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(54) **A METHOD OF INSTALLATION OF AN INSULATION FRAME IN A ROOF WINDOW, AN INSULATION FRAME FOR USE IN THE SAME AND A KIT FOR INSTALLATION**

(57) The invention relates to a method of installation of a roof window in an inclined roof structure, said method including the steps of providing a window frame in an opening in a roof structure, said window frame comprising a plurality of frame members, providing an insulating assembly adapted for abutment against the outer side of the window frame members, comprising a plurality of insulating assembly pieces wherein at least one first insulating assembly piece is hinged to at least one second insulating assembly piece with at least one hinge.

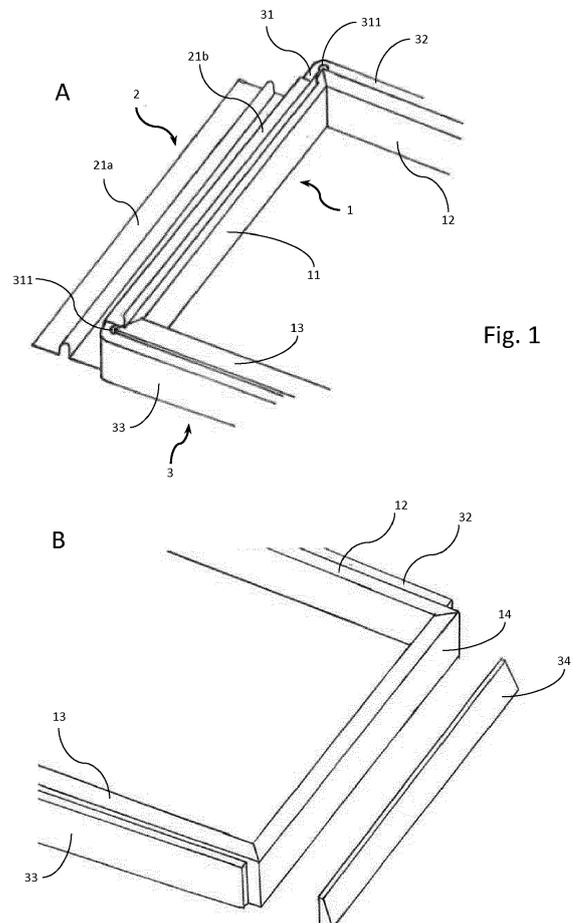


Fig. 1

EP 3 656 943 A1

Description

Technical Field

[0001] The present invention relates to a method of installation of an insulation frame in a roof window and an insulation assembly for use in the installation of a roof window comprising a number of insulation assembly pieces, some of which are pre-connected by at least one hinge so as to facilitate installation.

Background Art

[0002] Roof windows come in a number of varieties and models and are installed in combination with varying degrees of insulation material packed around the window frame periphery to ensure thermal and acoustic insulation. When installing roof windows in pitched roof structures it is generally of great importance that the weather-protecting and insulating function of the roof structure is re-established to the greatest extent possible at the transition between the roof window frame structure and the surrounding roof structure.

[0003] A number of solutions for establishing the necessary sealing between a roof window and the roof structure have been proposed, i.a. through development of various types of flashing and connection collars, with which the roof window may be tightly connected with the roofing material or the waterproof, weather-protecting membrane of the underroof. Other known solutions have aimed at re-establishing optimum insulation properties at the transition between the window and the roof structure as is described in EP3330451, EP0954659, and EP1061199. It is a common phenomenon, however, that in such installations thermal bridges may remain and that condensed water may form when large temperature differences occur between the interior and exterior of the window assembly. Therefore, further solutions providing insulation for window frames have been implemented for those geographical locations with particularly harsh weather conditions, such as that described in EP1550777.

[0004] As is well known to the skilled person, the work associated with mounting insulating frames and windows in an inclined roof structure is challenging, not least during heavy winds. The additional insulation members result in a greater installation effort requirement on behalf of the installer. Hindered handling of additional materials may be construed as an undue burden; the additional materials are therefore sometimes discarded or simply forgotten or lost by the installer. It therefore happens that the insulating frame is not mounted correctly or not mounted at all. This in turn may cause trouble during the subsequent mounting of the window or other associated components such as an underroof collar or lining panel and/or influences the insulating properties negatively. This results in a sub-optimal installation of the window and potentially translates to the user perceiving the prod-

uct as being of poor quality.

Summary of Invention

[0005] It is therefore the object of the invention to provide an alternative method for correctly installing an insulating assembly for a roof window in an inclined roof structure.

[0006] Another object of the present invention is to provide an insulating assembly for a roof window with improved insulating properties.

[0007] Another object of the present invention is to provide a safer and easier method of installation of an insulating assembly.

[0008] Another object of the present invention is to provide a more efficient method of packaging of an insulating assembly.

[0009] According to a first aspect of the present invention, at least one of said objects is achieved with a method of installation of a roof window in an inclined roof structure comprising roofing and roofing supporting structure, said method including the steps of: providing a window frame in an opening in a roof structure, said window frame comprising a plurality of frame members, for example a top member and a bottom member, which are substantially parallel to each other, and two side members that are substantially perpendicular to the top and bottom members and substantially parallel to each other, thus forming an essentially rectangular window frame, each frame member having an interior side facing the interior of the building in the mounted state, an exterior side facing the exterior of the building in the mounted state, an inner side and an outer side, an interior-exterior (I-E) dimension being defined by a direction extending from the interior side to the exterior side; providing an insulating assembly comprising a plurality of insulating assembly pieces adapted for abutment against the outer side of a corresponding window frame member wherein at least one first insulating assembly piece is hinged to at least one second insulating assembly piece with at least one hinge; arranging at least one insulating frame piece on the roof structure aligned with a side of said opening in said roof structure and/or abutting an outer side of a frame member of said window frame, and using said at least one insulating assembly hinge to adjust the angle between said insulating assembly pieces in a plane substantially parallel to said roof supporting structure to be substantially aligned with at least two sides of said opening in said inclined roof structure and/or abutting outer sides of at least two frame members of said window frame.

[0010] It is not within the scope of the different sections composing this application to establish the order in which the disclosed steps in the claims should be carried out. Accordingly, in some cases the window installer might want to connect the insulating assembly pieces to the corresponding outer sides of the window frame before inserting the window frame into the pre-arranged opening. In other instances, inserting the insulation assembly

pieces into the pre-arranged opening in the roof structure prior to inserting the window frame into the same may be preferred.

