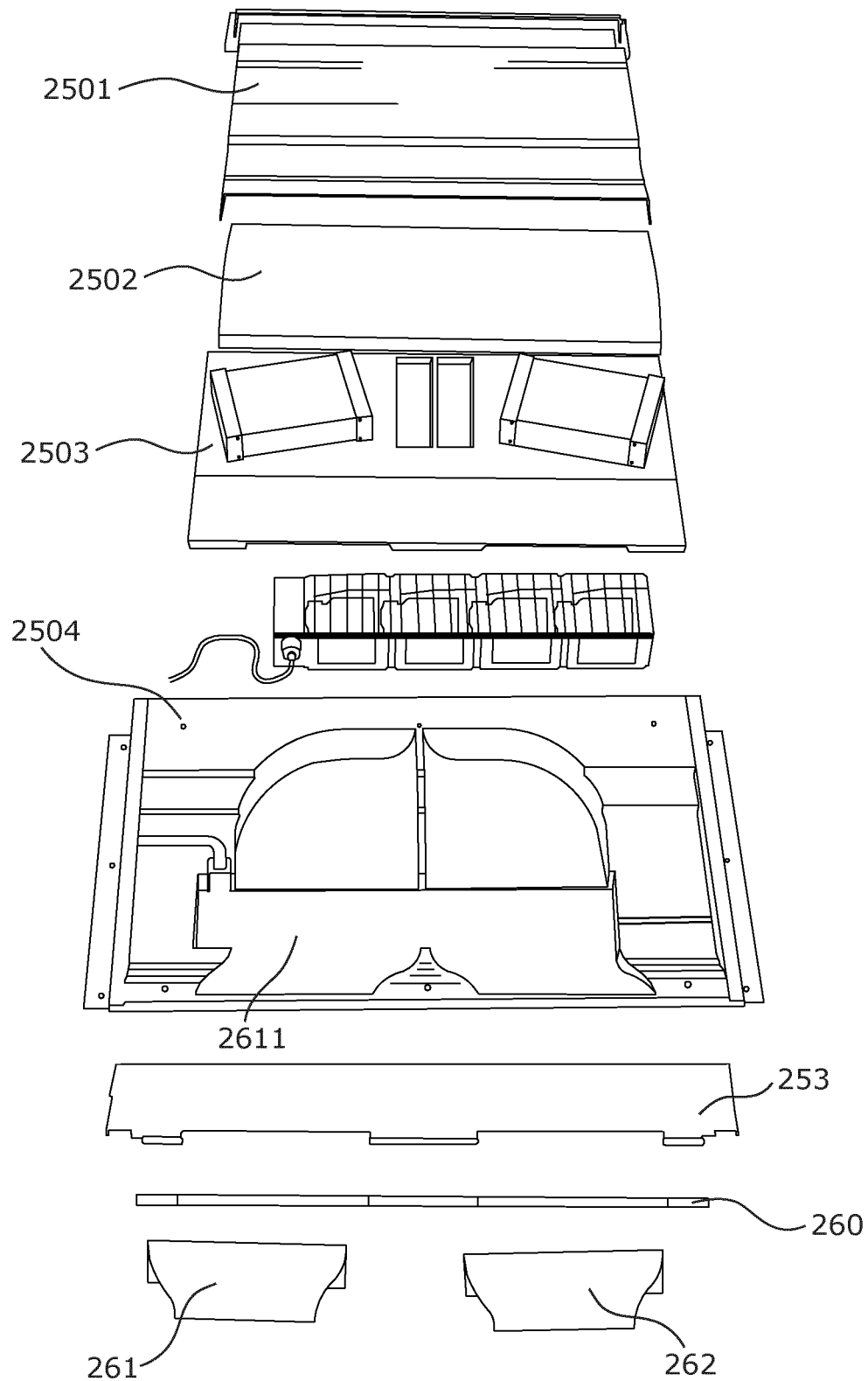


Fig. 21

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DK 176947 B1 [0002] [0048]
- EP 0458725 B1 [0004]
- EP 0372597 B1 [0004]
- DK 200001472 A [0004]
- DE 102004037563 A1 [0005]
- DE 20204020630 U1 [0005]
- DE 19811469 A1 [0005]
- DE 2906729 U1 [0005]
- WO 9928581 A [0018]
- GB 1028251 A [0018]
- DK 2012050371 W [0022]
- WO 2012025122 A1 [0034]
- WO 2012155913 A1 [0034]