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(54) A ROOF WINDOW COMPRISING A COVERING SET FOR COVERING AN ELEMENT OF THE ROOF WINDOW, AND A METHOD OF ASSEMBLING A ROOF WINDOW

(57) In a roof window (100), a covering set (10) is provided for covering an element (1) of the roof window (100). The covering set (10) comprises at least one fastening element (7) for being inserted into a component (121, 131, 141) of the roof window (100) and one or more covering elements (12, 13, 14, 15, 16) including at least one opening (14a) for receiving a respective fastening element (7). Each fastening element (7) comprises a head portion and a body portion, and at least the head portion (72) comprises a magnetic or magnetisable material.

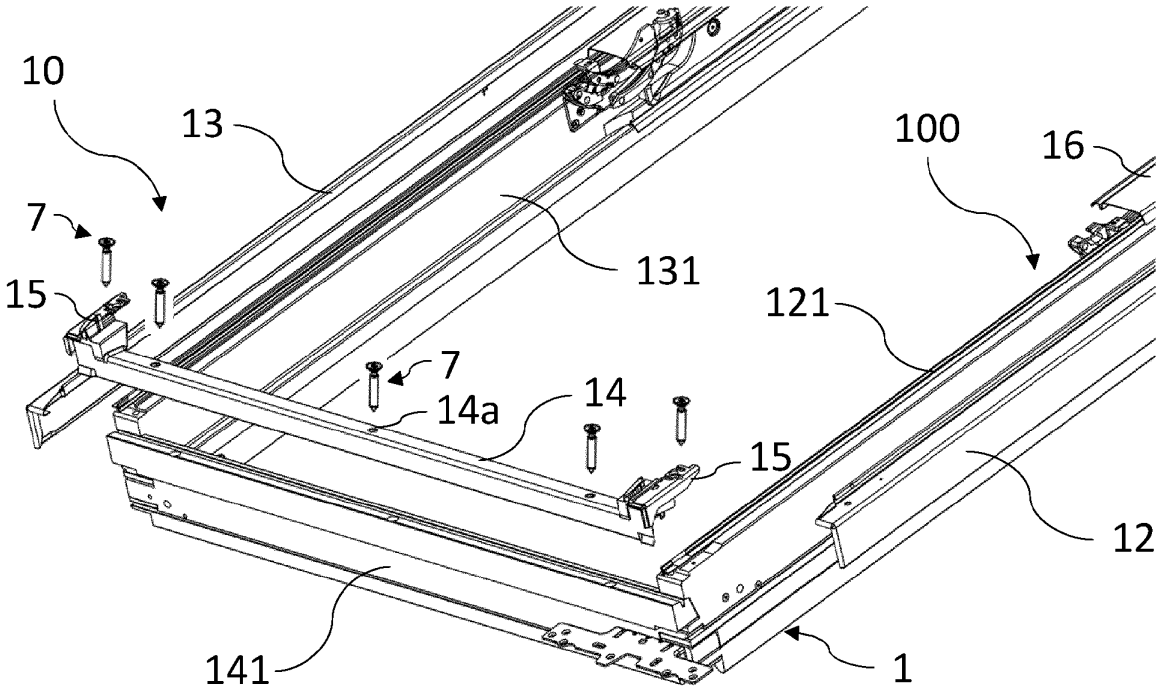

Fig. 3

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Description

Technical Field

[0001] The present invention relates to a roof window comprising a covering set for covering an element of the roof window. The invention furthermore relates to a method of assembling such a roof window.

Background Art

[0002] Roof windows has been known for years, and the presence of such roof windows in roof structures of buildings has greatly improved light intake in the buildings. When assembling windows, especially roof windows, a safe and rapid solution is required to guarantee the quality of the installation. In detail, having a simple and easy to assemble solution both guarantees a safer installation and a faster installation that would help in performing the installation in ideal weather conditions.

[0003] To withstand the exposure to different weather conditions, interior portions of the roof windows are protected by covering elements that are placed and fastened to the exterior surface of the roof window, i.e. the frame and the sash. The covering elements themselves also need to be fastened to the roof window, and consequently the fasteners, typically including screws, used for assembly are fastened using a power tool handled by the installer. Alternative solutions including snap engagement with components subjacent the covering element such as the hinge are known in the art. However, not all covering elements are suitable for such snap engagement, and hence the need for separate fastening elements remains.

[0004] Due to the need for protection against the exposure to the weathering, the fastening elements are typically made of metal comprising a stainless material. During assembly and installation of the roof window, at least some of the steps include fastening the covering elements manually to the roof window at the installation site. This applies in particular to covering elements covering components of the frame, which are typically provided as parts of an installation kit comprising flashing and insulation assemblies, and which are only connected to the frame once the frame has been installed in the roof structure.

Summary of Invention

[0005] It is an object of the present invention to provide a roof window with a covering set by which it is possible to facilitate the assembly and installation conditions.