[0011] A hinge is to be understood as a mechanical bearing that connects two insulating assembly pieces, allowing a rotation between them. Two insulating assembly pieces connected by an ideal hinge rotate relative to each other about a fixed axis of rotation: all other translations or rotations being hindered, and thus such a hinge has one degree of freedom. In this case, however, such an ideal hinge is not strictly necessary. As described herein, hinges may be made of flexible material, compressible material or of moving components. In one embodiment, the material of which the insulating assembly pieces are formed is continuous between two of said pieces. The thickness however is reduced at the hinge with respect to that of insulating assembly pieces, thus creating a groove lying substantially perpendicular to the largest dimension of the insulating assembly piece. The groove provides an area where the insulating material is weakened and allows for hinging between the insulating assembly pieces. Thus, the hinge may be formed by a groove in the insulating material, the groove separating two insulating assembly pieces. This construction is simple, insofar as it does not require further components and, thus, is quick and cheap to produce.

[0012] In another embodiment, at least one separate hinge arrangement is provided for the purpose of hinging two insulating assembly pieces. Such a hinge may offer greater resistance to wear during manipulation and thus have a longer useful life.

[0013] By comprising a plurality of insulating assembly pieces, wherein at least one first insulating assembly piece is hinged to at least one second insulating assembly piece, the adjustment of the angle between said assembly pieces to match the shape of the window frame installed, or to be installed in said inclined roof structure is facilitated. This will help to ensure the best possible match between the final shape of the insulating assembly and that of the window frame in the mounted condition, further increasing the insulating properties of the insulating assembly. Furthermore, by at least one first insulating assembly piece being hinged to at least one second insulating assembly piece, two or more insulating assembly pieces may be permanently attached to each other, which will result in a decreased chance of said pieces being forgotten, dismissed or lost. Also, by several insulating assembly pieces being attached to each other, the sequence of said pieces may not be changed, this reducing the chance of pieces being placed in the wrong position around the frame. Overall the effect of at least two insulating assembly pieces being hinged to each other may be an installation of higher quality.

[0014] In a preferred embodiment, it is contemplated that the inter-hinged insulation assembly pieces are unfolded from a delivery state to match the shape of the roof window in a mounted state. Unfolding the insulation assembly pieces over either the pre-arranged opening

in the roof structure or over the roof window frame provides the installer with increased ease of handling, since on site assembly of insulating pieces is avoided or reduced.

5 **[0015]** Thus, provision of a hinge also results in a more convenient manipulation of the insulating assembly pieces upon unpacking and installation.

[0016] In a preferred embodiment, the method is to be carried out in a pre-arranged opening in a roof structure. Such an opening is to be made with a shape similar to, and preferably larger than the shape of the window roof frame to be installed. The window frame comprises a plurality of frame members each having an interior side facing the interior of the building in the mounted state, an exterior side facing the exterior of the building in the mounted state, an inner side and an outer side. The window frame is made of window frame members of defined dimensions, the outer sides of the window frame members defining a window frame outer perimeter. Thus, the insulating assembly pieces are formed to match and tightly fit the outer perimeter of the window frame. This shape correspondence and tight fit ensures thermal, air flow and sound insulation in the mounted state. Furthermore, installation ease is once more favoured, since the installer may achieve a tight fit between the insulating assembly pieces and the window frame members with minimal effort.

[0017] Fitting said insulating assembly pieces along the outer sides of the frame members contributes to re-establishing insulation after the continuity of the elements of the roof structure is interrupted when providing an opening to receive the roof window.

[0018] Insulation is increased with regard to thermal insulation by applying an insulation assembly piece made of a low thermal-conductivity material such as polyethylene foam, mineral wool, cellulose, polyurethane foam or foamed ABS to window frame members, thereby making it harder for caloric energy to transfer from the interior of the construction to the exterior environment.

40 **[0019]** Insulation is also increased with regard to air flow by the abutment of insulating assembly pieces to the window frame members, thereby increasing the resistance to air flow around the roof window construction.

[0020] Insulation is also increased also with regard to sound insulation, as the accumulation of insulating materials around the window contributes to sound wave absorption leading to increased sound dampening.

[0021] In another embodiment, the method contemplates providing a flashing frame including flashing members each having a first section and a second section and securing said flashing frame around the window frame in such a manner that the first section lies in a plane substantially parallel to the most exterior plane of the supporting roof structure and the second section extends to at least partly cover at least one side of the corresponding window frame member. With this arrangement the flashing ensures a continuous barrier between the supporting roof elements, such as battens, rafters

and other roofing supporting and weather proofing materials and the window frame in the installed state.

[0022] In a preferred embodiment, the insulating assembly pieces are abutted against a window frame member outer side above said most exterior plane of the supporting roof structure. Many roof window constructions result in the window frame only partially penetrating the inclined roof structure. Such a construction can result in a thermal bridge and/or interruption in insulation remaining between the interior of the building and the exterior, across the roof window frame that is left protruding from the roof structure. By placing insulating assembly pieces above the most exterior plane of the supporting roof structure and in abutment to the window frame elements, the above-described thermal bridge and/or interruption in insulation may be reduced or eliminated.

[0023] In another embodiment, insulating assembly pieces are placed between the window frame and the roofing supporting structure. Here the insulating assembly pieces are positioned at least partly below a most exterior plane of the supporting roof structure. This insulation may be composed of separate insulating assembly pieces or integral to at least one of the insulating assembly pieces of the present invention.

[0024] In another embodiment, the insulating assembly is meant to be installed according to the invention as an additional component to an existing window installation. Such a window installation may or may not comprise other types of insulating material. Advantages of such an arrangement include that the insulating assembly may be conceived as an optional addition to a window assembly. This confers freedom of choice to the end user, insofar as the choice of installing the insulating assembly according to the invention may be made upon window installation or at a later time, or not at all. This will also allow the use of the same type of window assembly in different climate zones, adding the insulating assembly according to the invention only when installing the window assembly in areas where it is needed.

[0025] In several embodiments, the hinge is connecting two insulating assembly pieces and is arranged to coincide with the connection point of two roof window members, such as at the corner of a rectangular frame when mounted. This will help to ensure a match between the final shape of the insulating assembly, and that of the roof window frame in the mounted condition, further increasing the insulating properties of the insulating assembly.

