(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 957 704 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.12.2015 Bulletin 2015/52

(51) Int Cl.:
E06B 5/16 *(2006.01)* ***E06B 3/70*** *(2006.01)*

(21) Application number: **15173166.8**

(22) Date of filing: **22.06.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA

(30) Priority: **20.06.2014 NL 2013048**

(71) Applicant: **WWP Woodproducts B.V.**
7141 JK Groenlo (NL)

(72) Inventor: **LAAN, Rik**
7141 JK Groenlo (NL)

(74) Representative: **Slikker, Wilhelmina Johanna et al**
Arnold & Siedsma
Bezuidenhoutseweg 57
2594 AC The Hague (NL)

(54) **ASSEMBLY OF A WINDOW- OR DOOR-FRAME AND A WINDOW OR DOOR**

(57) The invention relates to an assembly of a window- or door-frame and a window or door, said window or door being moveable between a first, closed position and a second, open position, wherein said window- or door-frame and said window or door each comprise a laminate comprising a longitudinal extending layer of fire-resistant material interposed between two longitudinal extending layers of wood comprising material, wherein, in said first, closed position, the layers of fire-resistant material of said window- or door-frame and said window or door are aligned.

The invention further relates to a window or door, arranged to be part of such an assembly.

The invention further relates to a window- or door-frame, arranged to be part of such an assembly.

The invention further relates to a method for manufacturing a laminate for a window-frame, a door-frame, a window, or a door.

The invention further relates to a method for manufacturing an assembly of a window- or door-frame and a window or door.

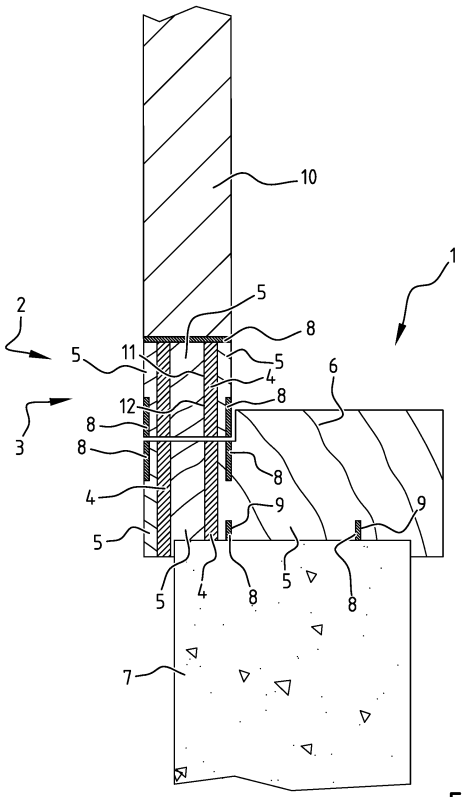

FIG. 1

EP 2 957 704 A1

Description

[0001] The invention relates to an assembly of a window- or door-frame and a window or door, said window or door being moveable between a first, closed position and a second, open position.

[0002] Such an assembly is known per se. Said window-frame, door-frame, window, or door may for example be made of wood, which is generally hardwood to provide sufficient stability and which is fire-resistant. Alternatively said window- or door-frame may be made of a plastics or a metal, which may optionally be filled with a fire-resistant material, such as a foam.

[0003] It is an objective of the invention to provide an improved assembly of the type described in the preamble.

[0004] This objective is achieved by an assembly of the type described in the preamble that is characterized in that said window- or door-frame and said window or door each comprise a laminate comprising a longitudinal extending layer of fire-resistant material interposed between two longitudinal extending layers of wood comprising material, wherein, in said first, closed position, the layers of fire-resistant material of said window or door frame and said window or door are aligned.

[0005] Said assembly according to the invention provides the advantage that it is relatively cheap, as any wood comprising material can be used and no hardwood is required, while it may also provide sufficient fire-resistance as a result of said layers of fire-resistant material being aligned. Because the layers of fire-resistant material are aligned, one substantially continuous fire-resistant layer is provided, thereby forming a good barrier for fire. Said substantially continuous fire-resistant layer may in particular not be interrupted by said wood comprising material, but for example only by a small air clearance between the window or door frame and said window or door in the first, closed position of the window or door. In particular, said layers of fire-resistant material are arranged such that they extend in extension of each other, in particular in their longitudinal directions.

