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(54) **Window set, particularly of a roof window, with an air outlet**

(57) A set of a roof window with an air outlet (1), which is a separate element of the window and is mounted on the external surface of the window frame (1) on the frame top member (11) or the frame bottom member (12) or the frame side member (13), the said set having the shape and external dimensions fitted to the shape and external dimensions of the window frame, enabling also installation of external additions.

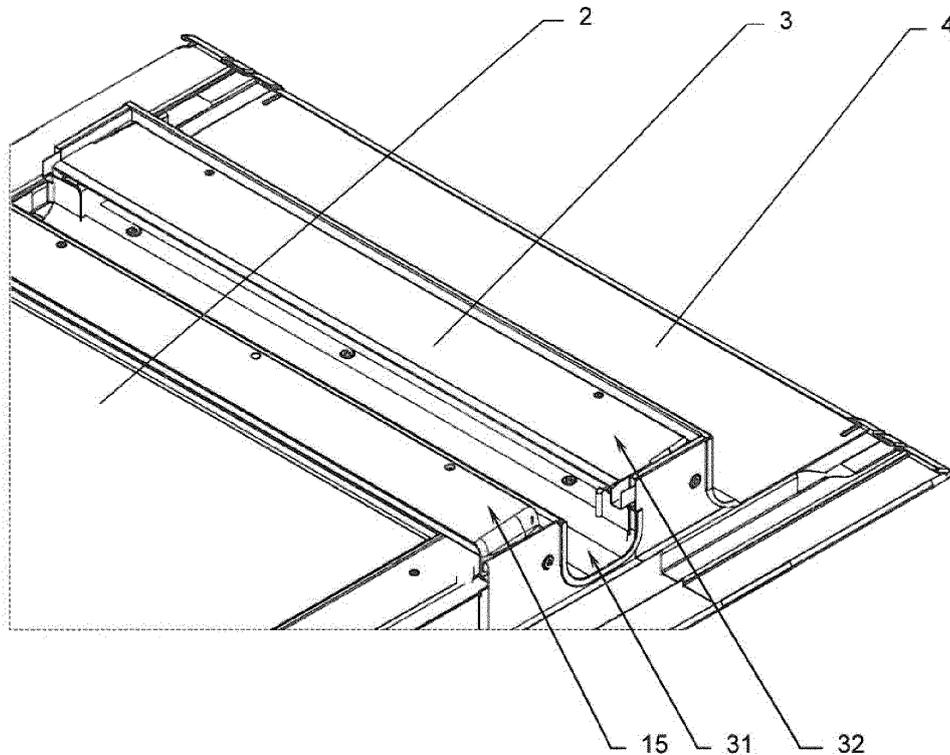


Fig. 3

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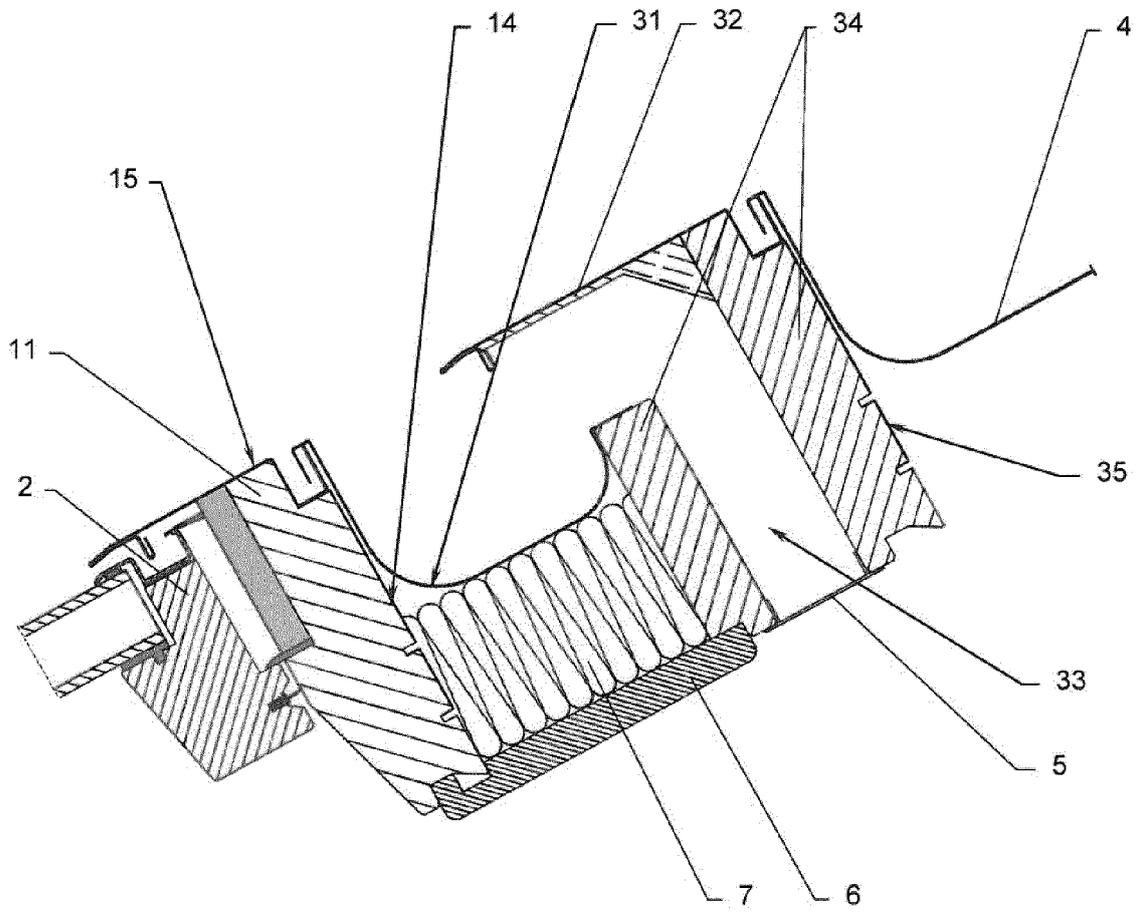


Fig. 4

Description

[0001] The present invention relates to a window set, particularly a roof window, with an air outlet. The air outlet functions as a duct providing fresh air to rooms independently from other ventilation systems used in buildings. The necessity to use air outlets occurred as a result of the trend towards a reduction of heat losses in buildings by excessive sealing and blocking of natural air exchange in rooms. In general, air outlets are used in exterior wall windows, however in case of attics, where most often roof windows are the only windows, a need for air outlets built-in into the structure of the roof window has arisen. Air outlets installed in the window structure are a natural solution, because of relative ease of their manufacturing and installation. In this case, making additional air outlet openings in the exterior wall or in the roof is not necessary.

[0002] Patent Application No. WO 2008/133539 A2 presents a window frame with a built-in air outlet. A solution for an automatic pressure-controlled opening or closing method of the air supply duct is disclosed in this application. However, solutions of such a type force significant enlargement of the window frame dimensions in order to integrate the air supply duct. In case of the described solution, the window frame width had to be significantly enlarged.