[0026] According to another embodiment, the method comprises the additional step of adjusting the insulating assembly pieces between a state of delivery, where said insulating assembly pieces are arranged to form a compact assembly, and a mounted state, where said insulating assembly pieces are arranged to fit along the outer side of one or more frame members. This results in a more convenient manipulation of the insulating assembly pieces when unpacking.

[0027] In a presently preferred embodiment, a retain-

ing device secures the insulating assembly pieces in a compact assembly in the state of delivery. The retaining device offers a first, disengaged position, where the insulating assembly pieces are not retained in a compact assembly, and a second, engaged position, where the insulating assembly pieces are retained in a compact assembly. The retaining device may also be adapted to easily transition from the second, engaged position to the first, disengaged position. The retaining device may also be adapted to conveniently alternate between the two positions. One example of a retaining device is a strap provided with a connector, such as a buckle, a snap fastener, Velcro or an adhesive, at one or both ends.

[0028] In one embodiment, the first insulating assembly piece is a top insulating assembly piece adapted to match the largest dimension of a top frame member. The insulating assembly pieces are formed to match at least part of the outer perimeter of the roof window frame as described herein above. If further adapted to fit tightly with the outer side of the frame thermal, air flow and sound insulation in the mounted state is improved. Furthermore, installation ease is once more favoured, since the installer may achieve a tight fit between the insulating assembly pieces and the window frame members with minimal effort. With the top insulating assembly piece being adapted to match the largest dimension of the top frame member, installation of other parts of an insulating assembly is also favoured, since the top insulating assembly piece may be rested on the top frame member of the roof window while adjusting the angle(s) between insulating assembly pieces and fitting them to the other frame members of the roof window.

[0029] According to another aspect of the present invention, an insulating assembly for installation around a roof window frame in a roof structure including roofing and roofing supporting structure is provided. Said insulating assembly comprises a plurality of insulating assembly pieces, and the window frame has a plurality of frame members, each frame member having an interior side facing the interior of the building in the mounted state, an exterior side facing the exterior of the building in the mounted state, an inner side and an outer side, and an interior-exterior dimension being defined by a direction extending from the interior side to the exterior side in the mounted condition, wherein at least one first insulating assembly piece is hinged to at least one second insulating assembly piece, in such a manner that the angle between said insulating assembly pieces can be changed within a plane substantially parallel to said roof structure when one insulating frame piece is arranged on the roof structure aligned with a side of an opening in said roof structure and/or is abutting an outer side of a frame member of said window frame.

[0030] In a preferred embodiment, two hinged insulating pieces are permanently interconnected. This may reduce the chance of individual insulating piece being lost, dismissed or forgotten prior to installation or installed in the wrong position. This also reduces the need for the

installer to assemble of insulating assembly pieces on site, thus benefiting both safety and ease of installation.

[0031] Alternatively, it is also contemplated that insulating assembly pieces connected by hinges are detachable from each other. Advantages of such a configuration might include the possibility of exchanging one insulation assembly piece for another one with different overall dimensions or shape, thus enabling a greater variety of possible fits being achieved. A further advantage of such a construction is found in the possibility of removing individual insulating assembly pieces in those places where limited available space could make it inappropriate to include an insulating assembly piece. In this manner, the possibility for removing one or more insulating assembly pieces could be advantageous for the overall roof window installation quality.

[0032] As described above, also in this aspect do the inter-hinged insulating assembly pieces contribute to increased installation ease, increased safety, increased installation quality and reduced risk of loss or omission of the different parts, all of which result in increased insulation of the installed roof window arrangement. Also, easier fitting of the insulating assembly within packaging is facilitated, which may favour a reduction of the space requirement for fitting the insulating assembly within packaging.

[0033] In some embodiments, the roof window arrangement may include a flashing frame comprising flashing members each having a first section lying substantially in the most exterior plane of the supporting roof structure elements and a second section extending to at least partly cover at least one side of the corresponding window frame member. Thereby, a continuous barrier to the exterior is ensured between the supporting roof elements and the window frame in the installed state.

[0034] In another embodiment, the insulating assembly pieces are also adapted for abutment against the outer side of the corresponding window frame members and to lie between these and the flashing frame when present, in the mounted state. By this arrangement, the mounted insulating assembly can advantageously fulfil its insulating function. In turn, the flashing will fulfil its weather protecting and water- and debris-evacuating function, preferably conforming to the underlying materials' profiles as tightly as possible.

[0035] In another embodiment, the insulating assembly piece has a triangular cross-section such that its exterior side is narrower than the interior side. This arrangement allows for a compact installation and minimization of volume occupied by insulation around the window frame perimeter. In this case, the flashing frame also conforms to the underlying insulating assembly pieces' profile as tightly as possible. This is achieved by the flashing sloping from where it covers the exterior side of the window frame members to where it covers the roof supporting structure while conforming tightly to the slope of the underlying triangular insulating assembly cross-section. This arrangement also allows for more efficient water and

debris evacuation along the flashing frame member and a more aesthetically pleasing finish.

[0036] In a preferred embodiment, the insulating assembly pieces about a window frame member outer side above said most exterior plane of the supporting roof structure in the mounted condition. With insulating assembly pieces above the most exterior plane of the supporting roof structure and in abutment to the window frame elements, thermal bridges and/or interruption in insulation existing between the inner and outer sides of the window frame above said most exterior plane may be reduced or eliminated.

[0037] In another embodiment, the hinging between said at least one first and second insulating assembly pieces is located to coincide with a corner of the window frame. With such an arrangement, a tight fit between the insulating assembly and the outer side of the window frame member may be easier to achieve and the insulation properties of the insulating assembly may be increased.

[0038] In another embodiment, the hinging allows the angle between the insulating assembly pieces to be adjusted between a state of delivery, where the insulating assembly pieces are arranged to form a compact assembly, and a mounted state, where the insulating assembly pieces are arranged to fit along the outer side of one or more window frame members. Such an arrangement entails easier fitting of the insulating assembly within a standard size packaging, thus favouring reduction of the space requirement for fitting the insulating assembly within packaging. The reduced space requirement of the packaged compact assembly potentially results in an overall smaller package, which increases ease of handling prior to unpacking and consequently increases safety for the user who is to install the assembly on an inclined roof structure. Shelf space during storage and freight volume during shipping is thereby also reduced. Shipping costs are often a function of the volume of the packages to be transported. Keeping the packaging material as small as possible, while still providing room for insulating materials therefore leads to savings in storage and shipping costs of the packaged product.