[0006] It is noted that prior art window- or door-frames and windows or doors are generally manufactured and offered by different companies, and are not offered as one assembly. Such window- or door-frames and windows or doors are not matched to each other and are therefore not able to provide a good fire resistance barrier layer. In accordance with the invention, said window-or door-frame is provided together with a window or door as one assembly, such that the window-or door-frame and the window or door, in particular the fire-resistant layers thereof, may be matched to each other, in particular aligned, for forming said one substantially continuous fire barrier. It is noted in this respect that said assembly may be assembled on site, wherein the window- or door-frame and the window or door may thus be offered as different elements intended to be assembled together.

[0007] In the case of said window- or door-frame, said laminate may form the horizontal and vertical peripheral edges of said window- or door-frame. In the case of said window, said laminate may form the horizontal and vertical peripheral edges of said window, wherein said peripheral edges hold a glass panel for forming said window. In the case of a door, said laminate may be formed as a panel forming said door. Alternatively, said laminate may form an edge beam of said door, wherein two such edge beams are arranged vertically and two such edge beams are arranged horizontally, and wherein the edge beams are mutually connected to form an edge frame of said door. In an embodiment of the assembly according to the invention said layer of fire-resistant material may be a material that is poured in a liquid phase between each layer of wood comprising material and then cured in order to form said laminate. For example, said layers of wood comprising material may be made of one piece comprising a cavity in which said material is poured and then cured. In the area of said poured and cured material said laminate is formed.

[0008] Said poured material may both be an expanding, in particular foaming material that expands or foams if the temperature exceeds a certain threshold temperature as in the case of a fire, as well as a material that substantially maintains its shape and form in the case of a fire.

[0009] In an alternative embodiment of the assembly according to the invention said layer of fire-resistant material is glued to each layer of wood comprising material over adjacent longitudinal edges thereof.

[0010] Said layer of fire-resistant material is formed as a longitudinal extending plate or strip and is glued with two of its opposing surfaces to each layer of wood comprising material. Gluing the layer of fire-resistant material to the layers of wood comprising material may take place relatively fast and thereby relatively cheap, without having to cure the fire-resistant material. The applicant has found, that in comparison with a poured and cured fire-resistant material, less CO_2 may be produced during manufacturing said laminate. After gluing said fire-resistant material to said layers of wood comprising material a stable laminate is obtained, and therefore a stable window-frame, door-frame, window or door may be obtained. Also, an improved fire resistance may be obtained with respect to a poured and cured layer, because the presence of air bubbles, which otherwise may be formed during pouring or curing of the liquid fire-resistant material, in the fire-resistant material is prevented or at least reduced.

[0011] In an embodiment of the assembly according to the invention, said fire-resistant material is a mineral bounded fibre-reinforced and/or filler-reinforced plate or strip like material. In particular, said mineral may be calcium silicate or magnesium. Such mineral, in particular calcium silicate or magnesium bounded fibre-reinforced plate or strip like material is not toxic and releases no harmful gasses when burnt. Such a non-toxic fire-resist-

ant material is in particular advantageous in cases where water is used for extinguishing a fire. The water used for extinguishing the fire may comprise parts or pieces of said fire-resistant material and because of it being non-toxic the used water comprising said parts or pieces will not contaminate the soil. In addition, said described fire-resistant material may be cheaper than a poured fire-resistant material. Said fire-resistant material substantially maintains its shape under influence of heat and is in particular not a "foam material".

[0012] It is noted that it is difficult to glue said mineral layer to said two layers of wood comprising material, in particular with respect to the requirements of sufficient stability on the one hand and flexibility in case of a fire on the other hand, which flexibility must be provided with respect to expansion or shrinkage or bending of the wood comprising material which may occur due to the heat of the fire. In addition thereto, said mineral must be machineable, in particular it must be possible to mill or screw said mineral. It took the applicant a long time to find a suitable mineral and then a suitable method to make said laminate comprising said mineral and the two layers of wood comprising material, which laminate fulfills all requirements.

