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(54) **A ROOF EQUIPPED WITH A ROOF WINDOW COMPRISING A HINGE WITH HIGHER BURGLARY RESISTANCE**

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TOITURE ÉQUIPPÉE D'UNE FENÊTRE DE TOIT AVEC CHARNIÈRES À HAUTE RÉSISTANCE À L'EFFRACTION

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WO-A1-2004/005642

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Description

[0001] The present invention relates to a roof with a roof window equipped with a reinforced-structure hinge which hinders the sash being forced open out of the frame. Depending on the detailed solution, a hinge of this type may be applied in all types of roof windows. The problem with roof windows is their poor resistance to burglary, wherein the sash is forced open out of the frame. This is usually achieved by breaking off the hinge, which is not secured in conventional solutions, from the frame, as this is relatively easy if done with a crowbar. In windows having their structure partially projecting from the surface of roofing, it is even simpler to force open the hinge as the seat with the set hinge is located in the upper frame section which is only covered by flashing. This is particularly true for roof windows with a horizontally-rotating sash or pivot sash or tilting sash, wherein the axis of sash rotation is located in the frame part projecting from the surface of roofing. According to EN 12519, horizontally-rotating windows have hinges arranged in side framing members, whereas pivot windows - in top and bottom framing members. Since both horizontally-rotating windows and pivot windows are referred to as pivot windows in the subject literature relating to roof windows, this term shall be used further herein. In pivot windows having horizontally-rotating sashes, the axis of sash rotation is usually arranged on parallel opposite side framing members between the top and bottom framing members which are opposite to each other. Hinges for pivot windows are known, comprising a part mounted on the frame and a part mounted on the sash. Each part of the hinge has a mounting plate with holes for screws fastening that part to the frame or to the sash frame respectively. Each mounting plate is provided with members connecting both plates so that the mounting plates can rotate relative to each other.

[0002] Dual action roof windows are also known, wherein the tilting axis is at the upper framing member of the frame and the rotation axis is in the middle section of the sash, located at a small distance from the glazing surface, wherein only one (tilting or pivotal) function may be usually used at a time.

[0003] Roof windows are externally fitted with guards, usually made of metal sheet, protecting the frame and the sash frame against an adverse impact of weather conditions. Such guards also impede burglar's intrusion while attempting to force open the sash. These guards, however, provide no protection against such an action, and for known solutions of wooden windows, it is easy to force open the sash together with the hinge, usually fastened in the framing member at a shallow depth, by applying force to break it out or to pull off the frame section projecting from the surface of roofing.

[0004] A solution disclosed in another application no. WO 2010005330 A2 is known, wherein the hinge of the pivot roof window comprises reinforcement elements to improve hinge fastening both in the sash and in the window frame. Mounting plates of the hinge have perpendicularly bent sections, flushed into bodies of the sash frame and the frame with through holes for screw fixing. This solution considerably improves quality and durability of the connection of the hinge with the sash and the frame. However, this is not an effective protection against forcing open the hinge together with a frame section. Such a protection may be provided by the solution disclosed in another application no. EP 2426305 A1. The wooden frame, whose side framing member with a mounted hinge is shown, being made of several glued layers of wood, has a metal clamp protecting it against splitting or other mechanical action to have it divided and force open the hinge.

[0005] The metal clamp is bent to obtain the L shape or a channel bar is provided, flushed into the side member body, arranged on the inner side of the frame, and providing reinforcement in the section used to set and fix the hinge. The application of glued wooden profiles makes it easier to integrate the clamp into the side member body. This solution reinforces this frame section and provides a significant obstacle during an attempt to force open the pivot hinge of the roof window. This solutions, however, is not effective if an attempt is made to split the wooden frame and to break off its entire section projecting from the surface of roofing in the vicinity of the hinge.

[0006] To prevent breaking of the wooden frame, WO 2004/005642 A1 discloses the features of the roof window of the preamble of claim 1.

[0007] It is therefore the object of the present solution to provide for a roof with a roof window hinge with higher burglary resistance.

[0008] The essence of the invention is that the reinforcement plate which is located on the external side surface of the frame, and which is connected with the hinge preferably with anchor bolts, is fastened to the frame by fastening means placed below the window installation plane. Substantially, the plane of window installation is the upper external plane of roof structure, determined by elements of roof structure, most frequently a batten, board or plate to which the frame is fastened.