[0039] In a presently preferred embodiment, a retaining device secures the insulating assembly pieces in a compact assembly in the state of delivery. Such a retaining device enables for the retention of the insulating assembly in the compact state and permits a more convenient handling.

[0040] According to another aspect of the present invention, a kit of elements for installation in a roof window is provided. Such a kit comprises a compact assembly as described herein above and at least one other element for installation in a roof window. By providing a kit, packaging of the insulating assembly in a delivery state may be facilitated in that a greater reduction of the required shelf space during storage, and freight volume during shipping may be achieved, this resulting in a reduction costs. Furthermore, the reduced space requirement of

the packaged compact assembly potentially results in an overall smaller package, which increases ease of handling prior to unpacking and consequently increases safety for the user who is to install the assembly on an inclined roof structure.

[0041] In a preferred embodiment, said at least one other element is a rigid element, such as a top frame covering providing a cavity adapted for fitting over a top frame member and in which said compact assembly may be fitted in the delivery state. In this manner, the at least one other element may advantageously contribute to retaining the insulating assembly in a compact assembly in a delivery state.

[0042] In another embodiment the kit has a top insulating assembly piece adapted to be of equal or smaller size to the largest dimension of said at least one other element. With such an arrangement, convenience, ease of installation and safety during installation are further favoured as the installer will find a top insulating assembly piece packed inside the other element for installation and ready to be abutted against a top frame member when the other element, such as a top cover, is positioned above the frame.

[0043] The provision of a kit may also increase the ease of manipulation of the insulating assembly, since including several elements for installing a roof window frame in one package means that the installer will have the kit elements available at one same time. This may advantageously lead to the installer not forgetting and/or to it not being easy to circumvent the installation of the insulating assembly. This may result the perceived quality of the final installation being increased.

[0044] Any feature described with reference to one aspect throughout this application also applies to other aspects unless otherwise stated.

[0045] Other presently preferred embodiments and further advantages will be apparent from the subsequent detailed description and drawings.

Brief Description of Drawings

[0046] In the following description embodiments of the invention will be described with reference to the schematic drawings, in which

Fig. 1 is a perspective view of a section of an embodiment of an insulating assembly mounted between a window frame and a flashing frame element.

Fig. 2 is a section of an embodiment of an insulating assembly mounted between a window frame member and a flashing frame element and above a most exterior plane of the supporting roof structure elements.

Fig. 3 shows alternative hinge constructions in four embodiments of the insulating assembly.

Fig. 4 is an exploded view of a hinge formed by a pin and knuckle construction.

Fig. 5 shows a hinge composed by moving parts with insertable hinge leaves and insulating assembly pieces with slots.

Fig. 6 shows the folded insulating assembly according to the invention.

Fig. 7 shows an embodiment of a kit of elements comprising a compact assembly fitted within another installation element for a roof window.

15 Description of Embodiments

[0047] Referring initially to Fig. 1, the general configuration of the elements composing an embodiment of the insulating assembly 3 and their relation to the window frame 1 in the mounted condition is shown. The roof window frame 1 and insulation assembly 3 are to be arranged within an opening in the roofing (not shown) and roofing supporting structure R of a roof as shown in Fig. 2. Roofing is layered on underlying supporting structure R and is, thus, the part of the roof that is on the exterior of the building. An interior-exterior dimension is defined by a direction extending from the interior of the building to the exterior of the building as shown by the arrow I-E in Fig. 2. Roofing can be composed by any type of common roofing materials, such as tiles, slates, profiled metal sheets, thatching or other. The underlying supporting structure R is typically composed of cross work of battens and rafters, which in combination define the inclination of the roof. In some cases, a water-proofing roofing felt is placed at the battens or in some other way within the roof structure to provide additional water-proofing. To arrange an opening in said roof structure, one typically must remove the roofing material from a chosen area of the roof and cut and clear battens from the area.

[0048] Still referring to Fig. 1, the hinges 311 between the various insulating assembly pieces 31, 32, 33 enable easy adjustment of the angle between them during, e.g. folding and unfolding of the insulating assembly 3, while maintaining them attached to each other. These insulation assembly pieces run along the length of window frame members 11, 12, 13 have substantially the same length as these. Hinges 311 are here located to coincide with the four window frame corners, thus providing for the establishment of the required angles between insulating assembly pieces 11, 12, 13 around window frame 1. The number of hinged pieces may, however, vary, the presence of hinges along one frame member 11, 12, 13 also being contemplated. Also, the incorporation of fewer hinges than the typical four window frame corners is also contemplated. The number of insulating assembly pieces 31, 32, 33 may be any number to fit the space requirement in the delivery state and to fit around the outer perimeter defined by the outer sides of the roof penetrating structure

members 11, 12 in the mounted state. In the embodiment shown in Fig.1, only two hinges are provided, which connect three insulating assembly pieces 31, 32, 33 tightly abutting window frame members 11, 12, 13 and in a "goal-post" configuration. In this a case, a second insulating assembly element is provided to form a fourth insulating assembly piece 34. All insulating assembly pieces may be shaped in a particular form to allow for a tight fit against the corresponding window frame member. The fourth assembly piece 34 is here shaped with a triangular shaped cross-section, and has a reduced cross-section area with respect to that of other insulating assembly pieces, to allow for sufficient space for accommodation of additional roof window assembly parts commonly installed around the bottom frame member.

[0049] Insulating assembly piece 34 may be integrated with the other insulating assembly pieces, hinged to insulating assembly pieces 32, 33 to form the insulating assembly 3.

[0050] Insulating assembly pieces 31, 32, 33, 34 are made of a low thermal-conductivity material such as mineral wool, cellulose, polyurethane foam, foamed ABS or any other material deemed advantageous for thermal, wind and/or sound insulation, or for the simplified method for correctly installing an insulating assembly. Shape, size and thickness are not limited to any particular values, rather it is the general intent to restrict the use of insulating material to a volume that will guarantee an effective insulation according to the specific material used and the expected temperature differential between interior and exterior environments.