[0013] In yet another embodiment of the assembly according to the invention, said fire-resistant material may be a composite material, in particular a fibre reinforced plastic or polymer. Said polymer may be chosen from, but not limited thereto, the group comprising polyester, vinyl ester, epoxy, acrylate, polypropylene, polyamide, polycarbonate, acrylonitrile butadiene styrene, polybutylene terephthalate, or any combination thereof. Said fibre may be chosen from, but not limited thereto, the group comprising (quartz) glass, mineral, ceramic, carbon, stainless steel, aramide, boron, or any combination thereof.

[0014] Said composite material may be provided as a plate or strip like material that is attached, in particular glued to the layers of wood comprising material, or may be provided in a liquid state and poured between the layers of wood comprising material.

[0015] In yet another embodiment of the assembly according to the invention said fire-resistant material, or a second fire-resistant material comprised in said window- or door-frame and/or in said window or door, is a material that expands upon being heated above a certain threshold temperature. Such a material may expand, in particular foam when heated above said threshold temperature, and thereby fill any existing cavities between the window- or door-frame and window or door and/or between the window- or door-frame and a wall and/or between the window and door and a (glass) panel thereof. Said expanding material may be said fire-resistant material comprised between said two layers of wood comprising material, or an additional fire-resistant material provided in said window- or door-frame and/or in said window or door to provide additional fire-resistance to said window- or door-frame and/or in said window or door.

[0016] If said expanding material is comprised as additional fire-resistant materials in both the window- or door-frame and said window or door, said additional fire-resistant materials are preferably aligned in said first, closed position. This way, said additional fire-resistant materials form an additional one substantially continuous barrier layer between the window- or door-frame and said window or door.

[0017] It is noted that said window- or door-frame and/or in said window or door may comprise any number of such expanding material layers or strips.

[0018] Said two layers of wood comprising material are preferably formed as two separate layers of wood comprising material and in particular not from a solid piece of wood comprising material comprising a longitudinal groove in which said fire-resistant material is introduced. Such a configuration according to the invention comprising said two separate layers of wood comprising material that are mutually connected by said fire-resistant material provides a stable laminate. In particular, under influence of heat as occurring under fire said two layers of wood comprising material may bend in a different direction, such that said bending forces substantially erase each other and said laminate remains relatively straight. Said fire-resistant material bents minimally under influence of heat and holds the two layers of wood comprising material together, thereby providing additional stability to said window-frame, door-frame, window or door in case of fire. Thus, as a result of said laminate structure comprising separate layers of wood comprising material and at least one layer of fire-resistant material provides a stable laminate, in particular under fire. By including more layers of wood comprising material and/or fire-resistant material an even more stable laminate may be obtained.

[0019] An even more stable laminate is obtained when the structures of the two layers of wood comprising material are different. As a result of said structures being different said two layers of wood comprising material tend to bent in a different direction under influence of heat, such that said bending forces substantially erase each other and said laminate remains relatively straight, thus providing a stable window-frame, door-frame, window or door. By providing even more layers of wood comprising material, an even more stable laminate may be provided, because all layers may have different structures and therefore different bending properties.

[0020] In addition or alternatively the structures of the two layers of wood comprising material may be arranged in different directions. In such an arrangement, even when the structures are substantially the same, a stable laminate is provided that remains relatively straight under fire due to different bending directions of the two layers of wood comprising material that result from the structures being arranged in different directions.

[0021] The laminate according to the invention may comprise layers of any type of wood comprising material. In particular any type of hardwood is suitable, since hard-

wood is relatively stable. However, also softwoods such as firwood or pinewood may be used. Also, wood comprising plates, such as plywood or (medium density) fibreboard, may be used. The structure of the wood comprising material may comprise the grain of the wood, or any other structure of the wood comprising material, for example the structure of the fibres of a fibreboard.

[0022] The thickness of the layer of fire-resistant material may be chosen in dependence of the required level of fire resistance. By providing a thicker fire-resistant material a more fire-resistant laminate is obtained. For example, said layer may be between 5 and 25 mm thick.