[0003] Patent Application No. WO 03/001017 A1 shows a casement frame with a built-in air outlet. The main element of this solution is a circular rotary ventilation valve installed in an opening made in the installation strip being a part of the top casement frame. In the closed position of the casement, the air duct is formed by the said ventilation valve and the space defined by the walls of the casement frame from one side and by the window frame walls from the other side. A disadvantage of this solution consists in a significant reduction of the window clearance accompanied by a small size of the ventilation duct. The rest of the installation strip is not used. Moreover, this solution is hard to use in roof windows because of a lack of protection from weather conditions. A similar idea is constituted by an air outlet proposed in Patent Application No. WO 2005038165 A1. A ventilation opening in the installation strip being a part of the window casement is closed by a flap valve, and the air supply duct is profiled in a way preventing penetration of water from the typical direction of precipitation. This solution is suitable both for exterior wall windows and roof windows.

[0004] All solutions for air outlets known in the market, including the ones cited above, utilise window casement frame or window frame for realization of the air supply duct and installation of elements of the air outlet. There are also many solutions utilising ducts formed between the window frame and the casement frame in the closed position. Their common disadvantage consists in a necessity to modify the structure of the profile of the window casement and window frame, which is most often unfavourable because of hindered profile forming and reduc-

tion of its mechanical strength, as well as increase in heat losses.