[0009] The hinge assembly with the reinforcement plate may be applied in all types of roof windows as a protection against forcing open the hinge out of the frame, in particular in windows the structure of which projects from the surface of roofing. This particularly applies to roof windows with a horizontally-rotating or pivot or tilting sash, wherein the axis of sash rotation in relation to the frame is located in the frame section which projects from the surface of roofing.

[0010] In roof windows with a horizontally-rotating or pivot sash according to the invention, the axis of sash rotation is located on preferably parallel and opposite framing members of the frame. The hinges comprise a frame portion set in the frame and a sash portion set in the sash. Both portions of the hinge have mounting plates with holes for screws fastening to the frame or the sash respectively. Both mounting plates have members which

allow their pivotal connection.

[0011] The frame mounting plate is set in the mounting seat and has at least one hole for anchor bolts. The anchor bolt joins the frame mounting plate with the reinforcement plate which is substantially set on the external side surface of the frame. To establish the connection, it is necessary that, in assembled position, mounting holes in the frame mounting plate, through holes in the frame and holes in the reinforcement plate are coaxial. The connection of the reinforcement plate with the frame mounting plate by means of anchor bolts should be made so that they cannot be unscrewed from the external side of the frame. One of possible solutions it to use anchor bolts, the heads of which have a shape preventing unscrewing from the outside, e.g. cup head, arranged on the external side of the frame. It is also possible to make threaded holes in the reinforcement plate and drive in anchor bolts from the side of the frame mounting plate.

[0012] The reinforcement plate is an element made of a metal sheet strip with mounting holes and holes for means used for fastening to the frame. Its length l, which refers to the dimension substantially perpendicular to the principal plane of the window, is adjusted to the frame depth so that it substantially does not project over the contour of the frame member. An essential feature of the invention is the arrangement of the means fastening the reinforcement plate to the frame below the window installation plane. Width of the reinforcement plate is not essential for this description. The dimension, however, should provide a sufficiently large surface for positioning means used to fasten the reinforcement plate to the frame, and sufficient mechanical strength. To provide means for fastening the reinforcement plate to the wooden frame, preferably screws driven in the frame body through the mounting holes may be used.

[0013] To provide additional fastening reinforcement of the frame portion of the hinge in the frame, one of window frame brackets may be used, fastening the same to the reinforcement plate. The bracket is substantially a metal sheet angle section used to fasten the window frame to the roof structural member, which is preferably entirely located below the plane of window installation. One arm of the bracket is fastened to the reinforcement plate or to the frame through the reinforcement plate, whereas another arm is positioned so that the mounting plane is substantially parallel to the surface of the roof structural member on which the same arm is set and to which it is fastened.

[0014] Alternatively, the reinforcement plate has a transverse arm with holes for fastening means for connection with the roof structure, the arm being bent at a substantially right angle relative to the plane of the reinforcement plate, the mounting surface of the arm being substantially parallel to the plane of the roof structural member on which the transverse arm is set and to which it is fastened.

[0015] The transverse arm in one of possible solutions is preferably formed by making preferably two cuts which are parallel to each other and perpendicular to the plane of window installation, and then the section of the installation plate so separated is bent relative to the bending axis which is substantially parallel to the frame edge.

[0016] In this way indirect fastening of the hinge to the roof structure is obtained, using elements of higher mechanical strength, which, in addition, considerably improves anti-lift protection of the roof window hinge.

[0017] A roof with a roof window according to the invention, installed within the roof structure, with the sash in closed position, is presented in the following figures:

Fig. 1 - Isometric view of the frame assembly with a complete hinge of the pivot roof window installed within the roof structure.

Fig. 2 - Cross section through a portion of the roof window with a pivot sash, equipped with a reinforcement plate the length of which does not project over the contour of the frame.

Fig. 3 - Cross section through a portion of the roof window section with a pivot sash, equipped with a reinforcement plate the length of which does not project over the contour of the frame and a bracket used to connect the frame with the roof structure.

Fig. 4 - Cross section through a portion of the roof window with a pivot sash, equipped with a reinforcement plate with a transverse arm, the functionality of which is as in the combination of the reinforcement plate and the mounting plate shown in Fig. 3.