[0023] A plurality of layers of fire-resistant material may be provided, thereby improving the fire resistance of the laminate and thereby of said window-frame, door-frame, window, or door. Said layers of fire-resistant material may be glued to each other or to additional layers of wood comprising material.

[0024] The invention further relates to a window or door, arranged to be part of an assembly according to any of the claims 1 - 9, wherein said laminate is arranged such that one layer of the two layers of wood comprising material forms the peripheral edge of said window or door or wherein said laminate is arranged such that both layers of wood comprising material and said layer of fire-resistant material form the peripheral edge of said window or door.

[0025] The advantages of such a window or door are described above with respect to the assembly.

[0026] The invention further relates to a window- or door-frame, arranged to be part of an assembly according to any of the claims 1 - 9, wherein said laminate is arranged such that one layer of the two layers of wood comprising material forms the peripheral edge of said window- or door-frame or wherein said laminate is arranged such that both layers of wood comprising material and said layer of fire-resistant material form the peripheral edge of said window- or door-frame.

[0027] The advantages of such a window or door are described above with respect to the assembly.

[0028] The invention also relates to a method for manufacturing a laminate for a window-frame, a door-frame, a window, or a door according to any of the claims 1 - 11, wherein said method comprises the steps of:

(a) providing two longitudinal extending layers of wood comprising material;
(b) providing a longitudinal extending layer of fire-resistant material.

[0029] In an preferred embodiment, said method comprises the step of:

(c) gluing said layer of fire-resistant material to each layer of wood comprising material over adjacent longitudinal edges thereof in order to form said laminate.

[0030] By gluing the two layers of wood comprising material to the layer of fire-resistant material, a stable laminate and thereby stable window-frame, door-frame, window, or door is manufactured relatively fast and/or cheap.

[0031] In order to enhance the stability of the window-frame, door-frame, window, or door, said method comprises the step, to be performed after step (c), of:

(d) compressing said layers in order to strengthen the glue bond therebetween.

[0032] Compressing may take place in any suitable type of press machine. For example, said press machine may be, but not limited thereto, a high frequency press machine, a plate press machine or a vacuum press machine. In particular a high frequency press machine is suitable if hardwood is used for the layers of wood comprising material, because hardwood is difficult to compress due to its hardness and such a vacuum press machine has high compressing power, in particular of at least 200 kg/cm^2.

[0033] In an embodiment of the method according to the invention said fire-resistant material is a mineral bounded fibre-reinforced plate or strip like material. In particular, said mineral may be calcium silicate or magnesium. Such a fire-resistant material is described above in more detail.

[0034] In another embodiment of the method according to the invention, said two layers of wood comprising material provided in step (a) are formed as two separate layers.

[0035] In even another embodiment of the method according to the invention, the structures of the two layers of wood comprising material are different.

[0036] In yet even another embodiment of the method according to the invention, steps (a) and (c) are performed such that said two layers of wood comprising material are provided such and glued to said layer of fire-resistant material such that the structures of the two layers of wood comprising material are arranged in different directions.

[0037] As described above, such two separate layers of wood comprising material, optionally with different structures or different arranged structures, provide a stable laminate and thereby a stable window-frame, door-frame, window, or door.

[0038] In an alternative method according to the invention, said method comprises the steps of:

(e) pouring said fire-resistant material between each layer of wood comprising material, and
(f) curing said fire-resistant material in order to form said laminate.

[0039] The invention further relates to a method for manufacturing an assembly of a window- or door-frame and a window or door according to any of the claims 1 - 9, comprising the step of:

(g) assembling said window- or door-frame and said window or door in such a manner, that in said first, closed position, the layers of fire-resistant material of said window- or door-frame and said window or door are aligned.

[0040] The invention will now be explained in more detail with reference to a figure illustrated in a drawing, wherein the figure is a cross-section through an assembly of a window- or door-frame and a window or door according to the invention.