[0005] The proposed solution according to the invention introduces a possibility to install the air outlet in the set, along with a possibility of free and unrestricted forming of the window frame profile.

[0006] The distinguishing feature of the invention consists in the air outlet being a separate module installed on the external surface of the window frame, basically intended for mounting on the reveal of the window opening, the outlet having the shape and external dimensions fitted to the shape and external dimensions of the window frame. The advantage of the solution is a possibility to shape the elements of the roof window and those of the air outlet independently. It is of a particular importance for the possibility of heat-insulation and aesthetic forming of profiles of the frame and the window frame. There is a possibility to install interchangeably in the same window opening, a window without the air outlet (with dimensions matching those of the window opening), as well as a set in the form of the air outlet and a smaller window, maintaining total external dimensions preferably equal to the dimensions of the bigger window without the air outlet.

[0007] An important advantage of the solution is a possibility of installation of the air outlet in an existing window within the framework of a retrofit. In this case, it is necessary to enlarge the window opening in the roof by the dimension of the air outlet. In case of a full retrofit within the framework of the existing window opening, a replacement of the window with a window of smaller dimensions is possible, preferably within the framework of a standard dimensional series of windows, and installation of the air outlet in the cleared space. An important feature of the invention consists in the fact that the shape and dimensions of the external surface of the air outlet, mounted on the reveal of the window opening during installation, are preferably the same as the shape and dimensions of the external surface of the window frame, on which the air outlet is mounted. The external surface of both the window frame and the air outlet should be understood as a surface serving the purpose of mounting on the reveal of the window opening and preferably parallel to the reveal surface. The proposed solution offers a possibility to retrofit the window set and to adjust the flow of fresh air in the rooms cheaply and easily, particularly in case of attics, where the roof windows are being installed. Also in case of new installations, the proposed solution provides a high flexibility in installation of windows with and without an air outlet, because a window from the set may be installed independently, as well as an air outlet may be installed in any other window, while the condition of similar dimension of the element of the window frame, on which the outlet is to be installed, is met.

[0008] The external outline of the air outlet is basically the shape of a rectangular prism with protective and installation elements formed. The interior of the air outlet is built of air supply ducts. Dimensions of the outline are defined by its length, width and height. The length is ba-

sically the longest dimension of the air outlet, while assembled with the window, preferably parallel to the longitudinal edge of a selected frame member of the window frame, on which the air outlet is mounted. The width and height are lateral dimensions of the outline, with the width defining the dimension in a direction basically perpendicular to the window surface. The height defines a dimension perpendicular to length and width, which while assembled with the window is basically perpendicular to the plane of the external surface of the window frame.

[0009] If an air outlet mounted on the external surface of the frame top member or the frame bottom member of the window frame is used, its length is preferably equal to the length of these elements, while its height may have any value in the range of dimensions of the window opening. In special cases of utilisation of an air outlet mounted on the external surface of the frame side member of the window frame, its length is preferably equal to the length of the frame side member of the window frame, and its width may have any value in the range of dimensions of the window opening. In case of a rectangular outline of the window, it is assumed that the length of the frame bottom member and the frame top member correspond to the width of the outline of the window frame, and the length of the frame side members corresponds to the height of the window frame. In case of other shapes of the window outline, the length of the air outlet as a rule corresponds to the length of the element on which the outlet is mounted.

[0010] A window set with an air outlet preferably has an external shape that allows installing external additions, e.g. roller blinds, used in a window from the set but without an air outlet. Therefore, usage of the air outlet is neutral for the possibility to utilise additions used in standard windows.

[0011] The air outlet is equipped with a longitudinal channel with a shape close to letter U, draining off water, fixed to the frame by one side, in parallel to the edge of the frame top member. At the same time, the second edge of the longitudinal channel is used for connection with the sheet metal flashing of the window frame. The connection of the longitudinal channel with the sheet metal flashing of the window frame is realised, preferably and sufficiently, by a single standing seam. Such a connection has two important features: ease of assembly and disassembly, and adequate resistance to weather conditions.