[0018] A roof with a window comprising a hinge with higher burglary resistance in the first embodiment, shown in the cross section in Fig. 2, has a window with a horizontally-rotating sash 1 set on hinges 2, wherein the axis of sash rotation 1 is preferably located on parallel opposite side framing members 3 between the top member 4 and the bottom member 5 which are opposite. The hinge 2 comprises a frame section, set in the side framing member 3 and a sash section, set in the sash 1. The sash mounting plate 21 is used to set and fasten the hinge 2 in the sash 1, whereas the frame mounting plate 22 is used to set and fasten the hinge 2 in the side framing member 3. Both hinge mounting plates - the sash mounting plate 21 and the frame mounting plate 22 - have holes for screws fastening the plates to the sash frame 1 or to the side framing member 3 of the frame accordingly. In addition, both mounting plates have members used to connect them pivotally.

[0019] The frame mounting plate 22 is set within the mounting seat 31 and has two installation holes 23 for the anchor bolts 6. The role of the mounting seat 31 is to retain and hold the set frame mounting plate 22 precisely and permanently. This is achieved, as the solution may be, by an assembly of retaining elements such as pins, screws, bolts and supports not shown in detail in the drawings. The anchor bolts 6 connect the frame mounting plate 22 with the reinforcement plate 7, set on the external side surface of the side framing member 3.

The reinforcement plate 7 is a flat, preferably rectangular, sheet metal strip with threaded holes 71 which are coaxial relative to the mounting holes 23 and preferably with through holes 32 in the frame 3. The length / of the reinforcement plate 7, i.e. the dimension in the direction substantially perpendicular to the principal plane of the window, is adjusted to the frame depth so that it does not project over the contour of the framing member 3.

[0020] The reinforcement plate 7 has at least two points for fastening to the side framing member 3 in the form of screws 8 driven through holes 72 to the side framing member 3. The said points fastening the reinforcement plate 7 are located in the lower portion of the side framing member 3, below the plane of window installation. Width of the reinforcement plate is sized to provide for sufficient area for the threaded holes 71 and holes 72 as well as sufficient mechanical strength. Upper surfaces of the roof structural members, determine the window installation plane 9.

[0021] A roof with a roof window comprising a hinge of higher burglary resistance in second embodiment, shown in the cross-section view in Fig. 3, has all elements shown and described in first embodiment. An additional element in this solution is the bracket 10, which provides additional reinforcement for the fastening of the frame mounting plate 22. The bracket 10 is an angle section made of bent sheet metal, whose vertical arm 101 is fastened with screws 81 to the side framing member 3 through the holes 72. The horizontal arm 102 of the bracket 10 is substantially perpendicular to the vertical arm 101 and substantially parallel to the surface 9 of the roof structural member (battens, plates, etc.) on which the horizontal arm 102 is set and to which it is fastened. In this way indirect fastening of the hinge 2 to the roof structure is obtained, using elements of higher mechanical strength, which, in addition, considerably improves anti-lift protection for the roof window. Upper surfaces of the roof structural members on which the horizontal arms 102 of the brackets 10 are set on both sides of the frame determine the window installation plane 9.

[0022] A roof with a roof window comprising a hinge of higher burglary resistance in third embodiment, shown in the cross-section view in Fig. 4, substantially has the same functionality as the solution presented in second embodiment. The bracket 10, being a separate element of the assembly is replaced by a transverse arm 73 which serves as the horizontal arm 102 in second embodiment. In this embodiment the transverse arm 73 is a uniform element with a reinforcement plate 7 being part of the same. The transverse arm 73 is bent at a substantially right angle relative to the plane of the reinforcement plate 7. The installation surface of the transverse arm 73 is preferably parallel to the surface 9 of the roof structural member on which the transverse arm 73 is set and to which it is fastened. The upper surfaces of the roof structural members on which the horizontal arms 73 of the reinforcement plates 7 are set on both sides of the frame, determine the window installation plane 9. The transverse arm 73 preferably has holes for means fastening to the roof structure. The transverse arm 73 is formed by making preferably two cuts which are parallel to each other and perpendicular to the plane of window installation, and then the section of the lower reinforcement plate 7 so separated is bent relative to the bending axis which is substantially parallel to the frame edge. Alternation at the manufacturing stage of the location of the bending axis of the transverse arm 73 allows determining the setting depth of the window in the roof.