[0041] The figure shows a horizontal cross-section through an assembly of a fire-resistant window- or door-frame 1 and a fire-resistant window or door 2. As the window- or door-frame 1 and the window or door 2 have a similar cross-section, independent whether it's a window(-frame) or door(-frame), the invention is described with respect to only one figure, indication either a an assembly of a fire-resistant window- frame and window, or a fire-resistant door-frame and door.

[0042] As is shown in the figure, said window- or door-frame 1 and said window or door 2, in particular an edge 3 of said window 2 or and edge beam 3 of said door 2, comprise a laminate comprising two longitudinal extending layers of fire-resistant material 4, wherein each layer of fire-resistant material 4 is interposed between two longitudinal extending layers of wood 5. Thus, in total three layers of wood 5 are provided and two layers of fire-resistant material 4, which are arranged alternatingly in said laminate. As is clear from figure 1, the layers of fire-resistant material 4 of the window- or door-frame 1 and the window or door 2 are aligned, in particular extend in extension with respect to each other. The longitudinal direction is defined here as the longitudinal direction of each edge of said window- or door-frame 1 or each edge or edge beam 3 of said window or door 2, which is vertical for the vertical edges or edge beams, and horizontal for the horizontal edges or edge beams. Said fire-resistant material 4 is for example a calcium silicate or magnesium bounded fibre-reinforced plate or strip like material. It is noted that instead of wood, said layers 5 may be composed of any wood comprising material, as described above. Said wood layers 5 are separate layers of wood. Said edges and edge beams are arranged such that all layers of the laminate, i.e. the three wood layers 5 and the fire-resistant material 5, form the peripheral edge of said window- or door-frame 1 or window or door 2.

[0043] As is further shown in the figure, the grains 6 of two succeeding wood layers 5 are arranged in opposing orientations or directions. Additionally or alternatively, the grains 6 of the wood layers 5 may be different.

[0044] As is further shown in the figure, said window- or door-frame 1 is mounted in a wall 7. In two recesses 9 of the frame 1 strips 8 are provided, which strips 8 are made of a material that expands, in particular foams, under the influence of heat as in the case of a fire. Said strips 8 extend in the longitudinal direction of the edge of the frame 1, and are orientated such with respect to the wall 7, that they extend perpendicular with respect to the wall 7. Said strips 8 provide additional fire-resistance between the frame 1 and the wall 7.

[0045] As is further shown in the figure, said window or door 2 comprise a panel 10 held by the edges or edge beams 3 thereof, which panel may be a glass panel in the case of a window or a panel made of any suitable material in the case of a door 2. Between the panel 10 and edge or edge beam 3, a strip 8 is provided, which strip 8 is made of said expanding or foaming material. Said strip 8 extends in the longitudinal direction of the edge or edge beam 3, and is orientated parallel with respect to the edge or edge beam 3 and peripheral side of the panel 10. Said strip 8 provides additional fire-resistance between the window or door 2 and the panel 10.

[0046] As is further shown in the figure, said frame 1 and window or door 2 further comprise strips 8, which strips 8 are made of said expanding or foaming material. Said strips 8 extend in the longitudinal direction of the edge of the frame 1 and edge or edge beam 3 of the window or door 2, and are orientated such that they are aligned, in particular extend in extension with respect to each other. Said strips 8 provide additional fire-resistance between the frame 1 and window or door 2.

[0047] It is noted that instead of the number, location and orientation of the strips 8 as shown, any suitable number, location and orientation of strips 8 may be chosen.

[0048] The longitudinal extending layer of fire-resistant material 4 is glued with its longitudinal edges 11 to longitudinal edges 12 of the wood layers 5. Preferably, said layers 4 and 5 are compressed in a press machine after gluing, such that the glue bond there between is enhanced.

[0049] It is noted that optionally an esthetical cover layer may be provided over said edges or edge beams to cover said laminate.

[0050] It is further noted that the invention is not limited to the above discussed exemplary embodiments but also extends to other variants within the scope of the appended claims.

[0051] For example, instead of three layers of wood comprising material and two layers of fire-resistant material any number of layers may be provided, wherein additional layers may improve the stability of the edge beams and less layers may provide a cheaper assembly.