[0051] Referring now to Fig. 2, a cross-section of a window frame member 11 is shown, along with an insulating assembly piece 31 and a flashing member 21. In the embodiment shown, insulating assembly piece 31 is shaped with a triangular cross section such that its exterior side is narrower than the interior side, which rests on roofing supporting structure R. Flashing member 21 rests on top of roof supporting structure R with section 21a and covers insulating assembly piece 31 with its flashing member section 21b, following its profile and ensuring a tight assembly. The insulating assembly piece 31 resting on roofing supporting structure R and being in tight abutment with the outer side 11d of the window frame member provides an interruption of the potential thermal bridge through the window frame member portion that is extending above the roofing supporting structure R.

[0052] Turning now to Fig. 3, hinges 311 connect insulating assembly pieces 31 and 32. As described herein, hinges may be made of flexible material or of moving components.

[0053] In the embodiment shown in Fig. 3a, the material of which the insulating assembly pieces are formed is continuous between two of said pieces 31 and 32. The thickness however is reduced at the hinge 311 with respect to that of insulating assembly pieces 31 and 32, thus creating a groove lying substantially perpendicular to the largest dimension of the insulating assembly piece.

This groove provides a weakening in the material, so that it is relatively easy to bend, and thus defines a hinge axis M.

[0054] In the embodiment shown in Fig. 3b, a separate hinge 311 comprising moving components (not shown) is provided for the purpose of hinging two insulating assembly pieces 31, 32. Here a piano hinge is contemplated, but any hinge comprising moving components of the spring, barrel, pivot, mortise, case, concealed, butterfly (parliament or dovetail), flag, strap or H type, or of any other construction type deemed appropriate or advantageous may be used. In particular, hinges comprising moving components that allow for the detachment of the insulating assembly pieces are considered.

[0055] In the embodiment shown in Fig. 3c, a living hinge is constructed 311 with the use of a flexible component adhered to the insulating assembly pieces 31, 32. Such a flexible component may be composed of a cloth- or scrim-backed pressure-sensitive tape, coated on at least one side with low-density polyethylene (LDPE) or other appropriate natural or synthetic polymer adhesive. The threads or fill yarn of the fabric may be cotton, such as in the case of gaffer tape, or contain polyester, nylon, rayon or fiberglass. Another variation is heat-resistant foil (not cloth) useful for adjoining insulating assembly pieces 31, 32 in situations where high temperatures are expected.

[0056] In the embodiment shown in Fig. 3d, a material with higher compressibility than that of the material of which the insulating assembly pieces is made is inserted in an analogous groove to that described in Fig. 3a. By compressibility it is understood that a higher relative volume change in response to a change in pressure or mean stress is achieved. Such a characteristic may be measured by applying Young's modulus in response to linear stress.

[0057] Yet another embodiment is shown in the exploded view of Fig. 4, where insulating assembly piece cut-outs 312 provide for a swivelling interlocking box-joint. The arrangement is held together by a hinge pin 3111, which is inserted through hinge knuckles 3112 provided in each interlocking part. Interlocking parts may be rounded off to permit rotation around hinge pin 3111. Hinge pin 3111 may be made of polymer plastic or other hardened synthetic polymer-based materials, such as hardened resins, wood or metal.

[0058] Fig. 5 shows an exploded view of one embodiment of hinge 311 comprising moving parts as shown in Fig. 3b. Here, a hinge pin 3111 holds hinge leaves 3113, 3114 together when inserted through hinge knuckle 3112a, 3112b. Hinge leaves 3113, 3114 further comprise retaining means 3116. In the embodiment shown, retaining means 3116 are barbed protrusions emerging from the surface of hinge leaves 3113, 3114. Such barbed protrusions allow for easy insertion of leaf 3113 into slot 3115, provided in a side of an insulating assembly piece 31, yet hinder their detachment once in place. A similar slot (not shown) to slot 3115 is provided in insulating as-

sembly piece 32 for receiving hinge leaf 3114. Such a hinge may be made of polymer plastic or other hardened synthetic polymer-based materials, such as hardened resins, wood or metal.

[0059] In Fig. 6 the general configuration of an embodiment of the compact assembly 4 is shown. The number of insulating assembly pieces 31, 32, 33 may be any number to fit the packaging space requirement in the delivery state (e.g. Fig. 7) and to fit around the outer perimeter defined by the outer sides of the roof window frame members 11, 12, 13 (Fig. 1) in the mounted state. In the embodiment shown in Fig. 6, five insulating assembly pieces are retained in a compact delivery state by a retainer device 5.

[0060] Retainer device 5 is a plastic band including a layer of adhesive allowing attachment to itself after being wrapped around insulating assembly pieces 31, 32, 33 to form compact assembly 4. Retainer device 5, however, may be any device of any shape and made of any material deemed useful for the retention of compact assembly 4 in a compact delivery state. Typically, retainer device 5 is a band made of a paper, cloth or polymer, optionally comprising other materials such as fiberglass filaments or metal foil, and at least partially coated with an adhesive. Adhesives may include common gum-based adhesives, pressure-sensitive adhesives, water-activated adhesives such as starch, hot-melt atactic polypropylene or other heat activated adhesives, amongst others. Retainer device 5 may also be a double-sided adhesive band, a strap, a thread or comprise any type of interlocking mechanism such as a hook and eyelet, hook-and-loop type fastener such as that produced by Velcro® or intertwining thread bites. Retainer device 5 may also be a spot of glue on the inner side of insulating assembly piece 31, 32, 33, 34, 35, which facilitates attachment to the outer side of another such piece and retains the insulating assembly in a compact assembly 4. Retainer device 5 additionally comprises, in the embodiment shown, a tab useful for engagement and dis-engagement of the retainer device, and displays information useful for the correct use of the assembly 4 and/or the retaining device 5.

[0061] In Fig. 7 a kit of elements 7 for installation in a roof window assembly is shown and comprises the compact assembly 4 packed into another installation element 6 for use with a roof window, here a top frame cover element. Said top frame cover element 6 provides a cavity in which the compact assembly 4 is fitted in the delivery state. Retaining element 5 retains at least insulating assembly pieces 34 and 35 to form a compact assembly 4.

[0062] The invention is not limited to the embodiments shown and described in the above, but various modifications and combinations may be carried out.