Claims

1. A roof comprising roof structural members, such as battens, boards or plates, the upper surface of the roof structural members defining a window installation plane (9), the roof further comprising a roof window, with a wooden frame substantially comprising a bottom framing member (5), a top framing member (4) and side framing members (3), said roof window having a horizontally-rotating sash or a pivot sash (1), with hinges (2) substantially fastened symmetrically on opposite framing members,

   - wherein each of the hinges (2) comprises a sash section set in the sash and a frame section set in the frame,
   - wherein a reinforcement element is provided in each hinge installation area and connected to the frame in that area , the reinforcement element being a reinforced plate (7) substantially made of flat sheet metal, the principal plane of which being installed substantially parallel to the external side surface of the frame,

   characterised in that said reinforced plate (7) is fastened to the frame at least by fastening means (8) placed, in use, below the window installation plane (9).

2. A roof according to claim 1, **characterised in that** the reinforcement plate (7) is connected with the frame mounting plate (22) of the hinge (2) by means of at least one anchor bolt (6) passing through the profile of the frame, the axis of which is preferably perpendicular to the surface of the reinforcement plate (7).

3. A roof according to claim 2, **characterised in that** the reinforcement plate (7) has threaded holes (71) into which anchor bolts (6) are driven, the heads of said bolts being set in the frame mounting plate (22).

4. A roof according to claim 1 or 2 or 3, **characterised in that** the reinforcement plate (7) has a transverse arm (73) for connection with the roof structure, the arm being bent at a substantially right angle relative

to the plane of the mounting plate (7), the installation surface of which is substantially parallel to the surface (9) of the roof structural member on which the transverse arm (73) is set.

5. A roof according to claim 1 or 2 or 3, **characterised in that** it features a bracket (10), fastened to the frame with screws (81) through holes (72), wherein the installation surface of the horizontal arm (102) is substantially parallel to the surface (9) of the roof structural member on which the arm is set.

Patentansprüche

1. Dach, das Konstruktionselemente besitzt, wie Dachlatten, Bretter oder Platten, obere Außenfläche der Dachkonstruktion, welche die Montageebene (9) des Fensters definiert; darüber hinaus hat das Dach ein Dachfenster mit einem Fensterrahmen aus Holz, der grundsächlich aus dem unteren Rahmenholz (5) und dem oberen Rahmenholz (4) sowie dem seitlichen Rahmenholz (3) besteht, das (das Dachfenster) einen kipp- oder drehbaren Flügel (1) mit Scharnieren (2) aufweist, die grundsätzlich symmetrisch zu den gegenüberliegenden Holzrahmen befestigt sind,

   - wobei die Scharniere (2) aus einem Flügelteil bestehen, der in den Fensterflügel eingesetzt wird, und aus einem Rahmenteil, der in den Fensterrahmen eingesetzt wird,
   - wobei das Profil des Fensterrahmens im Bereich der Scharniermontage ein verstärkendes Element aufweist, verbunden mit dem Rahmenteil des Scharniers, das (das Element) eine verstärkende Platte (7) ist, die grundsätzlich aus flachem Blech gefertigt ist, dessen Hauptfläche grundsächlich parallel zur äußeren Seitenfläche des Fensterrahmens ist, **dadurch gekennzeichnet, dass** die verstärkende Platte (7) mindestens mit Hilfe der Schrauben (8) befestigt ist, die im Gebrauchszustand unterhalb der Montageebene (9) des Fensters liegen.

2. Das Dach nach Anspruch 1, **dadurch gekennzeichnet, dass** die verstärkende Platte (7) mit der Fensterrahmen-Basisplatte (22) des Scharniers (2) mit Hilfe von mindestens einer Ankerschraube (6) verbunden ist, die durch das Profil des Fensterrahmens geht, dessen Achse vorzugsweise senkrecht zur Fläche der verstärkenden Platte (7) ist.

3. Das Dach nach Anspruch 2, **dadurch gekennzeichnet, dass** die verstärkende Platte (7) Gewindebohrungen (71) aufweist, in welche die Ankerschrauben (6) eingeschraubt werden, deren Schraubenkopf in der Fensterrahmen-Basisplatte (22) eingesetzt ist.

4. Das Dach nach einem beliebigen der Ansprüche 1, oder 2, oder 3, **dadurch gekennzeichnet, dass** die verstärkende Platte (7) einen Querträger (73) für die Verbindung mit der Dachkonstruktion aufweist, gebogen grundsätzlich im rechten Winkel zur Montageplatte (7), deren Montagefläche grundsätzlich parallel zur Fläche des Elements der Dachkonstruktion ist, auf dem der Querträger (73) aufgesetzt ist.