[0006] According to a first aspect of the invention, this and other objects are achieved by means of a roof window comprising a covering set for covering an element of a roof window, the covering set comprising:

- at least one fastening element for being inserted into a component of the roof window, wherein each fastening element comprises a head portion and a body portion, and wherein at least the head portion comprises a magnetic or magnetisable material, and
- at least one covering element including at least one opening for receiving a respective fastening element.

[0007] By providing a roof window with the above characteristics a simpler and more versatile configuration is achieved and easier assembly and installation of the roof window is provided. Since at least the head portion is made of a magnetic or magnetisable material, it is possible to temporarily hold the fastening element by a suitable tool and align the fastening element with an associated opening in the covering element; furthermore, if the fastening element is unintentionally dropped during assembly, it will be attracted by any ferromagnetic material present in the roof window, including the covering element itself.

[0008] Since it is in principle only necessary for the head portion to comprise magnetic or magnetisable material to provide for the easy assembly and installation aimed at, it is conceivable to form the head portion form one material and the body portion from another. In a presently preferred embodiment, however, the body portion of the fastening element comprises the same material. Typically, this will reduce the production costs since manufacture of the fastening element is cheaper.

[0009] In a development of this embodiment, the fastening element is a self-tapping or self-drilling screw, in particular a self-tapping or self-drilling wood screw with a countersunk head portion. This contributes to the easy assembly and installation aimed at.

[0010] Due to the severe outdoor exposure of a roof window, the weathering durability of exterior components needs to be far above the durability of for instance façade windows. This requirements also extends to the fastening elements that have a critical function in holding the covering elements in place. To this end, the fastening element preferably comprises a ferromagnetic or ferrimagnetic stainless material.

[0011] While the weathering durability of the fastening elements is preferably high, it is also preferred that the fastening elements is nonetheless easy to manufacture. Thus, in a presently preferred embodiment, the fastening element has a tensile strength below 800 N/mm^2, preferably below 600 N/mm^2, most preferred between 470 N/mm^2 and 590 N/mm^2.

[0012] It is furthermore preferred that the fastening element (7) has a yield strength, Rp0.2, of at least 280 N/mm^2, preferably between 330 N/mm^2 and 440 N/mm^2. This has proven to give a satisfactory strength.

[0013] In another embodiment, the fastening element has an elongation between 20% and 30%. In this way, accommodation of movements pf the covering elements naturally occurring in use of the roof window is ensure without the risk of breakage of the fastening elements.

[0014] In a presently preferred embodiment, the material of the fastening element comprises ferritic stainless steel. This material has proven to perform particularly well in manufacture, during assembly and in use.

[0015] In a development of this presently preferred embodiment, the composition of the ferritic stainless steel comprises more than 20% Cr, preferably more than 22% Cr, most preferably more than 23% Cr.

[0016] Additionally or alternatively, the composition of the ferritic stainless steel comprises an alloy in which at least a selection of at least five of the following elements has been included: Cr, C, Si, Mn, Ni, Mo, N, P and S. It may also be considered that the compositions comprise alloys in which at least a selection of at least five of the following elements is included: Al, Cb, Cr, C, Si, Mn, Ni, Nb, Mo, N, P, S and Ti.

[0017] In another embodiment, the ferritic stainless steel has been subjected to annealing. Without wishing to be bound by any theory, it is believed that by subjecting the ferritic stainless steel to annealing increases its ductility and reduce its hardness, making it more workable. In one exemplary embodiment, the ferritic stainless steel is 100% ferritic after annealing

[0018] It a particularly advantageous embodiment, the fastening element is configured to be at least temporarily connectable to a tool during installation of the roof window, in particular a magnetic screwdriver bit connected to or connectable to a screwdriver, preferably comprising a magnetic or magnetisable screwdriver bit holder.

[0019] In a second aspect of the invention, a method of assembling a roof window is provided. Advantages relevant to the first aspect also relate to the second aspect and vice versa.

[0020] It is noted that the invention relates to all possible combinations of features recited in the claims.

Brief Description of Drawings

[0021] The present invention will now be described in more detail with reference to the appended drawings showing embodiment(s) of the invention.

Fig. 1 is a perspective view of a roof window in an embodiment of the invention;

Fig. 2 is a side view of a fastening element according to an embodiment of the invention;

Fig. 3 is an exploded perspective view of the bottom part of a frame of the roof window in an embodiment of the invention;

Fig. 4 is an exploded perspective view of the top part of the frame of the roof window shown in Fig. 3; and

Fig. 5 is an exploded perspective view of the bottom part of a sash of the roof window in an embodiment of the invention.

Description of Embodiments

[0022] In the figures of the drawings, embodiments of a roof window according to the invention are shown.

[0023] In the figures, the sizes of layers and regions are exaggerated for illustrative purposes and, thus, are intended to illustrate the general structures of embodiments of the present invention. Like reference numerals refer to like elements throughout, even though they may not be identical.

[0024] Referring initially to Fig. 1, a roof window 100 comprises a number of elements including a frame 1, a sash 2 and a pane 3. In the embodiment shown, the sash 2 is openable relative to the frame 1 around a hinge axis α.