[0012] For the sake of protection of the air supply ducts, the air outlet has an eave, terminated over the longitudinal channel and formed preferably in parallel to it. Because of aesthetic reasons, the external surface of the eave is preferably located in the plane of the external surface of the sheet metal flashing of the window frame. The distance between the internal surface of the eave and the edge of the longitudinal channel determines the size of the clearance of the air supply duct and it should be adjusted to the designed size of the air supply duct. A too long distance increases the possibility for water to

penetrate the interior in case of heavy rainfall, while too short distance increases flow resistance of the air stream.

[0013] In the frame of the air outlet, a single or multiple pass-through air supply duct is made, connecting the niche defined by the eave and the longitudinal channel, with the space at the internal side of the window. Number and size of the air supply duct openings should be adjusted to the designed volume of the air stream flowing through the air outlet. Considering the mechanical strength, particularly with long frames of the air outlet, it is more preferable to use a duct with a higher number of smaller openings than with one wide opening along the frame of the air outlet. For adjustment of the volume of the air stream, known solutions applied in windows may be used, e.g. automatic: pressure-controlled, humidity-controlled or other systems. The simplest and cheapest solution is to use a manually-removable blanking plug, covering the air supply duct from the side of the space at the internal side of the window.

[0014] A complete set of a roof window with an air outlet in the proposed embodiment is shown while assembled as an isometric drawing in Fig. 1. The set without selected elements of the sheet metal flashing is shown in Fig. 2. The set is basically composed of a window frame 1, with a casement 2 mounted in it in any way, and of the air outlet 3, being a separate module of the set. In Fig. 3, the top fragment of the roof window comprising the frame top member 11 of the window frame 1 and the air outlet 3 installed on it, is shown in isometric view. While in Fig. 4, a cross-sectional view without background through the casement 2, the frame top member 11 and the air outlet 3 while assembled, is shown.

[0015] The air outlet 3 is mounted on the external surface 14 of the selected element of the window frame 1. In the embodiment shown in Figures 1- 4, the element having the air outlet 3 mounted, is the frame top member 11, however the proposed solution may be also realised in other configurations, not shown in the figures, with the air outlet 3 installed on the external surface 14 of the frame bottom member 12 or the frame side members 13.

[0016] The air outlet 3, mounted on the frame top member 11, has its external outline basically in the form of a rectangular prism with formed sheet metal protective elements. The protective elements are basically a longitudinal channel 31 and an eave 32, protecting the inlet of the air supply duct 33. The longitudinal channel 31, laid preferably in parallel to the longitudinal edge of the frame top member 11, has a cross-section in the shape of letter U. One arm of the longitudinal channel 31 is fixed permanently to the frame 34 of the air outlet 3, in parallel to the edge of the frame top member 11. The other arm of the longitudinal channel 31 is being connected during assembly, preferably by a single standing seam, with the sheet metal flashing 15 of the window frame 1.

[0017] In case - shown in the figures - of the air outlet 3 mounted on the external surface 14 of the frame top member 11, its length is preferably equal to the length of the frame top member 11, its width is preferably equal to

the width of the frame top member, and its height may have any value in the range of dimensions of the window opening.

[0018] In case not shown in the figures, when the air outlet 3 is mounted on the external surface 14 of the frame bottom member 12 of the window frame 1, its length is preferably equal to the width of the window frame, equal to the length of the frame bottom member, and its height may have any value in the range of dimensions of the window opening. In special cases, also not shown in the Figures, when the air outlet 3 is mounted on the external surface 14 of the frame side member 13, its length is preferably equal to height of the window frame 1, equal to the length of the frame side member 13, and its height may have any value in the range of dimensions of the window opening.

[0019] The external surface 35 of the air outlet 3 is preferably a functional copy of the external surface 14 of the window frame 1 and it allows using standard flashings 4, sealing the connection of the air outlet 3 with the roof decking, similarly as in case of a window without an air outlet. The term "functional copy" means that the external surface 35 of the air outlet 3 has a shape and dimensions enabling serving the same purpose as the external surface 14 of the window frame 1, i.e. it allows installing the window and the air outlet 3 in a window opening, as well as installing the flashing 4 and other dedicated elements of the window.