List of reference numerals

[0063]

1	1	window frame
	11	first window frame member
	11a	interior side
	11b	exterior side
5	11c	inner side
	11d	outer side
	12	second window frame member
	13	third window frame member
	14	fourth window frame member
10	2	flashing frame
	21	flashing frame member
	21a	first flashing frame member section
	21b	second flashing frame member section
	3	insulating assembly
15	31	first insulating assembly piece
	311	hinge
	3111	hinge pin
	3112a	hinge knuckle
	3112b	hinge knuckle
20	3113	first hinge leaf
	3114	second hinge leaf
	3115	slot
	3116	hinge leaf retaining means
	312	insulating assembly piece cut-out
25	32	second insulating assembly piece
	33	third insulating assembly piece
	34	fourth insulating assembly piece
	35	fifth insulating assembly piece
	4	compact assembly
30	5	retaining device
	6	roof window installation element
	7	kit
	R	roofing support structure
	M	hinge axis
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Claims

1. A method of installation of a roof window in an inclined roof structure comprising roofing and roofing supporting structure (4), said method including the steps of:
- providing a window frame (1) in an opening in a roof structure, said window frame comprising a plurality of frame members (11, 12, 13), each frame member (11) having an interior side (11a) facing the interior of the building in the mounted state, an exterior side (11b) facing the exterior of the building in the mounted state, an inner side (11c) and an outer side (11d), an interior-exterior (I-E) dimension being defined by a direction extending from the interior side (11a) to the exterior side (11b),
- providing an insulating assembly (3) adapted for abutment against the outer side (11d) of the corresponding window frame member (11) comprising a plurality of insulating assembly pieces

- (31, 32, 33) wherein at least one first insulating assembly piece (31, 32, 33) is hinged to at least one second insulating assembly piece (31, 32, 33) with at least one hinge (311), arranging at least one insulating frame piece (31, 32, 33) on the roof structure aligned with a side of said opening in said roof structure and/or abutting an outer side of a frame member of said window frame, and using said at least one insulating assembly hinge (311) to adjust the angle between said insulating assembly pieces (31, 32, 33) in a plane substantially parallel to said roof supporting structure (4) to be substantially aligned with at least one side of said opening in said inclined roof structure and/or abutting at least one outer side of a frame member of said window frame.
2. The method of installation of a roof window in an inclined roof structure according to claim 1, wherein the method comprises the additional steps of:
- providing a flashing frame (2) including flashing members (21, 22, 23, 24), each flashing member (21) having a first section (21a) and a second section (21b), and securing the flashing frame (2) around the window frame (1) in such a manner that the first section (21a) of each flashing member (21) lies substantially parallel and exterior to a most exterior plane of the supporting roof structure (4), and the second section (21b) extends to at least partly cover at least one side of the corresponding window frame member (11, 12, 13) and insulating assembly piece (31, 32, 33).
3. The method according to any one of claims 1 or 2, wherein at least one insulating assembly piece (31, 32, 33) is abutted against a window frame member outer side (11b) above said most exterior plane of the supporting roof structure elements.
4. The method according to any one of claims 1 or 2, wherein the insulating assembly pieces (31, 32, 33) are abutted against both a window frame member outer side (11d) and the supporting roof structure at least partly below a most exterior plane of the supporting roof structure elements.
5. The method of installation of a roof window in an inclined roof structure according to any one of the preceding claims, wherein the method comprises the additional step of: adjusting the insulating assembly pieces (31, 32, 33, 34, 35) between a state of delivery, where said insulating assembly pieces are arranged to form a compact assembly (4), and a mounted state, where said insulating assembly pieces are arranged to fit along the outer side of one or more frame members (11, 12).
6. The method according to claim 5, said method further comprising the step of removing a retaining device (5) to allow for adjusting the angle between said two insulating assembly pieces (31, 32, 33, 34, 35).
7. An insulating assembly (3) for installation around a roof window frame (1) in an roof structure (4) including roofing and roofing supporting structure, said insulating assembly comprising a plurality of insulating assembly pieces (31, 32, 33), and wherein the window frame (1) has a plurality of frame members (11, 12, 13), each frame member (11) having an interior side (11a) facing the interior of the building in the mounted state, an exterior side (11b) facing the exterior of the building in the mounted state, an inner side (11c) and an outer side (11d), an interior-exterior dimension being defined by a direction extending from the interior side (11a) to the exterior side (11b) in the mounted condition,
characterized in that, at least one first insulating assembly piece (31, 32, 33) is hinged to at least one second insulating assembly piece (31, 32, 33), in such a manner that the angle between said insulating assembly pieces can be changed within a plane substantially parallel to said roof structure when one insulating frame piece is arranged on the roof structure aligned with a side of an opening in said roof structure and/or is abutting an outer side of a frame member of said window frame.
8. The insulating assembly according to claim 7, wherein said insulating assembly pieces (31, 32, 33) are configured to be above a most exterior plane of the supporting roof structure elements in the mounted condition.
9. The insulating assembly according to any one of claims 7 or 8 wherein the hinging between said at least one first and second insulating assembly pieces (31, 32, 33) is located to coincide with a corner of the window frame (1).
10. The insulating assembly according to any one of claims 7 to 9 wherein said hinging is provided by a groove type hinge, or by a living hinge, or by a hinge comprising high compressibility material, or by a hinge comprising moving parts.
11. The insulating assembly according to any one of claims 7 to 10 wherein said hinging being configured to allow the angle between the insulating assembly pieces to be adjusted between a state of delivery, where the insulating assembly pieces (31, 32, 33, 34, 35) are arranged to form a compact assembly

(4), and a mounted state, where the insulating assembly pieces (31, 32, 33, 34, 35) are arranged to fit along the outer side of one or more frame members (11, 12).

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12. The insulating assembly according to claim 11, wherein a retaining device (5) secures at least one of the insulating assembly pieces (31, 32, 33, 34, 35) in a compact assembly (4) in the state of delivery.

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13. The insulating assembly according to any one of claims 11 or 12, wherein the first insulating assembly piece (31, 35) is a top insulating assembly piece adapted to match the largest dimension of a top frame member (11).

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14. A kit of elements for use in a roof window, comprising an insulating assembly according to any one of claims 7 to 13, and at least one other element (6) for installation in a roof window, wherein the compact assembly (4) is of a shape and size permitting it to be packed together with said one other element (6) in the delivery state.