[0025] The roof window could also have additional or alternative features relating to the frame, sash and pane etc. It could be a fixed frame with a pane, a frame with a sash being fixed or able to turn around a centre, top, bottom or side axis. Alternatively or additionally, the frame could hold a ventilation device, solar panel etc.

[0026] In the roof window 100, a covering set 10 is provided for covering one or more of the elements of the roof window 100, i.e. in the embodiment shown, such elements comprise the frame 1, the sash 2 and the pane 3. The covering elements cover one or more of the elements at least partly in a mounted condition of the roof window 100.

[0027] The covering set 10 comprises at least one fastening element 7, typically a plurality of fastening elements 7 which may either be identical to each other or vary in shape and size.

[0028] Fig. 2 is a side view of the fastening element 7 according to an embodiment of the invention. The fastening element 7 comprises a body portion 71 and a head portion 72. At least the head portion 72 comprises a magnetic or magnetisable material. The head portion 72 and the body portion 71 of the fastening element 7 typically comprises the same material, namely a ferromagnetic or ferrimagnetic stainless material.

[0029] The fastening element 7 according to the present invention offers easy assembly of the components of the roof window during installation, without compromising the durability and weatherproofing of the fastening element 7 and the covering elements of the roof window. It is thus understood that the fastening element 7 according to the present invention fulfils the requirements both for the chemical composition and for accelerated tests, the latter used to determine lifetime of the product. In particular, the person skilled in the art will appreciate that the fastening element according to the invention comprises magnetic or magnetisable material which is subject to limited corrosion caused by e.g. weather conditions.

[0030] In one exemplary embodiment, the fastening element 7 comprises ferritic stainless steel in which the composition of the ferritic stainless steel comprises more than 20% Cr, preferably more than 22% Cr, or even more than 23% Cr. Example of suitable compositions of the ferritic stainless steel comprise alloys in which at least a selection of at least five of the following elements is included: Cr, C, Si, Mn, Ni, Mo, N, P and S.

[0031] A further example of suitable compositions of the ferritic stainless steel comprise alloys in which at least a selection of at least five of the following elements is included: Al, Cb, Cr, C, Si, Mn, Ni, Nb, Mo, N, P, S and Ti.

[0032] It is also possible to subject the ferritic stainless steel to annealing. The person skilled in the art will be aware of materials that are conceivable. The inventors have found that ferritic stainless steel, which is not a standard choice for fastening elements of roof windows, in addition to its magnetic properties offers sufficient resistance to corrosion, thus, fulfilling the requirements for lifetime of the product. This goes against tradition within the field of roof windows, in which austenitic stainless steel has been the norm due to its recognized durability to atmospheric corrosion.

[0033] In a further exemplary embodiment, the composition of the ferritic stainless steel comprises at least Cr and Mo, wherein the amount and distribution of Cr and Mo is chosen so as to provide a substantially rust-proof fastening element. The person skilled in the art will know how to determine such content and distribution. In one embodiment, the composition of the ferritic stainless steel comprises Cr as its main alloying element and at least four additional alloying elements selected from the list comprising Al, C, Cb, Si, Mn, Ni, Nb, Mo, N, P, S and Ti, wherein if present in the composition, the additional alloying element is present in an amount below 4%, e.g. in an amount below 2.5%.

[0034] It is preferred that the fastening element 7 has a tensile strength below 800 N/mm^2, preferably below 600 N/mm^2, most preferred between 470 N/mm^2 and 590 N/mm^2. The yield strength, Rp0.2, of the fastening element 7 lies at least 280 N/mm^2, preferably between 330 N/mm^2 and 440 N/mm^2 and the fastening element (7) has an elongation between 20% and 30%. The person skilled in the art will know how to determine the tensile strength, the yield strength and the elongation using the appropriate measuring standards available within the field. In a preferred embodiment, the fastening element 7 is chosen with a tensile strength, yield strength and elongation which offers a material which facilitates easy assembly during installation of the roof window.

[0035] In another preferred embodiment, the fastening element 7 comprises ferritic stainless steel which has been subjected to annealing. Without wishing to be bound by any theory, it is believed that by subjecting the ferritic stainless steel to annealing increases its ductility and reduce its hardness, making it more workable. In one exemplary embodiment, the ferritic stainless steel is 100% ferritic after annealing. The dimensions of the fastening element 7 are chosen according to the specific field of application. Within the context of the present invention, the fastening element 7 has a length between 0.2 cm and 5 cm, preferably between 0.5 cm and 2 cm. The head portion 72 of the fastening element 7 has a diameter below 5 mm, preferably below 3.5 mm. The body portion 71 of the fastening element 7 has a diameter of below 4 mm, preferably below 2 mm.

[0036] The body portion 71 comprises a thread 711 which extends over at least the part of the body portion 71 which is intended to be inserted into the material of components of the roof window 100 as will be described in further detail below. To ensure easy assembly, the fastening element 7 is a self-tapping or self-drilling screw, in particular a self-tapping or self-drilling wood screw in which the head portion 72 is countersunk.