Claims

1. Assembly of a window- or door-frame and a window or door, said window or door being moveable between a first, closed position and a second, open position, **characterized in that** said window- or door-frame and said window or door each comprise a laminate comprising a longitudinal extending layer of fire-resistant material interposed between two longitudinal extending layers of wood comprising ma-

terial, wherein, in said first, closed position, the layers of fire-resistant material of said window- or door-frame and said window or door are aligned.

2. Assembly according to claim 1, wherein said layers of fire-resistant material are glued to each layer of wood comprising material over adjacent longitudinal edges thereof.

3. Assembly according to claim 1 or 2, wherein said fire-resistant material is a mineral bounded fibre-reinforced plate or strip like material, wherein said mineral is for example calcium silicate or magnesium.

4. Assembly according to claim 1 or 2, wherein said fire-resistant material is a composite material, in particular a fibre reinforced plastic.

5. Assembly according to any of the preceding claims, wherein said fire-resistant material, or a second fire-resistant material comprised in said window- or door-frame and/or in said window or door, is a material that expands upon being heated above a certain threshold temperature.

6. Assembly according to any of the preceding claims, wherein said two layers of wood comprising material are formed as two separate layers of wood comprising material that are mutually connected by said fire-resistant material.

7. Assembly according to claim 6, wherein the structures of the two layers of wood comprising material are different.

8. Assembly according to claim 6 or 7, wherein the structures of the two layers of wood comprising material are arranged in different orientations.

9. Assembly according to any of the preceding claims, wherein said door comprises two vertical edge beams and two horizontal edge beams that are mutually connected to form an edge frame of said door, and wherein said edge beams comprise said laminate.

10. Window or door, arranged to be part of an assembly according to any of the preceding claims 1 - 9, wherein said laminate is arranged such that one layer of the two layers of wood comprising material forms the peripheral edge of said window or door or wherein said laminate is arranged such that both layers of wood comprising material and said layer of fire-resistant material form the peripheral edge of said window or door.

11. Window- or door-frame, arranged to be part of an assembly according to any of the preceding claims 1 - 9, wherein said laminate is arranged such that one layer of the two layers of wood comprising material forms the peripheral edge of said window- or door-frame or wherein said laminate is arranged such that both layers of wood comprising material and said layer of fire-resistant material form the peripheral edge of said window- or door-frame.

12. Method for manufacturing a laminate for a window-frame, a door-frame, a window, or a door according to any of the claims 1 - 11, wherein said method comprises the steps of:

(a) providing two longitudinal extending layers of wood comprising material;
(b) providing a longitudinal extending layer of fire-resistant material.

13. Method according to claim 12, comprising the step of:

(c) gluing said layer of fire-resistant material to each layer of wood comprising material over adjacent longitudinal edges thereof in order to form said laminate, and, optionally,
(d) compressing said layers in order to strengthen the glue bond there between.

14. Method according to claim 13, comprising the steps of:

(e) pouring said fire-resistant material between each layer of wood comprising material, and
(f) curing said fire-resistant material in order to form said laminate.

15. Method for manufacturing an assembly of a window- or door-frame and a window or door according to any of the claims 1 - 9, comprising the step of:

(g) assembling said window- or door-frame and said window or door in such a manner, that in said first, closed position, the layers of fire-resistant material of said window- or door-frame and said window or door are aligned