5. Das Dach nach einem beliebigen der Ansprüche 1, oder 2, oder 3, **dadurch gekennzeichnet, dass** es eine Montagestütze (10) aufweist, die mit Schrauben durch die Bohrungen (72) an dem Fensterrahmen befestigt wird, und die Montagefläche des horizontalen Trägers (102) ist grundsätzlich parallel zur Fläche des Elements der Dachkonstruktion, auf dem er aufgesetzt ist.

Revendications

1. Le toit possédant les éléments de structure tels que les lattes, les planches ou les panneaux, un plan supérieur externe de la structure du toit, définissant le plan du montage (9) de la fenêtre, et de plus le toit possède la fenêtre de toit avec le dormant en bois composé essentiellement du montant inférieur (5) et du montant supérieur (4) ainsi que des montants latéraux (3), possédant l'ouvrant (1) basculant ou rotatif, avec les charnières (2) montés essentiellement de manière symétrique aux montants opposés,

   - les charnières (2) se composent de la partie de l'ouvrant encastrée dans l'ouvrant de fenêtre et de la partie du dormant, encastrée dans le dormant,
   - le profilé du dormant dans la zone du montage de la charnière possède un élément renforçant assemblé avec la partie de l'ouvrant de la charnière qui constitue un panneau de renforcement (7) exécuté essentiellement en tôle plate dont la surface principale est essentiellement parallèle à la surface latérale externe du dormant **caractérisé en ce que** le panneau de renforcement (7) est monté dans le dormant au moins à l'aide des vis (8), situées en position d'utilisation au-dessous du plan de montage (9) de la fenêtre.

2. Le toit selon la revendication 1, **caractérisé en ce que** le panneau de renforcement (7) est assemblé avec la plaque de base du dormant (22) de la charnière (2) au moins à l'aide d'un boulon d'ancrage (6), passant à travers du profilé du dormant dont l'axe est positivement perpendiculaire à la surface du panneau de renforcement (7).

3. Le toit selon la revendication 2, **caractérisé en ce que** le panneau de renforcement (7) possède des trous filetés (71) dans lesquels les boulons d'ancrage sont serrés, (6) dont les têtes sont encastrées sur la plaque de base du dormant (22).

4. Le toit selon l'une des revendications 1 ou 2 ou 3 **caractérisé en ce que** le panneau de renforcement (7) possède un bras transversal (73) pour l'assemblage avec la structure du toit, incliné sous l'angle droit au plan du panneau de renforcement (7), dont la surface de montage est essentiellement parallèle au plan de l'élément de la structure du toit sur lequel le bras transversal (73) est encastré.

5. Le toit selon l'une des revendications 1 ou 2 ou 3 **caractérisé en ce que** le support de montage (10), est fixé à l'aide des vis à travers les trous (72) dans le dormant et le plan de montage du bras horizontal (102) est essentiellement parallèle au plan de l'élément de structure du toit sur lequel il est encastré.