[0037] The head portion 72 is provided a screw drive according to specifications and selected among such types as slotted, for instance a cross drive, cruciform such as a Phillips drive, hexalobular such as torx, etc.

[0038] Each fastening element 7 is intended for being inserted into a component of the roof window 100, via an opening in the respective covering element. Referring now also to Figs 3 and 4 showing the frame 1 and Fig. 5 showing the sash 2, the components shown include a top member 111 of the frame 1, side members 121, 131 of the frame 1, and a bottom member 141 of the frame 1, a side member 221 of the sash 2 and a bottom member 241 of the sash 2.

[0039] In the embodiment shown, the covering elements comprise the following:

- a first covering element 11 which forms a top casing to be connected to the top member 111 of the frame 1,
- a second and a third covering element 12, 13 forming side frame coverings to be connected to the side members 121, 131 of the frame 1,
- a fourth covering element 14 forming a bottom frame covering to be connected to the bottom member 141 of the frame 1,
- fifth covering elements 15 in the form of bottom guides which are connected to the fourth covering element 14, i.e. the bottom frame covering, and which are intended to be connected to the side members 121, 131 of the frame 1 to form connection points for the second and third covering elements 12, 13, respectively,
- a sixth covering element 26 in the form of a bottom sash covering to be connected to the bottom member 241 of the sash,
- a seventh covering element 37 in the form of a glazing profile to cover a side edge of the pane 3 and to be connected to the side member 221 of the sash 2,
- an eighth and a ninth covering element 28, 29 forming a lower sash side covering, and
- a tenth and an eleventh covering element 16, 17 forming an upper frame side covering.

[0040] The covering elements to be connected to the components of the roof window 100 by means of fastening elements 7 include one or more openings, here represented by an opening 14a in the fourth covering element 14. It is understood that suitable openings are provided in the remaining covering elements as well, either as pre-formed openings or in the form of markings to be

pierced at assembly or installation.

[0041] The covering elements of the covering set 10 may be provided either together with the elements of the roof window, or separately, for instance forming part of an installation kit comprising flashing and insulation assemblies. Some covering elements are connected to the components of the roof window 100 in a supply condition and they remain in this position throughout installation and use. Others are provided separately; this holds true for the first to fifth covering elements 11, 12, 13, 14, 15 which are only connected to the frame 1 once the frame 1 has been installed in the roof structure.

[0042] A preferred assembly of the roof window once the frame 1 has been installed in a roof surface comprises the following steps for the frame:

F1) fastening of the bottom frame covering 14 and bottom guides 15
F2) fastening of the frame side coverings 12,13
F3) fastening of the upper frame side covering 16, 17, and
F4) fastening of the top casing 11.

[0043] For the sash 2, the following steps apply:

S1) fastening of the bottom sash covering 26
S2) fastening of the sash glazing profile 37 and
S3) fastening of the lower sash side covering 28,29.

[0044] Finally the frame and sash are connected to each other.

[0045] During assembly and installation, the fastening elements 7 are used for fastening the covering elements to the components of the roof window in that each fastening element 7 is temporarily connectable to a tool. While this may in principle be carried out manually by a screwdriver, the operation is typically carried out by means of a magnetic or magnetisable screwdriver bit connected to a power tool.

[0046] Assembly and installation by means of screws furthermore entails the advantage that the covering elements are easily disassembled and the components of the roof window may thus be exchanged or responsibly disposed of at end of life.

[0047] The person skilled in the art realizes that the present invention by no element is limited to the preferred embodiments described above. On the contrary, many modifications and variations are possible within the scope of the appended claims.

[0048] Additionally, variations to the disclosed embodiments can be understood and effected by the skilled person in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measured cannot be used to advantage.

List of reference numerals

[0049]

1 frame
2 sash
3 pane

7 fastening element
71 body portion
711 thread
72 head portion

10 covering set

11 first covering element / top casing
111 component / top member of frame 1

12 second covering element / side frame covering
121 component / side member of frame 1

13 third covering element / side frame covering
131 component / side member of frame 1

14 fourth covering element / bottom frame covering
14a opening
141 component / bottom member of frame 1

15 fifth covering element / bottom guide
16 tenth covering element / upper frame side covering
17 eleventh covering element / upper frame side covering

26 sixth covering element / bottom sash covering
28 eighth covering element / lower sash side covering
29 ninth covering element / lower sash side covering

221 component / side member of sash 2
241 component / bottom member of sash 2

37 seventh covering element / glazing profile

100 roof window

α hinge axis

Claims

1. A roof window (100) comprising a covering set (10) for covering an element (1,2,3) of the roof window (100), the covering set (10) comprising:

- at least one fastening element (7) for being inserted into a component (111, 121, 131, 141, 221, 241) of the roof window (100), wherein each

fastening element (7) comprises a head portion (72) and a body portion (71), and wherein at least the head portion (72) comprises a magnetic or magnetisable material, and
- at least one covering element (11, 12, 13, 14, 15, 16, 17, 26, 28, 29, 37) including at least one opening (14a) for receiving a respective fastening element (7).