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15. The kit according to claim 14, wherein said at least one other element (6) is a rigid element, such as a top frame covering, providing a cavity in which said compact assembly (4) may be fitted in the delivery state.

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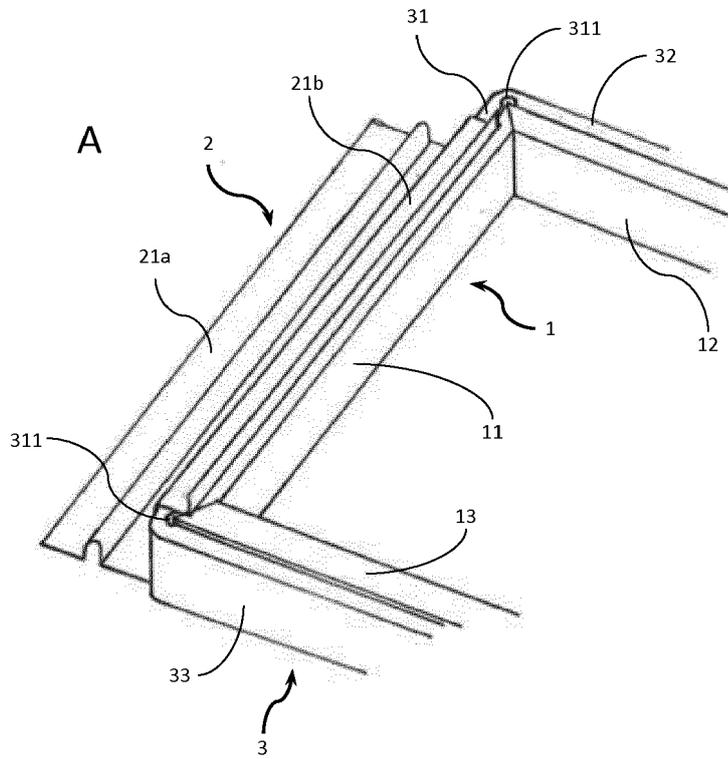
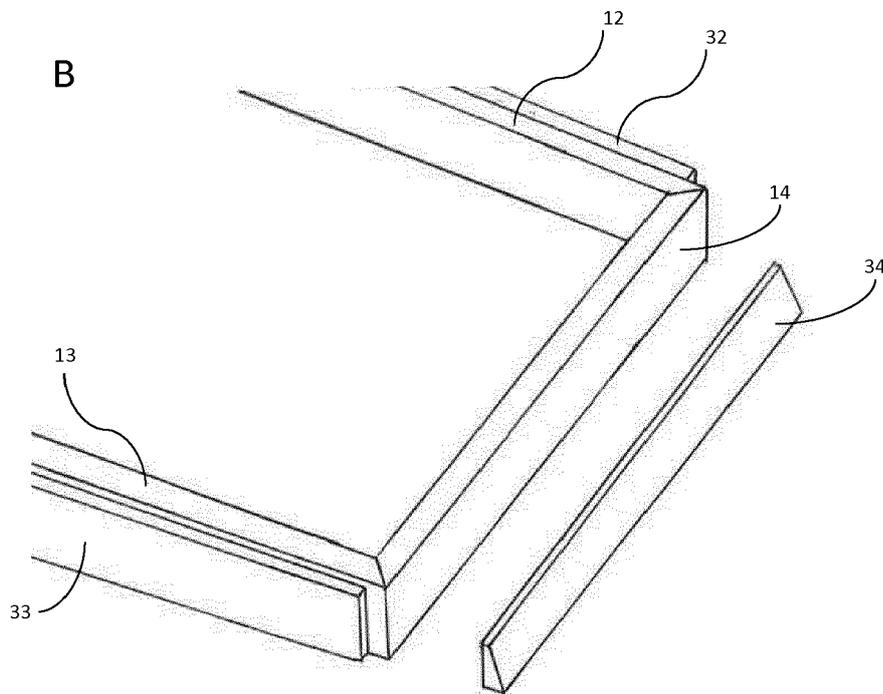