[0020] In the frame of the air outlet 3, an air supply duct 55 is made, basically perpendicular to the surface of the window. The air supply duct 33 connects the external space, defined by an eave 32 and a longitudinal channel 31, with the internal space, basically at the internal side of the window. The length of the eave 32 and its distance from the longitudinal channel 31 is chosen so that the system protects the inlet of the air supply duct 33 from external weather conditions.

[0021] The air supply duct 33 may be made as a single-opening or multi-opening version. The air supply duct preferably has an element or a device serving the purpose of closing or adjustment of the air flow. In the simplest and cheapest version, the air outlet 3 is equipped with a blanking plug 5, covering the air supply duct 33, installed as push-in in the inlet opening of the air supply duct 33, at the internal side of the window. In other, more advanced solutions, the blanking plug 5 may be replaced with known devices controlling the air flow.

[0022] An internal strip 6 constitutes an additional element for fixing the air outlet to the window frame and at the same time playing a decorative role. The internal strip 6 is fixed to the window frame 1 and to the frame 34 of the air outlet 3, stiffening the whole set. Empty space between the longitudinal channel 31 and the internal strip 6 is preferably filled with heat insulating material 7.

Claims

1. A window set with an air outlet, particularly a roof window, fixed or with a movable casement, basically consisting of a window frame installed in a window opening, the said frame composed basically of a frame top member, a frame bottom member and frame side members, and a casement mounted in any way in the window frame, **characterised in that** the air outlet (3) constitutes a separate module mounted on the external surface (14) of the element of the window frame (1).
2. A window set according to claim 1, **characterised in that** the air outlet (3) is mounted on the external surface (14) of the frame top member (11) and its total length is preferably equal to the length of the frame top member (11).
3. A window set according to claim 1, **characterised in that** the air outlet (3) is mounted on the external surface (14) of the frame bottom member (12) and its total length is preferably equal to the length of the frame bottom member (12).
4. A window set according to claim 1, **characterised in that** the air outlet (3) is mounted on the external surface (14) of the frame side member (13) and its total length is preferably equal to the length of the frame side member (13).
5. A window set according to claim 2 and 3, **characterised in that** the air outlet (3) has its external outline basically in the form of a rectangular prism with height depending on the height of the window frame (1), while the sum of heights of the window frame (1) and the air outlet (3) is close to the height of the window opening.
6. A window set according to claim 4, **characterised in that** the air outlet (3) has its external outline basically in the form of a rectangular prism with height depending on the width of the window frame (1), while the sum of width of the window frame (1) and height of the air outlet (3) is close to the width of the window opening.
7. A window set according to claim 1, **characterised in that** the external surface (35) of the air outlet (3) is preferably a functional copy of the external surface (14) of the element of the window frame (1), on which the air outlet (3) is mounted.
8. A window set according to claim 2, **characterised in that** the air outlet (3) has a longitudinal channel (31), an eave (32), and an air supply duct (33) in the frame (34).

9. A window set according to claim 8, **characterised in that** the longitudinal channel (31), with a cross-section preferably in the shape of letter U is mounted by one arm onto the frame (34), in parallel to the longitudinal edge of the frame top member (11), and the other arm is connected with the sheet metal flashing (15) of the window frame (1). 5
10. A window set according to claim 9, **characterised in that** the longitudinal channel (31) is fixed to the sheet metal flashing (15) of the window frame (1) by a single standing seam connection. 10
11. A window set according to claim 8, **characterised in that** the eave (32) is formed in to the longitudinal channel (31), preferably in the plane of the external surface of the sheet metal flashing (15) of the window frame (1). 15
12. A window set according to claim 8, **characterised in that** the frame (34) of the air outlet (3) has a single- or multi-opening air supply duct (33), connecting the external space, defined by the eave (32) and the longitudinal channel (31), with the space at the internal side of the window. 20
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13. A window set according to claim 11, **characterised in that** the air outlet (3) has a removable blanking plug (5), covering the air supply duct (33) from the internal side of the window. 30
14. A window set according to claim 11, **characterised in that** the air outlet (3) has a blanking plug with an automatically adjustable clearance, covering the air supply duct (33) from the internal side of the window. 35
15. A window set according to claim 1, **characterised in that** it has an external shape that allows installing external additions installable on a window from the set in which an air outlet (3) is not included. 40