2. A roof window (100) according to claim 1, wherein the head portion (72) and the body portion (71) of the fastening element (7) comprises the same material.

3. A roof window according to claim 2, wherein the fastening element (7) is a self-tapping or self-drilling screw, in particular a self-tapping or self-drilling wood screw with a countersunk head portion (72).

4. A roof window (100) according to any one of the preceding claims, wherein the fastening element (7) comprises a ferromagnetic or ferrimagnetic stainless material.

5. A roof window (100) according to any one of the preceding claims, wherein the fastening element (7) has a tensile strength below 800 N/mm^2, preferably below 600 N/mm^2, most preferred between 470 N/mm^2 and 590 N/mm^2.

6. A roof window (100) according to any one of the preceding claims, wherein the fastening element (7) has a yield strength, Rp0.2, of at least 280 N/mm^2, preferably between 330 N/mm^2 and 440 N/mm^2.

7. A roof window (100) according to any one of the preceding claims, wherein the fastening element (7) has an elongation between 20% and 30%.

8. A roof window (100) according to any one of the preceding claims, wherein the material of the fastening element (7) comprises ferritic stainless steel.

9. A roof window (100) according to claim 8, wherein the composition of the ferritic stainless steel comprises more than 20% Cr, preferably more than 22% Cr, most preferably more than 23% Cr.

10. A roof window (100) according to claim 8 or 9, wherein the composition of the ferritic stainless steel comprises an alloy in which at least a selection of at least five of the following elements has been included: Cr, C, Si, Mn, Ni, Mo, N, P and S.

11. A roof window (100) according to any one of claims 8 to 10, wherein the ferritic stainless steel has been subjected to annealing.

12. A roof window (100) according to any one of the preceding claims, wherein the fastening element (7) has a length between 0.2 cm and 5 cm, preferably between 0.5 cm and 2 cm.

13. A roof window (100) according to any one of the preceding claims, wherein the head portion (72) of the fastening element (7) has a diameter below 5 mm, preferably below 3.5 mm.

14. A roof window (100) according to any one of the preceding claims, wherein the body portion (71) of the fastening element (7) has a diameter of below 4 mm, preferably below 2 mm.

15. A roof window (100) according to any one of the preceding claims, wherein the fastening element (7) is configured to be at least temporarily connectable to a tool during installation of the roof window (100), in particular a magnetic screwdriver bit connected to or connectable to a screwdriver, preferably comprising a magnetic or magnetisable screwdriver bit holder.

16. A method of assembling a roof window (100) according to any one of claims 1 to 15, comprising the steps of:

providing a first element of the roof window (100) comprising a frame (1),
providing a second and a third element of the roof window (100) comprising a sash (2) and a pane (3),
providing the covering set (10) comprising a first covering element comprising a top casing (11), a second and a third covering element comprising side frame coverings (12, 13), a fourth covering element comprising a bottom frame covering (14), fifth covering elements comprising bottom guides (15), a sixth covering element comprising a bottom sash covering (26), a seventh covering element comprising a glazing profile (37), an eighth and a ninth covering element comprising lower sash side coverings (28, 29), and a tenth and an eleventh covering element forming upper frame side coverings (16, 17),
installing the frame (1) in a roof structure,
fastening elements of the covering set (10) to the frame (1):

F1) fastening the bottom frame covering (14) and bottom guides (15),
F2) fastening the frame side coverings (12, 13),
F3) fastening the upper frame side coverings (16, 17),
F4) fastening the top casing (11),

fastening elements of the covering set (10) to the sash (2):

S1) fastening the bottom sash covering (26),
S2) fastening the sash glazing profile (37), and
S3) fastening the lower sash side coverings (28, 29), and

connecting the frame (1) and sash (2) to each other to provide the assembled roof window (100).