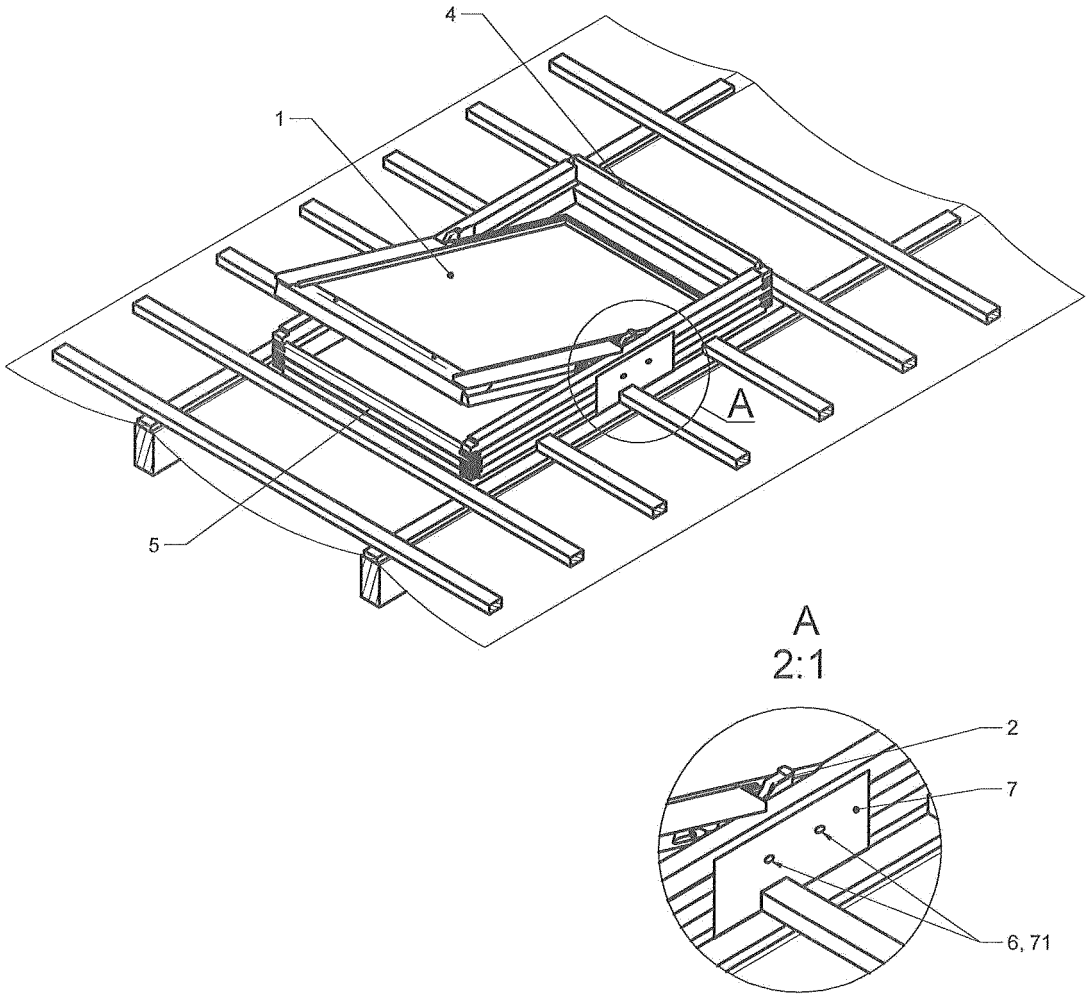


Fig. 1

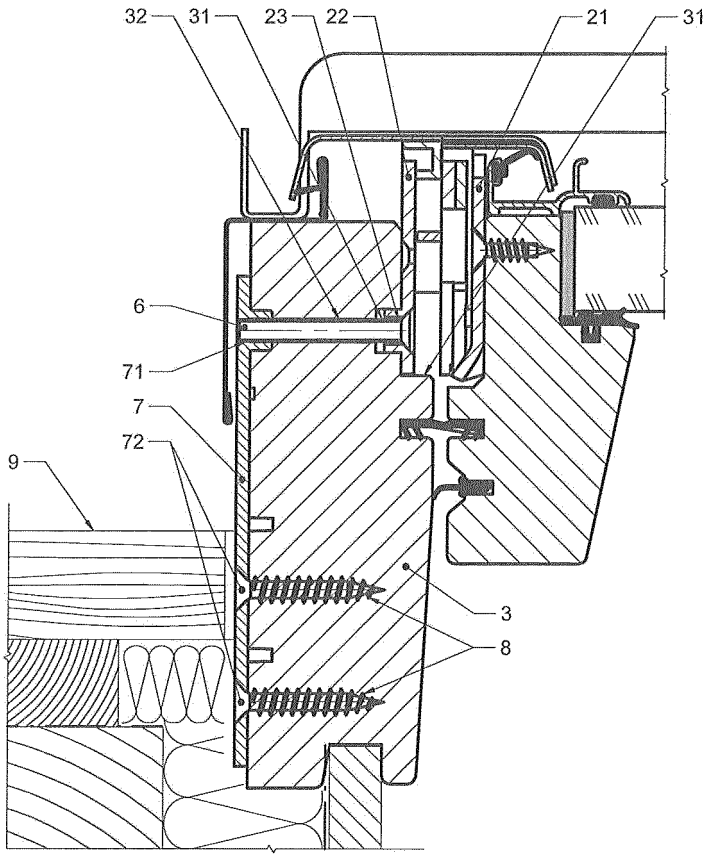


Fig. 2

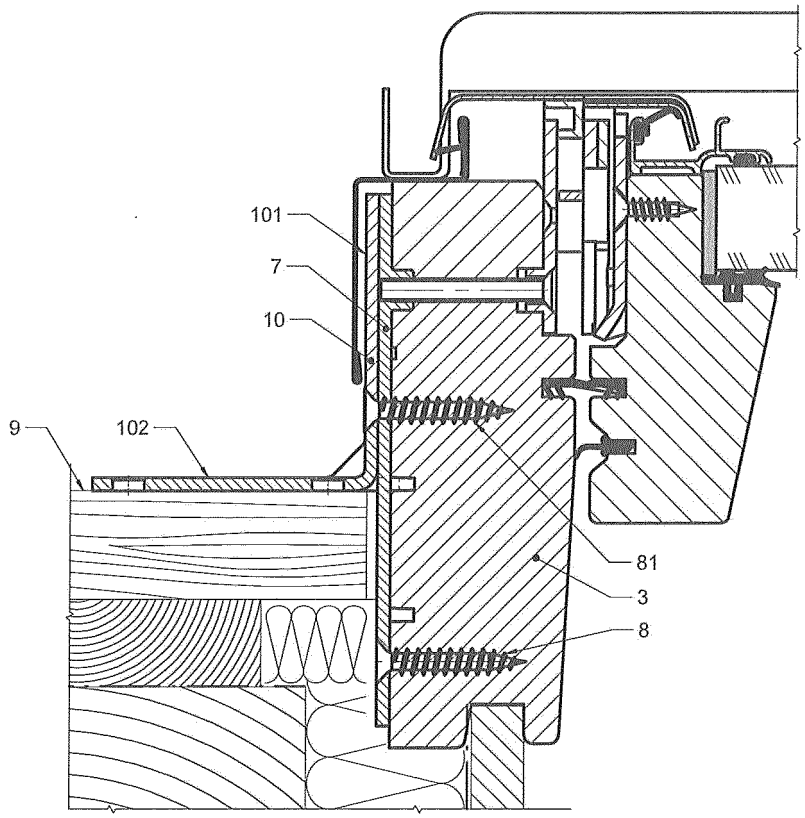


Fig. 3