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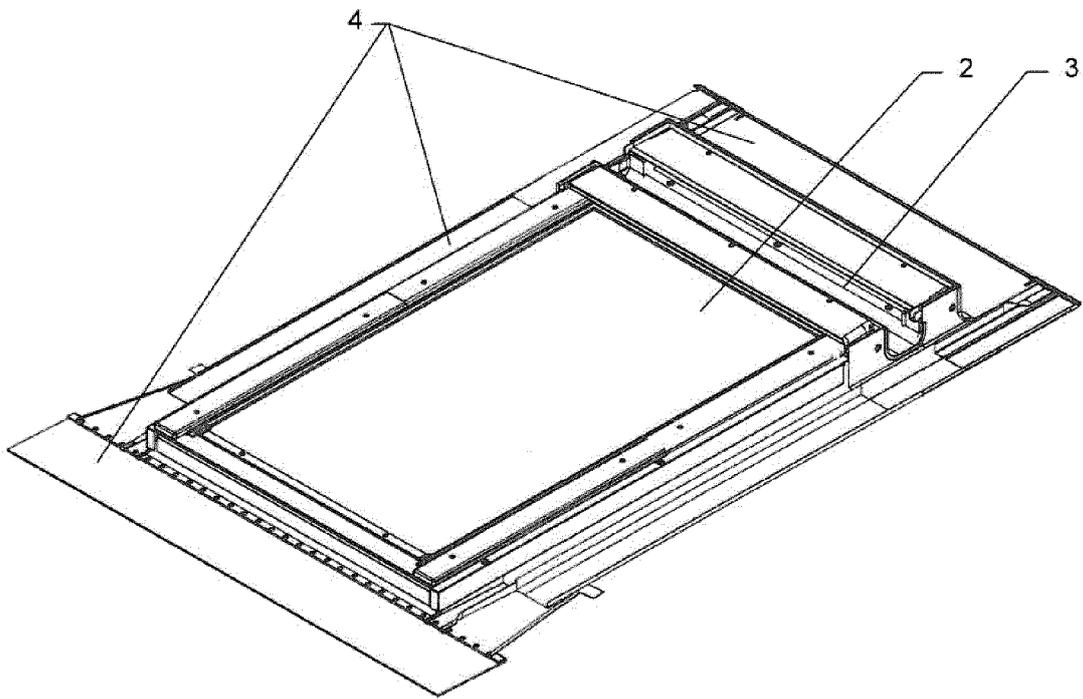