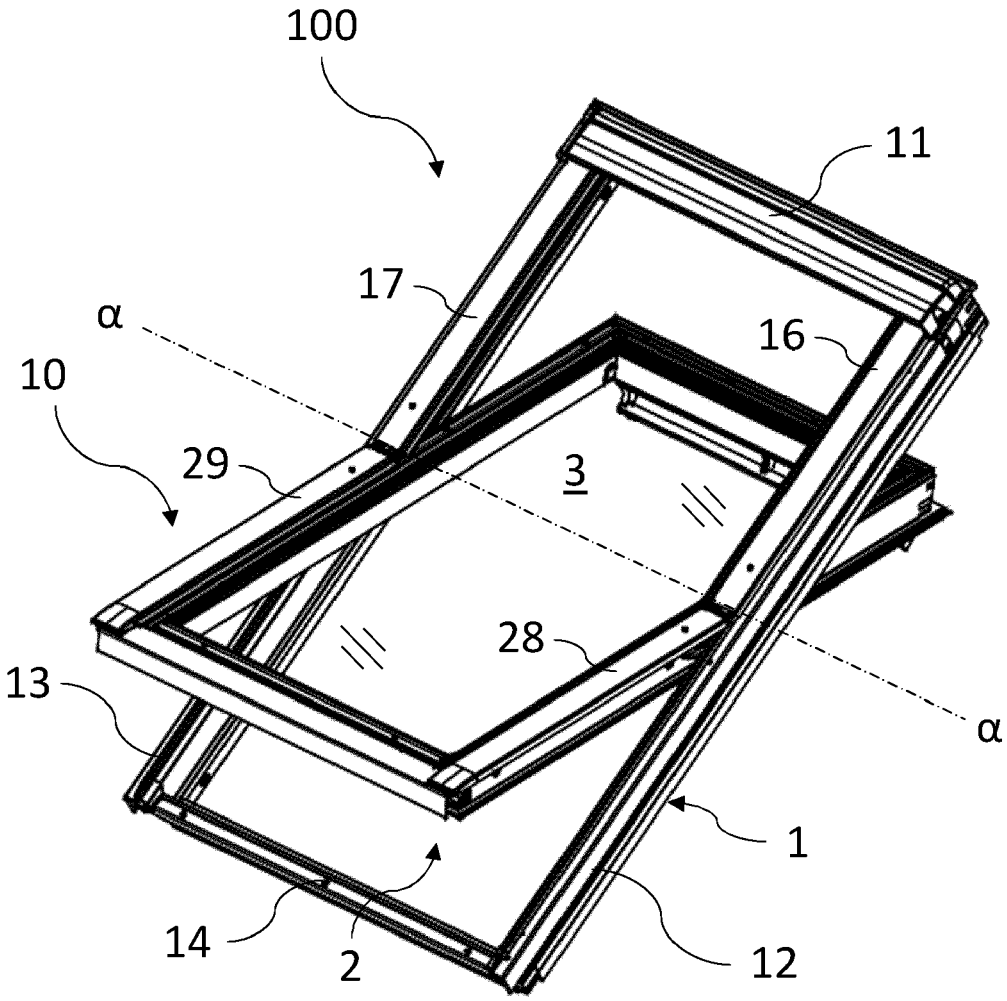

Fig. 1

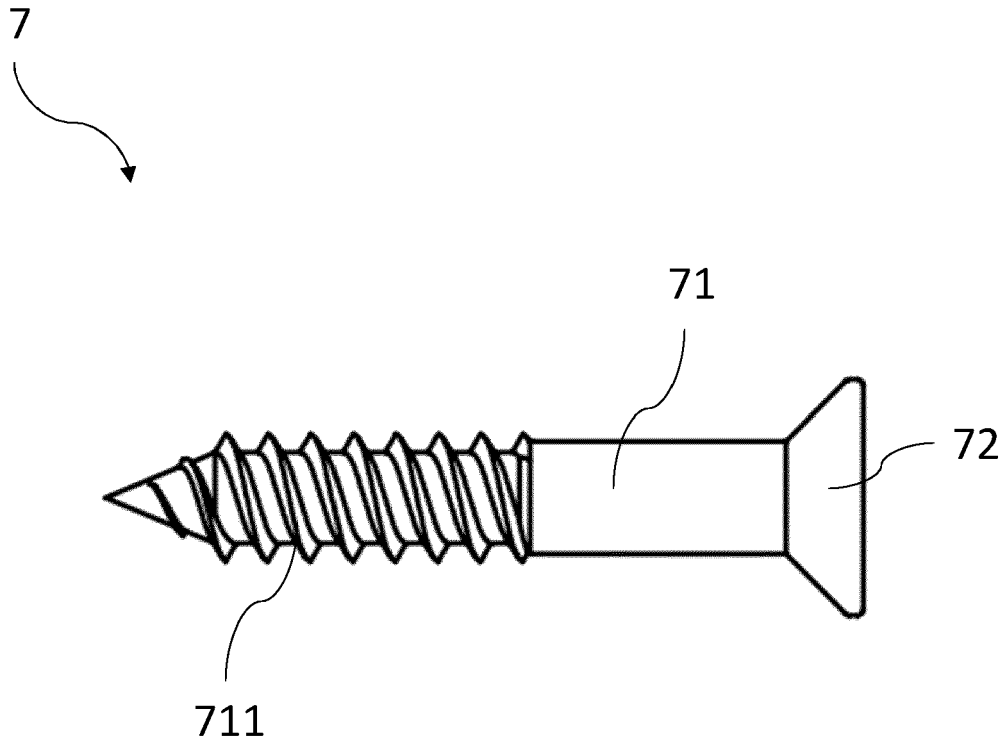

Fig. 2

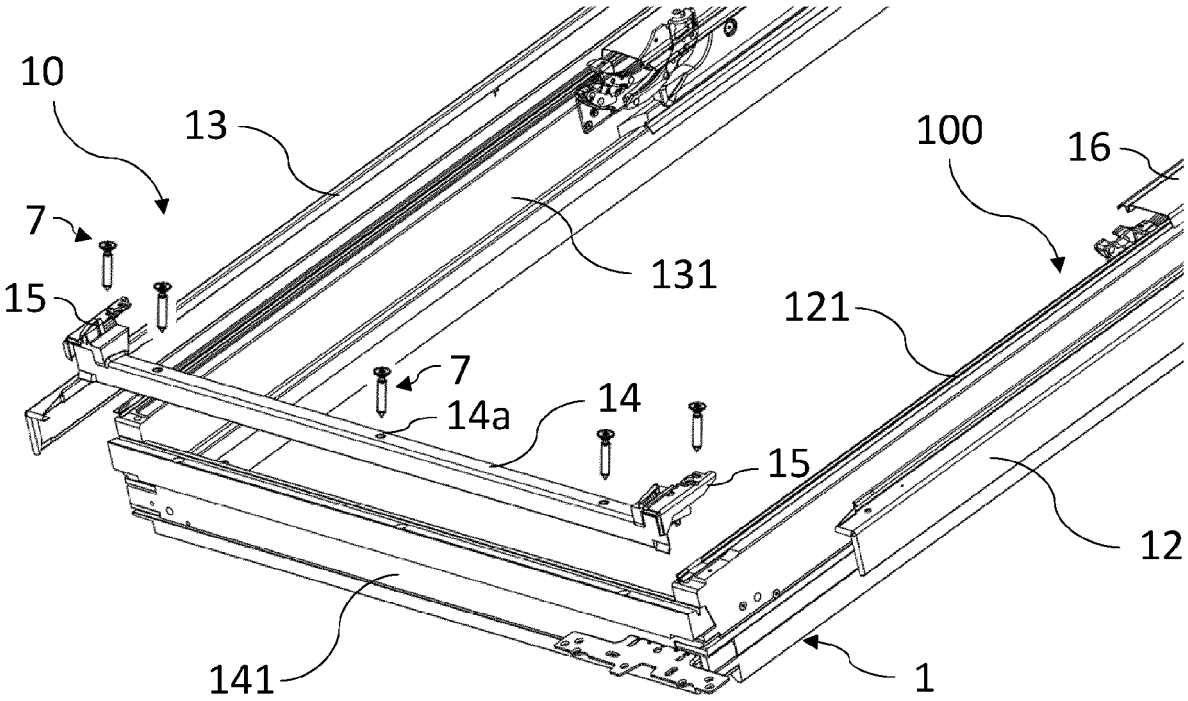