Fig. 1



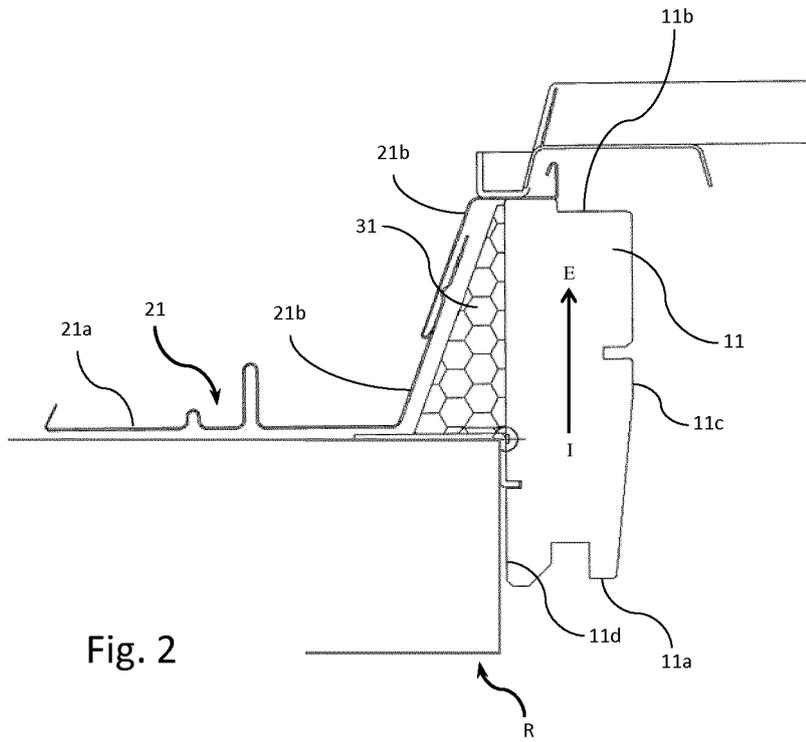


Fig. 2

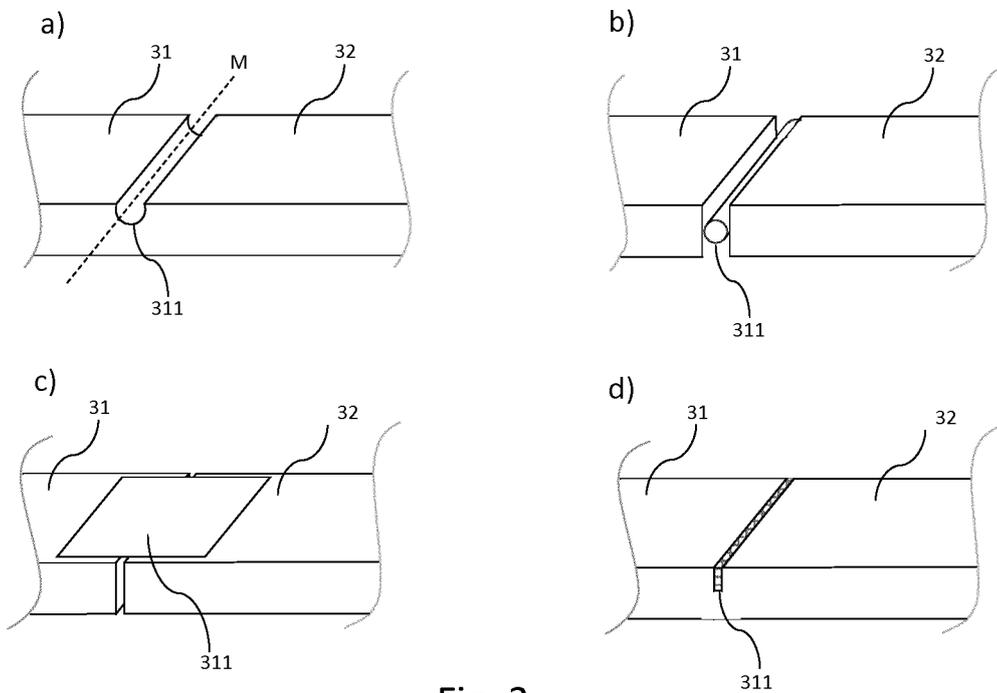


Fig. 3

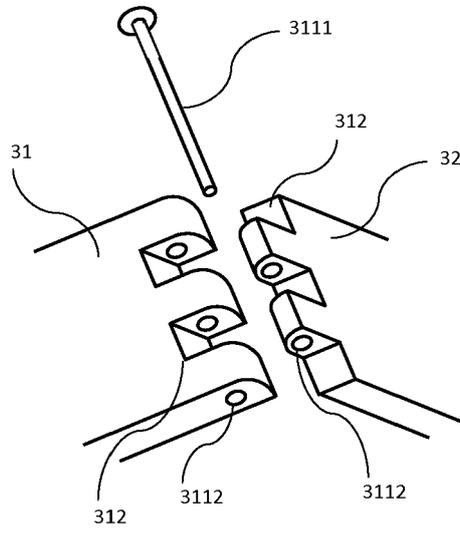


Fig. 4

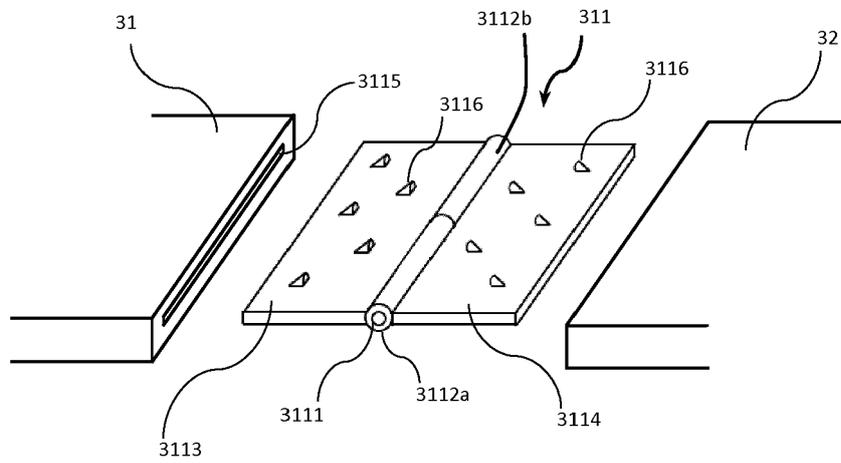


Fig. 5

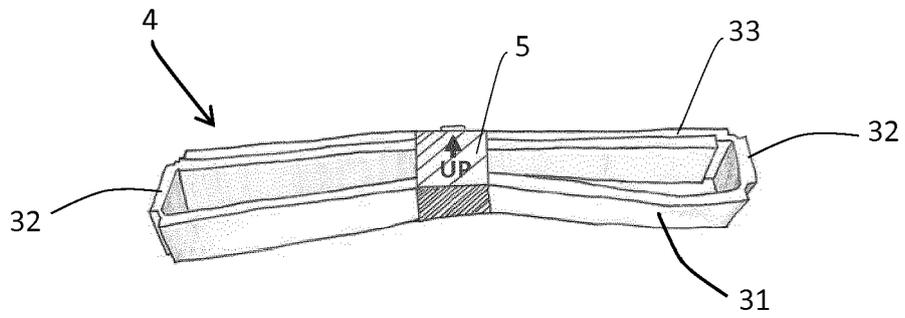


Fig. 6

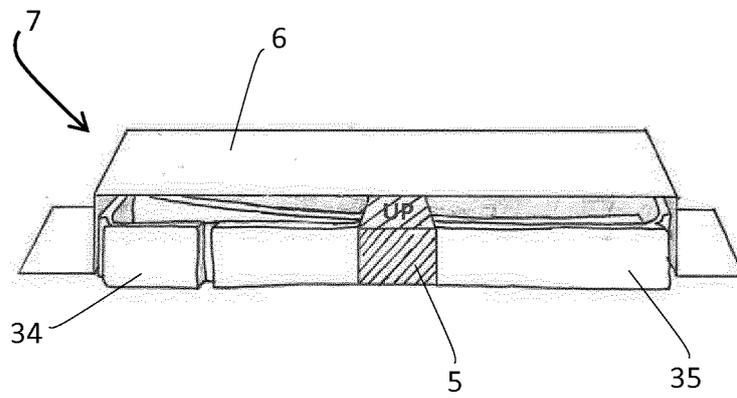


Fig. 7



EUROPEAN SEARCH REPORT

Application Number
EP 18 20 7392

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			E04D
Place of search		Date of completion of the search	Examiner
The Hague		16 May 2019	Tran, Kim Lien
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