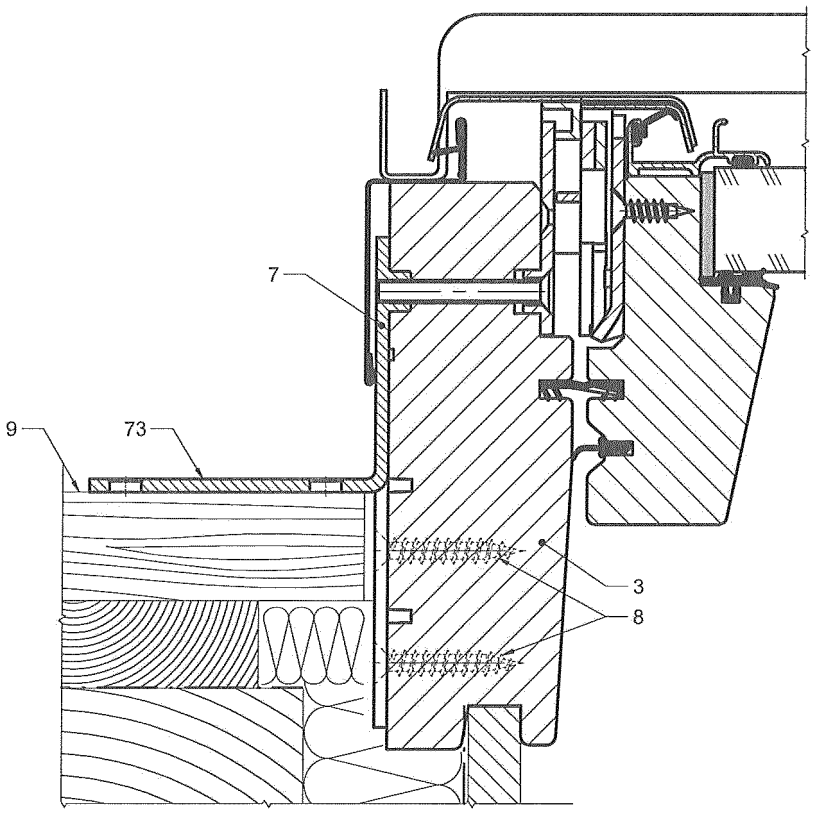


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- EP 2426305 A1 **[0004]**
- WO 2004005642 A1 **[0006]**