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Fig. 3

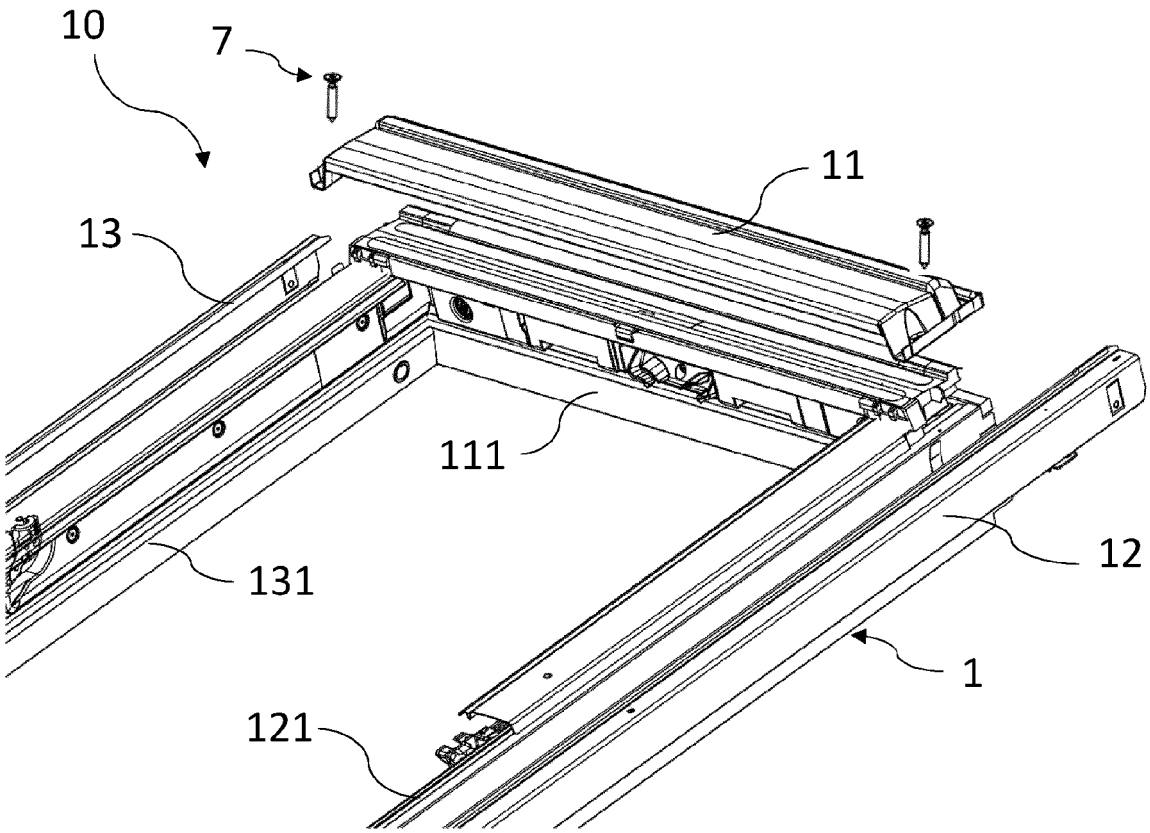
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Fig. 4