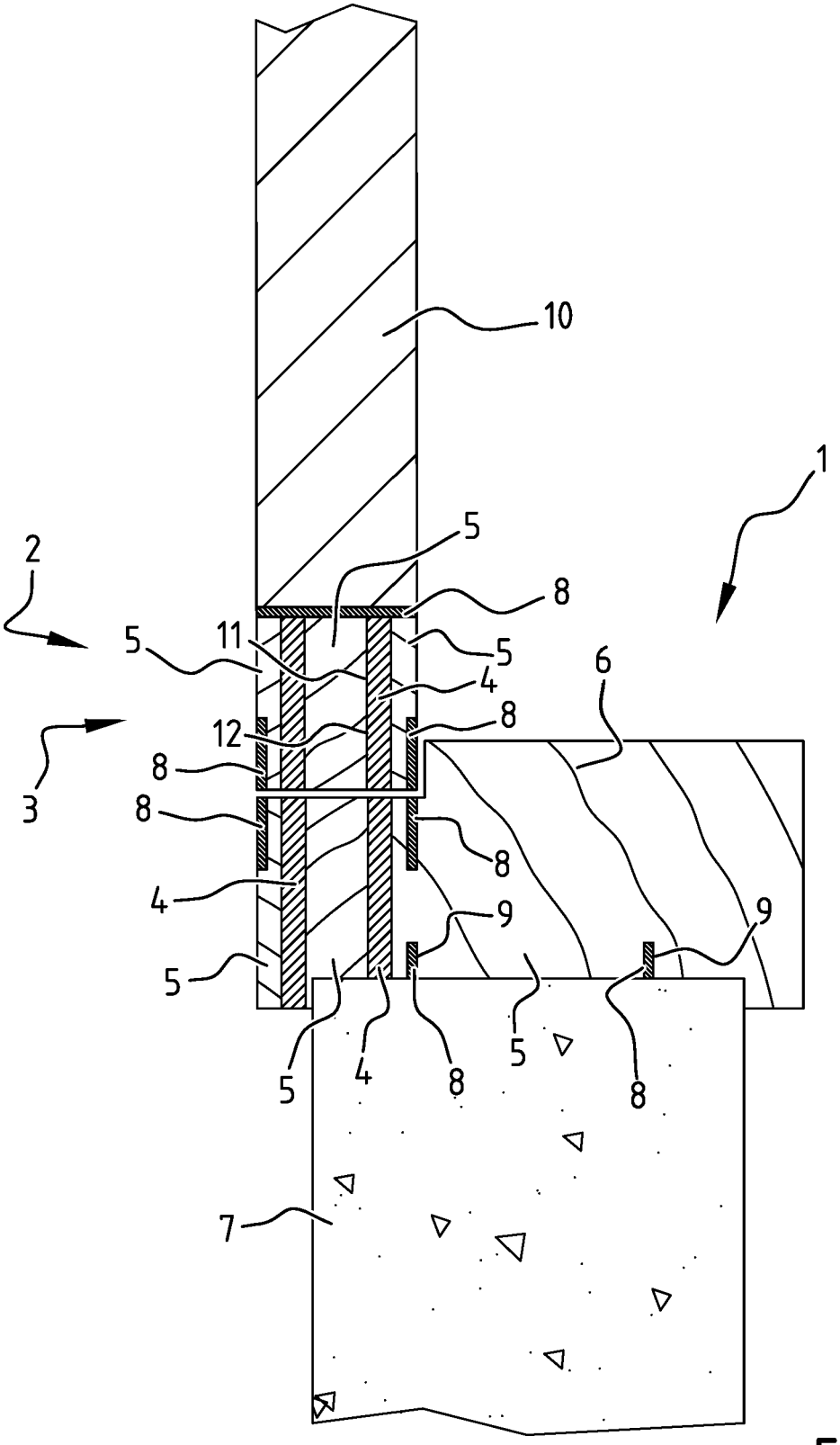

FIG. 1

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 15 17 3166

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 0 752 505 A1 (MATEU GIL MARIA DESAMPARADOS [ES]; MATEU GIL LORENA [ES]; MATEU GIL BE) 8 January 1997 (1997-01-08) * figure 13 * * column 11, line 28 - line 56 * * column 2, line 53 - line 56 *	1-15	INV. E06B5/16 E06B3/70
A	WO 2008/030087 A1 (WIJNVELD B V [NL]; WIJNVELD HENDRIK JAN [NL]) 13 March 2008 (2008-03-13) * the whole document *	12-15	

TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 October 2015	Cobusneanu, D

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 17 3166

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

09-10-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0752505 A1	08-01-1997	EP 0752505 A1	08-01-1997
		WO 9623112 A1	01-08-1996
WO 2008030087 A1	13-03-2008	EP 2059649 A1	20-05-2009
		NL 1032436 C2	06-03-2008
		RU 2009105759 A	20-10-2010
		WO 2008030087 A1	13-03-2008

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82