Fig. 1

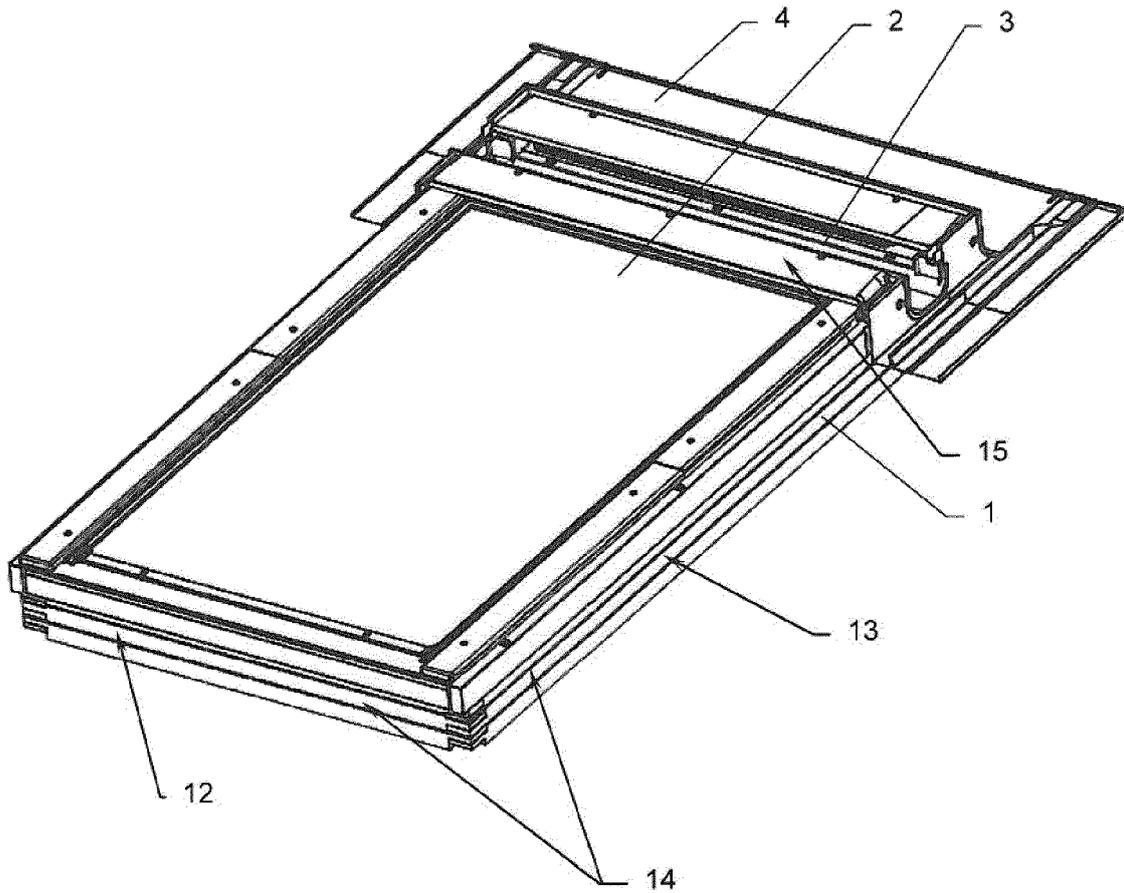


Fig. 2

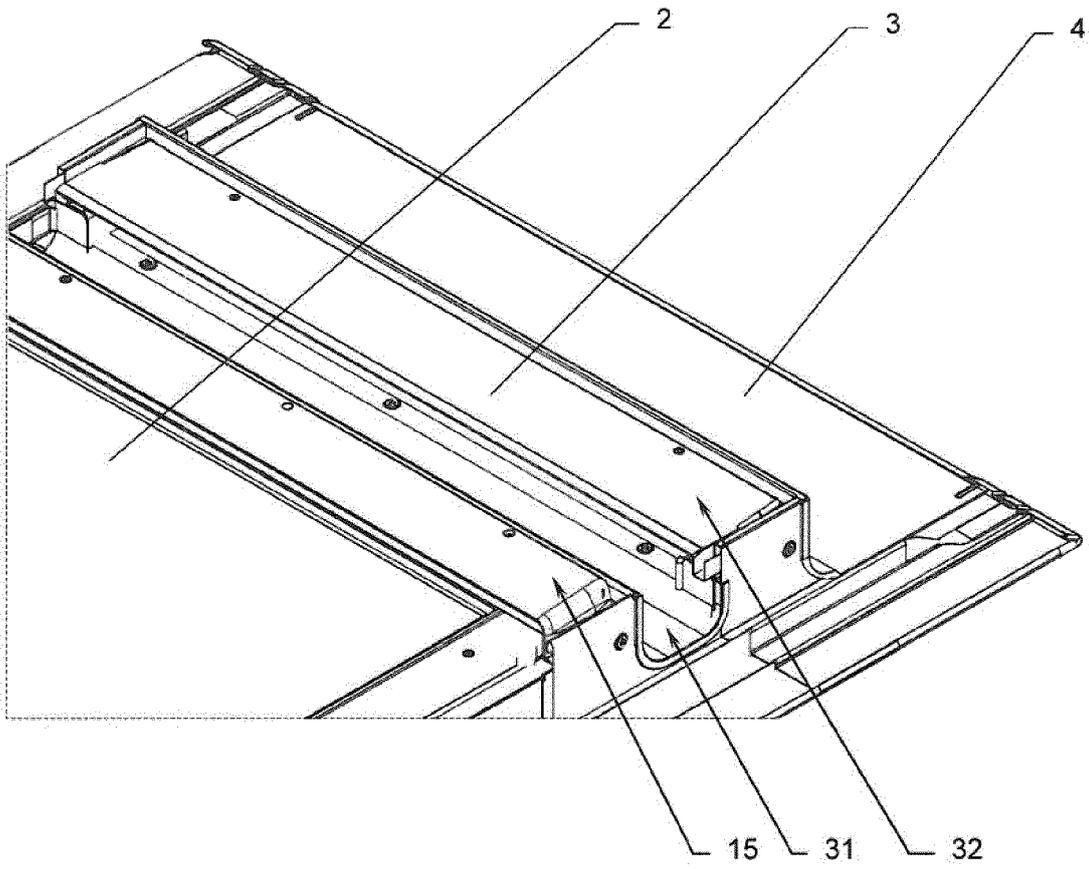


Fig. 3

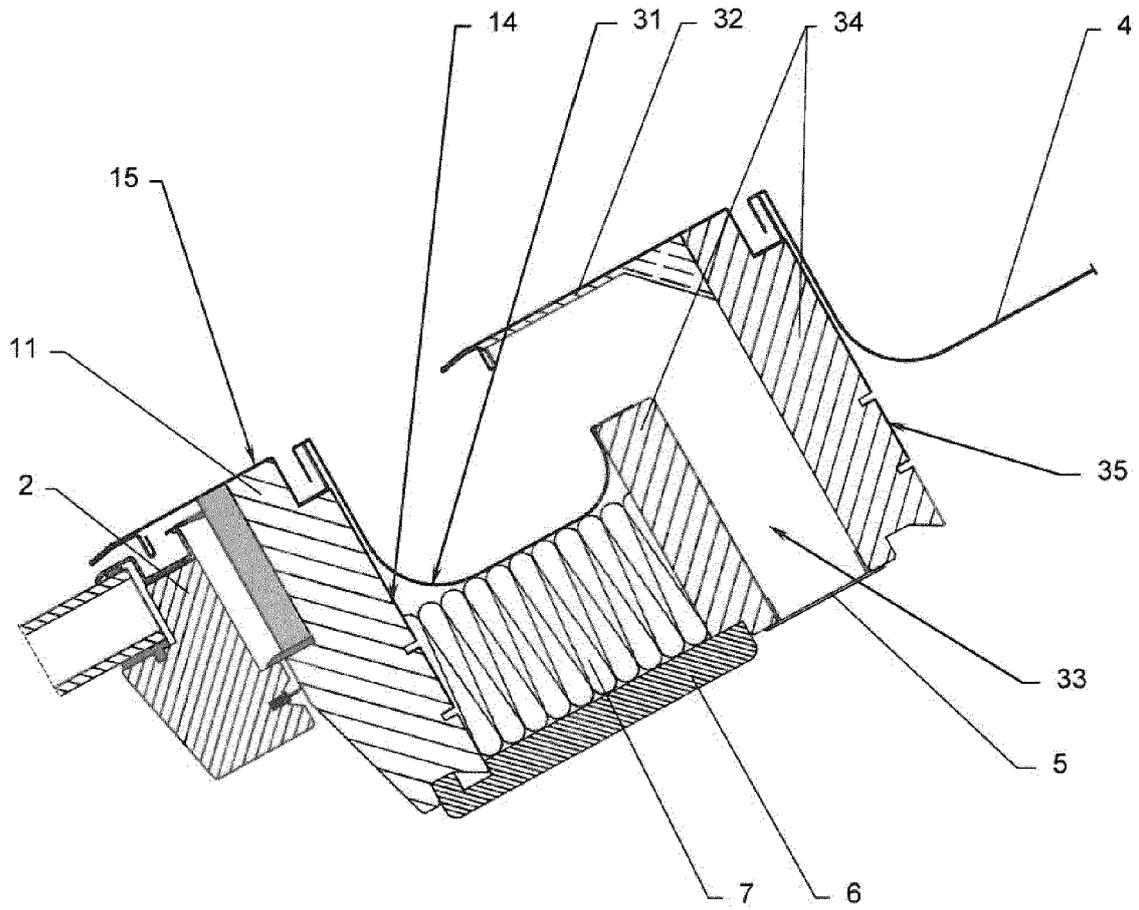


Fig. 4



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Place of search The Hague		Date of completion of the search 19 May 2014	Examiner Tran, Kim Lien
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