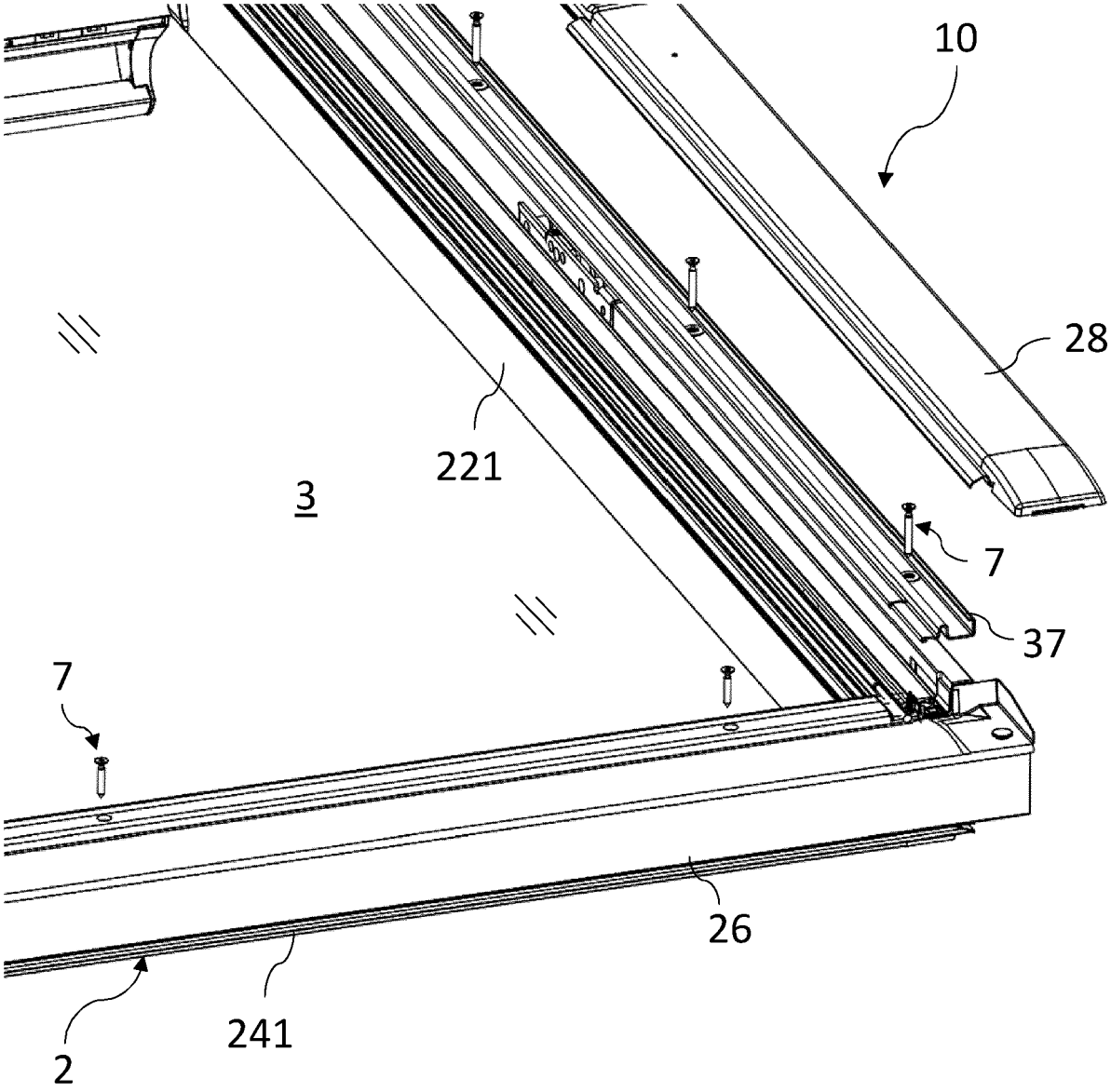

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 22 18 2729

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 751 354 B1 (VKR HOLDING AS [DK]) 25 November 2015 (2015-11-25) * paragraph [0029]; figures *	1-16	INV. E04D13/035

TECHNICAL FIELDS SEARCHED (IPC)

E04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 September 2022	Tran, Kim Lien

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 18 2729

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12-09-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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